



Continental Motors

ENGINE FIELD INSPECTION REPORT

ENGINE MODEL	IO470K3
ENGINE SERIAL NUMBER	86862-7-K
AIRCRAFT MAKE & MODEL	Beechcraft 35-B33
AIRCRAFT SERIAL NUMBER	CD-597
AIRCRAFT REGISTRATION	N9704Y
CMI FILE NUMBER	15-122

NAME	SIGNATURE	DATE
Mike Council		12-3-2015

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EXAMINATION		ACCIDENT DATA	
DATE	8-25-2015	NTSB ACCIDENT #	CEN15FA374
FACILITY	Dawson Aircraft, Inc.	NTSB INVESTIGATOR	John Brannen
ADDRESS	[REDACTED] Clinton, AR 72031	FAA INVESTIGATOR	Bill Aldrich
		ACCIDENT DATE	8-23-2015
		ACCIDENT LOCATION	El Dorado, Arkansas

ENGINE INFORMATION

ENGINE POSITION	Single
TOTAL TIME	4353 as of 8/10/2015 according to engine maintenance logbook entry
TIME SOH	1136.6 according to Penn Yan Aero logbook entry dated 10/5/1999
	Undetermined type of inspection-see below. 50 hours between inspection dated 12/5/2014 and final engine maintenance entry dated 8/10/2015.
SHIP DATE	7-19-1967

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TYPE AND TIME SINCE LAST INSPECTION:

Undetermined. See log book entries below.

MAINTENANCE RECORD				
DATE 2015	TOTAL TIME IN SERVICE		DESCRIPTION OF THE WORK PERFORMED	AUTHORIZED SIGNATURE, CERTIFICATE TYPE & NUMBER
	HOURS	10ths		
4/10	4330	3	Changed oil and filter. Serviced with Aeroshell 15W50, Checked compression on #2 cylinder $78\frac{1}{80}$.	
8/10	4353	3	Changed oil and filter. Serviced with Aeroshell 100plus.	

MAINTENANCE RECORD				
DATE 2014	TOTAL TIME IN SERVICE		DESCRIPTION OF THE WORK PERFORMED	AUTHORIZED SIGNATURE, CERTIFICATE TYPE & NUMBER
	HOURS	10ths		
12/05	4303	17	Changed oil and filter. Serviced with Aeroshell 100 mineral oil. Serviced spark plugs. Installed 1 new plug. Replaced #2 cylinder Assy due to low compression. Compression checked #1. $69\frac{1}{80}$ #2. $79\frac{1}{80}$ #3. $65\frac{1}{80}$ #4. $72\frac{1}{80}$ #5. $61\frac{1}{80}$ #6. $70\frac{1}{80}$. Magneto timing checked. Replaced induction air filter.	

I Certify That This engine Has Been Inspected In Accordance With _____ Inspection And Was Determined To Be In Airworthy Condition, Tach Reading: 4303.17 Aircraft Total Time 6768.17 Date 12/05/14 Maurice Lemmond

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TOTAL TIME IN SERVICE			DESCRIPTION OF THE WORK PERFORMED	AUTHORIZED SIGNATURE, CERTIFICATE TYPE & NUMBER
HOURS	10ths			
This is to certify that the engine described hereafter has been overhauled to manufacturer's new parts limits by Penn Yan Aero Service, Inc. Engine disassembled, cleaned, and inspected in accordance with manufacturer's instructions. All steel parts magnafluxed, reassembled in accordance with manufacturer's current overhaul manual. Engine test run. All applicable Airworthiness Directives are in compliance. See A.D. list supplied. A description of these repairs is on file at this agency under: W.O. # <u>2316-99</u> DATED <u>October 5, 1999</u> MFG. <u>TCM</u> MODEL <u>IO-470-K</u> Serial No. <u>86862-7-K</u> Time in svc. <u>3216.4</u>  PENN YAN AERO SERVICE, INC. Airport, Penn Yan, New York 14527 APPROVED REPAIR STATION <u>N11B350K</u> [REDACTED SIGNATURE]				

Report Summary:

Search Code(s):

The inspection of this engine did not reveal any pre-impact anomalies that would have prevented its ability to produce rated horsepower.

Disposition of engine following exam: The engine was recovered by Dawson Aircraft, Inc. and will be stored at Dawson's facility located at 544 Airport Road, Clinton, AR 72031

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NAME	Mike Council	NAME	Jan Smith
ADDRESS	2039 South Broad Street Mobile, Alabama	ADDRESS	10511 E. Central Ave. Wichita, Kansas
ORGANIZATION	Continental Motors	ORGANIZATION	Textron Aviation
PHONE	251-436-8123	PHONE	316-676-6649
NAME	John Brannen	NAME	
ADDRESS	Central Offices	ADDRESS	
ORGANIZATION	NTSB	ORGANIZATION	
PHONE	630-587-8107	PHONE	

EXTERNAL INSPECTION OF ENGINE

At the accident site, the engine remained encased in the impact damaged cowlings. The propeller remained attached to the crankcase. The engine crankcase was intact. The engine sump was intact with the exception of the broken engine mounts. The lower portion of the engine and oil sump was thermally damaged due to a post impact fire.

The engine data plate remained attached to the upper right crankcase. The painted portion of the data plate was destroyed leaving only a smooth, polished surface with the stamped serial number intact.

The propeller governor remained attached to its mount on the left forward crankcase. The governor control arm remained intact and secured. The position of the propeller governor arm prior to impact could not be determined.

The right magneto separated from its mount but remained secured by its ignition harness. Thermal damage to the magneto was noted.

The left magneto remained attached to its mount. Thermal damage to the magneto was noted.

The ignition harness was thermally damaged with impact pinching and cutting of individual leads.

Top and bottom spark plugs were intact and in place in each respective cylinder.

The engine driven fuel pump exhibited major thermal damage to the aluminum case assembly. The vapor tower and pressure adjustment screw housing were compromised due to high heat.

The top mounted fuel manifold remained intact but was thermally damaged.

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The sump mounted fuel components remained intact and in place with thermal damage noted. . The throttle arm remained attached and secured. The throttle plate was in the full open position. The throttle and mixture cables were cut by the recovery crew during recovery at the accident site. It was not possible to determine the position of the throttle and mixture arms prior to impact.

The engine was equipped with GAMI fuel injectors. All fuel injectors remained attached. The fuel injector for cylinder number 5 was impact damaged.

All cylinders remained attached to their respective mounts. All rocker box covers remained intact and in place with the exception of cylinder 2. Cylinder 2 rocker box was separated or consumed by post impact fire. The mounting screws for rocker box cover # 2 remained secured. Rocker box covers on cylinders 4 and 5 exhibited heavy thermal damage.

The wet type vacuum pump remained intact and secured to its mount. Thermal damage was noted.

The oil pump and oil pressure relief valve were intact. The front mounted oil cooler remained intact and attached to its mount. An aftermarket oil filter adapter was intact and secured.

The starter adapter remained attached. The starter adapter was removed to facilitate manual rotation of the engine. The rear mounted alternator pulley was damaged. The aftermarket alternator was separated. The electric starting motor was separated from its mount but located at the accident site. Only small portions of an alternator were recovered from the accident site.

The induction system was thermally damaged. The rear wye pipe was thermally compromised and the rubber connectors were damaged.

Both right and left exhaust manifold remained attached and intact. Right and left mufflers and tail pipes were present but exhibited impact damage.

The oil rod was removed to check the oil level. Only a small amount of engine oil remained in the oil sump but oil leakage was noted at the accident site and at the recover site. Note: the engine was found in an inverted position at the accident site.

The engine was rotated manually and thumb compression was achieved with the exception of cylinder 2. The intake and exhaust rocker arms were removed from cylinder 2 and the valves were manually staked. When the engine was again manually rotated all cylinders including cylinder 2 exhibited thumb compression.

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ENGINE COMPONENT EXAMINATION

EXHAUST SYSTEM

Condition: The individual exhaust tubes remained attached to each cylinder. The tubes and collector exhibited impact damage but remained intact. The right and left mufflers/tail pipes were impact damaged and were removed to facilitate transportation of the engine from the accident site to the recovery site.



INDUCTION SYSTEM

Condition: The induction manifold tube assemblies remained intact with thermal damage to the rubber intake hoses. The rear wye pipes (induction riser) were/was thermally damaged. Arrows point to induction components.



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IGNITION SYSTEM

LEFT MAGNETO	Manufacturer: Bendix (TCM)	P/N: Undetermined	S/N: Undetermined
Condition:	The left magneto remained attached to its mount but received thermal damage. The cover was removed to reveal thermally damaged internal components.		



RIGHT MAGNETO	Manufacturer: Bendix (TCM)	P/N: Undetermined	S/N: Undetermined
Condition:	The magneto separated from its mount. The cover was removed to reveal thermally damaged internal components.		



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IGNITION HARNESS

Manufacturer: Undetermined

P/N: Undetermined

S/N: Undetermined

Condition:

The ignition harness was thermally damaged and had several cut and pinched ignition leads.

SPARK PLUGS

Manufacturer: Champion

P/N: REM40E

Condition:

When compared to a Champion "Check A Plug" chart, the sparkplugs were found to be in "worn out- normal" condition. Sparkplugs 2, 4 and 5 contained a substance which resembled fire- fighting foam. Note: the engine was found at the accident site in an inverted position where it remained for two days.



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FUEL SYSTEM

FUEL PUMP

Manufacturer: CMI

P/N: 646212-1Z

S/N:E149906BR

Condition:

The engine driven fuel pump could not be manually rotated. The vapor tower and pressure adjusting screw and housing were compromised due to high thermal event. The drive gear and drive pin were intact. Overhaul records indicate that this pump was installed as overhauled at engine overhaul. Arrow points to fuel pump.



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THROTTLE BODY METERING UNIT

Manufacturer: CMI

P/N: Undetermined

S/N: Undetermined

Condition: The throttle body and metering unit remained attached to the lower sump mount. The unit was thermally damaged due to heat from the post impact fire. The throttle plate was fully open and frozen in position. The throttle and mixture arms were intact and secured. The fuel screen was removed and inspected. No contaminants were present. Red arrow points to installed fuel screen.



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FUEL MANIFOLD VALVE

Manufacturer: CMI

P/N:63142782X

S/N: E149901CR

Condition: The safety wire and lead seal were cut and the top cover removed. No contamination was found. No residual fuel was present. The fuel screen was clean.



FUEL NOZZLES AND LINES

Manufacturer: GAMI

Condition: The GAMI fuel injectors remained intact and secured in each respective cylinder head except # 5 fuel nozzle which was impact damaged. Red arrows point to individual fuel injectors as installed into cylinder heads.

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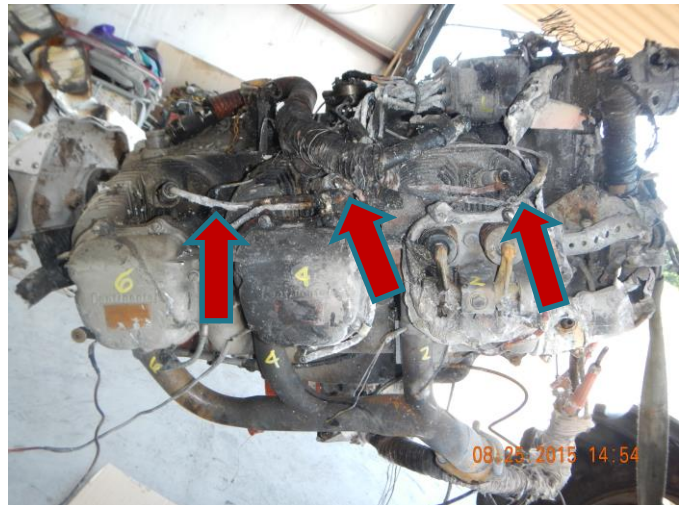
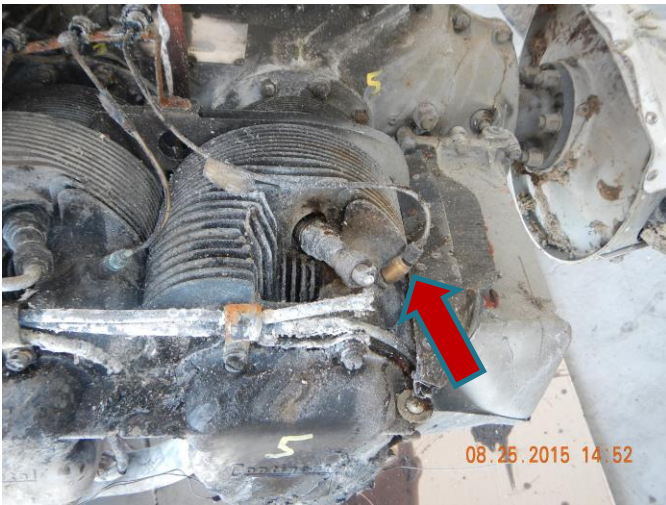
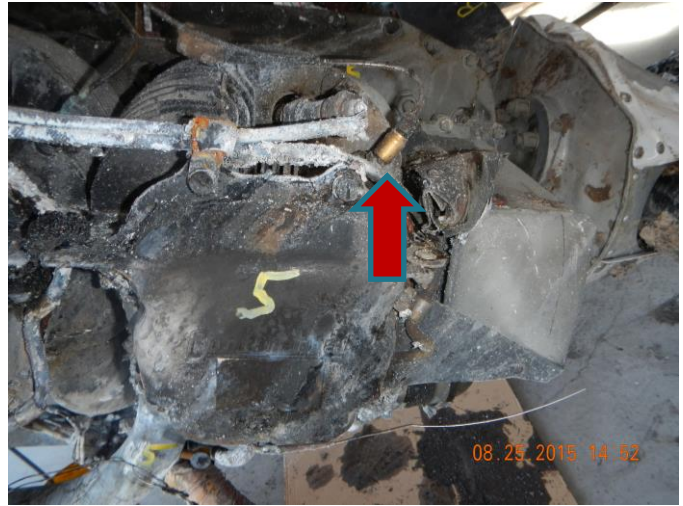
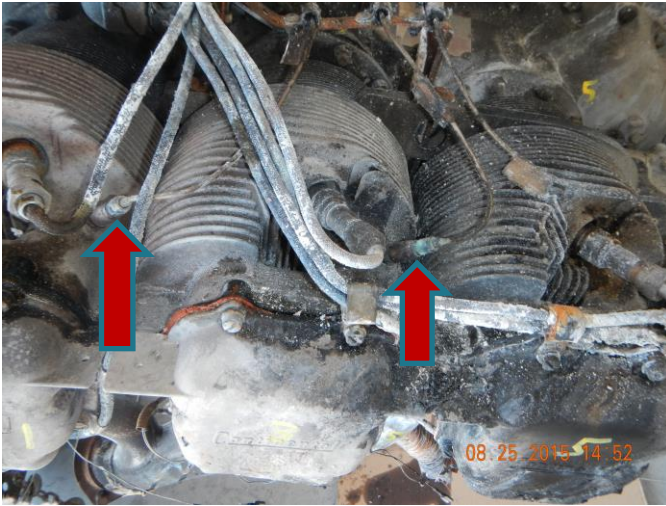
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LUBRICATION SYSTEM

OIL SUMP

Condition: Intact with the exception of three broken engine mounts. The sump was thermally damaged. Red arrow points to the oil sump.



OIL PUMP

Condition: The oil pump remained intact with thermal damage. The oil pressure relief valve was removed and inspected. The plunger and spring were intact.



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OIL FILTER

Manufacturer: Champion

P/N:CH49108

Condition: The oil filter exterior canister was thermally damaged. Security wire was intact.



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OIL COOLER

Manufacturer: CMI

P/N: Undetermined

S/N: Undetermined

Condition: No visible damage was noted



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CYLINDERS

CYLINDER #1	PN 655475		
Condition:	Thermal damage to rocker cover was noted. A lighted borescope inspection was performed. Intake and exhaust valves were intact with normal combustion signatures. Piston crowns and cylinder walls appeared normal.		



CYLINDER #3	PN 655475		
Condition:	Thermal damage to rocker cover was noted. A lighted borescope inspection was performed. Intake and exhaust valves were intact with normal combustion signatures. Piston crowns and cylinder walls appeared normal.		



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CYLINDER #5	PN 655475		
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Condition:	Heavy thermal damage to rocker cover was noted. Impact damage to cooling fins. A lighted borescope inspection was performed. Intake and exhaust valves were intact with normal combustion signatures. Piston crowns and cylinder walls appeared normal.
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CYLINDER #2	PN 655475		
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Condition:	Thermal damage to cylinder head was noted. Rocker cover separated. A lighted borescope inspection was performed. Intake and exhaust valves were intact with normal combustion signatures. Piston crowns and cylinder walls appeared normal.
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CYLINDER #4	PN 655475		
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Condition:	Thermal damage to rocker cover was noted. A lighted borescope inspection was performed. Intake and exhaust valves were intact with normal combustion signatures. Piston crowns and cylinder walls appeared normal.
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CYLINDER #6	PN 655475		
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Condition:	Light thermal damage to cylinder head was noted. A lighted borescope inspection was performed. Intake and exhaust valves were intact with normal combustion signatures. Piston crowns and cylinder walls appeared normal.
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CRANKCASE ASSEMBLY

CRANKCASE	Casting Number:	1-3-5: Undetermined	2-4-6: Undetermined	S/N: Undetermined
Condition:	No damage was indicated other than sooting and thermal damage due to heat from post impact fire. Red arrow points to crankcase assembly.			



CRANKSHAFT ASSEMBLY

CRANKSHAFT	Forging Number: Undetermined	S/N: A743M34	Heat code: Undetermined
Condition:	The crankshaft flange appeared undamaged. Crankshaft continuity was determined when the engine was manually rotated. Red arrows point to exposed crankshaft at propeller flange.		



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ACCESSORIES

STARTER

Manufacturer: Undetermined

P/N: Undetermined

S/N: Undetermined

Condition:

The starter motor separated from its mount and was recovered in the wreckage. The case was impact damaged and thermally damaged.

**STARTER ADAPTER**

P/N: Undetermined

Condition:

The starter adapter remained installed and intact with thermal damage to case. The alternator drive pulley was broken. The starter adapter was removed to facilitate manual rotation of the engine. The starter adapter would not rotate manually due to mechanical/impact and thermal damage.



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VACUUM PUMP	Manufacturer: Garwin	P/N:G-450	S/N: Undetermined
Condition:	The "wet type" vacuum pump remained attached to its mount but was thermally damaged. The pump was removed but would not rotate manually.		



PROPELLER

PROPELLER GOVERNOR	Manufacturer: Woodward	M/N: 210152	S/N:2134100
Condition:	The propeller governor remained attached to its mount and appeared undamaged.		



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Manufacturer: McCauley

Model: 2A36C23DE

S/N:738503

Condition:

The propeller remained attached to the crankshaft flange. Both propeller blades were arbitrarily marked with an "A" or "B" for photo identification. Both blades exhibited slight rearward bending patterns due to impact with the ground. There were no scratches or gouges on the blades leading edges or cambered surfaces. The aluminum spinner was crushed rearward with no evidence of rotation.



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