United States of America

Department of Transportation - Federal Aviation Administration

Supplemental Type Certificate

Number SA00971CH

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 thereto for as specified hereon meets the airworthiness requirements of Part 3 of the Federal Aviation Regulations.

Original Product-Type Certificate Number: *See attached FAA Approved Model List (AML) No. SA00971CH for list of approved airplane models and applicable airworthiness regulations.

Make:

Model:

Description of Type Design Change:

Remove South Wind 940 series combustion heater and install C&D Associates, Inc. TSO-C20 approved Heater Kit 3 (P/N CD14010K3), Kit 4 (P/N CD12006K4), Kit 5 (P/N CD11214K5) or Kit 6 (P/N CD11215K6) in accordance with C&D Associates, Inc. Installation Instructions as listed on AML No. SA00971CH, 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. A copy of this Certificate and FAA Approved Model List (AML) No. SA00971CH, dated April 16, 1999, or later FAA approved revision, must be maintained as part of the permanent records for the modified aircraft.
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 12, 1998

Date of issuance: December 16, 1998

Date reissued: February 11, 2016; June 6, 2016

Date amended: April 16, 1999; October 19, 1999 January 10, 2000; May 17, 2000; March 29, 2004

By direction of the Administrator

(Signature)

for Timothy P. Smyth
Manager,
Chicago Aircraft Certification Office

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

This certificate may be transferred in accordance with FAR 21.47.

FAA APPROVED MODEL LIST (AML) NO. SA00971CH
HARTZELL ENGINE TECHNOLOGIES LLC
FOR INSTALLING COMBUSTION HEATER KIT MODEL CD14010K3, CD12006K4, CD112145K5 OR CD11215K6

Date of Issuance: December 16, 1998

ITEM	AIRCRAFT MAKE	AIRCRAFT MODEL	ORIGINAL TYPE CERTIFICATE NUMBER	CERTIFICATION BASIS FOR ALTERATION	INSTALLATION INSTRUCTIONS		AFM SUPPLEMENT NUMBER/DATE	AML AMENDMENT DATE
					NUMBER	REVISION & DATE		
1.	Cessna	310, 310A, S/N 35000 thru 35546	3A10	CAR 3	IN14010K3	REV. D dated 2/19/04 or later FAA approved revision	N/A	3/29/04
2.	Piper	PA-30, S/N 30-2 thru 30-401	A1EA	CAR 3	IN12006K4	REV. A Dated 2/19/04 or later FAA approved revision	N/A	3/29/04
3.	Cessna	190, 195, 195A, 195B	A-750	CAR 3	IN11214K5	REV. A Dated 2/19/04 or later FAA approved revision	N/A	3/29/04
4.	Global Amphibians	Lake LA-4, Lake LA-4A, LakeLA-4P, Lake LA-4-200	1A13	CAR 3	IN11215K6	REV. A Dated 2/19/04 or later FAA approved revision	N/A	3/29/04
5.	Piper	PA-23, S/N 23-1 and up, 27-1 thru 27-3049 27-3051 thru 27-3053	1A10	CAR 3	IN 940 MOD I	REV. C. Dated 10/6/99 or later FAA approved revision	N/A	N/A

FAA Approved: _____
Timothy P. Smyth
Manager,
Chicago Aircraft Certification Office
Date amended: 4/6/1999; 10/19/1999; 1/10/2000;
5/17/2000; 3/29/2004
Date reissued: 2/11/2016

C&D ASSOCIATES, INC.

HEATER INSTALLATION INSTRUCTIONS FOR CD14010K3

For Cessna Aircraft 310, 310A, S/N 35000 thru 35546

READ COMPLETE INSTRUCTIONS BEFORE BEGINNING INSTALLATION

This system has been built to be installed on an aircraft that conforms to that aircrafts original Type Certificate (TC). If aircraft has been modified from the original TC (modifications such as props, engines, fuel system etc.) contact C&D Associates, Inc. for possible adjustments to this 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.

LOG OF REVISIONS

Rev.	Description	Pages Revised	Date
H	Reformatted and updated 'test after installation' section	all	5/7/15

1. PREPARATION

1.1. Heater Removal:

Follow the Aircraft Service Manual or other FAA approved source for removal of the existing South Wind combustion heater.

2. INSTALLATION

2.1. Install the C&D Associates, Inc. TSO-C20 Approved Combustion Heater utilizing the existing Aircraft Service Manual or other FAA approved source where applicable.

2.2. When removing electrical connections from the old heater, identify the airframe wires and their location on the old heater terminal strip or electrical cannon plug. Some of these wires will be used in the new installation. On the new heater terminal strip, connect "C" pin or E119N wire (wire that becomes hot when heater switch is turned on) to terminal 1. Connect ground, "A" pin or E-225 wire to terminal 5 (ground). Connect red wire coming from combustion air blower to terminal #1. Tape off wire numbers "B" or 423-N, "D" or E-120N and "E" or F-121N. Optional heater hour meter may be connected to terminal #2. Optional overheat light may be connected to terminal #4 on the heater strip. Refer to typical wiring schematic figure 7 page 37 of Maintenance Manual for Aircraft Combustion Heaters (MM10001).

2.3. Remove the old safety valve assembly from the firewall. Install the new fuel shut-off in place of the safety valve. Reuse the T-fitting from the safety valve and install it in the shut-off. Reconnect the fuel lines to the Tee as originally installed and secure to shelf with tie wrap or clamps. Install #3 fuel line from the new shut-off to the heater. Wire the remote solenoid shut-off to terminal #2 on heater.

2.4. Install the combustion air blower above the heater on the existing shelf and connect to the combustion air inlet, using the red sceet hose. Connect the short black wire to airframe ground and positive red wire to heater terminal strip at terminal #1.

2.5. Install the combustion air inlet scarf forward (opposite of exhaust for scooping in air). Installation should be 12" in front of and in line with exhaust by making a 1-1/2" hole. Use the new inlet as a pattern, drilling four 3/16" holes. Place the combustion air inlet inside and secure with four 8/32" screws. Connect the black ceet hose to aluminum combustion air inlet and the stainless steel angle adapter on the combustion air blower housing. Short wire goes to ground, long wire to terminal # 1 on terminal strip.

2.6. The adjustable duct switch sensor P/N CD21253 is to be installed aft of the heater in the plenum. Make two 1/16" holes 2-5/8" apart in a convenient location. Half way between the 1/16" holes, drill a 1/2" hole for the thermister and mount the switch using two sheet metal screws. Red wire to terminal #2, blue wire to terminal #3 and yellow (or orange) wires to thermostat control non-polarity yellow wires.

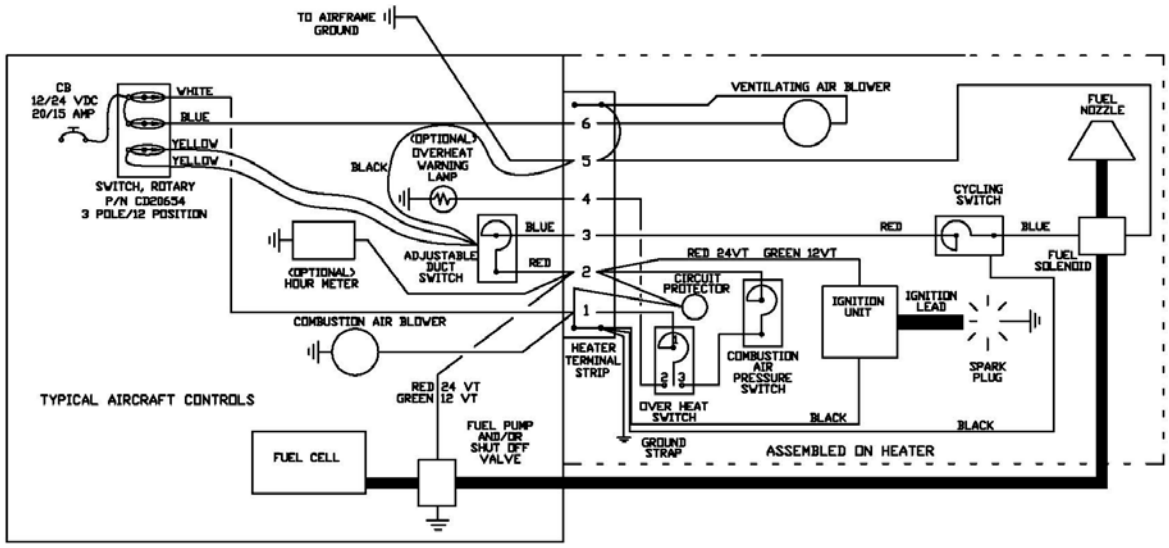


FIGURE 1

3. TESTING

3.1. **HEATER OPERATIONAL TEST AFTER INSTALLATION:**

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

(Heater terminal strip numbered 1 2 3 4 5 6)

3.1.1 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. Usually you can find a small access point somewhere in the ducting aft of the heater.

CAUTION: Verify thermal couple is not touching plenum internal wall.

3.1.2 Setting upper limit temperature upper limit switch

3.1.2.1 If your heater is equipped with a CD21252…..

- Place a 6" 20G jumper wire with 2 small alligator clips (or the like) across the heater terminal strip numbers 2 and 3, which will bypass the aircraft thermostat. (Fig. 2)

CAUTION: Be sure not to short any other terminals.

- ❑ With the heater running, verify that the outlet plenum temp. is approx. 250°. Adjust the temperature of the heat duct outlet distribution plenum to an average ambient temperature as follows.
  - For non-pressurized aircraft set switch to a low of 215º and a high of 255º.

NOTE: Adjustment is made by rotating a small 1/16" screw located next to the wires on the side of the switch. It may have a dab of inspectors lacquer over the screw. Rotation clockwise one turn will increase temperature approx. 20° F. Decrease temperature by turning counterclockwise (Fig 3).

- ❑ After sensor is adjusted, place small drop of tamper proof seal on adjustment screw to lock in settings so as to not change due to vibration. Use a product that can be easily removed for readjustment if necessary.
- ❑ 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.
- ❑ Remove the temperature probe sealing the hole with high temperature silicone.

Figure 2

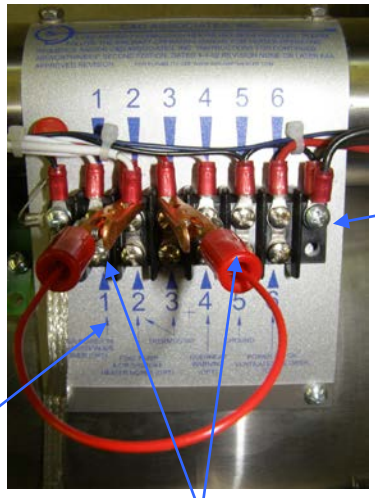
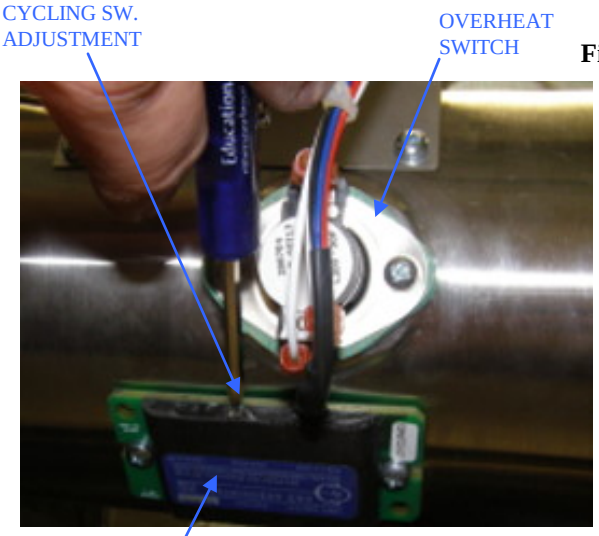


Figure 3



3.1.2.2 If your heater is not equipped with CD21252…..

Upper limit adjustments should be made in accordance with aircraft manufacturer's instructions**.**

3.1.3 Install the fuel pressure gauge (0-15). Tee into as shown. (Fig. 4)

- ❑ With the heater running, verify fuel pressure.
  - Preferred pressure is 8psi. (6.5psi min, 10psi max)

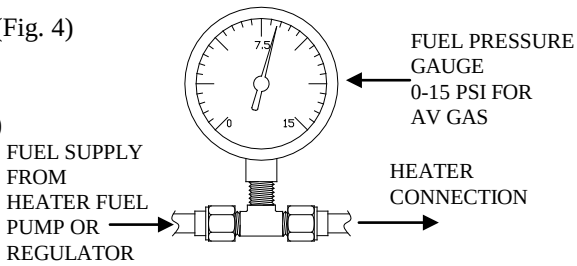


Figure 4

3.1.4 Remove the fuel gauge installed in step 3.1.3. Leave the "tee" fitting and cap off for future pressure readings if desired.

3.2 Verify proper installation is completed in accordance with the aircraft maintenance manual.

3.2.1 Verify all wires are secure and free of obstruction and chaffing.

3.2.2 If the hoses need to be replaced, we recommend Sceet-6 (1 ½") red from the blower to the heater and Ceet-6 (1 ½") black from outside air to the blower.

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

4. After installation, complete the operation and heat output tests specified in the C&D Associates, Inc. MM10001 Maintenance Manual for aircraft combustion heaters Rev L, dated 5/21/15 or later FAA approved revision. Tests should be accomplished in accordance with section 10.3 operational test, and 10.4 for heat output. Also in accordance with the "Instructions for Continued Airworthiness" "Preflight/Operational check and Shutdown Procedure." Rev E dated 5-21-15. These FAA-approved Instructions for Continued Airworthiness must be complied with and become a permanent part of the Aircraft Operations and Procedures manual.

5. Documentation:

5.1. Weight & Balance.

5.1.1. If changed remove old heater of 18 lbs (verify weight). And install new heater kit of 25 lbs. 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 #SA00971CH and PMA Supplement #38. Original heater replacement is authorized by way of FAA form 337. Alteration of aircraft by way of STC or PMA supplemental number and date must be recorded in the appropriate aircraft records.

5.1.2. If unchanged removal of the Combustion Heater and the installation of the C&D Associates Products TSO-C20 approved heater will have no net effect on weight and balance or electrical load requirements.

5.2. 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" located in MM10001 Rev I dated 8/1/14 or later FAA approved revision."

5.3. Utilize existing aircraft combustion heater operating instructions or other FAA approved combustion heater operating instructions where applicable.

5.5 Electrical requirements: 24VDC at 15 Amp.

5.6 Fuel consumption: Maximum operation 1.5 gal/hour

DOCUMENTATION AND PARTS REQUIREMENT TABLE

	DOCUMENTATION	Quantity
1.	FAA/PMA Supplement #38	____
2.	Installation Instructions IN14010K3	____
3.	Label for flight manual	____
4.	MM10001 Maintenance Manual	____
5.	Quality Assurance Certificate of Compliance #527	____
6.	STC #SA00971CH	____
7.	337 Form	

	PARTS			S/N
1.	(1) Heater	CD14010-1	____	_____
2.	(1) Blower Assy	21415	____	
3.	(1) Solid State Duct Sw.	21253	____	_____
	(1) Rotary Rheostat	21255	____	
4.	(1) Fuel Line (24") #3	21081	____	
5.	(1) Fuel Line (40") #3	21081	____	
6.	(4) Nut	60139	____	
	(4) Sleeve	60211	____	
7.	Hose, Sceet (2')	60199	____	
8.	Hose, Ceet (3')	60198	____	
9.	(4) Worm Drive Clamps	60900-28	____	
10.	(1) Drain Line #4 (7")	22336	____	
11.	(1) Drain Hose	21279	____	
12.	(1) Regulator	20801	____	_____
	a. Reuse Customer Original	#2 TEE FITTING		
	b. (1) Elbow	MS20822-3		
13.	(1) Retainer, Exhaust	20632	____	
14.	(1) Mount, Bracket	21191B	____	
15.	(1) Clamps	60900-104	____	

Initials:_____ Date:_____

HEATER INSTALLATION INSTRUCTIONS FOR
MODEL CD12006K4
For Piper Aircraft PA-30, S/N 30-2 thru 30-401

READ COMPLETE INSTRUCTIONS BEFORE BEGINNING INSTALLATION

This system has been built to be installed on an aircraft that conforms to that aircrafts original Type Certificate (TC). If aircraft has been modified from the original TC (modifications such as props, engines, fuel system etc.) contact C&D Associates, Inc. for possible adjustments to this 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.

LOG OF REVISIONS

Rev.	Description	Pages Revised	Date
F			

1. PREPARATION
   1.1. Heater Removal:

   Follow the Aircraft Service Manual or other FAA approved source for removal of the existing South Wind combustion heater.
2. INSTALLATION
   2.1. Install the C&D Associates, Inc., TSO-C20 Approved combustion heater utilizing the existing Aircraft Service Manual or other FAA approved source where applicable, with the following exceptions:
   2.2. Remove the old safety valve assembly from the firewall. Install the new fuel shut-off in place of the safety valve. Reuse the original fuel inlet fitting from the old safety valve and install it in the new shut-off. Reconnect the fuel lines to the new shutoff as originally installed and secure with tie wrap or clamps. Install new #4 fuel line from the shut-off to the heater. Wire the remote solenoid shut-off to terminal #2 on heater.
   2.3. The exhaust of the new heater must not be modified, however the exhaust shroud (shroud covering the exhaust pipe) may be trimmed to within .25 inch of the aircraft exterior skin once the heater is mounted in the aircraft.
   2.4. ELECTRICAL CONNECTIONS
      2.4.1. Check wires removed from original heater for the following:
         2.4.1.1. Master switch ON, heater OFF.
            One of the wires from the old heater will be HOT. This wire will not be used (tape off).
         2.4.1.2 Master ON, heater ON.
            Of the remaining wires one will now become HOT. This wire should be connected to terminal #1 on the new heater.
         2.4.1.3 With switches off, use OHM meter to identify ground wire and connect to terminal #5 on the new heater terminal strip. Tape off any remaining old wires as they will not be used. The new combustion air blower red wire should be connected to terminal #1 and black wire to ground or terminal #5.
         2.4.1.4 If aircraft has an old mechanical thermostat and you are reusing it, connect to terminal #2 and terminal #3 of new heater. If it is to be replaced remove it along with its push-pull cable. See installation instructions of the new electronic adjustable duct thermostat switch CD21253 included with the kit.
         2.4.1.5 Optional hour meter is connected to terminal #2. Optional overheat light may be connected to terminal #4 on the heater strip.

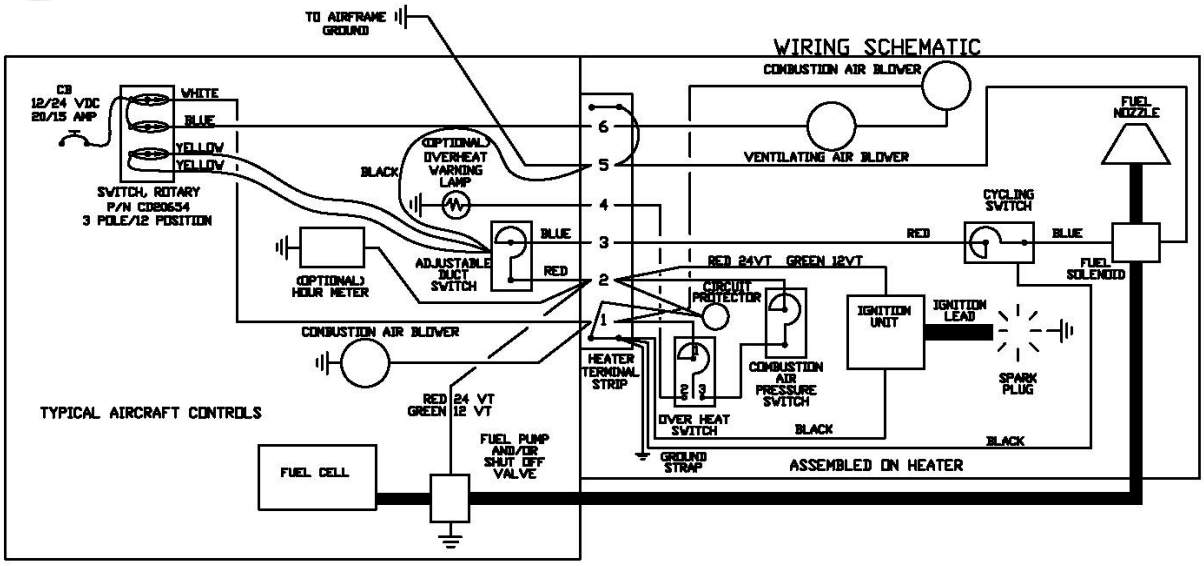


FIGURE 1

3. TESTING

3.1 HEATER OPERATIONAL TEST AFTER INSTALLATION:

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

(Heater terminal strip numbered 1 2 3 4 5 6)

3.1.1 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. Usually you can find a small access point somewhere in the ducting aft of the heater.

CAUTION: Verify thermal couple is not touching plenum internal wall.

3.1.2 Setting upper limit temperature upper limit switch

3.1.2.1 If your heater is equipped with a CD21252…..

- ❑ Place a 6" 20G jumper wire with 2 small alligator clips (or the like) across the heater terminal strip numbers 2 and 3, which will bypass the aircraft thermostat. (Fig. 2)

CAUTION: Be sure not to short any other terminals.

- ❑ With the heater running, verify that the outlet plenum temp. is approx. 250°. Adjust the temperature of the heat duct outlet distribution plenum to an average ambient temperature as follows.
  - For non-pressurized aircraft set switch to a low of 215º and a high of 255º.

NOTE: Adjustment is made by rotating a small 1/16" screw located next to the wires on the side of the switch. It may have a dab of inspectors lacquer over the screw. Rotation clockwise one turn will increase temperature approx. 20° F. Decrease temperature by turning counterclockwise (Fig 3).

- ❑ After sensor is adjusted, place small drop of tamper proof seal on adjustment screw to lock in settings so as to not change due to vibration. Use a product that can be easily removed for readjustment if necessary.
- ❑ 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.
- ❑ Remove the temperature probe sealing the hole with high temperature silicone.

Figure 2

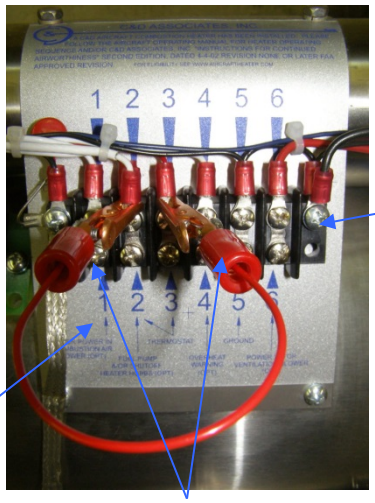
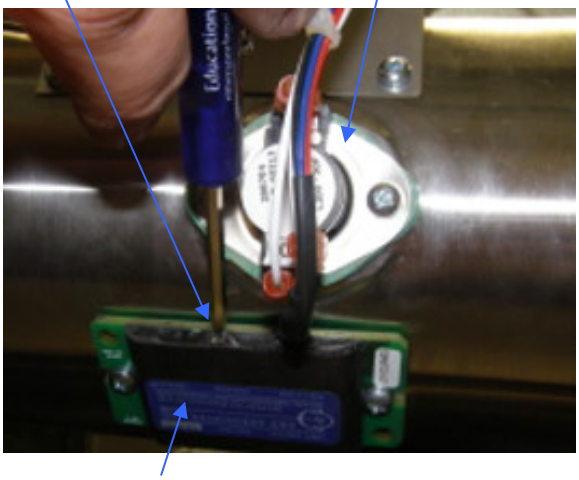


Figure 3



3.1.2.2 If your heater is not equipped with CD21252…..

Upper limit adjustments should be made in accordance with aircraft manufacturer's instructions**.**

3.1.3 Install the fuel pressure gauge (0-15). Tee into as shown. (Fig. 4)

- ❑ With the heater running, verify fuel pressure.
  - Preferred pressure is 8psi. (6.5psi min, 10psi max)

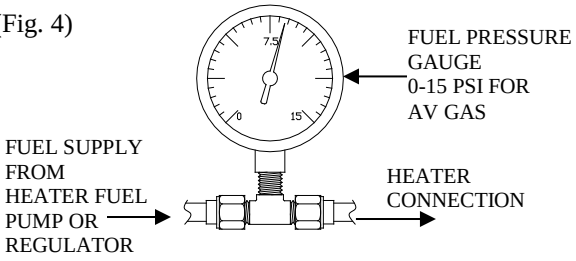


Figure 4

3.1.4 Remove the fuel gauge installed in step 3.1.3. Leave the "tee" fitting and cap off for future pressure readings if desired.

3.2 Verify proper installation is completed in accordance with the aircraft maintenance manual.

3.2.1 Verify all wires are secure and free of obstruction and chaffing.

3.2.2 If the hoses need to be replaced, we recommend Sceet-6 (1 ½") red from the blower to the heater and Ceet-6 (1 ½") black from outside air to the blower.

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

4. After installation, complete the operation and heat output tests specified in the C&D Associates, Inc. MM10001 Maintenance Manual for aircraft combustion heaters Rev L, dated 5/21/15 or later FAA approved revision. Tests should be accomplished in accordance with section 10.3 operational test, and 10.4 for heat output. Also in accordance with the "Instructions for Continued Airworthiness" "Preflight/Operational check and Shutdown Procedure." Rev E dated 5-21-15. These FAA-approved Instructions for Continued Airworthiness must be complied with and become a permanent part of the Aircraft Operations and Procedures manual.

5. DOCUMENTATION:

5.1. Weight & Balance.

5.1.1. If changed remove old heater of 18 lbs. (verify weight). And install new heater kit of 25 lbs. 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 #SA00971CH and PMA Supplement #38. Original heater replacement is authorized by way of FAA form 337. Alteration of aircraft by way of STC or PMA supplemental number and date must be recorded in the appropriate aircraft records.

5.1.2. If unchanged removal of the Combustion Heater and the installation of the C&D Associates Products TSO-C20 approved heater will have no net effect on weight and balance or electrical load requirements.

5.2. 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" located in MM10001 Rev I dated 8/1/14 or later FAA approved revision."

5.3. Utilize existing aircraft combustion heater operating instructions or other FAA approved combustion heater operating instructions where applicable.

5.4. NOTE: South Wind AD 81-09-09 Combustion Heater Airworthiness Directive does not apply to the C&D Associates, Inc. Combustion Heater.

5.5. Electrical requirements: 12VDC at 20Amp.

5.6. Fuel consumption: Maximum operation 1.25 gal/hour.

DOCUMENTATION AND PARTS REQUIREMENT TABLE

	DOCUMENTATION		Quantity	
1.	FAA/PMA Supplement #38		____	
2.	Installation Instructions IN12006K4		____	
3.	Label for flight manual		____	
4.	MM10001 Maintenance Manual		____	
5.	Quality Assurance Certificate of Compliance #527		____	
6.	STC #SA00971CH		____	
7.	337 Form		____	
	PARTS			**S/N**
1.	(1) Heater	CD12006-1	____	_____
2.	(1) Solid State Duct Sw.	CD21253	____	_____
3.	(1) Switch, Rotary	CD20654A	____	
4.	Hose, Ceet 1 ½" (black)	60198	____	
	(4) Worm Drive Clamps (1 ½")	60900-20	____	
5.	(1) Drain Line #4	21335	____	
6.	(1) Drain Hose	21279	____	
7.	(1) Regulator	CD20800	____	
	(1) Elbow	60144	____	
	(1) Elbow	60380	____	

Initials: _____ Date:_____

HEATER INSTALLATION INSTRUCTIONS FOR CD11214K5

For Cessna Model 190, 195, 195A, 195B

READ COMPLETE INSTRUCTIONS BEFORE BEGINNING INSTALLATION

This system has been built to be installed on an aircraft that conforms to that aircrafts original Type Certificate (TC). If aircraft has been modified from the original TC (modifications such as props, engines, fuel system etc.) contact C&D Associates, Inc. for possible adjustments to this 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.

LOG OF REVISIONS

Rev.	Description	Pages Revised	Date
A			

1. PREPARATION

1.1. Heater Removal:

1.1.1. Follow the Aircraft Service Manual or other FAA approved source for removal of the existing combustion heater.

1.1.2. Remove the existing combustion heater, fuel control valve, and remote fuel shutoff valve. The remaining ridged fuel line, extending from the left fuel tank down along the left fuselage, should be plugged with a #4 plug at this point.

1.2. Install the C&D Associates, Inc. TSO-C20 Approved Combustion Heater utilizing the existing Aircraft Service Manual or other FAA approved source where applicable.

2. MODIFICATIONS

2.1. Modify cabin floor as indicated in the drawing on page four. Complete location markings of steps a, b, and e before any cutting.

2.1.1 Locate step A on drawing, cut a 1 5/8” hole in floor at marked location. This hole is to allow the black combustion air hose to pass through.

2.1.2 Locate step B on drawing, drill four ¼” holes in cabin floor at marked locations. Insert four keyed #10-32 rivnuts for mounting the combustion air blower rubber mounts.

2.1.3 See step C. Install combustion air inlet adapter P/N 21356 in the existing old exhaust hole with scarf down and forward (scoops in air). Fasten with six evenly spaced 3/32” rivets. Connect the black 1 ½” hose to the adapter with a 1 ½” clamp. Route hose through existing lightning hose and up through new 1 5/8” hole (step B).

2.1.4 Locate step D. On the center line of the existing heater mounts, measure over 1 ¾" from the side of the inboard mount (3" back from step C edge) and mark for new exhaust. Measure over 8 ¼" from the side of the inboard heater mount for the new drain. Knockout the inboard mark to 2.625" for the exhaust. The other mark to 5/8" diameter for the new drain.

2.1.5 See step E on the drawing. From the edge of the old heater cavity, remove floor material identified by the dotted line previously marked as indicated on heater modification pattern, page 4.

2.1.6 See step F. Remove from the belly skin the old rectangular combustion air inlet adapter (drill out the old rivets) and install a small 6" by 3" patch using the existing rivet pattern.(see step F)

2.1.7 Set the fuel pump (as shown at step G) on the floor under the area of the ridged fuel line (capped in step 1). Locate the pump as indicated in the drawing with the removable end containing a filter (IN) towards outer skin. Mark the mounting leg holes in the floor per print. Install two ¼" holes for two PN CD21520 rubber mounts. Secure mounts with 60177 washers & 60172 self-locking nuts. Place the pump on the mounts and secure with ground wire, washer, and nuts in place.

3. INSTALLATION

3.1. Remove the two seven inch clamps from the new heater and install <u>through</u> the two mounting brackets that cradle the heater.

3.2. Set the new heater into the cradle. Tighten the two clamps around the heater. Verify that the heater sets completely down onto the two mounts and into the floor cavity.

3.3. Fasten the outlet plenum using four existing screw locations, two outboard and two inboard of the outlet plenum. (see step H) Two holes are in the flange aft of the plenum and may be used as a template to drill two holes for #8 sheet metal screws. (step I)

3.4. Install the combustion air blower by screwing four rubber mounts into the four rivnuts previously installed, (see step A on the drawing). Connect the black hose to the blower inlet and the red hose to the heater/blower outlet with four hose clamps.

3.5. Fuel Pump: Connect fuel line from heater to pump outlet and secure. Install the second fuel line at the pump inlet. Install and tighten AN815-4D #4 union in the other end of hose. Remove the previously installed plug from aircraft ridged fuel line and connect new hose with union in place.

4. ELECTRICAL (See page 6 for wiring schematic)

4.1. Identify the old wires removed from the original heater and at the old switch for the following: (Do this before installing the new switch)

4.1.1. Master switch ON, heater switch OFF.

One of the wires from the old heater will be HOT. This wire will not be used (tape off).

4.1.2 Master ON, fan switch ON.

4.1.3 Of the remaining wire, one will now become HOT. This wire should be connected to the new switch blue wire and terminal #6 on the new heater. This is power for the vent fan.

4.1.4 Master on heater switch in <u>heat</u> position. Of the remaining wires one will now become hot and should be connected to terminal #1 of the heater.

4.1.5 Remaining two wires (if they exist) may be used to interconnect the yellow (or orange) wires between the thermostat sensor and the yellow wires (no polarity) on the new switch.

4.1.6 Install the new switch using the old wiring or install new wiring.

4.2. Fuel Pump: Connect ground wire from pump leg to heater terminal strip #5. Hot wire to terminal #2 on heater.

4.3. Combustion Air Blower: Connect black ground wire to black pigtail from heater. White feed wire from pump to white pigtail.

4.4. Outlet plenum with ignition unit and thermostat: Connect ignition wire (white) to terminal strip #2 on heater. Black to main ground line on heater.

4.5. On the outlet plenum connect the thermostat ground black wire to terminal strip #5. Red wire to terminal strip #2. Blue wire to terminal strip #3. Yellow wires from thermostat to yellow wires on switch.

4.6. Optional hour meter is connected to terminal #2. Optional overheat light may be connected to terminal #4 on the heater strip.

5. INTERIOR

5.1. Trim interior to fit.

5.2. Outlet plenum can be customized to distribute heat properly.

6. TESTING

6.1 HEATER OPERATIONAL TEST AFTER INSTALLATION:

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

(Heater terminal strip numbered 1 2 3 4 5 6)

6.1.1 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. Usually you can find a small access point somewhere in the ducting aft of the heater.

CAUTION: Verify thermal couple is not touching plenum internal wall.

6.1.2 Setting upper limit temperature upper limit switch

6.1.2.1 If your heater is equipped with a CD21252…..

- ❑ Place a 6" 20G jumper wire with 2 small alligator clips (or the like) across the heater terminal strip numbers 2 and 3, which will bypass the aircraft thermostat. (Fig. 1)

CAUTION: Be sure not to short any other terminals.

- ❑ With the heater running, verify that the outlet plenum temp. is approx. 250°. Adjust the temperature of the heat duct outlet distribution plenum to an average ambient temperature as follows.
  - For non-pressurized aircraft set switch to a low of 215º and a high of 255º.
  - For pressurized aircraft set switch to a low of 190˚ and a high of 225˚.

NOTE: Adjustment is made by rotating a small 1/16" screw located next to the wires on the side of the switch. It may have a dab of inspectors lacquer over the screw. Rotation clockwise one turn will increase temperature approx. 20° F. Decrease temperature by turning counterclockwise (Fig 2).

- ❑ After sensor is adjusted, place small drop of tamper proof seal on adjustment screw to lock in settings so as to not change due to vibration. Use a product that can be easily removed for readjustment if necessary.
- ❑ 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.
- ❑ Remove the temperature probe sealing the hole with high temperature silicone.

Figure 1

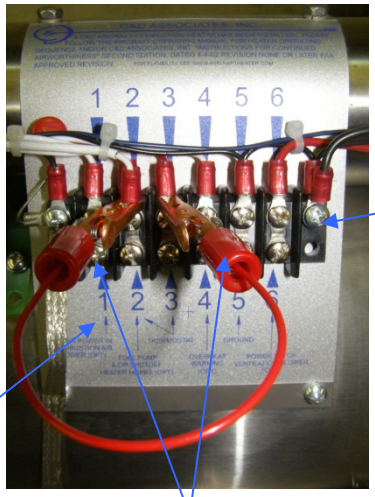
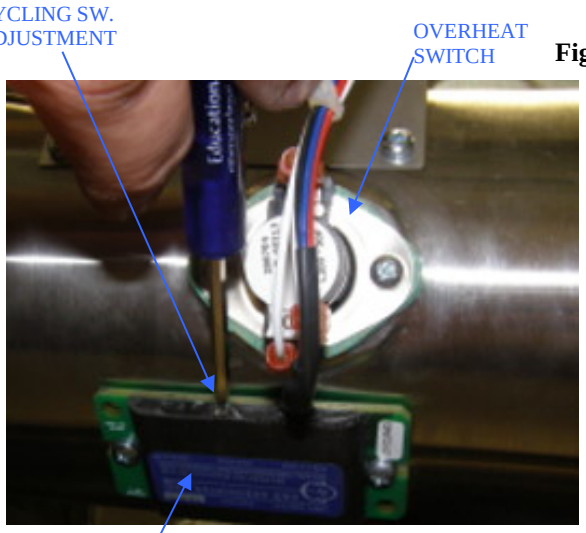


Figure 2



6.1.2.2 If your heater is not equipped with CD21252…..

Upper limit adjustments should be made in accordance with aircraft manufacturer's instructions**.**

6.1.3 Install the fuel pressure gauge (0-15). Tee into as shown. (Fig. 3)

- ❑ With the heater running, verify fuel pressure.
  - Preferred pressure is 8psi. (6.5psi min, 10psi max)

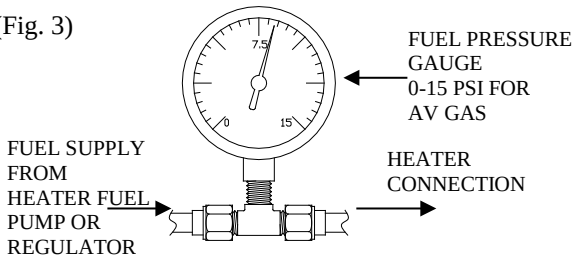


Figure 3

6.1.4 Remove the fuel gauge installed in step 6.1.3. Leave the "tee" fitting and cap off for future pressure readings if desired.

6.2 Verify proper installation is completed in accordance with the aircraft maintenance manual.

6.2.1 Verify all wires are secure and free of obstruction and chaffing.

6.2.2 If the hoses need to be replaced, we recommend Sceet-6 (1 ½") red from the blower to the heater and Ceet-6 (1 ½") black from outside air to the blower.

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

7. After installation, complete the operation and heat output tests specified in the C&D Associates, Inc. MM10001 Maintenance Manual for aircraft combustion heaters Rev L, dated 5/21/15 or later FAA approved revision. Tests should be accomplished in accordance with section 10.3 operational test, and 10.4 for heat output. Also in accordance with the "Instructions for Continued Airworthiness" "Preflight/Operational check and Shutdown Procedure." Rev E dated 5-21-15. These FAA-approved Instructions for Continued Airworthiness must be complied with and become a permanent part of the Aircraft Operations and Procedures manual.

8. DOCUMENTATION:

8.1. Weight & Balance.

8.1.1. If changed remove old heater of 18 lbs. (verify weight). And install new heater kit of 20 lbs. 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 # SA00971CH and PMA Supplement #38. Original heater replacement is authorized by way of FAA form 337. Alteration of aircraft by way of STC or PMA supplemental number and date must be recorded in the appropriate aircraft records.

8.1.2. If unchanged removal of the Combustion Heater and the installation of the C&D Associates Products TSO-C20 approved heater will have no net effect on weight and balance or electrical load requirements.

8.2. 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" located in MM10001 Rev I dated 8/1/14 or later FAA approved revision."

8.3. Utilize existing aircraft combustion heater operating instructions or other FAA approved combustion heater operating instructions where applicable.

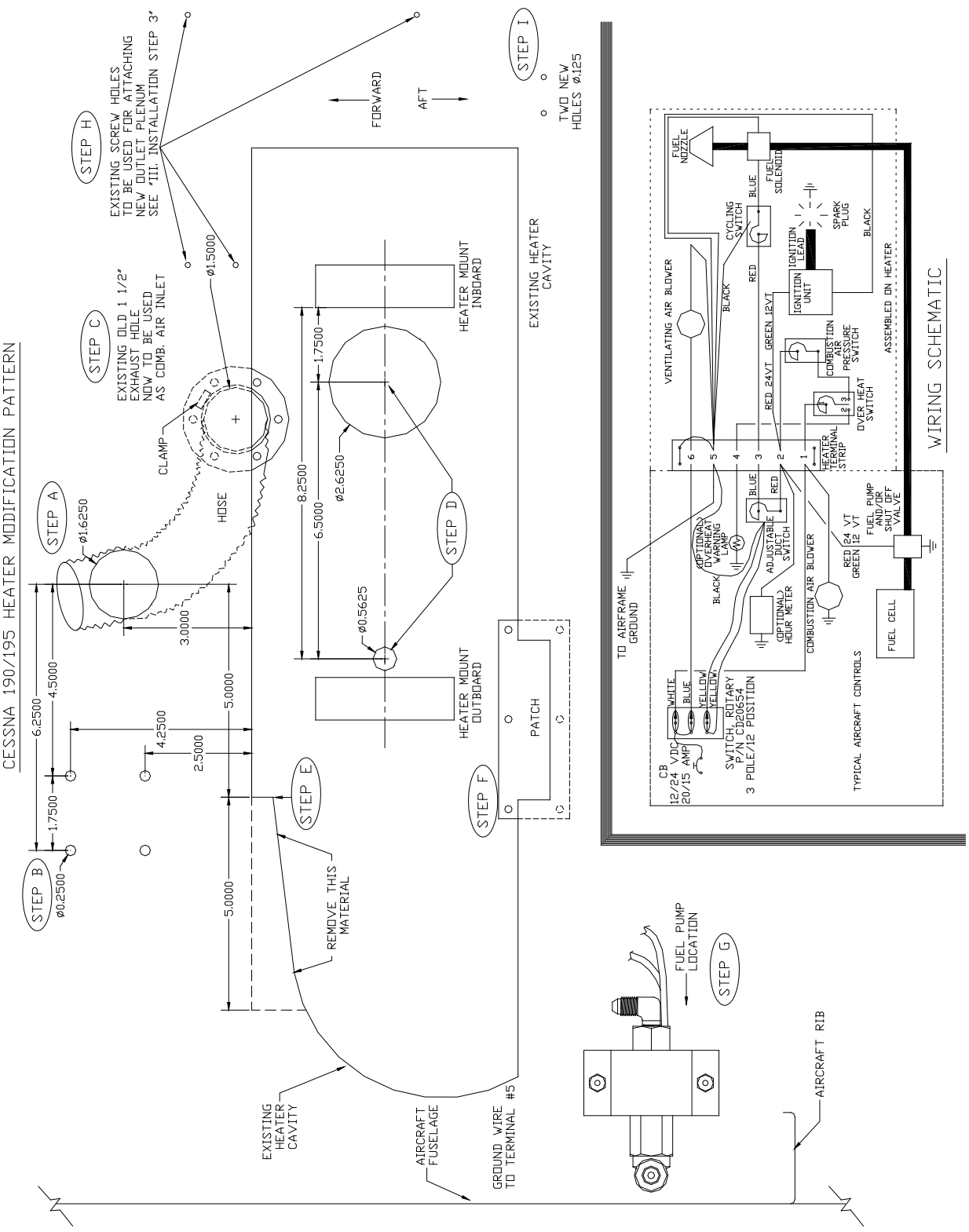
8.4. Electrical requirements: 12VDC at 20Amp.

8.5. Fuel consumption: Maximum operation 1 gal/hour.

DOCUMENTATION AND PARTS REQUIREMENT TABLE

DOCUMENTATION		Quantity	
1. FAA/PMA Supplement #38		____	
2. Installation Instructions IN11214K5		____	
3. Label for flight manual		____	
4. MM10001 Maintenance Manual		____	
5. Quality Assurance Certificate of Compliance #527		____	
6. STC #SA00971CH		____	
7. 337 Form		____	
PARTS			**S/N**
1. (1) Heater	CD11214-1	____	_____
2. (2) Clamp (6-7")	60900-104	____	
3. (1) Drain	20651	____	
4. (1) Drain Hose	20652	____	
5. (1) Outlet Plenum Deflector	21364	____	
6. (1) Outlet Plenum Shield	21368	____	
7. (1) Outlet Plenum Assembly	29150	____	
8. (1) Fuel Pump Assembly	29104	____	
9. (4) 2" Hose Clamps	60900-28	____	
10. (1) Hose Ceet 1 ½ Black	60198	____	
11. (2) Hose Sceet 1 ½" Red	60199	____	
12. (1) Union	60134	____	
13. (1) Comb. Air Inlet	21356B	____	
14. (1) Blower Assembly	29052	____	
15. (1) Fuel Line Assembly (18")	20715	____	
16. (1) Switch, Rotary	20654	____	
17. (1) Wire, 14g white	8'	____	
18. (1) Wire, 14g blue	8'	____	
19. (2) Wire, 18g yellow	8'	____	

Initials: _____ Date:_____


CESSNA 190/195 HEATER MODIFICATION PATTERN
STEP A
STEP B
STEP C
STEP D
STEP E
STEP F
STEP G
STEP H
STEP I
EXISTING SCREW HOLES TO BE USED FOR ATTACHING NEW OUTLET PLENUM SEE "III. INSTALLATION STEP 3"
EXISTING OLD 1 1/2" EXHAUST HOLE NOW TO BE USED AS COMB. AIR INLET
CLAMP
HOSE
FORWARD
AFT
TWO NEW HOLES Ø.125
EXISTING HEATER CAVITY
HEATER MOUNT INBOARD
HEATER MOUNT OUTBOARD
PATCH
REMOVE THIS MATERIAL
EXISTING HEATER CAVITY
AIRCRAFT FUSELAGE
GROUND WIRE TO TERMINAL #5
FUEL PUMP LOCATION
AIRCRAFT RIB
WIRING SCHEMATIC
FUEL NOZZLE
FUEL SOLENOID
CYCLING SWITCH
SPARK PLUG
IGNITION LEAD
IGNITION UNIT
VENTILATING AIR BLOWER
COMBUSTION AIR PRESSURE SWITCH
ASSEMBLED IN HEATER
OVER HEAT SWITCH
HEATER TERMINAL STRIP
TO AIRFRAME GROUND
(OPTIONAL) OVERHEAT WARNING LAMP
ADJUSTABLE DUCT SWITCH
(OPTIONAL) HOUR METER
COMBUSTION AIR BLOWER
FUEL PUMP AND/OR SHUT OFF VALVE
FUEL CELL
CB 12/24 VDC 20/15 AMP
SWITCH, ROTARY P/N CD2064 3 POLE/12 POSITION
TYPICAL AIRCRAFT CONTROLS
BLACK
BLUE
RED
RED 24VT
GREEN 12VT
WHITE
YELLOW
RED 24 VT
GREEN 12 VT

HEATER INSTALLATION INSTRUCTIONS FOR
CD11215K6
For Lake Model LA-4, LA-4A, LA-4P, LA-4-200

READ COMPLETE INSTRUCTIONS BEFORE BEGINNING INSTALLATION

This system has been built to be installed on an aircraft that conforms to that aircrafts original Type Certificate (TC). If aircraft has been modified from the original TC (modifications such as props, engines, fuel system etc.) contact C&D Associates, Inc. for possible adjustments to this 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.

LOG OF REVISIONS

Rev.	Description	Pages Revised	Date
I	Reformatted and updated 'test after installation' section	All	8/11/15

1. PREPARATION

1.1. Heater Removal:

- Follow the Aircraft Service Manual or other FAA approved source for removal of the existing combustion heater.
- Remove the existing combustion heater, fuel safety valve and drain line.

1.2. Install the C&D Associates, Inc. TSO-C20 Approved Combustion Heater utilizing the existing Aircraft Service Manual or other FAA approved source where applicable.

2. MODIFICATIONS (See page seven illustrations)

2.1. Combustion air blower:

Using the existing rear heater mount bracket, the lower front left edge will be used as a reference point. Mark two lines 1.75" and 2.75" forward and parallel with the aft heater mount to airshaft centerline. From the reference point measure inboard marking two lines parallel with the aircraft center line at 2.125" and 3.625" intersecting the first two lines. Drill four ¼" holes at intersections. Install four 10/32 rivnuts and blower-mounting bracket. Secure the combustion air blower (outlet pointing forward) with the two clamps. When properly installed the blower housing will be inline with and just touching the fiberglass heater bonnet when installed.

2.2 Heater Mounts:

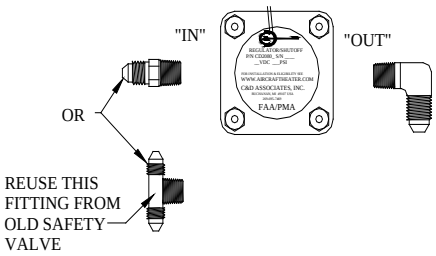
Remove the two heater mounts and use as a template for the spacers supplied with the kit. Install spacers under each mount to provide ¼" lift and secure into place.

2.3 Fuel Pump:

Carbureted series only. Mount the pump on the rear heater mount, aft left side in the location of the old safety valve which had been removed.

2.4 Remote Shut Off:

Fuel Injected series only. Mount the remote shut off on the rear heater mount, aft left side in the location of the old safety valve, which had been removed. Install T-fitting from old safety valve if required.



2.5 Heater Bonnet

2.5.1 Exhaust:

On the right side of the heater bonnet measure aft 5/8" from the back edge of the existing rectangular exhaust hole and 1 7/8" up from the bottom of the mounting flange. Using this location as a center mark cut a 2 ¼" round hole for the exhaust.

2.5.2 Exhaust Deflector:

Remove three rivets directly under the new exhaust hole and install the deflector P/N . Fasten by using three 8/32 screws, nuts, and washers.

2.5.3 Combustion Air Inlet:

On the left side of the heater bonnet measure 15" from the trailing edge and 2" up from the mounting flange. Drill a ½" hole and temporarily place the bonnet in place. Verify that the drilled hole lines up with the motor shaft. Make any adjustments necessary and then enlarge the hole to 2".

3. INSTALLATION

3.1 Combustion Air Blower:

Install blower on previously installed bracket (see step 2-A). Secure with tow 3" clamps. Make sure air flow outlet is facing forward. Blower assembly should be located in such a way as to minimize clearance between blower housing inlet and the bonnet when installed.

3.2 Heater:

Install plenum with hose adapter down (inline with drain). Place the new C&D heater onto the heater mounts with the drain straight down and exhaust off to the right side of the aircraft centerline. With the clamps loosely fastened, place the bonnet in place and adjust the heater to match exhaust location. Secure clamps.

3.3 Drain Line:

Install from heater drain along right side of aft heater mount. Connect drain hose from fuel box to drain line.

3.4 Thermostat:

Install on right aft end of outlet plenum. Drill two 1/8" dia. Holes 2 ¾" apart. Install one ½" hole half way in between. Mount the thermostat with two sheet metal screws.

4. ELECTRICAL (See page 5 for wiring schematic)

4.1 Identify the old wires removed from the original heater and at the old switch for the following: (Do this before installing the new switch)

4.1.1 Master switch ON, heater switch OFF.
One of the wires from the old heater will be HOT. This wire will not be used (tape off).

4.1.2 Master ON, fan switch ON.
Of the remaining wire, one will now become HOT. This wire should be connected to the new switch blue wire and terminal #6 on the new heater. This is power for the vent fan.

4.1.3 Master ON, heater switch in HEAT position. Of the remaining wires one will now become hot and should be connected to terminal #1 of the heater.

4.1.4 Remaining two wires (if they exist) may be used to interconnect the yellow wires between the thermostat and the yellow wires on the new switch.

4.1.5 Install the new switch using the old wiring or install new wiring.

4.2 Fuel Pump:

4.2.1 Fuel Pump - Carbureted only. Hot wire to terminal #2 on heater.

4.2.2 Solenoid remote shutoff – Fuel Injected only. Hot wire to terminal #2 on heater.

4.3 Combustion Air Blower: Connect black ground wire to terminal #5 of terminal strip on heater. Red to heater terminal strip #1.

4.4 Outlet plenum with ignition unit and thermostat: Connect ignition wire from terminal strip number #3 to ignition unit.

4.5 On the outlet plenum connect the thermostat ground black wire to terminal strip #5. Red wire to terminal strip #2. Blue wire to terminal strip #3. Yellow wires from thermostat to yellow wires on switch.

4.6 Optional hour meter is connected to terminal #2. Optional overheat light may be connected to terminal #4 on the heater strip.

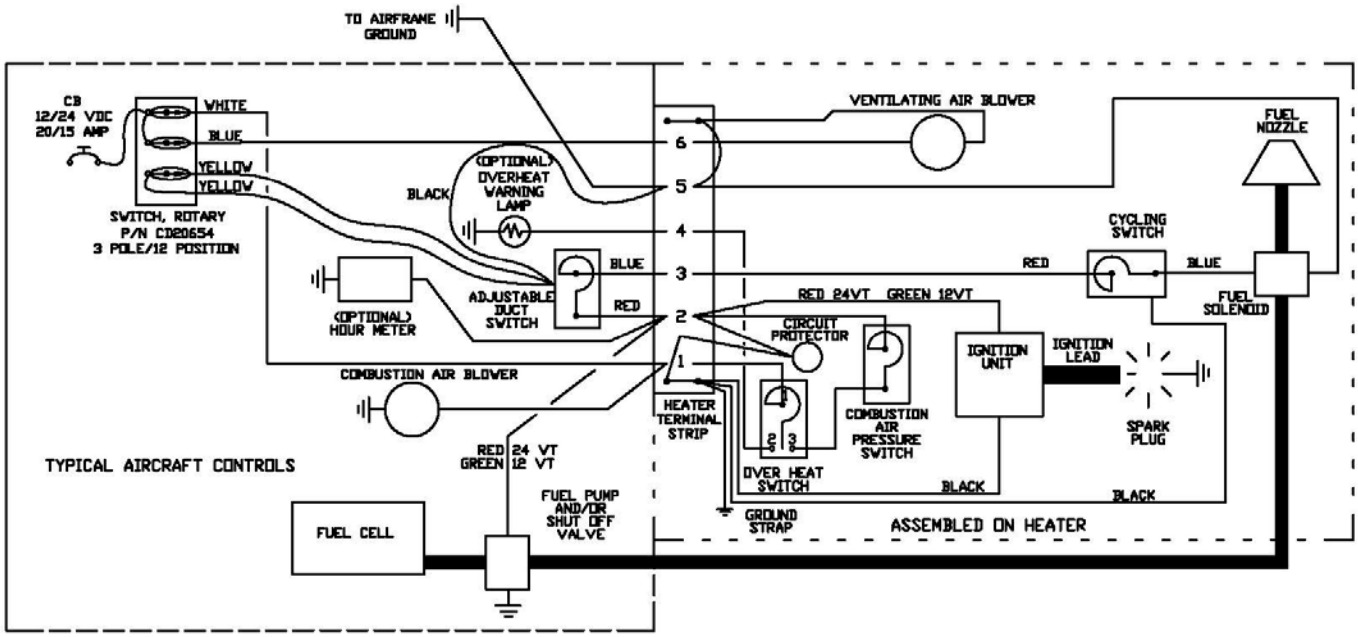


FIGURE 1

5. TESTING

5.1 HEATER OPERATIONAL TEST AFTER INSTALLATION:

IMPORTANT!! Please complete the followings steps after the new heater is installed in the aircraft. (Heater terminal strip numbered 1 2 3 4 5 6)

5.1.1 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. Usually you can find a small access point somewhere in the ducting aft of the heater.

CAUTION: Verify thermal couple is not touching plenum internal wall.

5.1.2 Setting upper limit temperature upper limit switch

5.1.2.1 If your heater is equipped with a CD21252…..

- ❑ Place a 6" 20G jumper wire with 2 small alligator clips (or the like) across the heater terminal strip numbers 2 and 3, which will bypass the aircraft thermostat. (Fig. 2)

CAUTION: Be sure not to short any other terminals.

- ❑ With the heater running, verify that the outlet plenum temp. is approx. 250°. Adjust the temperature of the heat duct outlet distribution plenum to an average ambient temperature as follows.
  - For non-pressurized aircraft set switch to a low of 215º and a high of 255º.

NOTE: Adjustment is made by rotating a small 1/16" screw located next to the wires on the side of the switch. It may have a dab of inspectors lacquer over the screw. Rotation clockwise one turn will increase temperature approx. 20° F. Decrease temperature by turning counterclockwise (Fig 3).

- ❑ After sensor is adjusted, place small drop of tamper proof seal on adjustment screw to lock in settings so as to not change due to vibration. Use a product that can be easily removed for readjustment if necessary.
- ❑ 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.
- ❑ Remove the temperature probe sealing the hole with high temperature silicone.

Figure 2

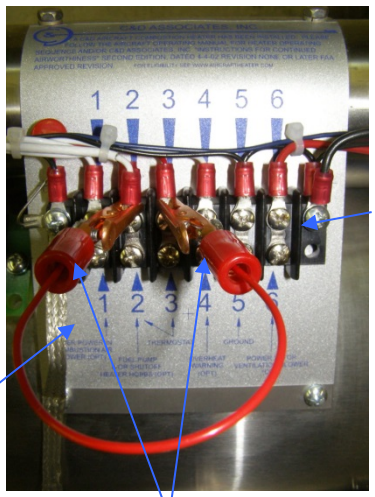
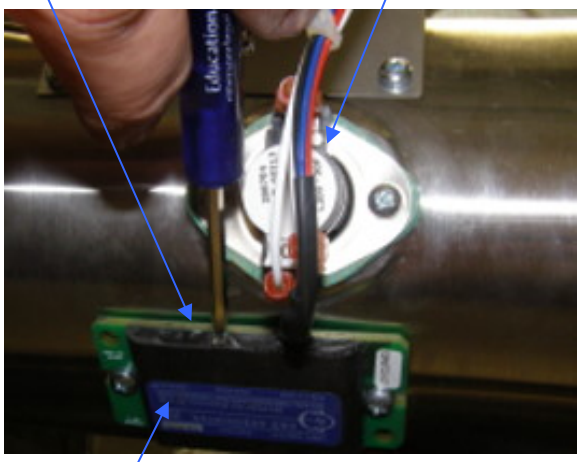


Figure 3



5.1.2.2 If your heater is not equipped with CD21252…..

Upper limit adjustments should be made in accordance with aircraft manufacturer's instructions**.**

5.1.3 Install the fuel pressure gauge (0-15). Tee into as shown. (Fig. 4)

- ❑ With the heater running, verify fuel pressure.
  - Preferred pressure is 8psi. (6.5psi min, 10psi max)

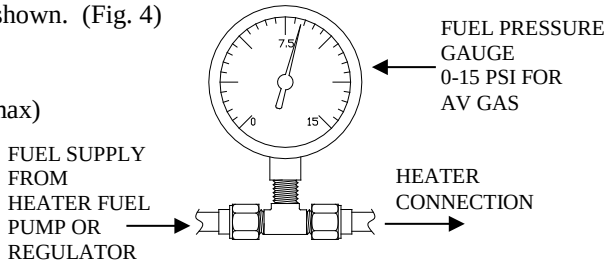


Figure 4

5.1.4 Remove the fuel gauge installed in step 5.1.3. Leave the "tee" fitting and cap off for future pressure readings if desired.

5.2 Verify proper installation is completed in accordance with the aircraft maintenance manual.

5.2.1 Verify all wires are secure and free of obstruction and chaffing.

5.2.2 If the hoses need to be replaced, we recommend Sceet-6 (1 ½") red from the blower to the heater and Ceet-6 (1 ½") black from outside air to the blower.

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

6. After installation, complete the operation and heat output tests specified in the C&D Associates, Inc. MM10001 Maintenance Manual for aircraft combustion heaters Rev L, dated 5/21/15 or later FAA approved revision. Tests should be accomplished in accordance with section 10.3 operational test, and 10.4 for heat output. Also in accordance with the "Instructions for Continued Airworthiness" "Preflight/Operational check and Shutdown Procedure." Rev E dated 5-21-15. These FAA-approved Instructions for Continued Airworthiness must be complied with and become a permanent part of the Aircraft Operations and Procedures manual.

7. DOCUMENTATION:

7.1 Weight & Balance.

7.1.1 If changed remove old heater of 18 lbs. (verify weight). And install new heater kit of 20 lbs. 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 # SA00971CH and PMA Supplement #38. 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.

7.2 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" located in MM10001 Rev I dated 8/1/14 or later FAA approved revision."

7.3 Utilize existing aircraft combustion heater operating instructions or other FAA approved combustion heater operating instructions where applicable.

7.4 Electrical requirements: 12VDC at 20Amp.

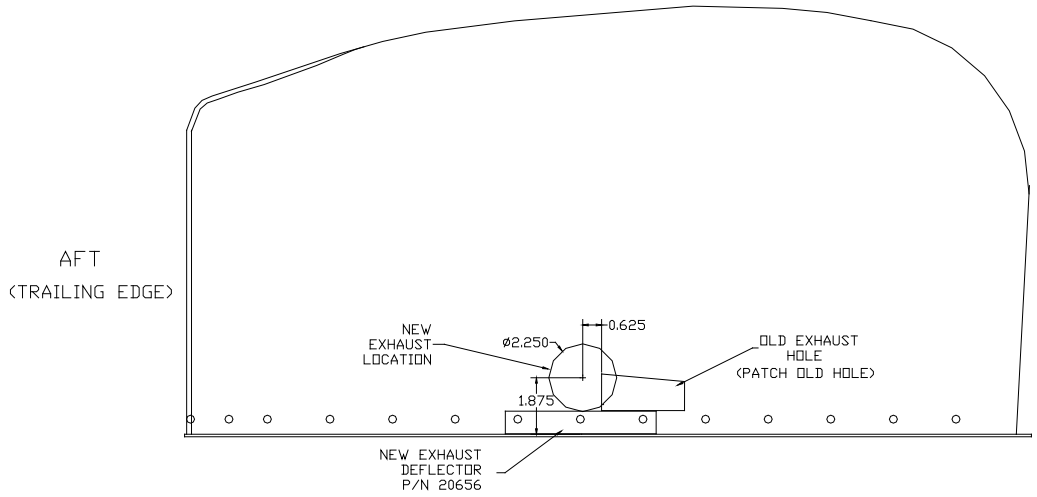
7.5 Fuel consumption: Maximum operation 1 gal/hour.

DOCUMENTATION AND PARTS REQUIREMENT TABLE

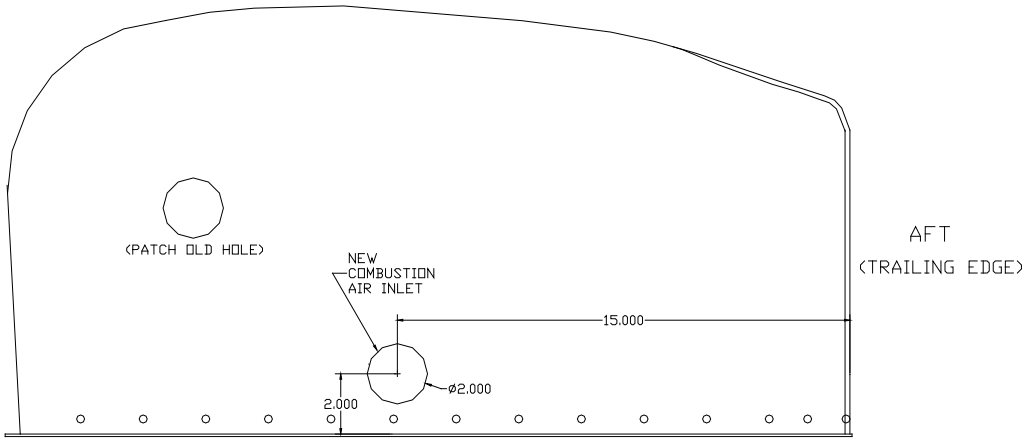
	DOCUMENTATION	Quantity
1.	FAA/PMA Supplement #38	____
2.	Installation Instructions IN11215K6	____
3.	Label for flight manual	____
4.	MM10001 Maintenance Manual	____
5.	Quality Assurance Certificate of Compliance #527	____
6.	STC #SA00971CH	____
7.	337 Form	____

	PARTS				S/N
1.	(1) Heater		CD11215-1	____	_____
2.	(1) Drain Line #4		21372	____	
3.	(1) Drain Hose 9”		21279	____	
4.	(1) Fuel pump Assy		29103	____	
5.	(1) Inlet Reflector		21373	____	
6.	(1) Blower Assembly		21693	____	
7.	(1) Deflector		20656	____	
8.	(2) Spacer (8” x 1: x ¼”)		20657	____	
9.	(18”) 1 ½” x 18” Sceet Hose		60199	____	
10.	(2) Worm Drive Clamps		60900-20	____	
11.	(1) Fuel Line (10”) #4		20715	____	
12.	(1) Switch, Rotary	(OPTIONAL)	20654	____	
13.	(1) Adj. Duct Sw.	(OPTIONAL)	21253	____	_____
14.	(2) Worm Drive Clamps	(OPTIONAL)	60900-104	____	
15.	(1) Plenum	(OPTIONAL)	21476	____	
16.	(1) Mount	(OPTIONAL)	21477	____	
17.	(1) Mount	(OPTIONAL)	21478	____	
18.	(1) 7.5 Regulator	(OPTIONAL)	20800	____	
19.	(1) 90 deg. elbow	(OPT W/20800)	60144	____	
20.	(1) Elbow, 1/8” NPT	(OPT W/20800)	60024	____	

Initials: _____ Date:_____



RIGHT SIDE



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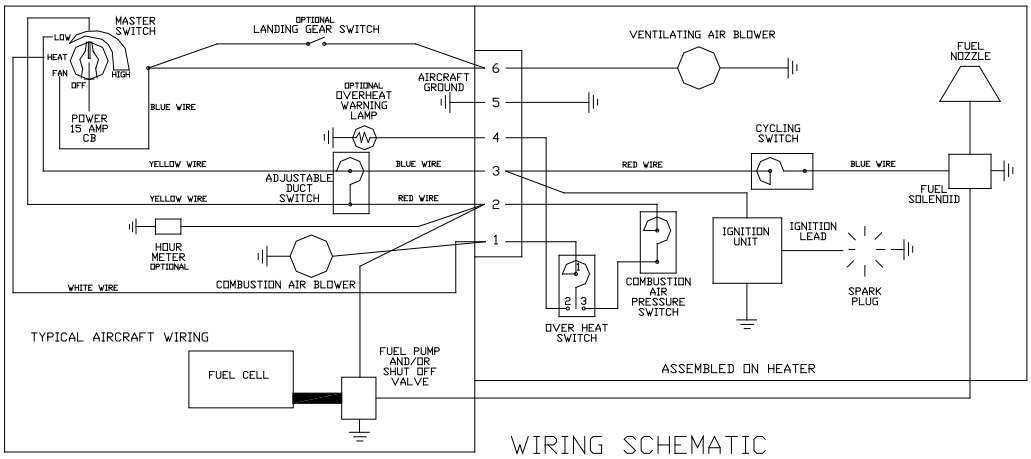

WIRING SCHEMATIC

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