



Continental Motors

ENGINE RUN REPORT

ENGINE MODEL	TSIO-550-C (1B)
ENGINE SERIAL NUMBER	802503
AIRCRAFT MAKE & MODEL	Piper PA46-310P
AIRCRAFT SERIAL NUMBER	46-8508027
AIRCRAFT REGISTRATION	N4385K
FILE NUMBER	19-110

NAME	SIGNATURE	DATE
Phillip Grice		03/17/2020
NAME	SIGNATURE	DATE
Mike Council		3-13-2020

ENGINE RUN REPORT

FILE NUMBER:

19-110

ENGINE S/N:

802503

PAGE 2 of 11

GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	3-12-2020	NTSB ACCIDENT #	ERA20LA011
FACILITY	Continental Aerospace Technologies	NTSB INVESTIGATOR	Brian Rayner-non attending Eric Gutierrez-attending
ADDRESS	[REDACTED] Mobile, Alabama 36615	FAA INVESTIGATOR	Non-Attending
		ACCIDENT DATE	10-4-2019
		ACCIDENT LOCATION	Harrisburg, PA

ENGINE INFORMATION

ENGINE POSITION	Single-Front
TOTAL TIME	2381.9 calculated
TIME SOH	74.9 calculated
TYPE & TIME SLI	20.2 hours since last 100-hour inspection dated 3-1-2019
BUILD DATE	6-30-1994
IN SERVICE DATE	Undetermined

Significant logbook information: The engine's final 100-hour inspection was completed 3-1-2019. See the logbook entry below:

SUN AVIATION, INC., Vero Beach, FL (VRB)

Date: 03/01/19

Engine Log

N4385K

ACTT: 5084.8

Model: TSIO-550C

SN: 46-8508027

Eng TT: 2361.7

SN: 802503

Eng TSO: 54.7

Accomplished an annual engine inspection IAW FAR 43, Appendix "D", using the Piper PA46-310P 100 hour inspection report as a guide. Accomplished engine compression check as follows: 1-73/80, 2-75/80, 3-77/80, 4-74/80, 5-75/80 and 6-77/80. Accomplished an oil and filter change, cut open filter removed and inspected, service with 8 qts Phillips XC 20W50 oil and one CH48109-1 filter. Accomplished AD 84-26-02 inspection of paper induction air filters. AD 2011-06-10 TIT probe replacement not due at this time. Replaced oil vernatherm valve seal, installed P/N 627496. Retimed right and left magnetos per MM 74-10-00. Adjusted propeller control and set propeller RPM to 26000 per MM 61-20-00 and 76-10-00. Retensioned alternator belt per MM 24-30-00. Reattached right hand tailpipe heat shield to right hand tailpipe. Lubricated wastegate butterfly per Hartzell SIL A-111. Adjusted alternate air door linkage per MM 12-10-00. Replaced right hand rear engine vibration mount heat shield, installed P/N 84136-004 per IPC figure 49.

MAINTENANCE RELEASE: This aircraft, airframe, aircraft engine, propeller or appliance identified above was repaired and inspected in accordance with current regulations of the Federal Aviation Administration and is approved for return to service. All work was performed in accordance with applicable aircraft, engine and or appliance maintenance manuals and instructions. Pertinent details are on file at the repair station office, WO # S003778 A.D.'s researched through Rev. 2019.03

Signature [REDACTED]

CRS # [REDACTED]

Sun Aviation, Inc, Municipal Airport, Vero Beach, FL 32961 [REDACTED]

ENGINE RUN REPORT**FILE NUMBER:**

19-110

ENGINE S/N:

802503

PAGE 3 of 11**Report Summary:**

Search Code(s):

15-12-68

Examination of the engine was performed under the supervision of the NTSB Investigator. The inspection and test run 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 was released by the NTSB IIC and returned to Anglin's Aircraft Recovery per shipper # AD01215

INSPECTION WITNESSES

NAME	Phillip Grice	NAME	Randy Bryant
ADDRESS	Mobile Alabama	ADDRESS	Mobile Alabama
ORGANIZATION	Continental Aerospace Technologies	ORGANIZATION	Continental Aerospace Technologies
PHONE		PHONE	
NAME	Eric Gutierrez	NAME	Mike Council
ADDRESS	Western Pacific Region	ADDRESS	Mobile, Alabama
ORGANIZATION	NTSB	ORGANIZATION	Continental Aerospace Technologies
PHONE		PHONE	

ENGINE RUN REPORT

FILE NUMBER:

19-110

ENGINE S/N:

802503

PAGE 4 of 11

EXTERNAL INSPECTION OF ENGINE

The engine was removed from the shipping crate in the presence of the NTSB Investigator and a visual inspection indicated that the engine exhibited surface corrosion on all cylinder cooling fins, both alternators and the left and right turbo chargers. A cardboard box was shipped with the engine which contained induction tubes, over boost valve, muffler and inner coolers.

This engine had been submerged in the Susquehanna River near Harrisburg, PA for 13 days before being recovered. The recovery crew drained the crankcase of oil and water and filled all cylinders and crankcase with diesel fuel to preserve the engine. No impact damage was noted.

An engine data plate affixed to the upper right crankcase half identified this engine as a Continental Motors model TSIO-550-C (1B), serial number 802503 assembled at Continental Motors 06-30-1994. According to engine maintenance records furnished by the NTSB IIC, this engine received its last 100-hour inspection 3-1-2019 at engine total time 2361.7 hours and 54.7 hours since overhauled. The engine was placed on an engine stand and prepared for testing.



ENGINE RUN REPORT

FILE NUMBER:

19-110

ENGINE S/N:

802503

PAGE 5 of 11



ENGINE RUN REPORT

FILE NUMBER:

19-110

ENGINE S/N:

802503

PAGE 6 of 11



ENGINE RUN REPORT

FILE NUMBER:

19-110

ENGINE S/N:

802503

PAGE 7 of 11

ENGINE PREPARATION PRIOR TO RUN

There were several airframe related items removed in preparation for operation on the CMI test bed. Items removed:

Left and Right Instrument Air Pumps

Air Conditioning Compressor and mounting bracket.

Alternator # 2.

Propeller governor

The following substitute or repaired parts were required for engine operation:

The electric starting motor was binding as the engine was manually rotated and a slave starter was substituted.

The left and right magneto were removed after ignition timing was verified (see below). Both magnetos contained water and were placed in a small oven to dry. The left and right magnetos were bench tested and a functional test was normal with spark produced at all ignition lead terminals. The magnetos were reinstalled and returned to previous ignition timing values.

The cylinders were borescoped at a previous recovery examination and the following was observed: All intake and exhaust valves were intact and exhibited normal combustion deposits. Each piston crown exhibited normal combustion deposits and cross hatching was visible on cylinder bores.

The magneto-to-engine timing was checked and with the following results:

Magneto-to-Engine Timing (Specified):	Left Magneto:	Right Magneto:
24 °BTDC	22°BTDC	24°BTDC

A cylinder leakage test was performed prior to the test run in accordance with the latest revision of CMI Service Bulletin SB03-3 with the engine at room temperature with the following results (master orifice reading – 43 PSI):

Cylinder #1 - 3/80 PSI (rings)

Cylinder #2 - 40/80 PSI rings)

Cylinder #3 - 25/80 PSI (rings)

Cylinder #4 - 27/80 PSI (rings)

Cylinder #5 - 32/80 PSI (rings)

Cylinder #6 - 34/80 PSI rings)

(*) – Leakage Source

The engine was not disassembled prior to the engine run. The crankshaft end-play measured 0.013", the run-out was 0.004" and the deflection was .003". The engine was then prepared for operation by installing the appropriate thermocouples, pressure lines and test pads for monitoring purposes. The engine was then moved to CMI test cell number 43 and mounted for operation. The engine was fitted with a test club propeller for the TSIO-550-C engine model.

ENGINE RUN REPORT

FILE NUMBER:

19-110

ENGINE S/N:

802503

PAGE 8 of 11

DESCRIPTION OF RUN

The engine did not start on the first attempt. No fuel flow was observed from the manifold valve to the fuel injectors. The fuel manifold was found to be contaminated with water and corrosion from being submerged in a river for several days prior to recovery. The manifold valve diaphragm assembly was stuck in the body which prevented the flow of fuel to the nozzles. The fuel manifold valve was disassembled, cleaned and reassembled. The engine then experienced a normal start without hesitation or stumbling in observed RPM. The engine RPM was advanced in steps for warm-up in preparation for full power operation. The engine throttle was advanced to 1200 RPM and held for five (5) minutes to stabilize. The engine throttle was advanced to 1600 RPM and held for five (5) minutes to stabilize. The engine throttle was advanced to 2450 RPM and held for five (5) minutes to stabilize. The engine throttle was advanced to full open position and held for five (5) minutes to stabilize. The engine throttle was rapidly advanced from idle to full throttle five times where it performed normally without any hesitation, stumbling or interruption in power.

Throughout the test phase, the engine accelerated normally without any hesitation, stumbling or interruption in power and demonstrated the ability to produce rated horsepower.

The NTSB Investigator received a copy of the engine run video which captured the engine test run in Continental test cell #43.



ENGINE RUN REPORT

FILE NUMBER:

19-110

ENGINE S/N:

802503

PAGE 9 of 11



ENGINE RUN REPORT

FILE NUMBER:

19-110

ENGINE S/N:

802503

PAGE 10 of 11



A cylinder leakage test was performed after the test run in accordance with the latest revision of CMI Service Bulletin SB03-3 with the engine hot with the following results (master orifice reading – 43 PSI):

Cylinder #1 - 74/80 PSI (rings)

Cylinder #2 - 74/80 PSI (rings)

Cylinder #3 - 73/80 PSI (rings)

Cylinder #4 - 73/80 PSI (rings)

Cylinder #5 - 74/80 PSI (rings)

Cylinder #6 - 72/80 PSI (rings)

(*) – Leakage Source

ENGINE RUN PARAMETERS

Record	RPM	MP/TDP " Hg	Oil		Fuel				Cell °F	Cylinder Heat Temp (CHT) / Exhaust Gas Temp (EGT) °F					
			PSI	°F	Lbs/Hr	Nozz PSI	Pump PSI	Fuel °F		# 1	# 2	# 3	# 4	# 5	# 6
1	1200	15.9 / 30.14	55	117	23.5	4.7	12.4	81	70	*/1028	250 / 1195	286 / 1113	234 / 1164	*/1157	150 / 1200
2	1600	19.3 / 30.4	55	122	42.7	5.0	15.7	81	70	*/1249	278 / 1249	319 / 1300	250 / 1248	*/1272	208 / 1257
3	2100	26.0 / 30.7	54	133	97.8	7.7	19.1	80	71	*/1314	274 / 1234	368 / 1355	282 / 1262	*/1257	238 / 1258
4	2450	32.6 / 34.3	54	142	165	12.6	25.0	79	72	*/1380	302 / 1295	411 / 1388	314 / 1285	*/1320	257 / 1271
2525 1214	F/T	36.8 / 37.4	51	152	223	18.1	31.4	79	73	*/1337	304 / 1252	401 / 1333	296 / 1232	*/1260	252 / 1214
6	Idle	18.7/ 30.1	10	174	11.4	4.4	9.3	83	73	*/707	222 / 591	338 / 870	264 / 686	*/825	200 / 614

Ambient Air Temperature °F	Ambient Air Pressure	Transfer Collar Δ P		Maximum Rated Power Engine Operational Parameters				
73.0	29.92	IN	OUT	RPM	" Hg MP	Fuel Flow Lbs/Hr	Metered PSI	Unmetered PSI
		33.8	33.9	2600	36.5	212 - 222	15.3 – 16.9	36.1 – 37.8

Notes: Operator -Phillip Grice

Transfer collar pressure delta measured at full throttle power setting.

All recoded data was taken at 5-minute intervals unless otherwise noted.

* Cylinders 1 and 5 CHT probes were inoperative.

Engine Performance Test				
Test RPM	Left Magneto	Left Magneto	Right Magneto	Right Magneto
	RPM	RPM Drop	RPM	RPM Drop
2120	2089	32	2098	23