Continental Motors

ENGINE FIELD INSPECTION REPORT

LEFT ENGINE

ENGINE MODEL	IO470D (15)
ENGINE SERIAL NUMBER	105176
AIRCRAFT MAKE & MODEL	Cessna 310F
AIRCRAFT SERIAL NUMBER	310-0070
AIRCRAFT REGISTRATION	N6770X
CMI FILE NUMBER	15-562

NAME	SIGNATURE	DATE
Mike Council	[redacted]	10-7-2016

Template Issue Date: 01/2015

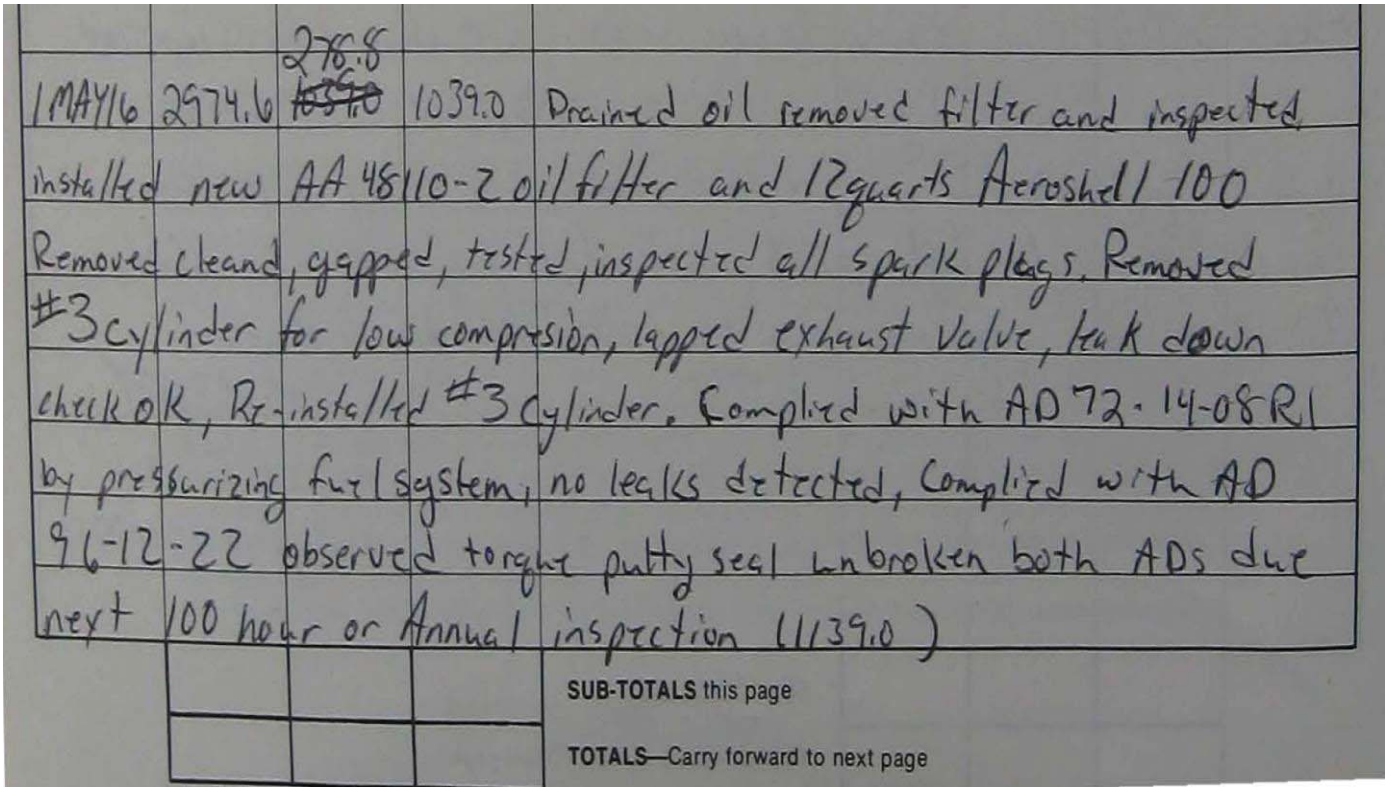
GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	5-7-2016	**NTSB ACCIDENT #**	CEN16FA172
FACILITY	Pulaski Technical College-A&P School	**NTSB INVESTIGATOR**	Todd Fox
ADDRESS	[redacted] North Little Rock, AR North Little Rock Municipal Airport	**FAA INVESTIGATOR**	Brian Love
		ACCIDENT DATE	5-5-2016
		ACCIDENT LOCATION	North Little Rock Municipal (ORK)

ENGINE INFORMATION

ENGINE POSITION	Left
TOTAL TIME	2974.6 hours reported in maintenance logbook at the last 100 hour inspection dated 5-1-2016
TIME SOH	278.8 reported in maintenance logbook entry dated 5-1-2016
TYPE & TIME SLI	Undetermined
BUILD DATE	Not available. This engine shipped 11-28-1960
IN SERVICE DATE	Undetermined

Significant logbook information:



278.8

1 MAY 16 | 2974.6 | ~~1051.0~~ | 1039.0 | Drained oil removed filter and inspected. installed new AA 48110-2 oil filter and 12 quarts Aeroshell 100 Removed cleand, gapped, tested, inspected all spark plugs. Removed #3 cylinder for low compresion, lapped exhaust valve, leak down check OK, Re-installed #3 cylinder. Complied with AD 72-14-08 R1 by pressurizing fuel system, no leaks detected, Complied with AD 96-12-22 observed torque putty seal unbroken both ADs due next 100 hour or Annual inspection (1139.0)

SUB-TOTALS this page

TOTALS—Carry forward to next page

DATE	TOTAL TIME IN SERVICE	TOTAL TIME SINCE OVERHAUL	TACH OR RECORDING METER TIME	DESCRIPTION OF WORK PERFORMED— SIGNATURE & CERTIFICATE NO. OF PERSON PERFORMING WORK
				TOTALS brought forward from previous page
Removed cleaned inspected fuel strainer. All work performed IAW Manufactures Maintenance Mannual. I certify this engine has been inspected IAW 14CFR 43 appendix D and is in a safe Condition for continued flight [redacted] A+P [redacted]				

Report Summary: Search Code(s):

This engine was disassembled and inspected under the supervision of the NTSB IIC. The inspection of this engine did not reveal any pre-impact anomalies which would have prevented its ability to produce rated horsepower.

Disposition of engine following exam:

The engine will be stored at AMF Aircraft Recovery until released by the NTSB IIC

NOTE: The log book entry above indicates that the number 3 cylinder was removed and repaired. The post-accident inspection of this engine reveals that the number 4 cylinder appeared to have had fresh gray paint applied and the number 3 cylinder did not appear to have been removed or installed recently. One of the #4 cylinder base attachment nuts was not an approved part.

INSPECTION WITNESSES

NAME	Mike Council	**NAME**	Todd Fox
ADDRESS	[redacted] Mobile, Alabama 36615	**ADDRESS**	Central Region
ORGANIZATION	Continental Motors	**ORGANIZATION**	NTSB
PHONE	[redacted]	**PHONE**	[redacted]
NAME	Ricardo Asensio	**NAME**	Brian Love
ADDRESS	[redacted]. Wichita, KS 67215	**ADDRESS**	[redacted] Little Rock, AR 72202
ORGANIZATION	Textron Aviation	**ORGANIZATION**	FAA Little Rock FSDO
PHONE	[redacted]	**PHONE**	[redacted]
NAME	R.J. (John) Loomis, Jr.	**NAME**	
ADDRESS	Southwest Region, Little Rock, Arkansas	**ADDRESS**	
ORGANIZATION	FAA	**ORGANIZATION**	
PHONE	[redacted]	**PHONE**	

EXTERNAL INSPECTION OF ENGINE

Both left and right exhaust components exhibited impact damage. Both left and right induction tubes and elbows remained intact with the exception of the left and right rear wye pipes which separated. The forward induction balance tube was impact damaged. The engine oil sump was damaged due to contact with the ground.

The right magneto separated from its mount but remained attached to the ignition harness. The left magneto remained intact and attached

Cylinder # 6 rocker box cover was damaged and small section of the rocker box separated. All other rocker box covers remained intact and attached to its prospective cylinder. Forward cooling fins were impact damaged.

NOTE: An intact cylinder rocker arm was found lying on the inner-cylinder baffle between cylinders one and three. All rocker box covers were removed and all rocker arms were accounted for. Impact damage was noted on the exhaust valve pushrod tube for cylinder # 6.

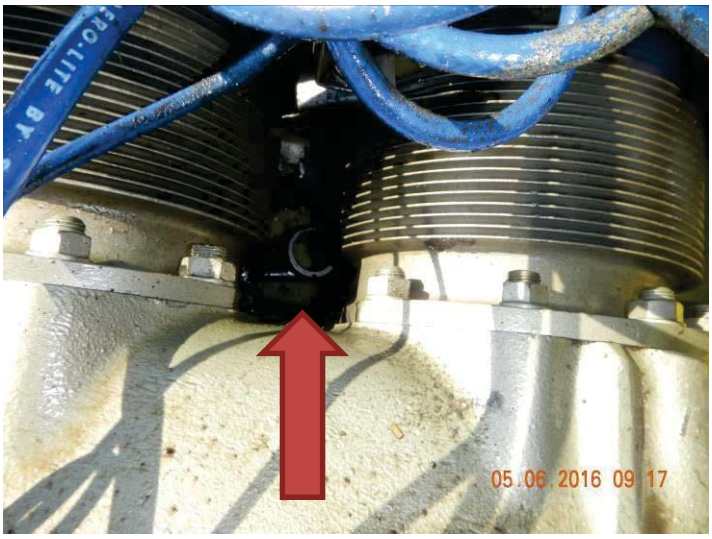
A cold differential cylinder compression test was performed with the following results:
#1 58/80 # 2 60/80 #3 62/80 #4 60/80 #5 68/80 #6 10/80 (exhaust valve push rod was damaged)


05 06 2016 09 12


05 06 2016 09 13


05 06 2016 09 14


05 06 2016 10 29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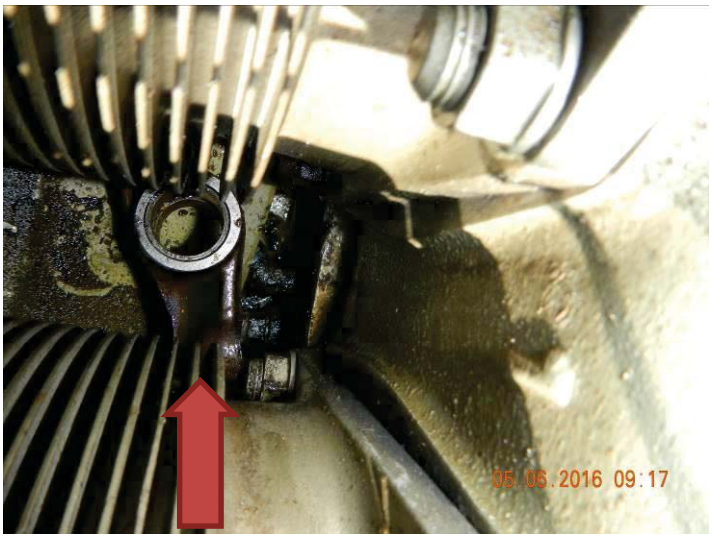
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LEFT
05.06.2016 10:31


05.06.2016 11:02

ENGINE TEARDOWN AND COMPONENT EXAMINATION

EXHAUST SYSTEM	
Condition:	The exhaust risers and collector were crushed upward due to impact forces

INDUCTION SYSTEM	
Condition:	Red arrows indicate broken and missing induction system components

IGNITION SYSTEM

LEFT MAGNETO	Manufacturer: Bendix	P/N: 10-163020-1	S/N: 858668R
Condition:	The left magneto remained attached and intact. The magneto was removed from the engine, bench tested and found to be functional		

RIGHT MAGNETO	Manufacturer: Bendix	P/N: 10-163060-1	S/N: 868566R
Condition:	The right magneto separated from its mount but remained attached to the ignition harness. The magneto was removed from the engine and bench tested. The magneto was found to be functional.		

IGNITION HARNESS	Manufacturer: Aerolite by Skytronics	P/N: Undetermined	S/N: Undetermined
Condition:	Impact damage on lower ignition leads		

SPARK PLUGS	Manufacturer: Mixture of Champion and Tempest brand	P/N: RHB32E - Champion P/N URHB32E - Tempest
Condition:	Normal to worn-out normal, according to a Champion Check A Plug chart. All sparkplugs were dark in color.	


Sparkplugs Right / Left (circle) Single
LEFT
N 6770X
Brand CHAMPION / TEMPEST
Part # RHB 32 E
Date 5/6/2016
Top Bottom
1 3 5 2 4 6
05.07.2016 12:06


Sparkplugs Right / Left (circle) Single
LEFT
N 6770X
Brand CHAMPION / TEMPEST
Part # RHB 32 E
Date 5/6/2016
Top Bottom
CHAMPION
AVIATION CHECK-A-PLUG
05.07.2016 12:06


1 3 5
05.07.2016 12:07

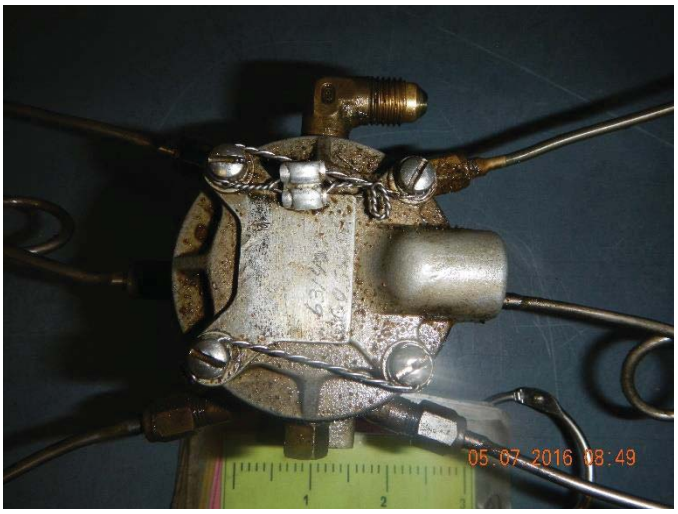

2 4 6
05.07.2016 12:07

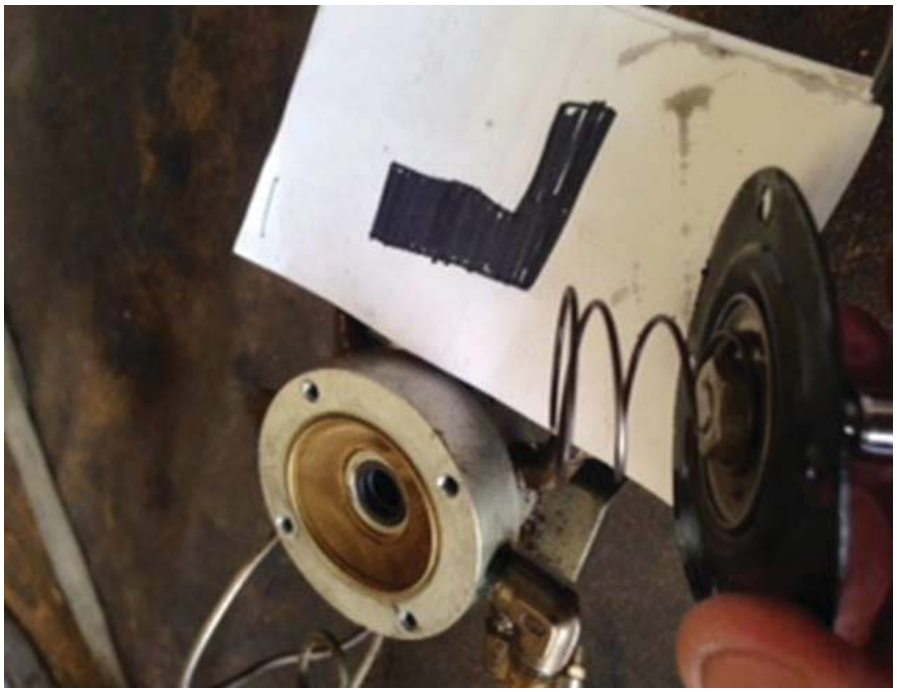
FUEL SYSTEM

FUEL PUMP	Manufacturer: Romec	P/N: 638156-3	S/N: C10605
Condition:	The fuel pump rotated smoothly when manually rotated. Fuel was present in the fuel hoses and the drive gear was intact		

THROTTLE BODY METERING UNIT	Manufacturer: TCM	P/N: 625219-2R	S/N: 6148R
Condition:	The fuel screen was removed and a small amount of lint-like contaminate was present. The throttle plate was frozen in the wide open position.		

FUEL MANIFOLD VALVE	Manufacturer: TCM Overhauled in the field	P/N: 631427	S/N: 6057208
Condition:	The manifold contained uncontaminated fuel. All components were intact and the fuel screen was uncontaminated.		





FUEL NOZZLES AND LINES	Manufacturer: TCM					
Position	#1	#3	#5	#2	#4	#6
Size	12D	P12D	12D	12D	P212D	12D
Condition:	All fuel injectors were open and clear of debris					

LUBRICATION SYSTEM

OIL SUMP	
Condition:	The oil sump received impact damage

OIL PICK-UP TUBE & SCREEN	
Condition:	The screen was intact and contained only a small amount of contaminant

OIL PUMP	
Condition:	The oil pump was disassembled and showed no evidence of hard particle passage

OIL FILTER	Manufacturer: Tempest	P/N: AA48110-2
Condition:	The outer shell was impact damaged. The filter was opened and inspected for contaminants. Only a small amount of contaminant consistent with carbon was noted. No metal was found.	

OIL COOLER	Manufacturer: Undetermined	P/N: Undetermined	S/N: Undetermined
Condition:	The oil cooler did not display impact damage. The data tag was missing.		

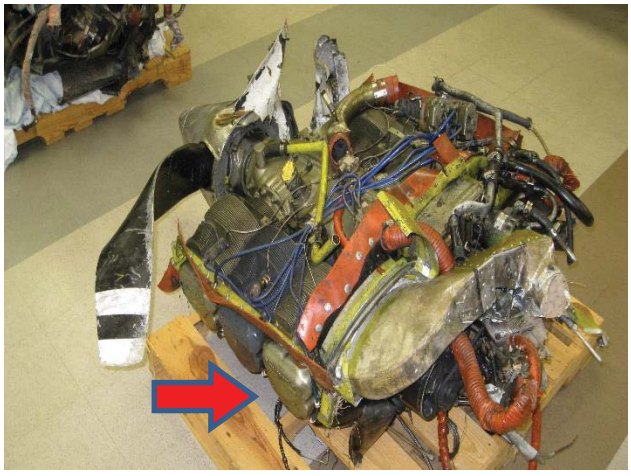
CYLINDERS

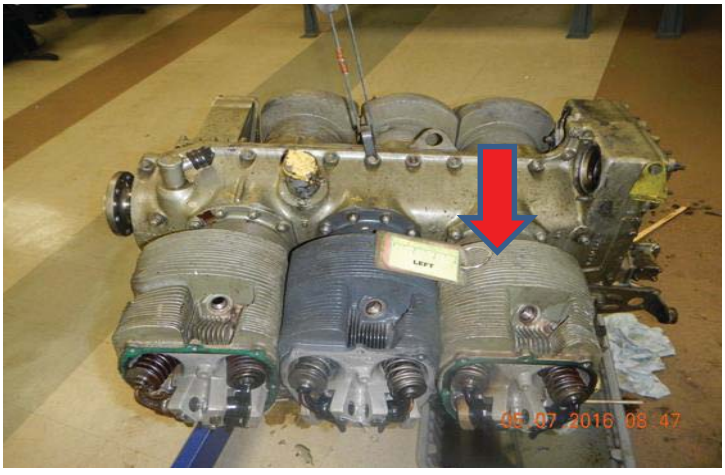
CYLINDER #1	P/N: 186072	S/N: Undetermined	Head Date: Undetermined
Work Orders:	Undetermined		
Condition:	No damage was noted. Red arrow points to cylinder 1		

CYLINDER #3	P/N: Undetermined	S/N: Undetermined	Head Date: Undetermined
Work Orders:	Undetermined		
Condition:	No damage was noted. Red arrow points to cylinder 3. This cylinder does not appear to have been recently installed.		

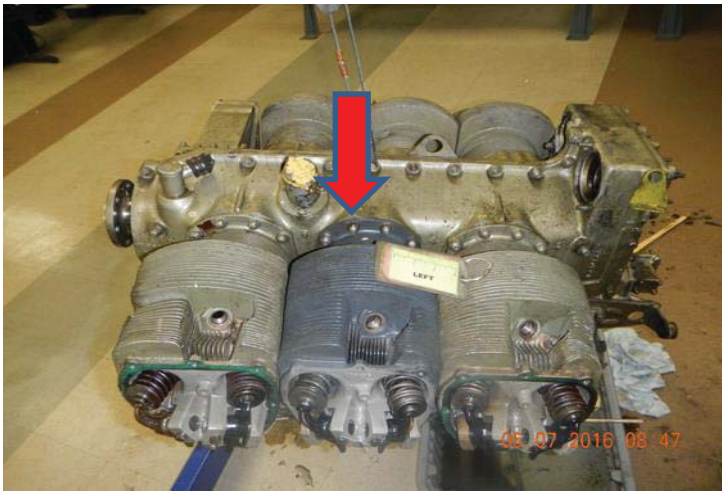
CYLINDER #5	P/N: 649166	S/N: Undetermined	Head Date: 10-91
Work Orders:	Undetermined		
Condition:	Minor damage to the cooling fins was evident. The red arrow points to cylinder 5		

CYLINDER #2	P/N: 538288	S/N: Undetermined	Head Date: Undetermined
Work Orders:	J9590-4		
Condition:	No damage was noted. Red arrow points to cylinder 2		

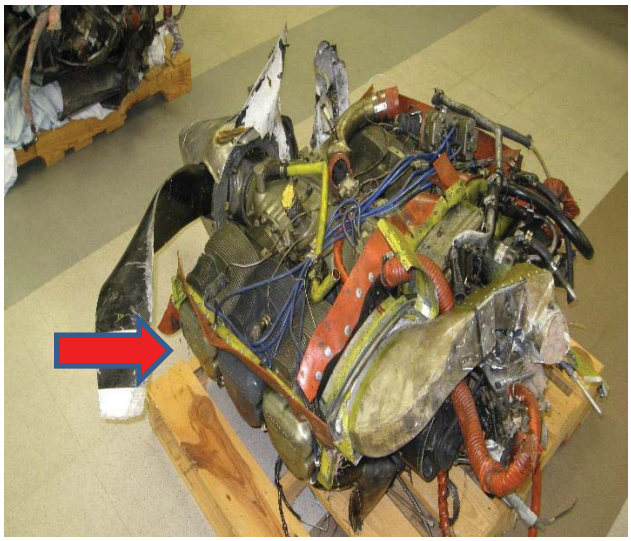




CYLINDER #4	P/N: Undetermined	S/N: 1140S6A	Head Date: Undetermined
Work Orders:	C1561		
Condition:	No damage was evident. This cylinder appears to have been freshly painted and installed recently. One lower deck stud nut was unapproved hardware.		



CYLINDER #6	P/N: Undetermined	S/N: Undetermined	Head Date: 10-94
Work Orders:	Undetermined-unreadable.		
Condition:	Minor impact damage was evident to cooling fins on the front of cylinder. Red arrow points to cylinder 6.		



VALVES	
Condition:	All valves were intact and exhibited normal combustion signatures

ROCKER ARMS AND SHAFTS	
Condition:	All rocker arms moved normally when the engine was manually rotated with the exception of cylinder 6 where the push rods and push rod housings were impact damaged. **NOTE**: An intact “extra” rocker arm was discovered lying on the inner cylinder baffle between cylinders 1 & 3 which could not be accounted for. A recent cylinder change was accomplished on cylinder 4.

#1 PISTON, RINGS AND PIN	Piston P/N: Undetermined
Condition:	The piston, piston rings and piston pin displayed normal combustion signatures and wear patterns.

#3 PISTON, RINGS AND PIN	Piston P/N: Undetermined
Condition:	The piston, piston rings and piston pin displayed normal combustion signatures and wear patterns.

#5 PISTON, RINGS AND PIN	Piston P/N: Undetermined
Condition:	The piston, piston rings and piston pin displayed normal combustion signatures and wear patterns.

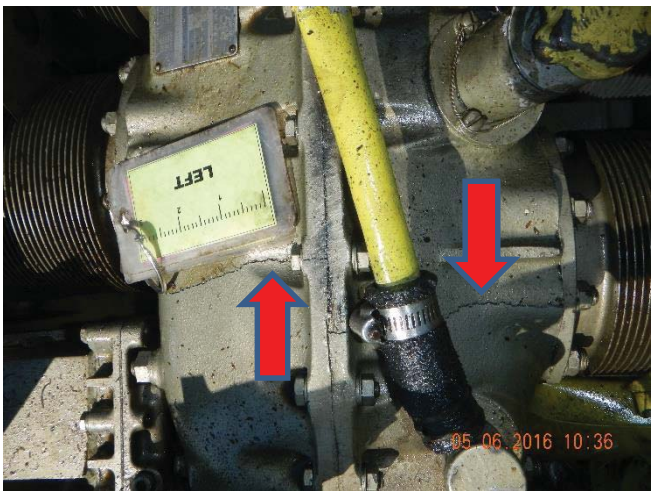
#2 PISTON, RINGS AND PIN	Piston P/N: Undetermined
Condition:	The piston, piston rings and piston pin displayed normal combustion signatures and wear patterns.

#4 PISTON, RINGS AND PIN	Piston P/N: Undetermined
Condition:	The piston, piston rings and piston pin displayed normal combustion signatures and wear patterns.

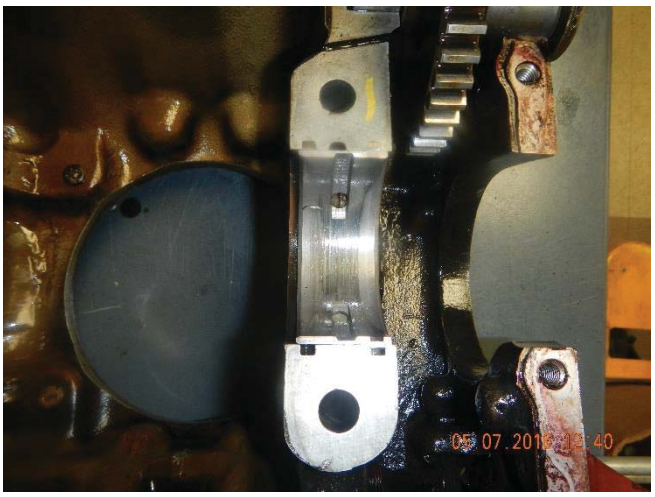
#6 PISTON, RINGS AND PIN	Piston P/N: Undetermined
Condition:	The piston, piston rings and piston pin displayed normal combustion signatures and wear patterns.

CRANKCASE ASSEMBLY

CRANKCASE				
Condition:	The crankcase was intact but with a crack on the right half (1-3-5 side) beginning at the top parting line and extending down to the mounting pad for cylinder # 5. A crack on the left crankcase half (2-4-6 side) extended from the top parting line to mounting pad for cylinder # 6. The red arrows point to the cracks.			



#1 MAIN BEARINGS	P/N: SA630464- MO10	Date Code: 10-00
Condition:	The main bearings exhibited normal wear signatures. Red arrow points to # 1 main bearing.	



#2 MAIN BEARINGS	P/N:SA630464-MO10	Date Code:10-00
Condition:	The main bearings exhibited normal wear signatures. Red arrow points to # 2 main bearing.	

#3 MAIN BEARINGS	P/N:SA630464-MO10	Date Code: 10-00
Condition:	The main bearings exhibited normal wear signatures. Red arrow points to # 3 main bearing.	

#4 MAIN BEARINGS	P/N: SA630464-MO10	Date Code: 10-00
Condition:	The main bearings exhibited normal wear signatures. Red arrow points to # 4 main bearing.	

#5 MAIN BEARINGS	P/N: SA530386-MO10	Date Code: 2-03
Condition:	The main bearings exhibited normal wear signatures. Red arrow indicates main bearing # 5.	

CRANKSHAFT ASSEMBLY

CRANKSHAFT	Forging Number: Undetermined	S/N: Undetermined	Heat code: Undetermined
Condition:	The crankshaft appeared to be undamaged.		

COUNTER WEIGHTS	
Condition:	Counter weights were intact and moved freely on pins

#1 CONNECTING ROD	P/N:655910	Forging or Serial Number: 40742
Condition:	Normal wear appearance	
#1 CONNECTING ROD BEARING	P/N: SA630826-MO10	
Condition:	Normal wear exhibited	

#3 CONNECTING ROD	P/N: 655910	Forging or Serial Number: 40742
Condition:	Normal wear appearance	
#3 CONNECTING ROD BEARING	P/N: SA630826-MO10	
Condition:	Normal wear exhibited	

#5 CONNECTING ROD	P/N: 655910	Forging or Serial Number: 40742
Condition:	Normal wear appearance	
#5 CONNECTING ROD BEARING	P/N: SA630826-MO10	
Condition:	Normal wear exhibited	

#2 CONNECTING ROD	P/N: 655910	Forging or Serial Number: 40742
Condition:	Normal wear appearance	
#2 CONNECTING ROD BEARING	P/N: SA630826-MO10	
Condition:	Normal wear exhibited	

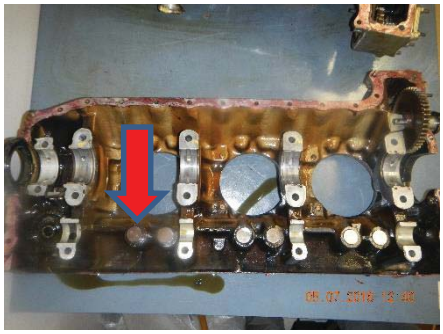
#4 CONNECTING ROD	P/N: 655910	Forging or Serial Number: 40742
Condition:	Normal wear appearance	
#4 CONNECTING ROD BEARING	P/N: SA630826-MO10	
Condition:	Normal wear exhibited	

#6 CONNECTING ROD	P/N: 655910	Forging or Serial Number: 40742
Condition:	Normal wear appearance	
#6 CONNECTING ROD BEARING	P/N: SA630826-MO10	
Condition:	Normal wear exhibited	

CAMSHAFT

CAMSHAFT	P/N: 535661-V	S/N: Undetermined
Condition:	The cam exhibited normal wear patterns	

LIFTERS						
INTAKE						
EXHAUST						
Condition:	Lifter faces exhibited normal wear patterns except # 2 and # 5 intake lifters which exhibited minor pitting on the lifter faces. Red arrows point to pitted lifters.					



ACCESSORIES

STARTER	Manufacturer: Delco-Remy	P/N: 627861	S/N: 1188234
Condition:	The starter motor was removed and visually inspected. No damage was noted		

STARTER ADAPTER	P/N: Undetermined
Condition:	The starter adapter was removed and visually inspected. The shaft rotated smoothly when the gear was rotated manually

GEN	Manufacturer: Delco-Remy – Overhauled by AeroTech	P/N: 1105053	S/N: A10907
Condition:	The generator separated but was recovered. The drive pulley received impact damage.		

VACUUM PUMP	Manufacturer: Garwin	P/N: G455P	S/N: 30820
Condition:	The vacuum pump was removed and inspected. The pump produced suction at the inlet fitting when the pump was rotated manually		

PROPELLER

PROPELLER GOVERNOR	Manufacturer: Woodward	P/N: Undetermined	S/N: 530241
Condition:	The propeller governor separated from the engine due to impact but was recovered.		

PROPELLER	Manufacturer: Hartzell	M/N: HC-C2YF-2CUFC8468-3	S/N: AN7313B
Blade 1 S/N:	I95963		
Blade 2 S/N:	J95964		
Condition:	Blade A exhibited a forward bend on the tip trailing edge only. Blade B exhibited a rearward twisting bend approximately 70-80 degrees beginning approximately 7 inches from blade root.