Continental Motors

ENGINE FIELD INSPECTION REPORT

ENGINE MODEL	O-470-L1
ENGINE SERIAL NUMBER	66818-6-L
AIRCRAFT MAKE & MODEL	Cessna 182
AIRCRAFT SERIAL NUMBER	33816
AIRCRAFT REGISTRATION	N5816B
FILE NUMBER	14-077

NAME	SIGNATURE	DATE
Nicole L. Charnon	[redacted]	07/25/2014

Report Issue Date: 07/2014

GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	07/16/2014	**NTSB ACCIDENT #**	WPR14FA286
FACILITY	AvTech Services LLC	**NTSB INVESTIGATOR**	Tom Little
ADDRESS	[redacted] Kent, WA 98042	**FAA INVESTIGATOR**	William Shin
		ACCIDENT DATE	07/08/2014
		ACCIDENT LOCATION	Fall City, WA

ENGINE INFORMATION

ENGINE POSITION	Single-Engine
TOTAL TIME	Unknown
TIME SOH	Unknown
TYPE & TIME SLI	Unknown
BUILD DATE	01/16/1956
IN SERVICE DATE	Unknown

Significant logbook information:
According to work orders supplied by the maintenance facility that maintained the aircraft, the last annual inspection took place between July 9, 2013 and December 6, 2013. During that annual inspection, a 500-hour magneto inspection was conducted and the muffler was replaced. A work order dated between 07/26/2011 and 08/05/2011, indicated that the standby vacuum pump was placarded inoperative in accordance with Airworthiness Directive (AD) 99-24-10. In May 2006, a JPI EDM 700 was installed on the accident airplane.

Report Summary: Search Code(s): 15-12-68

The engine sustained impact damage that resulted in the separation of the magnetos and carburetor, the partial separation of the #4 and #5 cylinders as well as a fractured crankcase. The impact-related damage precluded any functional testing of any of the components. In addition, rotation of the crankshaft was not possible due to the fractures of the crankcase and cylinder damage. However, examination of the engine and its components did not reveal any anomalies that would have prevented the production of full power.

Disposition of engine following exam: The NTSB released the wreckage to AvTech Services LLC on July 24, 2014.

INSPECTION WITNESSES

NAME	Nicole L. Charnon	**NAME**	Tom Little
ADDRESS	Mobile, Alabama	**ADDRESS**	Seattle, Washington
ORGANIZATION	Continental Motors	**ORGANIZATION**	NTSB – Western Pacific
PHONE	[redacted]	**PHONE**	[redacted]
NAME	William Shinn	**NAME**	Ernie Hall
ADDRESS	Renton, WA	**ADDRESS**	Wichita, KS
ORGANIZATION	FAA – Seattle FSDO	**ORGANIZATION**	Textron Aviation
PHONE	[redacted]	**PHONE**	[redacted]
NAME	Steve Miller	**NAME**	
ADDRESS	Wichita, KS	**ADDRESS**	
ORGANIZATION	Textron Aviation	**ORGANIZATION**	
PHONE	[redacted]	**PHONE**	

EXTERNAL INSPECTION OF ENGINE

The engine was resting in an upright position on a pallet. The propeller was separated from the crankshaft's propeller flange. A portion of the propeller flange was fractured and displaced aft. All six propeller bolts remained with the propeller flange. The aft spinner bulkhead was deformed aft around the topside of the crankcase. The two-bladed propeller was lying on the floor adjacent to the engine. Both blades remained attached to the hub, both were twisted toward low pitch, and both displayed a polished erosion of the paint from the tips. One of the blades also displayed s-bending signatures. The threaded areas of the hub where the propeller bolts are normally positioned displayed distortion and elongation signatures. The propeller mounting dowels were also displaced.

The #4 and #5 cylinders were partially separated from the crankcase. The topside of the crankcase was fractured permitting a view inside the engine in the area of the four aft cylinders. Both magnetos were separated from the engine. Portions of the ignition leads remained with the engine. The carburetor was separated from the engine as was the oil cooler, starter motor, and vacuum pump. The exhaust system remained attached to the engine; however, it sustained deformation damage and flattening. The primer system and primer lines remained attached to the engine.


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2
Continental


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ENGINE TEARDOWN AND COMPONENT EXAMINATION

EXHAUST SYSTEM	
Condition:	The exhaust risers and manifold remained with the engine; however, they sustained deformation damage and were flattened.

INDUCTION SYSTEM	
Condition:	The induction system was destroyed and only portions were observed among the recovered wreckage. The carburetor's throttle body was destroyed and only the throttle valve remained with the engine.

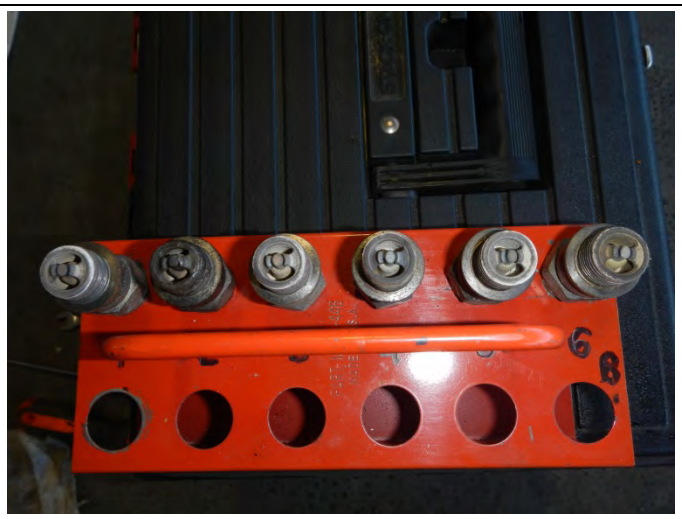
IGNITION SYSTEM

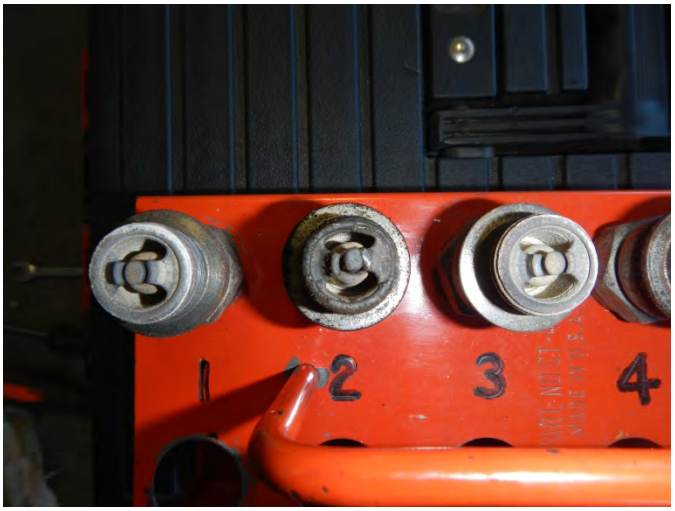
LEFT MAGNETO	Manufacturer: Slick	P/N: 6310	S/N: ?2110233
Condition:	The left magneto was separated from the engine and was intact, though it sustained impact damage that separated all of the ignition leads and left mechanical deformation damage to the housing. The drive shaft could be manually rotated and the snap of the impulse coupling was audible.		

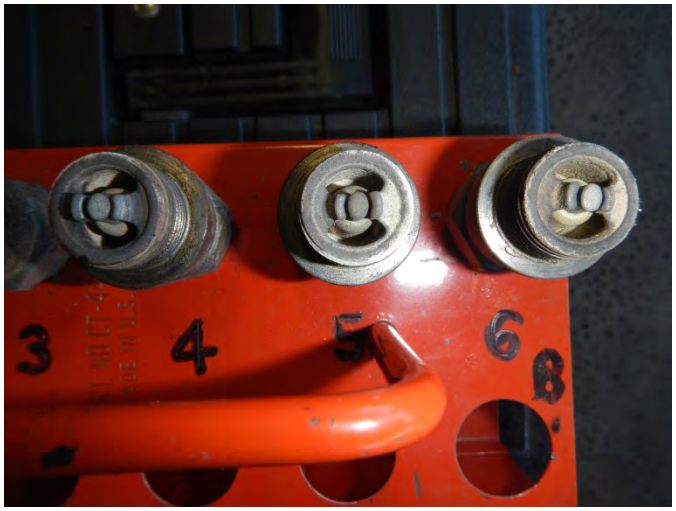
RIGHT MAGNETO	Manufacturer: Slick	P/N: 6310	S/N: 98041982
Condition:	The right magneto was separated from the engine and was fractured. Examination of the identified components did not reveal any pre-impact anomalies.		

IGNITION HARNESS	Manufacturer: Unknown	P/N: Unknown	S/N: Unknown
Condition:	The ignition harness was fragmented and untestable.		

SPARK PLUGS	Manufacturer: Champion	P/N: REM40E
Condition:	The top sparkplugs were removed from their respective cylinders. The #2 top sparkplug sustained mechanical damage. Otherwise, they were unremarkable, showing normal wear and combustion signatures when compared to the Champion Service Manual AV6-R.	





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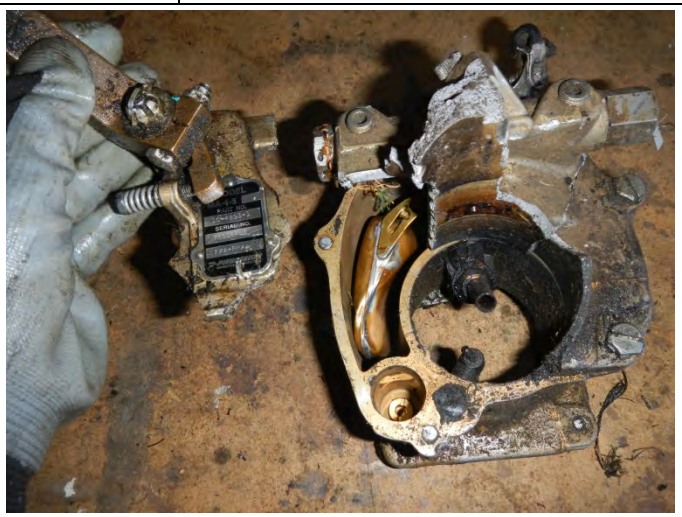
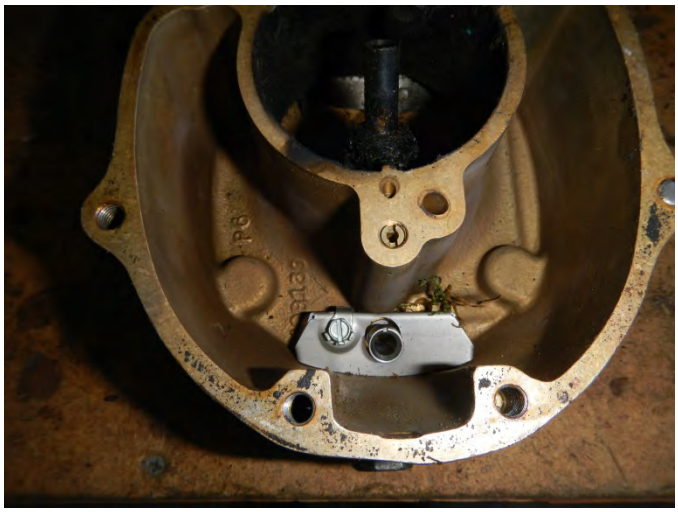
5 6

FUEL SYSTEM

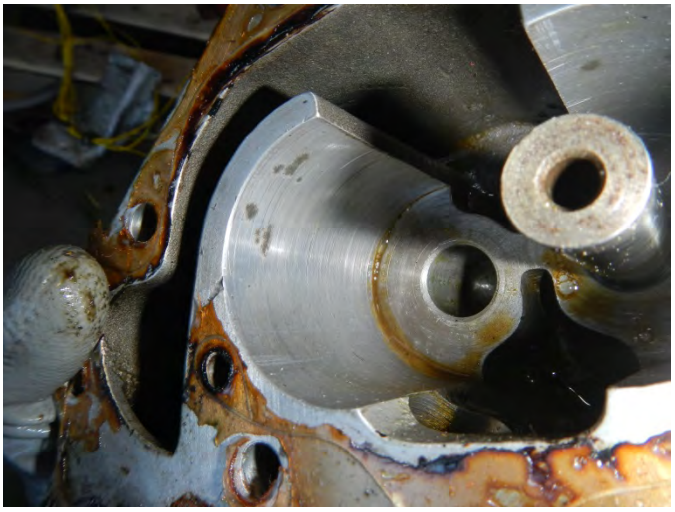
CARBURETOR	Manufacturer: Precision	P/N: 10-4893-1	S/N: 75016415
Condition:	The carburetor was separated from the engine and the throttle valve was separated from the carburetor as was the accelerator pump. The mixture lever was separated from the carburetor. The throttle shaft was bent but remained attached to the throttle plate. The throttle lever remained attached to the shaft. The carburetor housing was fractured permitting a view into the carburetor bowl. Disassembly of the carburetor revealed that the inlet screen was clean, and the floats, though deformed, were intact.		



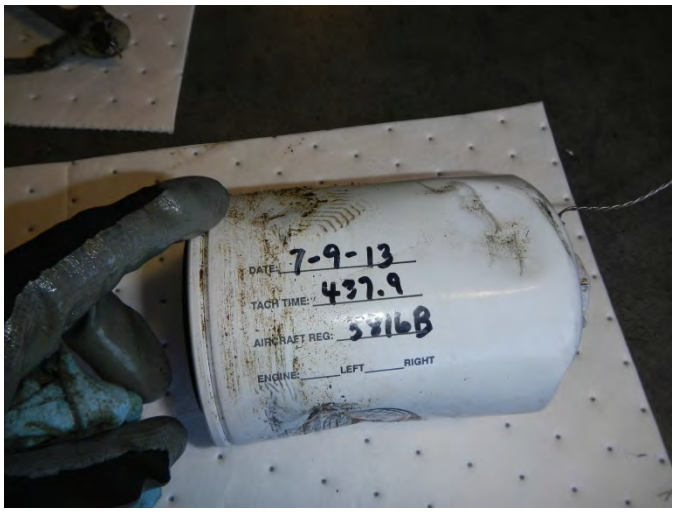


LUBRICATION SYSTEM

OIL PUMP	
Condition:	The oil pump remained secured to the backside of the engine. It was removed and disassembled. Some light scoring and corrosion was noted on the pump housing walls. There were no signs of operational distress with the oil pump housing or gears.



OIL FILTER	Manufacturer: Champion	P/N: CH48109-1
Condition:	The engine was modified using a remote, disposable, oil filter. The oil filter supply and return lines were separated from the adapter. The oil filter was located and cut open. There were no visible signs of contamination.	



OIL SUMP	
Condition:	The oil sump was destroyed and not observed during the examination.

OIL PICK-UP TUBE & SCREEN	
Condition:	The oil pick-up tube and screen were not observed during the examination.

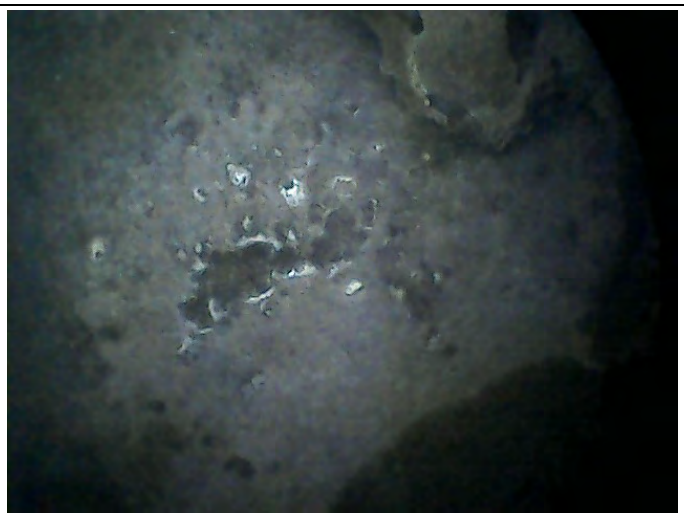
OIL COOLER	Manufacturer: Canadian Aero Manufacturing	P/N: CAM627392	S/N: L05-4640-4
Condition:	The oil cooler was separated from the engine and sustained deformation damage. There were no signs of operational distress with the unit.		

CYLINDERS

NOTE: Photos that follow each cylinder number represent the rockers, the piston, the exhaust valve and intake valve in that order unless otherwise noted.

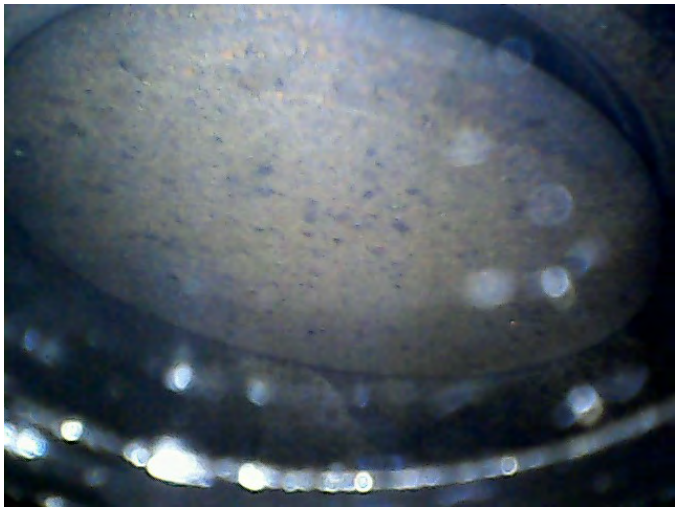
CYLINDER #1	P/N: 654959A1	S/N: Unknown	Head Date: 10-98
Condition:	The cylinder remained attached to the crankcase. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.		

CYLINDER #3	P/N: 654959A1	S/N: Unknown	Head Date: 10-98
Condition:	The cylinder remained attached to the crankcase, though some of the deck studs were displaced due to the crankcase damage. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.		

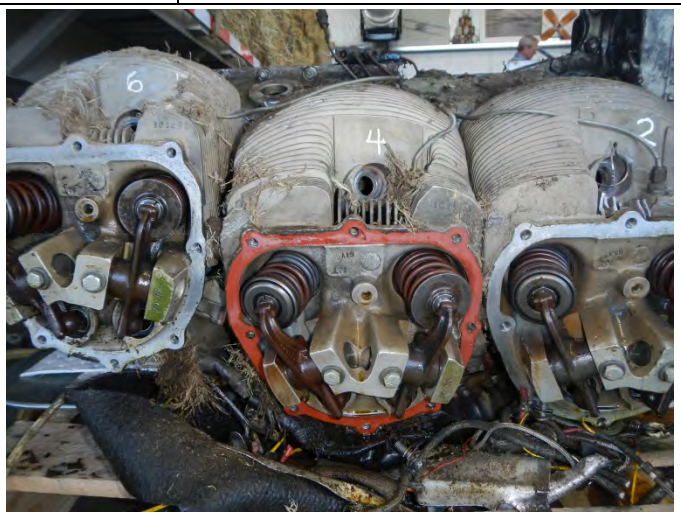


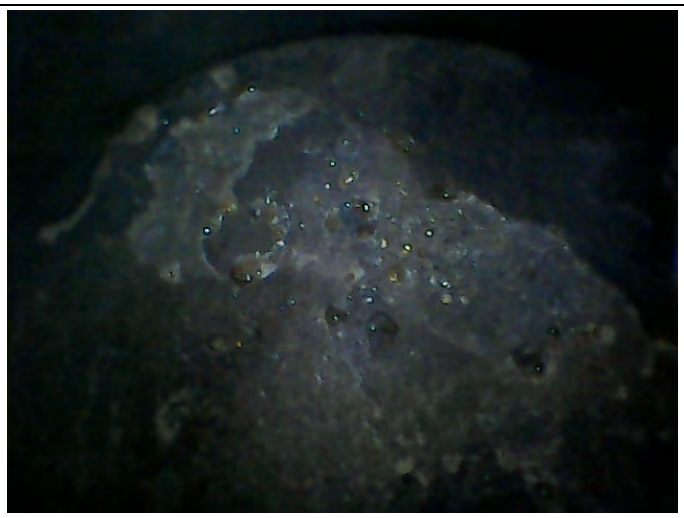
CYLINDER #5	P/N: 654959A1	S/N: Unknown	Head Date: 10-98
Condition:	The cylinder was partially separated from the crankcase exposing the connecting rod and backside of the piston. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.		

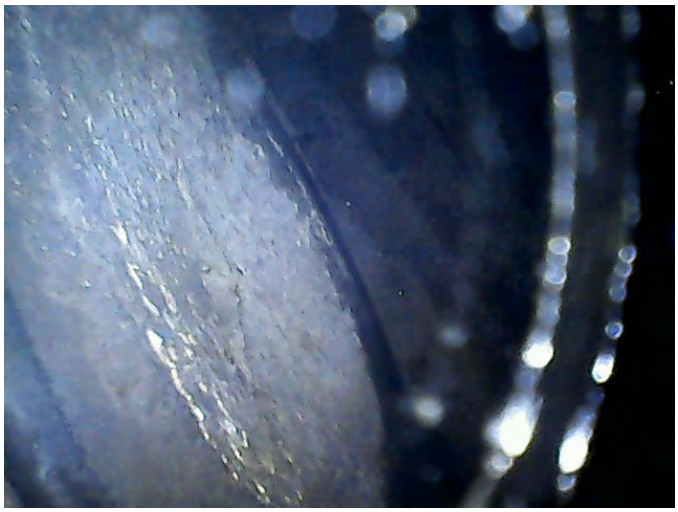
CYLINDER #2	P/N: 654959A1	S/N: Unknown	Head Date: 10-98
Condition:	The cylinder had broken cooling fins around the tops sparkplug. A hole was punctured in the rocker cover. The cylinder remained attached to the crankcase. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.		



CYLINDER #4	P/N: 654959A1	S/N: Unknown	Head Date: 10-98
Condition:	The cylinder was partially separated from the crankcase. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.		







CYLINDER #6	P/N: 654959A1	S/N: Unknown	Head Date: 10-98
Condition:	The cylinder remained attached to the crankcase. No anomalies were noted with the rockers or valve springs. Borescope examination of the cylinder revealed no anomalies with the piston, barrel, cylinder head, valves or valve seats.		

CRANKCASE ASSEMBLY

CRANKCASE	Casting Number	1-3-5: Unknown	2-4-6: Unknown	S/N: Unknown
Condition:	The crankcase was fractured exposing the internal components on the aft end of the engine. There was no evidence of any pre-existing anomalies with the crankcase.			

CRANKSHAFT ASSEMBLY

CRANKSHAFT	Forging Number: Unknown	S/N: Unknown	Heat code: Unknown
Condition:	The crankshaft was not examined in its entirety; however, portions that were visible through the fractured crankcase halves and removed components revealed no anomalies or signs of operational distress or malfunction. The crankshaft could not be rotated due to the fractured crankcase halves and the partially separated cylinders.		

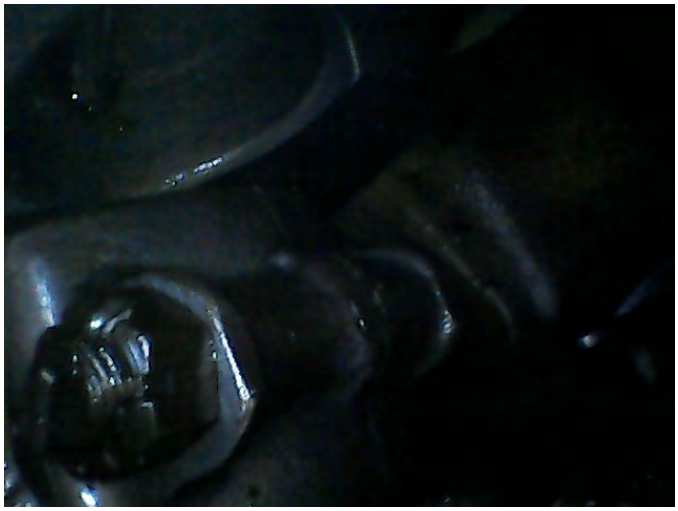
#1 CONNECTING ROD	
Condition:	Examination of the connecting rod through the fractured crankcase halves revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

#3 CONNECTING ROD	
Condition:	Examination of the connecting rod through the fractured crankcase halves revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

#5 CONNECTING ROD	
Condition:	Examination of the connecting rod through the partially separated cylinder revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

#2 CONNECTING ROD	
Condition:	Examination of the connecting rod through the fractured crankcase halves revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

#4 CONNECTING ROD	
Condition:	Examination of the connecting rod through the fractured crankcase halves revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.



#6 CONNECTING ROD	
Condition:	Examination of the connecting rod through the partially separated #5 cylinder revealed that it remained intact and the rod bolts were secured. The connecting rod did not display any evidence of operational or heat distress.

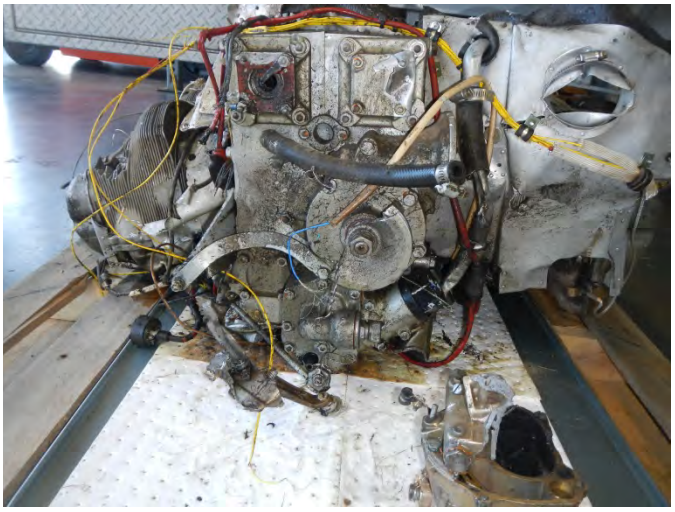
CAMSHAFT

CAMSHAFT	
Condition:	The camshaft was not examined in its entirety; however, portions that were visible through the fractured crankcase halves and removed components revealed no anomalies or signs of operational distress or malfunction. The hydraulic lifters were also examined through the fractured crankcase halves and no anomalies were noted.

ACCESSORIES

STARTER	Manufacturer: Unknown	P/N: MCL 6501	S/N: G000180
Condition:	The starter motor was separated from the engine. Rotation of the starter shaft did not reveal and anomalies or binding.		

STARTER ADAPTER	P/N: Unknown
Condition:	The starter adapter remained attached to the aft end of the engine; however it sustained impact damage that fractured a portion of the starter motor mount and the adapter cap.



ALT/GEN #1	Manufacturer: Delco	P/N: 1101892	S/N: FA1948A
Condition:	The 12 Volt generator was separated from the engine and sustained impact damage. A portion of the generator mount remained with the generator and a portion remained attached to the engine; both of which sustained deformation damage.		

VACUUM PUMP	Manufacturer: Not recorded	P/N: Not recorded	S/N: Not recorded
Condition:	The wet pump was separated from the engine. It was disassembled and no anomalies were noted with the rotor or vanes. All components displayed normal wear patterns.		

PROPELLER

PROPELLER GOVERNOR	Manufacturer: Not observed	P/N: Not observed	S/N: Not obsrved
Condition:	The propeller governor was not observed during the examination.		
PROPELLER	Manufacturer: McCauley	P/N: 2A34C66-0P	S/N: 806983
Condition:	The propeller was separated from the crankshaft's propeller flange. A portion of the propeller flange was fractured and displaced aft. All six propeller bolts remained with the propeller flange. The aft spinner bulkhead was deformed aft around the topside of the crankcase. The two-bladed propeller was lying on the floor adjacent to the engine. Both blades remained attached to the hub, both were twisted toward low pitch, and both displayed a polished erosion of the paint from the tips. One of the blades also displayed s-bending signatures. The threaded areas of the hub where the propeller bolts are normally positioned displayed distortion and elongation signatures. The propeller mounting dowels were also displaced.