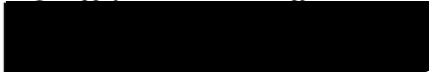




Continental Motors

ENGINE RUN REPORT

ENGINE MODEL	TSIO-550-K1B
ENGINE SERIAL NUMBER	1002324
AIRCRAFT MAKE & MODEL	Cirrus SR22T
AIRCRAFT SERIAL NUMBER	0014
AIRCRAFT REGISTRATION	N289CM
FILE NUMBER	17-248

NAME	SIGNATURE	DATE
Nicole L. Charnon		04/02/2018
Phillip Grice		04/02/2018

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17-248

ENGINE S/N:

1002324

PAGE 2 of 9**GENERAL INFORMATION**

EXAMINATION		ACCIDENT DATA	
DATE	March 28 & 29, 2018	NTSB ACCIDENT #	ANC18LA004
FACILITY	Continental Motors	NTSB INVESTIGATOR	David Brice Banning
ADDRESS	2039 Broad Street Mobile, Alabama 36615	FAA INVESTIGATOR	Robert Bullock
		ACCIDENT DATE	10/15/2017
		ACCIDENT LOCATION	Tuskegee, Alabama

ENGINE INFORMATION

ENGINE POSITION	Single-Engine
TOTAL TIME	Unknown
TIME SOH	Unknown
TYPE & TIME SLI	Unknown
BUILD DATE	06/23/2010
IN SERVICE DATE	Unknown

Significant logbook information:

The aircraft maintenance records were not reviewed as part of this test run. A pilot statement and the recorded engine parameters for the accident flight indicated that the engine was not adjusted to the manufacturers' specifications. It is unclear at this time as to how long the engine was operated under these conditions. Continental Motors specifies a full throttle MP of 37.5" at 2,500 RPM, whereas Cirrus adjusts the engine settings to attain 36.5" of MP and 2,500 RPM at full throttle.

Report Summary:

Search Code(s):

23-11-25, 58-05-25

The engine was placed in a test cell and run in the as-received-condition without any adjustments. Due to the pilot statements and recorded engine data, a decision was made to run the engine to record the parameters. The engine started with no anomalies noted. As the throttle was advanced it was noted that the fuel flow exceeded the Continental Motors' full throttle high-side limit once the MP surpassed 36". Continued movement of the throttle resulted in a MP of around 39" before the engine began experiencing fuel flows that were too excessive to support combustion. The slope controller was then adjusted to bring the MP down to that specified by Cirrus and the engine test run continued with high fuel flows observed. Overall, it was determined that the slope controller and engine-driven fuel pump were not adjusted within the manufacturers' specifications. Otherwise, no pre-accident anomalies were noted with the remaining engine components.

Disposition of engine following exam:

The engine and engine-related systems were released by the NTSB investigator-in-charge (IIC). The engine was shipped to Triad Aviation Inc. on shipper request number AD01061 and the slope controller was retained for further testing.

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INSPECTION WITNESSES			
NAME	Phillip Grice	NAME	Greg Eastburn
ADDRESS	Mobile, Alabama	ADDRESS	Mobile, Alabama
ORGANIZATION	Continental Motors	ORGANIZATION	Continental Motors
PHONE	██████████	PHONE	██████████
NAME	Lisa Jersild	NAME	Nicole L. Charnon
ADDRESS	Mobile, Alabama	ADDRESS	Washington, D.C.
ORGANIZATION	Continental Motors	ORGANIZATION	Continental Motors
PHONE	██████████	PHONE	██████████
NAME	David Brice Banning	NAME	Brad Miller
ADDRESS	Fairbanks, Alaska	ADDRESS	Duluth, Minnesota
ORGANIZATION	NTSB – Alaska Region	ORGANIZATION	Cirrus Aircraft
PHONE	██████████	PHONE	██████████
NAME	Todd Pryor	NAME	Robert Bullock
ADDRESS	Birmingham, Alabama	ADDRESS	Birmingham, Alabama
ORGANIZATION	Birmingham FSDO	ORGANIZATION	Birmingham FSDO
PHONE	██████████	PHONE	██████████

EXTERNAL INSPECTION OF ENGINE

The engine was mounted in the crate with the cooling baffle and intercoolers removed. A number of intake tubes were displaced and the waste gate was located within the crate with the tailpipes. The bottom ignition leads were not attached to the bottom sparkplugs. The slope controller was not located in the crate and was shipped to the factory separately.

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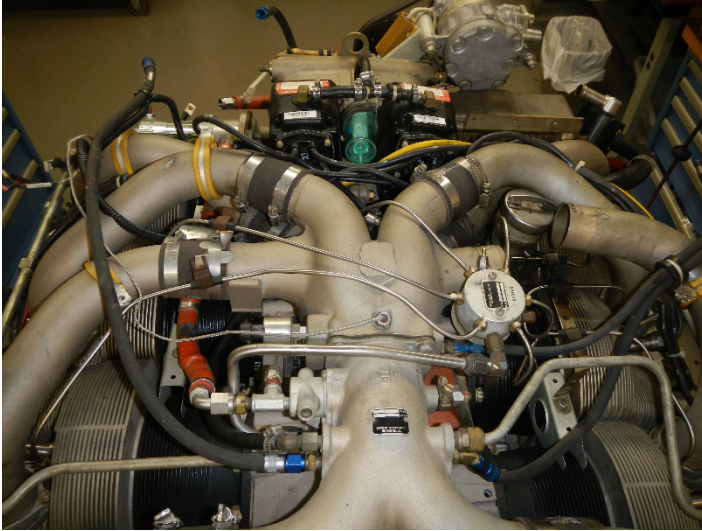
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ENGINE PREPARATION PRIOR TO RUN

It should be noted that the engine was run on the airplane following the accident; however, the propeller used during the test run limited the engine's ability to be fully tested. Therefore, the NTSB IIC elected to send the engine to the factory for testing.

There were a number of airframe related items removed in preparation for operation on the CMI test bed, which included the induction scat tubing, air filters, air conditioner compressor, drive pulley and belt, propeller governor, and air/oil separator. The cooling baffle was previously removed for shipping and the baffle was in the crate.

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

Magneto-to-Engine Timing (Specified):	Left Magneto:	Right Magneto:
22° BTDC	25° BTDC	24° BTDC

A cylinder leakage test was performed prior to the test run in accordance with the latest revision of CMI M-0 Maintenance Manual with the engine at room temperature with the following results (master orifice reading – 44 PSI):

Cylinder #1 - 20/80 PSI

Cylinder #2 - 64/80 PSI

Cylinder #3 - 61/80 PSI

Cylinder #4 - 20/80 PSI

Cylinder #5 - 45/80 PSI

Cylinder #6 - 43/80 PSI

The engine was not disassembled prior to the engine run. The crankshaft end-play measured 0.009" and the run-out was 0.003". 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 engine model.

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DESCRIPTION OF RUN

Priming fuel was applied to the engine and a leak was observed from the engine-driven fuel pump. It should be noted that the leak was not observed during the initial test run on the airplane. The pump was removed from the engine and, without adjusting any settings, the low pressure relief valve diaphragm and mixture shaft O-ring were removed and replaced. The diaphragm exhibited a crack on the spring side, but it did not appear to penetrate through. The pump was reassembled and placed on a test stand. When priming fuel was applied, the pump continued to leak. A decision was made by the NTSB IIC to utilize the pump as-is on the engine during the tests.

ENGINE RUN REPORT

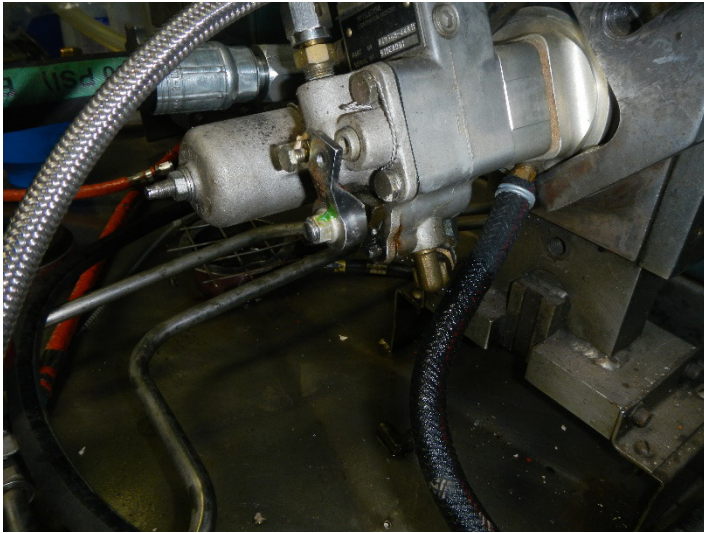
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Due to the recorded engine parameters and pilot statement, the NTSB IIC elected to run the engine to record the parameters as-is. The engine experienced a normal start on the first attempt without hesitation or stumbling in observed RPM. As the throttle was advanced it was noted that the fuel flow exceeded the Continental Motors' full-throttle high-side limit once the MP surpassed 36". Continued movement of the throttle resulted in a MP of around 39" before the engine began experiencing fuel flows that were too excessive to support combustion. The slope controller was then adjusted to bring the MP down to that specified by Cirrus (36.5") and the engine test run continued with high fuel flows. The engine throttle was rapidly advanced after adjustment from idle to full throttle five times where it performed normally without any hesitation, stumbling or interruption in power.

Overall, it was determined that both the slope controller and the fuel pump were adjusted in excess of that specified by the manufacturers'. Otherwise, no pre-accident anomalies were noted with the remaining engine components.

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A cylinder leakage test was performed after the test run in accordance with the latest revision of CMI M-0 Maintenance Manual with the engine hot with the following results (master orifice reading – 43 PSI):

Cylinder #1 - 54/80 PSI

Cylinder #2 - 64/80 PSI

Cylinder #3 - 66/80 PSI

Cylinder #4 - 75/80 PSI

Cylinder #5 - 40/80 PSI

Cylinder #6 - 61/80 PSI

ENGINE RUN PARAMETERS

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	16.48/30.12	62	82	25.1	3.78	12.98	73	76	308	213	304	239	243	206
2	5	1600	17.56/30.19	64	--	39.0	4.45	15.22	73	76	331	218	323	254	261	230
3	5	2100	25.68/34.64	68	--	105.1	6.82	26.98	74	76	357	235	364	283	295	251
4*	5	2450	33.2/35.28	65	209	194	12.09	28.26	74	75	374	227	368	277	287	254
5*	5	F/T 2504	36.2/37.1	69	222	235	14.76	33.11	74	75	378	222	362	265	287	246
6*	5	Idle 864	14.73/29.84	24	219	19.5	3.86	11.10	75	78	337	233	326	261	254	227
7*	5	After slope controller adjustment, the throttle was rapidly moved from stop-to-stop 5 times with no stumbling noted.														
Ambient Air Temperature °F		Ambient Air Pressure		Transfer Collar Δ P		Maximum Rated Power Engine Operational Parameters										
72.1		29.93		IN	OUT	RPM		" Hg MP		Fuel Flow Lbs./Hr.		Metered PSI		Unmetered PSI		
				--	--	2500		37.5		210 - 220		14.2 - 14.8		20.5 - 28.5		

Notes: Operators – Lisa Jersild/Phillip Grice.

Engine Performance Test				
Test RPM	Left Magneto	Left Magneto	Right Magneto	Right Magneto
	RPM	RPM Drop	RPM	RPM Drop
2124	2086	38	2068	56

As-Received Engine Parameters:

MP "Hg	RPM	FF
35	2388	210
36	2404	218
37	2416	232
38	2304	238
39	2284	250

*Parameters recorded after slope controller adjustment