



SERVICE LETTER

No. 804

Piper Aircraft Corporation

Lock Haven, Pennsylvania, U.S.A.

February 8, 1977

M

Subject: Heater System Maintenance and Operation

Models Affected: Serial Numbers Affected:

PA-31T Cheyenne..... 31T-7400002 and up.

Compliance Time: At owner/operator's discretion; reference text below for specific recommendations.

Purpose: Field reports have been received describing Cheyenne heater malfunctions, including flameout of the heater at higher altitudes and subsequent inability to relight. To assist field service personnel and operators in preventive maintenance and operating the heater, this release summarizes known successful maintenance and operational guidelines.

Instructions:

- I. Preventive Maintenance, General: Refer to Cheyenne Service Manual Environmental Control System (Cabin Heater System) Section for "Heating System Flow Diagram" (copy attached) for location of components discussed below, and related text for additional information.

Above all, it is important that all operating parameters of the heater system be properly maintained; failure of - or inattention to - one component of the system can compromise proper operation of the total system.

- A. A solenoid valve is located near the heater fuel tap-in on the fuel crossfeed line at the main spar, is operated by the heater system electrical circuit, and is the first component between the fuel source and the heater system.

This solenoid valve can be a source of heater fuel starvation due to foreign material in the valve orifice. The solenoid valve should be cleaned and checked AFTER EACH 100 HOURS OF AIRCRAFT OPERATION.

- B. Immediately downstream of the solenoid valve is an inline filter; present guidelines require replacement of this filter at each 500 hour operational interval. However, to insure an uninterrupted flow of clean fuel to the heater system, clean the filter AFTER EVERY 100 HOURS OF OPERATION. NOTE: This function could be oriented to the Programmed Inspection "Cockpit - Detailed" Event.

over

Instructions: (Continued)

- C. The fuel pump and pressure relief valve are located downstream of the filter. Since kerosene type fuels require a relatively high pressure to obtain proper atomization for combustion, it is important that fuel pressure of 100 ± 5 P.S.I. is generated by the pump. Fuel pressure at this point should be checked as follows AFTER EACH 100 HOURS OF OPERATION or after any maintenance has been conducted on the heater or aircraft fuel system that would affect pressure:
1. Install a pressure gauge (reading 0 to 150 PSI) in the fuel line as close to the heater inlet as possible.
 2. After installation of the gauge, check fuel pressure under the following condition:
 - a. Voltage - 28.0 V (DC)
 - b. Submerged fuel pump - right side - "ON"
 - c. Heater operational
 - d. Fuel pressure should indicate 100 ± 5 PSI
 - e. If pressure is not 100 ± 5 PSI, reset pressure per Service Manual - Section XIII.
 - f. Recheck fuel pressure after locking of relief valve.
- D. The ignition for the heater is provided by a continuous spark in operation when the heater switch is "ON". Heater cycling occurs as a result of controlled interruption/resumption of fuel flow. To insure continuous operation of the ignition system, check the following AFTER EACH 100 HOURS OF AIRCRAFT OPERATION:
1. Insure spark plug gap is correct (.156 to .187 in.), and voltage (28 v.) is being delivered to the ignition unit.
 2. The ignition unit can be checked while removed or disconnected from the heater assembly; however, the spark plug test fixture (fabrication described in Service Manual) must be installed on the plug to prevent damage to the ignition system while checking. NOTE: Ref. Material Required, below, for information concerning Spark Plug Gap Adjustment and Tool.
 3. The heater combustion head ground electrode is subject to gradual erosion; therefore, if difficulty in obtaining proper plug gap is encountered, check the condition of the ground electrode (disassembly of heater is required should ground electrode replacement be necessary).
 4. After conducting above checks and ignition problems still exist, complete replacement of ignition unit is recommended.
- E. Opening of the heater over-temperature circuit breaker is caused by higher than normal operating temperature of the heater. This condition can be traced to two areas: (1) improper heater operation and (2) insufficient air flow through the heater jacket - caused by recirculating blower failure.
1. Certain recirculation blower motors (Dukes #1092-00-1 Blue) have demonstrated a short operating life; therefore, to insure continuous operation of the blower, the blower motor brushes shall be inspected AFTER EACH 50 HOURS OF HEATER OPERATION. If brushes show excessive wear (less than 1/4 in. of brush remaining), it will be necessary to replace the blower assembly.

Continued.....

Instructions: (Continued)

- F. Heater System Check - Ground Operation: Heater system may be checked on the ground by observing the heater exhaust, as follows (insure delivery of 28 volts current to the aircraft).
1. With heater switch in manual mode, the heater should light within 5 seconds after switch is placed to the "ON" position.
 2. There should be very little or no smoke from the exhaust when the heater lights. If there is a delay and smoke, the fuel solenoid on the heater assembly should be checked for proper operation (reference Service Manual, Section XIII).
 3. If while operating, black smoke is visible at the heater exhaust, then insufficient combustion air is indicated and the combustion air blower should be checked for proper operation (reference Service Manual, Section XIII).
 4. If while operating, white smoke is visible at the exhaust, then low fuel pressure is indicated (reference Section C, above).

II. Maintenance/Troubleshooting Tips:

A. Heater fails to ignite:

1. Insure overheat switch is set and all wiring at terminal board (on heater) is secure.
2. Insure combustion blower motor operates.
3. Insure recirculating fan operates.
4. Check condition of ignition spark plug - clean and gap.
5. With plug installed on ignition lead, turn master switch "ON" and check for spark from plug to ground (reference Section D, above).
6. Check fuel pressure (reference Section C, above).
7. Check, clean/replace fuel filter (reference Section B, above).

B. Heater fails to operate at altitude:

1. Check all items in A, above.
2. Remove heater, inspect heater fuel nozzle; clean and reinstall per Service Manual, Section XIII.
3. Remove heater pressure switch and insure no fuel is present inside switch. If fuel is present, replace the switch assembly.
4. Insure pressure switch sense lines are not plugged; lines may be blown out with low pressure air or cleaned with wire.
5. Inspect ignition lead to ignition coil for arcing and proper installation.

C. Heater Control System

1. If heater operates in manual mode only;
 - a. Replace thermostat;
 - b. Replace heater controller.
2. If heater operates in automatic mode only;
 - a. Replace heater cycling switch;
 - b. Replace heater controller.

- D. Any time either of the right side submerged fuel pumps is changed, the heater fuel pump pressure should be checked (reference Section C, above).

III. Pilot Operating Tips:

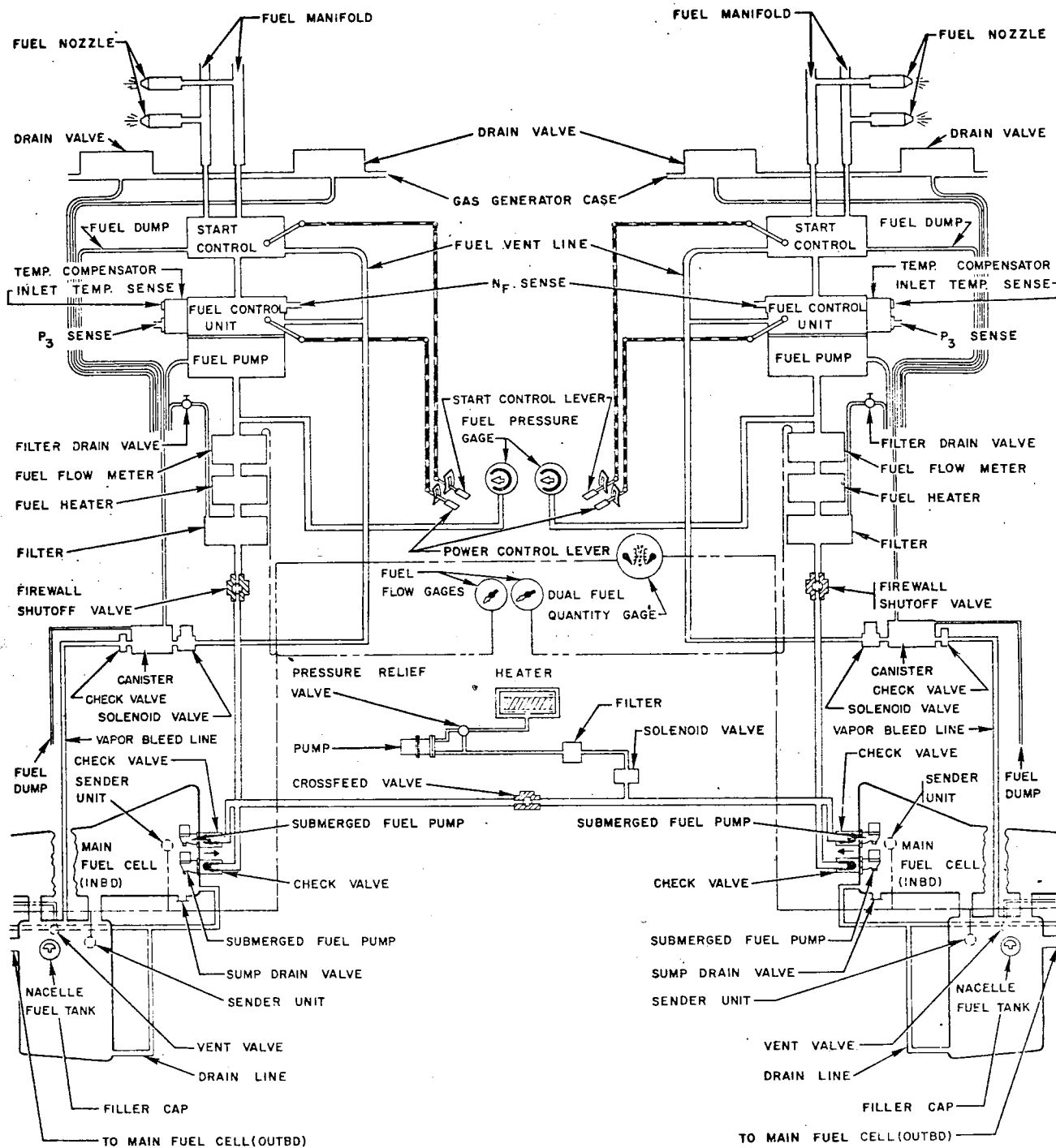
- A. When first turning heater master switch "ON", insure temperature rheostat switch is turned to "LOW" (heat) position. Then, turn heater fuel switch "ON".
- B. After heater is operational, increase (heater rheostat switch) to desired temperature, and allow cabin temperature to stabilize before further movement of the switch.
- C. If heater will not operate in automatic mode, use manual mode for interim operation.
- D. Do not operate the heater (rheostat) control too rapidly, due to the 10 second delay in the controller and to prevent flooding of the heater combustion chamber.
- E. If heater "flameout" occurs in flight, turn heater fuel switch "OFF" for 10 minutes, then try to relight. If heater does not relight, troubleshoot system after landing.
- F. IMPORTANT: For heater shutdown, turn heater fuel switch "OFF", allow heater to cool down, then turn controller master switch "OFF". Failure to observe this precaution may cause heater malfunction.

Material Required: The Spark Plug Gap and Adjustment Tool (referred to in above text Section I and II) may be fabricated per Service Manual (Section XIII) data or obtained from Piper per Piper Part No. 55998 - 02 @ suggested unit list price of \$ T/B/A . For replacement of heater system components described in the body of this service release, consult the Piper Parts Catalog for proper part numbers, nomenclature, application, etc.

Availability of Parts: Your Piper Field Service Facility.

Effectivity Date: This service release is effective upon receipt.

Summary: This service release contains a summary of existing heating system maintenance/troubleshooting and operation information, and offers additional information (retrieved from recent testing and evaluation) to assist in troubleshooting, maintaining and operating Cheyenne heater systems, with particular emphasis on heaters with apparent chronic improper operation.



Heating System Flow Diagram

Service Letter No. 804
Dated: February 8, 1977

LETTER SUPPLEMENT - PROCEDURAL OPERATING INFORMATION

<u>Material Allowance:</u>	Not Applicable *
<u>Labor Allowance:</u>	Not Applicable
<u>Disposition of Parts in Stock:</u>	Not Applicable
<u>Disposition of Replaced Parts:</u>	Not Applicable

* NOTE:

Price data for Piper part number 55998-02 Spark Plug Gap and Adjustment Tool is not available as of this date; check the March 1977 Piper Parts Price List revision for price data.