

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

Number SA01526CH

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 herein meets the airworthiness requirements of Part 3 of the Civil Air Regulations.

(See Type Certificate Data Sheet No. 1A13 for complete certification basis)

Original Product Type Certificate Number: 1A13
Make: REVO Inc.
Model: Lake LA-4, Lake LA-4A, Lake LA-4P, Lake LA-4-200,
Lake Model 250

Description of Type Design Change:

Installation of C&D Associates Combustion Heater Kit 7 (Part Number CD12011K7) in accordance with C&D Associates, Inc., Heater Installation Instructions IN12011K7, Rev. H, dated October 22, 2013, 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. 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: June 26, 2001

Date reissued: February 12, 2014;
February 11, 2016

Date of issuance: August 23, 2001

Date amended:



By direction of the Administrator


(Signature)

Timothy Smyth
Manager, Propulsion and Program Management Branch
Chicago Aircraft Certification Office

(Title)



**HEATER INSTALLATION INSTRUCTIONS FOR
 KIT, P/N CD12011K7**

For Lake LA-4, LA-4A, LA-4P, LA-4-200, Lake 250

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, updated Op test after install 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.

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. INSTALLATION

2.1. Heater Mounting Bracket Installation: (see figure #5)

2.1.1. Place a centerline mark on top of the cabin from the engine pylon forward 30" for alignment of the heater mounts and bonnet. Remove the vent outlet panel located aft of the overhead control panel.

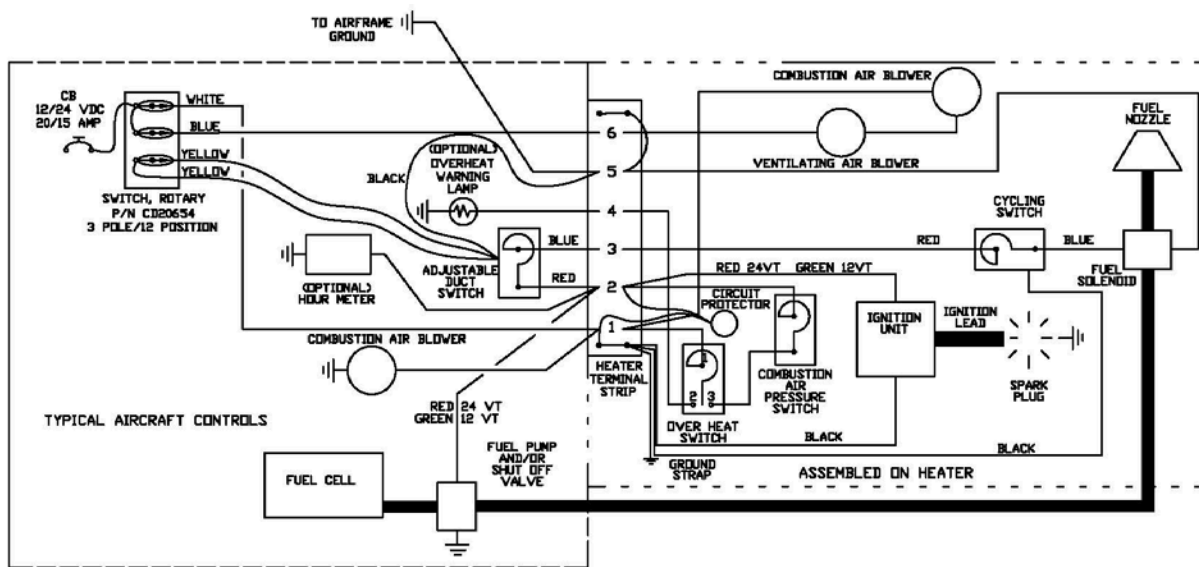
2.1.2. Doubler plate P/N 20710: At station 1470 identified approximately 12" forward of the engine pylon, where the aircraft skin overlaps. Remove the row of rivets (three on either side of the C/L), which holds the overlapped skins to a rib. Place the doubler P/N 20710 with the rivet locator line marked on the doubler over the removed rivets line (2 5/8 hole aft) and equally over the centerline mark. Transfer the existing rivet hole locations to the new doubler and temporarily fasten into place. Without moving the doubler, transfer the other holes in the new doubler to the roof of the aircraft. Install the new doubler using the original rivet pattern. Install the heat transfer adapter p/n 20709 (longer end down) through the 2 5/8" hole. The 1/4" bead will keep the adapter from passing through the hole.

2.1.3. Aft Heater Support Assembly P/N 20706: Mount this assembly, flanges forward, onto the new doubler P/N 20710 using three AN3-5A bolts, six AN960-10L washers and three AN365-10132 self-locking nuts.



- 2.1.4. Forward Heater Support Bulkhead P/N 20704: Locate this support (flanges aft) over the center line (mounting hole to mounting hole) 19" from the aft heater support. Install using 3 each AN3-5A bolts, six AN960-10L washers, and three AN365-10/32 self-locking nuts.
- 2.2. Combustion Air Blower Installation:
 - 2.2.1. Mount the combustion blower (housing to left side) onto the doubler just forward of the pylon, secure with four 10/32" self-locking nuts. Adjust motor clamps as needed for clearance when bonnet is installed.
 - 2.2.2. Install temporarily the new heat distribution plate. P/N 20708. Install the transfer adapter P/N 20709 thru the 2 5/8" hole from above to rest on the distribution plate. From above, mark the hole and cut the distribution plate as needed to allow the transfer adapter to extend down through the distribution plate. Remove the distributor plate, P/N 20708 until step #9.
- 2.3. Aft Bonnet Section: (see figure #5)
 - 2.3.1. Exhaust opening on the right side of bonnet. Measure along the lower mounting flange from the front 7 3/4" using a 90° square measure up 3 1/2". This will be the location of a 2 1/8" hole to be cut in the bonnet. After the hole is cut, use a square to extend the opening down to within 1/2" of the bottom flange.
 - 2.3.2. Combustion Air Blower Inlet: On the left side measure from the front 18 1/4" along the lower mounting flange and up with the square 2 1/2". Make a 2" hole.
 - 2.3.3. Drain location: On the left side, measure from the front 1" along the lower mounting flange and up with the square 1". Make a 1/2" hole for the drain.
- 2.4. Installing the heater:
 - 2.4.1. Insert the front of the heater into the front bulkhead mount and aft cradle mount. Adjust heater so that the forward drain is square with the roof, and the outlet plenum adapter fits into the transfer adapter P/N 20709, which may need to be trimmed for a secure fit. Before tightening the 6" clamp for final installation, verify that, with the bonnet installed, the exhaust of the heater is in correct alignment with the top of the bonnet exhaust cut out. After a trial fit of the bonnet, tighten the 6" clamp on the aft mount. Connect the Combustion Blower to the combustion air inlet adapter by using the 1 1/2" scet hose and clamps.
- 2.5. Regulator/Fuel Pump Installation: Install at the aft, left side, of the rear heater support assembly. For fuel injected A/C (20-35 PSI supplied) install the fuel regulator with the out port up. Aircraft that have carburetor (1-7 PSI supplied) install the fuel pump with the removable filter cap down.
- 2.6. Fuel Line Connections: Install the #4 fuel line from heater to "out" port of fuel regulator or fuel pump. Connect fuel line from fuel regulator or fuel pump to existing fuel line "T" fitting.
- 2.7. Fuel Drain Line: Fixed line from heater to outboard of bonnet, left side. Rubber drain line, fuel box to "y" on fixed line.
- 2.8. Electrical:
 - 2.8.1. Provide a 20 amp fused circuit up to the existing overhead panel just forward of the new heat distributor housing. Install the new heater control switch in a convenient location in this panel using the new "heater control" decal as a pattern. Route the white, blue, and two yellow wires back to the wire bundle going up through the cabin roof. Secure as needed.
 - 2.8.2. Heater Control Switch Wire Connections: Red to 20 amp circuit breaker, white to terminal #1 on heater, blue to terminal #6 on heater, yellow to thermostat sensor yellow wires (non polarity), located on back of heater outlet plenum.
 - 2.8.3. Thermostat Sensor: On back of outlet plenum "red wire to heater terminal #2, blue wire to heater terminal #3, black to ground."
 - 2.8.4. Combustion Air Blower: Red to heater terminal #1, black to #5(ground)

- 2.8.5. Regulator or Fuel Pump: Regulator - “green wire to heater terminal #2, black wire to heater terminal #5.” Fuel Pump – “wire to heater terminal #2.”
- 2.8.6. Hour Meter (optional): wire to terminal #2, wire to #5 (ground).
- 2.8.7. Heater Terminal Strip: Terminal #5 to airframe for grounding purposes.
- 2.8.8. Braided ground strap also to airframe for proper grounding.



- 2.9. Place the assembled bonnet over the installed heater and transfer the flange holes to the aircraft roof. Install eleven 8/32” rivnuts in the roof and reinstall the bonnet using eleven 8/32” x 5/8” screws. Install the upper fairing P/N 20702.
- 2.9.1. Exhaust Shield P/N 20711: Place over the exhaust and transfer the four mounting holes to the bonnet. Install four 8/32” rivnuts into the bonnet and secure the shield in place with four 8/32” x 1/2” screws.
- 2.9.2. Fairing P/N 20702: Install over the new bonnet, locating the two lower holes as needed to match the rivnuts in the bonnet.
- 2.10. Heat Distribution Plate and Housing P/N’s 20708 and 20707 installation: Reinstall the Distribution plate P/N 20708. Make sure the adapter P/N 20709 is extending through the 2 5/8” hole and seal with silicone. Heat distribution outlets may be installed in the distribution housing P/N 20707 as desired. Secure the housing through the plate and onto the cabin ceiling.

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 215° and a high of 255°.
- 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 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

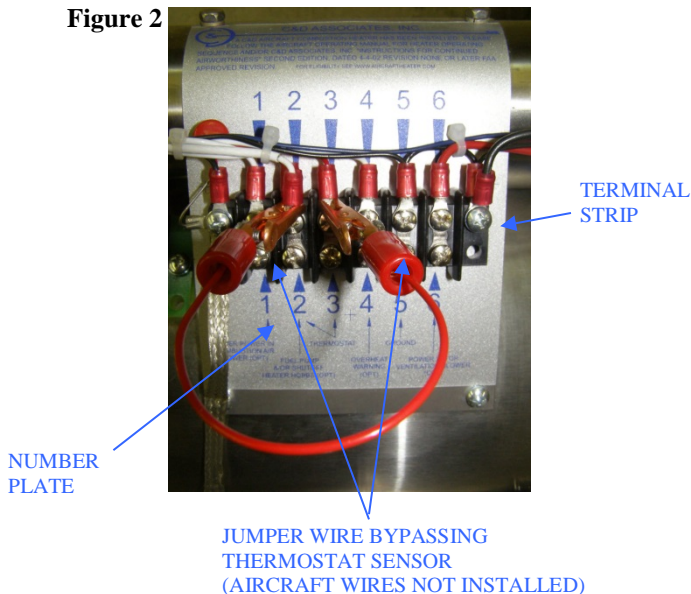
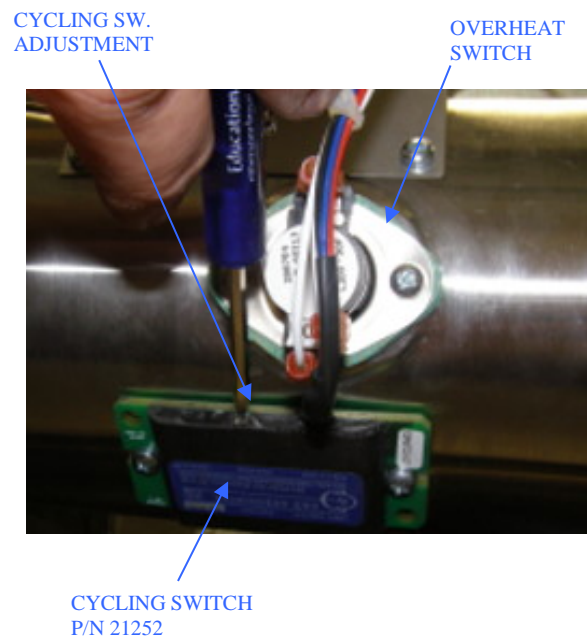


Figure 3



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)

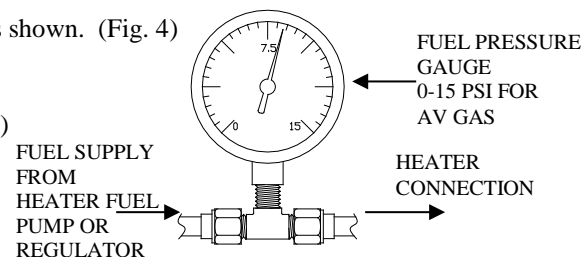


Figure 4

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 __ lbs (verify weight). And install new heater kit of 40 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 #SA01526CH and PMA Supplement #26. 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. Electrical requirements: 12VDC at 18Amp.
- 5.5. Fuel consumption: Maximum operation 1.25 gal/hour.

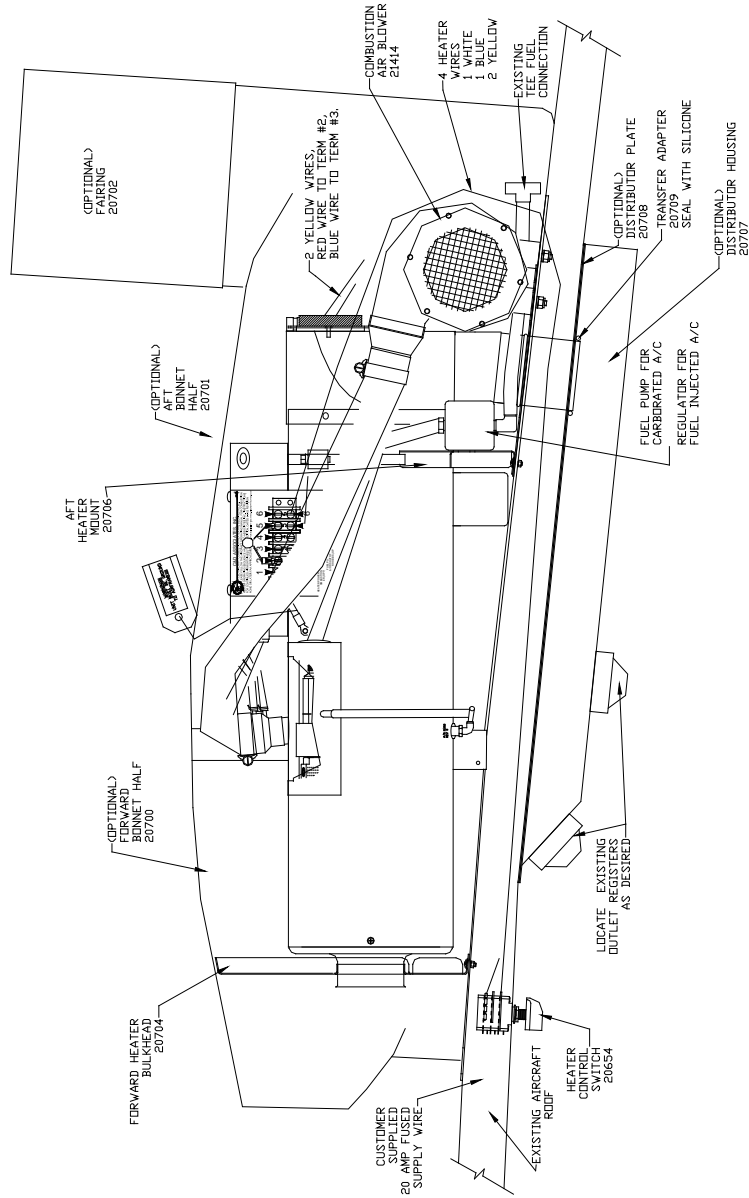


FIGURE 5
 OPTIONAL ITEMS AVAILABLE
 NOT STANDARD ON KIT

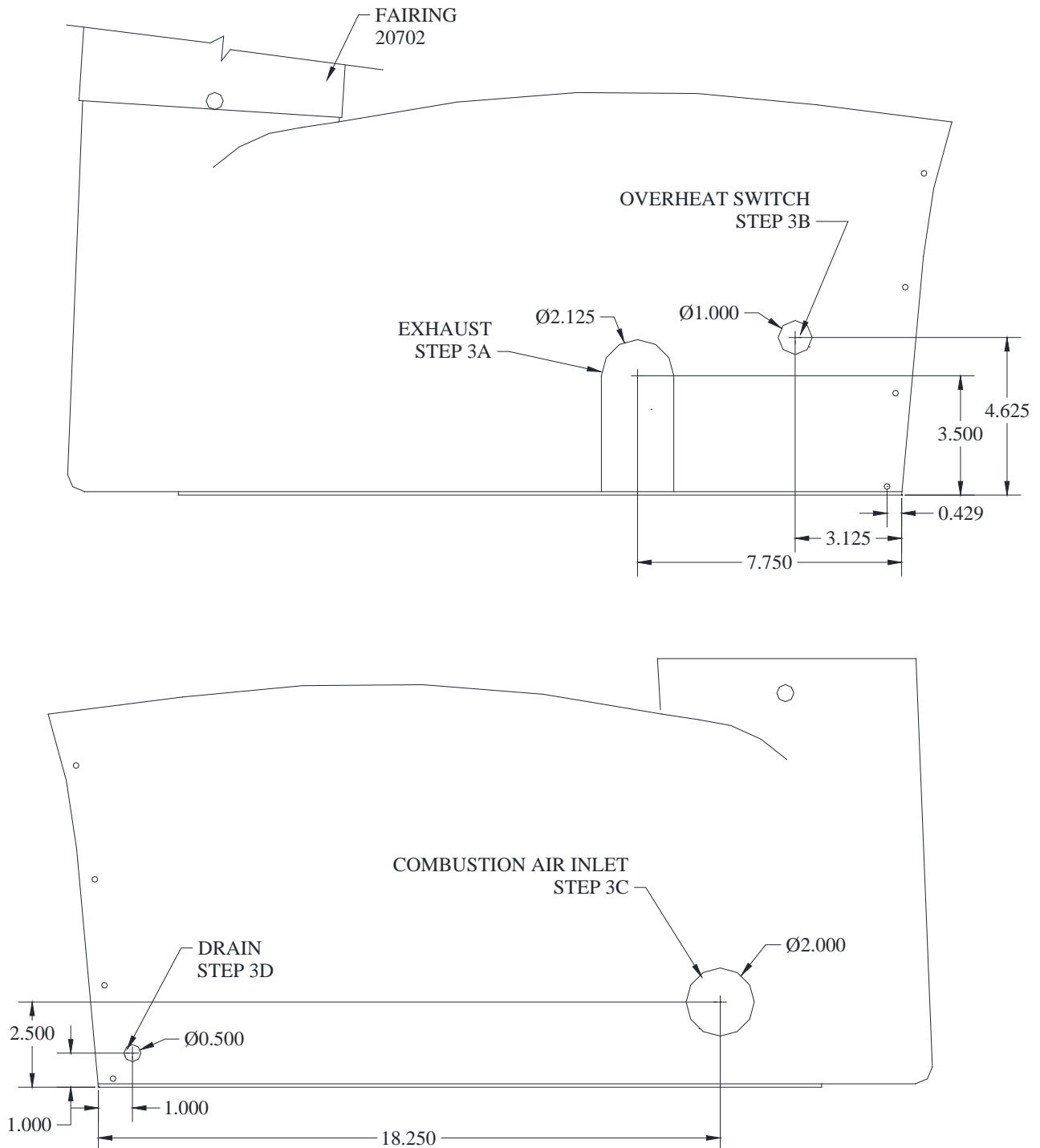


FIGURE 6, BONNET, AFT SECTION P/N 20701



C&D ASSOCIATES, INC.

IN12011K7
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 Rev I dated 8/11/15

DOCUMENTATION AND PARTS REQUIREMENT TABLE

DOCUMENTATION		Quantity
1.	FAA/PMA Supplement #26	_____
2.	FAA/STC # SA01526CH	_____
3.	Installation Instructions IN12011K7	_____
4.	Label for flight manual	_____
5.	MM10001 Maintenance Manual	_____
6.	Quality Assurance Certificate of Compliance #527	_____
7.	337 Form	_____
PARTS		S/N
	1. (1) Heater	CD12011-1
	2. (1) Bonnet, Front (Optional)	20700
	3. (1) Bonnet, Aft (Optional)	20701
	4. (1) Fairing (Optional)	20702
	5. (1) Bulkhead	20704
	6. (1) Plenum Assy	20705
	7. (1) Support Assy	20706
	8. (1) Housing, Heat Distributor (Optional)	20707
	9. (1) Eyeball Swivel Vent (Optional)	60464
	10. (1) Combustion Air Inlet	21356E
	11. (1) Exhaust Shield	20711
	12. (2) Clamps	60900-28
	13. (1) 90 deg. elbow	60159
If Fuel Injected:	14. (1) Regulator Assy	29125
If Carborated:	15. (1) Fuel Pump Assy	29100
	16. (1) Sceet-6 Hose	1 ½" ID X 24"
	17. (1) Drain Line #4	21372
	18. (2)(2') Fuel line assy	20715
	19. (1) Rubber Drain Hose	21279
	20. (1) Switch, Rotary	20654
	21. (2) Clamp	60900-44
	22. (1) Combustion Air Intake Retainer	21790

Initials: _____ Date: _____