United States of America

Department of Transportation -- Federal Aviation Administration

Supplemental Type Certificate

Number SA02119CH

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 thereof as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air *Regulations.*
See Type Certificate Data Sheet No. 2A4 for complete certification basis.

Original Product - Type Certificate Number: 2A4

Make: Twin Commander Aircraft Corporation

Model: 680FL(P), 680F(P)

Description of Type Design Change:
Installation of C&D Associates Combustion Heater Kit 17 P/N CD14045K17, in accordance with C&D Associates heater Installation Instructions IN14045K17, Rev. none, dated February 3, 2005 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. FAA Approved Airplane Flight Manual Supplement signed and dated February 17, 2005 is required.
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: February 10, 2005

Date of issuance: March 10, 2005

Date reissued: February 11, 2016

Date amended:

By direction of the Administrator

(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.

This certificate may be transferred in accordance with FAR 21.47.

HEATER INSTALLATION INSTRUCTIONS FOR
HEATER KIT #17, P/N CD14045K17

For Commander 680FL(P), 680F(P)

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. ELECTRICAL PREPARATION:
   A. New wiring installation: (Optional)
      a. Route new wiring from the new heater control switch to the heater location. This will require one 14G and three 22 G wires.
   B. Using old wiring: (Optional) **NOTE: If new wires are run the following steps are <u>not</u> required.**
      a. Identify the two wires formally attached to the "plenum overheat safety switch" also referred to as the "jacket high limit switch" halfway up the heater jacket and installed at an angle. Cut off both 3534 and 3534A wires near the switch, tape off and secure out of the way. They will not be used.
      b. Near the bottom of the heater the "high-limit switch" also called the "heater overheat safety switch" having red markings has wire 3534B. Cut this wire off at the cannon plug. Strip a ¼" from the end and install a #6 insulated terminal end. This wire will be used on the new heater terminal strip #2. The second wire 3534A is not used. The "Blower Delay (cycling) switch with yellow markings is right next to it and has two wires 3538A &B. Cut off at the cannon plug, tape off and secure. These will not be used.
      c. At the ignition unit identify wires 3559 and 3559E, which will be used for the new heater. Cut off at the cannon plug. Strip the end of both wires approx. 1/4" and install a butt splice on each for later connection to the thermostat sensor 21253 yellow wires. Locate wire 3522, cut this wire off and tape end. It is important that this wire be eliminated from the circuit. The third wire, at the ignition cannon plug, with no markings is a ground and may be discarded.

2. OLD HEATER REMOVAL
   A. Follow the aircraft service manual to remove the old heater from the aircraft.
   B. Secure old wiring as needed.

3. OLD COMBUSTION AIR BLOWER, COMBUSTION AIR PRESSURE SWITCH AND STEEL COMBUSTION AIR DUCT REMOVAL:
   A. At the combustion air blower, cut the two wires at the cannon plug and remove blower, tape off the ends of the wires and secure.
   B. At the combustion air pressure switch located just forward of the combustion air blower remove the two wires by cutting of at the cannon plug and secure. Remove the switch P/N M412QB3AA (38181) along with the plumbing including the combustion air steel ducting previously running to the old heater.

4. NEW COMBUSTION AIR ADAPTER AND HOSE INSTALLATION:
   A. Install the new combustion air hose adapter P/N 31217 at the rear-mounting bracket previously securing the old combustion air blower. Attach the new 2" diameter, 2.5' long black ceet hose using the supplied clamp.

Old combustion air blower removed and new adapter and black hose installed.

5. ELECTRICAL PREPARATION PRIOR TO NEW HEATER INSTALLATION
   A. Fuel cycle solenoid valve rewire:
      a. Locate the fuel cycle solenoid valve by following the fuel line, which was attached to the old heater. Identify the wire 3521 and follow from the valve approx. 3 ½ ft, cut the wire at this point. Secure the remaining wire by taping the end. Remove the 3-½ ft wire from the wire bundle and reroute to the new heater location. Add wire if needed of equivalent value. Install #6 insulated terminal end.
   B. Cabin temperature pressurization control box (Barber Coleman Unit) wire removal: (See wiring schematic-pg. 5)
      a. **NOTE: The following is only required if new wires from the pilot area <u>have not</u> been run and you are using existing wiring thru cabin.** Locate the control box and identify wires 3536 (cannon plug pin N) and 3537 (cannon plug pin P). Cut both wires near the box connection and tape off the remaining wire connected to the control box. Remove wires 3536 and 3537 from the wire bundle and re-route to the new heater location. Strip and join the two wires and together and install an insulated #6 terminal end for connection to the new heater terminal strip.

Cabin Temperature Pressurization Control Box

6. NEW HEATER INSTALLATION:
   A. Heater:
      a. Prepare the new heater for installation by applying a thin 1/16" layer of high temp silicone sealer and gasket around bottom mounting flange. Set the new heater on the outlet plenum assembly being careful to line up the exhaust and mounting holes. Use the mounting bolts removed from the old heater, apply a small amount of high temperature silicone sealer on each and install securing the new heater to the outlet plenum assembly.
   B. Combustion Air Hose:
      a. Connect the 2" black ceet hose coming from the combustion air supply previously installed to the new heater combustion air blower adapter. Secure with clamp.
   C. Drain and drain shroud connection:
      a. Connect the new drain line to the heater drain bending as necessary to extend through the old drain shroud to the outside of the fuselage. Attach the old drain shroud to the heater.
      b. Scarf aft the new drain line end extending outside of the fuselage approx. 1" to provide suction when in flight.

7. NEW HEATER ELECTRICAL CONNECTIONS:
   A. Fuel Cycle Solenoid Valve Electric Connection:
      a. Strip a ¼" from the cut end and install a #6 insulated terminal. Attach the wire 3521 with the new #6 insulated terminal coming from the fuel cycle solenoid valve to the new heater terminal strip #2. (See 5.A. fuel cycle solenoid valve rewire)
   B. Main Heater Wire Connection:
      a. Connect the new 20G wire run from the cockpit or the two wires 3536 and 3537, previously joined together (See #5.B. Pressure control box wires removal) to the heater terminal strip #1.
   C. Attach wire 3521 prepared in step 5.A.a.
   D. Heater Ground Strap:
      a. Connect heater ground strap to good airframe ground.

8. THERMOSTAT SENSOR INSTALLATION:
   A. Sensor:
      a. Looking aft, install the 21253 thermostat sensor in the outlet plenum. Measure approximately 6 inches from the heater bottom flange and center on the top of the heat outlet plenum. Drill a ½" hole and place the 21253 thermoster (black with white ring base) sensor centered in the hole in order to use as a template. Mark 4 evenly spaced holes. Remove the 21253 sensor and drill 1/8" holes for mounting. Apply high temperature silicone on the backside of the 21253 to serve as a gasket and install using 4 sheet metal screws.

B. Wiring:
   a. With the thermostat sensor installed connect the colored wires in the following manner.
      1) Red wire to heater terminal strip #2
      2) Blue wire to heater terminal strip #3
      3) Black wire to airframe or heater ground
      4) Yellow or orange wires are to be connected to two of the new 22G wires or the old ignition wires 3559 and 3559E previously removed in procedure #1.B.c. "old heater removal. Wires are non-polarity so either wire connection is good.

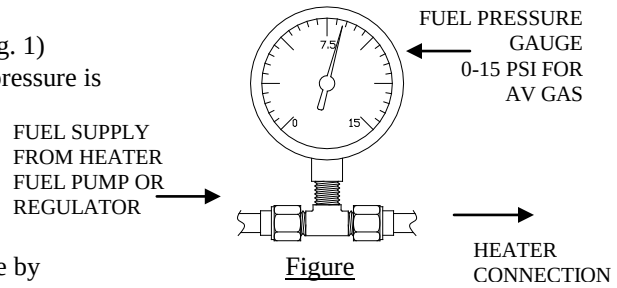
9. EXHAUST EXTENSION INSTALLATION:
   A. Install the exhaust extension P/N 25123 onto the heater exhaust. Make sure the inner exhaust extension and outer shroud extension slips over the heater exhaust at least 1 ½" and that the holes line up.
   B. Exhaust Clamp
      a. Install the exhaust retention half clamp making sure the locking pin extends through the drilled hole in the heater exhaust. Install the clamp mounting bolts and secure.
   C. Exhaust Spacer Installation:
      a. Under the aircraft where the heater exhaust extends out of the fuselage install the exhaust spacer P/N 31224 flush with the aircraft skin. From inside the aircraft, drill three 1/8" holes evenly spaced around the exhaust flange approx. 3/8" from the fuselage skin and install three ¼" long sheet metal screws to secure into place.

10. HEATER CONTROL SWITCH INSTALLATION: (See wiring schematic)
   A. Install a 10 amp circuit breaker to provide power to the new heater control rotary switch.

11. OLD HEATER CONTROL REMOVAL
   A. If new wires are installed (1.A.a.): Remove the existing heater rocker switch and tape off (disable) wires 3536A, 3534D, and 3537A. Secure as needed. Identify 3554 wire from existing "heater light" and connect to one of the new 22 G wires run in step 1.A.a.
   B. Old heater on-off switch. **NOTE: This step is not needed if new wiring is used.**
      a. Remove the existing heater switch and identify wires 3536A and 3537A. These are to be joined together. 3534D and 3554 will also be joined together. These wires will be reused with the new heater control rotary switch.
   C. Old heater ignition points switch (breaker). **NOTE: If new wires are run (step 1.A.a.) skip this step and remove from system or placard inoperative.**
      a. Remove the old push pull breaker switch and identify wires 3559B and 3559C. These wires will be used with the new heater control rotary switch yellow wires.
      b. Route to the new switch location.

12. New heater control rotary switch installation:
   A. Locate the new heater control in a convenient place making sure enough room is provided for proper clearance behind the mounting area. Install the new heater decal. Use as a guide for drilling 3/8" hole for switch if needed.
   B. Wire connections:
      a. Red wire of switch to 10 amp circuit breaker.
      b. White wire from switch to new 14G wire (1.A.a.) or to both wires 3536A and 3537A previously removed from the old heater switch and joined together. (1.B.)
      c. Yellow wires to new 22 G wires (1.A.a.) or old ignition switch wires 3559B and 3559C. Non-polarity, so connect either way.
      d. Black wire must be connected to a good airframe ground.
      e. If not previously accomplished wire 3554, removed from the old switch going to existing "heater light" is to be joined together with remaining unused 22G new wire or the 3534D reused in step 11.B.a. with a suitable butt splice.
      f. Blue wire from new switch is not used in this installation, cut off and discard.

13. HEATER OPERATIONAL TEST AFTER INSTALLATION:
IMPORTANT!! Please complete the followings steps after the new heater is installed in the aircraft.
   A. (Heater terminal strip numbered 1 2 3 4 5 6).
   B. 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. Otherwise it may be necessary to drill a small 1/8" hole through the heat distribution plenum allowing a thermo couple to enter unobstructed, into the heated air stream approx. 1".
   CAUTION: Never drill into combustion heater itself! Verify nothing will be damaged in this process.
   CAUTION: Verify thermal couple is not touching plenum internal wall.
   C. 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.
   D. Install the fuel pressure gauge (0-15). Tee into as shown. (Fig. 1)
      1) With the heater running, verify fuel pressure. Preferred pressure is 8psi. (6.5psi min, 10psi max)
      2) 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 off 225°. Typical readings will be a low of 215° and a high of 255°. Adjustment is made by rotating a small 1/16" screw located next to the wires on the side of the switch. Rotation clockwise one turn will increase temperature approx. 20°F. Decrease temperature by turning counter clockwise. (Fig. 3)
      NOTE: Adjust screw no more than ¼ turn at a time.
      3) 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.
      4) Remove the temperature probe. If drilled, seal the 1/8" hole with high temperature silicone.
      5) Remove the fuel gauge installed in step 13.D. Leave the "tee" fitting and cap off for future pressure readings if desired.



Figure

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.

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

Figure 2

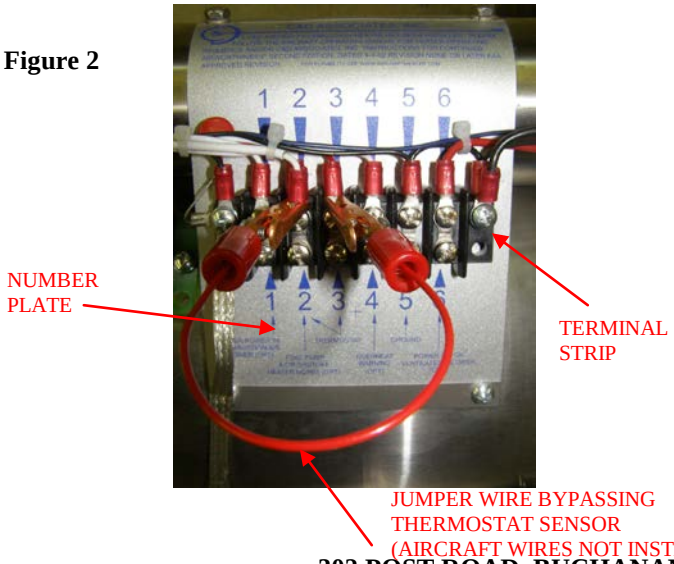
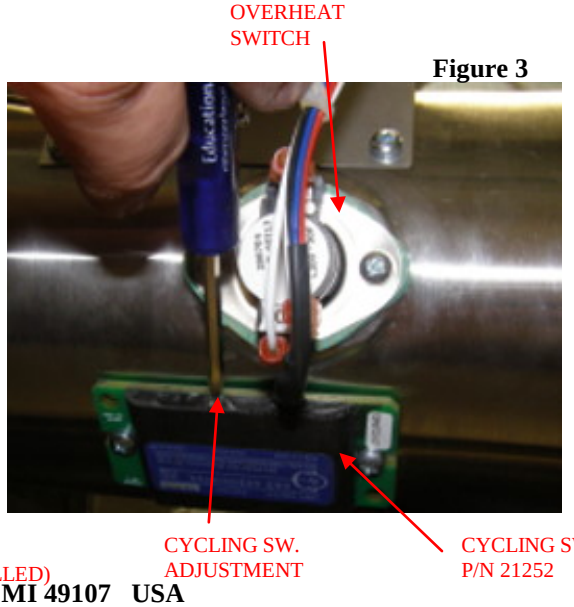
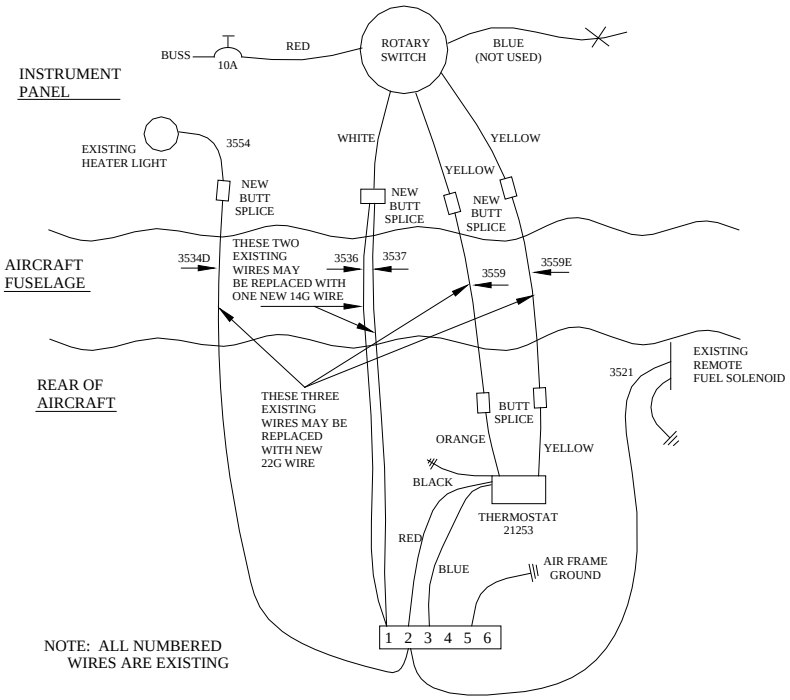


Figure 3



A. 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."
B. 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.
C. Verify all wires are secure and free of obstruction and chaffing.

2. DOCUMENTATION:
A. Weight & Balance. The aircraft does not require a weight and balance change. 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: 24VDC at 8Amp.
D. Fuel consumption: Maximum operation .6 gal/hour.



Wiring Schematic

DOCUMENTATION AND PARTS REQUIREMENT TABLE

DOCUMENTATION			Quantity	
1. FAA/PMA Supplement #45			____	
2. Installation Instructions IN14045K17			____	
3. Label for flight manual (21503)			____	
4. MM10001 Maintenance Manual			____	
5. Quality Assurance Certificate of Compliance #527			____	
6. STC #SA02119CH			____	
PARTS				**S/N**
1. (1) Heater		CD14045-1	____	_____
2. (1) Thermostat Sensor Switch		21253	____	_____
3. (18") #4 Fuel Line	20653		____	
4. (1) Nut		AN818-4D	____	
5. (1) Sleeve		AN819-4D	____	
6. (1) Combustion Air Inlet Adapter	31217		____	
7. (1) Exhaust Assembly		25123	____	
8. (1) Exhaust Spacer		31224	____	
9. (1) Klixon 10 amp breaker		7277-5-10	____	
10. (2.5') Black Ceet Hose		2"	____	
11. (2) Clamps		2"	____	
12. (1) Rotary Switch		20654B	____	

Initials: _____ Date: _____