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Install manual/Service Letter

Document: NC-14-022
Revision: M

EFFECTIVITY

Cirrus Aircraft Types: SR20, SR22 & SR22T

REVISION HISTORY

REV	DESCRIPTION	DATE
A	Initial Release, See ECN 14-024	5/26/2015
B	Revised System Overview, See ECN 15-014	8/20/2015
C	See ECN 15-009	9/18/2015
D	Added notes to Figures 2, 11, 12 & 13 See ECN 15-018	11/19/2015
E	See ECN 16-009	7/19/2016
F	See ECN 16-013	8/24/2016
G	See ECN 16-016	12/7/2016
H	See ECN 17-001	3/14/2017
J	Added Section 12. Optional Scat Duct See ECN 17-038	10/03/2019
K	See ECN 21-016	10/18/2021
L	See ECN 22-011	6/22/2022
M	See ECN 22-026	11/23/2022

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PURPOSE

For installation of Air Conditioning System.

COMPLIANCE

Not mandatory, shall be complied with at aircraft owner's discretion.

APPROVAL

FAA approval has been obtained on all technical data in this Service Letter that affects type design.

RESOURCES

100 hours of labor are required to comply with this Service Letter.

SYSTEM OVERVIEW

The Air Conditioning System consists of an electric hermetically sealed compressor, condenser and evaporator all located in the tail cone. The system is operated through temperature selection and a climate controller located on the instrument panel. There is both a fan mode only and a cooling mode. R-134a is used as a refrigerant for the system. Power is run from the alternator under the floor to the components in the rear of the aircraft. Cirrus SR20, SR22 & SR22T Air Conditioning System is powered by the Main Distribution Bus. The power for the Air Conditioning System is tapped off the Main Distribution Bus 1 in the MCU.

If the SR20 alternators have a combined output of less than100 amps an upgrade will be required to achieve the required minimum of 100 amps. One option is to upgrade the belt driven alternator to a 150 amp ALT-FLX alternator per STC SA11137SC. Alternator wires must be sized appropriately to corresponding STC or AMM. The SR22s with S/Ns prior to 22-3206 will need to be upgraded to a 100 amp ES-10024 alternator. The wire size from the alternator relay will need to be updated per the wiring diagram applicable to the 100 amps alternator.

For SR20 serial numbers 1005 through 1422 and SR22 serial numbers 0002 through 0820, the completion of STC SA04575CH Access Hole Installation is required *before* this Kelly Aerospace Thermal Systems (KATS) Air Conditioning System can be installed.

An electrical load analysis was done for this STC; no load shed is required to run the Air Conditioning System. The required alternator and mounting parts are included in the kit.

MATERIAL INFORMATION

The KATS document NC-14-029 lists the materials required for compliance with this Service Letter. Parts can be obtained from KATS.

INSTRUCTIONS FOR COMPLIANCE

1. **Preparation**

   A. Ensure all documentation is the latest revision.
   B. Conduct a parts inventory to ensure all required items are present.
   C. Remove the engine cowling per the Cirrus Airplane Maintenance Manual (AMM).
   D. Disconnect aircraft battery per the AMM.
   E. Remove the rear access panel and disconnect the rear battery per the AMM.
   F. Secure external power receptacle to prevent unwanted power on aircraft busses (e.g. tape over receptacle with non-metallic masking tape with label warning of hazard).

2. **General Instructions**

   A. For all references to electrical wiring procedures, refer to AC 43.13-1B chapter 11.
   B. For all references to riveting procedures, refer to AC 43.13-1B chapter 4.
   C. Consumables to be procured locally
      1) Paint, as required for touch up and re-coloring N numbers
      2) Masking tape
      3) Assorted sizes of tie wraps
      4) M22759/16 wire or equivalent in the sizes of AWG 8, 10, 16 and 18
      5) Hysol EA 9360 and Devcon 14265 Epoxy
   D. Torque Specifications

Unless otherwise specified, use the following torque values.	
6-32 UNC	7-9 inch-lbs.
8-32 UNC	17-19 inch-lbs.
10-24 UNC	20-22 inch-lbs.
10-32 UNF	28-31 inch-lbs.
1/4-20 UNC	70-75 inch-lbs.
1/4-28 UNF	90-94 inch-lbs.
5/16-24 UNF	120-145 inch-lbs.
3/8-24 UNF	200-250 inch-lbs.
7/16-20 UNF	520-630 inch-lbs.
Table 1 – Fastener Torque Specifications	

Unless otherwise specified, use the following torque values.	
5/8-18 UNF	15-20 ft.-lbs.
3/4-16 UNF	21-27 inch-lbs.
7/8-14 UNF	28-33 inch-lbs.
7/8-18 UNS	28-33 inch-lbs.
Table 2 – A/C Hose Fitting Torque Specifications	

3. **Bond the support structure to the rear fuselage**

A. If the aircraft *IS NOT* equipped with a Built-In Oxygen System, skip this part and continue to step "B". For aircraft with a Built-In Oxygen System, ensure that the oxygen tank is mounted so that the nozzle and equipment is no further forward than the rear access panel. See Figure 1.

If the Oxygen Tank Regulator does extend past the opening, see Paragraph 11 – Optional Outlet Duct Mounting.

Figure 1 - Oxygen tank position

The Oxygen tank must also maintain a minimum clearance of .050" between the tank and wall on both sides of the bottle. See Figure 2.

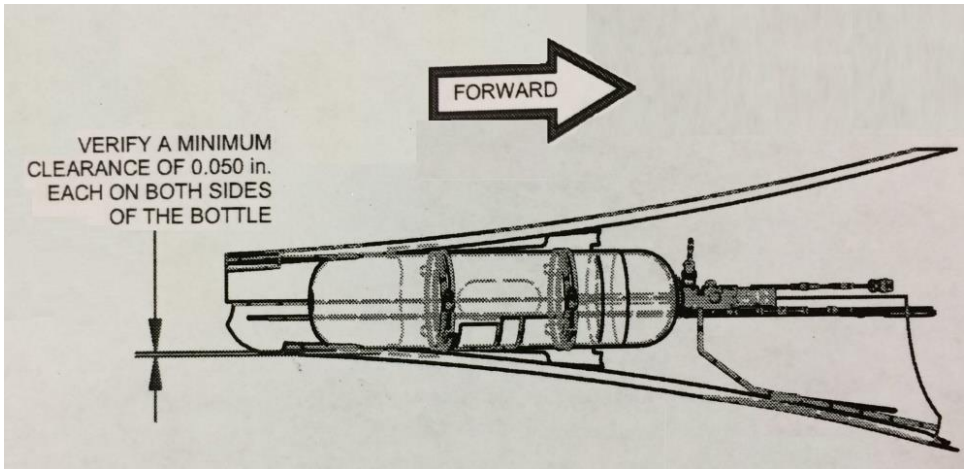

Figure 2 - Oxygen tank clearance

In order for the Oxygen tank to be moved back the ground strip may need to be modified by adding additional holes.

B. Bond the AC-01025 Compressor Mount Assembly, AC-01022 Controller Mounting Bracket and the two CN125-1032-8CR Click bonds to the inside of the fuselage per Installation Notes 1 through 5 on Sheet 2 and the bonding notes on Sheet 3 of AC-01079 Compressor / Controller Installation Details.

C. Bond the Condenser Support Kit to the inside fuselage per AC-01034. See Figure 3 for an illustration of the installation tool as installed.

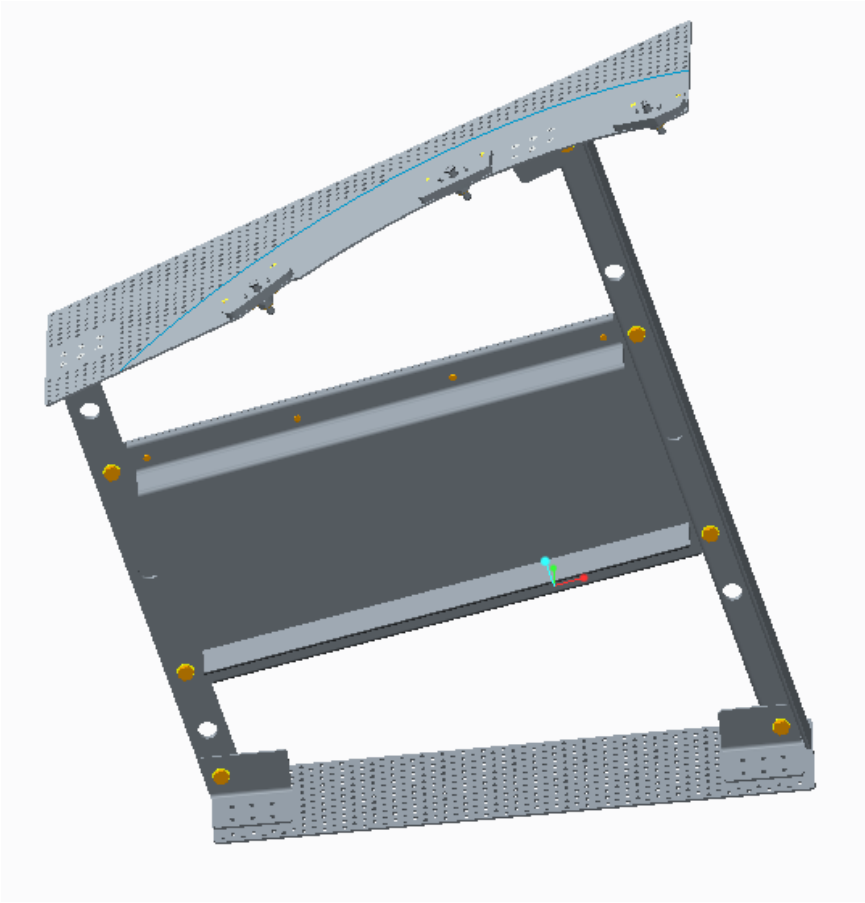

Figure 3 – AC-01034 Structure with Installation Tool

D. Wait at least 24 hours before connecting anything to the freshly bonded structure.

4. **Remove the following components utilizing the AMM and store securely:**

A. All seats
B. Cabin carpet as required
C. Floor panels as required
D. Headliner
E. Rear interior trim as required
F. Lamar electrical box cover

5. **Alternator Upgrade (when required)**

A. Some SR20s will need to be upgraded to a 150 amp ALT-FLX alternator. If the combined power of the alternators is less than 100 amps, an alternator upgrade is required; the wire size from the alternator relay will need to be updated per STC SA11137SC.
B. All SR22s with S/Ns prior to 22-3206 will need to be upgraded to a 100 amp ES-10024 alternator. The wire size from the alternator relay will need to be updated per the wiring diagram applicable to the 100 amps alternator.

6. **Evaporator Installation**

A. If the aircraft *IS NOT* equipped with a Built-In Oxygen System, skip this step and continue to "B". For aircraft with a Built-In Oxygen System, remove the (6) #8 sheet metal screws holding the 10510-003 Access Panel to the back wall in the rear of the cabin. Set the #8 sheet metal screws aside for later use. Remove the "L" shaped bracket from the Access Panel and set bracket and hardware aside for re-use and discard the Access Panel. Using the "L" shaped bracket as a guide, match drill the five middle screw holes. See Figure 4 and Figure 5.

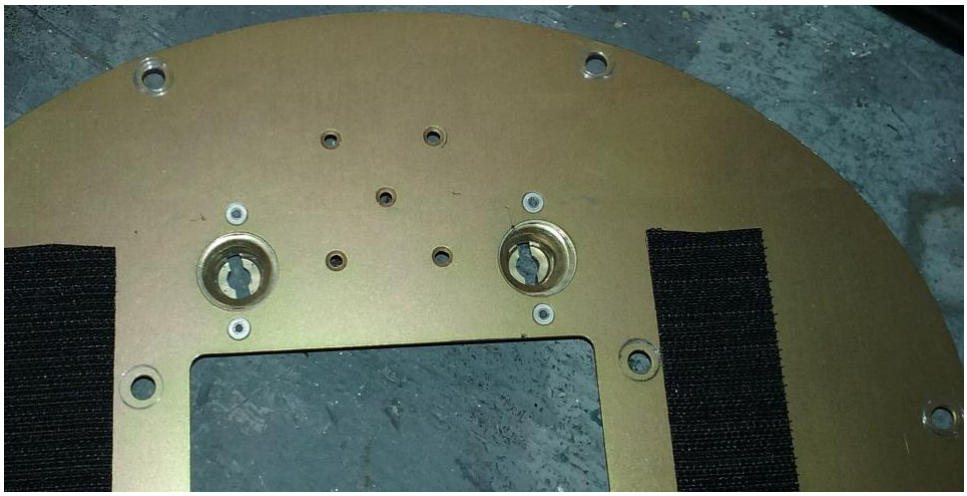

Figure 4 – Access Panel with Bracket Removed

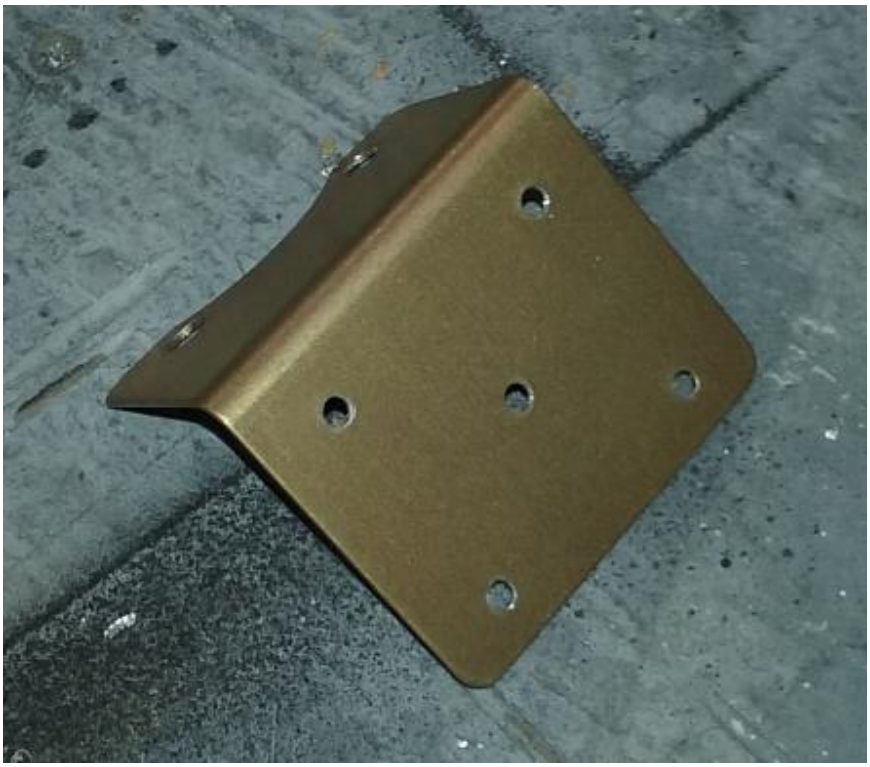

Figure 5 – "L" Shaped Bracket Removed

Attach the bracket to the replacement panel re-using the original hardware. Fit the replacement panel into place on the back wall so that the "L" shaped bracket sits in as close to its original location for the Oxygen System as possible. Fasten the replacement panel with the (6) #8 sheet metal screws that were set aside. See Figure 6.

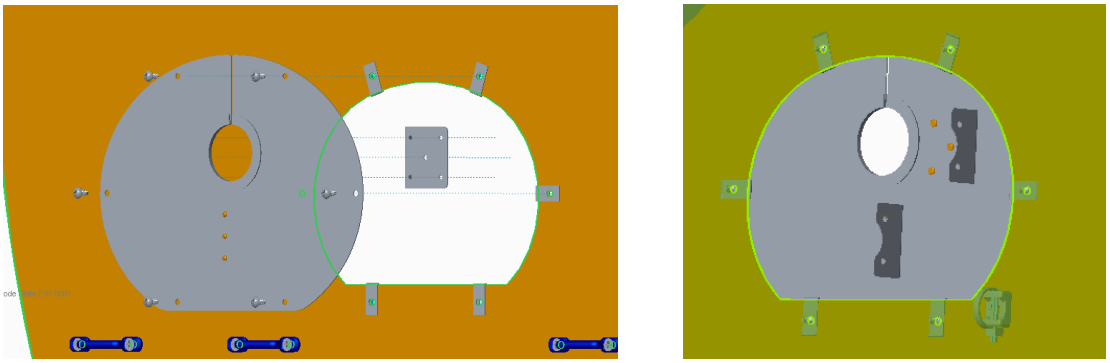

Figure 6 - Attach Bracket, Fit Replacement Panel

B. Install the evaporator assembly per AC-01082 Evaporator Installation Details. Route the wires and hoses through the access hole to best avoid control cables and other components in the rear fuselage. See Figure 7.

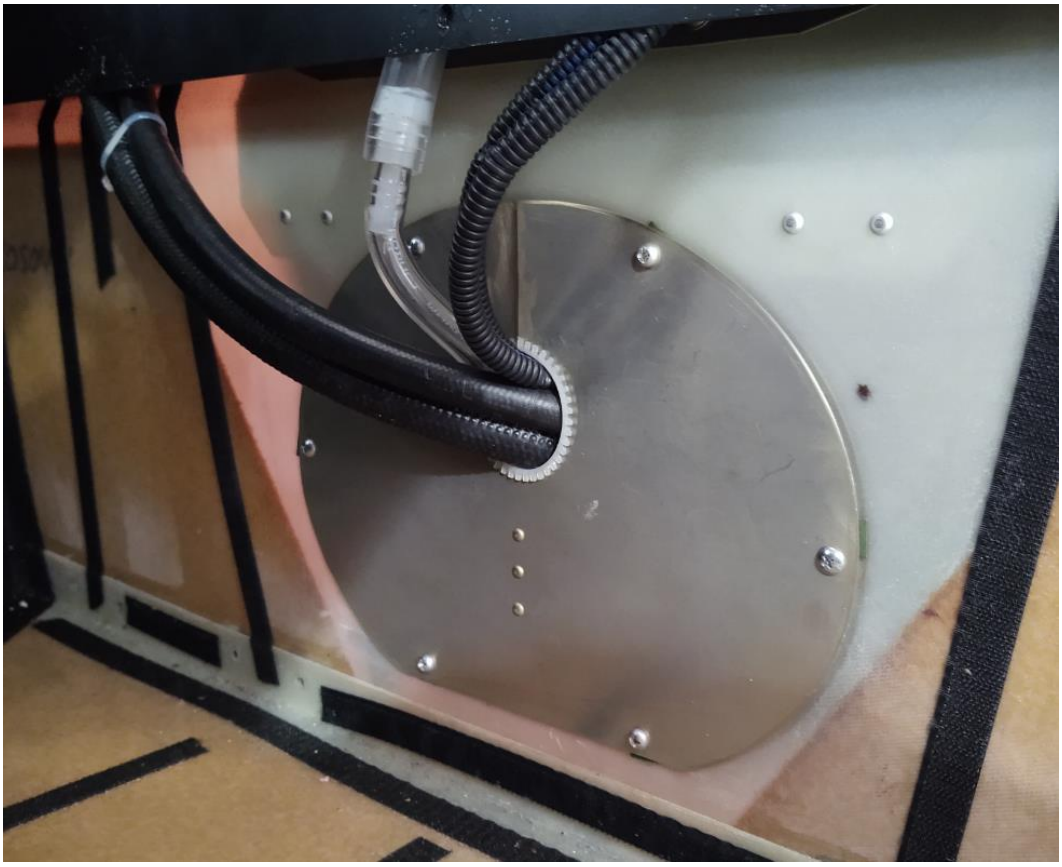

Figure 7 - Evaporator Hose and Wire Routing

C. Seal the Access Door Assembly with 4218-W3 foam tape to eliminate possible air leaks from the tail cone. See Figure 8.

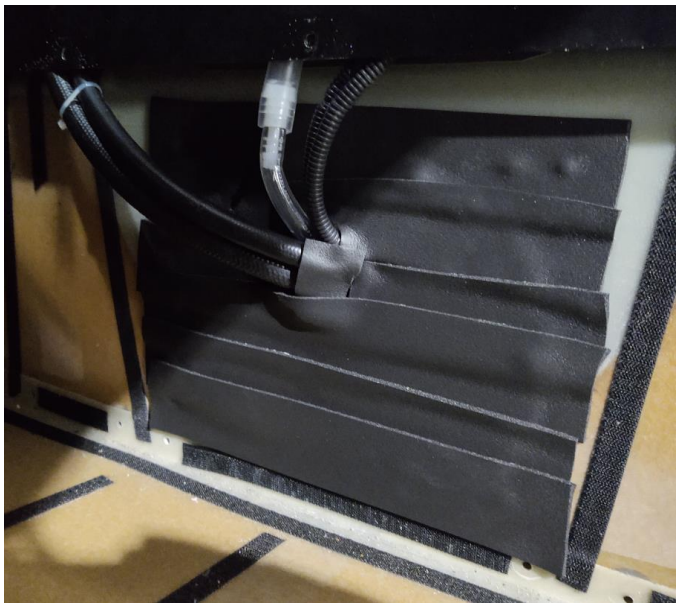

Figure 8 – Seal with Foam

D. Attach AC-02484 Access Door Cover to the outer blockoff panel in front of the now sealed area with six AN525-832R7 screws. See Figure 9.

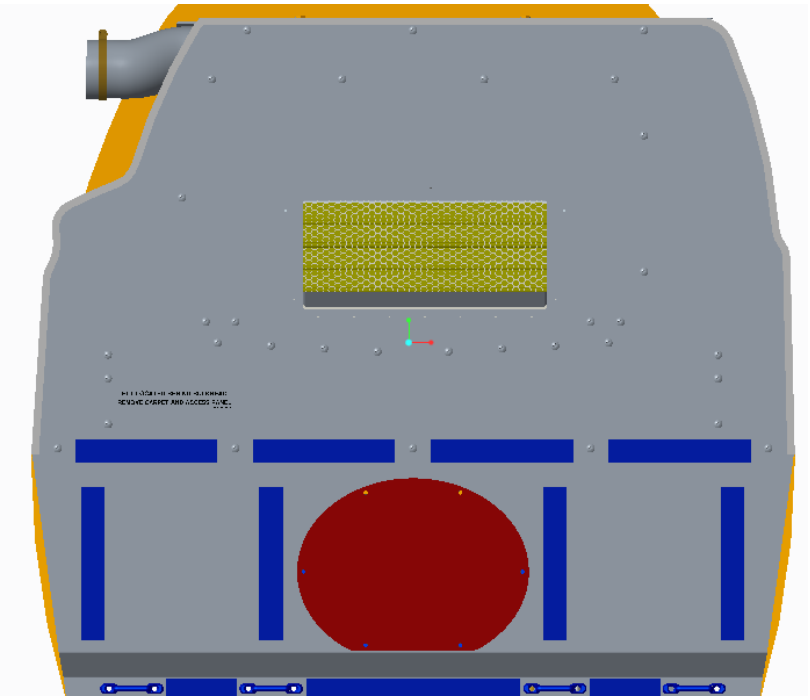

Figure 9 – Evaporator Assembly Installed

7. **Inlet-Outlet Installation**

Prepare the outlet flange per AC-01084 Inlet-Outlet Installation Details. See Figure 10 and Figure 11 for an example of the Cirrus rear access cover modification.

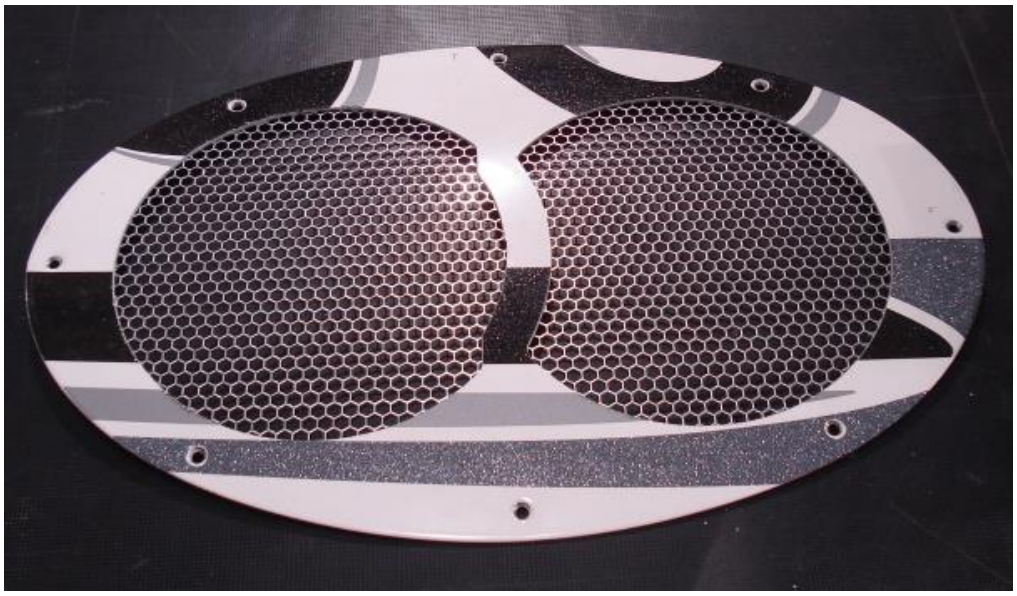

Figure 10 – Rear Access Cover Front

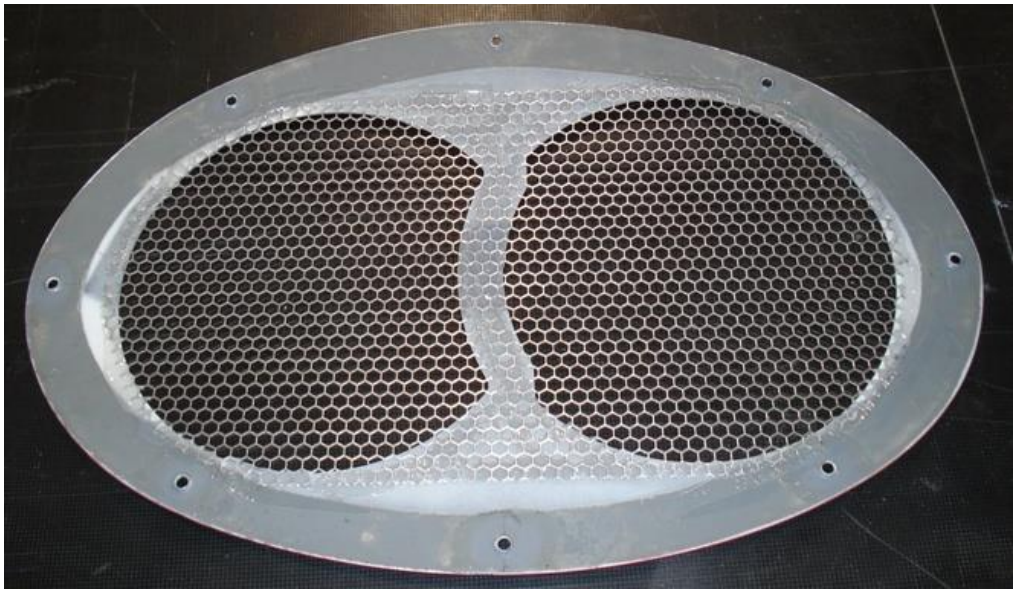

Figure 11 – Rear Access Cover Rear

8. **Condenser Assembly Installation**

Install the condenser assembly through the access panel per AC-01077 Condenser Assembly Installation Details. See Figure 12 and Figure 13 for illustrations.

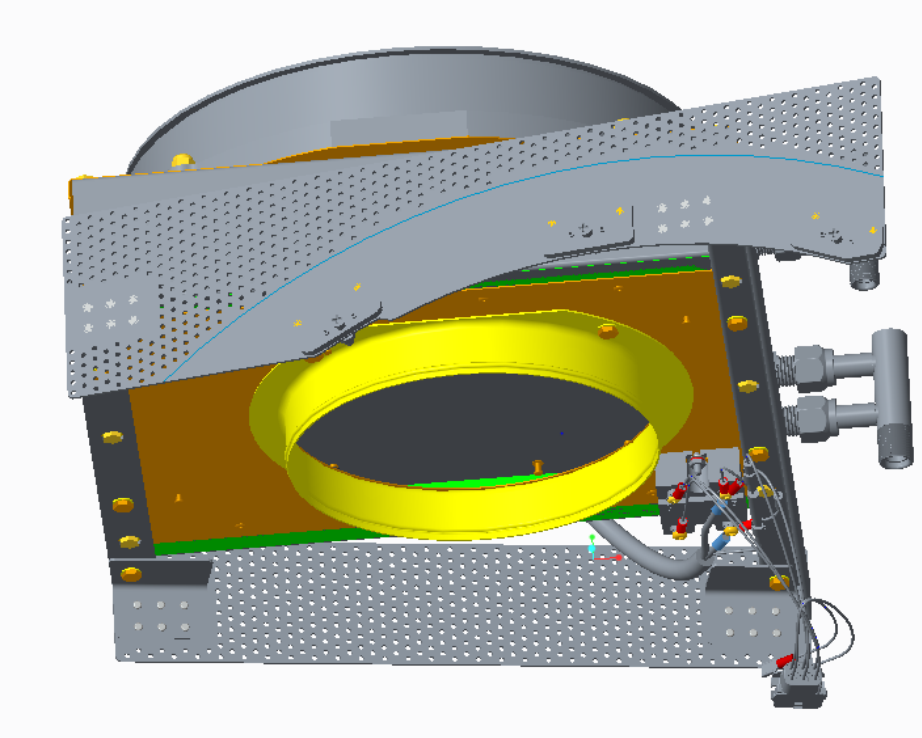

Figure 12 - Condenser Installation

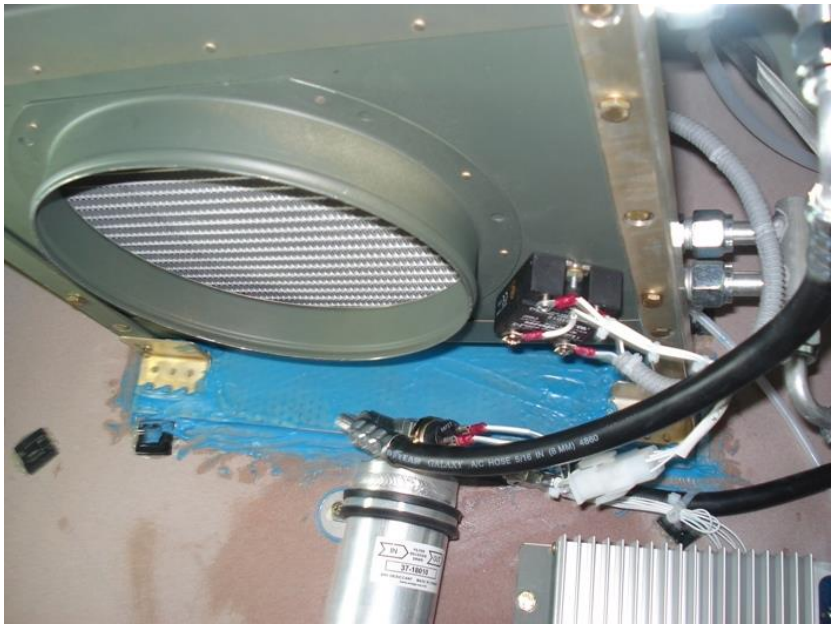

Figure 13 - Condenser Installation

9. **Compressor / Controller Installation Details**

Install the Compressor and Controller per AC-01079 Compressor / Controller Installation Details. See Figure 14 and Figure 15.

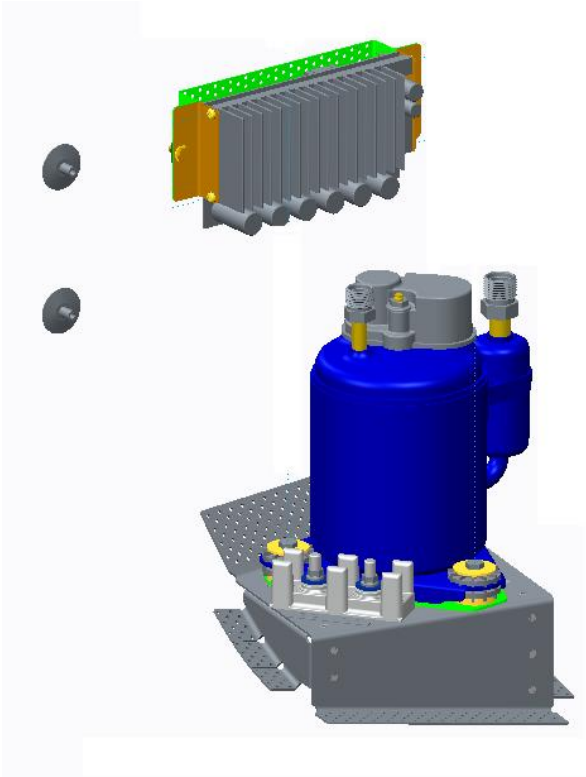

Figure 14 – Compressor Details

Figure 15 – Compressor Details

10. **Rear A/C Connections**

Make the final connections per AC-01085 Air Conditioning Installation Details and electrical connections per AC-00995 AC Schematic. See Figure 16 for an illustration of the overall installation. See Figure 17, Figure 18 and Figure 19 for suggested power wire routing through the cabin. If the wiring hole in Figure 17 does not exist in the seat pan you can either drill a hole in the same area after ensuring the area is clear on both sides or find an alternate wiring route.

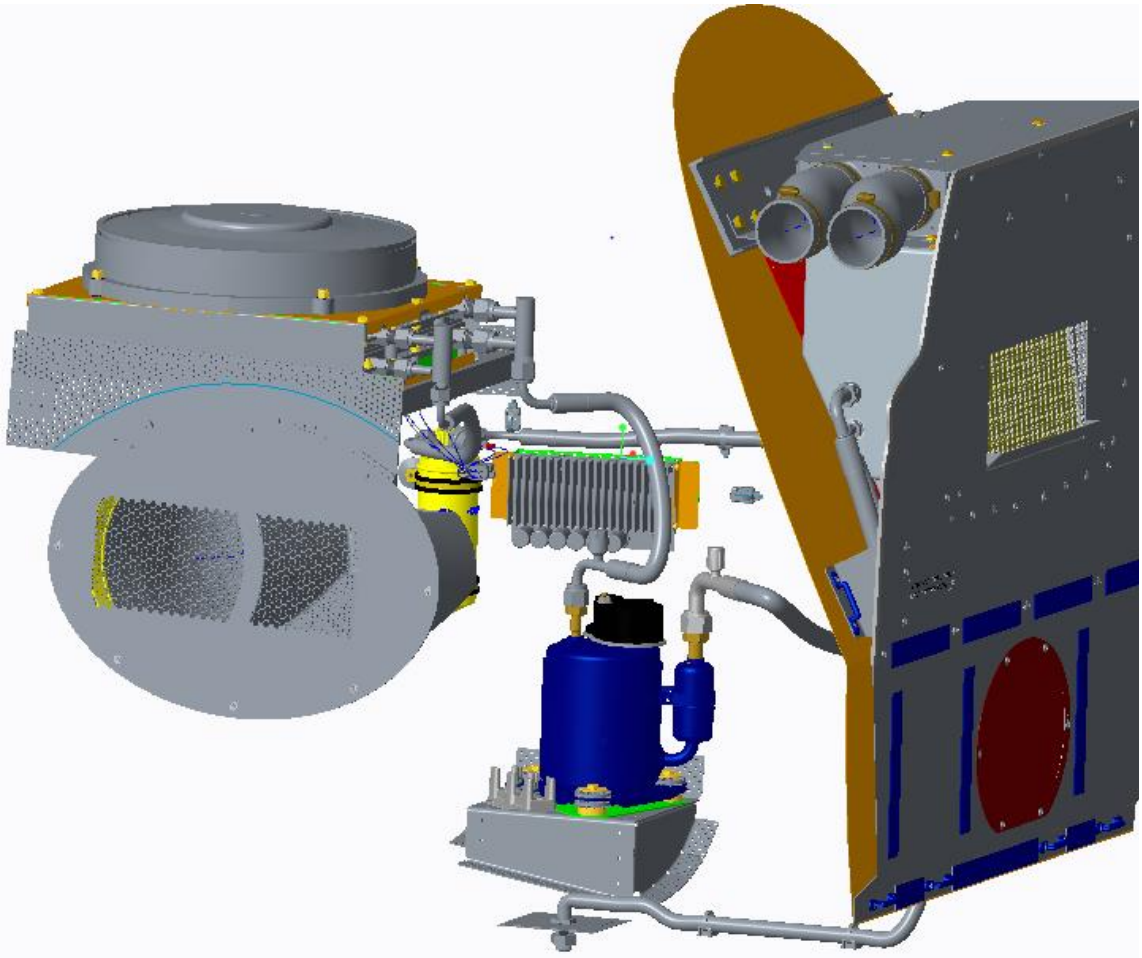

Figure 16 – Final Rear Connections

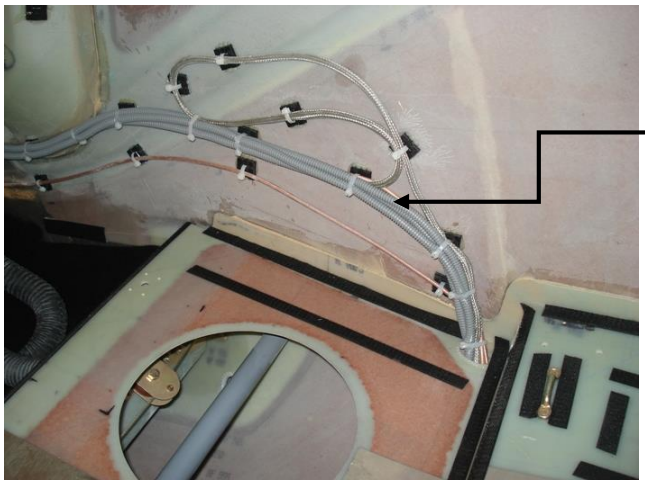

Figure 17 – Power Wire Routing

Figure 18 – Power Wire Routing

Figure 19 – Power Wire Routing

11. **Optional Outlet Duct Mounting to Avoid Oxygen Tank Regulator Interference**

A. If the regulator extends past the opening as shown in Figure 1; then wrap a strip of silicone aircraft baffling around the end of regulator where it extends past the opening and secure with zip ties. See Figure 20.

Figure 20 - Optional Outlet Duct Mounting

B. Take the 8” diameter duct and deform middle of ducting to an oval, leaving approximately 3” on either end in the initial round state.

C. Hook the outlet duct with a 5682K26 Hose Clamp to the condenser side, take zip ties and wrap it around the center oval part of the duct and zip tie it up to the rear condenser support bracket angle to hold it up from the regulator.

D. The outlet duct can touch the baffling wrapping the regulator, but there shall be not pressure from the duct onto the regulator. See Figure 21.

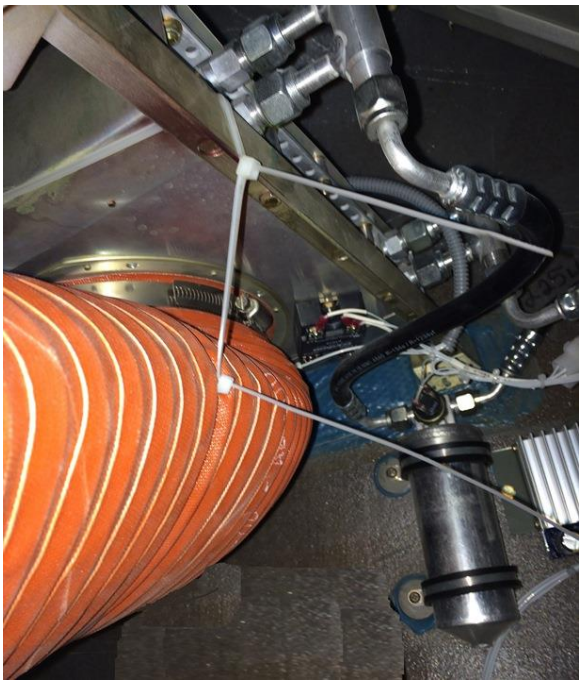

Figure 21 - Optional Outlet Duct Mounting

E. Attach the other end of outlet duct to the inlet/outlet assembly with a 5682K26 Hose Clamp.

12. **Front Seat Controls**

Install CB-1 or CB-2 Climate Controller in instrument panel or pedestal where space permits. See Figure 22 below for cutout dimensions.

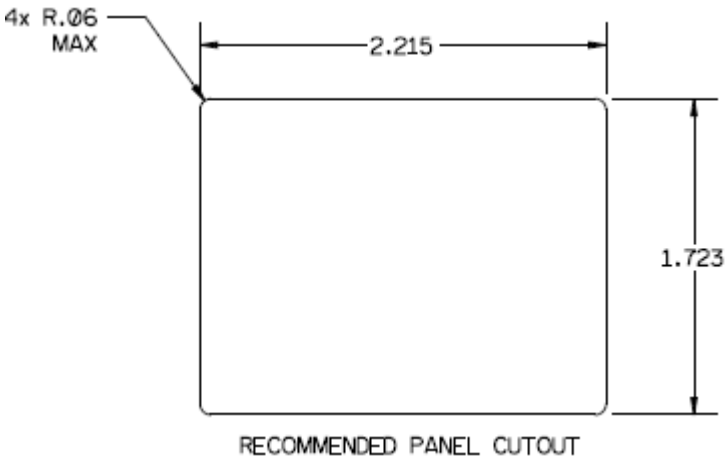

Figure 22 – CB-1 and CB-2 Panel Cutout Dimensions

13. **Temperature Sensor**

A. After ensuring the area is clear on both sides, drill a Ø7/16 hole in the panel above the pilot's knee and insert the MS35489-6 grommet.
B. Install the GL-S013 Temperature Sensor through the grommet, referencing AC-00995. See Figure 23.

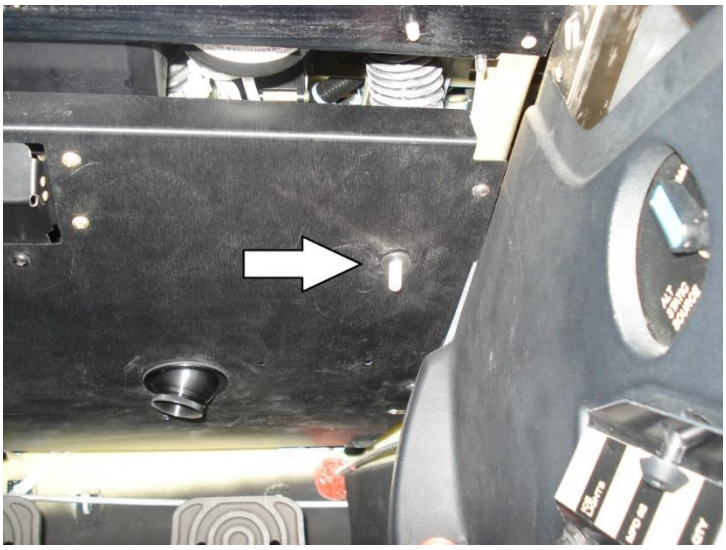

Figure 23 - Temperature Sensor

14. **Firewall Forward**

A. Drill holes and mount the 0498900.TXN fuse holder on the Junction Box with (2x) MS35206-230 Screws, AN960-6L Washers and AN365-632A Nuts. See Figure 24. Install the 0498070.M fuse in the fuse holder with the hardware included. See Figure 24 inset.

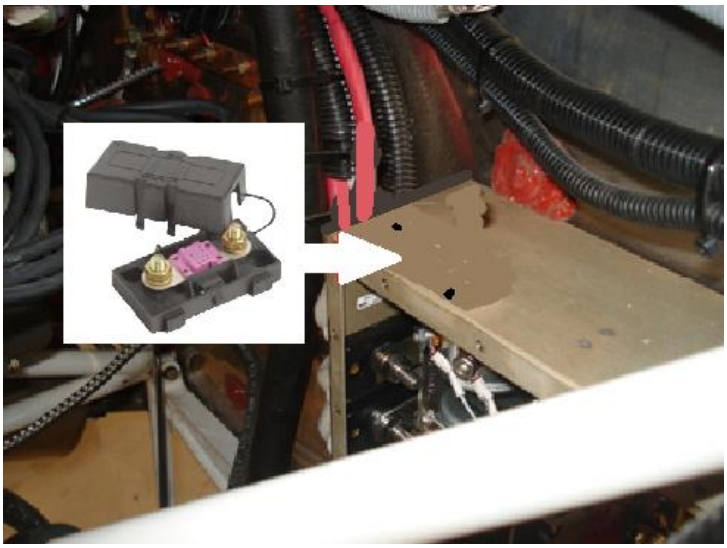

Figure 24 – Install Fuse Holder on Junction Box

B. Remove the existing firewall feed through cover (see Figure 25), cut in half, and return the top half to the original position using the existing hardware and RTV. Place P/N DI-00141 Firewall Pass Through into the bottom hole and add RTV to hold it in position. See Figure 26. If the aircraft does not have the firewall feed through hole shown in Figure 25, drill a Ø.938 hole in the same location after ensuring the area is clear on both sides of the firewall. Place P/N DI-00141 Firewall Pass Through in the newly drilled hole and add RTV to hold it in position.

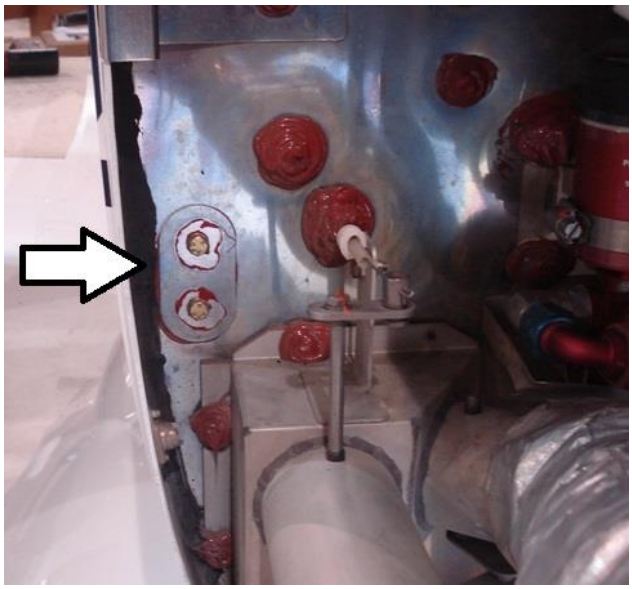

Figure 25 – Existing Firewall Feed Through Cover

Figure 26 – Modified Firewall Feed Through

C. Route AWG 6 power cables through the DI-00141 Firewall Pass Through, referencing AC-00995
D. Ground AWG 6 negative cable. Reference AC-00995

15. **Modification of existing components**

Paint reworked areas per AMM as required.

16. **Wiring**

A. Reference AC-00995.
   1) All harness runs below the cabin floor should be inside conduit.
   2) CB-1 or CB-2 harness runs from copilot's instrument panel to the left aft tailcone by following the existing wiring bundles and crossing over the center line of the aircraft under the avionics/hat rack area.
   3) ENSURE NO CONTROL CABLE INTERFERENCE
   4) Sufficient wire bundle length has been provided to accommodate variations in wire routing.

B. Make electrical connections between Evaporator Assembly and Climate Controller Harness and between Evaporator Assembly and Compressor Controller Harness.

C. See applicable Dwg# AC-00995 for all other wiring details.

17. **Installation of headliner**

Reference NC-14-030 Cirrus Headliner Installation Manual.

18. **Servicing**

A. Only qualified personnel with proper equipment may service this Air Conditioning System.

B. Connect condenser, evaporator, and compressor hoses per Figure 27 below:

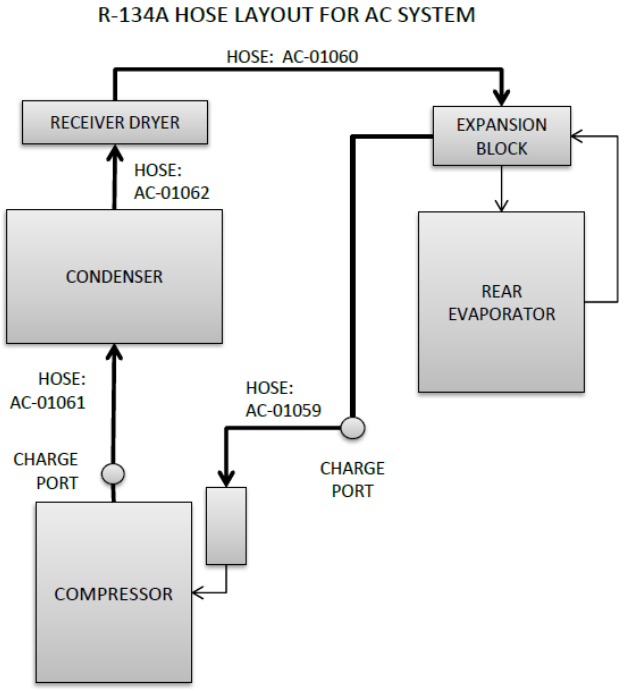

Figure 27 – Hose Layout

C. Wrap lines where required to prevent sweating with cork insulation tape P/N 4217-W3.

D. Evacuate system and insure no system leakage prior to charging with R-134a.

E. Charge system with 34oz. +/- 2 oz. of R-134a.

19. **Reassembly of aircraft**

A. Reinstall the following components utilizing the AMM.
   1) All seats
   2) Cabin carpet as required
   3) Floor panels as required
   4) Headliner
   5) Rear interior trim as required

B. Reinstall aircraft battery per the AMM.

C. Reinstall the engine cowling per the AMM.

20. **Perform operational tests of air conditioning system**

A. Plug in external power and energize.
B. Turn Master switch on.
C. Turn Climate Controller on.
D. Cabin temperature should be displayed.
E. Select fans up and fan speed should correspond.
F. Drive cabin temperature requested below ambient temperature by at least 10 degrees F.
G. Outlets should flow air 20-30 degrees cooler than ambient.
H. Check that water is coming from evaporator drain line. Water will not be present only if atmosphere is extremely dry, so if no water is flowing check for hose continuity to evaporator plenum.
I. If any items do not operate as described, troubleshoot system and correct discrepancies.
J. Turn Climate Controller off.
K. Aircraft will need to be located in a run up area to complete this section.
L. Utilizing qualified personnel operate the aircraft engine per the Pilot Operating Handbook.
M. If further assistance is needed contact Kelly Aerospace Thermal Systems Technical support at 440-951-4744.

21. **Return to service**

A. Update aircraft Weight and Balance records.
B. Install Approved Flight Manual Supplement.
C. Complete FAA form 337.
D. Make aircraft log book entry.