

United States of America
Department of Transportation -- Federal Aviation Administration
Supplemental Type Certificate

Number SA02487CH

This certificate issued to Hartzell Engine Technologies LLC
2900 Selma Highway
Montgomery, Alabama 36108

certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations.
See Aircraft Specification No. A-782 for complete certification basis.

Original Product--Type Certificate Number: A-782
Make: Navion
Model: Navion, Navion A, Navion B, Navion D, Navion E, Navion F,
Navion G, Navion H.

Description of Type Design Change:

Installation of C&D Associates Combustion Heater Kit 23 (P/N CD12008K23R or CD12016K23R) or Kit 27 (P/N CD12017K27L or CD12018K27L), in accordance with C&D Associates heater Installation Instructions IN12016K23 or IN12018K27, Rev. -, dated August 16, 2007 or later FAA approved revision.

Limitations and Conditions:

1. Compatibility of this design change with previously approved modifications must be determined by the installer.
2. Check aircraft Weight and Balance.
3. Full compliance with the C&D Combustion Heater Airworthiness Limitations, MM10000 Maintenance Manual, Second Edition, Rev A, dated April 4, 2002, or later FAA approved revision, is required.
4. If the holder agrees to permit another person to use this certificate to alter the product, the holder shall give the other person written evidence of that permission.

This certificate and the supporting data which is the basis for approval shall remain in effect until surrendered, suspended, revoked or a termination date is otherwise established by the Administrator of the Federal Aviation Administration.

Date of application: September 11, 2007

Date reissued: February 11, 2016

Date of issuance: January 23, 2008

Date amended:



By direction of the Administrator

A blue ink signature of Timothy P. Smyth, written over a horizontal line.

(Signature)
Timothy P. Smyth
Manager,
Chicago Aircraft Certification Office

(Title)

Any alteration of this certificate is punishable by a fine of not exceeding \$1,000, or imprisonment not exceeding 3 years, or both.



**NAVION REAR HEATER KIT INSTALLATION
INSTRUCTIONS FOR RIGHT SIDE INSTALLATION
KIT#23, P/N CD12008K23R, CD12016K23R**

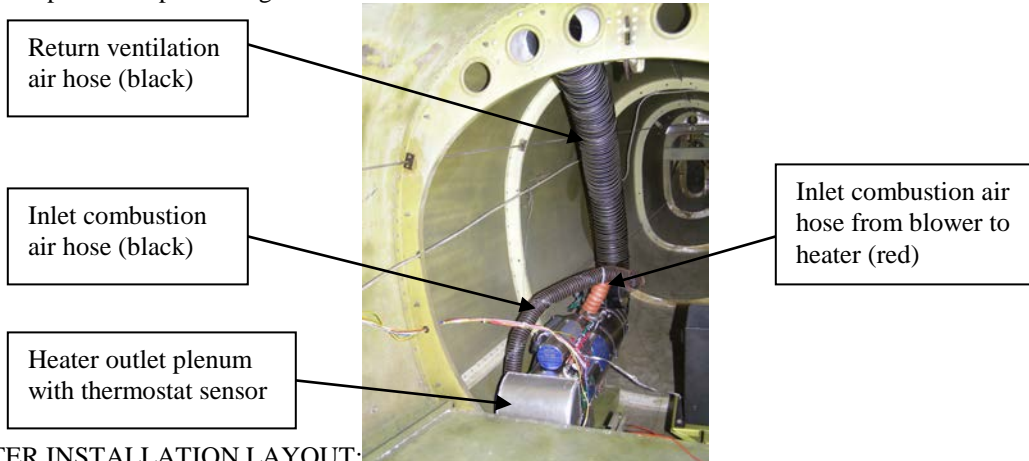
**READ COMPLETE INSTRUCTIONS BEFORE
BEGINNING INSTALLATION**

- Accomplish all wiring in accordance with AC43.13-1B
Chapter 11, Electrical Systems.
Accomplish all plumbing in accordance with AC43.13-1B
Chapter 8, Section 2, par. 8-31.

1. PREPARATION:

- A. Remove cabin seats, rear baggage bulkhead, upholstery and panels from both sides of cabin, carpet over wing areas, left and right hand lower aft wing fairings, and right hand engine cooling air outlet baffle.
- B. Fuel lines are to be installed in accordance with AC43.13-1B Chapter 8 section 2 paragraph 8-31
- C. Electrical installation to be completed in accordance with AC43.13-1B Chapter 11
- D. Riveting is to be in accordance with AC 43.13-1B Chapter 4 Section 4 paragraph 4-57
- E. Installation to be made in the right position aft of the rear baggage compartment bulkhead between station 179.75 and 198. This will allow placement of the heater longitudinally and outboard of the control cables for the elevator and rudder. Correct heater part number must be ordered, right side P/N CD12008-1(K23R) 12-VDC, P/N CD12016-1(K23R) 24-VDC.

Note: All pictures represent right side installation.

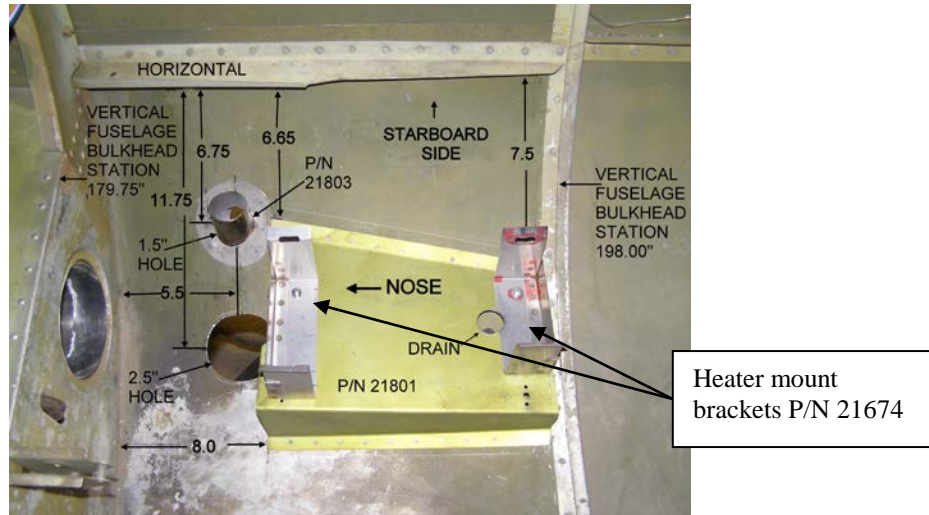


2. HEATER INSTALLATION LAYOUT:

- A. Aft of the baggage floor, using a flexible ruler measure back from the vertical fuselage bulkhead at station 179.75 a distance of 5 1/2". Mark a line starting from 6 1/2" down from the horizontal longeron to approximately 12" maintaining 5 1/2" back from station 179.75. Place a cross mark at 6.75" (for combustion air inlet) and 11.75" (for exhaust) down from the horizontal longeron on the marked line.
- B. Create a 1.5" hole at the 6.75" center mark.
- C. Rivet the combustion air inlet (P/N 21803) into place with the flange inside of fuselage and scarf (shorter portion outside) facing forward. Use six 1/8" rivets evenly spaced.
- D. Create a 2.5" hole at the 11.75 center line for the heater exhaust.
- E. Install doubler (P/N 21841) over 2.5" hole just created. Rivet in accordance with AC 43.13-1B Chapter 4 section 4 and paragraph 4-57. Enlarge slightly if needed for the heater exhaust shroud to slide through when the heater is installed.

F. Heater Mount P/N 21801R.

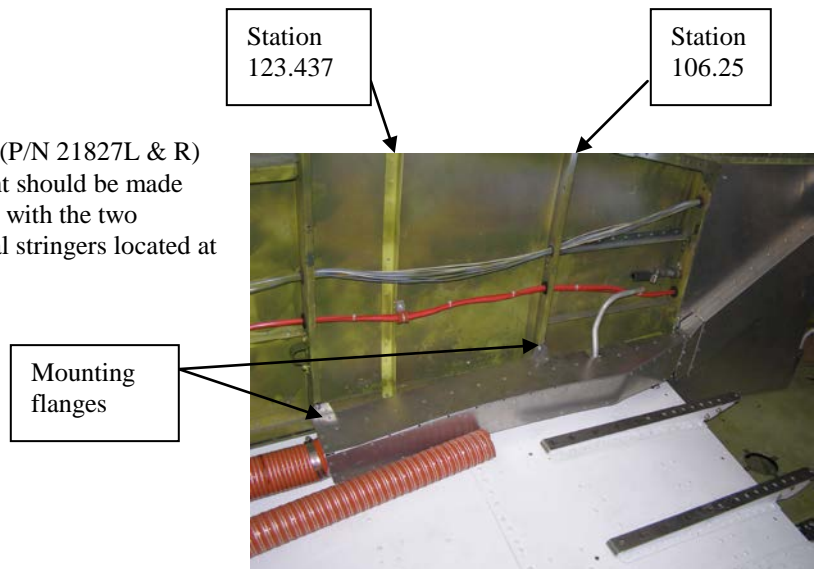
- a. Measure from the aft end of the horizontal longeron down along the vertical fuselage frame at station 198 approximately 7.5" and make a location mark on the frame forward edge.

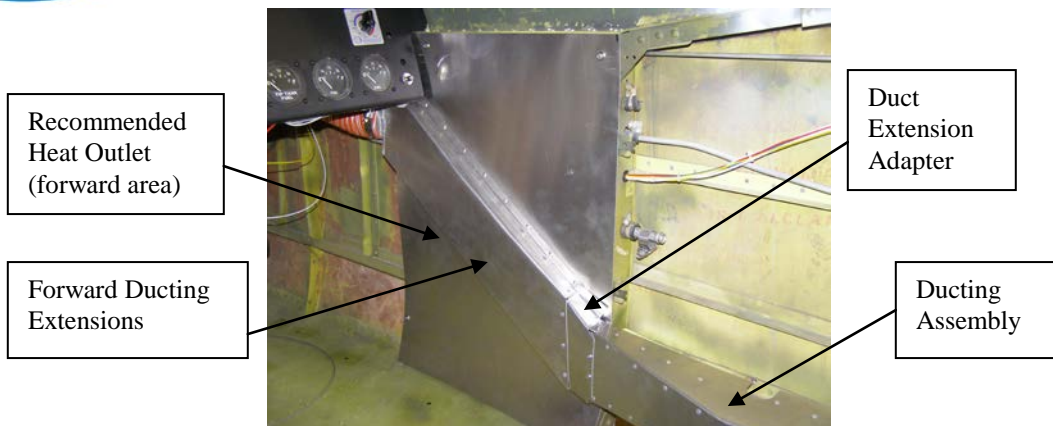


- b. Place the heater mount with narrow end aft and outboard edge at the 7.5" location mark. The aft end of the heater mount should almost touch the edge of the vertical fuselage frame at station 198. Rivet into place using 1/8" rivets in accordance with AC 43.13-1B Chapter 4 section 4 and paragraph 4-57. After riveting into place, use the center of the 1.25" drain hole in the mount to drill a 15/32 drain hole in the skin for the drain grommet (MS35489-6) P/N 60531.
- c. Install heater mount brackets (P/N 21674) in forward and aft locations on the heater mount.

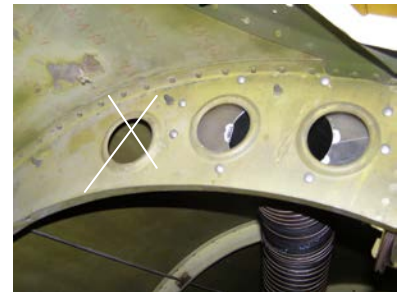
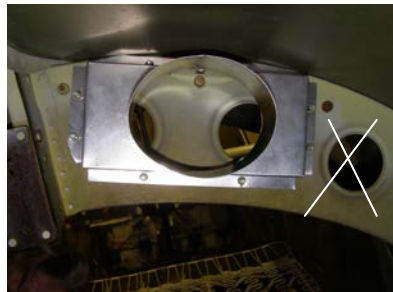
3. HEATER DUCTING INSTALLATION:

- A. Install left and right ducting assemblies (P/N 21827L & R) between stations 93 and 143. Placement should be made over the wing (no carpet under ducting) with the two mounting flanges fastened to the vertical stringers located at stations 106.25 and 123.437.





- B. Install left and right forward ducting extensions (P/N's 21843 & 21844). Trim to align with ducting assemblies over wing. Fasten to vertical stringers as needed. Join the two assemblies with (21833L & R) duct. extension adapters. Connect 2" hose to windshield defrost outlets. Heat outlets for pilot and copilot areas is recommended as marked on the bottom forward area of each duct extension. Openings can be enlarged as needed for heat distribution.



4. RETURN AIR ADAPTER P/N 21830:

- A. Place the return air adapter, after trimming to fit, on the upper back side of the vertical bulkhead station 179.75. Skip the outboard lightning hole and center over the next two inboard lightning holes. Using the adapter as a template, mark and drill to 7/32 the six mounting holes. Mount the return air adapter to the back side of the vertical bulkhead with 8/32 screws.
- B. Rear baggage upholstered bulkhead cover; trim to allow return air from the cabin to pass through the two vertical bulkhead lightning holes in the return air adapter. The rear baggage bulkhead cover will be installed after heater installation and testing is completed.

5. HEATER AND OUTLET PLENUM ASSEMBLY:

- A. Install the heater outlet plenum assembly (P/N 21676) on the heater and temporarily install the four mount screws loosely. Place the heater and the heater mounting brackets with the exhaust through the exhaust hole. Make sure the outlet flange of the outlet plenum is aligned and centered with the lightning hole in the vertical bulkhead at station 179.75
- B. Secure the heater in the two mounts with the two clamps supplied on the heater. With the outlet plenum centered in the bulkhead hole tighten the four mount screws in the heater jacket.
- C. Connect the 4.5" black hose on the heater vent air inlet adapter and route up to the return air bulkhead adapter and fasten both ends with the hose clamps.
- D. Install the combustion air inlet 1 1/2" hose (black) from the combustion air inlet scoop to the combustion air blower inlet mounted on the heater.

6. DISTRIBUTION ASSEMBLY P/N 21802:

Distribution Assembly

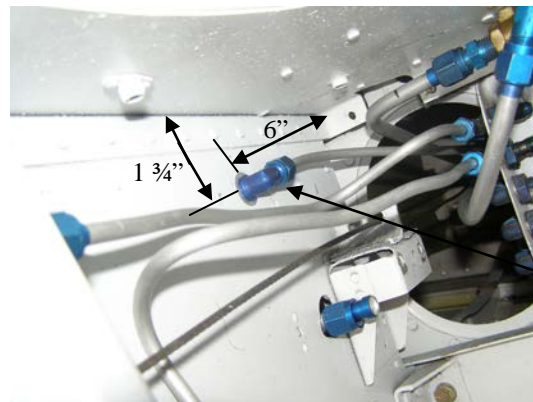
Heater fuel line

- A. Under the baggage floor install the distribution assembly by slipping it onto the heater outlet plenum assembly flange. Fasten to the baggage floor stringers utilizing the two mounting brackets. Install two #10 sheet metal screws with lock washers in the two holes provided in the slip flange after center drilling inner slip flange with 1/8" holes.
- B. Connect the 2.5" outlets to the ducting assemblies located over the wing by routing the 2.5" hose under the baggage floor and over control cables to the outboard holes of station 142.57. Locate the 2" outlet hoses in the same manner to the next inboard holes of station 142.57 and under rear seat for air distribution to the back passenger area. Fasten hoses to the bottom of the baggage floor and fasten hose ends with supplied hose clamps. CAUTION: Make sure adequate clearance is maintained between elevator and rudder control cables and hoses.



7. FUEL PUMP INSTALLATION (P/N 40051E):

- A. In the lower forward right hand section of the fuselage, remove the fuselage engine air cooling exhaust baffle to gain access to the electric fuel pump area. Remove the aircraft electric fuel pump to ease modification.
- B. From inside the nose gear area on the right hand gearbox beam assembly, measure back from the nose gear drag brace support channel [Fig. 2, Parts catalogue item 1408 P/N 145-34204] 5 inches along bottom. Place a location mark up from the bottom 6 inches and at 3.5 inches parallel with vertical brace located aft of measurement. Drill two holes, for 1/4" bolts, at the location marks for the pump mounting legs. With the pump's removable filter cap and the inlet port forward, secure the pump with 2 each 1/4" bolts and nuts.



Fuel line from pump to heater

- C. Fuel line from pump:
 - a. From the back of the nose gear box area measure from the wing spar forward along the right side 6" and down from the roof of the nose wheel well 1 3/4" and mark. Drill a 7/16" inch hole and install a bulkhead fitting P/N AN833-4D with 90° back toward wing.
- D. Fabricate a #4 fuel line from the other side of the newly installed bulkhead fitting up to the out aft port of the heater fuel pump.
- E. Fuel for the heater fuel pump will come from the inlet side of the aircraft electric fuel pump. In most cases an 1/8" Allen head NPT fitting can be removed from the aircraft Adel electric fuel pump inlet housing and an MS20822-D4 #4 90°



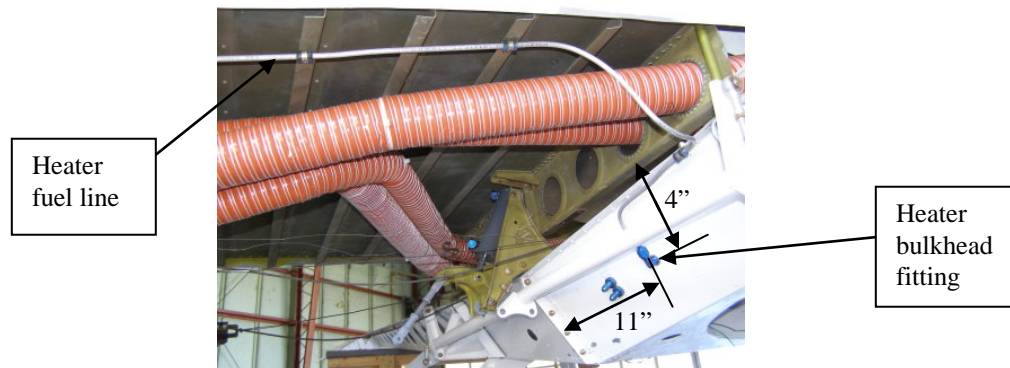
New fitting installed in aircraft electric fuel pump

New fuel line

New pump

fitting installed for fuel pickup to the heater pump. If this is not possible a tee fitting will need to be installed in the fuel line leading to the aircraft electric pump from the aircraft fuel supply.

- F. Reinstall aircraft electric boost pump.
- G. Install a 90° #4 bulkhead fitting P/N AN833-4D in back of wing. Measure 11" out from center wing joint and 4" down. Drill a 7/16" hole. Install the fitting pointing up.



8. ELECTRICAL INSTALLATION:

A. FUEL PUMP WIRING:

- a. Make sure the body of the heater fuel pump is grounded well to the air frame using the ground attached to the pump.
- b. Route 18 gage wire from heater terminal strip #2 along with other heater wires up to front of fuselage. Locate aircraft electrical boost pump wire and follow down to heater fuel pump fused wire. Connect with butt splice.

9. MAIN POWER WIRE TO HEATER:

A. AIRCRAFT BATTERY LOCATED IN FORWARD POSITION OF AIRCRAFT:

- a. For 12-VDC –Run one 10 gage wire from 20 amp circuit breaker or for 24-VDC one 14 gage wire from 15 amp circuit breaker to relay assembly red wire located on heater.

B. AIRCRAFT BATTERY LOCATED IN BACK POSITION OF AIRCRAFT:

- a. For 12 or 24-VDC run one 14 gage wire from a heater circuit breaker installed near the battery to the red wire of heater relay assembly. 20 amp for 12-VDC or 15 amp for 24-VDC.

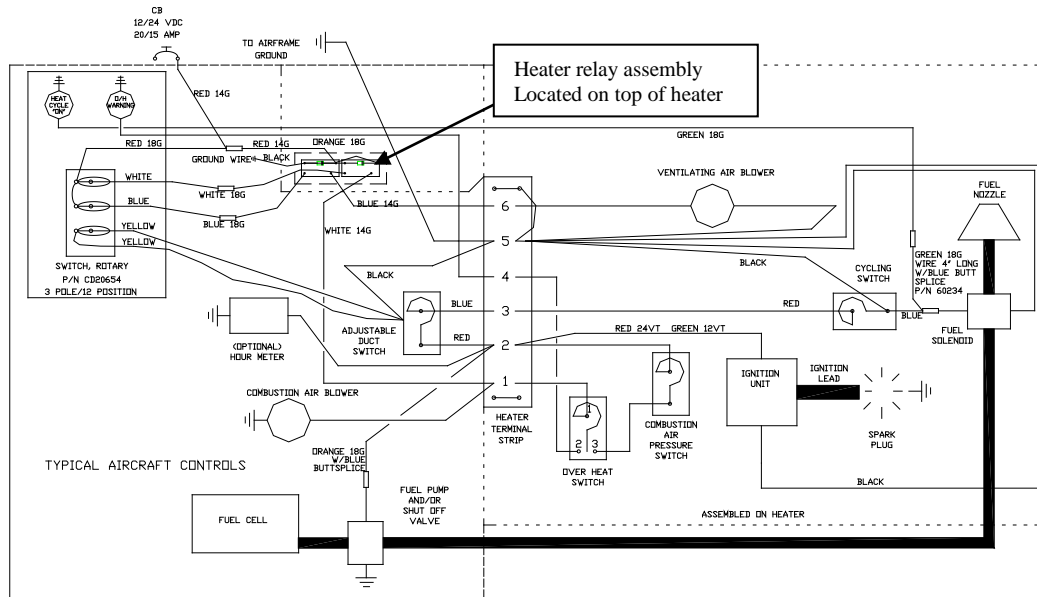
C. HEATER CONTROL ROTARY SWITCH:

- a. Install in location with adequate clearance behind panel. Using P/N CD20683 template, center punch and drill as indicated.
- b. Install P/N CD20684 decal and lights as indicated making sure amber light is installed in left position, "heat cycle" and red light in right position for "overheat warning".
- c. Install rotary switch thru hole with switch tab properly located in panel alignment hole which is covered by decal.
- d. Secure in place with lock washer and nut
- e. Install pointer knob and secure.



D. HEATER CONTROL SWITCH WIRING:

- a. Black wire to aircraft ground
- b. Red 18 gage wire to heater circuit breaker
- c. Blue 18 gage wire to heater relay assembly blue wire
- d. White 18 gage wire to heater relay assembly white wire
- e. Yellow 18 gage heater control switch wire to thermostat sensor yellow wires located on heater outlet plenum assembly



10. HEATER OPERATIONAL TEST AFTER INSTALLATION:

IMPORTANT!! Please complete the followings steps after the new heater is installed in the aircraft.

- A. Install a temperature probe (min 0-500° F) in the outlet plenum 6-8" aft of the heater. A good location would be approx. 6" aft of the heater or near the thermostat sensor.
- B. Place a jumper wire across the heater terminal strip numbers 2 and 3, which will bypass the aircraft thermostat. (Fig. 2)
- C. Install the fuel pressure gauge (0-15). Tee into as shown. (Fig. 1)
- D. With the heater running, verify fuel pressure. Preferred pressure is 8psi. (6.5psi min, 10psi max)
- E. With the heater running, verify that the outlet plenum temp. is approx. 250°. Adjust the cycling switch if needed using a small straight slot screwdriver. Clock-wise to increase, counter-clock-wise to decrease temperature. (Fig. 3)
- F. Remove the jumper wire and verify that the temperature is controlled by the aircraft thermostat from low (approx. 75° F) to medium to high (approx. 250° F) which is what the cycling switch is set at.
- G. Remove the temperature probe sealing the hole with high temperature silicone.
- H. Remove the fuel gauge installed in step 3. Leave the "tee" fitting and cap off for future pressure readings if desired.
- I. Verify proper installation is completed in accordance with the aircraft maintenance manual.

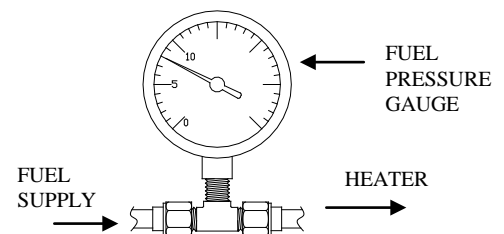
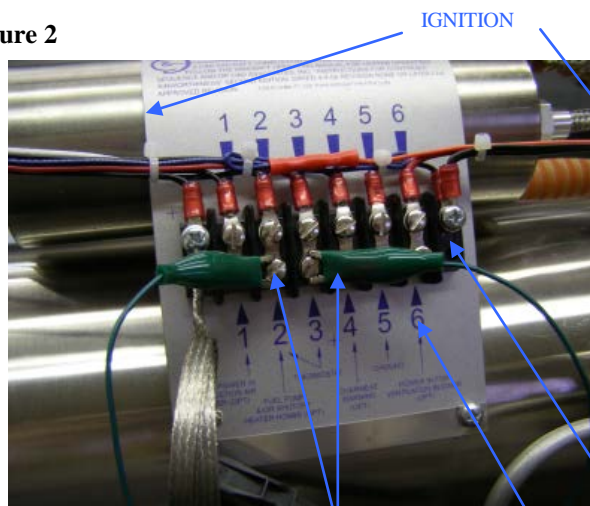


Figure 1

If the hoses need to be replaced, we recommend Sceet-6 (1 1/2") red from the blower to the heater and Ceet-6 (1 1/2") black from outside air to the blower.

For additional information see the "maintenance manual (MM10001)" included with this heater under "Testing after installation or overhaul."

Figure 2



JUMPER WIRE BYPASSING
THERMOSTAT SENSOR
(AIRCRAFT WIRES NOT INSTALLED)

NUMBER
PLATE

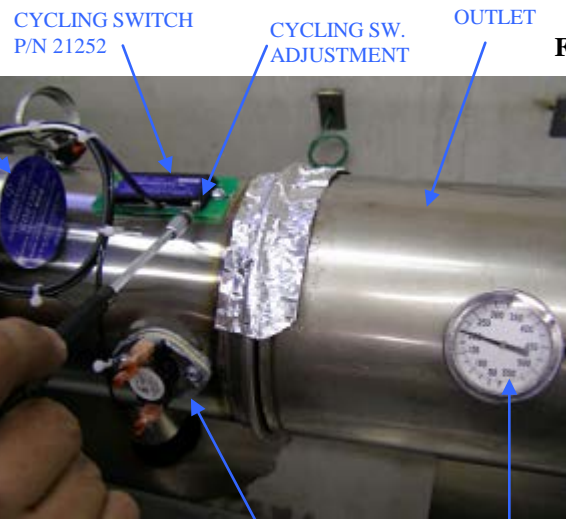


Figure 3

- J. After installation, complete the operation and heat output tests specified in the C&D Associates, Inc. MM10001 Maintenance Manual for aircraft combustion heaters dated 1/1/08. Tests should be accomplished in accordance with section IX 'C' operational test, and 'D' for heat output, steps 1 and 2. Also in accordance with the "Instructions for Continued Airworthiness" step #1 "Preflight/Operational check and Shutdown Procedure."
- K. NOTE: Follow the 'Combustion Heater PREFLIGHT/OPERATIONAL CHECK AND SHUTDOWN PROCEDURE' outlined within the Combustion Heater "Instructions for Continued Airworthiness", Second Edition, Revision: none, dated 04-04-02, or later revision, included with these instructions. This FAA-approved Instructions for Continued Airworthiness must be complied with and become a permanent part of the Aircraft Operations and Procedures manual.
- L. Verify all wires are secure and free of obstruction and chaffing.

11. DOCUMENTATION:

- A. Weight & Balance. Install new heater kit of 45 lbs at Sta. 189 . If the aircraft requires a weight and balance and a 337 must be completed and a copy of the STC attached. The logbook entry should contain the STC and PMA Supplement #. Original heater replacement is authorized by way of FAA form 337. Alteration of aircraft by way of STC and PMA supplemental number and date must be recorded in the appropriate aircraft records.
- B. Note: Insert the following statement (label 21503 provided) in the aircraft flight manual: "C&D Associates Inc. Combustion heater has been installed in this aircraft. Please follow the aircraft-operating manual for combustion heater operating sequence and/or C&D Associates Inc. Instructions for airworthiness." "Second Edition dated April 4, 2002 revision: none, or later FAA approved revision."
- C. Electrical requirements: 12VDC at 18 Amps, 24VDC at 14 Amps.
- D. Fuel consumption: Maximum operation .6 gal/hour.



DOCUMENTATION AND PARTS REQUIREMENT TABLE

DOCUMENTATION	Quantity		
1. FAA/PMA Supplement #56	_____		
2. Installation Instructions IN12008K23R, IN12016K23R	_____		
3. Label for flight manual (21503)	_____		
4. MM10001 Maintenance Manual	_____		
5. Quality Assurance Certificate of Compliance #527	_____		
6. STC # SA02487CH	_____		
7. Form 337	_____		
PARTS			S/N
1. (1) Heater (12V)	CD12008-1	_____	_____
Heater (24V)	CD12016-1	_____	_____
2. (1) Switch, Thermostat	CD21253	_____	
3. (2) Bracket, Htr Mount	21674	_____	
4. (1) Outlet Plenum Assy	21676	_____	
5. (4) Screw	60002	_____	
6. (1) Combustion Air Inlet	21803	_____	
7. (1) Return Air Adapter	21830	_____	
8. (1) Plenum, Heater	21802	_____	
9. (2) Screw, #10 Sheet Metal	60064	_____	
10. (2) Lockwasher	60098	_____	
11. (1) Bracket, Heater Mount	21801	_____	
12. (1) Ducting Ext Assy, RT	21843	_____	
(1) Ducting Ext Assy, LT	21844	_____	
13. (1) Ducting Ext. Adapter	21833L	_____	
Ducting Ext. Adapter	21833R	_____	
14. (6) Screw #6	60061	_____	
15. (6) Lockwasher #6	60092	_____	
16. (4) Screw #10	60064	_____	
17. (4) Lockwasher #10	60098	_____	
18. (1) Ducting Assy	21827L	_____	
(1) Ducting Assy	21827R	_____	
19. (1) Electrical Kit (12V)	29500A	_____	
Electrical Kit (24V)	29500B	_____	
20. (1) Hose Kit	29501	_____	
21. (1) Doubler	21841	_____	

Initials: _____ Date: _____