



INSTRUCTION – PREHEAT INSTALLATION

TSP1051- Oil Tank Heater Kits

Document No.: TNP1051 REV. A

Dated: JAN-06-2015

OIL TANK HEATER



**FOR
AG CAT G-164**

PROPRIETARY DATA

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RECORD OF REVISIONS*When updated, this document is changed in its entirety.*

REV	DATE	DESCRIPTION	BY	RELEASE
A	JAN-06-2015	Standardize kit configuration.	DNE	
-	SEP-23-2011	Initial Release	DNE	RCK

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1. PURPOSE

The purpose of this instruction is to provide guidance for the installation of the Tanis Oil Tank Heater Kit listed on the cover page of this document.

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 as needed (952-224-4425).

Note: *This instruction is for the installation of both 115 Volt and 230 Volt kits. The last numbers in a part number sequence (after the dash), represent the voltage requirement 115 or 230, and may be omitted in narrative. Example: TU02615- (115 or 230).*

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

2. REQUIREMENTS

Supporting documents listed in Table 1 of Section 5.

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

- Record and retain system information and installation documents indicated in Operating Guide and ICA (Table 1).
- 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 engine oil tank and shore power plug mounting location.
- Installation times vary to a wide range of variables. Bonding sealant cure time is in the range of 8 hours, refer to Instruction - Bonding (Table 1).
- Installation is to be in accordance with (IAW) current regulatory requirements, airframe/engine manufacturer's recommendations, 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.
- For global standardization and safety of operations, power connection point (shore power plug), is a non-locking blade type NEMA connector (Figure 1). A corresponding outlet/receptacle connector (supplied for field installation with 230-volt kits) is required on power connection/extension cord. Additional approved receptacles are available though Tanis (TP02872-115, TP02829-230).

2.1 Materials

Pad element bonding sealant is sourced at time of installation. Approved adhesive sealants and element installation procedures called out in Instruction - Bonding (Table 1).

Installation hardware, consumables, finish materials, brackets, lacing, and various MS21919 cushion clamps are sourced separately. Suggested clamps listed in Table 2.

2.2 Tools

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

Required:

- Ohmmeter certified to traceable standards.

Suggested tools for wire modifications or repairs include:

- Deutsch contact remover tool: DT-RT1
- Tanis 4 way indent crimp tool: TU02793
 - Alternate crimp tool, DMC: AF8-TH163

2.3 Power

Power supply and shore power connection (extension cord) is 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 Section 5, Table 3.

3. DESCRIPTION

Eligibility for installation of this kit is on remote oil tanks only. This is not for installation on engine mounted oil tanks. Complete engine preheat is required at temperatures below 20°F / - 6°C. Engine preheat, avionics and battery heat kits are available through Tanis Aircraft Products. Preheating is a cold weather aviation procedure that increases reliability and safety of operations, reduces torque oscillations, thermal stress, warm up, and launch times.

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

3.1 Physical Attributes

Preheat is applied through electrical resistance heat in the form of thin pads sized and shaped to fit remote engine oil tank. Power is routed to elements through dedicated wiring assembly with circuit overload protection and option for connecting Tanis Indicator Light.

3.2 Technical Specifications

Preheat system and individual element values listed in Table 3.

3.3 Weight and Balance

Record modification by updating equipment list and/or flight manual. If required include adjustment to weight and balance. Approximate installed weight is 0.75 pounds (lb). Use oil tank CG for moment arm.

3.4 Operation

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

3.5 Maintenance

Instructions for Continued Airworthiness (Table 1), lists inspection and cleaning procedures. All 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

Specific operational requirements may require modifications or additional elements. In addition, complete engine preheat, avionics and battery preheat is suggested and may be required. Heating of avionics allows for proper glass panel activation, reducing condensation build up and cold weather induced gyroscopic errors. Battery heating reduces freeze point depression, allowing higher amperage outputs and proper charge.

Modification and/or additional kits are available for installation with base kit.

4. INSTALLATION

Referenced documents, tables, and figures, 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 and retain system information and installation documents indicated in Operating Guide and ICA (Table 1). Modify Operating Guide and ICA noting installed system is oil tank only and attach this instruction and document listed in Table 1 as appendix to ICA.

4.1 Overview

- (1) Review all instructions and documents included with this kit.
- (2) 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) Verify installation by completing checklist and sign off (Sections 6 and 7).

4.2 Standards

Installation is to follow 43.13-1B., and airframe/engine manufacturer's procedures.

- (1) Wires and cables are to be supported by suitable 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, with the wires and cables held securely in place 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, or shorten cables by cutting and re-terminating with appropriate connector, or lengthen with extension cable.
- (9) Use existing feed-through and fire barrier penetrations whenever possible. Feed-through penetrations are to be IAW with 43.13-1B Chapter 11, section 17. If routing requires a new fire barrier penetration use Tanis Fireproof Grommet TG01056, Firewall connector kit TU03030, or approved fitting.
- (10) Check for proper installation of engine to airframe ground strap bonding.

4.3 Elements



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

- Verify individual element resistance before installing (Table 3).
- Element positioning and lead orientation may vary from figures.
- When installing consider oil drip points, lead orientation, and cable routing.
- Only install using approved sealants, refer to Instruction - Bonding (Table 1).
- Elements must be in full contact through bonding sealant.

Two TEP2650- pad heat elements supplied (120-watt 7 x 1.75 inch).

Before installing element(s) verify tank capacity and install accordingly:

- A. Engine oil tank with operating capacity of between 3 to 6 gallons install one (1) pad heat element below nominal oil level, positioning lead for cable routing.
- B. Engine oil tank with operating capacity of between 6 to 10 gallons install two (2) pad heat elements below nominal oil level, distance elements from each other as much as practical (opposite sides of tank).
- C. For installation on tanks outside of listed quantities, contact Tanis Engineering.

Note: Cable kit is configured with three output leads. Spare lead may be used for engine sump or high capacity tank element.

Optional edge sealant: Parameter/edge of elements may be sealed with P/S 700 after primary element bonding sealant is cured. For proper adhesion, area adjacent to element and perimeter surface of pad must be free of primary element bonding sealant.

When sealing edge of element, use only enough sealant to create smooth transition along edge of element to mounting surface. Transition is not to extend beyond 3/8 of an inch (0.375") from the element, and not more than 3/16 of an inch (0.188") onto the element's upper surface.

4.4 Routing

Cable routing is suggested, reference Cable Kit - Wire Diagram, and review Section 4.2, and 5.

- a. Shore power plug - mount in a location accessible through oil or coolant access door or cowl opening, on or near an engine or airframe mount. Plug must be securely mounted in a bracket or with cushioned clamps (Figures 1 and 2).
- b. *Optional indicator light - if used - locate in viewable location and secure in place with cushioned clamp, cable ties or other acceptable means (Figure 2).
- c. Placard - affix adjacent to the shore power plug. Optional placard stating at a minimum, *Tanis* and the system voltage requirement (*115 Volt* or *230 Volt*) *is acceptable*.
- d. Cabling - route between elements, junction and shore power plug adjusting lengths as required.
- e. Ground-wire - properly connect to the engine or airframe.
- f. Complete Functional System Check and Sign Off, Sections 6 and 7.

5. TABLES AND FIGURES

TABLE 1 - Supporting Installation Documents

* Note: Modify Operating Guide and ICA noting installed system is oil tank only.

Attach this instruction and document listed in Table 1 as appendix to ICA.

1051	Preheat Kit - Item List
02871	Cable Kit - Wire Diagram
TN02782	Instruction - Click bond cable mount
TN02788	Instruction - Bonding
TN02829	Instruction - Receptacle (Supplied with 230-volt kits)
TCA0001	Instructions for Continued Airworthiness (ICA) *
TPG0001	Operating Guide - Piston Engine Preheat System *

TABLE 2 - Cushioned Clamp Reference. (Alternate: MS21919WCH / 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 - Electrical Values.

Preheat system and individual element values +/- 10%.

115 Volt kit 1 elements installed 1.0 Amps 120 Watts 110.2 Ohms
2 elements installed 2.1 Amps 240 Watts 55.1 Ohms

Qty	Element Part Number	Location	Wattage	Ohms
(2)	TEP2650-115/120	Engine oil tank	120	110.2

230 Volt kit 1 elements installed 0.5 Amps 120 Watts 440.8 Ohms
2 elements installed 4.8 Amps 120 Watts 220.4 Ohms

Qty	Element Part Number	Location	Wattage	Ohms
(2)	TEP2650-230/120	Engine oil tank	120	440.8

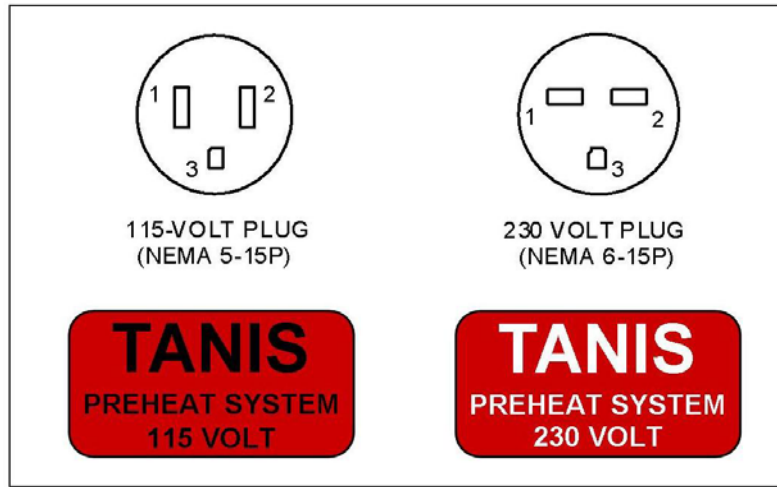


Figure 1 - Shore power plugs and placards. Placard that states at a minimum, *Tanis* and the system voltage requirement (115 Volt or 230 Volt) is acceptable.

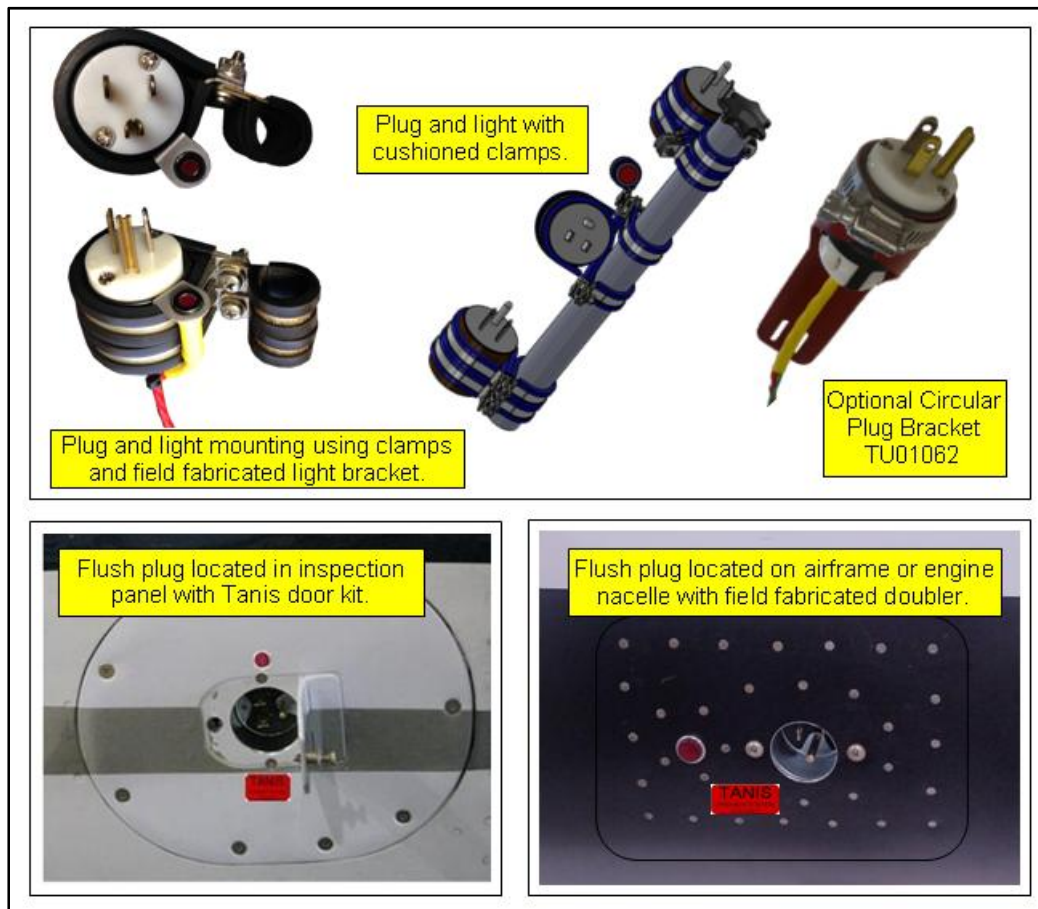


Figure 2 - Examples of plug mounting. Top pictures depict shore plug supplied with kit, bottom two pictures optional flush plugs configurations.

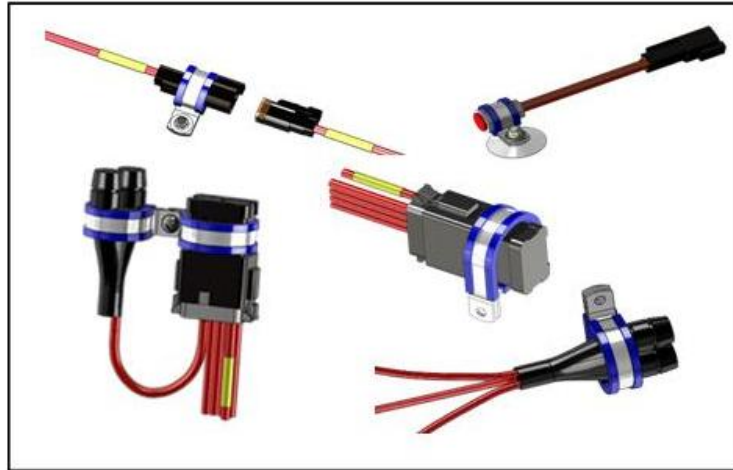


Figure 3 - Clamp positions, connectors, optional light, junctions, and fused link.



Figure 4 - Example of pad heat element.

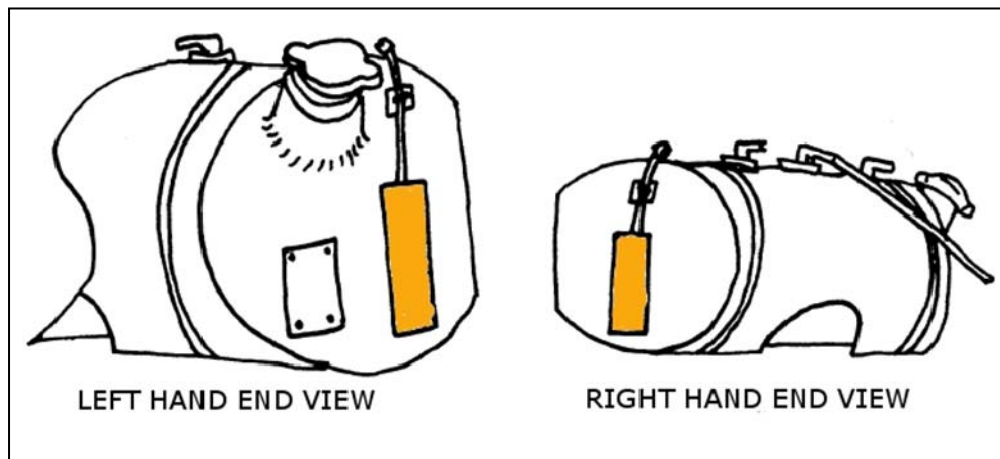


Figure 5 - Install heat element(s) on end(s) or bottom of tank below nominal oil level. Secure lead as required with cable mount.

- 1 - Engine oil tanks with operating capacities of between 3 to 6 gallons install one (1) pad heat elements below nominal oil level, positioning lead for cable routing.
- 2 - Engine oil tanks with operating capacities of between 6 to 10 gallons install two (2) pad heat elements below nominal oil level, distance elements from each other as much as practical (opposite sides of tank).

6. FUNCTIONAL SYSTEM CHECK



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

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

Verify that all elements are properly 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.

[√] Check the system as follows:

- 1) [] Verify system components are installed in accordance with kit installation instructions.
- 2) [] Verify effected component fluid levels are at operational levels.
- 3) [] Verify engine to airframe/engine bonding (ground strap) is as per OEM requirements.
- 4) [] Verify preheat system ground by checking for continuity between shore power plug ground, pin 3 (Figure 1), engine, and airframe.
- 5) [] Using an ohmmeter, verify there is no continuity between shore power plug pins 1 and 2, and the ground pin 3.
- 6) [] Using an ohmmeter, measure resistance between the power pins 1 and 2, and record total system resistance: _____. Compare with Table 3.
- 7) [] Connect the system to appropriate power.
- 8) [] * Verify power indicator light is on (illuminated).
- 9) [] Within 30-minutes, area adjacent to the elements will start to feel warm. Check each element individually.
- 10) [] When testing is completed, disconnect (unplug) from power, latch all access doors and stow extension cord in appropriate location.
- 11) [] Complete/fill-in blanks as indicated on first and last pages of Operating Guide listed in Table 1, and file with POH/AFM..
- 12) [] Complete/fill-in blanks and retain installation documents as indicated in ICA listed in Table 1, and file with aircraft manuals and logs.
- 13) [] Update/modify weight and balance, and installed equipment lists (Section 3.5).
- 14) [] Make a log entry to comply with 14 CFR Part 43.9 or other procedures set in place.
- 15) [] Complete and return Registration/Warranty Card.
- 16) [] Complete Sign Off in Section 7.

7. SIGN OFF

The undersigned found the system installed and operating correctly.

Date: ____ / ____ / ____

Preheat Kit

Part Number: _____

Serial Number: _____

Airframe

Manufacturer: _____

Model: _____

Serial Number: _____

Registration: _____

Engine

Manufacturer: _____

Model: _____

Serial Number: _____

System test performed by: _____

(Signature)

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

******* NOTHING FOLLOWS *******