Continental Motors, Inc.

ENGINE OPERATIONAL TEST

REPORT

DATE	December 6, 2011
REGISTRATION #	N227TX
ENGINE MODEL	TSIO550K
ENGINE SERIAL	1002510
INSPECTOR	Phillip Grice
SEARCH CODE	15-12-68

GENERAL INFORMATION	
DATE OF RUN:	December 6, 2011
FACILITY:	Continental Motors Inc.
ADDRESS:	2039 Broad Street, Mobile, AL 36615
TELEPHONE:	251-436-8482

ENGINE INFORMATION					
MAKE:		Continental Motors Inc.			
MODEL:		TSIO550K			
SERIAL NO.:	1002510		**POSITION:**	Single	
BUILD DATE:	08-02-2010		**DATE IN SERVICE:**	Not reported	
TIME SINCE TOP OVERHAUL:		N/A	**DATE OF TOH:**		N/A
TIME SINCE MAJOR OVERHAUL:		N/A	**DATE OF MOH:**		N/A
TOTAL TIME:	487.8				
REMARKS:	Last 100 inspection 10-14-2011 474.2 normal maintenance noted in logbook				

AIRCRAFT INFORMATION			
ACCIDENT DATE:	10-24-2011	**LOCATION:**	Carrollton, TX.
MANUFACTURER:	Cirrus	**MODEL:**	SR22-T

ATTENDEES	
NAME:	Phillip Grice – Manager, Product Field Performance Johnny Little – Mechanic/Inspector Greg K. Eastburn – Mechanic/Inspector
ORGANIZATION:	Continental Motors Inc.
ADDRESS:	2039 Broad Street, Mobile, AL 36615
TELEPHONE:	251-436-8482
NAME:	Aaron Sauer
ORGANIZATION:	NTSB
NAME:	Brad Miller
ORGANIZATION:	Cirrus Aircraft

ENGINE COMPONENT INFORMATION

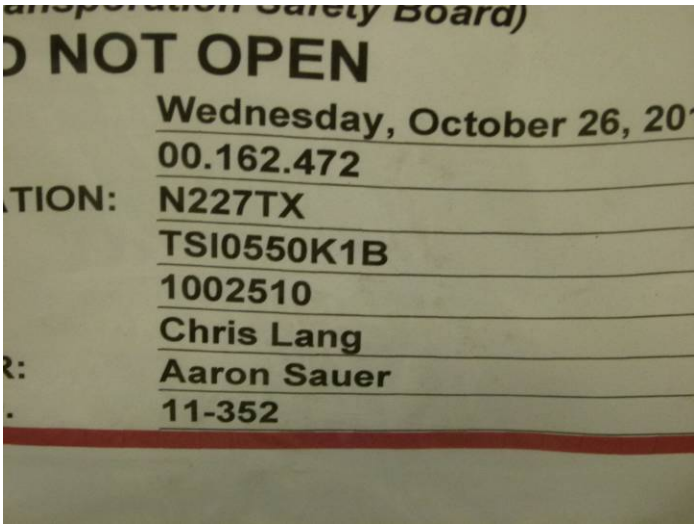
COMPONENT	MANUFACTURER / OVERHAULED BY	PART NUMBER	SERIAL NUMBER / DATE CODES / WORK ORDER #s
Alternator	CMI	656802	K070296
Controller, Turbocharger	Air Research Kelly Aerospace	657682	N/A
Crankcase	CMI	Casting # (L/H): 655435 Casting # (R/H): 655434	R10FA085
Crankshaft	CMI	Part #: Not accessible Forging #: Not accessible	Serial #: N10BA278 Heat Code: Not accessible
Cylinders	CMI	Part Number: 658178A1	Serial Number: 1 – AC10BA192 3 – ACOPKA976 5 – AC10AA415 2 – AC09KB973 4 – AC09KB392 6 – AC09KB401
Fuel Pump	CMI	649368-60A7	B10GA117
Fuel Manifold Valve	CMI	646433-17A1	C10FA088
Fuel Metering Unit	CMI	656785-4	A10DA175
Fuel Nozzles	CMI	Size: 1 - 1515, 3 -3531, 5 - 5520 2 - 2531, 4 - 4531, 6 - 6526	Not Applicable
Magneto - Left	CMI	10-500556-1	D07CA078
Magneto - Right	CMI	10-500556-1	D07HA042
Spark Plugs	Champion	RHM32S	N/A
Starter	CMI	Fractured	
Starter Adapter	CMI	Not legible	Not Applicable
Turbocharger	Air Research Kelly Aerospace	646677	Left - NEL00010 Right – NEL00013
Valve, Overboost	Air Research Kelly Aerospace	639319-26	NCN00250
Wastegate, Turbocharger	Air Research Kelly Aerospace	652456	MLN00169

ENGINE HISTORY

There were no engine logbooks, work orders or any other historical information returned with this engine.

EXTERNAL EXAMINATION

The engine exhibited impact damage concentrated at the Lower part of the engine. The external surfaces of the engine were undamaged. Both engine mount legs were replaced on the right side of the engine before the test run. The exhaust system was crushed and replaced for the engine run. The original turbo chargers were cleaned and reattached to the replacement exhaust system. The fuel Pump Inlet fitting was broken from the pump during the accident. The remainder of the fitting was removed and replaced and the fuel pump reinstalled. The starter and starter adapter were impact damaged and replace before the engine test.



Date	Engine Model	Engine Serial No.	Aircraft Registration	Page
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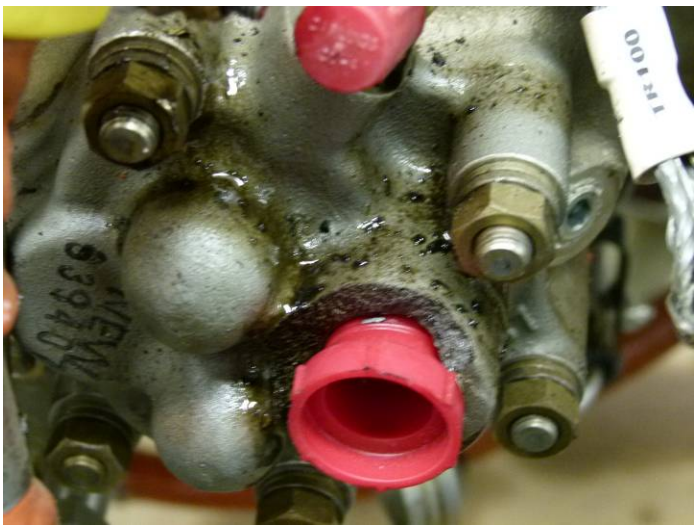
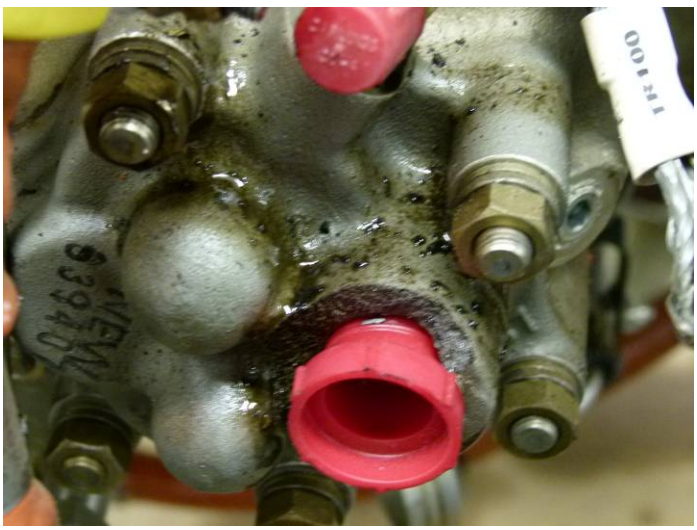




ENGINE PREPARATION PRIOR TO OPERATIONAL TEST

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

Items removed:

1. Alternator Generator.
2. CHT thermocouples and wiring harness.
3. Controller, exhaust waste gate.
4. Cooling baffles.
5. EGT thermocouples and wiring harness.
6. Exhaust system.
7. A/C compressor and drive

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

1. Fuel system - Fuel pump inlet fitting.
2. Mounts, engine – Front, right, Rear, right.
3. Oil sump.
4. Rocker cover - Cylinder number 5 intake and cylinder number 1 exhaust.
5. Starter adapter.
6. Starter.

The cylinders were borescoped and the following was observed:

Cylinder #1 – There were combustion deposits present in the combustion chamber and on the piston head. There was oil present on the cylinder bore. The cylinder head combustion chamber, intake and exhaust valve faces, piston head and cylinder bore exhibit normal operating signatures. The cylinder bore finish appears to be steel.

Cylinder #2 – There were combustion deposits present in the combustion chamber and on the piston head. There was oil present on the cylinder bore. The cylinder head combustion chamber, intake and exhaust valve faces, piston head and cylinder bore exhibit normal operating signatures. The cylinder bore finish appears to be steel.

Cylinder #3 – There were combustion deposits present in the combustion chamber and on the piston head. There was oil present on the cylinder bore. The cylinder head combustion chamber, intake and exhaust valve faces, piston head and cylinder bore exhibit normal operating signatures. The cylinder bore finish appears to be steel.

Cylinder #4 – There were combustion deposits present in the combustion chamber and on the piston head. There was oil present on the cylinder bore. The cylinder head combustion chamber, intake and exhaust valve faces, piston head and cylinder bore exhibit normal operating signatures. The cylinder bore finish appears to be steel.

Cylinder #5 – There were combustion deposits present in the combustion chamber and on the piston head. There was oil present on the cylinder bore. The cylinder head combustion chamber, intake and exhaust valve faces, piston head and cylinder bore exhibit normal operating signatures. The cylinder bore finish appears to be steel.

Cylinder #6 – There were combustion deposits present in the combustion chamber and on the piston head. There was oil present on the cylinder bore. The cylinder head combustion chamber, intake and exhaust valve faces, piston head and cylinder bore exhibit normal operating signatures. The cylinder bore finish appears to be steel.

A pre engine test cylinder leakage test was performed in accordance with the latest revision of CMI Service Bulletin SB03-3 on each cylinder prior to operation and with the engine at room temperature with the following results: Master orifice reading – 39 PSI

Cylinder #1 - 47/80 PSI (exhaust valve/rings) Cylinder #2 - 05/80 PSI (exhaust valve/rings)
Cylinder #3 - 05/80 PSI (exhaust valve/rings) Cylinder #4 - 00/80 PSI (exhaust valve/rings)
Cylinder #5 - 09/80 PSI (exhaust valve) Cylinder #6 - 09/80 PSI (exhaust valve/rings)

(*) – Leakage Source

Magneto to Engine Timing CMI Spec. - 24 ^{o} BTDC	Left Magneto: 24^{o} BTDC	Right Magneto: 24^{o} BTDC

The engine was not disassembled prior to the engine run.

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 TSIO550K engine model.

DESCRIPTION OF OPERATIONAL TEST

The engine experienced a normal start on the first attempt 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 six 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.

Note: During full power run fuel pressure was noted to decline below min. pressure after approximately 30 seconds of operation. During accident the main fuel pump fitting was broken off of fuel pump. The remainder of the fitting had to be removed from the pump body.

A replacement fitting was installed. Debris from both of these operations was introduced in the inlet of the pump. The vapor ejector port was back flushed in reverse flow from the return fitting through the inlet of the fuel pump. Pump pressure was normal after the back flush operation.

Engine Operational Test Log

Time		RPM	MP / TDP " Hg	Oil		Fuel				Cell °F	Cylinder Head Temperature °F					
Reading	Minutes			PSI	°F	Lbs/Hr	Nozzle PSI	Pump PSI	Fuel °F		# 1	# 2	# 3	# 4	# 5	# 6
1	5	1200	14 /29.5	60	131	19.6	2.54	9.3	55	46	237	174	243	201	196	164
2	5	1600	20.5 / 29.6	60	164	50.8	3.46	12.5	55	44	314	218	309	233	211	192
3	5	2100	24.2 / 30.0	60	173	85.0	4.74	17.29	54	44	338	238	347	267	243	211
4	5	2450	28.0 / 30.5	58	174	158.6	8.5	17.9	55	44	366	247	374	279	259	229
5	5	F/T 2600	34.3 /36.0	60	175	243.0	11.5	26.6	55	37	371	255	349	269	243	223
6	5	Idle 1076	15 / 29.8	48	157	22.6	2.8	9.5	51	38	270	199	249	207	186	157

Ambient Air Temperature °F	Ambient Air Pressure	Transfer Collar Δ P		Maximum Rated Power Engine Operational Parameters				
		In	Out	RPM	" Hg MP	Fuel Flow Lbs/Hr	Metered PSI	Unmetered PSI
57.5	30.16	60	59	2600	34.3	243	11.5	26.6

Notes: Operator – Johnny Little, 30524. Transfer collar pressure delta measured at full throttle power setting.

Engine Performance Test				
Test RPM	Left Magneto RPM	Left Magneto RPM Drop	Right Magneto RPM	Right Magneto RPM Drop
2100	1840	260	2058	42

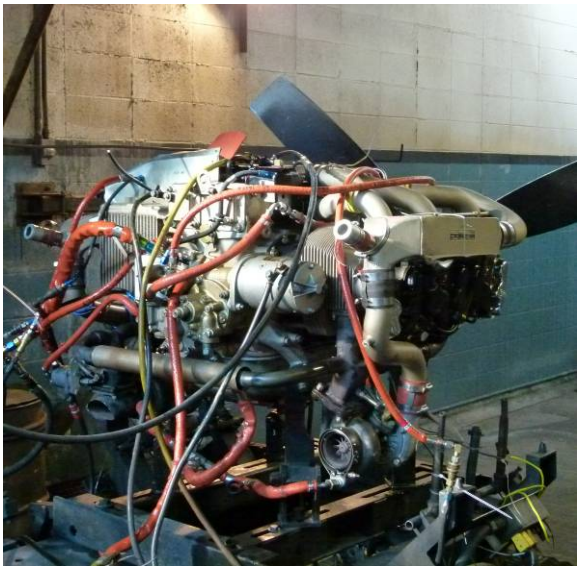
A post engine test cylinder leakage test was performed in accordance with the latest revision of CMI Service Bulletin SB03-3 on each cylinder with the engine hot. The results are as follows:
Master orifice reading – 39 PSI

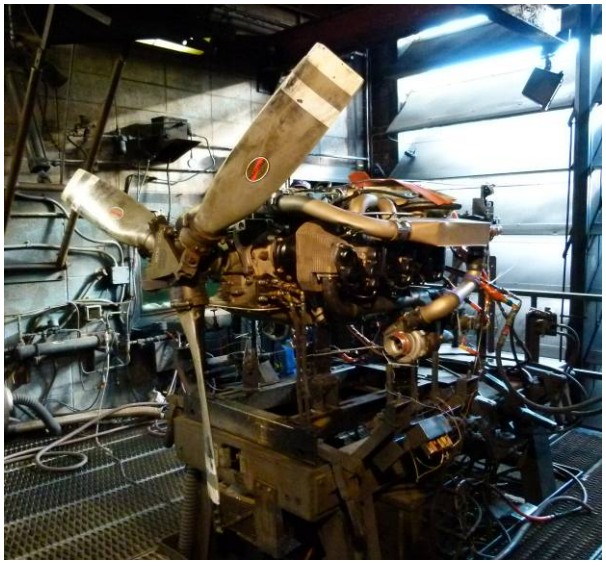
Cylinder #1 - 64/80 PSI (rings)
Cylinder #2 - 50/80 PSI (rings)
Cylinder #3 - 62/80 PSI (rings)
Cylinder #4 - 44/80 PSI (rings)
Cylinder #5 - 65/80 PSI (rings)
Cylinder #6 - 63/80 PSI (rings)

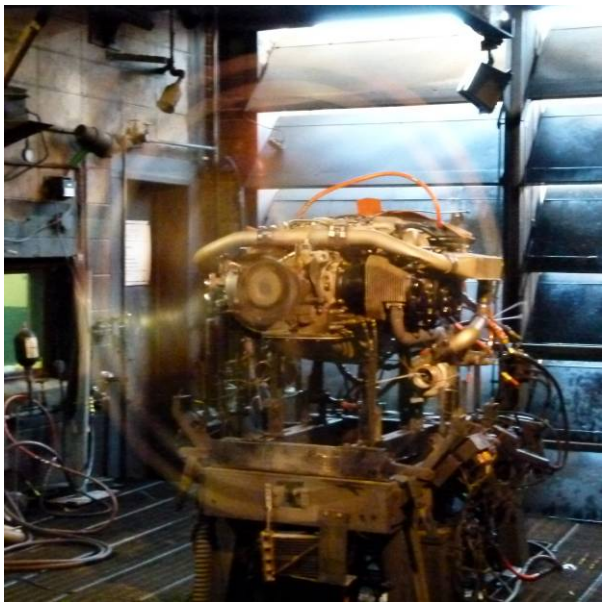
(*) – Leakage Source

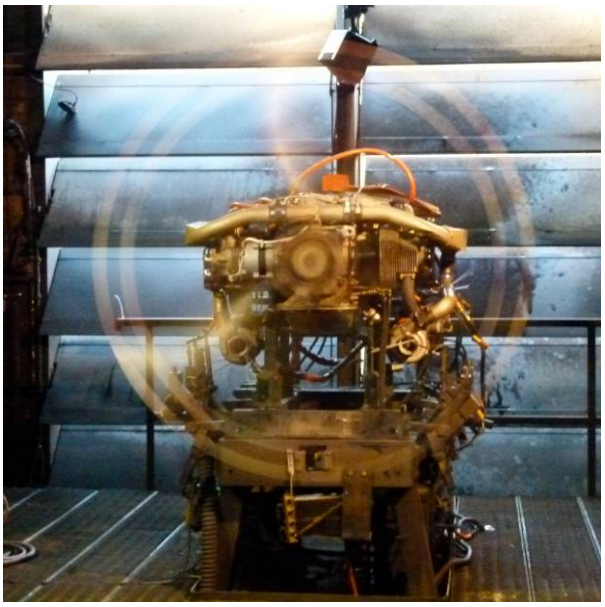
ENGINE OPERATIONAL TEST CONCLUSION

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









ENGINE DISPOSITION

The engine was shipped to the following address per the NTSB IIC upon the completion of the operational test:

Air Salvage of Dallas

1361 Ferris Road

Lancaster Texas 75146