

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

Number SA02973CH

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 Type Certification Data Sheet No. A20SO for complete certification basis.

Original Product--Type Certificate Number: A20SO
Make: Piper
Model: PA-31-350

Description of Type Design Change:

Installation of C&D Associates Distribution Modification Kit P/N CD29151, in accordance with C&D Associates Installation Instructions IN29151, Rev. -, dated February 16, 2011 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. A copy of this certificate must be maintained as part of the permanent records for the modified aircraft.
3. Full compliance with the C&D Associates Instructions for Continued Airworthiness Rev. -, dated March 22, 2011 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: March 10, 2011

Date reissued: February 11, 2016

Date of issuance: May 31, 2011

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.



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INSTALLATION INSTRUCTIONS FOR MODIFICATION KIT P/N CD29151

Rev. B: 29 April 2019

Piper Chieftain PA-31-350

RECORD OF REVISIONS

| Revision | Page(s) Affected | Description | FAA Accept Date |
|----------|---------------------|---|-----------------------|
| New | ALL | Original Release - C&D Associates. | 02/16/11 |
| A | ALL | No history of revision. | 08/18/11 |
| B | ALL | Convert document to Hartzell Engine Technologies LLC (HET) standard format. (HET obtained issuance of STC #SA02973CH, dated February 11, 2016). | 04/29/19 |
| | 1 | Add cover page; Janitrol Aero branding, address, and contact information. | |
| | 2 | Add Record of Revisions. | |
| | 3 | Add reference to Table 1 - Documentation and Materials Required. Change RTV Silicon to DOWSIL™ 732 Multi-Purpose Sealant under Tools Required. | |
| | 9 & 11 | Add torque values to screw P/N 60062. | |
| | 15 | Add Manifold Shutoff P/N 22127 illustrations; Figures 18, 19, & 20. | |
| | 22 | Add screw and lock washer P/Ns; ltm #10 & 11. | |

1. Purpose

- A. Incorporate design improvements to the aircraft heating system in the Piper Chieftain PA-31-350. Installation of the airframe modification will enhance heat distribution into the cabin by thirty percent. The heater change, which must be ordered separately and the airframe modification completed in accordance with this instructions will improve the heater life and increase passenger comfort.

2. Tools Needed

- A. Wrench - 11/32", 3/8", 7/16", 9/16", and 3/4"
- B. Screw driver - Philips #2 and 1/4" standard (stubby and/or ratcheting)
- C. Needle nose pliers
- D. Side cutters
- E. 2" knockout
- F. 1/8" and 3/16" drill bits
- G. Step drill bit (up to 7/8")
- H. Half-round metal file
- I. DOWSIL™ 732 Multi-Purpose Sealant (Silicone)
- J. Permatex #1 sealant

3. Material Required

- A. Refer to Table 1- Documentation and Materials Required.

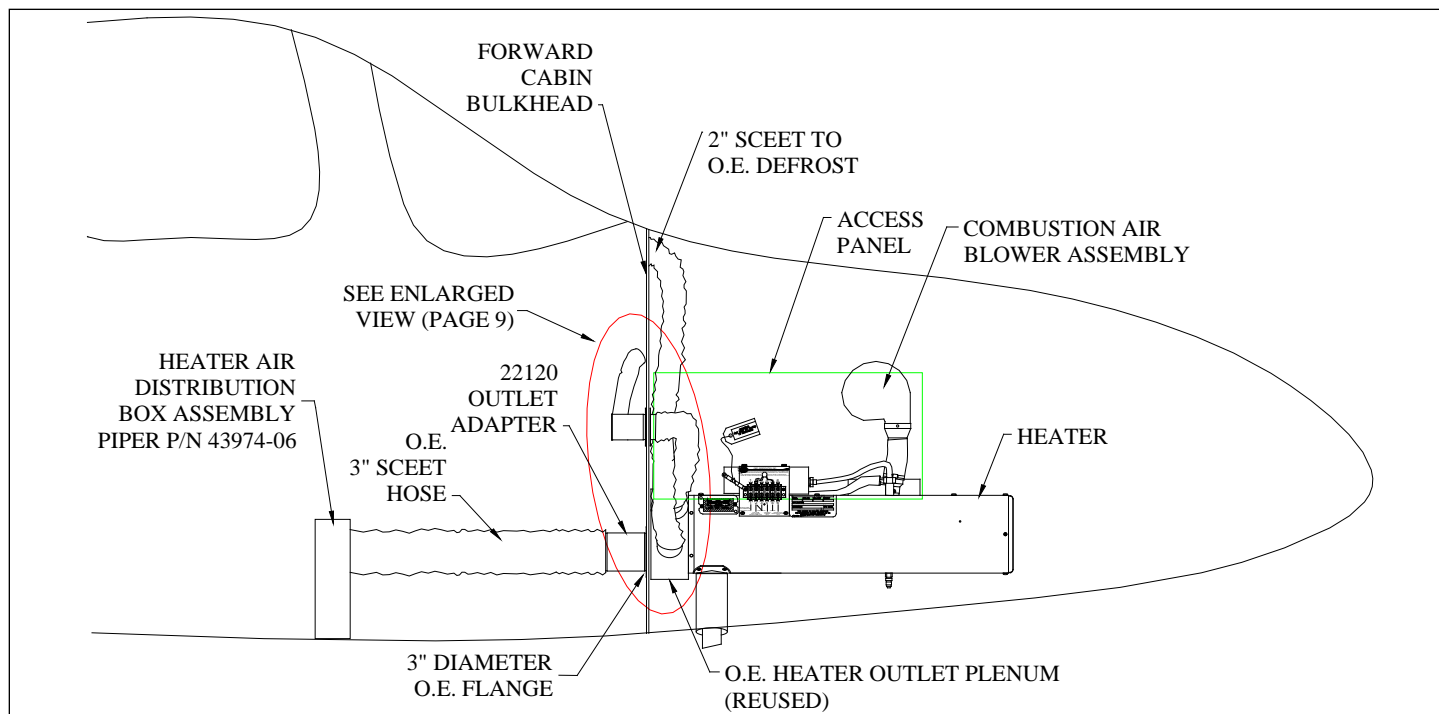


Figure 1 - Modification Kit Schematic

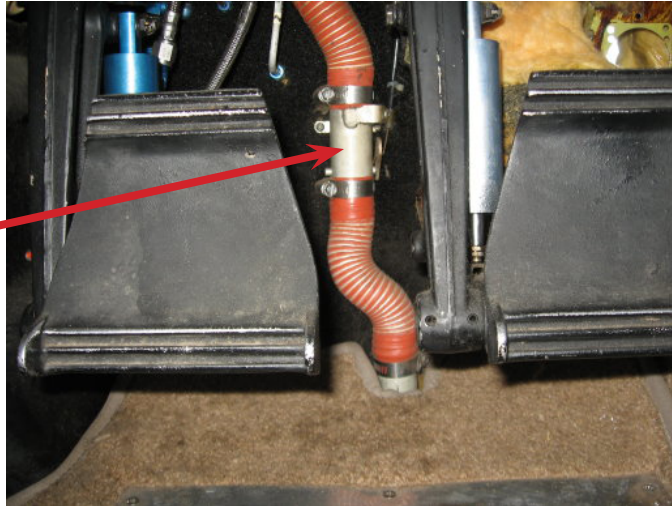
4. Preparation

A. Cabin

- (1) Remove pilot & copilot seats to ease access for modification.
- (2) Remove the Original Equipment (O.E.) front floor heat plenum (Piper P/N 54007-00) located forward of the throttle quadrant and aft of the forward bulkhead. These components begin forward and center of the co-pilots rudder pedals and dispense air to the crew. They attach to the airframe with two 1" Adel clamps screwed into nut plates. These screws are relatively hard to access, specifically copilots side. A ratcheting style screwdriver, 3" long with a #2 Phillips tip is recommended.
- (3) Remove the 1-1/4" sceet hose. (This hose runs from the 3" heater outlet plenum under the floor aft of the forward bulkhead and extends forward of the throttle quadrant.)
- (4) Valve assembly # 71478-02 is to be discarded. Aircraft serial numbers 31-8052131 and up or earlier aircraft modified by installing air valve relocation kit P/N 764005 in accordance with Piper service letter No. 894 have valve assembly P/N 71478-02 installed. Refer to Figure 1 to determine if the valve assembly that should be discarded (P/N 71478-02) is installed on the aircraft. It will be replaced by the new valve P/N 22127.

NOTE: Push-Pull cable will be rerouted to new valve P/N 22127.

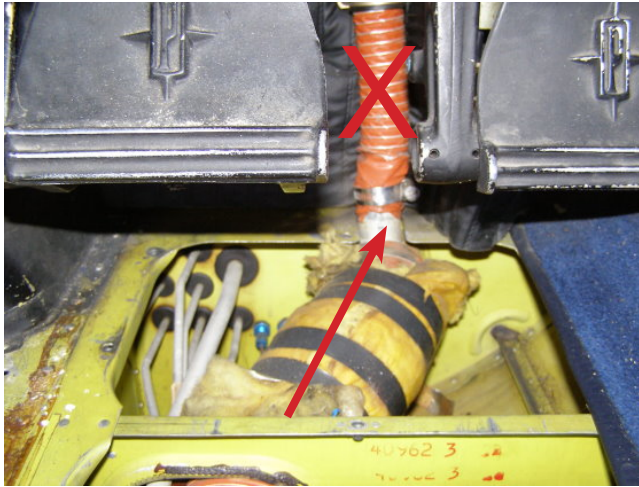
Valve Assembly
P/N 71478-02



**Figure 1 - Valve Assembly P/N 71478-02
(Remove if installed)**

- (5) Remove cabin floor at copilot's station, located under rudder pedals. (This will allow access to the 3" main heater duct hose).
 - (6) Remove the 3" sceet hose from the O.E. outlet adapter (Piper P/N 54005-00) found below the rudder pedals on copilot's side near the bulkhead.
- NOTE:** At this time, verify condition of ducting located within wrapped insulation. This should be a single scat or double wall sceet hose which is red (or orange) in color. If it is brittle or collapsed internally, it should be replaced.
- (7) Remove the hose from the O.E. main heat outlet adapter. There may be tape holding these two components together which needs to be removed. Discard the original adapter with the air scoop (Piper P/N 54005-00). (Refer to Figure 2).

NOTE: A replacement adapter will be installed later.



**Figure 2 - Outlet Adapter
(View From Copilot Side)**

Discarded Main
Heat Outlet Adapter
P/N 54005-00



Discarded Front
Floor Heat Plenum
(Step A.2.) P/N
54007-00

**Figure 3 - Outlet Adapter & Front Floor Heat Plenum
(Discarded)**

B. Heater Compartment

- (1) Gain access to heater compartment by removing right side access panel in nose.
- (2) Remove heater assembly, including heat distribution box assembly (Heat outlet plenum) Piper P/N 53108-06 as described in Piper PA31 maintenance manual (Note the orientation of the distribution plenum on the heater to simplify re-installation).
- (3) Remove the 2-1/4" x 2-1/2" cover plate located on forward bulkhead, horizontal to heater fuel regulator. (This plate is attached to the bulkhead with four #8 screws and covers one 1/2" hole and one 1" hole). (Refer to Figure 4).

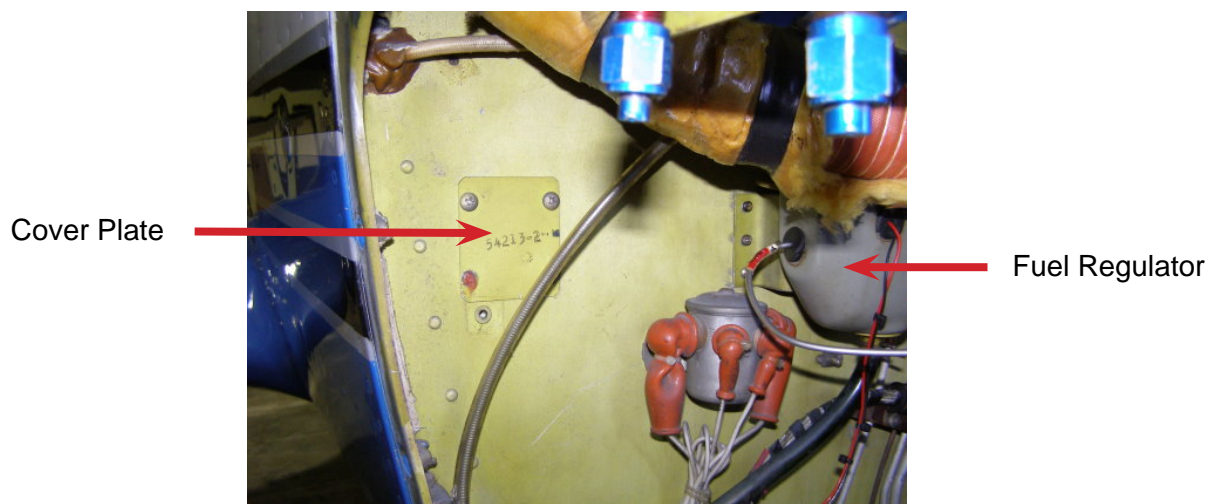


Figure 4 - Heater Access

C. Heater Outlet Plenum Modification (removed from original heater in step B.2).

- (1) On the side of the plenum with the defrost outlet measure and mark 1-1/2" over and 1-3/4" down. (Refer to Figure 5).
- (2) At center location, mark and knock-out a 2" hole in the plenum. (Refer to Figure 6).

Existing Defrost
Outlet



Figure 5 - Plenum Modification

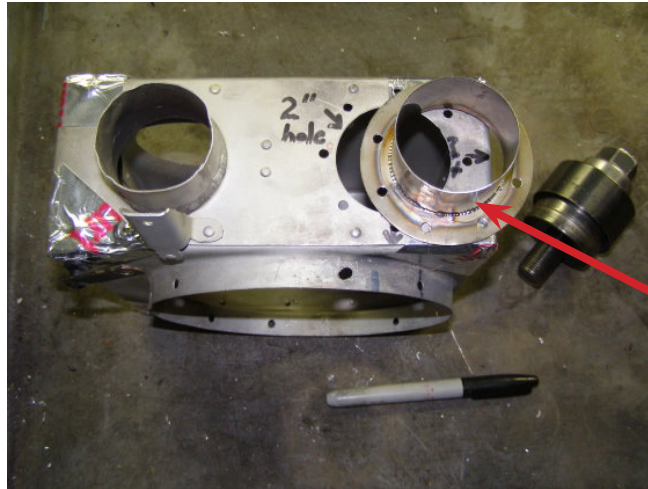


Figure 6 - Plenum 2" Knockout

HEATER MODIFICATION INSTRUCTION #IN29151



- (3) Utilize one of the 22110 flanges (supplied with kit) as a template to transfer the eight mounting holes to the plenum. (Refer to Figure 7).
- (4) Drill the transfer marks to 3/16" and de-bur.



**Figure 7 - 22110 Flange
(1 OF 3)**

- (5) Apply a small bead of DOWSIL™ 732 Multi-Purpose Sealant to the underside of the 22110 flange. Once tacky, mount flange on plenum using eight 60062 screws and 60171 self-locking nuts. Torque screws 12-15 in. lbs. in a criss-cross pattern. (Refer to Figures 8 & 9).



Figure 8



Figure 9

Figures 8 & 9 - 22110 Flange Mount

D. Bulkhead Modification

- (1) Mark center of gap between the two holes uncovered in step B.(3). (Refer to Figure 10).

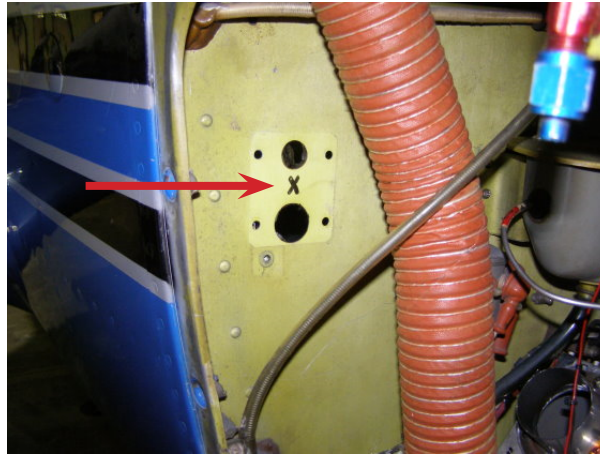


Figure 10 - Heater Access Bulkhead Modification

- (2) At center-mark, knockout a 2" hole through the bulkhead. (Refer to Figure 11).

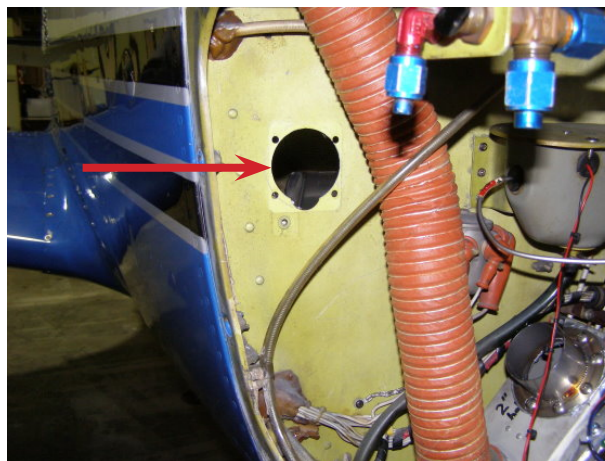


Figure 11 - Bulkhead 2" Knockout

HEATER MODIFICATION INSTRUCTION #IN29151



- (3) Utilize one of the remaining two 22110 flanges as a template to transfer mounting holes through the bulkhead. (Refer to Figure 12).

NOTE: The four original plate mounting holes should line up with the 22110 flange holes.

- (4) Drill the transfer marks to 3/16" and de-bur.

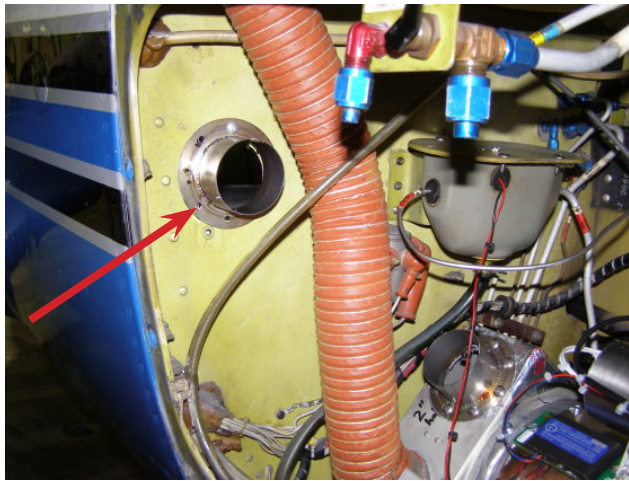
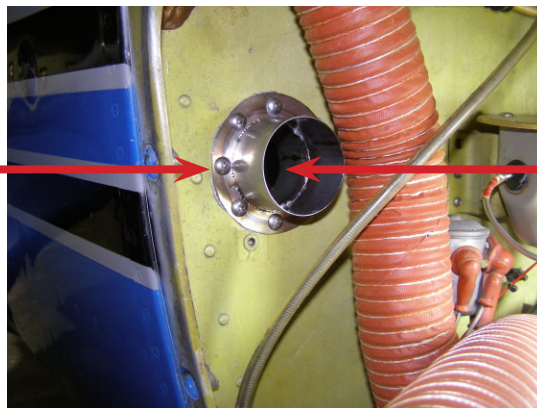


Figure 12 - 22110 Mounting Hole Pattern Transfer

- (5) Apply a small bead of DOWSIL™ 732 Multi-Purpose Sealant to the underside of the two remaining 22110 flanges.
- (6) Once tacky, mount the flanges by sandwiching the bulkhead from both sides. Use eight 60062 screws and 60171 self-locking nuts inserted from the heater compartment into the cabin. Torque screws 12-15 in. lbs. in a criss-cross pattern. (Refer to Figure 13)

Flange P/N 22110 Heater
Compartment Side.



Flange P/N 22110
Cabin Side.

Figure 13 - 22110 Secured to Bulkhead

E. Cabin Compartment Upgrade

In section A step 6, the original restrictive outlet adapter (Piper P/N 54005-00) was removed from under the copilot rudder pedals, this to be replaced with the new 22120 outlet adapter.

- (1) Clean outer surface of 3" outlet flange still bolted to the bulkhead.
- (2) Apply a small film of DOWSIL™ 732 Multi-Purpose Sealant around the larger inside diameter of 22120.
- (3) Slide 22120 (larger diameter) onto and over the 3" O.E. outlet flange until fully seated. (Refer figure 14).
- (4) Where accessible drill a 1/8" hole in the 22120 outlet adapter and the 3" diameter O.E. outlet flange and secure using a 1/8" rivet or #8 sheet metal screw.
- (5) Reconnect the 3" sceet hose onto and over the new extension 22120. Secure with hose clamp. (Refer to Figure 14).

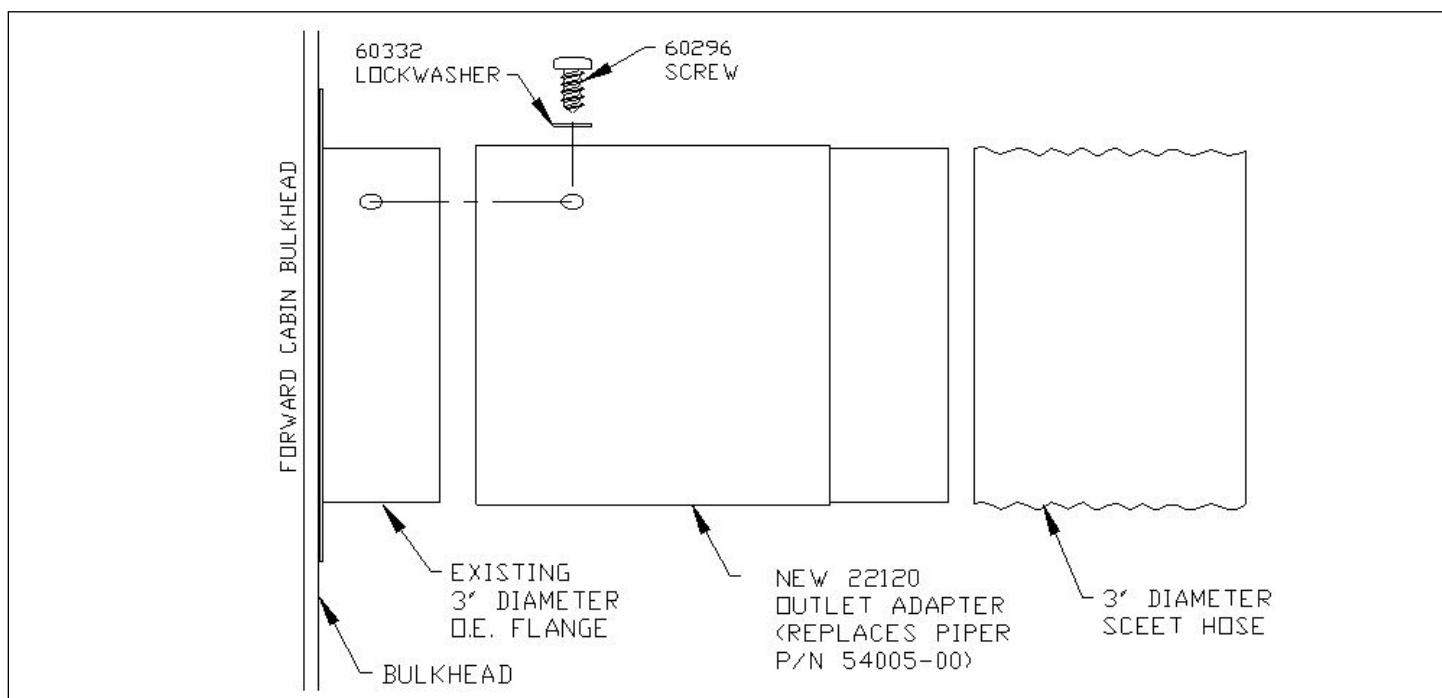


Figure 14 - 22120 Outlet Adapter Installation



Figure 15 - Post 22120 Installation View

- (6) Apply a small film of DOWSIL™ 732 Multi-Purpose Sealant around the larger inside diameter of the 22113 manifold.
- (7) Slide the manifold without shutoff (P/N 22113) or the P/N 22127 with the shutoff valve onto and over the 2" 22110 cabin side flange, installed in Section D, step 6, approximately 1/2 an inch. Rotate so the 1-1/4" outlet tube is at approx 10 o'clock position. (Refer to Figure 15).
- (8) Where accessible, drill a 1/8" hole extending through the manifold and into the 2" flange. Secure using a #4 pop rivet or #8 sheet metal screw (Refer to Figures 16 & 17).

If the manifold shutoff P/N 22127 is used, reroute the push pull cable to new shutoff bracket and secure making sure "HEATER/CABIN AIR" control opens (on) and closes (off) the new valve assembly smoothly and completely. (Refer to Figures 18 thru 20).

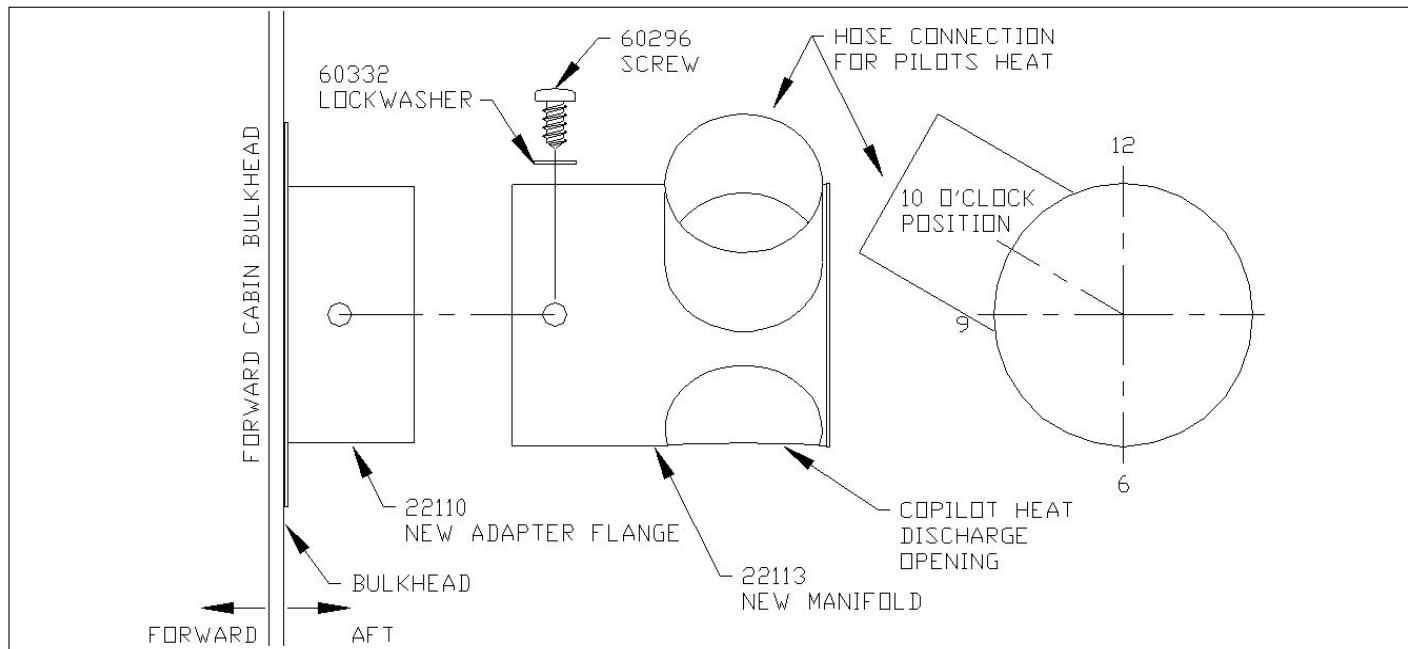


Figure 16 - Manifold P/N 22113 or P/N 22127 Installation

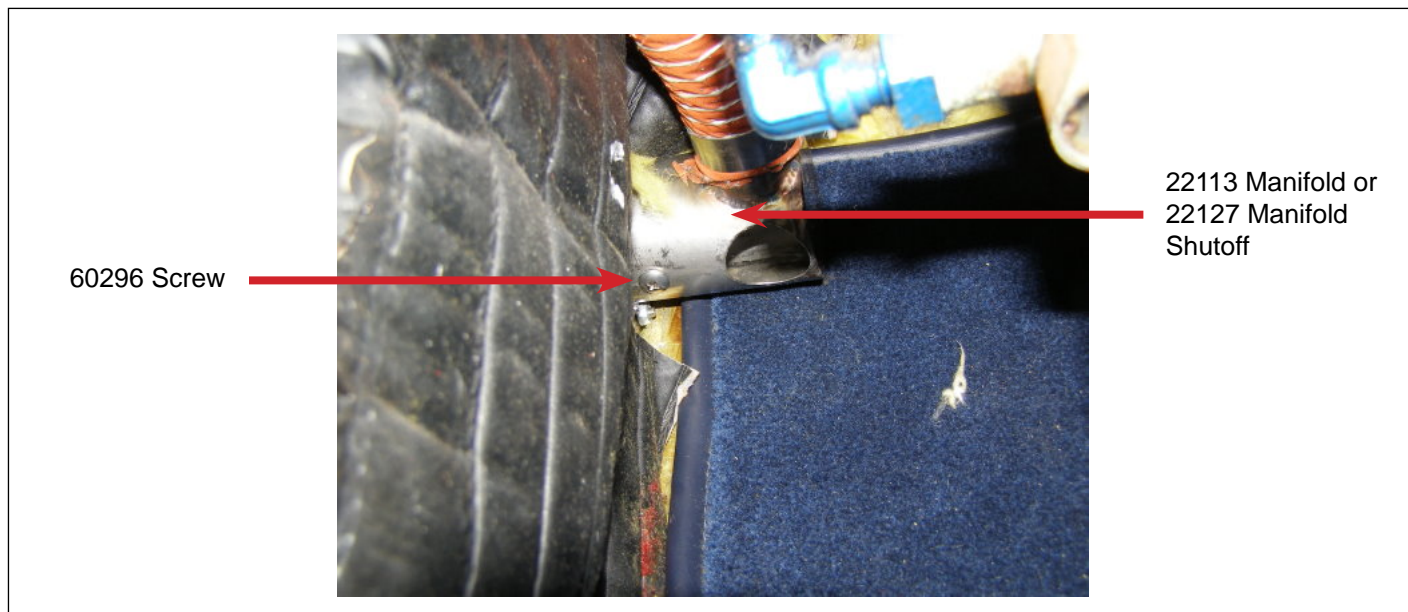
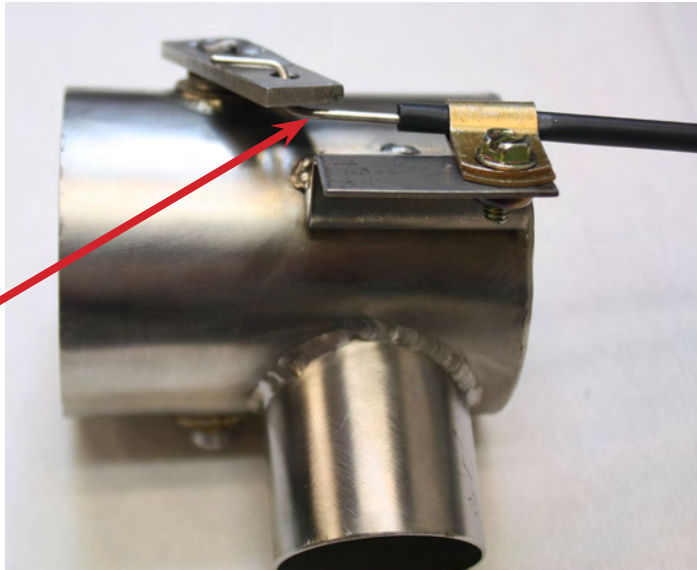


Figure 17 - Secure Manifold P/N 22113 or P/N 22127

Ensure Push-Pull
Cable is Routed
Inside of Shutoff
Bracket as Shown



**Figure 18 - Manifold P/N 22127 Push-Pull Cable
(Reference Only)**



**Figure 18 - Closed (OFF)
Position**



**Figure 19 - Open (ON)
Position**

Figures 19 & 20 - Manifold P/N 22127 Open and Closed Positions

- (9) Install one end of the red 23" x 1-1/4" sceet hose onto the longer portion of the pilot's heat discharge P/N 22117 using one of the supplied 60900-16 hose clamps and secure.
- (10) Beginning from the pilot's side, carefully feed the sceet hose above and across the throttle quadrant to the new heat manifold P/N 22113 or 22127. (Refer to Figure 21).
- (11) Continue routing the 1-1/4" sceet to the new manifold. Secure with the remaining 60900-16 clamp.
- (12) Secure 1-1/4" sceet hose to the bulkhead using 60518 Adel clamp.

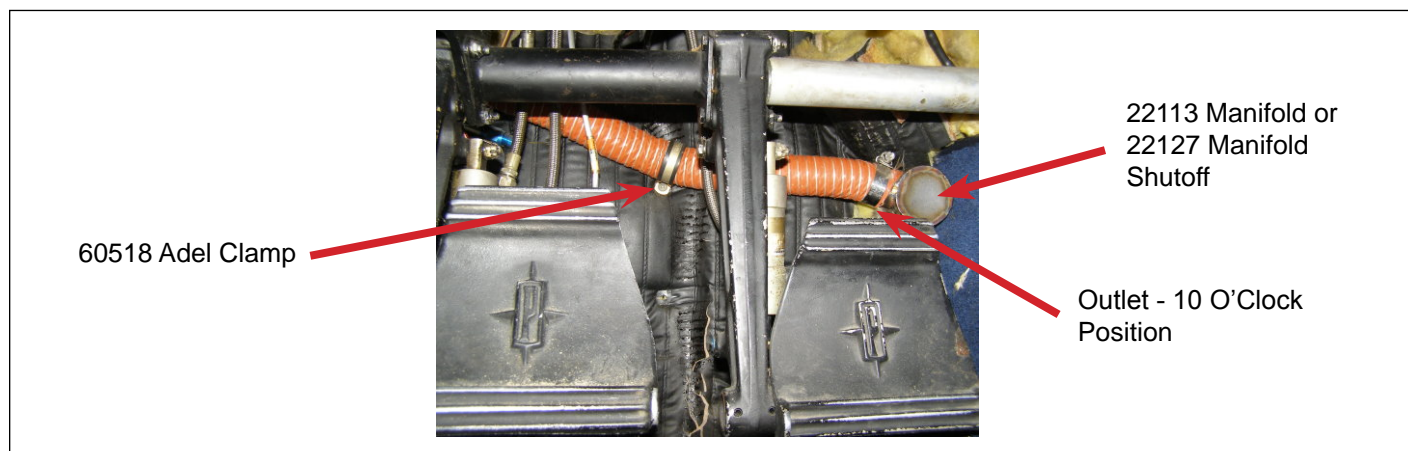


Figure 21 - Manifold P/N 22127 Open and Closed Positions

- (13) On pilot's side, secure the 22117 outlet port to the air frame using one of the supplied 60518 Adel clamps in the same location used for the O.E. clamp. (Refer to Figure 22).

NOTE: Before completely securing, rotate the 22117 outlet port to discharge towards the pilot's right rudder pedal.

- (14) Verify cabin portion of modification is free and clear of possible restriction and or chafe points.

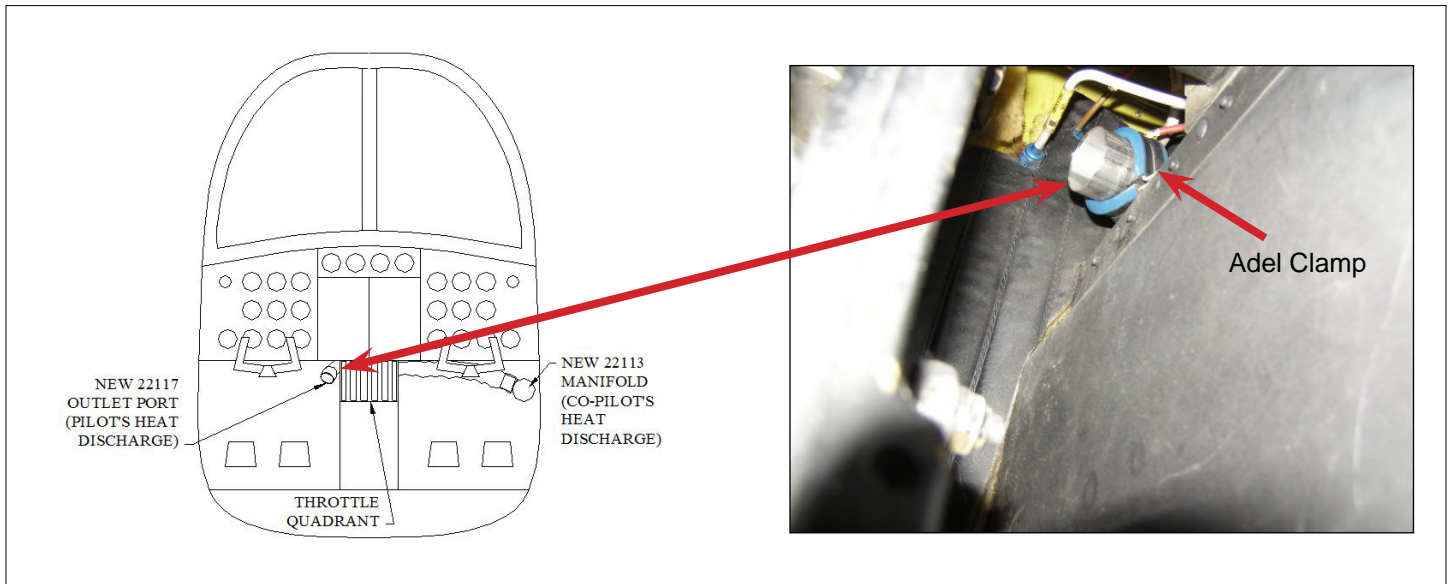


Figure 22 - Secure Outlet Port P/N 22117

F. Fuel Filter P/N 29130 and regulator P/N CD20801

NOTE: Shut fuel off at cross feed prior to performing the following maintenance procedures. Refer to the Piper PA-31-350 Service Manual.

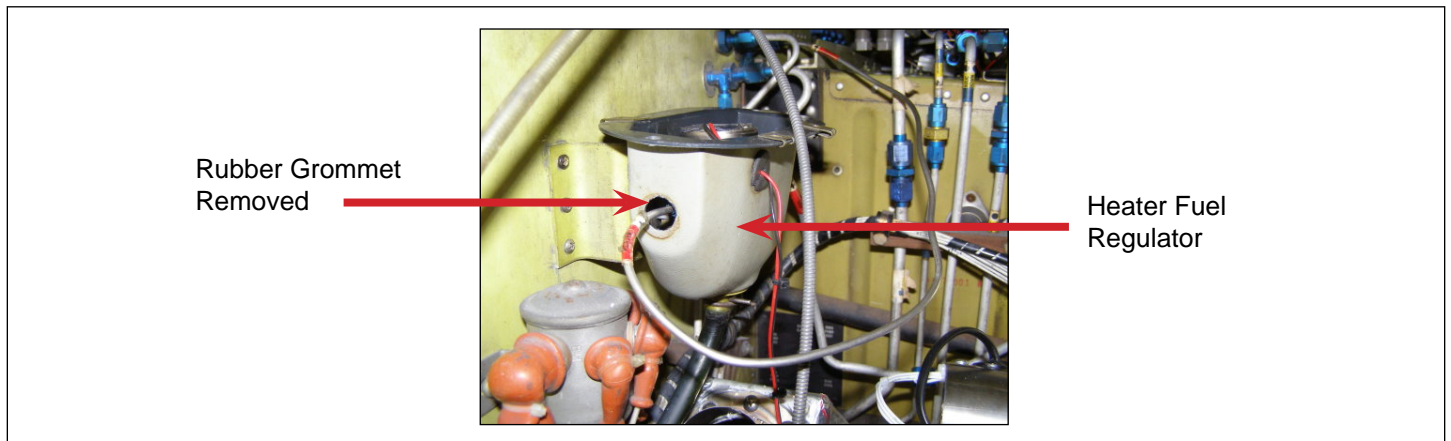


Figure 23 - Heater Fuel Regulator

- (1) Remove the fuel box and regulator assembly from the aircraft in accordance with the Piper service manual.
- (2) Remove the regulator from the fuel box.
- (3) Remove the fuel outlet nipple from the old regulator and install into the new regulator outlet.

NOTE: Return the old regulator for core credit.

- (4) Install the new 29130 filter kit into the “IN” port of the fuel regulator after applying a VERY small amount of Permatex #1 (or equivalent) on the 1/8” NPT threads leaving the first starting thread clean. Torque to 30 in. lbs. **DO NOT USE TEFLON PRODUCTS OF ANY KIND AS A SEALANT FOR THREADED FUEL FITTINGS.**
- (5) Enlarge the “IN” port (outboard side) of the fuel box to 7/8” keeping the hole centered and even with the original opening. (Refer to Figure 24).

Opened to 7/8” →



Figure 24 - Heater Fuel Regulator “IN” Port

- (6) Install the new regulator and filter assembly into the modified fuel box, filter-end first and with coil portion of regulator facing up.
- (7) Attach assembly to airframe (in accordance with the Piper manual) in reverse order of its removal. Seal area around filter housing and fuel box with a small amount of DOWSIL™ 732 Multi-Purpose Sealant. (Refer to Figure 25).
- (8) Reconnect fuel lines to regulator with the “IN” line now attaching to the filter assembly. (Refer to Figure 26).

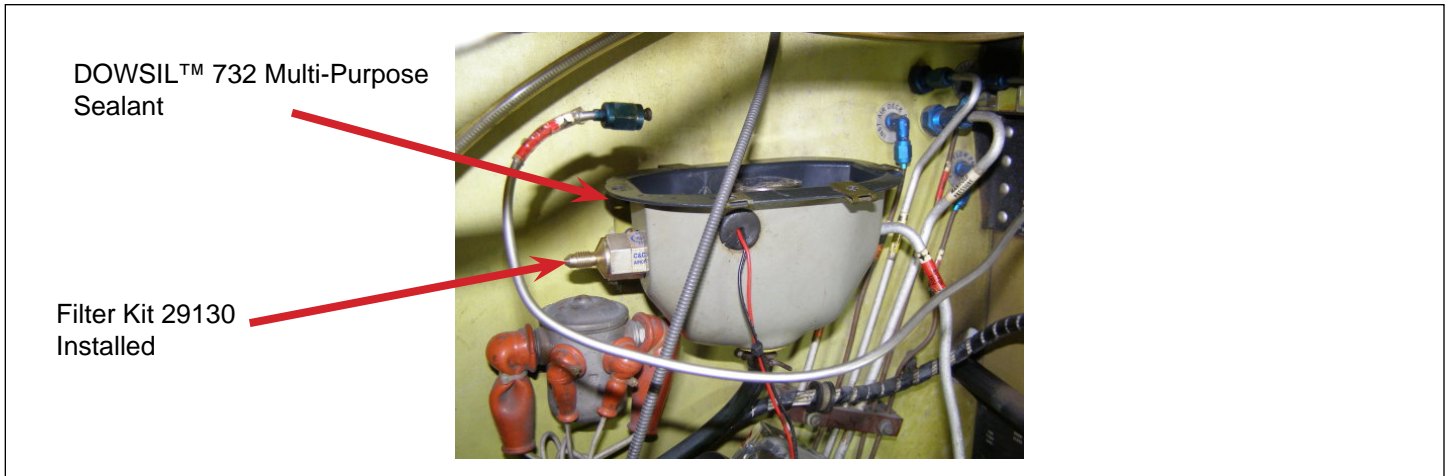


Figure 25 - Fuel Regulator & Filter Assy.



Figure 26 - Fuel Regulator "IN" Line Connected to Filter

G. Installation of Heater & Modified Plenum

- (1) Reattach the modified distribution plenum to the heater. (Refer to Figure 27).



Figure 27 - Plenum Attached to Heater Assy.

- (2) Reinstall the heater and heat outlet plenum assembly in accordance with the Piper Service manual.
- (3) Reconnect the defrost hose to the outlet plenum as removed.
- (4) Install P/N 60350. (2" X 15" long sceet hose) Extend from the distribution plenum's newly installed flange to the bulkhead flange as installed in section D. Secure at both ends with supplied 60900-28 hose clamps.

NOTE: Route hose with the additional shorter hose outboard of the existing defrost hose. (Refer to Figures 28A & 28B).

Ensure Fuel Line
is Clear of Ducting

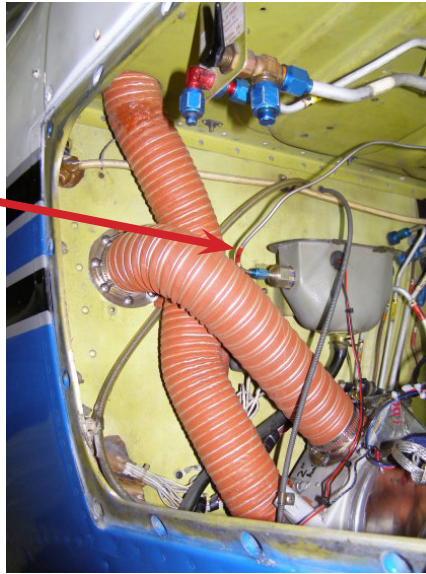


Figure 28A - Sceet Hose Configuration



Figure 28B - Sceet Hose Configuration - Assembled View

| Documentation | | | |
|---------------|--|-------------|-----|
| 1 | FAA/PMA Supplement #66 | | |
| 2 | STC #SA02973CH | | |
| 3 | Installation Instructions IN29151 | | |
| 4 | Instructions for Continued Airworthiness | | |
| Parts | | Part Number | QTY |
| 1 | Adapater Flange | 22110 | 3 |
| 2 | Manifold | 22113 | 1 |
| 3 | Manifold Shutoff (optional) | 22127 | 1 |
| 4 | Outlet Port | 22117 | 1 |
| 5 | Outlet Adapter | 22120 | 1 |
| 6 | Clamps | 60900-16 | 2 |
| 7 | Clamps | 60900-28 | 2 |
| 8 | Screws (#8-32) | 60062 | 16 |
| 9 | Nut, Self-Locking (#8-32) | 60171 | 16 |
| 10 | Screw | CD60296 | 2 |
| 11 | Lock Washer | CD60332 | 2 |
| 12 | Clamps, Adel | 60518 | 2 |
| 13 | Sceet Hose (15") 2" Dia. | 60350 | 1 |
| 14 | Sceet Hose (25") 1-1/4" Dia. | 60351 | 1 |
| 15 | Filter Kit | 29130 | 1 |
| 16 | Regulator | 20801 | 1 |
| | Regulator S/N: | | |

Table 1 - Documentation and Materials Required