

National Transportation Safety Board

Office of Aviation Safety

Washington, DC 20594



ERA24LA043

ENGINE TEST PREP AND RUN

March 12-13, 2024

A. ACCIDENT DETAILS

Location: Perry, Florida
Date: November 17, 2023
Time: 1708 EST
2208 UTC
Airplane: N37MB, Lancair IV-P

B. ENGINE TEST PREP AND RUN

IIC Lynn Spencer
NTSB/AS-ERA
Washington, DC

Party Member Phillip Grice
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Mobile, AL

C. SUMMARY

On November 17, 2023, about 1708 eastern standard time, an experimental amateur-built Lancair IV-P, N37MB, was substantially damaged when it was involved in an accident near Perry, Florida. The pilot sustained minor injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 personal flight.

The pilot reported a loss of engine power after descending and leveling off under a cloud layer at 2,000 ft msl. The pilot switched fuel tanks and enriched the mixture; however, he was unable to restore engine power and elected to execute a forced landing during which he impacted trees. The airplane came to rest inverted, and sustained substantial damage.

The engine, a Continental TSIO-550 EIB, S/N 803078, was prepared for a test run at Continental Aerospace, Mobile, Alabama, on March 12-13, 2024, and a test run was completed on March 13, 2024.

D. DETAILS OF THE TEST PREP AND RUN

The propeller, air conditioner compressor, fuel pump, air oil separator, two intercoolers, propeller governor, and air filter were removed from the engine. The oil sump was impact damaged and was replaced for testing. A fracture was observed on the No. 2 turbocharger exhaust where it had been previously welded. No determination could be made as to whether this was impact damage. The magneto-

to-engine timing was confirmed at 25.5° (right) and 25° (left), and the spec was 24°. No anomalies were noted in the crankshaft, with the crankshaft end-play at .011 inches, the crankshaft run-out at .003 inches, and the crankshaft deflection at .003 inches. The spark plugs and fuel pump were reinstalled, and the engine prepared for the test run with a replacement propeller.

Cold cylinder compression checks were:

Cylinder No. 1	50/80
Cylinder No. 2	50/80
Cylinder No. 3	45/80
Cylinder No. 4	50/80
Cylinder No. 5	20/80
Cylinder No. 6	55/80

The engine started without hesitation in the test cell and ran at idle for 5 minutes. It was subsequently run for 5 minutes at each of the following rpm settings: 1200, 1600, 2100, 2450, and then back at idle. Of note was that the fuel system was mal-adjusted and set too lean. Also of note was that manifold pressure was about 2 inches of mercury lower than rated power. This could have been due to the turbocharger exhaust leak or the sonic venturis which were open to the atmosphere for the engine test.

Following these static engine runs, the engine was brought to idle and then the throttle was rapidly advanced. This sequence was repeated several times, and when the throttle was advanced quickly, the engine ran very rich with black exhaust smoke, and then would falter. If the throttle was not immediately retarded, the engine quit completely. If the engine was brought back to idle after it faltered upon rapid throttle advancement, the engine regained power. This was consistent with the engine flooding with rapid throttle advancement after a period of idling.

Post engine run, the spark plugs were blackened due to rich mixture, which was not unusual given that the engine was operated at idle for many minutes before being shut down.

Hot cylinder compression checks were:

Cylinder No. 1	70/80
Cylinder No. 2	70/80
Cylinder No. 3	60/80
Cylinder No. 4	65/80
Cylinder No. 5	55/80
Cylinder No. 6	70/80

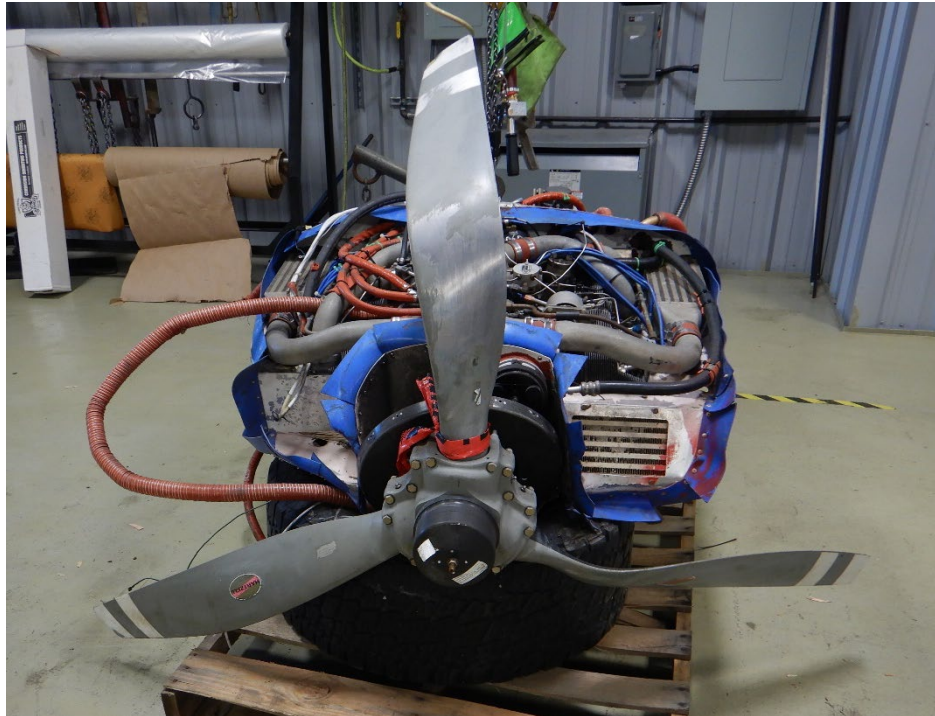


Photo 1 - Engine as delivered.

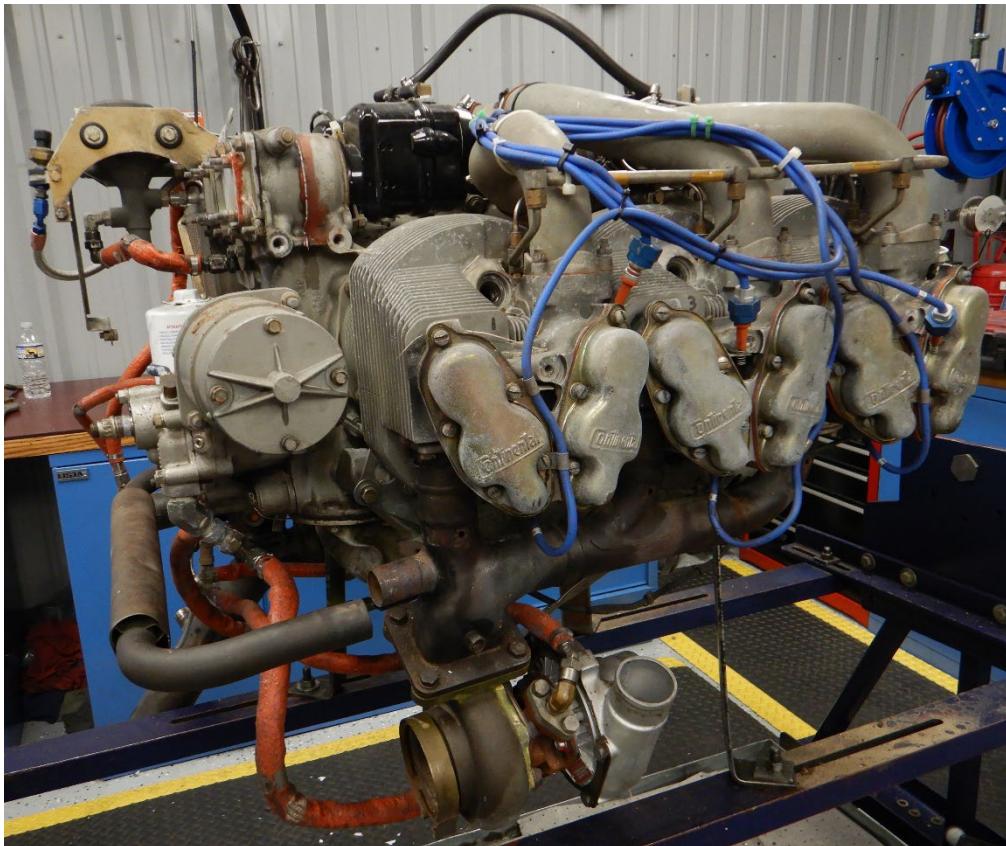


Photo 2 - Engine prepared to enter test cell.



Photo 3: Engine viewed in test cell from left front before testing.

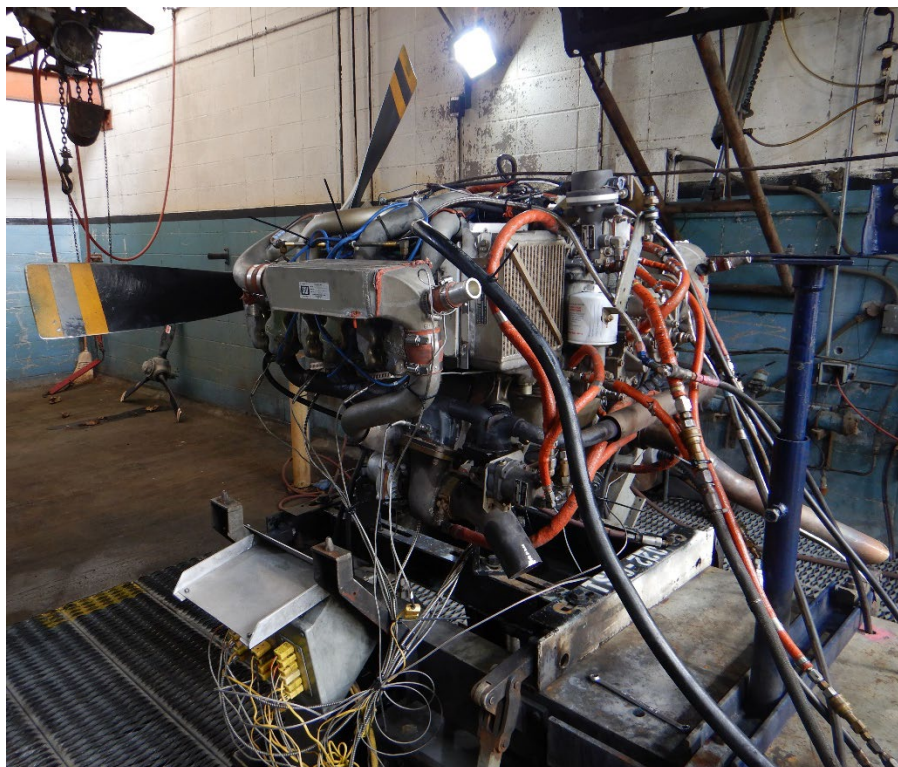


Photo 4 - Engine viewed in test cell from left rear before testing.



Photo 5 - Engine viewed in test cell from rear before testing.



Photo 6 - Engine viewed in test cell from right rear before testing.

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	15.2/31.5	57	101	29.6	5.6	10.2	66	—	212/1028	170/965	242/1091	170/1008	185/1044	162/1056	
2	1600	19.9/31.6	52	172	40.0	5.7	13.4	67	—	323/1313	285/1332	373/1355	244/1283	257/1385	203/1330	
3	2100	28.3/32.8	51	205	105.2	8.2	17.0	68	—	357/1335	358/1352	407/1358	246/1316	275/1289	216/1280	
4	2450	35.7/26.8	50	228	191.2	14.8	24.7	68	—	393/1317	247/1307	336/1316	235/1291	247/1272	214/1252	
5	F/T 2440	36.0/36.8	50	228	198	15.8	23.7	70	—	357/1297	257/1270	407/1279	262/1235	275/1282	218/1204	
6	Idle 800	18.5/30.6	18	216	19.2	4.8	8.8	67	—	290/828	215/706	315/870	194/875	224/865	174/904	
7		/								/	/	/	/	/	/	
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		
				41.6 29.8		2700		38.5		244-254		15.3-16.9		22.0-36.0		
Notes: Operator – Randy Bryant. Transfer collar pressure delta measured at full throttle power setting. All recorded 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	2117/2067				2097/2062											

Photo 7 - Engine test run results.

Submitted by:

Lynn Spencer
Aviation Accident Investigator