Continental Motors, Inc.

ENGINE FIELD INSPECTION REPORT

FINAL

ENGINE MODEL: IO-550-N (16)

ENGINE SERIAL: 687918

AIRCRAFT MODEL: Mooney M20L

SERIAL NUMBER: 26-0017

REGISTRATION: N137MP

Examiner	Signature	Date
Nicole L. Charnon	[redacted]	07/25/2012

GENERAL INFORMATION			
EXAMINATION		ACCIDENT DATA	
Date	07/12/2012	NTSB Accident #:	WPR12LA297
Facility	Air Transport	NTSB Investigator:	Jim Struhsaker
Address	3011 W. Buckeye Rd.	FAA Investigator:	M. Craig Roberts
City	Phoenix	Law Enforcement:	N/A
State and Zip	AZ 85009	Coroner / Medical Examiner	N/A

ENGINE INFORMATION	
Make	Continental Motors Inc.
Model	IO-550-N (16)
Serial No.	687918
Engine Position	Single
Total Time	Approximately 123 hours
Time SOH	Approximately 123 hours since new
Build Date	08/23/2003
In Service Date	Unknown
Removal Date	

AIRCRAFT / ACCIDENT INFORMATION	
Aircraft Make	Mooney
Aircraft Model	M20L
Aircraft Serial No.	26-0017
Registration No.	N137MP
Accident Date	07/09/2012
Accident Location	Scottsdale, AZ

Significant logbook information: The engine was installed new in accident airplane in 2004. On 03/08/2010 all of the hydraulic lifters were replaced due to corrosion at an engine total time of approximately 66 hours. At the time of the accident, the engine accumulated a total of approximately 123 hours.

Report Summary: **Search Code:**

The inspection of this engine did not reveal any anomalies that would have prevented normal operation and production of rated horsepower.

Disposition of engine following exam: Retained at Air Transport in Phoenix, AZ by NTSB.

Inspection Witnesses			
Name	Nicole L. Charnon	Name	M. Craig Roberts
Address	2039 Broad Street Mobile, AL. 36615	Address	17777 N. Perimeter Dr., #101 Scottsdale, AZ 85255
Organization	Continental Motors Inc.	Organization	FAA
Phone No	251-436-8202	Phone No	480-419-0330 ext. 271
Name	Tom Little	Name	John Kent
Address	Western Pacific Region	Address	Mobile, AL
Organization	NTSB	Organization	Continental Motors, Inc.
Phone No	425-745-1960	Phone No	251-436-8236
Witness		Witness	
Address		Address	
Organization		Organization	
Phone No		Phone No	
Witness		Witness	
Address		Address	
Organization		Organization	
Phone No		Phone No	

EXTERNAL INSPECTION OF ENGINE:

The engine broke free from its mounts during the impact sequence. The engine was placed on an examination table at the salvage yard. The propeller hub remained attached to the engine crankshaft, and the three propeller blades remained attached to the propeller hub. All three propeller blades displayed significant s-bending and heavy leading edge gouging. The outboard tip of two blades was torn off and all three blades were loose in the hub (broken free from their pitch change links).

The engine's oil sump was punctured from the outside in and oil had leaked out over the intake shroud. Removal of the engine oil dipstick revealed that some residual oil remained in the sump. The oil was coffee colored and appeared clear. The propeller governor remained intact and attached to the engine. The oil cooler sustained impact-related deformation and its mount was broken, but it remained in place. The magnetos remained in place and secured to the engine. The throttle, mixture, and propeller control cables remained secured to their respective engine controls, though they had been separated (post-accident) from the cockpit controls at the firewall junction. Examination of the top and sides of the engine did not reveal any evidence of pre-impact fuel or oil leaks.

The top spark plug ignition leads were removed from the top spark plugs and the plugs were removed for inspection. All of the spark plugs displayed a normal electrode wear condition when compared with the Champion (AV6-R) Aviation Service Manual. The #2 top spark plug was lightly dusted with black soot while the others remained gray in coloration and free from deposits.

The engine-driven fuel pump was removed from its mounting pad and its drive coupling was found in place and intact. Fuel emptied from the lines upon removal from the fuel pump. The drive coupling was reinstalled in the fuel pump and rotated manually. There was no binding noted and the coupling/driveshaft rotated freely.

All six cylinders were borescoped and none of the cylinders, pistons, valves or bottom spark plugs displayed any signs of operational distress. Thumb compression and suction were obtained on all six cylinders through manual rotation of the propeller, confirming crankshaft and camshaft continuity. The six top spark plugs were reattached to their ignition leads and manual rotation of the propeller resulted in a spark on all six top spark plugs.

The fuel line from the fuel pump to the fuel manifold valve was removed and fuel poured out of the line. The manifold valve, which remained attached to its mount and safety wired, was removed from the engine and disassembled. The fuel screen was clean and clear and fuel was pooled in the manifold. The plunger was intact and in place as was the fuel manifold gasket. No anomalies were noted.

ENGINE TEARDOWN AND COMPONENT EXAMINATION

IGNITION SYSTEM:

R/H Magneto — Manufacturer: TCM — Model/Part Number: 10-500556 — Serial #: D03GA242

Condition: The right magneto remained in place and secured to the engine. Magneto-to-engine timing was not confirmed. When the propeller was rotated manually, the magneto produced a spark through its ignition leads to its respective top spark plugs.

L/H Magneto — Manufacturer: TCM — Model/Part Number: 10-500556-1 — Serial #: D03GA247

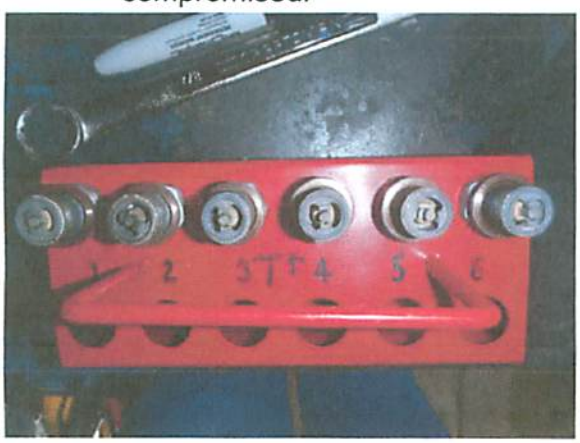
Condition: The left magneto remained in place and secured to the engine. Magneto-to-engine timing was not confirmed. When the propeller was rotated manually, the magneto produced a spark through its ignition leads to its respective top spark plugs.

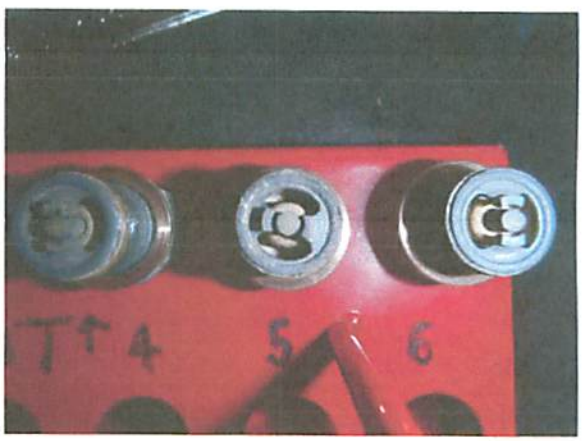
Ignition Harness — Manufacturer: TCM — Model/Part Number: Not Marked — Serial #: Not Marked

Condition: The ignition leads remained attached to their respective magnetos and spark plugs. All of the leads remained in good condition with no signs of chafing or wear.

Spark Plugs — Manufacturer: — Part number:

Condition: All six spark plugs displayed normal wear conditions when compared to the Champion AV6-R Aviation Service Manual. The #2 top spark plug was lightly coated with black soot. None of the electrodes appeared to be fouled or compromised.

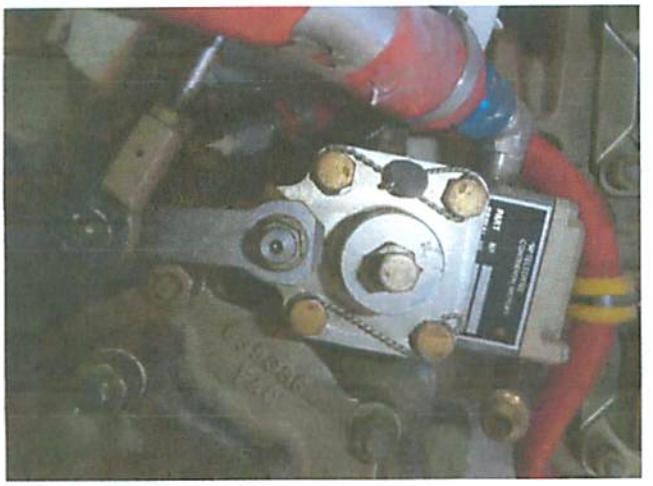




FUEL SYSTEM:

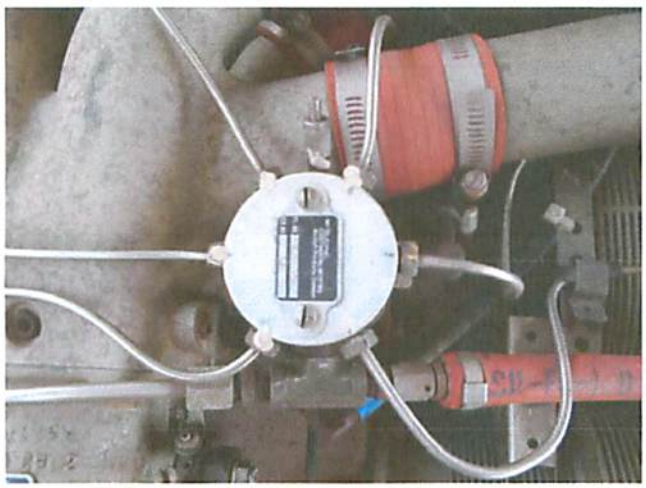
Fuel Pump Manufacturer: TCM Part Number: 655921-1A5 Serial #: B03HA142

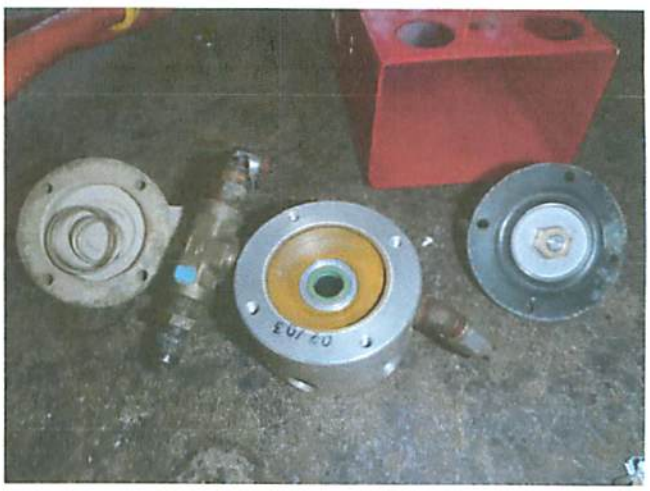
Condition: The fuel pump was removed from its mounting pad on the backside of the engine crankcase. Upon removal, fuel poured from the lines. The fuel pump's drive coupling was intact and in place. Installation of the drive coupling into the drive shaft and manual rotation revealed no evidence of drive shaft binding.



Fuel Manifold Valve Manufacturer: TCM Part Number: Not Legible Serial #: Not Legible

Condition: The fuel manifold remained attached to its mount on the topside of the engine. All but two of the fuel injector line nuts retained their original torque putty seals. The injector lines were removed as was the inlet line. Fuel poured from the inlet line upon its removal. Disassembly of the fuel manifold valve revealed that the screen was clean and free from debris and fuel was present in the valve. The plunger was in place and intact as was the gasket. Visual inspection of the gasket did not reveal any anomalies.



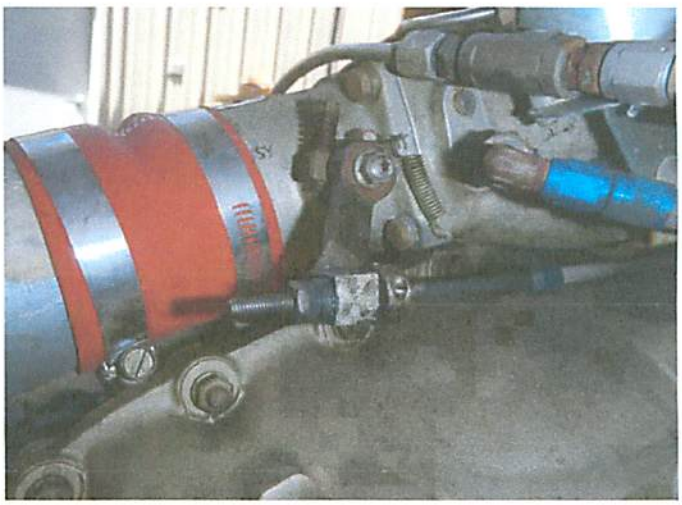


Fuel Nozzles and Lines — Manufacturer: TCM

Condition: The fuel injector lines and nozzles were in place and intact. None of the lines appeared to be damaged. The base of the fuel injector nozzle screens (beneath their shrouds) appeared to be clear. There were no signs of pre-impact leakage. The fuel nozzles were not removed from their respective cylinders.

Throttle Body / Metering Unit — Manufacturer: TCM — Part Number: 653353-5A1 — Serial #: A03HA144

Condition: The throttle body/metering unit remained intact and attached to the topside of the engine. The attachment screws were safety wired in place. The fuel inlet and outlet lines from the metering unit remained intact and attached. There were no visible signs of fuel leakage prior to the accident.



Crankshaft Forging number: Serial number: Heat code:

Condition: The only portion of the crankshaft that was visually observed was the crankshaft gear when the fuel pump was removed from its mounting pad. The crankshaft gear was intact, in place, and safety wired. There were no signs of operational distress and the crankshaft gear was observed to rotate with manual rotation of the propeller.

Propeller: MFG/Model: McCauley 3A32C418-1C S/N: HUB S/N:

Condition: The propeller hub remained attached to the engine crankshaft, and the three propeller blades remained attached to the propeller hub. All three propeller blades displayed significant s-bending and heavy leading edge gouging. The outboard tip of two blades was torn off and all three blades were loose in the hub (broken free from their pitch change links).