



INSTRUCTION – PREHEAT INSTALLATION

Document No.: TNF3120 REV. B

Dated: FEB-16-2016

**TSFGA8-3120 SERIES PREHEAT KITS
ON
MAHINDRA AEROSPACE**

AIRVAN⁸

PROPRIETARY DATA

Tanis Aircraft Products proprietary rights are included in the information disclosed herein. The recipient by accepting this document agrees that neither this document nor the information disclosed herein nor any part thereof shall be reproduced or transferred to other documents or used or disclosed to others for manufacturing or for any other purpose except as specifically authorized in writing by Tanis Aircraft Products - 952-224-4425.

RECORD OF REVISIONS

When updated, this document is changed in its entirety.

REV	DATE	DESCRIPTION	BY	RELEASE
B	FEB-16-2016	Installation revision	GDO	
A	DEC-04-2015	Initial release	DNE	DNE

CONTENTS

RECORD OF REVISIONS	2
CONTENTS	2
1. PURPOSE	3
2. REQUIREMENTS.....	3
2.1 Materials	4
2.2 Tools	4
2.3 Power.....	4
3. DESCRIPTIONS.....	4
3.1 Physical Attributes	4
3.2 Technical Specifications	4
3.3 Weight and Balance	5
3.4 Operation	5
3.5 Maintenance	5
3.6 Options.....	5
4. INSTALLATION	5
4.1 Overview	5
4.2 Standards.....	6
4.3 Elements	7
4.4 Cable Routing	7
5. TABLES AND FIGURES	9
6. FUNCTIONAL SYSTEM CHECK.....	18
7. SIGN OFF.....	19

1. PURPOSE

The purpose of this instruction is to provide guidance for the installation of the Tanis Preheat Kit listed on the cover page of this document. The kit may be installed in conjunction with GippsAero Service Bulletin SB-GA8-2015-160 or independent of SB. It is the responsibility of the technician and/or maintenance/repair facility performing the installation to read this instruction, become familiar with all processes and resolve conflicting issues before proceeding. Final judgment regarding the proper installation and inspection details are the responsibility of the authority releasing the aircraft for service. Contact Tanis engineering for design change approvals.

Note: This instruction is for the installation of both 115 Volt and 230 Volt kits. Letters before and after the 4 digit drawing number are modifiers used for article configuration and may be omitted in narratives. Example: TEP2653-115/40 = Tanis **E**lement with a **P**in connector (2653) 115-volts / 40-watts.

2. REQUIREMENTS

Required documents, figures and tables are located in Section 5.

Retrofitting of this aircraft with the Tanis preheat kit is to be accomplished by appropriately qualified technician or maintenance/repair facility.

- Kit is airframe and engine specific, location and installation of the supplied power connection is to be installed per GippsAero SB SB-GA8-2015-160.
- Retain documents and make record as indicated in Operating Guide and ICA.
- Work is to be performed in a clean environment under standard temperature conditions of 18°C / 65°F to 27°C / 80°F
- Installation requires access to the engine, battery, pilot, and passenger, compartments
- Installation times vary due to a wide range of variables such as installation of the shore power door and element sealant cure time (approximately 8 hours)
- Installation is to be in accordance with (IAW) current regulatory requirements, airframe/engine manufacturer's procedures, and approved procedures set in place by the installing authority
- Reference AC 43.13-1B Chapter 11, Sections 9 through 12 for securing, tying, and clamping, Section 15 for Grounding and bonding, and Section 17 for feed-through penetrations
- Reference AC 43.13-2B 1. Chapters 1 and 2 for AV/Cabin Heater mounting
- Power inlet - for global standardization and safety of operations, - shore power plug - is a non-locking blade type NEMA connector (Figure 1).
- Corresponding outlet connector - plug receptacle (supplied for field installation with 230-volt kits) - is required on extension cord. Approved outlets - TP02872-115, TP02829-230, reference instruction TN02829

2.1 Materials

Installation hardware, consumables, finish-materials, brackets, lacing, various MS21919 cushion clamps (Table 2) are required and not supplied. Review GippsAero SB for additional parts.

- Pad element bonding sealant is sourced at time of installation. Approved adhesive sealants and element installation procedures called out in Bonding Instructions (Table 1)
- Sheet metal work is required review GippsAero SB-GA8-2015-160, Section 4.4, and Tables and Figures in Section 5

2.2 Tools

Various standard aviation hand tools are required and are not supplied.

Required:

- Ohmmeter certified to traceable standards
- TU02905-05 1/2-inch slotted socket, or equivalent.

Suggested:

- Wire cutter/stripper
- Tanis 4 way indent crimp tool: TU02793
 - Alternate crimp tool, DMC: AF8-TH163 or equivalent
- Deutsch contact remover tool: DT-RT1 or equivalent

2.3 Power

Power supply and shore power connection (extension cord) supplied by operator.

- Ground based power source capable of supplying or producing required voltage and load for duration of operation is required, commonly AC (alternating current).
- System design is for operation at plus or minus 10% of system voltage requirement.
- Voltage and load requirements listed § 5, Table 3.

3. DESCRIPTIONS

Preheating is a cold weather aviation procedure that increases reliability, safety of operations, and reduces torque oscillations, thermal stress, warm up, emissions, and launch times.

This preheat kit preconditions the engine, battery, pilot and passenger compartments.

- System is self-regulating, does not operate in flight, and is not connected to or dependent on aircraft systems.
- Heated components reach an average state of thermal equilibrium in approximately six hours.

3.1 Physical Attributes

Two shore power plugs each with individual power indication and circuit overload protection are installed on the left side of the aircraft forward of the pilot door (Figures 2 and 3).

- Forward plug – Powers engine, battery, and avionics preheat system.
Electrical resistance elements heat engine each cylinder assembly, crankcase, oil, oil coolers, and battery. PTC fan heater preconditions avionic and pilot cockpit area.
- Aft plug – Powers auxiliary AC outlet and passenger compartment PTC fan heater.

3.2 Technical Specifications


Preheat system load analysis and individual element values are listed in Table 3.

3.3 Weight and Balance

Weigh kit and all installation hardware before installing.

- Record modification, update equipment list, and/or flight manual
- Include adjustment to weight and balance
- Approximate installed weight: 8.0 lb (3.6 kg).
- For moment arm, use 5.5 lb / 2.5 kg at engine firewall and 3.3 lb / 1.5 kg at aft fan heater location as installed.

3.4 Operation

 **Caution:** Before connecting system to power complete Functional System Check in § 6 and review Operating Guide.

3.5 Maintenance

Instructions for Continued Airworthiness (Table 1), lists inspection and cleaning procedures. All maintenance processes are IAW aircraft/engine manufacturer's recommendations, and 43.13-1B Chapter 11, Sections 1, 3, 4, 8, and 9.

The Airworthiness Limitations section of the FAA specifies inspections and other maintenance required by 14 CFR Part 43.16 and 91.403, of the Federal Aviation Regulations unless an alternative program has been approved.

3.6 Options

Modifications and/or additional kits are available for installation with base kit. Specific operational requirements may require alternate component, and/or additional elements.

- Circuit protection: Mountable fuse holder: HTB-42I. Breaker: MS26574-10, MS3320-10, or Klaxon 2TC49-10.
- Sealed power switch: MS35059-22 (8822K20)
- Firewall Connector Kit: TU03030 and TU03125 (non pressurized firewall and bulkheads)
- Fireproof Grommet Kit: TG01056 (non pressurized firewall and bulkheads)
- Connector Kits: Tanis sealed connectors series 2598 and 2603, TU02968 or TU03047 (5015/38999 crimp type disconnect)
- Contact Tanis Aircraft Products for additional options

4. INSTALLATION

Referenced documents, figures, and tables are located in Section 5.

All components are to be installed in a manner that allows for proper inspection and maintenance. Installation is not to interfere with other systems such as engine or flight controls.

- Record system information as indicated in Operating Guide and ICA
- Preheat system and individual element values are listed in Table 3

4.1 Overview

- (1) Review all instructions and documents listed in Table 1.
- (2) Before beginning installation weigh kit contents and intended installation hardware.
- (3) Identify installation sites for elements, shore power plug, and cable routing.
- (4) Install components per instructions.
- (5) Record and retain documents as indicated in Operating Guide and ICA.
- (6) Complete Functional System Check and Sign Off in Sections 6 and 7.


4.2 Standards

Installation is to be IAW current regulatory requirements (AC 43.13-1B.), and airframe/engine manufacturer's procedures.

Listing below may supplement above procedures:

- (1) Wires and cables are to be supported by suitable lacing, cable ties, clamps, grommets, or other devices at intervals of not more than 6 inches apart except when contained in ducts or conduits.
- (2) Do not allow connectors to free hang. Properly secure wires and cables so movement is restricted to the span between the points of support and not on the connectors.
- (3) Supporting devices should be of a size and type capable of supporting wires and cables securely without damage to the insulation.
- (4) Adequately support and secure wire and connectors to prevent excessive movement in areas of high vibration.
- (5) Route, wiring and cabling with enough slack to compensate for movement of shock mounts.
- (6) Route, cable/wire in a manner that ensures system components are not in close proximity to high heat sources and use fire sleeve to protect wiring and connectors in questionable high heat areas.
- (7) Where practical, route wires and cables above fluid lines, and provide separation from fuel lines. Such wiring should be closely clamped and rigidly supported and tied at intervals such that contact between lines and related equipment would not occur in the case of a broken wire and/or a missing wire tie or clamp.
- (8) To compensate for routing options it is acceptable to service loop, racetrack, shorten or lengthen, wires/cables by cutting and re-terminating with appropriate contacts, splice or connector.
- (9) Check for proper installation of engine to airframe ground strap bonding.
- (10) When penetrating composites follow approved airframe manufacturer procedures and reference AC 43.13-1B Chapter 3 as needed. When riveting use appropriately sized blind rivets (aluminum or Monel MS, CR and NAS), assemble wet and seal A/R with PS 870 or equivalent (MIL-PRF-81733). Do not buck or use solid rivet in fiberglass or composite panels or structures.
- (11) When working with sheet metal, reference AC 43.13-1B Chapter 4, Section 4. Use appropriate rivets per installation. For structural installations, rivet layout is to be patterned after a small patch, similar to Figure 4.16 of AC 43.13-1B. Assemble wet and seal A/R with PS 870 or equivalent (MIL-PRF-81733).
- (12) When penetrating firewall reference 43.13-1B Chapter 11, Section 17.

4.3 Elements

 **Caution:** Do not connect elements to power until installed and Functional System Check in Section has been completed.

Operational requirements or modifications may require additional and/or alternate elements.

- Verify individual element resistance before installing (Table 3)
- Install threaded elements per instruction TN02771 (Table 1).
- Install pad elements per instruction TN02788 (Table 1)
 - a) Pad elements must be in full contact through bonding sealant
 - b) Only install using approved sealants. Refer to Bonding Instructions
 - c) Positioning and lead orientation may vary from figures
 - d) When installing consider oil drip points, lead orientation, and cable routing

Qty	P/N	Heater description and general location (reference § 5. for examples)
1	TEP2649-	Pad element - Engine crankcase fwd lower right adjacent to starter lead aft (Figures 9 and 11).
2	TEP2653-	Pad element – One each oil cooler leads up to follow oil lines (Figures 9 and 12).
1	TEP2928-	Pad element - Engine oil sump below nominal oil level (Figures 9 and 10).
6	TTP2771-	Threaded element - replaces one intake fastener on each cylinder assembly (Figures 9 through 14).
1	TTP2771-	Threaded element - replace one accessible accessory case fastener on lower right side near sump flange, accessory case to crankcase near fuel pump (Figures 9 and 17).
2	THP3094-	AV/Cabin Heater – mount one behind co-pilot panel on avionic din panel, second Av heater is to be located in passenger compartment configured for occasional use or permanently mounted (Figures 7 and 19).
1	TBP2644-	Battery element 28 inch x 4 inch - Install with reference to Instruction TN02800 (Figures 8 and 18). Element may vary, common configuration supplied. Battery element installation does not use bonding sealant, installed using cable ties or appropriate lacing. Gently lace in place alternating tension between ties excessive tension may cause damaging or result in pulling grommets through element edge. .

4.4 Cable Routing

Review § 3.6 Options, § 5. Tables and Figures, and Cable Kit - Wire Diagram.

- Reference Table 1 in § 5. for documents as called out below
 - Routing is suggested; variations in aircraft configuration may require deviation
1. Shore power plugs (power connection/inlet):
 - a) Installed 2 place door kit TD03097, plugs and indicator lights on the left side of the aircraft forward of the pilot door (Figures 2 through 4), reference GippsAero SB SB-GA8-2015-160 and individual installation instructions (Table 1). Secure fused links with cable ties on wire and battery cable bundle above plugs (alt circuit protection listed in § 3.6. Options).
 - b) Plug(s) may be collocated or with approved shore power connection/plug(s).

2. Grounds: Bond ground wires on existing ground lug(s) or on airframe adjacent to plugs.
3. Firewall penetration: Route lead 04 through firewall with battery cables (Figures 15 and 16).
4. Junctions: Reference cable kit wire diagram, Figures 9, 15, and 16.
 - J-A: Mount above shore power plugs on existing wire bundle with battery cables.
 - J-B: Mount in engine compartment forward of firewall on engine mount with battery cables.
 - J-C: Mount on left cylinder ignition leads aft of left rear cylinder adjacent to junction J-B.
 - J-D: Mount on right cylinder ignition leads aft of right rear cylinder.
5. Leads: Reference cable kit wire diagram and Figures 9 through 19.

Note: Junction J-B is mounted on engine mount (Figures 9, 15, and 16), lead 05 with connector transitions the preheat system cabling to the first engine mounted junction, junction J-C (Figure 16).. From this point Junctions J-C and J-D are mounted on ignition leads and considered engine mounted. From this point cabling from junctions J-C and J-D are not transition between the engine and airframe. The engine should be able to be removed with the Tanis engine preheat attached by disconnecting lead 05 connector. Oil cooler leads 07 and 08 from J-B are routed with oil cooler lines to cooler elements.

 - 01 – Power lead with fusing routed between shore plug 1 and junction J-A.
 - 02 – Routed from junction J-A with existing wiring along firewall to AV heater mounted on right avionics equipment panel (Figure 19).
 - 03 – Route from junction J-A following battery cable to breaker switch box under pilot seat. Connect to battery thermal control cabling (Figure 18). Route battery lead with socket connector to battery element.
 - 04 – Route aft from junction J-B through firewall parallel with battery cables and terminate in junction J-A (Figures 15 and 16).
 - 05 – Junction J-B and J-C interconnect lead (Figure 16).
 - 06 – Junction J-C and J-D interconnect lead routed with ignition leads (Figure 15).
 - 07 and 08 – Oil cooler element leads route from junction J-B with oil lines to cooler elements.
 - 09 through 12 – Route to left cylinder bank elements and rear accessory case element. One of these leads is to be routed with lead 06 to J-D then to 2771 accessory case element located to right side of case near fuel pump (Figures 13 and 16).
 - 13 through 17 – Route to right cylinder bank elements, sump and forward case element (Figures 14 and 17).
 - 18 – Power lead with fusing routed between shore plug and AC outlet and AV heater lead.
6. Placard: Affix placard or placard with equivalent stating at a minimum; “Tanis”, and the system voltage near systems shore power plugs (Figures 1 and 3).
7. Complete Functional System Check and Sign Off, Sections 6 and 7.

5. TABLES AND FIGURES

TABLE 1 - Supporting Installation Documents

Reference GippsAero SB-GA8-2015-160 for additional parts and installation details.

* Note: Record and retain documents as indicated in Operating Guide and ICA.

03120	Drawing - Preheat Kit / Item List (-115 or -230)
03121	Drawing - Cable Kit / Wire Diagram
TN02070	Instruction - Flush Mount Plug
TN02788	Instruction - Bonding (element installation)
TN02793	Instruction - Connector (termination and assembly)
TN02829	Instruction - Receptacle (supplied with 230-volt kits)
TN02800	Instruction – Battery heater installation
TN03039	Instruction - Indicator 8mm
TN03094	Instruction – AV/Cabin Heater installation
TN03097	Instruction – 2 Place Shore Power Door installation
TNF3120	Instruction - Engine Preheat Installation (this document)
TCA0001	Instruction for Continued Airworthiness – Preheat System
TPG0001	Operating Guide – Preheat System

TABLE 2 - Cushioned Clamp Reference. (Alternates: MS21919 WCH / WCE)

(Clamp sizes vary by manufacturer, properly size for secure fit)

Size	MS number	Application
1/8"	MS21919WDG-2	1 - 2 wire
1/4"	MS21919WDG-4	2 - 3 wire
5/16"	MS21919WDG-5	8mm Indicator light
5/8"	MS21919WDG-10	2 contact connector
7/8"	MS21919WDG-14	3 contact connector and fused link
1"	MS21919WDG-16	4 lead junction
1 3/16"	MS21919WDG-19	6 lead junction (WCH-18)
1 1/2"	MS21919WDG-24	Circular shore power plug

TABLE 3 - Technical Specifications.

Total preheat system and individual element values +/- 10%.

Record system information as indicated in ICA and Operating Guide.

115 Volt kit - without battery and AV heaters **5.5 Amps** **630 Watts** **21.0 Ohms**
Total 10.3 Amps 1182 Watts 11.2 Ohms

Qty	Element Part Number	Location	Wattage	Ohms
1	TEP2649-115/120	Eng Case	120	110.2
2	TEP2653-115/40	Eng Oil Coolers	40	330.6
1	TEP2928-115/80	Eng Oil Sump	80	165.3
6	TTP2771-115/50	Cylinder Assembly	50	264.5
1	TTP2771-115/50	Rear Accessory Case	50	264.5
1	TBP2644-115/52	Battery Heater	52	254.3
2	THP3094-500	AV/Cabin Heater	500	26.5

230 Volt kit without battery and AV heaters **2.7 Amps** **630 Watts** **84.0 Ohms**
Total 5.1 Amps 1182 Watts 44.8 Ohms

Qty	Element Part Number	Location	Wattage	Ohms
1	TEP2649-230/120	Eng Case	120	440.8
2	TEP2653-230/40	Eng Oil Coolers	40	1322.5
1	TEP2928-230/80	Eng Oil Sump	80	661.3
6	TTP2771-230/50	Cylinder Assembly	50	1058.0
1	TTP2771-230/50	Rear Accessory Case	50	1058.0
1	TBP2644-230/52	Battery Heater	52	1017.3
2	THP3094-500	AV/Cabin Heater	500	105.8

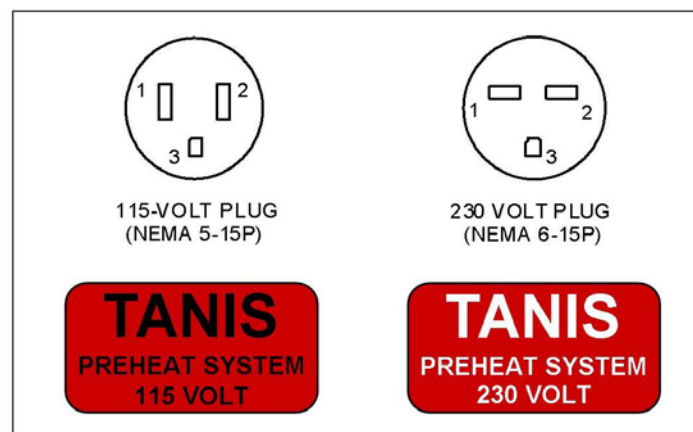


Figure 1 - Shore power plugs and placards. Placard that states at a minimum, *Tanis* and the system voltage requirement (115 Volt or 230 Volt) is acceptable.

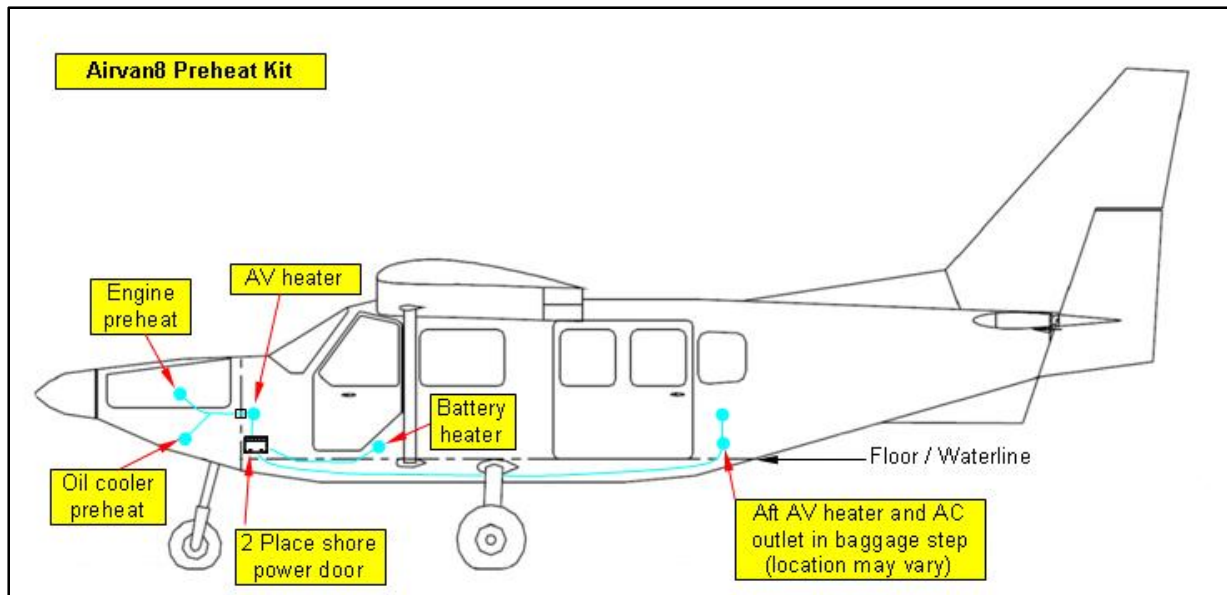


Figure 2 - Overview of Tanis Cold Weather Modification. Reference door installation instruction Table 1 and GippsAero SB-GA8-2015-160.



Figure 3 - Two place door kit TD03097 installed on left side of aircraft aft of firewall and above floor line. Forward plug (inlet) is dedicated to the preheat system, and aft plug (inlet) supplies power for aft passenger compartment AV heater and auxiliary AC outlet. Power junction J-A and fused links are to be mounted on wire bundle above plugs that contains battery cables. This bundle is routed from under floor up along left quarter panel to firewall penetration.

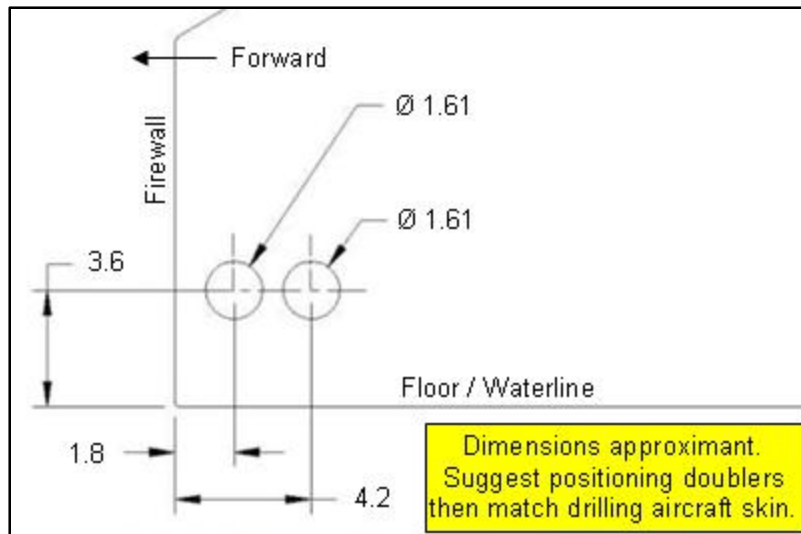


Figure 4 – Positioning reference for 2 place door ref. SB-GA8-2015-160 (Figures 2 and 3).

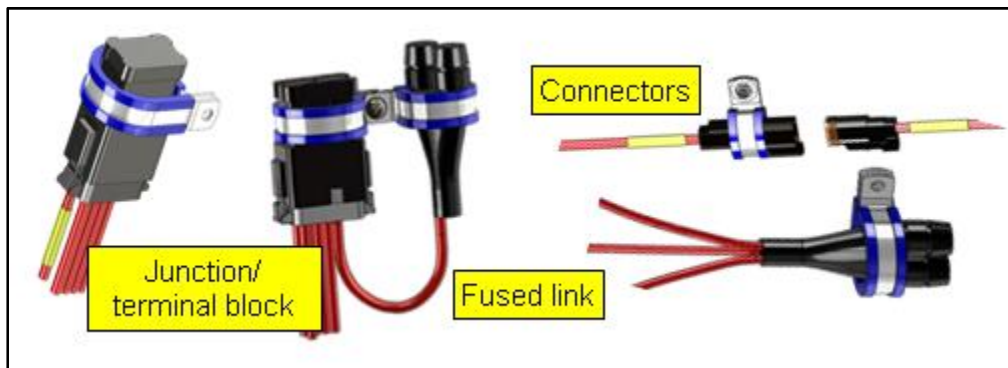


Figure 5 – If using cushioned clamps position on components as shown (sizing Table 2).

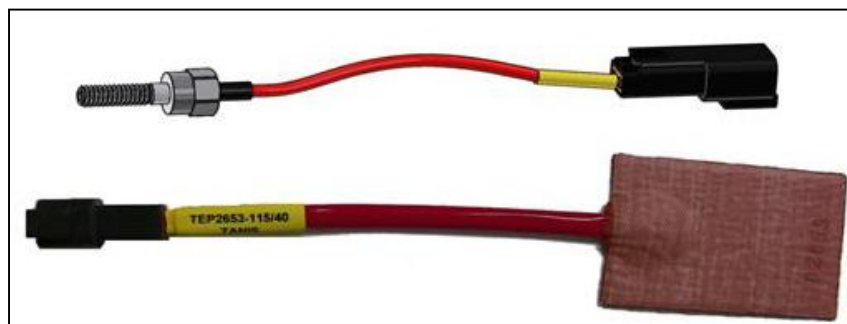


Figure 6 - Generic elements shown with 6 inch lead, sealed pin connector, and yellow label with part number.

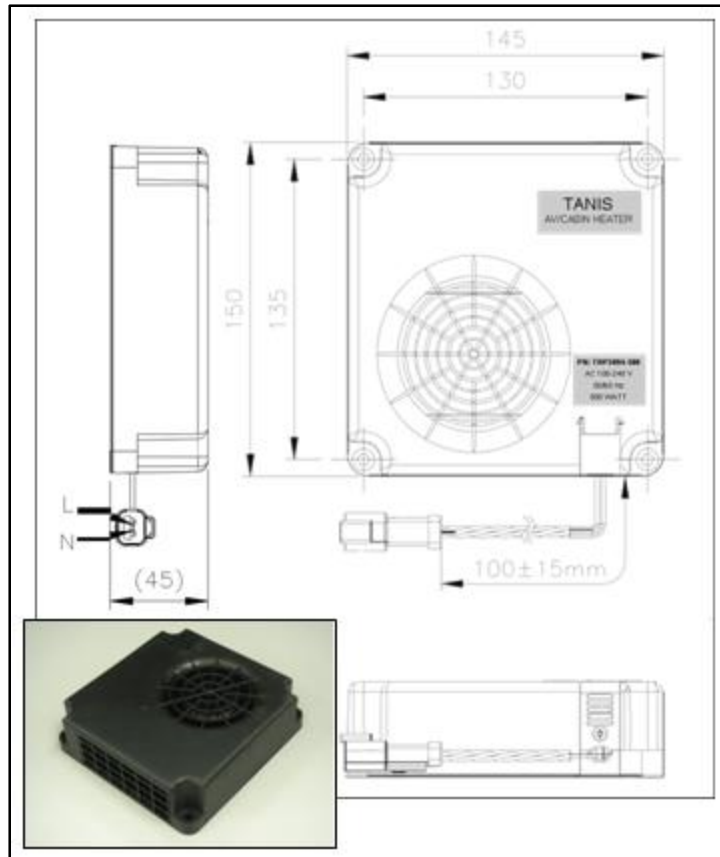


Figure 7 - AV/Cabin Heater THP3094-500, wall mounted in cockpit below avionics panel and in aft passenger compartment. Aft passenger compartment heater may be configured for occasional use, connected while on the ground and stowed before flight, reference TN03094 § 4.

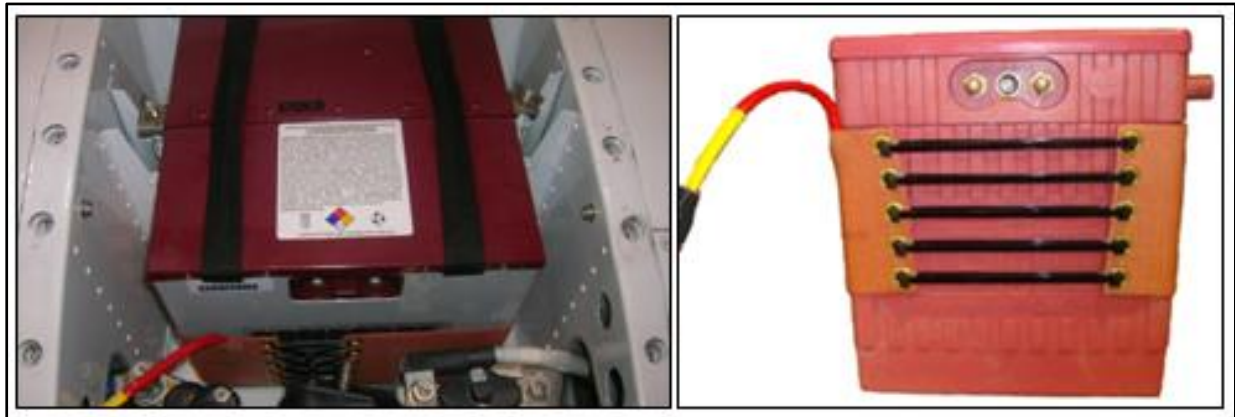


Figure 8 - Examples of generic battery heat element installation. Battery heat system incorporates cable assembly with dedicated thermal control (Figure 18 and instruction TN02800).

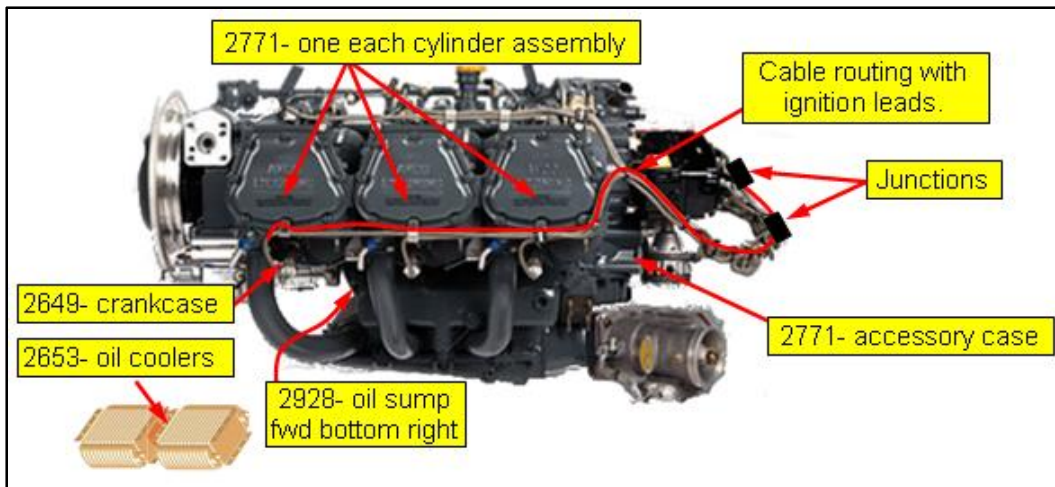


Figure 9 - General engine element layout and wire routing.

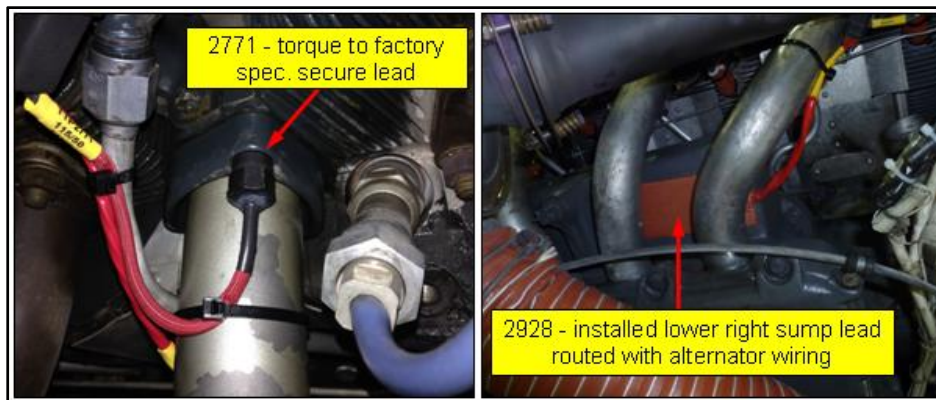


Figure 10 – Threaded elements installed per instruction TN02771 without washers or spacers, torque to factory specification, and secure leads. Pad elements installed per instruction TN02788 using approved solvent wipe and bonding sealant.

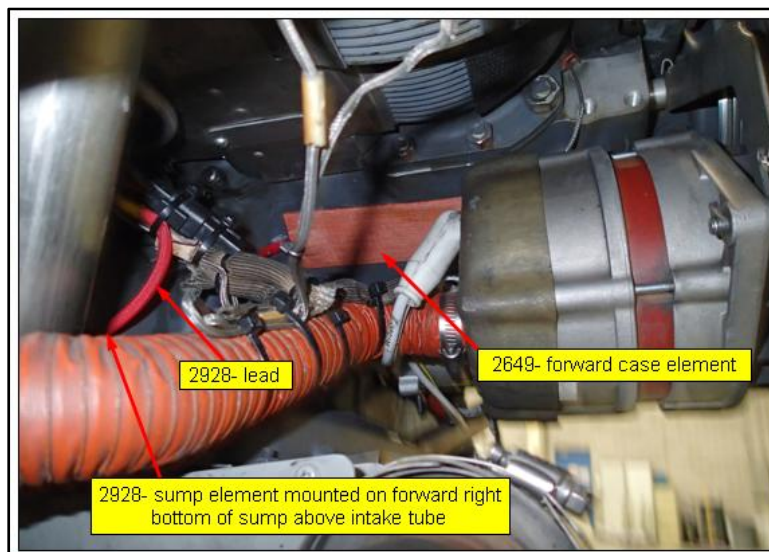


Figure 11 – Pad elements installed on forward lower right of crankcase and oil sump. Leads are routed between elements and junction with alternator wiring.

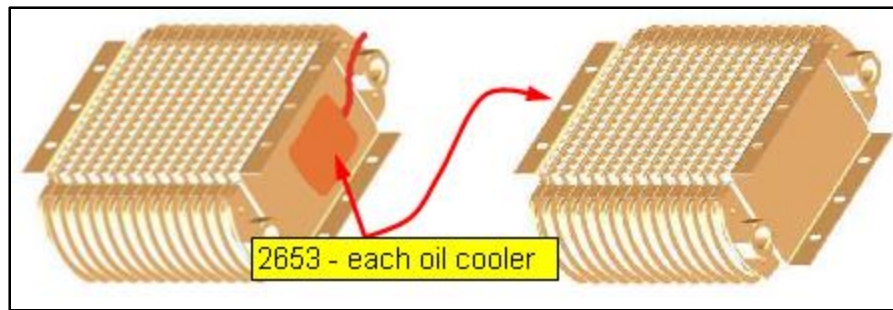


Figure 12 – Oil cooler are dropped down from bracketing and pad elements are installed on inner facing surfaces, leads routed with oil lines to junction J-B.



Figure 13 – Left side engine view of cylinder elements. From junction J-C cylinder element leads are routed with ignition leads (lead selection is based on installation).

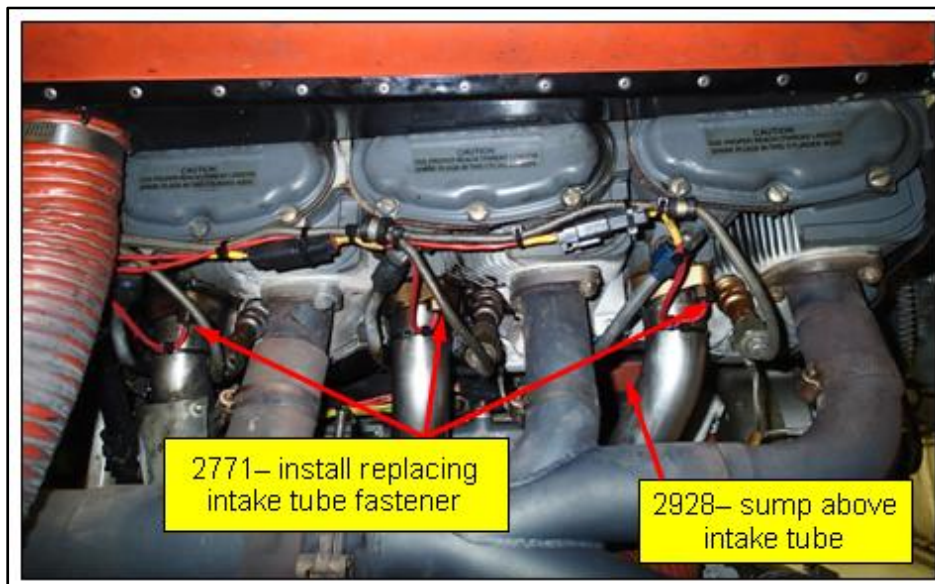


Figure 14 – Right side engine view of sump and cylinder and elements. From junction J-D cylinder element leads are routed with ignition leads (lead selection is based on installation), sump and crankcase pad element leads are routed with alternator wiring.

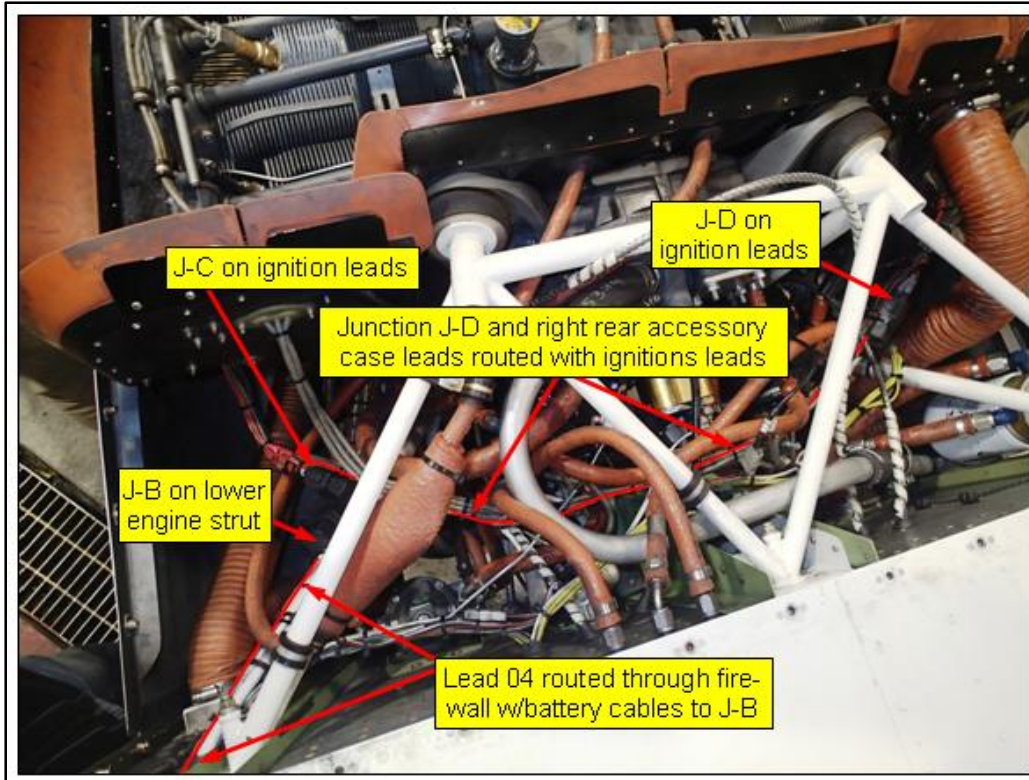


Figure 15 – Top view of engine forward of firewall with examples of junction mounting locations and lead routing.

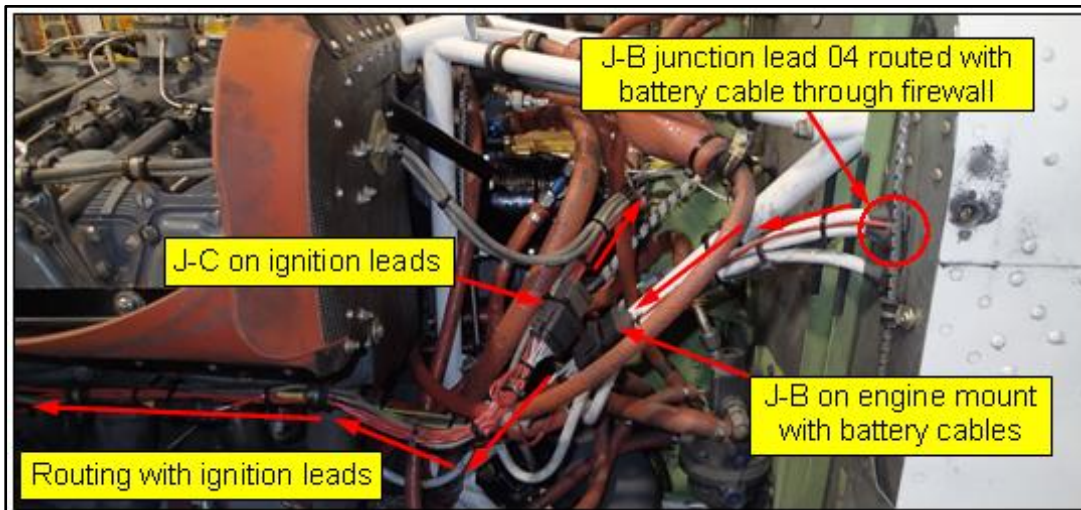


Figure 16 – Left view of engine with examples of junction mounting and lead routing. Lead 04 from junction J-A (located in cabin near plugs) routed through firewall with battery cables. J-C element leads routed forward to elements, lead for 2771 accessory case element and lead 05 for junction J-D are routed with ignition leads to right side of engine.

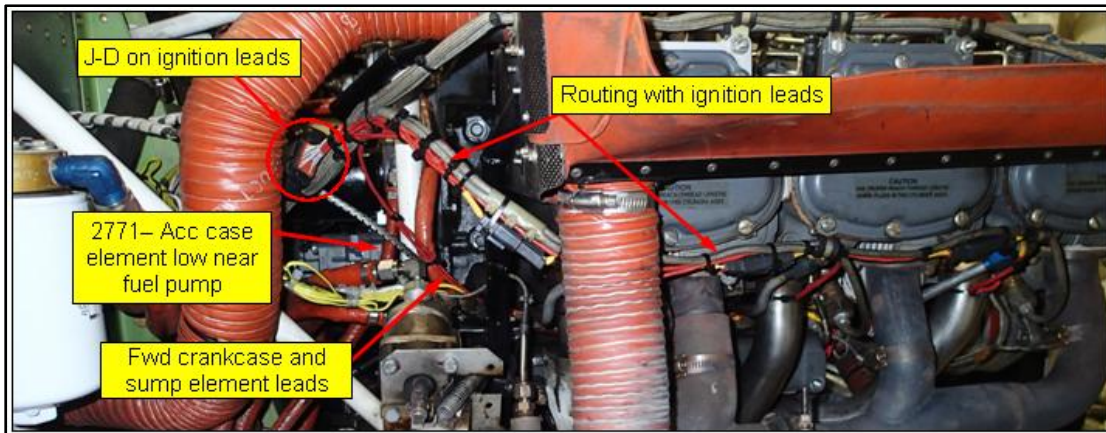


Figure 17 – Right view of engine and mounting of junction J-D and lead routing. Note individual element leads secured to intake tubes and pad element leads routed with alt. wiring.

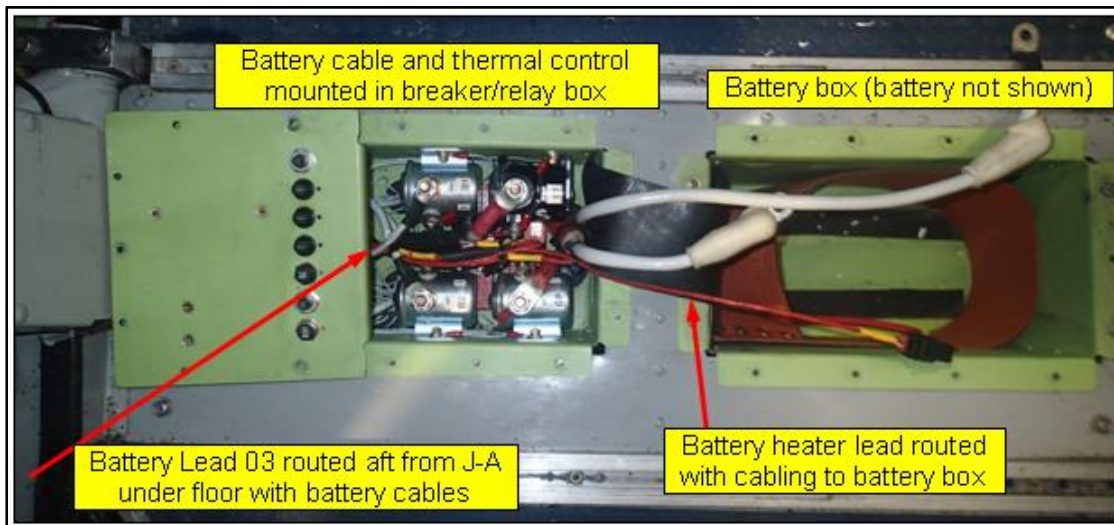


Figure 18 – Battery cable mounted in breaker box with.



Figure 19 - AV/Cabin Heater THP3094-500, wall mounted in cockpit below avionics panel. Installation hardware not supplied. Remove isolator feet and hardware. Install with isolators feet and appropriate number 8 screws, washers and lock nuts or nut plates.

6. FUNCTIONAL CHECK



Caution: Contact with hot element can cause 2nd degree burns.

Before proceeding, verify system is not powered or connected to a power source.

Verify that all elements are connected and bonding sealant is cured.

Follow in sequence, record as indicated, and check off when completed.

If a discrepancy is found, correct before proceeding to the next step.

* Skip when not installed, or test separately.

[☒] Check both power plugs as follows:

- 1) [☐] Verify installation is in accordance with kit installation instructions.
- 2) [☐] Verify any effected component fluid levels are at operational levels.
- 3) [☐] Verify engine to airframe/engine bonding (ground strap) is as per OEM requirements.
- 4) [☐] Verify grounds by checking for continuity between shore power plug ground pin 3 (Figure 1), engine, and airframe.
- 5) [☐] Verify there is no continuity between ground pin 3 and blades 1 or 2.
- 6) [☐] Using an ohmmeter measure resistance between blades 1 and 2 and record resistance: Fwd plug_____, Aft plug_____.
- 7) [☐] * Freeze (0°C) battery thermal control and repeat step 6, record: (fwd plug) _____.
- 8) [☐] Compare resistance figures recorded in steps 6 and 7 with values in Table 3.
- 9) [☐] Review Operating Guide TPG0001 and connect to appropriate power.
- 10) [☐] Verify power indicator light(s) on (illuminated).
- 11) [☐] Verify AV heater(s) operation by checking for audible fan and warm air circulation.
- 12) [☐] Within 30-minutes, area adjacent to the elements will start to feel warm. Check each element individually.
- 13) [☐] * While system is warming up, freeze (0°C) battery thermal control, test battery heat element for heat. Element can be touched, as wattage density is low.
- 14) [☐] When testing is completed, disconnect (unplug) from power, latch any access doors that were open, and stow extension cord(s) in appropriate location.
- 15) [☐] Complete/fill-in blanks as indicated on first and last pages of Operating Guide listed in Table 1, and file with POH/FM.
- 16) [☐] Complete/fill-in blanks as indicated in Instructions for Continued Airworthiness (ICA) listed in Table 1, and file with aircraft manuals and logs.
- 17) [☐] Update/modify weight and balance, and installed equipment lists (Section 3.5).
- 18) [☐] Make a log entry to comply with 14 CFR Part 43.9 or other procedures set in place by the operator.
- 19) [☐] Complete and return Registration/Warranty Card.
- 20) [☐] Complete Sign Off in Section 7.

7. SIGN OFF

Date: ____ / ____ / ____

Preheat Kit

Part Number: _____

Serial Number: _____

AV/Cabin Heater

Part Number: _____

Serial Number: _____

Part Number: _____

Serial Number: _____

Airframe

Manufacturer: _____

Model: _____

Serial Number: _____

Registration: _____

Engine

Manufacturer: _____

Model: _____

Serial Number: _____

Functional Check performed by: _____

(Signature)

(Printed name, title and certificate number, if applicable)