United States of America

Department of Transportation -- Federal Aviation Administration

Supplemental Type Certificate

Number SA01751CH

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 A20SO for complete certification basis.

Original Product - Type Certificate Number: A20SO

Make: Piper

Model: PA-31, PA-31-300, PA-31-325, PA-31-350

Description of Type Design Change:

Installation of C&D Associates auxiliary rear combustion heater Model CD35K heater kit, P/N CD12031K9 in accordance with Drawing CD12031K9, Rev. -, dated October 19, 2001, and Installation Instructions IN12031K9, Rev. A, dated November 22, 2001, or later FAA approved revisions.

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 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: January 7, 2002

Date reissued: February 11, 2016

Date of issuance: January 2, 2003

Date amended:

By direction of the Administrator

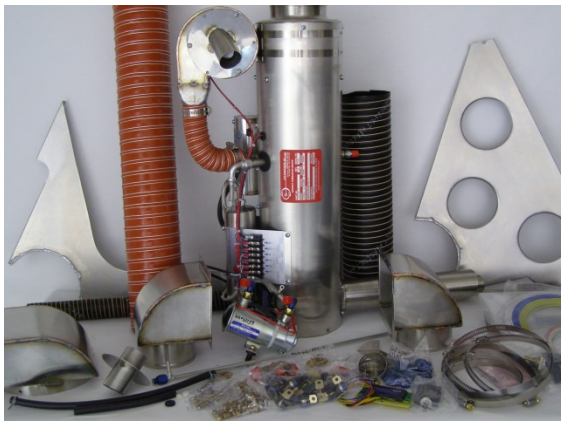
(*Signature*)

Timothy 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.



REAR HEATER INSTALLATION INSTRUCTIONS FOR HEATER KIT, P/N CD12031K9

For Piper PA-31, PA-31-300, PA-31-350, 31-325

READ COMPLETE INSTRUCTIONS AND VIEW DRAWING
CD12031K9 PAGES 1-4
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
E	Reformatted, updated Op test after install section	All	9/22/15

1. PREPARATION

1.1. Heater Removal:

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

1.2. Shut off (close) the right fuel shut off. Remove the flooring and forward lower wing root ferring from the right side of the aircraft to allow the fuel pump, fuel line and wiring to be installed. For the heater installation, remove the cabin aft bulkhead. Distance will vary from straight Navajo to Chieftain. Not all clamps or brackets supplied in kit are needed for straight Navajo.

1.3. 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. Plumbing and Electrical Installation: (See Drawing CD12031K9 pg 4 of 4)

2.1.1. Plumbing: Clamp fuel line as required per AC 43.13-1B chapter 8 section 2 paragraph 8-31

- Install as indicated in drawing 4 of 4. Begin the fuel line with an elbow just aft of the main spar. Route as indicated under the floor, through the lightning holes, past the rear cabin bulkhead, approximately 3'.

2.1.2. Electrical wiring: In accordance with AC43.13-1B Chapter 11 Section 8 paragraph 11-96.

- Along the fuel line, route the electrical wires above the fuel line. Leaving approximately 3' to work with, place two yellow 16G, one blue 14G and one white 14G wire from the new heater area under the floor to

the new heater switch location. Also one white 16G wire from the new heater area to the rear of the main spar and down under to the new fuel pump location in the wing root location. Fasten the new fuel line and wires as indicated on the drawing on pg 4 of 4, view F-F and G-G.

NOTE: Hanger item 25 is not used at main spar station 140.00.

2.2. Fuel Pump: (See Drawing CD12031K9 pg 4 View D-D and E-E)

2.2.1. Install the fuel pump, removable filter cap forward, as indicated, straddling the skin overlap (view D-D). Use the pump mounting legs as a template.

CAUTION: When drilling the 3/8" mount holes in the fuselage use extreme caution that damage is not caused when penetrating the hull. Insert the two shock fasteners, item 31 into the holes and fasten the pump with ground wire using Items 32, 33 and 34.

2.2.2. Install a ground wire from the lower leg of the pump to the airframe. Connect the 16G white wire, run previously, to the pump.

2.2.3. Confirm that the right fuel shut off near the pilot seat is closed. Remove the 45º elbow from the shut off valve in the right wing root area just forward of the main spar. Install the new elbow P/N 22063, item 28 with the #4 nipple facing inboard. Reconnect the fuel line running to the sump (view E-E).

2.2.4. Fabricate one fuel line from the fuel shut off #4 nipple in the elbow (item 28) to the inlet of the pump.

2.2.5. Fabricate one fuel line from the pump outlet to the 90º elbow AN821-4D located aft of the main spar installed earlier. Fasten as indicated on drawing pg 4, view E-E with clamp (items 14, 15 and 16). Before flaring both ends install hose item 59 onto the fuel line. Position the hose as indicated in view E-E to protect the fuel line from chafing the bottom of the main spar and the wing root ferring area when installed.

2.3. Heater Mount Installation: (See Drawing CD12031K9 pg 1)

- The main heater mount consists of four primary parts. Item 1 P/N 24012 left frame support, Item 2 P/N 24011 right frame support, Item 3 P/N 24014 front connecting plate, and Item 4 P/N 24010 rear connecting plate.

2.3.1. Install the right frame (Item 2) just outside of the existing stringer at BL 5.8. Slide the frame forward all the way flush with the aircraft frame at station 274.00 and hold in place with temporary fasteners. Using flush rivets secure the frame to the skin at 1" increments. Replace the temporary fasteners with #4 cherry rivets (item 46). Fasten the rear strap to the aft side of station 296.00 using three #4 cherry rivets (item 46).

2.3.2. Position items 1, 3 and 4 in place using temporary fasteners. Secure Item 1 to existing frame at station 274 using #4 cherry rivets. Secure front plate and rear plate using rivets item 13 as indicated.

2.3.3. Complete the heater mount installation by installing item 54 P/N 24015, frame extension. Place fully aft, against station 296.00 bulkhead frame and rivet, using three #4 cherry rivets (item 46), into station 296.00 bulkhead. Rivet frame extension to left frame support (item 1) using item 13.

2.4. Exhaust Hole Installation:

- Place a 2 ¾" exhaust hole in the skin of the aircraft. Center the hole 5 ¾" aft of the bulkhead station 274.0 and 6 ¼" outboard of the right frame support P/N 24011 (item 2).

2.5. Combustion Air Inlet:

- Install combustion air inlet adapter P/N 21356 (item 5) to the left side of left support frame, P/N 24012 (item 1). Center a hole 1.375 diameter between left frame support and next stringer, 3" aft of existing frame at station 274.00. With the scarf forward, rivet P/N 21356 (item 5) into place with to six equally spaced counter sunk rivets (item 60).

2.6. Drain Line Hole:

- Install a 7/16" hole 6 ¾" aft of station 274.00 centered between the left support frame and next stringer to the left side of airframe. Install grommet (item 20).

2.7. Inlet and Outlet Plenum:

- Mount as indicated in drawing CD12031K9 pg 2 of 4. Clearance holes for rivnuts are required in referenced bulkhead mainframe as indicated in view of section C-C for both out and in plenum mounting. Fasten in each location using three blind rivets (item 36).

2.8. Heater Installation:

2.8.1. Place the new heater assembly into position. Fasten using two 6" clamps, (item 6) around the heater and flanges on frames.

2.8.2. Drain connection and routing as indicated on page 1 of drawing. Bend as needed for clearance. Connect drain hose (item 18) from fuel box to drain line (item 19) using small tie wraps.

2.8.3. Install 4" black Ceet hose (item 9) to inlet of heater and fasten with two 4" clamps (item 7)

2.8.4. Connect 4" red Sceet hose (item 8) to outlet plenum (item 11) and upper distribution box with 4" clamps (item 7)

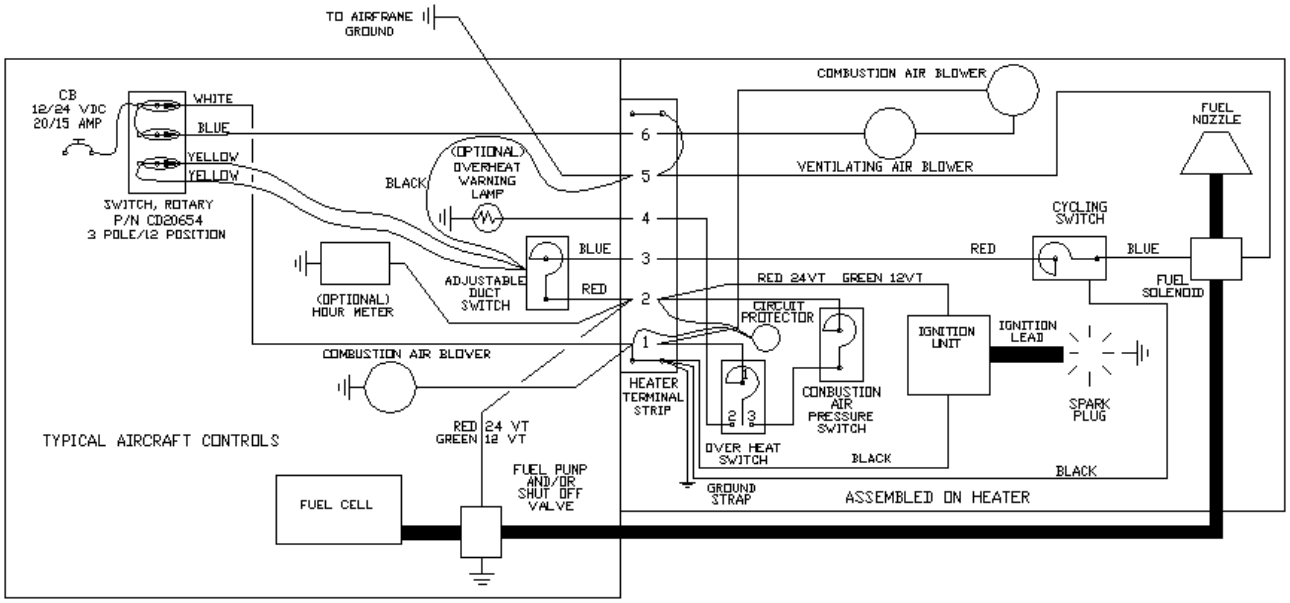
2.8.5. 1 ½" diameter combustion air hose (item 61) from combustion air blower inlet to adapter in skin (item 5). Clamp with two clamps (item 17). Fasten hose, as indicated, using tie wrap (item 55).

2.8.6. Fuel Line Connection:

- Route the fuel line under heater, outboard of right frame support to heater fuel box. Fasten to right support frame with clamp (item 25) and hanger (item 26)

2.8.7. Electrical Hook Up:

- Route wires, previously run, up the right support, clamp as indicated to frame. Fasten to the heater terminal strip. Blue 14G wire from switch to terminal #6 using blue #6 ilet (item 44). White 14G wire from switch to terminal #1 using blue #6 ilet (item 44). White 16G wire from fuel pump to terminal #2 using red #6 ilet (item 45). The two remaining yellow wires connect to the two wires on the thermostat. Connect a ground wire from terminal #5 to the right support frame.



2.9. Control Switch Installation:

2.9.1. Install as indicated in drawing CD12031K9, pg 3 of 4. Install the control switch (items 47, 48 and 49) in a convenient location near existing heater controls. Assure that the area behind the switch has adequate clearance. Interconnect previously installed wire harness to new rear heater switch using same wire color-coding.

2.9.2. Circuit breaker installation as indicated in view 1, 2, 4 and 5.

3. Operation Check:

3.1. Return right fuel shut off to on position. With master switch on, turn the heater control to first position "Fan." Verify the ventilation fan is operational. Airflow out of the top outlet.

3.2. Heater Control Switch to next position "Heat." Verify that the ventilation fan is still operational and that the combustion air motor is operating with airflow out the exhaust. Check for voltage at the heater terminal strip numbers 1, 2 and 6. Terminal #3 may or may not have power depending on temperature in area. Rotate heater control switch until power is evident at terminal #3 and heater fires. With fuel pump running, check for fuel leaks full length of new installation.

4. TESTING

4.1 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)

4.1.1 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.

4.1.2 Setting upper limit temperature upper limit switch

4.1.2.1 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.
  - 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

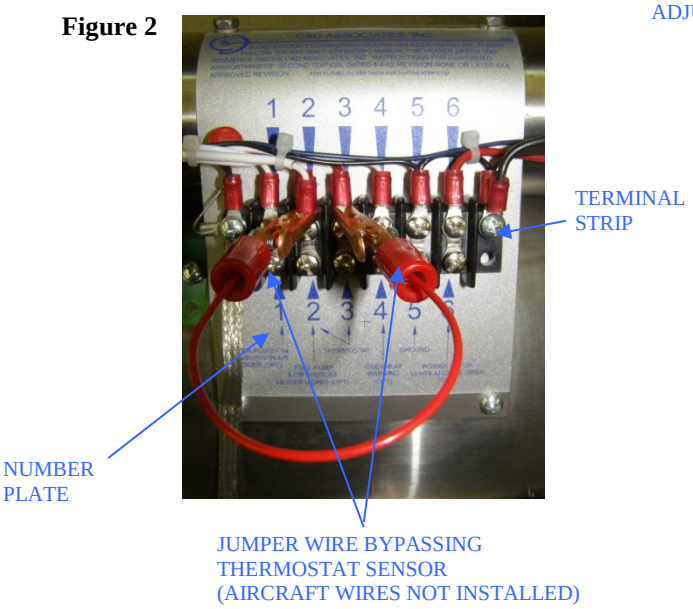
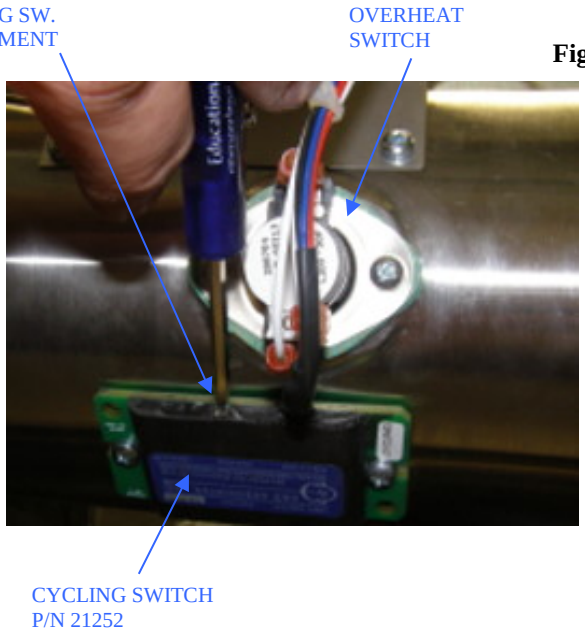


Figure 3



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

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

4.1.3 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)

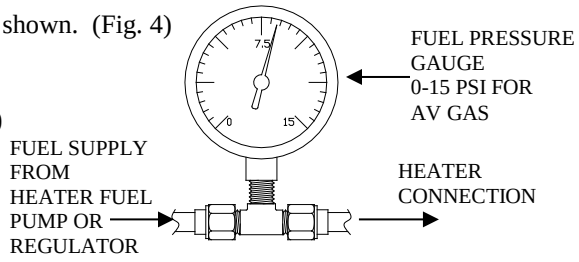


Figure 4

4.1.4 Remove the fuel gauge installed in step 4.1.3. Leave the "tee" fitting and cap off for future pressure readings if desired.

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

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

4.2.2 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.

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

5. 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.

6. DOCUMENTATION:

6.1. Weight & Balance.

6.1.1. If changed remove old heater of __ lbs (verify weight). And install new heater kit of 43 lbs aft of rear cabin bulkhead. 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 #SA01751CH and PMA Supplement #32. 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.

6.1.2. 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.

6.2. 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."

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

6.4. Electrical requirements: 24VDC at 15Amp.

6.5. Fuel consumption: Maximum operation 2 gal/hour.

DOCUMENTATION AND PARTS REQUIREMENT TABLE

DOCUMENTATION	Quantity
1. FAA/PMA Supplement #32	____
2. Installation Instructions IN12031K9	____
3. Label for flight manual 21504	____
4. MM10001 Maintenance Manual	____
5. Quality Assurance Certificate of Compliance #527	____
6. STC #SA01751CH	____
7. 337 Form	____

PARTS			S/N
1. (1) Heater	CD12031-1	____	_____
2. (1) Thermostat, Switch	21253	____	_____
3. (1) Frame, Left Support	24012	____	
4. (1) Frame, Right Support	24011	____	
5. (1) Plate, Connecting Front	24014	____	
6. (1) Plate, Connecting Rear	24010	____	
7. (1) Combustion Air Inlet	21356	____	
8. (2) Clamp, Hose	60900-104	____	
9. (4) Clamp, Hose	½" x 3 ½-6"	____	
10. (1) Hose, Red Sceet	4" x 34"	____	
11. (1) Hose, Black Ceet	4" x 17"	____	
12. (1) Outlet Plenum	24016	____	
13. (25) Clamp for wires/Fuel line	60519	____	
14. (28) Rivets 1/8"	MS20470-AD4-4	____	
15. (43) Nut, 8/32"	60171	____	
16. (43) Washer, #8	60160	____	
17. (43) Screw, 8-32	60045	____	

DOCUMENTATION AND PARTS REQUIREMENT TABLE cont'd

18.	(2) Clamp	60900-20	____
19.	(1) Drain Hose	21279	____
20.	(1) Drain Line	21335	____
21.	(1) Grommet	60531	____
22.	(16') Fuel Line	20653	____
23.	(3) Union	60134	____
24.	(12) Nut	60140	____
25.	(12) Sleeve	60156	____
26.	(11) Hanger	24019	____
27.	(1) Elbow	60142	____
28.	(1) Elbow	22063	____
29.	(2) 10/32 Weldnut	21379	____
30.	(2) Bolts	AN3-7A	____
31.	(2) Washer	AN960-10	____
32.	(2) Lock Washer/Split	AN935-10	____
33.	(2) Distribution Box	24017	____
34.	(6) 1/8" Blind Rivet	60019	____
35.	(2) Dist Box Plate	24018	____
	a. (2) Duct Mesh	24020	____
36.	(1) Caution Placard Inlet	24023	____
37.	(1) 15 Amp Circuit Breaker	W23X1A1G-15	____
38A.	(15') 14 G Wire, White	MIL-W-22759/16-14	____
38B.	(15') 14G Wire, Blue	MIL-W-22759/16-14	____
39.	(30') 16G Wire, Yellow	MIL-W-22759/16-16	____
40.	(15') 16G Wire, White	MIL-W-22759/16-16	____
41.	(2) Blue Insulated Terminal	#6 Ilet	____
42.	(3) Red Insulated Terminal	#6 Ilet	____
43.	(14) Cherry Rivets	CR9163-4-2	____
44.	(5) Butt Splices	Red Butt Splices	____
45.	(1) Rotary Switch	20654B	____
46.	(2) Butt Splices	Blue Butt Splices	____
47.	(1) Blue Insulated Terminal	#10 Ilet	____
48.	(2) Butt Splices	Yellow Butt Splices	____
49.	(1) Fuel Pump	21186	____
	a. (2) Shock Mounts	21379	____
	b. (2) Brass Bushing	60132	____
	c. (2) Elbows	60144	____
50.	(1) Frame, Extension	24015	____
51.	(1) Tye Wrap, #8 Mount	4"	____
52.	(1) Distribution Assembly (Opt)	24021	____
53.	(1) Transition (Optional)	24022	____
54.	(1) Caution Placard, Outlet	24024	____
55.	(6") Hose, Chafe, fuel resistant	21279	____
56.	(28) Rivet, Flush Head	MS20426-AD4-4	____
57.	(1) Hose, Black Ceet	1 ½ x 20"	____
58.	(1) Installation Instructions	IN12031K9	____

Initials: _____ Date:_____