



Continental Motors

ENGINE RUN REPORT

ENGINE MODEL	TSIO-550-C (1B)
ENGINE SERIAL NUMBER	802608
AIRCRAFT MAKE & MODEL	Piper PA-46-310P
AIRCRAFT SERIAL NUMBER	46-8508046
AIRCRAFT REGISTRATION	N811SK
FILE NUMBER	19-050

NAME	SIGNATURE	DATE
Phillip Grice		03-20-2020
NAME	SIGNATURE	DATE
Mike Council		3-12-2020

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EXAMINATION		ACCIDENT DATA	
DATE	3-10-2020	NTSB ACCIDENT #	ERA19LA231
FACILITY	Mobile Alabama	NTSB INVESTIGATOR	Brian Rayner-non-attending Eric Gutierrez-attending
ADDRESS	2039 Broad Street Mobile, Alabama 36615	FAA INVESTIGATOR	Non-attending
		ACCIDENT DATE	7-19-2019
		ACCIDENT LOCATION	Poughkeepsie, NY

ENGINE INFORMATION

ENGINE POSITION	Single-Front
TOTAL TIME	1095.1 calculated
TIME SOH	NA
TYPE & TIME SLI	41.5 since last 100-hour inspection 3-12-2019 at hobbs 174.2
BUILD DATE	11-05-2001
IN SERVICE DATE	Undetermined-engine logbooks were not available except excerpt below.

Significant logbook information: The engine received its last 100-hour inspection 3-12-2019.

Make and Model	A/C Serial No	Registration	Hobbs	Total Time
PA46-310P	46-8508046	N811SK	174.2	2641.3

CONTINENTAL TSIO-550-C1 SER# 802608

ENGINE TIME 1053.6

12MAR2019

PERFORMED 100 HR INSPECTION PER FAR43, APPENDIX D. CLEANED GAPPED AND ROTATED SPARK PLUGS.
PERFORMED COMPRESSION CHECK. INDUCTION LEAK CHECK COMPLETED. REMOVED AND REPLACED #4 EGT
PROBE PN M-111.

I CERTIFY THIS ENGINE HAS BEEN INSPECTED IN ACCORDANCE WITH 100HR INSPECTION AND FOUND TO BE IN
AIRWORTHY CONDITION.

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.

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Disposition of engine following exam: The engine was released by the NTSB IIC and was returned to Anglin's Aircraft Recovery, Clayton, DE per shipper # AD01214

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	Eastern Region	ADDRESS	Mobile, Alabama
ORGANIZATION	NTSB	ORGANIZATION	Continental Aerospace Technologies
PHONE			

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 impact damage to induction components, turbochargers, oil sump and starter adapter. The rocker cover for cylinder 6 exhaust rocker arm was impact damaged as was the rocker cover for cylinder # 5, Intake rocker arm.

The engine was placed on an engine stand and prepared for testing.

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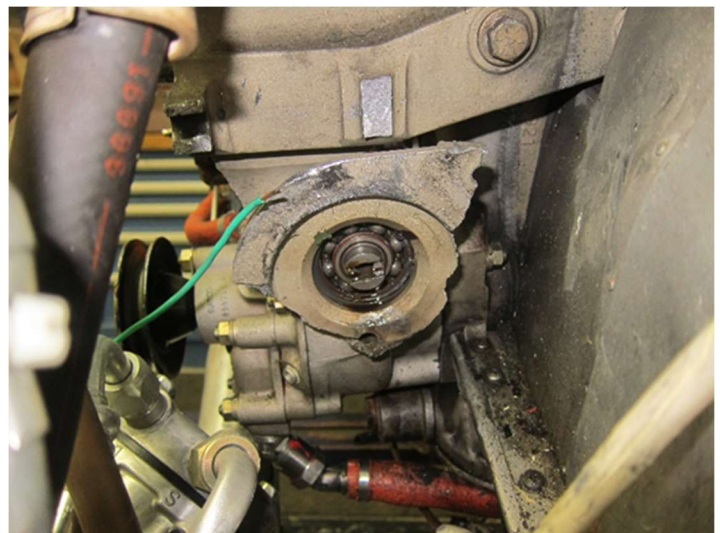
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There were a number of airframe related items removed in preparation for operation on the CMI test bed.

Items removed:

Airframe cooling baffles

Left and right Instrument Air Pumps

Propeller governor

Alternator # 2 (impact damage)

Air Conditioner Compressor.

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

Engine oil sump and pick-up tube

Starter adapter

Rocker covers-6E and 5I

Left turbo charger (impact damaged). Right turbo charger (would not rotate).

Turbo exhaust transition components (impact damaged).

Exhaust System

The cylinders were borescoped and the following was observed:

All exhaust and intake valves were intact and exhibited normal combustion deposits. The piston domes were intact and exhibited less than normal combustion deposits.

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

Magneto-to-Engine Timing (Specified):	Left Magneto:	Right Magneto:
24° BTDC	20°BTDC	25°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 - 15/80 PSI (Rings)

Cylinder #2 - 45/80 PSI (Rings)

Cylinder #3 - 10/80 PSI (Rings)

Cylinder #4 - 63/80 PSI (Rings)

Cylinder #5 - 10/80 PSI (Rings)

Cylinder #6 - 36/80 PSI (Rings)

(*) – Leakage Source

The engine was not disassembled prior to the engine run. The crankshaft end-play measured .012", run-out was 0.003" and deflection was .002".

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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.

DESCRIPTION OF RUN

The engine experienced a normal start on the first attempt but would not continue running without the use of the test cell boost pump. The engine driven fuel pump was removed, and the drive coupling was damaged. A slave fuel pump was substituted, and the engine started and ran normally. During the performance test, an oil leak was identified at the oil inlet fitting on the wastegate actuator. The oil fitting exhibited impact damage and a replacement fitting and O-ring were installed. 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 2100 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 fully open position and held for five (5) minutes to stabilize. The engine throttle was 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 was furnished with a copy of engine data and video captured at the engine test cell during engine test operations.



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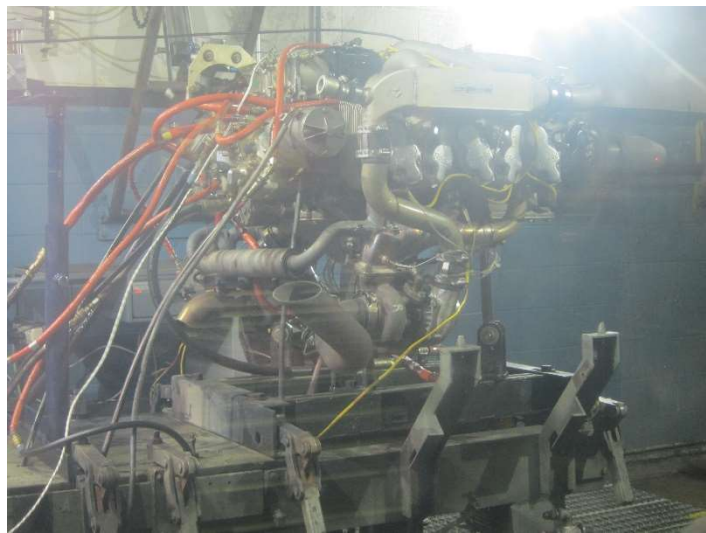
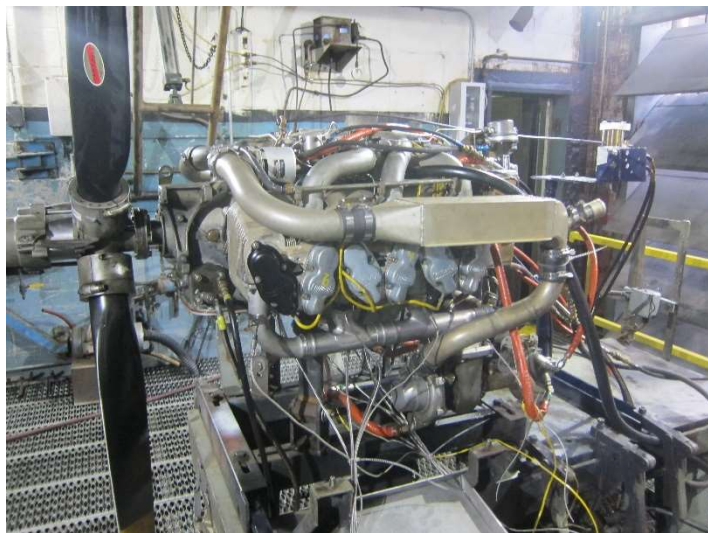
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A cylinder leakage test was performed after the test run in accordance with the latest revision of CMI Service Bulletin SB03-3 with the engine hot with the following results (master orifice reading – 43 PSI):

Cylinder #1- 65/80 PSI (rings)
Cylinder #3 -61/80 PSI (rings)
Cylinder #5 - 63/80 PSI (rings)
(*) – Leakage Source

Cylinder #2 -67/80 PSI (rings)
Cylinder #4 -61/80 PSI (rings)
Cylinder #6 - 64/80 PSI (rings)

Further examination of the engine-driven fuel pump identified corrosion and contamination throughout the interior of the fuel pump, preventing the pump from rotating. The corrosion is consistent with moisture collecting in the fuel system during post-accident storage while exposed to the environment. The corrosion prevented the pump from rotating damaging the drive coupling. All interior pump components were intact.

According to Continental build records for engine serial # 802608, the engine was assembled at Continental Motors 11-05-2001 with engine driven fuel pump serial # B01JA159 installed.

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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	16.2 / 30.3	56	121	35.0	4.4	12.5	66	64	*/ 871	165 / 1010	287 / 1204	196 / 1119	233 / 1121	156 / 977
2	1600	20.2 / 30.6	54	169	60.1	4.9	14.9	66	65	*/1193	203 / 1226	352 / 1376	222 / 1190	271 / 1231	187 / 1154
3	2100	27.8 / 31.0	54	197	118	7.8	16.4	65	66	*/1185	217 / 1244	350 / 1267	252 / 1350	296 / 1230	221 / 1185
4	2450	34. 7 / 36.0	54	211	176	13.6	22.5	66	67	*/1361	252 / 1410	415 / 1445	301 / 1436	330 / 1315	257 / 1275
5	F/T 2750	35.3 / 35.9	54	227	209	15.6	22.9	69	67	*/1389	272 / 1429	497 / 1436	312 / 1314	inop- /1342	265 / 1301
6	Idle 689	19.9 / 30.4	13	233	22.9	4.5	10.4	74	66	*/769	226 / 721	354 / 859	241 / 654	239 / 645	195 / 556

Ambient Air Temperature °F	Ambient Air Pressure	Transfer Collar Δ P		Maximum Rated Power Engine Operational Parameters				
64.8	30.15	IN	OUT	RPM	" Hg MP	Fuel Flow Lbs/Hr	Metered PSI	Unmetered PSI
		30.5	29.2	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.

Engine Performance Test				
Test RPM	Left Magneto	Left Magneto	Right Magneto	Right Magneto
	RPM	RPM Drop	RPM	RPM Drop
2100	1889	211	1897	203

*Cylinder # 1 CHT probe was inoperative