



Continental Motors

ENGINE EXAMINATION REPORT

ENGINE MODEL	IO-520-C3
ENGINE SERIAL NUMBER	830948-R
AIRCRAFT MAKE & MODEL	Beech 95-C55
AIRCRAFT SERIAL NUMBER	TE-298
AIRCRAFT REGISTRATION	N3717Q
FILE NUMBER	16-656

NAME	SIGNATURE	DATE
Nicole L. Charnon		09/20/2017

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EXAMINATION		ACCIDENT DATA	
DATE	09/19 and 20/2017	NTSB ACCIDENT #	WPR16FA125
FACILITY	Plain Parts	NTSB INVESTIGATOR	Tealeye Cornejo
ADDRESS	5007 Pacific Ave. Pleasant Grove, CA 95668	FAA INVESTIGATOR	Cholena Devlin
		ACCIDENT DATE	06/09/2017
		ACCIDENT LOCATION	Mountain Ranch CA

ENGINE INFORMATION

ENGINE POSITION	Left Engine
TOTAL TIME	350 at last oil change (03/03/2017)
TIME SOH	N/A
TYPE & TIME SLI	Oil Change 03/03/2017 at 350 hours total time
BUILD DATE	05/24/2005
IN SERVICE DATE	03/20/2006

Significant logbook information:

The engine was built in 2005 and was installed on the accident airplane on March 20, 2006. According to the maintenance records, the engine underwent a series of annual inspections and oil changes, the last of which took place on March 3, 2017, at an engine total time of 350 hours. The instrument panel was destroyed and the Hobbs meter was not observed.

Report Summary:

Search Code(s):

15-12-68

The engine sustained significant impact-related damage that precluded functional testing of the engine and the engine-related systems. The propeller, magnetos, alternator, oil cooler, oil dipstick housing, and exhaust system were separated from the engine. The cylinders were inspected utilizing a lighted borescope with no pre-accident anomalies noted with the pistons, barrels, valves or valve seats. There were no signs of lubrication distress or discoloration. Examination of the ignition and fuel system components did not reveal any pre-accident anomalies.

Disposition of engine following exam:

The engine and all engine-related systems were left at the aircraft recovery facility.

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NAME	Tealeye Cornejo	NAME	Peter Basile
ADDRESS	Western Pacific Region	ADDRESS	Wichita, Kansas
ORGANIZATION	NTSB	ORGANIZATION	Textron Aviation
PHONE		PHONE	
NAME	Nicole Charnon	NAME	
ADDRESS	Washington, DC	ADDRESS	
ORGANIZATION	Continental Motors	ORGANIZATION	
PHONE		PHONE	

EXTERNAL ENGINE CONDITION

The propeller was separated from the engine and the engine was lying in an upright position on top of a wooden pallet. The crankshaft was fractured aft of the propeller flange and the crankcase around the nose seal sustained deformation damage. The exhaust system was separated from the engine as were the magnetos. All six cylinders sustained deformation or fracture damage to their cooling fins and/or rocker covers. The bottom front crankcase was fractured and the engine-driven alternator was separated from the engine. The alternator face gear and propeller governor drive and bevel gears were visible through the fractured case with no pre-accident anomalies noted. The crankshaft and oil transfer collar were intact and did not show any signs of lubrication distress.

The engine-driven fuel pump remained attached to the backside of the engine and the vapor return fitting was fractured. The throttle body remained attached to the engine. The throttle lever was bent and the throttle body was deformed around the throttle valve which was in the full open position. The fuel metering unit was separated from the throttle body. The throttle and mixture control cables remained secured to their control levers, but the levers were bent and deformed. The fuel manifold valve was separated from its mount and all injector lines were separated from the housing, except one.

The oil pump housing was fractured but the pump remained attached to the backside of the engine. Only the fractured remains of an oil filter were observed in the wreckage. The oil cooler was separated and deformed and the oil sump was deformed and fractured.

There were no external signs of operational distress with any of the engine components.

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ENGINE COMPONENT EXAMINATION

INTAKE AND EXHAUST SYSTEMS

The exhaust system was separated from the engine. The induction system was fragmented. Only one intake riser remained attached to its cylinder. Two other risers were separated from their cylinders but remained attached to the engine by the balance tube. The throttle body was deformed and the throttle valve was in the full open position.



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IGNITION SYSTEM

Both magnetos were separated from the topside of the engine and the ignition harness was fragmented. The left magneto remained attached to the engine via a couple of ignition leads. The magneto was disassembled since functional testing was not possible due to damage sustained during the accident sequence. No pre-accident anomalies were noted with the internal components.



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The top sparkplugs were removed from their respective cylinders and the bottom sparkplugs were documented utilizing a lighted borescope. Some of the sparkplugs were covered in dirt from the accident site and some were oil coated, but there was no sign of lead or carbon fouling on any of the electrodes.



1T



1B



3T



3B

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5T



5B



2T



2B



4T



4B

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6T



6B

FUEL SYSTEM

The engine-driven fuel pump remained secured to the backside of the engine. The vapor return fitting was fractured. The pump was removed and the drive coupling remained intact. The pump was disassembled and a bee was found between the pump vanes; however, since it was intact it is presumed that the bee entered the system following the wreckage recovery. No other pre-accident anomalies were noted with any of the internal components.



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The throttle body and fuel metering unit remained attached to the backside of the engine, but they were separated from each other. The mixture and throttle control cables remained attached to their respective levers, but the levers were bent and deformed. The throttle lever and throttle valve were jammed in place and were found in the full open position. The throttle interconnect linkage was fractured. The fuel metering unit was disassembled. The inlet screen contained a small piece of lint near the base, but the screen was not blocked or obstructed. The mixture and throttle cams were removed as was the metering plug. No pre-accident anomalies were noted with any of the o-rings or metering orifices.



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The fuel manifold valve remained attached to the topside of the engine via one injector line. The cap was removed and the diaphragm was intact. The screen was clean and free from obstructions and debris. No pre-accident anomalies were noted with the unit.



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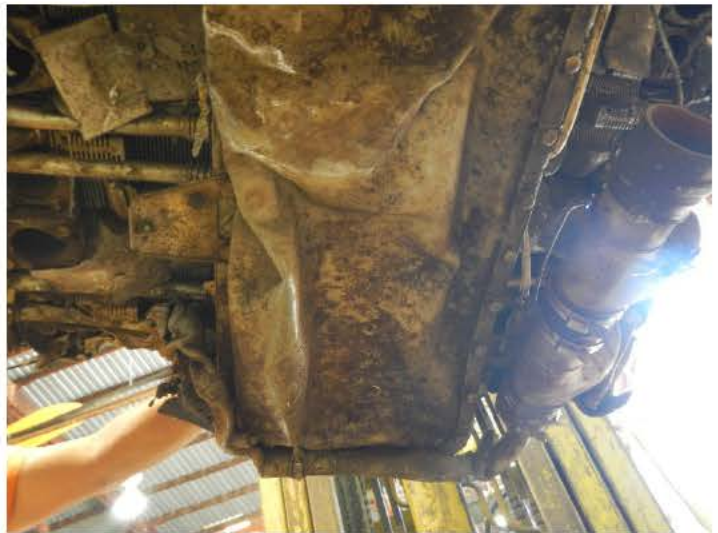
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LUBRICATION SYSTEM

The oil sump was displaced up around the bottom of the engine and there were numerous punctures and tears. The camshaft gear was protruding from the aft end of the sump. The oil pump remained attached to the backside of the engine; however, the pump housing cap was fractured as was the tach drive. The remains of the cap were removed and the gears were examined. The drive gear splines displayed a torsional displacement. The gears were intact and did not display any pre-accident anomalies. The housing walls displayed short arcs of circumferential scoring that coincided with the apexes of the drive gear teeth and the cap remains displayed an arc of displaced and polished metal. The oil cooler was deformed and the mount was fractured. The oil filler neck and oil filter were separated from the engine. None of the observed components displayed signs of thermal discoloration or lubrication system distress.



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CYLINDERS

The cylinders remained attached to the crankcase and the original torque putty was observed on the attaching hardware. The cylinders sustained impact-related damage to the cooling fins and rocker area. The top sparkplugs were removed and the cylinders were examined internally utilizing a lighted borescope. Dirt from the accident site was present in some of the cylinders and oil was observed in cylinders #1 and #3; however, there were no pre-accident anomalies noted externally or internally on the barrels, pistons, valves or valve seats.

NOTE: The photographs that follow each cylinder number represent the rocker area, the piston, the intake valve and the exhaust valve in that order unless otherwise specified.

Cylinder 1



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Cylinder 3



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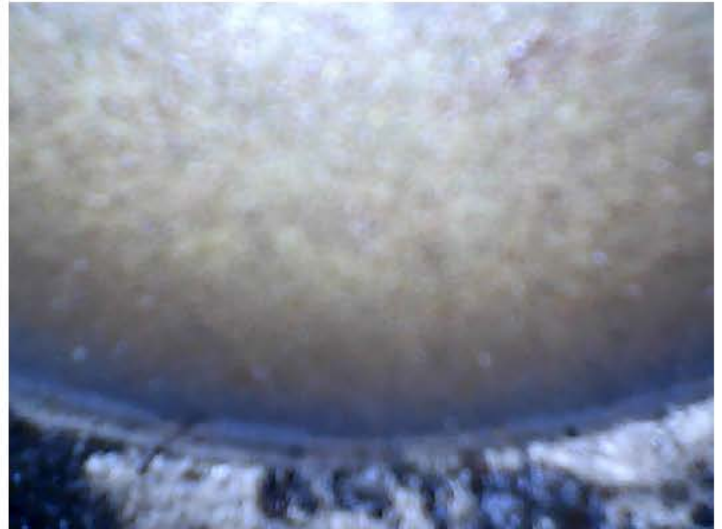
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Cylinder 5



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Cylinder 2



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Cylinder 4



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Cylinder 6



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CRANKCASE ASSEMBLY

The crankcase sustained impact-related damage to the front end of the crankcase. The bottom portion of the case halves were damaged when the oil sump was displaced upward. Additionally, the area around the engine-driven alternator was also fractured. However, there were no signs of pre-accident operational anomalies with the crankcase.



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CRANKSHAFT & CONNECTING ROD ASSEMBLY

The crankshaft was fractured aft of the propeller flange. Though the crankshaft was not visible in its entirety, the portions that were did not display any signs of thermal discoloration or lubrication distress. The crankshaft gear remained secured in place. The connecting rods were not observed.



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CAMSHAFT & LIFTERS

The camshaft and lifters were not observed. Only a portion of the camshaft gear that was protruding from the bottom of the oil sump and the propeller governor drive gear were observed.



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ACCESSORIES

The vacuum pump remained partially attached to the backside of the engine. It was disassembled and the vanes remained intact with no pre-accident anomalies noted. The alternator was separated from the front right side of the engine. One alternator was found within the debris and it did not display any pre-accident anomalies. The starter and starter adapter remained attached to the backside of the engine.



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PROPELLER

The propeller governor remained attached to the front side of the crankcase, but the control lever was fractured and separated from the governor.

The propeller was separated from the engine. The hub remained intact and all three blades remained attached to the hub. The blades were rotated in the hub, indicative of pitch change linkage fracture. The piston housing was partially separated. All three blades retained their counterweights. The blades were arbitrarily labeled A, B, and C. Blade A was bent aft with a slight twist toward low pitch. Blade B displayed a twist toward low pitch along with leading edge gouges, chord-wise scrapes and chord-wise paint erosion. Blade C displayed heavy leading edge gouges, blade twist toward low pitch, and significant blade distortion.



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AIRCRAFT MAKE & MODEL	Beech 95-C55
AIRCRAFT SERIAL NUMBER	TE-298
AIRCRAFT REGISTRATION	N3717Q
FILE NUMBER	16-656

NAME	SIGNATURE	DATE
Nicole L. Charnon		09/20/2017

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EXAMINATION		ACCIDENT DATA	
DATE	09/19 and 20/2017	NTSB ACCIDENT #	WPR16FA125
FACILITY	Plain Parts	NTSB INVESTIGATOR	Tealeye Cornejo
ADDRESS	5007 Pacific Ave. Pleasant Grove, CA 95668	FAA INVESTIGATOR	Cholena Devlin
		ACCIDENT DATE	06/09/2017
		ACCIDENT LOCATION	Mountain Ranch CA

ENGINE INFORMATION

ENGINE POSITION	Right Engine
TOTAL TIME	350 at last oil change (03/03/2017)
TIME SOH	N/A
TYPE & TIME SLI	Oil Change 03/03/2017 at 350 hours total time
BUILD DATE	05/25/2005
IN SERVICE DATE	03/20/2006

Significant logbook information:

The engine was built in 2005 and was installed on the accident airplane on March 20, 2006. According to the maintenance records, the engine underwent a series of annual inspections and oil changes, the last of which took place on March 3, 2017, at an engine total time of 350 hours. The instrument panel was destroyed and the Hobbs meter was not observed.

Report Summary:

Search Code(s):

15-12-68

The engine sustained significant impact-related damage that precluded functional testing of the engine and the engine-related systems. The propeller, prop governor, magnetos, and alternator were separated from the engine. The cylinders were inspected utilizing a lighted borescope with no pre-accident anomalies noted with the pistons, barrels, valves or valve seats. There were no signs of lubrication distress or discoloration. Examination of the ignition and fuel system components did not reveal any pre-accident anomalies.

Disposition of engine following exam:

The engine and all engine-related systems were left at the aircraft recovery facility.

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NAME	Tealeye Cornejo	NAME	Peter Basile
ADDRESS	Western Pacific Region	ADDRESS	Wichita, Kansas
ORGANIZATION	NTSB	ORGANIZATION	Textron Aviation
PHONE		PHONE	
NAME	Nicole Charnon	NAME	
ADDRESS	Washington, DC	ADDRESS	
ORGANIZATION	Continental Motors	ORGANIZATION	
PHONE		PHONE	

EXTERNAL ENGINE CONDITION

The propeller was separated from the engine and the engine was lying upside down on top of a wooden pallet. The crankshaft was fractured aft of the propeller flange and the crankcase around the nose seal sustained deformation damage. The exhaust system remained attached to the engine but sustained significant deformation damage. The magnetos were separated from the topside of the engine. All six cylinders sustained deformation or fracture damage to their cooling fins and/or rocker covers. The bottom front crankcase was fractured and the engine-driven alternator was separated from the engine. The alternator face gear and propeller governor drive and bevel gears were visible through the fractured case with no pre-accident anomalies noted. The crankshaft and oil transfer collar were intact and did not show any signs of lubrication distress.

The engine-driven fuel pump remained attached to the backside of the engine; all but one fuel line fittings were fractured. The throttle body remained attached to the engine, but the wye plenum was fractured. The throttle lever and throttle valve were found in the full open position. The fuel metering unit remained attached to the throttle body, though the mixture shaft was bent. The throttle and mixture control cables remained secured to their control levers, but the levers were bent and deformed. The fuel manifold valve was separated from its mount and all injector lines were separated from the housing, except one. The fuel inlet line remained attached to the manifold valve.

The oil pump housing was fractured but the pump remained attached to the backside of the engine. The oil filter remained attached to the oil filter adapter. The oil cooler remained in place, but its mounting system was fractured and the cooler was deformed. The oil sump sustained deformation damage but remained attached to the bottom side of the engine.

There were no external signs of operational distress with any of the engine components.

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ENGINE COMPONENT EXAMINATION

INTAKE AND EXHAUST SYSTEMS

The exhaust system remained attached to the engine but sustained deformation damage. The intake wye plenum was fractured, the elbows were separated, and the balance tube was deformed. The intake tubes remained attached to their respective cylinders with no pre-accident anomalies noted. The throttle valve was in the full open position.



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IGNITION SYSTEM

Both magnetos were separated from the topside of the engine and the ignition harness was fragmented. One magneto was found in the wreckage and was identified as the left magneto on the right engine (the serial number was noted in the aircraft maintenance records). That magneto was disassembled since functional testing was not possible due to damage sustained during the accident sequence. No pre-accident anomalies were noted with the internal components.



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The bottom sparkplugs were removed from their respective cylinders and the top sparkplugs were documented utilizing a lighted borescope. Some of the sparkplugs were covered in dirt from the accident site and some were coated in oil. The #4 and #6 top sparkplugs were missing their center electrodes, as the topside of those cylinders and top sparkplugs sustained significant impact damage. However, there was no sign of lead or carbon fouling on any of the electrodes.



1T



1B



3T



3B

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5T



5B



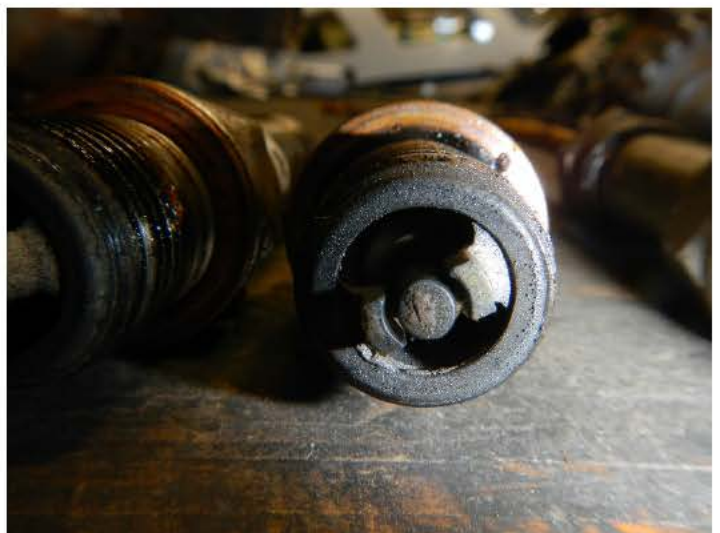
2T



2B



4T



4B

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6T



6B

FUEL SYSTEM

The engine-driven fuel pump remained secured to the backside of the engine. All but one of the fuel line fittings were fractured. The pump was removed and the drive coupling remained intact. The pump was disassembled and organic debris from insects was noted at the top of the swirl chamber near the vapor return jet; however, it is presumed that the debris entered the system following the wreckage recovery. No other pre-accident anomalies were noted with any of the internal components.



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The throttle body and fuel metering unit remained attached to the backside of the engine. The mixture and throttle control cables remained attached to their respective levers, but the levers were bent and deformed. The throttle lever and throttle valve were found in the full open position. The throttle interconnect linkage was bent. The fuel metering unit was disassembled. The inlet screen contained some lint, but the screen was not blocked or obstructed. The mixture and throttle cams were removed as was the metering plug. No pre-accident anomalies were noted with any of the o-rings or metering orifices.



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The fuel manifold valve remained attached to the topside of the engine via one injector line and the fuel inlet fitting. The cap was removed and the diaphragm was intact. The screen was clean and free from obstructions or debris. No pre-accident anomalies were noted with the unit.



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LUBRICATION SYSTEM

The oil sump remained intact on the bottom of the engine and there were no signs of pre-impact oil leaks. The oil pump remained attached to the backside of the engine; however, the pump housing cap was fractured as was the tach drive. The remains of the cap were removed and the gears were examined. The drive gear splines displayed a torsional displacement. The gears were intact and did not display any pre-accident anomalies. The housing walls displayed short arcs of circumferential scoring that coincided with the apexes of the drive gear teeth. The oil filter remained attached to the adapter and it had the following information hand written on the side for date and tach time, respectively: 1-26-17 and 3937.3. The oil cooler was deformed and the mount was fractured. The oil filler neck was partially separated from the engine. None of the observed components displayed signs of thermal discoloration or lubrication system distress.



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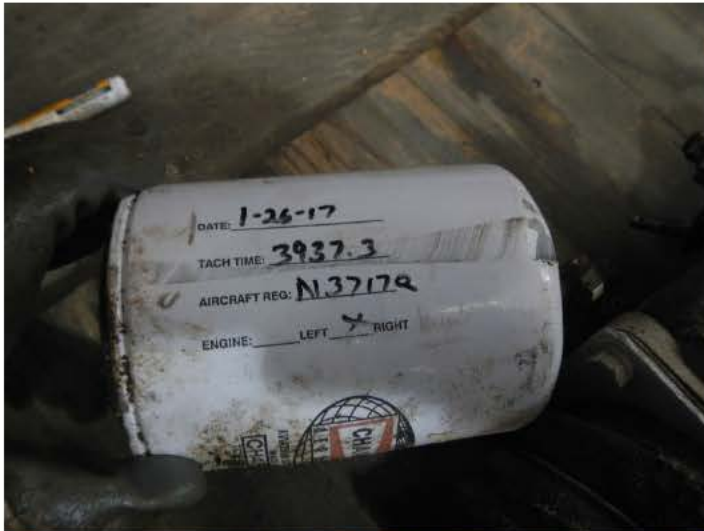
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CYLINDERS

The cylinders remained attached to the crankcase and the original torque putty was observed on the attaching hardware. The cylinders sustained impact-related damage to the cooling fins and rocker area, with the #4 and #6 cylinder heads sustaining fracture and deformation damage to the rocker areas. The bottom sparkplugs were removed and the cylinders were examined internally utilizing a lighted borescope. Dirt from the accident site was present in some of the cylinders as was oil; however, there were no pre-accident anomalies noted externally or internally on the barrels, pistons, valves or valve seats.

NOTE: The photographs that follow each cylinder number represent the rocker area, the piston, the intake valve and the exhaust valve in that order unless otherwise specified.

Cylinder 1



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Cylinder 3



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Cylinder 5



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Cylinder 2



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Cylinder 4



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Cylinder 6



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CRANKCASE ASSEMBLY

The crankcase sustained impact-related damage to the front end of the crankcase. Additionally, the area around the engine-driven alternator was also fractured. However, there were no signs of pre-accident operational anomalies with the crankcase.



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CRANKSHAFT & CONNECTING ROD ASSEMBLY

The crankshaft was fractured aft of the propeller flange. Though the crankshaft was not visible in its entirety, the portions that were did not display any signs of thermal discoloration or lubrication distress. The crankshaft gear remained secured in place. The connecting rods were not observed.



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CAMSHAFT & LIFTERS

The camshaft and lifters were not observed. The propeller governor drive gear was observed.



ACCESSORIES

The vacuum pump remained partially attached to the backside of the engine. It was disassembled and the vanes remained intact with no pre-accident anomalies noted. The alternator was separated from the front right side of the engine. One alternator was found within the debris and it did not display any pre-accident anomalies. The starter and starter adapter remained attached to the backside of the engine.



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PROPELLER

The propeller governor was separated from the engine. The control lever and cable remained attached to the governor. No anomalies were noted with propeller governor drive or the bevel gear.

The propeller was separated from the engine. The hub remained intact and all three blades remained attached. The blades were rotated in the hub, indicative of pitch change linkage fracture. The piston housing was separated. The blades were arbitrarily labeled A, B, and C. Blades B and C retained their counterweights; Blade A's counterweight was separated and the fracture surface appeared to be jagged and irregular. Blade A was twisted toward low pitch with two substantial leading edge gouges. Blade B displayed a 180-degree twist toward low pitch along with leading edge gouges. Blade C displayed a twist toward low pitch.

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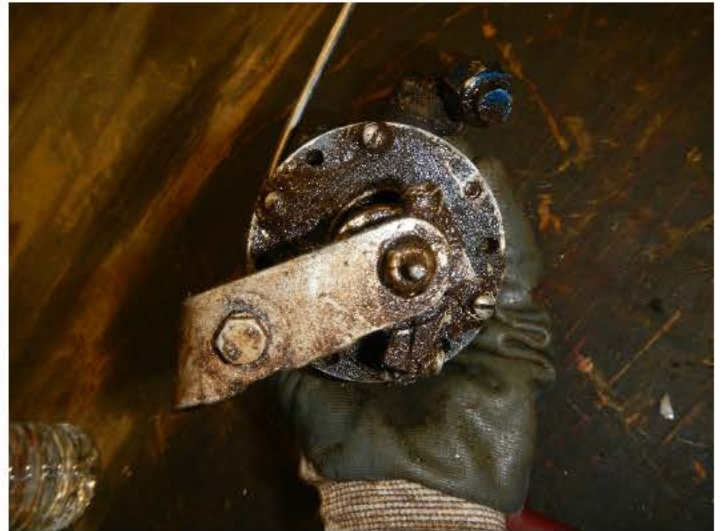
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