



Continental Motors

ENGINE EXAMINATION REPORT

ENGINE MODEL	IO-550-B1A
ENGINE SERIAL NUMBER	675040
AIRCRAFT MAKE & MODEL	Beech A36
AIRCRAFT SERIAL NUMBER	E-2152
AIRCRAFT REGISTRATION	N69286
FILE NUMBER	16-314

WRITTEN BY	SIGNATURE	DATE
Nicole Charnon		04/07/2017
APPROVED BY	SIGNATURE	DATE
Phillip Grice		04/11/2017

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GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	03/02/2017	NTSB ACCIDENT #	ERA17LA069
FACILITY	Continental Motors	NTSB INVESTIGATOR	Daniel Boggs
ADDRESS	2039 S Broad St Mobile, AL 36615	FAA INVESTIGATOR	William Attridge
		ACCIDENT DATE	12/11/2016
		ACCIDENT LOCATION	Shoreham, NY

ENGINE INFORMATION

ENGINE POSITION	Single-Engine
TOTAL TIME	1,668.5 hours at time of last maintenance entry
TIME SOH	202 hours since top overhaul
TYPE & TIME SLI	Unknown
BUILD DATE	12/19/1983
IN SERVICE DATE	Unknown

Significant logbook information:

On May 21, 2012, at a Hobbs time of 1,484.5 hours, all six cylinders were replaced and new engine instruments were installed on the aircraft. It should be noted that previous maintenance entries listed the Hobbs time and engine total time as the same. An entry dated September 3, 2013, indicated that the old Hobbs meter (which registered 1,505 hours), was replaced with a new zero-hour meter. After the cylinder replacement, the engine underwent a series of annual inspections and oil changes. The last maintenance entry was dated June 27, 2016, at a Hobbs time of 163.5 hours and indicated that the fuel injector nozzles were replaced. At the time of the event, the Hobbs meter indicated 181.5 hours and the total time since the cylinder change was 202 hours.

Report Summary:	Search Code(s):	06-01-36, 13-24-03, 15-08-06, 10-08-03
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The crankshaft was fractured at the #4 main bearing journal and the fracture surfaces displayed crack arrest and beach marks consistent with fatigue cracking. The fracture surface and origin will be examined/described by the NTSB Materials Laboratory in a separate report. Examination of the crankcase mating surfaces revealed signs of fretting at the #1, #2, #3, and #4 main bearing journal case halves, with the worst being noted on the bottom journal mating surfaces and the #4 top and bottom surfaces. The #4 bearing journal was obliterated and the #3 main bearing journal showed signs of lock slot elongation. In addition, the #1 and #6 connecting rods were fractured and separated from the crankshaft. All six connecting rods displayed signatures of lubrication distress. Significant amounts of metal consistent with bearing material and crankcase debris were recovered from the oil sump and observed on the oil pickup tube screen.

Disposition of engine following exam:

The engine, minus the crankshaft, was shipped to the aircraft recovery facility on shipper request AD00975 on March 6, 2017. The crankshaft was shipped to the NTSB Materials Laboratory on shipper request AD00976 on March 6, 2017.

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NAME	Phillip Grice	NAME	Greg Eastburn
ADDRESS	Mobile, Alabama	ADDRESS	Mobile, Alabama
ORGANIZATION	Continental Motors	ORGANIZATION	Continental Motors
PHONE	251-436-8310	PHONE	251-436-8481
NAME	Lisa Jersild	NAME	Daniel Boggs
ADDRESS	Mobile, Alabama	ADDRESS	Daytona Beach, FL
ORGANIZATION	Continental Motors	ORGANIZATION	NTSB – Eastern Region
PHONE	251-436-8481	PHONE	571-223-3913

EXTERNAL INSPECTION OF ENGINE

The engine crankshaft was fractured at the #4 main bearing journal and the portion of crankshaft forward of the #4 main bearing (that included the alternator drive gear mounting flange, oil transfer collar surface, the #5 main bearing journal and the propeller flange) was not recovered or observed. The crankcase forward of the alternator was also missing and not observed. The fracture surface of the observed crankshaft section revealed beach and crack arrest marks. The crankcase supporting the #4 main bearing was obliterated. The alternator drive gear remained in place and the alternator drive coupling was visible and displaced. A large hole was also observed in the crankcase around the #6 and #5 cylinders. A sealant was observed along the crankcase mating surfaces of the backbone. Pieces of fractured crankcase and connecting rods were observed outside the crankcase between the cylinders near the cooling baffle.



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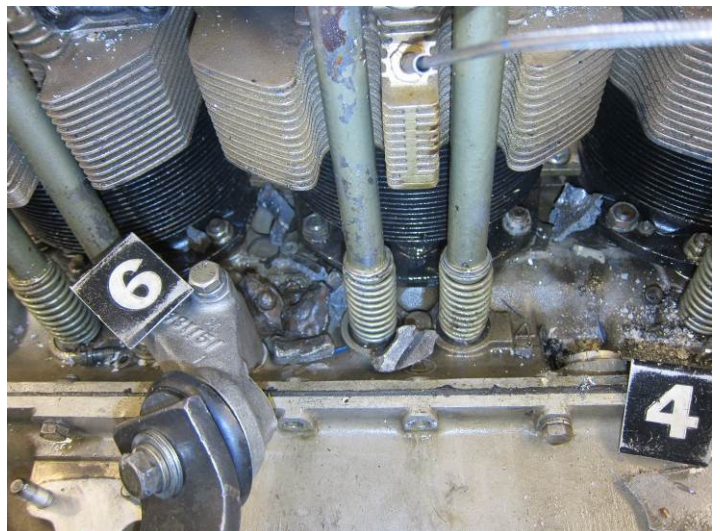
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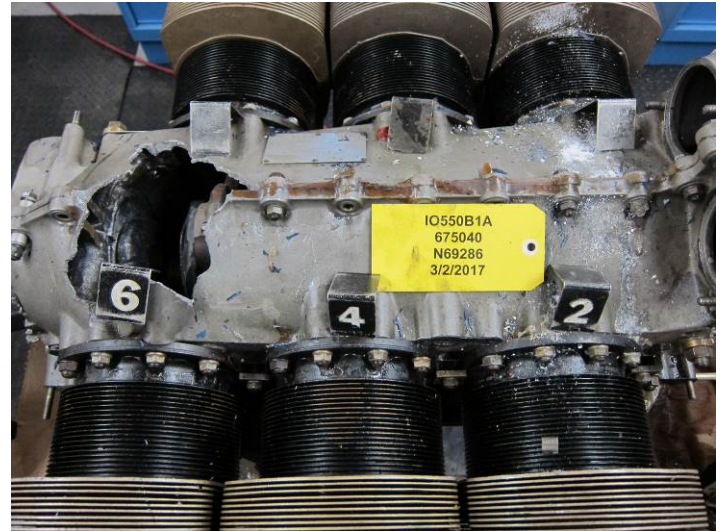
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INTERNAL INSPECTION OF ENGINE

A breakaway torque check was conducted on the cylinder attaching hardware and that information is provided as an embedded photograph at the end of this report. Disassembly of the engine revealed that the oil sump contained debris consistent with bearing material, gouged and worn crankcase material, alternator drive gear attachment screws and locking plates, alternator drive coupling washer and nut, and the oil transfer collar pieces. The oil pickup tube screen was covered with metal debris. Examination of the crankcase mating surfaces revealed signs of fretting at the # 1, #2, #3, and #4 main bearing journal case halves, with the worst being noted on the bottom journal mating surfaces and the #4 top and bottom surfaces. The #4 bearing journal was obliterated and the #3 main bearing journal showed signs of lock slot elongation. In addition, the # 1 and #6 connecting rods were fractured and separated from the crankshaft. All six connecting rods displayed signatures of lubrication distress. The oil pump displayed signs of hard particle passage and the housing contained metal debris. The oil filter contained metallic debris within the pleats.



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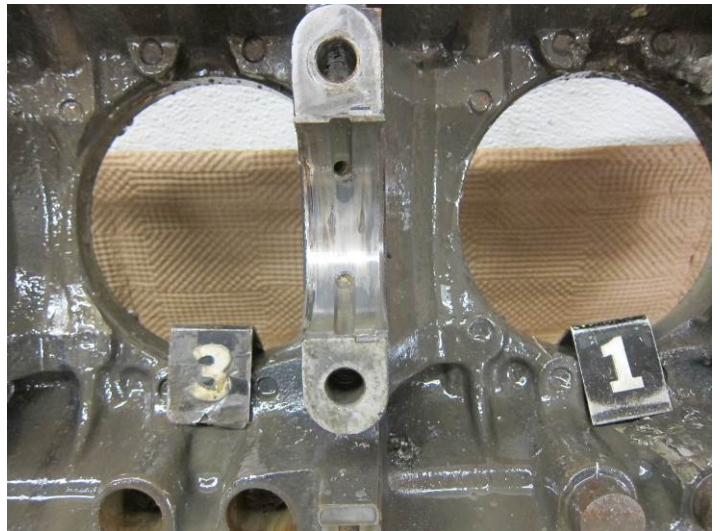
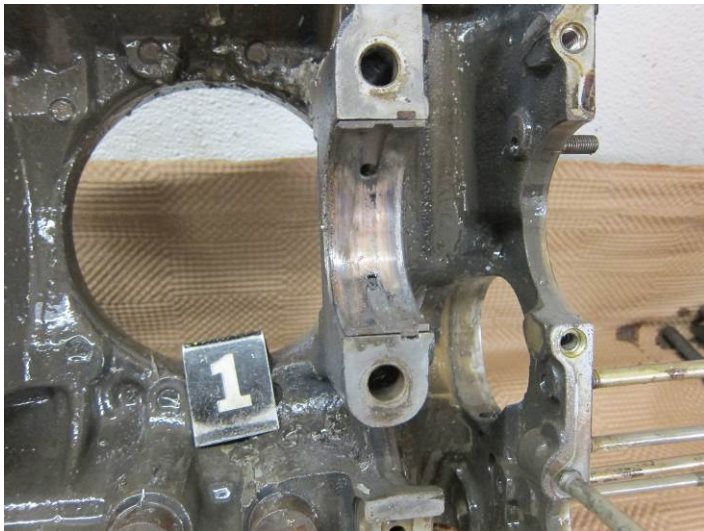
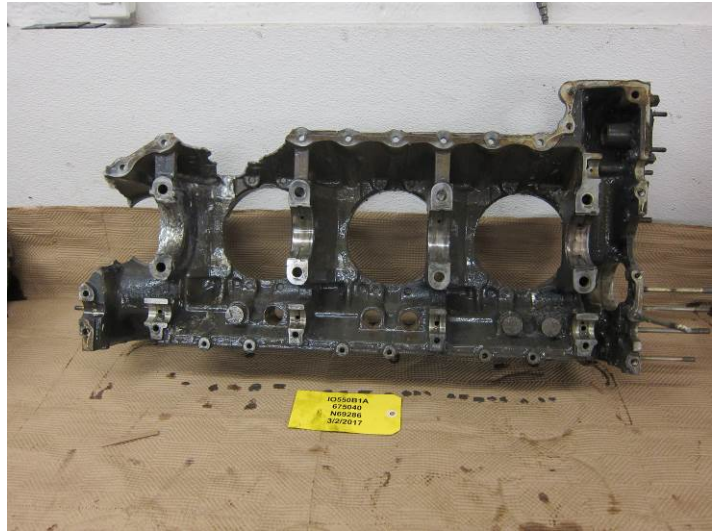
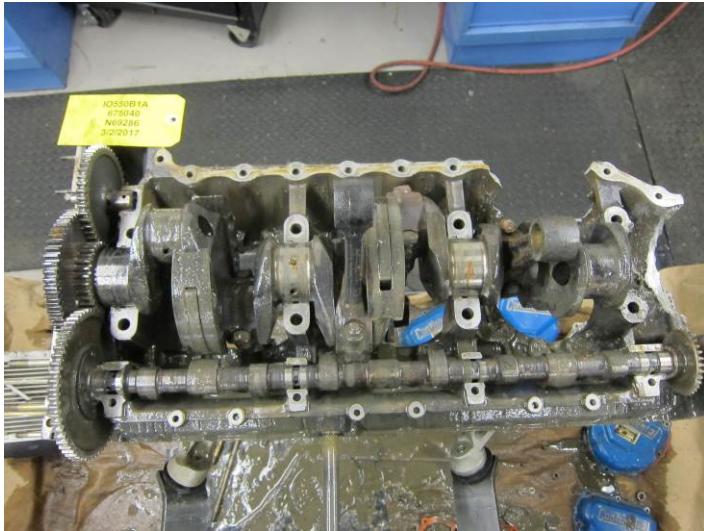
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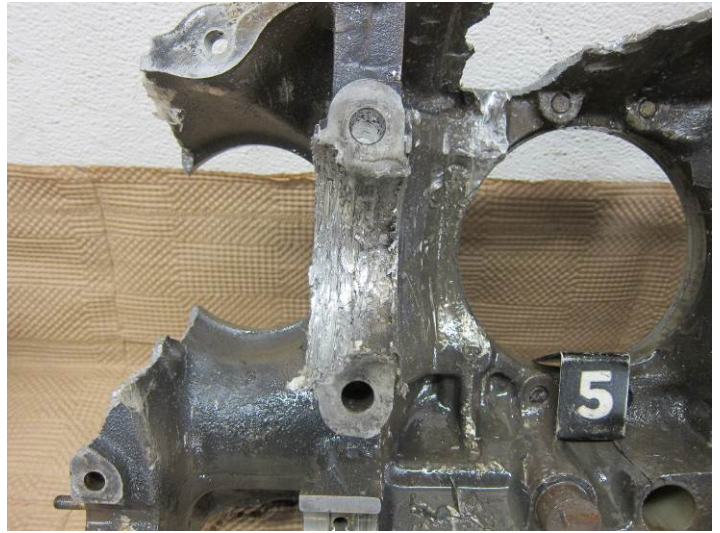
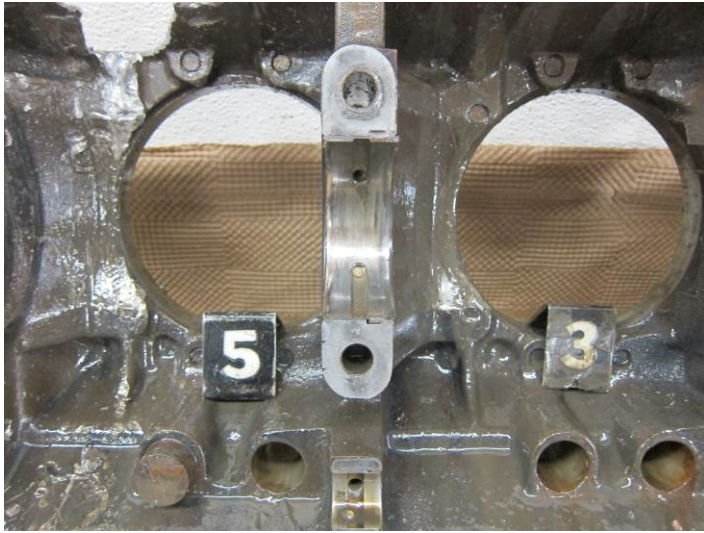
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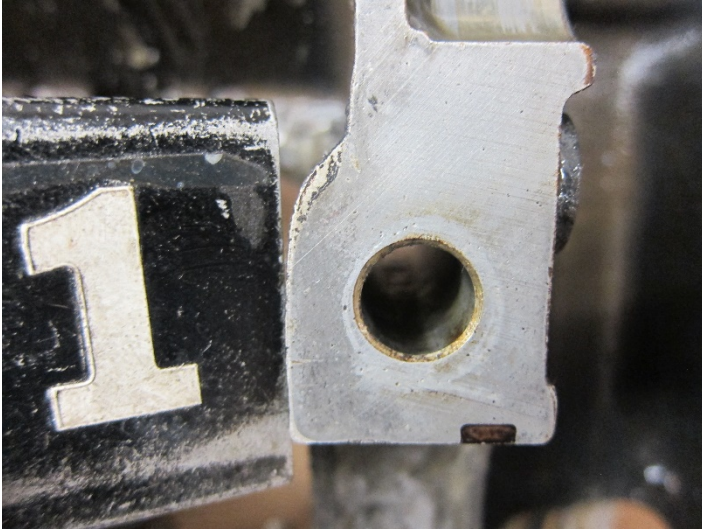
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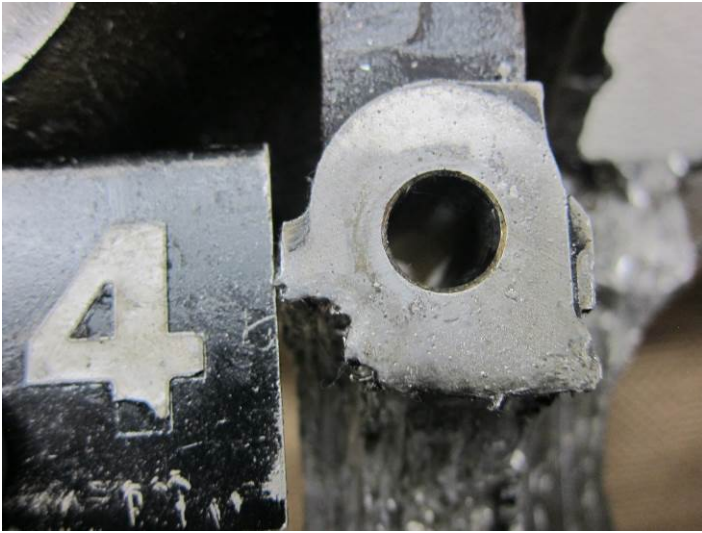
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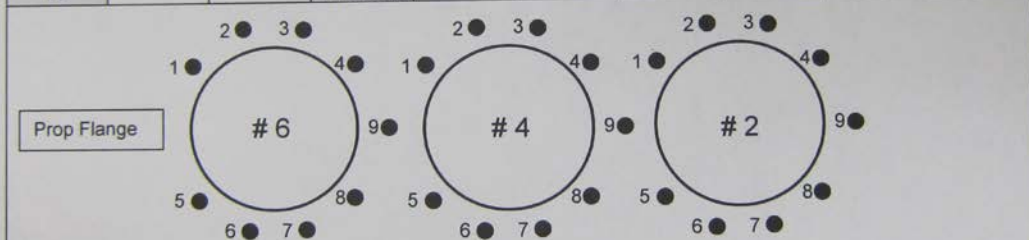


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Cylinder Through-Bolt and Deck Stud Break-Away (Tightening / Loosening) Torque Measurements (Foot-Pounds) (Position numbers 1 and 5 are through-bolts)									
Thru Bolt 6-Point nuts 690-710	Bolt 1	Stud 2	Stud 3	Stud 4	Bolt 5	Stud 6	Stud 7	Stud 8	Stud 9
	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose
Cylinder #2	626/528	584/453	647/524	591/491	804/616	613/496	633/515	648/509	489/397
Cylinder #4	703/574	651/534	548/459	531/479	833/661	628/490	588/464	588/471	281/0
Cylinder #6	499/416	449/362	Crankcase Fractured	518/426	861/855	325/261	470/395	384/288	249/200



Thru Bolt 6-point nuts 690-710	Bolt 1	Stud 2	Stud 3	Stud 4	Bolt 5	Stud 6	Stud 7	Stud 8	Stud 9
	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose	Tight / Loose
Cylinder #1	606/469	551/455	467/401	523/422	595/488	572/474	565/472	581/472	340/292
Cylinder #3	701/574	604/511	621/501	544/439	780/605	583/486	569/454	532/415	357/309
Cylinder #5	685/547	654/554	652/548	433/379	747/564	519/413	560/464	614/515	535/430

