

ENGINE TEARDOWN REPORT INSPECTOR STATEMENT

Engine Model: Continental IO-240-B (3)

Engine Serial Number: 806409

Aircraft Make: Diamond Aircraft IND, Inc.

Aircraft Model: DL20-C1

Aircraft Serial Number: C0267

Registration Number: N248ME

Date of Examination: July 6-7, 2015

Requesting FAA Office: ASO-FSDO-SO-09

Kavin Hancock; Aviation Safety Inspector

Phone: (205) 876-1355

NTSB: Dennis Diaz

Accident/Incident Number: ERA 15 LA 200

Investigation Party:

Jack Clark----Birmingham, Al. FSDO SO-09

Phillip Grice---Continental Motors, Mobile, Al.

John Hudson—Falcon Aviation Academy (Lead Mechanic)

Clint Hughey---Falcon Aviation Academy (Director of Operations)

Description of Engine:

240 cubic inch displacement, four cylinder air cooled, horizontally opposed, fuel injected engine, developing 125 horsepower at 2800 RPM (take-off) and 94 horsepower at 2550 (recommended cruise).

Initial Inspection:

Aircraft engine was located in the Analytical Department at Continental Motors, Mobile, Alabama. The engine was removed from a shipping container and placed on an engine stand. This engine was received with the magnetos, harness, spark plugs, fuel system & starter, no alternator or vacuum pump was received with the engine.

Engine Disassembly:

- No disassembly required for the crankcase and power section.
- Magneto timing was checked—both magnetos 25 degrees BTC
- Crankshaft—end play .010, runout .003, deflection .000
- Cold compression-
- Engine prepared for test run.

Engine Test:

- Test run engine to 1900 RPM fuel flow/pressures normal; increase in throttle power, RPM began to drop off; engine began running rough (lean mixture) with no increase in RPM.
- Fuel pump was removed and checked on flow bench; fuel pressures found low and adjusted to manufactures specifications.
- Throttle body/fuel metering unit removed and checked on flow bench; metering unit failed; fuel pressure low as throttle shaft angle increased fuel pressure was dramatically lower in accordance with manufactures specifications.
- Fuel metering valve was disassembled noting no discrepancies with internal operations of the metering valve. The fuel metering valve was reassembled.
- The fuel pump (original) and a used (slave) throttle body/fuel metering valve was installed on the engine and test run to 2800-2850 RPM; fuel pressures were within manufactures specifications (test cell).
- The original throttle body/fuel metering valve was re-installed.
- Test run engine to 2100 RPM; engine began running rough/ backfiring with no increase in RPM.
- Removed original throttle body/metering valve and installed a used (slave) throttle body/metering unit. Test run engine to 2800-2850 RPM; fuel pressures within manufactures specifications (test cell), engine test 15-20 minutes at this power setting.
- The throttle body/fuel metering valve was removed from the engine and checked on flow bench. The fuel metering unit failed; fuel pressure low as throttle shaft angle increased fuel pressure was dramatically lower in accordance with manufactures specifications.
- The fuel metering valve was disassembled; with no obvious discrepancies with the internal components.
- Fuel metering valve was sent to Continental Motor fuel department for verification of parts to specifications/drawings

Accessory Testing:

- Fuel pump was bench flow checked; initially, indicating low fuel pressures, but was adjusted to manufactures specifications. Test result were recorded and printed.
- Throttle body/fuel metering valve was bench flow checked; failing initially with low pressure throughout all throttle settings; second bench flow check was performed; failing due the low fuel pressures throughout all throttle settings.
- The throttle body was disassembled and parts sent to layout inspection at Continental Motors. Parts from the fuel metering valve matched drawing specifications and part numbers.

Left Magneto:	p/n 4310	s/n 13040917
Right Magneto:	p/n 4309	s/n 14090232
Starter:	p/n BC320-1	s/n 08032572S
Fuel Manifold:	p/n 633898-1A18	s/n A05AA044
Throttle Body:	p/n 653351-3A5	s/n B08GA297
Fuel Pump:	p/n 656151-1A2	s/n C04GA323R
Magneto Harness:	Left p/n 4043	Right p/n 4044

Added Information/Other:

First Compression (cold)--#1 50/80, #2 60/80, #3 70/80, #4 72/80.

Final Compression (hot)--#1 70/80, #2 75/80, #3 71/80, #4 75/80.

Causal Factor/ Observations:

[REDACTED]

[REDACTED]

Jack E. Clark
Aviation Safety Inspector, FSDO SO-09
August 17, 2015

Enclosures: Photographs one CD.

Continental Motors Engine Run Report, dated July 6, 2015.

Fuel Pump Test Results (unadjusted and adjusted), July 7, 2015.

*un Adjusted
Readings - JEC*

----- Continental Motors, Inc. -----

Final Report
OF
calibration-31_CW TEST RESULTS
FOR

Accy Name : 632845 -31

Part Number : R-653351-3A5

Serial Number : B08Ga29+7

LOGGED BETWEEN : 7/7/2015 1:53:36 PM

AND : 7/7/2015 1:59:08 PM

BY

Operator : etaylor

Work Order Number : FAA

Report Generated On : 7/7/2015 1:59:15 PM

----- Continental Motors, Inc. -----

Airframe Name : 632845-31	Model Number : ***
Part Number : R-653351-3A5	Test Document : 632845
Accy Name : 632845 -31	
Test Type : calibration-31_CW	
Serial Number : B08Ga29+7	Operator : etaylor
Test Station ID: R678	Work Order : FAA
Run Date/Time : 7/7/2015 1:53:36 PM	Report Type : Final

Paragraph Number : 1

Paragraph Name : ----

Test Point	supply temp F	pump speed RPM	fuel flow Min	fuel flow PPH	fuel flow Max	discharge pressure Min	discharge pressure PSIG	discharge pressure Max
3	74.2	699.3	5.300	5.830	6.000	6.60	8.21+	7.20
4	74.9	2800.7	85.000	84.140-	86.000	47.80	37.46-	48.00
5	74.6	1799.6	65.000	65.350	66.000	16.50	17.38	18.50
6	74.2	699.2	5.300	5.980	6.000	6.60	8.14+	7.20
7	74.2	700.3	0.000	0.870	2.000	-	1.18	-

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Part Number	: R-653351-3A5	Test Document	: 632845
Accy Name	: 632845 -31		
Test Type	: calibration-31_CW		
Serial Number	: B08Ga29+7	Operator	: etaylor
Test Station ID	: R678	Work Order	: FAA
Run Date/Time	: 7/7/2015 1:53:36 PM	Report Type	: Final

----- Data Variance Report -----

Paragraph Number : 1

Paragraph Name : ----

Data for Test Point "3" out of limits

Data for Test Point "4" out of limits

Data for Test Point "6" out of limits

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102405 - 006407

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	22.7	56	198	7.6	5.9	12.0	89	85	256	230	244	200		
2	5	1600	13.7	54	167	11.7	6.1	16.6	84	85	274	249	267	213		
3	5	2100	19.7	50	198	21.7	7.3	26.3	86	86	322	285	319	251		
4	10X	2450	24.5	50	207	45.0	10.2	37.3	87	86	314	279	328	279		
5	5	F/T 2800	27.4	45	239	63.0	15.8	43.5	87	86	336	293	356	251		
6	5	Idle 748	12.6	18	204	11.9	4.9	10	86	86	239	224	232	198		
7	5		1													

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

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

Engine Performance Test				
Test RPM	Left Magneto	Left Magneto	Right Magneto	Right Magneto
	RPM	RPM Drop	RPM	RPM Drop
2100	2090	2036	2086	2064

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Serial Number : B08Ga29+7

LOGGED BETWEEN : 7/7/2015 2:00:09 PM

AND : 7/7/2015 2:08:48 PM

BY

Operator : etaylor

Work Order Number : FAA

Report Generated On : 7/7/2015 2:08:53 PM

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Part Number : R-653351-3A5	Test Document : 632845
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6	74.4	699.6	5.300	5.770	6.000	6.60	7.17	7.20
7	74.4	700.0	0.000	1.050	2.000	-	1.05	-

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All data points are within limits