NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, D.C. 20594

February 23, 2016

POWERPLANT GROUP CHAIRMAN'S FACTUAL REPORT

NTSB No: WPR14FA068

A. ACCIDENT

Location:	Kalaupapa, Molokai, Hawaii
Date:	December 11, 2013
Time:	1522 Hawaii Standard Time
Aircraft:	Cessna 208B, Registration: N687MA

B. POWERPLANTS GROUP

Group Chairman:	Harald Reichel National Transportation Safety Board Washington, DC
IIC:	Jim Struhsaker National Transportation Safety Board Kona, Hawaii
Member:	Marc Gratton Pratt & Whitney Canada Quebec, Canada
Member:	Henry Soderlund Cessna Aircraft Company Wichita, Kansas

Member:	Travis Shilling Makani Kai Air Honolulu, Hawaii
Member:	David Keenan Federal Aviation Administration Washington, DC
Member:	Robert Morlath Federal Aviation Administration Burlington, Massachusetts

C. SUMMARY

On December 11, 2013, at 1522 Hawaiian standard time, a Cessna 208B, N687MA, sustained substantial damage following a loss of engine power and ditching into the Pacific Ocean near Kalaupapa, Hawaii. The airline transport pilot and two passengers were seriously injured, one passenger was fatally injured, and five passengers received minor injuries. Makani Kai Air (MKA) was operating the flight under the provisions of 14 Code of Federal Regulations Part 135. Visual meteorological conditions prevailed for the cross-country flight, which had originated about 2 minutes before the accident. A company flight plan had been filed. The flight departed from the Kalaupapa airport on the island of Molokai, and was en route to Honolulu International airport, on the island of Oahu.

The pilot stated that shortly after takeoff, a loud bang was heard and there was a total loss of power. After a short glide, he performed an open ocean ditching. The airplane floated for approximately 25 minutes and then sank. All the passengers put on their life preservers and exited the airplane. US Coast Guard and Maui Fire and Rescue personnel recovered the passengers approximately 80 minutes later.

The airplane was recovered from submersion in the ocean after approximately 6 days during which time, the engine was separated from the airframe, consistent with current activity. The engine was then shipped to Honolulu, Hawaii for a preliminary inspection after which it was boxed and shipped to the P&WC facilities in St. Hubert, Quebec, Canada for examination. The teardown examination occurred on January 21-23, 2014.

D. DETAILS OF THE INVESTIGATION

D.1 Powerplant Information

D.1.1 Engine General Description

The Pratt & Whitney Canada (P&WC) PT6A engine is a 2-spool turbo-shaft engine. The gas generator (spool 1 or Ng) consists of a compressor section, which has 3 axial, and 1 centrifugal stages driven by a single turbine. The combustion chamber is a reverse-flow annular type. One power turbine stage (spool 2 or Np) drives the propeller through a 2-stage reduction gearbox (RGB). The constant-speed, variable pitch propeller is a single-acting type and is hydraulically controlled. The engine power management system consists of a Hydro-mechanical Fuel Control Unit (FCU), which governs the gas generator spool, Ng, and a Propeller Governor, which governs the power turbine spool, Np. The PT6A-114A produces a takeoff power of 675 horsepower.

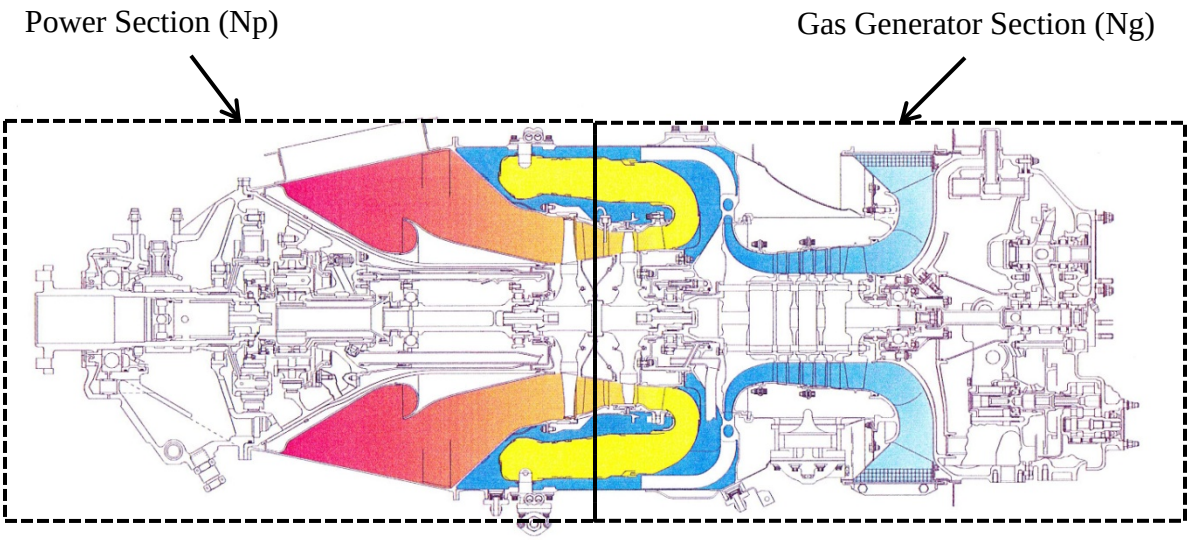

Figure 1 – PT6A Cross Section

D.1.2 Engine Identification

The accident engine was a P&WC PT6A-114A. Its data plate was partially obscured due to corrosion, however, the engine serial number (S/N) was readable as PCE-PC1021. According to the manufacturers records, the engine was manufactured on October 4, 2002 and installed on the Cessna C208 airplane S/N 208B1002 on December 12, 2002.

D.1.3 Engine Maintenance & History

According to MKA maintenance records, the engine times and cycles at the time of the accident were:

Time Since New (TSN)	4899.6 hours
Gas Generator Cycles Since New (CSN)	9303 cycles
Power Section Cycles Since New (CSN)	9303 cycles
Time since last hot section inspection (HSI)	1137.3 hours
Cycles since last HSI	3388 cycles

A review of the MKA maintenance records indicates the following:

Date	TSN	CSN	Activity	Notes
2002-10-04	0	0		New
2007-02-27	1844.7	2019	HSI	CESCOM Program
2007-11-15	2254.1	2566	Borescope CT blades	CAMP program
2008-11-18			A/C sold to Mokulele	
2011-12-23	3500		Request for 200 hr. TBO extension	CAMP program
2012-05-03			A/C sold to MKA	
2012-07-23	3752.3	5915	MORE entry insp.	Start MORE program- W.O. 3941
2012-07-28			Engine began MORE program	FAA Form 337
2012-10-10	3846.6	6651	100 hr. MORE engine insp.	W.O. 3959
2012-11-01	3925.5	6714	200 hr. MORE engine insp. Vibration analysis.	W.O. 3973
2012-12-06	4028.2	6946	100 hr. MORE engine insp.	W.O. 3984
2013-01-09	4112.8	7054	100, 200 & 400 hr. MORE engine insp.	W.O. 3993 - Vector WO# 32-02291
2013-02-14	4209.3	7162	100 hr. MORE engine insp.	W.O. 4000
2013-03-13	4299.7	7321	100, 200 MORE engine insp. Vibe analysis.	W.O. 4009
2013-04-12	4395.6	7666	100 hr. MORE engine insp.	W.O. 4019
2013-06-27	4492.1	8079	100, 200 & 400 hr. MORE engine insp.	W.O. 4045
2013-08-19	4601.7	8374	100 hr. MORE engine insp.	W.O. 4063
2013-10-02	4693.6	8645	100, 200 MORE engine insp. Vibe analysis.	W.O. 4074
2013-10-25	4780.9	8881	100 hr. MORE engine insp.	W.O. 4078
2013-12-04	4885.7	9248	100, 200 & 400 hr. MORE engine insp.	W.O. 4091
2013-12-11	4889.6	9303	accident	

The engine maintenance records revealed that this engine was operated under the P&WC factory recommended inspection, maintenance and overhaul program schedule which is contained in the Cessna Phase Card and the CAMP (Computerized Aircraft Maintenance Program), both Cessna approved, from when it was new until July 2012, when it had reached its factory recommended time between overhaul (TBO) limit of 3600 hours. MKA then requested and received a factory authorized 200 hour TBO extension, which was approved by the FAA, which extended the overhaul time limit to 3800 hours. On July 23, 2012, with a TSN 3,752.3 hours, MKA, instead of performing the factory recommended overhaul, took the engine off the P&WC inspection program and placed it under the MORE[1] Instructions for Continuing Airworthiness (ICA) Supplemental Type Certificate (STC) No. SE0002EN program (MORE STC). The MORE STC increases the TBO interval from 3600 hours to 8000 hours. The Hawaiian Flight Standards District Office (FSDO) approved the MORE STC incorporation. At the time of the accident, the engine had been maintained on the MORE STC program for approximately 1137.3 hours. According to the MKA records, the last inspection performed on the engine was at TSN 4885.7 hours, just 3.9 hours before the accident, which consisted of the MORE program 100, 200 and 400 hour inspection. This inspection was also 1,289.6 hours beyond the P&WC TBO recommendation of 3,600 hours. The MORE 400 hour inspection included a hot-section borescope inspection, which required the viewing, via borescope, of the compressor blades (see Appendix IV).

The MORE literature states that the MORE ICA is not a stand-alone document but is only a supplement to the PW&C engine maintenance program. This requires that all the inspection and maintenance specified in the PW&C manual must be performed along with the additional inspections and maintenance specified by the MORE STC, such as periodic borescope inspection of the hot section, periodic inspection of the compressor and exhaust duct areas, periodic Power Plant- Adjustment /Test (to monitor engine performance).

According to the MKA records, the engine was placed onto the MORE STC in accordance with the MORE STC checklist, during which time, an engine hot section inspection (HSI) was performed under WO 3941. A review of WO 3941 reveals that P&WC's applicable engine maintenance manual/service bulletin, No. 1703 titled "Operating Time Between Overhauls and Hot Section Inspection Frequency Recommendations" Revision 6, which was applicable at the time (see Appendix I, page 6), were not fully complied with; no record was found to indicate that the required compressor turbine (CT) blade metallurgical evaluation was complied with. The maintenance manual and SB required a compressor turbine (CT) blade metallurgical

[1] The MORE Instructions for Continuing Airworthiness (ICA) Supplemental Type Certificate (STC), referred to as the MORE STC, is a turbine propeller engine inspection program with Instructions for Continuous Airworthiness applicable to some models of the P&WC PT6A series of engines. Although the MORE STC is a program approved by the FAA, it needs to be purchased for each engine and incorporated by each particular operator through an amendment to its operations specifications. MORE is a contraction of Maintenance On Reliable Engines.

evaluation, which consisted of selecting two random pre-SB1669[2] blades, sectioning them and evaluating the samples in a materials laboratory. The tests destroy the two samples. According to the operator, the combined guidance documentation between the MORE literature, P&WC Maintenance Manual and the P&WC SB was confusing. They further stated that they interpreted the P&WC guidance, recommending the destructive blade testing, if a TBO extension was being requested from P&WC, however, since the TBO extension was granted via the MORE STC, which did not contain blade sectioning instructions, they deemed that this task was not necessary because they believed the increased inspection intervals required in MORE STC guidance, would effectively manage the CT blades.

Two other HSI tasks, a combustion liner cooling ring gap check and a trim thermocouple verification, which are recommended by the P&WC MM (see Appendix II), but not required under the MORE STC program were not accomplished (see Appendix III). The MORE documentation also does not reference the P&WC publication SIL PT6A-116R3 "Borescope Inspection in Conjunction with Fuel Nozzle Check" which assists maintenance staff by better illustrating the borescope examination of the trailing edges of the CT blades.

D.1.4 TBO Background

Time between overhaul (TBO) is the manufacturer's recommended number of running hours or calendar time before an aircraft engine requires an overhaul. Jet engines and turboprops generally have TBOs on the order of 3,000 to 5,000 hours. Depending upon what regulatory rules the aircraft operates under, overhauling the engine at this time is not necessarily mandatory. The TBO applies only to engines that have been operated and maintained in accordance with approved instructions for continuing airworthiness. If an operator does not comply with the recommended instructions for continued airworthiness, operational or environmental factors may necessitate repair or replacement of the engine and components earlier than the published TBO.

The manufacturer recommended engine TBO limits are intended to ensure reliability and warranty guarantees by the manufacturer and to provide reusable and repairable major components at overhaul time. During the engine qualification type certificate (TC) testing, the engine is operated in a test cell and then torn down at prescribed hourly intervals, at which time, the tolerances of the engine critical running parts are examined in detail to make sure they maintain factory run-out standards. As the engine is further tested, and the manufacturer has determined that wear-out limits are reached, the TBO times are established. Engine reliability may suffer if it is operated beyond TBO. Metal fatigue and small but growing cracks and internal engine wear and

[2] SB1699 introduced a newly designed CT blade, P/N 3072791-01 in 2009. This blade is of a new material and manufactured as a single-crystal, making it more resistant to stresses at high temperatures. Sectioning and laboratory analysis of the grain structure is no longer effective in determining the life status of the new blades, however, all pre-SB1669 blades, are still subject to the 2 blade sample sectioning process described in the P&WC MM 72-00-00 page 634.

damage which do not show up on routine inspection procedures may become a factor. From an economic perspective, engine components that wear beyond the recommended limits may not be repairable, requiring purchase of more expensive new components at the time of overhaul.

TBO periods were established on most aircraft engines beginning in the 1960s. According to P&WC engineers, the original TBO of a PT6A engine type certificate in the 1960's was 800 hours. This has been gradually increased through the years to 3600 hours due to continued improvements in engineering, design, manufacturing, tooling and materials as well as field inspection and maintenance experience.

D.1.4.1 Factors affecting TBO

A - Airplane Operation

Engines with a cycles-to-hours ratio of 2 or higher spend a higher percentage of their life in takeoff power than engines with a cycle-to-hour ratio of 1 or less. An engine that has one takeoff cycle associated with an hour or more of cruise power will sustain less wear than engine that has 3 takeoffs in one hour of operation. Engines used in parachute jumping, glider towing, banner towing, blimp propulsion, crop spraying or other unusually stressful applications may require more frequent overhauls than listed, because most of their operational life is under takeoff or high power.

Climatic conditions have an effect on TBO life; operation in very hot and humid climates and/or salt laden, or highly polluted atmospheric conditions increase the likelihood of chemical contamination and corrosion of the hot section components such as the CT blades.

The PT6 engine does not have any automatic limiting features for the torque or ITT parameters. The pilot is in control of the engine at all times and must monitor these values closely to ensure that maximum values are not exceeded at any time. During takeoff, the pilot is very busy with other tasks and cannot visually manage the engine power 100% of the time, leading to occasional inadvertent temperature exceedances. Starting a warm engine can also lead to inadvertent temperature exceedances. Various ground operation situations also exist which can lead to over-temp conditions. The accumulation of these small exceedances throughout the life of the engine can have a significantly detrimental effect on the life of the hot section and the TBO of the engine. Cessna C-208 airplanes delivered after approximately 2010 have, as standard equipment, an Aircraft Data Acquisition System (ADAS) system, which monitors, among other things, engine parameters on a continual basis. The best feature of the system software is the identification, isolation and accumulation of any engine exceedances, which can be overlooked by pilots. The ADAS data is a great help to maintenance staff in managing engine inspection and maintenance. Older airplanes can be retrofitted, however, this airplane was not so equipped. Many MKA pilots with variations in experience and performance have operated this airplane and errors could have been made throughout the

life of the engine that caused engine parameter exceedances, however without an ADAS system, this could not be determined.

B - Maintenance Practices and Quality

The quality and experience level of inspection and workmanship utilized during routine maintenance, hot section inspections (HSIs) and overhauls have a direct effect on the service life of the engine. TBO times are generally considered invalid for engines that have been overhauled or repaired in a manner that is inconsistent with the specifications, limits, and instructions provided in the manufacturer's Instructions for Continued Airworthiness and FAA Airworthiness Directives.

D.1.5 MORE Instructions for Continued Airworthiness (ICA) STC Program Review

D.1.5.1 FAA Type Certificate (TC) and Supplemental Type Certificate (STC) Guidance and Approval Process

According to the FAA guidance on the subject Type Certification:

"A type certificate (TC) is issued to signify the airworthiness of an aircraft manufacturing design. The certificate is issued by the FAA, and reflects a determination made by the regulating body that the aircraft is manufactured according to an approved design, and that the design ensures compliance with airworthiness requirements. Once issued, the design certificate cannot be changed without submitting the new design and receiving FAA approval for the changes."

"When an airframer wants to change something it has two options. One is to create an entirely different design, the other is to request a supplemental type certificate (STC). The choice is determined by considering whether or not the change constitutes a new design (i.e. introduces risk not considered in the first design). This is less expensive. If the regulatory authority agrees with the rationale for choosing STC, then the STC process for the design change approval is granted."

"An original FAA design approval is a five-phase process in which an applicant applies for, and the FAA may issue, a TC or design approval of a product or a major design change to a product. A product is an aircraft, an aircraft engine or, an aircraft propeller. The process, if approved, results in the issue of a TC, an STC or an amendment to either a TC or STC as contained in 14 CFR part 21."

"Due to their inherent criticality, all changes to the design of an aircraft are required to be approved in some form. Generally, modifications and repairs deemed to be 'minor', such as the installation of a radio or the repair to upholstery, may be approved by the aircraft mechanic or maintenance engineer. However, larger changes, such as changing the type of engine or increasing the maximum weight, are deemed 'major' and require formal approval from the FAA or FAA approved person or organization."

"There are various methods to obtain approval for a major modification or repair to a type-certified aircraft. Among them are:

- A data approval issued by a Designated Engineering Representative which is usually issued on a FAA Form 8110-3
- A data approval issued by an Organization Designation Authorization Holder using ODA Procedures
- A Field Repair which may be issued on a FAA Form 337, or
- A Supplemental Type Certificate (STC).

An STC is a certificate which defines a change in the design of a product; stating how the modification affects the existing type design, and listing serial number effectivity. It also identifies the certification basis, listing specific regulatory compliance for the design change. Information contained in the certification basis is helpful for those applicants proposing subsequent product modifications and evaluating certification basis compatibility with other STC modifications."

D.1.5.2 MORE Instructions for Continued Airworthiness (ICA) STC Program Review

In May 1993 the MORE company received approval for a Supplemental Type Certificate (STC) Number SE000EN which altered the Instructions for Continued Airworthiness (ICA) for the PT6A -21, -27, and -28 series engines. In February 1994, STC Number SE00002EN was issued, altering the ICA for the PT6A-34, 34AG, -34B, 36, 114, 114A, 116, 135, 135A engine series. Their purpose was to change the factory recommended TBO interval from 3600 hours to 8000 hours by modifying the instructions for continued airworthiness.

The MORE Instructions for Continued Airworthiness are almost a direct copy of the P&WC maintenance manual with modified inspection intervals for: periodic borescope inspection of the hot section, periodic inspection of the compressor and exhaust duct areas, periodic Power Plant- Adjustment /Test (to monitor engine performance). It requires a periodic spectrometric oil analysis and periodic oil filter debris analysis, periodic vibrational analysis. The MORE SB's are direct copies of the P&WC SB's with the only changes being the letterhead.

The MORE instructions state that they use a more aggressive inspection period of engine components, however the STC application does not contain any documentation that testing was done that substantiates the claim that slightly more frequent inspections allow an engine to be maintained on an on-condition basis. In fact P&WC have stated in subsequent revisions of SB 17003 (see Appendix XI, page 6) that it does not recommend that the PT6 be operated on an on-condition basis. A review of the MORE STC application found no technical justification for putting the engine on an on-condition basis contrary to the P&WC guidance. This also presented a conflict in which the MORE program required the operators to adhere to all the P&WC guidance, which included the P&WC guidance for a hard-time inspection and overhaul interval, but in fact put the

engine inspection and maintenance management in direct conflict with that guidance and made the maintenance on-condition instead.

The review of the MORE literature states: “The cost of operating your engine using the MORE Instructions is usually less than one half the cost of a typical engine overhaul and the MORE Instructions provides for an 8000 hour TBO. The MORE Company “On Condition” engine monitoring provides a method for maintaining your engine in top operating condition and enables early identification of problems when they are in the “infant” failure mode.” The NTSB notes that the P&WC maintenance manual and SB 1703 state that on condition engine maintenance programs are not recommended.

“The periodic required maintenance procedures greatly reduce hot section distress. During a 400 hour MORE hot section inspection you can expect to find little or no damage.” The NTSB notes that hot section distress is a function of operational factors, not maintenance factors; If an engine is operated in a harsh environment, it will exhibit hot section distress at 400 hours.

According to the MORE sales literature, they state “The More Supplemental Type Certificate for an 8000 Hour TBO is equivalent to the P&WC Type Certificate for a 3600 Hour TBO. Source (FAA SAIB: NE-08-40)”. All information is on a testimonial basis. No engine tests, maintenance data, operational data or safety assessment has been done to substantiate the MORE claims of equivalent safety for 8000 hours using its own test procedures or analysis methods.

According to the FAA Special Airworthiness Information Bulletin (SAIB) NE-08-40, (see Appendix V) which is intended to alerts owners, operators, and certificated repair and maintenance providers of the responsibilities of type and production certificate (TC/PC) holders, supplemental type certificate (STC) holders, and the parts manufacturer approval (PMA) holders to support the continued operational safety (COS) of their product or part design:

“1) FAA-approved TC/PC holder, PMA, and STC parts are interchangeable within the certificated product since they are approved only after a full demonstration of compliance to the applicable requirements of Title 14 of the Code of Federal Regulations (14 CFR). A PMA or STC part, when FAA-approved for installation on a certificated product, is a valid replacement part to the TC/PC holder part according to 14 CFR;” The NTSB notes that SAIB: NE-08-40 states ‘full demonstration of compliance to the applicable requirements of Title 14 of the Code of Federal Regulations (14 CFR)’. Nowhere in the MORE STC application was any documentation found that substantiates it’s claims that its ICA will increase the TBO of the PT6 engine with an equivalent level of safety as a 3600 hour TBO. No engine testing, no statistical data, no operational data, no vibration testing or comparative data was submitted that proved that engine and propeller vibration management increases engine life. No documents that substantiate the claim that more frequent oil sampling increases engine life could be found.

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3) The FAA approves the content of an ALS and ICA based upon its review of the substantiating data provided by an applicant. Applicants for PMA or STC parts are required to assess the ICA requirements. A PMA or STC applicant either shows and states that the product's ICA are still valid with their part installed or provides a supplemental ICA for any differences; ". The NTSB notes that no substantiation documentation was submitted to the FAA that could be evaluated. FAA did not adequately review the STC application. It is uncertain what the FAA actually reviewed and approved.

4) TC/PC holders, PMA holders, and STC holders are responsible for the continued operational safety (COS) support in accordance with the applicable standards for their parts and products which they have designed and produced." The NTSB notes that according to MORE, it does not keep, or has the FAA required them to keep any statistics on the failure rate, in-flight shut down (IFSD) rate, or unscheduled removal rate (BUR). It is therefore not capable of proving the effectiveness of its extended TBO fleet of PT6s.

Additionally, because the MORE engine fleet is less than 10% of the entire PT6 fleet, any serious statistical reliability problems that are unique to the MORE fleet will be 'diluted' by a factor of 9 and will not be able to be identified. All STCs are associated with actual physical parts and installation processes except for the rather unique MORE STC. In STCs that are physical parts, it is easy to assess their quality and maintain quality control: when the part fails, it stops to function. An automatic quality control process exists with physical parts; if parts break at a higher than acceptable rate, changes must be made by the STC holder. In contrast, the MORE program is not a part; engine reliability and failure is statistical in nature and cannot be directly attributed to the maintenance program. Therefore to get a clear understanding of the effectivity of the program, it is important to isolate the sample fleet and keep separate continuous statistics on its effectiveness and to maintain quality control.

Four years after the MORE STC was approved, there was sufficient confusion among operators and within the FAA concerning the incorporation of the MORE STC by that FSIB 94-48 (see Appendix VIII) was issued as guidance. A review of FAA document Flight Standards Information Bulletin FSAW 94-48, which was in effect until 2001, highlights several issues on the difficulties and confusion that the FAA PMI encountered when monitoring their operators during changing to and using the MORE STC.

- "The MORE STC's are intended to supplement, not replace, the Pratt and Whitney Canada (PWC) PT6A Instructions for Continued Airworthiness; specifically, the service information letters entitled "Engine Operating-Time-Between Overhauls and Hot Section Inspection Frequency" (see note 14 of the applicable type certificate data sheet for the exact numbers)." The operators were often unsure on what manual to use.
- There is concern that some operators have used the STC's (referred to as the MORE Program) to increase time between overhaul (TBO) intervals beyond

those allowed by their operations specifications without the trending and inspection procedures required by the MORE Program and FAR. To comply with section 135.421, an operator must make appropriate changes to its operations specifications if the inspection program under consideration differs from the manufacturer's recommended program or from another program approved by the Administrator for the particular operator. Although the MORE STC is a program approved by the Administrator, it needs to be incorporated by each particular operator through an amendment to its operations specifications.

D.1.6 TBO Extension Comparisons

D.1.6.1 P&WC TBO Extension Discussion

The P&WC TBO Extension Process is described in P&WC SB1703 (see Appendix I)

The PT6A-114A has a 3600 hour ‘basic’ TBO. The operator can increase his subsequent TBO in 500 hour increments after successfully passing a factory performed TBO-extension teardown exam. This is not to be confused with the 200 hour one-time extension provided by the FAA for scheduling and convenience discussed in section D.1.3. Once a TBO extension approval and recommendation is obtained by P&WC, fleet operators can immediately apply the 500 hour extension to the rest of the fleet because it is assumed that the operation and maintenance on the other airplanes in the fleet is of the same quality as the samples. Single or small operators cannot take advantage of this ‘fleet extension’ because the fleet size is too small. When the next engine in the fleet reaches 4100 hours, and successfully passes the exams, another 500 hour TBO extension is granted and the entire fleet is automatically extended 4600 hours. Fleets with high quality operations have attained an 8000 hour TBO.

When an engine is submitted to PWC for a TBO extension examination the engine is dis-assembled and displayed on a table for engineering and product support to examine. It is a very thorough exam. The condition of the engines examined at overhaul is only one element of validating that the specific operator is operating and maintaining the engines in a manner that warrants extending the TBO interval for the specific fleet. Other elements include but are not limited to:

- Accuracy of maintenance records.
- Reported condition of hardware at previous maintenance intervals.
- Local regulatory endorsement of operator adherence to OEM recommended operation and maintenance practices. This endorsement should be obtained on a yearly basis.
- The sample must have been operated by the current operator for the majority of the TBO period (i.e. for more than 50% of the current TBO interval).
- The utilization rate for the engine must be at least 300 hours per year.

- The sample engine must not have had a shop visit for major repairs (Overhaul Manual level) during the current TBO interval (i.e. only Maintenance Manual level tasks and repairs have been carried out).
- The evaluation consist of 2 stages, the first portion consists of a visual examination of the engines prior to cleaning to assess whether the hardware appears capable of 500 hours of further operation. Following satisfactory completion of this phase the second portion consist of detailed examination of the components to the requirements of the P&WC OHM.
- **The TBO Extension is not transferrable to a new owner**.

Through S.I.L. No. PT6A-194 (see Appendix VI), Discontinuation of On-Condition and Highly Extended Time Between Overhaul Endorsements by P&WC, Issued on Apr 13, 2012, P&WC has withdrawn its approval of on-condition maintenance programs. This is also reflected on SB1703.

If the exam determines that there have been too many maintenance problems in the last overhaul period, such as too many changes of the CT vane ring or other hot section components, this would be an indication that either the pilots are not trained in correct engine management, or that the maintenance staff is inadequate and a request for a 500 hour TBO extension would rejected. According to P&WC, about 10% of the TBO extension applicants are rejected compared to a 2% rejection rate by MORE.

The P&WC MM instructions for continued airworthiness is the only guidance required to maintain engines on extended TBOs. No other special inspections, oil sample analysis or vibration monitoring is recommended on any engines on the factory recommended extended TBO program because of their limited value. P&WC, after many years of experience, has withdrawn the recommended continuous Spectrometric Oil Analysis Program (SOAP) oil analysis program because their data-based experience has determined that the program does not have a reliability and cost benefit to the operator.

D.1.6.2 TBO Extension Process Outlined in the MORE Instructions

The MORE Extension Process is described in 'Summary Of How The More Instructions For Continued Airworthiness Works'.

A review of the MORE documentation revealed:

The initial entry inspection checklist for PCE-1021 (see Appendix VII), a filled-in Scheduled Inspection Status Sheet, completed copy of the FAA form 337, a filled-in STC Registration Form, a copy of the vibration analysis chart, and a copy of a filled-in Statement of Understanding is all that is required to start the MORE STC program.

MORE has no requirement for a detailed engine exam or factory inspection to obtain the TBO extension. The owner/operator mechanic or a hired FAA approved mechanic may perform the checks fill in the checklist.

An operator can incorporate the MORE STC into an engine at any time within its approved overhaul period, even within hours before it has reached the end of the factory recommended TBO limit. The accident engine, was placed on the MORE program at 3752 hours since the last overhaul. According to MORE literature, as long as the engine has accumulated less than 8,000 hours since the previous overhaul and as long as the engine can be repaired to make it eligible to pass the MORE STC initial entry inspection requirements, without exceeding economically prudent limits; the engine may be placed on the MORE Instructions for Continued Airworthiness STC.

The MORE STC has no restriction for a minimum annual utilization rate.

The MORE Instructions For Continued Airworthiness are FAA approved Supplemental Type Certificate(s) and the increase in TBO is transferable with the engine (aircraft) to a new owner; unlike the P&WC extension that is **not** transferable.

The MORE ICA STC is not a stand-alone document: According to MORE:

"The MORE Instructions For Continued Airworthiness have been written to supplement the P&WC PT6A-34 or PT6A-114 series overhaul manual, maintenance manual, illustrated parts catalog, service bulletins, etc. The MORE Instructions For Continued Airworthiness and the P&WC documents are to be used together.

Where the MORE STC Instructions for Continued Airworthiness include a particular maintenance action that is also included in the P&WC manuals, the methods, techniques, and practices, including inspection pass/fail criteria, provided in the P&WC manuals are to be used, unless stated otherwise. It is the responsibility of maintenance personnel to use current P&WC manuals when complying with the requirements of this STC."

MORE allows replacement parts used, parts repair methods or repair shops used for repair to be FAA approved compared to the P&WC requirement that only P&WC affiliated and approved parts are to be installed.

D.1.6.3 Engine Condition Trend Monitoring (ECTM)

A - Definition and the P&WC Process

Engine Condition Trend Monitoring (ECTM) is a P&WC recommended process, developed in the 1970's, which uses engine operational data to identify engine wear, deterioration, and damage. Most other engine manufacturers have also developed their ECTM processes which they recommend in their maintenance programs.

The ECTM process continuously monitors the health of an engine by tracking a set of parameters in flight, such as altitude, outside air temperature (OAT), air speed, inter-turbine temperature (ITT), gas generator speed (Ng), and fuel flow (Wf). These parameters are routinely recorded manually or electronically and are then analyzed by

software which plots ‘normalizes’ the new engine performance values and compares them with previous reference or ‘trended’ values. Although flight crews are able to notice big or sudden changes to performance, ECTM can identify subtle changes over a period of time that a flight crew cannot. A continuous analysis of the ECTM trend is a predictive tool which can assist the maintenance department by providing early detection of engine performance deterioration due to contamination, wear or malfunction of engine components and accessories so that they can plan for possible corrective action. ECTM allows operators to better predict needed maintenance before secondary damage or a failure occurs.

When performed properly by trained and experienced personnel, trend monitoring is capable of detecting faults such as:

- Hot section deterioration
- Hot starts
- Faulty fuel nozzles
- Dirty or eroded compressors
- Foreign object damage (FOD)
- Bleed leaks
- Instrumentation errors

P&WC as well as other training companies offer an extensive training course to educate owners/operators on the ECTM process.

All Cessna 208A airplanes, since 2002, have installed, as standard equipment, an Altair aircraft data acquisition system (ADAS) which is capable of automatically recording engine trend data. This data can be manually downloaded by the maintenance staff or automatically be transmitted to an internet subscription based ‘Turbine Tracker’ system which records, analyzes and issues recommendations for corrective action schedules. According to the P&WC records, MKA never used the Altair Avionics system to maintain and manage their ECTM data.

B - MORE ECTM Process Guidance

According to the MORE STC SE00002EN guidance for ECTM, page 37 (see Appendix X): ‘Engine Condition Trend Monitoring (ECTM) is not required by this revision of the MORE Instructions For Continued Airworthiness. ECTM has been replaced with: A. Power Plant- Adjustment / Test, B. Borescope Inspection of Hot Section, C. Visual Inspection of the Compressor, and D. Visual Inspection of the Power Turbine / Exhaust Duct. ECTM is NOT PROHIBITED. The choice of whether or not to use ECTM is to be made by the owner / operator.‘

A review of the original MORE STC application for STC SE00002EN, found no technical justification or any documentation of testing done that would substantiate the elimination of ECTM, contrary to the P&WC guidance.

According to their director of maintenance, MKA elected to follow the MORE guidance and not perform ECTM. MKA were required by CFR section 135.421 - Additional maintenance requirements, to perform an oil analysis at 100 hour intervals, however, oil sampling only identifies bearing, gears, bushings, accessories, and other lubrication issues, while ECTM provides a representation of the condition of the engines' gas path.

D.1.6.4 Owner/Operator MORE TBO Extension Inconsistent Application

Safety Board staff has been made aware of owner/operators of Beechcraft King Air or similar airplanes powered of PT6 engines that when whose engines have reached 3600 hour as specified by P&WC TBO limit sometimes cannot pay for the engine(s) overhaul costs and sell the airplane cheaply instead of incurring those costs. A savvy mechanic or company can buy the airplane with 'timed-out' engines, purchase the MORE STC and sell the airplane with 4400 hours (8000 hours – 3600 hours) remaining before TBO; with more TBO hours than a new PT6 engine. In this case, the quality of operation and maintenance during the initial TBO 3600 hours cycle is unknown and since the MORE STC is easily transferred, for a fee, the quality of operation and maintenance that will be performed on the airplane by the new owner for the next 4400 hours will also be unknown.

D.1.7 Hawaii FSDO

On Jan 14, 1997 FAA bulletin FSAW 94-48, 'Procedures to be Used to Approve Instructions for Continued Airworthiness Approved by Supplemental Type Certificates (STC)' (see Appendix VIII) was issued that prescribed actions to be taken by to principal maintenance inspectors (PMI) having certificate management responsibility for operators of aircraft using the MORE STC program. Among the actions that the PMI was responsible for was:

- Review the operators submitted revision to their Approved Aircraft Inspection Program.
- Review the operators procedures for administering the program requirements.
- Evaluate the applicant's current operation to determine if the flight stage length, altitude, and time in cruise configuration will allow accurate engine condition trend monitoring in accordance with the applicable PWC PT6A Maintenance Manual.
- Confirm that the applicant has the necessary facilities, tools, and equipment to properly perform the required tests and checks required by the applicable MORE STC maintenance program document.
- Confirm that the individuals performing the tests and checks are properly certificated, trained and qualified.
- Confirm that the inspection tasks have been accomplished.

On May 10, 2005, FAA bulletin FSAW 05-07, Availability of a CD-ROM Training Program for the Maintenance on Reliable Engines (MORE) STCs and Reporting Requirements for Non-STC MORE. Inspection Programs (see Appendix IX) was issued that provided additional reporting requirements for FAA inspectors when they approve a non-STC MORE inspection program as part of a Title 14 of the Code of Federal Regulations (14 CFR) part 91, section 91.409(f)(4) inspection program. Among the guidance is:

- FAA Flight Standards District Office (FSDO) inspectors are responsible for monitoring the operators on the MORE STC program and ensuring all inspection criteria are being met.
- The existing STC MORE programs are reported to the FAA database in Oklahoma City via the normal recording process on FAA Form 337, Major Repair and Alteration.

A telephone interview was conducted with the responsible Hawaii FSDO PMI, who stated that he had only become familiar with the MORE STC when MKA applied to place two additional aircraft on the MORE STC. He stated that he was not the PMI for MKA when their first engine was placed on the MORE STC. He added that no guidance on reviewing and applying the MORE STC existed in the FAA Flight Standards Information Management System (FSIMS) 8900.1 handbook. In contrast, there was guidance in the FSIMS on how to evaluate and apply engine time-between-overhaul (TBO) extension requests by individual operators, but none on the MORE STC. Mr. Wilson added that he contacted the aircraft evaluation group (AEG) and asked questions concerning the MORE STC, and noted that the STC was an FAA approved document. During his review of MORE STC implementation for the operator, he ensured that the application documentation process was being followed and that all the pre inspection requirements were met. He also stated that he checked that the additional instructions for continued airworthiness (ICA) were incorporated into the maintenance program and were being accomplished.

D.2 Engine Teardown and Examination

The engine was visually examined on scene, in Hawaii by a P&WC field representative, after which, it was boxed and sent to the P&WC plant 5 facility in St. Hubert, Quebec, Canada for a complete teardown and examination.

D.2.1 General External Condition

The engine was received in a wooden container with most airframe accessories still attached (Figure 2, Figure 3 & Figure 4). The following airframe parts were removed prior to the engine examination: 1) Horse collar or engine mount frame, 2) airframe inlet plenum, 3) airframe oil cooler, 4) air conditioning compressor and pulley assembly, 5) starter/generator, and 6) bleed air tubing.

It was reported that the engine was recovered after approximately 6 days in salty ocean waters. The engine magnesium cases were severely corroded causing a loss of structurally integrity. There was corrosion on all metal engine components consistent with immersion in salt water. The engine had been externally washed with fresh water before it was shipped to P&WC. The external surfaces were clean, however generalized organic deposits were found on all surfaces of all internal components, resulting in various amounts of corrosion on the surfaces of all internal components. Externally, the engine appeared intact, however all the external surfaces were battered and dented, consistent with ocean current activity rolling the engine and airframe on the ocean floor. A dead sea star was found inside an engine component. When viewed through the exhaust duct, the power turbine wheel revealed turbine blades with between 1/3rd and 4/5th of the span remaining (Figure 5). The inlet screen was intact, however it was dented in several locations.

The fuel nozzles had been removed prior to being put into the shipping container and the components were found in a separate box. It was reported that a P&WC representative was sent to the field to perform a borescope examination, which requires removal of the fuel nozzles. The oil dip stick was not present.

All the FCU-related pneumatic lines were secured with safety wire however some fittings were tight and others were not torqued. The push-pull linkage between the CSU, FCU and prop reversing cam were continuous however it was heavily battered.

D.2.2 Reduction Gearbox

The propeller shaft could not be rotated by hand. Approximately 50 percent of the reduction gear box (RGB) housing was corroded to the point of being dissolved. The corrosion is consistent with long-term immersion of magnesium material in a salt water environment (Figure 6). Therefore the internal components such as the propeller shaft, bearings and gears were exposed to salt water. The internal components were all intact and appeared to be undamaged, however they were all coated with a white powdery deposit. The aft RGB housing was almost completely dissolved, leaving a white powder (Figure 7). Removal of this residue exposed the 1st stage sungear, carrier and planet gears which exhibited no evidence (Figure 8 & Figure 9) of pre-impact damage.

The front housing was partially disintegrated by corrosion and it was also filled with magnesium oxide residues. The 2nd stage sungear, planet gears and carrier appeared intact and the investigation team elected not to further disassemble the RGB.

The propeller governor and the overspeed governor were present, however they were coated with a moist watery deposit. There was also a white powdery deposit on the mating surfaces of the RGB (Figure 10).

The RGB chip detector was coated in a white powdery deposit and was no longer attached to the RGB because the RGB housing was completely dissolved in that location.

The prongs were covered with debris from the RGB housing, but was otherwise free of magnetic particles. The large screen was still in place and no debris was found inside. The electrical connector and wire were still connected to the chip detector.

D.2.3 Power Section

The power section module was removed at the 'C' flange with effort because of the resistance offered by corroded material on the mating surface.

All the power turbine blades were (Figure 11) were part number 3115902-01 and present, but fractured, with 1/3rd and 4/5th of the span remaining. All the blade fractures surfaces were consistent with overload (Figure 12).

The power turbine vane ring was intact however the trailing edges of three vanes were fractured (Figure 13) and several vanes were bent in the vane spanwise direction in the direction of rotation of the power turbine wheel. The power turbine shroud was circumferentially scored, however it was still circular.

D.2.4 Combustor Section

The combustion chamber liner was intact and undamaged (Figure 14) but coated with organic debris. The large exit duct was intact and undamaged. The small exit duct had cracks (Figure 15) between the cooling holes and the inner edge, but was otherwise intact.

D.2.5 Compressor Section

D.2.5.1 Compressor Vane Ring and Compressor Turbine

The compressor turbine vane ring (Figure 16) was intact and the leading edges were all undamaged, however the trailing edges of all the vanes were fractured due to impact with associated material loss and subsequent thermal distress (Figure 17).

The compressor turbine shroud segments (P/N 3035673) were intact but were coated with a metal spray deposit consistent with melted material from the compressor turbine blades. There were two impact marks (Figure 18) in the shape of a turbine blade chord on two shroud segments: one at 4:00 o'clock[3] and the other at approximately 9:00 o'clock, which is consistent with a compressor turbine blade release during a high power

[3] All directional references to front and rear, right and left, top and bottom, and clockwise and counterclockwise are made aft looking forward (ALF) as is the convention. Top is the 12 o'clock position. The direction of rotation of the engine is clockwise. All numbering in the circumferential direction starts with the No. 1 position at the 12:00 o'clock position, or immediately clockwise from the 12:00 o'clock position and progresses sequentially clockwise ALF.

condition. The compressor turbine shroud support ring was slightly deformed outwards only at the 4:00 location.

All the compressor turbine blades (Figure 19) were pre-SB1669, part number 3045741-01 and present, but fractured, leaving between 1/3rd and 2/3rd of the blade span remaining (Figure 20). All the surfaces of the blades and the disk were coated with a fine white deposit (Figure 21). At the location of the blade fractures, the coating material was separated from the parent blade material (Figure 22).

The compressor turbine wheel was sent to the P&WC materials laboratory for blade removal, cleaning, sectioning and analysis.

During the analysis the blades were numbered 1 to 58 starting at the disk master spline and progressing clockwise pilot view. The legible CT blades were of 2 different heat code batches; T179 & T184. The heat code on blades Nos. 30 to 50 was not legible due to rotational scoring damage.

The four shortest blades were selected for fracture surface analysis. The shortest blades were selected because the highest loads occur near the root of the blade and overload failure there is most likely. Additionally, the maximum creep[4] occurs at this location. A visual examination of the CT blade fracture surfaces revealed only overload fracture features; no evidence of fatigue cracking was observed. A typical fracture surface is shown on blade No. 4 (Figure 23) after cleaning. The condition of the other 3 blades was similar.

Gamma prime precipitates are a grain structure of the blade material which is produced when the blade is being heat treated during the manufacturing process. The precipitates were observed as a checkerboard pattern (Figure 24) when the blade was sectioned, polished and etched in an acid solution. The entire blade should have a similar pattern. When a CT blade is subjected to a high heat condition during operation that causes creep, then the checkerboard pattern becomes elongated in the blade span

[4] During normal operation, CT blades are subjected to high heat (CT blades glow red-hot at take-off power) and high tensile loads due to the centrifugal force imparted at 40,000 RPM. At these conditions, a phenomenon known as 'creep' becomes a factor in the life of the blade. Creep is the permanent stretching or yielding of the blade and is an accumulative value. Minute amounts of high-temperature and speed (takeoff propeller rotational speed is held constant by the propeller governor) induced stretch cause irreversible changes to the CT blade material microstructure and add up throughout the life of the blade. At normal operating temperatures, a blade creeps very little and can last for more than 2 overhaul cycles however, during temperature exceedances as small as 10 degrees ITT, blades stretch many times faster than normal and will quickly reduce the life of the blade. Creep causes microscopic voids in the material which can lead to micro cracks and fatigue initiation. The failure mode of a stretched blade is a sudden fracture and immediate loss of power. According to PWC, blades that have been used throughout 2 entire overhaul cycles are near the end of their fatigue life.

direction, or in the tensile load direction[5]. Metallographic examination, prepared longitudinally along the trailing edge of CT blade #10 (heat code: T184) and CT blade #16 (heat code: T179) both revealed full solutioning of the gamma prime precipitates between 0.30 inches above the platform and the airfoil fracture plane (Figure 25). Full solutioning is a condition which occurs in the blade material when the metal has been heated so high a temperature that is becomes almost liquid and all the gamma prime grain structure is dissolved and lost. This high heat condition is consistent with a distressed engine and secondary damage. Any evidence of accumulated operational creep in the CT blades would have been erased due to the solutioning.

The chemical composition of the base material, analyzed using SEM-EDS standardless and semi-quantitative analysis showed the material met drawing requirements.

D.2.5.2 Compressor

The 1st , 2nd and 3rd stage axial compressor blades were intact and rubbed on the tips (Figure 26, Figure 27 & Figure 28). The impeller was intact and undamaged (Figure 29). The 1st, 2nd and 3rd stage stators and the impeller shroud were intact and undamaged.

The No. 1 & No. 2 bearings were intact however they were corroded.

D.2.6 Accessory Gearbox

The accessory gearbox (AGB) was corroded to the point of being dissolved, consistent with long-term immersion of magnesium material in a salt water environment and approximately 50 percent of the AGB material remained, exposing the internal gearing and bearing components (Figure 30). The internal gears of the AGB were coated with a white powdery deposit, however they were all intact and the AGB was not further disassembled.

D.2.7 Controls and External Accessories Detail Examination

The propeller governor or constant speed unit (CSU) was intact and externally undamaged, however it had been inundated with water and could not be functionally tested. The CSU was disassembled and the internal components were examined by the PWC fuel laboratory. A report will be issued by the PWC laboratory.

[5] In operation, the only way to determine if the blades have been subjected to temperature and stress induced creep is to section the blades and subject them to a material analysis. During an engine hot section inspection (HIS), this examination is done on two random CT blades in the CT wheel to determine if they are affected by creep. If they are, then the entire set of blades must be discarded and replaced. Creep cannot be evaluated with a borescope inspection.

The bleed valve, fuel-to-oil heater and flow divider could not be functionally tested and were sent to the PWC accessory laboratory for teardown examination. PWC will provide a report of the findings.

D.2.8 Fuel System

The fuel heater, fuel pump, fuel control unit (FCU), flow divider valve (FDV), fuel nozzles, were sent to the P&WC accessories laboratory for detailed examination.

D.2.8.1 Fuel Heater

The fuel heater was dented and scratched at many locations and the fuel outlet fitting was fractured (Figure 31). Testing of the thermal element revealed that it was nonfunctional which would result in fuel being heated at all times.

D.2.8.2 Fuel Pump

The fuel pump was externally undamaged however the input drive spline could not be turned. There was no evidence of cavitation on the gears, gear pockets or bearings (Figure 32). The bearing seal surfaces, gear sides and gear-shaft journals had a polished appearance. There were no leak paths observed on the carbon-seal sealing surfaces.

D.2.8.3 Fuel Nozzles

The fuel nozzles had corrosion and organic contamination on the nozzle adapters and many of the nozzle tips. Debris was noted on the crown of the sheaths. The fuel nozzles could not be tested.

D.2.8.4 Fuel Control Unit (FCU)

The FCU drive-body had separated from the flow body and therefore could not be functionally tested so it was disassembled for a detailed examination. The P3/PY air adapter was fractured off the FCU (Figure 33). Metallic-oxide and environmental residue and was present in the drive-shaft bearing cavity. The plastic drive-coupling was present and intact. One of the driveshaft flyweights was missing, the other flyweight moved freely. The retaining ears of the flyweight table were bent outward, restricting the rotation of the driveshaft. The throttle lever bracket and throttle lever shaft were bent. The throttle lever moved freely, and the part-power trim stop was in the stowed (flight) position. The throttle and cut-off lever linkages were bent. The air adapter had separated from the drive-body.

Powder and organic debris was present in the bellows cavity. There was surface corrosion present on the bellows ratio-lever and the ratio lever was straight. The metering valve ratio lever was straight. There was organic debris, but no metal visible in the bypass valve sleeve. The bypass valve diaphragm was marked 1Q11 indicating that it had been manufactured in the first quarter of 2011. The diaphragm was pliable and there were no blisters or leak-paths visible. It was necessary to machine the FCU flow-body in order to remove the governor bellows. The governor bellows was tested and confirmed to have no leaks. The acceleration bellows was distorted and it was not possible to confirm the length (Figure 34). Debris was present in the Py bleed cavity. There was no corrosion visible in the threads of the air adapter.

Chemical analysis of the residue from the FCU inlet screen, bypass valve sleeve and Py cavity identified chlorine, sodium, calcium, aluminum and magnesium with oxygen which is consistent with sea water residue and oxidation residues.

D.2.9 Air System

The compressor bleed valve (BOV) (Figure 35) was sent to the P&WC accessories laboratory where it was tested and found to be leaking at the seat. The seat and piston were cleaned and the test repeated with similar results. The BOV was disassembled in order to determine the cause of the observations and moisture was found to be present on the diaphragm. Organic debris from exposure to sea water was present on the piston, its housing and on the seat which is consistent with the leakage.

D.2.10 Oil System

D.2.10.1 Propeller Governor (CSU)

There was metallic, consistent with magnesium oxide, residue and environmental debris attached to the exterior of the propeller governor (CSU) (Figure 36), in the driveshaft cavity and in the gasket strainer (Figure 37). The driveshaft could not be turned by hand. Movement of the rest arm, speed control lever and beta-valve clevis were restricted. Surface corrosion was observed on the external steel fittings. The speed control lever linkage bolt was bent. The ball-head flyweights showed surface corrosion, but fell freely and evenly (Figure 38). There was organic debris in the ball-head cavity and in the gear-pockets. It was not possible to remove the driven gear. The drive-gear and pilot valve required force to remove them and surface corrosion was present on the pilot-valve. The reset-post was difficult to remove. There was no debris visible in the air bleed orifice.

D.2.10.2 Overspeed Governor (OSG)

There was metallic, consistent with magnesium oxide, residue and environmental debris adhering to the exterior of the overspeed governor (OSG) (Figure 39). The driveshaft cavity was encrusted with metallic, consistent with magnesium oxide, residue with environmental debris (Figure 40) and the driveshaft could not be turned by hand. A piece of the airframe wiring harness was attached to the solenoid connector. Disassembly showed the ball-head flyweights had surface corrosion, but fell freely and evenly. There was organic debris in the ball-head cavity and in the cover (Figure 41). Surface corrosion was present on the pilot-valve (Figure 42).

D.2.11 Chip Detectors, Oil, and Fuel Filters

The external oil scavenge and pressure pump housing was not connected to the AGB due to dissolution of the AGB housing. The pressure pump housing, which is inside the AGB, was dissolved. They were intact and undamaged and were not tested. The oil filter was clean (Figure 43) however it contained water.

Harald Reichel
Aerospace Engineer - Powerplants

Figure 2 – PT6A-114A Engine S/N PCE-PC1021 Container

Figure 3 – PT6A-114A Engine S/N PCE-PC1021 – As Received

Figure 4 - PT6A-114A Engine S/N PCE-PC1021 - As Received

Figure 5 – Power Turbine Wheel – All Blades Fractured

Figure 6 – Reduction Gearbox (RGB)

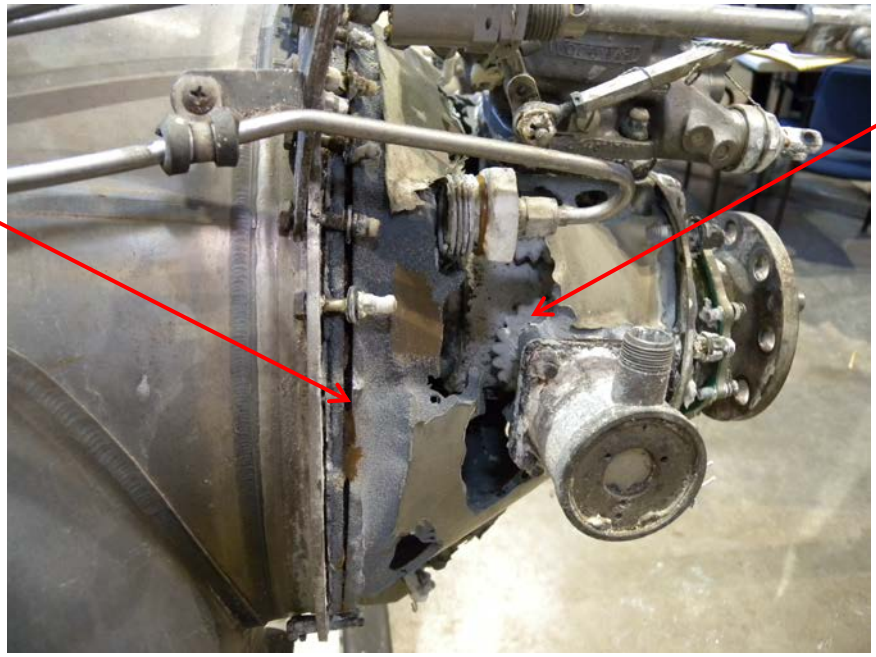


Figure 7 – RGB Aft Housing

Figure 8 – 1st Stage Sungear

Figure 9 – 1st Stage Carrier, Planet Gears & 2nd Stage Carrier

Figure 10 – Propeller Governor and O/S Governor

White Powdery Deposit

Figure 11 – Power Turbine

Figure 12 – PT Blades – Typical Fracture Surface

Figure 13 – Power Turbine Vane Ring

Figure 14 – Combustor

Figure 15 – Inner Exit Duct

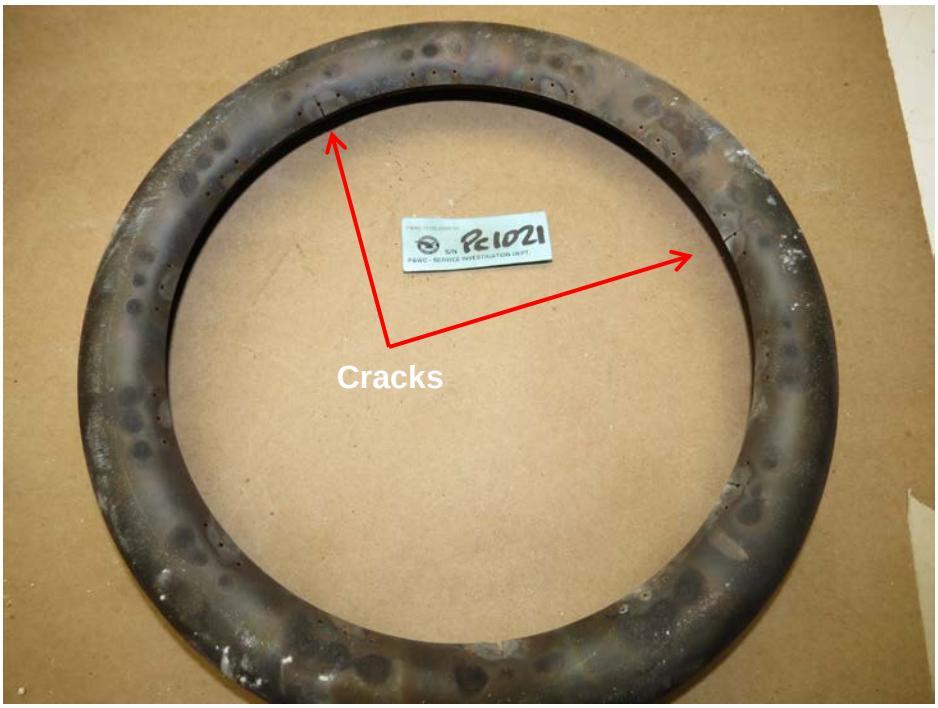


Figure 16 – Compressor Turbine Vane Ring – Front View

Figure 17 – Compressor Turbine Vane Ring – Trailing Edges - Detail

Figure 18 – Compressor Turbine Shroud – Detail at 4:00 O'clock

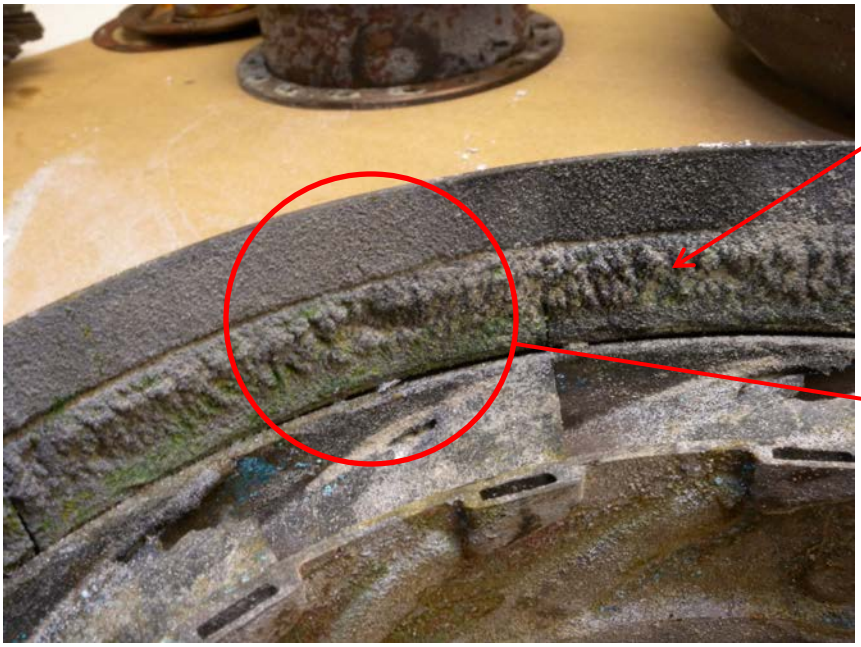


Figure 19 - Compressor Turbine Disk - Front View – in situ

Figure 20 – Compressor Turbine Disk – Aft View

Figure 21 – Detail of Compressor Turbine Blades

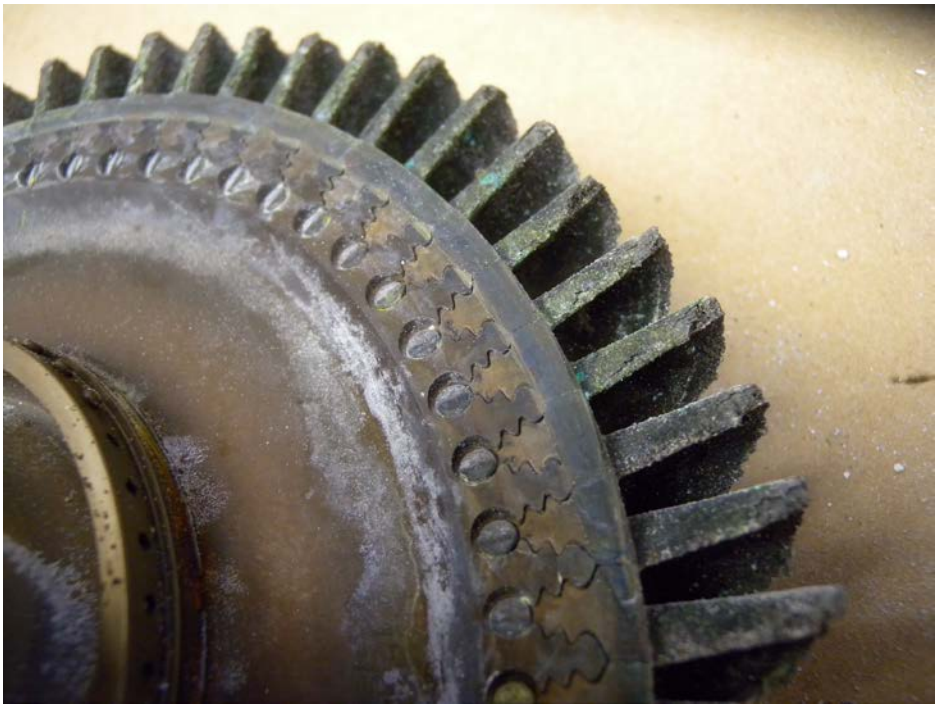


Figure 22 – Close-up of Compressor Turbine Blades

Figure 23 – CT Blade Fracture – Typical

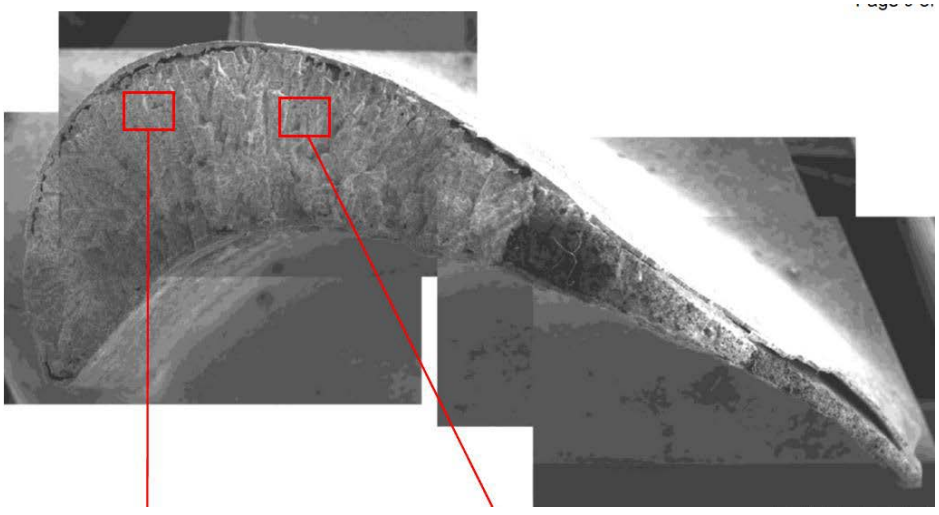


Figure 24 – Gamma Prime Structure of CT Blade

Normal Gamma Prime Pattern

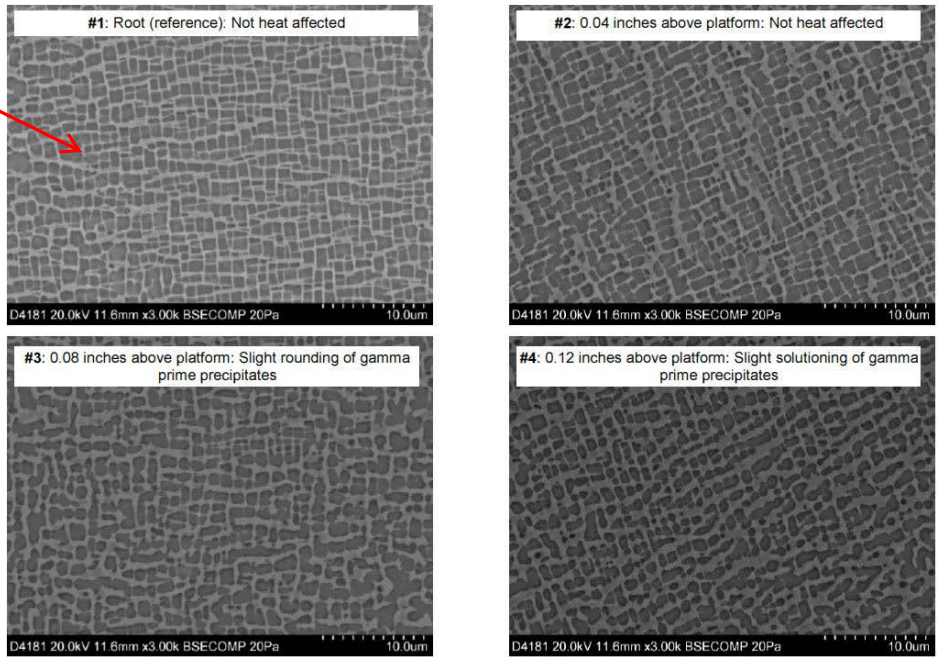
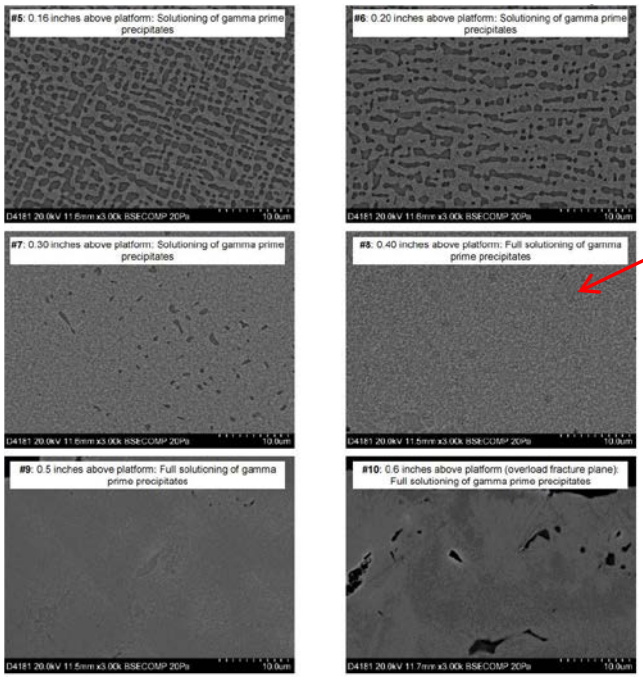


Figure 25 – Gamma Prime of CT Blade



Full Solutioning of Gamma Prime at 0.1 inch Below the Fracture.

Figure 26 – 1st Stage Compressor Wheel

Figure 27 – 2nd Stage Compressor Wheel

Figure 28 - 3rd Stage Compressor Wheel

Figure 29 - Impeller

Figure 30 – Accessory Gearbox (AGB) – Dissolved, Exposing Internal Components

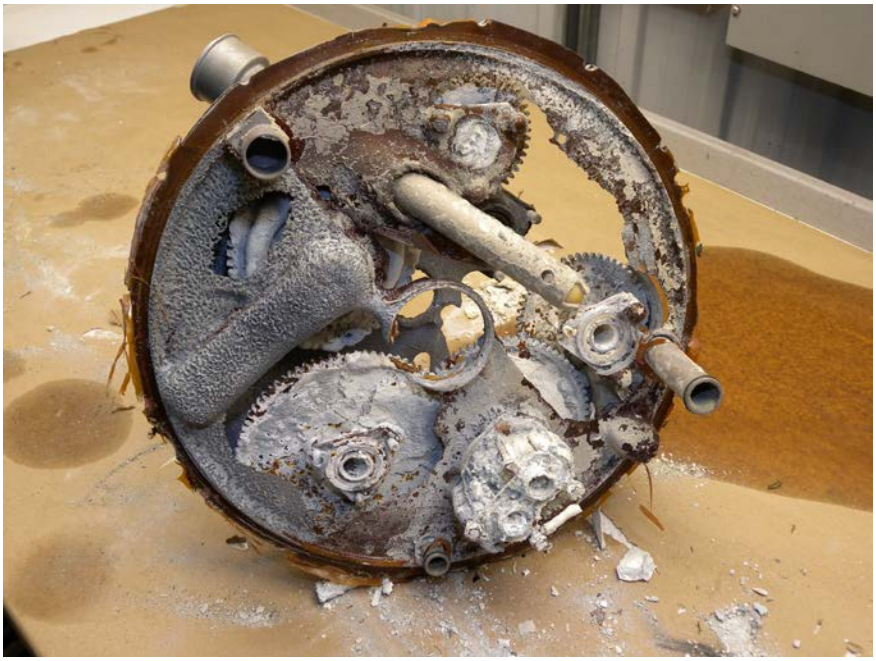


Figure 31 – Fuel Heater

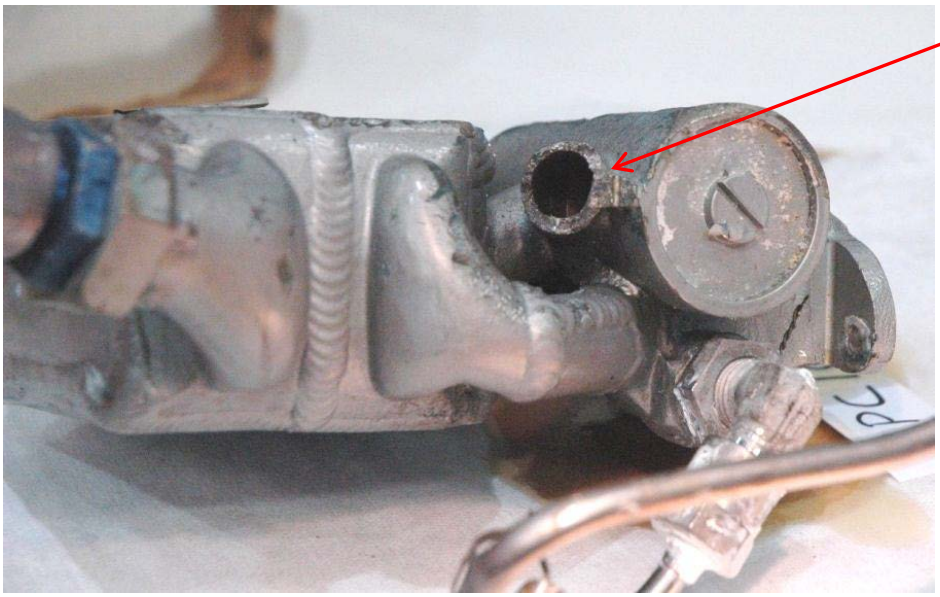


Figure 32 – Fuel Pump - Disassembled

Figure 33 – Fuel Control Unit

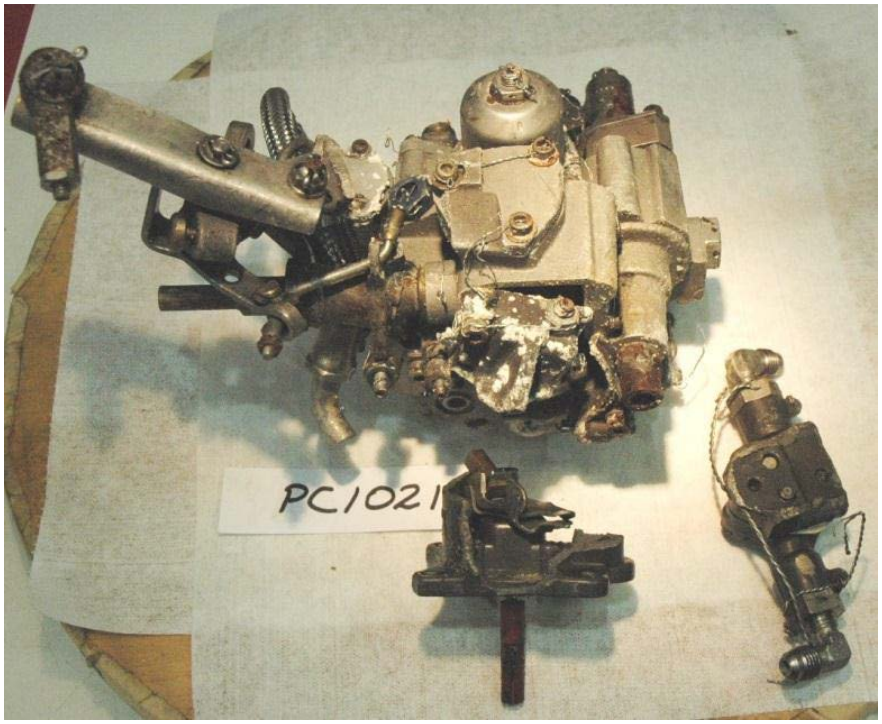
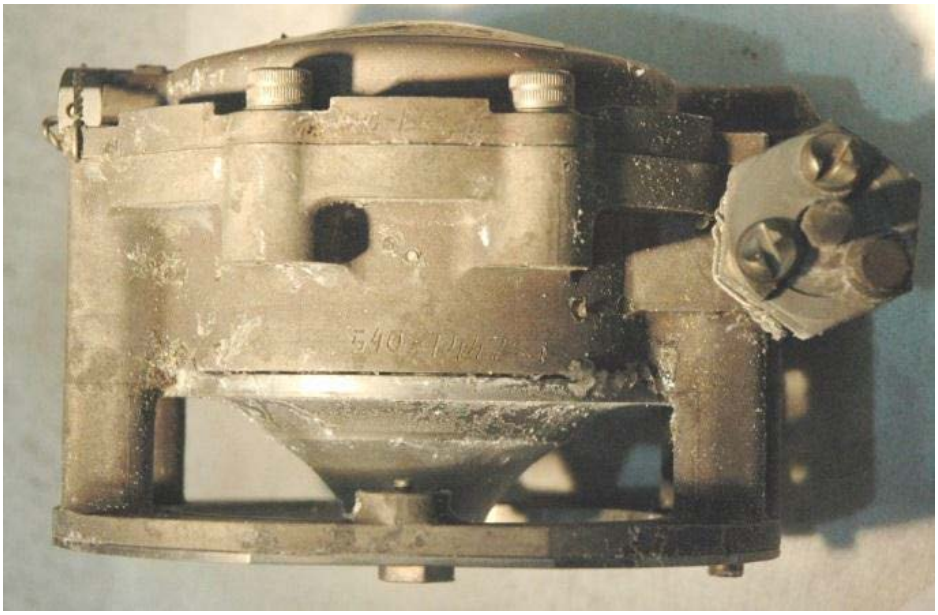


Figure 34 – Acceleration Bellows

Figure 35 – Compressor Bleed Valve



Speed Control
Lever Linkage
Bolt - Bent

Figure 36 – Propeller Governor – In Situ

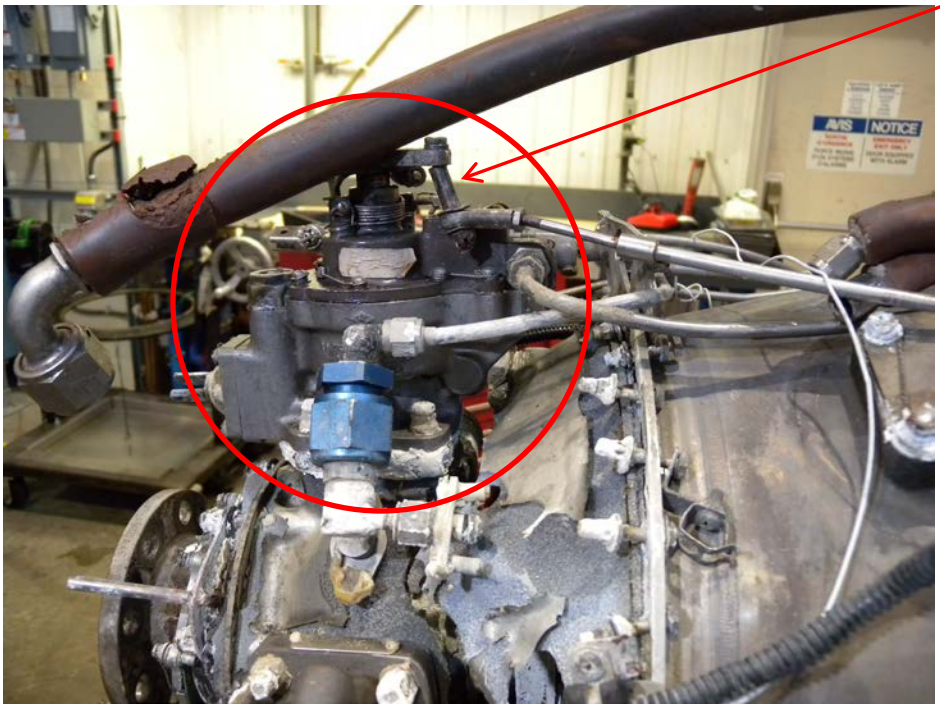


Figure 37 – Propeller Governor – Gasket Strainer

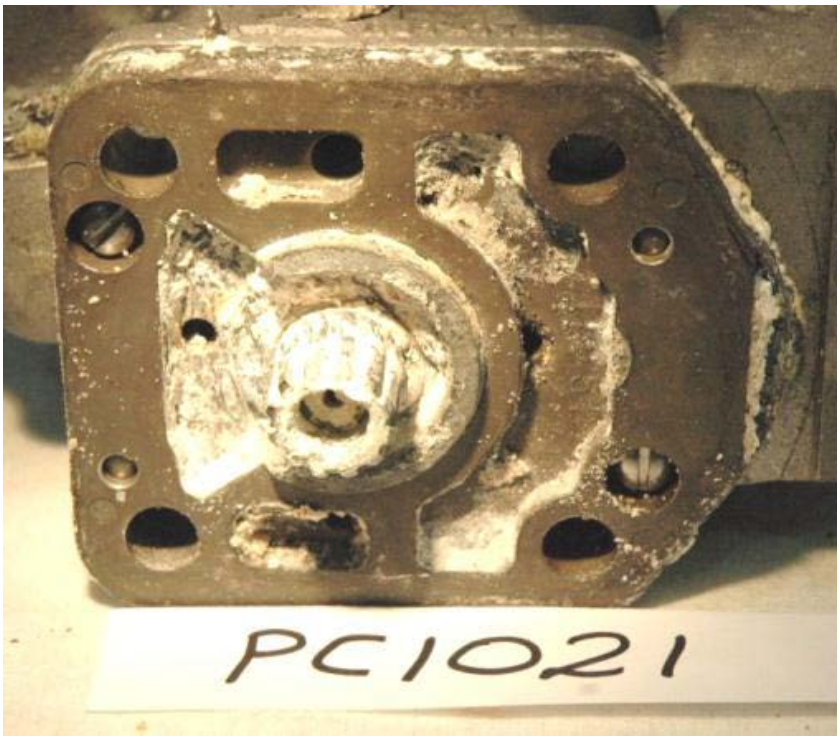


Figure 38 – Propeller Governor - Disassembled

Figure 39 – Overspeed Governor – In Situ

Figure 40 - Overspeed Governor - Driveshaft Cavity

Figure 41 - Overspeed Governor - Ball-Head Cavity

Figure 42 - Overspeed Governor - Pilot-Valve

Figure 43 – Main Oil Filter – Clean, but Contained Water

E. Engine Teardown Findings

- The engine showed significant damage caused by exposure to a salt water environment.
- The reduction and accessories gearboxes, although severely damaged by exposure to salt water, displayed no evidence of pre-impact anomalies.
- The compressor turbine exhibited burning of all blade airfoils. The compressor turbine shroud showed evidence of high energy impact, consistent with the fracture and release of one or more compressor turbine blades as initiating cause of the power loss.
- The compressor components were rotationally scored, consistent with rotation at impact. No evidence of pre-impact anomalies was found on the compressor section.
- The power turbine blades were fractured and dented. The features on the fracture surfaces were consistent with overload and bending, and considered secondary damage.
- The engine accessories showed impact and damage from exposure to salt environment and could not be tested. Subsequent physical investigation by P&WC revealed no evidence of pre-impact anomalies.
- The engine failed at 4889.6 hours, TSN, and only 3.9 hours since its last major 100, 200 & 400 hour MORE inspection.
- The inspection and maintenance of this engine was managed under the Cessna Phase Card maintenance program from new until July 2012, when it had accumulated 3752.3 hours and reached its factory recommended overhaul limit.
- The engine was not overhauled at 3752.3 hours, but instead extended per MORE STC (STC No. SE0002EN) to 8000 hours.
- The engine maintenance was then managed and performed under the MORE program from TTSN 3,752.3 hours to the time of the accident, completing approximately 1133 hours under this program.
- The last logbook entry stated a total engine time of 4,889.6 hours, which is 1,289.6 hours beyond P&WC's Time Between Overhaul (TBO) recommendation of 3,600 hours.
- The last engine hot section inspection (HSI) was performed at the time of introduction of the engine to the MORE program using the MORE instructions. The records available for this HSI indicate that P&WC's applicable engine Maintenance Manual / Service Bulletin No. 1703 recommendations were not fully complied with. There were no records to indicate that the required CT blade metallurgical evaluation (sample of 2 blades) was complied with. Other requirements such as combustion liner cooling ring gap check and trim thermocouple verification are also not stated as requirements for HSI under the MORE program.

Appendix I

PRATT & WHITNEY CANADA

SERVICE BULLETIN

P&WC S.B. No. 1703R6

BULLETIN INDEX LOCATOR

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

MODEL APPLICATION

PT6A-114, PT6A-114A

Compliance: Refer to Para. 1.E. in the Service Bulletin

Summary: This Service Bulletin (SB) provides a recommended basic operating Time Between Overhaul (TBO) and specifies a recommended initial Hot Section Inspection (HSI) frequency. P&WC turbine engines are required to undergo periodic inspection in accordance with a pre-established schedule in order to ensure serviceability. The TBO and HSI intervals represent the two major scheduled periodic inspections, and are defined in this SB. This SB also provides TBO extension procedures for operators with an average utilization higher than 300 hours/year. The technical content of this service bulletin has been reviewed by and is acceptable to Transport Canada.

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Pratt & Whitney Canada
A United Technologies Company

29 January 2010

P&WC S.B. No. 1703R6

REVISION TRANSMITTAL SHEET
TURBOPROP ENGINE MODEL PT6A

SUBJECT: Pratt & Whitney Canada Service Bulletin No. PT6A-72-1703, Rev. No. 6, dated Jan 29/2010 (P&WC S.B. No. 1703R6) OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

Replace your existing copy of this service bulletin with the attached revised bulletin. Destroy the superseded copy.

Please retain this Revision Transmittal Sheet with the revised bulletin.

SUMMARY: This service bulletin is revised to:

- Updatet Para. 1.A., Effectivity and Para.1.D., Description.
- Updated Para.1.E., Compliance and Para.1.J., References to delete reference to Gen-011 and add references to SIL PT6A-146 and SB1669.
- Revised Para.3.A., Accomplishment Instructions.
- Revised Para 4, Appendix. and added Figure Option B - Yearly Operator Report.

EFFECT OF REVISION ON PRIOR ACCOMPLISHMENT:

None.

NOTE: A black bar in the left margin indicates a change in that line of text or figure.

REVISION HISTORY:

Original Issue: Oct 29/2001
Revision No. 1: Nov 13/2001
Revision No. 2: Jun 21/2004
Revision No. 3: Oct 31/2006
Revision No. 4: Mar 15/2007
Revision No. 5: Nov 14/2007
Revision No. 6: Jan 29/2010

PRATT & WHITNEY CANADA

SERVICE BULLETIN

P&WC S.B. No. 1703R6

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

1. Planning Information

A. Effectivity

PT6A-114 Engines.
PT6A-114A Engines.

NOTE: This service bulletin supersedes P&WC S.B. No. 1003 for the models listed.

B. Concurrent Requirements

None.

C. Reason

This service bulletin:

- Provides a recommended basic operating TBO;
- Specifies a recommended initial HSI frequency; and
- Describes the TBO extension/evaluation process.

D. Description

(1) Definitions:

- The Basic Industry TBO is the P&WC recommended TBO per this service bulletin which is applicable to all operators.
- The Fleet TBO is the TBO level which individual operators have attained for engines of the same model in their possession only.
- The Engine TBO is the TBO applicable to a specific engine per the Industry TBO or Fleet TBO or a recommended TBO by P&WC for a particular set of conditions.
- The term ‘‘hours’’ in this document is the Engine Flight Hours (EFH).

(2) TBO recommendations take into consideration the average effect of the many variables affecting overhaul life, such as:

- Average flight duration;
- Percentage of time at any given power level;
- Climatic conditions and environment;
- Maintenance practices;
- Utilization; and
- Engine modification standards.

1. Planning Information (Cont'd)

(3) Under extreme conditions of very low utilization coupled with continuous operation in agricultural spraying, salt water atmosphere or heavy sand and dust environments, periodic inspections in accordance with the applicable maintenance instructions may indicate maintenance action prior to the recommended overhaul life.

(4) The TBO interval may be extended with the approval of the operator's Airworthiness Authority. The minimum requirements for engine TBO extension or for fleet TBO extension are described in the Para. 3. Accomplishment Instructions.

E. Compliance

The inspection intervals and overhaul periods provided in this bulletin are the manufacturer's recommendations. Airworthiness authorities normally require operators to follow these recommendations unless alternative arrangements have been made between the operator and the manufacturer, and approved by the operator's local airworthiness authority.

F. Approval

Transport Canada has reviewed and approved the technical contents of this Service Bulletin.

NOTE: The service life values quoted herein are determined by the limiting values stated on the Pratt & Whitney Canada (P&WC) drawings which form part of the Department of Transport Aircraft Engine Type Approval for the applicable engine model. These limiting values are based on the use of P&WC recommended components installed on/in the engine. Use of other than P&WC recommended components may reduce the life limits.

G. Weight and Balance

None.

H. Electrical Load Data

Not changed.

I. Software Accomplishment Summary

Not applicable.

J. References

Applicable PT6A Technical Manuals
PWA Overhaul Standard Practices Manual P/N 585005

1. Planning Information (Cont'd)

P&WC S.B. No. 1002, 1505, 1510 and 1669
Service Information Letter No. PT6A-107
Service Information Letter No. PT6A-146
Service Information Letter No. DELETED
Service Information Letter No. GEN-055
Service Information Letter No. PT6A-122

K. Publications Affected

None.

L. Interchangeability and Intermixability of Parts

Not applicable.

2. Material Information

A. Industry Support Information

Not applicable.

B. Material - Cost and Availability

Not applicable.

C. Manpower

Not applicable.

D. Material Necessary for Each Engine

Not applicable.

E. Reidentified Parts

None.

F. Tooling - Price and Availability

Not applicable.

2. Material Information (Cont'd)

3. Accomplishment Instructions

A. Basic Time Between Overhaul (TBO) Recommendations:

(1) The basic industry TBO for all PT6A-114 and PT6A-114A engines is 3,600 hours.

NOTE: DELETED.

(2) Engines that are within the basic recommended TBO and that have been maintained or stored per maintenance manual requirements have no related calendar time limits.

(3) Rotor component life limitations outlined in the latest revision of P&WC S.B. No. 1002 override TBO considerations.

(4) The Hamilton Sundstrand fuel pump may be operated to the engine TBO (basic or extended, as applicable).

(5) The engine accessories that follow may be operated to the engine TBO (basic or extended, as applicable) plus 500 hours.

FCU
Fuel Heater
Propeller Governor
Ignition Exciter
Compressor Bleed Valve
Flow Divider/Starting Control Installation
Fuel Pump (Argo-Tech only)

NOTE: Where accessories are removed (for repair or other reason) and subsequently reinstalled, operating time since new or overhaul must be recorded on the repair tag.

(6) The basic engine TBO can be extended, subject to the approval of the operator's Airworthiness Authority (Ref. Para. 3.B.).

(7) **For engines PRE-SB1669 configuration** the compressor turbine disk and blade set must be sent for an inspection per the overhaul manual instructions at the intervals that follow:

NOTE: This inspection must include Non-Destructive Testing (NDT) and stretch measurement.

(a) Compressor turbine disk with full set of new blades installed at last shop visit, inspect within 5,000 hours.

3. Accomplishment Instructions (Cont'd)

(b) Compressor turbine disk with full or partial set of previously run compressor turbine blades installed, inspect within 3,000 hours since last compressor turbine blade inspection.

(8) **For engines POST-SB1669 configuration**
the compressor turbine disk and blade set must be inspected per the overhaul manual at the engine basic TBO or extended, as applicable.

NOTE: This inspection must include Non-Destructive Testing (NDT) and stretch measurement.

(a) Compressor turbine blades P/N 3072791-01 must be replaced at or before 10,000 hours

(9) **For PT6A-114A engines Pre-SB1510 configuration**
Incorporate the third-stage compressor-stator assembly in accordance with P&WC S.B. No. 1510 at overhaul.

B. TBO Extension Recommendations

(1) For operators with an average utilization higher than 300 hours/year, P&WC can provide recommendations for TBO extensions by one of the two options that follow:

(a) **Option A - Fleet TBO Extension**
An operators' full fleet of similarly operated and maintained engines, covered by this SB, can have its TBO escalated in 500-hour increments based on a review of the condition of the hardware from an engine inducted for overhaul. The recommendation is based on a satisfactory overhaul sample. Refer to the Appendix Para. 4.A., 4.B., 4.C. and 4.D.

(b) **Option B - Engine-Specific TBO Extension**
The TBO of an individual engine can be increased, subject to the evaluation of the configuration, condition and method of operation of this engine. Refer to the Appendix Para. 4.A., 4.B., 4.C. and 4.E.

(2) TBO Extension recommendations that were approved prior to issue of this SB, per P&WC SB No. 1703 revisions 0 to 5, P&WC S.B. No. 1003 revisions 0 to 27, or per AGTOIL 32 are not affected and remain valid, with the conditions, restrictions, and references stated at the time they were provided.

(3) P&WC will no longer endorse requests for on-condition TBO programs on PT6A engine models.

(4) TBO extension recommendations from P&WC are subject to approval of the operator's local airworthiness authority.

3. Accomplishment Instructions (Cont'd)

(5) The TBO established by individual operators and/or for individual engines is independent of the TBO published for the industry.

C. Hot Section Inspection (HSI) Frequency Recommendations:

(1) P&WC recommends to do the HSI within 50 hours of the scheduled HSI interval. The HSI interval does not increase, as the TBO is escalated.

(2) The recommended scheduled HSI interval is 1,800 hours.

(3) **For engines PRE-SB1669 configuration:**

(a) P&WC further recommends that, at each HSI, operators submit a two-CT blade sample for metallurgical evaluation at an overhaul facility (Ref. Pratt & Whitney Standard Practices Manual PN 585005).

NOTE: On the basis of individual service history, P&WC can provide an exemption from this recommendation to those operators who demonstrate a maintenance program encompassing fuel nozzle refurbisment, borescope inspection and engine condition trend monitoring (ECTM®). Ref. SIL PT6A-146 for additional details.

(b) If the metallurgical evaluation is not acceptable, replace the complete set of CT blades with POST-SB1669 blades.

(c) If the metallurgical evaluation is acceptable, a maximum of 10 blades can be replaced with PRE-SB1669 blades if they are rejected for reasons other than overtemperature or creep. If more than 10 blades are rejected, the complete set of CT blades must be replaced with POST-SB1669 blades.

(4) Alternatively, the HSI frequency can be based on Engine Condition Trend Monitoring (ECTM®) in accordance with the Service Information Letter (S.I.L.) Gen-055 "Guidelines and Standards for Utilizing the Engine Condition Trend Monitoring (ECTM®)" and Service Information Letter (SIL) PT6A-122 "Web-Based Engine Condition Trend Monitoring (WebECTM®) Services".

(5) If trend monitoring is introduced part way through engine life, a compressor wash and HSI must be accomplished to establish a performance base line.

4. Appendix

NOTE: This Appendix provides the procedures and requirements to obtain TBO extension recommendations from P&WC.

A. General Considerations for TBO Extension Recommendations

4. Appendix (Cont'd)

(1) A TBO extension recommendation from P&WC is based on both the operator's procedures and experience and on P&WC experience. P&WC experience is based on:

(a) Engines built only with new P&WC recommended components, components refurbished by P&WC owned shops, or components refurbished by P&WC recommended shops per P&WC procedures.

(b) Factory built engines or engines overhauled/repaired at a P&WC service center or a P&WC Distributor and Designated Overhaul Facility (DDOF).

(c) As P&WC experience grows, the TBO extension requirements and limitations may be adjusted accordingly.

(2) An engine maintains its TBO extension recommendation on either program as long as it is operated within the limitations of the relevant aircraft operating manuals and is maintained in accordance with the appropriate P&WC Maintenance Manual and the terms of this S.B.

NOTE: P&WC reserves the right to withdraw a TBO recommendation in instances where engine abuse or non-compliance with this recommendation are reported.

(3) If the engine was put in storage or was unused for an extended period in the time since its last overhaul (or since new if not previously overhauled), there must be documented evidence that the engine has been preserved per the engine Maintenance Manual.

(4) Extension recommendations are only transferable between operators under circumstances described in option A and B. (Ref. Appendix Para. D and E), as applicable.

(5) Recommendations for extension are subject to limitations including the maximum numbers of years between overhauls (Ref. Appendix Para. D and E).

(6) TBO extension recommendations from P&WC are subject to fees per S.I.L. No. PT6A-107.

(7) TBO extensions, recommended by P&WC, do not affect the applicable Warranty and Service Policy originally supplied with the engine. P&WC will continue to use the basic industry TBO (refer to Para. A.(1)) to calculate the pro-rata credit and the benefits per the Primary Parts Service Policy and/or the Extended Engine Service policy.

4. Appendix (Cont'd)

B. Assembly and Component Records:
TBO extensions incorporate limitations on the life of certain components. The operator and/or the Maintenance Organization (M.O.) selected by the operator must have a system to log the total accumulated time, i.e. Time Since New (TSN), and the Time Since Overhaul (TSO) of the following assemblies and components:

(1) Gas Generator Section and Power Section times and cycles since new and since last overhaul;

(2) Accessories time since new or since last overhaul;

(3) Total cycles of life limited rotors (Ref. P&WC S.B. No. 1002);

(4) Total hours since new for the components that follow:

- The mainline ball bearings (bearings No. 1 and No. 4);
- The power turbine blades;
- The compressor turbine blades,
- The first stage sun gears; and
- The first stage planet gears.

NOTE: For non-serialized turbine blades, the total hours since new must be based on the oldest installed blade. For example, if a complete new set of blades is installed at overhaul and 18 blades are replaced at TSO = 1800 hrs, the total time on the entire blade set will still be considered 1800 hrs, even though the 18 newly installed blades have zero time. Refer to Para. 3.A.(7) for additional requirements related to compressor turbine blade inspection times.

C. Configuration Records
P&WC makes available product improvements through the issuance of Service Bulletins (S.B.). The operator and/or the maintenance organization selected by the operator must have a system to log S.B.s that are incorporated in each engine. In particular, the following are considered especially valuable for operators on extended TBO:

P&WC S.B. No. 1427	PT Containment Ring (PT6A-114)
P&WC S.B. No. 1430	Exhaust Duct and No. 3 Bearing Cover
P&WC S.B. No. 1434	Combustion Chamber & Large Exit Duct
P&WC S.B. No. 1446	External Scavenge Pump
P&WC S.B. No. 1510	Third Stage Compressor Stator (See Note 2)

4. Appendix (Cont'd)

P&WC S.B. No. 1669 Compressor Turbine Blades (PT6A-114A)

NOTE: 1. Refer to each service bulletin for individual engine model applicability.

NOTE: 2. P&WC S.B. No. 1510 is only required for PT6A-114A Engines with a compliance category of 5 per the SB instructions.

NOTE: 3. DELETED

D. Option A - Fleet TBO Extension by Overhaul Sample Evaluation

(1) P&WC may provide extension recommendations for the TBO of an operator's fleet of similarly operated and maintained engines. The condition of the engines examined at overhaul is the primary means of validating that the specific owner is operating and maintaining the engines in a manner that warrants extending the TBO interval for the specific fleet.

(2) The time limits applicable under this program are as follows:

TBO Limit:	8,000 hrs
Calendar Limit:	Engines may operate at the extended TBO for a maximum period of 12 years since new or since overhaul as applicable, or as otherwise agreed in writing by P&WC.

(3) To make sure that engine durability is maintained as the engines are operated into their subsequent extended overhaul intervals, the components listed in the Appendix, Para. 4.B.(4), that are used for engine reassembly at overhaul, must not have more than 12,000 hours since new. Also, all the service bulletins listed in the Appendix, Para. 4.C. must be incorporated in the build of the sample engine and at the next overhaul of other engines in the fleet for which the TBO extension is applicable.

NOTE: Refer to paragraph 3.A.(7) and (8) for specific requirements related to the compressor turbine blades.

(4) Normal TBO extension recommendations are 500 hours per sample submitted. For fleets of more than 10 engines, two samples are required for recommendations above 6,000 hours.

(5) Requirements applicable to the sample(s):

(a) The sample must have a Time Since Overhaul (TSO) that is within 250 hours of the current TBO period. Engines that have more hours than the current P&WC recommended TBO are also acceptable but the extension will be based on the currently recommended P&WC TBO.

4. Appendix (Cont'd)

(b) The sample must have been operated by the current operator for the majority of the TBO period (i.e. for more than 50% of the current TBO interval).

(c) The sample engine must not have had a shop visit for major repairs (Overhaul Manual level) during the current TBO interval (i.e. only Maintenance Manual level tasks and repairs have been carried out).

(d) The operator must complete the fleet TBO Evaluation Sample Request Form - Option A (Ref. Fig. 1, Sheet 1) and the fleet evaluation form (Ref. Fig. 1, Sheet 2) and submit them to their DDOF for forwarding to P&WC.

(e) The sample engine must be sent to a P&WC DDOF for the TBO evaluation. The evaluation requires the engine to be disassembled and reviewed, prior to cleaning the hardware, to determine if the condition of the parts is such that they could have stayed in service for another 500 EFH. The P&WC DDOF will forward the sample request form, fleet evaluation form and TBO evaluation report (Ref. Fig. 1) to P&WC for review and request a TBO extension. A successful sample will result in a letter from P&WC to the operator stating that a TBO extension of 500 EFH is recommended, subject to the approval of the operator's Airworthiness Authority.

NOTE: 1. When shipping an engine to a P&WC DDOF as a sample, operators should state that it is a sample and request a TBO extension evaluation report.

NOTE: 2. Forward all documents to pt6atboevaluation@pwc.ca

(6) The owner/operator can make a request for a TBO contingency of up to 200 EFH directly to their Airworthiness Authority, for the remaining engines in the fleet. This will permit continued operation beyond the current TBO interval, while the sample engine is evaluated and overhauled, provided that engine performance remains satisfactory and a borescope inspection of the hot section is performed in accordance with the applicable P&WC Maintenance Manual.

(7) For previously submitted samples that were rejected, operators must present what actions were taken to correct the situation.

(8) The extended TBO may apply to other eligible engines in the operator's fleet covered by the same TBO S.B., or by P&WC S.B. No. 1403, 1803 or 12003.

(9) Extended TBO intervals for engines which were added to the fleet from another operator are subject to the pro-rating formula in Para. (14). This formula must be used again when a fleet TBO extension is granted (Ref. Para. 14, Example 2).

(10) The TBO extension process can be repeated when the next engine reaches the new escalated TBO interval.

TBO Evaluation Sample Request Form

REQUESTING PARTY DATA

Company name: _____ (Operator)

Company address: _____

_____

_____

Telephone number: _____

Facsimile number: _____

Company contact: Mr./Mrs. _____

Title: _____

Telephone number: _ _____ Ext.: _____ (If other than company number)

Maintenance Facility: _____ (if other than owner)

Contact name: _____

Title: _____

Telephone number: _____

Facsimile number: _____

SAMPLE ENGINE DATA

- Engine Model _____ Engine Serial Number: _____
- Total time since new: _____ hours
- Total time since overhaul: _____ hours
- Current Operator TBO _____ hours
- Was this sample engine operated by the requesting party for the totality of the specified TBO period? Yes___ No ___

If not, please provide the total hours accumulated by the requesting party during this last TBO period. _____ hours

- Did this engine undergo major repair (requiring removal from aircraft) during this last TBO period? Yes___ No ___

If yes, please provide details of repair performed:

1. Reason for removal _____
2. Total time (since overhaul if applicable)of sample engine at time of major repair _____ hours
3. List of parts replaced by the repair agency who performed the repair

If this sample does not meet the minimum eligibility criteria (Ref. 4.A.(4)), please explain why you believe that the engine should still be considered as an eligible sample for the TBO evaluation process. Include attachments as necessary.

_____

_____

I understand that the sample engine submitted for the purpose of TBO evaluation must meet minimum eligibility criteria for it to be considered as an acceptable sample.

I hereby attest that the information provided herein is exact to the best of my knowledge and that I may be requested to provide additional data to support the sample engine's eligibility to this program.

Completed by: _____ Date: _____

C85410A

TBO Evaluation Sample Request Form
Figure 1 (Sheet 1 of 2)

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

List other engines in the fleet for which the TBO extension requested would be applicable (Ref. paragraphs 4.A.(1), 4.A.(5) and 4.D.).

Engine Model	S/N	TTSN	TTSO	Time * Date	TTSO at Induction	Shop Where Last O/H Carried Out

*** Date on which the engine times were recorded.**

C109317

TBO Evaluation Sample Request Form
Figure 1 (Sheet 2)

4. Appendix (Cont'd)

(11) Certain circumstances may warrant a higher TBO increase increment. These will be reviewed on a case by case basis upon written request.

(12) P&WC reserves the right to request additional information on the sample condition, or further TBO extension samples, and this request does not herein imply that P&WC will automatically recommend the extension.

(13) TBO escalation recommendation is subject to the approval of the operators local Airworthiness Authority.

(14) Transfer of Fleet TBO Extension Recommendations
Fleet TBO extensions are valid only as long as the operator, the Maintenance Organization (M.O.), and the typical mission remain unchanged. The following conditions apply for P&WC to transfer the recommendation to a new M.O., a new operator, or a new application (typical mission):

NOTE: If an operator chooses a new M.O. that already supports operators who have approval for engines covered by this SB and to the same or higher TBO, no action is required.

(a) For changes for an engine operating, or to be operated, under a fleet extended TBO, P&WC recommends to use a pro-rating formula. Regulatory authorities generally accept this formula. The TBO applicable to an engine in these circumstances is the average of the fleet TBO formerly applicable and the fleet TBO separately established for the new combination of operator, M.O. and mission for the same engine models. It is then weighted on the basis of the time remaining to overhaul under the original operation. The formula for this purpose is:

$$X = Y * a/b$$

where X = time remaining to overhaul on new program (buyer's TBO)

Y = time remaining to overhaul on previous program (seller's TBO)

a =TBO interval on new program (buyer's TBO)

b = TBO interval on previous program (seller's TBO)

Example 1: An aircraft is transferred (by sale or lease) between two operators. The previous operator's engine TBO is 8,000 hours and the new operator's engine TBO is 5,000 hours and the engine has a time since overhaul (TSO) of 6,000 hours

4. Appendix (Cont'd)

Time remaining to overhaul on the previous program:

Y = 8,000 - 6,000 = 2,000 hours.

Time remaining to overhaul on the new program:

X = Y * a/b

X = 2,000 * 5,000/8,000 = 1,250 hours

Therefore this engine may be operated to a TBO interval of 7,250 hours

Example 2: An operator obtains a recommendation from P&WC for a TBO extension from 5,000 to 5,500 hours, but one of the engines was purchased from an operator with a TBO of 8,000 hours and is currently running to a TBO of 7,250 hours (Ref. Example 1). The new TBO interval will be calculated using the pro-rating formula and the TSO of the engine at entry to the new operator's fleet (6,000 hours).

Time remaining to overhaul on the previous program:

Y = 8,000 - 6,000 = 2,000 hours.

Time remaining to overhaul on the new program:

X = Y * a/b

X = 2,000 * 5,500/8,000 = 1,375 hours

Therefore this engine may be operated to a TBO interval of 7,375 hours.

4. Appendix (Cont'd)

E. Option B - Engine Specific Extension by Evaluation of Configuration, Condition and Operation

(1) General
TBO extensions can be recommended under this option for specific engines based on a full evaluation of their configuration, condition, and operation. Operators and engines must meet minimum eligibility criteria and the engines must be individually registered into the P&WC engine-specific TBO extension program, and maintained per specific procedures set forth hereunder. Registration is recommended as early as possible when new or after overhaul, but is not subject to a time limit other than the maximum limits of this program. Refer to the Appendix, Para. 4.E.(4).

(2) Application Procedure:
To apply for a TBO extension recommendation for an engine per this program, contact the local P&WC Field Service Representative (FSR). The P&WC Customer FIRST Centre may be contacted to get the name of the local FSR. Refer to the cover page of this S.B.

(3) Missions that are not Eligible
The following missions are not considered applicable to this program:

NOTE: For confirmation of eligibility, please refer the proposed mission to your local P&WC FSR.

(a) Agricultural;

(b) Skydiving operations;

(c) Fire fighting; or

(d) Other missions which involve an unusually high ratio of cycles to flight hours or unusually protracted use of high power.

(4) Time Limits

Overhaul:	6,000 hrs or 12 years, whichever comes first, since new or since overhaul as applicable.
	3,000 hrs or 6 years, which ever comes first, since mid-life inspection (Ref. Appendix Para. 4.E. (8))
HSI:	May be part of the mid-life inspection (Ref. Appendix Para. 4.E.(8)), or per ECTM or disk/blade life expiry requirement. If per ECTM®, perform at least once in a 5,000 hour period.

4. Appendix (Cont'd)

(5) Eligibility - Operator and Maintenance Organization
To be eligible to request an engine TBO extension recommendation, an operator must provide evidence that the operator's Maintenance Organization (M.O.) has addressed the following maintenance procedures:

(a) The M.O. must be capable of performing all line maintenance activities, including all activities listed in the Maintenance Manual, periodic inspection table, borescopic inspection, compressor and turbine washing, etc. It must also be capable of, or have access to, other aircraft maintenance that can have an effect on the durability of the engine, such as instrumentation calibration and propeller balancing. To demonstrate capability, the M.O. must have available all the applicable tooling and must have personnel specifically trained to perform these tasks and/or must have service contracts with facilities that have such applicable tooling and trained personnel.

(b) The operator/M.O. must have a quality system that records all snags and maintenance activities related to the operation of the engine. This also applies to engine-mounted aircraft accessories such as the propeller, the overspeed governor, and the starter-generator. Records must be available for review by P&WC on request.

(6) Eligibility - Engines:

(a) Engines must incorporate all service bulletins in the Appendix, Para. 4.C. at the first opportunity and no later than the mid-life inspection. Also, components listed in the Appendix, Para. 4.B.(4) must have no more than 12,000 hours total time since new, at induction and through the applicability of the program.

(b) Records for engine events that required unscheduled inspections must be available for review by P&WC. This is to ensure compliance with all Maintenance Manual requirements.

(c) P&WC recommends that the aircraft is equipped with an approved exceedance and engine monitor. Engine Condition Trend Monitoring (ECTM) requirements can be found in SIL's GEN-055 and PT6A-122.

NOTE: DELETED

(7) DELETED

4. Appendix (Cont'd)

(8) Mid-Life Inspection
Engines registered in the engine specific TBO extension program are subject to a mid-life inspection. Schedule between 2,500 hours and the operator's TBO (Ref. Note 3). Requirements need not be carried out concurrently, and the HSI portion may be scheduled per the Appendix, Para. 4.E.(4). When scheduling this inspection, operators must also consider other limitations such as the time limits per the Appendix, Para. 4.E.(6), and cyclic limits per P&WC S.B. No. 1002. Do the inspection as follows:

NOTE: 1. For P&WC to provide a TBO extension recommendation, the various inspection procedures must be performed by a P&WC DDOF facility/representative/M.O. recommended by P&WC for the procedures carried out.

NOTE: 2. Unless otherwise specified, Maintenance Manual procedures and limits apply.

NOTE: 3. Operator's TBO refers to the engine basic TBO or extended TBO per Option A as applicable, prior to enrollment in Option B.

(a) Verify compliance with all applicable inspection SBs.

(b) Do a full hot section inspection, including all applicable requirements described in the Maintenance Manual (72-00-00). The exposed gas generator surfaces must be free of corrosion and all missing diffuser ducts must be replaced. Compressor turbine and power turbine blades must show no or minimal sulphidation (stage 1 maximum). Engine performance after this inspection must meet the aircraft power assurance requirements with a minimum of 20°C (36°F) ITT margin and 0.5% rpm (200 rpm) Ng margin.

(c) For engines Pre-SB1669 configuration:
Do the CT disk assembly overhaul level inspection (Ref. Para. 3.A.(7)) at this time. Include an overtemperature exposure check per the overhaul manual (72-50-02, Light Overhaul, Overtemperature, Category B (All Conditions Other than Starting)). On the basis of individual service history, P&WC can provide an exemption from this recommendation to those operators who demonstrate a maintenance program encompassing fuel nozzle refurbishment, borescope inspection and engine condition trend monitoring (ECTM). Ref. SIL PT6A-146 for additional details.

NOTE: DELETED

(d) Make sure the compressor is free of corrosion.

(e) Repair compressor foreign object damage (FOD).

4. Appendix (Cont'd)

(f) Inspect the AGB starter generator drive pad splines for wear.

(g) Make sure the external surfaces meet all corrosion and damage requirements. Repair gas generator and cast housing surfaces with touch-up paint. Clean and inspect the gas generator drain valves.

(h) Remove and inspect the external pneumatic hoses and tubes (Px and Py tubes) for cracks or other damage. Tubes must show no signs of deformation (compared to a new tube).

(i) Perform all oil system checks, for example

1 MOP setting

2 Torque meter functional check

(j) Accessories require inspection per Appendix Table 1.

TABLE 1, Accessories Option B

System Accessory	Recommended Configuration	Mid-Life Requirement (Option B only)	Other Requirements
Propeller Governor	SB1470	Shop Functionality Check	
Fuel Heater		Shop Functionality Check Replace element packings	
Fuel Pump		Shop Functionality Check Replace Pump to FCU coupling	
Flow		Shop Functionality Check	
Fuel Nozzles	SB1396 (PT6A-114)	Overhaul (Except for nozzles on an exchange program).	
Bleed Off Valve	SB1581 (PT6A-114A)	For Pre-SB1581: Replace diaphragm, clean and re-calibrate	For Pre-SB1581: Inspect per the MM annually
T5 Harness		Inspect per MM	

4. Appendix (Cont'd)

TABLE 1, Accessories Option B (Cont'd)

System Accessory	Recommended Configuration	Mid-Life Requirement (Option B only)	Other Requirements
T5 Thermocouple		Inspect per MM	
T1 Thermocouple		Inspect per MM	

(k) Inspect all controls, linkages, leads and connectors for chafing, corrosion, cracks. Do all controls adjustments and checks specified in the Maintenance Manual (Ref. 71-00-00, Power Plant - Adjustment/Test).

(l) Check the temperature indicating system, including the T1 probe trim resistance.

(m) Check the operation and/or calibration of all engine related instrumentation (ITT, Tq, Ng, Np). Refer to the applicable Aircraft Maintenance Manual (AMM).

(9) Operation and maintenance requirements after registration in the program. Maintain the engine per the Engine and/or Aircraft Maintenance Manual (AMM). In addition, an approved maintenance plan will include the items that follow:

(a) Monitor the engine performance as per the ECTM® program (Ref. Service Information Letter (SIL) Gen-055 and PT6A-122).

(b) Wash the engine compressor and turbine at intervals that are consistent with the environment in which the engine operates (Ref. Maintenance Manual 71-00-00, Power Plant - Cleaning).

NOTE: Contact the local P&WC FSR for information on the best interval.

(c) At the periodic fuel nozzle inspection, record the nozzle positions per the applicable Maintenance Manual. The concurrent borescope inspection of the hot section must cover the area in line with any nozzle found unserviceable.

NOTE: For nozzle assemblies on an exchange program, do the inspection within 400 hours of removal of nozzles reported as unserviceable.

(d) Inspect the compressor first stage blades for FOD at an interval not more than 1,000 hours or one year whichever occurs first and blend per the Maintenance Manual.

4. Appendix (Cont'd)

(e) Do all control adjustments and checks annually per the Maintenance Manual (Ref. 71-00-00, Power Plant - Adjustment/Test).

(f) Balance the propeller per the Aircraft Maintenance Manual (AMM) or the propeller Component Maintenance Manual (CMM) at an interval not more than 1,000 hrs or one year.

(g) Check the operation and/or calibration of all engine related instrumentation at intervals not more than 1,000 hrs or one year per the Aircraft Maintenance Manual (AMM). (ITT, Tq, Ng, Np).

NOTE: This check is not required if the engine has an exceedance monitor.

(h) Supply a report each year to P&WC with a status update relative to these requirements (Ref. Fig. 2).

(10) DELETED.

(11) DELETED

(12) Mission Consistency
The mission that the engine is used for and the area of operation must remain as specified at the time of induction. (Ref. Appendix, Para. 4.E.(3)).

(13) Transfer of Engine Specific TBO Recommendations
For changes for an engine registered under the P&WC engine-specific TBO extension program, the operator/owner can apply to P&WC for a transfer. If the operator, its mission, and its M.O. are already established as eligible for the engine models per this SB, no further action will be required. Otherwise, it is necessary to establish the eligibility of the new operator, application, and/or M.O. before the recommendation can be extended to these new conditions.

F. Transfer from one TBO Extension Option to the Other

(1) Operators that have extended their fleet TBO per Option A, or prior to November 2002, may apply for an individual engine TBO extension per Option B. Refer to the Appendix, Para. 4.E.

(2) Operators that have extended the TBO of individual engines per Option B may consider submitting these engines as samples per Option A. Refer to the Appendix, Para. 4.D.

(a) Each acceptable sample provides a fleet extension of 500 hours relative to the current P&WC recommended fleet TBO for the operator.

PT6A Engine Specific TBO Extension (Option B)
Operator Yearly Report

This form is to be completed yearly by PT6A operators registered in the 'Engine Specific TBO Extension Option B' to support the yearly operation and maintenance requirements of the program.

OPERATOR DATA

Name (owner of engine): _____

Maintenance Facility (if other than owner): _____

ENGINE DATA

Engine Model: _____ **Engine S/N:** _____

TSN: _____ **TSO:** _____ **Current TBO interval:** _____

A) ECTM

Use of ECTM program: ☐ **Yes**

Data review by trained/qualified technicians: ☐ **Yes** **Frequency of reviewed:** _____

Last time/TSN completed: _____

B) ENGINE WASH

Interval for compressor wash: _____ **Last time/TSN completed:** _____

Interval for turbine wash: _____ **Last time/TSN completed:** _____

C) FUEL NOZZLES INSPECTION

Interval for nozzles inspection: _____ **Last time/TSN completed:** _____

Concurrent borescope inspection of hot section: ☐ **Yes**

D) COMPRESSOR BLADES INSPECTION

Interval for blades inspection: _____ **Last time/TSN completed:** _____

E) CONTROL AND POWER ADJUSTMENTS/CHECKS

Interval for adjustments/checks: _____ **Last time/TSN completed:** _____

F) PROPELLER

Interval for propeller balance: _____ **Last time/TSN completed:** _____

G) ENGINE INSTRUMENTATION (ITT, NG, Tq)

Interval for gauges calibration: _____ **Last time/TSN completed:** _____

H) MISSION CONSISTENCY

Mission that the engine is used for and area of operation have remained as specified at induction of TBO extension? ☐ **Yes** ☐ **No**

I hereby attest that the information provided herein is exact to the best of my knowledge and that I may be requested to provide additional data to support yearly requirements of Option B TBO Extension.

Completed by: _____ **Date:** _____

Please return report to: **Pratt & Whitney Canada**
Attn: Manager Serv. Engineering – Small Turboprops (01PD4)
100 Marie–Victorin
Longueuil, Quebec
Canada, J4G1A1
Fax: (450) 647–7567 Email: pt6atboevaluation@pwc.ca

C109297

Option B - Yearly Operator Report
Figure 2

4. Appendix (Cont'd)

(b) The recommendation will apply to engines in the fleet that meet requirements per Option B. Refer to the Appendix, Para. 4.E.

(c) Recommendations in cases where some of the samples submitted were not in satisfactory condition may be lower and/or take into consideration corrective actions put in place.

G. **Minimum Engine Parameters Monitoring System Requirements:**

NOTE: For more information or clarification, contact your local P&WC Field Support Representative (FSR).

(1) **ENGINE AND AIRCRAFT PARAMETERS:**
The system must record and store data from all the parameters that follow:

- Inter Turbine Temperature (ITT)
- Torque (Tq);
- Gas generator speed (Ng);
- Propeller speed (Np);
- Fuel flow (Wf);
- Indicated Outside Air Temperature (IOAT);
- Altitude; and
- Indicated Airspeed (IAS).

(2) **SAMPLING AND RECORDING FREQUENCY:**
The system must monitor, in real time, all of the parameters with a minimum sampling frequency of 5 Hz and record the data at least twice per second during an exceedance event. System software level "C" is recommended. The aircraft Original Equipment Manufacturer (OEM) and P&WC can negotiate acceptable alternative software levels.

(3) **SIGNAL ACCURACY:**
The accuracy of the signal processing, which includes the sensor where applicable, should be within the tolerances that follow:

TABLE 2, Signal Accuracy

Parameter	Tolerance
Inter-Turbine Temperature (ITT)	±5°C

4. Appendix (Cont'd)

TABLE 2, Signal Accuracy (Cont'd)

Parameter	Tolerance
Engine Torque (TQ)	±1%
Compressor (Ng) and Propeller (Np) speed	±0.2%
Fuel Flow (Wf)	±2.5%
Indicated Outside Air Temperature (IOAT)	±2°C
Altitude	±250 ft
Indicated Air Speed (IAS)	±10 knots

(4) **DATE AND TIME:**
For each engine parameter exceedance event and for ECTM® readings, the system must record all the parameters with Date and Time. The device that records the data must keep it during system power-off intervals.

(5) **EVENT DEFINITION:**
The system program must record exceedances for the specific PT6A engine model per the applicable P&WC Maintenance Manual limitations.

(6) **VISUAL INDICATION:**
The system must have a visual indication to the pilot or maintenance personnel to tell them that an engine event occurred and that there may be a maintenance action prior to the next flight.

(7) **SIMULTANEOUS EVENTS:**
The system must have the capability to record simultaneous or multiple events for each parameter monitored, with the minimum requirements that follow:

(a) Identify the affected parameter.

(b) Record the Date and Time that each event starts and ends.

(c) System shall be capable of recording all parameters identified above for a period of time prior to and after an engine exceedance event in a manner that allows for a complete reconstruction of the event.

(8) The examples that follow show methods on how to reconstruct and record simultaneous or multiple events:

(a) Method 1: The system buffers data and then writes it to the permanent memory when necessary.

4. Appendix (Cont'd)

(b) Method 2: System flags are defined at specific set points, which occur before the event definition. If the actual value of a parameter crosses the value defined by the flag, the system starts or stops storing data as required.

(9) **ALLOWABLE DOWNTIME (System or specific elements of system in-operative):** Anytime the system or elements of the system are in-operative, the maximum allowable downtime for specific parameters are as follows:

TABLE 3, Maximum Allowable Downtime

Parameter	Downtime (hours)
Entire System	20
Inter-Turbine Temperature (ITT)	20
Engine Torque (TQ)	40
Compressor (Ng) and Propeller (Np) speed	40
Any other elements not specified	150

(a) Manually record the parameters listed in 4.H.(1) at a stabilized cruise condition, daily or every 6 hours, in compliance with ECTM® requirements. Refer to S.I.L. No. GEN-055.

(10) **FIELD REPROGRAMMING:** The software must make it possible for field maintenance personnel to apply software modifications authorized by the manufacturer for the current installation.

(11) **INSUFFICIENT MEMORY:** The system must generate a notification to the pilot or maintenance personnel when there is a possibility of insufficient remaining memory to store event or trend data during the next flight.

Appendix II

TABLE 603, Hot Section Inspection

Component	Nature of Inspection
Gas Generator Case	Cracks, distortion, overheating and corrosion (Ref. 72-30-04).
Combustion Chamber Liners, Large and Small Exit Ducts	Cracks, distortion, burning, blockage of cooling holes due to repair and coating loss. Any amount of coating loss is acceptable provided burning of parent metal has not occurred (Ref. 72-40-01 and 72-50-01). Verify the cooling ring gaps.
Compressor Vane Ring Assembly, Shroud Housing	Cracks, coating loss, erosion of parent metal or impact damage. Examine vane ring cooling air inlet and outlet ports for blockage (Ref. 72-50-01).
Compressor Turbine Shroud Segments	Cracks, distortion, erosion and metal build-up (Ref. 72-50-02).
Compressor Turbine Disk Assembly	Measure radial tip clearance. (Ref. 72-50-01).
	Examine CT blades for tip rub, erosion, impact damage, coating loss, cracks, shift and circumferential movement. If a crack is found on any blade, ship the CT disk assembly to an approved overhaul facility. The complete set of blades must be discarded and replaced with a new set of CT blades (Ref. 72-50-02).
	Examine blade retaining rivets for condition.
	Dye penetrant crack check all Pre-SB1360 PT6A-135 CT blades.
Interstage Sealing Rings	Wear, fretting and distortion. (Ref. 72-50-01).
Fuel Nozzles	Dissimilarity of carbon build-up. Perform functional test (Ref. 73-10-05).
Fuel Nozzle Sheaths	Fretting wear, erosion and carbon build-up (Ref. 73-10-05).
Compressor Inlet	Remove air inlet screen, examine inlet area and struts, first-stage blades and vanes for dirt deposits, corrosion and cracks. (Ref. 72-20-00).
Trim Thermocouple	Check attachment of lugs and leads. Carry out operational check (Ref. 77-20-01).
Power Section Module	

Appendix III

PART 3C Initial Entry Inspection Items for HIGHER Time Engines

Engines may be placed on the MORE Instructions for Continued Airworthiness at any time between either new or overhaul and the accumulation of 8,000 hours since overhaul. The following items have inspection intervals which are in excess of 1,000 hours. (That is, 1055, 1505, 3005, 4105, 5005 flight hours since overhaul). Depending on when the engine was either new or last overhauled; the following items may or may NOT have reached the inspection time interval specified. If the engine or the appropriate engine components have reached these intervals; the following inspections will be necessary. If the engine records are unclear as to when each of these inspection requirements were performed last; assume that the time interval has expired and perform these inspections. If the engine records clearly show that sufficient time remains so that the engine may operate at least to the next nominal 150 hour inspection interval; then fill out the "MORE Scheduled Inspection Status Sheet" to show how many flight hours remain until EACH of these inspection are required to be performed.

REPLACE DISPOSABLE OIL FILTER

Frequency:

Perform this inspection NO LATER THAN 1055 hours after the last time this inspection was performed.

P&WC Service Bulletin Numbers 1215 and 1282 provide "disposable" oil filter elements with a 1000 hour service life. Many PT6A engines use these disposable oil filter elements. If a disposable oil filter element is used and if it is NOT subject to heavy contamination; it may be extended to 1055 flight hours, to coincide with the oil filter inspection interval.

Specifics:

If the engine is equipped with a disposable oil filter element, replace that element after no more than 1055 flight hours of use. If it is subject to heavy contamination at any time, replace the filter element.

Records requirement:

Record whether or not the engine contains a disposable / life limited oil filter element.

If the engine is equipped with a disposable oil filter element, record the date and flight hours when it was installed.

If the engine is NOT equipped with a disposable oil filter element, record the fact that the oil filter is NOT disposable and that no further action is required with respect to this particular MORE Instructions For Continued Airworthiness requirement. If the engine is NOT equipped with a disposable oil filter element, the "MORE Scheduled Inspection Status Sheet" needs to be modified to accommodate this fact.

Reference information;

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 79-20-02,

B. P&WC Service Bulletin Numbers 1215 and 1282.

P3 FILTER REPLACEMENT

Frequency:

Perform this inspection (replacement) NO LATER THAN 1055 hours after the last time this inspection was performed.

Specifics:

Replace the P3 filter. Inspect P3 filter housing for correct installation. Inspect vent hole in the filter cover to make sure it is clear of all obstructions. (The hole size is 0.029 to 0.034 inch diameter).

Federal Aviation Administration Airworthiness Directive 92-15-11 removes the P3 air filter from SOME PT6A-34 or PT6A-114 series engines. If the P3 filter has been removed, the MORE Scheduled Inspection Status Sheet will need to be modified to show that the P3 filter has been removed and therefore P3 filter inspection and replacement are not necessary. However if a P3 filter is installed; that P3 filter will need to be replaced. FAA AD 92-15-11 allows the P3 filter housing to be retained AFTER the P3 filter is removed. In this case it is still necessary to inspect the P3 filter housing and the vent hole. Alternatively, there are optional P3 line configurations which do not incorporate a P3 filter housing.

Records requirement:

Record whether or not a P3 filter is installed in the engine.

The information to be recorded is: the fact that the P3 filter was replaced, the date, and the engine flight hours. If the P3 filter has been removed, the MORE Scheduled Inspection Status Sheet will need to be modified to show that the P3 filter has been removed.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601, especially the table titled "Periodic Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-07.

BLEED VALVE ADJUSTMENT TEST

Frequency:

Perform this inspection NO LATER THAN 1505 hours after the last time this inspection was performed.

Specifics:

A. Remove bleed valve.

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 75-30-00 provides instructions for performing "Adjustment / Test" on the bleed valve. Perform that adjustment test. Repair or replace bleed valve if it does not pass test.

C. For PT6A-114A,-135,-135A engines that incorporate S/B 1504 or S/B 1619 "Vane Ring Damping Strap Assembly" only, Perform a visual inspection to see if the damping strap has shifted. If the damping strap has shifted, refer to Third Stage Compressor Stator (Vane) Assembly portion of the MORE Instructions For Continued Airworthiness.

D. Reinstall bleed valve.

Records requirement:

The information to be recorded is: the fact that adjustment test was performed on the bleed valve, the date, and the engine flight hours.

Reference information:

Additional information is provided in:

P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 75-30-00.
P&WC S/B 1504 and S/B 1619.

THIRD STAGE COMPRESSOR STATOR (VANE) ASSEMBLY (PT6A-114A, -135,-135A Engines)

Frequency:

NOTE WELL: This modification requirement does NOT apply to PT6A-34, -34AG,-34B, -36 or -114 engines. No action or logbook entries are required for PT6A-34,-34AG, -34B, -36 or -114 engines.

Perform this modification during MORE Program Initial Entry Inspection. OR if this modification was not performed earlier, perform this modification at the next 100 Hour / 150 Hour Inspection. P&WC Service Bulletin (S/B) 1504 Revision 4 and P&WC Service Bulletin 1619 Revision Original (or later FAA approved revisions) provide a (stator) Vane Ring Damping Strap Assembly which is installed around the outside of the Third Stage Compressor Stator Vane Assembly. The engine model effectivity is listed at the beginning of S/B 1504 and S/B 1619. Generally the effectivity is the earlier PT6A-114A,-135,-135A engines, but it is necessary to refer to and comply with the effectivity listed in S/B 1504 and S/B 1619. (Please note the engine model effectivity for S/B 1504 and S/B 1619 are highly similar but NOT identical).

Specifics:

COMMENT: S/B 1504 and S/B 1619 provide a method whereby the (stator) Vane Ring Damping Strap Assembly may be installed through the bleed valve mounting hole in the gas generator case. It is not necessary to remove the engine from the aircraft or to disassemble the engine in order to perform this modification.

If the subject PT6A-114A,-135,-135A engine already has S/B 1504 incorporated, no further action is necessary unless the (stator) Vane Ring Damping Strap Assembly shifts during engine operation after installation in the engine. If the subject PT6A-114A,-135,-135A engine already has S/B 1619 incorporated, no further action is necessary. If the subject PT6A-114A, -135, -135 engine does not have either S/B 1504 or S/B 1619 incorporated then it is necessary to incorporate S/B 1619. If the (stator) Vane Ring Damping Strap Assembly provided by S/B 1504 shifts during engine operation, it will be necessary to remove the (stator) Vane Ring Damping Strap Assembly provided by S/B 1504 and install the (stator) Vane Ring Damping Strap Assembly provided by S/B 1619. If the subject PT6A-114A-135,-135A engine is one of the "newer" engines and is NOT affected by either S/B 1504 or S/B 1619 no further action is necessary.

COMMENT: PT6A-114A, -135, -135 engines that incorporate P&WC S/B 1505 must also incorporate S/B 1504 or S/B 1619. However, PT6A-114A engines that incorporate P&WC S/B 1510 do not require the installation of either the S/B 1504 or S/B 1619 (stator) Vane Ring Damping Strap Assembly.

Records requirement:

The information to be recorded is: the status of the engine with respect to S/B 1504, 1505, 1510, and 1619, the date and the engine flight hours. Depending on the circumstances, the log book entry should state that one or more of the S/Bs are not applicable, or that one or more of the S/Bs have been complied with. A short note on the MORE Scheduled Inspection Status Sheet is also appropriate.

Reference Information:
Additional information is provided in:

P&WC Service Bulletin Number 1504 Revision 4 (or later FAA approved revision).

P&WC Service Bulletin Number 1505 Revision 3 (or later FAA approved revision).

P&WC Service Bulletin Number 1510 Revision 4 (or later FAA approved revision).

P&WC Service Bulletin Number 1619 Revision Original (or later FAA approved revision).

FUEL NOZZLE INSPECTION (In accordance with the OVERHAUL manual.)

NOTE: Part 3B contains the inspection of the fuel nozzles in accordance with the MAINTENANCE manual. This is the inspection of the fuel nozzles in accordance with the OVERHAUL manual. If the fuel nozzles were inspected in accordance with the OVERHAUL manual within 1200 flight hours perform the MAINTENANCE manual inspection. If the fuel nozzles were inspected in accordance with the OVERHAUL manual more than 1200 flight hours ago perform the OVERHAUL manual inspection. It is NOT necessary to perform BOTH inspections.

Frequency:

Perform this inspection NO LATER THAN 1505 hours after the last time this inspection was performed.

Specifics:

NOTE: When removing the fuel nozzles, mark the fuel nozzles to show where they were installed. This way, if a discrepant fuel nozzle is found during inspection, you will know where to look for potential secondary damage.

P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-05 provides instructions for removing and installing the fuel nozzles, the fuel nozzle adapters and the fuel nozzle sheaths. Remove the fuel nozzles, the fuel nozzle adapters and the fuel nozzle sheaths.

P&WC PT6A-34 or PT6A-114 series OVERHAUL manual, section 73-10-05 provides instructions for performing fuel nozzle "Adjustment Test" and fuel nozzle and fuel manifold sheath "Inspection Check". In accordance with the OVERHAUL manual:

A. Perform the fuel nozzle "Adjustment Test" including both "Leakage Test" and "Functional Test".
B. Inspect the fuel nozzles for burrs and similar defects.
C. Verify correct fuel nozzle part numbers.
D. Inspect fuel manifold sheaths for erosion. Eroded areas may be lightly buffed, provided final dome thickness is 0.040 inch minimum.
E. Inspect the hole in the fuel nozzle sheath adjacent to the fuel nozzle tip. This hole shall be round not ovalized, no larger than 0.193 inch diameter, and this hole shall be centered on the fuel nozzle tip.
F. Inspect the locating pin for security in the adapter and for burrs or similar defects.

Correct any defects found.

COMMENT: the intent of this item is to impose a nominal 1500 flight hour OVERHAUL interval on the fuel nozzle tips.

If it is preferred, fuel nozzles which have been OVERHAULED by either the fuel nozzle manufacturer or an overhaul facility may be installed, but the remainder of these inspections must be performed.

Reinstall the fuel nozzles, fuel nozzle adapters and fuel nozzle sheaths in accordance with the maintenance manual.

Records requirement:

The information to be recorded is: the fuel nozzle adapters and the fuel nozzle sheaths were inspected in accordance with the MAINTENANCE manual, the fuel nozzles were leakage tested and flow tested in accordance with the OVERHAUL manual, the date, and the engine flight hours.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-05.

B. P&WC PT6A-34 or PT6A-114 series overhaul manual, Section 73-10-05.

COMPRESSOR TURBINE DISK AND BLADE INSPECTION (used blades)

Frequency:

Perform this inspection NO LATER THAN 3005 hours after the last time this inspection was performed, or perform this inspection prior to the expiration of the compressor turbine disk cyclic life limit, or if you can not determine when this inspection was performed last, perform this inspection NOW, which ever comes first.

This is a NOMINAL 3000 hour inspection interval. This requirement begins when the compressor turbine blades were last inspected in accordance with the overhaul manual, and is repeated approximately every 3000 flight hours thereafter.

Specifics:

If ANY one of the compressor turbine blades were installed USED at the previous compressor turbine blade overhaul inspection or if you can NOT verify whether or not used blades were installed (otherwise see Compressor Turbine Disk and Blade Inspection (new blades)):

A. Remove the compressor turbine disk and blade assembly in accordance with the PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-02.

B. Send the compressor turbine disk and blades assembly to a facility that can perform overhaul inspection in accordance with the detailed instructions in the PT6A-34 or PT6A-114 series OVERHAUL manual, Section 72-50-02:

1. Remove the blade retaining rivets, and balance weights and rivets.
2. Remove the blades from the disk.
3. Clean the compressor turbine disk and clean the compressor turbine blades.
4. Inspect the blades using fluorescent penetrant inspection.
5. Inspect the blades for cracks, nicks, dents, pits, or erosion.
6. Inspect the blades for squealer tip height.
7. Inspect the blades for stretch.
8. Inspect blade fir trees for wear.
9. Inspect the blades for the condition of the diffused aluminide coating.
10. Inspect the disk using fluorescent penetrant inspection.
11. Inspect the disk for diametral growth.
12. Inspect the disk for fir tree wear.
13. Inspect disk surfaces for scaling caused by oxidation.
14. Inspect disk coupling splines for damage.
15. Inspect disk for surface damage.
16. Install blades into the disk.
17. Rivet the blades into the disk.
18. Grind compressor turbine blade tips.
19. Balance the compressor turbine disk and blade assembly.
20. Correct any defects found.

COMMENT: The intent of this item is to impose a nominal 3000 flight hour overhaul inspection interval on the compressor turbine disk and blade assembly.

C. Reinstall the compressor turbine disk and blade assembly into the engine in accordance with the PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-02.

COMMENT: it is frequently necessary to replace the compressor turbine blade shroud segments in order to obtain the correct compressor turbine blade tip clearance at assembly.

Records requirement:

The information to be recorded is: the fact that the compressor turbine disk and blade assembly was overhauled in accordance with the OVERHAUL manual, whether new or overhauled blades were installed, the date, and the engine flight hours. Also record the accumulated total cycles on the compressor turbine disk. In addition, record whether the Compressor Turbine Blades are coated with Silicon Aluminide or Chromium Aluminide or Platinum Aluminide or with Pack Process Diffused Aluminide.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-02.

B. P&WC PT6A-34 or PT6A-114 series overhaul manual, Section 72-50-02.

COMPRESSOR TURBINE DISK AND BLADE INSPECTION (new blades)

Frequency:

Perform this inspection NO LATER THAN 5005 hours after the last time this inspection was performed, or perform this inspection prior to the expiration of the compressor turbine disk cyclic life limit, which ever comes first.

This is a NOMINAL 5000 hour inspection interval. This requirement begins when the compressor turbine blades were installed NEW in accordance with the overhaul manual, and is repeated approximately every 3000 flight hours thereafter.

Specifics:

If EVERY one of the compressor turbine blades were installed NEW at the previous compressor turbine blade overhaul inspection (otherwise refer to Compressor Turbine Disk and Blade Inspection (used blades)):

A. Remove the compressor turbine disk and blade assembly in accordance with the PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-02.

B. Send the compressor turbine disk and blades assembly to a facility that can perform overhaul inspection in accordance with the detailed instructions in the PT6A-34 or PT6A-114 series OVERHAUL manual, Section 72-50-02:

1. Remove the blade retaining rivets, and balance weights and rivets.
2. Remove the blades from the disk.
3. Clean the compressor turbine disk and clean the compressor turbine blades.
4. Inspect the blades using fluorescent penetrant inspection.
5. Inspect the blades for cracks, nicks, dents, pits, or erosion.
6. Inspect the blades for squealer tip height.
7. Inspect the blades for stretch.
8. Inspect blade fir trees for wear.
9. Inspect the blades for the condition of the diffused aluminide coating.
10. Inspect the disk using fluorescent penetrant inspection.
11. Inspect the disk for diametral growth.
12. Inspect the disk for fir tree wear.
13. Inspect disk surfaces for scaling caused by oxidation.
14. Inspect disk coupling splines for damage.
15. Inspect disk for surface damage.
16. Install blades into the disk.
17. Rivet the blades into the disk.
18. Grind compressor turbine blade tips.
19. Balance the compressor turbine disk and blade assembly.
20. Correct any defects found.

COMMENT: the intent of this item is to impose a nominal 5000 flight hour overhaul inspection interval on the compressor turbine disk and blade assembly.

C. Reinstall the compressor turbine disk and blade assembly into the engine in accordance with the PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-02.

COMMENT: It is frequently necessary to replace the compressor turbine blade shroud segments in order to obtain the correct compressor turbine blade tip clearance at assembly.

Records requirement:

The information to be recorded is: the fact that the compressor turbine disk and blade assembly was overhauled in accordance with the OVERHAUL manual, whether new or overhauled blades were installed, the date, and the engine flight hours. Also record the accumulated total cycles on the compressor turbine disk. In addition, record whether the Compressor Turbine Blades are coated with Silicon Aluminide or Chromium Aluminide or Platinum Aluminide or with Pack Process Diffused Aluminide.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-02.

B. P&WC PT6A-34 or PT6A-114 series overhaul manual, Section 72-50-02.

FUEL PUMP

Frequency:

Perform this inspection NO LATER THAN 4105 hours after the last time this inspection was performed.

This is a NOMINAL 4100 hour inspection interval. This requirement begins when the fuel pump was last overhauled in accordance with appropriate FAA approved data, and is repeated approximately every 4100 flight hours thereafter.

Specifics:

A. When the fuel pump accumulates 4105 hours, the fuel pump is to be overhauled. OR,

B. The fuel pump is overhauled for cause. That is: inspection, performance test etc. has shown that the fuel pump is not working properly, and it can not be repaired using procedures in the PT6A-34 or PT6A-114 series maintenance manual. WHICH EVER COMES FIRST.

C. Alternatively, at the owner's / operator's discretion, the fuel pump may be replaced with a serviceable fuel pump which has accumulated less than 4105 flight hours since previous overhaul.

Records requirement:

The information to be recorded is: the fact that the fuel pump was overhauled in accordance with the appropriate FAA approved data, or a serviceable fuel pump with (fill in) flight hours since overhaul was installed, the date, and the engine flight hours.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-02.

B. P&WC PT6A-34 or PT6A-114 series overhaul manual, Section 73-10-02.

FUEL CONTROL

Frequency:

Perform this inspection NO LATER THAN 4105 hours after the last time this inspection was performed.

This is a NOMINAL 4100 hour inspection interval. This requirement begins when the fuel control was last overhauled in accordance with appropriate FAA approved data, and is repeated approximately every 4100 flight hours thereafter.

On single engine aircraft ONLY, Every 2050, hours remove FCU and ship to an approved overhaul facility for a special inspection (that is, drive body inspection / drive shaft bearing replacement).

COMMENT: the drive body inspection / drive shaft bearing replacement is to be done 2050 hours after FCU overhaul. When the fuel control is overhauled (completely) at 4105 hours the drive body inspection / drive shaft bearing replacement is part of that complete overhaul.

Specifics:

A. When the fuel control accumulates 4105 hours, the fuel control is to be overhauled OR,

B. The fuel control is overhauled for cause. That is: inspection, performance test etc. has shown that the fuel control is not working properly, and it can not be repaired using procedures in the PT6A-34 or PT6A-114 series maintenance manual. WHICH EVER COMES FIRST.

C. Alternatively, at the owner's / operator's discretion, the fuel control may be replaced with a serviceable fuel control which has accumulated less than 4105 flight hours since previous overhaul.

Records requirement:

The information to be recorded is: the fact that the fuel control was overhauled in accordance with the appropriate FAA approved data, or a serviceable fuel control with (fill in) flight hours since overhaul was installed, the date, and the engine flight hours.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-20-00.

B. P&WC PT6A-34 or PT6A-114 series overhaul manual, Section 73-20-00.

START VALVE

Frequency:

Perform this inspection NO LATER THAN 4105 hours after the last time this inspection was performed.

This is a NOMINAL 4100 hour inspection interval. This requirement begins when the start valve was last overhauled in accordance with appropriate FAA approved data, and is repeated approximately every 4100 flight hours thereafter.

COMMENT: PT6A-34AG, -34B, -114, -114A, -116 do not have start valves, and this requirement does not apply.

Specifics:

A. When the start valve accumulates 4105 hours, the start valve is to be overhauled. OR,

B. The start valve is overhauled for cause. That is: inspection, performance test etc. has shown that the start valve is not working properly, and it can not be repaired using procedures in the PT6A-34 or PT6A-114 series maintenance manual. WHICH EVER COMES FIRST.

C. Alternatively, at the owner's / operator's discretion, the start valve may be replaced with a serviceable start valve which has accumulated less than 4105 flight hours since previous overhaul.

Records requirement:

The information to be recorded is: the fact that the start valve was overhauled in accordance with the appropriate FAA approved data, or a serviceable start valve with (fill in) flight hours since overhaul was installed, the date, and the engine flight hours.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-04.

B. P&WC PT6A-34 or PT6A-114 series overhaul manual, Section 73-10-04.

COMPRESSOR BLEED VALVE (OVERHAUL)

Frequency:

Perform this inspection NO LATER THAN 4105 hours after the last time this inspection was performed.

This is a NOMINAL 4100 hour inspection interval. This requirement begins when the compressor bleed valve was last overhauled in accordance with appropriate FAA approved data, and is repeated approximately every 4100 flight hours thereafter.

Specifics:

A. When the compressor bleed valve accumulates 4105 hours, the compressor bleed valve is to be overhauled. OR,

B. The compressor bleed valve is overhauled for cause. That is: inspection, performance test etc. has shown that the compressor bleed valve is not working properly, and it can not be repaired using procedures in the PT6A-34 or PT6A-114 series maintenance manual. WHICH EVER COMES FIRST.

C. Alternatively, at the owner's / operator's discretion, the compressor bleed valve may be replaced with a serviceable compressor bleed valve which has accumulated less than 4105 flight hours since previous overhaul.

Records requirement:

The information to be recorded is: the fact that the compressor bleed valve was overhauled in accordance with appropriate FAA approved data, or a serviceable compressor bleed valve with (fill in) flight hours since overhaul was installed, the date, and the engine flight hours.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 75-30-00.

B. P&WC PT6A-34 or PT6A-114 series overhaul manual, Section 75-30-00.

PROPELLER GOVERNOR

Frequency:

Perform this inspection NO LATER THAN 4105 hours after the last time this inspection was performed.

This is a NOMINAL 4100 hour inspection interval. This requirement begins when the propeller governor was last overhauled in accordance with appropriate FAA approved data, and is repeated approximately every 4100 flight hours thereafter.

Specifics:

A. When the propeller governor accumulates 4105 hours, the propeller governor is to be overhauled. OR,

B. The propeller governor is overhauled for cause. That is: inspection, performance test etc. has shown that the propeller governor is not working properly, and it can not be repaired using procedures in the PT6A-34 or PT6A-114 series maintenance manual. WHICH EVER COMES FIRST.

C. Alternatively, at the owner's / operator's discretion, the propeller governor may be replaced with a serviceable propeller governor which has accumulated less than 4105 flight hours since previous overhaul.

Records requirement:

The information to be recorded is: the fact that the propeller governor was overhauled in accordance with the appropriate FAA approved data, or a serviceable propeller governor with (fill in) flight hours since overhaul was installed, the date, and the engine flight hours.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 61-20-00.

B. P&WC PT6A-34 or PT6A-114 series overhaul manual, Section 61-20-00.

IGNITION BOX (Ignition Current Regulator or Ignition Exciter)

Frequency:

Perform this inspection NO LATER THAN 4105 hours after the last time this inspection was performed.

This is a NOMINAL 4100 hour inspection interval. This requirement begins when the ignition current regulator or ignition exciter was last overhauled in accordance with appropriate FAA approved data, and is repeated approximately every 4100 flight hours thereafter.

COMMENT: PT6A-34AG, -114, -114A, -116, -135, -135A do not have ignition current regulators. However, PT6A-34,-34B,-36 can have ignition current regulators.

Specifics:

A. When the ignition current regulator accumulates 4105 hours, the ignition current regulator is to be overhauled. OR,

B. When the ignition exciter accumulates 4105 hours, the ignition exciter is to be overhauled. OR,

C. The ignition current regulator or the ignition exciter is overhauled for cause. That is: inspection, performance test etc. has shown that the ignition current regulator or the ignition exciter is not working properly, and it can not be repaired using procedures in the PT6A-34 or PT6A-114 series maintenance manual. WHICH EVER COMES FIRST.

D. Alternatively, at the owner's / operator's discretion, the ignition current regulator or the ignition exciter may be replaced with a serviceable ignition current regulator or ignition exciter which has accumulated less than 4105 flight hours since previous overhaul.

Records requirement:

The information to be recorded is: the fact that the ignition current regulator or the ignition exciter was overhauled in accordance with the appropriate FAA approved data, or a serviceable ignition current regulator or ignition exciter with (fill in) flight hours since overhaul was installed, the date, and the engine flight hours.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 74-10-00 or 74-10-01.

B. P&WC PT6A-34 or PT6A-114 series overhaul manual, Section 74-10-00 or 74-10-01.

OTHER ACCESSORIES ATTACHED TO THE PT6A ENGINE.

NOTE, the (propeller) over speed governor, the power turbine (Nf) tachometer, the compressor (Ng) tachometer, the starter generator, and the oil pressure and oil temperature sensors are airframe accessories. THESE ACCESSORIES ARE NOT PART OF THE PT6A ENGINE AND ARE NOT PART OF THE MORE INSTRUCTIONS FOR CONTINUED AIRWORTHINESS. FOR THIS REASON, NO ACTIONS WITH RESPECT TO THE MORE INSTRUCTIONS FOR CONTINUED AIRWORTHINESS ARE REQUIRED ON THESE PARTS. "Refer to the aircraft maintenance manual or applicable component maintenance manual for these accessories."

COMPRESSOR MODULE

Frequency:

Perform this inspection NO LATER THAN 8005 hours after the last time this inspection was performed.

COMMENT: If the compressor module was overhauled more than 8005 hours ago; the Compressor Module MUST be overhauled, BEFORE the engine may be placed on the MORE Instructions For Continued Airworthiness.

Inspect (overhaul) every 8005 flight hours, or sooner. (This is a NOMINAL 8000 hour inspection interval.) (This requirement begins when the compressor module was last overhauled in accordance with the overhaul manual, and is repeated approximately every 8000 flight hours thereafter.)

Specifics:

The compressor module shall include: accessory gear box assembly, oil tank assembly, compressor inlet case assembly, gas generator case assembly, compressor rotor assembly, and the external hardware attached to this portion of the engine.

The requirement of the MORE Instructions For Continued Airworthiness is to have the compressor module overhauled in accordance with the PT6A-34 or PT6A-114 series overhaul manual when one of the following criteria is reached, WHICH EVER COMES FIRST.

A. The compressor module accumulates 8,000 hours since last overhaul.

B. The compressor module is subjected to overhaul or major repair for cause. That is:

1. The engine oil system has been contaminated by an abnormal quantity of metal particles. This could be found during oil filter inspection, chip detector inspection, or spectrometric oil analysis, etc.

2. The compressor airfoils have been corroded, and / or eroded beyond maintenance manual inspection limits. This could be found during compressor borescope inspection.

3. The compressor airfoils have extensive foreign object damage beyond maintenance manual inspection limits. This could be found during compressor borescope inspection.

4. The engine has experienced a deterioration in performance which can not be corrected by repair to the hot section module or the propeller torque measurement system.

5. Engine vibrational analysis has shown an abnormal vibration in the compressor rotor, which can NOT be eliminated by repeated compressor performance recovery wash to remove the "dirt" which is causing compressor unbalance.

6. One (or more) of the compressor disks or the impeller reaches the cyclic life limit listed in P&WC S/B 1002 or 1302.

Oil system contamination, compressor corrosion, compressor erosion, compressor foreign object damage, uncorrectable performance deterioration, abnormal vibration(s), disk cyclic life limits etc. are considered to be unusual events. When one of these unusual events occur, the individual circumstances of this particular compressor module shall be considered, in determining the appropriate action for the compressor module. Appropriate action may be major repair to the compressor module or appropriate action may be overhaul of the compressor module.

Example: If the compressor module is contaminated with debris in the engine oil system, but everything else in the compressor module is in good operating condition; then major repair would be appropriate.

Example: If ice accumulated on the inlet screen because the anti-ice protection was not activated at the appropriate time and (ice) foreign object damaged the compressor airfoils, but everything else in the compressor module is in good operating condition; then major repair would be appropriate.

Example: If one disk reached its cyclic life limit, but everything else in the compressor module is in good operating condition; then major repair would be appropriate.

Example: If the compressor module has any one of these conditions and other things in the compressor module are NOT in good condition, then overhaul would be appropriate.

When major repair is selected the intent is to return the compressor module to a condition where it can be expected to operate for multiple thousands of flight hours without further anticipated major repair.

Perform either compressor module overhaul or compressor module major repair in accordance with the PT6A-34 or PT6A-114 series overhaul manual.

NOTE: When overhauling the compressor module make sure that the first stage compressor disk (that is the rear hub), the second stage compressor disk, the third stage compressor disk, and the impeller have sufficient cycles remaining to operate to the next 8000 flight hour overhaul. Alternatively, at the operator's / owner's specific request, components with fewer remaining cycles may be installed provided: A. A shorter overhaul or major repair interval is acceptable, and B. Specific notation of this fact is placed in the engine records and the MORE Scheduled Inspection Status Sheet.

When either Compressor Module overhaul or major repair is performed; perform Vibrational Analysis prior to flight. See Part 4, Vibrational Analysis and Appendix C.

After major repair or overhaul, more frequent Chip Detector check or inspection and more frequent Inspection of Oil Filter and Engine Oil are required for the first 100 and 150 hours, respectively AFTER major repair or overhaul.

Records requirement:

The information to be recorded is: the fact that the compressor module was overhauled in accordance with the OVERHAUL manual, or compressor module major repair was performed in accordance with the overhaul manual, the compressor module time since overhaul, the date, and the engine flight hours. Also record the accumulated total cycles on each of the compressor disks and the impeller.

Reference information:

Additional information is provided in:

P&WC PT6A-34 or PT6A-114 series overhaul manual.

POWER SECTION MODULE

Frequency:

Perform this inspection NO LATER THAN 8005 hours after the last time this inspection was performed.

COMMENT: If the Power Section module was overhauled more than 8005 hours ago; the Power Section module MUST be overhauled, BEFORE the engine may be placed on the MORE Instructions For Continued Airworthiness.

Inspect (overhaul) every 8005 flight hours, or sooner. (This is a NOMINAL 8000 hour inspection interval.) (This requirement begins when the power section module was last overhauled in accordance with the overhaul manual, and is repeated approximately every 8000 flight hours thereafter.)

Specifics:

The power section module shall include: power turbine disk and blade assembly, power turbine stator assembly (except for the power turbine vane ring), exhaust duct, reduction gear box assembly, and the external hardware attached to this portion of the engine.

The requirement of the MORE Instructions For Continued Airworthiness is to have the power section module overhauled in accordance with the PT6A-34 or PT6A-114 series overhaul manual when one of the following criteria is reached, WHICH EVER COMES FIRST.

A. The power section module accumulates 8,000 hours since last overhaul.

B. The power section module is subjected to overhaul or major repair for cause. That is:

1. The engine oil system has been contaminated by an abnormal quantity of metal particles. This could be found during oil filter inspection, chip detector inspection, or spectrometric oil analysis, etc.

2. Engine vibrational analysis has shown an abnormal vibration in the power section module.

3. The power turbine disk reaches the cyclic life limit listed in P&WC S/B 1002 or 1302.

Oil system contamination, abnormal vibration(s), disk life limit, etc. are considered to be unusual events. When one of these unusual events occur, the individual circumstances of this particular power section module shall be considered, in determining the appropriate action for the power section module. Appropriate action may be major repair to the power section module or appropriate action may be overhaul of the power section module.

Example: If the power section module is contaminated with debris in the engine oil system, but everything else in the power section module is in good operating condition; then major repair would be appropriate.

Example: If the power turbine disk reached its cyclic life limit, but everything else in the power section module is in good operating condition; then major repair would be appropriate.

Example: If the number three and / or number four bearing is worn, but everything else in the power section module is in good operating condition; then major repair would be appropriate.

Example: If the first or section stage planetary reduction gear bushings are worn, but everything else in the power section module is in good operating condition; then major repair would be appropriate.

Example: If the power section module has any one of these conditions and other things in the power section module are NOT in good condition, then overhaul would be appropriate.

When major repair is selected the intent is to return the power section module to a condition where it can be expected to operate for multiple thousands of flight hours without further anticipated major repair.

Perform either power section module overhaul or power section module major repair in accordance with the PT6A-34 or PT6A-114 series overhaul manual.

P&WC Pre-Service Bulletin Number 1404 first stage planet gear bearings (bushings) must be replaced at each and every overhaul, or 8,000 flight hours, which ever occurs first.

P&WC Post-Service Bulletin Number 1404 first stage planet gear bearings (bushings) must be inspected at each and every overhaul. Replace only if damage exceeds overhaul manual limits.

NOTE: When overhauling the power section module it is often helpful to make sure that the power turbine disk has sufficient cycles remaining to operate to the next 8000 flight hour overhaul. Alternatively, at the operator's / owner's specific request, a power turbine disk with fewer remaining cycles may be installed provided: A. a shorter overhaul or major repair interval is acceptable, and B. specific notation of this fact is placed in the engine records and the MORE Scheduled Inspection Status Sheet.

COMMENT: on PT6A-34 or PT6A-114 series engines the replacement of a life limit expired power turbine disk is NOT significantly more difficult than removal and replacement of the compressor turbine disk.

When either Power Section module overhaul or major repair is performed; perform Vibrational Analysis prior to flight. See Part 4, Vibrational Analysis and Appendix C.

After major repair or overhaul, more frequent Chip Detector check or inspection and more frequent Inspection of Oil Filter and Engine Oil are required for the first 100 and 150 hours, respectively AFTER major repair or overhaul.

Records requirement:

The information to be recorded is: the fact that the power section module was overhauled in accordance with the OVERHAUL manual, or power section module major repair was performed in accordance with the overhaul manual, the power section module time since overhaul, whether or not P&WC S/B 1404 (bronze planet gear bushings) are installed in the first stage planet gears, whether or not P&WC S/B 1404 (bronze planet gear bushings) are installed in the second stage planet gears, the number of flight hours accumulated on the first and second stage planet gear bushings since overhaul, the date, and the engine flight hours. Also record the accumulated total cycles on the power turbine disk.

Reference information:

Additional information is provided in:

P&WC PT6A-34 or PT6A-114 series overhaul manual.

Appendix IV

400/450 HOUR INSPECTION CHECKLIST

Date: _____ Engine Time: _____

Total Time Engine: _____ Engine S/N: _____

1.	Install vibration pickup and bracket on engine.	_____
2.	Perform PT6A Initial Performance Run.	_____
3.	Check the engine oil level.	_____
4.	Inspect the oil filter and collect a filter and engine oil sample.	_____
5.	Perform a continuity inspection of the oil system chip detector.	_____
6.	Perform a chip detector functional inspection.	_____
7.	Inspect the starter generator gearshaft wear.	_____
8.	Inspect the fuel pump filter.	_____
9.	Inspect fuel nozzles.	_____
10.	Perform Hot Section Borescope Inspection.	_____
11.	Perform Compressor Inspection.	_____
12.	Perform an exhaust duct & ITT system inspection.	_____
13.	Perform a compressor performance wash.	_____
14.	Perform a compressor desalination wash.	_____
15.	Perform a turbine desalination wash.	_____
16.	Perform an engine external wash.	_____
17.	Perform a engine general condition inspection.	_____
18.	Inspect and clean the P3 filter (if installed).	_____
19.	Verify Correct Operation Of Cockpit Instruments.	_____
20.	Balance the propeller.	_____
21.	Perform an engine vibrational analysis.	_____
22.	Compare readings with earlier vibrational analysis to see any changes. NOTE: Changes in readings must be the same if ok or show an improvement. Any degrade in the readings must be investigated.	_____
23.	Perform post inspection performance run.	_____
24.	Make appropriate engine record keeping entries.	_____
25.	Update the Scheduled Inspection Status Sheet.	_____
26.	Confirm receipt of the Oil Analysis results.	_____

INCOMING MAINTENANCE POWER PLANT ADJUSTMENT/TEST

(DO NOT PUT MORE THAN ONE ENGINE ON THIS SHEET)

ENGINE MODEL: _____ S/N: _____
DATE OF TEST: _____ O.A.T.: _____
PRESSURE ALT: _____ BAROMETRIC PRESS: _____

	TARGET	ACTUAL		TARGET	ACTUAL
D.P.S. RPM:			D.P.S.%:		
INLET AIR TEMP:			STARTING TEMP:		
FLIGHT IDLE TORQUE:			TORQUE:		
ITT (C):			FUEL FLOW (PPH)		
PROP RPM (N2) (RPM%):			GAS GEN SPEED (N1)(%):		
OIL PRESS (PSI):			OIL TEMP (C):		
IDLE SPEED (N1%) LOW:			HIGH:		
REVERSE (%):			PROP GOV CHECK:		
MAX PROP RPM(%):					

TEST RUN PERFORMED BY: _____

DPTS= DATA PLATE TRIM SPEED (FROM DATA PLATE).
EPC = ENGINE PERFORMANCE CHECK.
NOTE= PROPELLER FLIGHT IDLE TORQUE (BLADE ANGLE TORQUE) IS FOUND IN AIRCRAFT MANUAL.
NOTE= PROP GOV CHECK IS FOUND IN P&WC MANUAL.

POST MAINTENANCE POWER PLANT ADJUSTMENT/TEST

(DO NOT PUT MORE THAN ONE ENGINE ON THIS SHEET)

ENGINE MODEL: _____ S/N: _____
DATE OF TEST: _____ O.A.T.: _____
PRESSURE ALT: _____ BAROMETRIC PRESS: _____

	TARGET	ACTUAL		TARGET	ACTUAL
D.P.S. RPM:			D.P.S.%:		
INLET AIR TEMP:			STARTING TEMP:		
FLIGHT IDLE TORQUE:			TORQUE:		
ITT (C):			FUEL FLOW (PPH)		
PROP RPM (N2) (RPM%):			GAS GEN SPEED (N1)(%):		
OIL PRESS (PSI):			OIL TEMP (C):		
IDLE SPEED (N1%) LOW:			HIGH:		
REVERSE (%):			PROP GOV CHECK:		
MAX PROP RPM(%):					

TEST RUN PERFORMED BY: _____

THIRD STAGE COMPRESSOR STATOR (VANE) ASSEMBLY (PT6A-114A, -135, -135A Engines)

Frequency:

NOTE WELL: This modification requirement does NOT apply to PT6A-34,-34AG,-34B,-36 or -114 engines. No action or logbook entries are required for PT6A-34,-34AG,-34B,-36 or -114 engines.

Perform this modification during MORE Program Initial Entry Inspection. OR if this modification was not performed earlier, perform this modification at the next 100 Hour / 150 Hour Inspection. P&WC Service Bulletin (S/B) 1504 Revision 4 and P&WC Service Bulletin 1619 Revision Original (or later FAA approved revisions) provide a (stator) Vane Ring Damping Strap Assembly which is installed around the outside of the Third Stage Compressor Stator Vane Assembly. The engine model effectivity is listed at the beginning of S/B 1504 and S/B 1619. Generally the effectivity is the earlier PT6A-114A,-135,-135A engines, but it is necessary to refer to and comply with the effectivity listed in S/B 1504 and S/B 1619. (Please note the engine model effectivity for S/B 1504 and S/B 1619 are highly similar but NOT identical).

Specifics:

COMMENT: S/B 1504 and S/B 1619 provide a method whereby the (stator) Vane Ring Damping Strap Assembly may be installed through the bleed valve mounting hole in the gas generator case. It is not necessary to remove the engine from the aircraft or to disassemble the engine in order to perform this modification.

If the subject PT6A-114A,-135,-135A engine already has S/B 1504 incorporated, no further action is necessary unless the (stator) Vane Ring Damping Strap Assembly shifts during engine operation after installation in the engine. If the subject PT6A-114A,-135,-135A engine already has S/B 1619 incorporated, no further action is necessary. If the subject PT6A-114A,-135,-135A engine does not have either S/B 1504 or S/B 1619 incorporated then it is necessary to incorporate S/B 1619. If the (stator) Vane Ring Damping Strap Assembly provided by S/B 1504 shifts during engine operation, it will be necessary to remove the (stator) Vane Ring Damping Strap Assembly provided by S/B 1504 and install the (stator) Vane Ring Damping Strap Assembly provided by S/B 1619. If the subject PT6A-114A,-135,-135A engine is one of the "newer" engines and is NOT affected by either S/B 1504 or S/B 1619 no further action is necessary.

COMMENT: PT6A-114A,-135,-135A engines that incorporate P&WC S/B 1505 must also incorporate S/B 1504 or S/B 1619. However, PT6A-114A engines that incorporate P&WC S/B 1510 do not require the installation of either the S/B 1504 or S/B 1619 (stator) Vane Ring Damping Strap Assembly.

Records requirement:

The information to be recorded is: the status of the engine with respect to S/B 1504, 1505, 1510, and 1619, the date and the engine flight hours. Depending on the circumstances, the log book entry should state that one or more of the S/Bs are not applicable, or that one or more of the S/Bs have been complied with. A short note on the MORE Scheduled Inspection Status Sheet is also appropriate.

Reference Information:
Additional information is provided in:

P&WC Service Bulletin Number 1504 Revision 4 (or later FAA approved revision).

P&WC Service Bulletin Number 1505 Revision 3 (or later FAA approved revision).

P&WC Service Bulletin Number 1510 Revision 4 (or later FAA approved revision).

P&WC Service Bulletin Number 1619 Revision Original (or later FAA approved revision).

PART 4E Routine Maintenance
Preventive Measures - Requirements
NOMINAL 400/450 HOUR INSPECTIONS

MAINTENANCE RECORDS

FAA Regulations require that records be made and retained to show that maintenance work was performed and when it was performed. MORE Instructions For Continued Airworthiness are NO exception to this requirement. MORE Instructions For Continued Airworthiness list the information which needs to be recorded.

On the other hand, record keeping is a highly individual activity, with variations from one operator to another. MORE Instructions For Continued Airworthiness have been written, as much as possible, to allow each operator to make and retain records in a way which is most beneficial to his operation.

The MORE Scheduled Inspection Status Sheet(s) MUST be used by every operator to summarize when work was done and when it will be due again.

FAA Form 337 or foreign equivalent MUST be used when engines are placed on, or removed from, MORE Instructions For Continued Airworthiness.

MORE Company, Registration Form MUST be completed and submitted to MORE Company within thirty days, because this is a contractual requirement between the owner and MORE Company.

MORE Company, Transfer Of Ownership Form MUST be completed and submitted to MORE Company promptly, when the engine / aircraft changes owners, because this is a contractual requirement between the owner and MORE Company.

It is absolutely necessary that MORE Company be kept informed of the identity of the owner and provided with information so we can contact the owner. This is so we can provide technical support etc. to the owner. Technical support includes, but is not limited to: future revisions to the MORE Instructions For Continued Airworthiness, oil filter debris and oil sample analysis kits, etc.

Also, it is necessary to record that each item in the Initial Entry Inspection, the 100 / 150 Hour Inspection, the 200 / 300 Hour Inspection, and the 400 / 450 Hour Inspection (as applicable) was performed. The use of the Initial Entry Inspection Checklist, the 100 / 150 Hour Inspection Checklist, the 200 / 300 Hour Inspection Checklist, the 400 / 450 Hour Inspection Checklist forms is one way, but not the only way to record this information. If the inspection personnel wish to record this information using another method, that is acceptable, but the information must be recorded.

All of the other forms provided in MORE Instructions For Continued Airworthiness are OPTIONAL. We have provided these forms because they have helped many of our customers. However, if these forms do NOT fit into your operation, you must devise and use an alternate method to maintain appropriate records.

All records which relate to engine maintenance performed on an engine using MORE Instructions For Continued Airworthiness must be retained, at least until the engine is overhauled.

POWER PLANT - ADJUSTMENT / TEST

The performance of Power Plant - Adjustment / Test (Engine Performance Check Only) at the beginning of the 150/ 300/ 450 Hour Inspection(s) will help identify "Problem" areas which will need special attention during 150/ 300/ 450 Hour Inspection(s). When Power Plant - Adjustment / Test (Engine Performance Check Only) is performed at the beginning of 150/ 300/ 450 Hour Inspection(s), and when "Problems" are found and corrected during 150/ 300/ 450 Hour Inspection(s), going back to re-do work in the engine can be avoided. Power Plant - Adjustment / Test (Engine Performance Check Only) is one of the LAST things which will be done at the end of 150/ 300/ 450 Hour Inspection(s). The performance of Power Plant - Adjustment / Test (Engine Performance Check Only) at the end, will help confirm that the engine is operating correctly and is airworthy for return to service.

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection about half way between the 200 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 150 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 100 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

D. After any maintenance is performed on the engine, and prior to returning the engine to service, with the exception of the most basic engine maintenance. (That is, Power Plant - Adjustment / Test is not required after: daily check, checking the engine oil level, collecting an engine oil sample, inspecting the engine oil filter, inspecting the continuity of the oil system chip detector, performing compressor desalination wash, or performing turbine desalination (desulfidation) wash.)

E. When there is a suspicion that the engine is not operating as it should.

Specifics:

The PT6A-34 or PT6A-114 series maintenance manual contains instructions for Power Plant - Adjustment / Test, Section 71-00-00 beginning on page 501, especially the tables titled "Engine Performance Checking Chart". In addition the engine portion of the aircraft manuals for the particular aircraft using the PT6A-34 or PT6A-114 series engine, normally contain equivalent information for checking the engine performance as installed in the aircraft.

Following these manuals, perform Power Plant - Adjustment / Test (Engine Performance Check Only) to confirm correct engine operation. Record both the TARGET values from the engine curves, and the ACTUAL performance values observed during Power Plant - Adjustment / Test. Compare the differences between the target and the actual performance values observed (now) with the differences between the target and the actual performance values observed and recorded during the previous hot section inspection, or during entry on to the MORE Instructions For Continued Airworthiness, which ever is more recent. If there is a substantial difference in performance (that is, a change in inter turbine temperature (ITT) of 25 degrees Celsius or 45 degrees Fahrenheit or a change in gas generator speed of 1.5 percent or 562 rpm or both); this is an indication of a significant change in engine performance and it is necessary to inspect further to determine the cause. If any abnormal conditions are observed they are to be corrected promptly.

This maintenance manual section is useful for troubleshooting suspected engine discrepancies. Compressor performance recovery wash, this maintenance manual section, borescope inspection, etc. should be used together to determine if the engine has a problem and what that problem is. Power Plant - Adjustment / Test and this maintenance manual section may be used to help determine if the engine may be repaired while it is installed in the aircraft. Alternatively, this section will provide useful information if the engine needs to be removed for more extensive repair.

Records requirement:

Record both the target and actual performance values, the date, and the engine flight hours. Record whether Power Plant - Adjustment / Test was performed because it was scheduled, or whether Power Plant - Adjustment / Test was performed after maintenance, or whether Power Plant - Adjustment / Test was performed because there was a suspicion the engine was not operating properly. If maintenance was performed, BRIEFLY describe the maintenance. If there was a suspicion that the engine was not operating properly, describe the circumstances. In addition, when appropriate, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 71-00-00 beginning on page 501,

B. The appropriate aircraft manual which provides instructions for determining engine performance as installed in the aircraft.

CHECK ENGINE OIL LEVEL

Frequency:

A. Check every 25 flight hours or sooner. OR,

B. Check once a week, WHICH EVER OCCURS FIRST. (This requirement begins when the engine is placed on the MORE Instructions For Continued Airworthiness, and is repeated every twenty five flight hours, or weekly, or sooner.)

Specifics:

A. Check engine oil level within 10 minutes of engine shutdown.

B. Check condition and locking of oil filler cap.

Commonly PT6A engines are filled to the "one quart low" mark because; PT6A engines normally pump oil overboard when the oil tank is filled above this mark.

Normally PT6A engines do NOT consume more than one quart of engine oil in 50 engine hours. If the engine consumes more than one quart of oil in 50 engine hours, it is necessary to investigate to determine the reason for the abnormally high oil consumption, and to then correct the cause of abnormally high oil consumption.

Normally this work task is intended to be performed as a part of the aircraft pre flight or post flight check and is intended to be performed by the personnel who perform the pre flight check. However, if the engine location is such as to prevent safe access to the oil filler cap (for example, if the engine is too high off the ground), this check may be performed by maintenance personnel.

Records requirement:

The information to be recorded is: The fact that the engine oil level was checked, the amount of oil added (if any), the date, and the engine flight hours. This information is to be recorded in such a way that the rate of engine oil consumption will be calculated.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00, beginning on page 601, especially the table titled "Periodic Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-60-00, beginning on page 201.

C. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00, beginning on page 301.

INSPECTION OF OIL FILTER AND ENGINE OIL

(Visual inspection of oil filter, collection of debris from the oil filter, and collection of an oil sample for Spectrometric Oil Analysis)

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection about half way between the 200 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 150 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 100 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

D. Inspect after: 25, 50, 75, 100 and 150 flight hours since new, overhaul, or major repair (Other than hot section inspection.) Thereafter inspect every 155 flight hours, or sooner.

Specifics:

A. Remove oil filter in accordance with PT6A-34 or PT6A-114 series maintenance manual, Section 79-20-02, beginning on page 201.

B. Inspect the oil filter for metal contamination, in accordance with PT6A-34 or PT6A-114 series mainte nance manual, Section 79-20-02, "Inspection / Check". If any metallic contamination is visible follow the instructions in PT6A-34 or PT6A-114 series maintenance manual, Section 79-20-02.

C. Following visual inspection of the oil filter for metal contamination, collect the debris from the oil filter. The specific and detailed procedure for collecting the debris from the oil filter is contained in Appendix B of this MORE Instructions For Continued Airworthiness. That specific and detailed procedure is to be followed. In brief summary, the procedure is as follows:

1. Throughout this procedure, use care to prevent outside material from contaminating the filter, the solvent or the filter patch.
2. Insert a #4 solid rubber stopper tightly into the holes in each end of the oil filter element.
3. Insert the stoppered filter element into a rinsing bottle.
4. Fill the rinsing bottle half full using one of the solvents mentioned in the procedure.
5. Cap the bottle.

6. Shake the bottle up and down as well as back and forth, for at least five minutes.
7. Open the rinsing bottle carefully. Remove the filter. Remove the stoppers from the filter.
8. Set up the oil filter analysis kit with a NEW filter patch. Make sure everything is CLEAN.
9. Pour a portion of the solvent / debris mixture into the filter funnel. Use the vacuum pump to draw the solvent through the filter patch. Repeat the pouring and vacuuming until all of the solvent / debris mixture has gone into the filter patch.
10. Rinse the rinsing bottle with additional clean solvent, as many times as necessary to remove all the debris from the rinsing bottle. Repeat the pouring and vacuuming until all of the solvent / debris mixture has gone into the filter patch.
11. Remove the filter patch and place it in the petri dish. Cover the petri dish.
12. Fill out the label for the petri dish / filter patch. Fill out the form enclosed with the filter kit. Return:

    a. The form,

    b. The filter patch / petri dish, and

    c. The oil sample (see below), to the metallurgical laboratory specified in the MORE Company sample kit.

13. Clean the oil filter analysis kit and put it away so it is ready for use the next time.
14. If visual inspection of the oil filter showed "less than 40 metal particles of miscellaneous metal, largely non-ferrous"; the engine may be operated up to 10 flight hours while the debris from the oil filter is being analyzed by the metallurgical laboratory and while the owner is awaiting the results of the metallurgical laboratory report.

D. Clean oil filter and reinstall it in accordance with PT6A-34 or PT6A-114 series maintenance manual, Section 79-00-02, beginning on page 201. Alternatively, P&WC Service Bulletin Numbers 1215 and 1282 provide "disposable oil filter elements" with a 1000 flight hour service life. If one of these disposable oil filters is subject to heavy contamination; it should be discarded and replaced.

E. Collect an oil sample, using the oil sample kit provided by MORE Company Inc. The specific and detailed procedure for collecting an oil sample is contained in Appendix B of this MORE Instructions For Continued Airworthiness. That specific and detailed procedure is to be followed. In brief summary, the procedure is as follows: Use precautions to prevent outside contaminants from getting into the engine oil sample. Remove oil tank filler cap. Place the clear plastic tube into the oil tank. Cover the exposed end of the tube with your thumb or finger, to prevent the oil from flowing out. Remove the tube. Put the tube in the oil sample bottle. Remove your thumb or finger from the end of the tube to allow the oil to drain into the bottle. Repeat as necessary, to obtain a sample which fills the oil sample bottle at least one third full. Replace the oil tank filler cap in the customary manner. Ship the oil sample along with the oil filter debris sample to the metallurgical laboratory specified in the MORE Company sample kit. Should the metallurgical laboratory's report indicate an abnormal condition, appropriate corrective action is to be taken.

F. If the oil filter inspection and / or spectrometric oil analysis shows abnormal levels of metal (that is, wear metal); engine vibrational analysis can be used as a part of the trouble shooting process. In the cases where engine vibrational analysis identifies the problem area; unnecessary disassembly and inspection may be avoided. Vibrational Analysis is described in Part 4, and Appendix C.

Records requirement:

The information to be recorded is: the fact that the oil filter debris was collected, the date the debris was collected, the engine flight hours when the debris was collected, the fact that the oil sample was collected, the date the oil sample was collected and the engine flight hours when the oil sample was collected. This information is to be recorded on the form included with the oil filter debris / oil sample kit, and in the engine records. The metallurgical laboratory will send back a written report of their analysis. That metallurgical laboratory report is to be retained as part of the engine records. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 79-20-02.

B. Appendix B of this MORE Instructions For Continued Airworthiness.

C. Contact, MORE Company, 1132B Airport Rd., Minden NV 89423, USA, 775-782-3346.

CONTINUITY INSPECTION OF OIL SYSTEM CHIP DETECTOR.

Frequency:

A. If the aircraft is equipped with a chip detector continuity warning light in the cockpit, check after engine start, but prior to each flight. (This requirement begins when the engine is placed on the MORE Instructions For Continued Airworthiness, and is repeated every day the aircraft is used.)

B. 200 Hour Airframe Inspection Intervals - If the aircraft is not equipped with a chip detector continuity warning light in the cockpit; perform this inspection about one quarter way between, and about half way between, and about three quarters way between, and when the 200 hour airframe inspection is performed, or perform this inspection at convenient times, but perform this inspection NO LATER THAN 55 hours after the last time this inspection was performed.

C. 150 Hour Airframe Inspection Intervals - If the aircraft is not equipped with a chip detector continuity warning light in the cockpit; perform this inspection about one third way between, and about two thirds way between, and when the 150 hour airframe inspection is performed, or perform this inspection at convenient times, but perform this inspection NO LATER THAN 55 hours after the last time this inspection was performed.

D. 100 Hour Airframe Inspection Intervals - If the aircraft is not equipped with a chip detector continuity warning light in the cockpit; perform this inspection about half way between, and at the same time as the 100 hour airframe inspections, or perform this inspection at convenient times, but perform this inspection NO LATER THAN 55 hours after the last time this inspection was performed.

E. If the aircraft is not equipped with a chip detector continuity warning light in the cockpit; inspect after: 10, 25, 50, 75 and 100 flight hours, since new, overhaul or major repair (Other than hot section inspection.) Thereafter inspect every 55 hours, or sooner.

Specifics:
If the aircraft is equipped with a chip detector continuity warning light in the cockpit, check after engine start, but prior to each flight. If there is an indication that a chip(s) is present, take appropriate corrective action.

If the aircraft is not equipped with a chip detector continuity warning light in the cockpit; use a suitable ohmmeter to inspect magnetic chip detector for continuity. An open circuit condition must exist which indicates the absence of ferrous (that is: magnetic iron) contamination at pole tips. If an indication of magnetic iron material is found, refer to P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-10-00, beginning on page 201, and take appropriate corrective action.

In all cases when metal is found in the chip detector, appropriate corrective action will include sending that material to the metallurgical laboratory specified by MORE Company Inc., to have that metal analyzed. The purpose of the analysis is to determine the source of the metal, so further corrective action may be performed. When metal is found in the chip detector, it is also necessary to inspect the scavenge oil strainer sleeve (that is, finger strainer) adjacent to the chip detector. Inspect the finger strainer for metal or other abnormal material.

If metal is found, take appropriate corrective action.

NOTE: Some MORE Instructions for Continued Airworthiness operators (who do NOT have chip detector warning lights in the cockpit) have reported the installation of wiring to the chip detector, in order to permit easier access when performing the ohmmeter check of the chip detector.

Records requirement:

If the aircraft is equipped with a chip detector warning light in the cockpit; it is NOT necessary to make a written record that the chip detector warning light was checked. The check of the chip detector warning light is to be performed by the personnel who operate the aircraft.

If the aircraft is NOT equipped with a chip detector warning light; the information to be recorded is: the fact that the chip detector ohmmeter inspection was performed, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet". If metal is found, or if any abnormal condition was found, briefly record that fact.

Reference information:
Additional information is provided in:

P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00, beginning on page 601, especially the table titled "Periodic Inspection".

P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-10-00.

CHIP DETECTOR FUNCTIONAL INSPECTION

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection every other time the 200 hour air frame inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection every third time the 150 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection every fourth time the 100 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

Specifics:

A. Use a suitable ohmmeter to inspect magnetic chip detector for continuity. An open circuit condition must exist which indicates the absence of magnetic contamination at the pole tips.

B. Remove magnetic chip detector. Bridge chip detector magnetic poles with a suitable metallic jumper and use a suitable ohmmeter to inspect for continuity between the connector pins. Any foreign material found on the chip detector must be identified before further operation. Replace chip detector if continuity does not exist. Reinstall and reconnect magnetic chip detector.

C. Remove reduction gear box oil strainer, visually inspect and reinstall. If debris is found in the oil strainer, perform additional investigation to identify and correct the source of the debris.

D. **NOTE:** For aircraft equipped with an airframe supplied indicating device, the integrity of the complete indicating system shall be inspected by re-attaching the electrical connector to the removed chip detector and inspect for chip indication when magnetic poles are bridged. Closed circuit condition must exist.

Records requirement:

The information to be recorded is: the fact that the chip detector functional inspection was performed, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601, especially the table titled "Hot Section Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-10-00.

STARTER GENERATOR GEARSHAFT WEAR

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 200 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 305 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection every other time the 150 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 305 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection every third time the 100 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 305 hours after the last time this inspection was performed.

NOTE: This requirement has been scheduled to coincide with the generator brush inspection requirements.

Specifics:

A. Pre Service Bulletin Number 1386 or 1480 (dry spline drive configuration) - Inspect splines for wear and RE-LUBRICATE splines.

B. Post Service Bulletin Number 1386 or 1480 (wet spline drive configuration) - Inspect splines for wear, do NOT lubricate splines. **NOTE:** The wet spline drive configuration is lubricated with engine oil. If the wet spline configuration were to be lubricated (that is greased) that grease would interfere with oil flow, additionally it would contaminate the engine oil.

Records requirement:

The information to be recorded is: the fact that the spline inspection was performed, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601, especially the table titled "Periodic Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-60-00.

FUEL PUMP FILTER

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 200 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 305 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection every other time the 150 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 305 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection every third time the 100 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 305 hours after the last time this inspection was performed.

Specifics:

A. Inspect coarse / inlet metal fuel filter for contamination, and clean the metal filter.

B. Inspect coarse / inlet metal filter (screen) for distortion. Replace metal filter if distorted.

C. Inspect fine / paper outlet filter for contamination, and replace the paper filter.

D. If Sunstrand fuel pump is installed, check fuel pump coupling in-situ (that is, in position) for fretting corrosion, coincident with scheduled outlet (paper) filter.

E. If more than normal contamination is found in either filter, investigate further to find and correct the source of that contamination.

Records requirement:

The information to be recorded is: the fact that the inspection of both fuel filters was performed, the fact that the metal filter was cleaned, the fact that the paper fuel filter was replaced, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601, especially the table titled "Periodic Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-02.

FUEL NOZZLE INSPECTION (In accordance with the MAINTENANCE manual)

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 200 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 305 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection every other time the 150 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 305 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection every third time the 100 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 305 hours after the last time this inspection was performed.

Specifics:

NOTE: When removing the fuel nozzles, mark the fuel nozzles to show where they were installed. This way, if a discrepant fuel nozzle is found during inspection, you will know where to look for potential secondary damage.

A. Perform the fuel nozzle leakage test and the fuel nozzle functional test in accordance with the PT6A-34 or PT6A-114 series MAINTENANCE manual, every 305 flight hours. Replace any fuel nozzles which are NOT performing satisfactorily. Whenever, the fuel nozzles are inspected, inspect the fuel nozzle tip posi tioning with respect to the hole in the fuel nozzle sheath. The fuel nozzle tip is designed to be centered in the hole in the fuel nozzle sheath. If it is not, inspect further to determine the cause of the problem. Often it is necessary to replace either a bent fuel nozzle adapter or a worn fuel nozzle sheath; to correct this problem.

NOTE: This 305 hour interval is based on the expectation of continued satisfactory fuel nozzle operation. If inspection shows the fuel nozzles are not in satisfactory condition, shorter inspection intervals and / or a change to the fuel nozzle maintenance techniques are appropriate. Occasionally changes in fuels and or changes in fuel quality have an adverse effect on fuel nozzle operation. The Pratt and Whitney Canada Service Bulletin(s) "Engine Fuels - Requirements and Approved Listings" contains two lists of fuels: "Acceptable fuels subject to NO restrictions on use", and "Acceptable fuels subject to RESTRICTIONS on use". Obviously the fuels subject to NO restrictions on use are preferred. Normally when the fuels without restriction on use are used; few problems are encountered. Normally when the same fuel continues to be used; few problems are encountered. Alternatively, when the engine operator uses a fuel which is listed on the restriction on use list OR when there are changes in the TYPE of fuel used; more rapid fuel nozzle spray pattern deterioration is possible. When fuel type is changed or when restricted use fuels are used the engine operator is expected to use a shorter fuel nozzle maintenance interval UNTIL experience has shown that the changes in fuel are NOT detrimental to fuel nozzle spray pattern quality. Normally if a fuel causes a problem with fuel nozzle spray pattern quality; the operator would change BACK to the fuel which was NOT troublesome. If this is not possible, then a shorter fuel nozzle maintenance interval should be used and the "MORE Scheduled Inspection Status Sheet" needs to be modified to accommodate the change in the wash interval.

B. On flow divider and dump or purge valve, check for signs of leakage at spigot joint between dump spring housing or purge valve housing and main body. If leakage is evident, return valve to an approved overhaul facility.

C. On starting flow control, PT6A-34, -36,-135, -135A ONLY check lever movement for freedom of move ment. Return suspect units to an approved overhaul facility.

D. Engine Internals, Hot section

If and only if, gas generator case, diffuser exit ducts were previously found to be damaged during hot section inspection / repair, and if and only if these damaged gas generator case diffuser exit ducts were NOT replaced; then: inspect for allowable loss of diffuser exit ducts. Examine, with borescope, gas generator case and combustion chamber in conjunction with fuel nozzle inspection. Additional disassembly to perform this diffuser exit duct inspection is NOT intended; unless abnormal conditions are seen.

Records requirement:

The information to be recorded is: the fact that the fuel nozzle inspection per the Maintenance manual was performed, the date, and the engine flight hours. If the gas generator case diffuser exit ducts were inspected, record that also. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601, especially the table titled "Periodic Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-04.

C. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-05.

BORESCOPE INSPECTION OF HOT SECTION

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection every other time the 200 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection every third time the 150 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection every fourth time the 100 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

D. **COMMENT:** many operators have found that it is easier in the long run to perform the borescope inspection of the hot section every 305 flight hours when the fuel nozzles have been removed for fuel nozzle inspection in accordance with Fuel Nozzle Inspection. If this option is selected, the "MORE Scheduled Inspection Status Sheet" needs to be modified to accommodate the change in the Borescope Inspection interval.

E. **COMMENT:** alternatively, some operators have found that they prefer to split the engine at "C" Flange in order to perform a visual inspection of the hot section in place of the borescope inspection, at 455 flight hours. This is also an acceptable alternative method, if selected by the personnel performing this inspection. While this option allows a change to the way the inspection is to be performed; the intent of the inspection is unchanged.

Specifics:

P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601 contains instructions for using the borescope. Additional instructions for using the borescope are contained in Appendix A "Borescope Inspection Manual".

Inspect as follows:

A. Gas generator case - Cracks, distortion, overheating and corrosion. (When these conditions are present, they are often visible on the exterior of the gas generator case.)

B. Combustion chamber liners, large and small exit ducts - Cracks, distortion, burning, blockage of cooling holes due to repair and coating loss. Any amount of coating loss is acceptable provided burning of parent metal has not occurred.

C. Compressor vane ring assembly - Cracks, coating loss, erosion of parent metal or impact damage.

D. Compressor turbine shroud segments - Cracks, distortion, erosion and metal build-up.

E. Compressor turbine disk assembly - Examine CT blades for tip rub, erosion, impact damage, coating loss, cracks, and visible shift. If a crack is found on any blade, ship the CT disk assembly to an approved overhaul facility. When the overhaul facility confirms that at least one of the CT blades is CRACKED; the complete set of CT blades must be discarded and replaced with serviceable CT blades.

F. Fuel nozzles - Dissimilarity of carbon build-up.

G. Fuel nozzle sheaths - Fretting wear, erosion and carbon build-up.

NOTE: In each of these cases, the objective is:

A. To inspect the hot section to see if it is in a condition suitable for continued operation.

B. To identify hot section (engine) problems while the problems are in the preliminary stages and to initiate corrective action at this time, in order to avoid more serious problems and more extensive repair at a later time.

Records requirement:

The information to be recorded is: the fact that the hot section inspection borescope inspection was performed, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601, especially the table titled "Hot Section Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-30-04.

C. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-40-01.

D. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-01.

E. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-02.

F. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-05.

G. Appendix A "Borescope Inspection Manual".

COMPRESSOR INSPECTION

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection every other time the 200 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection every third time the 150 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection every fourth time the 100 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

Specifics:

P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601 contains instructions for using the borescope. Additional instructions for using the borescope are contained in Appendix A "Borescope Inspection Manual. While the inspection of the compressor is intended to be performed using a mirror and a bright light; the borescope can frequently be a useful tool to evaluate specific conditions which may be found.

Inspect as follows:

A. Remove the air inlet screen (See PT6A-34 or PT6A-114 series maintenance manual Section 72-20-00).

B. Inspect the compressor inlet case and struts for cracks.

C. Inspect the inlet screen for dirt or damage or other abnormal conditions.

D. Inspect the first stage compressor blades and first stage compressor stator vanes for dirt deposits, erosion, corrosion and / or cracks. If corrosion, erosion, foreign object damage, cracks, etc. are observed; the PT6A-34 or PT6A-114 series maintenance manual describes the acceptable limits for damage etc. in section 72-30-05.

E. Reinstall the air inlet screen.

F. If salt, dirt or other deposits are observed; the compressor wash interval or the compressor wash technique is insufficient. Perform Compressor Performance Recovery Wash AGAIN. Reinspect the compressor to see if this has corrected the problem. If Compressor Performance Recovery Wash corrects the problem; then the compressor wash interval must be shortened. In addition, up date the "MORE Scheduled Inspection Status Sheet". If repeated Compressor Performance Recovery Wash does NOT correct the problem; then compressor module overhaul or major repair will be necessary.

G. If damage (that is foreign object damage) exceeds PT6A-34 or PT6A-114 series maintenance manual limits and if the damage can be repaired; the compressor will be repaired to correct the foreign object damage. If damage (that is extensive foreign object damage, or corrosion, or erosion) exceeds PT6A-34 or PT6A-114 series maintenance manual limits; then compressor module overhaul or major repair will be necessary.

H. If foreign object damage, or corrosion or erosion is significant or extensive, but within PT6A-34 or PT6A-114 series maintenance manual limits and the engine performance deterioration can NOT be corrected by repair to the hot section module; then compressor module overhaul or major repair will be necessary.

NOTE: In each of these cases the objective is: A. To inspect the compressor, etc. to see if it is in a condition suitable for continued operation. B. To identify compressor, etc. problems and to initiate corrective action as appropriate.

Records requirement:

The information to be recorded is: the fact that the compressor inspection was performed, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:
Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601, especially the table titled "Hot Section Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-20-00.

C. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-30-05.

EXHAUST DUCT INSPECTION

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection every other time the 200 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection every third time the 150 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection every fourth time the 100 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

Specifics:

P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601 contains instructions for using the borescope. Additional instructions for using the borescope are contained in Appendix A "Borescope Inspection Manual". While the inspection of the exhaust duct is intended to be performed using a mirror and a bright light; the borescope can frequently be a useful tool to evaluate specific conditions which may be found.

A. Remove the exhaust stack (exhaust stub). (See appropriate airframe maintenance manual).

B. Use a bright light and a hand held mirror to perform the inspection.

C. Inspect power turbine blades for impact damage, erosion, and cracks.

D. Inspect power turbine stator vanes for cracks, erosion and impact damage.

E. Inspect exhaust duct ski jump for cracks, looseness and / or distortion.

F. Inspect number 3 bearing cover for condition. While this can be a difficult area to examine; look for evidence of looseness and / or rotation.

G. Inspect outer surface of the exhaust duct for buckling, ripples, and similar distortion, or cracks. Pay particular attention to "A" Flange and "C" Flange when looking for cracks.

H. Reinstall the exhaust stack.

NOTE: In each of these cases the objective is:

A. To inspect the power turbine, etc. to see if it is in a condition suitable for continued operation.

B. To identify power turbine, etc. problems and to initiate corrective action as appropriate.

Records requirement:

The information to be recorded is: the fact that the power turbine blade and the exhaust duct inspection was performed, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601, especially the table titled "Hot Section Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-03.

C. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-04.

D. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-05.

POWER PLANT CLEANING (COMPRESSOR AND TURBINE WASHES)

COMMENT: the MORE Instructions For Continued Airworthiness rely on extensive use of Compressor Desalination Wash and also rely on regularly scheduled Compressor Performance Recovery Wash. P&WC Service Bulletin number 1495 provides a P3 Air Filter Drain Adapter which simplifies the steps necessary to perform Compressor Desalination Wash and Compressor Performance Recovery wash. These MORE Instructions For Continued Airworthiness do NOT require the incorporation of P&WC S/B 1495, however in many cases incorporation of this S/B will provide a significant long term benefit to the aircraft operator, and for this reason MORE Company suggests that each operator consider the incorporation of S/B 1495.

COMPRESSOR PERFORMANCE RECOVERY WASH

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection about half way between the 200 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 150 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 100 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

D. The following guide lines will help establish appropriate compressor performance recovery wash intervals. Every 155 flight hours or sooner is intended as a maximum limit. The following conditions will determine if a shorter compressor performance recovery wash interval is necessary:

E. If Power Plant - Adjustment / Test monitoring shows a significant improvement after compressor performance recovery wash, then a shorter wash interval is needed. If a shorter wash interval is needed, the "MORE Scheduled Inspection Status Sheet" needs to be modified to accommodate the change in the wash interval.

F. If the inlet screen is un-bolted at the 6 O'clock location, it is then possible to examine the concave side of the first stage compressor blades with a small mirror. (See PT6A-34 or PT6A-114 series maintenance manual, Section 72-20-00, beginning on page 201 and Section 72-30-05 beginning on page 201.) It is also possible to examine the leading edges of the first stage compressor stator vanes. If salt, dirt, or other deposits are observed; the compressor performance recovery wash interval or the compressor perfor mance recovery wash technique is insufficient, and an appropriate change is required.

Specifics:

COMMENT: compressor performance recovery wash uses cleaning chemicals and is FOLLOWED by a wash with CLEAN water. Clean water is water which is suitable for drinking.

Perform compressor performance recovery wash in accordance with P&WC PT6A-34 or PT6A-114 series maintenance manual, section 71-00-00, beginning on page 701.

Records requirement:

The information to be recorded is: the fact that the compressor performance recovery wash was performed, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:
Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 71-00-00 beginning on page 701.

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-30-05 beginning on page 201.

C. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-20-00 beginning on page 201.

COMPRESSOR DESALINATION WASH

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection about half way between the 200 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 150 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 100 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

D. Local experience will be used (when available) to determine the corrosion severity. Corrosion severity is dependent on many factors: atmospheric pollution, volcanic activity, proximity to salt water, amphibious operation on salt water, exposure to agricultural chemicals, etc.

E. Since water without cleaning chemicals is used for compressor desalination wash, and for turbine desalination (desulfidation) wash; it is almost impossible to cause a problem from excessively frequent compressor desalination washes or turbine desalination washes. If the operating environment for your aircraft seems to fall in between wash criteria, select the more frequent wash schedule.

F. Engines which are exposed to severe corrosion shall receive compressor and turbine desalination washes daily. Desalination wash at the end of the day is slightly better for reducing the corrosive effects. However, if desalination wash at the end of the day will adversely effect aircraft scheduling and / or availability; then compressor desalination wash at another time in the day is permissible. When local experience is unavailable, engines used for agricultural operation, engines used for amphibious operation on salt water, engines operated over salt water more than 80% of their flight time, and engines operated near volcanic activity shall be considered severe.

G. Engines which are exposed to moderate corrosion shall receive compressor and turbine desalination washes weekly. When local experience is unavailable, engines operated in polluted air, engines operated over salt water more than 20% of their flight time but less than 80% of their flight time, engines operated out of airports within one mile (1.6 kilometers) of salt water shall be considered moderate.

H. Engines which are exposed to mild corrosion shall receive compressor and turbine desalination washes monthly or every 55 flight hours which ever comes first. When local experience is unavailable, engines operated away from salt water, away from agricultural chemicals, away from air pollution, and away from volcanic activity shall be considered mild.

I. Engines which are NOT exposed to corrosion shall receive compressor and turbine desalination washes every 155 flight hours, or sooner. When local experience is available, and when that local experience has shown that compressor corrosion is NOT a problem AND when that local experience has shown that turbine section sulfidation is NOT a problem; then the engine shall receive compressor and turbine desalination (desulfidation) washes every 155 flight hours or sooner. If a shorter wash interval is needed, the "MORE Scheduled Inspection Status Sheet" needs to be modified to accommodate the change in the wash interval.

J. Engines and / or operators who have had a history of compressor turbine sulfidation; shall be considered to be in either a severe corrosion environment or in a moderate corrosion environment, depending on the severity of that sulfidation history.

K. The use of Silicon Aluminide (Sermaloy J), Chromium Aluminide, and Platinum Aluminide coatings on compressor turbine vane rings and compressor turbine blades, have been shown to reduce the rate of progression of sulfidation corrosion. When silicon or chromium or platinum aluminide coatings are used on BOTH CT vane rings and CT blades; that use may be considered to reduce the need for desulfidation wash to the next lower exposure category. HOWEVER, Pack Process Diffused Aluminide does NOT provide this benefit.

L. The condition of the compressor turbine vane ring and the condition of the compressor turbine blades which is observed during hot section inspection or hot section repair and which is observed during hot section borescope inspection; is an important part of local experience. When an engine or engines are observed in a specific operating environment, and that operating environment remains reasonably uniform over a time period in excess of 1000 flight hours; the rate of change or the lack of change to the CT vane ring and CT blades with respect to sulfidation corrosion may be used as a method of determining local experience.

Specifics:

COMMENT, compressor desalination wash uses ONLY CLEAN water. Clean water is water which is suitable for drinking.

Perform compressor desalination wash in accordance with P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 71-00-00, beginning on page 701.

Records requirement:

The information to be recorded is: the fact that the compressor desalination wash was performed, the date, and the engine flight hours. Also, if the engines are only exposed to mild corrosion or only exposed to mild sulfidation or not exposed to corrosion at all, or not exposed to sulfidation at all; a written statement explaining why those conditions are applicable is required. If BOTH CT vane ring and CT blades are coated with silicon, chromium or platinum aluminide; that fact shall be recorded as well. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 71-00-00 beginning on page 701.

TURBINE DESALINATION (DESULFIDATION) WASH

Frequency:

The turbine desalination (desulfidation) wash is to be performed at the same time (that is: immediately after) as the performance recovery wash, and on the same schedule.

AND

The turbine desalination (desulfidation) wash is to be performed at the same time (that is: immediately after) as the compressor desalination wash, and on the same schedule.

Specifics:

COMMENT, turbine desalination (desulfidation) wash uses ONLY CLEAN water. Clean water is water which is suitable for drinking.

Perform turbine desalination (desulfidation) wash in accordance with P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 71-00-00, beginning on page 701.

Records requirement:

The information to be recorded is: the fact that the turbine desalination wash was performed, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 71-00-00 beginning on page 701.

ENGINE EXTERNAL WASH

Frequency:

The engine external wash is to be performed at the same time as the performance recovery wash, and on the same schedule.

Specifics:

COMMENT: Engine external wash uses cleaning chemicals and is FOLLOWED by a wash with CLEAN water. Clean water is water which is suitable for drinking.

Perform engine external wash in accordance with P&WC PT6A-34 or PT6A-114 series maintenance manual, section 71-00-00, beginning on page 701.

Records requirement:

The information to be recorded is: the fact that the engine external wash was performed, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 71-00-00 beginning on page 701.

GENERAL CONDITION

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection about half way between the 200 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 150 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 100 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

Specifics:

Inspect as follows (Inspect for condition and security):

1. Engine externals
1A. Tubing, wiring, control linkages, hose assemblies
1A1. All accessible connections, clamps and brackets for attachment.
1A2. Wear, chafing, cracks and corrosion.
1A3. Fuel and oil lines for leaks.
1A4. Depending on operating conditions and environment, examine linkages at regular intervals. Pay particular attention to rear linkage cam box, fuel control unit arm, telescoping rod and rod end fittings. Disconnect rod ends and clean using solvent. Lubricate with light grease after engine external wash. Examine rod ends for corrosion, roughness in rotation, side play and radial play. After lubrication reinstall rod ends and torque to specified value. Inspect for free movement of linkage. **NOTE:** With the exception of rod end fittings, linkages generally will operate satisfactorily without lubrication. While lubrication will be effective in some instances, it must be realized that grease and oil attracts dirt and foreign matter. Depending on local conditions, operators should take these facts into consideration before deciding to lubricate components.

1B. Air inlet screen
1B1. Cleanliness

1C. Gas generator case
1C1. External surfaces, and fire seal mounting ring brackets for cracks, distortion and corrosion.

1D. Fire seal mount rings
1D1. Cracks and attachment of brackets and seals.

1E. Exhaust duct
1E1. Cracks and distortion

1F. Propeller shaft seal
1F1. Inspect for oil leaks.

1G. Accessories
1G1. Attachment of accessories and linkages, air, oil and fuel lines.
1G2. Security of pneumatic lines.
1G3. Oil and fuel leaks as applicable.
1G4. N/A (See Starter Generator Gearshaft Wear).

2. Engine Internals
2A. Compressor turbine disk
2A1. N/A (See Compressor Turbine Disk And Blade Inspection).
2B. Hot section
2B1. N/A (See Fuel Nozzle Inspection).

3. Systems
3A. Oil System
3A1. Inspect oil level within 10 minutes of engine shutdown.
3A2. Inspect condition and locking of oil filler cap.
3A3. N/A (See Inspection Of Oil Filter And Engine Oil).
3A4. AFTER collection of oil filter debris in accordance with Inspection Of Oil Filter And Engine Oil; use approved equipment to clean permanent filter element at an overhaul facility prior to further use. Do not clean ultrasonically. Filter element must be discarded after 1055 hours or after heavy contamination.
3A5. N/A (See Continuity Inspection Of Oil System Chip Detector.)
3A6. N/A (See Chip Detector Functional Inspection).
3A7. Inspect scavenge oil pump housing for leaks

3B. Fuel system
3B1. Inspect fuel for water contamination.
3B2. Inspect fuel pump for installation and leaks. **NOTE:** If airframe fuel boost pump fails or is inadvertently left off for an accumulative time in excess of 10 hours, the engine driven fuel pump must be removed and replaced. The removed fuel pump shall be sent to an approved overhaul facility.
3B3. N/A (See Fuel Pump Filter).
3B4. N/A (See Fuel Pump Filter).
3B5. N/A (See Fuel Pump Filter).
3B6. Inspect drain valve for installation and leaks.
3B7. Inspect flow divider and dump valve for installation and leaks.
3B8. Inspect FCU for installation, linkages and pneumatic tubes. Evidence of FCU bearing washout indicated by traces of blue dye effluent is caused by a mixture of bearing grease and fuel. **NOTE:** Blue dye effluent is frequently an indication of fuel pump leakage / failure.
3B9. For engines with a fuel control manual override only (normally only single engine aircraft), and with a pre-S/B 1472 fuel control:

A. Disconnect manual override linkage at FCU.

B. Actuate manual override linkage and inspect for freedom of movement.

C. Inspect manual override linkage for binding or roughness. If binding or roughness is present, replace FCU.

D. Reconnect manual override linkage.

3B10. N/A (See Fuel Control).
3B11. N/A (See Fuel Nozzle Inspection).
3B12. Inspect oil-to-fuel heater installation.

3C. Ignition System
3C1. Inspect ignition exciter / current regulator for installation and condition.
3C2. Inspect ignition cables for chafing, wear and installation.
3C3. Inspect spark igniters / glow plugs for cleanliness and erosion. Inspect functional test.

3D. Pneumatic System N/A (See P3 Filter Cleaning, and See P3 Filter Replacement).

Records requirement:

The information to be recorded is: the fact that the general condition (inspection) was performed, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601, especially the table titled "Periodic Inspection".
B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 70-00-00.
C. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 71-00-00.
D. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00.
E. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-10-00.
F. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-20-00.
G. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-30-01.
H. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-30-02.
I. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-30-04.
J. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-50-05.
K. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-60-00.
L. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-00.
M. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-01.
N. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-02.
O. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-04.
P. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-05.
Q. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-06.
R. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-07.
S. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-08.
T. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-20-00.
U. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 74-00-00.
V. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 74-10-00.
W. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 74-20-00.
X. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 75-30-00.
Y. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 76-10-00.
Z. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 79-20-02.
P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 79-20-04.

P3 FILTER INSPECTION AND CLEANING

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection about half way between the 200 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 150 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 100 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

Specifics:

Inspect P3 filter housing for correct installation. Inspect vent hole in the filter cover to make sure it is clear of all obstructions. (The hole size is 0.029 to 0.034 inch diameter). Inspect the P3 filter for cleanliness. Unless it really looks clean, clean it.

Federal Aviation Administration Airworthiness Directive 92-15-11 removes the P3 air filter from SOME PT6A-34 or PT6A-114 engines. If the P3 filter has been removed, the MORE Scheduled Inspection Status Sheet will need to be modified to show that the P3 filter has been removed and therefore P3 filter inspection and replacement are not necessary. However if a P3 filter is installed; that P3 filter will need to be inspected. FAA AD 92-15-11 allows the P3 filter housing to be retained AFTER the P3 filter is removed. In this case it is still necessary to inspect the P3 filter housing and the vent hole. Alternatively, there are optional P3 line configurations which do not incorporate a P3 filter housing.

Records requirement:

The information to be recorded is: the fact that the P3 filter was inspected and cleaned, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet". If the P3 filter has been removed, the MORE Scheduled Inspection Status Sheet will need to be modified to show that the P3 filter has been removed.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00 beginning on page 601, especially the table titled "Periodic Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 73-10-07.

VERIFY CORRECT OPERATION OF COCKPIT INSTRUMENTS

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection every other time the 200 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection every third time the 150 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection every fourth time the 100 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

D. OR When Power Plant - Adjustment / Test indicates an un-explained change in engine performance.

Specifics:

Inspect the following cockpit instruments to confirm that they are providing correct readings. That is, test to verify correct instrument calibration. Inspect / test the following instruments: Propeller RPM or percent gage (Np), Compressor RPM or percent gage (Ng), Inter Turbine Temperature (ITT), Propeller Torque, Fuel Flow, and (engine) Oil Pressure. Since these are aircraft components, refer to the appropriate aircraft manuals for specific instructions.

Records requirement:

The information to be recorded is: the fact that the propeller speed, compressor speed, inter turbine temperature, propeller torque, fuel flow and oil pressure gages were inspected to confirm that they were providing correct readings, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

The appropriate aircraft manuals.

PROPELLER BALANCING

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection every other time the 200 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection every third time the 150 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection every fourth time the 100 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

D. In addition the propeller shall be balanced every time after the propeller is separated from the engine AND REINSTALLED, but prior to flight.

Specifics:

MORE Company suggests the use of the Chadwick Helmuth Model 192A Spectrum Analyzer for performing propeller balance; since Propeller Balance and Engine Vibrational Analysis are normally performed at the same time, and since the Chadwick Helmuth Model 192A Spectrum Analyzer is required to be used for Engine Vibrational Analysis. ALTERNATIVELY, many mechanics have experience using a propeller balancing device / machine other than a Chadwick Helmuth Model 192A, and because of that experience can correctly balance a propeller more quickly and more easily than using the Chadwick Helmuth Model 192A. There is no reason why the propeller could not be balanced with another device, so long as after the propeller is balanced, the Chadwick Helmuth Model 192A is used to confirm that the resulting propeller unbalance is below 0.2 inches per second.

The PT6A engines use a constant speed propeller. When the propeller governor is properly adjusted and when the engine is producing sufficient power (usually above 80 percent Ng (gas generator speed)) the propeller will rotate at 2200 revolutions per minute (RPM), (PT6A-34,-34AG,-34B,-36) or 1900 RPM (PT6A-114,-114A,-116,-135,-135A) and the Np (propeller speed) will be 100.0 percent within a small tolerance. When propeller speed is known this way, the calculations and effort associated with propeller balancing are less difficult. Normally the propeller balancing device will be used to determine the propeller speed exactly.

The technique for propeller balancing is:

A. Use the propeller balancing device to determine the amount of unbalance and location.

B. Use the propeller manufacturer's instructions (usually Hartzell or McCauley) to attach the necessary quantity of weight in the correct clock location to off set the unbalance.

C. Use the propeller balancing device to determine the resulting unbalance.

D. Repeat steps A, B, and C as necessary until the propeller unbalance has been reduced below 0.2 inches per second (IPS).

E. If a device other than a Chadwick Helmuth Model 192A was use to balance the propeller, use a Chadwick Helmuth Model 192A to confirm that the resulting unbalance is below 0.2 IPS.

In addition the propeller shall be balanced every time after the propeller is separated from the engine AND REINSTALLED, but prior to flight.

Records requirement:

The information to be recorded is: the fact that the propeller was balanced to a remaining unbalance of less than 0.2 inches per second, the date, and the engine flight hours. In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. Chadwick Helmuth, "Spectrum Analyzer Model 192A Operation Manual", Manual Number 9107-1, revision 1 dated July 1988 or later revision.

B. Chadwick Helmuth "The Smooth Propeller: How to perform a dynamic propeller balance", revised June 1990 or later revision.

C. Any instructions from the propeller manufacturer that tell how to balance their propeller and / or where to attach the weights used to balance the propeller.

D. The operating instructions for any other device which is being used for performing propeller dynamic balancing.

ENGINE VIBRATIONAL ANALYSIS

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection every other time the 200 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection every third time the 150 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection every fourth time the 100 hour airframe inspection is performed, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 455 hours after the last time this inspection was performed.

D. In addition Engine Vibrational Analysis shall be performed every time the propeller is separated from the engine and reinstalled.

E. In addition Engine Vibrational Analysis shall be performed after major repair or overhaul is performed on the engine. Major repair is defined as any repair to the engine which is performed in accordance with the OVERHAUL manual but does NOT include Hot Section Repair.

F. If the oil filter inspection and / or the oil spectrometric oil analysis show abnormal levels of metal (that is wear metal); engine vibrational analysis can be used as a part of the trouble shooting process. In the cases where engine vibrational analysis identifies the problem area; unnecessary disassembly and inspection may be avoided. Vibrational Analysis is described in Appendix C.

Specifics:

Perform Engine Vibrational Analysis in accordance with Appendix C.

Records requirement:

The information to be recorded is:

A. The fact that Engine Vibrational Analysis was performed, the date, and the engine flight hours.

B. A copy of the Chadwick Helmuth 150 RPM to 14,000 RPM card(s) (this is the RED card) and a copy of the Chadwick Helmuth 9,600 RPM to 900,000 RPM card(s) (this is the GREEN card) shall be retained with the engine records.

C. On each of the red and green cards record: the date, the engine serial number, the compressor speed (either rpm or percent) and the propeller speed (either rpm or percent) and the location where the vibration transducer was attached to the engine (Example: "A" Flange, 12 O'clock). In addition, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. Chadwick Helmuth, "Spectrum Analyzer Model 192A Operation Manual", Manual Number 9107-1, revision 1 dated July 1988 or later revision.

B. Chadwick Helmuth "The Smooth Propeller: How to perform a dynamic propeller balance", revised June 1990 or later revision.

C. Appendix C, "Spectrum Analyzer Supplementary Instructions."

POWER PLANT - ADJUSTMENT / TEST

The performance of Power Plant - Adjustment / Test (Engine Performance Check Only) at the beginning of the 150/ 300/ 450 Hour Inspection(s) will help identify "Problem" areas which will need special attention during 150/ 300/ 450 Hour Inspection(s). When Power Plant - Adjustment / Test (Engine Performance Check Only) is performed at the beginning of 150/ 300/ 450 Hour Inspection(s), and when "Problems" are found and corrected during 150/ 300/ 450 Hour Inspection(s), going back to re-do work in the engine can be avoided. Power Plant - Adjustment / Test (Engine Performance Check Only) is one of the LAST things which will be done at the end of 150/ 300/ 450 Hour Inspection(s). The performance of Power Plant - Adjustment / Test (Engine Performance Check Only) at the end, will help confirm that the engine is operating correctly and is airworthy for return to service.

Frequency:

A. 200 Hour Airframe Inspection Intervals - Perform this inspection about half way between the 200 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

B. 150 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 150 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

C. 100 Hour Airframe Inspection Intervals - Perform this inspection at the same time as the 100 hour airframe inspections, or perform this inspection at a convenient time, but perform this inspection NO LATER THAN 155 hours after the last time this inspection was performed.

D. After any maintenance is performed on the engine, and prior to returning the engine to service, with the exception of the most basic engine maintenance. (That is, Power Plant - Adjustment / Test is not required after: daily check, checking the engine oil level, collecting an engine oil sample, inspecting the engine oil filter, inspecting the continuity of the oil system chip detector, performing compressor desalination wash, or performing turbine desalination (desulfidation) wash.)

E. When there is a suspicion that the engine is not operating as it should.

Specifics:

The PT6A-34 or PT6A-114 series maintenance manual contains instructions for Power Plant - Adjustment / Test, Section 71-00-00 beginning on page 501, especially the tables titled "Engine Performance Checking Chart". In addition the engine portion of the aircraft manuals for the particular aircraft using the PT6A-34 or PT6A-114 series engine, normally contain equivalent information for checking the engine performance as installed in the aircraft.

Following these manuals, perform Power Plant - Adjustment / Test (Engine Performance Check Only) to confirm correct engine operation. Record both the TARGET values from the engine curves, and the ACTUAL performance values observed during Power Plant - Adjustment / Test. Compare the differences between the target and the actual performance values observed (now) with the differences between the target and the actual performance values observed and recorded during the previous hot section inspection, or during entry on to the MORE Instructions For Continued Airworthiness, which ever is more recent. If there is a substantial difference in performance (that is, a change in inter turbine temperature (ITT) of 25 degrees Celsius or 45 degrees Fahrenheit or a change in gas generator speed of 1.5 percent or 562 rpm or both); this is an indication of a significant change in engine performance and it is necessary to inspect further to determine the cause. If any abnormal conditions are observed they are to be corrected promptly.

This maintenance manual section is useful for troubleshooting suspected engine discrepancies. Compressor performance recovery wash, this maintenance manual section, borescope inspection, etc. should be used together to determine if the engine has a problem and what that problem is. Power Plant - Adjustment / Test and this maintenance manual section may be used to help determine if the engine may be repaired while it is installed in the aircraft. Alternatively, this section will provide useful information if the engine needs to be removed for more extensive repair.

Records requirement:

Record both the target and actual performance values, the date, and the engine flight hours. Record whether Power Plant - Adjustment / Test was performed because it was scheduled, or whether Power Plant - Adjustment / Test was performed after maintenance, or whether Power Plant - Adjustment / Test was performed because there was a suspicion the engine was not operating properly. If maintenance was performed, BRIEFLY describe the maintenance. If there was a suspicion that the engine was not operating properly, describe the circumstances. In addition, when appropriate, up date the "MORE Scheduled Inspection Status Sheet".

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 71-00-00 beginning on page 501,

B. The appropriate aircraft manual which provides instructions for determining engine performance as installed in the aircraft.

Appendix V

FAA
Aircraft Certification Service

SPECIAL AIRWORTHINESS INFORMATION BULLETIN

SUBJ: Powerplant - Original Type and Production Certificate Holder Parts and Aftermarket Modification and Replacement Parts

SAIB: NE-08-40
Date: August 8, 2008

This is information only. Recommendations aren't mandatory.

This Special Airworthiness Information Bulletin (SAIB) alerts owners, operators, and certificated repair and maintenance providers of the **responsibilities of type and production certificate (TC/PC) holders, supplemental type certificate (STC) holders, and the parts manufacturer approval (PMA) holders** to support the continued operational safety (COS) of their product or part design.

Background

Producers of aircraft, aircraft engines, propellers, and replacement parts comprise an elite segment of a global industry that has produced some of the safest aviation products in the world. The FAA recognizes that this is due to many factors including advanced design tools, testing and analysis techniques, materials, early fault detection capability, and the regulatory certification environment that the industry operates in.

In today's competitive market, owners and operators are continuously searching for ways to reduce costs while maintaining safety. One way is to reduce maintenance expenses by finding alternative sources of replacement parts. This naturally created new markets for replacement parts.

Recently, some engine manufacturers responded to the FAA's approval of PMA and STC for parts involving their type design engine models by telling customers that support of their products could be limited if such parts are installed, since they do not have data on these PMA and STC parts and the effect these parts may have on the overall system. Some TC/PC holders have included language in the FAA-approved airworthiness limitation section (ALS) of their engine instructions for continued airworthiness (ICA) stating that the ICA was developed only for use with their parts.

The FAA understands that the TC/PC holder has no knowledge or data about the PMA and STC parts installed in the product and, therefore, can only assess the airworthiness and systems effects of their parts installed in the product.

PMA and STC parts are thoroughly evaluated for compliance with respect to any changes they introduce and their effect on the original type design. The need for supplemental ICAs, new airworthiness limitations, and other conditions is established by the FAA to ensure the safe integration of the PMA and STC parts into the product.

Recommendations

The following information is provided to assist the aviation community with regard to the installation of FAA-approved replacement parts –

1) FAA-approved TC/PC holder, PMA, and STC parts are interchangeable within the certificated product since they are approved only after a full demonstration of compliance to the applicable requirements of Title 14 of the Code of Federal Regulations (14 CFR). A PMA or STC part, when FAA-approved for installation on a certificated product, is a valid replacement part to the TC/PC holder part according to 14 CFR;

2) Unless stated otherwise as a limitation to an STC, the FAA has determined and the applicant has shown that FAA-approved life limits established for the TC/PC holder parts remain unchanged for those TC/PC holder parts when PMA or STC parts are installed elsewhere within the product. For example, the life limit for a TC/PC holder disk is unchanged and remains in effect when PMA blades are installed in that disk;

3) The FAA approves the content of an ALS and ICA based upon its review of the substantiating data provided by an applicant. Applicants for PMA or STC parts are required to assess the ICA requirements. A PMA or STC applicant either shows and states that the product's ICA are still valid with their part installed or provides a supplemental ICA for any differences; and

4) TC/PC holders, PMA holders, and STC holders are responsible for the COS support in accordance with the applicable standards for their parts and products which they have designed and produced.

Owners and operators are ultimately responsible for the safety and airworthiness of the product, which includes being responsible for the configuration control of the product. Owners and operators must ensure that any replacement part installed in the product is approved for that installation and further, they must also ensure that they follow any supplemental ICA that may have been developed for that part.

For Further Information Contact

Thomas A. Boudreau, Manager, Engine Certification Office, FAA, 12 New England Executive Park, Burlington, MA 01803; phone: (781) 238-7140; fax: (781) 238-7199; e-mail: thomas.boudreau@faa.gov; or Antonio Cancelliere, Aerospace Engineer; FAA, 12 New England Executive Park, Burlington, MA 01803; phone: (781) 238-7751; fax: (781) 238-7199; e-mail: antonio.cancelliere@faa.gov.

Appendix VI

SERVICE INFORMATION LETTER

Subject: PT6A – Discontinuation of On-Condition and Highly Extended Time Between Overhaul Endorsements by P&WC

Applicability: All PT6A engines

Since its introduction in 1964, the PT6A family has been well received by operators. Over 22,000 are in service, and, with P&WC recommended maintenance, the engine has exhibited excellent reliability and dependability.

P&WC continuously monitors the reliability of the operating fleet, working in partnership with Transport Canada, the Federal Aviation Administration (FAA), European Aviation Safety Agency (EASA) and other regulatory authorities. In this regard, P&WC initiated a formal “aging engine” program in 2008 with Transport Canada to review our PW100, JT15D, and PT6A engine families.

In this pro-active program, the effectiveness of maintenance programs and practices are specifically reviewed with reference to the higher time, higher calendar age and higher TBO engines. Recently, P&WC has met with representatives of Transport Canada and the FAA to review the current and projected reliability of PT6A engines that have been operating to “on-condition” and/or highly extended TBO programs.

P&WC’s approach since 2000 has been to only endorse on-condition and highly extended TBO programs when they are supported by a thorough MSG-3 analysis. As this analysis is not available for the PT6A, and as the design basis of the engine was not that of an on-condition or extreme TBO, P&WC revised SBs xxx03 to state that on-condition programs submitted to P&WC would no longer be endorsed by P&WC. At that time – 12 years ago – the field evidence of reliability was such that P&WC elected to not withdraw our endorsement of programs that had been submitted and accepted prior to the date of the SB revision.

This Service Information Letter is valid until superseded by revision or cancellation.

PRATT & WHITNEY CANADA CORP.
MARIE-VICTORIN, LONGUEUIL
QUEBEC, CANADA J4G 1A1
PRINTED IN CANADA

PWC: PT6A-194

Today, following the results of our aging engine program review and following discussion with Transport Canada and the FAA, P&WC will no longer continue its endorsement of these “legacy” on-condition and extreme TBO programs. P&WC will be revising the SBs xxx03 in the near future to state explicitly that P&WC does not endorse any on-condition or highly extended TBO program on the PT6A series of engines apart from the TBO Extension Options set out in our SBs xxx03.

P&WC expects to issue the appropriate SB revisions – following regulatory review and acceptance – by the middle of 2012.

P&WC remains as fully committed to the on-going reliability and dependability of our PT6A as when we introduced it 48 years ago.

P&WC will keep you informed of our progress on this topic via supplements to this SIL.

Yours truly,

PRATT & WHITNEY CANADA Corp.

[redacted]

Peter Boyd
Chief Engineer
P&WC Customer Service

Appendix VII

PART 3, INITIAL ENTRY INSPECTION

(Inspection procedures to be applied to an engine upon initial entry into the Maintenance On Reliable Engines (MORE) Instructions for Continued Airworthiness.)

Initial Entry Inspection is divided into three sections for clarity. An engine is NOT in compliance with the MORE Instructions for Continued Airworthiness until ALL of the Initial Entry Inspection procedures have been complied with. The three sections are:

PART 3A. Pre Inspection Items,

PART 3B. Initial Entry Inspection Items for ALL Engines, and

PART 3C. Initial Entry Inspection Items for HIGHER Time Engines.

A copy of the Initial Acceptance Checklist filled out completely, a copy of the Scheduled Inspection Status Sheet, filled out completely(found at the end of Part 3 and in Appendix D),a copy of the STC Registration Form filled out completely (found in Appendix D), a copy of the FAA Form 337 filled out completely, a copy of each Vibrational Analysis Card (green and red cards), and a copy of the Statement of Understanding filled out completely (found in Appendix D) shall be forwarded to MORE Company Inc., within thirty days. 1132B Airport Rd., Minden, NV 89423. This requirement is part of the contractual agreement with the aircraft owner when permission to use the MORE Instructions For Continued Airworthiness on an individual engine, listed by serial number is sold to the owner. This requirement has been instituted in order to provide information to the MORE Company which will help us provide improvements to the MORE Instructions For Continued Airworthiness in the future. This requirement has been instituted in order for the MORE Company to collect data which will assist us in our efforts to provide appropriate information to the aircraft owner / operator and to the maintenance facility and / or personnel who are performing the inspections described in the MORE Instructions For Continued Airworthiness.

The FAA has requested that a copy of the Initial Entry Inspection Checklist be submitted to the FAA along with the FAA Form 337.

The purpose of the Initial Entry Inspection is to find problems, and then having found these problems to correct them, PROMPTLY. When the Initial Entry Inspection is done properly; it will assure the engine is in good condition, and the Part 4 Routine Maintenance work tasks will keep the engine in good condition.

INITIAL ENTRY INSPECTION CHECKLIST

Date: 7-24-12 Engine Time: 3752.3
Total Time Engine: 3752.3 Engine S/N: PCE-PC 1021

The following initial entry inspection procedures are to be complied with when the STC is being incorporated.
This INITIAL ACCEPTANCE CHECKLIST is provided and must be completed so that no checks are missed.
NOTE: In each step, if the results are not satisfactory, appropriate corrective action is to be taken prior to the MORE STC being incorporated.

1. Perform an engine Log Book Review, enter results on status sheet. [redacted]
   Check log books to see the last time the following were overhauled:
   a. Fuel pump. 3752.3
   b. Fuel control. 218.0 [redacted]
   c. Start valve. 3752.3
   d. Bleed valve. 3752.3
   e. Prop governor. 3752.3
   f. Ignition box. 3752.3
   If any of the above where last overhauled over 4100 hours ago, they must be overhauled.

   Fill out the Scheduled Inspection Status Sheet and maintain this form so that due items are not missed.

   Perform a Log Book Review on PT6A-114A,-135,-135A to determine the configuration of the 3rd Stage Compressor Stator. Depending on configuration additional action may be necessary.

2. Perform Daily Check.
3. Confirm that required service bulletins have been complied with.
4. Confirm that AD's have been complied with.
5. Install vibration pickup and bracket on engine.
6. Perform Incoming Power Plant Adjustment Test & Initial Engine Vibration Analysis.
7. Check engine oil level.
8. Inspect the oil filter and obtain a filter and engine oil sample.
   (If a disposable oil filter is installed, replace the disposable oil filter if it has 1000 hours on it.)
9. Perform continuity inspection of the oil system chip detector. [redacted]

[redacted]

INITIAL ENTRY INSPECTION CHECKLIST

Date: 7-24-12 Engine Time: 3752.3
Total Time Engine: 3752.3 Engine S/N: PCE-PC 1021

The following initial entry inspection procedures are to be complied with when the STC is being incorporated.
This INITIAL ACCEPTANCE CHECKLIST is provided and must be completed so that no checks are missed.
NOTE: In each step, if the results are not satisfactory, appropriate corrective action is to be taken prior to the MORE STC being incorporated.

1. Perform an engine Log Book Review, enter results on status sheet.
Check log books to see the last time the following were overhauled:

a. Fuel pump. 008788 — 3752.3

b. Fuel control. B10620 — 218.0 [redacted]

~~c. Start valve.~~ — ~~3752.3~~

d. Bleed valve. 3408 — 3752.3

e. Prop governor. B218-002 — 3752.3

f. Ignition box. MN022868 22 — 3752.3

If any of the above where last overhauled over 4100 hours ago, they must be overhauled.

Fill out the Scheduled Inspection Status Sheet and maintain this form so that due items are not missed.

Perform a Log Book Review on PT6A-114A,-135,-135A to determine the configuration of the 3rd Stage Compressor Stator. Depending on configuration additional action may be necessary.

2. Perform Daily Check.

3. Confirm that required service bulletins have been complied with.

4. Confirm that AD's have been complied with.

5. Install vibration pickup and bracket on engine.

6. Perform Incoming Power Plant Adjustment Test & Initial Engine Vibration Analysis.

7. Check engine oil level.

8. Inspect the oil filter and obtain a filter and engine oil sample.
(If a disposable oil filter is installed, replace the disposable oil filter if it has 1000 hours on it.)

9. Perform continuity inspection of the oil system chip detector.

[redacted]

INITIAL ENTRY INSPECTION CHECKLIST
CONTINUED

10. Perform a chip detector functional inspection.
11. Inspect the starter generator gearshaft splines for wear.
12. Inspect fuel pump filters (Replace paper outlet filter). Replaced GX
13. Inspect fuel nozzles. Overhaul if nozzle tips have more than 1200 hours on them since last nozzle tip overhaul. Replaced
14. Split engine at "C" flange and inspect Hot Section.
15. Inspect Compressor Section.
16. Inspect exhaust duct & ITT system.
17. Perform Compressor Performance Wash.
18. Perform Turbine Wash.
19. Perform Engine External Wash.
20. Perform a general condition check.
21. Has the P3 filter been removed in accordance with AD 92.15-11, (Yes or No)? If it has been removed, item 22 is not applicable (N/A). Installed @ TSN
22. Clean and inspect P3 Fliter. Replace if it has a 1000 hours on it. NEW
23. Perform bleed valve test.
24. Calibrate engine instruments.
25. Balance the propeller.
26. Perform an engine vibrational analysis.
27. Perform Post Power Plant Adjustment Test.
28. Compare readings with Incoming and Post Power Plant Adjustment Test to see any changes.
29. Fill out FAA Form 337 and submit to the proper agencies.
30. Make appropriate engine record keeping entries.
31. Fill out the Owner Registration Form and send to MORE Company.
32. Send MORE Company paperwork as described on page 29 of this manual.

M.O.R.E. SCHEDULED INSPECTION STATUS SHEET
FOR 200 HOUR AIRFRAME INSPECTION INTERVALS

PT6A-34 ____ PT6A-34AG ____ PT6A-34B ____ PT6A-36 ____ PT6A-114 ____ PT6A-114A X
PT6A-116 ____ PT6A-135 ____ PT6A-135A ____
(Put a check mark next to the appropriate engine series.)

Date: 7-2012 Engine Time When First Placed on MORE STC: 3752.3
Total Time Engine: 3752.3 Total Cycles: 5915
Time Since Overhaul: / Cycles Since Overhaul: /
Engine S/N: PCE-PC1021 Tail #: N687MA

TASK	TIME WHEN LAST PERFORMED		NEXT TIME DUE
Chip Detector Continuity Check (50 hrs not to exceed 55)	3752.3	+50	50
Oil & Oil Filter Analysis (100 hrs not to exceed 155)		+100	100
Compressor Wash (100 hrs not to exceed 155)		+100	100
General Condition Check (100 hrs not to exceed 155)		+100	100
P3 Filter clean if required (100 hrs not to exceed 155)		+100	100
Power Plant - Adjustment Test (100 hrs not to exceed 155)		+100	100
Starter Generator Gearshaft (200 hrs not to exceed 305)		+200	200
Fuel Pump Filters (200 hrs not to exceed 305)		+200	200
Fuel Nozzle Inspection (200 hrs not to exceed 305)		+200	200
Borescope Hot Section (400 hrs not to exceed 455)		+400	400
Compressor Section Inspection (400 hrs not to exceed 455)		+400	400
Exhaust Duct Inspection (400 hrs not to exceed 455)		+400	400
Chip Detector Functional Check (400 hrs not to exceed 455)		+400	400
Engine Vibration Analysis (400 hrs not to exceed 455)		+400	400
Calibrate Engine Instruments (400 hrs not to exceed 455)		+400	400
Propeller Balancing (400 hrs not to exceed 455)		+400	400
Replace Disposable Oil Filter (1000 hrs not to exceed 1055)	3752.3	+1000	1000
P3 Filter Replacement (1000 hrs not to exceed 1055)	3752.3	+1000	1000
Bleed Valve Test (1400 hrs not to exceed 1505)	3752.3	+1400	1400
Fuel Nozzle Overhaul/Replacement (1400 hrs not to exceed 1505)	3752.3	+1400	1400
3rd Stage Compressor Stator (PWC SB 1504 or SB 1619)	0		
C/T Blade Inspection, USED (3000 hours)	NA	+3000	NA
C/T Blade Inspection, NEW (5000 hours)	0	+5000	1285
Fuel Pump Overhaul (4100 hrs not to exceed 4105)	0	+4100	347.7 3882
Fuel Control Overhaul (4100 hrs not to exceed 4105)	0	+4100	347.7
Fuel Control Special Inspection (for single engine aircraft only)		+2050	1832
Start Valve Overhaul (4100 hrs not to exceed 4105)	0	+4100	347.7
Bleed Valve Overhaul (4100 hrs not to exceed 4105)	0	+4100	347.7
Prop. Governor Overhaul (4100 hrs not to exceed 4105)	0	+4100	347.7
Ignition Box Overhaul (4100 hrs not to exceed 4105)	0	+4100	347.7
Compressor Module (8000 hrs not to exceed 8005)	0		4247.7
Power Section Module (8000 hrs not to exceed 8005)	0		13,085
Compressor Hub Life Limit(PWC S/B 1002 or PWC S/B 1302)	19,000		18,085
2nd Stage Disk Life Limit (PWC S/B 1002 or PWC S/B 1302)	24,000		18,085
3rd Stage Disk Life Limit (PWC S/B 1002 or PWC S/B 1302)	25,000		13,085
Impeller Life Limit (PWC S/B 1002 or PWC S/B 1302)	19,000		18,085
C/T Disk Life Limit (PWC S/B 1002 or PWC S/B 1302)	16,000		14,085
P/T Disk Life Limit (PWC S/B 1002 or PWC S/B 1302)	26,000		
Unscheduled Maintenance (list tasks below)			

Schuman Aviation Co Ltd - Honolulu, HI **Printed: Thu Jul 19 17:03:34 2012**

----- MICROBASE BALANCE HISTORY REPORT -----

DATE: 07/19/2012 11:13:04 OPER:

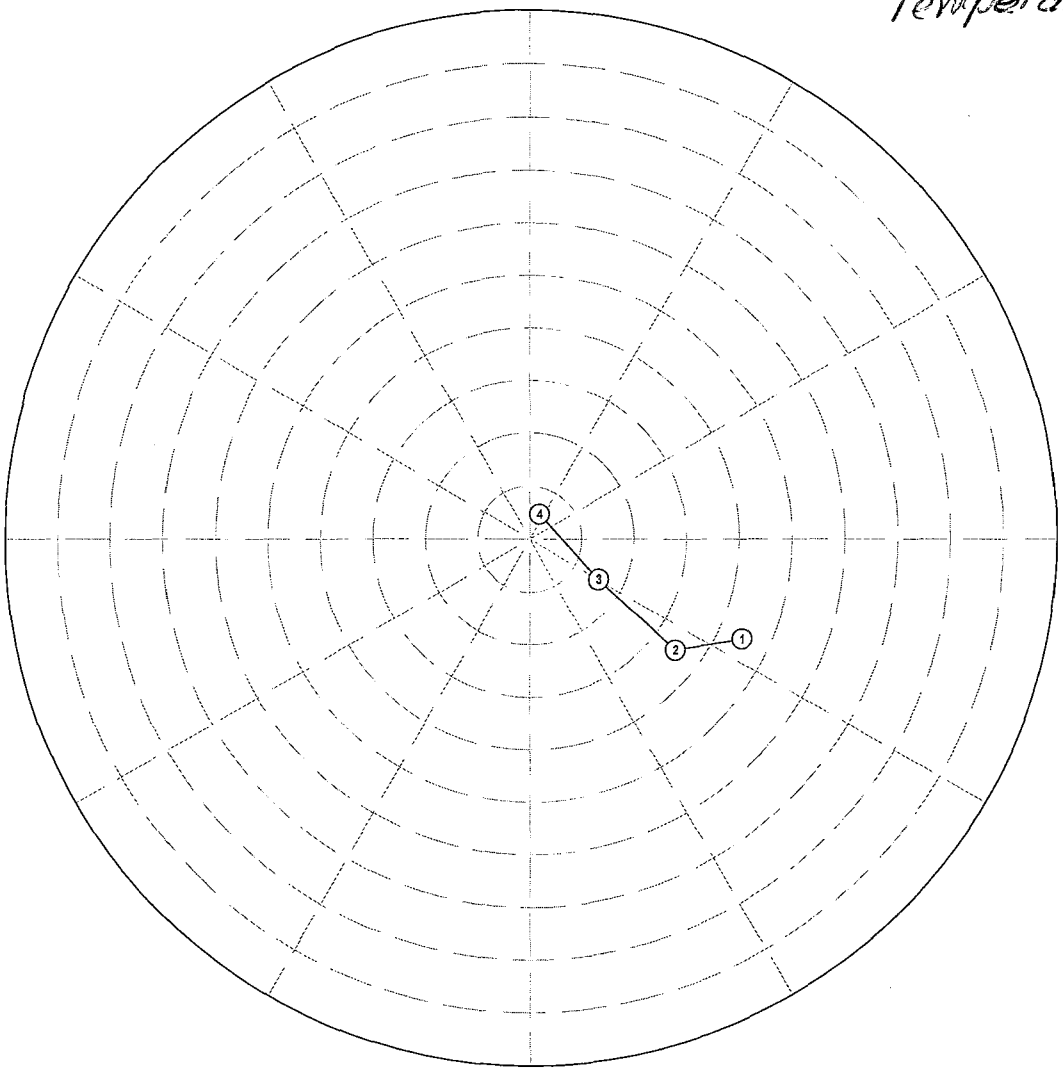
A/C: N687MA Mdl: S/N: 1002 Misc: Hrs: 0.0
Cmp: engine Mdl: PT6M S/N: 1021 Misc: Hrs: 0.0

Group: PROP Task: PROP1

RUN	TYPE	RPM	VIB	LEVEL	PHASE	WT1	LOC1	WT2	LOC2	SENS	TACH
1	L	1816.4	0.447	IN/S	115.0	3.00	330.0	0.00	0.0	80.0	90.0
2	LS	1800.1	0.348	IN/S	127.0	2.00	240.0	3.00	300.0	23.4	129.1
3	LS	1798.2	0.153	IN/S	120.0	1.00	240.0	2.00	300.0	22.0	131.1
4	LS	1803.5	0.051	IN/S	21.7	-0.92	240.0	0.37	300.0	15.8	121.7

----- POLAR PLOT - 1.0 IN/S FS -----

Temperary weight



--- OPERATOR COMMENTS ---

PROP0054.HST 07/19/2012 10:51:28

----- MICROBASE BALANCE HISTORY REPORT -----

DATE: 07/19/2012 15:44:06 OPER:

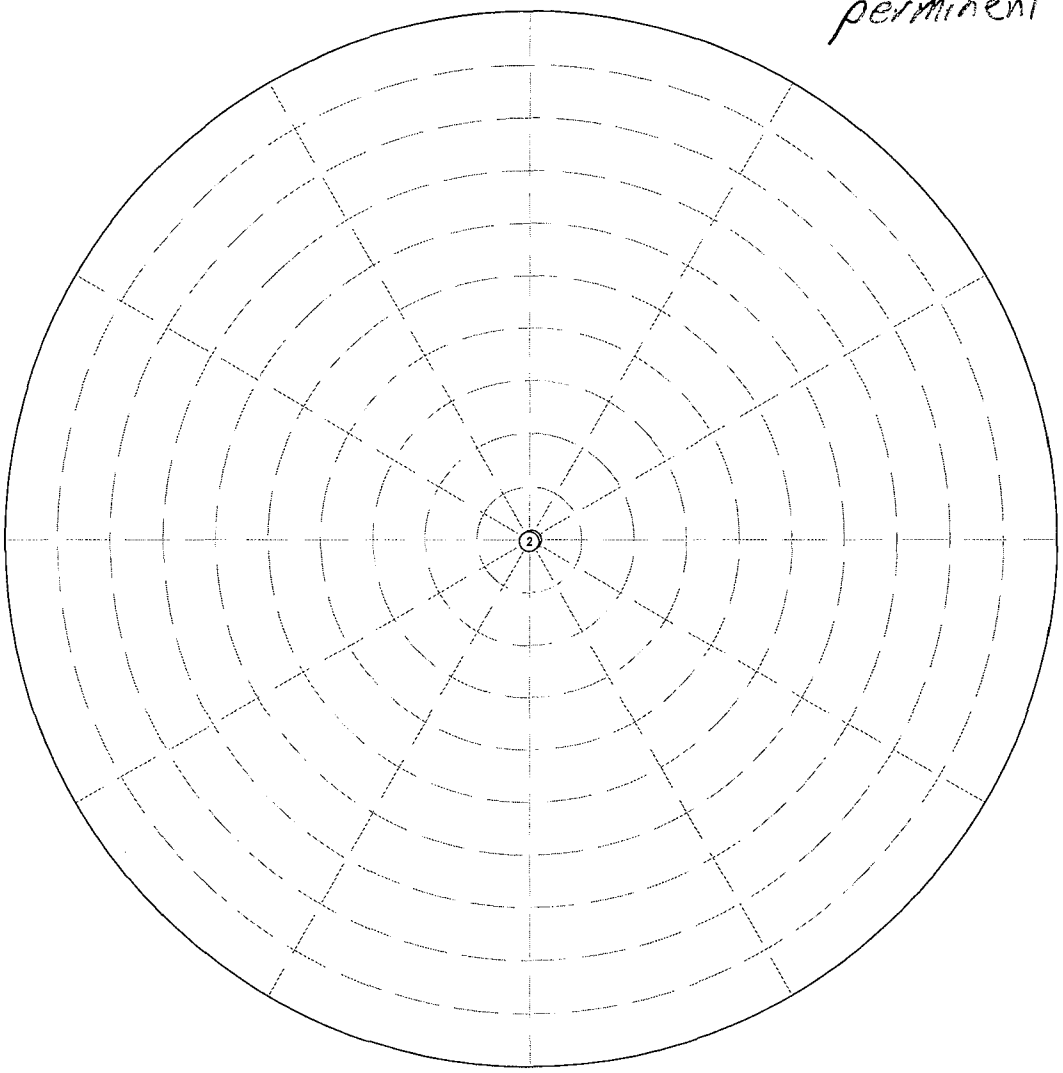
A/C: N687MA Mdl: S/N: 1002 Misc: Hrs: 0.0
Cmp: engine Mdl: PT6M S/N: 1021 Misc: Hrs: 0.0

Group: PT6M Task: PROP BAL

RUN	TYPE	RPM	VIB	LEVEL	PHASE	WT1	LOC1	WT2	LOC2	SENS	TACH
1	L	1792.3	0.004	IN/S	82.7	0.00	0.0	0.00	0.0	80.0	90.0
2	L	1786.9	0.003	IN/S	185.0	0.00	0.0	0.00	0.0	80.0	90.0

----- POLAR PLOT - 1.0 IN/S FS -----

permanent



--- OPERATOR COMMENTS ---

PT6M0057.HST 07/19/2012 15:38:32

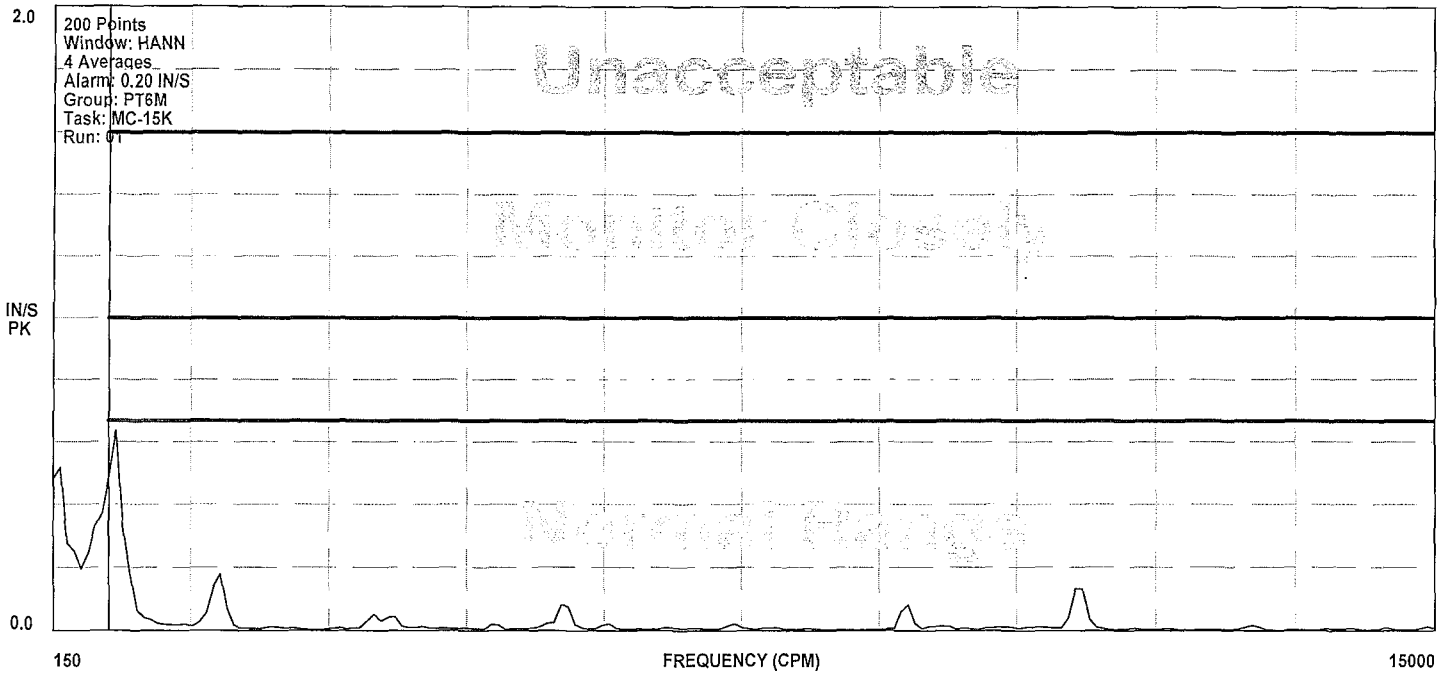
---- MORE REPORT - Schuman Aviation - PT6A-114A S/N:PCE-PC1021 ----

DATE: 07/20/2012 09:52:24 OPER:

A/C: N687MA	Mdl: PT6A-114A	S/N: 1002	Misc:	Hrs: 0.0
Cmp: engine	Mdl: PT6A-114A	S/N: PCE-PC1021	Misc:	Hrs: 0.0

Group: PT6M Task: MC-15K

----- SPECTRUM AVERAGE PLOT -----



--- PEAK LISTING - 600 TO 15000 CPM ---

FREQ (CPM)	PEAK (IN/S)	RANGE	DESCRIPTION	FREQ (CPM)	PEAK (IN/S)	RANGE	DESCRIPTION
726.8	0.508	High Normal	---	1851.8	0.142	Normal Range	---
3518.1	0.038	Normal Range	---	3715.1	0.037	Normal Range	---
4828.4	0.016	Normal Range	---	5583.6	0.069	Normal Range	---
6049.2	0.017	Normal Range	---	7411.9	0.017	Normal Range	---
9280.6	0.063	Normal Range	---	11137.5	0.116	Normal Range	---

--- OPERATOR COMMENTS ---

PLOT0065.SPC 07/20/2012 09:52:28

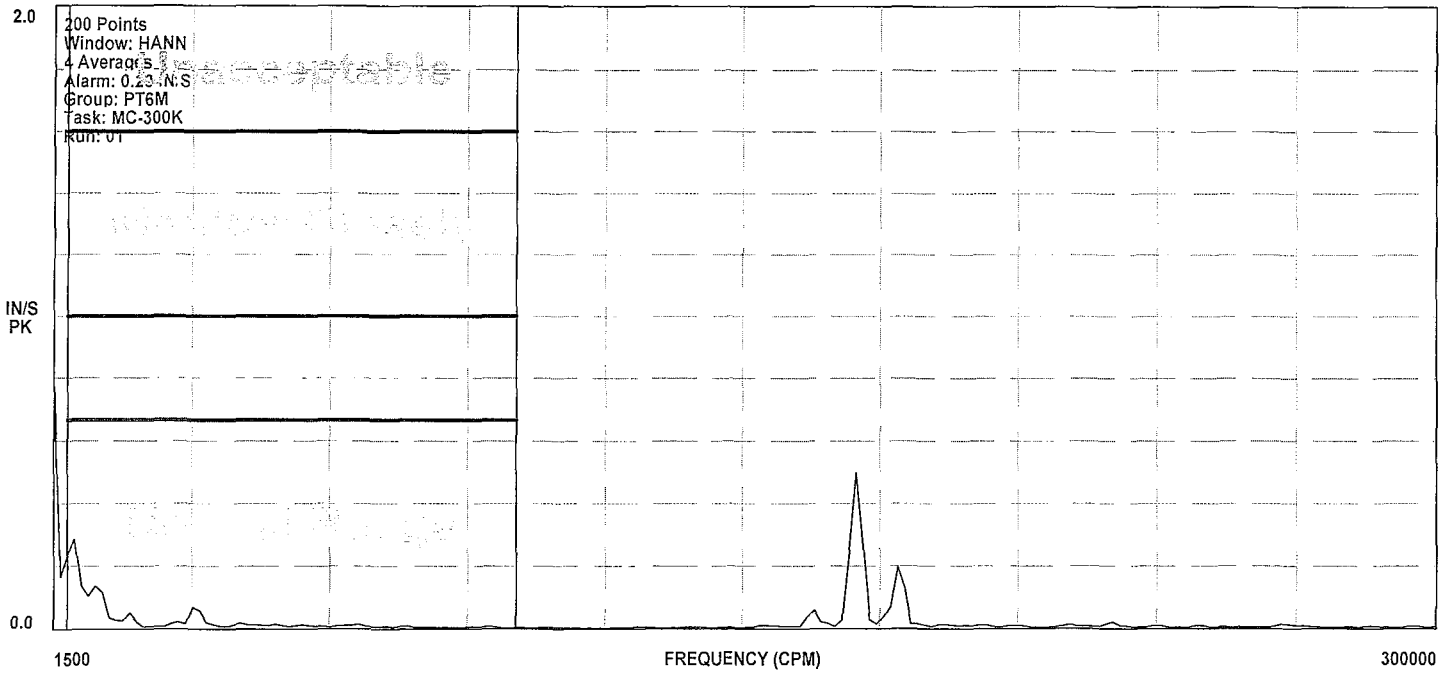
---- MORE REPORT - Schuman Aviation - PT6A-114A S/N:PCE-PC1021 ----

DATE: 07/20/2012 09:54:48 OPER:

A/C: N687MA	Mdl: PT6A-114A	S/N: 1002	Misc:	Hrs: 0.0
Cmp: engine	Mdl: PT6A-114A	S/N: PCE-PC1021	Misc:	Hrs: 0.0

Group: PT6M Task: MC-300K

----- SPECTRUM AVERAGE PLOT -----



--- PEAK LISTING - 3000 TO 100000 CPM ---

FREQ (CPM)	PEAK (IN/S)	RANGE	DESCRIPTION	FREQ (CPM)	PEAK (IN/S)	RANGE	DESCRIPTION
5458.0	0.233	Normal Range	---	10500.0	0.104	Normal Range	---
17980.3	0.040	Normal Range	---	28500.0	0.018	Normal Range	---
32042.0	0.058	Normal Range	---	42438.7	0.016	Normal Range	---
49913.4	0.012	Normal Range	---	55009.5	0.011	Normal Range	---
67061.3	0.012	Normal Range	---	77458.0	0.009	Normal Range	---

--- OPERATOR COMMENTS ---

PLOT0066.SPC 07/20/2012 09:54:52

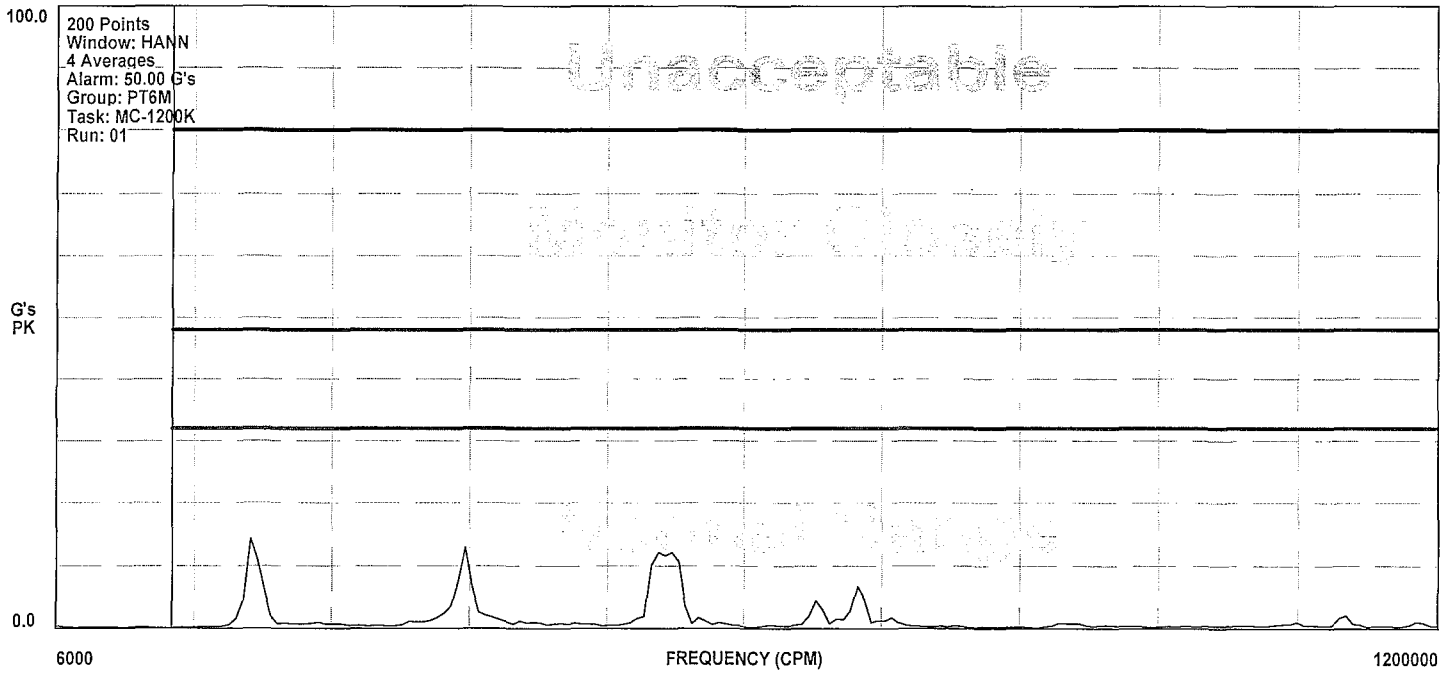
---- MORE REPORT - Schuman Aviation - PT6A-114A S/N:PCE-PC1021 ----

DATE: 07/20/2012 09:59:10 OPER:

A/C: N687MA	Mdl: PT6A-114A	S/N: 1002	Misc:	Hrs: 0.0
Cmp: engine	Mdl: PT6A-114A	S/N: PCE-PC1021	Misc:	Hrs: 0.0

Group: PT6M Task: MC-1200K

----- SPECTRUM AVERAGE PLOT -----



--- PEAK LISTING - 100000 TO 1200000 CPM ---

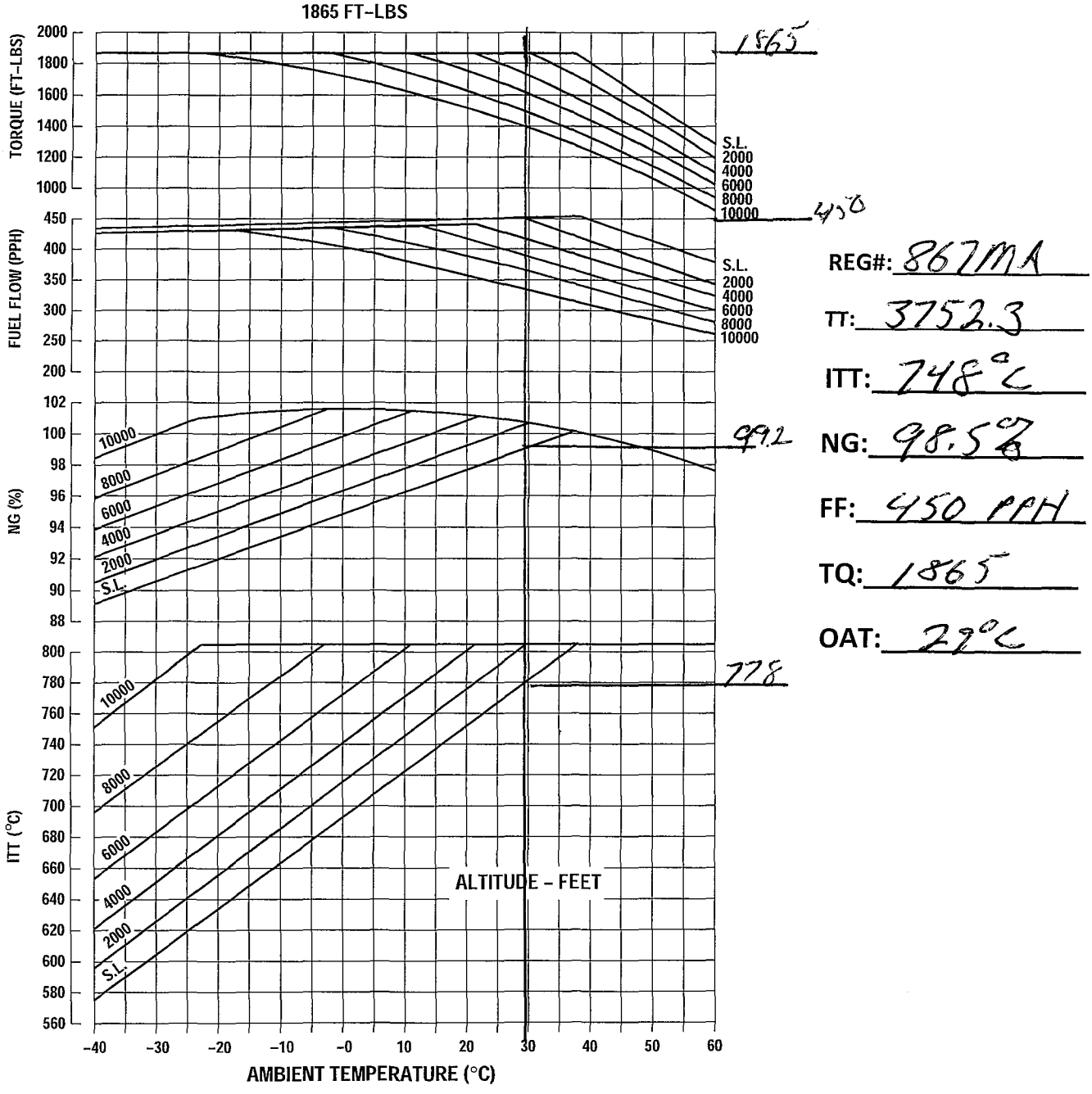
FREQ (CPM)	PEAK (G's)	RANGE	DESCRIPTION	FREQ (CPM)	PEAK (G's)	RANGE	DESCRIPTION
175811.3	18.965	Normal Range	---	359336.3	16.270	Normal Range	---
530818.7	17.544	Normal Range	---	540000.0	15.178	Normal Range	---
564000.0	2.174	Normal Range	---	667275.3	5.737	Normal Range	---
684000.0	1.962	Normal Range	---	703364.9	8.675	Normal Range	---
730458.0	2.316	Normal Range	---	1119916.1	2.885	Normal Range	---

--- OPERATOR COMMENTS ---

PLOT0067.SPC 07/20/2012 09:59:14

Initial

STATIC, INSTALLED Nprop = 1900rpm ALTITUDE IN FEET



REG#: 867MA

TT: 3752.3

ITT: 748°C

NG: 98.5%

FF: 450 PPH

TQ: 1865

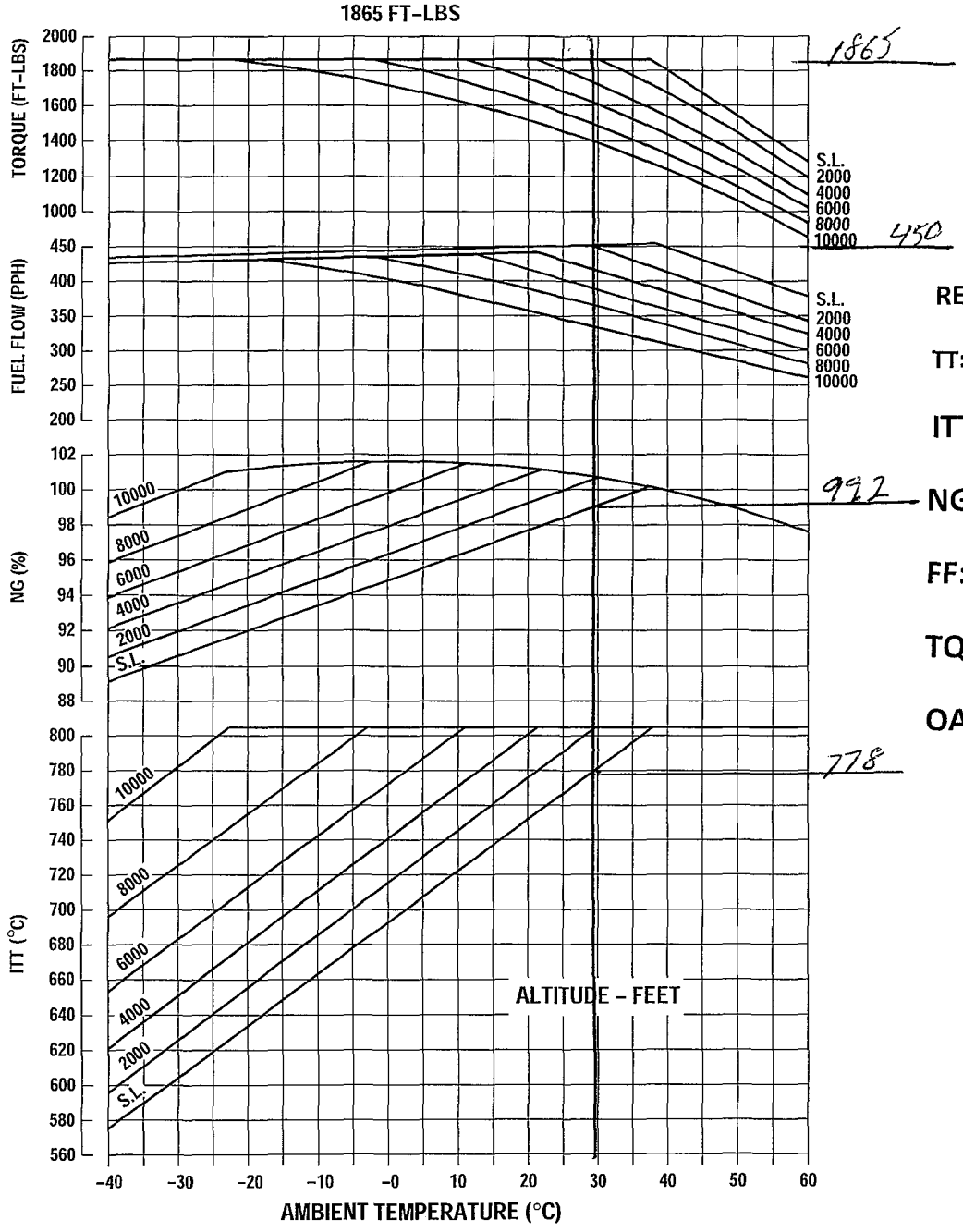
OAT: 29°C

PT6A-114A (Cessna 208 B Grand Caravan) C33561A

Engine Performance Checking Curve
Figure 511 (Sheet 9)

Post Inspection

STATIC, INSTALLED Nprop = 1900rpm ALTITUDE IN FEET



REG#: 867MA
TT: 3752.4
ITT: 750°C
NG: 98.5
FF: 450
TQ: 1865
OAT: 29°C

PT6A-114A (Cessna 208 B Grand Caravan) C33561A

Engine Performance Checking Curve
Figure 511 (Sheet 9)

Appendix VIII

ORDER: 8300.10

APPENDIX: 4

BULLETIN TYPE: Flight Standards Information Bulletin (FSIB) for Airworthiness (FSAW)

BULLETIN NUMBER: FSAW 94-48 (Extended)

BULLETIN TITLE: Procedures to be Used to Approve Instructions for Continued Airworthiness Approved by Supplemental Type Certificates (STC)

EFFECTIVE DATE: 01-14-97

---

1. SUBJECT. This FSIB is to alert all principal maintenance inspectors (PMI) of the existence of the Maintenance On Reliable Engines (MORE) Program Supplemental Type Certificates (STC) and to provide guidance for incorporating the MORE STC's into operations specifications and the applicable inspection program under Title 14 of the Code of Federal Regulations (14 CFR) section 135.411. The MORE STC's are intended to supplement, not replace, the Pratt and Whitney Canada (PWC) PT6A Instructions for Continued Airworthiness; specifically, the service information letters entitled "Engine Operating-Time-Between Overhauls and Hot Section Inspection Frequency" (see note 14 of the applicable type certificate data sheet for the exact numbers). This FSIB will address the specifics of section 135.411(a)(1) (9 passenger seats or less per aircraft) operator. The PMI can also apply these fundamental principles to an operator using aircraft with ten or more passenger seats.

2. BACKGROUND. There is concern that some operators have used the STC's (referred to as the MORE Program) to increase time between overhaul (TBO) intervals beyond those allowed by their operations specifications without the trending and inspection procedures required by the MORE Program and FAR. To comply with section 135.421, an operator must make appropriate changes to its operations specifications if the inspection program under consideration differs from the manufacturer's recommended program or from another program approved by the Administrator for the particular operator. Although the MORE STC is a program approved by the Administrator, it needs to be incorporated by each particular operator through an amendment to its operations specifications.

3. DISCUSSION. The MORE Company, Inc., has developed a program to maintain some models of the PWC PT6A engine, on a "on-condition" basis. The on-condition program comprises preventive maintenance; repetitive inspections, checks, and tests; spectrometric oil analysis; performance trend monitoring; and propeller balance and vibration analysis. The operator must have procedures in place which adequately administer the program requirements. The procedures should

be clearly defined and OpSpecs Paragraph D71 should reference the document or section of the manual containing the procedures. The procedures should include:

(a) A description of how the operator will ensure compliance with the various requirements of the program.

(b) The title of the person(s) responsible for performance of various elements of the program and the person(s) responsible for program management.

(c) Program management procedures should include recognition of adverse trends and revision of inspection frequencies or requirements resulting from program findings.
(d) A description of the system and procedures to ensure that all records required by the program can be specifically tracked to the engine that incorporates the MORE STC. The MORE program has set forth qualifying requirements for persons other than the operator who perform required inspections and/or maintenance. If the operator has made such arrangements, procedures should be established to identify those persons and ensure that the records of the work accomplished are made available to, and maintained by, the operator.

Operators should be advised that they must maintain all records and reports necessary to demonstrate continued compliance with the MORE Program.

Operators using engines that have been modified to incorporate a MORE STC should be aware they must comply with the requirements set forth in the STC, irrespective of 14 CFR parts 91 or 135 under which the aircraft is being operated.

The MORE Program inspections and maintenance requirements are organized in the following three sections:

A. Initialization. When an operator incorporates one of the MORE STC's on a specific engine (each engine by serial number must be considered independently), the operator must comply with the initiation requirements of part 4 of the program document. The STC must be applied to each engine the operator intends to operate under the MORE Program. Additional maintenance required to bring the engine into compliance with the MORE Program must be performed (e.g., periodic inspections that were not previously performed in accordance with the engine's prior maintenance program).

B. Periodic Inspections. Part 3 of the program document defines the preventive maintenance to be performed at the specified intervals while the engine is installed in the aircraft. Most of these maintenance tasks are included in the PWC Instructions for Continued Airworthiness, but the MORE Program specifies shorter intervals and includes additional tasks. The hourly intervals, as shown in the ``Summary Table,'' are based on time since new (TSN), or time since overhaul (TSO). Therefore, after compliance with the initialization

in part 4, the engine must be put on a schedule at its current and properly recorded TSN or TSO.

C. Major Repair and Overhaul. Overhaul of individual engine modules, controls, and accessories is addressed in part 5 of the program document. The hourly, or cyclic, intervals defined in this section apply to the engine TSN or TSO. No attempt should be made to link the overhaul of these controls and accessories to the engine time when the program is initiated. In addition, as stated in the MORE Program manual, the manufacturer's life limits take precedence over the overhaul intervals. The specific engine
enters the schedule as summarized in Part 5A, "Summary Table," at its current TSN or TSO.

4. ACTION. Principal maintenance inspectors having certificate management responsibility for operators of aircraft using the MORE STC program should ensure that incorporation of the program is accomplished in accordance with this bulletin.

(a) Review the operators submitted revision to their Approved Aircraft Inspection Program, ensuring that the provisions of the MORE STC maintenance program document are properly incorporated.

(b) Review the operators procedures for administering the program requirements. Ensure the procedures include a description of how the operator will comply with the various requirements of the program, the title of the person(s) responsible for performance of various elements of the program and the person(s) responsible for program management. Ensure that the program management includes recognition of adverse trends and revision of inspection frequencies or requirements resulting from program findings. Revision to the inspection frequency must be approved by the Principal Maintenance Inspector provided adequate justification is submitted.

(c) Evaluate the applicant's current operation to determine if the flight stage length, altitude, and time in cruise configuration will allow accurate engine condition trend monitoring in accordance with the applicable PWC PT6A Maintenance Manual.
(d) Confirm that the appropriate MORE STC has been incorporated and documented (FAA Form 337) on engines the applicant has incorporated into the program.

(e) Confirm that the applicant has copies of the documents listed in Part Two of the applicable MORE STC maintenance program document.

(f) Confirm that the applicant has the necessary facilities, tools, and equipment to properly perform the required tests and checks required by the applicable MORE STC maintenance program document. Confirm that the individuals performing the tests and checks are properly certificated, trained and qualified. This should include the pilots responsible for recording inflight engine condition trend monitoring data and persons responsible for plotting and evaluating

the recorded information, in addition to the mechanics performing the required maintenance tasks.

If the applicant has made arrangements with another person to perform a required inspection and/or maintenance in accordance with the applicable MORE STC maintenance program document, confirm that the person is listed in the supplement attached to the applicable MORE STC maintenance program document as required by Part 5B of that document.

(g) Confirm that the inspection tasks have been accomplished and satisfactory results obtained as described in Part 4 of the applicable MORE STC maintenance program document.

(h) For engines that have accumulated any flight time since the last hot section inspection, confirm that the engine run data obtained following the inspection is available and used as a performance base line for the condition trend monitoring of that engine. In addition, confirm that a change in performance parameters has not occurred which exceeds the limits specified in Part 3, Hot section Inspection/Repair of the applicable MORE STC maintenance program document.

(i) Provided all of the above requirements are satisfactorily ensured by the operator and the PMI, approve the operator's revision to their maintenance program using established procedures. The PMI shall terminate the program if the operator fails to comply with the provisions of the MORE program as required by the operator's operations specifications.

(j) Revision of Operating Specifications.

EXAMPLE:

D71. Additional Maintenance Requirements (10/05/90)

Table 1

ENGINE MAKE AND MODEL	MAINTENANCE DOCUMENT	TIME-IN-SERVICE INTERVAL
PWC PT6A-28	Piper Service Manual XXX-XXX PWC S/B XXXX	3500 HOURS H.S.I.- 1200 HOURS
PWC PT6A-28 Serial Number(s): P1234-0 P6789-0	I.A.W. PWC S/B XXXX, S.T.C. SEXXXEN, And Chapter XX Of (Insert Manual/Doc. Name)	8000 Hours
	I.A.W. PWC S/B XXXX And S.T.C. SEXXXEN	H.S.I.- O.C.

5. INQUIRIES. This FSIB has been coordinated with the Flight Standards National Field Office, Aircraft Evaluation Group, and the New England Region's Engine and Propeller Directorate. Questions or comments concerning this bulletin should be directed to the Air Carrier Branch, AFS-330 at (202) 267-3440.

6. EXPIRATION. This FSIB will expire on 05-31-01.

/s/
Frederick J. Leonelli

Appendix IX

ORDER: 8300.10

APPENDIX: 4

BULLETIN TYPE: Flight Standards Information Bulletin for Airworthiness (FSAW)

BULLETIN NUMBER: FSAW 05-07

BULLETIN TITLE: Availability of a CD-ROM Training Program for the Maintenance on Reliable Engines (M.O.R.E.) STCs and Reporting Requirements for Non-STC M.O.R.E. Inspection Programs

EFFECTIVE DATE: 05-10-05

TRACKING NUMBER: NA

APPLICABILITY:

M/M	ATA Code	14 CFR	PTRS
NA	NA	91.409(f)	NA

---

1. PURPOSE. This bulletin alerts all aviation safety inspectors (ASI) (Airworthiness) to the availability of a CD-ROM training program that provides an overview of the Maintenance On Reliable Engines (M.O.R.E.) Supplemental Type Certificates (STC) that are used on PT6A engines. It also provides additional reporting requirements for Federal Aviation Administration (FAA) inspectors when they approve a non-STC M.O.R.E. inspection program as part of a Title 14 of the Code of Federal Regulations (14 CFR) part 91, section 91.409(f)(4) inspection program.

2. BACKGROUND. The M.O.R.E. STC is a turbine propeller engine inspection program with Instructions for Continuous Airworthiness applicable to different models of the Pratt and Whitney Canada PT6A series of engines. The current STCs for the M.O.R.E. program are:

SE000EN	SE00001EN
SE00002EN	SE00003EN
SE00004EN	SE00006EN
SE00010EN	SE00011EN

3. ACTION.

A. M.O.R.E. STCs, when properly followed, enable operators to extend the manufacturer’s recommended overhaul time of an

applicable PT6 engine from existing recommended time between overhauls to as much as 8,000 hours, depending on the condition of life-limited parts and which M.O.R.E. STC is being used. FAA Flight Standards District Office (FSDO) inspectors are responsible for monitoring the operators on the M.O.R.E. STC program and ensuring all inspection criteria are being met. To help FSDO inspectors become familiar with the STC, the M.O.R.E Company has compiled a training program that addresses the various requirements of the M.O.R.E. inspection program. FAA inspectors can gain access to the training from the FAA Intranet at http://intranet.faa.gov/avr/afs/training/morestc.pps. It is recommended that FAA inspectors review this training program.

B. The STCs (stated in paragraph 2) are eligible for acceptance as part of an Approved Aircraft Inspection Program (AAIP) for a section 91.409(f)(4) program that also includes the airframe, avionics, propeller, and accessories.

C. If an inspector has approved a non-STC M.O.R.E. inspection program as part of a section 91.409(f)(4) inspection program, that inspector should ensure that the entire program meets the criteria set forth in the regulation as well as the guidance provided in FAA Order 8300.10, Airworthiness Inspector's Handbook. If additional information on the M.O.R.E. STC is needed, FSDO inspectors may contact:

Kevin McLaughlin
Boston Aircraft Evaluation Group
12 New England Executive Park
Burlington, MA 01803
(781) 238-7892

D. The existing STC M.O.R.E. programs are reported to the FAA database in Oklahoma City via the normal recording process on FAA Form 337, Major Repair and Alteration. For those operators that use the non-STC M.O.R.E. inspection programs on their aircraft's AAIP, those records are retained by the local FSDO and need not be sent to the Boston Aircraft Evaluation Group (BOS AEG) or to the Aircraft Certification Service Engine and Propeller Directorate, ANE-100.

4. INQUIRIES. This bulletin was developed by the Aircraft Maintenance Division, AFS-300. Direct any questions concerning this bulletin to Bill O'Brien, AFS-305, at (202) 267-3796.

5. EXPIRATION. This bulletin will remain in effect until further notice.

/s/ David E. Cann
Manager, Aircraft Maintenance Division

Appendix X

ENGINE CONDITION TREND MONITORING SYSTEM.

Engine Condition Trend Monitoring (ECTM) is not required by this revision of the MORE Instructions For Continued Airworthiness. ECTM has been replaced with: A. Power Plant - Adjustment / Test, B. Borescope Inspection of Hot Section, C. Visual Inspection of the Compressor, and D. Visual Inspection of the Power Turbine / Exhaust Duct. ECTM is NOT PROHIBITED. The choice of whether or not to use ECTM is to be made by the owner / operator.

CHECK ENGINE OIL LEVEL

Specifics:

A. Check engine oil level within 10 minutes of engine shutdown.

B. Check condition and locking of oil filler cap.

Commonly PT6A engines are filled to the "one quart low" mark because; PT6A engines normally pump oil overboard when the oil tank is filled above this mark.

Normally PT6A engines do NOT consume more than one quart of engine oil in 50 engine hours. If the engine consumes more than one quart of oil in 50 engine hours, it is necessary to investigate to determine the reason for the abnormally high oil consumption, and to then correct the cause of abnormally high oil consumption.

Records requirement:

The information to be recorded is: The fact that the engine oil level was checked, the amount of oil added (if any), the date, and the engine flight hours. This information is to be recorded in such a way that the rate of engine oil consumption will be calculated.

Reference information:

Additional information is provided in:

A. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00, beginning on page 601, especially the table titled "Periodic Inspection".

B. P&WC PT6A-34 or PT6A-114 series maintenance manual, Section 72-00-00, beginning on page 301.

Appendix XI

PRATT & WHITNEY CANADA

SERVICE BULLETIN

P&WC S.B. No. 1703R9

BULLETIN INDEX LOCATOR

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

MODEL APPLICATION

PT6A-114, PT6A-114A

Compliance: Refer to Para. 1.E. in the Service Bulletin

Summary: This Service Bulletin (SB) provides a recommended basic operating Time Between Overhaul (TBO) and specifies a recommended initial Hot Section Inspection (HSI) frequency. P&WC turbine engines are required to undergo periodic inspection in accordance with a pre-established schedule in order to ensure serviceability. The TBO and HSI intervals represent the two major scheduled inspections, and are defined in this SB. This SB also provides TBO extension procedures for operators with an average utilization higher than 300 hours/year. The technical content of this service bulletin has been reviewed by and is acceptable to Transport Canada.

Oct 29/2001
Revision No. 9: Sep 04/2013

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	Canadian ECL(s)*	
	ECCN(s)*	
	P-ECCN(s)**	9E991
	USML (ITAR)*	
	P-USML**	

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Longueuil, Québec, Canada J4G 1A1
Tél. 450-677-9411

Pratt & Whitney Canada
A United Technologies Company

04 September 2013

P&WC S.B. No. 1703R9

REVISION TRANSMITTAL SHEET
TURBOPROP ENGINE MODEL PT6A

SUBJECT: Pratt & Whitney Canada Service Bulletin No. PT6A-72-1703, Rev. No. 9, dated Sep 04/2013 (P&WC S.B. No. 1703R9) OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

Replace your existing copy of this service bulletin with the attached revised bulletin. Destroy the superseded copy.

Please retain this Revision Transmittal Sheet with the revised bulletin.

SUMMARY: This service bulletin is revised to:

- For PT6A-114 engines, delete the gas generator limitation for Pre-SB1445 of 30,000 hours.

EFFECT OF REVISION ON PRIOR ACCOMPLISHMENT:

None.

NOTE: A black bar in the left margin indicates a change in that line of text or figure.

REVISION HISTORY:

Original Issue: Oct 29/2001
Revision No. 1: Nov 13/2001
Revision No. 2: Jun 21/2004
Revision No. 3: Oct 31/2006
Revision No. 4: Mar 15/2007
Revision No. 5: Nov 14/2007
Revision No. 6: Jan 29/2010
Revision No. 7: May 09/2013
Revision No. 8: Aug 16/2013
Revision No. 9: Sep 04/2013

PRATT & WHITNEY CANADA

SERVICE BULLETIN

P&WC S.B. No. 1703R9

TURBOPROP ENGINE

OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

1. Planning Information

A. Effectivity

PT6A-114 Engines.
PT6A-114A Engines.

NOTE: This service bulletin supersedes P&WC S.B. No. 1003 for the models listed.

B. Concurrent Requirements

None.

C. Reason

This service bulletin:

- Provides a recommended basic operating TBO;
- Specifies a recommended initial HSI frequency; and
- Describes the TBO extension/evaluation process.

D. Description

(1) Definitions:

- The Basic Industry TBO is the P&WC recommended TBO per this service bulletin which is applicable to all operators.
- The Fleet TBO is the TBO level which individual operators have attained for engines of the same model in their possession only.
- The Engine TBO is the TBO applicable to a specific engine per the Industry TBO or Fleet TBO or a recommended TBO by P&WC for a particular set of conditions.
- The term "hours" in this document is the Engine Flight Hours (EFH).

(2) TBO recommendations take into consideration the average effect of the many variables affecting overhaul life, such as:

- Average flight duration;
- Percentage of time at any given power level;
- Climatic conditions and environment;
- Maintenance practices;
- Utilization; and
- Engine modification standards.

1. Planning Information (Cont'd)

(3) Under extreme conditions of very low utilization coupled with continuous operation in skydiving, fire fighting, agricultural spraying, salt water atmosphere or heavy sand and dust environments, periodic inspections in accordance with the applicable maintenance instructions may indicate maintenance action prior to the recommended overhaul life.

(4) The TBO interval may be extended with the approval of the operator's Airworthiness Authority. The minimum requirements for engine TBO extension or for fleet TBO extension are described in the Appendix Para. 4.

E. Compliance

The inspection intervals and overhaul periods provided in this bulletin are the manufacturer's recommendations. These periods are based on operation that is per the Airframer's POH (Pilot Operating Handbook). Extended operation at power settings above normal Takeoff/Climb/Cruise may require a reduction in the intervals stated. The use of Maximum Continuous is unrestricted for the duration required by the crew to address an emergency situation. Repetitive use of Maximum Continuous, and/or extended operation at high speeds and/or ITT (Inter-Turbine Temperature) will necessitate a significant reduction in HSI (Hot Section Inspection) interval. Airworthiness authorities normally require operators to follow these recommendations unless alternative arrangements have been made between the operator and the manufacturer, and approved by the operator's airworthiness.

F. Approval

Transport Canada has reviewed and approved the technical contents of this Service Bulletin.

NOTE: The service life values quoted herein are determined by the limiting values stated on the Pratt & Whitney Canada (P&WC) drawings which form part of the Department of Transport Aircraft Engine Type Approval for the applicable engine model. These limiting values are based on the use of P&WC approved components installed on/in the engine. Use of other than P&WC approved components may reduce the life limits.

G. Manpower

Not applicable.

H. Weight and Balance

None.

I. Electrical Load Data

Not changed.

1. Planning Information (Cont'd)

   J. Software Accomplishment Summary

   Not applicable.

   K. References

   Applicable PT6A instructions for Continued Airworthiness (ICA)
   P&WC S.B. No. 1002, 1505, 1510 and 1669
   Service Information Letter No. PT6A-107
   Service Information Letter No. PT6A-146
   Service Information Letter No. GEN-055
   Service Information Letter No. PT6A-041

   L. Publications Affected

   None.

   M. Interchangeability and Intermixability of Parts

   Not applicable.

2. Material Information

   A. Industry Support Information

   Not applicable.

   B. Material - Cost and Availability

   Not applicable.

   C. Material Necessary for Each Engine

   Not applicable.

   D. Reidentified Parts

   None.

   E. Tooling - Price and Availability

   Not applicable.

2. Material Information (Cont'd)

3. Accomplishment Instructions

A. Basic Time Between Overhaul (TBO) Recommendations:

(1) The basic industry TBO for all PT6A-114 and PT6A-114A engines is 3,600 hours.

(2) For maintenance scheduling purposes, one engine per aircraft may be operated an additional 70 calendar days or 200 flight hours, whichever comes first, conditional on the following:

(a) The engine has been maintained and operated in accordance with P&WC's Instructions for Continued Airworthiness and operated to an engine TBO interval that is recommended by P&WC;

(b) Boroscope inspection of the hot section components per the Engine Maintenance Manual must be carried out and engine found to be in serviceable condition;

(c) Only one maintenance scheduling extension per TBO interval is available;

(d) The maintenance scheduling hours do not modify the operator's base TBO interval;

(e) The engine is used in a civil application;

(f) The operator must notify their local airworthiness authority upon use of this extension.

(3) Engines that are within the basic recommended TBO and that have been maintained or stored per maintenance manual requirements have no related calendar time limits.

(4) Rotor component life limitations outlined in the latest revision of P&WC S.B. No. 1002 override TBO considerations.

(5) The Hamilton Sundstrand fuel pump may be operated to the engine TBO (basic or extended, as applicable).

NOTE: Refer to periodic inspection of Hamilton Sundstrand fuel pump, per the EMM as applicable.

3. Accomplishment Instructions (Cont'd)

(6) The engine accessories that follow may be operated to the engine TBO (basic or extended, as applicable) plus 500 hours. All other accessories may be operated to the engine TBO.

FCU
Fuel Heater
Propeller Governor
Ignition Exciter
Compressor Bleed Valve
Flow Divider/Starting Control Installation
Fuel Pump (Argo-Tech only)

NOTE: Where accessories are removed (for repair or other reason) and subsequently reinstalled, operating time since new or overhaul must be recorded on the repair tag.

(7) **For engines PRE-SB1669 configuration**
the compressor turbine disk and blade set must be sent for an inspection per the overhaul manual instructions at the intervals that follow:

NOTE: This inspection must include Non-Destructive Testing (NDT) and stretch measurement.

(a) Compressor turbine disk with full set of new blades installed at last shop visit, inspect within 5,000 hours.

(b) Compressor turbine disk with full or partial set of previously run compressor turbine blades installed, inspect within 3,000 hours since last compressor turbine blade inspection.

(8) **For engines POST-SB1669 configuration**
the compressor turbine disk and blade set must be inspected per the overhaul manual at the engine basic TBO or extended, as applicable.

NOTE: This inspection must include Non-Destructive Testing (NDT) and stretch measurement.

(a) Compressor turbine blades P/N 3072791-01 must be replaced at or before 10,000 hours.

(9) **For PT6A-114A engines Pre-SB1510 configuration**
Incorporate the third-stage compressor-stator assembly in accordance with P&WC S.B. No. 1510 at overhaul.

3. Accomplishment Instructions (Cont'd)

(10) **For PT6A-114 engines Pre-SB1445 configuration**
DELETED.

B. TBO Extension Recommendations

(1) For operators with an average utilization higher than 300 hours/year, P&WC can provide recommendations for TBO extensions by one of the two options that follow:

(a) **Option A - Fleet TBO Extension**
An operators' full fleet of similarly operated and maintained engines, covered by this SB, can have its TBO escalated in 500-hour increments based on a review of the condition of the hardware from one or two engines inducted for overhaul. The recommendation is based on one or two satisfactory overhaul samples. Refer to the Appendix Para. 4.A., 4.B., 4.C. and 4.D.

(b) **Option B - Engine-Specific TBO Extension**
The TBO of an individual engine can be increased, subject to the evaluation of the configuration, condition and method of operation of this engine. Refer to the Appendix Para. 4.A., 4.B., 4.C. and 4.E.

(2) TBO Extension recommendations that were approved prior to issue of this SB, per P&WC SB No. 1703 revisions 0 to 6, P&WC S.B. No. 1003 revisions 0 to 30, are not affected and remain valid, except that:

- P&WC No longer endorses on-condition TBO programs on the PT6A engine models
- Aircraft Gas Turbine Operating Information Letters (AGTOIL) are no longer valid.

(3) TBO extension recommendations from P&WC are subject to approval of the operator's local airworthiness authority.

(4) The TBO established by individual operators and/or for individual engines is independent of the TBO published for the industry.

C. Hot Section Inspection (HSI) Frequency Recommendations:

(1) The HSI interval does not increase, as the TBO is escalated.

(2) The recommended scheduled HSI interval is 1,800 hours.

(3) An additional 50 flight hours or 30 days is available for maintenance scheduling purposes, conditional on the following:

3. Accomplishment Instructions (Cont'd)

(a) The engine has been maintained and operated in accordance with P&WC's Instructions for Continued Airworthiness;

(b) Only one maintenance scheduling extension per HSI interval is available;

(c) The maintenance scheduling hours do not modify the engine's base HSI interval;

(4) **For engines PRE-SB1669 configuration:**

(a) P&WC further recommends that, at each HSI, operators submit a two-CT blade sample for metallurgical evaluation at an overhaul facility (Ref. Pratt & Whitney Standard Practices Manual PN 585005).

NOTE: On the basis of individual service history, P&WC can provide an exemption from this recommendation to those operators who demonstrate a maintenance program encompassing fuel nozzle refurbishment, borescope inspection and engine condition trend monitoring (ECTM®). Ref. SIL PT6A-146 for additional details.

(b) If the metallurgical evaluation is not acceptable, replace the complete set of CT blades with POST-SB1669 blades.

(c) If the metallurgical evaluation is acceptable, a maximum of 10 blades can be replaced with PRE-SB1669 blades if they are rejected for reasons other than overtemperature or creep. If more than 10 blades are rejected, the complete set of CT blades must be replaced with POST-SB1669 blades.

(5) Alternatively, the HSI frequency can be based on Engine Condition Trend Monitoring (ECTM®) in accordance with the Service Information Letter (S.I.L.) Gen-055 "Guidelines and Standards for Utilizing the Engine Condition Trend Monitoring (ECTM®)" subject to local Airworthiness Authority approval.

(6) If trend monitoring is introduced part way through engine life, a performance recovery wash and HSI must be accomplished to establish a performance base line.

4. Appendix

NOTE: This Appendix provides the procedures and requirements to obtain TBO extension recommendations from P&WC.

A. General Considerations for TBO Extension Recommendations

(1) A TBO extension recommendation from P&WC is based on both the operator's procedures and experience and on P&WC experience. P&WC experience is based on:

4. Appendix (Cont'd)

(a) Engines that incorporate only P&WC parts originally supplied by P&WC or its authorized distributors or components repaired in accordance with P&WC approved repair process.

(b) Factory built engines or engines overhauled/repaired at a P&WC service center or a P&WC Designated Overhaul Facility (DOF).

(c) As P&WC experience grows, the TBO extension requirements and limitations may be adjusted accordingly.

(2) An engine maintains its TBO extension recommendation on either program as long as it is operated within the limitations of the relevant aircraft operating manuals and is maintained in accordance with the appropriate P&WC Maintenance Manual and the terms of this S.B.

NOTE: P&WC recommendation is null and void in instances where engine abuse or non-compliance with this recommendation is reported.

(3) If the engine was put in storage or was unused since its last overhaul (or since new if not previously overhauled), there must be documented evidence that the engine has been preserved per the engine Maintenance Manual.

(4) Extension recommendations are only transferable between operators under circumstances described in option A and B. (Ref. Appendix Para. D (13) and E (10)), as applicable.

(5) Recommendations for extension are subject to limitations including the maximum numbers of years between overhauls (Ref. Appendix Para. D (2) and E (4)).

(6) TBO extension recommendations from P&WC are subject to fees per S.I.L. No. PT6A-107.

(7) TBO extensions, recommended by P&WC, do not affect the applicable Warranty and Service Policy originally supplied with the engine. P&WC will continue to use the basic industry TBO (Ref. Para. 3. A.(1)) to calculate the pro-rata credit and the benefits per the Primary Parts Service Policy and/or the Extended Engine Service policy.

B. Assembly and Component Records:
TBO extensions incorporate limitations on the life of certain components. The operator and/or the Maintenance Organization (M.O.) selected by the operator must have a system to log the total accumulated time, i.e. Time Since New (TSN), and the Time Since Overhaul (TSO) of the following assemblies and components:

(1) Engine times and cycles since new and since last overhaul;

4. Appendix (Cont'd)

(2) Accessories time since new or since last overhaul;

(3) Total cycles of life limited rotors (Ref. P&WC S.B. No. 1002);

(4) Total hours since new for the components that follow:

- The mainline ball bearings (bearings No. 1 and No. 4);
- The power turbine blades;
- The compressor turbine blades;
- The first stage sun gears; and
- The first stage planet gears.

NOTE: For non-serialized turbine blades, the total hours since new must be based on the oldest installed blade. For example, if a complete new set of blades is installed at overhaul and 18 blades are replaced at TSO = 1800 hrs, the total time on the entire blade set will still be considered 1800 hrs, even though the 18 newly installed blades have zero time. Refer to Para. 3.A.(7 and 8) for additional requirements related to compressor turbine blade inspection times.

C. Configuration Records
P&WC makes available product improvements through the issuance of Service Bulletins (S.B.). The operator and/or the maintenance organization selected by the operator must have a system to log S.B.s that are incorporated in each engine. In particular, the following are considered especially valuable for operators on extended TBO:

P&WC S.B. No. 1427	PT Containment Ring (PT6A-114)
P&WC S.B. No. 1430	Exhaust Duct and No. 3 Bearing Cover
P&WC S.B. No. 1434	Combustion Chamber & Large Exit Duct
P&WC S.B. No. 1446	External Scavenge Pump
P&WC S.B. No. 1510	Third Stage Compressor Stator (See Note 2)
P&WC S.B. No. 1669	Compressor Turbine Blades (PT6A-114A)

NOTE: 1. Refer to each service bulletin for individual engine model applicability.

NOTE: 2. P&WC S.B. No. 1510 is only required for PT6A-114A Engines with a compliance category of 5 per the SB instructions.

D. Option A - Fleet TBO Extension by Overhaul Sample Evaluation

4. Appendix (Cont'd)

(1) P&WC may provide extension recommendations for the TBO of an operator's fleet of similarly operated and maintained engines. The condition of the engines examined at overhaul is one element of validating that the specific operator is operating and maintaining the engines in a manner that warrants extending the TBO interval for the specific fleet. Other elements include but are not limited to:

(a) Accuracy of maintenance records.

(b) Reported condition of hardware at previous maintenance intervals.

(c) Local regulatory endorsement of operator adherence to OEM recommended operation and maintenance practices. This endorsement should be obtained on a yearly basis.

(2) The time limits applicable under this program are as follows:

TBO Limit:	8,000 hrs
Calendar Limit:	Engines may operate at the extended TBO for a maximum period of 12 years since new or since overhaul as applicable, or as otherwise agreed in writing by P&WC.

(3) To make sure that engine durability is maintained as the engines are operated into their subsequent extended overhaul intervals, the components listed in the Appendix, Para. 4.B.(4), that are used for engine reassembly at overhaul, must not have more than 12,000 hours since new. Also, all the service bulletins listed in the Appendix, Para. 4.C. and all applicable category 1, 2 and 3 service bulletins must be incorporated in the build of the sample engine and at the next overhaul of other engines in the fleet for which the TBO extension is applicable.

NOTE: Refer to paragraph 3.A.(7) and (8) for specific requirements related to the compressor turbine blades.

(4) Normal TBO extension recommendations are 500 hours. For TBO extension up to 5,100 hours one representative sample engine per 500 hrs increment is required. For TBO extensions above 5,100 hours two representative sample engines per 500 hrs increment are required.

(5) Requirements applicable to the sample(s):

(a) The sample must have a Time Since Overhaul (TSO) that is within 250 hours of the current TBO period. Engines that have more hours than the current P&WC recommended TBO are also acceptable but the extension will be based on the currently recommended P&WC TBO.

4. Appendix (Cont'd)

(b) The sample must have been operated by the current operator for the majority of the TBO period (i.e. for more than 50% of the current TBO interval).

(c) The sample engine must not have had a shop visit for major repairs (Overhaul Manual level) during the current TBO interval (i.e. only Maintenance Manual level tasks and repairs have been carried out).

(d) The operator must complete the fleet TBO Evaluation Sample Request Form Option A (Ref. Fig. 1) and the fleet information form (Ref. Fig. 2) and submit them to their P&WC service center or Designated Overhaul Facility for forwarding to P&WC.

(e) The sample engine must be sent to a P&WC service center or Designated Overhaul Facility (DOF) for the TBO evaluation. The evaluation consist of 2 stages, the first portion consists of a visual examination of the engines prior to cleaning to assess whether the hardware appears capable of 500 hours of further operation. Following satisfactory completion of this phase the second portion consist of detailed examination of the components to the requirements of the P&WC OHM. The P&WC DOF or P&WC Service Centre will forward the TBO Evaluation Sample Request Form (Ref. Fig. 1), the Operator's Fleet Information Form (Ref. Fig. 2) and the TBO Evaluation Hardware Report to P&WC for review and request a TBO extension. After one or two successful samples, depending on the TBO escalation threshold (Ref D,(4)) P&WC will issue a letter to the operator stating that a TBO extension is recommended, subject to the approval of the operator's Airworthiness Authority.

NOTE: 1. When shipping an engine to a P&WC service center or DOF as a sample, operators should state that it is a sample and request a TBO extension evaluation report.

NOTE: 2. Forward all documents to pt6atboevaluation@pwc.ca

NOTE: 3. Refer to P&WC SIL PT6A-041 for further information.

(6) Should a sample be rejected P&WC will not consider a TBO escalation unless the operator defines the actions taken to correct the observed conditions.

(7) The extended TBO may apply to other eligible engines in the operator's fleet covered by the same TBO P&WC S.B. No. 1703., or by P&WC P&WC S.B. No. 1403, 1803 or 12003.

(8) Extended TBO intervals for engines which were added to the fleet from another operator are subject to the pro-rating formula in Para. (13). This formula must be used again when a fleet TBO extension is granted (Ref. Para. (13), Example 2).

4. Appendix (Cont'd)

(9) The TBO extension process can be repeated when the next engine reaches the new escalated TBO interval.

(10) Certain circumstances may warrant a higher TBO increase increment. These will be reviewed on a case by case basis upon written request.

(11) P&WC reserves the right to request additional information on the sample condition, or further TBO extension samples, and this request does not herein imply that P&WC will automatically recommend the extension.

(12) TBO escalation recommendation is subject to the approval of the operators local Airworthiness Authority.

(13) Transfer of Fleet TBO Extension Recommendations
Fleet TBO extensions are valid only as long as the operator, the Maintenance Organization (M.O.), and the typical mission remain unchanged. The following conditions apply for P&WC to transfer the recommendation to a new M.O., a new operator, or a new application (typical mission):

NOTE: For changes limited to the selection by the operator of a new M.O., the change will have no effect if the maintenance plan remains unchanged and the newly selected M.O. is already supporting operators who have approval for engines covered by this SB and to the same or higher TBO.

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

TBO Evaluation Sample Request Form

REQUESTING PARTY DATA

Company name: _____ (Owner of engine)
Company address: _____
_____
_____

Telephone Number: _____
Fax Number: _____

Company Contact: Mr./Mrs. _____
Title _____

Telephone Number _____ Ext_____ (if other than Company number)

Maintenance Facility: _____
Contact Name: _____
Title: _____
Telephone Number: _____
Fax Number: _____

SAMPLE ENGINE DATA

- Engine Model _____ Engine Serial Number _____
- Total time since new _____ hrs Cycle since new _____ Cycles
- Total time since overhaul _____ hrs Cycle since overhaul _____ Cycles
- Current operator TSO _____ hrs
- Date of entry in service _____ or date of last Overhaul _____

- Was this sample engine operated by the requesting party for the totality of the specified TBO period? Yes___ No ___
  If not please provide the total hours accumulated by the requesting party during last TBO period _____
- Did this engine undergo major repair (requiring removal from aircraft) during this TSO period? Yes___ No ___
  If yes please provide details of repair performed:
  1. Reason for removal _____
  2. Total time (since overhaul if applicable)of sample engine at time of repair _____ hours
  3. List of parts replaced by the repair agency who performed the repair_____

If this sample does not meet minimum eligibility criteria (ref. Appendix 4 (D)), please explain why you believe that the engine should still be considered as an eligible sample for the TSO evaluation process. Include attachments as necessary.

_____
_____

I understand that the sample engine submitted for the purpose of TSO evaluation must meet the minimum eligibility criteria for it to be considered as an acceptable sample and must represent the condition of the other engines submitted in the fleet information form relative to mission type and operational environment.

I hereby attest that the information provided herein is exact to the best of my knowledge and that I may be requested to provide additional data to support the sample engine's eligibility to this program.

Completed by: _____ Date_____

C207304

TBO Evaluation Sample Request Form
Figure 1

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

List other engines in the fleet for which the TBO extension requested would be applicable (Subject to the compliance with this SB).

Engine Model	S/N	TTSN	TTSO	Time * Date	TTSO at induction into the fleet	Date of entry in service or last overhaul	Shop where the last overhaul was carried out

*** Date on which the engine times were recorded.**

C207303

Fleet Information Form
Figure 2

4. Appendix (Cont'd)

(a) For the transfer of an engine to a different fleet extended TBO, the operator can use a pro-rating formula. This formula is generally recognized by regulatory authorities. The TBO applicable to an engine in these circumstances is the fleet TBO formerly applicable and the fleet TBO established for the new operator, Maintenance Organization and mission for the same engine models. It is then weighted on the basis of the time remaining to overhaul under the original operation. The formula for this purpose is:

$X = Y * a/b$

where X = time remaining to overhaul on new program (buyer's TBO)

Y = time remaining to overhaul on previous program (seller's TBO)

a =TBO interval on new program (buyer's TBO)

b = TBO interval on previous program (seller's TBO)

Example 1: An aircraft is transferred (by sale or lease) between two operators. The previous operator's engine TBO is 8,000 hours and the new operator's engine TBO is 5,000 hours and the engine has a time since overhaul (TSO) of 6,000 hours

Time remaining to overhaul on the previous program:

$Y = 8,000 - 6,000 = 2,000$ hours.

Time remaining to overhaul on the new program:

$X = Y * a/b$

$X = 2,000 * 5,000/8,000 = 1,250$ hours

Therefore this engine may be operated to a one time TBO interval of 7,250 hours. After overhaul, the engine TBO will revert to the new owners TBO, which is 5,000 hrs. in this example.

Example 2: An operator obtains a recommendation from P&WC for a TBO extension from 5,000 to 5,500 hours, but one of the engines was purchased from an operator with a TBO of 8,000 hours and is currently running to a TBO of 7,250 hours (Ref. Example 1). The new TBO interval will be calculated using the pro-rating formula and the TSO of the engine at entry to the new operator's fleet (6,000 hours).

4. Appendix (Cont'd)

Time remaining to overhaul on the previous program:

Y = 8,000 - 6,000 = 2,000 hours.

Time remaining to overhaul on the new program:

X = Y * a/b

X = 2,000 * 5,500/8,000 = 1,375 hours

Therefore this engine may be operated to a one time TBO interval of 7,375 hours. After overhaul, the engine TBO will revert to the new owners TBO, which is 5,500 hrs. in this example.

4. Appendix (Cont'd)

E. Option B - Engine Specific Extension by Evaluation of Configuration, Condition and Operation

(1) General
TBO extensions can be recommended under this option for specific engines based on a full evaluation of their configuration, condition, and operation. Operators and engines must meet minimum eligibility criteria and the engines must be individually registered into the P&WC engine-specific TBO extension program, and maintained per specific procedures set forth hereunder. Registration is recommended as early as possible when new or after overhaul, but is not subject to a time limit other than the maximum limits of this program. Refer to the Appendix, Para. 4.E.(4).

(2) Application Procedure - To apply for a TBO recommendation for an engine per this program, complete the Option B Operator Qualification Checklist (Ref. Fig 3) and the Option B TBO Application and Engine Qualifying Checklist (Ref. Fig 4) There are two approaches to filling out these forms:

(a) The list may be completed by a qualified Part 145, Part 135, or Part 121 Inspector or equivalent, who must sign off each item.

(b) The list may be completed by other operator personnel and submitted to the local P&WC FSR for review and approval.

(3) Missions that are not Eligible:
The following missions are not considered applicable to this program

- Agricultural;
- Skydiving operations;
- Fire fighting; or
- Other missions which involve an unusually high ratio of cycles to flight hours or unusually protracted use of high power.

NOTE: For confirmation of eligibility, please refer the proposed mission to your local P&WC FSR.

(4) Time Limits

Overhaul: 6,000 hrs or 12 years, whichever comes first, since new or since overhaul as applicable.
3,000 hrs or 6 years, which ever comes first, since mid-life inspection (Ref. Appendix Para. 4.E. (7)).

4. Appendix (Cont'd)

HSI: May be part of the mid-life inspection (Ref. Appendix Para. 4.E.(7)), or per ECTM or disk/blade life expiry requirement. If per ECTM®, perform at least once in a 5,000 hour period.

(5) Eligibility - Operator and Maintenance Organization
To be eligible to request an engine TBO extension recommendation, an operator must provide evidence that the operator's Maintenance Organization (M.O.) has addressed the following maintenance procedures:

(a) The M.O. must be capable of performing all line maintenance activities, including all activities listed in the Maintenance Manual, periodic inspection table, borescopic inspection, compressor and turbine washing, etc. It must also be capable of, or have access to, other aircraft maintenance that can have an effect on the durability of the engine, such as instrumentation calibration and propeller balancing. To demonstrate capability, the M.O. must have available all the applicable tooling and must have personnel specifically trained to perform these tasks and/or must have service contracts with facilities that have such applicable tooling and trained personnel.

(b) The operator/M.O. must have a quality system that records all snags and maintenance activities related to the operation of the engine. This also applies to engine-mounted aircraft accessories such as the propeller, the overspeed governor, and the starter-generator. Records must be available for review by P&WC on request.

(c) The operator/M.O must also complete the Option B Operator Qualification Checklist (Ref. Fig 3).

(6) Eligibility - Engines:

(a) Engines must incorporate all service bulletins in the Appendix, Para. 4.C. at the first opportunity and no later than the mid-life inspection. Also, except C.T Blades (Ref.Para 3.A (7 and 8), components listed in the Appendix, Para. 4.B.(4) must have no more than 12,000 hours total time since new, at induction and through the applicability of the program.

(b) Records for engine events that required unscheduled inspections must be available for review by P&WC. This is to ensure compliance with all Maintenance Manual requirements.

(c) P&WC recommends that the aircraft is equipped with an approved exceedance and engine monitor. Engine Condition Trend Monitoring (ECTM) requirements can be found in SIL's GEN-055.

(d) The operator/M.O must also complete the Option B TBO Application and Engine Qualifying Checklist (Ref. Fig 4).

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

Option B Operator Qualification Application and Checklist

Company Name _____ Telephone _____
Company Address _____ Fax _____
_____ Email _____
_____

Company Contact _____ Title _____
Email _____ Telephone _____
Fax _____

Maintenance Facility _____ (if other than operator)
Contact Name _____ Title _____
e-mail _____ Telephone _____
Fax _____

PT6A Maintenance Experience	**Current Experience:**	**Yes**	**No**		**Operating Certificate**	
	Start-up Operator	( )	( )		Part 91 or equivalent	( )
	Existing Operator	( )	( )	Yrs:____	Part 121 or equivalent	( )
	P&WC Experience	( )	( )	Yrs:____	Part 135 or equivalent	( )
	PT6A Experience	( )	( )	Yrs:____	Other: _____	
	Operating Certificate	( )	( )			
Operator Mission Profile	Average hours / month	_____				
	Average cycle-to-hour ratio	_____				

		In-House		Contract	
		Yes	**No**	**Yes**	**No**
Quality Assurance (Part 121 / 135 only)	Q.A. Program in place	( )	( )	( )	( )
Maintenance Tracking	Manual system	( )	( )	( )	( )
	Computer software	( )	( )	( )	( )
	ECTM capability	( )	( )	( )	( )
	Please provide a brief summary of the maintenance tracking system in place:	_____			
		_____			
		_____			
		_____			
		Yes	**No**	**Yes**	**No**
Facility	Maintenance hangar sufficient for applicable aircraft installation	( )	( )	( )	( )
	Segregated and secure parts area	( )	( )	( )	( )
Publications	**Illustrated Parts Catalog(s):**				
	Current Illustrated Parts Catalog	( )	( )	( )	( )
	Subscription to revisions up-to-date	( )	( )	( )	( )
	Engine Maintenance Manual(s):				
	Current Maintenance Manual	( )	( )	( )	( )
	Subscription to revisions up-to-date	( )	( )	( )	( )
	Service Bulletins (SB):				
	Complete SB set for applicable engine	( )	( )	( )	( )
	Subscription to SB's up-to-date	( )	( )	( )	( )

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Option B Operator Qualification Checklist
Figure 3 (Sheet 1 of 2)

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

		In-House		Contract		
Personnel	**Minimum Personnel:**	Yes	No	Yes	No	
	Director of Maintenance	( )	( )	( )	( )	(Attach resume)
	Chief Inspector	( )	( )	( )	( )	(Attach resume)
	Experienced PT6A Mechanic(s)	( )	( )	( )	( )	
	Chief Pilot	( )	( )	( )	( )	
		In-House		**Contract**		
Personnel Training	Pilot recurrent training up-to-date	( )	( )	( )	( )	
	# Mechanics with PT6A factory training					(Attach names / dates)
	# Mechanics scheduled					(Attach names / dates)
		Yes	No	Yes	No	
Tooling	Specialized engine tooling	( )	( )	( )	( )	(Attach list)
	Ground support equipment	( )	( )	( )	( )	(Attach list)
	Hot Section and mid-life inspection	( )	( )	( )	( )	(Attach list)
	ECTM (tools to download files)	( )	( )	( )	( )	
	Compressor / Turbine Wash	( )	( )	( )	( )	
	Fuel Nozzle Inspection	( )	( )	( )	( )	
	Propeller Balancing	( )	( )	( )	( )	
	Cockpit instrumentation calibration	( )	( )	( )	( )	
	Borescope inspection	( )	( )	( )	( )	(Attach specifications)

Acknowledgment
I hereby acknowledge that as an operator I must have maintenance capability to support a TBO extension and must meet minimum eligibility criteria as determined by P&WC. I hereby attest the information provided herein is exact to the best of my knowledge and that P&WC may request additional data. I acknowledge that the TBO recommendation requires additional maintenance actions at mid-life in accordance with the applicable service bulletin or the TBO extension may become void. I grant P&WC all rights to independently verify all submitted information and acknowledge this application is subject to P&WC's written approval. I acknowledge failure in the future to operate and maintain engines in accordance with the applicable Pilots Operating Handbook (POH), applicable Maintenance Manuals (Aircraft and Engine), applicable Airworthiness Directives, and the applicable P&WC Service Bulletin's, may render the TBO recommendation null and void. I agree to provide an annual report (Ref. Figure 4. Yearly Operator Report) of engines operated on Option B.

Director of Maintenance

Name (printed) Signature Date

Aircraft Owner

Name (printed) Signature Date

Chief Pilot

Name (printed) Signature Date

P&WC Field Service Representative

Name (printed) Signature Date

C167287

Option B Operator Qualification Checklist
Figure 3 (Sheet 2)

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

Option B TBO Application and Engine Qualification Checklist

Company Name _____ Telephone _____
Company Address _____ Fax _____
_____ Email _____
_____

Company Contact _____ Title _____
Email _____ Telephone _____
Fax _____

Maintenance Facility _____ (If other than operator)
Contact Name _____ Title _____
Email _____ Telephone _____
Fax _____

Engine Data:
Application for TBO extension under Option B requires inspector's initials in each inspector's signature block, or alternatively, an on-site engine review by a P&WC Field Service Representative.

Engine Model: _____

EIS		Data of entry into service or last overhaul
TTSN		Total Time Since New
TCSN		Total Cycle Since New
TTSO		Total Time Since Overhaul
TCSO		Total Cycles Since Overhaul
TTSHSI		Total Time Since Hot Section Inspection
TCSHSI		Total Cycles Since Hot Section Inspection

General Considerations for Eligibility:
The applicant's Director of Maintenance, Chief Inspector or other qualified inspector shall initial for conformity with the following statements:

	Conforms Yes	Conforms No	Inspector's Initials
1. The above mentioned engine has been built with new P&WC recommended components, components refurbished by P&WC owned shops, or components refurbished by P&WC authorized shops per P&WC standards.	( )	( )	
2. The above mentioned engine is a P&WC factory built engine or an engine overhauled/repaired by a P&WC service center or a P&WC Distributor and Designated Overhaul Facility (DDOF)	( )	( )	
3. If the above mentioned engine was put in storage or was unused for an extended period of time since its last overhaul (or since new if not previously overhauled), there must be documented evidence (logbook entry) that the engine was preserved per the engine maintenance manual or alternative methods found to be acceptable to P&WC.	( )	( )	

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Option B TBO Application and Engine Qualification Checklist
Figure 4 (Sheet 1 of 3)

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

Engine Assembly and Component Records:
Initial for conformity of availability of assembly and component records

	Conforms Yes	Conforms No	Inspector's Initials
Module time and cycles since new, since last overhaul and since HSI	( )	( )	
Accessories time since new and since overhaul	( )	( )	
Total cycles of life limited rotors (Ref. P&WC SB No. 1002)	( )	( )	

The following components must have no more than 12,000 hours total time since new. Initial for conformity with this Service Bulletin.

The mainline ball bearing No. 1	TTSN_____	( )	( )	
The mainline ball bearing No. 4	TTSN_____	( )	( )	
The compressor turbine blades	TTSN_____	( )	( )	
The power turbine blades	TTSN_____	( )	( )	
The RGB 1st stage Sun and Planet Gears	TTSN_____	( )	( )	

Aircraft must be equipped with an approved exceedance monitor	( )	( )	
Aircraft signed up for ECTM services with a P&WC approved Designated Analysis Center (DAC).	( )	( )	

Service Bulletin and Accessory Configuration Records:

Note: If any of the following SB's are NOT currently complied with, compliance Is required no later than 1st mid-life inspection.

Service Bulletin	Applicability	Description	Completed? Yes	Completed? No	Inspector's Initial
P&WC S.B. No. 1427	PT6A-114	PT Containment Ring	( )	( )	
P&WC S.B. No. 1430	PT6A-114 /114A	Exhaust Duct and No.3 Bearing Cover	( )	( )	
P&WC S.B. No. 1434	PT6A-114	Combustion Chamber & Large Exit Duct	( )	( )	
P&WC S.B. No. 1446	PT6A-114 /114A	External Scavenge Pump	( )	( )	
P&WC S.B. No. 1510	PT6A-114A	Third Stage Compressor Stator	( )	( )	
P&WC S.B. No. 1669	PT6A-114 /114A	Compressor Turbine Blades	( )	( )	

C210879

Option B TBO Application and Engine Qualification Checklist
Figure 4 (Sheet 2)

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

Accessory Maintenance Records

NOTE: Refer to SB 1703 Appendix Para. J Table 1 for specific requirements.

Accessory	Mid-life Requirement	TSO	Completed? Yes	Completed? No	Inspector's Initial
Propeller Governor	Shop Functionality Check		( )	( )	
FOHE	Shop Functionality Check		( )	( )	
	Replace element packings		( )	( )	
Fuel Pump	Shop Functionality Check		( )	( )	
Fuel Nozzles	Replace pump coupling Overhaul (Except for Nozzles on an exchange Program)		( )	( )	
Bleed Off Valve	Shop Functionality Check		( )	( )	
T5 Harness	Inspect per EMM		( )	( )	
T5 Thermocouple	Inspect per EMM		( )	( )	
T1 Thermocouple	Inspect per EMM		( )	( )	

Mid-life Inspection Status

	Yes	No	
Mid Life Inspection Completed?	( )	( )	

Acknowledgment

I acknowledge the engine submitted for the purpose of TBO evaluation must meet minimum eligibility criteria as determined by P&WC. I hereby attest the information provided herein is exact to the best of my knowledge based upon an inspection of engine records and that P&WC may request additional data. I acknowledge the TBO recommendation requires additional maintenance actions at mid-life in accordance with SB 1703 or the TBO recommendation may become void. I grant P&WC all rights to independently verify all submitted information and acknowledge this application is subject to P&WC written approval. I acknowledge that failure in the future to operate and maintain engines in accordance to the applicable Pilot's Operating Handbook (POH), applicable Maintenance Manuals, applicable airworthiness directives and P&WC SB 1703 may render the TBO recommendation null and void. I acknowledge this is a guide and the text in SB 1703 will govern in all cases. I agree to provide an annual report (Ref Figure 5. Yearly Operator Report) of engines on Option B.

Director of Maintenance

Name (printed) Signature Date

Inspector Completing Checklist

Name (printed) Signature Date

Aircraft Owner

Name (printed) Signature Date

C210880

Option B TBO Application and Engine Qualification Checklist
Figure 4 (Sheet 3)

4. Appendix (Cont'd)

(7) Mid-Life Inspection
Engines registered in the engine specific TBO extension program are subject to a mid-life inspection. Schedule between 2,500 hours and the operator's TBO (Ref. Note 3). Requirements need not be carried out concurrently, and the HSI portion may be scheduled per the Appendix, Para. 4.E.(4). When scheduling this inspection, operators must also consider other limitations such as the time limits per the Appendix, Para. 4.B.(4), and cyclic limits per P&WC S.B. No. 1002. Do the inspection as follows:

NOTE: 1. For P&WC to provide a TBO extension recommendation, the various inspection procedures must be performed by a P&WC service centre or DOF facility/representative/M.O. recommended by P&WC for the procedures carried out.

NOTE: 2. Unless otherwise specified, Maintenance Manual procedures and limits apply.

NOTE: 3. Operator's TBO refers to the engine basic TBO or extended TBO per Option A as applicable, prior to enrollment in Option B.

(a) Verify compliance with all applicable inspection SBs.

(b) Do a full hot section inspection, including all applicable requirements described in the Maintenance Manual (72-00-00). The exposed gas generator surfaces must be free of corrosion and all missing diffuser ducts must be replaced. Compressor turbine and power turbine blades must show no or minimal sulphidation (stage 1 maximum). Engine performance after this inspection must meet the aircraft power assurance requirements with a minimum of 20°C (36°F) ITT margin and 0.5% rpm (200 rpm) Ng margin.

(c) For engines Pre-SB1669 configuration:
Do the CT disk assembly overhaul level inspection (Ref. Para. 3.A.(7)) at this time. Include an overtemperature exposure check per the overhaul manual (72-50-02, Light Overhaul, Overtemperature, Category B (All Conditions Other than Starting)). On the basis of individual service history, P&WC can provide an exemption from this recommendation to those operators who demonstrate a maintenance program encompassing fuel nozzle refurbishment, borescope inspection and engine condition trend monitoring (ECTM). Ref. SIL PT6A-146 for additional details.

(d) Make sure the compressor is free of corrosion.

(e) Repair compressor foreign object damage (FOD).

(f) Inspect the AGB starter generator drive pad splines for wear.

4. Appendix (Cont'd)

(g) Make sure the external surfaces meet all corrosion and damage requirements. Repair gas generator and cast housing surfaces with touch-up paint. Clean and inspect the gas generator drain valves.

(h) Remove and inspect the external pneumatic hoses and tubes (Px and Py tubes) for cracks or other damage. Tubes must show no signs of deformation (compared to a new tube).

(i) Perform all oil system checks, for example

- MOP setting
- Torque meter functional check.

(j) Accessories require inspection per Appendix Table 1.

TABLE 1, Accessories Option B

System Accessory	Recommended Configuration	Mid-Life Requirement (Option B only)	Other Requirements
Propeller Governor	SB1470	Shop Functionality Check	
Fuel Heater		Shop Functionality Check Replace element packings	
Fuel Pump		Shop Functionality Check Replace Pump to FCU coupling	
Fuel Control Unit	P&WC S.B. No. 1561	Drivebody Inspection (driveshaft bearing replacement, clean pneumatic section and recalibrate)	Ref. EMM (Chap. 72-00-00, Table 601)
Flow		Shop Functionality Check	
Fuel Nozzles	SB1396 (PT6A-114)	Overhaul (Except for nozzles on an exchange program).	

4. Appendix (Cont'd)

TABLE 1, Accessories Option B (Cont'd)

System Accessory	Recommended Configuration	Mid-Life Requirement (Option B only)	Other Requirements
Bleed Off Valve	SB1581 (PT6A-114A)	For Pre-SB1581: Replace diaphragm, clean and re-calibrate	For Pre-SB1581: Inspect per the MM annually
T5 Harness		Inspect per MM	
T5 Thermocouple		Inspect per MM	
T1 Thermocouple		Inspect per MM	

(k) Inspect all controls, linkages, leads and connectors for chafing, corrosion, cracks. Do all controls adjustments and checks specified in the Maintenance Manual (Ref. 71-00-00, Power Plant - Adjustment/Test).

(l) Check the temperature indicating system, including the T1 probe trim resistance.

(m) Check the operation and/or calibration of all engine related instrumentation (ITT, Tq, Ng, Np). Refer to the applicable Aircraft Maintenance Manual (AMM).

(8) Operation and maintenance requirements after registration in the program. Maintain the engine per the Engine and/or Aircraft Maintenance Manual (AMM). In addition, an approved maintenance plan will include the items that follow:

(a) Monitor the engine performance as per the ECTM® program (Ref. Service Information Letter (SIL) Gen-055).

(b) Wash the engine compressor and turbine at intervals that are consistent with the environment in which the engine operates (Ref. Maintenance Manual 71-00-00, Power Plant - Cleaning).

NOTE: Contact the local P&WC FSR for information on the best interval.

(c) At the periodic fuel nozzle inspection, record the nozzle positions per the applicable Maintenance Manual. The concurrent borescope inspection of the hot section must cover the area in line with any nozzle found unserviceable.

NOTE: For nozzle assemblies on an exchange program, do the inspection within 400 hours of removal of nozzles reported as unserviceable.

4. Appendix (Cont'd)

(d) Inspect the compressor first stage blades for FOD at an interval not more than 1,000 hours or one year whichever occurs first and blend per the Maintenance Manual.

(e) Do all control adjustments and checks annually per the Maintenance Manual (Ref. 71-00-00, Power Plant - Adjustment/Test).

(f) Balance the propeller per the Aircraft Maintenance Manual (AMM) or the propeller Component Maintenance Manual (CMM) at an interval not more than 1,000 hrs or one year.

(g) Check the operation and/or calibration of all engine related instrumentation at intervals not more than 1,000 hrs or one year per the Aircraft Maintenance Manual (AMM). (ITT, Tq, Ng, Np).

NOTE: This check is not required if the engine has an exceedance monitor.

(h) Supply a report each year to P&WC with a status update relative to these requirements (Ref. Fig. 5).

(9) Mission Consistency
The mission that the engine is used for and the area of operation must remain as specified at the time of induction. (Ref. Appendix, Para. 4.E.(3)).

(10) Transfer of Engine Specific TBO Recommendations
For changes for an engine registered under the P&WC engine-specific TBO extension program, the operator/owner can apply to P&WC for a transfer. If the operator, its mission, and its M.O. are already established as eligible for the engine models per this SB, no further action will be required. Otherwise, it is necessary to establish the eligibility of the new operator, application, and/or M.O. before the recommendation can be extended to these new conditions.

F. Transfer from one TBO Extension Option to the Other

(1) Operators that have extended their fleet TBO per Option A, per revisions 1 to 6 of this SB, may apply for an individual engine TBO extension per Option B. Refer to the Appendix, Para. 4.E.

(2) Operators that have extended the TBO of individual engines per Option B may consider submitting these engines as samples per Option A. Refer to the Appendix, Para. 4.D.

(a) Each acceptable sample provides a fleet extension of 500 hours relative to the current P&WC recommended fleet TBO for the operator.

TURBOPROP ENGINE
OPERATING TIME BETWEEN OVERHAULS AND HOT SECTION INSPECTION FREQUENCY

PT6A Engine Specific TBO Extension (Option B)
Operator Yearly Report

This form is to be completed yearly by PT6A operators registered in the 'Engine Specific TBO Extension Option B' to support the yearly operation and maintenance requirements of the program.

OPERATOR DATA

Name (owner of engine): _____

Maintenance Facility (if other than owner): _____

ENGINE DATA

Engine Model: _____ Engine S/N: _____

TSN: _____ TSO: _____ Current TBO interval: _____

A) ECTM

Use of ECTM program: ☐ Yes

Data review by trained/qualified technicians: ☐ Yes Frequency of reviewed: _____

Last time/TSN completed: _____

B) ENGINE WASH

Interval for compressor wash: _____ Last time/TSN completed: _____

Interval for turbine wash: _____ Last time/TSN completed: _____

C) FUEL NOZZLES INSPECTION

Interval for nozzles inspection: _____ Last time/TSN completed: _____

Concurrent borescope inspection of hot section: ☐ Yes

D) COMPRESSOR BLADES INSPECTION

Interval for blades inspection: _____ Last time/TSN completed: _____

E) CONTROL AND POWER ADJUSTMENTS/CHECKS

Interval for adjustments/checks: _____ Last time/TSN completed: _____

F) PROPELLER

Interval for propeller balance: _____ Last time/TSN completed: _____

G) ENGINE INSTRUMENTATION (ITT, NG, Tq)

Interval for gauges calibration: _____ Last time/TSN completed: _____

H) MISSION CONSISTENCY

Mission that the engine is used for and area of operation have remained as specified at induction of TBO extension? ☐ Yes ☐ No

I hereby attest that the information provided herein is exact to the best of my knowledge and that I may be requested to provide additional data to support yearly requirements of Option B TBO Extension.

Completed by: _____ Date: _____

Please return report to: Pratt & Whitney Canada
Attn: Manager Serv. Engineering – Small Turboprops (01PD4)
100 Marie-Victorin
Longueuil, Quebec
Canada, J4G1A1
Fax: (450) 647-7567 Email: pt6atboevaluation@pwc.ca

C109297

Option B - Yearly Operator Report
Figure 5

4. Appendix (Cont'd)

(b) The recommendation will apply to engines in the fleet that meet requirements per Option B. Refer to the Appendix, Para. 4.E.

(c) Recommendations in cases where some of the samples submitted were not in satisfactory condition may be lower and/or take into consideration corrective actions put in place.

G. **Minimum Engine Parameters Monitoring System Requirements:**

NOTE: For more information or clarification, contact your local P&WC Field Support Representative (FSR).

(1) **ENGINE AND AIRCRAFT PARAMETERS:**
The system must record and store data from all the parameters that follow:

- Inter Turbine Temperature (ITT);
- Torque (Tq);
- Gas generator speed (Ng);
- Propeller speed (Np);
- Fuel flow (Wf);
- Indicated Outside Air Temperature (IOAT);
- Altitude; and
- Indicated Airspeed (IAS).

(2) **SAMPLING AND RECORDING FREQUENCY:**
The system must monitor, in real time, all of the parameters with a minimum sampling frequency of 5 Hz and record the data at least twice per second during an exceedance event. System software level "C" is recommended. The aircraft Original Equipment Manufacturer (OEM) and P&WC can negotiate acceptable alternative software levels.

(3) **SIGNAL ACCURACY:**
The accuracy of the signal processing, which includes the sensor where applicable, should be within the tolerances that follow:

TABLE 2, Signal Accuracy

Parameter	Tolerance
Inter-Turbine Temperature (ITT)	±5°C

4. Appendix (Cont'd)

TABLE 2, Signal Accuracy (Cont'd)

Parameter	Tolerance
Engine Torque (TQ)	±1%
Compressor (Ng) and Propeller (Np) speed	±0.2%
Fuel Flow (Wf)	±2.5%
Indicated Outside Air Temperature (IOAT)	±2°C
Altitude	±250 ft
Indicated Air Speed (IAS)	±10 knots

(4) **DATE AND TIME:**
For each engine parameter exceedance event and for ECTM® readings, the system must record all the parameters with Date and Time. The device that records the data must keep it during system power-off intervals.

(5) **EVENT DEFINITION:**
The system program must record exceedances for the specific PT6A engine model per the applicable P&WC Maintenance Manual limitations.

(6) **VISUAL INDICATION:**
The system must have a visual indication to the pilot or maintenance personnel to tell them that an engine event occurred and that there may be a maintenance action prior to the next flight.

(7) **SIMULTANEOUS EVENTS:**
The system must have the capability to record simultaneous or multiple events for each parameter monitored, with the minimum requirements that follow:

(a) Identify the affected parameter.

(b) Record the Date and Time that each event starts and ends.

(c) System shall be capable of recording all parameters identified above for a period of time prior to and after an engine exceedance event in a manner that allows for a complete reconstruction of the event.

(8) The examples that follow show methods on how to reconstruct and record simultaneous or multiple events:

(a) Method 1: The system buffers data and then writes it to the permanent memory when necessary.

4. Appendix (Cont'd)

(b) Method 2: System flags are defined at specific set points, which occur before the event definition. If the actual value of a parameter crosses the value defined by the flag, the system starts or stops storing data as required.

(9) **ALLOWABLE DOWNTIME (System or specific elements of system in-operative):** Anytime the system or elements of the system are in-operative, the maximum allowable downtime for specific parameters are as follows:

TABLE 3, Maximum Allowable Downtime

Parameter	Downtime (hours)
Entire System	20
Inter-Turbine Temperature (ITT)	20
Engine Torque (TQ)	40
Compressor (Ng) and Propeller (Np) speed	40
Any other elements not specified	150

(a) Manually record the parameters listed in 4.H.(1) at a stabilized cruise condition, daily or every 6 hours, in compliance with ECTM® requirements. Refer to S.I.L. No. GEN-055.

(10) **FIELD REPROGRAMMING:** The software must make it possible for field maintenance personnel to apply software modifications authorized by the manufacturer for the current installation.

(11) **INSUFFICIENT MEMORY:** The system must generate a notification to the pilot or maintenance personnel when there is a possibility of insufficient remaining memory to store event or trend data during the next flight.