



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

AIRFRAME AND ENGINE EXAMINATION

WPR17LA075

Accident Date: February 22, 2017

Exam Date: March 13, 2017

This document contains 34 embedded images

A. ACCIDENT

Location: Pacific Ocean, Near Guam
Date: February 22, 2017
Aircraft: Hughes -369A, N805LA, S/N 101355
NTSB IIC: Michael Huhn

B. EXAMINATION PARTICIPANTS:

Douglas Dymock
Inspector
Federal Aviation Administration
Dallas, TX

Jack Johnson
Air Safety Investigator
Rolls Royce Corporation
Indianapolis, IN

John Hobby
Air Safety Investigator
Boeing
Mesa, AZ

C. SUMMARY

On February 22, 2017, about 1325 local time, a McDonnell-Douglas (Hughes/Boeing) MD-369A helicopter, N805LA, was substantially damaged during an autorotation to international Pacific Ocean waters near Guam. The aerial observation flight was being conducted under the provisions of Title 14 Code of Federal Regulations Part 91 during daylight visual meteorological conditions. The helicopter was owned and operated by "Jim's Air Repair," and was operating from a Japanese fishing boat.

The main rotor blades severed the tail boom, but the helicopter remained afloat and upright on its utility floats. The wreckage was transported to a facility of, and into the possession of, Hansen Helicopters on Guam. Subsequent to the recovery, Hansen Helicopters personnel were instructed by the NTSB to retain the wreckage and maintenance records for examination. On March 13, 2017, representatives from the FAA, Boeing, and Rolls Royce examined the wreckage at the Hansen Helicopters facility.

D. EXAMINATION DETAILS

1.0 Airframe Examination

1.1 General

According to a report created by and submitted to the NTSB by Hansen Helicopters, a portion of the tail boom assembly was severed by the main rotor blades during the ocean impact, and was lost at sea. On-site examination by the investigative team yielded the following observations:

The helicopter was inside a Hansen Helicopters building, resting on the left utility float, fuselage lower structure, and the right forward and aft struts. The right utility float was removed from the helicopter, separating at the strut-to-foot joint, during recovery. The utility floats appeared to have limited the damage to most of the lower fuselage structure during the water impact, but the four fuselage attach points for the landing gear struts/dampers were severely damaged, with torn/ripped skins, and fractured structure.

1.2 Airframe, Fuselage and Landing Gear

The helicopter fuselage experienced extensive impact damage to the forward fuselage, pilot/copilot seat structure, and aft fuselage. Visual inspection revealed significant damage to the lower fuselage at the landing gear attach structure locations. The four landing gear struts, dampers, and braces all had impact damage and fractures, with the worst damage on the left side. The aft landing gear center beam fitting was fractured. The utility float attachment to the skid tube and landing gear foot showed little visible damage.

The composite "doghouse" assembly, located aft of the engine inlet, was broken and torn, consistent with main rotor blade contact. A section of the upper aft fuselage was separated at the tailboom attach point, fuselage station (FS) 197.78, with torn and ripped skin, and a fractured tailboom attach frame.

The tailboom was separated into at least two sections, only one of which was recovered. (Figs 4 & 5) The recovered section was separated from the fuselage near FS 197.78, and extended to approximately FS 258.0. The recovered section showed evidence of main rotor blade contact. The tailboom aft of FS 258.0, including the vertical and horizontal stabilizers, tail rotor transmission, and the tail rotor system, was not recovered from the ocean.

The engine mounts were bent and cracked. The left aft mast support channel near the FS 124.0 canted frame was cracked and deformed.

1.3 Cockpit and Instruments

The canopy windscreens and overhead transparencies, doors, and doorframe structures were all damaged from impact. The cockpit instrument panel and center console assembly, and its associated components, showed little damage. The warning/caution system was unable to be activated due to lack of battery power.

The seat box structure was extensively damaged, with both left and right cockpit seat pans significantly deformed downward and their box structures crushed. The seat restraint systems were intact and functional.

1.4 Flight Control System

Single pilot, left hand controls were installed. Cyclic and collective control system continuity was confirmed. The cyclic stick was found balanced, near center. This is consistent with the trim actuators being neutral. Anti-torque control continuity was confirmed from the pilot's pedals to the fractured tail rotor control rod at the tailboom fracture. The pilot's pedal bracket was fractured at the attach frame.

1.5 Main Rotor System

The main rotor system hub assembly and components, strap assemblies, pitch housings, feather bearings, and pitch change links were relatively undamaged. The main rotor head showed damage to one damper arm, but overall was intact with chips and scrapes. The rotor system did exhibit visible hub damage due to excessive lead/lag excursions and high flapping angles. All four main rotor blades (Helicopter Technology Company PN: 500P2100-303, SNs: 0864B, 0865B, 0866B and 0867B) were unbroken, with varying degrees of bends and skin damage. The damage to the main rotor system components was consistent with low rotor RPM, power-off, main rotor blade strikes.

1.6 Main Transmission and Drivetrain

Drivetrain continuity was established from the engine, through the main transmission, to the main rotor. The main transmission (PN 369A5100-615, SN 118-1934R) appeared to be undamaged. One transmission magnetic chip plug had a small amount of paste, and the other was clean.

Rotation of the main rotor hub by hand resulted in rotation of both the engine-to-transmission drive shaft and the tail rotor driveshaft. The engine-to-transmission drive shaft (PN 500N5215, SN 1381) was displaced to one side as a result of the engine mount damage. The over-running clutch assembly was functional. The transmission cooler blower assembly appeared undamaged.

1.7 Tail Rotor System

The tailboom section forward of the tail rotor transmission attach frame showed evidence consistent with a main rotor blade strike. The aft section, including the tail rotor gearbox, tail rotor assembly, V-tail and lower vertical, was not recovered.

The tail rotor driveshaft separation locations matched the locations of the tailboom separations. The shaft fracture signatures were consistent with less than normal flight RPM, due to the lack of the characteristic "wind-up" (torsional deformation) that is normally associated with high-RPM fracture or sudden stoppage. The forward tail rotor driveshaft Kamatics coupling was in place on the main transmission, and was determined to be functional.

2.0 Engine Configuration

The engine is a two-spool design. In the direction of airflow, the first spool is referred to as "N1," and includes all 7 compressor stages and the first two turbine stages. The N1 compressor section includes 6 axial stages and a final centrifugal stage. The N1 turbine section, which drives the compressor, is also referred to as the "gas generator" turbine. The second spool includes the last two turbine stages and the mechanical accommodations to drive the rotor system. This section is also referred to as the "N2" or "power turbine" section.

3.0 Engine Examination

The engine mounting structure was mostly intact and properly secured within the engine compartment. However, all engine mounts exhibited deformation consistent with a hard landing. Inspection of the engine exterior revealed no evidence of fire or uncontained failure. The engine exhibited evidence of saltwater exposure and had significant external corrosion. The examination showed no impact damage to the compressor blades, or any visible signs of water ingestion. The compressor section (N1) was able to rotate freely, and had no indications of foreign object damage or housing rubbing. The power turbine section (N2) showed no visible damage. Its rotation was stiff, but this appeared consistent with saltwater/corrosion damage to the accessory case, and not with impact damage. No obstruction of the intake was noted, and no evidence of any mechanical failures or deficiencies that would have prevented the normal engine operation was observed.

All fuel, lubrication, and pneumatic lines, coupling "B-nuts," and their associated fittings were checked by hand for security, and were found to be at least finger tight. No evidence of oil leaks was observed in the engine bay or surrounding area. No torque paint was evident on the fittings.

No oil (or any liquid) was visible in the airframe oil level sight glass. However, the aircraft was resting at an angle which precluded an accurate oil level sighting. The oil cap was removed and exhibited oil residue. The oil reservoir did not exhibit any unusual odor.

A vacuum check of the engine's fuel system was performed by draining the contents of the fuel filter bowl of the engine-driven fuel pump, and attaching a vacuum source to the filter bowl port. A vacuum of 8 psi was applied to the filter bowl port. The system would not hold that vacuum value for the test requirement period of 2 minutes. Vacuum was lost at a rate of approximately 1 psi every 2 to 3 seconds, indicating that there was a slow leak within the fuel system. Systematic isolation of components traced the vacuum leak to a line connecting the fuel pump to the fuel control. The B-nut on the fuel pump side of this line was found to be excessively tight, and was the most likely leak source. However, visual examination of the B-nut ferrule did not reveal any obvious cracks or damage, and the exact source of the vacuum leak was not determined.

The fuel spray nozzle (FSN) was removed, disassembled, and examined. The spray face exhibited corrosion and typical carbon coating. The FSN filter screen exhibited contamination similar to that found in the fuel pump filter. A borescope was inserted into the fuel spray nozzle

port on the aft end of the engine. Examination revealed no evidence of foreign object damage or operational thermal damage to the gas generator turbine blades or nozzle vanes.

Significant evidence of water contamination was observed in the helicopter's fuel storage and delivery system, including all filters, and the evidence was consistent with the pre-impact presence of the water. The left fuel cell cover was opened and water, with no evidence of fuel, was found inside the cell. Potential water entry points included the fuel vent system, a deficient fuel-cap seal, or tank damage. The investigation considered the possibility that damage, including torn/ripped structure in the area of the fuel cells, might have compromised the fuel cells. However, no evidence of leakage of fuel onto the floor was observed, and no visible holes or tears were noted in the fuel bladder.

The contents drained from the fuel pump filter bowl contained significant amounts of entrained particulates, and a fluid suspected to be water. Water-detecting paste confirmed the presence of water. The filter bowl in the housing of the engine-driven fuel pump was opened and examined. The filter exhibited significant contamination of unknown particulate matter, a paste-like substance, and what appeared to be plant material.

The fuel supply line from the fuel pump filter to the FSN is normally sealed at both ends by spring-loaded check valves, which trap the last fluid about to be introduced into the engine. The fluid from that line was drained and examined. That fluid was observed to be about 30% water, , and the rest milky grey turbine fuel.

The fuel pump wire was not wrapped around the start pump fuel line as required; this condition can result in an erroneous fuel quantity indication. In addition, the in-tank sensor exhibited visible corrosion.

4.0 Service and Maintenance Records Information

4.1 Helicopter History

The helicopter, an OH-6A (Manufacturer's Model 369A, SN 1355A) was delivered new to the US Army on February 24, 1970 as US Army SN 69-15985. Hughes Tool Company (HTC), Aircraft Division was the original manufacturer of the helicopter. HTC underwent several ownership (and name) changes subsequent to the production of this helicopter.

At the time of the accident, the airframe had accumulated approximately 7,284.8 hours total time (TT).

4.2 Records and Operator Assistance

Hansen Helicopters either would not or could not provide the complete maintenance records for N805LA. The investigation was provided with a 3-ring binder entitled "Paperwork" that was represented as being the helicopter maintenance records. The binder included a mix of flight records, status reports, FAA 337 forms, and other documents. Only a very limited amount of the contents conformed to the FAA maintenance entry requirements; in particular, most lacked

airframe/engine times and appropriate sign-offs, that included the mechanic's name and certificate number.

According to the FAA representative, cursory comparisons of the 337 forms with the helicopter's records on file with the FAA at Oklahoma City revealed numerous discrepancies and/or mismatches.

4.3 Service Time Information

There were two hour meters (Fig 8) in the helicopter. One was mounted to the battery box and registered 0937.8 hours. The other was found in the lower section of the instrument panel, dislodged from its mounting, and registered 1,245.9 hours.

The meter reading of 1,245.9 correlated with the "Hobbs" time entries found in the Monthly Reports (Figs 27, 29, & 30), and that meter/time was likely used for billing purposes. The meter with the reading of 0937.8 appeared to be used to register activation of the collective control, signaled by a collective position switch. This hour meter reading was used by the investigation to determine the approximate helicopter total time of 7,284.8 hours.

The following were some of the discrepancies noted during comparisons of the records provided by Hansen Helicopters, the Hansen-supplied NTSB accident reporting form, and the engine data plate. The reasons for these discrepancies were not identified, and simple transcription or arithmetic errors could not be discounted as the underlying factors:

- Hansen stated on the NTSB form that N805LA had 7,374.8 total time hours of operation, that the engine had 2,702.4 total time hours of operation, and that the engine had been overhauled 393.7 hours ago.
- The engine data plate showed the engine was overhauled at 2,627.0 hours, but Hansen's records stated that the engine had 2,308.7 hours of operation at overhaul, a difference of 318.3 hours.
- The records stated that the engine had been installed on N805LA at airframe time of 6891.1 hours. Adding the 393.7 hours flown since installation on the airframe would yield a value of 7,284.8 hours, but the NTSB accident reporting form stated that the airframe time was 7,374.8, a difference of 110.0 hours.

4.4 Engine Maintenance and Records

Selected Part & Serial Numbers

Component	Records Serial Number	Records Part Number	Data Plate P/N & S/N Agree with Provided Records?
Engine	AE-400499	6876268	Agree
Compressor	AC-16217	6876266	Not observed/unable to confirm
Turbine	AT-10403	6983028	Turbine P/N agree, but 4 th stage turbine (at least) S/Ns did not
Power Turbine Governor	84460019	2524910-2	Agree
Fuel Control Unit	302671	2524927-3	Agree
Bleed Valve	103-4483	A45413A	Not observed/unable to confirm
Fuel Pump	T106429	6899253	Agree
Fuel Spray Nozzle	AG654N	2307706	Agree

- Operator-supplied engine records indicate the engine was installed with 0 hours time since overhaul (TSOH) and a total engine time 2308.7 hours. However, the TSOH stamped on the engine's data plate indicate 2627.0 hours total engine time at overhaul. (Fig 15)
- During manufacture, the 4th stage turbine wheel's serial number is engraved on the convex side of the turbine blades, with one number engraved per blade. Borescope examination of the 4th stage turbine wheel clearly shows the numbers "3" and "5" engraved into the convex sides of the blades.
- According to the records supplied by the operator, the 4th stage turbine wheel's serial number is "BU18527."
- The records indicate the same turbine module serial number as that found on the data plate, however the manufacturer's part number printed on the data plate does not match the part number listed in the records.
- The records indicated the turbine module's time since overhaul at installation "0.0." However the same record set for the installed 1st and 2nd stage turbine wheels indicated component times of 762.5 hours at installation, 3rd stage turbine wheel time of 1292.0 hours at installation, and 4th stage turbine wheel of 1525.6 hours at installation. These times contraindicate a turbine overhaul, because all components are required to be new/0-timed in order to qualify as a turbine module overhaul.

4.5 Inspections

The most recent recorded 100 hour/Annual, 300 hour, or 600 hour inspection was completed and signed off by the Hansen Helicopters DOM on 5/7/16. On that inspection entry, the airframe time was listed as 6,891.1 hours, and the "Hobbs time" was listed as 544.1 hours.

The 5/17/16 inspection entry stated "Next inspection due is a 100 hour at 6991.1" [hours]. However, despite the fact that the available information indicated that the helicopter had

accumulated nearly 400 hours since that inspection, and maintenance and inspection activities were recorded on the Monthly Reports, none of those activity entries included the aircraft total time in service, or the mechanic's name, rating, or certificate number.

E. OPERATIONAL INFORMATION

1.0 Operational Performance

The performance capability for the approximate power-available conditions and helicopter configuration at the time of the accident was evaluated using the manufacturer's performance data. The results indicated that the planned mission, considering the ambient conditions and helicopter loading and configuration, was within the helicopter's normal performance and operational capability envelope.

2.0 Weight and Balance

The helicopter's weight and balance documentation sheet, dated August 15, 2016, was located in the 3-ring binder provided by the operator. A weight and balance estimate for the accident flight was conducted using the "worst case" estimated values that were based on the known and/or estimated helicopter configuration at the time of the accident. Even with minor deviations in weight and configuration, the calculations indicated that the helicopter was being operated within allowable weight and balance envelope during the accident flight.

Item	Weight (Lbs)	Longitudinal Arm (In)	Moment (In-lbs.)
Empty weight	1,262	110.1	138,903.6
Pilot	170	73.5	12,495
Passenger	170	73.5	12,495
Fuel	322	96.7	31,137.4
Total	1,924	101.4	195,031
Limiting Values	2,400 max	97.0 – 104.0	

3.0 Other Relevant Information

The amount of water found in the captured fuel samples would suggest significant water contamination of the fuel prior to the accident. According to the Rolls-Royce investigator, previous operational experience has shown that the amount of water found in the FSN supply line was sufficient to result in an engine flame-out and loss of power.

Due to limited resources available for the examination, removal of the engine from the airframe was not attempted. According to the Rolls-Royce investigator, it is unlikely that removal of the engine, and further examination effort, would yield significant additional evidence regarding the reason for the accident.

F. EXAMINATION PHOTOGRAPHS



Figure 1 - Front View



Figure 2 - Pilot's Compartment



Figure 3 - Aft View



Figure 4 - FS 197.78 Tailboom Separation Location



Figure 5 - Recovered Tailboom Section (~FS 197 to ~FS 258)



Figure 6 - Aft Cabin Interior



Figure 7 - Landing Gear Strut/Brace Damage



Figure 8 - Hour Meters



Figure 9 - Damaged Aft Left Mast Support Channel



Figure 10 - Pilot's Anti-Torque Pedal Assembly



Figure 11 - Crushed Right (Observer) Seat Bottom

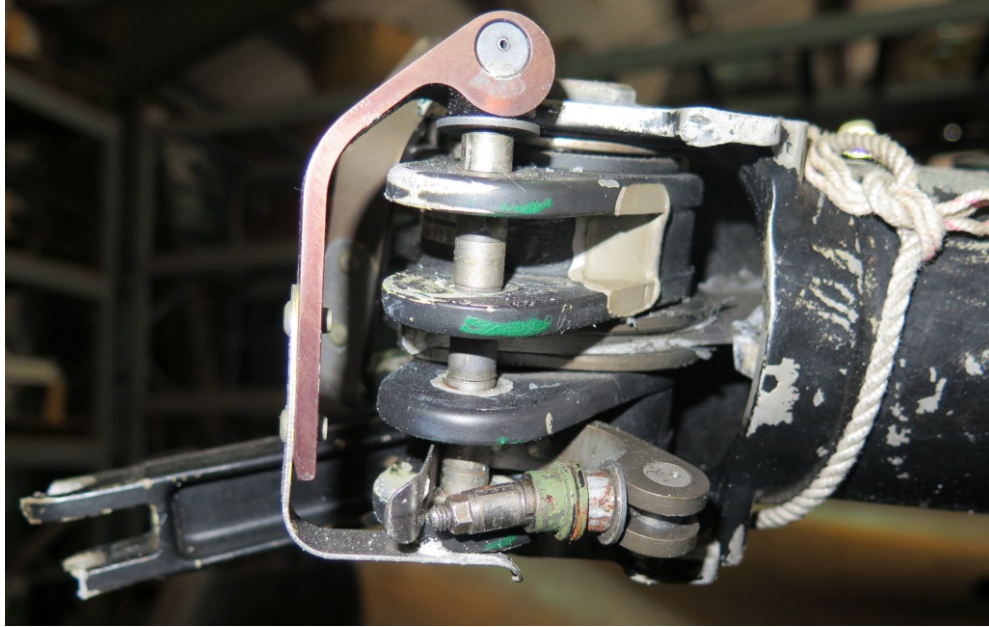


Figure 12 - Main Rotor Head



Figure 13 - Main Rotor Blades

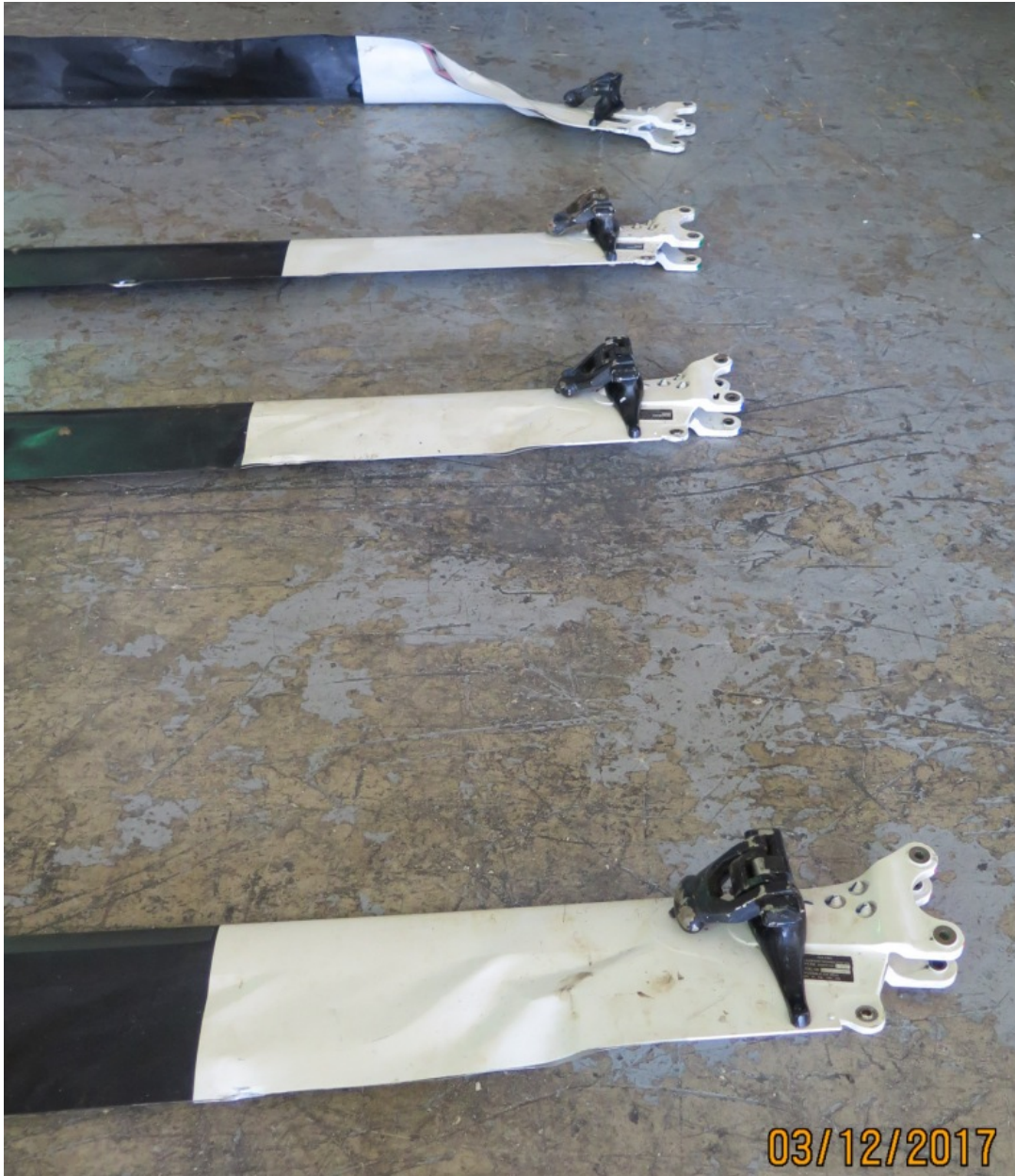


Figure 14 - Main Rotor Blade Roots

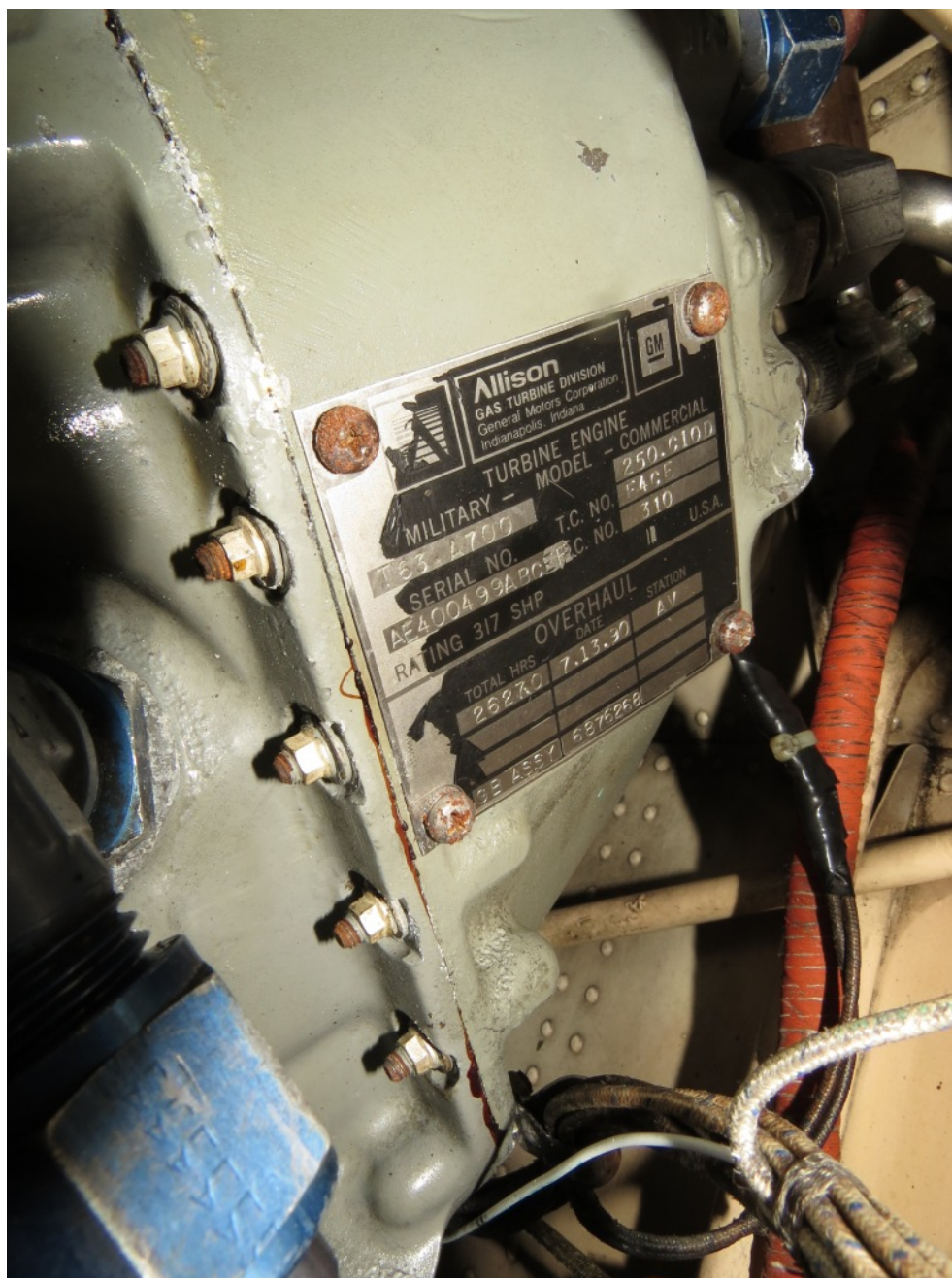


Figure 15 - Engine Data Plate

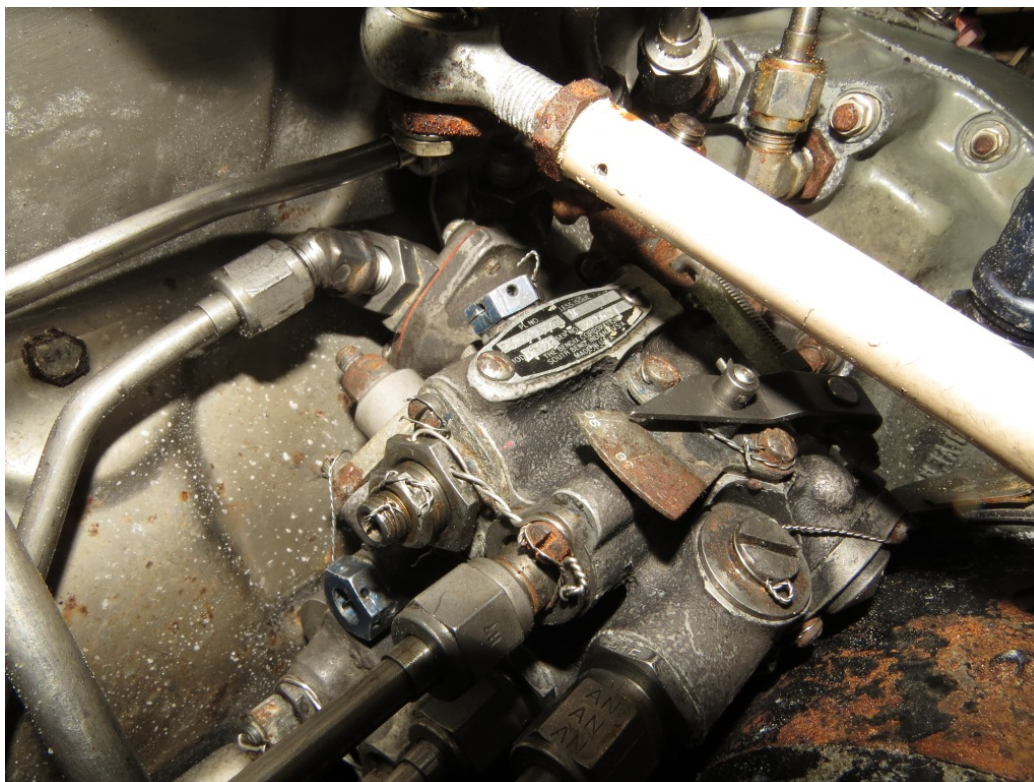


Figure 16 - Fuel Control Unit



Figure 17 - Small Vacuum Leak Traced to this B-nut at Engine Fuel Control



Figure 18 -Engine Fuel Spray Nozzle



Figure 19 - 4th Stage Turbine with Engraved Serial Numbers Circled

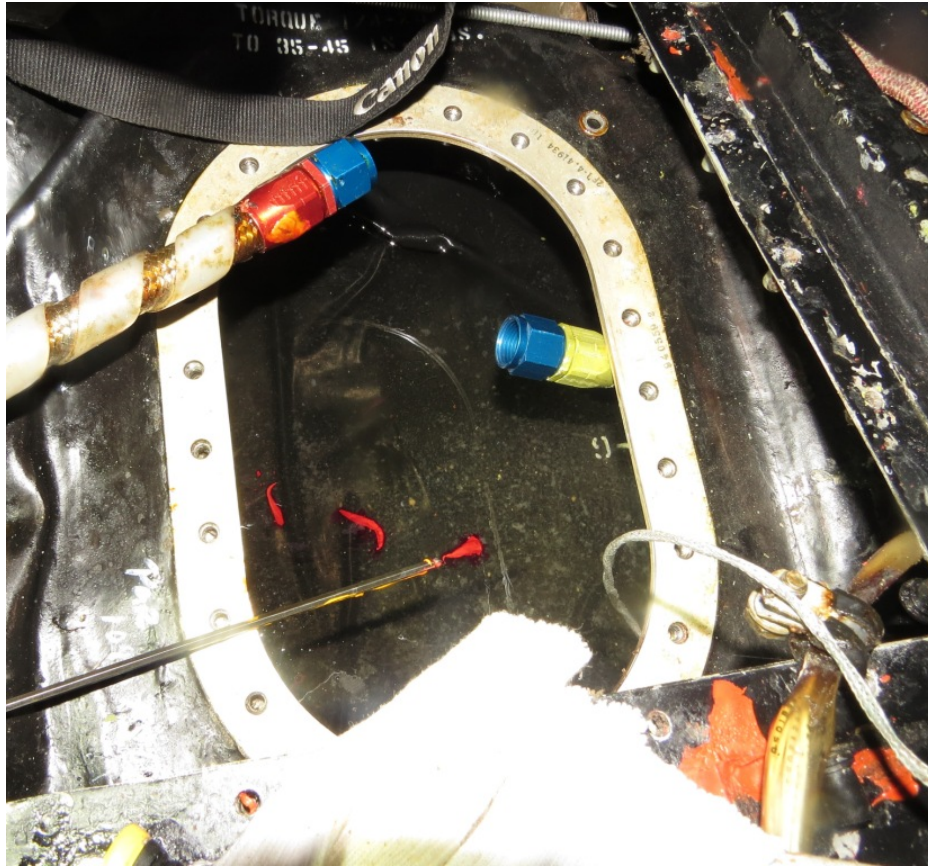


Figure 20 – Activated (red) Water-Detecting Paste in Fuel Cell



Figure 21 - Positive Water Indication via Water Detecting Paste from Fuel Line Sample



Figure 22 –Fuel/Water Mixture Captured from Fuel Pump Fuel Filter Bowl



Figure 23 – Fuel/Water Mixture Captured from Fuel Pump Fuel Filter Bowl



Figure 24 - Fuel Filter and Fuel Filter Bowl

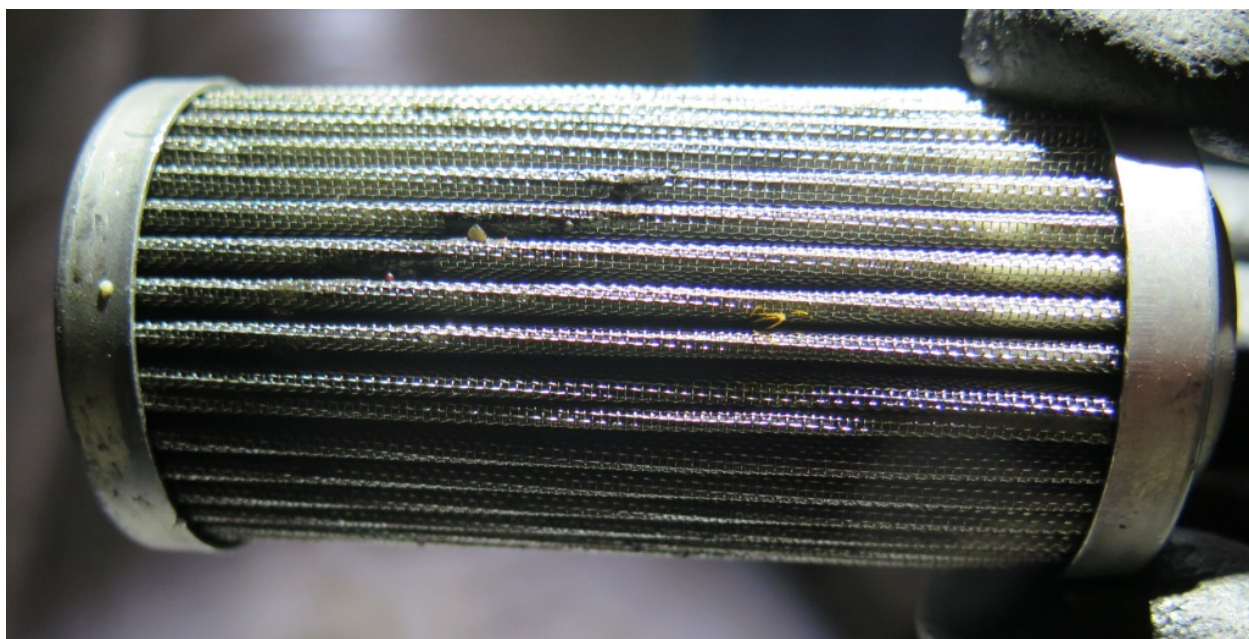


Figure 25 - Fuel Filter

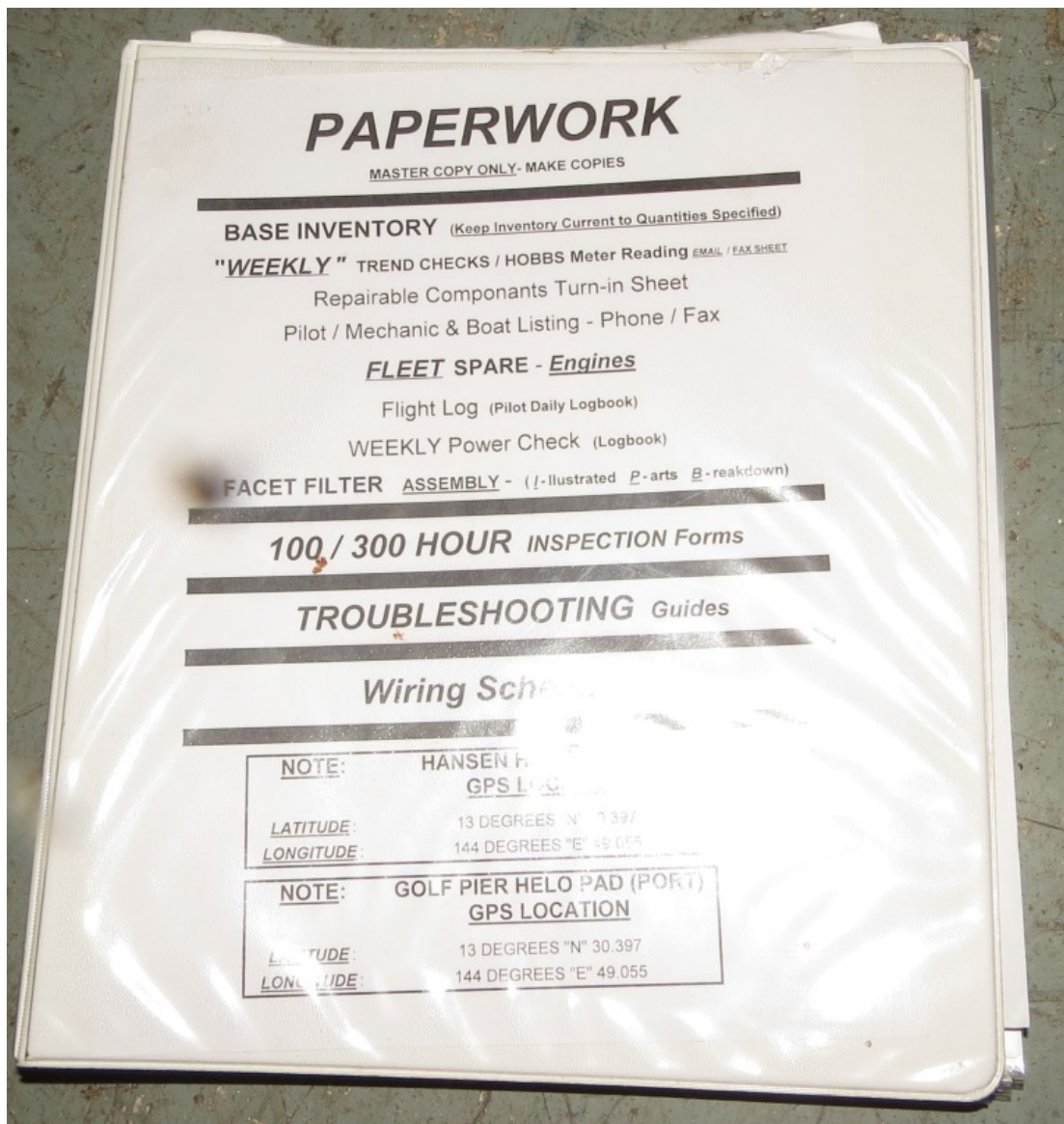


Figure 26 - Binder Proffered as Maintenance Records

TO: MARDIN / RUFUS / TURNER
 FROM: WAKABA MARI NO. 7
 NROSLA
 SUBJ: MONTHLY AND WEEKLY REPORT

DATE:	HOBBS-OUT:	HOBBS-IN:	T. TIME:	REMARKS:
JAN. 02, '17	1186.6	1188.6	2.0	TRACK AND BALANCE T/R BLADE; A/C AIRWORTHY.
03	1188.6	1190.4	1.8	
04	1190.4	1192.8	2.4	
05	1192.8	1195.7	2.9	PROGRESSIVE CHECK FOR 100 HRS. INSPECTION.
06	1195.7	1197.3	1.6	
07	1197.3	1200.6	3.3	ALL 100 HRS. INSP. COMPLIED WITH.
09	1200.6	1203.8	3.2	
10	1203.8	1206.0	2.2	A/C AIRWORTHY.
11	1206.0	1209.9	3.9	
12	1209.9	1213.5	3.6	
13	1213.5	1217.1	3.6	
14	1217.1	1218.8	1.7	
16	1218.8	1220.6	1.8	
18	1220.6	1222.5	1.9	
20	1222.5	1223.3	0.8	INSPECTED (BOTH) FUEL CELLS AND FUEL LINES, AND WIRING CONNECTORS AND FOUND A/C AIRWORTHY.
21	1223.3	1226.2	2.9	
22	1226.2	1228.7	2.5	
23	1228.7	1230.2	1.5	
24	1230.2	1231.8	1.6	
26	1231.8	1234.0	2.2	
JAN. 28, '17	1234.0	1235.8	1.8	
TOTAL FT. = 49.2 HRS.				

WEEKLY TREND CHECK:
 N1-94% ; N2-102% ; ALT-1,000 FT ; TR-55 PSI ; TOT-640°C
 HOBBS-1235.8 ; REQUEST P/N-369HH0929.2
NO DOWNTIME ; A/C AIRWORTHY.

BEST REGARDS,
 TONY / R440

NOTE: DEFINITELY, WE'RE SAILING TO
 YAMAGAWA, JAPAN FOR UNLOADING
 FISH AND FISHING NET REPAIR.

Figure 27 - Sample Page from Binder

TO: HANSEN HELICOPTERS INC.
FROM: WAKABA MARU NO. 7
NR05LA

SUBJ: WEEKLY TREND CHECK

N1 - 94 %
N2 - 102 %
ALT - 1000 FT
TQR - 56 PSI
TOT - 640 °C
HOBBS - 1230.2

REQUEST P/N - 369HH0924.3

A/C AIRWORTHY.

BEST REGARDS,
RIGD / TONY

Figure 28 - Sample Page from Binder

TO: HANSEN HELI. INC.
 FROM: WAKABA MARU NO. 7
 N805LA
 SUBJ: MONTHLY REPORT AND POWER CHECK

DATE: HOBBS-OUT - HOBBS-IN - T.TIME ; REMARKS :
 DEC. 20, '16 - 1153.2 - 1155.8 - 2.6
 21 - 1155.8 - 1157.1 - 1.3
 23 - 1157.1 - 1158.1 - 1.0 - REPLACED WORN OUT BRUSHES
 24 - 1158.1 - 1159.6 - 1.5 ON STARTER GEN. ASSY.
 25 - 1159.6 - 1163.6 - 4.0
 26 - 1163.6 - 1168.8 - 5.2 - SERVICED AIR ON ALL LANDING
 27 - 1168.8 - 1174.6 - 5.8 GEAR DAMPERS.
 28 - 1174.6 - 1177.2 - 2.6
 29 - 1177.2 - 1182.6 - 5.4 "NO DOWNTIME"
 DEC. 30, '16 - 1182.6 - 1186.6 - 4.0
 TOTAL = 33.4 A/C AIRWORTHY.

POWER CHECK :
 N1 - 94%
 N2 - 102%
 ALT - 1000 FT
 TD - 55 PSI
 TOT - 640°C
 HOBBS - 1186.6
 REQUEST P/N - 369HH0885.1

HAPPY NEW YEAR TO ALL !

TAT RECORDS,
 TAY / RIGO

03/12/

Figure 29 - Sample Page from Binder (note informal maintenance and airworthiness annotations)

TO: MARVIN / RUFUS / TURNER			
FROM: WAKABA MARU NO. 7			
NR03 LA			
SUBJ: MONTHLY REPORT			
DATE:	HOBBS OUT:	HOBBS IN:	T. TIME:
SEPT 01, 16	- 979.1	- 982.1	- 3.0
02	- 982.1	- 985.4	- 3.3
03	- 985.4	- 988.0	- 2.6
04	- 988.0	- 990.6	- 2.6
05	- 990.6	- 992.0	- 1.4
06	- 992.0	- 996.0	- 4.0
07	- 996.0	- 999.3	- 3.3
08	- 999.3	- 1000.7	- 1.4
09	- 1000.7	- 1003.7	- 3.0
10	- 1003.7	- 1007.4	- 3.7
11	- 1007.4	- 1011.1	- 3.7
12	- 1011.1	- 1012.6	- 1.5
13	- 1012.6	- 1016.3	- 3.7
14	- 1016.3	- 1018.8	- 2.5
15	- 1018.8	- 1023.3	- 4.5
16	- 1023.3	- 1024.3	- 1.0
17	- 1024.3	- 1028.7	- 4.4
18	- 1028.7	- 1032.4	- 3.7
19	- 1032.4	- 1035.5	- 3.1
20	- 1035.5	- 1037.0	- 1.5
21	- 1037.0	- 1040.1	- 3.1
22	- 1040.1	- 1043.4	- 3.3
23	- 1043.4	- 1045.2	- 1.8
25	- 1045.2	- 1047.3	- 2.1
26	- 1047.3	- 1050.2	- 2.9
27	- 1050.2	- 1053.4	- 3.2
28	- 1053.4	- 1057.2	- 3.8
29	- 1057.2	- 1058.6	- 1.4
SEPT. 30, 16	- 1058.6	- 1062.0	- 3.4
TOTAL = 82.9 HRS			
REQUEST #N369H40 - 774.9			
REMARKS:			
REPLACED GPS ON HELI DUE TO KEY BOTTON DEFECTIVE.			
PROGRESSIVE CHECKED FOR 100 HRS INSPECTION.			
100 HRS INSPECTION C/W.			
INSTALLED NEW GPS ON HELI DUE TO POWER CUTTING OFF AND DISTANCE NOT INDICATING NORMALLY.			
CHECKED AND WELL INSPECTED T/R PITCH CONTROL ASSY. T-HEAD NUT AND TANG WASHER SECURELY LOCK. RE-CHECKED TORQUE AND FOUND A/C AIRWORTHY.			
BEST REGARDS, TONY / RIGO			

Figure 30 - Sample Page from Binder (note informal maintenance and inspection annotations)

Assembly Record					Rolls-Royce	
Engine Assembly					Part V	1 of 2
Engine Serial Number		AE400499		Engine Designation BR 250-C100/ T63-A-790		
Nomenclature	Part Number	Installed		Date	Removed	
	Serial Number	Date	Engine TT	Component TSOH/TSN Comp Life	Engine TT	Component TT
#1 Wheel, Turbine	6886407	2/17/16	2308.7	762.5		
	X126859			1550		
#2 Wheel, Turbine	6898782	"	2308.7	762.5		
	HX136037			1550		
#3 Wheel, Turbine	6843393	"	2308.7	1292.0		
	HX765952			2500		
#4 Wheel, Turbine	6847449	"	2308.7	1525.6		
	BU18527			2500		
Impeller, Compressor	685116	"	2308.7	748.3		
	E73621M			1700		
Fuel Control Unit	2524927-3	"	2308.7	126.9		
	302671			750		
Power Turbine Governor	2524910-2	"	2308.7	285.7		
	84460019			750		
Fuel Pump	6899253	"		645.9		
	T106429			1500		
Bleed Valve	A45413A	"		0.0		
	103-4483			1250		

Figure 31 - Engine Component Time Record

 Rolls-Royce

Part V
Page No. 2 of 2
Engine Designation RR250-C10D/T63A700

[illegible]

32

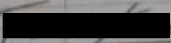
HANSEN HELICOPTERS WEIGHT AND BALANCE REPORT			
N805LA WB AUGUST 15, 2016			
CONFIGURATION	WEIGHT	ARM	MOMENT
A/C EMPTY WEIGHT	1316.0	108.8	143167.2
JACK FITTINGS	54.0	96.9	4263.6
NEW EMPTY WEIGHT	1262.0	110.1	138903.6
FOREWARD CG			
BASIC WEIGHT	1262.0	110.1	138903.6
PILOT	170.0	73.5	12495.0
PASSENGER	170.0	73.5	12495.0
CRITICAL FUEL (FWD)	40.0	90.6	3624.0
GROSS WEIGHT (FWD CG)	1642.0	102.0	167517.6
AFT CG			
BASIC WEIGHT	1262.0	110.1	138903.6
PILOT	170.0	73.5	12495.0
AFT L/H PASSENGER	170.0	105.0	17850.0
AFT R/H PASSENGER	170.0	105.0	17850.0
BAGGAGE (AFT)	80.0	110.0	8800.0
GROSS WEIGHT (AFT CG)	1852.0	105.8	195898.6
WEIGHING POINT			
LEFT MAIN	574.0	96.9	55620.6
RIGHT MAIN	586.0	96.9	56783.4
TAIL	156.0	197.2	30763.2
	1316.0	108.8	143167.2
CG RANGE 97 --- 104			
THE AIRCRAFT WAS WEIGHED WITH FULL ENGINE, MAIN ROTOR AND TAIL ROTOR GEARBOX OIL. THE SEATS, RADIO PACKAGE, FIXED FLOATS AND FLIGHT MANUAL WERE ALL			
 PHILLIP T. KAPP A + P  A			

Figure 33 - Weight & Balance Data from Binder

ROTORCRAFT INSPECTION / MAINTENANCE				
Model: 369A		N: N805LA	Serial: 101355	Page: 1 of 1
DATE	ROTORCRAFT HOURS	INSPECTION / MAINTENANCE DETAILS	SIGNATURE AND LICENSE NO.	INSPECTOR SIGNATURE AND LICENSE NO.
5/7/16	6891.1 TTAF hobbs 544.1	This aircraft has been inspected IAW the current MDHI 369H inspection program. All work was performed IAW MDHI M+O Manual 500 Series HMI Appendix B Section 6 and 7 Checklist. All applicable AD's have been complied with, see attached list for individual compliance and description. Time life data recomputed and brought up to date. This aircraft, including engine(s) and components, shall be maintained IAW the manufacturer's current recommended maintenance program as per FAR 91.409 e & f(3). The A/C was tracked, balanced and test flown satisfactorily. I certify this aircraft was inspected in accordance the MDHI 369H inspection program and determined to be in airworthy condition. The following inspections were preformed; 100hr/Yearly, 300hr & Yealy. 300hr, 600hr and two year lube accomplished. Faucet oil filter for ICA's, no defects. M/R Mast, M/R Head, M/R Swashplate, Tailboom, tailboom attach bolts, start/gen, engine assembly & landing gear dampers were removed & replaced with serviceable, new or O/H'd parts; see helicopter assembly record for details. This engine has been inspected IAW the current Rolls Royce 250 inspection program. All work was performed IAW Rolls Royce M+O manual section 72-00-00 Table 602 Checklist. All applicable AD's complied with, see attached list for individual compliance and description. Time life data recomputed and brought up to date. The engine was test run satisfactorily. I certify this aircraft was inspected in accordance with the Rolls Royce 250 Inspection Program and determined to be in airworthy condition. <i>Next inspection due is a 100 hour at 6991.1</i>		
				Phillip Turner Kapp IA

Figure 34 - Most Recent Inspection Record that Included FAA-Required Mechanic Information