Continental Motors

ENGINE FIELD INSPECTION REPORT

ENGINE MODEL	TSIO-520-B12B
ENGINE SERIAL NUMBER	176760-R
AIRCRAFT MAKE & MODEL	Cessna T310Q
AIRCRAFT SERIAL NUMBER	T310Q-0611
AIRCRAFT REGISTRATION	N310JA
FILE NUMBER	15-199

NAME	SIGNATURE	DATE
Nicole L. Charnon		09/29/2015

GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	09/27 and 28/2015	**NTSB ACCIDENT #**	CEN15FA425
FACILITY	Accident Site	**NTSB INVESTIGATOR**	Courtney Leidler
ADDRESS	410 S. Wetmore Wichita, KS 67209	**FAA INVESTIGATOR**	Bobby Warren
		ACCIDENT DATE	09/25/2015
		ACCIDENT LOCATION	Wichita, Kansas

ENGINE INFORMATION

ENGINE POSITION	Left Engine
TOTAL TIME	Unknown
TIME SOH	187.7 hours at time of last annual inspection
TYPE & TIME SLI	Unknown
BUILD DATE	09/01/1998
IN SERVICE DATE	Unknown

Significant logbook information:

At the time this report was written, the aircraft logbooks had not been acquired by the NTSB investigator-in-charge (IIC). The NTSB IIC obtained a copy of the last annual inspection maintenance entries. According to the maintenance entry, the last annual inspection took place on May 8, 2015, at a tachometer (hobbs) time of 187.7 hours. At the time of the annual inspection, the engine accumulated 227.5 hours since its last overhaul and an unknown total time. The hobbs meter was not located during the examination.

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

There were no pre-accident anomalies noted with the engine or the engine-related systems that would have prevented its ability to produce full rated power.

Disposition of engine following exam:

The aircraft wreckage (including the engines) was taken to Beegles Aircraft Service, Inc. in Greeley, Colorado where it will be stored until the investigation is complete.

INSPECTION WITNESSES

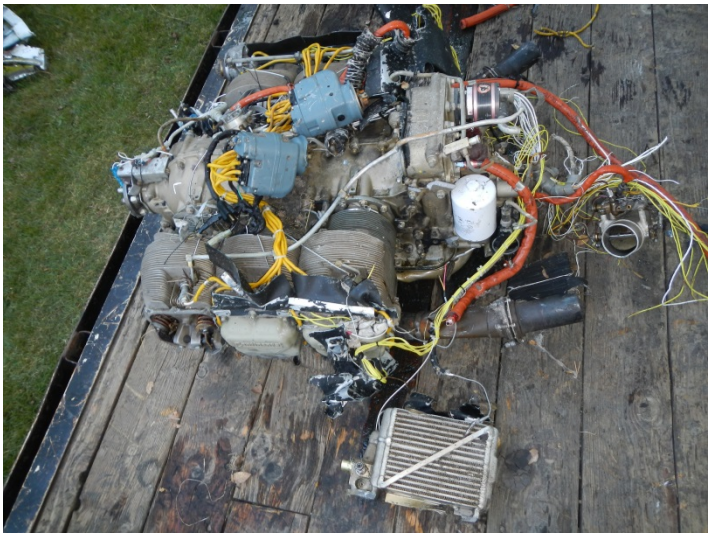
NAME	Nicole L. Charnon	**NAME**	Courtney Liedler
ADDRESS	Washington, DC	**ADDRESS**	Denver, CO
ORGANIZATION	Continental Motors	**ORGANIZATION**	NTSB Central Region
PHONE	[redacted]	**PHONE**	[redacted]
NAME	John Clark	**NAME**	Bobby Warren
ADDRESS	Wichita, KS	**ADDRESS**	Wichita, KS
ORGANIZATION	NTSB Aviation Safety	**ORGANIZATION**	Wichita FSDO
PHONE	[redacted]	**PHONE**	[redacted]
NAME	Ernie Hall	**NAME**	Jon George
ADDRESS	Wichita, KS	**ADDRESS**	Wichita, KS
ORGANIZATION	Textron Aviation	**ORGANIZATION**	Wichita FSDO
PHONE	[redacted]	**PHONE**	[redacted]

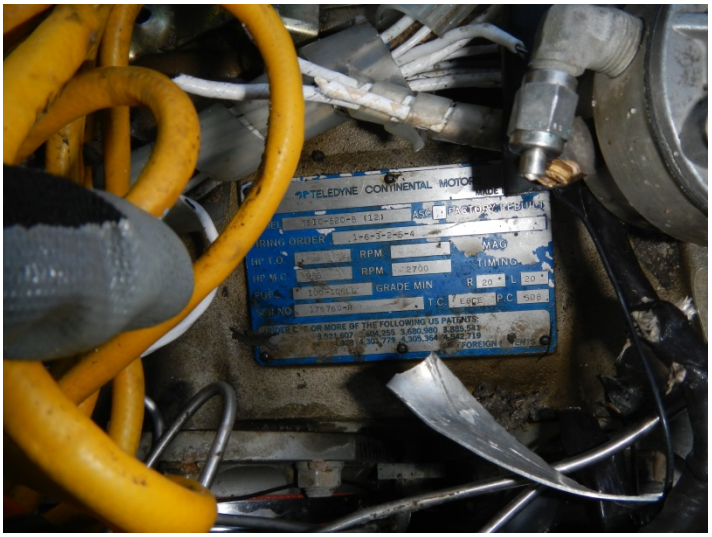
EXTERNAL INSPECTION OF ENGINE

The engine was recovered from a pond in a residential area prior to this investigator's arrival. The engine was covered in mud and organic debris. The engine was cleaned using fresh water. The propeller was separated from the engine. The left engine's propeller flange was distorted and all six of the propeller bolts remained with the propeller flange, and the bolt threads contained remnants of the propeller hub threads. The exhaust risers and manifolds remained attached to the engine. The only portion of the intake system that remained with the engine was the throttle body. The oil sump was torn open permitting a view of the lower crankcase halves, oil pickup tube/screen and sections of the camshaft.

The left engine's magnetos were separated from their respective mounting pads but remained attached to the engine via the ignition harness.

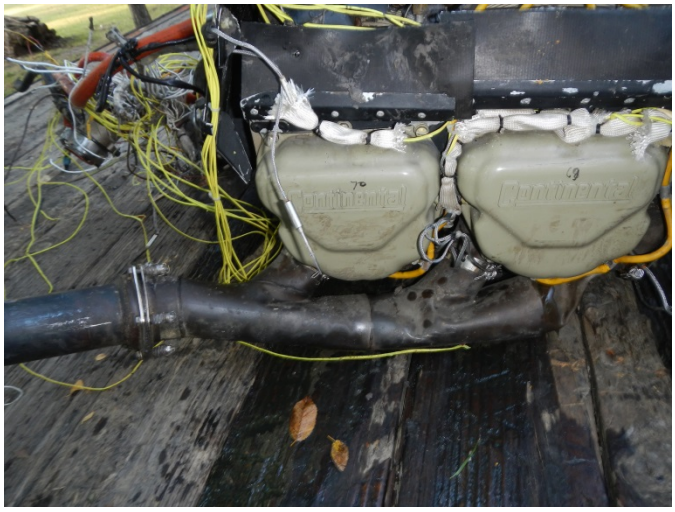
There were no external signs of pre-accident operational distress with any of the engine components or systems.



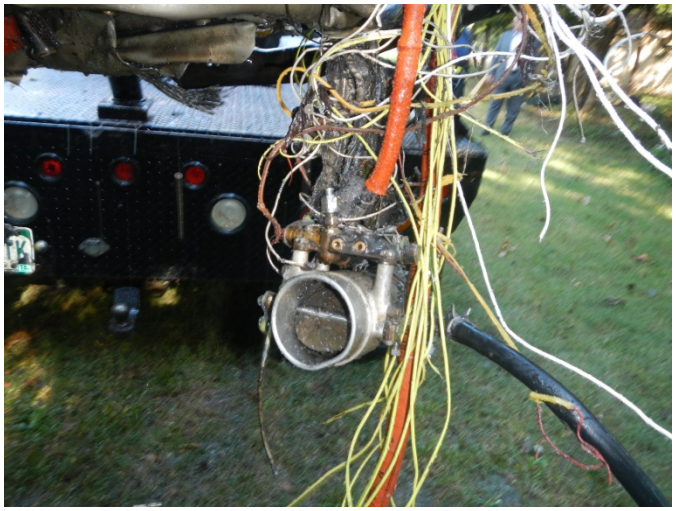


ENGINE TEARDOWN AND COMPONENT EXAMINATION

EXHAUST SYSTEM	
Condition:	The exhaust risers remained attached to their respective cylinders and the exhaust manifolds remained in place; however, they sustained deformation damage and were filled with mud and debris. The turbocharger exhaust system was separated from the exhaust manifold. No pre-accident anomalies were noted with the exhaust system components.

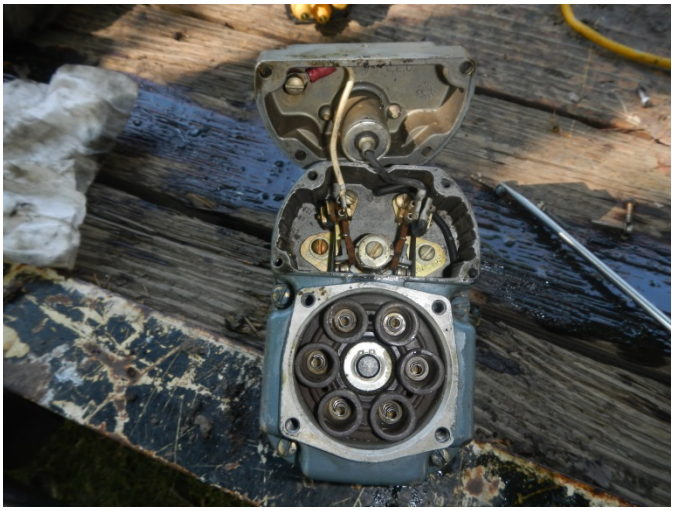


INDUCTION SYSTEM	
Condition:	The intake risers were fractured and separated from their respective cylinders. Portions of the intake system were found in the wreckage. The throttle body remained attached to the engine via a fuel line. A majority of the induction system was not observed during the wreckage examination.

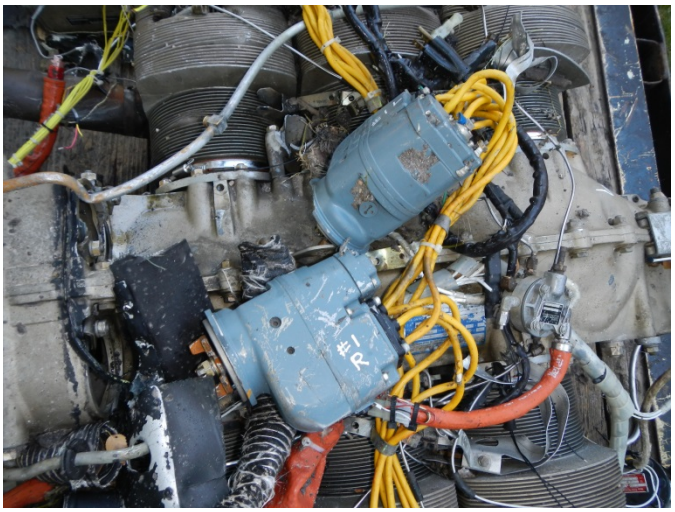


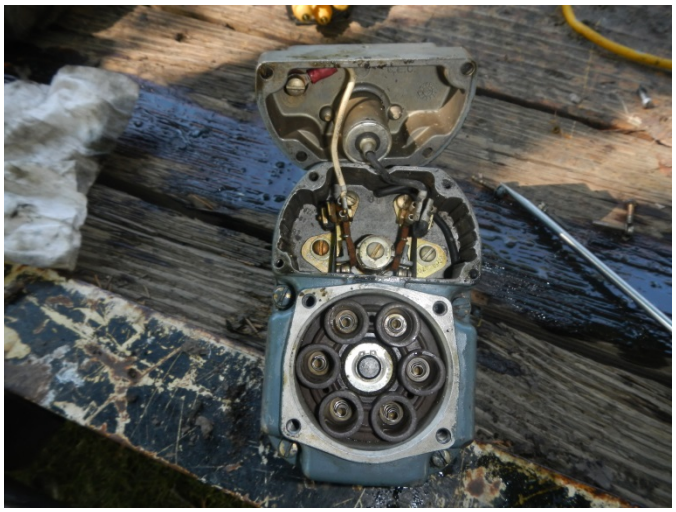
IGNITION SYSTEM

LEFT MAGNETO	Manufacturer: CMI S6RSC-201	P/N: 10-600606-1	S/N: H079819ER
Condition:	The left magneto was separated from its mounting pad but remained attached to the engine via the ignition harness. The mounting flange was fractured in an area that coincided with the attach washers. The drive shaft was manually rotated with no binding noted. The distributor gear shaft rotated with manual rotation of the drive shaft; however, no spark was noted as there was no impulse coupling for either magneto. The housing plug was removed and water/mud was drained from the magneto. The point/capacitor cover was removed and the magneto was permitted to dry for an hour. The point/capacitor cover was reinstalled and the drive shaft was rotated using a hand drill. Spark was observed emitting from the left magneto's distributor block. No internal, pre-accident anomalies, besides water emersion and mud contamination, were observed with the magneto.		



RIGHT MAGNETO	Manufacturer: CMI S6RSC-203	P/N: 10-6006??-1	S/N: ?109720BR
Condition:	The right magneto was separated from its mounting pad but remained attached to the engine via the ignition harness. The mounting flange was fractured in an area that coincided with the attach washers. The drive shaft was manually rotated with no binding noted. The distributor gear shaft rotated with manual rotation of the drive shaft; however, no spark was noted as there was no impulse coupling for either magneto. The housing plug was removed and water/mud was drained from the magneto. The point/capacitor cover was removed and the magneto was permitted to dry for an hour. The point/capacitor cover was reinstalled and the drive shaft was rotated using a hand drill. No spark was observed from the right magneto's distributor block; however, a significant amount of water and mud contamination remained. No internal, pre-accident anomalies, besides water emersion and mud contamination, were observed with the magneto.		

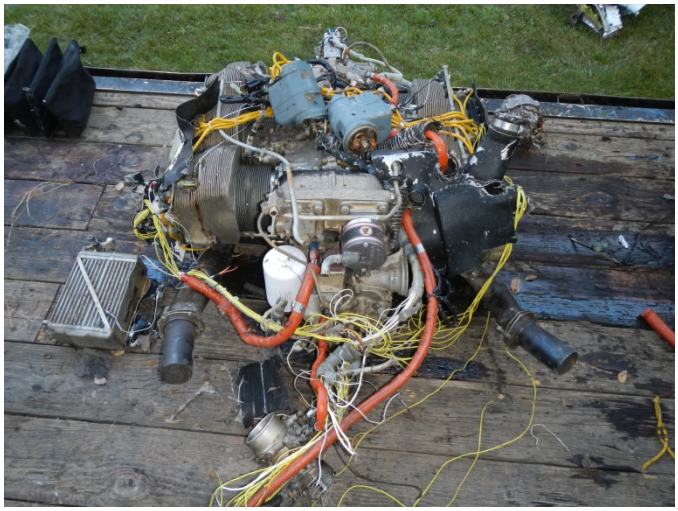


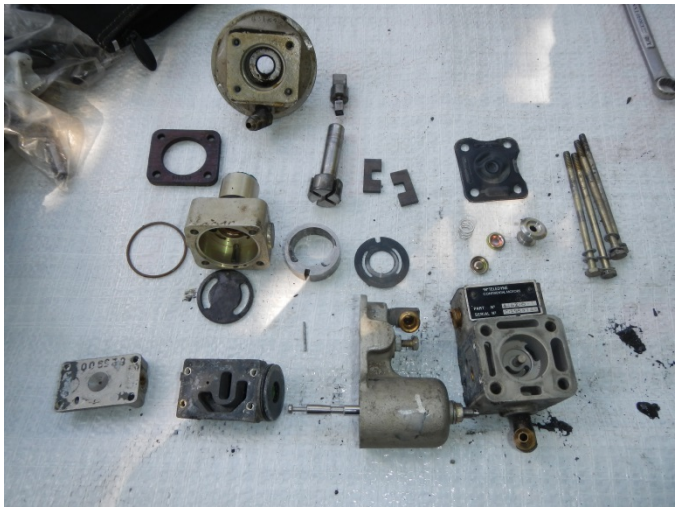


IGNITION HARNESS	Manufacturer: CMI	P/N: Unknown	S/N: Unknown
Condition:	The ignition harness remained attached to the magnetos, but a number of the leads were damaged. All of the terminal ends remained attached to their respective sparkplugs.		
SPARK PLUGS	Manufacturer: Champion	P/N: RHB32E	
Condition:	The top sparkplugs were covered with mud, water, and oil. All electrodes displayed a normal worn condition when compared to the Champion Aviation Service Manual (AV6-R).		

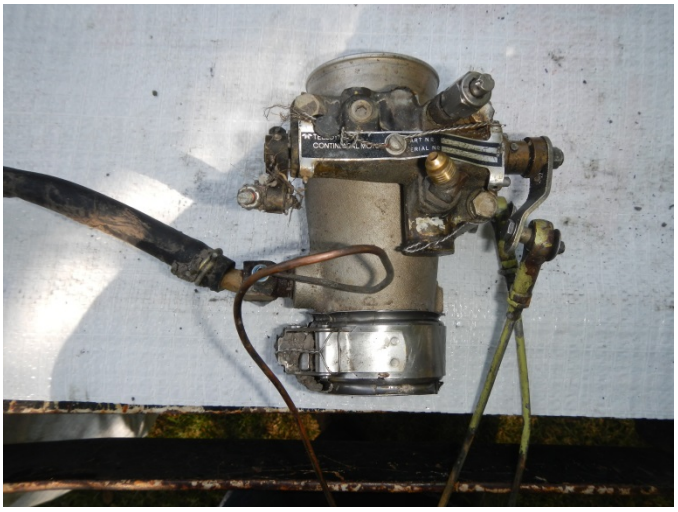
FUEL SYSTEM

FUEL PUMP	Manufacturer: CMI	P/N: 646210-1	S/N: C129807BR
Condition:	The engine-driven fuel pump was attached to the backside of the engine. The fuel line from the pump to the metering unit was attached and intact. Removal of the fuel line resulted in fuel, water, and mud pouring from the fittings. The engine-driven fuel pump was removed from the backside of the engine and fuel poured from the housing fittings. The drive coupling was intact and rotation of the drive coupling while installed in the driveshaft resulted in rotation of the driveshaft with a gritty feel to the rotation, but no binding noted. The fuel pump was disassembled and no pre-accident anomalies were noted with any of the internal components.		



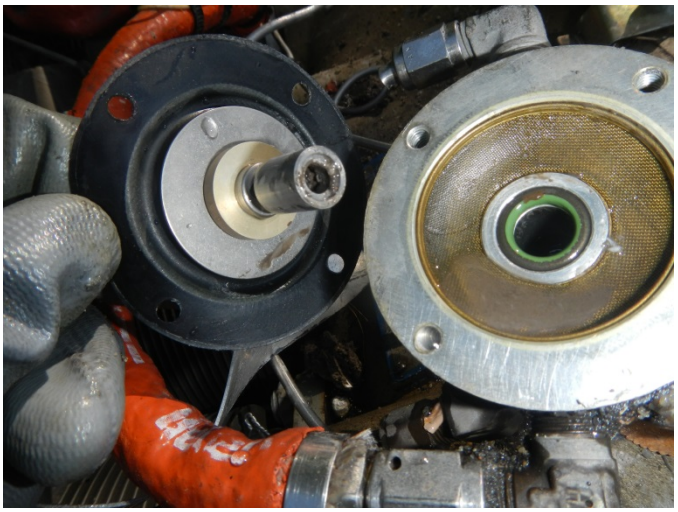


THROTTLE BODY METERING UNIT	Manufacturer: CMI	P/N: 632916-8	S/N: H129818AR
Condition:	The throttle body/fuel metering unit remained attached to the engine via the fuel line between the fuel pump and the metering unit. The throttle and mixture cables remained attached to the throttle body and metering unit levers, which remained attached to their respective shafts. Rotation of the levers resulted in a coinciding rotation of the shafts with no binding noted. The metering unit fuel inlet filter was removed and no obstructions or blockage was noted, but mud and dirty water was observed. The metering unit was disassembled and besides water and dirt contamination, no pre-accident anomalies were noted with the internal components.		

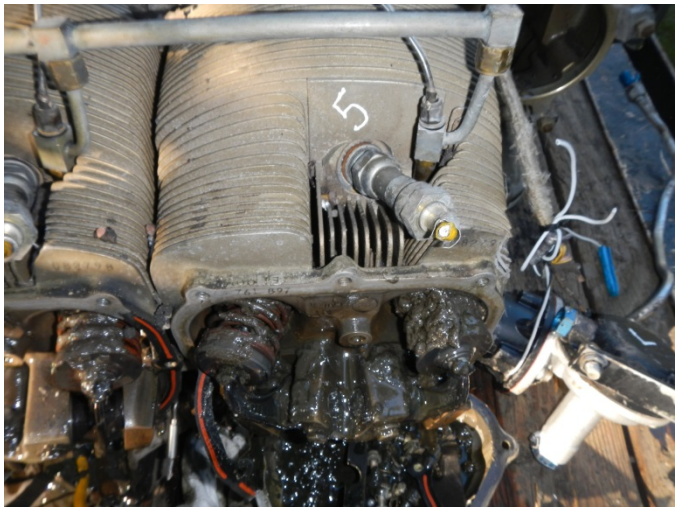



ART Nº
ERIAL Nº

FUEL MANIFOLD VALVE	Manufacturer: CMI	P/N: 631351-18A2	S/N: C129806CR
Condition:	The fuel manifold valve remained attached to the topside of the engine; however, some of the fuel injection lines were fractured and it was separated from its mount. The cap was secured to the body with safety-wire. The fuel manifold valve was disassembled and aviation gasoline, mud and water were noted in the manifold. No pre-accident anomalies were noted with the diaphragm, plunger, spring, or screen.		



FUEL NOZZLES AND LINES	Manufacturer: CMI
Condition:	The upper deck reference (UDR) lines remained attached to the fuel injector nozzles with the exception of the #2 nozzle. The #2 nozzles was bent and its UDR shroud remained in place, but the UDR manifold line was separated. The fuel lines remained secured to their respective nozzles.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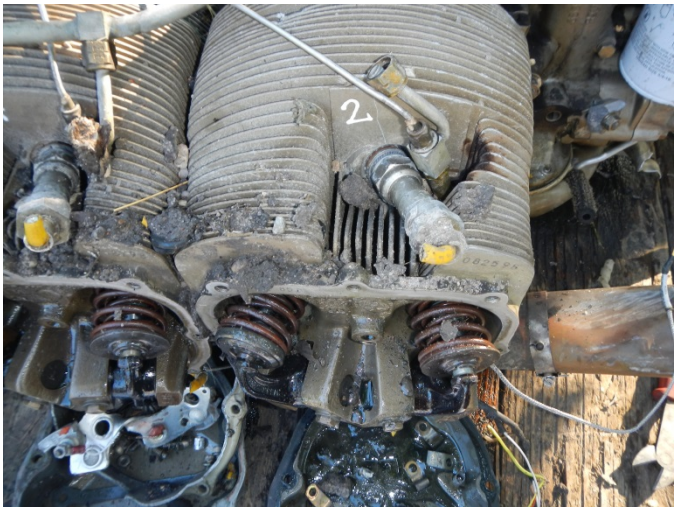
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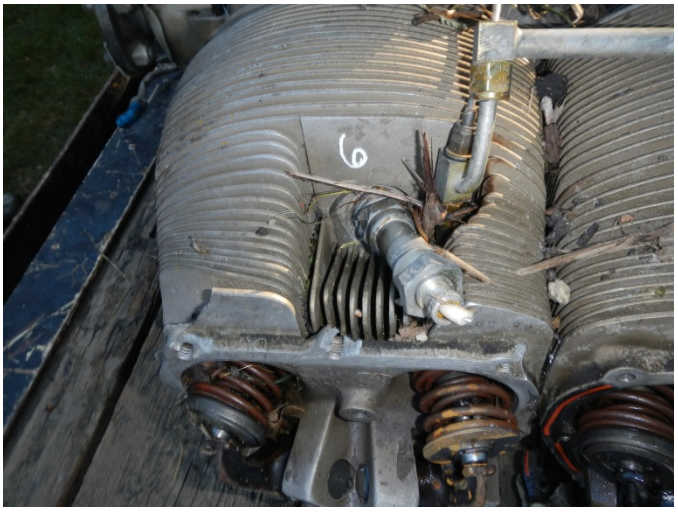
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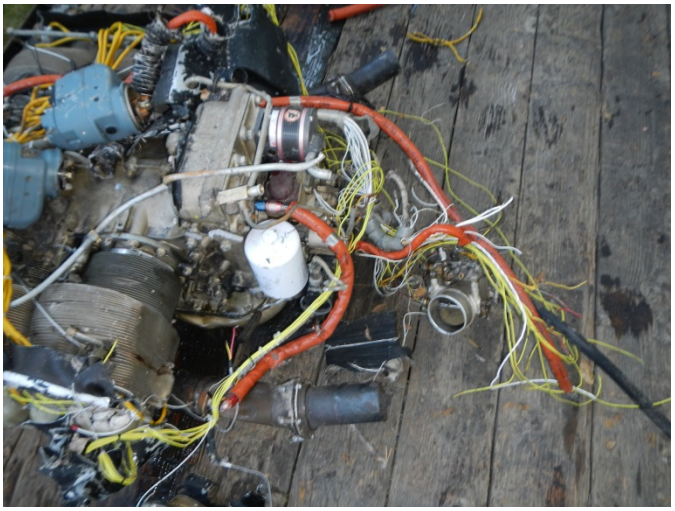
LUBRICATION SYSTEM

OIL SUMP	
Condition:	The oil sump was crushed upward toward the bottom side of the engine and sections were torn permitting a view of the oil pickup tube/screen. No pre-accident anomalies were noted with the observed portions of the oil sump.

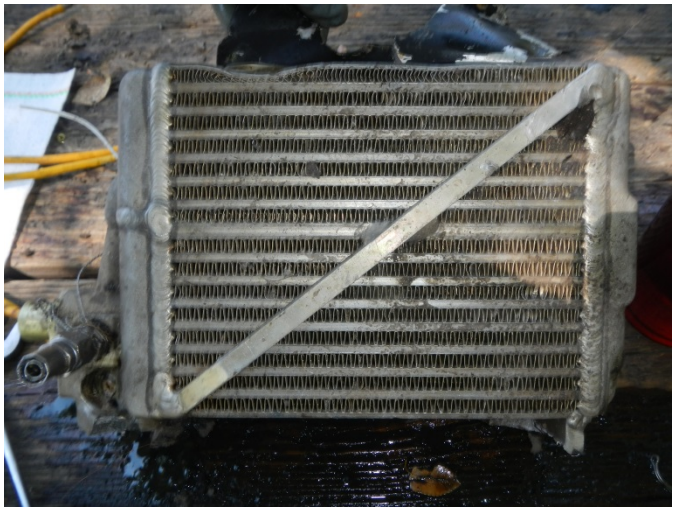
OIL PICKUP TUBE & SCREEN	
Condition:	The oil pickup tube/screen was visible through the fractured oil sump. No pre-accident anomalies were noted.

OIL PUMP	
Condition:	The oil pump remained attached to the backside of the engine. No external pre-accident anomalies were noted. The oil pump was not disassembled, but all of the visible components of the engine appeared to be well lubricated with no signs of thermal distress noted.

OIL FILTER	Manufacturer: Champion
Condition:	The oil filter remained secured and safety-wired to the engine. There were no signs of pre-accident anomalies with the oil filter.



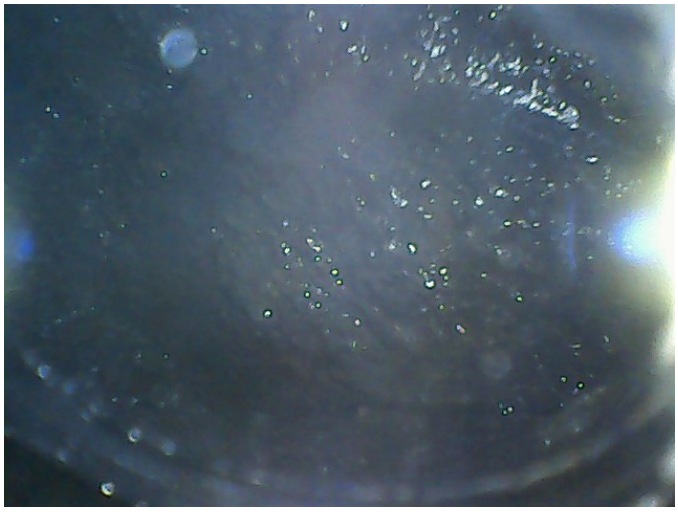
OIL COOLER	Manufacturer: Niagara Development & Manufacturing Co.	P/N: 654572	S/N: G98-2750-776
Condition:	The oil cooler was separated from its mounting pad on the engine, but remained attached via two electrical wires. Besides impact-related damage, no pre-accident anomalies were noted with the oil cooler and residual oil flowed from the unit.		



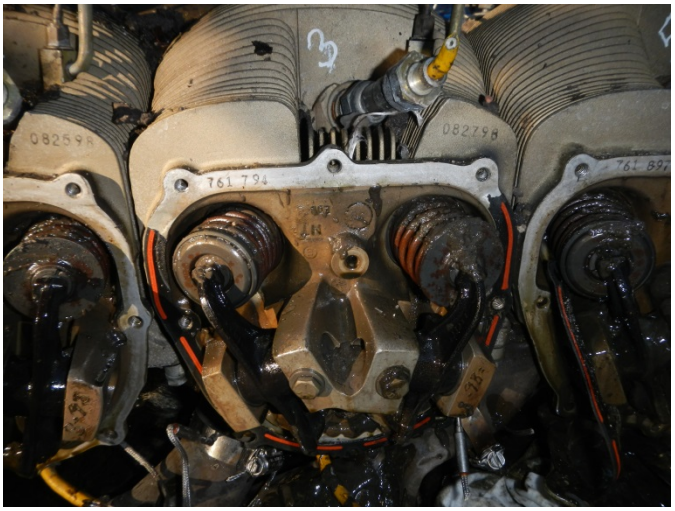
CYLINDERS

NOTE: The photographs that follow the cylinder condition description represent the cylinder head components, the piston, the intake valve, and the exhaust valve, in that order unless otherwise noted.

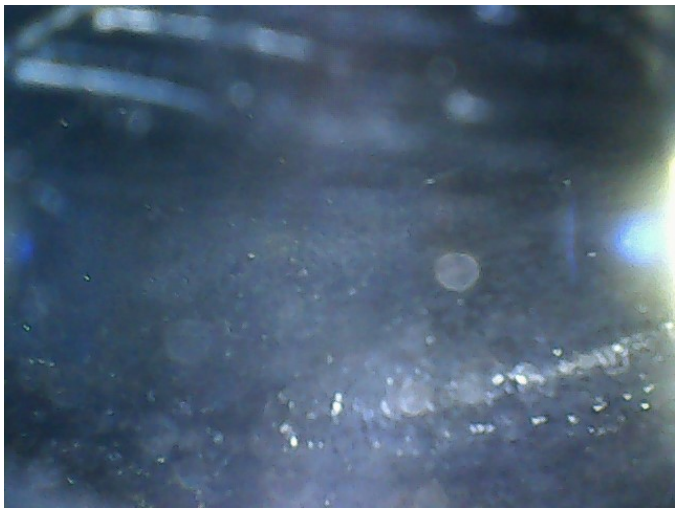
CYLINDER #1	P/N: 658552A1	S/N: Unknown	Head Date: 8-98
Condition:	The cylinder remained attached to the engine and torque putty from the last overhaul was evident on the cylinder flange hardware. No pre-accident anomalies were noted externally. The top sparkplug was removed from the engine and the cylinder was inspected using a lighted borescope. Mud and water were observed in the cylinder. The crankshaft was rotated and the rockers, valves, and valve springs functioned properly and piston movement was observed. No pre-accident anomalies were noted with the cylinder components.		



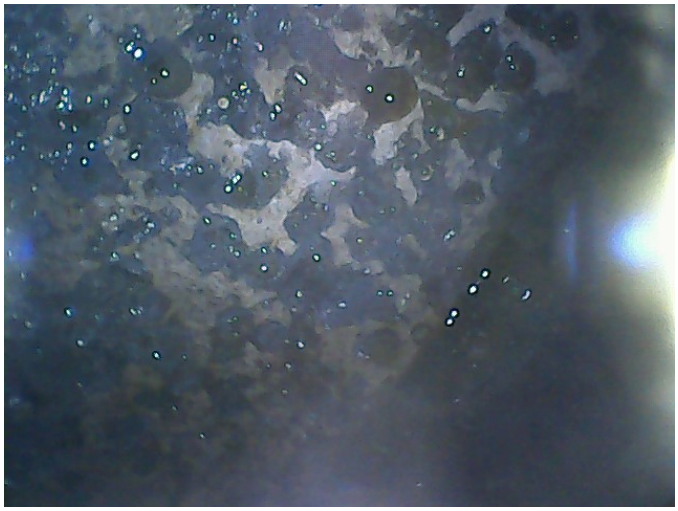
CYLINDER #3	P/N: 658552A1	S/N: Unknown	Head Date: 8-98
Condition:	The cylinder remained attached to the engine and torque putty from the last overhaul was evident on the cylinder flange hardware. No pre-accident anomalies were noted externally. The top sparkplug was removed from the engine and the cylinder was inspected using a lighted borescope. Mud and water were observed in the cylinder. The crankshaft was rotated and the rockers, valves, and valve springs functioned properly and piston movement was observed. No pre-accident anomalies were noted with the cylinder components.		

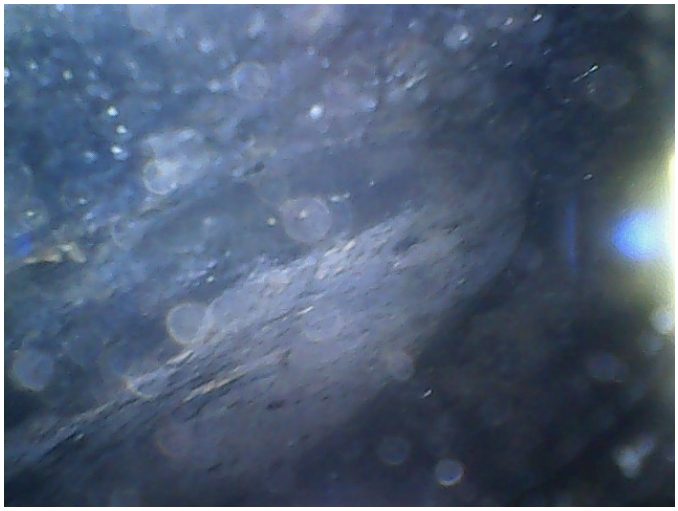


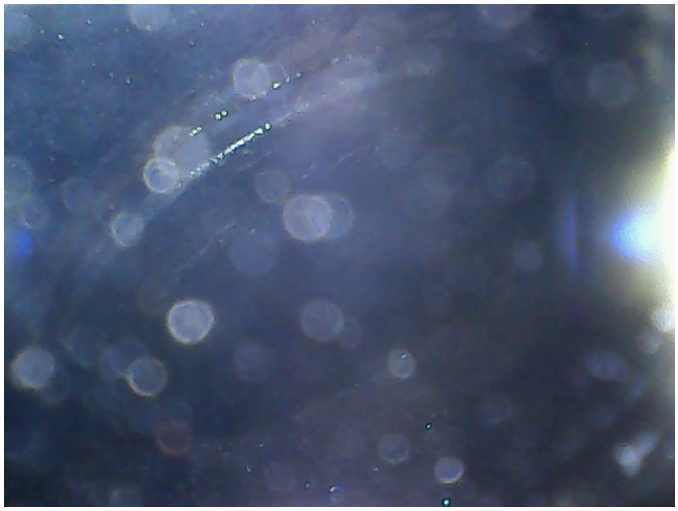
CYLINDER #5	P/N: 658552A1	S/N: Unknown	Head Date: 8-98
Condition:	The cylinder remained attached to the engine and torque putty from the last overhaul was evident on the cylinder flange hardware. No pre-accident anomalies were noted externally. The top sparkplug was removed from the engine and the cylinder was inspected using a lighted borescope. Mud and water were observed in the cylinder. The crankshaft was rotated and the rockers, valves, and valve springs functioned properly and piston movement was observed. No pre-accident anomalies were noted with the cylinder components.		



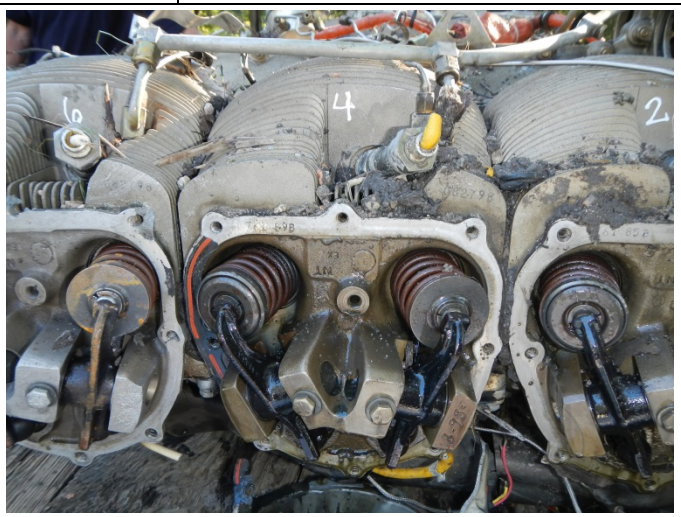
CYLINDER #2	P/N: 658552A1	S/N: Unknown	Head Date: 8-98
Condition:	The cylinder remained attached to the engine and torque putty from the last overhaul was evident on the cylinder flange hardware. No pre-accident anomalies were noted externally. The top sparkplug was removed from the engine and the cylinder was inspected using a lighted borescope. Mud and water were observed in the cylinder. The crankshaft was rotated and the rockers, valves, and valve springs functioned properly and piston movement was observed. No pre-accident anomalies were noted with the cylinder components.		

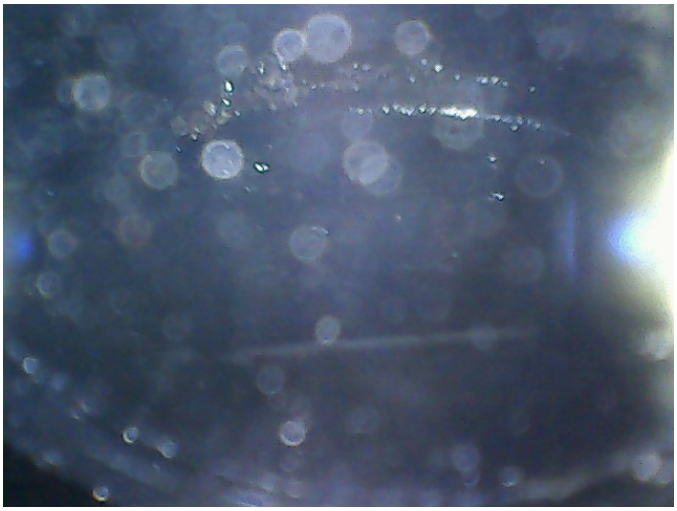






CYLINDER #4	P/N: 658552A1	S/N: Unknown	Head Date: 8-98
Condition:	The cylinder remained attached to the engine and torque putty from the last overhaul was evident on the cylinder flange hardware. No pre-accident anomalies were noted externally. The top sparkplug was removed from the engine and the cylinder was inspected using a lighted borescope. Mud and water were observed in the cylinder. The crankshaft was rotated and the rockers, valves, and valve springs functioned properly and piston movement was observed. No pre-accident anomalies were noted with the cylinder components.		





CYLINDER #6	P/N: 658552A1	S/N: Unknown	Head Date: 8-98
Condition:	The rocker cover was fractured and the majority was missing. The cylinder remained attached to the engine and torque putty from the last overhaul was evident on the cylinder flange hardware. No pre-accident anomalies were noted externally. The top sparkplug was removed from the engine and the cylinder was inspected using a lighted borescope. Mud and water were observed in the cylinder. The crankshaft was rotated and the rockers, valves, and valve springs functioned properly and piston movement was observed. No pre-accident anomalies were noted with the cylinder components.		

CRANKCASE ASSEMBLY

CRANKCASE	Casting Number:	1-3-5: Not Recorded	2-4-6: Not Recorded	S/N: H219814R
Condition:	The crankcase remained intact with no pre-accident anomalies noted.			

CRANKSHAFT ASSEMBLY

CRANKSHAFT	Forging Number: Not Observed	S/N: H109510N	Heat code: Not Observed
Condition:	Though the crankshaft was not viewed in its entirety, crankshaft continuity was visually observed during manual rotation of the propeller flange. The crankshaft gear rotated in conjunction with the propeller flange and all pistons moved within their respective cylinders during crankshaft rotation.		

CAMSHAFT

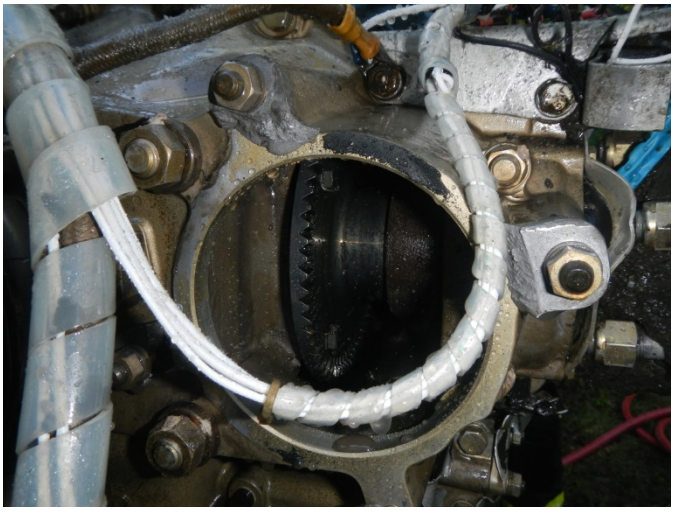
CAMSHAFT	P/N: Not observed	S/N: Not observed
Condition:	Though the camshaft was not visually observed, camshaft continuity was observed on all of the rockers during manual rotation of the crankshaft (with the exception of the rocker's whose pushrods were missing).	

ACCESSORIES

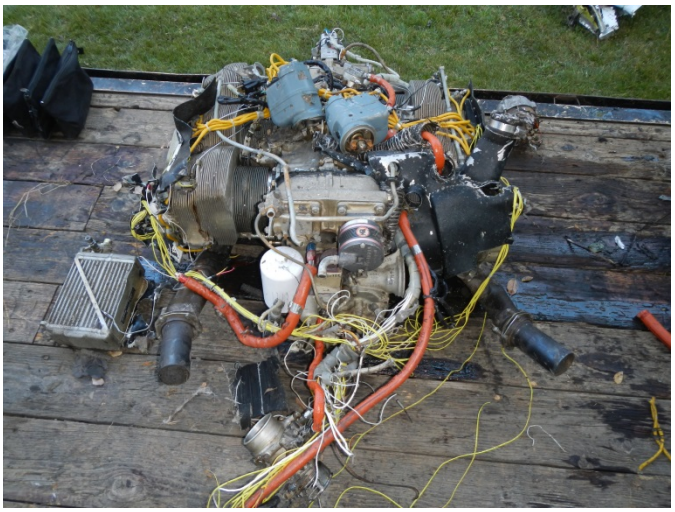
STARTER	Manufacturer: Unknown	P/N: Unknown	S/N: Unknown
Condition:	The starter motor was separated from its mounting pad. Only one starter motor (Energizer 24 PN: 646275 SN: A08269806) was recovered from the pond. No pre-accident anomalies were noted with the recovered motor.		

STARTER ADAPTER	
Condition:	The starter adapter remained attached to the backside of the engine with no pre-accident anomalies noted.

ALT/GEN #1	Manufacturer: Unknown	P/N: Unknown	S/N: Unknown
Condition:	The alternator was separated from the front right side of the engine. No pre-accident anomalies were noted with the alternator drive gear.		



VACUUM PUMP	Manufacturer: Tempest	P/N: Unknown	S/N: Unknown
Condition:	The vacuum pump remained secured to the backside of the engine. One of the mount studs was bent and removal of the pump could not be facilitated.		



TURBO	Manufacturer: Garrett	P/N: 632729-11	S/N: BH017650
Condition:	The turbocharger, wastegate, overboost valve and controller were separated from the aircraft and the engine. The left turbocharger remained attached to a portion of fractured airframe which also retained a portion of exhaust manifold. Dirt and mud were observed in both the impeller and turbine sections of the turbocharger. Removal of the turbocharger impeller shroud revealed that the impeller was intact and the shaft to the turbine was intact and capable of rotation.		

TURBO CONTROLLER	Manufacturer: Kelly Aerospace (OH by Main Turbo Systems, Inc.)	P/N: 470948-1	S/N: JL0101
Condition:	The controller was separated from the aircraft and engine. The controller was intact with no external signs of operational distress. Residual oil poured from the controller during the examination.		

WASTEGATE	Manufacturer: Garrett	P/N: 470780-9016	S/N: BH006171
Condition:	The wastegate actuator remained attached to the wastegate linkage and no pre-accident anomalies or disconnects were noted.		

OVERBOOST VALVE	Manufacturer: Unknown	P/N: Unknown	S/N: Unknown
Condition:	The overboost valve was intact and its poppet valve could be opened and the spring was intact.		

PROPELLER

PROPELLER GOVERNOR	Manufacturer: Unknown	P/N: Unknown	S/N: Unknown
Condition:	The propeller governor was separated from the engine and was not located or observed during the examination.		
PROPELLER	Manufacturer: McCauley	P/N: Unknown	S/N: Unknown
Condition:	The left propeller hub was fractured and only two of the three blades were recovered with only remnant of the hub remaining attached to one of the blades. The two blades displayed s-bending, and both were twisted toward low pitch. The pitch change link was fractured from the blade shanks.		


#1L