Subject: P/N: TSFDHC6-2972-115 AND TSFDHC6-2972-230 ON DHC-6 SERIES TWIN OTTER

Document No: TNF2972
Revision: D
Date: NOV-09-2018

RECORD OF REVISIONS

When revised document changed in its entirety.

REV	DATE	DESCRIPTION	BY	CKD
D	NOV-09-2018	Revise requirements & correct Viking drawing callouts.	DNE	GDO
C	DEC-11-2017	Reformat and add TNG1000, TCA1000, and TPG1000 update 3039 light, add 3094 AV/Cabin Heater option.	DNE	GDO
B	SEP-25-2013	Fitting update	GDO	DNE
A	OCT-28-2012	Release for conformity installation	DNE	GDO

Current revision approval: Digitally signed by dirk@tanisaircraft.com DN: cn=dirk@tanisaircraft.com Date: 2018.11.09 15:23:59 -06'00'

1. PURPOSE

This instruction provides guidance for installation of preheat kits listed in subject line above.

2. REQUIREMENTS

Technicians and users of this instruction should be familiar with Installation Guide, TNG1000.

Installation requires parts and related documents listed in applicable top-level drawing: 02972-115 (115-volt kit) or 02972-230 (230-volt kit).

Tools, sealants, consumables, and the following sourced separately as required:

a) Door kit source separately or field fabricate per installation refer to Section (§) 3.2. and § 4. Figures 1 through 4.

b) TU03125 firewall connector kits, required if not using exiting engine firewall connectors, Figure 21.

c) DC 730 white fluorosilicone, pad element bonding sealant refer to instruction TNDC730.

d) PS 700, DAPCO 2100 Type-1, or equivalent OEM approved firewall sealant.

e) PS 870 (PR 1422B-2) or equivalent OEM approved corrosion inhibitor sealant.

Weigh kit and all installation hardware before installing or weigh aircraft upon completion. Refer to installation guide, TNG1000.

a. Approximate installed weight: 14.0 pounds (lbs.) / 6.5 Kilograms (Kg), use engine CG for moment arm.
b. Optional AV/heater weight (each): 1.3 lb. / 0.6 kg, use location as installed for C.G.

Record installation and retain data as indicated in Instructions for Continued Airworthiness (ICA) TCA1000 and Operating Guide TPG1000.

3. INSTALLATION

⚠ **Caution:** Energized elements can cause 2nd and 3rd degree burns.

Preform Functional System Check before connecting power to element or system, TNG1000.

3.1 Elements

Note: Element positioning, location, and/or lead orientation, may vary from narratives and figures, refer to § 4, Table 1, Figures 1 through 9.

a. Should alternates element(s) be required contact Tanis engineering.

b. Verify element resistance before installing, refer to § 4. Table 1.

c. Only locate elements with approved bonding sealant, refer to instruction TNDC730.

* Note: TEP2970- Instrument panel pad elements used on DHC-6-400 and subsequent. If not installing these elements do not route harness lead and seal corresponding open cavities in junction J-A with locking sealing plugs 0413-217-1605, refer to TN03012. Install 2 each THP3094-500 AV/Cabin Heaters. AV/Cabin Heaters may supplement or replace instrument panel elements on 400 series aircraft. Refer to wire diagram 02973 and instruction TN03094. Locate with 4 each CB4000E3CR16 or CB4000E3CR20-750 Click Bond stud or locate using Dual Lock Strips TU03239-02 (8 strips required, 1 mated pair each corner), location TBD by installer.

Abbreviations: Engine Accessory Gearbox (AGB), Epicyclic Prop Reduction Gearbox (PRGB).

Qty	P/N	Heat elements and location
1	TBP2648-38-	Main Battery - Locate element around perimeter of main battery (installation does not use bonding sealant). Locate using cable ties or appropriate lacing. Gently lace in place, alternate tension between ties, excessive tension may result in pulling grommets out. Note: Due to varying battery configuration, alternate elements are available, refer drawing 02800 for available alternates.
1	TEP2971-	Emergency Lighting Battery SOO 6205 or equivalent - Locate pad element on bottom using sealant. If element is not used cap harness lead connector with supplied sealing cap DT04-2P-C017.
2	TEN2659-	PRGB - Locate one pad element on right side of each engine PRGB lead down.
4	TEN2969-	RH AGB - Locate two pad elements on right side tank section of each engine, upper and lower leads down or as required by location.
2	TEN3179-	Oil Cooler - Locate one pad element on each cooler tank near Vernatherm valve lead aft.
2	TEN3181-	LH AGB - Locate one pad element on left side of each engine lead down.
2	TEP2970-	Instrument panel pad elements, installed on DHC-6-400 and subsequent only, refer to drawing 02978. Locate one element on frame below each display. If not used install optional AV/Cabin Heaters, supplied separately. * Note: If not using instrument panel pad elements refer to § 3.1.

3.2 Electrical System

Electrical system routing is suggested. Final routing is determined by installer and may vary from examples due to existing equipment, and/or operating requirements, refer to narrative below and § 4 Figures 1 through 25.

Cable kit supplied in bulk, configure per drawing, 02973. When applicable refer to Viking Air factory drawings, C6G1503, C6G1516, and C6N1004-103.

Note: Plug door kit not supplied with preheat kit, chosen by the operator based on individual operating requirements, for options refer to § 4. Figures 1 through 5.

Tanis door kits modify existing hydraulic door C6FS1273-27, refer to this instruction and supplied drawings 02959 and 03152.

Viking door kit C6G1511-1 fitted with 2-place plug door kit is sourced through Viking Air Ltd., replaces existing hydraulic door C6FS1273-27, refer to Viking drawings C6G1503 and C6G1511.

1. Shore power plug (inlet): Install one of the above door kits and locate supplied plugs (inlets) refer to instruction TN02070 and § 4. Figures 1 through 5.

   Note: 230-volt kits: 2 ea. TP02829-230, plug adaptors supplied loose for field installation on operator supplied extension cord(s), refer to instruction TN02829.

2. Circuit Protection Devices (CPD): Locate CPD fuse holder's w/fuses, in factory door kit, or near back side plugs in supplied bracket, refer to drawing 03141 and Figures
3. Indicator Lights: Locate in panel just above hydraulic bay door, in plug door, or adjacent to plugs, refer to instruction TN03039.
4. VAC Power Outlet: Locate receptacle (outlet) with cap, low and outboard of pilot seat in sloping panel just above floor, refer to TN02533 and Viking drawing C6G1503. Outlet not used if installing optional AV/Cabin Heaters, ref to wire diagram drawing 02973.
5. Grounding: Attach grounding wire to aircraft structure with proper metal-to-metal bonding attachment. Resistance of ground connection is not to exceed .003 ohms.
6. Junctions: Identify locations for cable junctions, locate with cushioned clamps or cable ties, route leads to corresponding components and individual elements.

   J-A and J-B - Power junctions, locate in hydraulic bay, or as required by plug location.

   Note: Apply supplied chafing sleeve as required on leads between plugs, junctions, and lights.

   J-C - Wing root junction, locate in cabin ceiling inboard of right wing root.

   J-D and J-E - Left and right engine junctions, locate on the lower right aft side of each engine AGB fire barrier.

7. Firewall penetration: Route engine junction lead through existing connectors or locate optional firewall connector kits (2 required), refer to TU03125 drawing 03125 (supplied separately).
8. Thermal-control cable assemblies:

   Secure cable assembly with existing wiring. Locate thermal control 6 - 18 in / 15 - 45 cm from elements, secure with cable anchor, TU02782 or with existing wiring using cable-tie or lace. Position element connectors for disconnect during maintenance. * Note: If not using instrument panel pad elements refer to § 3.1.

9. Cable Leads:

   01 and 17 - Power junction leads. Route between corresponding plugs, through CPDs, and Junctions J-A and J-B (protect with supplied chaff sleeve or equitant as required).

   Note: 230-volt kit. 2 each, receptacle (outlet) adapter, TP02829-230 supplied loose and wired to extension cords (provide by operator).

   02 and 18 - Indicator light leads. Route between corresponding junctions and lights (protect with chaff sleeve as required).

   01 - Wing Root junction lead. Route between Junction J-A and wing route Junction J-C (Figure 4-12), from hydraulic bay to right forward cabin bulkhead, up and aft with existing wiring to right wing root.

   03 and 04 - Engine junction leads. Route between wing root junction J-C and corresponding engine junctions (J-D left and J-E right) with existing wiring forward of wing spar to engine firewall bulkhead connector, and engine junction. For firewall penetration use existing connector or alternate TU03125 (supplied separately). Engine junction are located with clamps on lower aft side of each engine air box divider.

   05 - Instrument panel lead. Route between Instrument panel thermal control cable assembly and main power Junction J-A. Locate cable assembly behind panel with existing wiring. Secure thermal control, with Click Bond cable mount (TU02782), cable tie, or lace, with existing wiring 6-18 inches away from elements. * If not using instrument panel pad elements refer to § 3.1.

   06 - Battery elements lead. Route between Battery thermal control cable assembly and wing root Junction J-C. Typical routing in celling or right side of passenger cabin to battery assembly.

   07 through 16 - Left and right engine element leads. Route between corresponding Junctions J-D and J-E, and corresponding elements.

   19 - AC power outlet. Route between Junction J-B and AC outlet.

   Note: 230-volt kit. Plug adapter, TP02980-230 supplied loose for operator installation.

   19 and 20 - Refer to drawing 02973 for optional circuit configuration for AV/Cabin Heaters.

10. Placard: Affix placard, TU02615 near shore power plug, or on inside or outside of door. Alternate field fabricated placard with *Tanis Preheat* and voltage requirement (*115 Volt* or *230 Volt)* may be used. Placard CPD (breakers or fuses) as required, refer to TNG1000.

11. Inspect: Visually inspect and verify all components are connected and secure.

12. Complete: Functional System Check, refer to Installation Guide, TNG1000.

4. TABLES AND FIGURES

This section contains technical information and examples of installations that may be used for reference, actual installation may vary due to existing equipment or operating requirements.

Table 1. Electrical values, 115 and 230-volt systems.

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

* AV heater Not included in totals - Ohm reading varies due to PTC element design, reference AV heater instructions TN03094 for values. Note: When installing refer to § 3.1.

115-volt system:

Without instr. and battery elements operating	10.8 Amps	1244 Watts	10.6 Ohms
With instr. and battery elements operating	11.5 Amps	1318 Watts	10.0 Ohms

Qty	Element Part Number	Location	Wattage	Ohms
*2	THP3094-500	AV/Cabin Heater – Option	500	* (PTC)
1	TBP2648-38-115/74	BATTERY - MAIN	74	178.7
1	TEP2971-115/4	BATTERY - EMERGENCY LIGHTING	4	3306.3
2	TEP2970-115/40	INSTRUMENT	40	330.6
2	TEN2659-52-115/240	PRGB	240	55.1
4	TEN2969-24-115/90	RH AGB	90	146.9
2	TEN3179-32-115/40	OIL COOLER	40	330.6
2	TEN3181-18-115/120	LH AGB	120	110.2

230-volt system:

Without instr. and battery elements operating	5.4 Amps	1244 Watts	42.5 Ohms
With instr. and battery elements operating	5.7 Amps	1318 Watts	40.1 Ohms

Qty	Element Part Number	Location	Wattage	Ohms
*2	THP3094-500	AV/Cabin Heater – Option	500	* (PTC)
1	TBP2648-38-230/74	BATTERY - MAIN	74	714.9
1	TEP2971-230/4	BATTERY - EMERGENCY LIGHTING	4	13225.0
2	TEP2970-230/40	INSTRUMENT	40	1322.5
2	TEN2659-52-230/240	PRGB	240	220.4
4	TEN2969-24-230/90	RH AGB	90	587.8
2	TEN3179-32-230/40	OIL COOLER	40	1322.5
2	TEN3181-18-230/120	LH AGB	120	110.2

Table 2. Weight and Balance

Record installed weight, arm, and moment calculations or weight aircraft, and update aircraft records accordingly, refer to weight and balance section.

Preheat system arm use center line of forward engine firewall. AV/Heater use arm location as installed.

	WEIGHT LB (KG)	*ARM IN (CM)*	*MOMENT IN (CM)*	*MOMENT WT x ARM/100 IN (CM)*
Preheat System	+			
Option: AV/Cabin Heater	+			
Option: AV/Cabin Heater	+			

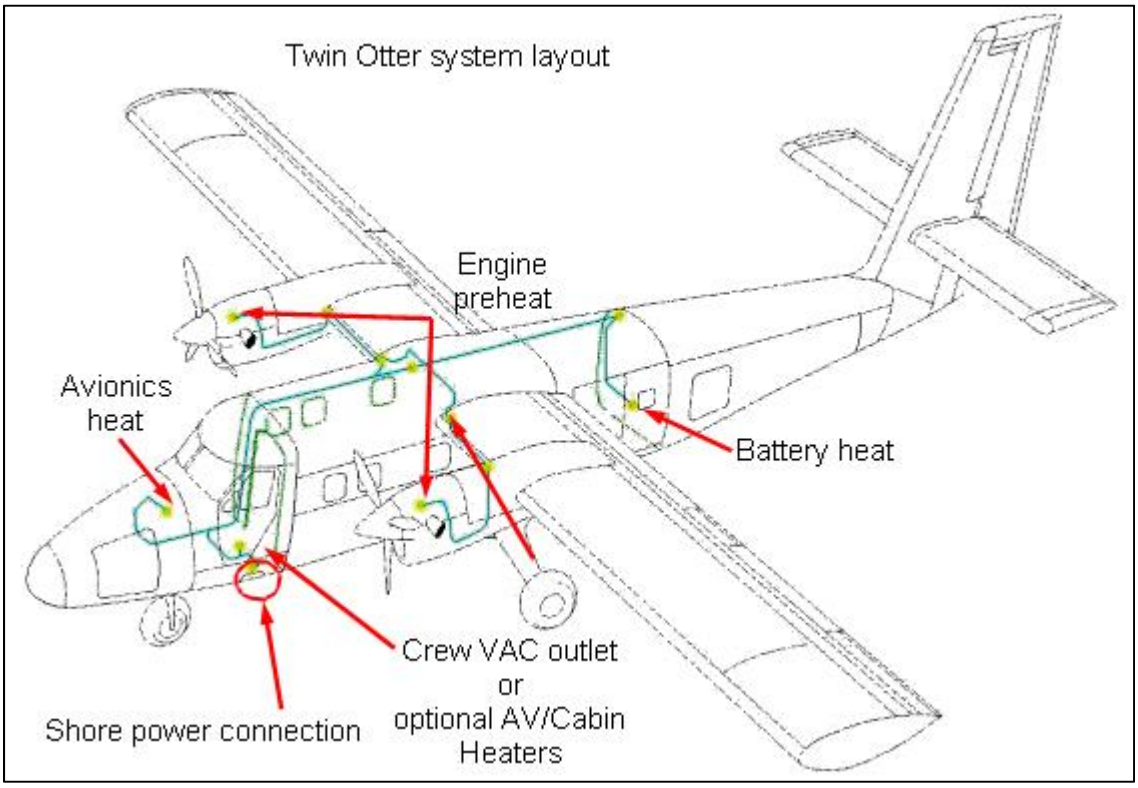

Figure 1. Overview of preheat and external shore power connection locations.

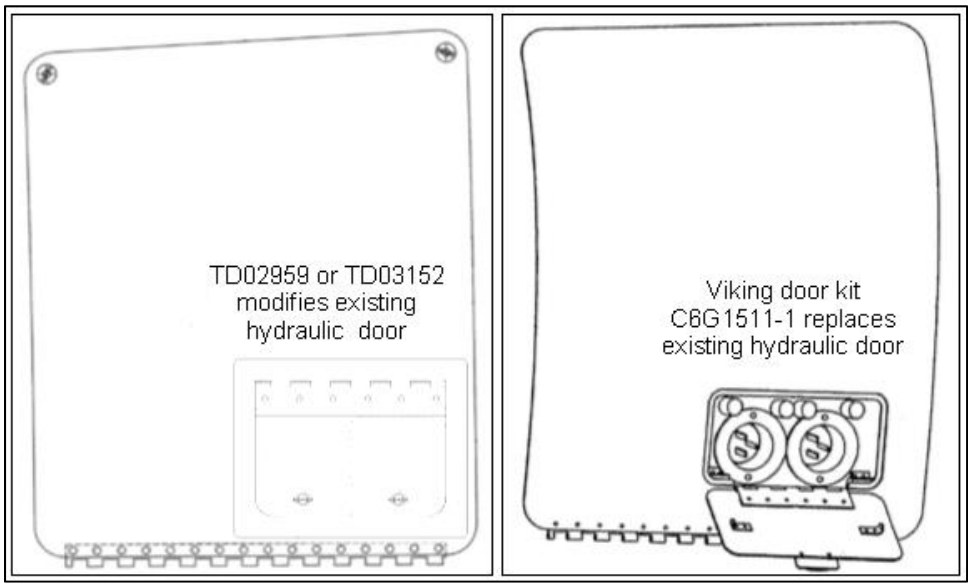

Figure 2. Available door kits TD02959, TD03152, and C6G1511-1. Location for the modification is below left forward crew door in an existing nonstructural (not primary structure) hydraulic bay access door/panel approximate STA 98, refer to Figure 1.

TD02959 field fabricated and installed with reference to drawing 02959.

TD03151 field fabricated or available through Tanis Aircraft, installed with reference to drawing 03152 (layout and installation similar to TD02959).

C6G1511-1 available through Viking Air Ltd. This door replaces existing hydraulic bay door C6FS1273-27. It is fitted with plug door kit for Tanis plugs, refer to Viking drawings C6G1503 and C6G1511.

Forward plug (left) - Preheat system plug, placard with TU02615- or field fabricate placard with *Tanis Preheat System* and voltage requirement.

Aft plug (right) – Cabin accessory power for cabin outlet or optional AV/Cabin heaters, field fabricate placard per wire diagram drawing 02973. When configured with optional AV heaters placard with TU03119-1.

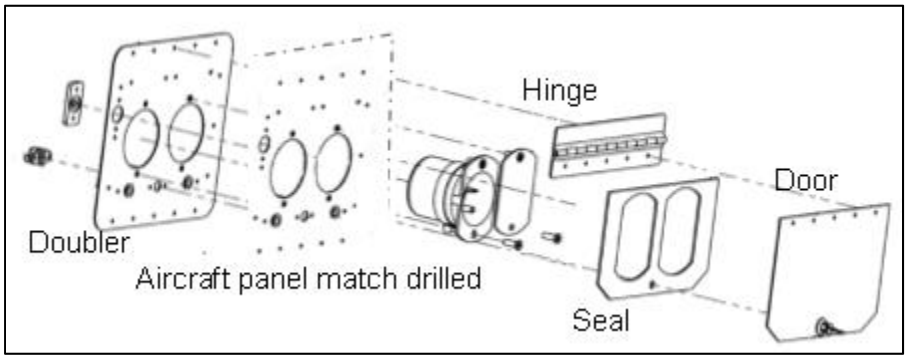

Figure 3. TD02959 Door Kit layout shown above is field fabricated and installed with reference to drawings 02959 and 03141, and instructions TN02070 and TN03039.

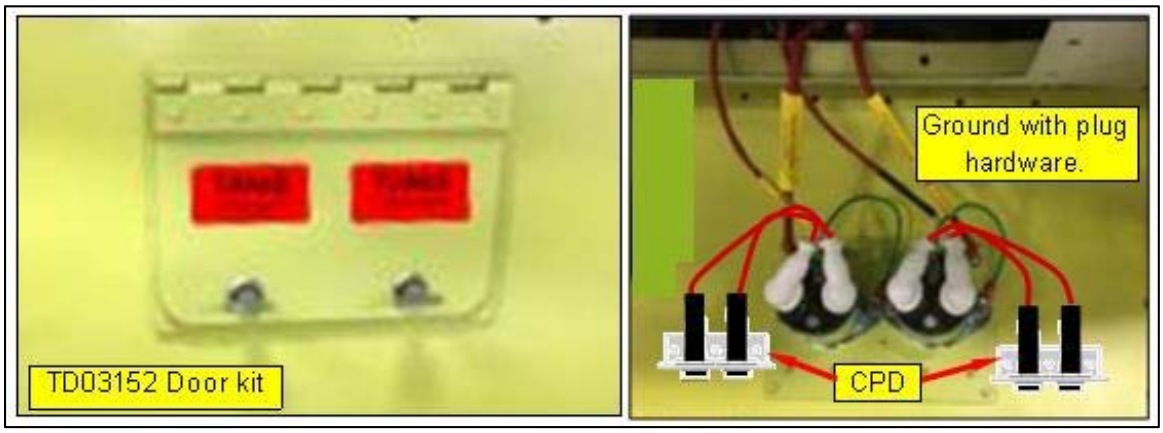

Figure 4. TD03152 Door Kit, refer to drawings 03152 and 03141, and instructions TN02070 and TN03039.

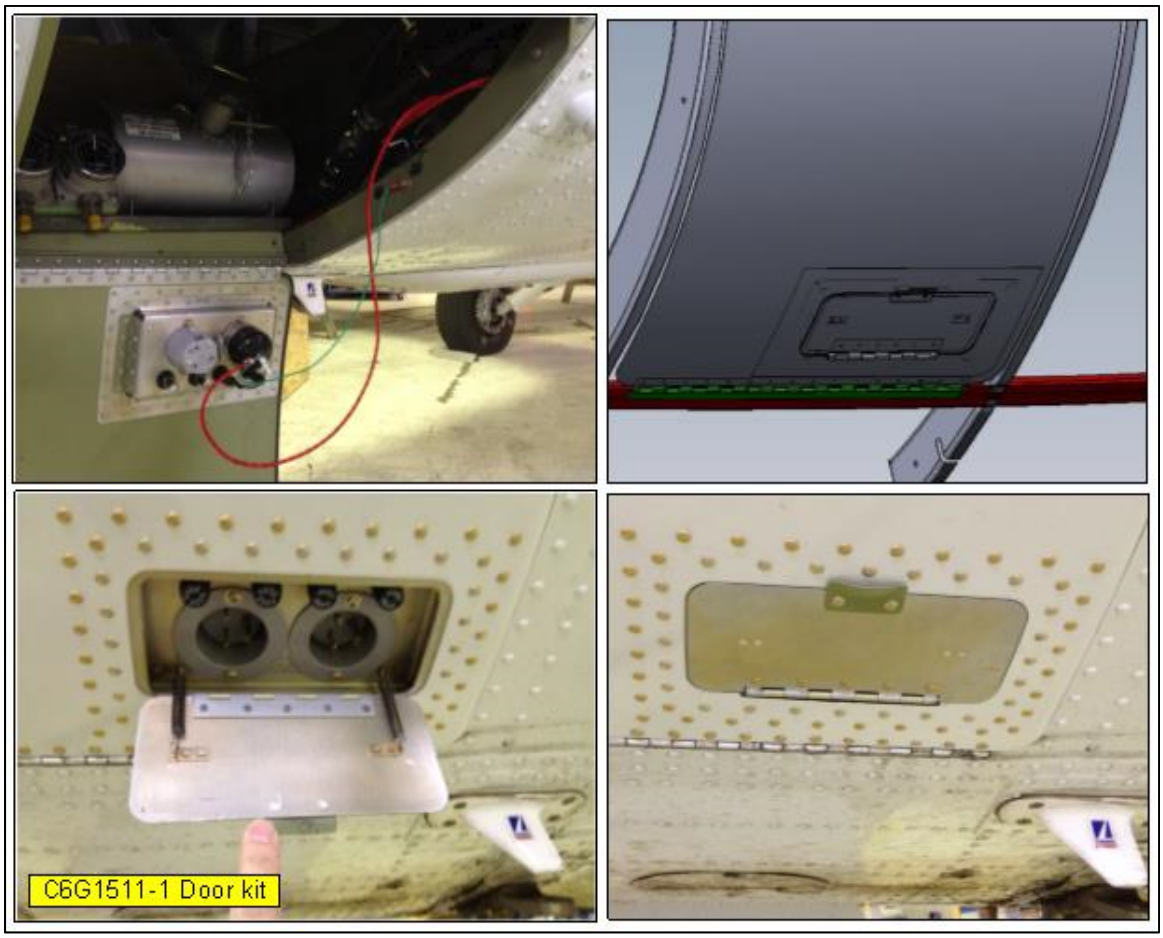

Figure 5. Replacement of existing hydraulic door C6FS1273-27 with Viking Air door C6G1511-1 or install Viking Air kit C6G1511, refer to Viking Air drawings C6G1503 and C6N1004-103, and Tanis instructions TN02070, TN03039, and drawing 03141.

Figure 6. Main battery. Locate TBP2648-38- battery heat element on perimeter of main battery, secure in place using cable ties, position clear of contact block and bracketing.

Note: Alternate, TBP3086-31- element and TB02645-07 panel, refer to drawing 02800 for listing of additional battery heat elements.

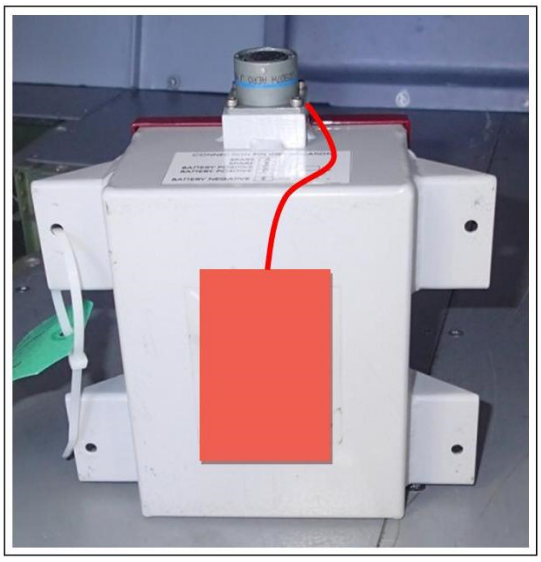

Figure 7. Emergency lighting battery SOO 6205. Locate TEP2971- pad element on bottom, position lead to follow existing wiring battery, bond with sealant.

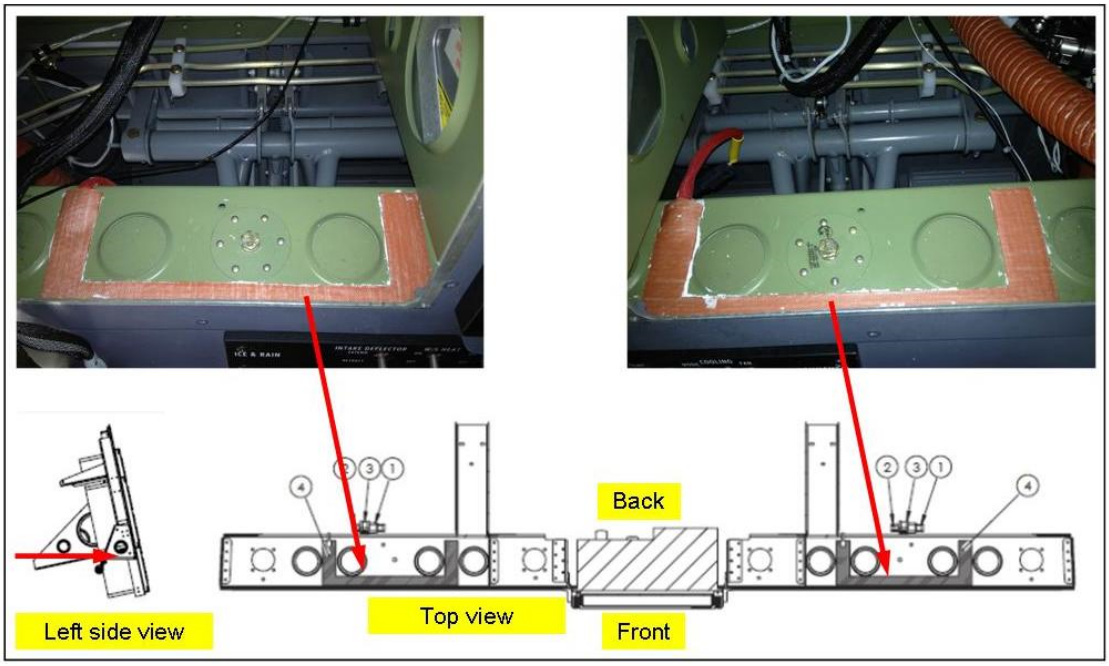

Figure 8. DHC-6-400 instrument heat configuration: Two panel heat elements, TEP2970-. Locate on top surface of the avionics frame below PFD and MFD, with bonding sealant. Suggest locating connectors with existing wiring or with clamps as shown, Items 1, 2 and 3. Refer to Tanis drawing 02978. Optional AV/Cabin Heaters, refer to Figure 7.

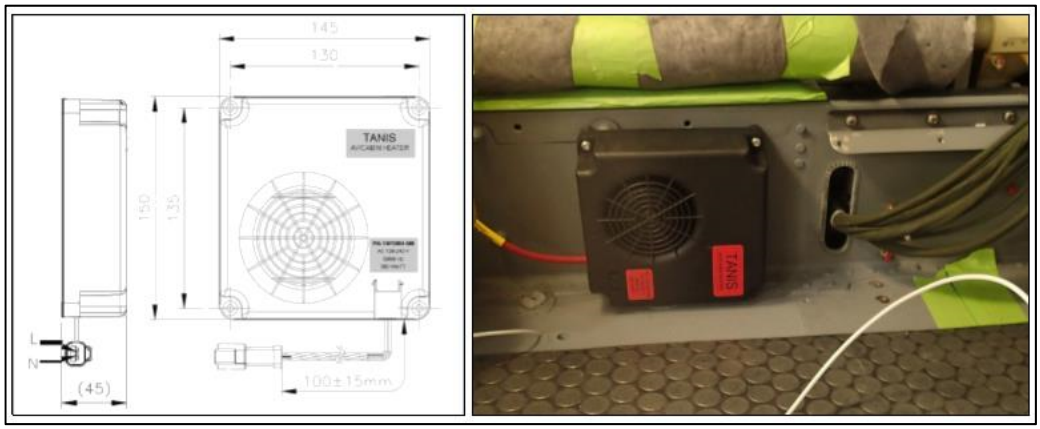

Figure 9. Option: DHC-6 all model instrument/cabin heat (supplied separately): Two AV/Cabin Heaters, THP3094-500 in place of or in addition to panel heat elements, TEP2970-. This option replaces crew cabin outlet circuit, refer to drawing 02973. Example above AV/Cabin Heater located in crew cabin with 4 each Click Bond studs, CB4000E3CR16 (round base) or CB4000E3CR20-750 (trimmed base). For alternates and/or supplemental information, refer to Click Bond drawing CB4000 Rev 23 or later and heater instruction TN03094. Note: Plug 2 circuit operates separate from primary preconditioning kit.

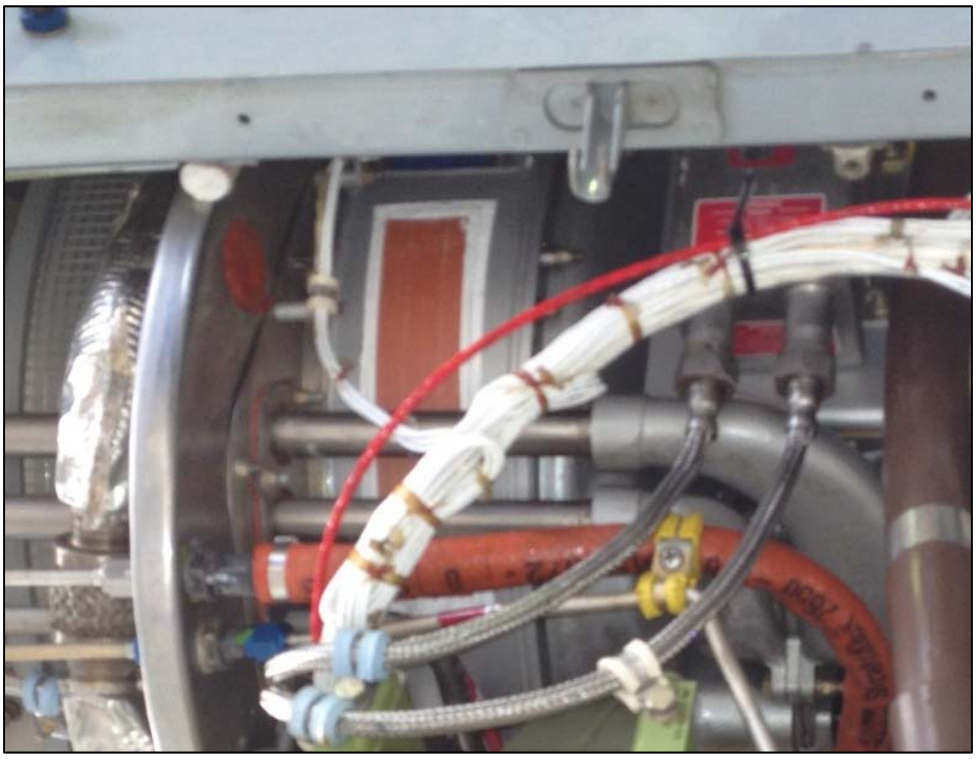

Figure 10. Engine LH AGB. Locate TEN3181-, pad element on left tank side accessory gearbox oil tank, lead down.

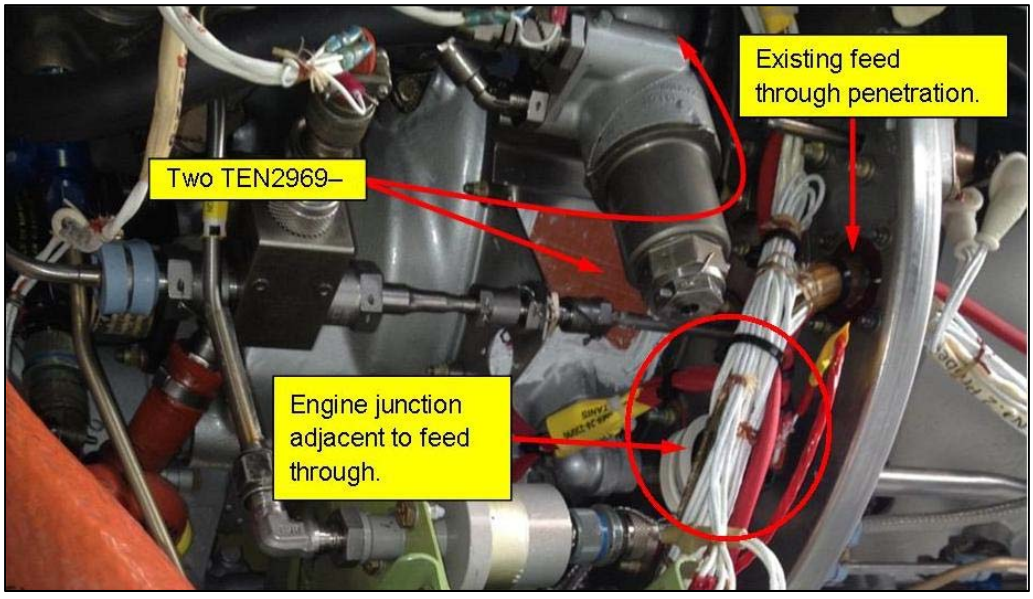

Figure 11. Engine RH AGB. Locate two each TEN2969, pad elements on right side of engine AGB leads aft or down. Note: Location of systems junction (Figure 24). Junction power lead routed with existing wire between engine firewall connector to engine element junction.

Figure 12. Engine oil cooler. Locate TEN3179-, pad element on left side of oil cooler tank lead aft.

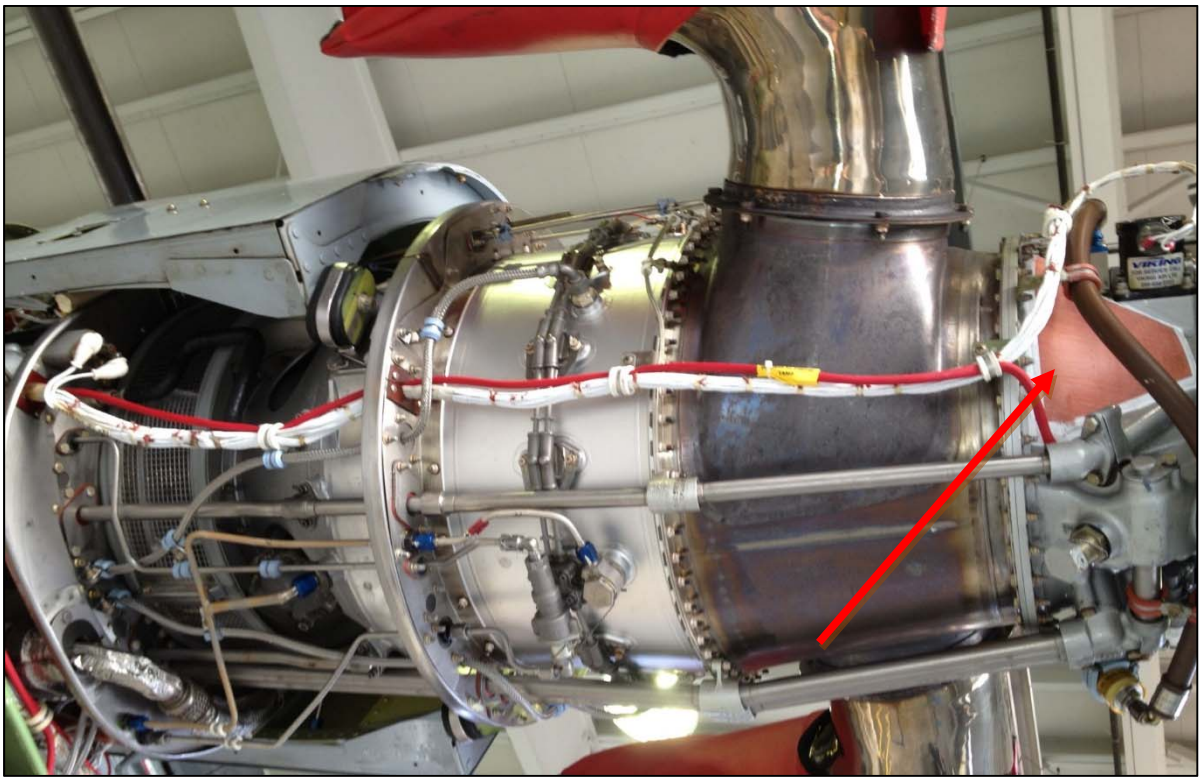

Figure 13. Engine PRGB. Locate TEN2659-, right side lead down with existing wiring to engine to junction.

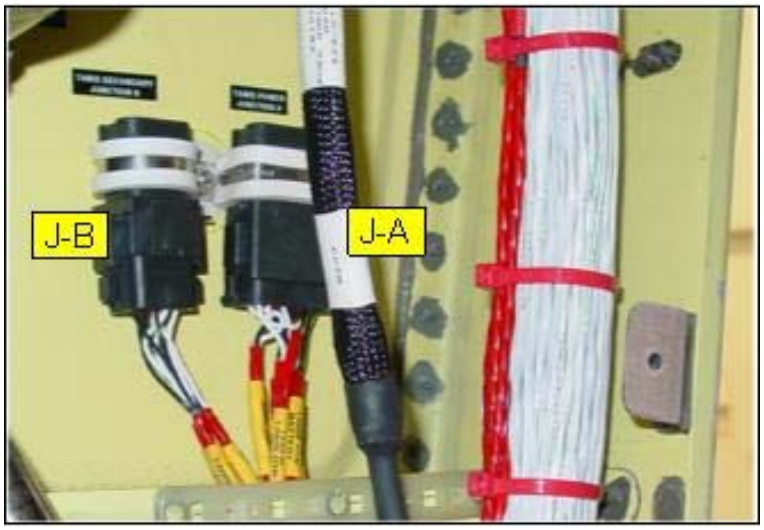

Figure 14. Example of junctions J-A and J-B located in lower hydraulic hold inboard of shore plugs. Location varies suggest locating with clamps similar to example above.

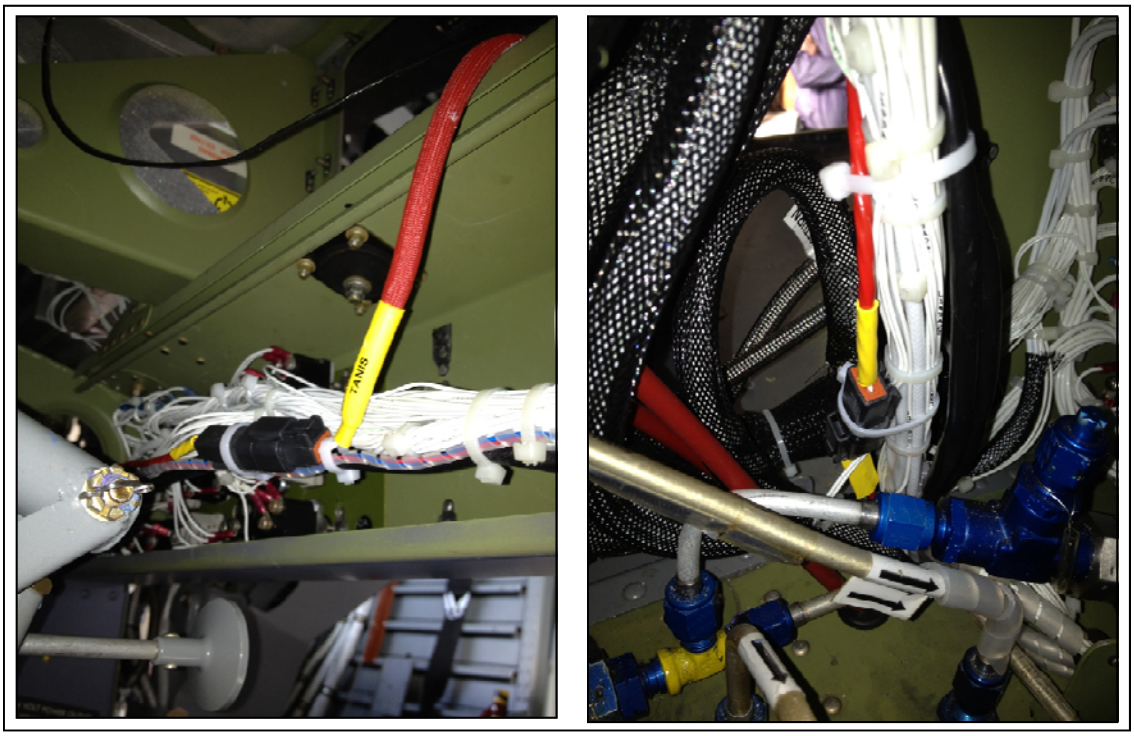

Figure 15. Example of instrument thermal cable assembly and Lead 05 routed and secured with existing wiring.

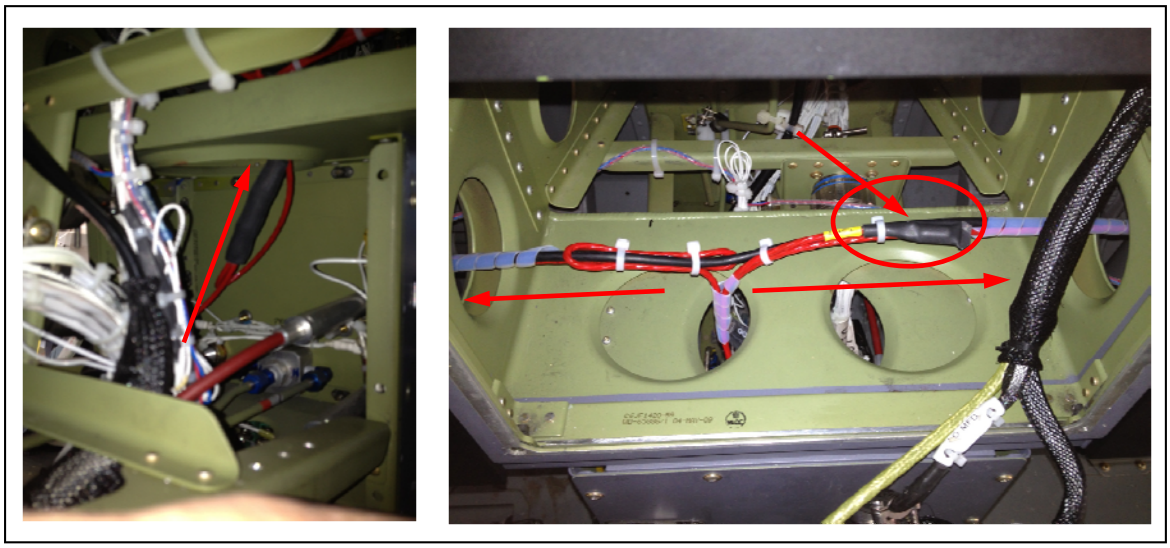

Figure 16. Example of instrument thermal cable assembly shown routed from panel center section up (left), then outboard to elements left and right. Thermal control shown secured 6 - 18 in / 15 - 45 cm from elements in the center section of panel with existing wiring and cable ties (right), or secure with supplied cable anchor TU02782.

Figure 17. Example of lead 01 routing between hydraulic bay junction J-A and right wing root junction J-C. From hydraulic bay, then aft down right side to right wing root.

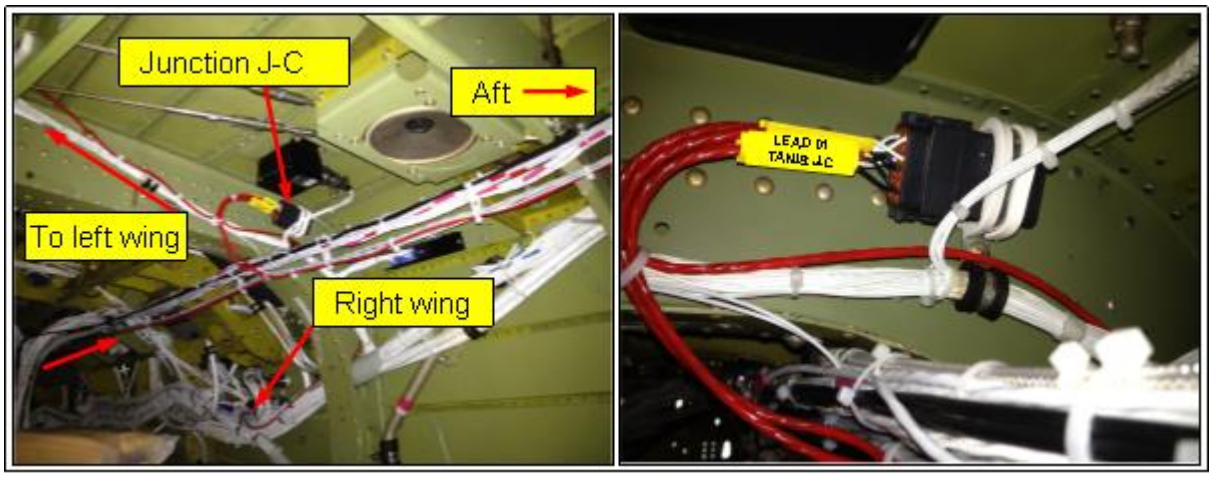

Figure 18. Example of junction J-C and cable routing at right wing root, refer to cable kit wire diagram drawing 02973.

Figure 19. Example engine lead routing along forward edge of wing spar. Route with existing wiring and use existing penetrations when possible.

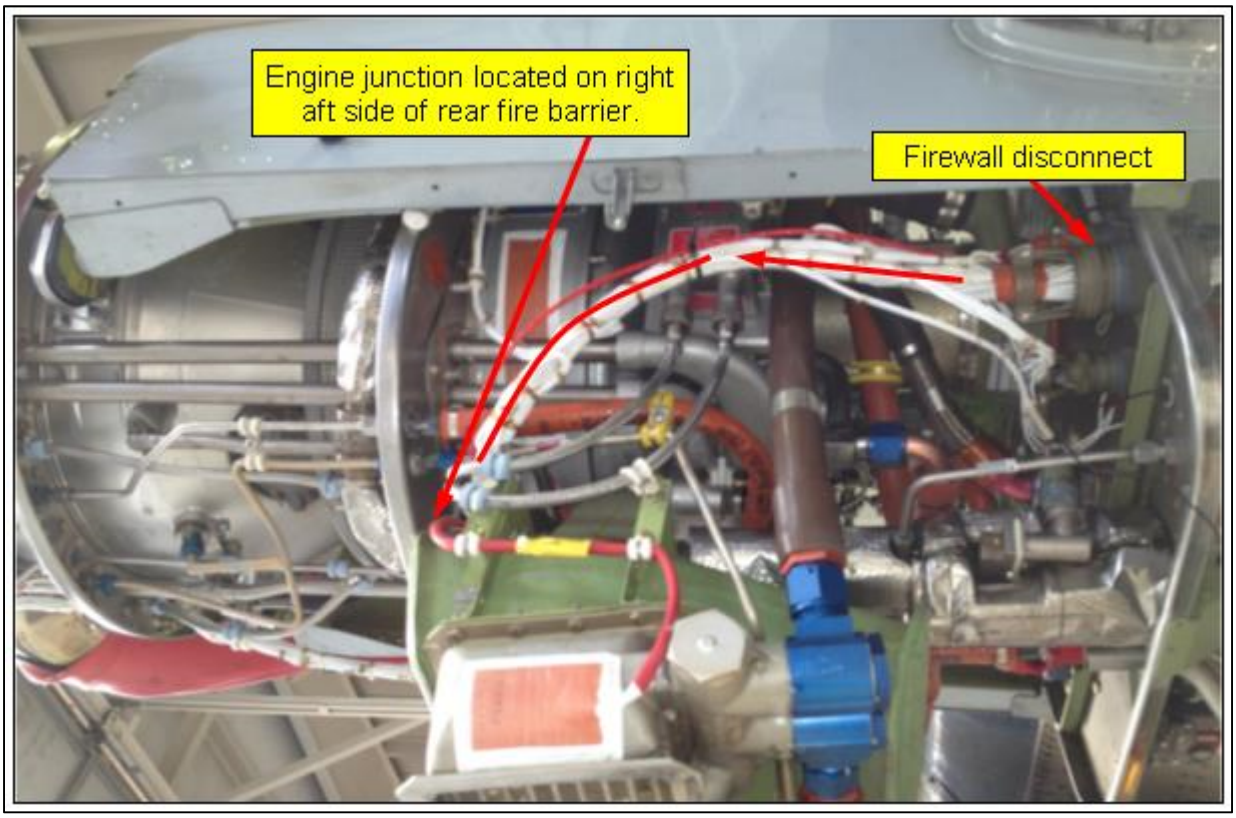

Figure 20. Example of engine compartment routing.

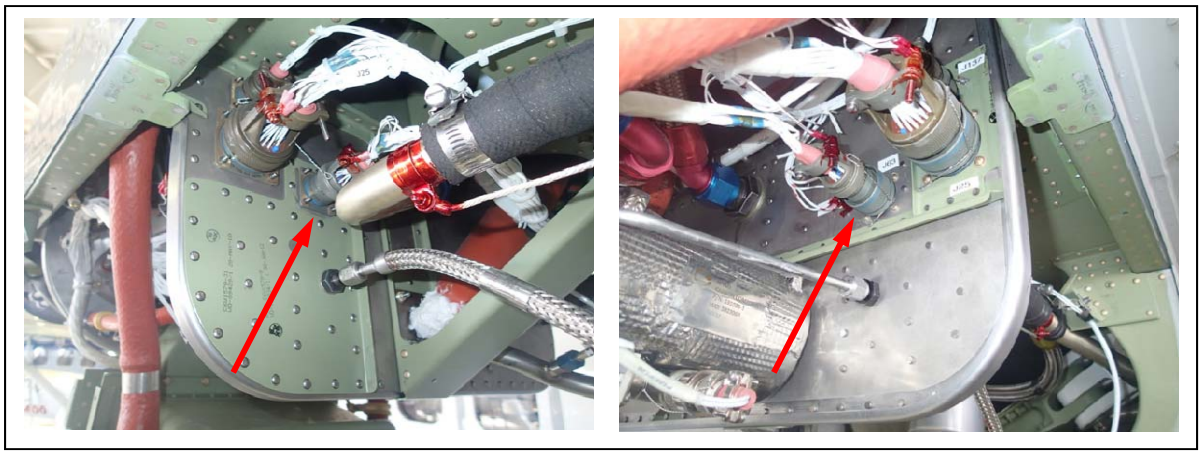

Figure 21. Left engine lead 03. Aft and forward views of left engine firewall using existing disconnect J62 or locate TU03125 (supplied separately) or approved alternate.

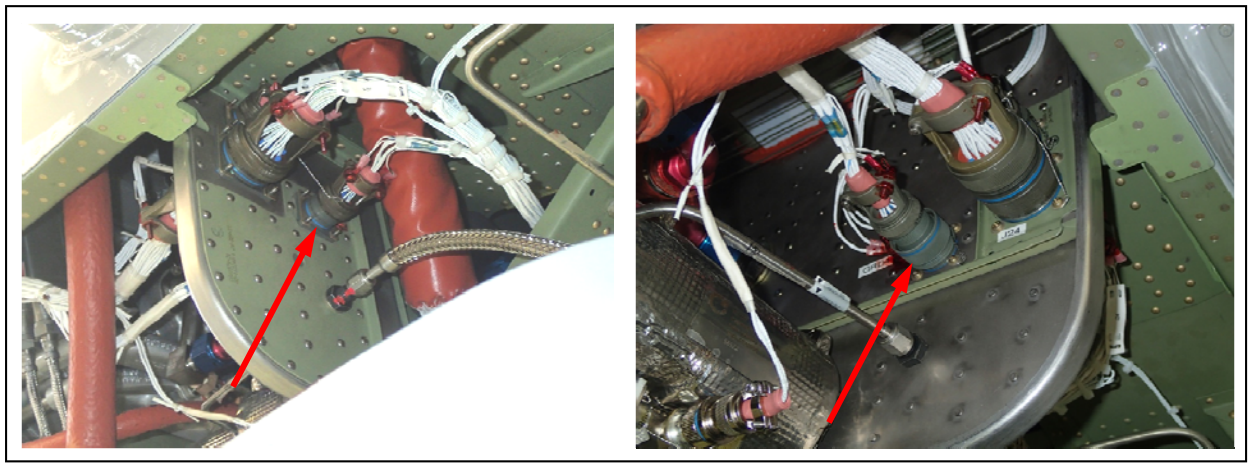

Figure 22. Right engine lead 04. Aft and forward views of right engine firewall using existing disconnect J63 or locate TU03125 (supplied separately) or approved alternate.

Figure 23. Locate engine junction on right rear side of aft engine fire barrier, use exiting wire feed through for routing forward element leads (Figure 9).

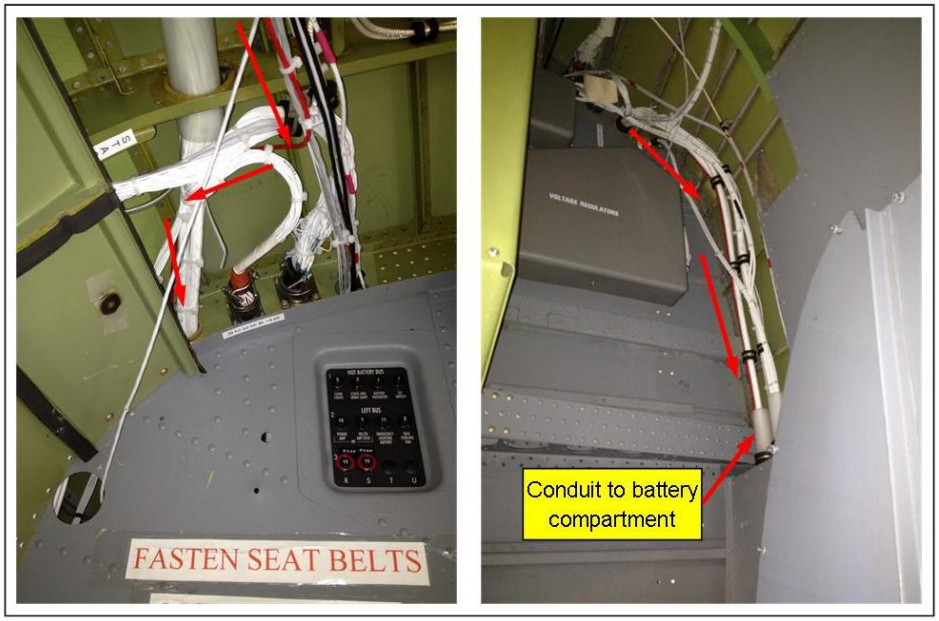

Figure 24. Example of routing of lead 06 routed between junction J-C and battery compartment. Routed with existing wiring to top of rear cabin bulkhead (left), and down to aft side of bulkhead (right) to battery compartment conduit.

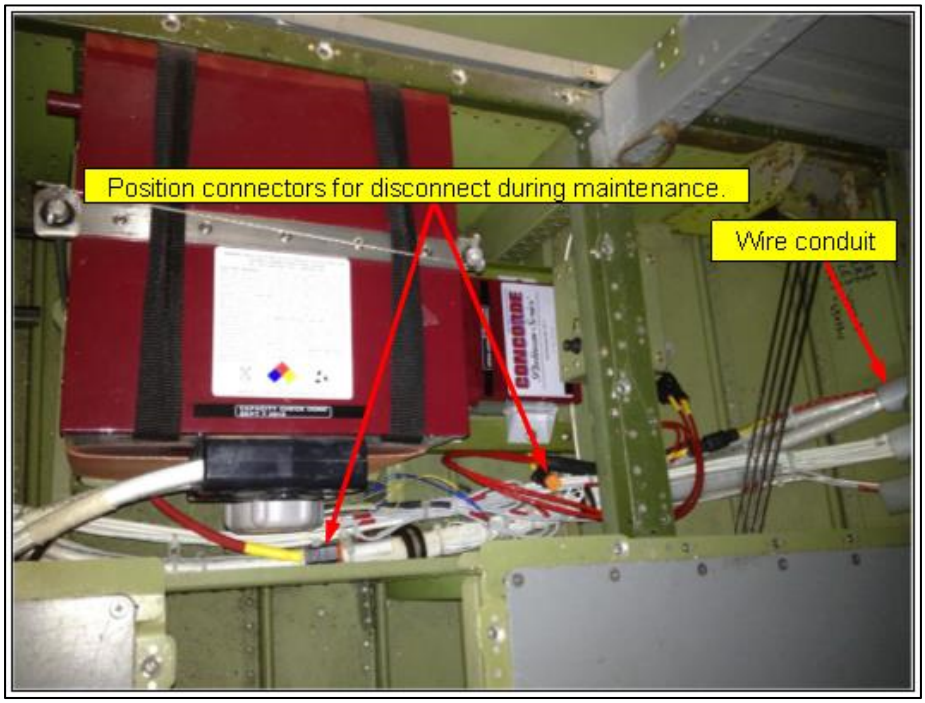

Figure 25. Example thermal control cable assembly located in battery compartment. Locate thermal control 6 - 18 in / 15 - 45 cm from battery elements. Cable tie with existing wiring or use supplied anchor TU02782.

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