KELLY AEROSPACE
Thermal Systems
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Install Manual/Service Letter

Doc No: NC-10-086
Revision: M
Issue Date: 12/09/2020

EFFECTIVITY

Piper Aircraft: PA-44

REVISION HISTORY

	DATE	REV DESCRIPTION
Initial Release see ECN 12-008	7 Mar 2012	A
Revised see ECN 12-010	11 Apr 2012	B
Revised see ECN 12-012	24 Apr 2012	C
Revised see ECN 12-015	11 Jun 2012	D
Revised see ECN 12-030	16 Aug 2012	E
Revised see ECN 12-031	15 Nov 2012	F
Revised see ECN 13-018	08 August 2013	G
Revised see ECN 14-010	18 Feb 2014	H
Revised see ECN 17-012	15 May 2017	J
Revised see ECN 19-013	6 Mar 2019	K
Revised see ECN 20-024	30 Sept 2020	L
Revised see ECN 20-034	9 Dec 2020	M

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PURPOSE

For installation of Intake Plenum and Air Conditioner.

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

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

SYSTEM OVERVIEW

The intake plenum consists of a Doubler, Bulkhead, Intake Manifold and a Mounting Plate. The Doubler, Bulkhead, Intake Manifold and Mounting Brackets are going to be riveted to the skin and bulkhead of the plane. The Mounting Plate is removable and is secured using flathead screws. The Air Conditioning System is a self-contained unit. This unit consists of an electric hermetically sealed compressor, condenser, evaporator all located on or behind the hat rack. The system is operated through temperature selection on a climate controller located the instrument panel. R-134a is used as a refrigerant for the system. All R-134a lines are located in the Air Conditioning unit.

MATERIAL INFORMATION

The following documents list the materials required for compliance with this Installation Manual. Parts can be obtained from Kelly Aerospace Thermal Systems Drawing List NC-10-085 and Kit List NC-11-024.

14 volt PA-44 aircraft will require Air Conditioning Kit Number KATS-11-002 and an Auxiliary Bus Kit Number KATS 11-001.

28 volt PA-44 aircraft will require Air Conditioning Kit Number KATS-13-002.

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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 aircraft battery per the Piper Aircraft Maintenance Manual (AMM).
   D. Remove the engine cowling per AMM.
   E. 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. **Remove the following components utilizing the AMM and store securely:**
   A. Rear seats
   B. Hat rack close out panels and carpet
   C. Cabin carpet
   D. Rear air circulation intake cover
   E. Air circulation blower and assembly
3. **Wire stripping, crimping and tying.**
   A. For all references to wire stripping, crimping and tying procedures, refer to AC 43.13-1B chapter 11.
4. **Riveting procedures.**
   A. For all references to riveting procedures, refer to AC 43.13-1B chapter 4.
5. **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 – Torque Specifications

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6. Removal of Fresh Air Vent & Installation of Air Inlet Cover

A. Existing fresh air vent system removal. See Figure 1.

1) Remove the Blower and Cover Assembly, unplug the electrical harness from the blower, secure harness end to bulkhead with cable ties to remain permanently out of the way
2) Remove Blower Hanger Assembly and the attaching screws
3) Remove the Duct Assembly
4) Remove Rear Duct Hose
5) Remove the internal Flapper Assembly and Shaft Assembly from the Flapper Valve Assembly
6) Remove the control cable all the way to the front, cover the holes from the missing shaft with Aluminum Tape
7) Fill hole left by the missing cable above the front seats with 963-018D Dorman Trim Panel Push Retainer or equivalent
8) Open the circuit breaker labeled "Vent" and place an S4933959-507 Circuit Breaker Lockout Ring on the on the breaker
9) Place AC-02004 "INOP" Placard under the Rocker Switch labeled "Vent"

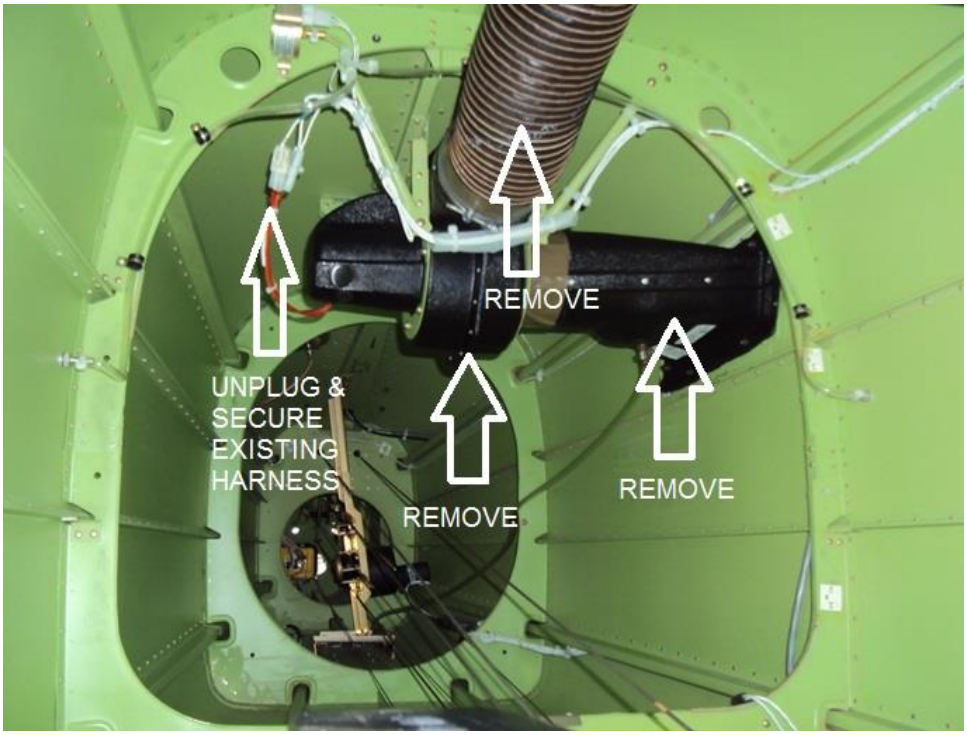

Figure 1 – Existing Fresh Air Vent Removal

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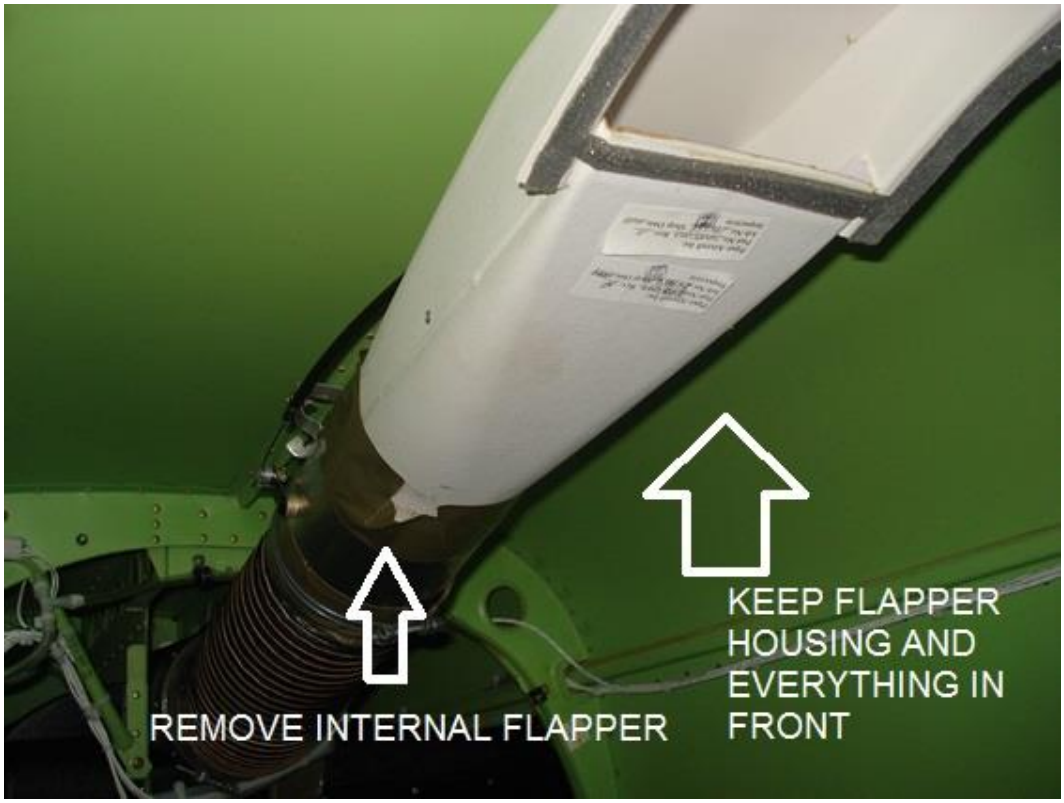

Figure 2 – Existing Fresh Air Vent Removal

B. Installation of Air Inlet Cover; Refer to Drawing No. AC-00423 Installation Details and Figure 3 below.

1) Drill out existing rivets to remove louver, air vent (Piper p/n 36612-003)
2) Position AC-00950 Cover to align with opening in aircraft skin, cleco existing hole in bottom right of cover to the appropriate hole in aircraft skin.
3) Match drill 23x Ø.098 holes, 5x Ø.129 holes and 8x Ø.141 holes in AC-00950 with corresponding holes in aircraft skin.
4) Attach AC-00950 to aircraft skin with (19) MS20426AD3-3 Rivets, (5) MS20426AD3-4 Rivets and (7) MS20470AD4-4 Rivets and (8) MS35206-230 Screws, (8) NAS1149FN632P Washers, and (8) AN365-632A Nuts.

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Figure 3 – Air Inlet Cover Installation

7. Installation of Controller

A. Refer to Drawing No. CB-2 for instructions and dimensions to mount CB-2 control head to instrument panel.

B. Once controller is mounted to instrument panel, connect wiring harness AC-01543 or AC-01544 to controller and route harness to tailcone using standard practices.

C. On 28 Volt PA-44, install placard part number AC-00901 in a location visible to both the pilot and co-pilot.

8. Installation of Condenser Outlet

A. Refer to Drawing No. AC-00659 Installation Details.

1) Place AC-00658 Outlet Doubler Condenser into the bottom of the aircraft aft of FS 191. Slide doubler along outboard stringer until the corner of the doubler touches the existing Piper doubler (79259-2).

2) Remove rivets from the stringer in the area covered by the doubler.

3) Match drill holes in the doubler and aircraft stringer.

4) After match drilling, using the inside edges of the doubler as a template, cut out the hole in the aircraft skin.

5) Using the doubler as a template, and AC-00659 Sheet 1 for guidance, match drill (13) Ø.200 holes, (6) #40 rivet holes and (16) #30 rivet holes.

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6) Using AC-00659 Sheet 2 for guidance, rivet doubler to aircraft skin with factory heads on the outside of the aircraft and flat heads beneath the Duct Scoop.
7) Install the AC-02391 Outlet Duct Assembly and the 66609-002 Scoop using the hardware shown in Drawing AC-00659. See Figure 4.
8) Attach 10" Duct Tubing (trim to length as required) to flange on duct and to flange on rear of air conditioner using NAS1922 1000-3 Clamp.

Figure 4 - Scoop Installation

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9. Installation of Intake Doubler.

A. Refer to AC-00415 Installation Details and Figure 5 below.

1) Place AC-00397 Intake Doubler into bottom of aircraft. Make sure the Doubler is making contact with the front and side stringers.
2) Remove the rivets from the side stringer in the area around the Intake Doubler.
3) Match drill the two corner holes in the Doubler through the aircraft skin then cleco the Doubler in place.
4) Using the inside edges of the Doubler as the boundary for the air conditioning inlet, mark the opening for the air conditioning inlet. Remove the Doubler and cut out hole for air conditioner inlet.
5) After the intake hole is cut out and deburred, replace the Doubler and rivet in place using the 2 corner rivets.

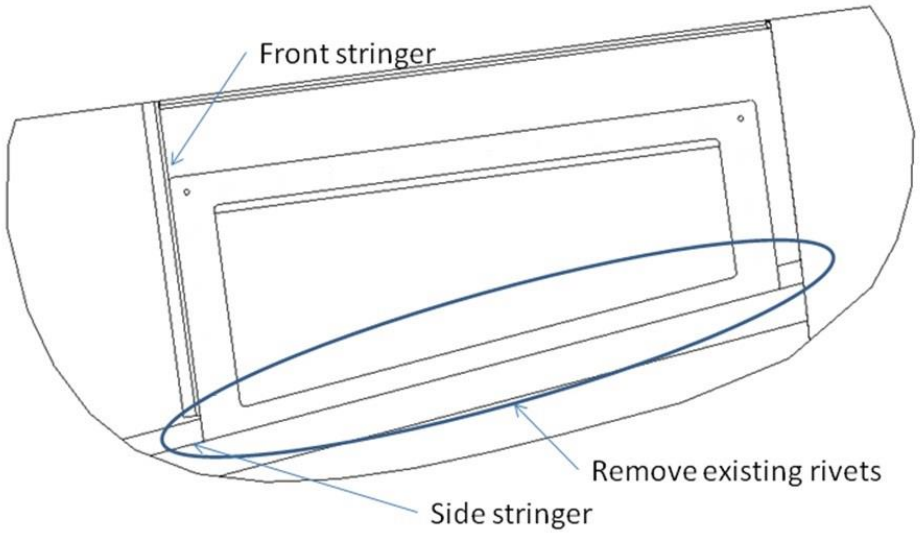

Figure 5 – Intake Doubler Location

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10. Installation of the Intake Plenum, Rear Bulkhead and Mounting Supports

A. Refer to Drawing No. AC-00299 Installation Details

1) Place AC-00434 Drill Template onto FS-191 bulkhead, clamp in place. Match drill FS-191 bulkhead, then remove template.
2) Place AC-00373 Rear Bulkhead Assembly behind FS-191 bulkhead and clamp in place. **Do not match drill at this time**.
3) Attach AC-00414 Side Support Assembly to AC-00393 Lower Intake Assembly using appropriate hardware. **Do not tighten screws**.
4) Place AC-00393 Lower Intake Assembly in fuselage and line up with hole inside of AC-00397 Inlet Doubler. Match drill from the top the three bottom flanges of AC-00393, through the Inlet Doubler and fuselage bottom skin. Match drill from the bottom the rivet holes in the aircraft skin, through the Inlet Doubler and one AC-00393 flange. Ensure proper edge distance for all rivet holes Cleco the Intake Assembly and Doubler to the fuselage.
5) Attach AC-00375 Front Support Member Assembly to FS-156 bulkhead, then match drill AC-00375 to AC-00393.
6) Attach AC-00549 Rear Support Member to AC-00373 Rear Bulkhead Assembly and match drill AC-00549 to AC-00393.
7) Match drill AC-00373 Rear Bulkhead Assembly to FS-191 bulkhead. Not all holes will be accessible for match drilling at this time.
8) Slide AC-00414 Side Support Assembly against aircraft skin, tighten screws and match drill aircraft skin to AC-00414.
9) Remove all components except AC-00373 and match drill remaining holes in FS-191 bulkhead.
10) Place back all previously removed components.
11) Rivet AC-00373 Rear Bulkhead Assembly to FS-191 bulkhead.
12) Rivet AC-00414 Side Support Assembly to aircraft skin.
13) Rivet AC-00375 Front Support Member Assembly and AC-00549 Rear Support Member to AC-00393 Lower Intake Assembly.
14) Remove top plate from AC-00393 Lower Intake Assembly and rivet bottom section to AC-00397 Doubler and fuselage bottom skin.
15) Attach top plate of AC-00393 Lower Intake Assembly to bottom section and attach to AC-00373 Rear Bulkhead Assembly and AC-00414 Side Support Assembly.

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11. Installation of the Air Conditioning System

A. Refer to drawing no. AC-00298 Installation Details

1) Place AC-00359 AC Evaporator Condenser Assembly on top of AC-00393 Lower Intake Assy. Line up the drain hole in the Condenser Assembly with the hole in the Lower Intake Assy.
2) Thread AC-02003 Barbed Drain into the Condenser Assembly and seal with Black RTV.
3) Remove AC-01541 Condenser Chamber Lid from AC-00359 and lay flat without disconnecting any internal wiring.
4) Line up attachment holes in bottom of AC unit with holes in top plate of Lower Intake Assy. See Figure 6.
5) Attach AC-00359 to AC-00393 using hardware specified on AC-00298 Installation Details.
6) Re-install AC-01541 onto air conditioning unit.
7) Place AC-00978 Drain Reinforcement directly under the Evaporator Condenser Assembly drain. Check to make sure there is no interference with any aircraft structure. Rivet the Reinforcement to the floor with (8) MS20470AD4 Rivets.
8) Drill a Ø9/16" hole through pilot hole in the center of the reinforcement and the aircraft skin.
9) Install 2974K861 Barbed Fitting.
10) Attach 5233K68 Tubing to AC-02003 and 2974K861 using (2) NAS1922-0050-3 or 3606 Hose Clamps.
11) Seal gaps with black RTV.

B. Refer to AC-01537 Air Conditioning Schematic (Sheet 1 for 14 volt Aircraft or Sheet 2 for 28 volt Aircraft)

1) Route wire harness AC-01544 or AC-01543 and power and ground wires to appropriate locations on side of AC unit.
2) Trim AC-01544 or AC-01543 wires to length and terminate per drawings.
3) Trim power and ground wires to length and terminate them to terminal block on side of AC unit.

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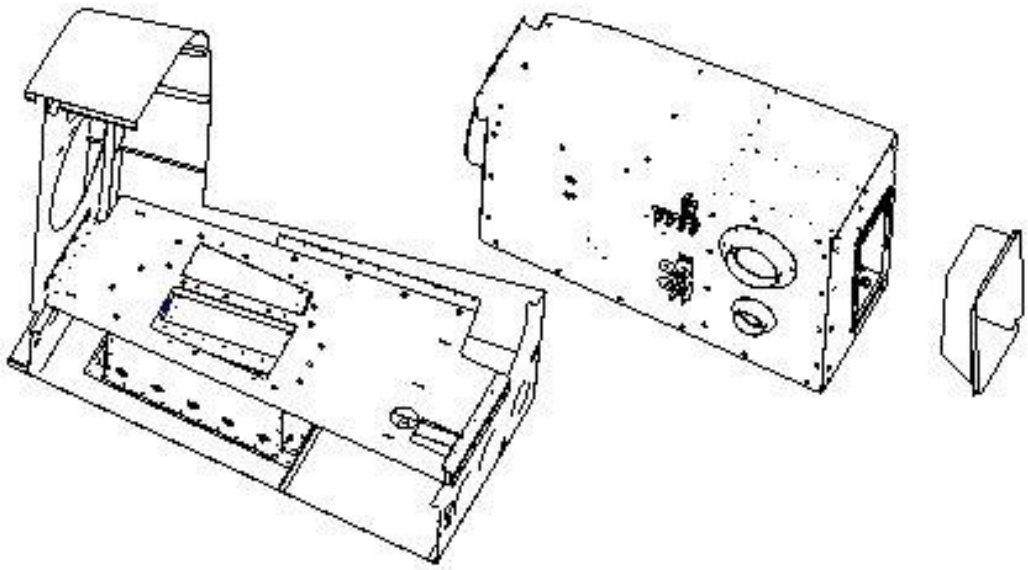

Figure 6 – AC unit installation

12. Modification of Block off and Installation of Intake Bezel and Air Filter

A. Slide AC-00613 AC Block Off Adapter into opening on front of air conditioner.

B. Install blockoff into its proper location and slide AC-00613 forward until it rests against back of blockoff.

C. Mark outline of AC-00613 onto back of blockoff.

D. Remove blockoff and cut hole to match up with inside opening of AC-00613.

E. Attach AC-00613 to blockoff with 4218-W3 Foam Tape Sealant and 92470A110 Screws.

F. Install Piper cover and screen over opening in blockoff.

G. Install the 499193 Vintage Air Adjustable Ball Louver into the location shown in Figure 7. Drill a 2 ½" diameter hole in the wall where shown and sandwich it between the threaded housel and vent face.

H. Install 2 ½" and 4 ½" Ducting between Air Conditioner and Cabin circulation nozzles with hose clamps. See Figure 7 and Figure 8.

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Figure 7 - Ball Vent Location

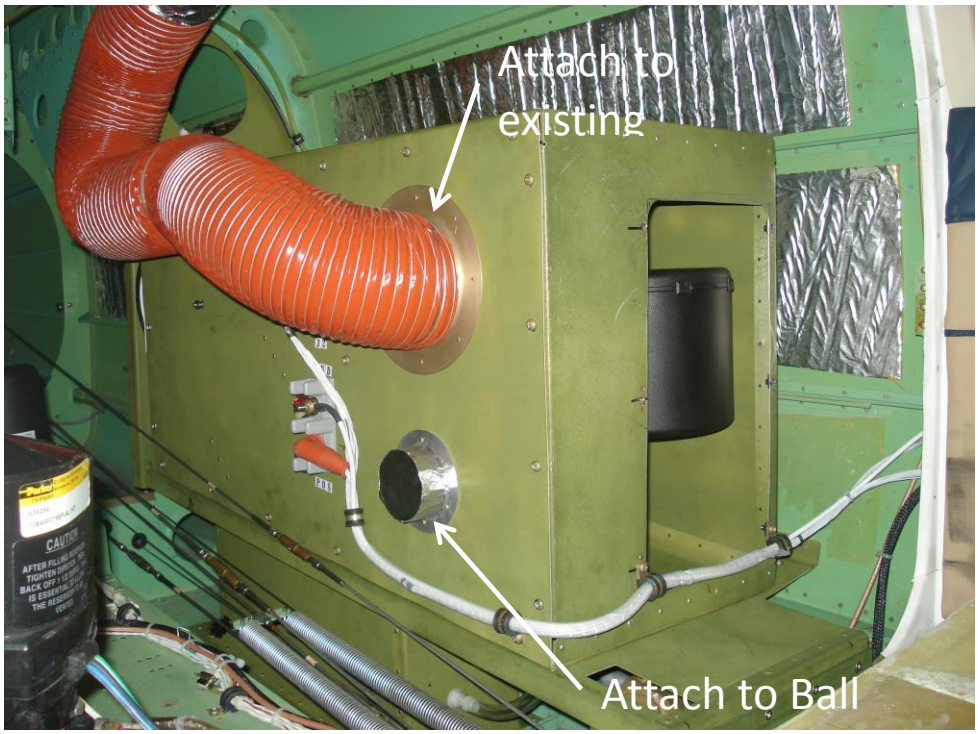

Figure 8 – AC Installation

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13. <u>Reassembly of aircraft</u>

A. Reinstall the following components utilizing the AMM.

1) Hat rack close out panels and carpet
2) Cabin carpet
3) Rear seats

14. <u>Perform operational tests of air conditioning system.</u>

A. Plug in external power and energize

B. (For 14 Volt PA-44 only) Ensure cabin temp controller master switch is in the on position.

C. Press the bottom left button of the CB-2 controller and toggle between modes with the middle right button. Select fan mode.

D. Press the middle left button to bring up the fan speed screen. Toggle the fan speed up or down using the middle and upper right buttons speed range is 1 to 3. The fan speed should correspond.

E. Press the lower right button on the CB-2 controller, the display will first show the logo and software version; then it will show the temperature set point, fan speed bar graph and mode display. Press the bottom left button and toggle between modes with the middle right button. Select AC mode, either press the bottom right button to enter or wait 3 seconds and the display will return to the main screen. The snow flake symbol on the bottom center of the display will indicate AC mode.

F. Press the top or middle right buttons to adjust the temperature set point down by at least 10 degrees F.

G. Press the middle left button to bring up the fan speed screen. Toggle the fan speed up to maximum using the upper right button.

H. Headliner outlets should flow air 20-30 degrees cooler than ambient.

I. Press and hold lower right button to turn the AC off. (Leaving air conditioning master switch in the "on" position for 14 Volt PA-44)

J. Unplug external power and air conditioning will turn off.

K. 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. A steady stream of air should be felt at the evaporator drain line also as the evaporator fan pressurizes the plenum and forces condensed water out.

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15. <u>Aircraft will need to be located in a run up area to complete this section</u>

A. Utilizing qualified personnel operate the aircraft engine per the Pilot Operating Handbook

B. Repeat section 14 items B) through G) and I) to ensure operation of the secondary alternator for 14 Volt PA-44.

C. Repeat section 14 items C) through G) and I) to ensure operation of the system off the alternators for 28 Volt PA-44.

D. 28 Volt PA-44 Alternator Fail Check

E. Turn OFF one alternator and verify A/C system turns OFF after 2 seconds.

F. Leave A/C OFF for a minimum of 30 seconds.

G. EMI Checks:

H. NO detectable interference on the aircraft headsets: (audio noise as a result of running the A/C).

I. NO detectable interference on ADF indication: (if installed) (antenna interference as a result of power return currents through the airframe.

J. NO detectable interference on StormScope indication: (if installed) (antenna interference as a result of power return currents through the airframe).

K. NO detectable audio distortions on com transmit: (Interference as a result of power return currents through the airframe).

L. If further assistance is needed contact Kelly Aerospace Thermal Systems Technical Support at (440) 951-4744

16. <u>Return to service</u>

A. Update aircraft Weight and Balance records.

B. Install Approved Flight Manual Supplement.

C. Complete FAA form 337.

D. Make aircraft log book entry.

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