

NC-12-012
172N, 172P, 172R & 172S AIR CONDITIONING INSTALLATION MANUAL



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Install manual/Service Letter

Doc. No: NC-12-012

Revision: S

REDLINED 6/8/2023 (see pg 15, 16)

1. Effectivity

Cessna 172N, 172P, 172R & 172S

2. Revision History

	DATE	REVISION
Initial Release see ECN 12-013	5/21/2012	A
ECN 12-019	7/6/2012	B
ECN 13-003	1/23/2013	C
ECN 14-008	2/12/2014	D
ECN 14-016	6/24/2014	E
ECN 15-002	1/26/2014	F
ECN 16-017	1/24/2017	G
ECN 17-028	8/31/2017	H
ECN 17-043	4/16/2018	J
ECN 18-005	10/24/2018	K
ECN 18-024	12/17/2018	L
ECN 18-033	2/25/2019	M
ECN 20-026	10/01/2020	N
ECN 20-033	12/14/2020	P
ECN 21-010	8/10/2021	Q
ECN 22-009	7/11/2022	R
ECN 23-004	2/28/2023	S

REDLINED 6/8/2023
(see pg 15, 16)

OK per Paul Garcia

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5. Purpose

For installation of Air Conditioning System.

6. Approval

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

7. Resources

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

8. System Overview

The Air Conditioning System is a self-contained unit. This unit consists of an electric hermetically sealed compressor, condenser, evaporator all located on the hat rack. The system is operated through a set of toggle switches or a 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. Power is run from the primary alternator.

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9. Before Proceeding with Installation

Review the following notes based on your aircraft model:

- A. Cessna 172N: The aircraft must be 24 VDC.
- B. Cessna 172N & 172P: KIT number KATS-17-001 shall be used which has the parts required to install a 172 Pitch Servo Access Door on the right side of the plane.
- C. Cessna 172N, 172P & 172R: KIT number KATS-12-002 or KATS-17-001 must be used in conjunction with a separate STC to increase the engine to 180 HP, or these kits must be used in conjunction with a separate STC to upgrade the alternator to at least 100 amps.
- D. Cessna 172S: KIT number KATS-12-002.

10. Material Information

Kelly Aerospace Thermal Systems (KATS) document NC-12-011 Kit List enumerates the materials supplied by KATS for compliance with this Installation Manual.

11. Preparation

- A. Ensure all documentation is at the appropriate revision. Reference KATS document NC-12-010 Drawing List.
- B. Conduct a parts inventory to ensure all required items are present.
- C. Remove aircraft battery per the Cessna 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).

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12. Remove the following components utilizing the AMM and store securely:

- A. Front and Rear seats
- B. Hat rack close out panels and carpet
- C. Cabin carpet
- D. Tail cone avionics access panel
- E. LH Rudder pedal cover
- F. Floor inspection panels when/as required
- G. Lamar electrical box cover
- H. Hat rack floor

13. General Instructions

- A. For all references to wire stripping, crimping and tying procedures refer to AC 43.13-1B chapter 11.
- B. For all references to riveting procedures refer to AC 43.13-1B chapter 4.

14. 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	

15. Install Door Doubler Assembly (172N, 172P & 172R only)

Per the AMM, modify the 0512010-4 Skin RH on the aft fuselage, add 0501146-5 Door Doubler Assembly in accordance with Cessna Drawing #0501145.

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16. Installation of Alternator

This air conditioning kit includes an optional higher output alternator that replaces the original equipment 60 amp alternator. A 180 HP rated engine is required for installation of alternator ES10024FB-2 with this STC. Review Section 9: Before Proceeding with Installation

It is acceptable to substitute this alternator with any alternator of equal or greater output that is approved for this engine/airframe.

A. Installing optional ES10024FB-2

- 1) Remove existing alternator per AMM.
- 2) Remove Right Front engine baffle per AMM.
- 3) Reference AC-00964 to modify the baffle assembly behind the alternator.
- 4) Install ES10024FB-2 alternator per AMM.
- 5) Replace 8 AWG wiring from alternator to alternator relay and alternator to ground with 6 AWG wire (AC-00980 & AC-00981).

B. Installing optional ALT-FLX-8 in 172R or 172S

- 1) Install alternator per Hartzell Engine Technologies STC-SA11137SC

C. Installing optional ALT-FLX-1 in 172N or 172P

- 1) Install alternator per Hartzell Engine Technologies STC-SA11137SC

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17. Installation of Toggle Switches or Optional Digital Climate Controller (CB-2)

- A. For Toggle Switches mount A/C on/off switch and Hi/Low switches in panel. For CB-2 refer to Drawing No. CB-2 for instructions and dimensions to mount control head to instrument panel.
- B. Once switches or controller are mounted to instrument panel, connect wiring harness (AC-00635 for Toggle Switches or AC-01477 for CB-2) and route harness to tail cone using standard practices.
- C. Drill hole for external piezo electric switch where required. See Figure 1 for approximate location.



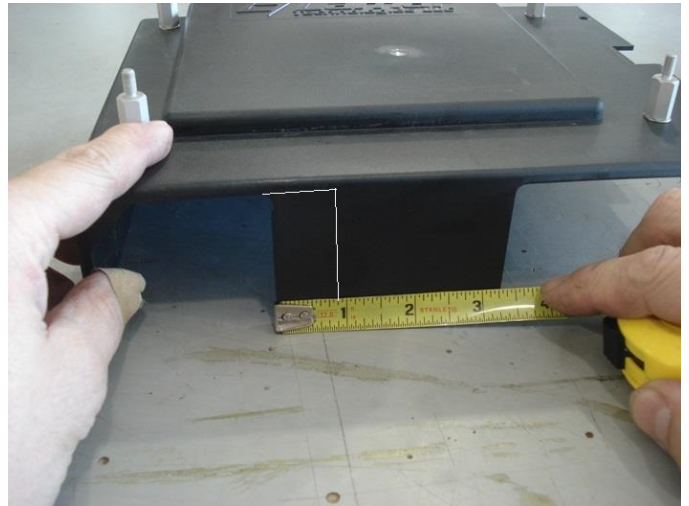
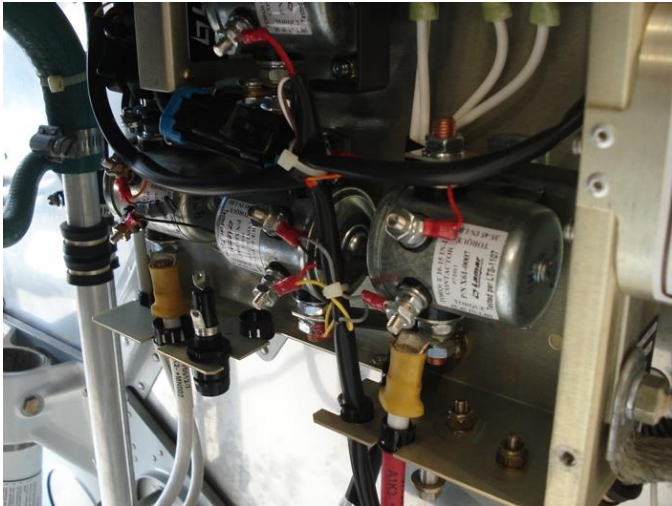
Figure 1 - Blue Dot is Typical Piezo Switch Location.

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18. Wiring

A. Lamar Box Interface

- 1) See applicable drawing AC-00635 or AC-01478 for wiring details.
- 2) See Figure 2 for modifications of the Lamar box and cover.



Trim approximately 7/8" from the inboard side of the bottom cover to expose the hole for the wire run

Figure 2 – Junction Box Modification

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- B. Connect the fuse holder and fuse to the bottom of the AC-00958 harness. Reference Figure 3 below.



**Figure 3 – Installation of 70 Amp Fuse and Fuse Holder
Below J Box**

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19. Installation of Doubler and Water Dam.

- A. Locate AC-00678 Doubler Assembly inside tail cone between FS 139 & 175 (see drawing AC-00681 and Figure 4).

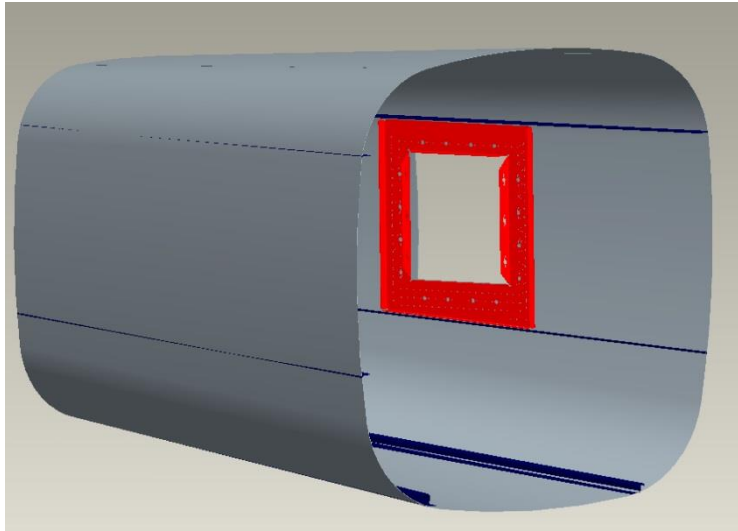


Figure 4 - Doubler between FS 139 & 175

- B. Remove rivets from longeron at doubler location.
- C. Match drill doubler to existing rivet holes in longeron.
- D. Match drill aircraft skin and lower longeron to existing holes in doubler.
- E. Cleco AC-00679 template to outside skin of aircraft using rivet holes for alignment.
- F. Drill ¼” holes for screws per template.
- G. Cut hole in aircraft skin per template.
- H. Rivet AC-00678 doubler to aircraft skin and longeron.
- I. Attach AC-00685 water dam assembly to doubler flanges (See drawing AC-00686).
- J. Attach AC-00687 Access Hole Cover Assy.

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20. Installation of Air Conditioner.

A. Refer to Drawing No. AC-00634 and Figure 5 & Figure 6 below.

- 1) Remove support bracket at rear of hat rack and install AC-00977 bracket in its place. See Figure 5.

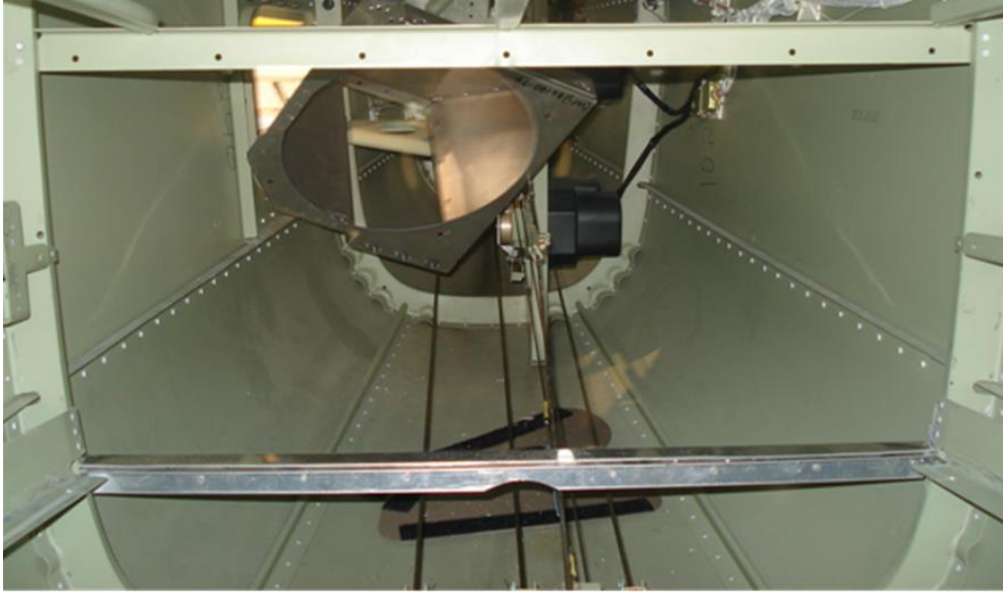


Figure 5 – Bracket Installation

- 2) Remove tinnerman clips from side supports and attach nutplates at each location, see Figure 6. Note: some aircraft will already have nutplates.

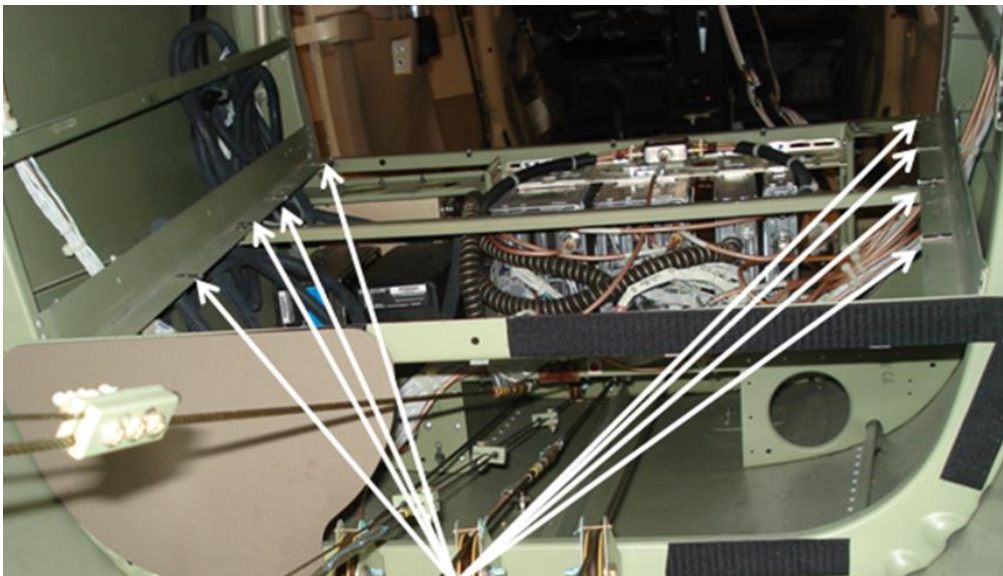


Figure 6 – Nutplate Attachment

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- 3) Drill Ø.56 hole in bottom skin just aft of rear hat rack bulkhead for drain.
- 4) Trace the center bulkhead openings on back of rear window molding and remove molding, and cut two holes for scat tubing, reattach molding.
- 5) Move the cabin power converter outboard as required to avoid center holes
- 6) Attach 10" hose (AC-00676) to flange on back of air conditioner and to flange on outlet assembly as shown in drawing AC-00634.
- 7) Attach 2 pieces of 3" SCAT tube to flanges on back of evaporator plenum.
- 8) Remove nut and attach 2974K861 drain flange to end of drain hose on rear of air conditioner.
- 9) Slide air conditioner and outlet assembly onto hat rack, the bottom rear flange of the air conditioner base plate should slide against AC-00977 bracket, and the outlet assembly should extend into the tail cone and be positioned inside the access hole (see Figure 7).

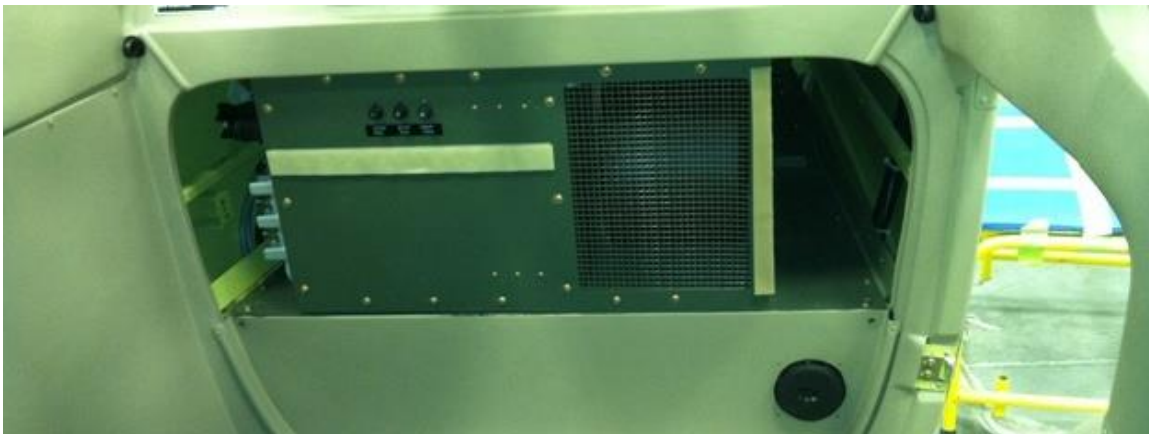


Figure 7 – Access Hole

- 10) Attach air conditioner to hat rack side and front supports using AN3-4A bolts and AN960-10L washers, an access hole on the front cover on the air conditioner will need to be removed to access the front attachment holes.
- 11) Re-attach access hole cover and route wire harness, power and ground wires to the appropriate locations on the side of the air conditioner.
- 12) Feed drain flange through hole in bottom skin of aircraft and secure with nut.

- 13) Remove AC-00525 Outlet Flange and AC-00532 Condenser Duct Flange Assembly from AC-00533 Condenser Outlet Assembly, setting the hardware aside for re-use. Place the Condenser Outlet Assembly in the aircraft at the access hole. Connect 10" ducting to the Condenser Duct Flange Assembly, then reconnect it to the Condenser Outlet Assembly. Fit the Outlet Flange over the Access hole and reattach it to the Condenser Outlet Assembly. Reference AC-00634 and Figure 8 and Figure 9.

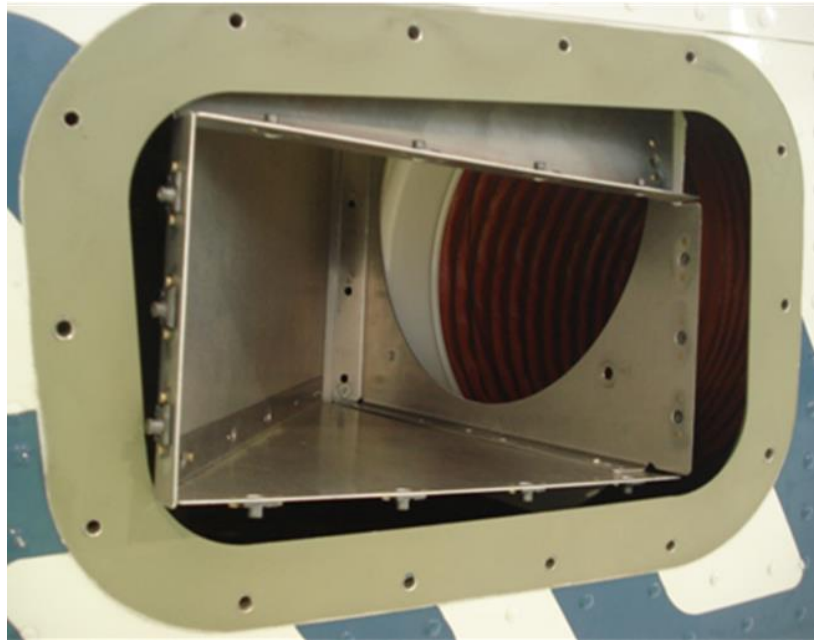


Figure 8 - AC Outlet Assembly



Figure 9 - Outlet Flange Attachment

- 14) Route the two 3” SCAT tubes from the evaporator plenum through the bulkhead above the front of the hat rack. For Standard Overhead Ducting installation, route tubes through the inner two holes as shown in Figure 10. For Alternate Side Ducting installation, route tubes through outer two holes.



Figure 10 – Standard Overhead Routing of SCAT Tubing

- 15) Cut outlet opening in tail cone avionics access panel using AC-00645 template.
 16) Trim wire cloth to fit over outlet opening and attach tail cone avionics access panel with screen in between access panel and outlet flange.
 17) For Standard Overhead Ducting installation ONLY, continue with step 18). For Alternate Side Ducting installation, skip ahead to step 27).
 18) Remove the forward coat hanger screw and paint the back window as follows. Mask rear window on each side of window divider as required to paint the portions shown in Figure 11. Abrade surface to be painted with Scotch Bright or equivalent. Clean surface with Windex or equivalent. Spray surface with Bulldog Adhesion Promoter or equivalent. Paint with (Satin Black) SEM interior paint or equivalent.

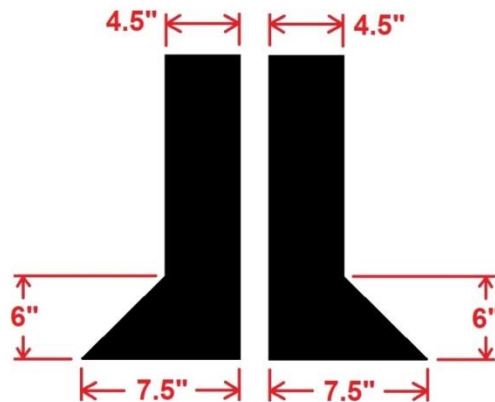


Figure 11 - Rear Window Painting

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- 19) Paint (3) 85985K22 plugs and (4) 92470A110 screws with Krylon 4295 Ultra Flat Paint or equivalent to match ducting assembly color.
- 20) Position the AC-01927 Duct Head Assembly in place so that the front tab aligns with the seatbelt screws. Trim any edges as required to make a clean fit, **then add provided edge trim around the perimeter (except the back edge) of the Assembly texture side out.** See Figure 12.



Figure 12 Check fit the Duct Head Assembly

- 21) Unscrew the overhead console from the headliner. Detach the backseat light and backseat light switch from the console. Disconnect the light and switch wires. Upsize the Ø.125 pilot hole in the Duct Head Assembly to properly fit the backseat light switch, then feed the wiring through the hole and reattach them to the light and switch. See Figure 13. If the switch wiring is not long enough to install the switch in the Duct Head Assembly, use (4) D-436-36 Terminal Splices to lengthen the wire run.



Figure 13 - Light and switch relocation

- 22) Re-install the overhead console with the Duct Head Assembly using the seatbelt screws in the forward tab and the coat hanger attachment point for the rear tab. The forward tab is to be covered by the seatbelt cover molding. For the rear tab attachment, use an MS35207-266 screw and AN960-10 Washer.
- 23) Attach the 3" SCAT tubes from the back to the Duct Head Assembly, trimming the tube length if necessary.
- 24) Position AC-01941 Duct Base Assembly centered to the blockoff and window. Trim any edges as required to make a clean fit, **then add provided edge trim around the edges against the blockoff and window texture side out**. Attach the Duct Base Assembly using (3) 92470A110 screws. Cap the three holes with the painted plugs from step 19). See Figure 14.



Figure 14 - Duct Base Assembly attachment

- 25) Position AC-01924 Duct Cover to connect the Duct Head and Duct Base. Trim any edges as required to make a clean fit against the window and frame, **then add provided edge trim around side edges texture side out**. Affix 9776K84 Hook & Loop to the inside ends of the Duct cover with the corresponding Hook or Loop portion on the Duct Head and Duct Base. Once it is positioned correctly, use (4) 92470A110 screws to secure the cover to the head and base pieces. See Figure 15.



Figure 15 - Duct Cover attachment

- 26) Standard Overhead Ducting installation is complete. Skip steps 27) through 31) and continue with step 32).

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- 27) For Alternate Side Ducting installation ONLY, complete the following steps. Place AC-02371 and AC-02372 Side Duct Assemblies against the corners of the cabin and identify the portions of the rear window that will be blocked. Mask the window as required to paint these portions. Abrade surfaces to be painted with Scotch Bright or equivalent. Clean surfaces with Windex or equivalent. Spray surfaces with Bulldog Adhesion Promoter or equivalent. Paint with (Satin Black) SEM interior paint or equivalent. Reference Figure 16.



Figure 16 - Paint Window for Alternate Side Ducting

- 28) Paint (2) 85985K22 plugs with Krylon 4295 Ultra Flat Paint or equivalent to match Ducting Assembly color, then set aside. Seat the Side Duct Assembly in place, trim as necessary for a clean fit, then Attach P580110 Edge Trim around the Duct Assembly perimeter.
- 29) Place Side Duct Assemblies against the corners of the cabin and lightly mark (so as to be erased afterwards) the edges of the Duct Assemblies against the headliner and window trim. Affix six (or more if necessary) AC-00143 Brackets with 92470A110 Sheet Metal Screws as required to support the Duct Assemblies, taking care not to puncture the fuselage. Reference suggested locations in Figure 17. Repeat for the opposite side.



Figure 17 - Attach AC-00143 Brackets

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- 30) Attach a 3' section of 2.5" SCAT Ducting to the Side Duct Assemblies with a 200-44H Hose Clamp. Add a 03-1827 Hose Adapter to the other end with another 200-44H Hose Clamp. Trim to length the 3" SCAT Ducting coming from the tail to neatly connect with the Hose Adapter when the Duct Assembly is fitted in place. Affix the 3" Duct to the Hose Adapter with a 200-44H Hose Clamp.
- 31) Affix the Duct Assembly to the Brackets with 92470A110 Screws. Seat AC-02375 bracket in approximate area shown, then drill Ø13/16 hole and affix bracket with plastic welder. Attach the base to the block off with (1) 92470A196 Sheet Metal Screw then cover the hole with the painted plug. Repeat for the opposite side. Alternate Side Ducting installation is now complete.



Figure 18 - Side Ducts Installed

- 32) Re-install lower baggage compartment panel assembly.
- 33) Trim Kydex to fit over hat rack opening, cut out for circuit breakers and evaporator intake opening.
- 34) Attach Kydex blockoff to hat rack opening and front of air conditioner with hook and loop fastener.

21. Reassembly of aircraft

- A. Reinstall the following components utilizing the AMM.
- B. Front and Rear seats
 - 1) Floor inspection panels
 - 2) Cabin carpet
 - 3) LH rudder pedal cover
 - 4) Lamar electrical box cover

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22. Perform operational tests of air conditioning system (Ground Power).

- A. Plug in external power and energize, battery must be connected.
- B. For Air Conditioning systems with Toggle Switches
 - 1) Flip AC on/off Toggle Switch to “ON” position and Hi/Low switch to “HI” position.
 - 2) Rear outlets should flow air 20°-30° cooler than ambient and fan speed will increase to max.
 - 3) Flip AC on/off Toggle Switch to the “OFF” position.
- C. For Air Conditioning systems with CB-2 Climate Controller
 - 1) Turn on Climate Controller.
 - 2) Cabin temperature set point should be displayed.
 - 3) Select fans up and fan speed should correspond.
 - 4) Drive cabin temp requested below ambient temp by at least 10 degrees F. Rear outlets should flow air 20-30 degrees cooler than ambient.
 - 5) Drive cabin temperature set point above ambient temperature.
 - 6) Turn Climate Controller off.
- D. Unplug external power.
- E. 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.

23. Perform operational tests of air conditioning system (Alternator Power).

- A. Aircraft will need to be located in a run up area to complete this section
- B. Utilizing qualified personnel operate the aircraft engine per the Pilot Operating Handbook
- C. Repeat item B or C of Section 22 to ensure operation of the air conditioner using alternator power.
- D. If further assistance is needed contact KATS Technical support by phone at (440) 951-4744.

24. 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.