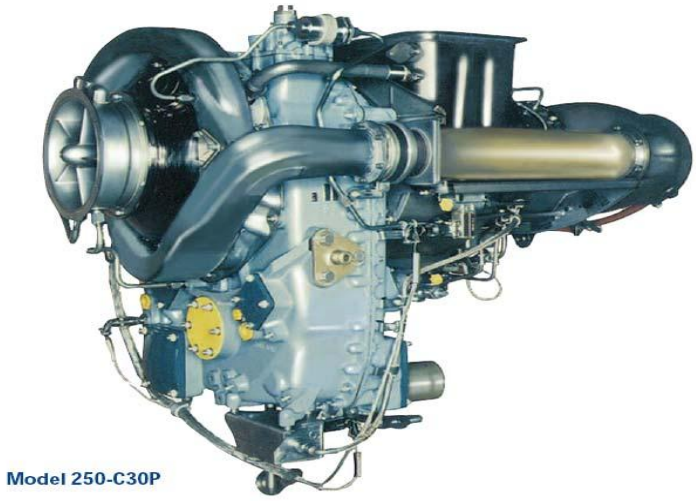
Rolls-Royce

Engine Investigation

Allison
Model 250-C30P
Engine CAE 890569

Bell 206 L-4
Registration: N57AW



Model 250-C30P

Cochise County Sheriff's Dept.
Benson, Arizona

[redacted]

David W. Riser
Air Safety Investigator

Accident date: December 31, 2014
Investigation date: January 1-3, 2015
Report date: January 9, 2015

Report Enclosures:

Report Narrative

Appendix A, Photographs On-Site

Appendix B, Photographs at Recovery Location

Appendix C, Photographs at Disassembly

Appendix D, Engine Records

Background Information:

On December 31, 2014 at approximately 1710 Mountain Standard Time a Bell 206 L-4 helicopter, N57AW was involved in an accident 7 miles west of Benson, Arizona. The commercial pilot and pilot rated mechanic were fatally injured when the helicopter collided with terrain and the helicopter was destroyed. The flight had been a positioning flight. The helicopter was registered to N57AW LLC, and operated by Airwest Helicopters under lease to Cochise County AZ. Sheriff's Department. Visual meteorological conditions prevailed for the flight, which operated on a company visual flight rules flight plan. The flight originated form Glendale, Arizona, at 1550, and was destined for Sierra Vista, Arizona.
The operator reported that the helicopter had not arrived at its destination and that the Sky Connect Tracking System indicated that the helicopter was at a stationary location between Tucson and Benson. The Cochise County Sheriff's Department located the helicopter wreckage about 2030 at the location the Sky Connect system was reporting. The helicopter was fragmented into multiple pieces along a 174-foot-long debris path. Witnesses living in the local area reported hearing a low flying helicopter around the time of the accident, and that the visibility at ground level was very limited, with low clouds and fog.

Airframe Observations on Site:

The airframe was completely fragmented over an approximate 180 foot debris path, and no cockpit crew occupiable space remained. Both main rotor blades had separated outboard of the doublers. One separated blade section was measured as 12 feet in length and the other blade section measured 8 feet in length. The main rotor blades exhibited leading edge bending and chordwise scratches. The tail rotor and gearbox separated from the tail boom. One blade on the tail rotor was absent half the blade with the other displaying both spanwise and chordwise bending. The tail rotor drive shaft remained with the tail boom. Both the forward end of the drive shaft and the tail rotor end of the drive shaft exhibited torsional overload separations. The main transmission remained attached to fuselage with transmission mount assembly. (Fig 1)

Engine Observations on Site:

The engine was located along with an aft section of airframe at the downstream end of the debris field resting against a tree. With the exception of several oil lines and some wiring the engine was separate from the airframe. All mounting arms had been fractured. The engine was resting on the ground in a generally upright position. The left side of the airframe exhaust stack as well as the left side of the exhaust collector support stack was crushed in a downward direction. The left side scroll and the left side compressor air discharge tube displayed denting and impact damage. Bending of four compressor impeller blades opposite direction of rotation was noted. The power turbine governor displayed a fracture of the after body at the split line. Other than some bending of engine lines from impact, externally the balance of the engine was in visually good condition. (Fig 2)

Engine Observations at Recovery:

The wreckage was recovered to Air Transport in Phoenix AZ for further examination. Other than damage noted on site, the compressor impeller was found to exhibit the blade tips and leading edges of at least four blades to have bending and deformation opposite the direction of rotation. Manual rotation of both the N1 and N2 drive trains at their respective tachometer generator drive pads revealed free rotation and continuity. N1 exhibited smooth rotation with N2 exhibiting a light drag. The engine was then prepared for movement to AeroMaritime for disassembly and further investigation. The freewheeling unit and other airframe components were removed prior to transport as were all engine fuel, oil and pneumatic lines. During removal all “B” nuts were found at least finger tight with no evidence of leakage. (Fig 3)

Engine Information:

An Allison M250-C30P gas turbine engine, S/N CAE 890569, powered the helicopter. Engine log records reflect the engine was installed on the air frame November 4, 2014 at 13453.6 ETT following 2000 hour compressor inspection, installation of an overhauled turbine and accessory gearbox.

Manufacturer	Allison
Engine Model	250-C30P
Rating:	650 Shaft Horsepower
Serial Number	CAE890569
Engine Total Hours	13547.2
Last 100-Hour Inspection	13547.2
Last 300-Hour inspection	13547.2

Component	Serial Number	Part Number	TSO	Total Time
Engine	CAE 890569	23004545		13547.2
Gearbox	CAG 90685	23053349	93.6	8749.8
Compressor	CAC 91925	23051643	4106.1	4106.1
Turbine	CAT 98196	23035128	93.6	3868.5
Fuel Control	87421462	23070613	2223.5	
Governor	BR40630	23070106	1356.7	
Fuel Pump	T-200838	6896822	1130.3	
Fuel Nozzle	1WN05923	23077067	57.0	57.0
Bleed Valve	FF36854	23073353	102.0	102.0

* All times are from last recorded flight and do not include the accident flight.

Engine Investigation:

Engine investigation and disassembly was conducted on January 3, 2015 at AeroMaritime in Mesa Arizona under the auspices of an NTSB investigator. The following represents the facts and findings of that investigation. (Fig 4)

Compressor Section:

Externally the compressor displayed minor impact damage to the outside left shoulder area of the scroll but was otherwise visually normal. Visual examination of the impeller revealed bending of four blades tips and outboard ends of the leading edges in the direction opposite of impeller rotation. Removal of the compressor from the engine revealed smooth and continuous rotation of the compressor during manual rotation by the spur adapter gear shaft. No further disassembly of the compressor was conducted. (Fig 5)

Accessory Gearbox Section:

The accessory gear box was not opened. No damage to the gear box was noted. Manual rotation of both N1 and N2 drive trains at the tachometer generator pads resulted in smooth and continuous gear rotation of both N1 and N2 drive trains through the gear box. (Fig 6)

Combustion Section:

The outer combustion case exhibited impact damage across the bottom surface. A small puncture hole was noted just forward of the combustor drain emanating from the outside inward. The combustor liner was in position and visually undamaged. Removal and examination of the combustor liner revealed it to be normal in appearance with no evidence of unusual streaking or thermal damage. Both left and right side compressor air discharge tubes were in position and properly seated. The left air tube exhibited impact denting along its length with the right side being visually normal. A light dirt coating was noted throughout both air discharge tubes and internally on both the outer combustion case and combustor liner. (Fig 7)

Turbine Section:

Both the gas producer and power turbine supports were visually normal and undamaged. The gas producer rotor was freely rotatable and undamaged. The power turbine rotor was easily rotatable but did exhibit a slight drag due to the impact damage sustained to the exhaust collector support causing an out of round condition in the blade track of the stage three and stage four wheels. (Fig 8) The turbine was separated from the exhaust collector support allowing visual access to the pressure side of the stage three wheel and the suction side of the stage three nozzle. Removal of the stage three nozzle allowed for visual examination of the suction side of the stage two wheel. Thermocouple harness probe tips revealed no evidence of over temperatures. Dirt adhesion was noted throughout the gas path across vane and blade surfaces with heavier amounts observed on the inside of the outer rim area of the stage three wheel. The stage three wheel was otherwise

visually normal and undamaged. The stage four nozzle was in position and undamaged. The stage three nozzle was undamaged but exhibited light spatter across vane surfaces. Coked oil was noted on the suction side near bore and outer rim areas. The stage one wheel and nozzle and the stage two wheel and nozzle were visually normal and exhibited no damage. (Fig 9)

Engine Shafting:

Examination of N1 shafting consisting of the turbine to compressor coupling and spur adapter gear shaft revealed both to have been properly seated, oil coated and visually normal in appearance. The power turbine to pinion gear coupling was in normal position, undamaged and oil coated. The power turbine rotor was not separated however both the power turbine inner shaft and power turbine outer shaft were in normal position and undamaged. (Fig 10)

Oil System and Engine Bearings:

Manual rotation of the N1 gear box drive train resulted in smooth rotation of the oil pump. The internal portion of the accessory was coated with clean oil. The piccolo tube was in position and undamaged. The #4 bearing oil nozzle was in proper position and visually undamaged.
The # 1 and #8 bearings were not removed but rotated freely during manual rotation. Engine bearings #2, 2 ½, 3, 4, 5 and 6, were all visually and tactilely examined. Each was found in proper position, oil coated with all balls and or rollers in position and undamaged. (Fig 11) Both the upper and lower chip detectors were void of metal. (Fig 12)

Fuel System:

Fuel system examination consisted of visual examination of the engine fuel pump and all associated engine fuel lines and visual examination of the fuel nozzle. The engine fuel pump was in position with no visible damage. At fuel pump removal the pump drive shaft was normal in appearance and undamaged. Removal of fuel lines at the fuel pump revealed fuel present in the lines. Removal of the fuel line between the check valve and fuel nozzle revealed fuel present in the line. The fuel nozzle was visually normal with no excessive carbon on the outer air shroud. (Fig 13)

Engine Accessories:

The fuel control unit was normal in appearance with no visible damage. Manual operation of the fuel control unit throttle arm resulted in full and smooth travel from stop to stop. The power turbine governor was fractured from impact at the at the split line forward of the after body and could not be actuated due to damage but was otherwise visually normal. (Fig 14)

Summary of Findings:

- During engine disassembly and examination, no pre accident damage or anomalies were discovered which would have precluded normal engine operation.

- Bending of compressor impeller blade leading edges and tips opposite direction of impeller rotation is consistent with engine operation during the accident.

- Dirt noted throughout the gas path and adhesion of dirt on and around turbine blade and vane surfaces is consistent with engine operation during the accident sequence.

- Torsional fracture of the tail rotor drive shaft is consistent with engine operation resulting from rotational tail rotor impact while being driven.

Appendix A,
Photographs On Site

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014

Fig 1

Fig 1 Cont

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014

Forward Fuselage / Main Rotor / Main Transmission

Engine to Main transmission Drive Shaft

Tail Boom

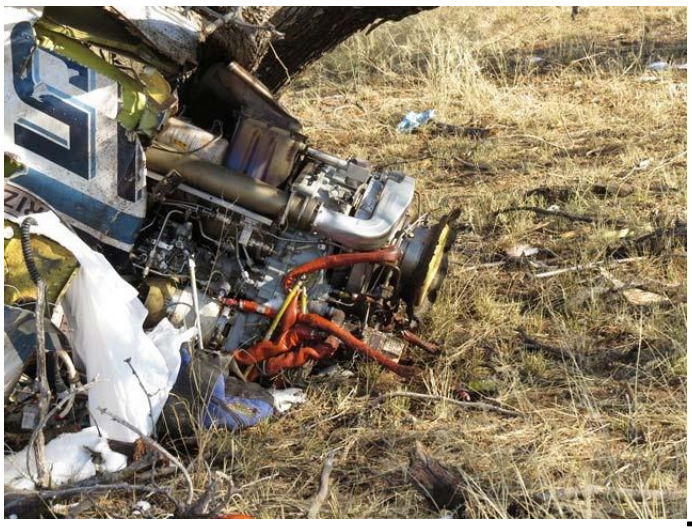
Tail Rotor Drive Shafting

Tail Rotor Gearbox and Tail Rotor Blades

(Return)

Fig 2

Engine on Site



(Return)

Appendix B,
Photographs at Recovery Location

Fig 3

Engine at Recovery

(Return)

Appendix C,
Disassembly Photographs

Fig 4

Engine as Received for Disassembly

(Return)

Fig 5

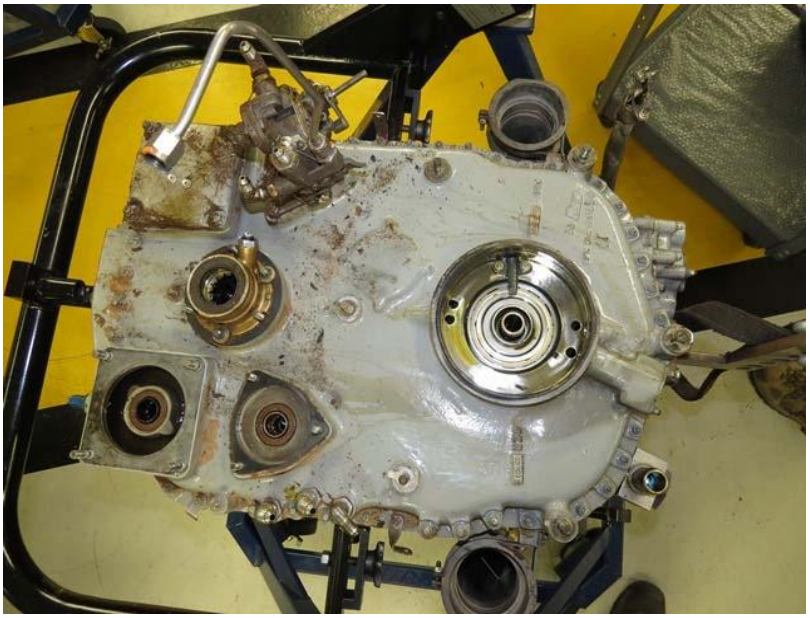
Compressor

Compressor Inlet / Impeller

Compressor Aft Side

(Return)

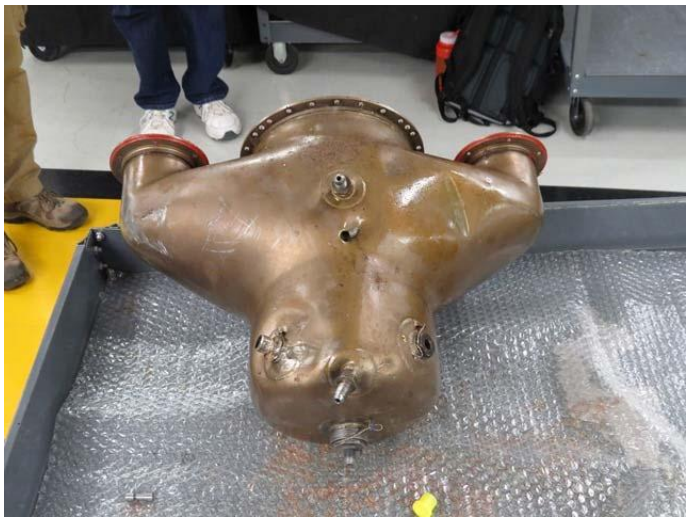
Fig 6

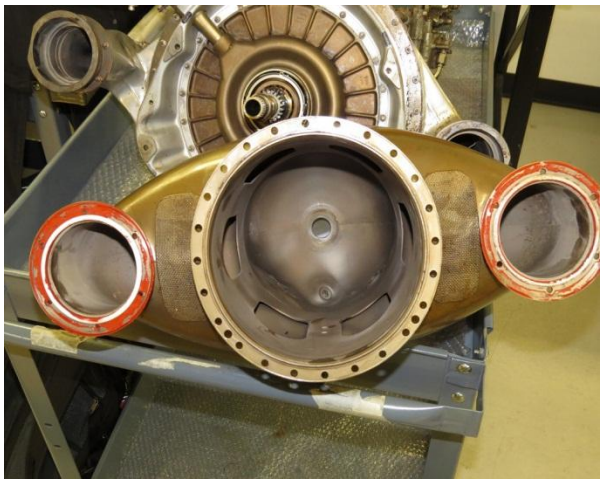


Accessory Gearbox

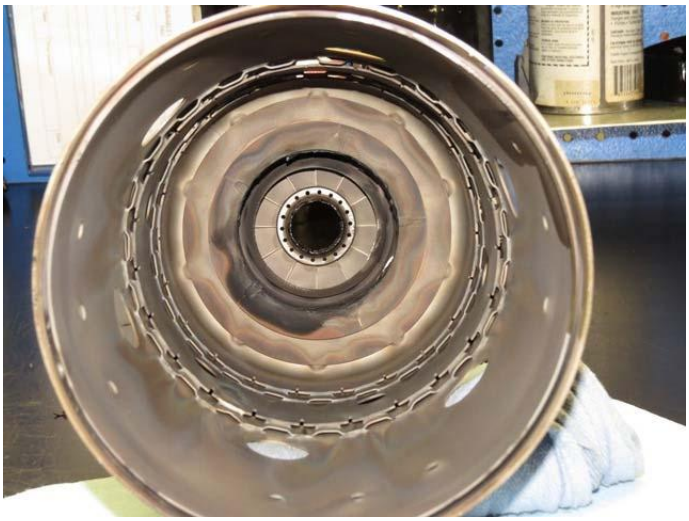
(Return)

Fig 7





Outer Combustion Case

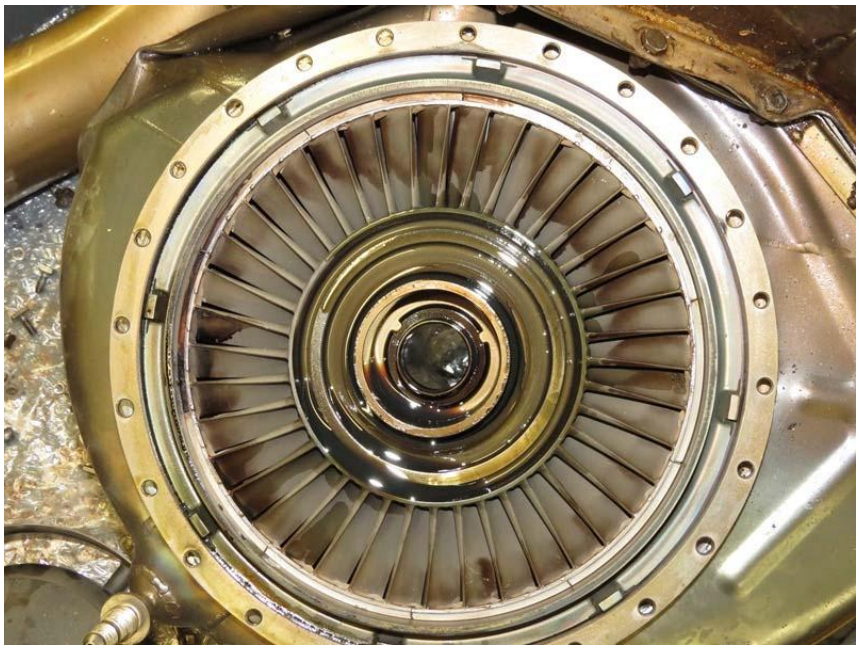


Combustor Liner

(Return)

Fig 8

Exhaust Collector Support Damage



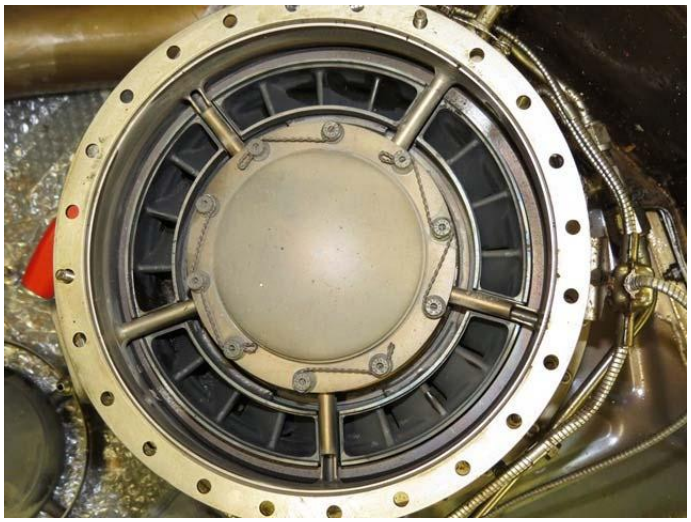
Power Turbine Rotor in Position inside exhaust Collector Support

(Return)

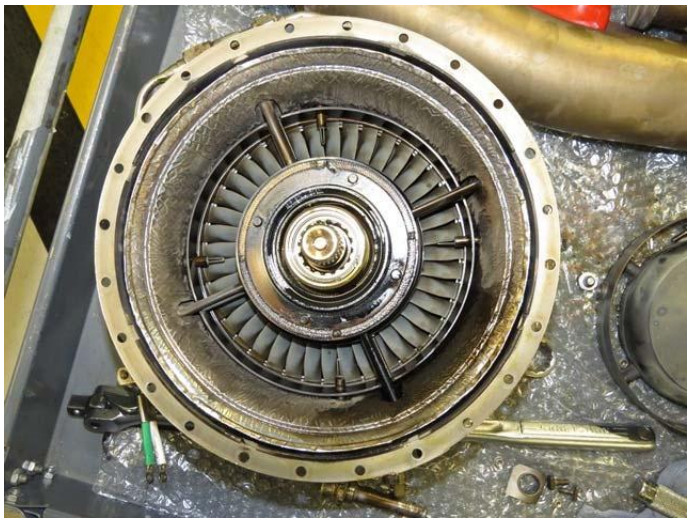
Fig 9

Stage Three Nozzle

Stage Three Wheel



Stage One Nozzle

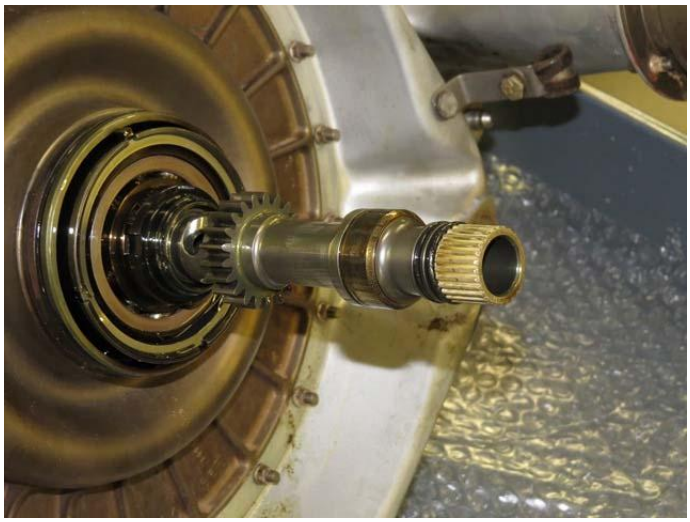


Stage Two Wheel

Thermocouple Probe

(Return)

Fig 10



Spur Adapter Gear Shaft on Position

Turbine to Compressor Coupling

Power Turbine to Pinion Gear Coupling

Aft End of Power Turbine Inner Shaft in Position

(Return)

Fig 11

Piccolo Tube and #2 ½ Bearing in Position

4 Bearing and #4 Bearing Oil Nozzle

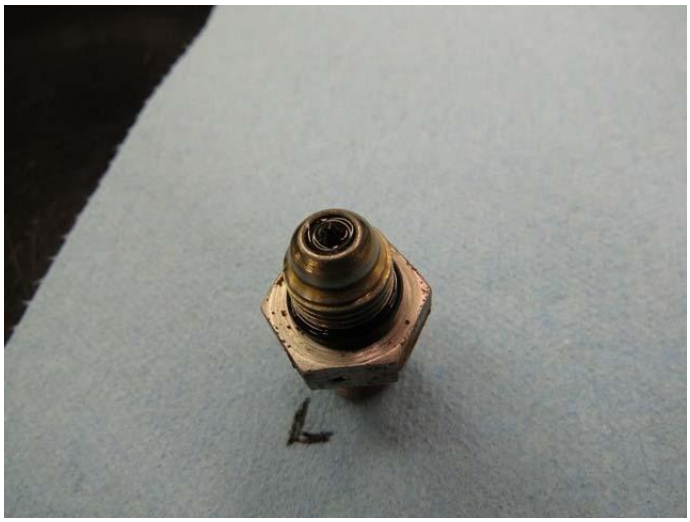
2 Bearing in Position

#6 Bearing in Position

(Return)

Fig 12

Upper Chip Detector



Lower Chip Detector

(Return)

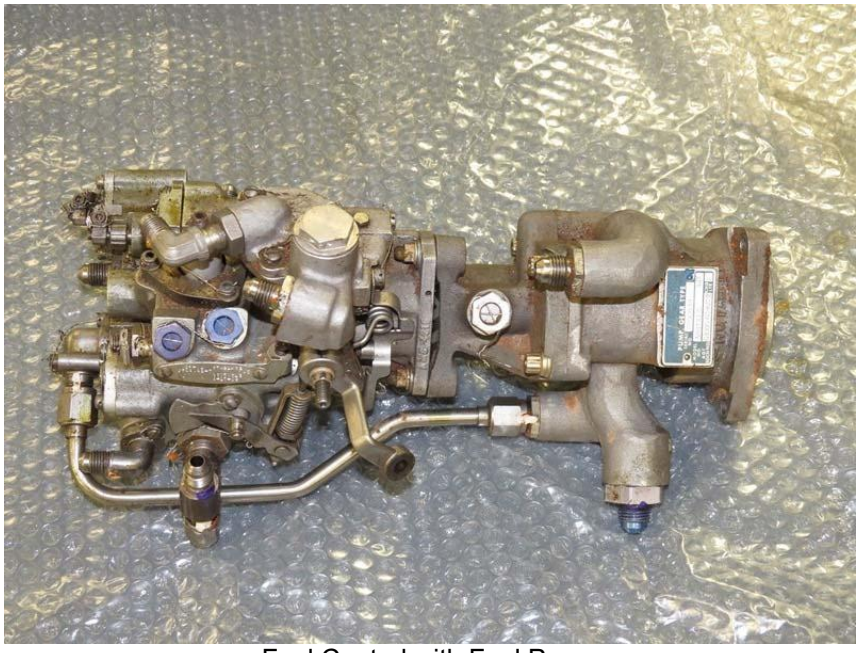
Fig 13

Fuel Pump

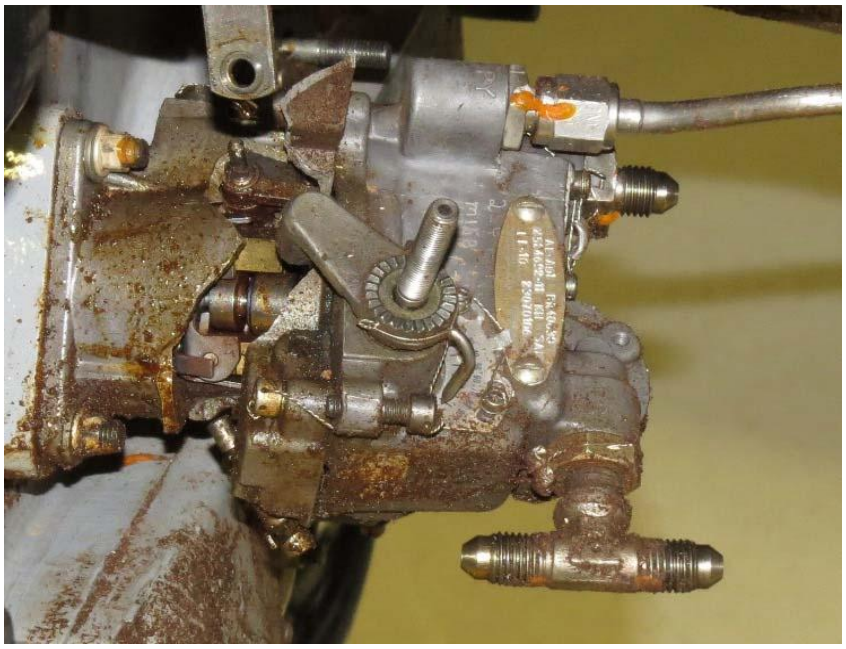
Fuel Nozzle

(Return)

Fig 14



Fuel Control with Fuel Pump



Power Turbine Governor

(Return)

Appendix D,
Selected Engine records

AIRCRAFT STATUS REPORT

N57AW 1/2/2015 1/2/2015

AIRWEST HELICOPTERS

MODEL: 206L-4 SERIAL NO. 52004

1992

	HOURS	CYCLES	RINS-T	RINS-M
NEW TOTAL TIME/CYCLES	8116.7	12220	30170	30170
OLD TOTAL TIME/CYCLES	7631.8			
FLIGHT HOURS/CYCLES	484.9			

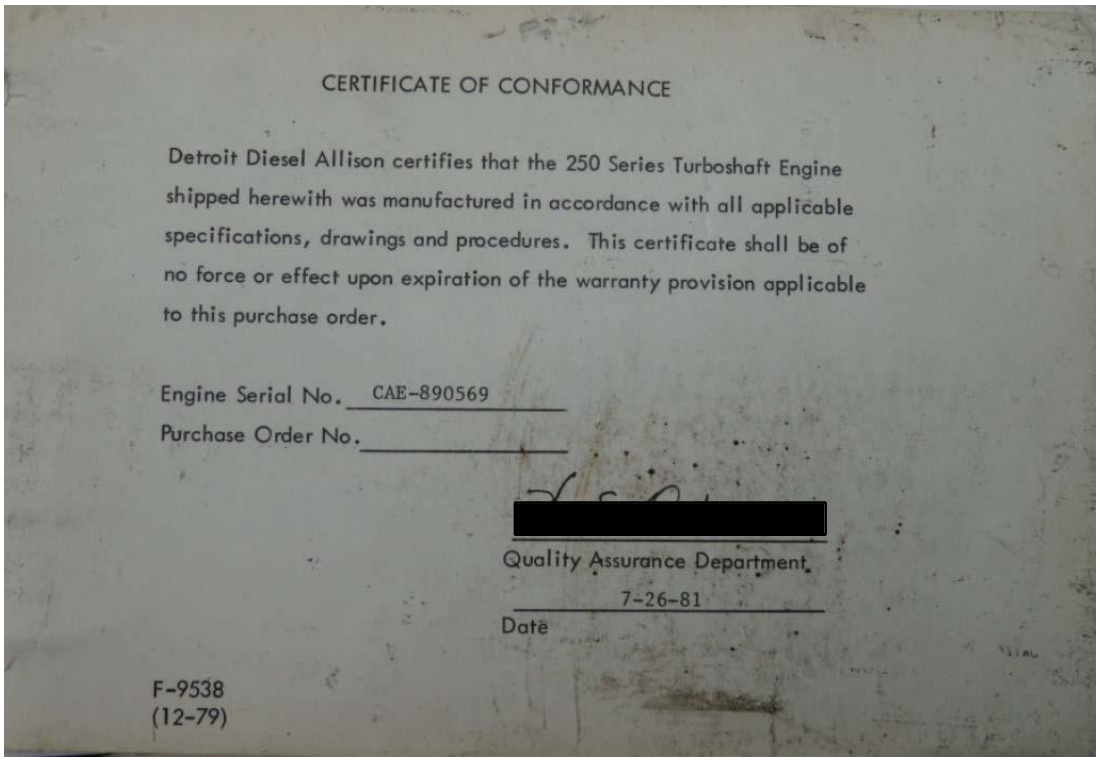
ENGINE HRS: 13547.2 HOBBS= 285.7

ENG-ACFT= 5430.5 A/C-Hobbs 7831.0

Remote Hook 162.1 Cargo Hook 438.6

DESCRIPTION	SERIAL NUMBER	PART NUMBER	TIME LIFE		COMPONENT TOTAL TIME	COMPONENT TSO/TSI	TIME TO OH/IN/RT	DUE AT A/C TT/CY/RIN	INSTALLED A/C TT/CY	COMP T.T. AT INSTL.	TSI/TSO AT INSTL.
SERVO, LH	RH-4178A	206-076-062-101FM	3600	OH	8081.6	936.7	2663.3	10780.0	7180.0	7144.9	0.0
SERVO, RH	RH-2785A	206-076-062-101FM	3600	OH	936.7	936.7	2663.3	10780.0	7180.0	0.0	0.0
CYCLIC EXT. TUBE, RH	A-8454	206-001-193-001	4800	RT	3378.4	3378.4	1421.6	9538.3	4738.3	0.0	0.0
CYCLIC EXT. TUBE, LH	A-8449	206-001-193-001	4800	RT	3378.4	3378.4	1421.6	9538.3	4738.3	0.0	0.0
START-GENERATOR	Y30060	23081-018	1000	OH	1665.5	751.6	248.4	8365.1	7725.7	1274.5	360.6
HYDR. PUMP	142627	206-076-030-117FM		OC					03/08/02	3465.1	0.0
						Engine					
ENGINE	CAE-890569S			OC	13547.2			O/C	8023.1	13453.6	1944.7
GEARBOX	CAG-90685	23053349		OC	8749.8	93.6		O/C	8023.1	8656.2	0.0
COMPRESSOR	CAC-91925	23051643		OC	4106.1	4106.1		O/C	8023.1	4012.5	4012.5
IMPELLER HOURS	DU94748	23076543	15000	RT	4106.1	4106.1	10893.9	19010.6	8023.1	4012.5	4012.5
IMPELLER FPI			12500	IN	4106.1	4106.1	8393.9	16510.6	8023.1	4012.5	4012.5
IMPELLER CYCLES			25000	RT	5506		19494	31714	12138	5424	5424
COMP ADPT. INSP.		CSL-A-3066	2000	IN	4106.1	93.6	1906.4	10023.1	8023.1	4012.5	0.0
COMB CASE AND LINER			2000	IN	2038.3	93.6	1906.4	10023.1	8023.1	1944.7	0.0
DISCHARGE TUBES			2000	IN	2038.3	93.6	1906.4	10023.1	8023.1	1944.7	0.0
TURBINE-OVERHAUL	CAT-98196	23035128	2000	OH	3868.5	93.6	1906.4	10023.1	8023.1	3774.9	0.0
1st ST. WHL. HRS	X618515	M250-10227	2025	RT	93.6	93.6	1931.4	10048.1	8023.1	0.0	0.0
1st ST. WHL. CYL			3000	RT	82		2918	15138	12138	0	0
2nd ST. WHL. HRS	X633116	M250-10658	2025	RT	93.6	93.6	1931.4	10048.1	8023.1	0.0	0.0
2nd ST. WHL. CYL			3000	RT	82		2918	15138	12138	0	0
3rd ST. WHL. HRS	X619988	6898663	4550	RT	93.6	93.6	4456.4	12573.1	8023.1	0.0	0.0
3rd ST. WHL. CYL			6000	RT	82		5918	18138	12138	0	0
4th ST. WHL. HRS	X632803	23066744	4550	RT	93.6	93.6	4456.4	12573.1	8023.1	0.0	0.0
4th ST. WHL. CYL			6000	RT	82		5918	18138	12138	0	0
BLEED VALVE	FF-36854	23073353	1500	OH	102.0	102.0	1398.0	9514.7	8023.1	8.4	8.4
FUEL PUMP	T 200838	6896822	3000	OH	1130.3	1130.3	1869.7	9986.4	8023.1	1036.7	1036.7
FUEL CONTROL	87421462	23070613	2500	OH	2223.5	2223.5	276.5	8393.2	8023.1	2129.9	2129.9
FILTER INSPECTION		73-20-02 PAR. 5.A.	2000	IN	318.2	318.2	1681.8	9798.5	8023.1	224.6	224.6
FUEL NOZZLE	1WN05923	23077067	2000	OH	57.0	57.0	1943.0	10059.7	8059.7	0.0	0.0
GOVERNOR	BR 40630	23070106	2000	OH	1356.7	1356.7	643.3	8760.0	8023.1	1263.1	1263.1
						Inspections					
AD 2013-25-10	1/31/2014	Tailboom Fitting	100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
FUEL NOZZLE			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI BAG FLOOR PROTECTOR			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI BAG WALL PROTECTOR			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI CABIN FLOOR PROTECT.			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI CYC-COLL COVERS			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI DOOR OPENERS			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI FOLDING STEPS			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI HAT RACK NET			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI LOCKING FUEL CAP			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI SKID TUBES			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI SPACEMAKER			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI STEP HANDLES			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
AAI WINDOWS			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
BRISTOL WIRE STRIKE			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
CARGO MIRROR			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0
DART HEATER-DEFROST			100	IN	0.0	0.0	100.0	8216.7	8116.7	0.0	0.0

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014



CERTIFICATE OF CONFORMANCE

Detroit Diesel Allison certifies that the 250 Series Turboshaft Engine shipped herewith was manufactured in accordance with all applicable specifications, drawings and procedures. This certificate shall be of no force or effect upon expiration of the warranty provision applicable to this purchase order.

Engine Serial No. CAE-890569

Purchase Order No. _____

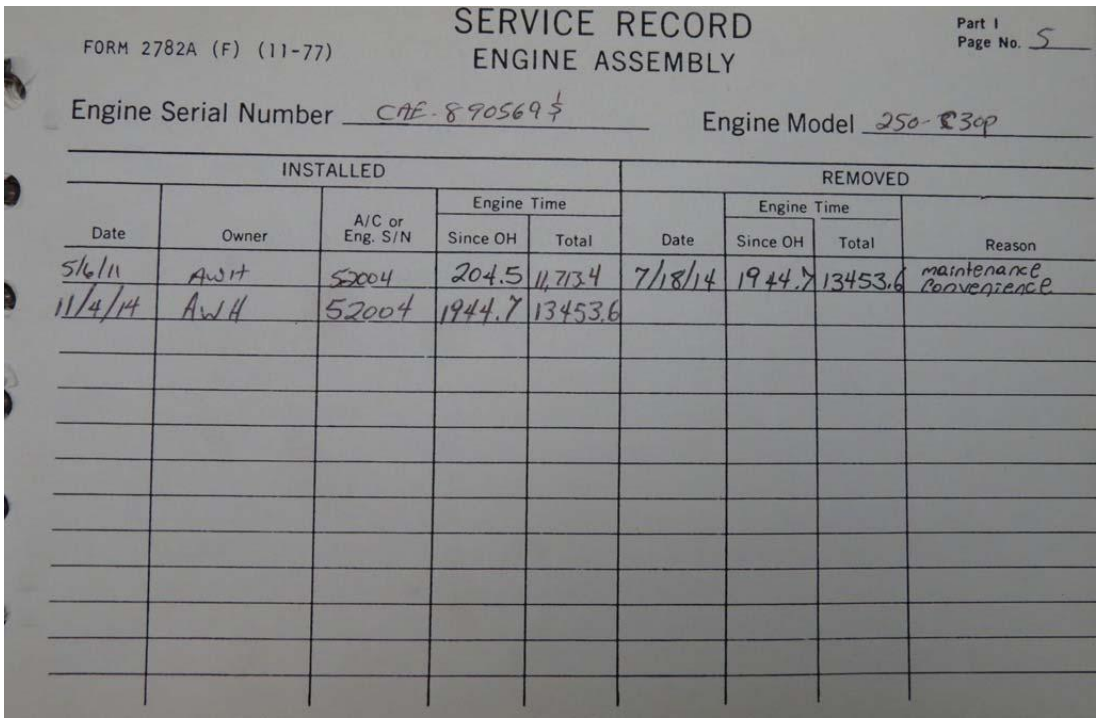
[redacted]

Quality Assurance Department

7-26-81

Date

F-9538
(12-79)



FORM 2782A (F) (11-77)

SERVICE RECORD
ENGINE ASSEMBLY

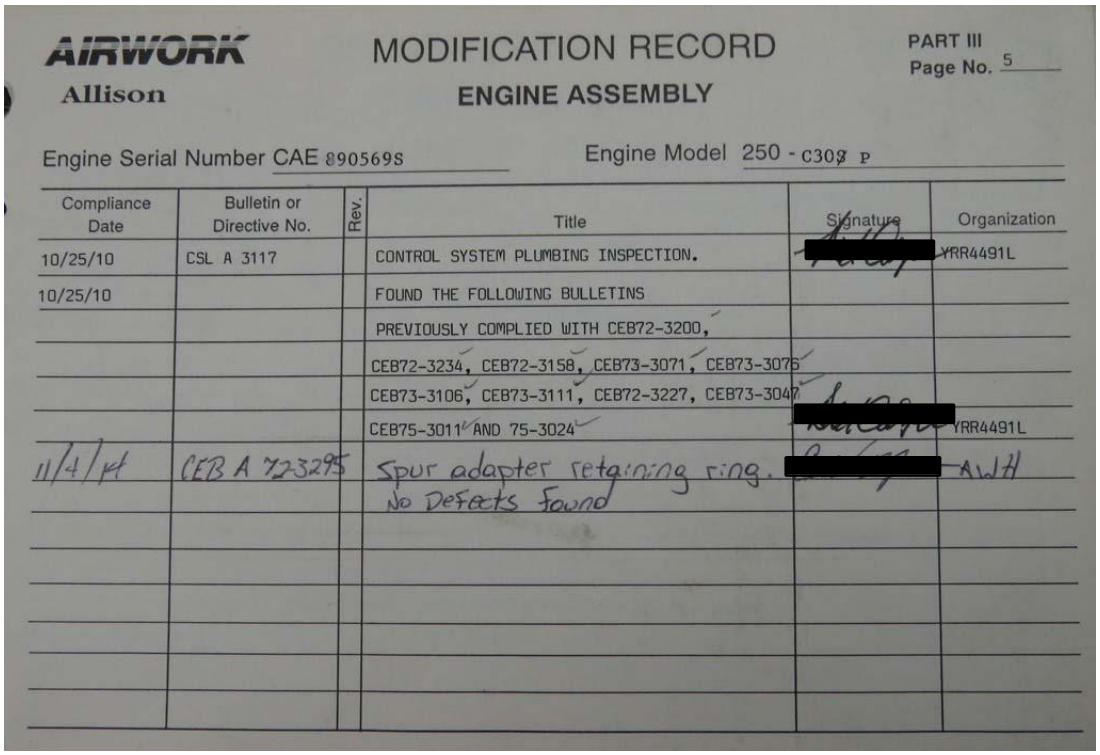
Part I
Page No. 5

Engine Serial Number CAE-890569

Engine Model 250-C30P

INSTALLED					REMOVED			
			Engine Time			Engine Time		
Date	Owner	A/C or Eng. S/N	Since OH	Total	Date	Since OH	Total	Reason
5/6/11	AWH	52004	204.5	11,713.4	7/18/14	1944.7	13453.6	maintenance convenience
11/4/14	AWH	52004	1944.7	13453.6				

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014



AIRWORK

Allison

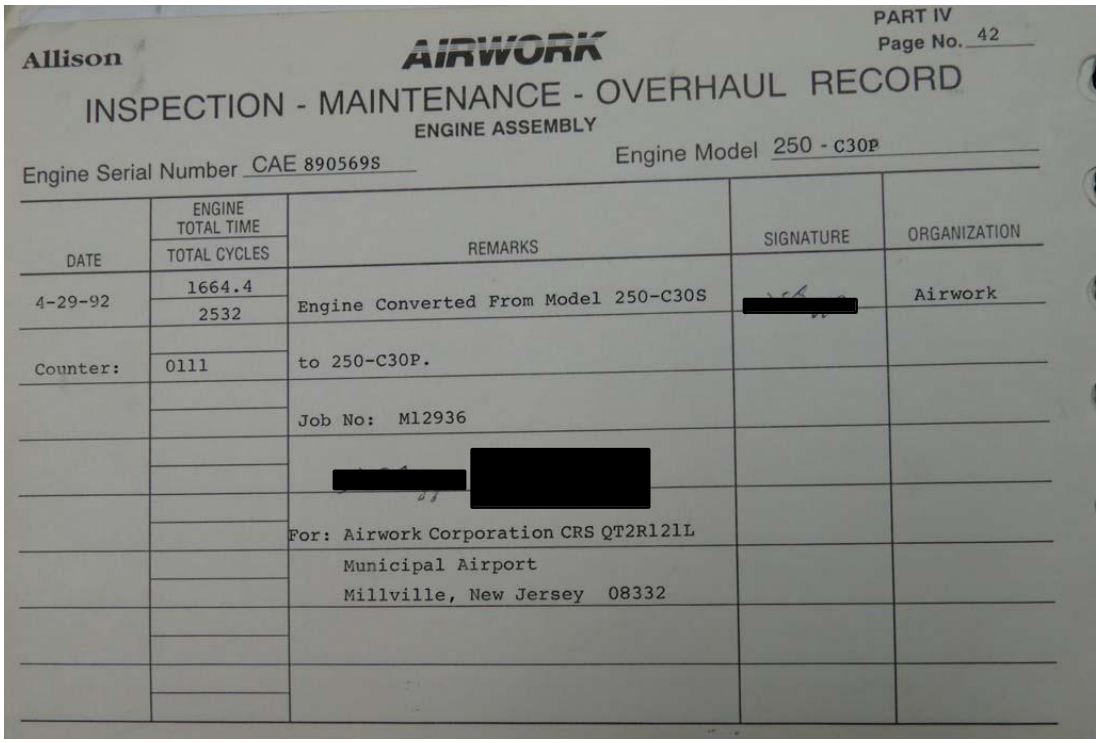
MODIFICATION RECORD

ENGINE ASSEMBLY

PART III
Page No. 5

Engine Serial Number CAE 890569S Engine Model 250 - C30S P

Compliance Date	Bulletin or Directive No.	Rev.	Title	Signature	Organization
10/25/10	CSL A 3117		CONTROL SYSTEM PLUMBING INSPECTION.	[redacted]	YRR4491L
10/25/10			FOUND THE FOLLOWING BULLETINS		
			PREVIOUSLY COMPLIED WITH CEB72-3200,		
			CEB72-3234, CEB72-3158, CEB73-3071, CEB73-3075		
			CEB73-3106, CEB73-3111, CEB72-3227, CEB73-3047	[redacted]	
			CEB75-3011 AND 75-3024		YRR4491L
11/4/04	CEB A 723295		Spur adapter retaining ring. No Defects found	[redacted]	AWH



Allison

AIRWORK

PART IV
Page No. 42

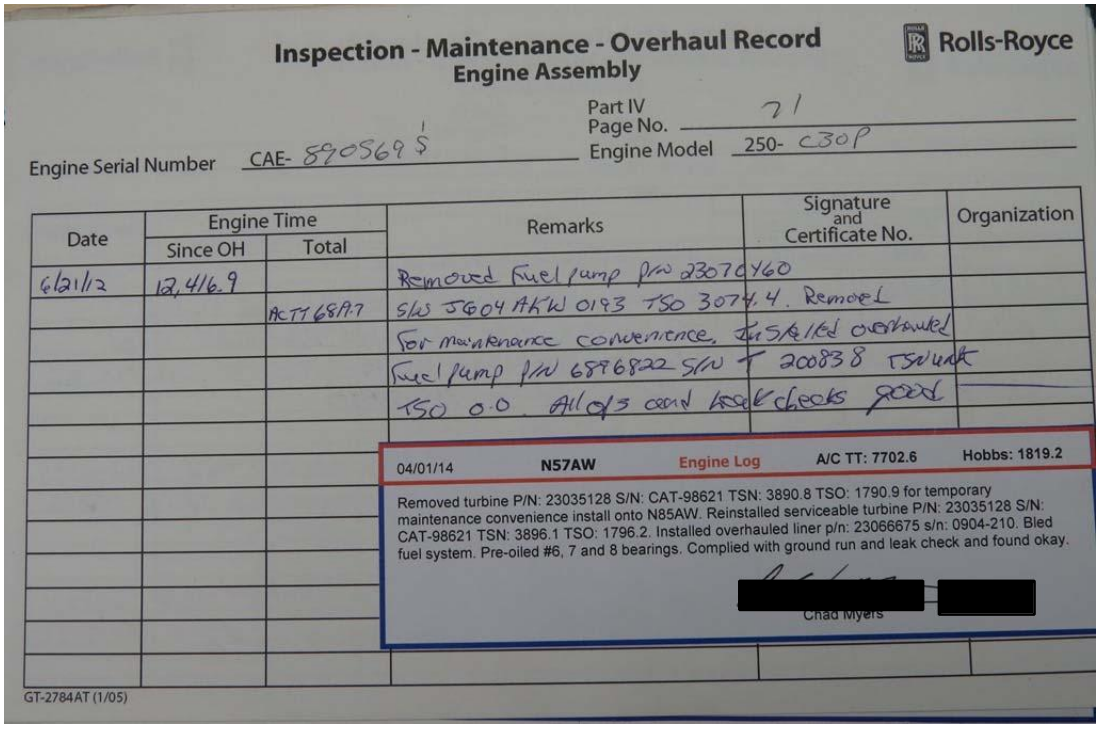
INSPECTION - MAINTENANCE - OVERHAUL RECORD

ENGINE ASSEMBLY

Engine Serial Number CAE 890569S Engine Model 250 - C30P

DATE	ENGINE TOTAL TIME / TOTAL CYCLES	REMARKS	SIGNATURE	ORGANIZATION
4-29-92	1664.4 / 2532	Engine Converted From Model 250-C30S	[redacted]	Airwork
Counter:	0111	to 250-C30P.		
		Job No: M12936		
		[redacted]		
		For: Airwork Corporation CRS QT2R121L		
		Municipal Airport		
		Millville, New Jersey 08332		

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014



Inspection - Maintenance - Overhaul Record
Engine Assembly

Rolls-Royce

Part IV Page No. 71

Engine Serial Number CAE- 890569 5 Engine Model 250- C30P

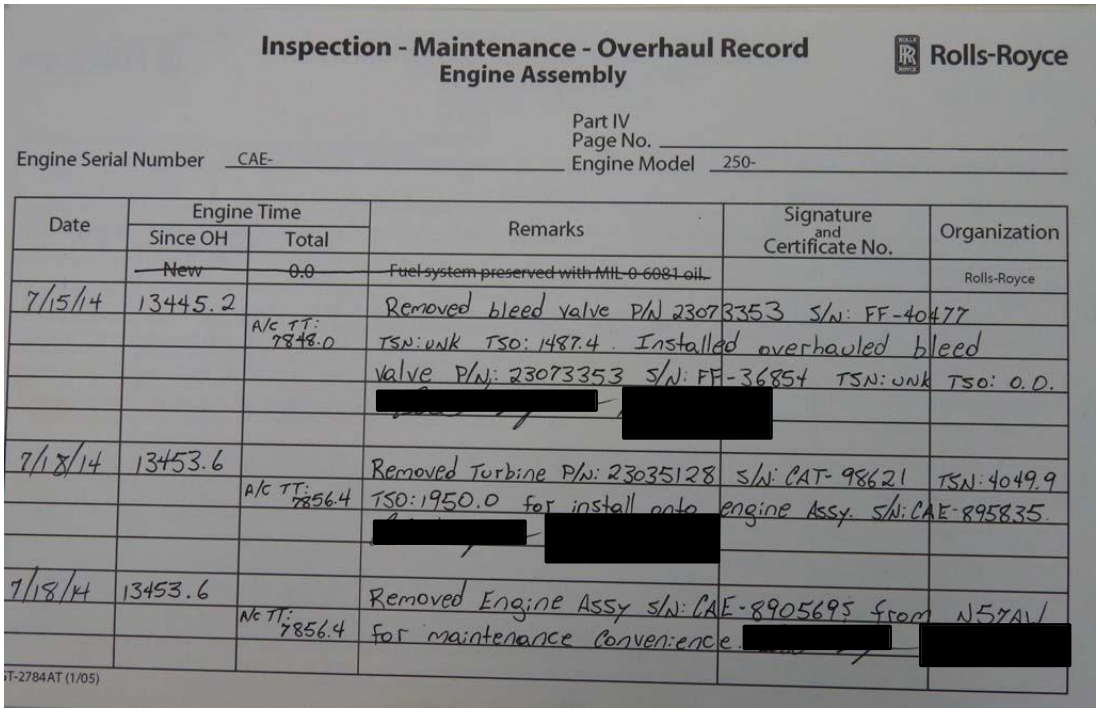
Date	Engine Time Since OH	Engine Time Total	Remarks	Signature and Certificate No.	Organization
6/21/12	12,416.9		Removed fuel pump P/N 23070460		
		AC TT 6817	S/N JG04AKW 0193 TSO 3074.4. Removed		
			for maintenance convenience. Installed overhauled		
			fuel pump P/N 6896822 S/N T 20083 8 TSO unkt		
			TSO 0.0. All o/s and leak checks good		

04/01/14 **N57AW** **Engine Log** **A/C TT: 7702.6** **Hobbs: 1819.2**

Removed turbine P/N: 23035128 S/N: CAT-98621 TSN: 3890.8 TSO: 1790.9 for temporary maintenance convenience install onto N85AW. Reinstalled serviceable turbine P/N: 23035128 S/N: CAT-98621 TSN: 3896.1 TSO: 1796.2. Installed overhauled liner p/n: 23066675 s/n: 0904-210. Bled fuel system. Pre-oiled #6, 7 and 8 bearings. Complied with ground run and leak check and found okay.

[redacted] [redacted]
Chad Myers

GT-2784AT (1/05)



Inspection - Maintenance - Overhaul Record
Engine Assembly

Rolls-Royce

Part IV Page No.

Engine Serial Number CAE- Engine Model 250-

Date	Engine Time Since OH	Engine Time Total	Remarks	Signature and Certificate No.	Organization
	~~New~~	~~0.0~~	~~Fuel system preserved with MIL-0 6081 oil.~~		Rolls-Royce
7/15/14	13445.2		Removed bleed valve P/N 23073353 S/N: FF-40477		
		A/C TT: 7848.0	TSN: unk TSO: 1487.4. Installed overhauled bleed		
			valve P/N: 23073353 S/N: FF-36854 TSN: unk TSO: 0.0.		
			[redacted] [redacted]		
7/18/14	13453.6		Removed Turbine P/N: 23035128 S/N: CAT-98621 TSN: 4049.9		
		A/C TT: 7856.4	TSO: 1950.0 for install onto engine Assy. S/N: CAE-895835.		
			[redacted] [redacted]		
7/18/14	13453.6		Removed Engine Assy S/N: CAE-8905695 from N57AW		
		A/C TT: 7856.4	for maintenance Convenience. [redacted] [redacted]		

GT-2784AT (1/05)

Inspection - Maintenance - Overhaul Record
Engine Assembly

Rolls-Royce

Part IV
Page No. _____

Engine Serial Number CAE- _____ Engine Model 250- _____

Date	Engine Time		Remarks	Signature and Certificate No.	Organization
	Since OH	Total			
7/18/14	13453.6		Removed gearbox P/N: 23053349 S/N: CAG-90120 TSN: 8401.8 TSO:		
		N/C TT: 7856.4	new for leaking mating surface at turbine. Installed		
			overhauled Gearbox P/N: 23053349 S/N: CAG-90685 TSN: 8656.2		
			TSO: 0.0 Removed Compressor P/N: 23051643 S/N: CAC-91925		
			TSN: 4012.5 TSO: 1944.7 and sent to Aero Maritime for 2000		
			hour inspection. Reinstalled Compressor P/N: 23051643 S/N: CAC-91925		
			TSN: 4012.5 TSO: new.		

11/04/14 Cycles: 12138 **N57AW** Engine Log A/C TT: 8023.1 Hobbs: 192.1

Removed engine assembly S/N: CAE-895431 TSN: 6886.6 TSO: 312.2 CSN: 15186 CSO: 216. Installed serviceable engine assembly s/n: CAE-890569S TSN: 13453.6 TSO: 1944.7 with overhauled gear box p/n: 23053349 s/n: CAG-90685 TSN: 8656.2 TSO: 0.0, repaired compressor p/n: 23051643 s/n:CAC-91925 TSN: 4012.5 TSO: 4012.5 and overhauled turbine p/n: 23035128 s/n: CAT-98196 TSN: 3774.9 TSO: 0.0. Bled fuel system. Pre-oiled #6,7 and 8 bearings. Adjusted idle and governor beep range. Ground run and leak check good.

[redacted] [redacted]
Tyler Evans

GT-2784AT (1/05)

Inspection - Maintenance - Overhaul Record
Engine Assembly

Rolls-Royce

Part IV
Page No. _____

Engine Serial Number CAE- _____ Engine Model 250- _____

Date	Engine Time		Remarks	Signature and Certificate No.	Organization
	Since OH	Total			
	New	0.0	Fuel system preserved with MIL-0-6081 oil.		Rolls-Royce
11/24/14			Removed fuel Nozzle P/N: 23077067 S/N: AC42399 TSN: UNK TSO: 1981.3		
	13490.2		Installed overhauled Fuel Nozzle P/N: 23077067 S/N: 1W05923		
		A/C TT: 8059.7	TSN: UNK TSO: 0.0 Bled fuel System, OPS & leak Check		
			good. [redacted] [redacted]		

GT-2784AT (1/05)

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014

Dallas Airmotive

COMPONENT INSTALLATION / REMOVAL RECORD

ENGINE ASSEMBLY

Part V
Page No. ________

Engine Serial Number CAE - 890569 Model 1884.2 1261.8 250 C30P

Component	Part Number Serial Number	Installed Date	Engine TSN CSN	Component TSN TSO	Removed Date	Engine TSN CSN	Component TSN TSO	Reason
Bleed Valve	23073353 FF 50176	11/03/10	11508.9 10281	UNK 1884.2	7/28/11	11,957.4 10624	UNK 1560.3	overhaul
Fuel control	23070613 87421462	11/04/10	11508.9 10281	UNK 185.2				
Bleed Valve	23073353 FF 40477	8/28/11	11,952.4 10624	UNK 0.0	7/15/14	13445.2 11995	UNK 1487.4	overhaul
Governor	23070106 BR 40630	02/15/12	12,190.5 10872	UNK 0.0				
Fuel pump	23070960 JG04AKW0185	04/23/12	12,333.3 10943	2990.8 new	06/21/12	12,416.9 11077	3074.4 NEW	maintenance convenience
Fuel pump	6896822 T 200838	06/21/12	12,416.9 11077	UNK 0.0				
Bleed valve	23073353 FF-36854	7/15/14	13445.2 11995	UNK 0.0				
Turbine	23035128 CAT-98621	4/1/14	13299.8 11811	3896.1 1796.2	7/18/14	13453.6 11973	4049.9 1950.0	maintenance convenience
Gearbox	23053349 CAG-90685	7/18/14	13453.6 11963	8656.2 0.0				
Compressor	23051643 CAC-91925	8/20/14	13453.6 11963	4012.5 NEW				
Turbine	23035128 CAT-98196	10/28/14	13453.6 11963	3774.9 0.0				
Fuel Nozzle	23077067 1WN05923	11/24/14	13490.2 12159	UNK 0.0				

DTP / RE: 100-004 R2

Service Accessory Record

Rolls-Royce

Nomenclature P.T. GOVERNOR
Component Serial Number BR 40630

Part I
Page No. 1
Engine Model 250- C30

Installed					Removed				
			Accessory Time				Accessory Time		
Date	Engine S/N	Engine TT	Since OH	Total	Date	Engine TT	Since OH	Total	Reason
02/15/12	CAE 890569	12,190.5	0.0	UNK					

GT-11778(F) 7/03

Service Accessory Record

Rolls-Royce

Nomenclature Bleed Valve ~~2305366~~ Part I Page No. ~~1~~

Component serial number FF36854 Engine Model 250- ~~C30~~B

Installed					Removed			
Date	Engine S/N	A/C S/N Reg. #	Accy. Time Since OH	Accy. Time Total	Date	Accy. Time Since OH	Accy. Time Total	Reason
9-22-05	844031	~~#49014~~ N30090	New	0.0	16 JAN 14	1170.8	UNKN	POWER LOST
7/15/14	CAE 890569$	52004 N57AW	0.0	UNK				

GT-11778(F) 5/00

Service Accessory Record

Rolls-Royce

Nomenclature FCU Part I Page No.

Component Serial Number 8742462 Engine Model 250-

Installed					Removed			
Date	Engine S/N	A/C S/N Reg.No.	Accessory Time Since OH	Accessory Time Total	Date	Accessory Time Since OH	Accessory Time Total	Reason
8-19-09	CAE-895790	52115 N73AW	New	0.0	03/22/10	NEW	105.2	Install on CAE-890569$
3/23/10	CAE-890569$	45261 N85AW	NEW	105.2	5/17/10 TSO 175.7 Ag 22796	~~NEW~~ ~~175.7~~ 80.110	UNK ~~175.7~~	DAI CONVENIENCE
08/17/10	CAE-895790	52115 N73AW	175.7	UNK	11/04/10	185.2	UNK	Convenience
11/04/10	CAE-890569$	45261 N85AW	185.2	UNK				

GT-11778T (F) 5/00

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014

Service Accessory Record

Nomenclature: Fuel Nozzle — Part I Page No. 1

Component serial number: 1NN05923 — Engine Model: 250- C30

Installed					Removed			
Date	Engine S/N	A/C S/N Reg. #	Accy. Time Since OH	Accy. Time Total	Date	Accy. Time Since OH	Accy. Time Total	Reason
11/24/14	CAE-890569$	52004 57AW			7/30/14	UNK	UNK	Overhaul
11/24/14	CAE-890569$	52004 57AW	0.0	UNK				

SERVICE RECORD
COMPRESSOR ASSEMBLY

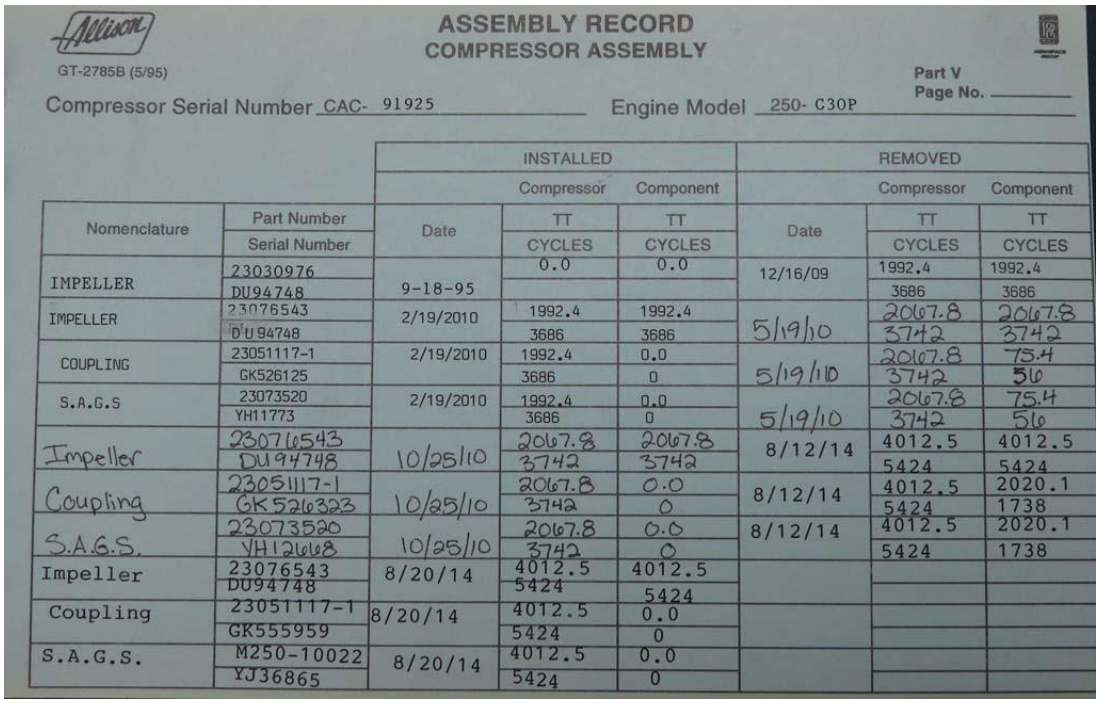
Allison F-2782BT (F)

Part I Page No.

Compressor Serial Number: CAC- 91925 — Engine Model: 250- C30P

	INSTALLED		REMOVED		
Aircraft S/N / Engine S/N	Date	TT TSO	Date	TT TSO	Reason
CAE-895835	9-18-95	0.0 NEW	12-15-09	1992.4	2000 Hour Inspection
CAE-890569$	03-08-10	1992.4 NEW	5/19/10	2067.8 NEW	Inspection
CAE-890569S	10/25/10	2067.8 NEW	7/18/14	4012.5 1944.7	2000 Hour Inspection
CAE-890569$	8/20/14	4012.5 New			

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014



Allison

GT-2785B (5/95)

ASSEMBLY RECORD
COMPRESSOR ASSEMBLY

Part V
Page No. _____

Compressor Serial Number CAC- 91925 Engine Model 250- C30P

Nomenclature	Part Number / Serial Number	INSTALLED Date	INSTALLED Compressor TT CYCLES	INSTALLED Component TT CYCLES	REMOVED Date	REMOVED Compressor TT CYCLES	REMOVED Component TT CYCLES
IMPELLER	23030976 / DU94748	9-18-95	0.0	0.0	12/16/09	1992.4 / 3686	1992.4 / 3686
IMPELLER	23076543 / DU94748	2/19/2010	1992.4 / 3686	1992.4 / 3686	5/19/10	2067.8 / 3742	2067.8 / 3742
COUPLING	23051117-1 / GK526125	2/19/2010	1992.4 / 3686	0.0 / 0	5/19/10	2067.8 / 3742	75.4 / 56
S.A.G.S	23073520 / YH11773	2/19/2010	1992.4 / 3686	0.0 / 0	5/19/10	2067.8 / 3742	75.4 / 56
Impeller	23076543 / DU94748	10/25/10	2067.8 / 3742	2067.8 / 3742	8/12/14	4012.5 / 5424	4012.5 / 5424
Coupling	23051117-1 / GK526323	10/25/10	2067.8 / 3742	0.0 / 0	8/12/14	4012.5 / 5424	2020.1 / 1738
S.A.G.S.	23073520 / YH12668	10/25/10	2067.8 / 3742	0.0 / 0	8/12/14	4012.5 / 5424	2020.1 / 1738
Impeller	23076543 / DU94748	8/20/14	4012.5 / 5424	4012.5 / 5424			
Coupling	23051117-1 / GK555959	8/20/14	4012.5 / 5424	0.0 / 0			
S.A.G.S.	M250-10022 / YJ36865	8/20/14	4012.5 / 5424	0.0 / 0			

Allison

F-2784C (5/95)

INSPECTION - MAINTENANCE - OVERHAUL RECORD
COMPRESSOR ASSEMBLY

Part IV
Page No. _____

Compressor Serial Number CAC- 91925 Engine Model 250- C30P

Date	Compressor Time Since OH	Compressor Time Total	Remarks	Signature and Certificate No.	Organization

4927 East Falcon Drive
Mesa, Arizona USA 85215
480-830-7780
www.aeromarusa.com

AEROMARITIME ITP GROUP

Engine Model: RR M250-C30P
Item Serial #: CAC-91925
TSO : New TT : 4012.5
CSO : New TC : 5424

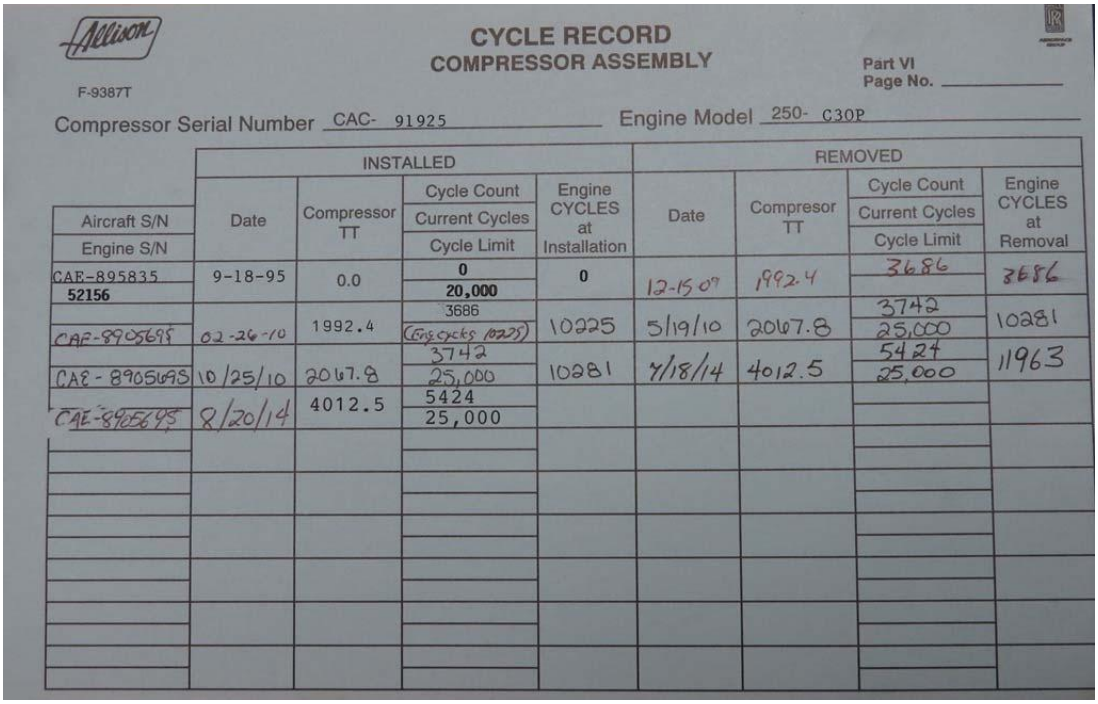
Compressor Moduel repaired for rub and carbon seal leak. #1 carbon seal replaced along with mating ring seal. Compressor 2000 hour inspection complied with. All work performed in accordance with Rolls-Royce 14W2 and 14W3 Specs.

This certifies that the work requested by the customer and described on the work order listed below was accomplished and inspected with reference to instructions for continued airworthiness, other data acceptable to the FAA and current FAA regulations, and with respect to the work performed, is approved for return to service. Pertinent details of this repair are on file at this FAA Certified Repair Station. AeroMaritime America Incorporated CRS# XZNR915L

Date: 8/20/2014 W/O# 19525 Signed [redacted]

Kevin Driscoll

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014



Allison

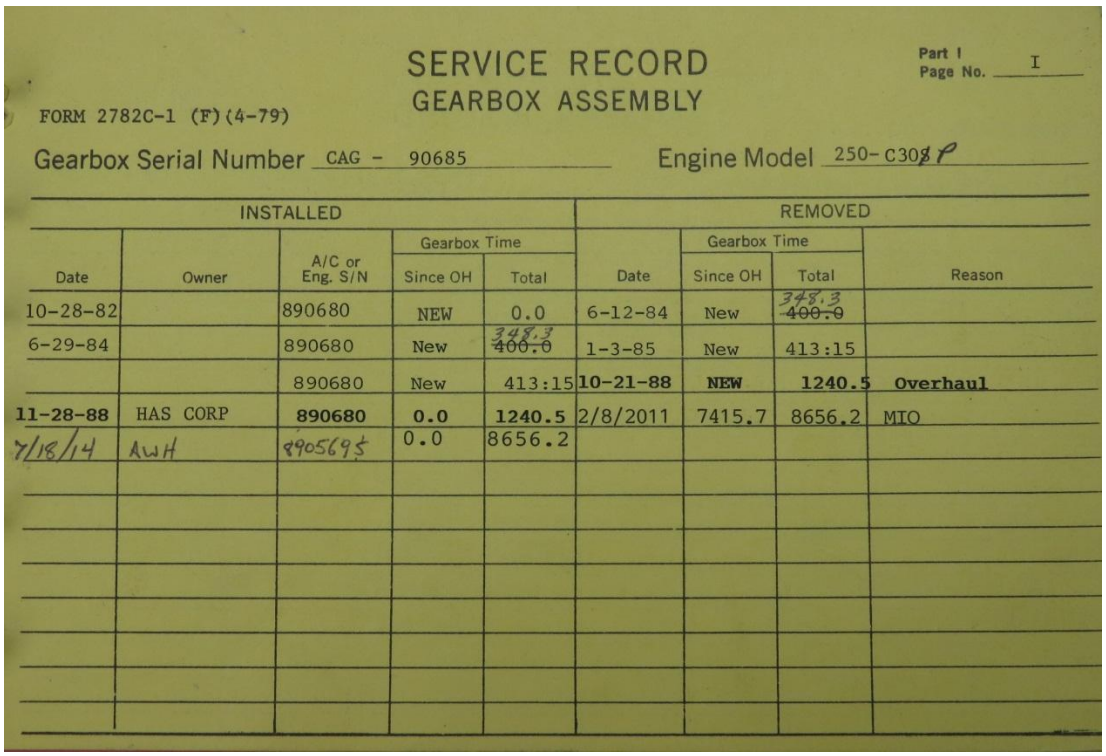
F-9387T

CYCLE RECORD
COMPRESSOR ASSEMBLY

Part VI
Page No. _____

Compressor Serial Number CAC- 91925 Engine Model 250- C30P

	INSTALLED				REMOVED			
Aircraft S/N / Engine S/N	Date	Compressor TT	Cycle Count: Current Cycles / Cycle Limit	Engine CYCLES at Installation	Date	Compresor TT	Cycle Count: Current Cycles / Cycle Limit	Engine CYCLES at Removal
CAE-895835 / 52156	9-18-95	0.0	0 / 20,000	0	12-15-09	1992.4	3686	3686
CAE-8905695	02-26-10	1992.4	3686 (Engine cycles 10225)	10225	5/19/10	2067.8	3742 / 25,000	10281
CAE-8905695	10/25/10	2067.8	3742 / 25,000	10281	7/18/14	4012.5	5424 / 25,000	11963
CAE-8905695	8/20/14	4012.5	5424 / 25,000					



SERVICE RECORD
GEARBOX ASSEMBLY

Part I
Page No. I

FORM 2782C-1 (F)(4-79)

Gearbox Serial Number CAG - 90685 Engine Model 250-C30P

			INSTALLED			REMOVED			
			Gearbox Time			Gearbox Time		
Date	Owner	A/C or Eng. S/N	Since OH	Total	Date	Since OH	Total	Reason
10-28-82		890680	NEW	0.0	6-12-84	New	~~400.0~~ 348.3	
6-29-84		890680	New	~~400.0~~ 348.3	1-3-85	New	413:15	
		890680	New	413:15	**10-21-88**	**NEW**	**1240.5**	**Overhaul**
11-28-88	HAS CORP	**890680**	**0.0**	**1240.5**	2/8/2011	7415.7	8656.2	MIO
7/18/14	AWH	8905695	0.0	8656.2				

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014

Part I
Page No. _____

SERVICE RECORD
TURBINE ASSEMBLY

GT 2782D-1 (9-83)

Turbine Serial Number CAT- 98196 Engine Model 250- C30P

INSTALLED					REMOVED			
			Turbine Time			Turbine Time		
Date	Owner	A/C or Eng. S/N	Since OH	Total	Date	Since OH	Total	Reason
10-30-94		895790	NEW	0.0	8-4-08	unk	1992.7	overhaul
10-24-08	AWH	895790	0.0	1992.7	4-16-13	1430.0	3422.7	wheel Rub
10-05-13	AMS	895695	1430.0	3422.7	7-16-14	1782.2	3774.9	Cycles
11/4/14	AWH	890569	3774.9	0.0				

Part IV
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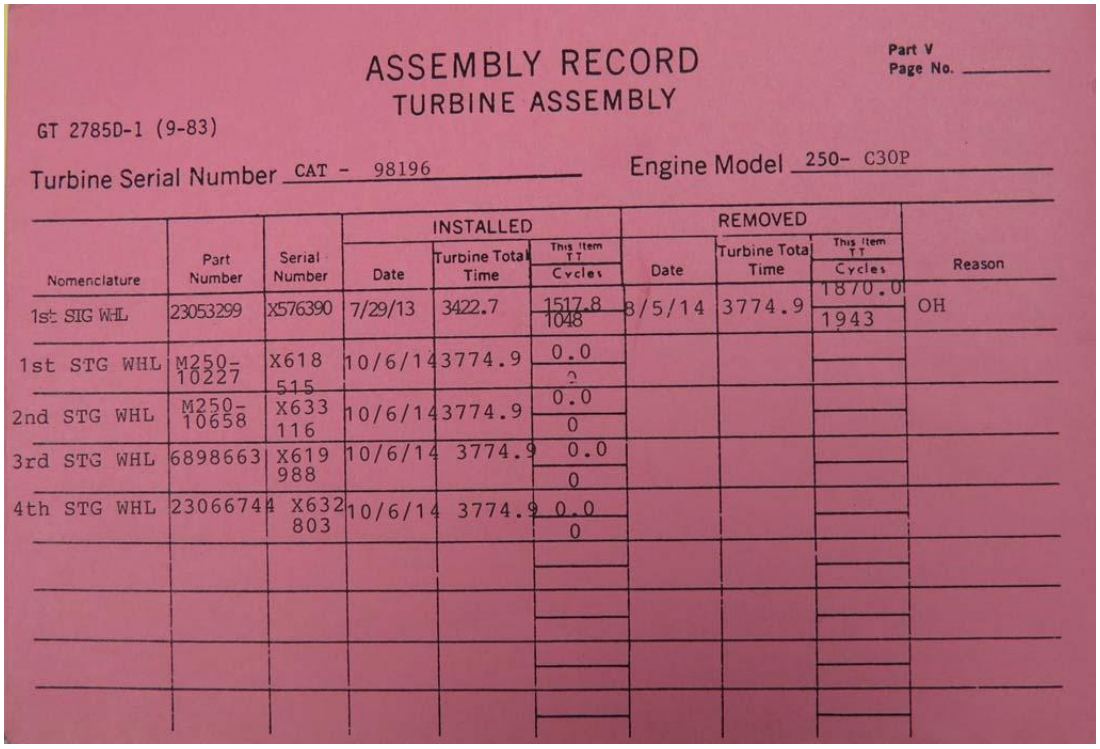
INSPECTION — MAINTENANCE — OVERHAUL RECORD
TURBINE ASSEMBLY

GT 2784D-1 (9-83)

Turbine Serial Number CAT- 98196 Engine Model 250- C30P

Date	Turbine Time Since OH	Turbine Time Total	Remarks	Signature	Organization
			4927 East Falcon Drive Mesa, Arizona USA 85215 480-830-7780 www.aeromarusa.com AEROMARITIME ITP GROUP Engine Model: RR M250-C30P Item Serial #: CAT-98196 TSO : 1430.0 TT : 3422.7 CSO : 2088 TC : 4435 Turbine repaired for N1 Rub and low power. Functionally tested. All work performed in accordance with Rolls-Royce 14W2 and 14W3 Specs. This certifies that the work requested by the customer and described on the work order listed below was accomplished and inspected with reference to instructions for continued airworthiness, other data acceptable to the FAA and current FAA regulations, and with respect to the work performed, is approved for return to service. Pertinent details of this repair are on file at this FAA Certified Repair Station. AeroMaritime America Incorporated CRS# XZNR915L Date: 7/29/2013 W/O# W319405 Signed [redacted] Charles Garrett Hagen	
			4927 East Falcon Drive Mesa, Arizona USA 85215 480-830-7780 www.aeromarusa.com AEROMARITIME ITP GROUP Engine Model: RR M250-C30P Item Serial #: CAT-98196 TSO : 0.0 TT : 3774.9 CSO : 0 TC : 5330 Complied with overhaul. Tie Bolt PN: 23008030 SN: NC83384 Free Length: 7.371 Stretch Length: 7.387 Total Stretch: 0.016. Functionally tested and accepted. All work performed in accordance with Rolls-Royce 14W3 Specs. This certifies that the work requested by the customer and described on the work order listed below was accomplished and inspected with reference to instructions for continued airworthiness, other data acceptable to the FAA and current FAA regulations, and with respect to the work performed, is approved for return to service. Pertinent details of this repair are on file at this FAA Certified Repair Station. AeroMaritime America Incorporated CRS# XZNR915L Date: 10/6/2014 W/O# 19528 Signed [redacted] Kevin Driscoll	

Cochise County Sheriff, N57AW, Engine M250-C30P, S/N CAE 890569 --- December 31, 2014



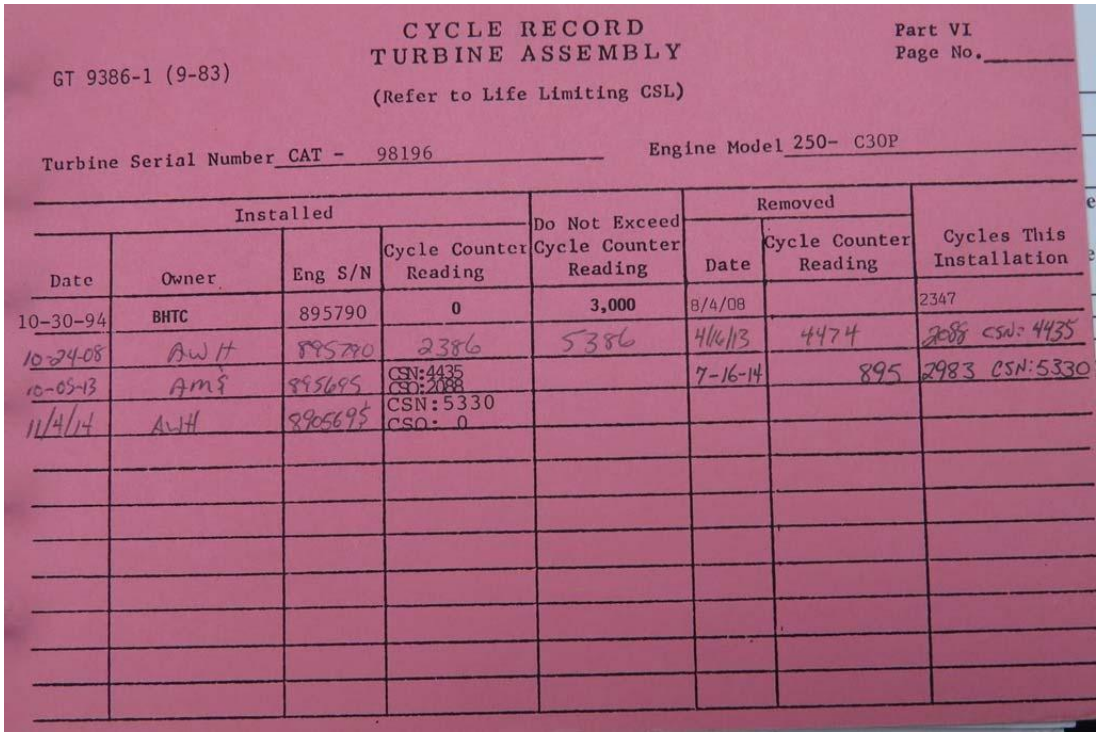
ASSEMBLY RECORD
TURBINE ASSEMBLY

Part V
Page No. _____

GT 2785D-1 (9-83)

Turbine Serial Number CAT - 98196 Engine Model 250- C30P

Nomenclature	Part Number	Serial Number	INSTALLED Date	INSTALLED Turbine Total Time	INSTALLED This Item TT Cycles	REMOVED Date	REMOVED Turbine Total Time	REMOVED This Item TT Cycles	Reason
1st SIG WHL	23053299	X576390	7/29/13	3422.7	1517.8 1048	8/5/14	3774.9	1870.0 1943	OH
1st STG WHL	M250-10227	X618515	10/6/14	3774.9	0.0 0				
2nd STG WHL	M250-10658	X633116	10/6/14	3774.9	0.0 0				
3rd STG WHL	6898663	X619988	10/6/14	3774.9	0.0 0				
4th STG WHL	23066744	X632803	10/6/14	3774.9	0.0 0				



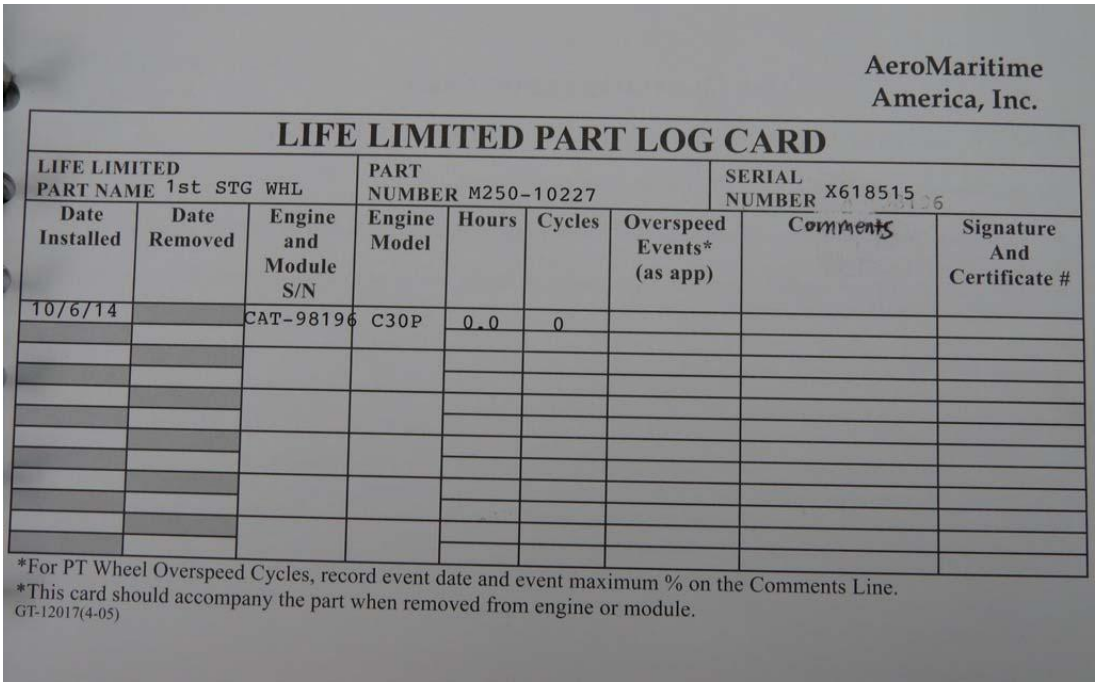
CYCLE RECORD
TURBINE ASSEMBLY
(Refer to Life Limiting CSL)

Part VI
Page No._____

GT 9386-1 (9-83)

Turbine Serial Number CAT - 98196 Engine Model 250- C30P

Installed Date	Owner	Eng S/N	Cycle Counter Reading	Do Not Exceed Cycle Counter Reading	Removed Date	Removed Cycle Counter Reading	Cycles This Installation
10-30-94	BHTC	895790	0	3,000	8/4/08		2347
10-24-08	AWH	895790	2386	5386	4/16/13	4474	2088 CSN: 4435
10-05-13	AMS	895695	CSN:4435 CSO:2088		7-16-14	895	2983 CSN:5330
11/4/14	AWH	895695	CSN:5330 CSO: 0				



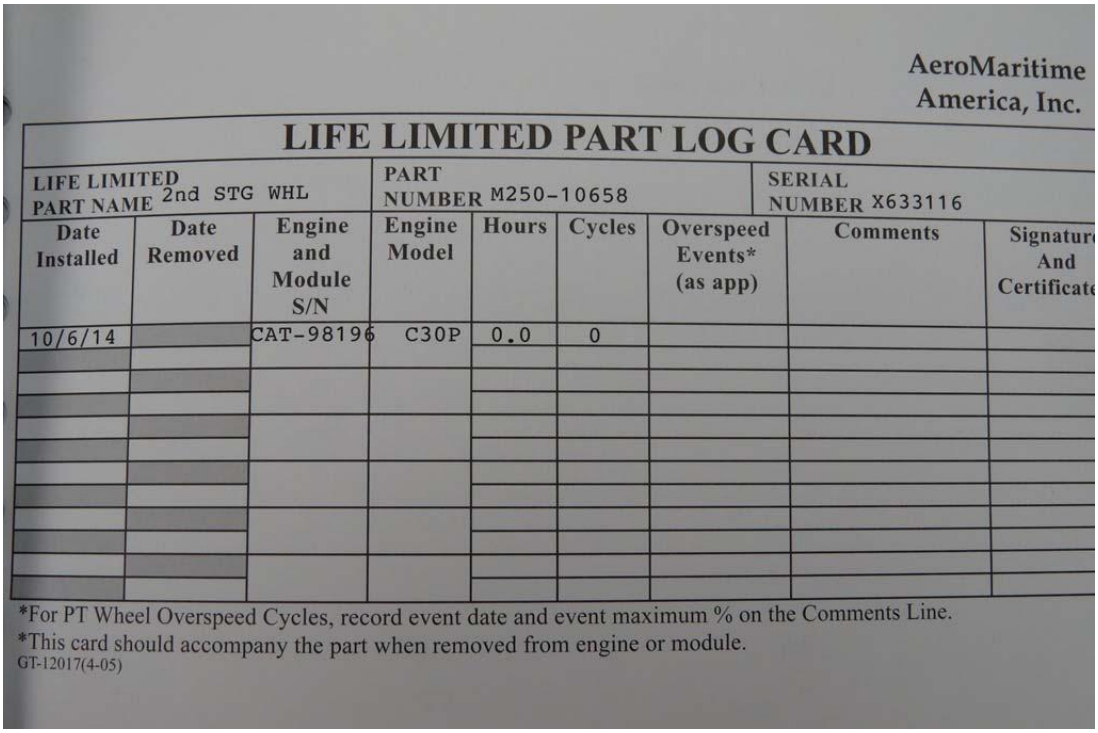
AeroMaritime America, Inc.

LIFE LIMITED PART LOG CARD

LIFE LIMITED PART NAME: 1st STG WHL | PART NUMBER: M250-10227 | SERIAL NUMBER: X618515

Date Installed	Date Removed	Engine and Module S/N	Engine Model	Hours	Cycles	Overspeed Events* (as app)	Comments	Signature And Certificate #
10/6/14		CAT-98196	C30P	0.0	0			

*For PT Wheel Overspeed Cycles, record event date and event maximum % on the Comments Line.
*This card should accompany the part when removed from engine or module.
GT-12017(4-05)



AeroMaritime America, Inc.

LIFE LIMITED PART LOG CARD

LIFE LIMITED PART NAME: 2nd STG WHL | PART NUMBER: M250-10658 | SERIAL NUMBER: X633116

Date Installed	Date Removed	Engine and Module S/N	Engine Model	Hours	Cycles	Overspeed Events* (as app)	Comments	Signature And Certificate
10/6/14		CAT-98196	C30P	0.0	0			

*For PT Wheel Overspeed Cycles, record event date and event maximum % on the Comments Line.
*This card should accompany the part when removed from engine or module.
GT-12017(4-05)

AeroMaritime America, Inc.

LIFE LIMITED PART LOG CARD

LIFE LIMITED PART NAME	PART NUMBER	SERIAL NUMBER
3rd STG WHL	6898663	X619988

Date Installed	Date Removed	Engine and Module S/N	Engine Model	Hours	Cycles	Overspeed Events* (as app)	Comments	Signature And Certificate #
10/6/14		CAT_98196 C30P		0.0	0			

*For PT Wheel Overspeed Cycles, record event date and event maximum % on the Comments Line.
*This card should accompany the part when removed from engine or module.
GT-12017(4-05)

AeroMaritime America, Inc.

LIFE LIMITED PART LOG CARD

LIFE LIMITED PART NAME	PART NUMBER	SERIAL NUMBER
4th STG WHL	23066744	X632803

Date Installed	Date Removed	Engine and Module S/N	Engine Model	Hours	Cycles	Overspeed Events* (as app)	Comments	Signature And Certificate #
10/6/14		CAT-98196 C30P		0.0	0			

*For PT Wheel Overspeed Cycles, record event date and event maximum % on the Comments Line.
*This card should accompany the part when removed from engine or module.
GT-12017(4-05)