



Continental Motors

ENGINE FIELD INSPECTION REPORT **FINAL**

ENGINE MODEL	IO-520-FcD
ENGINE SERIAL NUMBER	245532-R
AIRCRAFT MAKE & MODEL	Cessna A188B
AIRCRAFT SERIAL NUMBER	18801153
AIRCRAFT REGISTRATION	N5850G
FILE NUMBER	14-176

NAME	SIGNATURE	DATE
Kurt Gibson		09/12/2014

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GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	08/28/2014	NTSB ACCIDENT #	ERA14LA409
FACILITY	Accident site (soy bean field)	NTSB INVESTIGATOR	Ralph Hicks
ADDRESS	Middleton, Tennessee	FAA INVESTIGATOR	David Hays
		ACCIDENT DATE	08/27/2014
		ACCIDENT LOCATION	Middleton, Tennessee

ENGINE INFORMATION

ENGINE POSITION	Single engine
TOTAL TIME	Logbooks not provided at the time of this report's writing
TIME SOH	Logbooks not provided at the time of this report's writing
TYPE & TIME SLI	Logbooks not provided at the time of this report's writing
BUILD DATE	10/10/1983
IN SERVICE DATE	Information not provided.

Significant logbook information:

Logbooks not provided at the time of this report's writing

Report Summary:

Search Code(s):

15-12-68

There were no anomalies noted that would have prevented normal operation or production of rated horsepower.

Disposition of engine following exam:

Wreckage was taken to AMF Aviation in Springfield, Tennessee.

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INSPECTION WITNESSES

NAME	Kurt Gibson	NAME	Jan Smith
ADDRESS	Mobile, Alabama	ADDRESS	Wichita, Kansas
ORGANIZATION	Continental Motors	ORGANIZATION	Textron Aviation
PHONE		PHONE	
NAME	David Hays	NAME	
ADDRESS	Memphis FSDO	ADDRESS	
ORGANIZATION	FAA	ORGANIZATION	
PHONE		PHONE	
NAME		NAME	
ADDRESS		ADDRESS	
ORGANIZATION		ORGANIZATION	
PHONE		PHONE	

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The engine had broken free from the airframe and came to rest approximately 160 feet away from the main wreckage. The engine sustained damage consistent with impact damage concentrated to the front and bottom of the engine. All six cylinders remained attached to the engine and all of the cylinders displayed varying amounts of impact damage. The two blade, variable pitch propeller remained attached to the propeller flange and the propeller flange remained attached to the crankshaft. One of the propeller blades displayed twisting deformation, polishing of the leading edge and propeller tip. The other propeller blade displayed a significant amount of bending deformation towards the rear, twisting, and gouges in the trailing edge of the propeller blade. It was also noted that several branches were found among the trees near the primary wreckage site that were cut at a smooth 45 degree angle.

The left magneto remained partially attached to its respective installation point and displayed damage consistent with impact damage. The right magneto remained attached to its respective installation point and sustained damage consistent with impact damage. The ignition harness displayed impact damage signatures; a couple of the ignition leads were torn or severed. All of the spark plugs remained installed in their respective cylinders and displayed minor impact damage signatures.

The fuel pump remained attached to its respective installation point and displayed damage consistent with impact damage. The throttle body and fuel metering assembly remained partially attached to the engine through fuel lines and displayed damage consistent with impact damage. The fuel manifold valve remained attached to its respective installation point and displayed impact damage signatures to the vent line fitting. All six fuel injectors remained installed in their respective cylinders and there were no defects noted with the injectors.

The intake system sustained damage consistent with impact damage; a few pieces of intake tubing were located along the wreckage path. There were no anomalies noted with the intake system. The exhaust risers remained attached to their respective cylinders and sustained damage consistent with impact damage; the exhaust system was crushed and bent in several locations. There were no anomalies noted with the exhaust system.

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ENGINE TEARDOWN AND COMPONENT EXAMINATION

EXHAUST SYSTEM

Condition:

All of the exhaust risers remained attached to their respective cylinders. The exhaust system sustained damage consistent with impact damage; a portion of the exhaust system broke free from the rest of the exhaust and the exhaust risers displayed crushing and bending deformation. There were no anomalies noted with the exhaust.



INDUCTION SYSTEM

Condition:

The intake system sustained damage consistent with impact damage; portions of the intake tubing going to the throttle body had broken free and were located along the wreckage path. All of the intake risers remained attached to their respective cylinders. There were no anomalies noted with the intake system.



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IGNITION SYSTEM

RIGHT MAGNETO

Manufacturer: Slick

P/N: 6310

S/N: 06021241

Condition:

The magneto remained attached to its respective installation point and sustained damage consistent with impact damage. The magneto was removed from the engine and the magneto drive was spun by hand; it was noted that the magneto was capable of creating a spark on each of the six posts when the impulse coupling was engaged.



LEFT MAGNETO

Manufacturer: Slick

P/N: 6310

S/N: 05090834

Condition:

The magneto remained partially attached to its respective installation point and sustained damage consistent with impact damage. The magneto was removed from the engine and the magneto drive was spun by hand; it was noted that the magneto was capable of creating a spark on each of the six posts when the impulse coupling was engaged.



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IGNITION HARNESS	Manufacturer: Unison	P/N: L-M2380, R-M2379	S/N: N/A
Condition:	The ignition harness sustained damage consistent with impact damage; several of the ignition leads were torn and severed. It was noted one of the metal spring contacts for the right distributor cap fell out when it was removed from the magneto. There were no further anomalies noted with the ignition harness.		



SPARK PLUGS	Manufacturer: BG	P/N: 341-1
Condition:	All of the spark plugs remained installed in their respective cylinders. All of the spark plugs were removed and visually inspected. All of the spark plugs displayed normal operating signatures.	



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FUEL SYSTEM

FUEL PUMP

Manufacturer: CMI

P/N: 646212-23A7

S/N: B08FA197R

Condition:

The fuel pump remained installed in its respective installation point and had sustained damage consistent with impact damage. The fuel pump was removed from the engine and it was noted that the fuel pump drive coupling was intact. The fuel pump drive was rotated by hand and it was noted the fuel pump drive rotated normally. The fuel pump was disassembled and the internal components were visually inspected; the internal components displayed normal operating signatures. There were no anomalies noted with the fuel pump.



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FUEL MANIFOLD VALVE

Manufacturer: CMI

P/N: 631351-17A4

S/N: C08FA210R

Condition:

The fuel manifold valve remained attached to its respective installation point and displayed impact damage to the manifold vent fitting. The fuel manifold valve was disassembled and the internal components were visually inspected. The internal components displayed normal operating signatures; there were no anomalies noted with the manifold valve.



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FUEL NOZZLES AND LINES

Manufacturer: CMI

Position	#1	#3	#5	#2	#4	#6
Size	2250 O47	5250 O47	6250 O47	1250 O47	4250 O47	3250 O47
Condition:	All of the fuel injectors remained installed in their respective cylinders and were undamaged. The fuel injectors were removed and visually inspected. All of the injectors were clear of blockages. It was noted that several of the injectors were installed in the incorrect cylinders according to the fuel injector part numbers.					



#1 Injector



#3 Injector



#5 Injector



#2 Injector



#4 Injector



#6 Injector

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THROTTLE BODY METERING UNIT

Manufacturer: CMI

P/N: 639715A18

S/N: A08FA229R

Condition:

The throttle and fuel metering assembly remained attached to the engine only through fuel lines and had sustained damage consistent with impact damage. The fuel return AN elbow had broken free from the fuel metering unit and the throttle body had several pieces that had broken free. It was noted that both the mixture and the throttle control arms were free moving around their respective control shafts. The control arms were removed and the splines for both controls displayed smearing consistent with the splines being overloaded. The fuel inlet screen was removed and it was noted there were no contaminants within the fuel screen. There were no anomalies noted with the assembly.



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LUBRICATION SYSTEM

OIL SCREEN

Manufacturer: Not Marked

P/N: Not Marked

Condition:

The oil screen was removed from its respective installation point. The screen pleats were visually inspected; it was noted there was a minor amount of carbon within the screen pleats. There were no anomalies noted.



OIL SUMP

Condition:

The oil sump sustained a significant amount of damage consistent with impact damage. The oil sump was crushed and was breached; there were no anomalies noted with the oil sump.



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OIL COOLER	Manufacture: Not Marked	P/N: Not Marked	S/N: Not Marked
Condition:	The oil cooler remained attached to the engine and sustained a significant amount of damage consistent with impact damage. There were no anomalies noted with the oil cooler		



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CYLINDERS

CYLINDERS

Condition: All of the cylinders remained attached to their respective installation points and displayed varying degrees of impact damage signatures. The cylinders were inspected using a borescope; the cylinder bores, piston heads, and valve heads displayed normal operating signatures. The crankshaft was rotated and it was noted that all six cylinders displayed thumb compression and suction. There were no anomalies noted with the cylinders.



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VALVES AND GUIDES

Condition:

All of the valve heads were inspected using a borescope; all of the valve heads displayed normal operating signatures. All of the valves operated normally during crankshaft rotation. There were no anomalies noted with the valves.

ROCKER ARMS AND SHAFTS

Condition:

All of the rocker arms were visually inspected; the rocker arms displayed normal operating signatures. All of the rocker arms operated normally during crankshaft rotation; there were no anomalies noted with any of the rocker arms.



PISTONS

Piston P/N: Inaccessible

Condition:

All of the piston faces were inspected using a borescope. The piston faces displayed normal operating and combustion signatures. All of the pistons operated normally during crankshaft rotation. There were no anomalies noted with the pistons.

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CRANKCASE ASSEMBLY

CRANKCASE	Casting Number:	1-3-5: 649043	2-4-6: 649042	S/N: K219103RS
Condition:	The crankcase remained intact and sustained only minor impact damage. There were no anomalies noted with the crankcase.			



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CRANKSHAFT ASSEMBLY

CRANKSHAFT

Forging Number:
Inaccessible

S/N: N00FA040

Heat code: Inaccessible

Condition:

The crankshaft remained intact and displayed impact damage signatures; there were several cracks noted aft of the propeller flange. The propeller was removed from the crankshaft and the crankshaft was rotated by hand; continuity was established between the crankshaft, camshaft, connecting rods, and associated components. There were no anomalies noted with the crankshaft.



CONNECTING RODS

P/N: Inaccessible

Forging or Serial Number: Inaccessible

Condition:

Operation of the connecting rods was verified by rotating the crankshaft and observing piston movement. All of the connecting rods operated normally.

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CAMSHAFT

CAMSHAFT

P/N: Inaccessible

S/N: Inaccessible

Condition:

Operation of the camshaft was verified by rotating the crankshaft and observing rocker arm movement. The camshaft operated normally.

ACCESSORY GEARS

Condition:

All of the visible accessory gears operated normally. There were no anomalies noted.



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ACCESSORIES

STARTER

Manufacturer: Kelly Aerospace

P/N: ES646238-2

S/N: F101374

Condition:

The starter had broken free from the starter adapter and displayed impact damage signatures. There were no anomalies noted with the starter.



STARTER ADAPTER

P/N: Illegible

Condition:

The starter adapter sustained damage consistent with impact damage. There were no anomalies noted with the starter adapter.



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ALTERNATOR

Manufacturer: Motorcraft

P/N: 7078107

S/N: Not marked

Condition:

The alternator remained attached to its respective installation point and the alternator drive belt remained intact. The alternator was capable of rotating freely by hand. There were no anomalies noted with the alternator.



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GOVERNOR**

Manufacturer: McCauley

P/N: C290D2 K/T9

S/N: 722676

Condition:

The propeller governor remained attached to its respective installation point and displayed minor impact damage signatures. There were no anomalies noted with the propeller governor.

**PROPELLER**

Manufacturer: McCauley

P/N: D2A34C 98-NO

S/N: 744089

Condition:

The two blade, variable pitch propeller remained attached to the propeller flange and the propeller flange remained attached to the crankshaft. One of the propeller blades displayed twisting deformation, polishing of the leading edge and propeller tip. The other propeller blade displayed a significant amount of bending deformation towards the rear, twisting, and gouges in the trailing edge of the propeller blade. It was also noted that several branches were cut at a smooth 45 degree angle and were found among the trees near the primary wreckage site.

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