Benefits 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 Benefits Overview

HUEY TALON

The
New Generation HUEY

To whom it may concern,

TAS Aerospace is pleased to present the UH-1H HUEY TALON the next generation alternative replacement solution for the old analog T53 engine. We feel the engine is the heart of the aircraft and with the installation of the modern digital PT6C-67D engine, the UH-1H HUEY TALON upgrade will breathe new life into the aging Huey and is a big step in modernizing the old workhorse.

This upgrade can be accomplished in a short 20-day period at the customers facility and can be carried out on its own or in conjunction with other maintenance or modifications. On behalf of the Trinity team I would like to thank you for your consideration of this proposal. If you have any further questions, please do not hesitate to contact us at any time.

Best Regards,

Warren Malmberg
President,
TAS Aerospace Ltd.

UH-1H HUEY TALON Overview

The UH-1H TALON utilizes a completely new PT6C-67D engine designed and STC'd for the HUEY Platform. The Pratt & Whitney PT6C-67 series of engines are utilized in many other aircraft and has a proven history of exceptional reliability, fuel economy, and low maintenance requirements. The Trinity Aviation Group manufactures the new fairings, cowlings, and kitting hardware included in the upgrade which lays the foundation for a truly modernized Huey.

The complete PT6C-67D Engine Upgrade Kit (STC# SR0949492) represents significant benefits to the safety, reliability, performance, and operational costs for the customer. The benefits gained are not only monetary in nature but increase the performance and safety of the aircraft while reducing the flight crew's workload and increase their confidence in the aircraft.

The US Forest Service owns one of the first PT6C-67D upgraded aircraft, this aircraft is currently operated by Florida Forestry. Florida Forestry reference contacts are available upon request.

General Benefits

- New In-Production Engine
- Warranty 4 years / 1500 hrs - Whichever occurs first
  - Fully covers workmanship & defects
  - Repair / replace parts
  - Engine shop labor
  - Removal & installation labor (R&I)
  - Coverage for engine and all accessories
  - *Except for consumables & routine maintenance – No engine expenses for four years*
- Worldwide logistical support
  - Operators of the engine will be supported through P&WC's Global Service Network, 24/7 CFirst customer response center, network of Field Support Representatives and the company's worldwide network of Parts Distribution Centers.
- Readily available Parts
- Training
  - Maintenance training available at Flight Safety for 1 Technician at no charge for each installation
  - Pilot Differences Training

Features Comparison

	T53-L-13B	T53-L-703	PT6C-67D
EEC	NO	NO	YES
Oil Change - hours	900 hours	900 hours	N/A
Oil Analysis - hours	25 hours**	25 hours**	N/A
Vibration Test - at Installation	YES	YES	NO
TBO	2400 hours	3000 hours ***	4000 hours
Scheduled Hot End Inspection	1200 hours	1200 hours	2000 hour
Line maint Interval	150 hours	150 hours	600 hrs / 1 yr
Lowest Limited Life Components	4600 cycles	6000 cycles	10000 cycles
Life Limited Parts	15	17	9
Engine Warranty	No Warranty	No Warranty	4 years / 1500

Conklin & de Decker 2019 Data*
Operators Option**
Minute Man STC***

HUEY TALON

Operation Benefits

- Self – Starting system
- Electronic starting allows immediate re-start after shutdown - no cooldown before re-starting is required
- Increased Responsiveness
    - Electronic Engine Control (EEC) for precise and fast rotor governing
    - Electronic Collective Power Anticipator – located at the collective Jackshaft and replaces the old drop compensator system
        - No delay
        - No setup after initial installation and calibration
- Increased Availability – less downtime
- Increased High / Hot Performance
- Better fuel economy – Approximately 30% savings
    - Improved Payload / Range
    - Longer time on station
- Increased Safety Factor – New generation engine with electronic fuel control

Safety Benefits

- New In-Production Engine
    - Increased Reliability
    - P&WC has delivered well over 100,000 engines and these engines have flown over 830 million hours with one of the most reliable safety records in the industry
- Auto Start system – eliminates pilot error / hot starts
- Increased Responsiveness with the EEC and Electronic Power Anticipator
- Electronic Engine Control (EEC) and Data Control Unit (DCU)
    - Download Engine Performance
    - Maintenance Trend Monitoring
    - Life Usage, Cycles / Hours
    - Exceedance Metrics / Monitoring
    - Fault Detection
    - HUMS Compatible
- Hydro-Mechanical manual back-up feature that provides for safe engine control and ease of helicopter operation
- Cockpit Integrated Master Caution Panel – Two MC Lights
    - Caution light illuminates with any Engine Issues / Parameter Exceedance
    - Fail Light Illuminates – Change to Manual Mode
- Reduced Pilot Workload
- Reduced Maintenance Workload

Maintenance Benefits

- New In-Production Engine
  - Warranty 4 years / 1500 hrs - Whichever occurs first
  - Worldwide logistical support
  - Field Technical Support
  - Parts availability – off the shelf parts support from P&WC
  - Maintenance Training
- Reduced Maintenance Downtime due to the EEC Unit
  - The Electronic Engine Controller (EEC) is the standard engine controller used in all modern Pratt and Whitney Canada applications. It Controls all engine operations and prevents over-temps during startup. It also records the following information in the engine Data Collection Unit (DCU) to assist in maintenance practices and troubleshooting
    - Engine Running Time
    - Automatic Engine Cycle Counting (in partial cycles) leads to reduced cycle counts
    - Data Control unit, stores the operational history of the engine
    - Exceedance Monitoring
    - Fault Detections
    - Trend monitoring – In house or with P&WC software, Pratt could do the engine performance trend analysis for you.
    - HUMS Compatible - can adapt to aircraft HUMS system to collect engine data along with airframe data
    - Download all data through 3 methods, utilizing Pratt and Whitney's Canada's Ground Based Software System via DCU, EEC or Cockpit Port.
- Routine Maintenance
  - Minimum Scheduled Maintenance with Standard Tools
  - Approx. 6.5 hrs. labor per 600 hrs. operation /year scheduled maintenance
  - No engine oil changes between overhauls
- Removal of the bleed air oil cooler fan – install electric Fan Assembly
- Reduced tailboom heat exposure
  - Reduced tailboom panel delamination problems
- Reduced exhaust soot
- No Engine Vibrations Analysis Checks Required at installation
- 20-day Conversion at Customers Facility

T53-L13 vs PT6C-67D Inspection Requirements

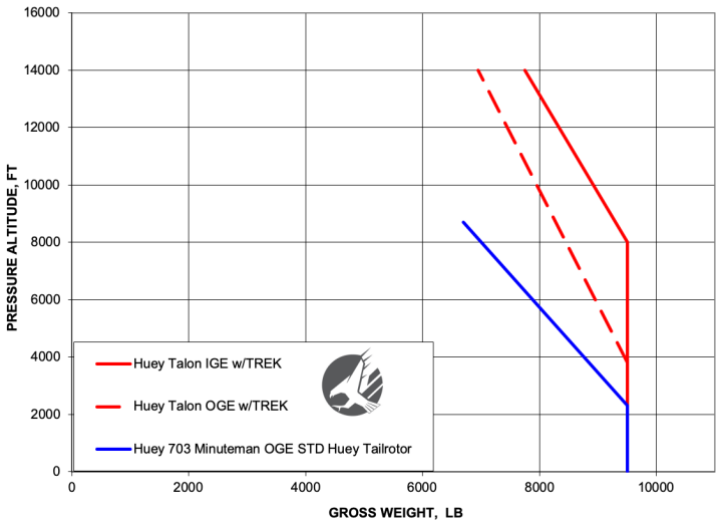
Inspection Requirement	T53 Insp Intervals	PT6C-67D Insp Int
Engine Air-bleed strainer service	150 hours	600 hours
Starter Generator	150 hours	On Condition
Fuel Control Inlet Strainer	150 hours	600 hours
Fuel Control Servo Strainer and replace filter	150 hours	N/A
Quick Disconnect Fuel Lines	150 hours	N/A
Quick Disconnect Oil Lines	150 hours	N/A
Engine Oil Filter	150 hours	600 hours / 1 year
Engine mnt Rod Ends for axial and radial play	300 hours	600 hours
Engine Pillow Block Mounts	300 hours	N/A
Breakaway Valves at ODDS lubrication filter	300 hours	N/A
Power Turbine gov cont tube, levers, lube and attachment for wear, security and corrosion	150 hours	N/A
Droop Compensator for attachement, wear and corrosion	150 hours	N/A
Linear Actuator for security, connections, wear and operation	150 hours	N/A
Hot End Inspection	1200 hours	2000 hrs
Oil Change, Cooler flush (without ODDS)	900 hours	N/A
Fire Detection System	12 months	12 months

HUEY TALON

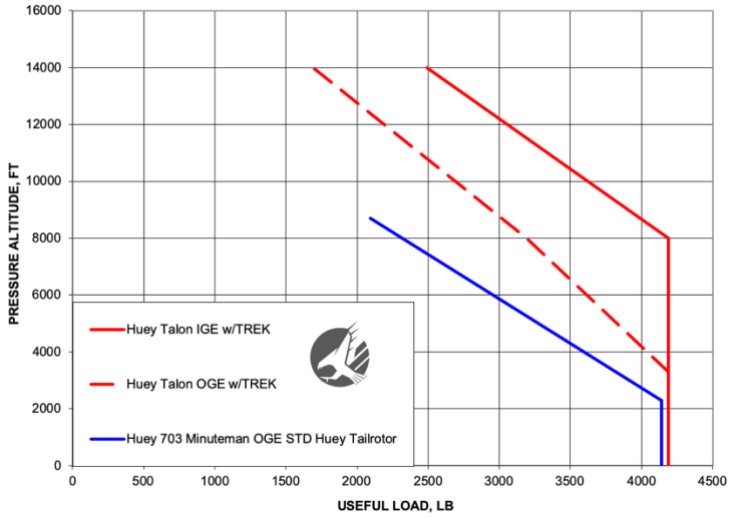
Performance Benefits

- Fuel savings 60 gal/hr. Approx. 30%
- Higher useful load
  - Weight Saving 50 Lbs. from the standard UH-1H T53-13 installation
  - less fuel needed for specific operations
  - No aux tank needed – more useful load
- No bleed air requirements with the electric Oil Cooler Blower installation
- Altitude performance
  - 15,000 ft. Auto Re-lite certification
  - Because the PT6 is of a newer design era, it's "laps rate" (power fall-off due to altitude) less than that of the T53
  - Available Power (not at its max for the Engine design)
    - Although the PT6C-67D is utilized in the UH-1H at 1160 HP Takeoff rating, the PT6C-67 engine series is, at its maximum certified to 2,518 Thermodynamic Horsepower in other applications.
    - The additional “reserve” power available helps with the Altitude Performance of the engine
- Responsiveness
  - Electronic Collective Power Anticipator, electronic replacement for the droop compensator system, very responsive
  - The advanced factory-new engine is equipped with an Electronic Engine Control (EEC) for precise and fast rotor governing with a hydro-mechanical back-up feature that provides for safe engine control and ease of helicopter operation.

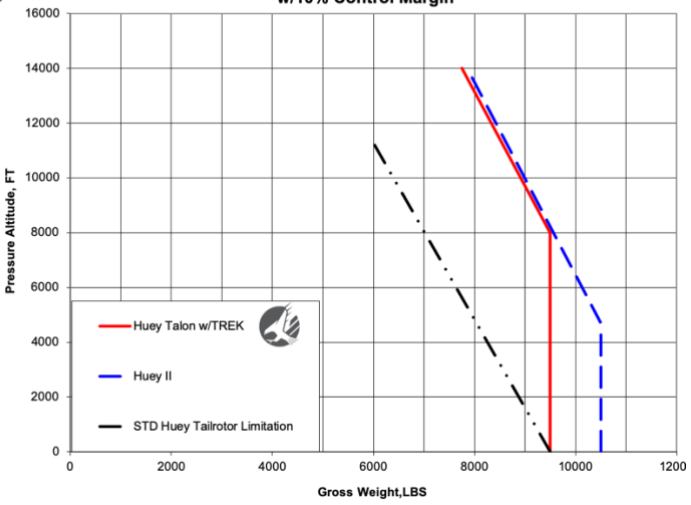
PERFORMANCE COMPARSION, GROSS WEIGHT ISA+30C



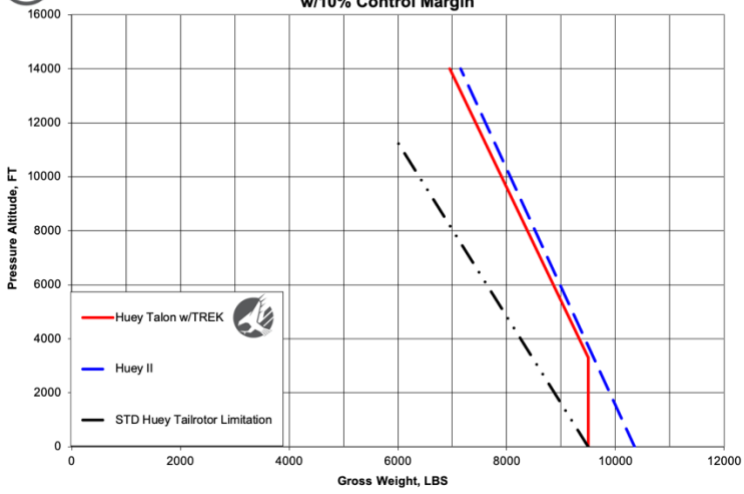
PERFORMANCE COMPARSION, USEFUL LOAD ISA+30C



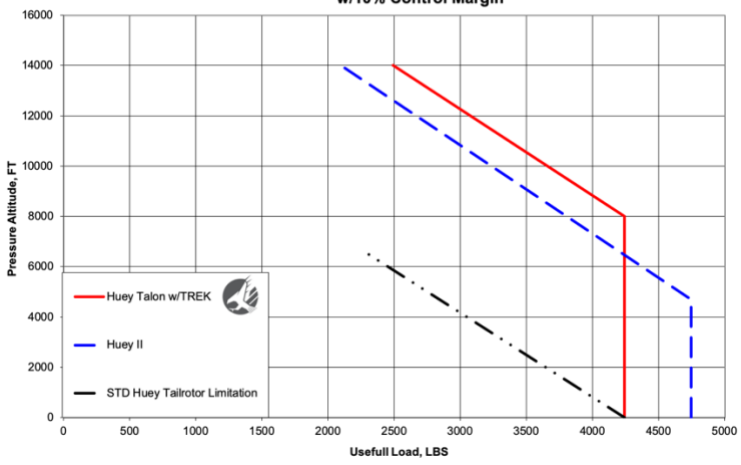
IGE Performance Comparison ,Gross Weight ISA +30 DEG C w/10% Control Margin



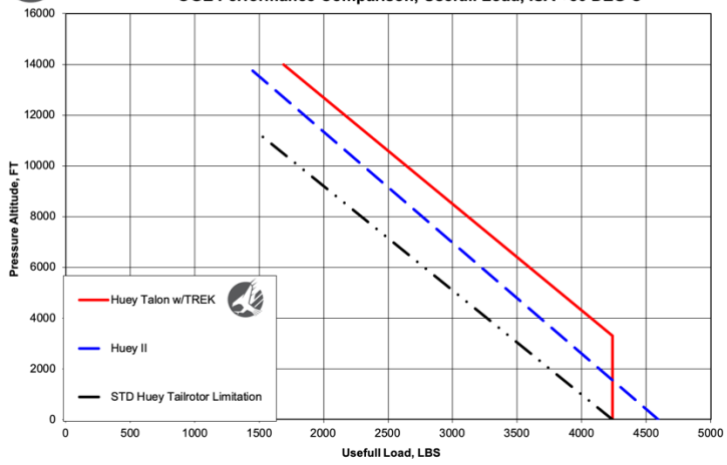
OGE Performance Comparison, Gross Weight ISA +30 DEG C w/10% Control Margin



IGE Performance Comparison, Usefull Load, ISA +30 DEG C w/10% Control Margin



OGE Performance Comparison, Usefull Load, ISA +30 DEG C



Cost Benefits

- Reduced Maintenance Costs by approximately 30%
- Reduced Hourly Operating Cost by approximately 30%
- Reduced Fuel Consumption by approximately 30%
  - 205A-1 / UH-1H with -13 engine 88 Gal / hour – US Forest Service Numbers
  - 205A-1++ / UH-1H with -17 engine 90 Gal / hour – US Forest Service Numbers
  - PT6C-67D – 60 Gal / hour
- Revenue Increase – Potential Charge Per Hour Increase
  - Higher performance
  - On station longer
    - Less non-production time / more production time per hour
  - Carry more higher and hotter
  - Increased fuel economy

Fuel Cost Comparisons

	T53-13B	T53-703	PT6C-67D
Fuel Consumption Rate / Hour	88 Gal*	90 Gal*	60 Gal**
Fuel Consumption Cost / Hour. Gal = $4.00	$352.00	$360.00	$240.00
PT6 Fuel Cost Savings per Hour	**$112.00**	**$120.00**	Base
Annual Fuel Cost @ 600 hr	$211,200.00	$216,600.00	$144,000.00
Annual Fuel Cost Savings @ 600 hr	**$67,200.00**	**$72,600.00**	Base

Based on US Forestry Chart*
Based on Current Flight Test Data**

HUEY TALON

Maintenance Cost Comparisons

	T53-L13B	T53-L703	PT6C-67D
Direct Maintenance Cost per Hour	$271.00	286.67*	$202.50*
PT6 Cost Savings per Hour	**$68.50**	**$84.17**	Base
Annual Maintenance Cost**	$96,258	$72,858	$52,278
PT6 Annual Cost Savings**	**$43,980**	**$20,580**	Base

Conklin & de Decker 2019 Data*
Based on 600 hr Annual Flight Program**

HUEY TALON

Total Cost Comparisons / Flight Hour

	T53-13B	T53-703	PT6C-67D
Fuel Consumption Cost / Hour Gal = $4.00	$352.00*	$360.00*	$240.00**
Maintenance Cost per Hour	$271.00	$286.67***	$202.50***
TOTAL Cost / Hour	$623.00	$646.67	$442.50
TOTAL Cost / Hour Above the PT6C-67D	**$180.50**	**$204.17**	Base

Based on US Forestry Chart*
Based on Current Flight Data**
Conklin & de Decker 2019 Data***

HUEY TALON