



Continental Motors

ENGINE FIELD EXAMINATION REPORT

ENGINE MODEL	IO-520F (83B) Converted by Texas Skyways to O-520FTS
ENGINE SERIAL NUMBER	1033217 (CMI) 622 (Texas Skyways)
AIRCRAFT MAKE & MODEL	Cessna 182K
AIRCRAFT SERIAL NUMBER	18258329
AIRCRAFT REGISTRATION	N2629R
FILE NUMBER	18-293

NAME	SIGNATURE	DATE
Mike Council		1-8-2019

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EXAMINATION		ACCIDENT DATA	
DATE	11-18-2018	NTSB ACCIDENT #	WPR19FA025
FACILITY	Plain Parts	NTSB INVESTIGATOR	Maja Smith, IIC Western Pacific Region
ADDRESS	Pleasant Grove, CA	FAA INVESTIGATOR	NA
		ACCIDENT DATE	11-15-2018
		ACCIDENT LOCATION	Redding, CA

ENGINE INFORMATION

ENGINE POSITION	Single
TOTAL TIME	283 calculated
TIME SOH	NA-Factory Rebuilt zero-time engine
TYPE & TIME SLI	100-hour/Annual Inspection - 168.9 hours calculated SLI
BUILD DATE	11-04-2016
IN SERVICE DATE	3-3-2017

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Significant logbook information:

Date	Total Time		Time Since Last Overhaul		Engine Service and Maintenance Record Record maintenance actions including engine part removal and installation and compliance with inspections, Airworthiness Directives, Special Inspections, Modifications and Service Bulletins
	Hours	Min	Hours	Min	
 "Serving to Serve Again"					
Date: 3 JAN 2017 Eng: IO520DcF S/N:1033217 Total Time:0.0 Modified this engine, IO-520-D172B, to a IO-520-D-c-F by removing the -D fuel system (639713A48) and installing -F fuel system (639173A90). Reference TCM Service Bulletin M75-6, Rev. 1 and TCM IO-520 parts manual. No weight change.					
Michael D. Gleason AP [REDACTED]					
 "Serving to Serve Again"					
Date: 3 JAN 2017 Eng: IO520DcF S/N:1033217 Total Time:0.0 Modified engine in accordance with STC SE09017SC Removed fuel injection system, (639173A90). Provided for installation Marvel Schebler modified carburetor, p/n 10-4893-1-TXSM, in accordance with Texas Skyways, Inc. drawing TS0017S/N dated 10/01/94, or later FAA approved revision. Rework of oil pump accomplished in accordance with TSI0019. Serial number of Texas Skyways STC is TSI-622. Reference FAA Form 337 dated 1/3/2017. Engine model is now O-520-F/TS. Installed STC#SE09319SC, modified oil pan adding a new oil sump drain in accordance with Texas Skyways Drawing Number TS1076, dated 12/30/95, or later FAA approved revisions. Reference FAA Form 337 dated 1/3/2017. Instructions for Continued Airworthiness: Ref ICA O-520-F/TS, Compatibility of this design change with previously approved modifications must be determined by the installer. Perform standard preflight and annual inspections per manufactures recommendation. The installer must also complete sections 1 and 2 on the FAA form 337 and file one copy to FAA and file second copy in aircraft records.					
Michael D. Gleason AP [REDACTED]					

NOTE: This engine was manufactured by Continental Motors, Inc. as a model **IO-520F** (83B) factory-rebuilt engine, sold and shipped to Air Power, Inc. 11-7-2016. The CMI supplied engine logbook lists the engine model as an **IO-520F** (83B) confirming serial data information.

The first logbook entry made by Texas Skyways incorrectly indicated: "Modified this engine, IO-520-D172B, to IO-520-D-c-F by removing the -D fuel system (639713A48) and installing -F fuel system (639173A90). Reference TCM Service Bulletin M75-6, Rev. 1 and TSM IO-520 parts manual. No weight change." This is an error since the accident engine was not configured as a model "D".

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NAME	Mike Council	NAME	Maja Smith, IIC
ADDRESS	██████████ Mobile, Alabama	ADDRESS	Western Pacific Region
ORGANIZATION	Continental Motors	ORGANIZATION	NTSB
PHONE	██████████	PHONE	██████████
NAME	Ricardo Asensio	NAME	NA
ADDRESS	Wichita, KS	ADDRESS	
ORGANIZATION	Textron Aviation	ORGANIZATION	
PHONE	██████████	PHONE	

EXTERNAL INSPECTION OF ENGINE

All six cylinders remained attached and the crankcase was intact. The engine mounts were broken by impact forces. The crankcase oil filler neck and oil rod and housing separated. The engine data plate was intact and indicated that the engine was a Continental Motors model IO-520-F (83B) serial number 1033217 which has been modified by Texas Skyways under STC SE-09017SC. This modification includes removing the fuel injection components and installing a carburetor which reduces the original 300 horsepower at 2850 RPM to an advertised horsepower of 280 at 2700 RPM. Texas Skyways also assigned a unique serial number 622 and model number O520FTS.

The # 5-cylinder rocker cover was impact damaged and the intake and exhaust push rod-tubes and pushrods separated. The lower portion of cylinder #5 separated. The rocker arms separated. A portion of one rocker arm was discovered in the leading edge of propeller blade C.

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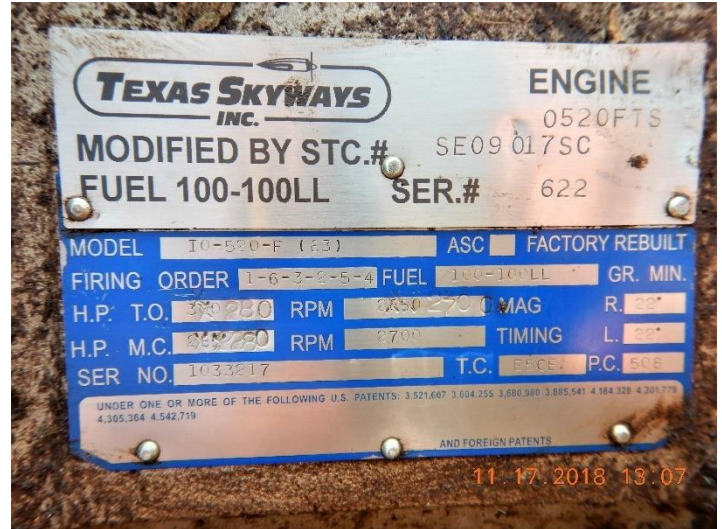
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ENGINE AND COMPONENT EXAMINATION

EXHAUST SYSTEM

Condition: The exhaust muffler separated but was recovered in the wreckage path. The muffler outer heat shield and muffler exterior were crushed by impact forces.



INDUCTION SYSTEM

Condition: Induction components separated at impact and were recovered along the debris path. All recovered induction components exhibited impact damage.



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IGNITION SYSTEM

LEFT MAGNETO	Manufacturer: CMI	M/N: S6RN-1225	S/N: F161A166R
Condition:	The left magneto separated but was recovered from the wreckage path debris. A cotter pin was present in the drive coupling and the impulse coupling released normally when manually rotated. The cotter pin was removed from the magneto drive shaft to allow rotation of the magneto with an electric drill motor. The magneto produced spark at all terminals when manually rotated.		



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RIGHT MAGNETO	Manufacturer: Electroair	P/N: Undetermined	S/N: 14-161-006 Rev 2
Condition:	The original right magneto had been removed and an Electroair electronic ignition device was installed in its place. The broken electronic ignition module was impact damaged and could not be tested.		



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SPARK PLUGS

Manufacturer: Tempest

P/N: URHB32E

Condition: The top sparkplugs were removed and inspected. Sparkplugs from cylinders 1, 2, and 5 exhibited impact damages. When compared to a Champion Spark Plug "Check-A-Plug" chart, the sparkplugs were "normal" in condition and color. The bottom sparkplugs were removed and inspected. The sparkplugs from cylinders 3 and 5 exhibited impact damaged. The threaded lower portion of sparkplug # 5 separated. The lower sparkplug from cylinder # 2 was oil fouled.



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FUEL SYSTEM

FUEL PUMP	Manufacturer: NA	P/N: NA	S/N: NA
Condition:	No engine-driven fuel pump was utilized on this engine/airframe application.		
CARBURETOR	Manufacturer: Marvel Schebler	P/N: 10-4893-1	S/N: MSE16404
Condition:	The carburetor exhibited impact damage and the mixture control arm and mixture adjustment screw were damaged. The carburetor was disassembled, and no fuel was present. The floats were intact and correctly operated the needle valve when manually lifted. The accelerator pump plunger was intact, but no fuel was present in the orifice. The fuel finger-screen was removed and inspected. No contamination was present. The throttle plate was in the full closed position.		



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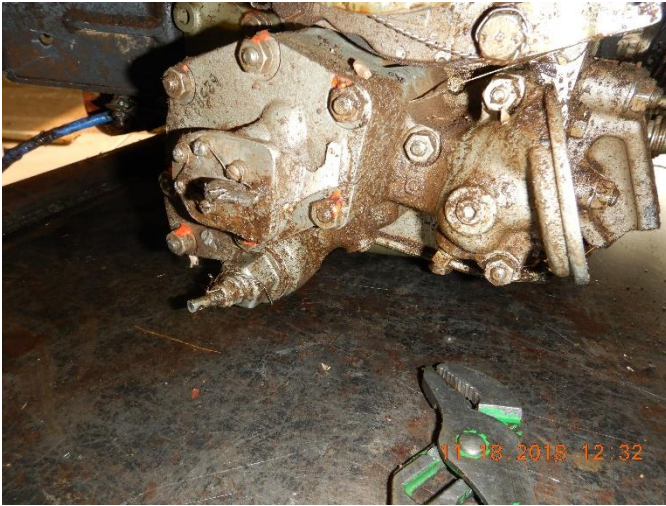
LUBRICATION SYSTEM

OIL SUMP

Condition: The engine oil sump which is located on the lower portion of the engine received impact damage. No oil remained in the oil sump.

OIL PUMP

Condition: The oil pump gears, shaft, and pump housing were intact and exhibited no damage.



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OIL FILTER

Manufacturer: Champion

P/N: CH48108-1

Condition:

The spin-on oil filter separated from the oil pump due to impact forces. The oil filter was cut open and inspected. Only a small amount of oil was present. The paper filter media was removed, and no contamination was present.



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OIL COOLER

Manufacturer: Niagara

P/N: 20618A

S/N:11513833-31

Condition:

The oil cooler separated from the engine during the impact sequence and exhibited impact damage.



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CYLINDERS

NOTE: The engine was manually rotated and all cylinders except cylinder # 5 produced thumb compression. Cylinder # 5 was impact damaged and both pushrods separated leaving the intake valve partially open and damaged.

CYLINDER #1	P/N: 658552A4	S/N: AC16JA340	Head Date: Undetermined
Work Orders:	Undetermined		
Condition:	The cylinder was intact, but the rocker cover was broken due to impact forces. The top cooling fins were impact damaged.		



CYLINDER #3	P/N: 658552A4	S/N: AC16JA526	Head Date: Undetermined
Work Orders:	Undetermined		
Condition:	The cylinder was intact, but the rocker cover was broken due to impact forces.		



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CYLINDER #5	P/N: 658552A4	S/N: AC16HD725	Head Date: Undetermined
Work Orders:	Undetermined		
Condition:	The rocker cover and the lower portion of the cylinder head separated. The rocker arms and pin separated. A broken section of a rocker arm was found imbedded in a propeller blade leading edge. See photos on page 19 of this report.		



CYLINDER #2	P/N: 658552A4	S/N: AC16IA239	Head Date: Undetermined
Work Orders:	Undetermined		
Condition:	The cylinder was intact with only minor impact damage to cooling fins.		



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CYLINDER #4	P/N: 658552A4	S/N: AC16HD813	Head Date: Undetermined
Work Orders:	Undetermined		
Condition:	The cylinder was intact with only minor impact damage to cooling fins.		



CYLINDER #6	P/N: 658552A4	S/N: AC16HC929	Head Date: Undetermined
Work Orders:	Undetermined		
Condition:	The cylinder was intact, but the rocker cover received impact damage.		



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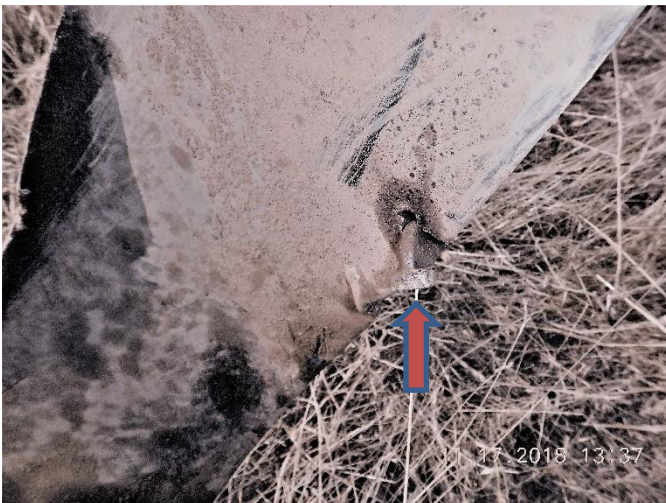
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VALVES

Condition: Valve faces were examined during the lighted borescope inspection. All valves exhibited normal combustion signatures. The intake valve stem on cylinder # 5 was bent and would not allow the valve to close normally.

ROCKER ARMS AND SHAFTS

Condition: Rocker covers were removed, and the engine was rotated manually. All rocker arms, valve springs and valves moved normally except cylinder # 5. Cylinder # 5 rocker arms separated, and the intake valve stem was bent due to impact forces.
NOTE: The # 5 intake rocker arm was recovered in the debris path. The top portion separated and was discovered embedded in the leading edge of blade C. See the red arrows below.



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CRANKCASE ASSEMBLY

CRANKCASE	Casting Number:	1-3-5: Undetermined	2-4-6: Undetermined	S/N: R16IA227
Condition:	The crankcase assembly remained intact with only minor impact damage noted on the lower portion of the oil sump rails.			

CRANKSHAFT ASSEMBLY

CRANKSHAFT	Forging Number: Undetermined	S/N: N16GA100	Heat code: Undetermined
Condition:	Crankshaft continuity was confirmed by manually rotating the crankshaft and noting that the accessory gears in the rear of the engine rotated normally. The propeller flange was impact damaged and the propeller separated due to impact forces.		

**CAMSHAFT**

CAMSHAFT	P/N: Undetermined	S/N: Undetermined
Condition:	Camshaft continuity was confirmed when the engine was manually rotated, and the rocker arms moved normally.	

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ACCESSORIES

STARTER

Manufacturer: Undetermined

P/N: Undetermined

S/N: Undetermined

Condition:

No data plate was attached to the starter motor. The starter motor shaft rotated smoothly when manually manipulated.

**STARTER ADAPTER**

P/N: 643259A18

Condition:

The starter adapter remained attached to the rear of the crankcase. The PTO pulley was impact damaged and would not rotate.



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ALTERNATOR

Manufacturer: Undetermined

P/N: Undetermined

S/N: Undetermined

Condition:

The alternator separated from the engine and fragments were discovered in the debris path. The data plate separated.



VACUUM PUMP

Manufacturer: NA

P/N: NA

S/N: NA

Condition:

No vacuum pump was installed on this engine



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PROPELLER

PROPELLER GOVERNOR

Manufacturer: McCauley

M/N: C290D3-R/T50

S/N: 040448

Condition:

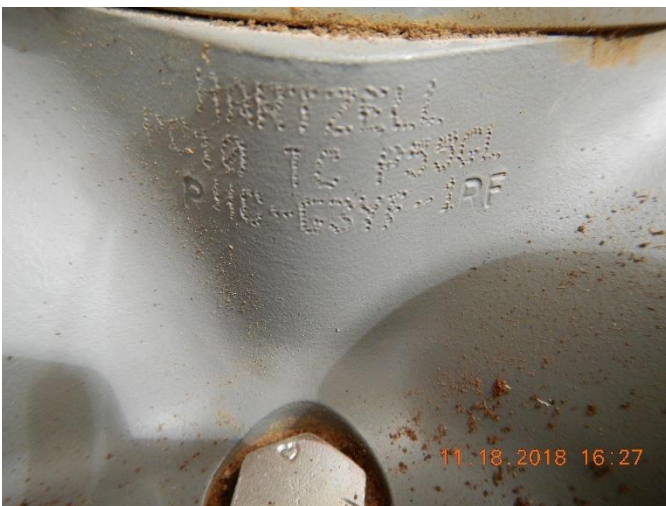
The propeller governor remained attached and the governor control arm remained attached. The mounting gasket screen was uncontaminated, and the pump shaft rotated smoothly when manipulated manually and oil was expelled.



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PROPELLER	Manufacturer: Hartzell	M/N: PHC-G3F-1RF	S/N: HP857B
Blade 1 S/N:	Undetermined		
Blade 2 S/N:	Undetermined		
Blade 3 S/N:	Undetermined		
Condition:	The three-blade constant speed propeller separated from the engine crankshaft during the impact sequence. The spinner exhibited crush damage and was heavily damaged. Each propeller blade was marked with a letter A, B, or C to assist with photo identification. All three blades remained in the propeller hub and all exhibited cordwise scratching and gouging of the leading edges and tips. Blade A exhibited the least damage of the three blades. Blade A exhibited rearward bending and twisting beginning approximately 27" outboard of the blade root. Blade B exhibited rearward bending, twisting and paint transfer beginning approximately 20 inches outboard of the blade root. Blade C exhibited the most damage with rearward bending, twisting and paint transfer beginning approximately 12" outboard of the blade root. Heavy gouging of the leading edge and tip was present.		



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