



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety

Central Region

May 4, 2016

ENGINE EXAMINATION

CEN16FA111

A. EXAMINATION PARTICIPANTS:

Pam Sullivan
Air Safety Investigator
National Transportation Safety Board
North Central Region
Denver, CO 80239

Kurt Gibson
Air Safety Investigator
Continental Motors
Mobile, AL

Brad Miller
Manager, Air Safety
Cirrus Aircraft
Duluth, MN

B. SUMMARY

Examination of the airframe was conducted on May 4, 2016, at the Continental Motors facility in Mobile, Alabama.

C. DETAILS OF THE INVESTIGATION

1.0 Engine Examination

IO-360-ES
s/n 357628
210 HP

Right Magneto – Slick – Model No. 6314 s/n 03030909 Right Magneto was separated from the engine accessory case. The magneto fired on all leads when tested on a test bench.

Left Magneto – Slick – Model No. 6314 s/n 03030911 Left magneto was separated from the engine accessory case. The magneto fired on all leads when tested on a test bench.

Propeller Governor – McCauley p/n C290 D3 R/T 23 s/n 03-0836

Fuel Pump – Teledyne p/n 649368-46A4 s/n B031A112

Oil pump was removed from the engine and disassembled. The pump gears were intact.

Oil screen – clean

The oil filter was opened and there was no metal contamination in the filter.

All of the spark plugs were removed and appeared to be in good condition.

All of the internal engine components including the crankshaft, camshaft, cylinders, pistons, bearings, and connecting rods were intact and appeared to be capable of normal operation.

The fuel pump, fuel manifold assembly, and throttle body were tested. The throttle body and fuel pump were slightly out of tolerance at some of the test points; however, the fuel flows noted would not have prevented normal operation of the engine.

The engine was manufactured in 2003, but there were indications that it had been overhauled at some point.

Piston pins on all of the cylinders were able to be pushed out by hand. No carbon build-up on the pins as would have been expected.

Orange paint was visible on the all of the connecting rod bolts. Continental Motors does not use this paint.

The seal between crankcase halves was a double seal. Continental Motors uses a single seal during manufacture.

All of the connecting rods contained a NDT stamp indicating non-destructive testing. Continental Motors uses a M stamp indicating magnaflux.

The main bearings #1 and #3 had a date code of 9/14. The #4 main bearing had a date code of 01/15.

The connecting rod bearings had a date code of 12/13.

The lifters 658106. The production release date for these lifters was December 9, 2009.

The original crankshaft serial number was N03DA219. The serial number on the crankshaft that was in the engine was N15EA036. This crankshaft was produced in 2015.

Submitted by : Pamela Sullivan, NTSB IIC

MANIFOLD VALVE CALIBRATION SYSTEM

User: ffurguso

TEMPERATURE (°F)
69.5

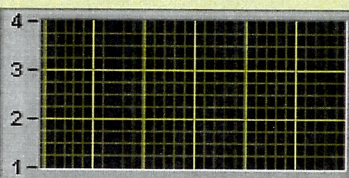
SUPPLY PRESSURE (PSIG)
-0.96

Leak Timer **0**

Initial Pressure **3.165**

Final Pressure **2.012**

Slope **0.038434**



TEST STATUS

IDLE

PASSED

- FAN
- PUMP
- SHUTOFF
- PURGE

MANIFOLD VALVE CALIBRATION

641865-39

SETUP

START

METERED FUEL PRESSURE (PSIG)
-0.09

FLOWRATE (PPH)
-0.1

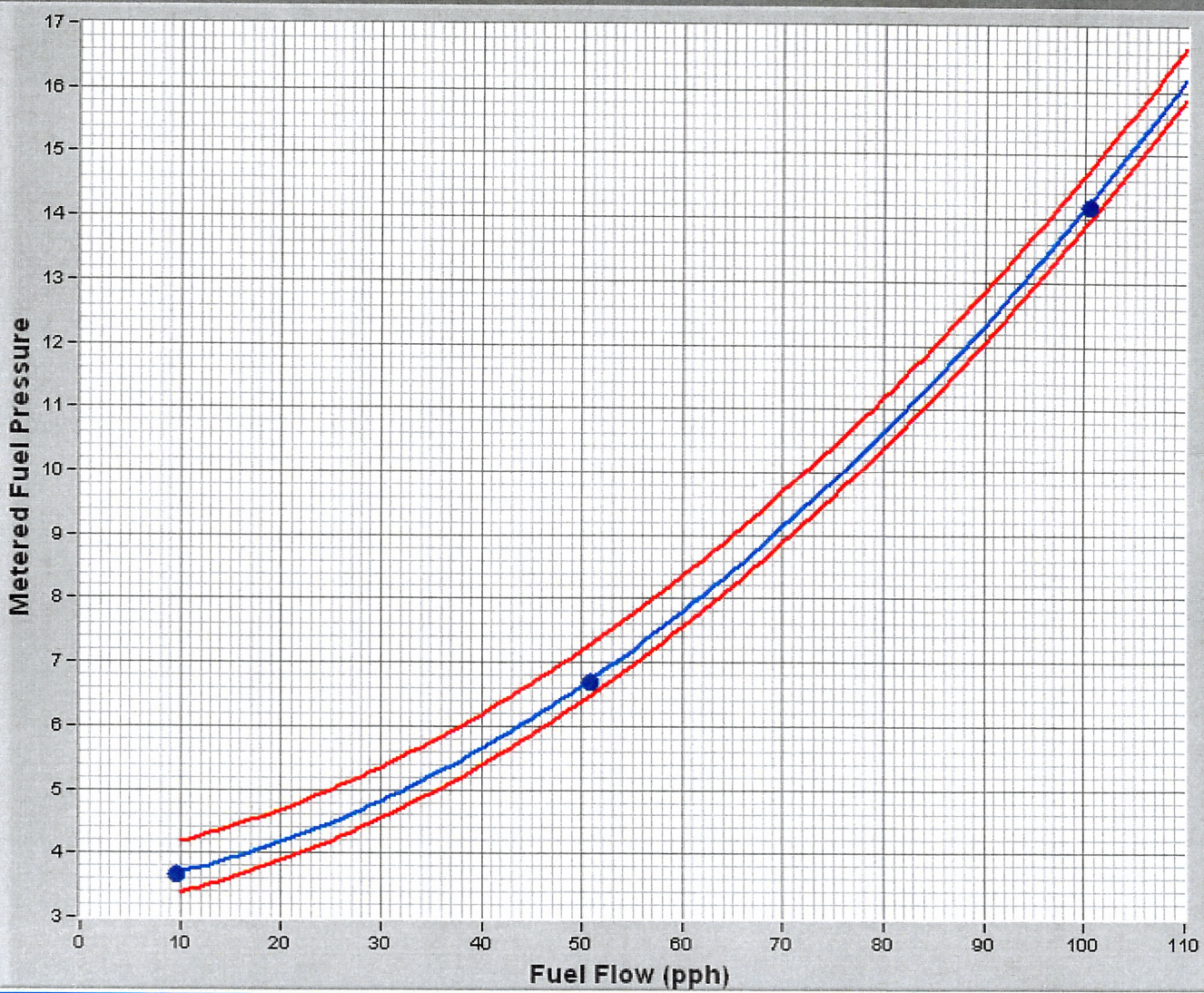
PART NUMBER **646508-10a6**

SERIAL NUMBER **c03ia1169**

CALIBRATION STATUS

PASS

FLOW (PPH)	PRESSURE (PSIG)	LOW LIMIT	HIGH LIMIT	TEST STATUS
10	3.696	3.380	4.180	REF
50	6.63	6.380	7.180	PASS
100	14.164	14.080	14.480	PASS



MEASURED POINTS **PASS**

LEAK TEST **PASS**

SATBTS v1.11

SUB ASSEMBLY THROTTLE BODY TEST STAND

Testing New Part

05/05/16 08:01 AM

CURRENT USER FFURGUSON

NO ANGLE SENSOR

THROTTLE ANGLE(°)

64.18

72.00 MIN

76.00 MAX

FUEL PRESSURE (PSI)

-0.3

14.75 MIN

15.25 MAX

FUEL TEMP(°F)

69.1

68.00 MIN

78.00 MAX

FUEL FLOW (LBS/H)

-5.0

151.00 MIN

158.60 MAX

TEST COMPLETE. CLICK THE 'START A NEW TEST' BUTTON TO BEGIN TESTING A NEW PART

FLOW TEST FAILED!

START NEW TEST

SERIAL NUMBER

a03ia116

PART NUMBER

652844-1a4

DASH NUMBER

35-MANUAL

BEGIN TEST

RESTART TEST

OPEN REPORT

EXIT

TARGET ANGLE(°)	TARGET PRESSURE(PSI)	MEASURED PRESSURE(PSI)	MIN FUEL FLOW(LBS/H)	MAX FUEL FLOW(LBS/H)	MEASURED FUEL FLOW(LBS/H)
2.0	15.0	14.68	10.9	11.4	13.29
8	15.0	14.74	27.0	35.0	29.33
16	15.0	14.80	58.0	69.6	50.41
24	15.0	14.94	81.0	89.1	70.51
36	15.0	14.96	101.0	111.1	101.91
48	15.0	14.89	121.5	130.6	128.38
58	15.0	14.90	137.0	147.3	142.32
74	15.0	14.96	151.0	158.6	157.37

start

SATBTS v1.11

AnalogIO

Untitled Document - ...

CAPP Production (RE...

8:01 AM

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

Final Report
OF
calibration-32_CW TEST RESULTS
FOR

Accy Name : 632845 -32

Part Number : 649368-46A4

Serial Number : B03IA112

LOGGED BETWEEN : 5/5/2016 7:34:26 AM

AND : 5/5/2016 7:40:49 AM

BY

Operator : etaylor

Work Order Number : WARRANTY

Report Generated On : 5/5/2016 7:40:53 AM

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

Airframe Name	: 632845-32	Model Number	:
Part Number	: 649368-46A4	Test Document	: 632845
Accy Name	: 632845 -32		
Test Type	: calibration-32_CW		
Serial Number	: B03IA112	Operator	: etaylor
Test Station ID	: R678	Work Order	: WARRANTY
Run Date/Time	: 5/5/2016 7:34:26 AM	Report Type	: Final

Paragraph Number : 1

Paragraph Name : ----

Test Point	supply temp F	pump speed Min	pump speed RPM	pump speed Max	fuel flow Min	fuel flow PPH	fuel flow Max	discharged pressure Min	discharged pressure PSIG	discharge pressure Max	aneroid press Min	aneroid press "HgA	aneroid press Max
3	72.1	594.0	599.4	606.0	6.930	6.930	7.070	6.93	10.81+	7.07	29.900	30.011	30.100
4	72.6	2495.0	2520.8	2545.0	103.950	104.150	106.050	23.80	57.33+	24.20	29.900	29.991	30.100
5	72.3	2495.0	2523.0	2545.0	86.000	90.710	96.000	-	-	-	25.900	26.020	26.100
6	72.2	2495.0	2520.8	2545.0	74.000	80.010	84.000	-	-	-	21.900	22.050	22.100
7	72.1	2495.0	2524.6	2545.0	60.000	61.860	78.000	-	-	-	17.900	20.340+	18.100
8	72.2	594.0	599.0	606.0	6.930	7.010	7.070	-	-	-	29.900	29.970	30.100

9	72.2	594.0	599.9	606.0	0.000	0.010	2.000	-	-	-	29.900	29.991	30.100
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----- Continental Motors, Inc. -----

Airframe Name	: 632845-32	Model Number	:	
Part Number	: 649368-46A4	Test Document	:	632845
Accy Name	: 632845 -32			
Test Type	: calibration-32_CW			
Serial Number	: B03IA112	Operator	:	etaylor
Test Station ID	: R678	Work Order	:	WARRANTY
Run Date/Time	: 5/5/2016 7:34:26 AM	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 "7" out of limits