



Continental Motors

ENGINE FIELD INSPECTION REPORT

Addendum to Original Report dated 02/09/2015

ENGINE MODEL	IO-520-BA12B Converted to IO-520-XXBB ²
ENGINE SERIAL NUMBER	241573-R
AIRCRAFT MAKE & MODEL	Beechcraft 36
AIRCRAFT SERIAL NUMBER	E-80
AIRCRAFT REGISTRATION	N999CJ
FILE NUMBER	14-392

NAME	SIGNATURE	DATE
Nicole L. Charnon		03/20/2015

ENGINE FIELD INSPECTION REPORT

FILE NUMBER:	14-392	ENGINE S/N:	241573-R	PAGE 2 of 27
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GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	03/10/2015	NTSB ACCIDENT #	WPR15FA088
FACILITY	Air Transport	NTSB INVESTIGATOR	Patrick Jones
ADDRESS	[REDACTED] Phoenix, AZ 85009	FAA INVESTIGATOR	Gary Rucker, LV FSDO
		ACCIDENT DATE	1/20/2015
		ACCIDENT LOCATION	Mountain Pass, CA

ENGINE INFORMATION

ENGINE POSITION	Single-Engine
TOTAL TIME	Unknown
TIME SOH	~330 hours
TYPE & TIME SLI	~34 hours
BUILD DATE	07/20/1983
IN SERVICE DATE	08/22/1983

Significant logbook information:

Review of the engine maintenance records revealed that the #2 engine logbook started on May 28, 2003, with a dynamic balance of the propeller. A June 30, 2003 entry for an oil change indicated that the tachometer time was 4,091.1 and the time since major overhaul was 563.1 hours. The engine underwent routine maintenance and inspections up until November 18, 2011, when it was overhauled. The entries associated with the overhaul and the re-installation indicated that the total time in service was 1,253.4 hours; however, this time coincides with the total time since its previous overhaul and may not actually be representative of the engine's total time. The tachometer time recorded at the latest engine overhaul was 4,770.19 hours. Since the last overhaul, the engine underwent routine maintenance and inspections, the last of which was an oil change that took place on September 10, 2014 at a tachometer time of 5,066.1 hours and a time since overhaul of 295.91 hours. The tachometer found in the recovered wreckage displayed a meter reading of 5,100.72 hours.

Report Summary:

Search Code(s): 15-12-68

This report is functioning as an addendum to the original CMI Engine Field Inspection Report dated 02/09/2015 and written by CMI Air Safety Investigator, Mike Council. The original report documented the engine condition at the accident site and this report documented the engine during a follow-on examination conducted at the aforementioned recovery facility.

There were no pre-accident anomalies observed with the recovered/identified components that would have prevented the engine's ability to produce full, rated power.

Disposition of engine following exam:

The NTSB investigator-in-charge released the wreckage to the owner's representative following the examination with the exception of an EDM JPI 700, which was shipped to the NTSB Vehicle Recorders Laboratory to determine the presence of non-volatile memory.

ENGINE FIELD INSPECTION REPORT**FILE NUMBER:**

14-392

ENGINE S/N:

241573-R

PAGE 3 of 27**INSPECTION WITNESSES**

NAME	Nicole L. Charnon	NAME	Patrick Jones
ADDRESS	Mobile, Alabama	ADDRESS	San Dimas, California
ORGANIZATION	Continental Motors	ORGANIZATION	NTSB; Western Region
PHONE		PHONE	
NAME	Andrew Hall	NAME	Paul Yoos
ADDRESS	Wichita, Kansas	ADDRESS	Wichita, Kansas
ORGANIZATION	Textron Aviation	ORGANIZATION	Textron Aviation
PHONE		PHONE	

INSPECTION OF ENGINE

Please see the February 9, 2015 report for more details as to the engine's post-accident condition. The engine was placed on an examination table for the inspection. The rocker covers and/or rocker cover remnants were removed from the cylinders as were the top sparkplugs. A borescope inspection of the cylinders was conducted with no anomalies noted. The recovered wreckage was examined by the investigative parties and the observed components are described in their pertinent sections below.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 4 of 27



ENGINE TEARDOWN AND COMPONENT EXAMINATION

EXHAUST SYSTEM

Condition:

The exhaust system was separated from the engine. Segments of exhaust risers along with the exhaust manifolds and mufflers were located within the recovered wreckage. All of the exhaust system components displayed ductile deformation and flattening. A segment of exhaust manifold was found adhering to a piece of synthetic clothing. Examination of the exhaust manifold revealed that the material that came into contact with the exhaust manifold was burnt and some areas of the synthetic material had been melted to the manifold.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 5 of 27



INDUCTION SYSTEM

Condition:

None of the induction system components were identified.

ENGINE FIELD INSPECTION REPORT**FILE NUMBER:**

14-392

ENGINE S/N:

241573-R

PAGE 6 of 27**IGNITION SYSTEM**

LEFT MAGNETO	Manufacturer: Bendix (CMI)	P/N: Unknown	S/N: Unknown
Condition:	Photographs taken from the accident site revealed that portions of one of the magnetos were identified along the wreckage debris field; however, the magnetos were not identified in the recovered wreckage.		
RIGHT MAGNETO	Manufacturer: Bendix (CMI)	P/N: Unknown	S/N: Unknown
Condition:	Photographs taken from the accident site revealed that portions of one of the magnetos were identified along the wreckage debris field; however, the magnetos were not identified in the recovered wreckage.		
IGNITION HARNESS	Manufacturer: Unknown	P/N: Unknown	S/N: Unknown
Condition:	The ignition harness was destroyed and only portions of the leads or terminal ends remained with the engine.		



SPARK PLUGS	Manufacturer: Tempest	P/N: URHB3
Condition:	The #2, #4, and #6 top sparkplugs were fractured, but the electrode end remained inserted in their respective cylinders. The top sparkplugs were removed from the cylinders and examined. All of the sparkplugs displayed a new electrode condition along with combustion deposits that were consistent with lean engine operation. The #2, #4, and #6 top sparkplug center electrodes were displaced from the center position.	

ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 7 of 27



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 8 of 27



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 9 of 27

FUEL SYSTEM

FUEL PUMP

Manufacturer: CMI
(overhauled by Aircraft
Accessories)

P/N: 646212-16

S/N: C319923BR

Condition: The fuel pump was separated from the engine and all of the fuel fittings were fractured as was the adjustable orifice fitting (though it remained safety-wired to the fuel pump housing). The mounting flange was fractured and mechanically deformed. The low pressure relief valve adjustable screw was fractured and its stop nut was displaced into the cap. The drive coupling was not identified. Inserting a screw driver into the base of the fuel pump drive shaft and manually rotating the screw driver resulted in a coinciding rotation of the drive shaft and revealed no binding. Disassembly of the fuel pump revealed no pre-accident anomalies with the internal components. Dirt consistent with that photographed at the accident site and noted on the engine's external surfaces was found within the fuel pump.



ENGINE FIELD INSPECTION REPORT

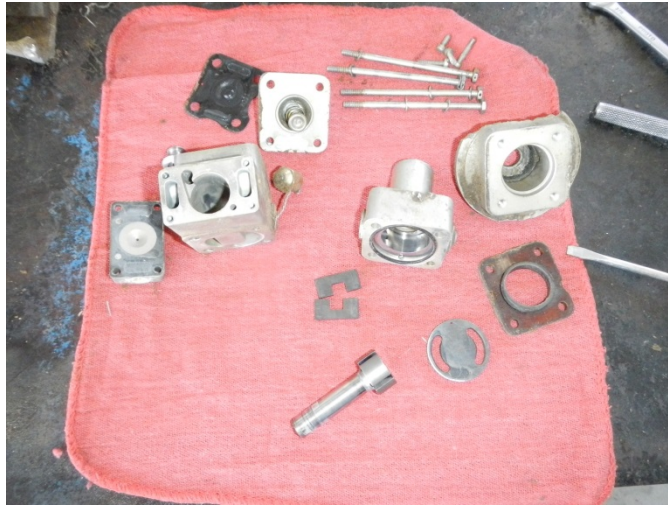
FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 10 of 27



THROTTLE BODY METERING UNIT

Manufacturer: CMI
(overhauled by Aircraft
Accessories)

P/N: 62990?

S/N: C319917BR

Condition:

The throttle body was destroyed and the throttle valve was not identified among the recovered wreckage. The metering unit housing was deformed and the throttle synchronization lever was intact but deformed and the mixture lever remained intact and secured to the mixture shaft and cam; however the cam was pulled out of the metering unit housing and was bent. The fittings were all separated from the metering unit. The fuel inlet screen was in place with remnant of safety-wire. Removal of the fuel inlet screen did not reveal any signs of obstruction.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:	14-392	ENGINE S/N:	241573-R	PAGE 11 of 27
--------------	--------	-------------	----------	---------------



FUEL MANIFOLD VALVE

Manufacturer: Unknown

P/N: Unknown

S/N: Unknown

Condition: The fuel manifold was not identified among the recovered wreckage.

FUEL NOZZLES AND LINES

Manufacturer: GAMI

Condition: The GAMI injectors were fractured (with the exception of the #6, which was bent) and the bases remained secured to the cylinders. The #6 fuel injector line remained connected to the nozzle.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 12 of 27

LUBRICATION SYSTEM

OIL SUMP

Condition: The oil sump was separated from the engine and was not observed. However, there was no evidence of an oil starvation or exhaustion event.



OIL PICKUP TUBE & SCREEN

Condition: The oil pickup tube and screen were not observed.

OIL PUMP

Condition: The oil pump was separated from the backside of the engine and the housing was fractured. The pump gears were located within the recovered wreckage. The drive shaft was fractured and bent, but there were no anomalies noted with the gears. A portion of the housing containing the oil pressure relief valve was recovered and no pre-accident anomalies were noted.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 13 of 27



OIL FILTER

Manufacturer: Unknown

P/N: Unknown

Condition:

The oil filter was not observed and only a portion of its adapter was identified.

OIL COOLER

Manufacturer: Not Legible

P/N: Not Legible

S/N: Not Legible

Condition:

The oil cooler was located among the recovered wreckage. It was separated from the engine and sustained deformation damage that crushed the cooling fins and bent the cooler.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

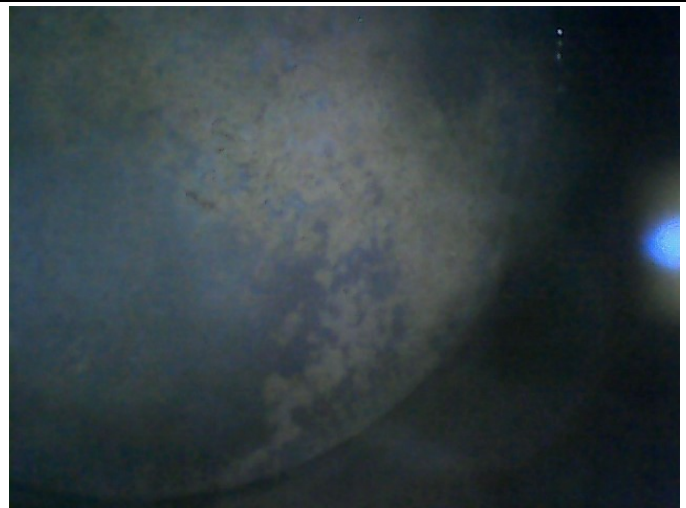
241573-R

PAGE 14 of 27

CYLINDERS

NOTE: The photographs that follow the cylinder descriptions represent the rocker area, the piston, the intake valve and the exhaust valve in that order unless otherwise specified.

CYLINDER #1	ECI AEC65385
Work Orders:	A1461, H7274H
Condition:	The bottom section of the cylinder head was fractured. None of the cylinder components revealed any evidence of thermal distress or lack of lubrication. The cylinder piston, head, valves and valve seats displayed deposits consistent with a lean combustion process.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 15 of 27

CYLINDER #3

ECI AEC65385

Work Orders:

A197116, H7279K

Condition:

None of the cylinder components revealed any evidence of thermal distress or lack of lubrication. The cylinder piston, head, valves and valve seats displayed deposits consistent with a lean combustion process.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 16 of 27

CYLINDER #5

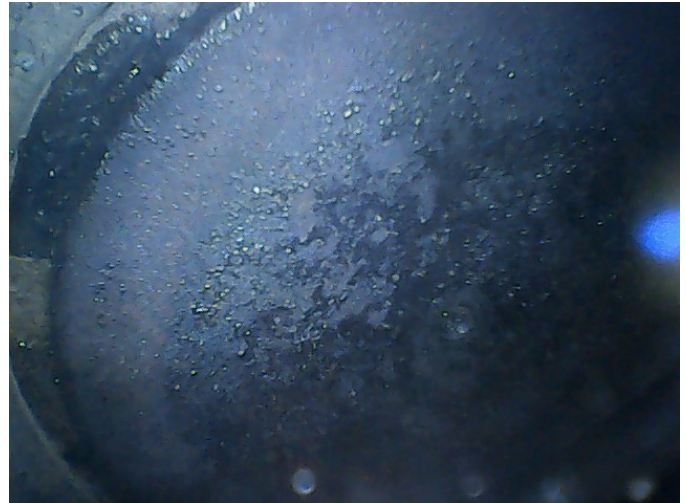
ECI AEC65385

Work Orders:

A096117, N1850N

Condition:

The bottom section of the cylinder head was fractured. None of the cylinder components revealed any evidence of thermal distress or lack of lubrication. The cylinder piston, head, valves and valve seats displayed deposits consistent with a lean combustion process.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 17 of 27

CYLINDER #2

ECI AEC65385

Work Orders:

A220118, H7312H

Condition:

The bottom section of the cylinder head was fractured. None of the cylinder components revealed any evidence of thermal distress or lack of lubrication. The cylinder piston, head, valves and valve seats displayed deposits consistent with a lean combustion process. A stick was observed protruding into the cylinder via the intake port/valve.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:	14-392	ENGINE S/N:	241573-R	PAGE 18 of 27
--------------	--------	-------------	----------	---------------

CYLINDER #4	ECI AEC65385
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Work Orders:	H7274H
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Condition:	The cylinder head was fractured and the exhaust rocker and shaft was missing. None of the identified cylinder components revealed any evidence of thermal distress or lack of lubrication. The cylinder piston, head, valves and valve seats displayed deposits consistent with a lean combustion process.
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ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 19 of 27

CYLINDER #6

ECI AEC65385

Work Orders:

A14118

Condition:

The cylinder head was fractured and both rockers and rocker shafts were separated from the head. The rocker shafts remained with the separated boss. None of the identified cylinder components revealed any evidence of thermal distress or lack of lubrication. The exhaust valve was hanging out of the exhaust port with the valve guide in place. The exhaust valve was displaced from its valve seat. The cylinder piston, head, valves and valve seats displayed deposits consistent with a lean combustion process. Debris was noted between the intake valve and its seat.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 20 of 27

CRANKCASE ASSEMBLY

CRANKCASE	Casting Number:	1-3-5: Not observed	2-4-6: Not observed	S/N: Not observed
Condition:	The crankcase was fractured in numerous areas; however, there was no sign of pre-accident anomalies with the crankcase halves.			



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 21 of 27

CRANKSHAFT ASSEMBLY

CRANKSHAFT	Forging Number: Not Observed	S/N: E239702N	Heat code: Not Observed
Condition:	The crankshaft was deformed and fractured aft of the propeller flange. The crankshaft gear remained secured and safety-wired to the crankshaft. There were no pre-accident anomalies or signs of operational distress noted with the visible portions of crankshaft or crankshaft gear. Also, a borescope inspection of the connecting rods and counterweights revealed that the internal components were lubricated and showed no signs of thermal distress or operational anomalies.		



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 22 of 27



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 23 of 27

CAMSHAFT

CAMSHAFT

P/N: Not Observed

S/N: Not Observed

Condition:

The camshaft was fractured in the front and aft sections. The camshaft gear remained secured and safety-wired to the aft-end of the separated camshaft segment. No pre-accident anomalies were noted with the observed components. Borescope of the internal engine components revealed that the lifters were lubricated and did not display any signs of thermal distress.





ACCESSORIES

STARTER	Manufacturer: Aerotech	P/N: Not Recorded	S/N: Not Recorded
Condition:	The starter motor was separated from the adapter and its mounting flange was fractured.		



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:	14-392	ENGINE S/N:	241573-R	PAGE 25 of 27
--------------	--------	-------------	----------	---------------

STARTER ADAPTER

P/N: Unknown

Condition: The starter adapter was separated from the engine and the housing was not observed. Only a portion of the adapter was identified.



VACUUM PUMP

Manufacturer: Unknown

P/N: Unknown

S/N: Unknown

Condition: The separated portions of the engine driven vacuum pump were identified and its drive coupling remained intact. The pump housing rotor and vanes were not observed.



ENGINE FIELD INSPECTION REPORT**FILE NUMBER:**

14-392

ENGINE S/N:

241573-R

PAGE 26 of 27**PROPELLER****PROPELLER GOVERNOR**

Manufacturer: Not Legible

P/N: Not Legible

S/N: Not Legible

Condition:

The propeller governor was separated from the engine and the housing was fractured. The governor gears were visible and there were no signs of pre-accident operational distress. Only one of the flyweights remained with the governor housing. The lever remained secured to the top cap of the flyweight housing.

**PROPELLER**

Manufacturer: Hartzell

P/N: PHC-C3YF-1RF/F8068

S/N: QG220B

Condition:

The three-bladed, constant-speed propeller was separated from the engine. The propeller hub remained secured to the crankshaft's propeller flange by three of the six propeller bolts. The propeller flange fracture was irregular in shape and displayed shear lips. The propeller hub was fractured. All three blades were loose in the propeller hub. All three blades displayed significant s-bending, leading edge gouging and paint erosion on the camber side, and scraping. The blade labeled C for investigative purposes was torn about mid span. The blade labeled B had its tip torn away and curled toward low pitch. No pre-accident anomalies were noted.



ENGINE FIELD INSPECTION REPORT

FILE NUMBER:

14-392

ENGINE S/N:

241573-R

PAGE 27 of 27

