INSTRUCTION –
PREHEAT KIT INSTALLATION

Subject: P/N: TSFB737-3277-230, Preheat Kit - 230 Volt
TSFB737-3277-115, Preheat Kit - 115 Volt
Boeing 737 w/PW-JT8D Series Engines.

Document No: TNF3277
Revision: A
Date: SEP-09-2019

RECORD OF REVISIONS

When updated, this document is changed in its entirety.

REV	DATE	DESCRIPTION	BY	CKD
A	SEP-09-2019	Initial Release	DNE	GDO

Current revision approval: Dirk Ellis Digitally signed by Dirk Ellis DN: cn=Dirk Ellis, o=Tanis, ou=Eng, email=dirk@tanisaircraft.com, c=US Date: 2019.09.09 08:49:58 -05'00'

1. PURPOSE

This instruction provides guidance for installation of preheat kits listed above which contain heaters for two engines and one battery. Auxiliary power unit (APU) preheat is required refer to Section 2. below.

Note: 230-volt kit is preferred for operations with access to high voltage external ground power.

2. REQUIREMENTS

Subject kit top-level drawing, 03277-230 or 03277-115, parts and documents as listed.

a) Tools, hardware, and consumables, power supply and extension cords, not supplied

b) Element bonding sealant supplied separately refer to TNDC730. Requires approximately 3-6 oz. of DC 730 White Fluorosilicone.

c) APU preheat kit supplied separately as a required subcomponent, installation of APU kit is not addressed in this instruction. For APU preheat kit refer to applicable top-level drawing above.

3. INSTALLATION

⚠ **Caution:** Energized elements can cause 2nd and 3rd degree burns. **Do Not** connect power to elements or system before completing Functional System Check, TNG1000.

Abbreviations: Alternating current (AC), Accessory gearbox (AGB), Auxiliary power unit (APU), Center of gravity (CG), Circuit protection device (CPD), Direct current (DC), Electronic and equipment bay (E&E), Maintenance Manual (MM), Propeller reduction gearbox (PRGB), Original equipment manufacturer (OEM), Section (§), To be determined (TBD), Top-level drawings (TLD).

Kit is installed and powered through four external power connections refer to Figure 4.1.

- Technicians and users of this instruction are be familiar with Installation Guide TNG1000 and related document listed in TLD.

3.1 Inventory

Start with parts and document inventory, refer to subject TLD for item list.

3.2 Weight and Balance

Weigh kit and intended installation hardware before installation.

Note: APU kit supplied separately weights included as reference in totals below.

Approximate total installed weight: 3.5 lb. / 1.6 kg. Refer to TNG1000 for change requirements.

Left engine preheat: 1.0 lb. / 0.5 kg, use engine CG for Weight and Balance calculations.

Right engine preheat: 1.0 lb. / 0.5 kg, use engine CG for Weight and Balance calculations.

Battery preheat: 0.5 / 0.3 kg, use main battery CG for Weight and Balance calculations.

APU preheat: 1.0 lb. / 0.5 kg, refer to applicable APU kit installation instruction and include accordingly.

3.3 Elements

⚠ *Only use* approved bonding sealant DC 730 white fluorosilicone refer to instruction TNDC730.

Measure resistance of each element before installing, refer to applicable voltage table in § 4.

a) Locate elements with reference to narratives and examples below and in § 4.

b) Battery element secured with cable-ties or appropriate lacing around perimeter of battery.

c) Engine pad elements located with approved sealant refer to instruction TNDC730.

d) Should alternate or additional elements be required contact Tanis engineering.

3.4 Electrical System

⚠ *Only use* cushioned clamps and/or cable-ties/lacing approved by installing authority for location of installation.

a) Locate electrical components with reference to narratives and example below and in § 4.

b) Electrical routing suggested finial routing TBD by installing authority.

c) Refer to cable kit wire diagram drawing 03276 and installation guide TNG1000.

d) Wire termination and tooling refer to instructions TN02793 and TN03012.

e) Wires and cables are to be supported by suitable clamps, cable-ties, grommets, or other devices at intervals of not more than 6-inches / 15.25-centimeters, except when contained in ducts or conduits. Refer to TNG1000 and AC 43.13-1 (as amended) Chapter 11. Verify applicability with installing authority.

f) 230-volt kit supplied with extension cord plug adaptor, refer to instruction TN02829.

Shore power connections:

230-volt; 3 each: plug TP02980-230, light TLP3039-06-230 and light bracket TU03145, or

115-volt 3; each: plug TP02770-115, light TLP3039-06-115 and light bracket TU03145.

For cushioned clamp sizing and positioning refer to instruction guide TNG1000, plug pinout drawing 03276, indicator light TN03039 and TNG1000.

Should operational requirements and/or existing equipment require alternate plug or plug location refer to TNG1000 and/or contact Tanis engineering.

Plug 1. Battery heater plug, locate with cushioned clamps (Adels) in accessible area of E&E bay near main battery and DC power connection, refer to Figures 4.1., 4.2., and 4.3.

Plug 2 left engine, Plug 3 right engine. Locate left and right engine plugs and indicator lights on corresponding engine or area accessible through oil filer door, refer to Figures 4.1., 4.2. and 4.4.

Plug 4. APU preheat kit, supplied separately refer to §§ 2 and 4.

Cable Kit with CPD: TCF3276 refer to cable kit wire diagram drawing 03276. Only use cushioned clamps and/or cable ties/lacing approved by installing authority for location of installation. CPDs and Junctions, locate near corresponding plug in serviceable areas that allow leads to reach components as depicted in wire diagram.

Ground wire: 22759-181 green ground wire, verify OEM engine/airframe bonding strap is installed. Attach ring crimp end of ground wire to engine, airframe, or existing ground lug.

Placard: Affix supplied placards in visible location adjacent to shore power plugs.

3.5 Completion

1. Inspect: Visually inspect and verify components are connected and secure.
2. Check: Perform Functional System Check, refer to Installation Guide TNG1000.
3. Record: Record and retain data as indicated in Instructions for Continued Airworthiness TCA1000 and Operating Guide TPG1000.

4. TABLES AND FIGURES

Section contains technical information and examples of typical installation; actual installation may vary due to existing equipment or operating requirements.

Refer to Operating Guide TPG1000, record as indicated, suggest including Figures 4.1. and 4.2.

Note: APU kit supplied separately values not included in Tables below.

Table 1. 230 Volt Kit Electrical Values.

Resistance tolerance +/- 10%.

Total power requirements for battery and engine heaters: 1600 Watts 7.0 Amps. Recommend 230-VAC 10-Amps service (does not include APU kit values).

Plug 1. Battery – 230 Volt		**Total: 0.4 Amps**	**100 Watts**		**529.0 Ohms**
Qty	**Element Part Number**	**Element Type and Location**		**Watts**	**Ohms**
1	TBP3228-38-230/100	Battery - Main	each:	100	529.0

Plug 2. Left Engine – 230 Volt		**Total: 3.3 Amps**	**750 Watts**		**70.5 Ohms**
Qty	**Element Part Number**	**Element Type - Location**		**Watts**	**Ohms**
1	TEP2686-230/150	Pad - Eng Fuel/Oil Cooler	each:	150	352.7
2	TEP2878-230/120	Pad - Eng AGB Hyd and Case	each:	120	440.8
1	TEP3274-230/250	Pad - Eng AGB Sump	each:	250	211.6
1	TEP3275-230/110	Pad - Eng Oil Tank	each:	110	480.9

Plug 3. Right Engine – 230 Volt		**Total: 3.3 Amps**	**750 Watts**		**70.5 Ohms**
Qty	**Element Part Number**	**Element Type - Location**		**Watts**	**Ohms**
1	TEP2686-230/150	Pad - Eng Fuel/Oil Cooler	each:	150	352.7
2	TEP2878-230/120	Pad - Eng AGB Hyd and Case	each:	120	440.8
1	TEP3274-230/250	Pad - Eng AGB Sump	each:	250	211.6
1	TEP3275-230/110	Pad - Eng Oil Tank	each:	110	480.9

Table 2. 115 Volt kit electrical values.

Resistance tolerance +/- 10%.

Total power requirement for battery and engine heaters: 1600 Watts 14 Amps. Recommend 115-VAC 20-Amp service (does not include APU kit values).

Plug 1. Battery – 115 Volt		**Total: 0.9 Amps**		**100 Watts**	**132.3 Ohms**
Qty	**Element Part Number**	**Element Type and Location**		**Watts**	**Ohms**
1	TBP3228-38-115/100	Battery - Main	each:	100	132.3

Plug 2. Left Engine – 115 Volt		**Total: 6.5 Amps**		**750 Watts**	**17.6 Ohms**
Qty	**Element Part Number**	**Element Type - Location**		**Watts**	**Ohms**
1	TEP2686-115/150	Pad - Eng Fuel/Oil Cooler	each:	150	88.2
2	TEP2878-115/120	Pad - Eng AGB Hyd and Case	each:	120	110.2
1	TEP3274-115/250	Pad - Eng AGB Sump	each:	250	52.9
1	TEP3275-115/110	Pad - Eng Oil Tank	each:	110	120.2

Plug 3. Right Engine – 115 Volt		**Total: 6.5 Amps**		**750 Watts**	**17.6 Ohms**
Qty	**Element Part Number**	**Element Type - Location**		**Watts**	**Ohms**
1	TEP2686-115/150	Pad - Eng Fuel/Oil Cooler	each:	150	88.2
2	TEP2878-115/120	Pad - Eng AGB Hyd and Case	each:	120	110.2
1	TEP3274-115/250	Pad - Eng AGB Sump	each:	250	52.9
1	TEP3275-115/110	Pad - Eng Oil Tank	each:	110	120.2

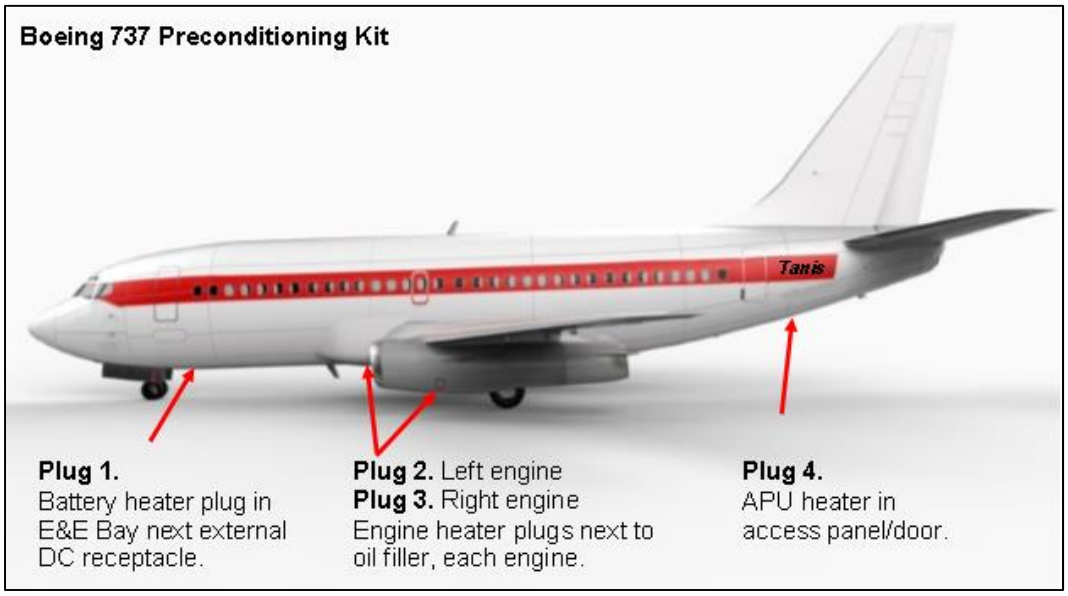

Figure 4.1. Preconditioning system. Avionics and crew cabin heater options available refer to TNG1000. Note: Plug 4. Required APU kit supplied separately.

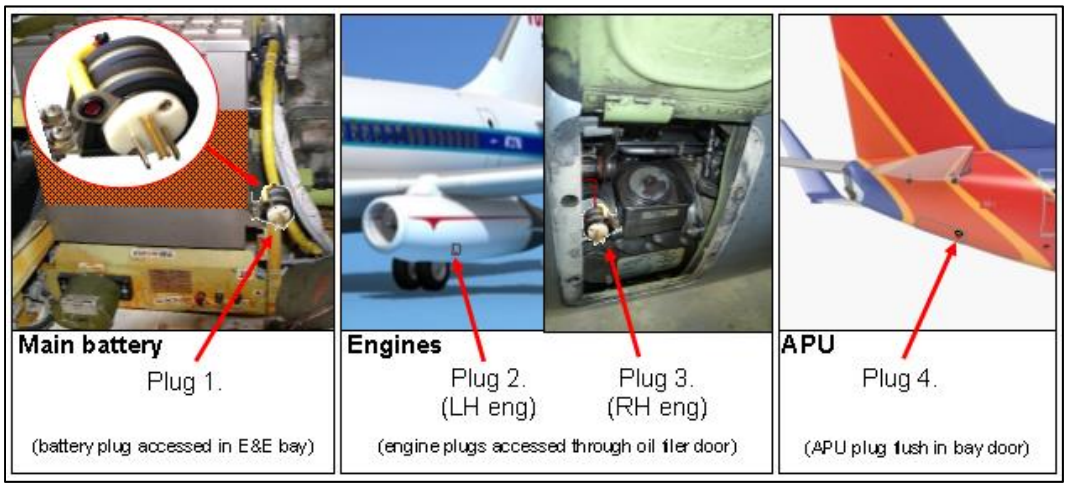

Figure 4.2. Overview of suggested plug locations; Plug 1: E&E bay near battery or DC connection, plugs 2 and 3: Butterfly with camps off engine oil filler drain line or oil tank fitting in area accessible through oil door. Refer to TNG1000 for clamp positioning, sizing, and additional plug mounting options.

Plugs and Lights: Locate with cushioned clamps, light locate with supplied light bracket, slide long end of bracket between clamps and plug, bend, and secure clamps.

Cable kit, CPDs, and Junctions: Locate near plugs in serviceable areas that allow leads to reach corresponding components. For 230-volt single point plug options contact Tanis engineering, requires additional parts and airframe wiring.

Note: Install wire support shrink on light shank before assembling connector, refer to instruction TN03039, TNG1000, and Figure 4.3.

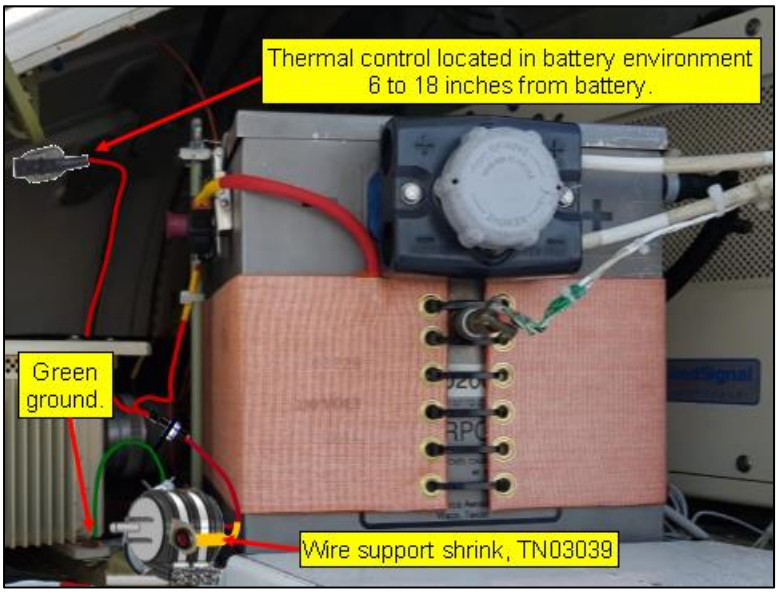

Figure 4.3. Example of battery element TBP3228-38-. Wrap around battery clear of bracketing, connectors, and chafe points Gently lace in-place with cable ties or appropriate lacing alternating tension between ties. Excessive tension may cause damage or result in pulling grommets out. Note: Due to varying battery configuration and/or location alternate elements, and/or adaptor panels, available, installation does not use bonding sealant.

Refer to cable kit wiring diagram 03276; locate thermal control cable assembly TL03217-C (single battery) in battery station. For applications with more than one battery contact Tanis engineering.

Connect thermal controller TLP3046-05 to thermal control cable lead, secure in battery environment 6 to 18 inches (15 to 46 cm) from battery using supplied cable-tie anchor TU02782 or lace with existing wiring, refer to instructions TN02782 and TN03046.

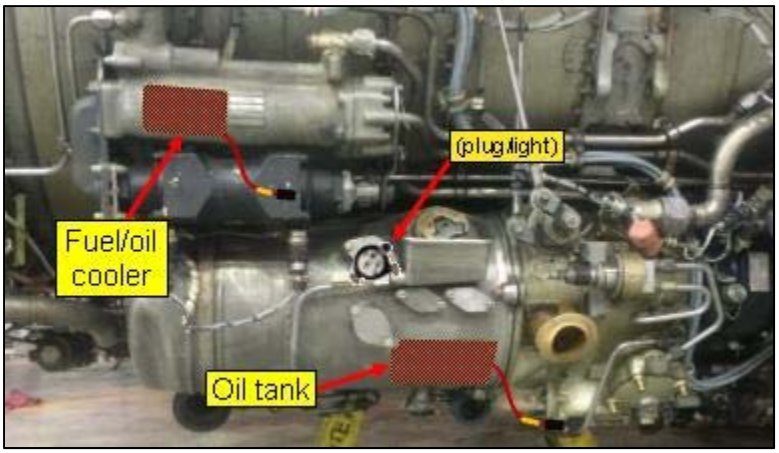

Figure 4.4. Engine fuel/oil cooler and oil tank elements:

TEP2686- Fuel/oil cooler case, low on casing clear of placards position for lead routing.

TEP3275- Oil tank, below nominal oil level clear of oil drip points position for lead routing.

Note: Element placement and lead positioning may differ from depiction above.

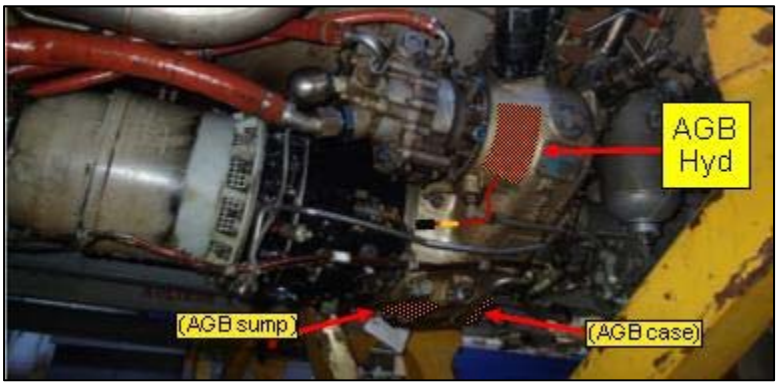

Figure 4.5. Engine AGB Hydraulic element: TEP2878- left side lead left.

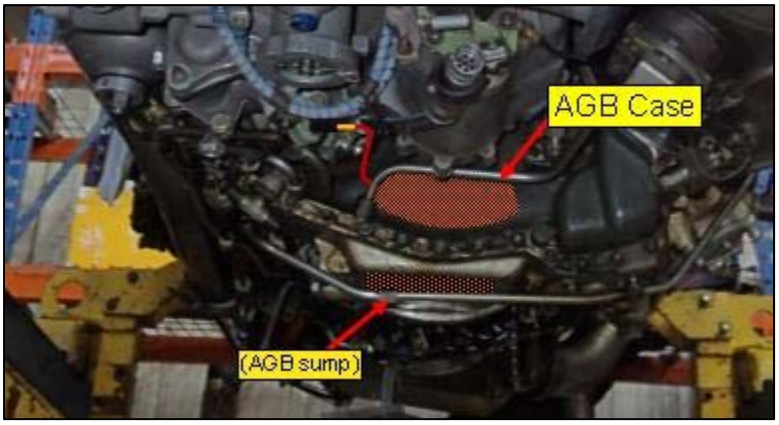

Figure 4.6. Engine AGB Case element: TEP2878- forward section lead right.

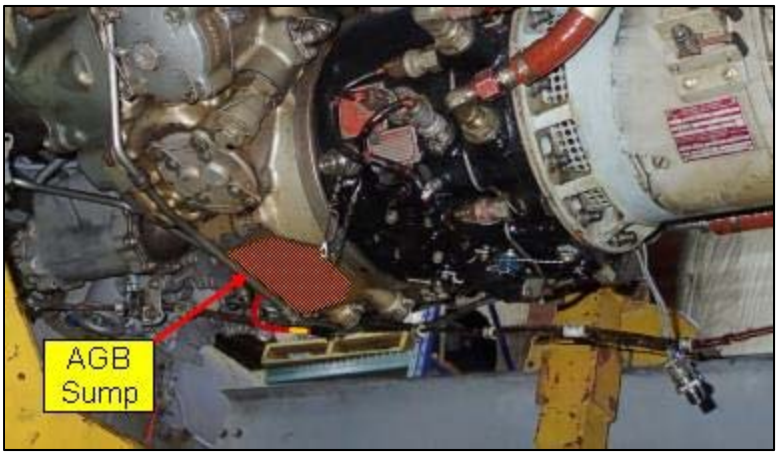

Figure 4.7. Engine AGB Sump element: TEP3274- bottom of sump lead forward.

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