



## INSTRUCTION – PREHEAT KIT INSTALLATION

**Subject:** P/N: TSHR66-3078-115 and TSHR66-3078-230

**Document No:** TNH3078

Heli-Preheat Kits, Robinson R66 w/250-300 series engine

**Revision:** D

**Date:** DEC-04-2019

### RECORD OF REVISIONS

*When revised document changed in its entirety.*

REV	DATE	DESCRIPTION	BY	CKD
D	DEC-04-2019	Revise w/1000 series documents and turbine elements.	DNE	GDO
C	JUN-10-2016	Add battery heater, update tail rotor jumper lead connectors and element	DNE	DNE
B	FEB-18-2015	Fitting update	DNE	DNE

Current revision approval: \_\_\_\_\_

### 1. PURPOSE

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

### 2. REQUIREMENTS

Subject kit top-level drawing, 03078-115 or 03078-230, parts and documents as listed.

- Tools, hardware, consumables, power supply and extension cord not supplied.
- Pad element bonding sealant supplied separately refer to TN02788.
- Sheet metal work required refer to this instruction and related documents.

### 3. INSTALLATION

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

**Abbreviations:** Accessory gearbox (AGB), Alternating current (AC), Center of gravity (CG), Circuit protection device (CPD), Engine accessory gearbox (AGB), Fuel control unit (FCU), Main rotor gearbox (MRGB), Original equipment manufacturer (OEM), Part number (P/N), Section (§), Service Bulletin (SB), Tail rotor gearbox (TRGB), To be determined (TBD), Top-level drawings (TLD).

- Technicians and users of this instruction should be familiar with regulations and procedures referenced in Installation Guide TNG1000 and related document listed in TLD, refer to § 2.

#### 3.1 Inventory

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

#### PROPRIETARY DATA

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### 3.2 Weight and Balance

Before installing, weigh kit and intended installation hardware. Approximate installed system weight 2.2 lb. / 1.0 kg (without optional AV Cabin Heater). Use main rotor mast for CG calculations. Refer to TNG1000 for change requirements.

Optional AV Cabin Heater, approximate installed weight 1.5 lb / 0.68 kg. Use location of installation for CG. Example deck below right front seat or location as installed.

### 3.3 Elements

Locate elements with reference to following narratives and examples and § 4.

- a) Measure resistance of each element before installing, refer to § 4. Table 4.1. or 4.2.
- b) Pad heat elements, for installation procedures refer to bonding instruction TN02788.
- c) Battery heat element locate in direct contact with battery, when required secure in place on battery with 4 to 6 small dollops of bonding sealant TU02788.
- d) Optional AV/Cabin Heater, locate in cabin below seat, refer to cable kit wire diagram 03077 and TN03094.
- e) Should alternate or additional elements be required contact Tanis engineering. Common alternate on MRGB, due to space limitations, TEP3180- may be replaced with TEP3179- or other appropriate element as assigned by Tanis engineering.

### 3.4 Electrical

Locate electrical components following narratives below, cable kit wire diagram drawing 03077, and examples in § 4.

- a) Plug requires hard-mounting, method and location TBD by installing authority refer to this instruction and TNG1000 for examples. Plug and light bracket kit TU01062 supplied for locating plug on round strut/frame member.
- b) Electrical routing suggested, final routing TBD by installing authority.
- c) Wires and cables are to be supported by suitable cable-ties, clamps, 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.
- d) Wire termination and tooling refer to instructions TN02793 and TN03012.
- e) Only connect power after completing Functional System Check with ohmmeter, § 3.5.
- f) 230-volt kit supplied with extension cord plug adaptor, refer to instruction TN02829.

Shore plug (inlet) and indicator light: Plug: TP02770-115 or TP02980-230, Light: TLP3039-115 or TLP3039-230 (supplied by voltage). Location and mounting method TBD by installing authority refer to Figures 4.1. and 4.11.

Cable kit TCH3077 with CPD (fused link): Locate CPD and junction J-A near plug, junction J-B in engine compartment on or near firewall adjacent to passthrough. Secure with cushioned clamps and/or cable-ties in serviceable areas that allow leads to reach corresponding components and route accordingly.

Tail Rotor Cable: Jumper cable from main harness to the tail rotor element options:

- (a) Jumper flagged with **“Remove Before Flight”** used only during preheat on the ground and **removed before engine start-up**. Harness side connector may be located just inside ELT door adjacent to power plug with TRGB element connector secured with clamp on tailboom with chip light wiring clamp. When element and airframe connectors are not in use install grey sealing plugs (P/N: DT06-2S-C017), refer to Figures 4.2. and 4.11.
- (b) Permanent installation preferred although routing accommodations limited.

Battery control cable assembly TL03217-C and thermal control TLP3046-05: Locate in battery compartment, secure with existing wiring or as required. Thermal control, locate battery environment 6 to 18 inches (15 to 46 cm) from battery, secure with Click Bond cable mount and/or cable-tie with existing wiring. Heater may be removed seasonally. Cap lead when not in use (gray sealing caps DT04-2P-C017 supplied for use as needed) refer to Figure 4.4.

Ground wire, green 22759-181 wire with ring crimp: Verify OEM engine/airframe bonding strap is installed. Attach ring crimp end to applicable ground on airframe or engine, terminate in shore plug. Connection not to exceed .003 ohms, refer to TNG1000.

Firewall passthrough: TG01056 Fireproof Grommet, locate in firewall adjacent to existing passthrough, fill voids with bonding sealant TU02788 or PS 700 refer to Figure 4.11. and TN01056.

Alternate K-type firewall connector kit TU03125 available, supplied separately.

Optional AV/Cabin Heater: Dedicated circuit lead with CPD, route between plug and heater. Lead connects to thermostat control assembly TU03238. Locate CPD in serviceable near plug. Suggest locating AV/Cabin heater below right crew seat or other location TBD by install authority refer to Figure 4.12 and instruction TN03094. Heater and thermostat may be removed seasonally. When locating circuit with separate dedicated plug affix corresponding placard TU03119-01 near plug.

Placards: TU02615-115 or TU02615-230 (supplied by voltage) affix Tanis placard on ELT door adjacent to ELT or other applicable location based on plug location and/or operator requirements refer to Figures 4.1. and 4.11. Alternate placard may be field fabricated stating at a minimum: *Tanis Preheat* and voltage requirement (*115- or 230-Volt*).

### 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.

**Note:** Suggest including copy of page 6 with Figures 4.1. and 4.2. as appendix in operating guide TPG1000.

#### 4. TABLES AND FIGURES

This section contains technical information and examples of typical installations, final installation may vary due to existing equipment or operating requirements.

**Table 4.1.** 115-Volt Electrical Values.

System and individual element value tolerances +/- 10%.

\* Battery heater circuit normally open, closed below +5°C / 41°F (freezing) refer to TN03046 and Functional System Check located in Installation Guide TNG1000.

\*\* Optional AV/Cabin heater ohms and inrush amperage vary due to heater design, refer to instructions TN03094 and TN03235.

##### 115 Volt Kit:

**Total power requirement with optional AV/Cabin Heater 9.6 Amps.**

Plug 1. Engines, gearboxes, battery			Total:	3.6 Amps	418 Watts	31.6 Ohms
* Without battery heater:				3.4 Amps	393 Watts	33.7 Ohms
Qty	Element Part Number	Element Location			Watts	Ohms
1	TEP2661-115/10	FCU	each:		10	1322.5
1	TEP2672-115/37	MRGB Oil Cooler	each:		37	357.4
1	TEP2709-115/23	HYD Res	each:		23	575.0
1	TEP2742-115/23	TRGB	each:		23	575.0
2	TEP3166-115/80	ENG AGB LH and Eng AGB RH	each:		80	165.3
1	TEP3179-115/40	ENG Oil Cooler	each:		40	330.6
2	TEP3180-115/50	Engine Oil Tank and MRGB Sump	each:		50	264.5
* 1	TEP3033-115/25	Battery	each:		25	529.0

AV/Cabin Heater			6.0 Amps	500 Watts	26.5 Ohms
Qty	Part Number	Location		Watts	Ohms
** 1	THP3094-001	Crew cab	each:	500	PTC

**Table 4.2.** 230-Volt Electrical Values.

System and individual element value tolerances +/- 10%.

\* Battery heater circuit normally open, closed below +5°C / 41°F (freezing) refer to TN03046 and Functional System Check located in Installation Guide TNG1000.

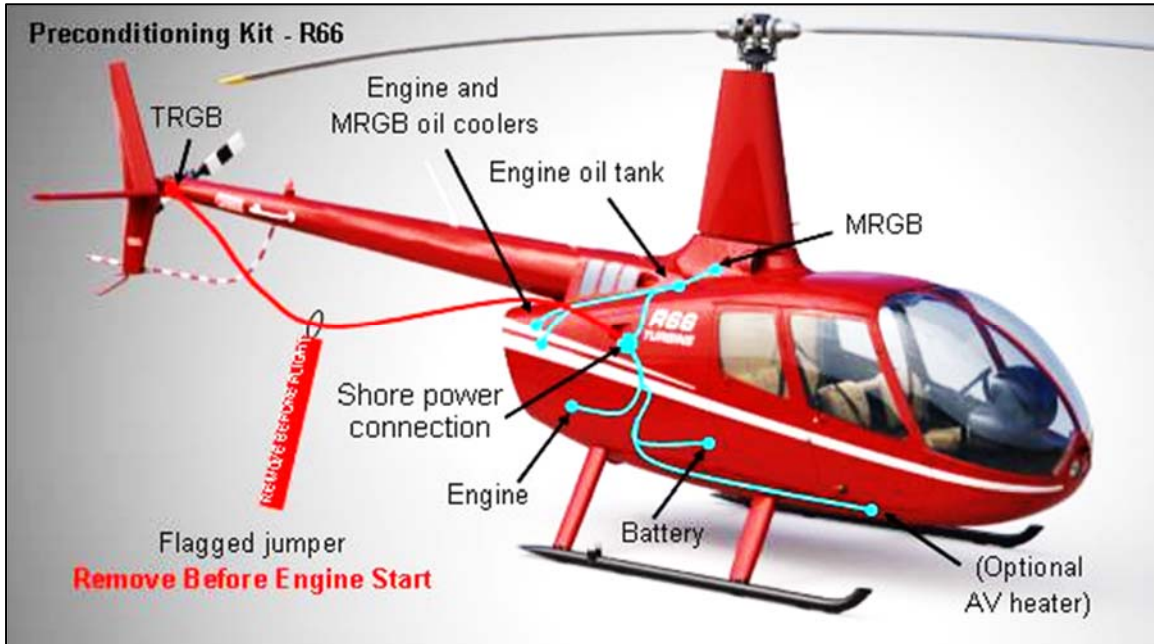
\*\* AV/Cabin heater ohms and inrush amperage may vary due to heater design, refer to instructions TN03094 and TN03235.

**230 Volt Kit:**

**Total power requirement 4.8 Amps.**

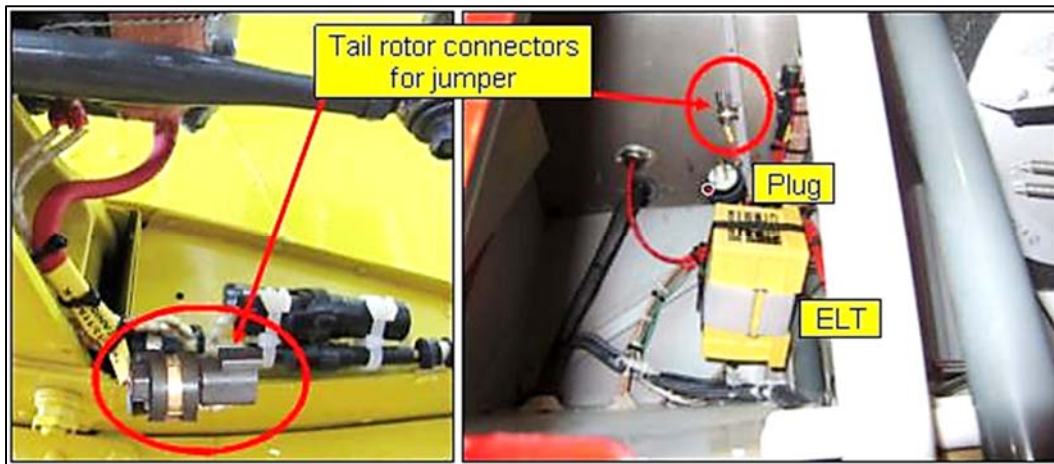
Plug 1. Engines, gearboxes, battery			Total:	1.8 Amps	418 Watts	126.6 Ohms
* Without battery heater:				1.7 Amps	393 Watts	134.6 Ohms
Qty	Element Part Number	Element Location		Watts	Ohms	
1	TEP2661-230/10	FCU	each:	10	5290.0	
1	TEP2672-230/37	MRGB Oil Cooler	each:	37	1429.7	
1	TEP2709-230/23	HYD Res	each:	23	2300.0	
1	TEP2742-230/23	TRGB	each:	23	2300.0	
2	TEP3166-230/80	ENG AGB LH and Eng AGB RH	each:	80	661.3	
1	TEP3179-230/40	ENG Oil Cooler	each:	40	1322.5	
2	TEP3180-230/50	Engine Oil Tank and MRGB Sump	each:	50	1058.0	
* 1	TEP3033-230/25	Battery	each:	25	2116.0	

Plug 2. AV/Cabin Heater			Total:	3.0 Amps	500 Watts	26.5 Ohms
Qty	Part Number	Location		Watts	Ohms	
** 1	THP3094-001	Crew cab	each:	500	PTC	



**Figure 4.1.** Preconditioning kit overview.

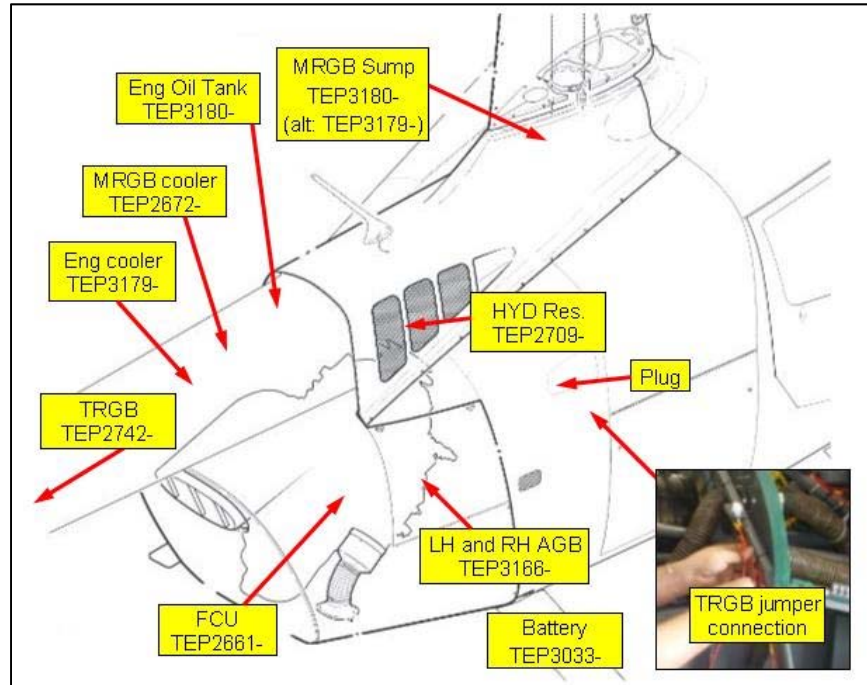
- Operation refer to TPG1000. Connect as soon as practical after engine shutdown.
- Preheat at or below 5°C (40°F), **required below 7°C (20°F)**.
- Tail rotor gearbox (TRGB) preheat required at or below -10°C (14°F).
- Before engine start disconnect and stow, power and jumper cords.



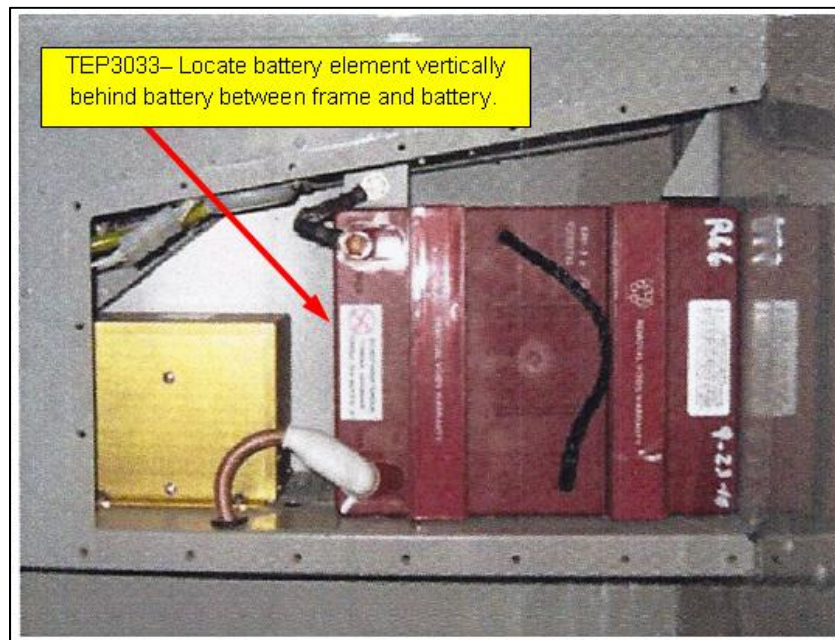
**Figure 4.2.** During preheat TRGB element connected with flagged jumper cable; remove before engine start and stow. Connectors located near power plug and tail rotor, install grey sealing plugs (P/N: DT06-2S-C017) in element and airframe connectors when not in use.

**Note:** Suggest including copy of this page as appendix in TPG1000.

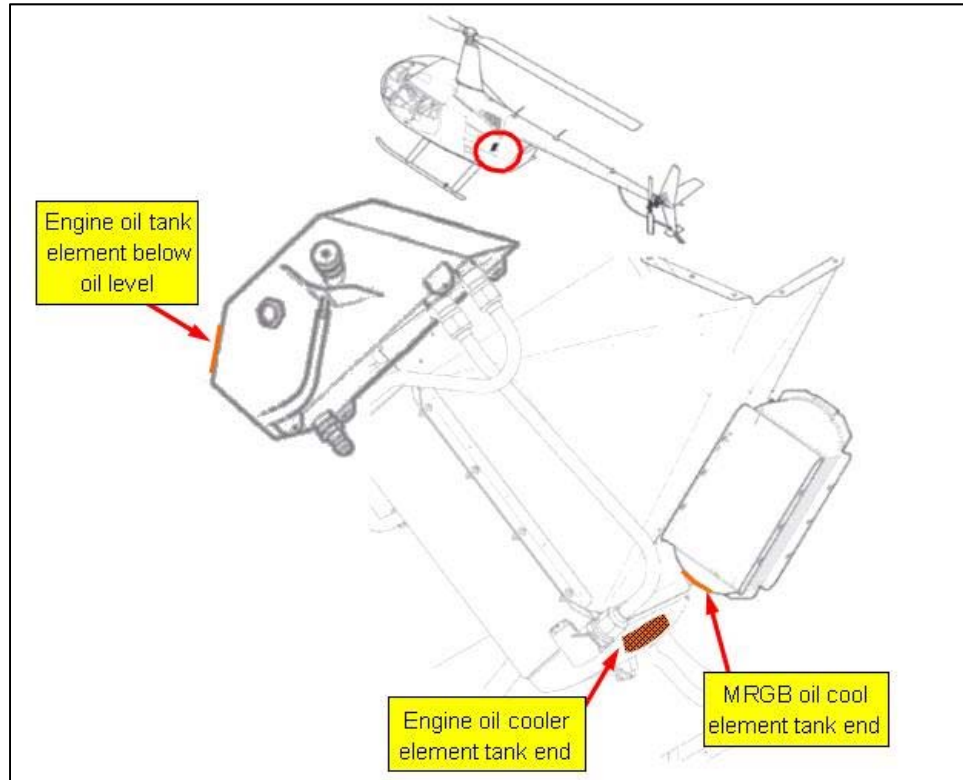




**Figure 4.3.** General plug and element layout. Locate and secure tail rotor jumper connector with cushioned clamps near power plug.



**Figure 4.4.** Battery element TEP3033- locate in direct contact with the battery, acceptable to locate along top, back or side, avoiding pinching between battery and top bracket. When required secure in place on battery with 4 to 6 small dollops of bonding sealant TU02788. Locate Thermal control TLP3046-05, 6 to 18 inches from battery or as far as practical, secure with supplied cable-tie anchor TU02782 or cable-tie with existing wiring, refer to TN03046. Note: installation may vary depending on battery and/or modifications refer to drawing 02800 for alternate battery elements.

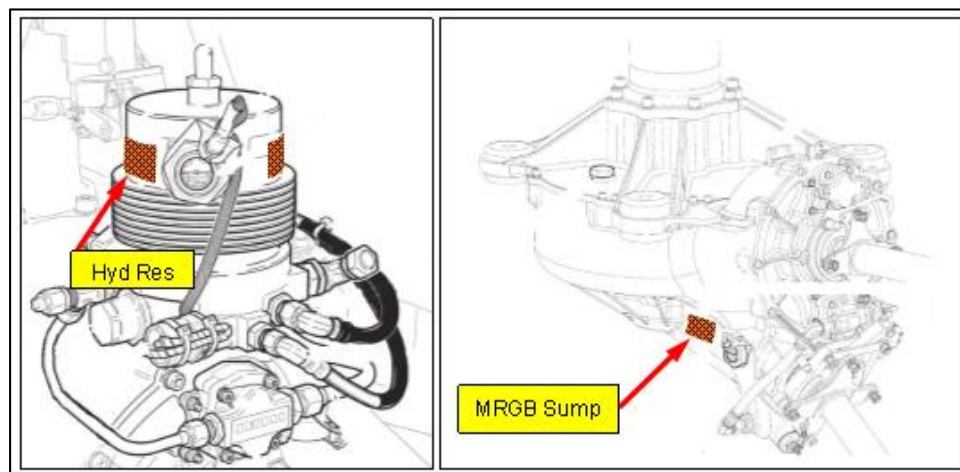


**Figure 4.5.** Engine oil tank, engine and MRGB oil coolers elements:

TEP3180- Engine oil tank, locate on tank below nominal oil level.

TEP3179- Engine oil cooler, locate on tank end position for lead routing.

TEP2672- MRGB oil cooler, locate on tank end position for lead routing.



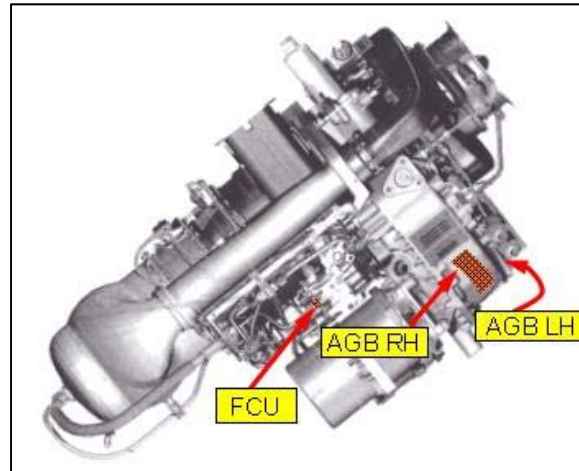
**Figure 4.6.** Hydraulic reservoir and MRGB elements: opposite sight glass.

TEP2709- Hyd res, locate around top just above cooling fins lead to follow hydraulic lines.

TEP3180- MRGB sump, locate left side forward of sight glass position for lead routing.

Note: Due to variation in case, MRGB may require alternate element TEP3179-, supplied separately as needed.

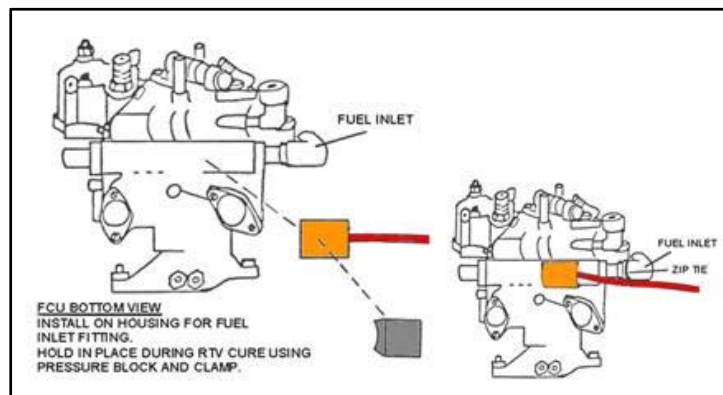




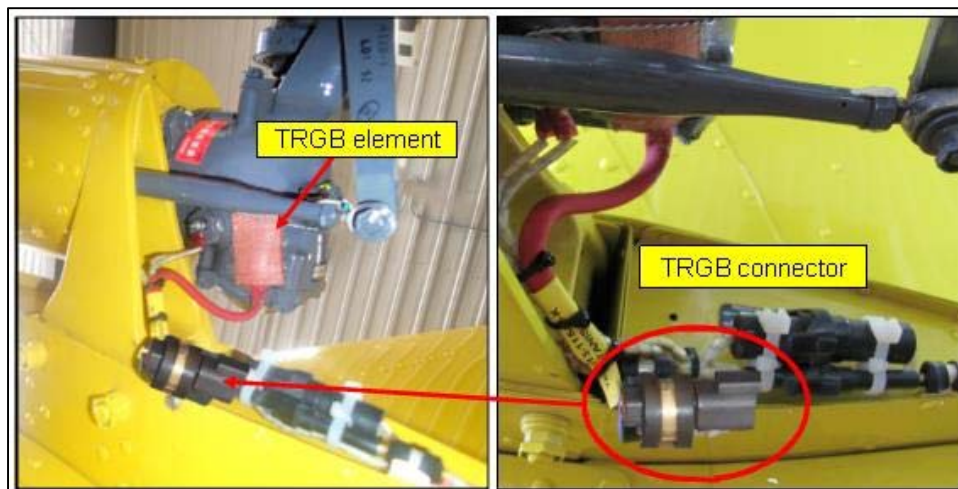
**Figure 4.7.** Engine elements:

TEP3166- Engine AGB, locate low on tank section, one each side leads down.

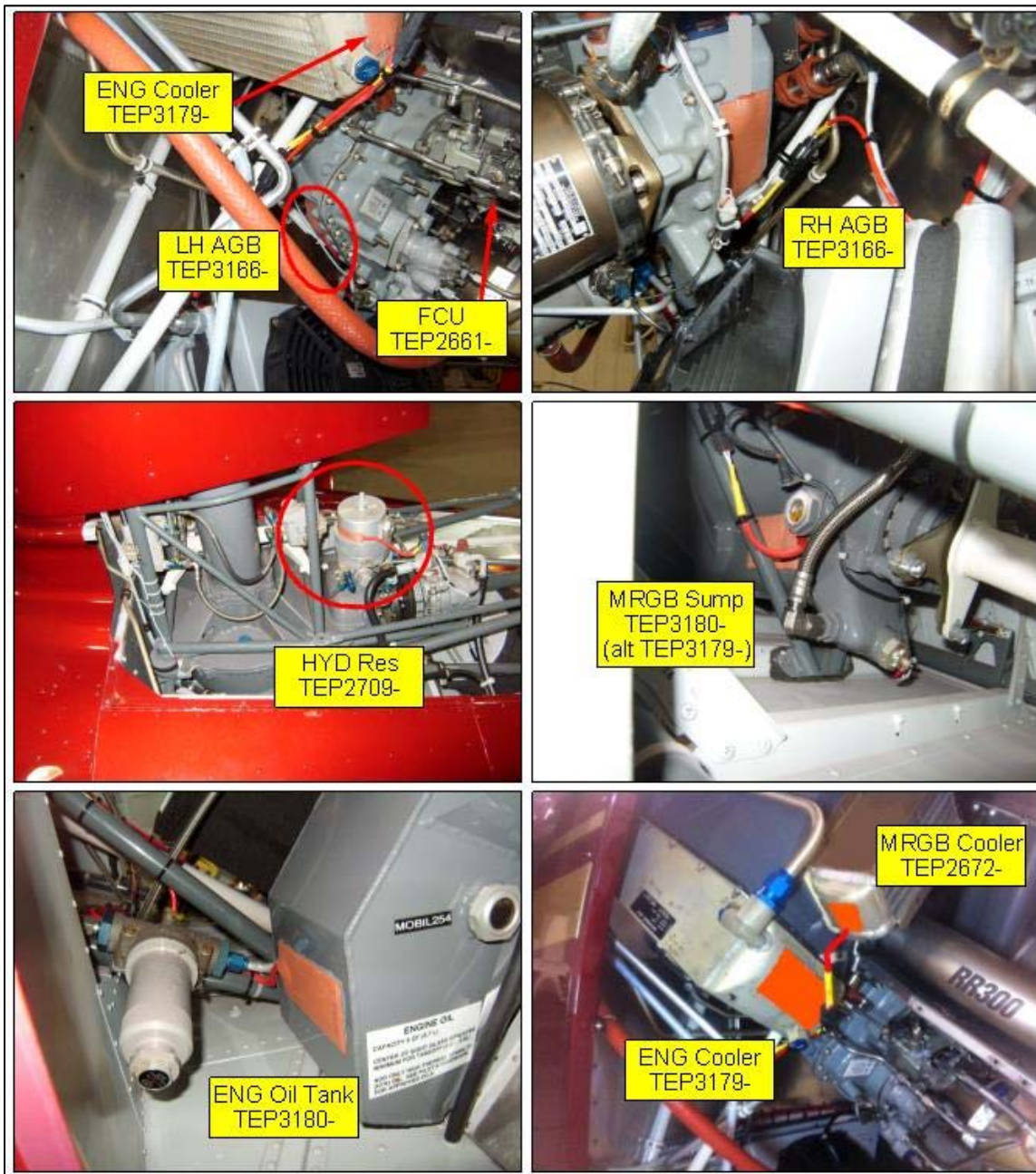
TEP2661- FCU, locate using pressure block TU02855 on casting near inlet fitting.



**Figure 4.8.** FCU element installation using TU02855, location may vary refer to TN02855.

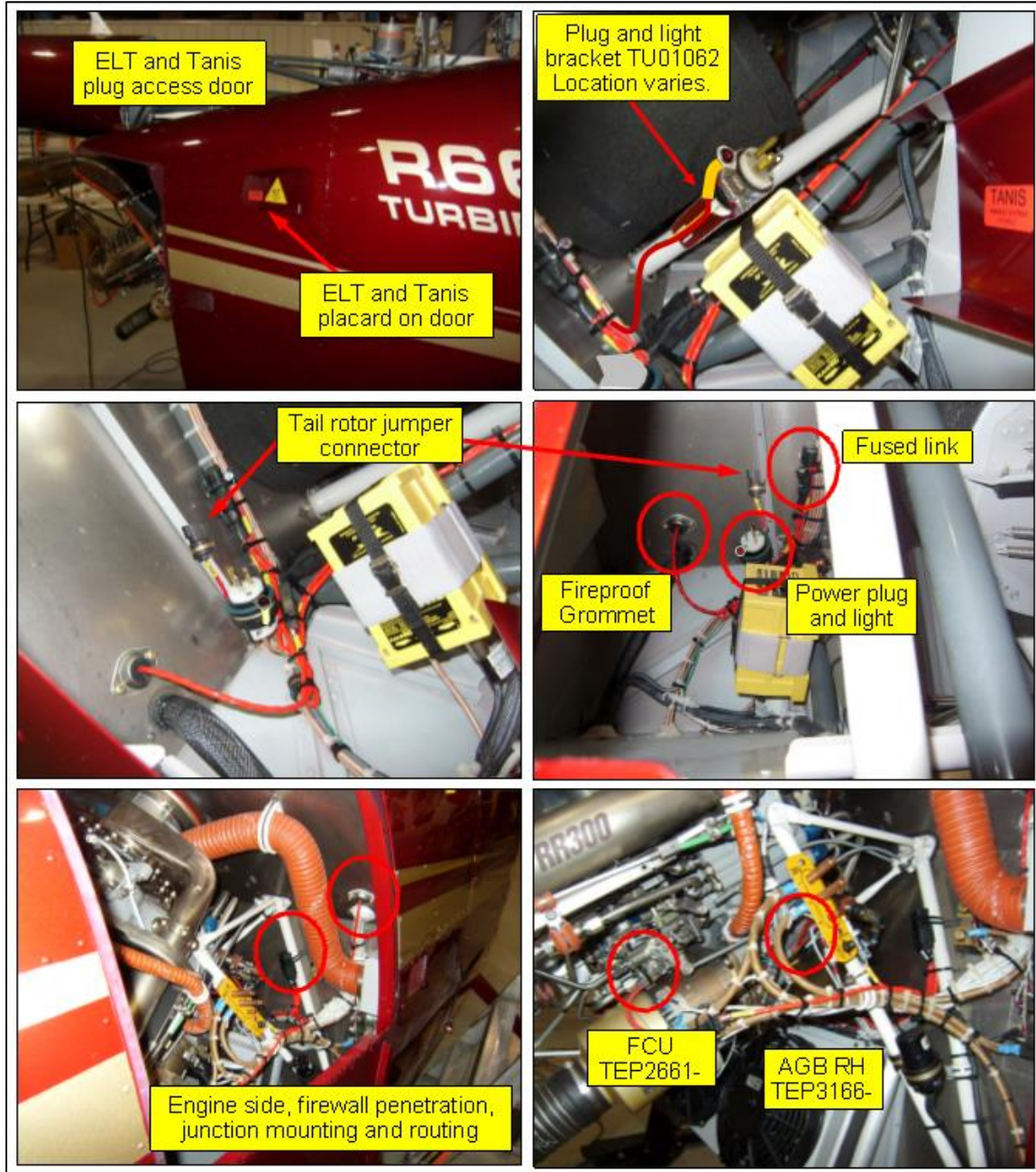


**Figure 4.9.** Tail rotor gearbox element TEP2742- locate on bottom of gearbox, secure connector with clamp with or near existing wire clamp(s). Element is powered by jumper cable refer to Figures 4.1. and 4.2.



**Figure 4.10.** Examples of element installed on engine, hydraulic reservoir, MRGB sump, engine oil tank, and oil coolers. Note: Due to variation in case, MRGB may require alternate element TEP3179-, supplied separately as needed.

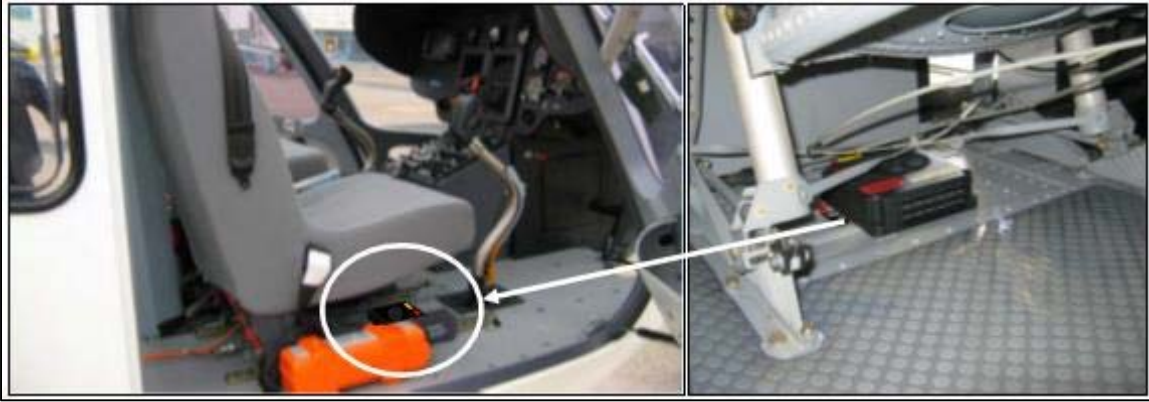




**Figure 4.11.** Examples of plug mounting, elements and routing. Installation will vary due to specific airframe and/or operational requirements.

TU01062 Circular plug bracket kit, supplied for use when locating plug on tubular frame member. Bracket kit includes indicator light bracket refer to instruction TN01062.

TG01056 Fireproof grommet, fill voids with bonding sealant TU02788 or PS 700, refer to TN01056.



**Figure 4.12.** Generic example of THP3094-001 AV/Cabin Heater with TLP3235 Thermostat. (Alt: THP3094-500 configured for temporary use). Locate on deck below right crew seat or location TBD installing authority, heater outflow forward, may vary due to seating configuration. TU03262 stud mount kits available for permanent mounting. AV heater and thermostat may be removed seasonally (gray sealing cap DT04-2P-C017 available). Power cable may be routed into crew cab with existing wiring, refer to wire diagram 03077, and instructions TN03094 and TN03235.

\*\*\*\*\* NOTHING FOLLOWS \*\*\*\*\*