

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

*Number* SA01772CH

*This certificate is issued to*

Hartzell Engine Technologies LLC  
2900 Selma Highway  
Montgomery, Alabama 36108

*certifies that the change in the type design for the following product with the limitations and conditions therefor as specified hereon meets the airworthiness requirements of Part 3 of the Civil Air Regulations.*

See Aircraft Specification No. A-782 for complete certification basis.

*Original Product - Type Certificate Number:*

A-782

*Make:*

Navion Aircraft Company, Ltd.

*Model:*

Navion (L-17A), Navion A (L-17B, L-17C), Navion B, Navion D,  
Navion E, Navion F, Navion G, Navion H

*Description of Type Design Change:*

Installation of C&D Associates Combustion Heater Kit P/N CD11007K8, in accordance with C&D Associates heater Installation Instructions IN11007K8, Rev. A, dated July 2, 2002 or later FAA approved revision.

*Limitations and Conditions:*

1. Compatibility of this design change with previously approved modifications must be determined by the installer.
2. Check aircraft Weight and Balance.
3. Full compliance with the C&D Combustion Heater Instructions for Continued Airworthiness, second edition, revision none, 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:* November 12, 2002

*Date reissued:* February 11, 2016

*Date of issuance:* February 20, 2003

*Date amended:*



*By direction of the Administrator*

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

(Signature)

Timothy Smyth  
Manager, Chicago Aircraft Certification Office

(Title)



**HEATER INSTALLATION INSTRUCTIONS FOR  
 HEATER KIT, P/N CD11007K8**

Navion, Navion A, Navion B, Navion D, Navion E, Navion F,  
 Navion G, Navion H

**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 as applicable;  
 Accomplish all plumbing in accordance with AC43.13-1B Chapter 8, Section 2, par. 8-31.

**LOG OF REVISIONS**

Rev.	Description	Pages Revised	Date
G	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 or inlet distribution box if installed.

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.

1.2.1. References in brackets refer to Navion parts book.

1.2.2. Temporarily position new heater and note location for exhaust clamp to clear exhaust or augments.

**2. INSTALLATION**

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

2.1.1. In the lower forward right hand section of the fuselage, remove the fuselage engine air cooling exhaust baffle to gain access to the electric fuel pump area. Remove the aircraft electric fuel pump to ease modification.

2.1.2. Disconnect and remove the main rigid fuel line that runs from the aircraft electric fuel pump back and through the right hand nose gear box beam assembly to the fuel strainer. Also remove the AN816-6 nipple from the fuel pump that the main fuel line was connected to.

2.1.3. From inside the nose gear area on the right hand gearbox beam assembly, measure back from the nose gear drag brace support channel [Fig. 2, Parts catalogue item 1408 P/N 145-34204] 6 inches along bottom. Place



a location mark up from the bottom 5 inches and at 2.5 inches. Drill two holes, for ¼” bolts, at the location marks for the pump mounting legs. With the pump’s removable filter cap and the inlet port forward, secure the pump with 2 each ¼” bolts and nuts. If rudder retaining mounts P/N 21379 are supplied with #10-32 cross point head screws, drill two 0.375”dia holes. The supplied #10-32 cross point head screws may be replaced with NAS1352C3H #10-32 socket head screws or NAS1801 #10-32 hex head screws in order to be able to apply proper torque in very limited working space.

## 2.2. FUEL LINE (AC43.13-1B, Chapter 8, Section 2, paragraph 8-31):

2.2.1. Install the new running T fitting P/N MS20826-6D (60817) with its adapter bushing P/N AN 894-6-4D (60815) into the aircraft electric fuel pump using thread sealer on the pipe thread. Direct the bushing that will supply fuel to the heater toward the nose wheel well. Utilizing the removed rigid fuel line, shorten by 1/2 inch, re-flair and re-install.

2.2.2. Inboard of the right exhaust pipe hanger on the fire wall are two bulkhead fittings for the existing fuel supply to the engine. Drill a .4375 hole and insert the AN833-4D (60212) bulkhead fitting for the new heater line.

2.2.3. Fabricate three new fuel lines:

- Connect the IN side of the heater fuel pump, forward connection to the bushing on the new running T installed in the aircraft electric fuel pump.
- Install one line from the back OUT connection of the heater fuel pump to the bulkhead fitting in the firewall.
- Fabricate a fuel line from the lower firewall bulkhead filling up to the heater fuel box. Secure half way up with a clamp.

## 2.3. HEATER EXHAUST CLAMP INSTALLATION:

2.3.1. Using the heater exhaust clamp as a pattern, locate 1” above the cabin floor rivet pattern located in the firewall and outboard of the right engine exhaust pipe hanger or augmentor. Mark and drill two .375-inch holes. Place the rubber retaining mounts P/N 21379 into the holes. With the two mounting screws and lock washers placed into the metal bracket, install three large washers as spacers on each screw and secure to the firewall mounts.

2.3.2. (Optional) Exhaust pipe modification: Aircraft without augmentors require shortening the exhaust. Measuring from the heater shroud 10.75” and maintain the same scarf angle. Cut and debur. This will allow heater exhaust to expel into discharge airflow of the engine.

## 2.4. HEATER INSTALLATION (Forward right side of engine fire wall):

2.4.1. Install the new heater with eight retaining screws thru the supporting bracket and firewall. Secure with washers and lock nuts. Secure the exhaust shroud onto the exhaust mounting bracket with the worm drive clamp.

2.4.2. Fuel line connection:

- Connect the fuel line from the new fire wall bulkhead fitting to the fuel connection located in the fuel feed housing on the top left of the heater.

2.4.3. Route and secure the fuel drain hose from the fuel feed housing down past the fire wall and 1” into the engine exhaust cavity area.

2.4.4. OPTION 1: (Cowling scoop) Install the air inlet adapter C&D P/N 22064 just aft of the right hand center cowl fastener bracket [Figure 10, Key 29, Item 1722, P/N 145-31926-7] using two 10/32 screws, washers and nuts. The air inlet adapter bracket may have to be bent slightly in order to achieve a good fit when cowling is closed. If the original cowling scoop [Item 1739, P/N 145-31501-136] was previously removed, C&D P/N CD22066 is available.

2.4.5. OPTION 2: (Air tube) Remove the air inlet adapter bracket from P/N 22064 and discard. Connect the remaining CD22066 adapter to the fresh inlet air duct.

2.4.6. OPTION 3: If older Navions use Up-Draft engine cooling baffling: Baffle, right lower, P/N 145-42301-70 figure 11, key 13 item 1807;and Duck Assembly P/N 145-53301-55, Figure 43 Key 1, item 4600 Options 1 and 2 may not be appropriate. The following is recommended:

2.4.6.1. Modify the heater cabin intake end bell assembly and duct connection by dropping the center line of the air intake 0.75 inches in accordance with DLS Engineering DRG. DLS000030 and DLS000031 to match the duct centerline hole in baffle P/N 145-43301-70.

2.4.6.2. Modify the heater air intake end bell by installing four each two lug anchor nuts P/N K 1000-3 as shown on drawing DLS000032 to provide adequate clearance between the front surface of the heater and the baffle P/N 145-42301-70.

2.4.6.3. Discard C&D P/N 22064 and instead connect the combustion air input to the combustion blower 1.5 " dia. CAT flexible duct to the original South Wind combustion air input pot located on the bottom of the engine cowling per drawing DLS000018 and DLS000019. This connection was originally used for the SouthWind combustion air intake. Open cowling hole from 1 inch dia. to 1.5 inch dia.

## 2.5. COMBUSTION AIR BLOWER INSTALLATION

2.5.1. From the right side of the firewall, count over to the fourth indented vertical stiffener above the heater. Place the combustion air mounting bracket with its top edge 10.75 inches down from the top of the firewall. Using the combustion air mounting bracket as a pattern, place it straddling the indented stiffener and mark the mounting holes. If required, an alternate location above the heater on the firewall may be chosen. Make sure adequate clearance for the closed cowling is maintained.

2.5.2. Install the combustion air blower (housing down) with housing outlet pointing to the heater combustion air inlet adapter.

2.5.3. Connect the blower outlet port to the heater combustion air inlet adapter using the red 1 1/2" sceet hose and two clamps.

2.5.4. Connect the combustion air blower inlet (45° angle) adapter to the fresh air inlet attachment using the black 1 1/2" sceet hose and secure with two clamps or to combustion air inlet drawing DLS000018.

## 2.6. THERMOSTAT INSTALLATION:

2.6.1. The outlet plenum (Air Control Valve Assy, P/N 145-53301-7, Item 4628) has a rotating disc inside. Remove approx. 10" x 3/4" from the movable disk (P/N 145-53301-5, Item 4607 Key 10) as indicated in the drawing below. Mount the thermostat (CD21253) as indicated. Make sure the heater control as it is moved from stop to stop does not interfere with mounting of switch.

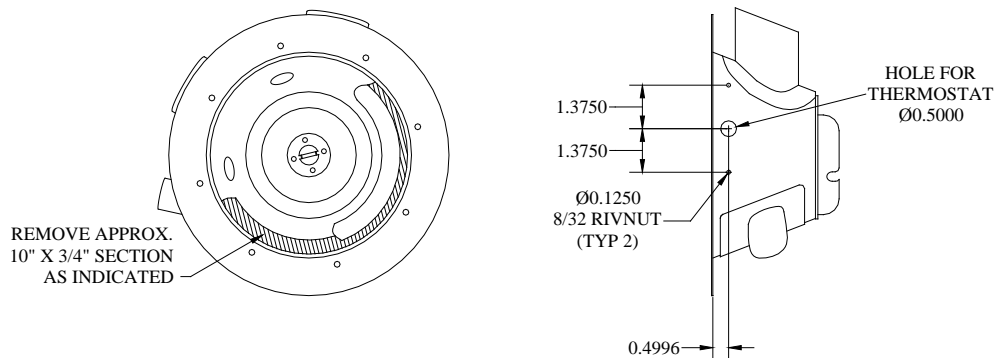


FIGURE 1

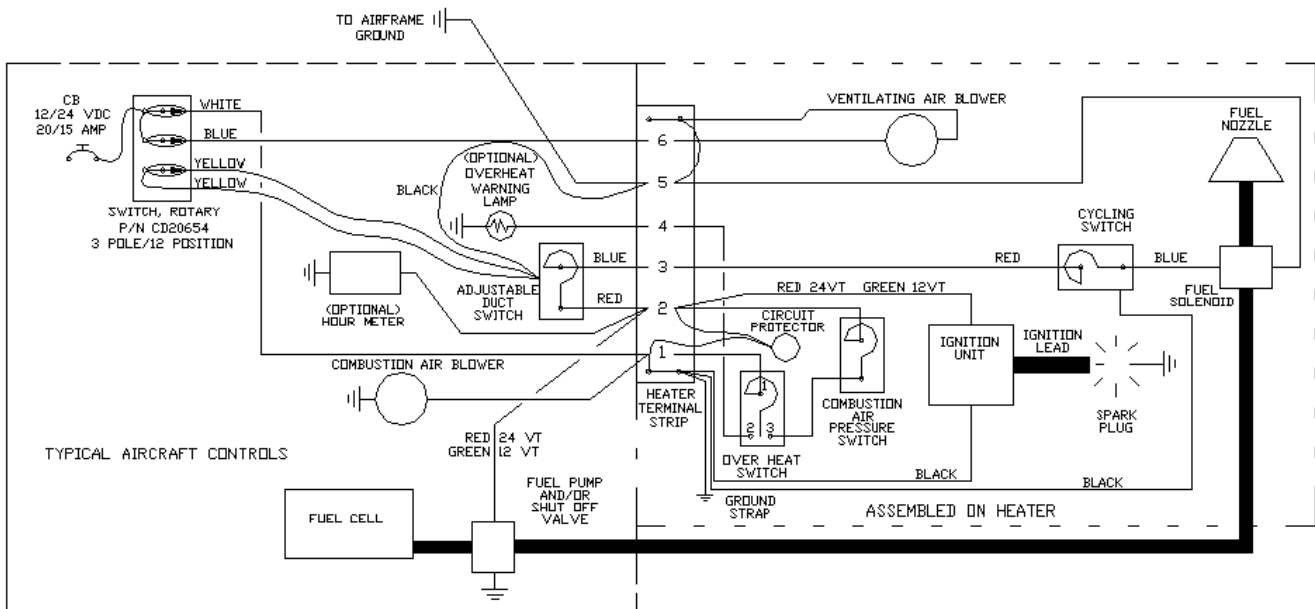
2.6.2. OPTION 1: After removal of the South Wind Thermostat Assembly P/N 145-53304, Key 24, Figure 51, mount, in its place, Anticipator Feedback Regulator Box per Drawing DLS000033. Reconnect the Feedback regulator SCAT duct to the Valve Assembly 145-53301-7. Mount the thermostat (CD21252) to the surface of the DLS000033 Anticipator Feedback Regulator Box.

2.7. ELECTRICAL (AC43.13-1B Chapter 11):

2.7.1. Provide a 10 AMP Circuit breaker for the heater installation. Prior to removing an old control switch, locate and identify the wire from the heater circuit breaker connected to the old switch.

- Remove the old heater control switch and install the new rotary switch, making sure it has adequate clearance to eliminate possible shorting.
- Connect the red wire to the heater circuit breaker and the black wire to an airframe ground. White wire to the heater terminal strip #1.
- The new switch has two relays incorporated in the wiring approx. 3" from the switch. Secure the relays in such a way as to minimize movement. Secure wiring in accordance with AC 43.13-1B Chapter 1 for electrical applications.
- The blue wire is not used in this installation. Cut short, insulate and secure. Terminate the blue wire on heater terminal board position #6 (This circuit is used only if a ventilation (cabin) air blower is installed. If ventilation air blower is used, use a 15amp circuit breaker in place of the specified 10amp circuit breaker). The supply power from the circuit breaker shall be wired through the micro switch installed on the manual control, P/N 145-54035-4 that controls the position of the air valve assembly P/N 14553301-7. This micro switch enable powering the heater only when air valve is in any open position and if valve assembly is in the closed position, removes electrical power to the heater to shut it down.
- The white wire is for the heater and is to be connected to terminal #1.
- The two yellow wires are for the electronic thermostat and may be connected to the thermostat sensor yellow wire in any order (non-polarity).

2.7.2. Run the electric wire from the new heater fuel pump along with the existing aircraft wiring thru the fire wall to the heater terminal strip and connect to terminal #2. Fasten as needed for support. Verify pump is grounded.





### 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.

CYCLING SW.  
ADJUSTMENT

OVERHEAT  
SWITCH



Figure 2

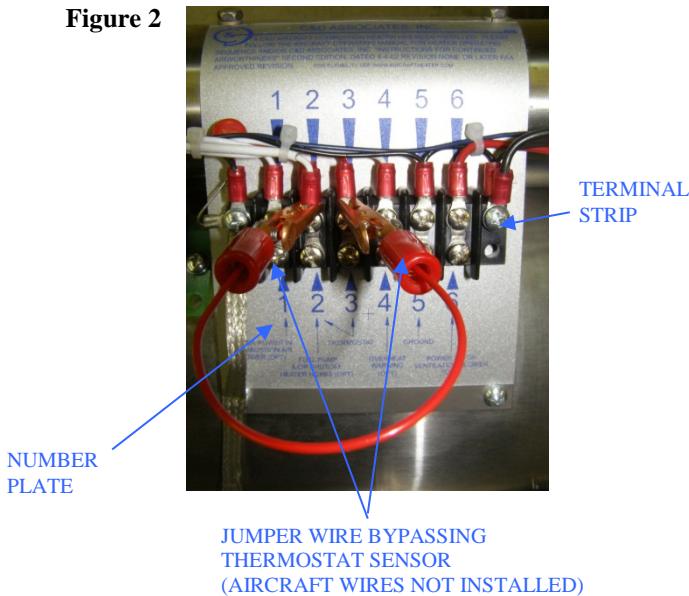
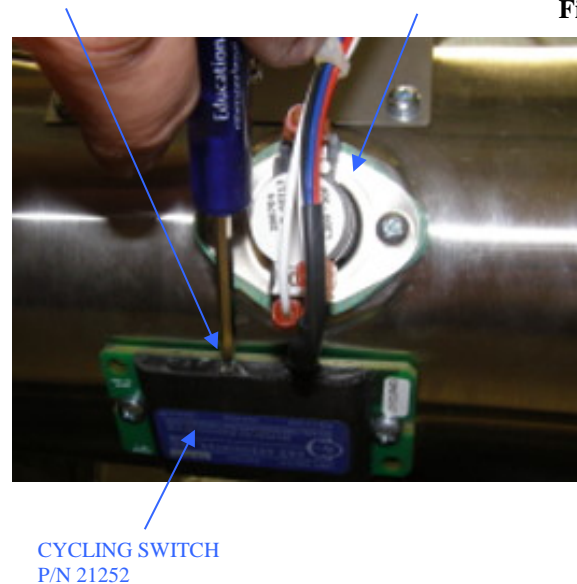


Figure 3



### 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)

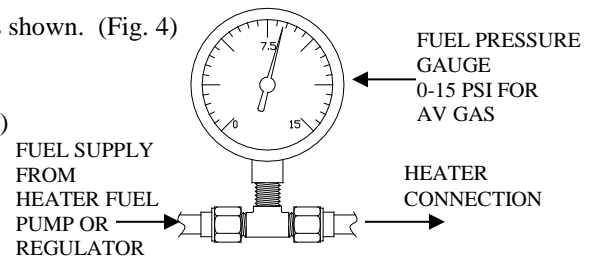


Figure 4

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 Scelet-6 (1 1/2") red from the blower to the heater and Ceet-6 (1 1/2") 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 25 lbs at station 47. 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 #SA001772CH and PMA Supplement #33. 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 10Amp.

5.5. Fuel consumption: Maximum operation \_\_\_\_ gal/hour.





C&D ASSOCIATES, INC.

**DOCUMENTATION AND PARTS REQUIREMENT TABLE**

DOCUMENTATION				Quantity	
1.	FAA/PMA Supplement #33			___	
2.	Installation Instructions IN11007K8			___	
3.	Label for Flight Manual			___	
4.	MM10001 Maintenance Manual			___	
5.	Quality Assurance Certificate of Compliance #527			___	
6.	STC #SA01772CH			___	
7.	337 Form			___	
PARTS					S/N
1.	(1) Heater	CD11007-1		___	_____
2.	(18") Drain Hose w/clamps	21279		___	
3.	(1) Rotary Switch	20654		___	
4.	(1) Adj. Solid State Duct Switch	21253		___	_____
5.	(12") Hose, Sceet	60199		___	
6.	(24") Hose, Ceet	60198		___	
7.	(4) Worm Drive Clamps	60900-20		___	
8.	(4) Sleeve	60156		___	
9.	(4) Nuts	60140		___	
10.	(3) Exhaust Clamp	60900-36		___	
11.	(1) Fuel Pump Assembly	29106		___	
12.	(1) Air Inlet Adapter	22064		___	
13.	(1) Mount, Heater Adapter	22065		___	
14.	(48") #4 Fuel Line	20715		___	
15.	(1) Tee	60817		___	
16.	(1) Bushing	60815		___	
17.	(1) Elbow	60212		___	
18.	(1) Nut	60210		___	
19.	(1) Washer	7/16 ID		___	
20.	(2) Mount, Shock	21379		___	
21.	(2) Screw, Hex	60071		___	
22.	(6) Washer	60238		___	
23.	(1) Mount	21620		___	
24.	(1) Blower Assembly	29053		___	

Initials: \_\_\_\_\_ Date: \_\_\_\_\_