



Continental Motors

ENGINE EXAMINATION REPORT **N1738R**

ENGINE MODEL	IO520F (9A)
ENGINE SERIAL NUMBER	553523
AIRCRAFT MAKE & MODEL	Cessna U206G
AIRCRAFT SERIAL NUMBER	U20604588
AIRCRAFT REGISTRATION	N1738R
FILE NUMBER	18-203

NAME	SIGNATURE	DATE
Mike Council		1-10-2019

ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 2 of 26

GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	11-8-2018	NTSB ACCIDENT #	CEN18FA386
FACILITY	Alaska Claims Services, Inc.	NTSB INVESTIGATOR	Joshua Lindberg,
ADDRESS	[REDACTED] [REDACTED] Wasilla, Alaska	FAA INVESTIGATOR	Paula Huckleberry
		ADDITIONAL REPRESENTATIVE	Bruce Schulte, Regal Air
		ACCIDENT DATE	9-24-2018
		ACCIDENT LOCATION	Rainy Pass, Alaska

ENGINE INFORMATION

ENGINE POSITION	Single
TOTAL TIME	Undetermined. The July 4, 2018 logbook entry describing the last engine overhaul indicated that the engine total time was undetermined.
TIME SOH	211.8
TYPE & TIME SLI	15.4 hours since last 100-hour inspection dated 9-21-2018 at hobbs time 500.0. Hobbs time at recovery: 515.4 hours.
BUILD DATE	10-22-1974
IN SERVICE DATE	Undetermined

Significant logbook information:

Date -- / -- / --	Time since new	Time since overhaul	Total cycles	Details of task
Date: July 4, 2018 This engine overhauled as per Overhaul Manual P/N X30039 revised October 2013 and M-0 revised Jan 2018. Full details held on Work Order No.1606124. The Maintenance described has been performed in accordance with the applicable standards of airworthiness. All accessories are either new or overhauled. Refer to enclosed form ARC 18B for applicable accessory part numbers and serial numbers. Engine sprayed internally with type II corrosion inhibitor.				
Model No.: IO-520-F Serial No.: 553523 TTSN: U/K hrs; TSO: 0.0 hrs. Crankshaft Serial No.: N08BA215		Authorized Signature [REDACTED] Aero Recip (Canada) Ltd. 540 Marjorie Street Winnipeg, Manitoba R3H 0S9 AMO 45-89		



**AERO
RECIP**
(CANADA) LTD.

ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 3 of 26

9/21/2018 Hobbs: 500.0

ACTT: 4127.5

N1738R Cessna U206G S/N: U20604588

Completed 100 hour inspection this date. Inspected and serviced IAW FAR 43 Appendix D and the Manufacturer's Maintenance Manual for proper assembly, structural and mechanical integrity. ELT checked IAW FAR 91.207d(1-4). Batteries due May 2024. Checked aircraft flight controls for proper range of movement, security, and general condition. C/W AD 2011-10-09 Seats & Seat Rail Installation IAW Para. (g), (1)-10). No defects found at this time. C/W AD85-10-02 Induction Airbox Inspection IAW Para. (a), no defects found at this time. Removed ships battery and serviced. Inspection as per FAR 43 Appendix D and found to be in airworthy condition, and ok for return to service.

Kennedy Canarr AP

Report Summary:

Search Code(s):

Examination of the engine was performed by the CMI Investigator under supervision of the NTSB Investigator. The inspection of this engine did not reveal any pre-impact anomalies that would have prevented its ability to produce rated horsepower.

Disposition of engine following exam:

The engine will remain in the care, custody and control of Alaska Claim Services, Inc. until released by the NTSB IIC.

ENGINE EXAMINATION REPORT**FILE NUMBER:**

18-203

ENGINE S/N:

553523

PAGE 4 of 26**INSPECTION WITNESSES**

NAME	Mike Council	NAME	Josh Lindberg, IIC
ADDRESS	██████████ Mobile, Alabama	ADDRESS	Central Region
ORGANIZATION	Continental Motors	ORGANIZATION	NTSB
PHONE	██████████	PHONE	██████████
NAME	Andrew Hall	NAME	Paula Huckleberry, Inspector
ADDRESS	Wichita, KS	ADDRESS	██████████ ██████████ Wasilla, Alaska 99678
ORGANIZATION	Textron Aviation	ORGANIZATION	FAA-Anchorage FSDO
PHONE	██████████	PHONE	██████████
NAME	Bruce Schulte, Chief Pilot	NAME	NA
ADDRESS	██████████ Dr. Anchorage, AK	ADDRESS	
ORGANIZATION	Regal Air	ORGANIZATION	
PHONE	██████████	PHONE	

ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 5 of 26

EXTERNAL INSPECTION OF ENGINE

The engine remained attached to the damaged airframe by control cables, electrical harnesses and impact damaged engine mounts. The propeller separated from the engine crankshaft flange. The propeller mounting studs had pulled from the propeller hub leaving the mounting studs and nuts attached to the damaged crankshaft propeller flange.

The engine data plate remained attached to the upper right crankcase half. The data plate indicated that the engine was manufactured by Teledyne Continental Motors as a model IO520F. Two X's were stamped into the data plate by unknown persons immediately following the F-designation portion of the engine model information. The engine serial number was depicted as 553523. According to the Continental Motors engine database, this engine, model IO-520F (9A) was assembled and shipped to Cessna Aircraft Company 10-22-1974 as a factory new engine.

All six cylinders remained attached to the crankcase assembly and the installation hardware exhibited orange-colored torque putty. All six rocker covers remained intact except cylinder 6 which exhibited impact damage. Each rocker cover exhibited the brand logo "Millennium" which is the trade name of cylinders produced by Superior Air Parts.

The exhaust system components were impact damaged but remained attached to each cylinder exhaust port. The oil sump was crushed and forced upward due to impact damage. The oil filler cap separated from the filler neck located on the top of the engine crankcase.



ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 6 of 26



ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 7 of 26

ENGINE AND COMPONENT EXAMINATION

EXHAUST SYSTEM

Condition: The exhaust system components were impact damaged but remained attached to each cylinder exhaust port. The left muffler and heat muff were removed and inspected. The internal flame cone remained intact but slightly distorted due to impact forces. The bale remained intact and no thermal deterioration was noted. The right muffler was crushed but remained attached to the right exhaust manifold.



ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 8 of 26



INDUCTION SYSTEM

Condition:

Several induction system elbows, connectors and hoses separated by impact forces allowing dirt, snow and other contaminations to enter each cylinder intake port.



ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 9 of 26
--------------	--------	-------------	--------	--------------

IGNITION SYSTEM

LEFT MAGNETO	Manufacturer: Slick-Champion/Kelly Aerospace	M/N: 6310	S/N: 12110928/F-10586
Condition:	The left magneto remained attached, but the mounting flange was damaged by impact forces. The impulse coupling was heard to release normally, and the magneto produced spark at the individual ignition leads when manually rotated using an electrical drill motor.		



RIGHT MAGNETO	Manufacturer: Slick-Champion/Kelly Aerospace	M/N: 6310	S/N: 04120403/C-03136
Condition:	The right magneto separated at its mounting flange but was held in place by the ignition harness leads. The impulse coupling was heard to release normally, and the magneto produced spark at the individual ignition leads when manually rotated using an electrical drill motor.		



ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 10 of 26
--------------	--------	-------------	--------	---------------

IGNITION HARNESS		Manufacturer: Kelly Aerospace	P/N: Undetermined	S/N: Undetermined
Condition:	Several ignition harness leads were cut and pinched.			
SPARK PLUGS		Manufacturer: Champion	P/N: RRB32S	
Condition:	When compared to a Champion Spark plug chart, all six top sparkplugs were “normal” in both condition and coloration.			



ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 11 of 26

FUEL SYSTEM

FUEL PUMP

Manufacturer: CMI

P/N: 646212-1

S/N: E048724BR

Condition:

The drive coupling was intact, and the fuel pump operated smoothly when manually rotated. The shaft, blades and pump body cavity were intact and appeared normal.



ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 12 of 26
--------------	--------	-------------	--------	---------------



ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 13 of 26
--------------	--------	-------------	--------	---------------

THROTTLE BODY METERING UNIT

Manufacturer: CMI

P/N: 629703-2

S/N: E288743AR

Condition: The fuel screen was secured properly with safety wire. The fuel screen was removed, examined and found to be uncontaminated. The mixture control unit control arms were intact and the damaged control cable ends remained secured with proper bolts, castellated nuts and cotter pins.



ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 14 of 26

FUEL MANIFOLD VALVE

Manufacturer: CMI

P/N: 631351-17AG

S/N: 009JA225R

Condition:

The assembly screws remained properly secured with safety wire and lead seal. The assembly screws and cover were removed. The spring and diaphragm were intact. The valve body and internal fuel screen were intact and uncontaminated. A small amount of fuel escaped when the fuel inlet hose was removed.



ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 15 of 26

FUEL NOZZLES AND LINES

Manufacturer: GAMI

Condition:

The modified, aftermarket fuel injectors were removed from each cylinder head. The fuel injector orifices were contaminated and blocked on fuel injectors removed from cylinders 2, 3, 4 and 5. The contamination was consistent with dirt/mud. The induction system elbows, connectors and hoses separated by impact forces allowing dirt, snow and other contaminations to enter each cylinder intake port.



ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 16 of 26

LUBRICATION SYSTEM

OIL SUMP

Condition:

The oil sump was crushed and forced upward due to impact damage.



OIL FILTER

Manufacturer: Champion

P/N: CH48109

Condition:

The spin-on oil filter remained attached and properly secured with safety wire. The oil filter was not removed or internally examined.



ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 17 of 26
--------------	--------	-------------	--------	---------------

OIL COOLER

Manufacturer: Undetermined

P/N: Undetermined

S/N: Undetermined

Condition:

The oil cooler separated but was recovered. The oil cooler core, brace and end cap exhibited impact damage.



ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 18 of 26
--------------	--------	-------------	--------	---------------

CYLINDERS

A turning bar was used to manually rotate the engine. Thumb compression was achieved at all six cylinders. A lighted electronic borescope inspection was performed on each cylinder. All intake valves, exhaust valves and piston domes were intact and exhibited normal combustion signatures.

CYLINDER ASSEMBLIES	P/N: SAC 52001	S/N: Undetermined	Head Date: Undetermined
Condition:	All cylinders were Superior Parts PMA aftermarket cylinders. Installation hardware exhibited orange-colored torque putty. All rocker covers remained intact except cylinder 6 which exhibited impact damage. Each rocker cover exhibited the brand logo "Millennium". Cooling fins were impact damaged on cylinders 5 and 6.		



ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 19 of 26

VALVES

Condition: A lighted electronic borescope inspection was performed on each cylinder. All intake valves and exhaust valves were intact and exhibited normal combustion signatures.

ROCKER ARMS AND SHAFTS

Condition: All rocker arms and shafts were undamaged and operated normally when the engine was manually rotated.



ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 20 of 26
--------------	--------	-------------	--------	---------------

CRANKCASE ASSEMBLY

CRANKCASE	Casting Number:	1-3-5: Undetermined	2-4-6: Undetermined	S/N: N44122
Condition:	The crankcase assembly remained intact.			



CRANKSHAFT ASSEMBLY

CRANKSHAFT	Forging Number: Undetermined	S/N: Undetermined	Heat code: Undetermined
Condition:	The propeller flange was misaligned due to impact forces.		



ENGINE EXAMINATION REPORT**FILE NUMBER:**

18-203

ENGINE S/N:

553523

PAGE 21 of 26**CAMSHAFT****CAMSHAFT**

P/N: Undetermined

S/N: Undetermined

Condition:

Camshaft continuity was confirmed by action of each rocker arm when the engine was manually rotated.

**ACCESSORY
GEARS**

Condition:

A visual inspection was not accomplished. The accessory gears continuity was confirmed by manually rotating the engine using a turning bar and noting that the camshaft-initiated operation of all rocker arms correctly and magneto impulse couplings audibly snapped and released

ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 22 of 26
--------------	--------	-------------	--------	---------------

ACCESSORIES

STARTER	Manufacturer: Hartzell	P/N: 646275-1A	S/N: H-8040066
Condition:	The electric starter motor remained attached but received impact damage.		



STARTER ADAPTER	P/N: Undetermined
Condition:	The starter adapter was damaged at the starter attach flange. The starter adapter pulley and accessory v-belt were intact.



ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 23 of 26
--------------	--------	-------------	--------	---------------

ALT #

Manufacturer: Plane Power

M/N: 10-5050C

S/N: H-8021787

Condition:

The belt driven alternator remained attached and appeared to be undamaged.



ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 24 of 26
--------------	--------	-------------	--------	---------------

VACUUM PUMP

Manufacturer: Tempest

M/N: AA3216CW

S/N: 024E12

Condition: The instrument air pump remained attached but received impact damage to the outer case and cooling fins. The plastic drive coupler (shear drive) was intact. The carbon rotor and blades were intact, and the pump operated smoothly when manually rotated producing suction and pressure at the corresponding ports.



ENGINE EXAMINATION REPORT

FILE NUMBER:	18-203	ENGINE S/N:	553523	PAGE 25 of 26
--------------	--------	-------------	--------	---------------

PROPELLER

PROPELLER GOVERNOR	Manufacturer: McCauley Serviced by Southwest Aero	P/N:C290D4M4T4	S/N: 810466
Condition:	The governor received impact damage to the pitch change arm and spring.		



PROPELLER	Manufacturer: Hartzell	P/N: PHCJ3YF-1RF	S/N: FP716A
Blade 1 S/N:	Undetermined		
Blade 2 S/N:	Undetermined		
Blade 3 S/N:	Undetermined		
Condition:	The constant speed three blade propeller received impact damage crushing the spinner. Each damaged propeller blade was marked with a letter "A, B, or C" for photo identification. Blade A was loose inside the propeller hub and exhibited impact damage beginning approximately 27" outboard of the blade root with the blade tip curled rearward and significant gouging and paint transfer. The inboard 28" of blade A exhibited only minor scratching across the cambered surface. Blade B was also loose in the propeller hub and exhibited a clockwise twist beginning approximately 10" outboard of the blade root. The outboard section of blade B exhibited heavy paint transfer and gouging of the cambered surface. Blade C exhibited impact damage with clockwise twisting beginning approximately 9" outboard of the blade root with significant cordwise scratching and a large gouge at the blade tip.		

ENGINE EXAMINATION REPORT

FILE NUMBER:

18-203

ENGINE S/N:

553523

PAGE 26 of 26

