Technical Overview

UH-1H Modernization and Performance Upgrade Solution.

HUEY TALON

This Overview is Presented By;

TAS Aerospace Ltd.

A Trinity Aviation Group Company

202-19148 27th Ave.
Surrey, BC, CANADA
V3Z 5T1
Tel: 604.536.9606

Technical Description Overview

HUEY TALON

The
New Generation HUEY

To whom it may concern,

The data presented herein will contain information from the original UH-1H STC No. SR09492RC and TEMSCO's effort on the STC for the Bell 205. While we feel that the current UH-1H engine conversion STC can be improved upon, we also see areas on the 205 STC design, mainly weight and continued maintenance concerns which should be addressed at this time as well.

It is our intent to make changes to the UH-1H design based on the knowledge accumulated from the 205 STC effort. We intend to complete a design which will be utilized for both the UH-1H and the Bell 205 aircraft engine conversions. The UH-1H will benefit from the new design with increased performance and maintainability, while the 205 will benefit from both weight savings and maintenance benefits.

The technical descriptions presented herein will be accurate, however the final look of the design will be somewhat similar to the 205 depicted, nonetheless, changes will be made to facilitate the proposed improvements.

Best Regards,

Warren Malmberg
President,
TAS Aerospace Ltd.

UH-1H HUEY TALON Overview

1.0 INTRODUCTION

1.1 Purpose

The purpose of this document is to provide a general technical description of the TALON PT6C-67D Engine Conversion for the Medium Bell UH-1H, 205A-1, 205B and Huey II type helicopter that is being FAA Supplemental Type Certified (STC) by TAS Aerospace. The PT6C-67D Engine Conversion kit is already certified on the Restricted Category UH-1H under STC No. SR09492RC.

This document briefly describes the system and its installation.

1.2 Summary Project Description

TAS Aerospace Ltd., a Trinity Aviation Group Company (TRINITY) is developing a PT6C-67D Engine Conversion Installation for the Medium Bell UH-1H, 205A-1, 205B aircraft. The design replaces the current single Lycoming T53-L-13B, T53-13B or T53-17B engine with a Pratt & Whitney Canada (P&WC) PT6C-67D Turboshaft engine, an RGB (Reduction Gearbox), Engine Interface Components, Inlet & Exhaust Plenums and Upper Cowlings.

The original UH-1H conversion kit will be re-designed and upgraded with knowledge accumulated form the 205 STC effort. The intake system will be re-located higher alongside the engine, however unlike the 205 prototype the intake plenums (one on each side) will be incorporated into the engine compartment doors. This modification will increase the installation efficiency by 8-10% and allow direct access to the engine for maintenance. Refer to Figures 1-1 and 1-2 for the current installation on the UH-1H and Bell 205.

Medium Bell operators with the PT6 installation will benefit from increased reliability, fuel savings, decreased maintenance cost and operational costs, no engine oil changes between TBO. The EEC (Electronic Engine Control) allows for trend monitoring, exceedance monitoring, automatic cycle counts and compatibility with HUMS Systems.

Figure 1-1 UH-1H with PT6C-67D Engine Conversion

Figure 1-2 Bell 205A-1 Prototype with PT6C-67D Engine Conversion

The PT6 Engine Conversion boasts the following features:

1) Single Pratt & Whitney Canada PT6C-67D Reverse Flow Turboshaft Engine with new Engine Mounting Brackets and Hardware. The Engine features an EEC (Electronic Engine Control) which operates like a FADEC, but with Manual Backup Control. It also has its own (self-contained and self-cooled) oil system.
2) Reduction Gearbox (RGB) with separate self-contained RGB Oil System
3) Electric Oil Cooler Fan (replaces the Bleed-Air Driven Oil Cooler Fan) to cool the transmission oil and RGB oil systems only, since the engine oil is self-cooled (Fuel Cooled).
4) RGB Firewall
5) Engine Inlet Air System
6) Carbon Fiber Upper Engine Cowlings
7) IR Signature Reduced Engine Exhaust System
8) Aft Horizontal Firewall
9) Upgraded Throttle Control System
10) Electronic Collective Power Anticipator
11) Slightly Modified Fuel System
12) Modified Engine Fire Detection / Suppression System
13) LED Anti-Collision Beacon Installations
14) Digital Cockpit Instruments and Indications
15) LED Oil Level Light Installations

The PT6C-67D Engine Conversion utilizes high quality components and aircraft quality hardware.

2.0 DESCRIPTION - PT6C-67D Engine Conversion

The Lycoming engine with integral RGB and engine mounting brackets/clevises/legs will be removed from the aircraft. The existing starter generator, engine fuel supply and return lines, the engine control droop cam, 13-quart engine oil reservoir, 28 Volt Battery, engine air inlet and upper cowlings, cockpit “de-icing” switch and associated wiring will all be removed.

The PT6 Engine (with separate RGB Assembly) attaches to the engine deck at the exact same five locations, and in the same manner as the removed T53 engine, but with new mount clevises. Two of the engine deck mount locations are on the left-hand side of the engine deck (Reference Figure 2-1). Two are on the right (Reference Figure 2-2). The 5th engine deck mount location is in the center of the engine deck immediately below the tail rotor drive train just forward of STA 211.

The engine mount clevises (both engine side and deck side) that are located in the engine compartment fire zone (those between STA 166 and STA 211) are constructed of 300 series stainless steel. The engine mount legs are made of 17-4PH corrosion resistant steel.

The PT6C-67D Engine installation includes a sixth mount from the RGB to the airframe (just forward of the STA 166 firewall). This mount will be for lateral loads only. The lateral mount is supported at the intersection of the aft cabin bulkhead, the cabin roof, and the main airframe beam.

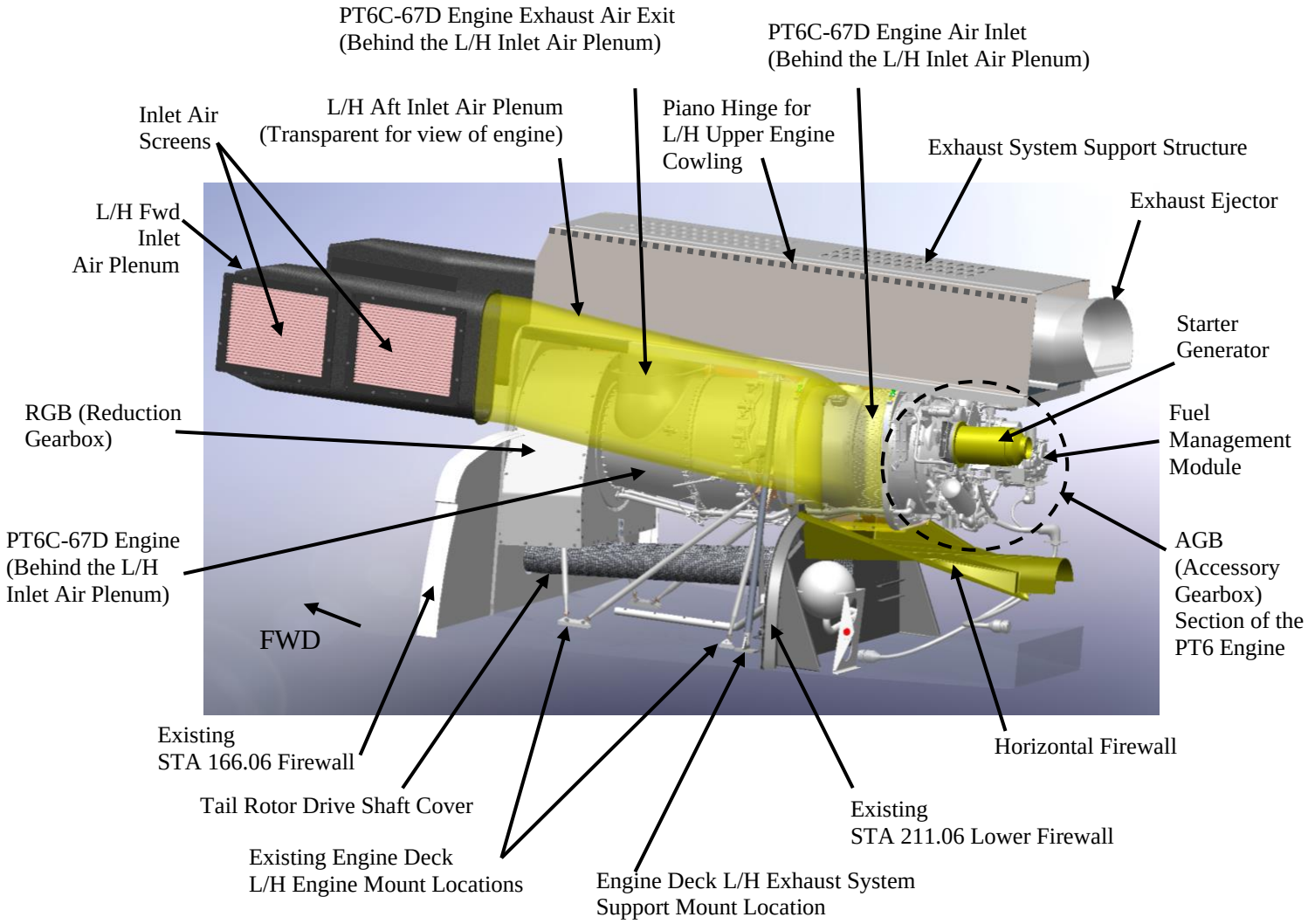

Figure 2-1 Model of the 205 Prototype PT6C-67D Engine Installation L/H Side

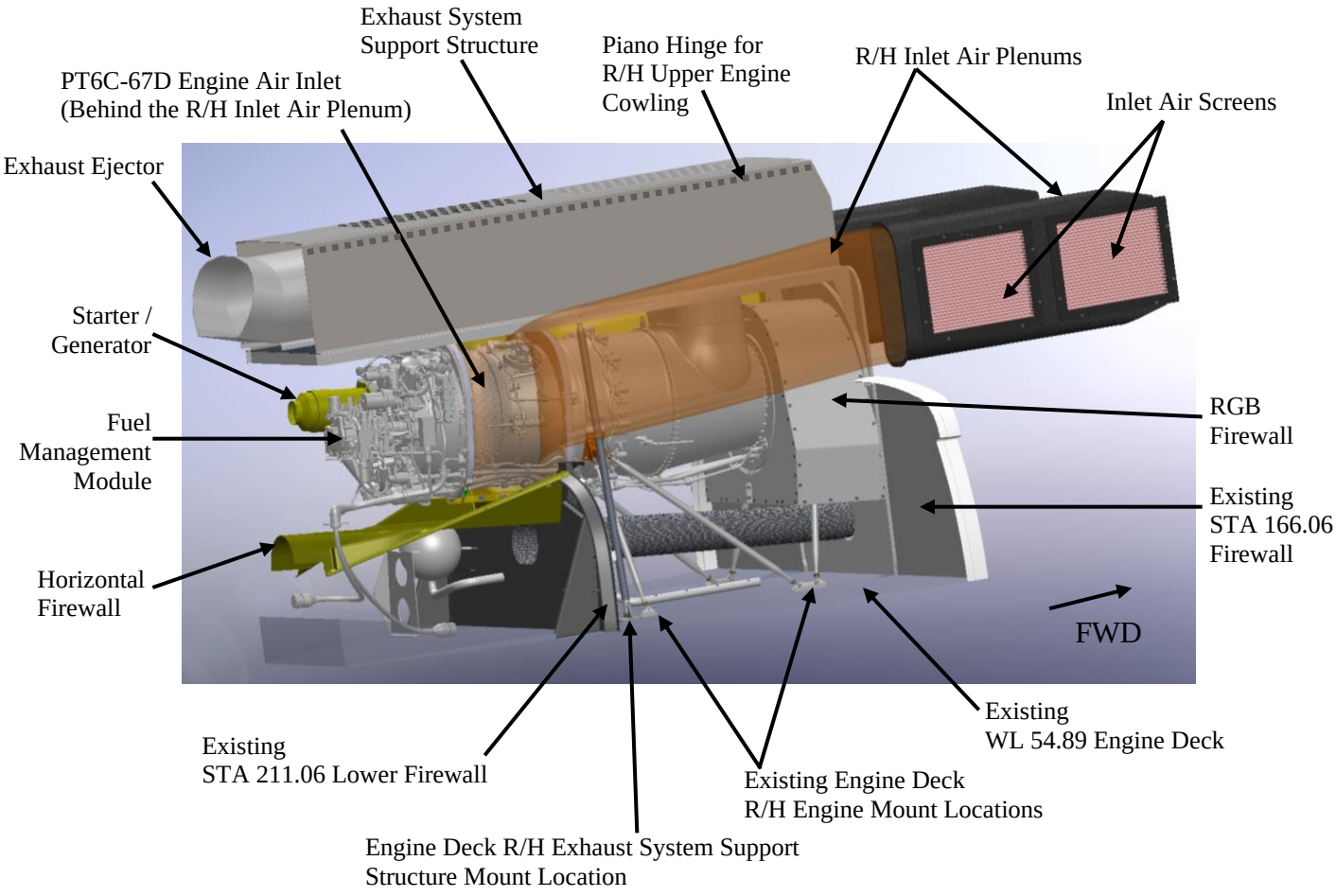

Figure 2-2 Model of the 205 Prototype PT6C-67D Engine Installation R/H Side

3.1 PT6C-67D Turboshaft Engine

The PT6C-67D Engine is a reverse flow, free turbine turboshaft engine (Reference Figure 3-3) with a clockwise output shaft speed of 21,200 rpm (Max Continuous Power) per TCDS E00068EN Rev 2. The engine utilizes two independent turbine sections: one driving the compressor and the second driving the output shaft through a direct drive section. The engine also has a self-contained engine oil system that is separate from the other oil systems on the aircraft. The total weight of the engine is 467.8 lbs. with maximum oil and fuel. The TBO (Time Between Overhauls) for the Pratt PT6C-67D engine is 4000 hours with a hot section inspection at 2000 hours. The operating limits of the engine will be expanded to 1800 thermal horsepower and 1350 shp mechanical for the 205 installation. The PT6C-67D engine EEC (Electronic Engine Control) operates like a FADEC (Full-Authority Digital Engine Control) but has pilot-controlled backup and

override. The PT6C-67 engine series is certified up to 2518 Thermo Horsepower, however, the Shaft Horsepower is limited by the EEC software, but should the software fail, there are mechanical stops on the engine FMM (Fuel Management Module) to prevent an overspeed event. The EEC will revert to Pilot Controlled Manual Mode automatically or manually.

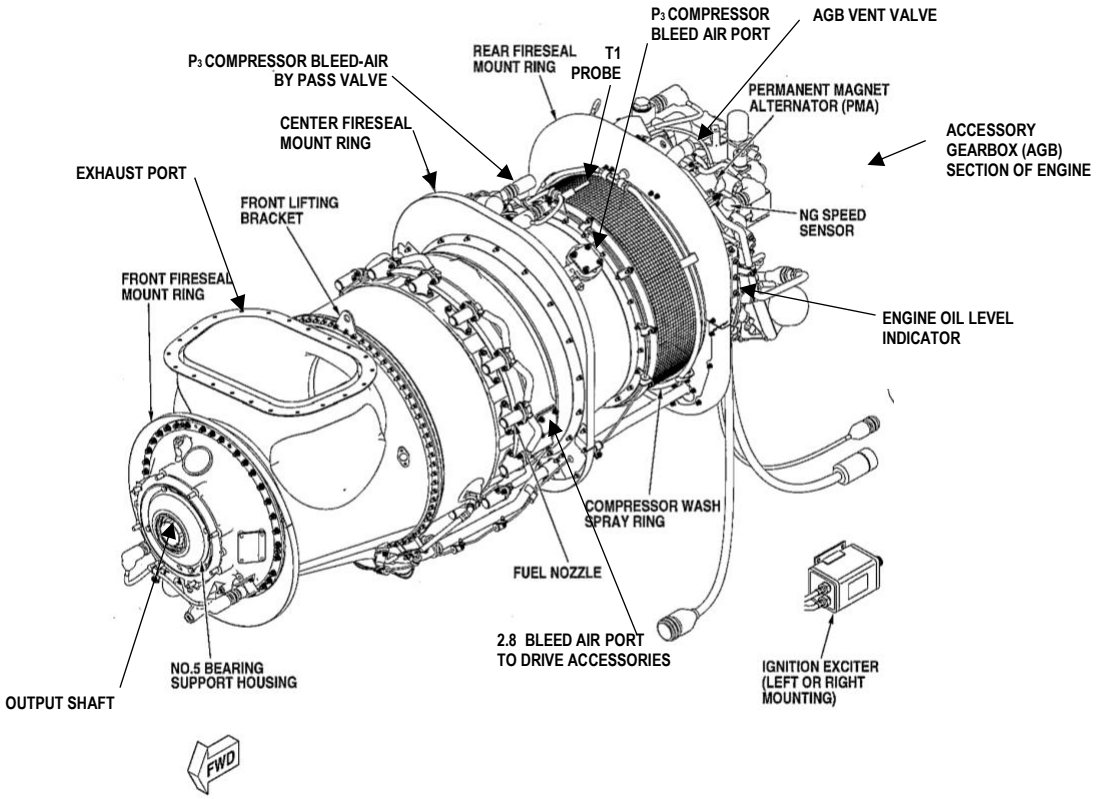

Figure 3-3 PT6C-67D Engine L/H Side

The Engine Oil Supply is self-contained in an integral oil tank at the rear section of the compressor inlet case. The engine oil is separated from any other oil system on the aircraft. The maximum oil quantity is 8.45 US quarts and the oil tank is provided with two visual oil level indicators. An Engine Oil Magnetic Chip Detector is located on the upper right-hand side of the AGB (Accessory Gearbox) section of the engine. Refer to Figures 3-3 and 3-4. The engine is designed with an integrated Fuel Cooled Oil Cooler (FCOC) and does not require an external airframe mounted oil cooling system. The Red Line Engine Oil Temperature is 145°C.

A single channel, Electronic Engine Control (EEC) system operates like a Full-Authority Digital Engine Control (FADEC) with a pilot controlled MANUAL backup to ensure accurate control of the engine output speed and fast response to changes in power

demand. The EEC monitors Engine Torque, Engine Oil Temperature/Pressure, Engine Inlet Air Temperature (T1 Probe), Inter-Turbine Temperature (ITT) with the internal T5 Probe, NG Speed, NPT Speed, Fuel Flow, Throttle Position, and all other required systems. The Electronic Engine Control system is equipped with an O/S (overspeed) limiter which is active in both AUTO and MANUAL modes. Upon detection of a power turbine (NPT) speed exceedance, the O/S limiter will provide fuel flow cut-back and recovery. There are also mechanical stops on the engine FMM (Fuel Management Module) to prevent an overspeed event. The software for the EEC has been developed and tested in accordance with the provisions of "Flight Critical" category (Level A) of RTCA/DO-178B.

A fuel heater preheats the Fuel Management Module (FMM). Metered fuel from the FMM is sprayed into the combustion chamber through fourteen individual fuel nozzles mounted around the gas generator case. At shutdown, residual fuel in the nozzles and tubes are captured in an ecology tank and stored for next start.

The engine has an integral DCU (Data Collection Unit) which records engine phase shift torque meter, ITT Trim data, exceedances (type & duration), fault occurrences and fault code, and events (parameters affected & duration). The DCU also has Low Cycle Fatigue (LCF) counting on rotating components. The DCU has life-ing software which calculates engine part life, and will reduce the component service life on engine parts should any limits be exceeded.

All engine-driven accessories are mounted on the AGB (Accessory Gearbox). These components are driven by the compressor. The rear location of accessories provides for a clean engine and simplifies maintenance procedures.

The uninstalled engine meets FAA requirements for operating in icing conditions as defined in CFR Part 29, Appendix C. Refer to the Pratt & Whitney PT6C-67D Installation Manual Dated 01/09/04, Page 4-1, Section 4.2. It also meets the requirements of Canadian Airworthiness Manual 533.68 for operation in icing conditions as defined in Canadian Airworthiness Manual 529, Appendix C.

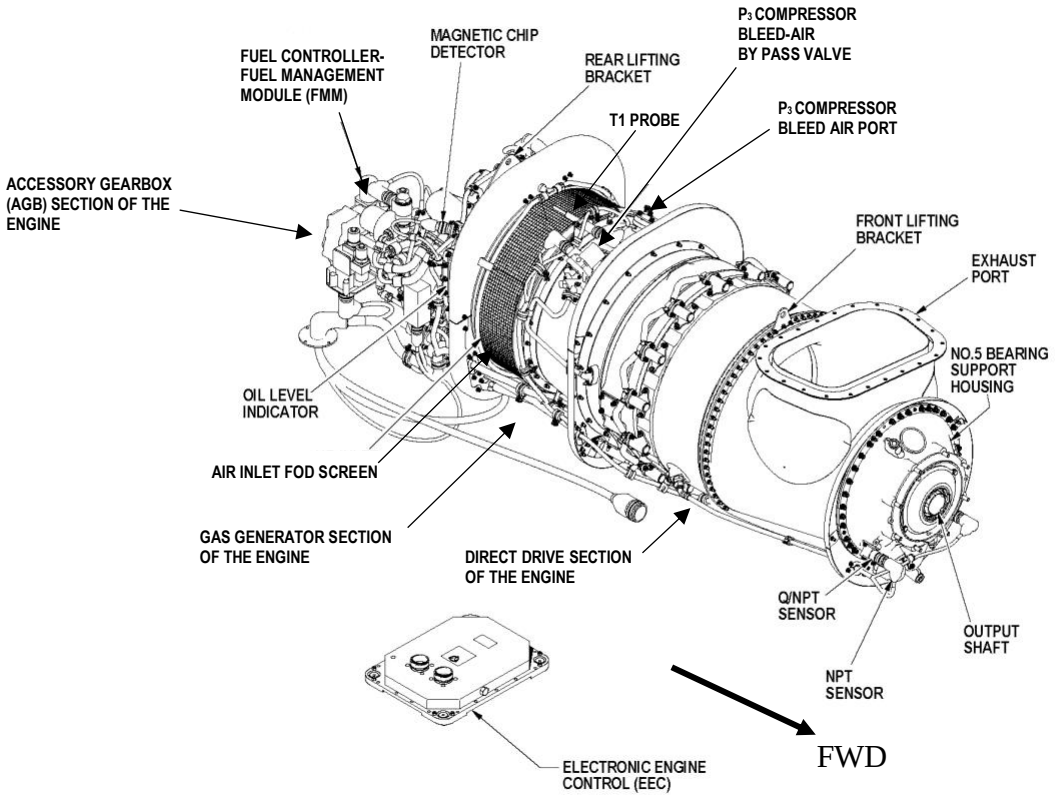

Figure 3-4 PT6C-67D Engine R/H Side

3.2 Reduction Gearbox Assembly and Oil System

The Reduction Gearbox Assembly (RGB) is designed to interface the PT6C-67D Engine Output Shaft to the aircraft Main Input Driveshaft utilizing the existing Engine Output Flange. The RGB will reduce the Max Continuous Power; 21,200 rpm output speed of the PT6C-67D Engine to the 6600 rpm Transmission Input speed. Refer to Figures 3-5 and 3-6.

It is recommended that the KAFlex Driveshaft Assy P/N: 204-040-433-101 be installed in place of the standard curvic coupling grease packed Main Input Driveshaft (due to its safety features) per the Bell Helicopter Textron Technical Bulletin 205-82-45 Dated 05/05/82, prior to this Engine Upgrade Installation, but is not a requirement.

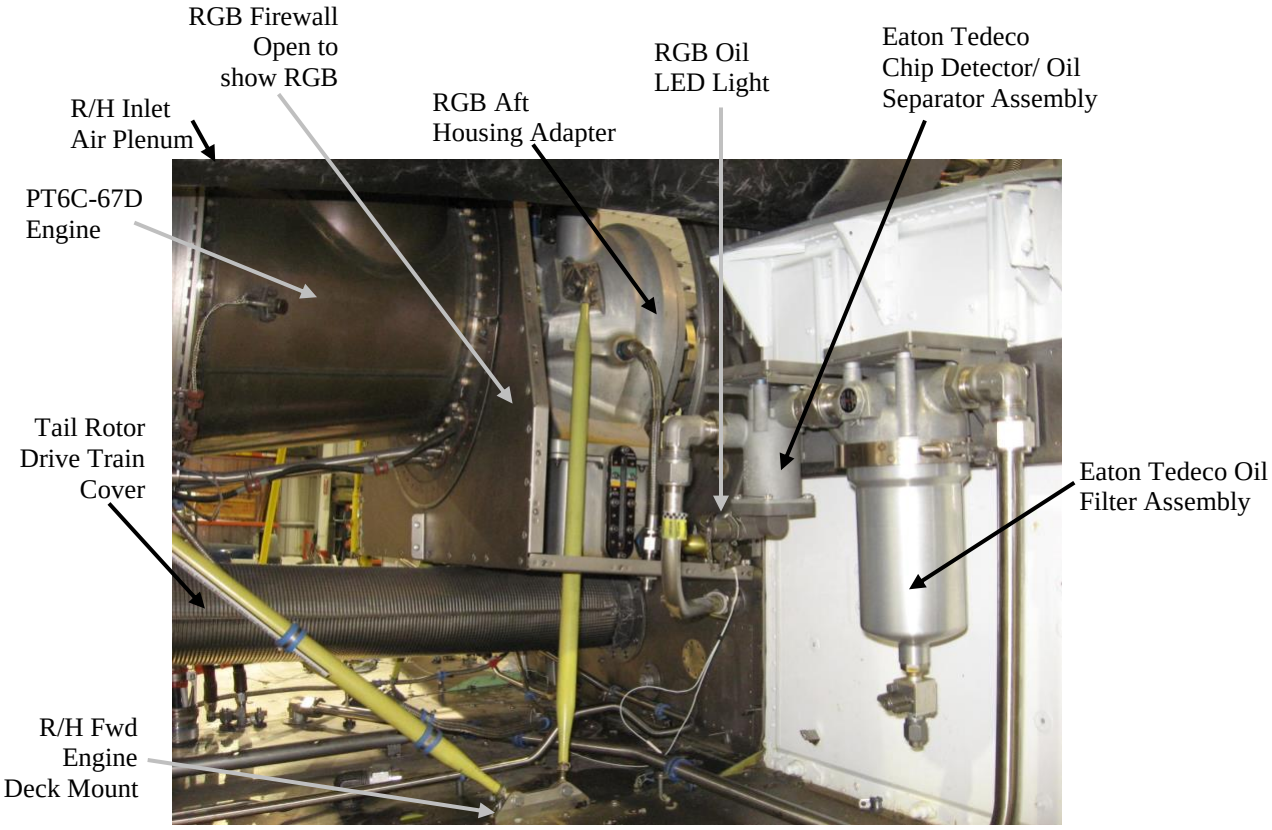

Figure 3-5 Reduction Gearbox Assy (R/H Side View)

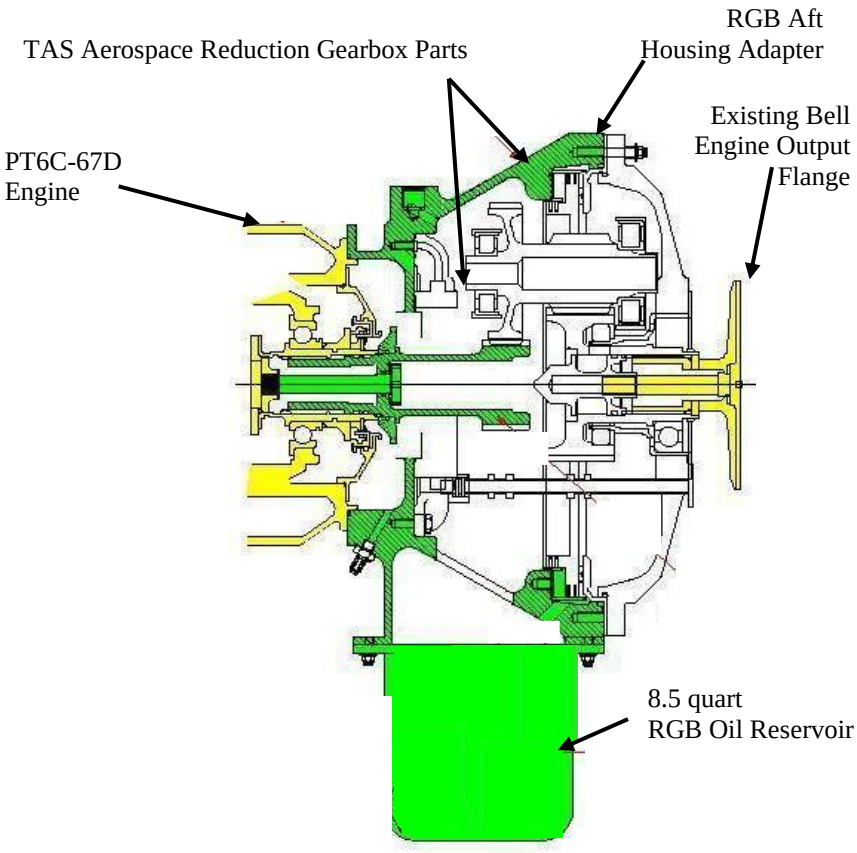

Figure 3-6 Reduction Gearbox Assy Internal View

Since the PT6C-67D has its own self-contained Engine Oil System, the existing Engine/RGB Oil System is modified to service just the new RGB. The existing 13 qt airframe mounted engine oil reservoir is removed.

The RGB Oil System includes:

1) An 8.5-quart Oil Reservoir (Refer to Figure 3-6)
2) A Nichols Airborne Oil Pump (Refer to Figure 3-7)
3) An Eaton Tedeco Products Chip Detector/ Oil Separator Assembly (Refer to Figure 3-8)
4) An Eaton Tedeco Products Oil Filter Assembly (Refer to Figure 3-8)
5) An Electric Oil Cooler Fan Installation (Refer to Section 3.3)
6) Oil Pressure Manifold

The lubrication system for the RGB incorporates a single stage Oil Pump (operated at 4.5 GPM but rated to 15 GPM, manufactured by Nichols Airborne, a Division of Parker-Hannifin).

The pad from which the oil pump is driven, is a Dual Drive Quill pad located on the main transmission. The Dual Drive Quill is standard on all AH-1F Cobra Transmissions P/N 212-040-001-039 or -051. Refer to Figures 3-7 and 3-42 for the Dual drive Quill.

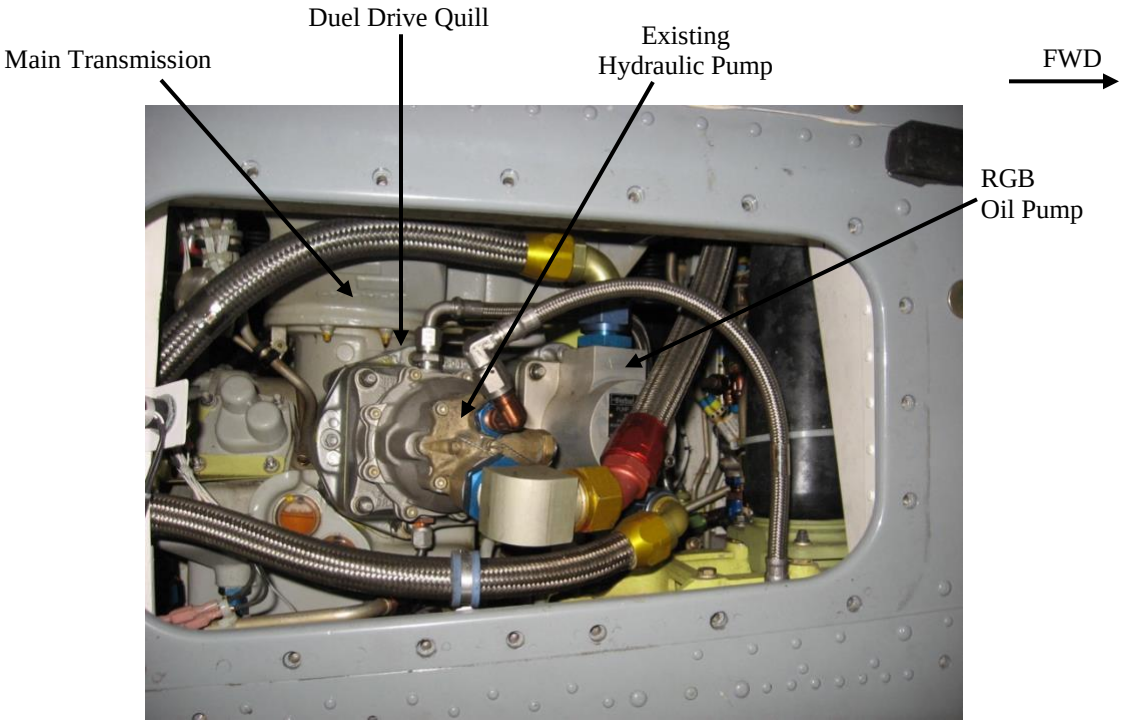

Figure 3-7 RGB Oil Pump (R/H Side View Looking Inboard)

For convenience of maintenance, the Chip Detector/ Oil Separator Assembly and the Oil Filter Assembly are installed in the same location as the removed T53 Engine/RGB 13 quart oil reservoir (on the R/H side of the engine compartment) utilizing a 300 Series Stainless Steel Adapter plate. Refer to Figure 3-8 below.

Figure 3-8 RGB Oil Chip Detector and Filter (Looking Fwd STA 166.06)

The Oil Pressure Manifold will be located below the engine deck, on the R/H outboard wall of the Lower Engine Deck Access. Refer to Figure 3-9 below.

Figure 3-9 RGB Oil Manifold (Located in Lower Engine Deck Access)

NOTE: The RGB will not share oil with the PT6C-67D engine. The PT6 engine is designed with its own self-contained oil reservoir. However, for convenience of maintenance; the type of oil used by both will be the same.

3.3 Electric Oil Cooler Fan Installation

In the standard UH-1H aircraft, the Bleed-Air driven Oil Cooler Fan cooled both the T53 13 qt engine oil and the 13 qt main transmission oil. The PT6 Engine Upgrade Installation replaces the existing Bleed-Air driven Oil Cooler Fan with an Electric Oil Cooler Fan (EOCF). Since the PT6 Engine has a self-contained Fuel Cooled Oil Cooler, the Electric Oil Cooler Fan (EOCF) only cools the RGB and main transmission oil.

The TALON design installs a 44 Amp, 28V Electric Oil Cooler Fan (EOCF), P/N: M7921T-1B, made by Dynamic Air Engineering Inc. The EOCF will remain off until either the RGB oil or the main transmission oil rises to 50°C. Keeping the oil cooler off until the oil temperature reaches 50°C will aide in cold weather oil warm up. Once the EOCF starts, it will remain on for the duration of the flight. The RGB and Main Transmission Oil redline temperatures is at 110°C.

The Electric Oil Cooler Fan (EOCF) will be installed at the exact same location (on the existing Air Duct Assy), in the aft right-hand bay, as the removed Bleed-Air driven Oil Cooler Fan. The original bolts used to install the Bleed-Air Oil Cooler Fan will be removed and replaced with identical, but new, standard aircraft bolts. Refer to Figure 3-10. The weight of the Electric Oil Cooler Fan is 13.40 lbs. The removed Oil Cooler Fan weighs 9 lbs 11 oz.

The OCF Bleed-Air Supply Line from the underside of the L/H engine deck to the right/hand aft bay will be removed. The Bleed-Air Tripod (Upper side of the engine deck) will be replaced by a stainless-steel adapter for the Bleed-Air Heater connection. Refer to Section 3.9 for the Air Ventilation System Modifications.

No changes will be made to the existing oil cooling heat exchangers or to any of the existing oil lines. (Refer to Section 3.9 for more information on the Bleed-Air System).

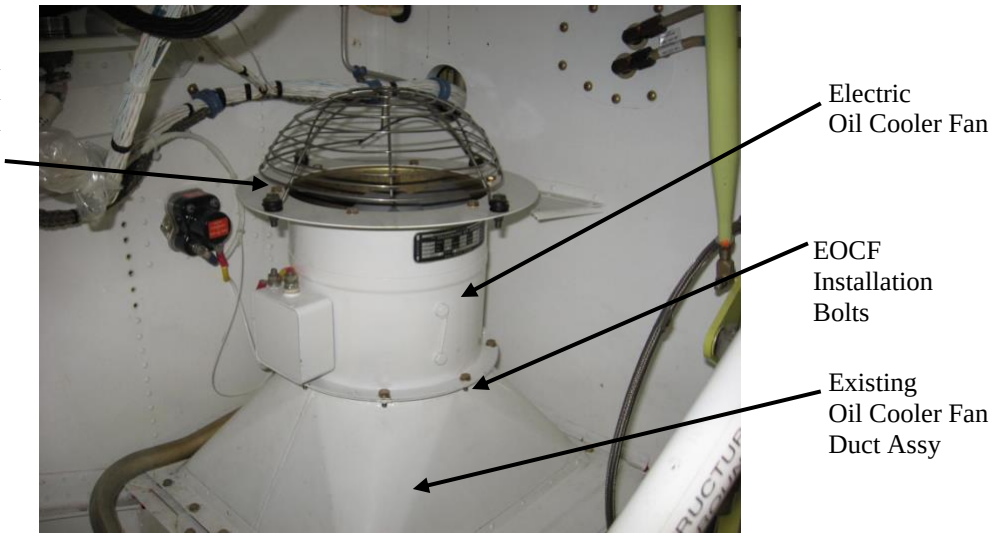

Figure 3-10 Electric Oil Cooler Fan Installation

3.5 Engine Inlet Air System

The standard UH-1H / 205A-1 Engine Air inlet, exhaust and upper cowlings are to be removed from the aircraft. The standard aircraft does not have a particle separator for the engine inlet air. If one has been added, as an OEM optional kit, it will be removed. The STA 211.06 Upper Firewall will be removed. The STA 211.06 Lower Firewall will not be removed.

The PT6 is a Reverse Flow Engine, meaning that the inlet air flows into the engine aft of the exhaust air exit (Reference Figure 3-13). Therefore, a new Engine Inlet Air System will be installed to route cooler air forward of the exhaust, to flow around and slightly above the engine in a non-symmetrical manner. Refer to Figure 3-14.

Figure 3-13 below illustrates airflow to, though, and from the engine. Air will flow through the four Inlet Air Screens, continue aft through inlet plenums to the PT6 engine inlet air FOD screen (Refer to Figure 3-4). The exhaust air exits the top of the engine and is channeled aft through the exhaust ejector.

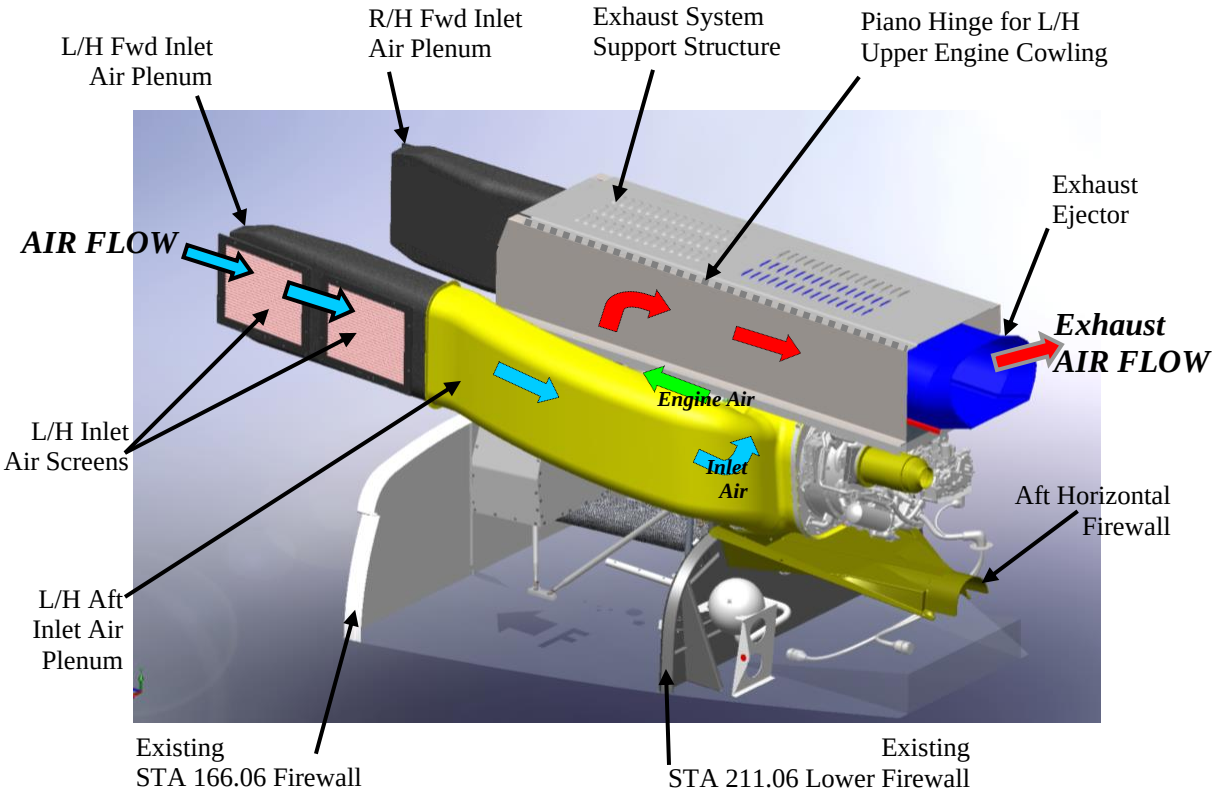

Figure 3-13 Engine Air Flow and Plenums (L/H Side)

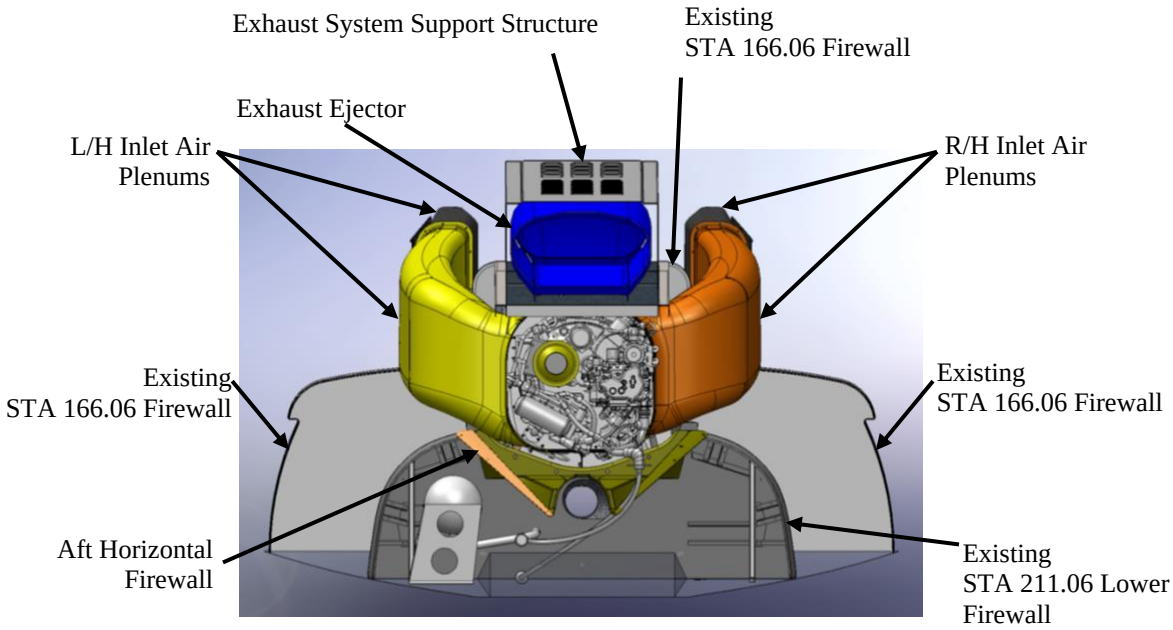

Figure 3-14 Model of the Engine Inlet Air Plenums (View Looking Fwd)

The re-designed Inlet Air Plenums will be incorporated into the main engine cowlings and will consist of 6 parts, the L/H; Fwd, center and Aft and R/H; Fwd, center and Aft. The R/H side inlet plenums will direct air to the upper R/H side of the engine inlet, while the L/H side will be biased to the lower L/H side, so that the airflow into the engine will be in a counterclockwise circular motion to coincide with the engine airflow direction. Each side of the inlet system will maintain an average minimum cross-sectional area of 115 square inches as it gently curves out and around the engine to avoid pre-heating of the inlet air. This will yield a minimum of 230 square inches of air to the engine at all times. The PT6 engine has a requirement of 100 square inches of air total.

Figure 3-15 below illustrates airflow through the engine. Air will flow through the four AFS (Aerospace Filtration Systems) Inlet Barrier Filters, continue aft through inlet plenums to the PT6 engine inlet air FOD screen (Refer to Figure 3-4). The exhaust air exits the top of the engine and is channeled aft through the exhaust ejector.

3.6 Engine Exhaust System

The PT6C-67D Engine Exhaust consists of a single port which is located at the 12 o'clock position on the engine. Reference Figures 3-3 and 3-4.

The PT6 Engine Kit incorporates an Engine Exhaust System to funnel the engine exhaust air away from the engine inlet. A Titanium Exhaust Pipe will channel the exhaust gas up and then 90° aft. Reference Figure 3-15 below. A Titanium Exhaust Ejector overlaps the aft end of the Exhaust Pipe by approximately one inch and is larger around than the Exhaust Pipe, leaving a ¼ - ½ inch gap, thus allowing cooler air to mix with the exhaust air. At the exit of the Ejector, the air is channeled up approximately 15° for better cooling distribution of the exhaust air.

The forward end of the Exhaust System Support Structure is left open. Ram air will fill the Exhaust System Support Structure and exits via; vents in the upper portion of the structure, or around the ejector in the aft end. Reference Figure 3-15 below. This ram air aides in cooling of the exhaust system. The exhaust system is designed to reduce the IR signature and heat of the installation to less than that of the T53 engine installation factory IR Suppression kit.

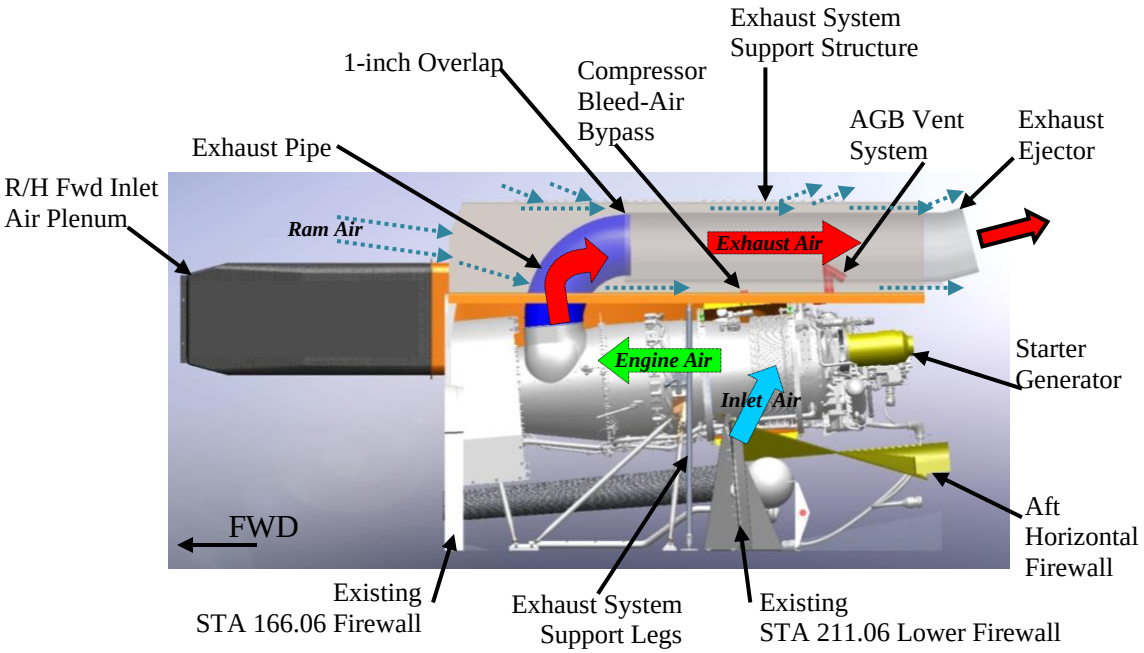

Figure 3-15 Solid Model of Engine Exhaust System (L/H Side Removed)

3.8 TEMSCO 212 Style Upper Cowlings

The standard UH-1H / 205A-1 Transmission Cowling, Engine Intake Fairing, and Engine Upper Cowlings (Refer to Figure 2-1) are removed. Because the PT6C-67D Engine is Reverse Flow, new Engine Inlet Air and Exhaust Systems are required. New designed Upper Cowlings will replace the original fairings and upper cowlings to fit around the new inlet and exhaust systems.

The new Upper Cowlings will consist of 6 (six) individual pieces; the Fwd Transmission Cowling, L/H Transmission Cowling, R/H Transmission Cowling, Center Cowling, the L/H Upper Engine Cowling, and the R/H Upper Engine Cowling. Refer to Figure 3-18 below.

The following figures 3-18 through 3-22 represent the current Bell 205A-1 prototype, as noted earlier, the final design will vary from these illustrations in order to reduce weight and increase the maintainability of the installation.

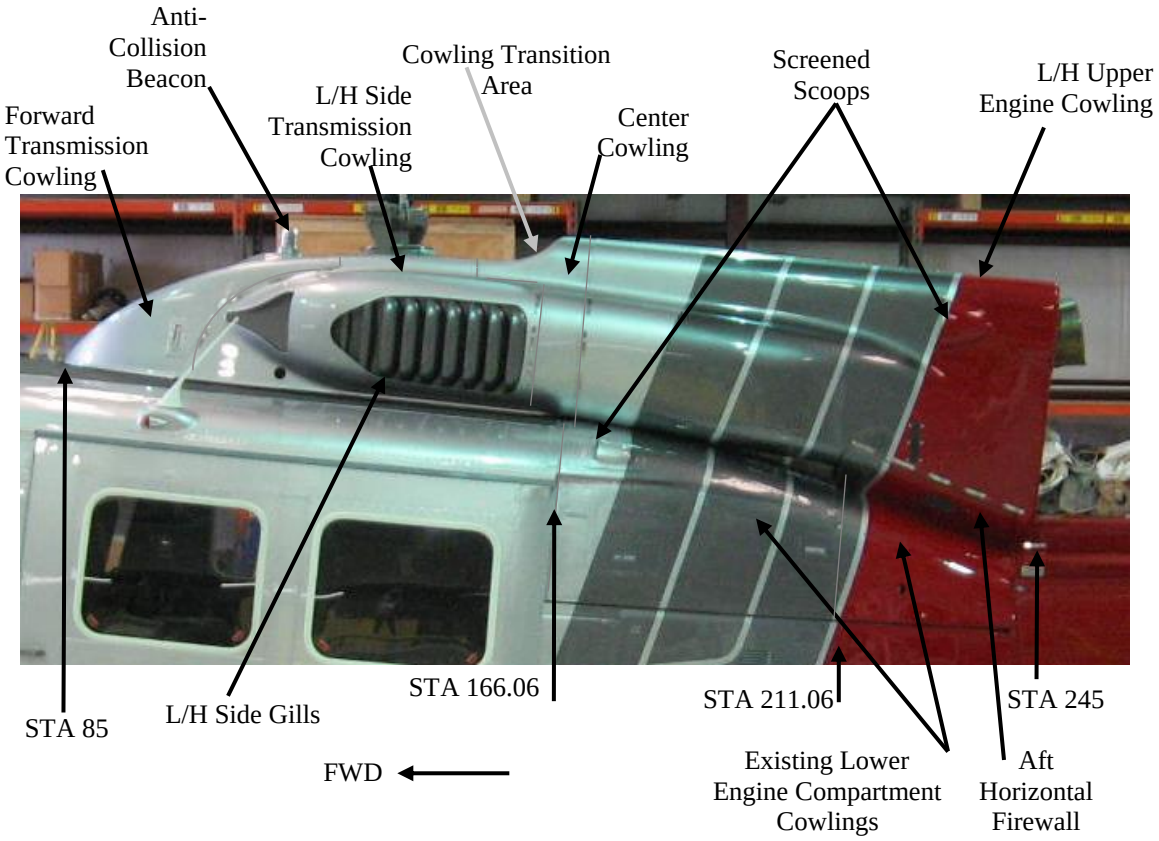

Figure 3-18 "212 Style" Upper Cowlings

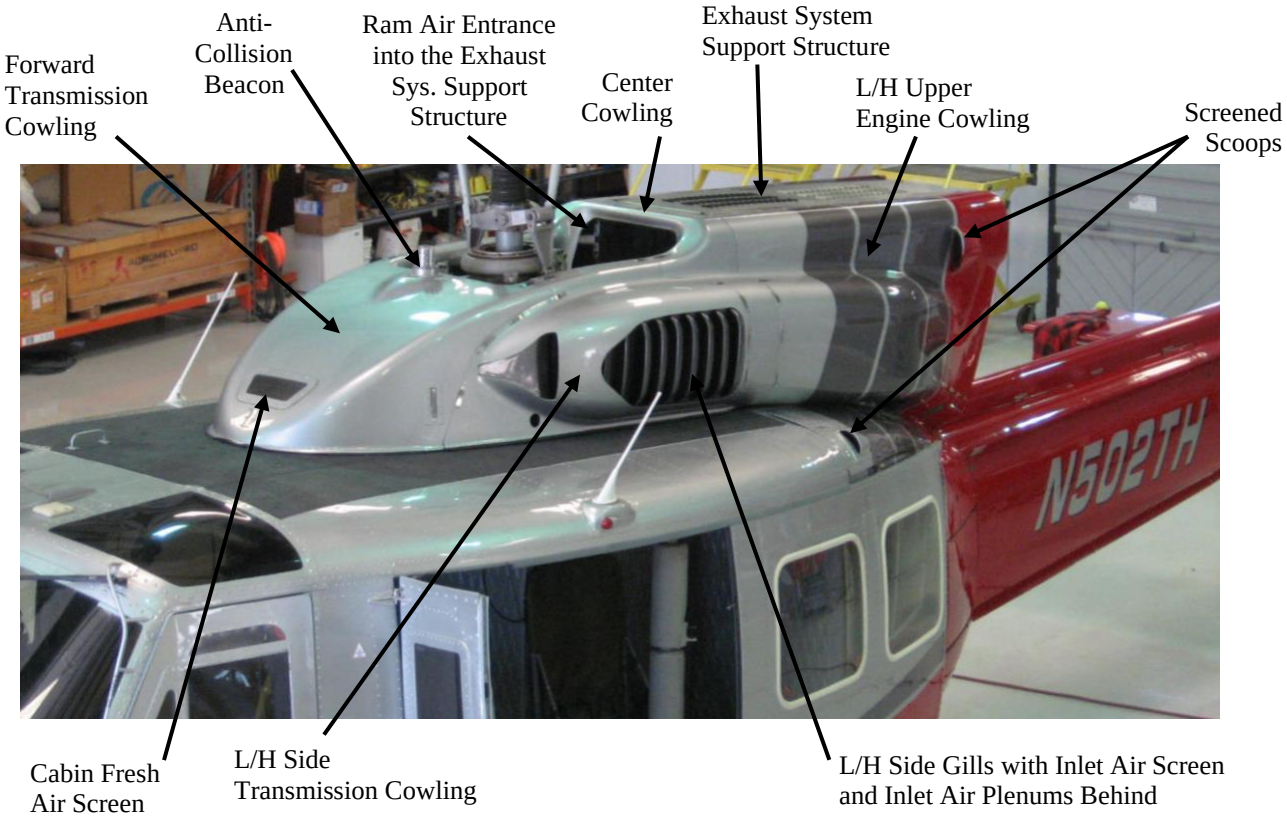

Figure 3-19 "212 Style" Upper Cowlings

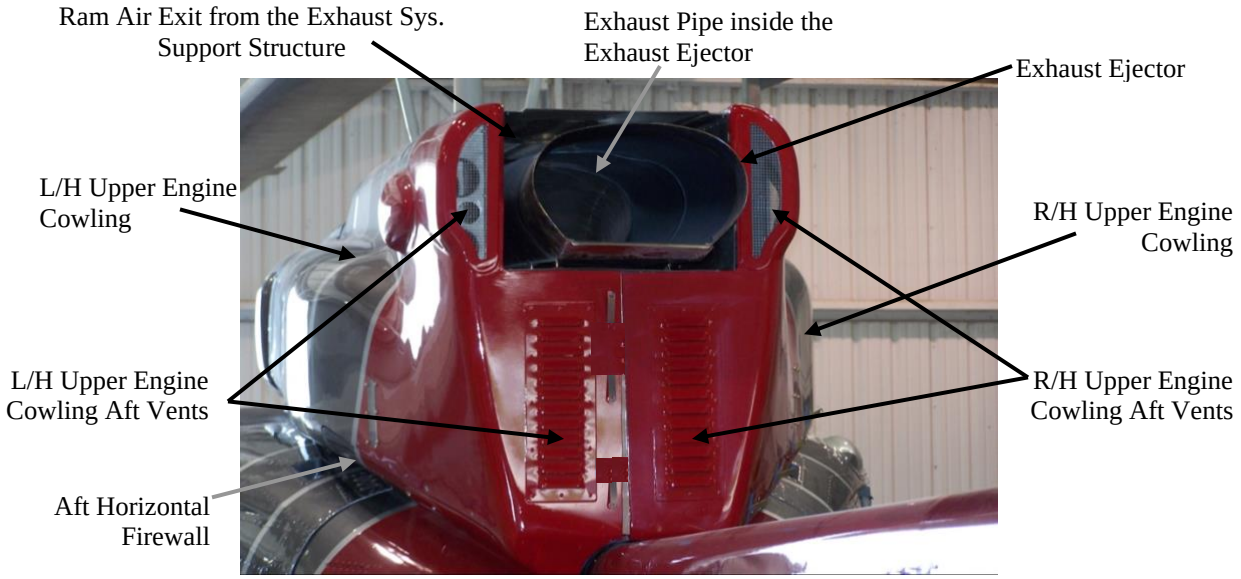

Figure 3-20 "212 Style" Upper Cowlings

Support Structure

Figure 3-21 Forward Transmission Cowling on Roof

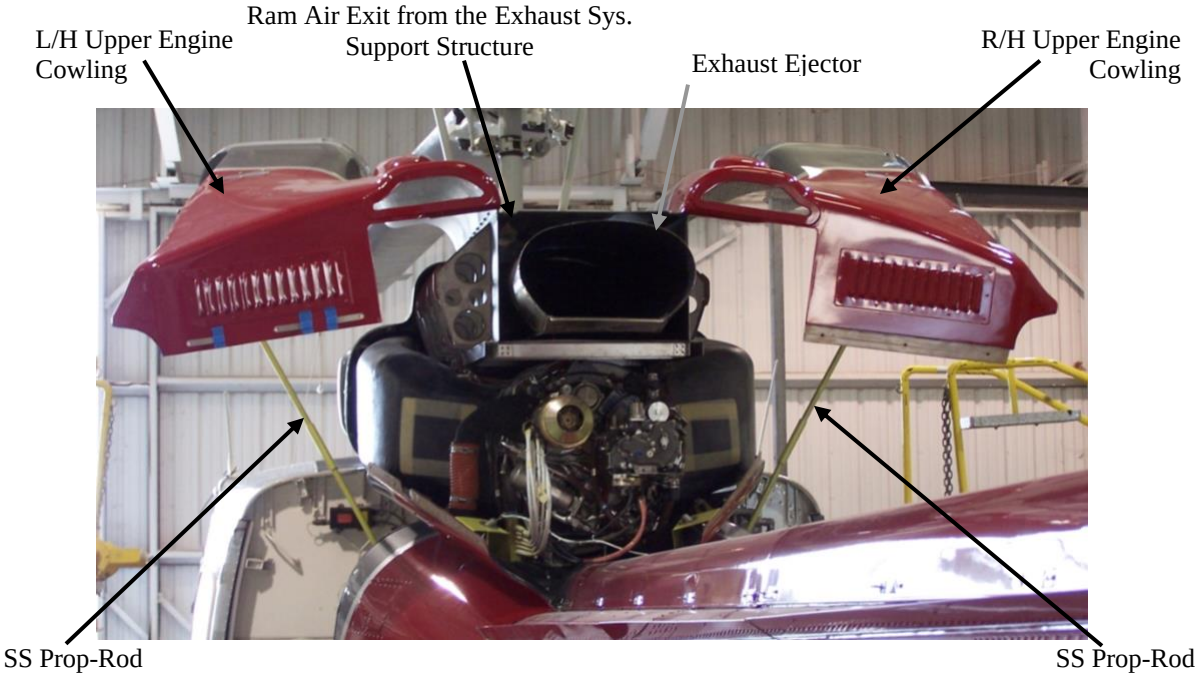

Figure 3-22 "212 Style" Upper Cowlings

3.10 Anti-Collision Light System Modification

The existing aircraft Anti-Collision Light System consists of two Aviation Red Anti-Collision Beacons, one located on the underside of the fuselage at approximately STA 66, the other located on the aft upper engine cowling at approximately STA 220. Both are controlled by the anti-collision light switch located on the left panel of the overhead console in the cockpit.

The PT6 Engine Conversion includes three LED Flashing Anti-Collision Beacons; one on the Fwd Transmission Cowling (Refer to Figures 3-18, 3-19 and 3-25), one aft at approximately STA 205 with an aluminum mount, and one which replaces the existing STA 66 Beacon.

Figure 3-25 LED Flashing Anti-Collision Beacons

The LED Flashing Anti-Collision Beacons operate on a 28 volt dc integral power supply. Each light assembly is designed with 10 vertical columns consisting of 3 LEDs each. The beacons, made by Whelen Engineering Company Inc., have been TSO-C96a Class I Approved for Rotorcraft. They are controlled by the existing anti-collision light switch located on the left-hand panel of the overhead console.

3.12 AFT Horizontal Firewall

The PT6C-67D AGB (Accessory Gearbox) Section extends past the STA 211 Firewall. To isolate the Tail Rotor Drive System Components from the engine, a composite Horizontal Firewall is installed just under the engine AGB. Refer to Figures 3-1, 3-2, 3-13, 3-15, 3-27 and 3-28.

The tail rotor drive shaft cover will close over the aft end of the horizontal firewall. This installation will not require any modification to the tail rotor drive shaft cover. No changes will be made to the Aft Lower Cowlings due to the Aft Horizontal Firewall. The Aft Lower Cowlings will close out the area under the Horizontal Firewall on both the left and right sides. The AGB section will be closed out by the Upper Engine Cowlings.

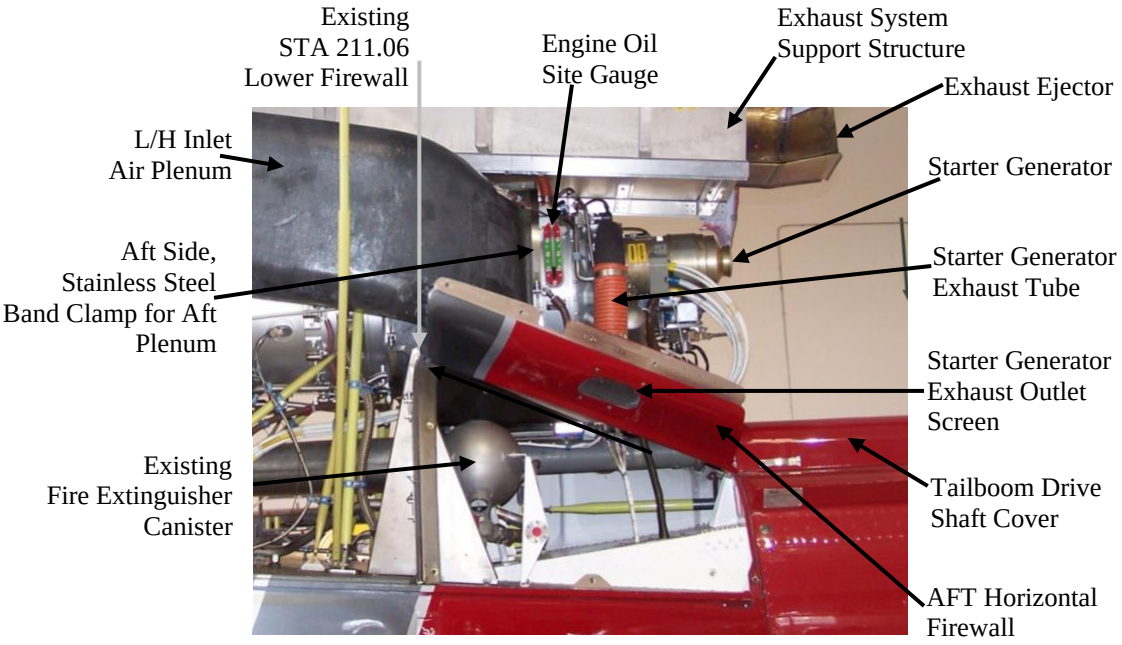

Figure 3-27 AFT Horizontal Firewall

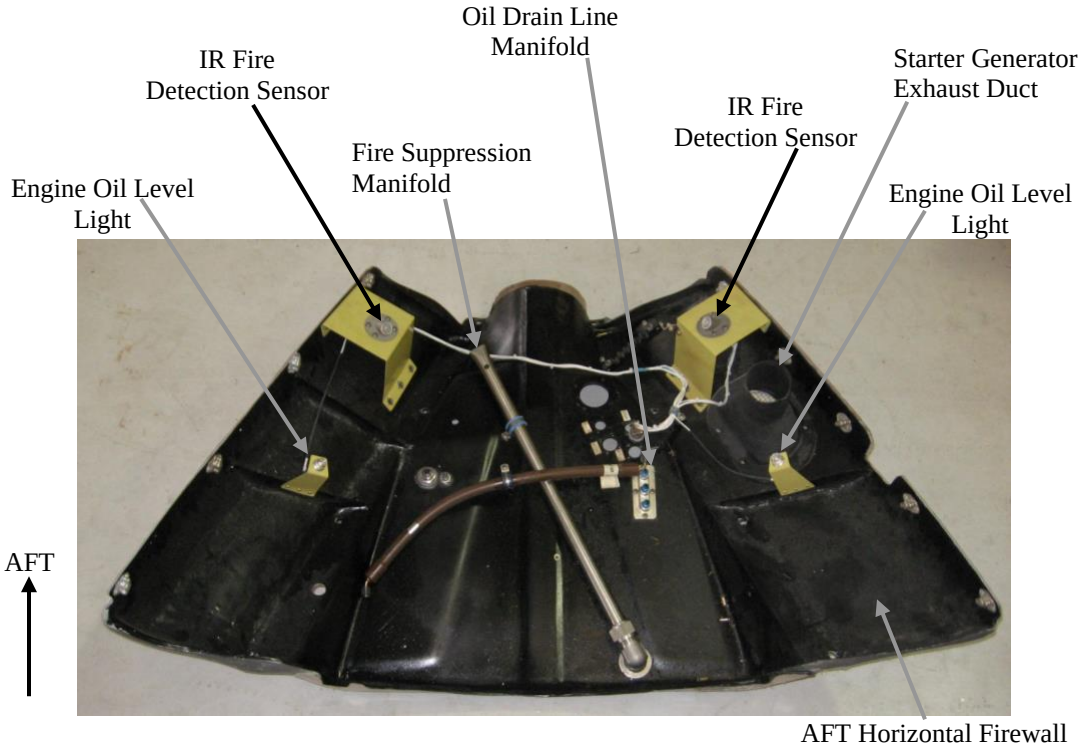

Figure 3-28 AFT Horizontal Firewall
(View Looking Down and Aft)

3.13 Throttle Control System

The PT6C-67D Engine features an EEC (Electronic Engine Control) System which operates like a Full-Authority Digital Engine Control (FADEC) to ensure accurate control of the engine output speed and fast response to changes in power demand, but with a pilot controlled MANUAL backup. The PT6 Engine Conversion will offer the pilot the option of flying the aircraft in MANUAL mode just like a standard UH-1H, but with a few improvements. Droop Compensation will be accomplished by the addition of an electric LVDT (Linear Variable Differential Transducer) to the existing aircraft engine control system, this gives the EEC immediate collective response inputs from the pilot. The aircraft Throttle Controls will be enhanced to adapt to the Fuel Management of the engine, but still operate from the twist grip on the collective stick.

No operational changes will occur to the system at the pilot location, other than the addition of an EEC AUTO / MANUAL mode switch on the Collective Stick Panel.

Just aft of the cockpit, under the cabin floor, a 55° Detent Assembly is added to the system attaching to the STA 95.0 bell crank, and to the existing control rods. Reference Figure 3-29 below.

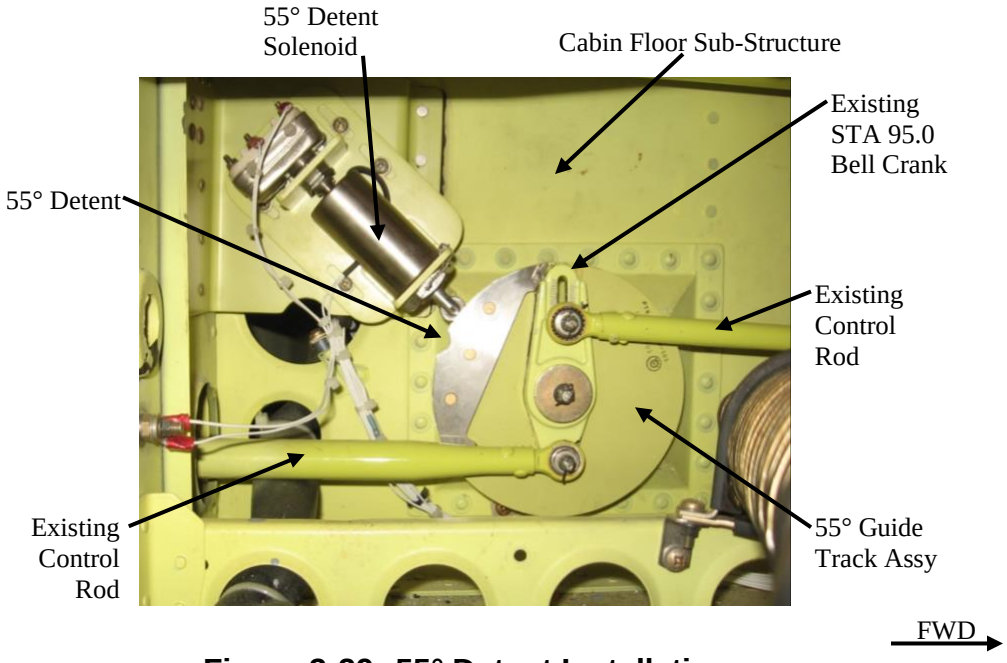

Figure 3-29 55° Detent Installation

The existing throttle system will be unchanged from the 55° detent assembly to the Lower Engine Deck Access.

In the Lower Engine Deck Access, a Teleflex cable replaces the aft control rod that attached the idle stop solenoid bell crank to the droop cam on the engine at STA 191.57. Refer to Figure 3-30. The droop cam is removed and the hole in the engine deck will be utilized for the RGB Manifold Oil Sensor wiring. The Throttle Control System Teleflex cable will be routed thru the aft R/H bay, then up to the AGB (Accessory Gearbox) section of the engine.

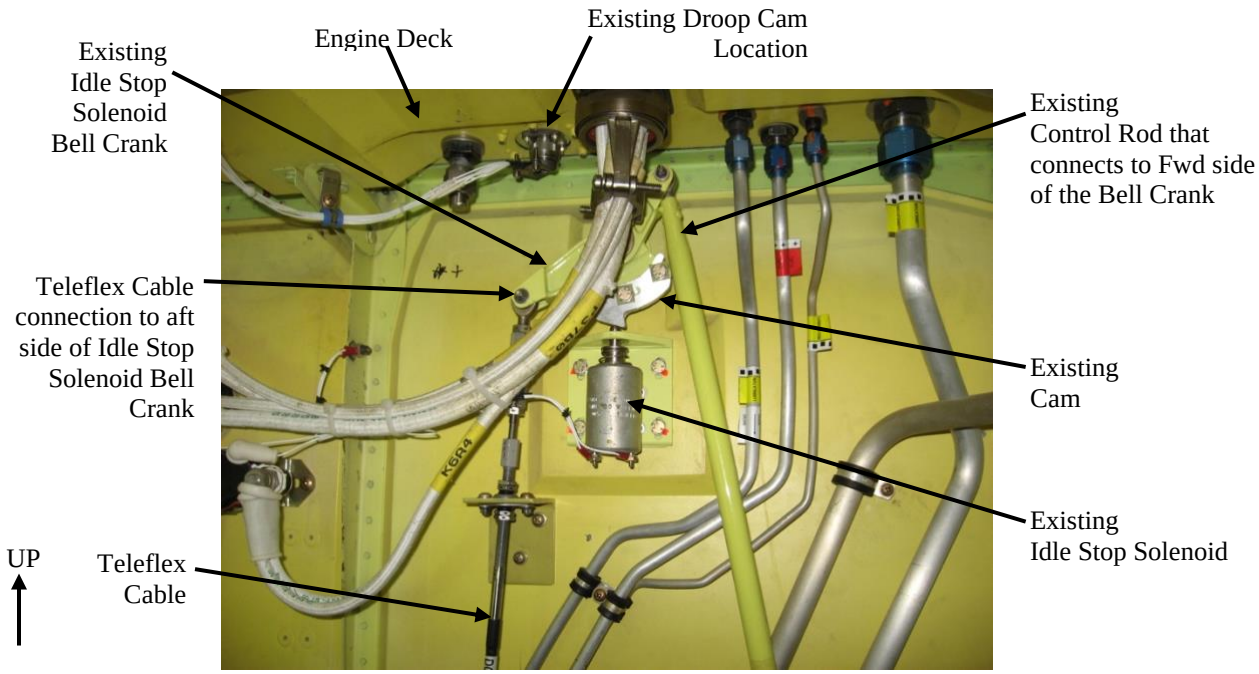

Figure 3-30 Throttle Control System Mods in Lower Engine Deck Access
(View Looking Inboard from R/H Side)

The Teleflex cable attaches to a 300 Series Stainless Steel rack and pinion design throttle gearbox on the underside of the FMM (Fuel Management Module). Refer to Figure 3-31 below. This throttle gearbox, manufactured by Triumph Controls, is identical to the throttle gearbox used in the Agusta AW139, the Bell 427, and the Bell 429 rotorcrafts.

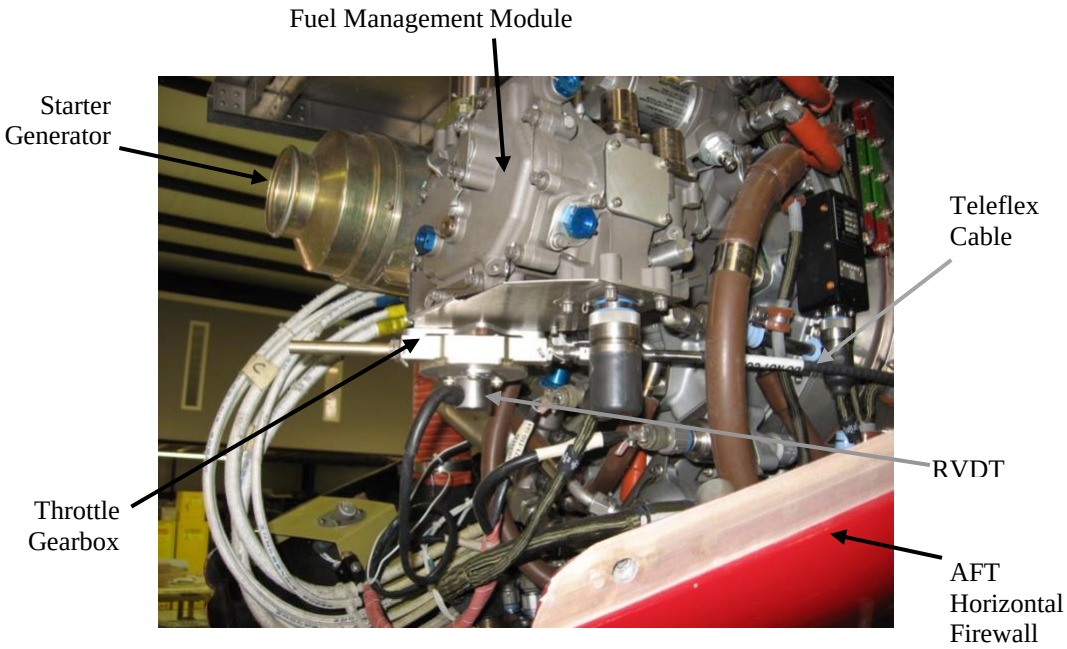

Figure 3-31 Throttle Gearbox

An RVDT (Rotary Variable Differential Transducer) is attached to the underside of the throttle gearbox. Refer to Figure 3-31. The RVDT acts as an electronic reference to let the EEC know the throttle position even when in MANUAL mode. If the pilot were to choose to switch from MANUAL mode to AUTO mode, the EEC will be capable of transitioning to AUTO (FADEC) mode almost seamlessly with this installation.

3.19 Cockpit Instruments and Indicators

The PT6C-67D Electronic Engine Control (EEC) System monitors engine parameters. It sends this information, digitally to the cockpit. Refer to Figure 3-36. The PT6 Engine Conversion replaces six (6) analog engine Instrument Panel (IP) instruments with digital instruments as follows:

Original Instruments in IP	PT6 Engine Conversion Instruments in IP
ENGINE OIL PRESS	ENGINE OIL TEMP/PRESS
ENGINE OIL TEMP	RGB OIL TEMP/PRESS
DUAL TACH (N_P/N_R)	DUAL TACH (N_P/N_R)
TORQUE METER	PERCENT ENGINE TORQUE
N_1 (GAS PRODUCER TACH)	N_1 TACH (GAS PRODUCER TACH-N_G)
EGT (EXHAUST GAS TEMP)	ITT (INTERTURBINE TEMPERATURE)

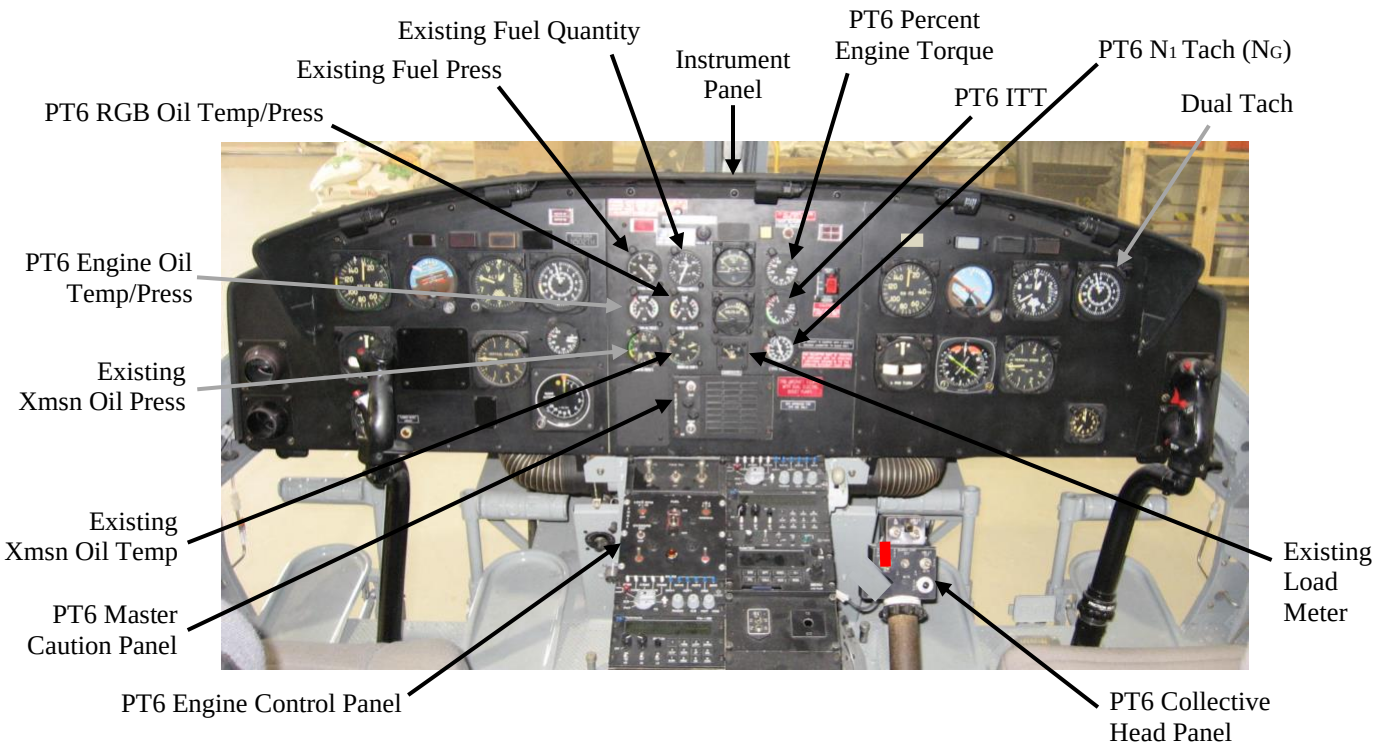

Figure 3-36 PT6 Engine Conversion Instrument Panel

The PT6 Conversion Master Caution Panel is located in the pedestal and has 20 Annunciators / Legends.

Due to the added safety of the PT6 installation there is an increase in the number of parameters that are monitored with a caution light, a new master caution panel is installed with 24 Annunciators / Legends. The PT6 Engine Conversion Master Caution Panel is located in the center of the Instrument Panel. Refer to Figures 3-36 and 3-37.

The new caution lights (Annunciators / Legends) are listed as follows:

205A-1 Legend to be Replaced	PT6 Engine Kit Legend
ENGINE OIL PRESS	ENGINE OIL PRESS LOW
ENGINE ICING	RGB OIL PRESS LOW
ENGINE ICE DET	RGB CHIP
ENGINE DE-ICE ON	RGB OIL TEMP HIGH
ENGINE FUEL PUMP	ENG FUEL PRESS LOW
FUEL FILTER	ENG FUEL FILTER BYP
	AF FUEL FILTER BYP
GOV EMER	PL NOT NEUTRAL
	EEC DEGRADED
	EEC MANUAL
	EEC FAIL
ENG OIL FILTER	FUEL TEMP HIGH
XMSN OIL PRESS	XMSN OIL PRESS LOW
XMSN OIL HOT	XMSN OIL TEMP HIGH
HYD PRESS	HYD PRESS LOW
IFF	OIL COOLER FAN OFF / FAIL

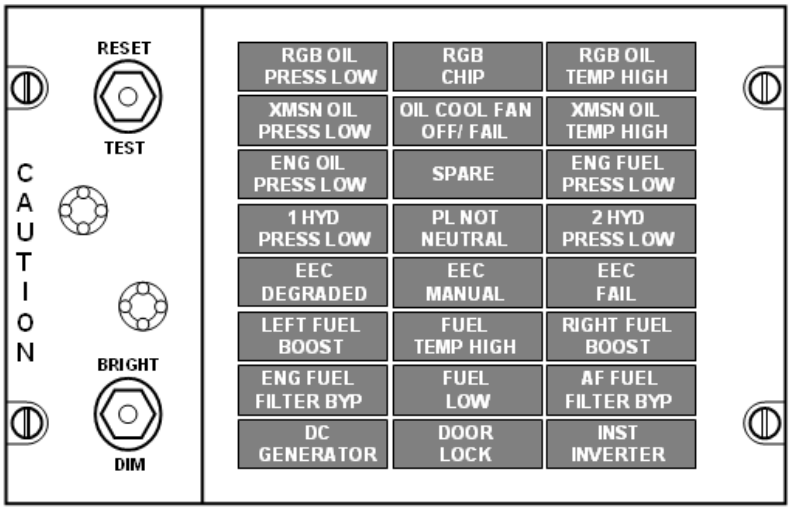

Figure 3-37 PT6 Master Caution Panel

Seven of the Annunciators / Legends in the new PT6 Master Caution Panel will have the same text as the UH-1H Caution Panel Legends and are listed as follows:

SPARE
LEFT FUEL BOOST
DC GENERATOR
INST INVERTER
FUEL LOW
RIGHT FUEL BOOST
DOOR LOCK

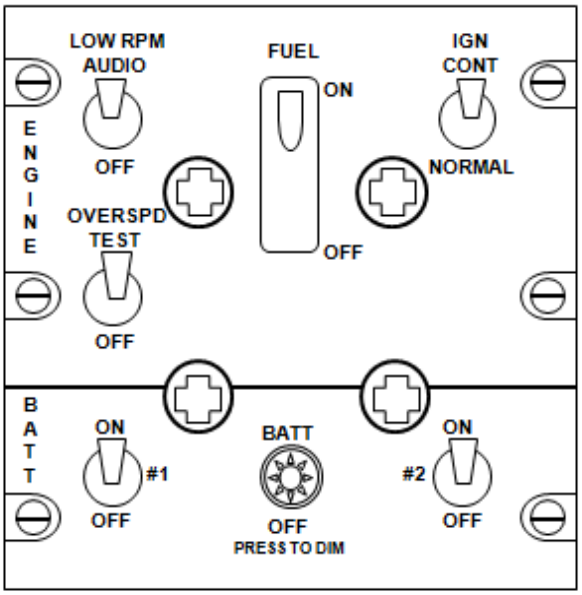

Figure 3-38 PT6 Engine Control Panel

A new Collective Head Panel is required to add the EEC guarded toggle switch for MANUAL and AUTO modes. Refer to Figures 3-36 and 3-39.

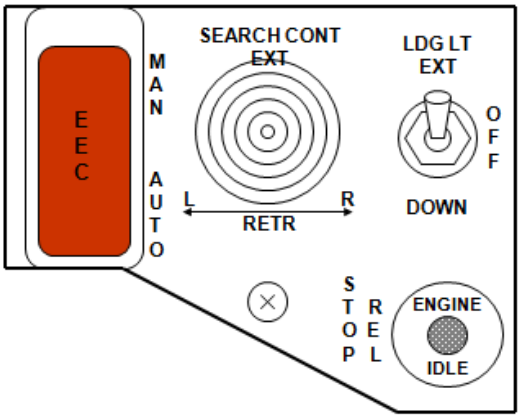

Figure 3-39 PT6 Collective Head Panel

New Circuit Breakers are added to the existing overhead console as part of the PT6 Engine Conversion (Refer to Figures 3-40 and 3-41). The PT6 DC Power Circuit Breaker Panel in Figure 3-40 are for the items as follows:

Engine ITT Indicator	Engine Temp/Press IND	Engine N1 IND
Engine Torque IND	Dual Tach IND	RGB&XMSN Oil Fan
Fuel Temp IND	Engine Out WARN	Engine Cont PNL
EEC Eng Cont	GSE Test Connector	Oil Fan OFF AUTO Switch

Figure 3-40 PT6 Circuit Breaker Panel

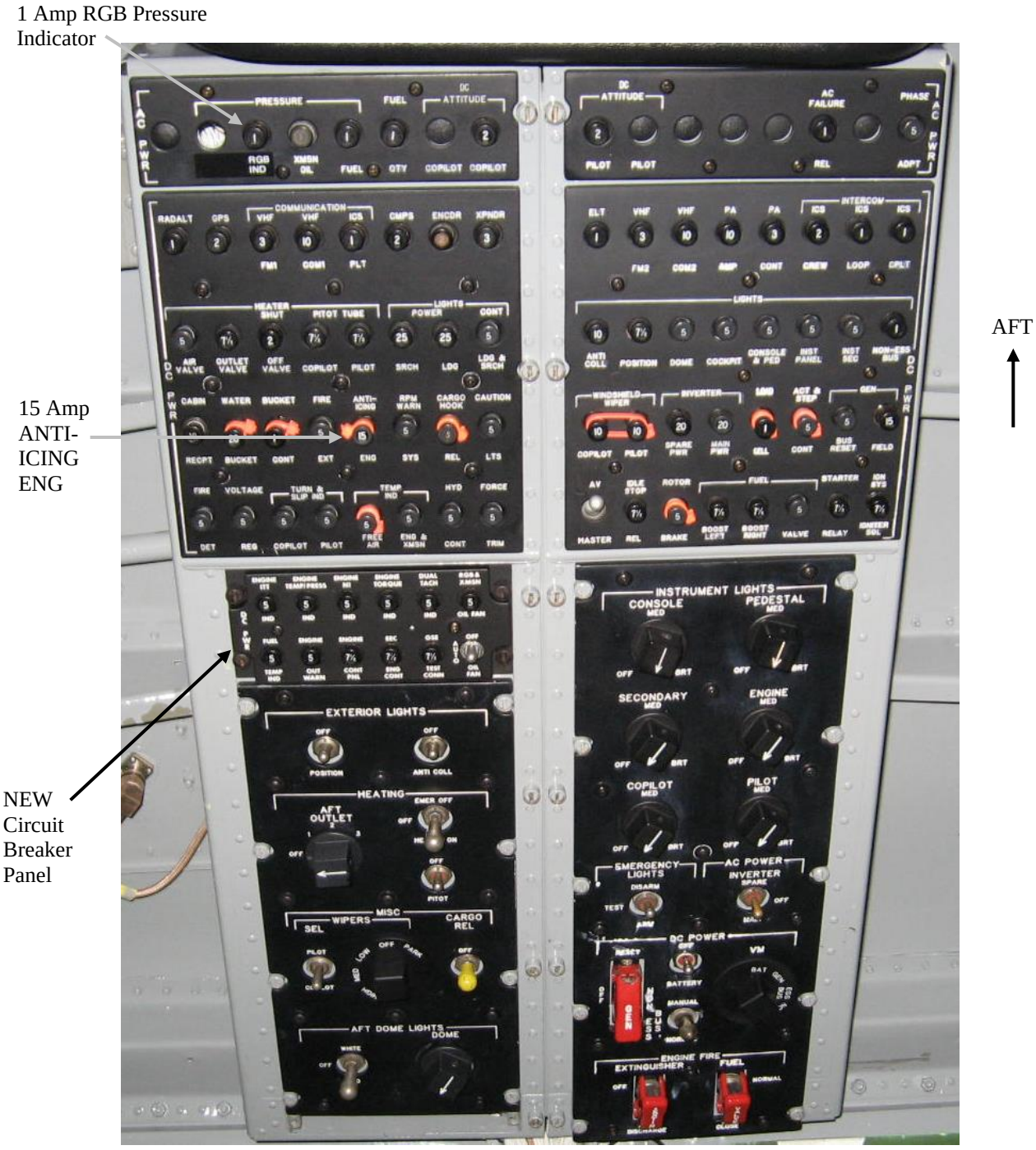

Figure 3-41 Cockpit Overhead Console (View Looking Fwd & Up)

The existing overhead console in the cockpit will require; the addition of a 1 Amp RGB Pressure Indicator Circuit Breaker and that the 15 Amp ANTI-ICING ENG Circuit Breaker be disabled.

A GSE (Ground Support Equipment Port) RS422 Connector is installed on the L/H side of the cockpit pedestal for accessing the engine control fault codes as well as the life cycle components usage.

In the instrument panel, the analog Dual Tach (NP/NR) is replaced with a digital Dual Tach (NP/NR), so that the signal can interface with the EEC. Therefore, the existing Analog Rotor Tach Generator will be removed and replaced with a Digital Rotor Tach Generator on the dual drive quill in the transmission bay. (Refer to Figure 3-42). Refer to Section 3.2 for information on the Dual Drive Quill.

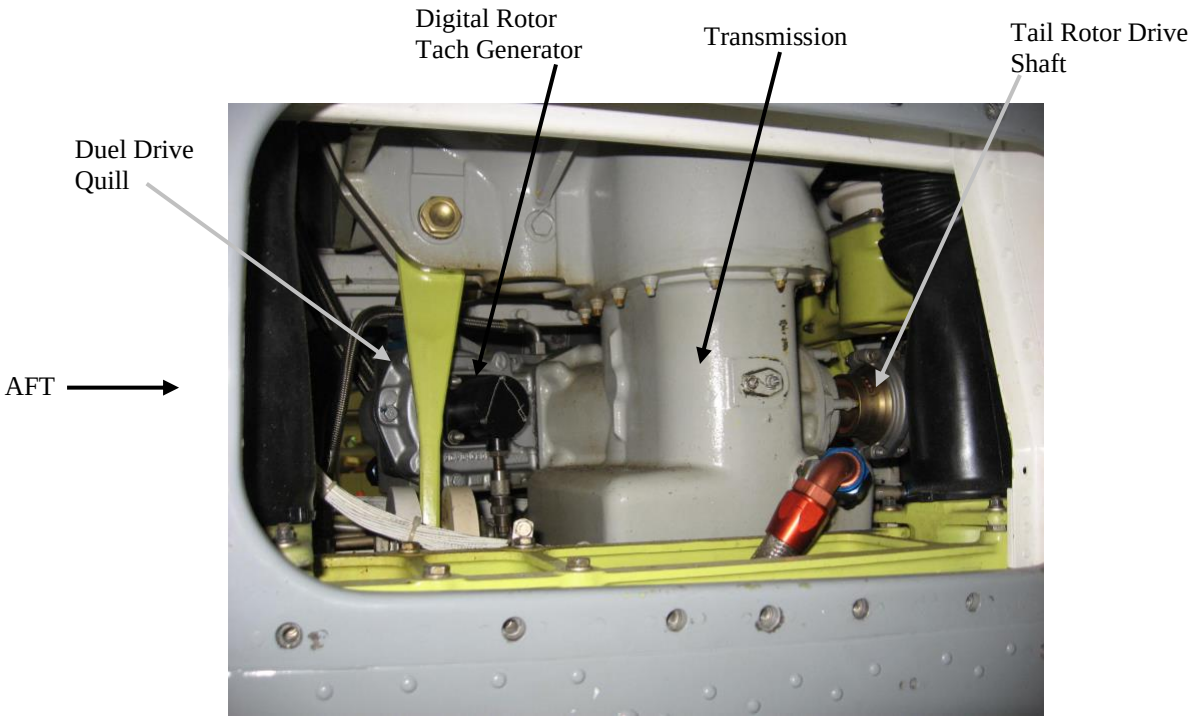

Figure 3-42 Digital Rotor Tach Generator (L/H Side View Looking Inboard)

For all of the electrical components, new wiring will be used to minimize splicing of the existing wiring.