



Continental Motors, Inc.

Powering Aircraft Since 1929

AIR SAFETY INVESTIGATIONS ENGINE FIELD INSPECTION REPORT

FINAL


ENGINE MODEL: IO-550-N (EXP)

ENGINE SERIAL: 687922

AIRCRAFT MODEL: Lancair Legacy

SERIAL NUMBER: L2K-232

REGISTRATION: N121J

Examiner	Signature	Date
Andrew L. Swick		10-12-2011

Date	Engine Model	Engine Serial No.	Aircraft Registration	Page
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GENERAL INFORMATION			
EXAMINATION		ACCIDENT DATA	
Date	10-12-2011	NTSB Accident #:	WPR11FA230
Facility	Plain Parts	NTSB Investigator:	Tealeye Cornejo
Address	[REDACTED]	FAA Inspector:	Unknown
City	Pleasant Grove	Law Enforcement:	Amador County Sheriff's Department
State and Zip	California, 95668	Coroner/Medical Examiner:	Unknown
ENGINE INFORMATION			
Make	Continental Motors, Inc.		
Model	IO-550-N (EXP)		
Serial No.	687922		
Engine Position	Forward		
Total Time	354.6*		
Time SOH	202.5*		
Tachometer	Undetermined		
Assembled Date	09-12-2003		
Shipped Date	09-18-2003		
In Service Date	12-10-2003		
Customer Name	Lancair International, Inc.		
In Service Date	Not Reported		
TopCare Date	Not Reported		
*according to log book information.			
AIRCRAFT / ACCIDENT INFORMATION			
Aircraft Make	Nicholas James Cameron		
Aircraft Model	Lancair Legacy		
Aircraft Serial No.	L2K-232		
Registration No.	N121J		
Accident Date	05-18-2011		
Accident Location	Pioneer, California		

Report Summary:

Search Code:

The inspection of this experimental engine did not reveal any abnormalities that would have prevented operation and production of horsepower.

Disposition of engine following exam: Awaiting disposition.

LOGBOOK ENTRIES (MOST RECENT INSPECTION)

ENGINE:

22 Apr '04	0	0	-NA-	Drained preservation oil per operator's manual.
				Re-filled with Aeroshell ^{Oil 100} 50W Straight Mineral Oil.
				9 qts. Drain plug replaced and safety-wired.
30 Apr '04	0	0	-	First start-up. Pre-oiled as per operator's manual.
				Run about 5 min, to CHT 200°±.



VICTOR AVIATION SERVICES, INC.
P.O. BOX 50608
PALO ALTO, CA 94303-0608
(650) 856-7616

F.A.A. CERTIFIED
REPAIR STATION #BJ3R399L

A/C Reg. # N121J A/C Ser. # L2K-232 W.O. # 15926
 Engine Make TCM Model IO550EXPERIMENTAL
 Serial # EXP687922 Eng. T.T. _____ S.M.O.H. _____
 A/F T.T. _____ Hobbs Time _____ Tach Time _____

1. Engine disassembled, cleaned, inspected, and repaired in accordance with the current overhaul manual for this model. Parts included, main bearings, connecting rod bearings, connecting rod nuts and bolts, seals, gaskets, piston rings and miscellaneous hardware.
2. Honed Cylinder bores. Machined Valves and Seats. Rebuilt 6 Rocker Arms.
3. Crankshaft certified MSB96-10 by Level III NDT. Crankcase overhaul by CSI.
4. TCM New Camshaft, Lifters, 2 Connecting Rods, 2 Piston Pins. Oil Cooler by Positech Inc.
5. Starter by Kelly Aerospace Power Systems. Starter Adapter by Canadian Aero Mfg.
6. The engine referenced above has been inspected and repaired in accordance with current Federal Air Regulations and has been determined to be in airworthy condition for the work performed. Pertinent details of the repair are on file at this agency under work order number 15960 dated 09/12/06. Engine test ran satisfactorily upon completion of work. This was not an engine overhaul.
7. Aircraft information and data to be entered by installing agency. Nothing follows.

Inspector [Signature] Date 11/27/06
 For repair station of Victor Aviation Services, Inc.

N121J

Hobbs: 219.6

TTAF: 354.6

12/02/10

Performed 100 Hour / Annual Condition inspection to this engine at this time. Compression check as follows; 1= 74/80, 2= 75/80, 3= 74/80, 4= 74/80, 5= 75/80, 6= 76/80. Cleaned, gapped and rotated all spark plugs. Checked magneto timing. Removed propeller, installed overhauled propeller Model MTV-9-D/183-50A, S/N 05203 with new "o" ring and nuts. Torqued nuts to 80 ft/lb per MT installation instructions. I certify that this Engine has been inspected in accordance with a 100 Hour / Annual condition inspection and was determined in airworthy condition.

[Signature]
Richard C. Strand

AP [Signature]

Carson Valley Aircraft Services
 2177 Taxiway F, Hanger B-5
 Minden, Nevada 89423

PROPELLER:

PROP MODEL: MTV-9-D/183 PROP S/N: 05203 REG. NO: 121J WORK ORDER: 3457-01-2008	Top Gun Aviation, Inc. 6100 S. Lindbergh St. Stockton, CA 95216 Phone: [REDACTED]	DATE: 3/4/2008 A/C TSN: 225.2 PROP TT: 73.1 HOBBS: 90.2
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Prop Entries

(27) Performed Dynamic Balance IAW Chadwick Helmuth Publication AW 9511-2. Beginning .37 IPS. Final .06 IPS.... (28) Completed 100hr/Annual inspection.

I certify that this PROPELLER is airworthy with respect to the work performed.

DATE: 3/4/2008 SIGNED: [REDACTED] Work Order: 3457-01-2008
 Thomas W. Richard, IA [REDACTED] Printed by EBis 3 (datamedia.com)

AIRFRAME:

N121J	Hobbs: 219.6	TTAF: 354.6	12/02/10
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Removed wings for lower skin damage. Wing lower skin performed by Lancair Factory 6/18/10, order # 4572. Reinstalled wings on aircraft per Lancair assembly instructions. Serviced with fuel and leak checked good. Removed rudder and elevator assemblies for repainting. Reinstalled rudder and elevator assemblies following re-paint. Checked control surface balance at 100% per Lancair technical support instructions. Replaced all plastic brake lines with Aeroquip 153-3 steel braided brake hose and fittings. Pressure checked all hose assemblies @ 800 psi. Serviced and bled left and right brake systems as required. Performed landing gear extension and retraction test through several cycles. Performed ops check of ELT system IAW FAR 91.207(d). I certify that this experimental aircraft has been inspected in accordance with an Annual Condition and was found to be in airworthy condition.

[REDACTED] AP [REDACTED]
 Richard C. Strand **Carson Valley Aircraft Services**
 2177 Taxiway F, Hanger B-5
 Minden, Nevada 89423

4/25/11	233.1	Removed instrument panel equipment as follows: Flight instrument panel and associated instruments Rt side instrument panel and associated instruments. Fabricated new metal plates for left and right sides. Rearranged radio rack placing portable Garmin dock at top. Installed Advanced Flight Systems AF4500 "s" in left flight panel and AF 2400 "s" in right flight panel. Installed existing Airspeed, Altimeter and Horizon in right flight panel as back-up instruments. Replaced all engine sensor wires and sensors. Cleaned up and replaced avionics wiring. Upgraded Trutrak autopilot to vertical format. Installed auto-trim in pitch system. Calibrated fuel system. Performed weight and balance FW 1704 EWCG 87.3. Reseal engine baffling, upgraded 530 operating software to current version. A/C evaluation good.
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Inspection Witnesses

Name	Tealeye C. Cornejo	Name	Unknown
Address	1515 West 190 th Street Gardena, California 90248	Address	Pioneer, California
Organization	N.T.S.B.	Organization	(Volunteer)-Amador County Sheriff's Department
Phone No	[REDACTED]	Phone No	Unknown
Name	Andrew L. Swick	Name	
Address	[REDACTED] Sacramento, California	Address	
Organization	Continental Motors	Organization	
Phone No	[REDACTED]	Phone No	

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EXTERNAL INSPECTION OF ENGINE:

The engine inspection took place at Plain Parts in Pleasant Grove, California on 10-12-2011. The engine separated from the airframe and had excessive impact damage. The 2, 4 and 6 cylinders separated from engine and were found in the wreckage path. The crankcase had missing material from all sides. The propeller hub and portions of the propeller shanks was attached to the crankshaft propeller flange. All of the accessories separated from the engine. The supercharger main drive pulley and tensioner pulleys and a section of the belt were found in the wreckage. The compressor housing was not found in the wreckage. The crankshaft, connecting rods and counterweight assemblies remained attached and had impact damage. Several main bearings were visible and no thermal discoloration or distress was noted. The inspection of the wreckage was under direct supervision of the NTSB investigator in charge.



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ENGINE TEARDOWN AND COMPONENT EXAMINATION

Exhaust assembly

Condition: An impact damaged exhaust pipe and muffler was found in the main wreckage.



Induction assembly

Condition: The induction assembly separated from the engine and was found in several sections.



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IGNITION SYSTEM:

RH Magneto Manufacturer: TCM Type/Part No.: No Data Tag Serial No.: No Data Tag

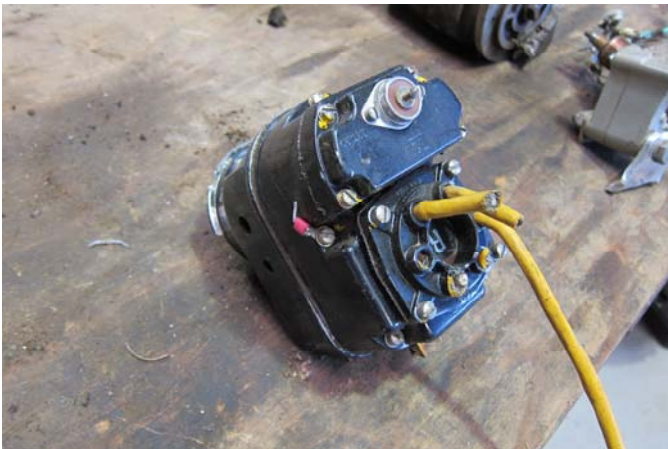
LH Magneto Manufacturer: Unknown Type/Part No.: Serial No.:

Condition: The magnetos separated from the engine and only one was found intact. The internal coil of the other magneto was found with the main wreckage. The magneto drive shaft rotated freely with impulse coupling engagement. Spark was visible from the damaged ignition lead ends and at the distributor cover.



Ignition Harness Manufacturer: TCM

Condition: Small sections of ignition leads remained attached to one magneto. Spark was obtained at the damaged ends.



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Spark Plugs

Manufacturer: Autolite

Part No.: URHB32S

Condition: The no. 1, 2, 4 and 5 positioned spark plugs were removed from their cylinders. In accordance with the Champion AV-27 chart, the spark plugs had (Worn Out – Normal) wear signatures indicating a normal service life. The no. 6 cylinder spark plugs remained in the cylinder head and showed (Worn out-Normal) wear conditions. The spark plug electrode areas had gray deposits with the exception of the no. 5 upper spark plug. The no. 5 spark plug electrode area had debris and corrosion deposits.



Autolite URHB32S

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FUEL SYSTEM:

Fuel Pump

Manufacturer: TCM

Part No.: 656921-1A9

Serial No.: B08FA239

Condition: The fuel pump separated from the engine and the drive coupling was not found. The fuel pump was disassembled and no anomalies were noted. Several pressure fittings separated.



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Fuel Manifold Valve Manufacturer: TCM Part No.: 646433-3A1 Serial No.: C03IA027

Condition: The fuel manifold valve separated from the engine and several lines had separated at the fittings. The manifold valve's cover plate had impact damage and the diaphragm was visibly damaged. The valve was disassembled and the inlet screen was crushed. The cavity area had shredded wood debris and the plunger area had a small amount of fuel. The fuel manifold valve plunger and diaphragm retaining nut was tight and secure.



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Fuel Nozzles and Lines Manufacturer: TCM Size: 3 each – 12E

Condition: The no. 1, 2 and 4 fuel nozzles were removed from their cylinders and had impact damage.



Throttle Body Fuel Control Manufacturer: TCM Part No.: (652179)

Condition: The throttle body fuel control had impact damage and was found with the main wreckage. The throttle linkage separated and the valve was found in the open position.



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LUBRICATION SYSTEM:

Oil Pump

The oil pump remained attached to the separated accessory section. The cover plate was removed and the gears were undamaged. Both sides of the cavity had impact marks.



Oil Sump

Condition: The oil sump had impact damage and the largest section remained attached to the separated accessory section.



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Oil Cooler Condition: The oil cooler separated from the engine and was crushed.



Oil Pick-up Tube & Screen The oil pick-up tube and inlet screen had impact damage. The inlet screen was partially obstructed with dirt.



Oil Filter The oil filter and adapter housing had impact damage. The oil filter canister was torn and dirt and debris was on the filter element. The oil canister read "Date: 11-4-09, Tach Time: 211.0..."



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CYLINDERS:

Cylinder #1 Part No.: Unknown Head Date: Unknown Barrel Surface: Steel

Condition: The cylinder remained attached to the crankcase and had impact damage to the rocker covers, induction and exhaust flanges, cooling fins and pushrod assemblies. The cylinder overhead components were lubricated and undamaged. The cylinder was boroscoped and the combustion chamber had a layer of light grey deposits and the cylinder barrel was undamaged. The valve heads were undamaged and had no signs of abnormal thermal discoloration.



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Cylinder #2

Part No.: Unknown

Head Date: Unknown

Barrel Surface: Steel

Condition: The cylinder separated from the engine and was found with the main wreckage. The cylinder rocker covers, induction and exhaust flanges, cooling fins and pushrod assemblies had impact damage. The cylinder overhead components were lubricated. The combustion chamber had a layer of light grey deposits and the cylinder barrel had corrosion deposits. The valve heads were undamaged and had no signs of abnormal thermal discoloration.



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Cylinder #3

Part No.: Unknown

Head Date: Unknown

Barrel Surface: Steel

Condition: The cylinder remained attached to the crankcase and had impact damage to the overhead, induction and exhaust flanges, cooling fins and pushrod assemblies. The rockers and rocker bore material separated from the cylinder head. The damaged spark plugs could not be removed from the cylinder.



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Cylinder #4

Part No.: Unknown

Head Date: Unknown

Barrel Surface: Steel

Condition: The cylinder separated from the engine and was found with the main wreckage. The cylinder rocker covers, cooling fins and pushrod assemblies had impact damage. The cylinder overhead components were lubricated and undamaged. The combustion chamber had a layer of light grey deposits and the cylinder barrel had corrosion deposits. The valve heads were undamaged and had no signs of abnormal thermal discoloration.



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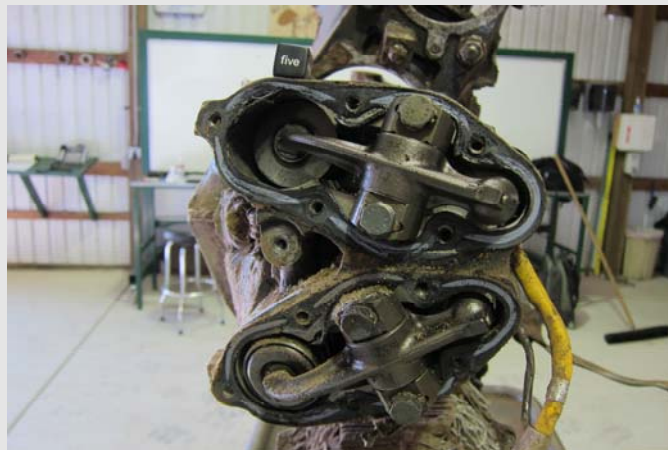
Cylinder #5

Part No.: Unknown

Head Date: Unknown

Barrel Surface: Steel

Condition: The cylinder separated from the crankcase and remained attached to its connecting rod. The cylinder had impact damage to the rocker covers, induction and exhaust flanges, cooling fins and pushrod assemblies. The cylinder overhead components were lubricated. The cylinder was boroscoped and the combustion chamber had a layer of light grey deposits and the cylinder barrel was undamaged. The valve heads were undamaged and had no signs of abnormal thermal discoloration.



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Cylinder #6

Part No.: Unknown

Head Date: Unknown

Barrel Surface: Steel

Condition: The cylinder separated from the engine and was found in several sections with the main wreckage. The cylinder overhead components were not found during the inspection. The cylinder head separated from the barrel and was found in two large sections. The combustion chamber had a layer of light grey deposits and the valve heads showed no signs of abnormal thermal discoloration. The spark plugs remained in the cylinder head and showed (Worn out-Normal) wear conditions when compared to a Champion AV-27 chart.



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Pistons, Rings and Pins Piston Part No.: Not checked.

Condition: Two piston heads were found with the main wreckage and had impact damage. Both had missing rings and separated skirts.



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CRANKCASE ASSEMBLY:

Crankcase Casting No. 1-3-5 Side: Not Legible 2-4-6 Side: Not Legible Serial No.: Not Legible

Condition: The crankcase had impact damage and the majority of the material was found with the main wreckage. The crankshaft had impact damage and remained in the damaged crankcase. Several crankcase mating surfaces were visible and no fretting was noted.



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CRANKSHAFT ASSEMBLY:

Crankshaft Forging No.: Not Legible Serial No.: Unknown Heat code: Unknown

Condition: The crankshaft and counterweight assemblies had impact damage and showed no signs of thermal damage or lubrication distress. The crankshaft remained intact from the propeller flange to the aft gear attachment. Multiple bending and cracking was noted near several of the crankshaft cheeks. The connecting rod journals, main journals and thrust surfaces had impact damage. The crankshaft counterweight pins, plates and snap-rings were intact. The counterweights had movement on the hanger blades.



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CAMSHAFT:

Camshaft

Part No.: Not Legible

Serial No.:

Condition: The camshaft had impact damage and was found in three sections. The aft camshaft gear and camshaft gear flange remained attached to the separated crankcase accessory section. A section of the camshaft from the no. 1 to the no. 3 main journal remained in the crankcase. The forward section of the camshaft and the forward drive gear was found in the main wreckage. The camshaft lobes showed normal operational signatures and the forward and aft gears showed normal operation.



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ACCESSORIES:

Accessory Gears

Condition: The accessory gears had impact damage. The gear teeth were intact and there were no anomalies noted.



Starter Manufacturer: No Data Tag

Condition: The starter separated from the engine and a section of the starter adapter remained attached to the starter mounting flange. The starter drive shaft rotated with some resistance.



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Starter Adapter

Condition: The starter adapter had impact damage to its starter mounting flange. The starter adapter was not removed during the inspection.



Alternator

Manufacturer: Unknown

Condition: The alternator had impact damage and was found in two sections.



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Supercharger

Part No.: Not checked.

Serial No.: Not checked.

Condition: The supercharger assembly separated from the engine. The bracket assembly, main drive pulley, belt tensioners and a small section of the drive belt was found in the main wreckage. The compressor and compressor housing were not found during the inspection.



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Vacuum Pump Part No.:

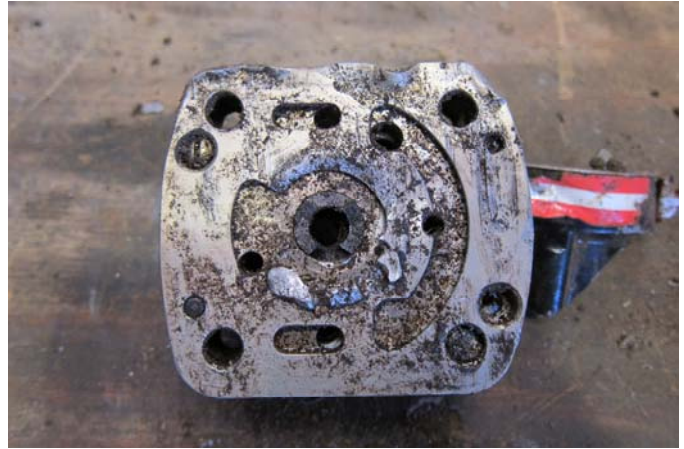
Serial No.:

Condition: A vacuum pump was not found during the inspection.

Propeller Governor Model No.: No data tag

Serial No.:

Condition: The propeller governor separated from the engine and two sections were found in the main wreckage.



Propeller: Manufacturer: MT Propeller Model/Blade No.: MTV-9-D/183-50-A HUB S/N: 05203

Condition: The propeller assembly had impact damage and remained attached to the crankshaft during the inspection. The blades separated and only sections of the shanks remained attached to the hub. The hub remained intact.

