Continental Motors

ENGINE FIELD INSPECTION REPORT

ENGINE MODEL	E-225
ENGINE SERIAL NUMBER	30057-D-3-4
AIRCRAFT MAKE & MODEL	Navion A
AIRCRAFT SERIAL NUMBER	NAV-4-1827
AIRCRAFT REGISTRATION	N4827K
FILE NUMBER	14-171

NAME	SIGNATURE	DATE
Kurt Gibson		11/03/2014

GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	10/01/2014	**NTSB ACCIDENT #**	ANC14LA068
FACILITY	Arctic Aviation	**NTSB INVESTIGATOR**	Todd Gunther
ADDRESS	[redacted] Fairbanks, AK 99709	**FAA INVESTIGATOR**	Jason Major
		ACCIDENT DATE	08/24/2014
		ACCIDENT LOCATION	Coldfoot, Alaska

ENGINE INFORMATION

ENGINE POSITION	Single Engine
TOTAL TIME	4666.1
TIME SOH	379.0
TYPE & TIME SLI	44.9 since last annual inspection.
BUILD DATE	03/23/1953
IN SERVICE DATE	Information not provided at the time of this report's writing.

Significant logbook information:

The last annual inspection was performed on 06/14/2014 at a tachometer time of 1567.4. According to the logbook on 05/01/2011 the engine was disassembled, cleaned and inspected with reference to "SB97-6A" (SB97-6B was the current service bulletin at the time of the maintenance entry) and "Continental Overhaul Manual E-225"; the logbook entry never specifically stated the engine was overhauled. Subsequent logbook entries referred to this logbook entry for the time since overhaul.

Report Summary: **Search Code(s):** 06-01-08

The engine was disassembled and it was noted that the #5 main crankshaft bearing displayed damage; several large flakes of material had broken off from the bearing and were located in the crankcase. The pressure carburetor fuel inlet filter contained a significant amount of material consistent with rubber; there was also a significant amount of particulates found within several of the pressure carburetor chambers.

Disposition of engine following exam:

Engine remained at Arctic Aviation.

INSPECTION WITNESSES

NAME	Kurt Gibson	**NAME**	Jason Major
ADDRESS	Mobile, Alabama	**ADDRESS**	Fairbanks, Alaska
ORGANIZATION	Continental Motors	**ORGANIZATION**	FAA
PHONE	[redacted]	**PHONE**	[redacted]
NAME	Fred Distad	**NAME**	
ADDRESS	Fairbanks, Alaska	**ADDRESS**	
ORGANIZATION	Arctic Aviation	**ORGANIZATION**	
PHONE	[redacted]	**PHONE**	
NAME		**NAME**	
ADDRESS		**ADDRESS**	
ORGANIZATION		**ORGANIZATION**	
PHONE		**PHONE**	

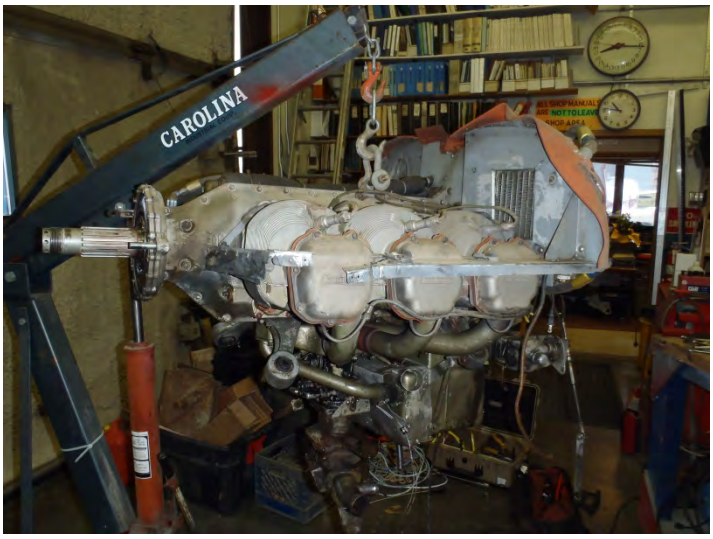
EXTERNAL INSPECTION OF ENGINE

The engine had been recovered to a hanger; the engine and a portion of the airframe had been cut away from the rest of the airframe for the examination. The engine remained attached to the airframe by all three of the four engine mounts and by hoses, wires, and cables. The fourth engine mount was reported to be removed by the recovery crew. The engine was removed from the airframe for examination. The engine sustained some damage concentrated to the exhaust system and the pressure carburetor. The two blade; variable pitch propeller had been previously removed by the Hartzell representative for an examination. All six cylinders remained attached to the engine and were undamaged.

Both of the magnetos remained attached to their respective installation points and were undamaged; it was noted that the right magneto was missing one of the magneto housing screws. The ignition harness remained attached to the engine and to each of the spark plugs and was undamaged. The twelve spark plugs remained installed in their respective cylinders and were undamaged.

The pressure carburetor remained attached to its respective installation point and sustained damage consistent with impact damage to the mixture control portion of the carburetor. There were no anomalies noted with the external inspection of the pressure carburetor.

The exhaust system remained attached to the engine and to the airframe and sustained damage consistent with impact damage in the form of bending. The intake system remained attached to the engine and to the carburetor. The intake system sustained damage consistent with impact damage to the carburetor air box. There were no anomalies noted.


CAROLINA


CAROLINA

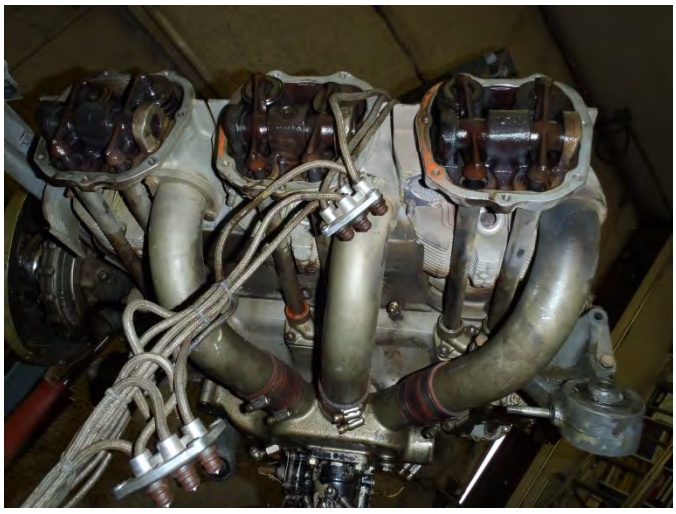

CAROLINA
4000


CAROLINA
4000

ENGINE TEARDOWN AND COMPONENT EXAMINATION

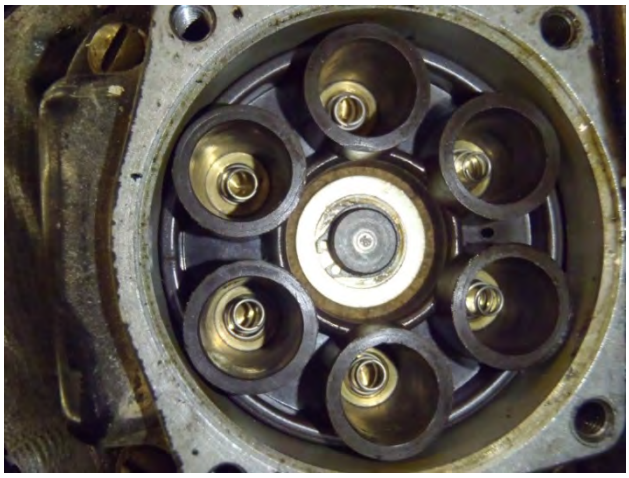
EXHAUST SYSTEM	
Condition:	The exhaust system remained attached to the engine and to the airframe. The exhaust system sustained damage consistent with impact damage in the form of bending. There were no anomalies noted with the exhaust system.

INDUCTION SYSTEM	
Condition:	The induction system remained attached to the engine and to the carburetor. The carburetor airbox sustained damage consistent with impact damage. There were no anomalies noted with the intake system.

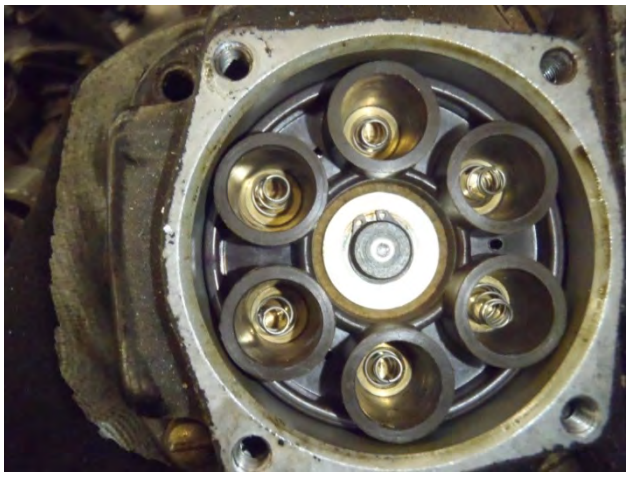


IGNITION SYSTEM

LEFT MAGNETO	Manufacturer: CMI	P/N: 10-51365-43	S/N: 207713
Condition:	The left magneto remained attached to its respective installation point and was undamaged. The magneto drive was spun by rotating the crankshaft and it was noted that the impulse couplings engaged normally. The spark plugs were installed onto the igniton leads and it was noted that the magneto was capable of producing a spark for all six spark plugs.		

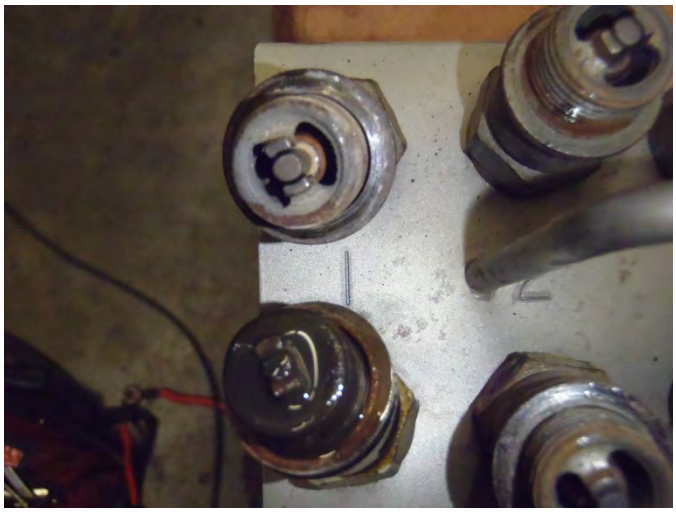


RIGHT MAGNETO	Manufacturer: CMI	P/N: 10-51365-43	S/N: 287709
Condition:	The right magneto remained attached to its respective installation point and was undamaged. It was noted that one of the magneto housing screws was missing and the magneto housing was lose. During the initial crankshaft rotation the magneto would not produce a spark; it was noted that P-Lead was cut to remove the engine which potentially caused the P-lead to ground the magneto. The magneto cover containing the P-lead was removed and the crankshaft was rotated; it was noted that the impulse couplings engaged and the magneto was capable of producing a spark for all six spark plugs.		



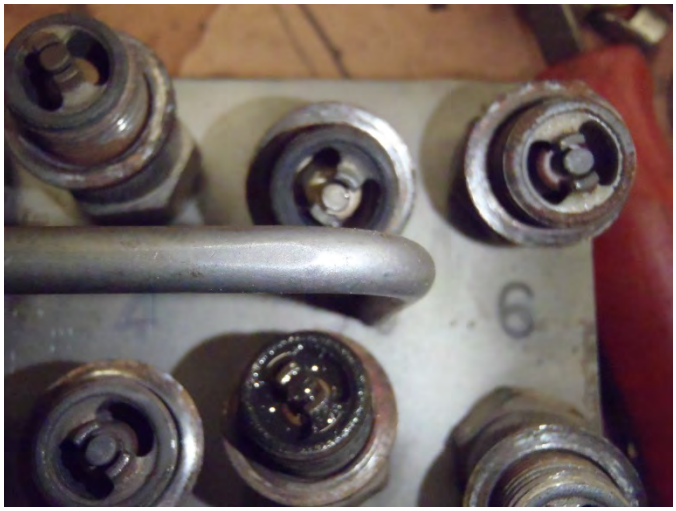
IGNITION HARNESS	Manufacturer: Not Marked	P/N: Not Marked	S/N: Not Marked
Condition:	The ignition harness remained attached to both magnetos and to each spark plug; the ignition harness was undamaged. It was noted that during the impulse coupling engagement of the magnetos that the ignition harness was capable of conducting a spark from the magnetos to each spark plug. There were no anomalies noted.		

SPARK PLUGS	Manufacturer: Champion	P/N: REM40E
Condition:	All of the spark plugs remained installed in their respective cylinders and were undamaged. All of the spark plugs were removed and visually inspected. The bottom #1, #3, and #5 spark plug electrodes were oil coated which was consistent with the engine position at rest. All of the spark plugs displayed normal operating signatures when compared to Champion Aviation Service Manual AV6-R. The #5 bottom, #2 top, and the #4 top and bottom were in a normal worn out condition when compared to Champion Aviation Service Manual AV6-R	



#1

#3



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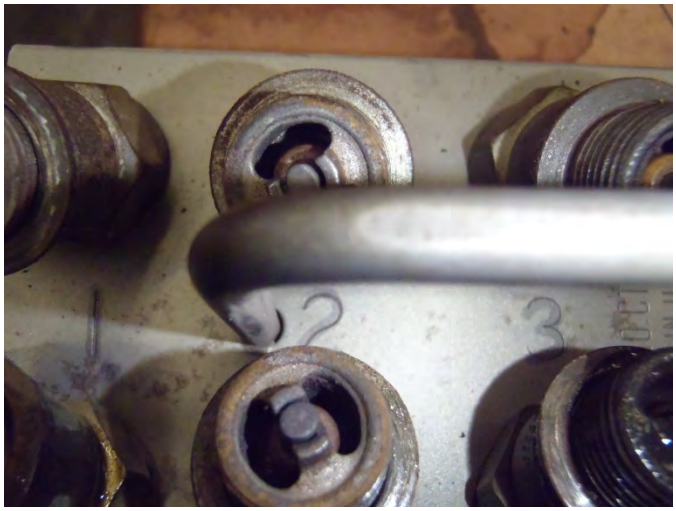

#2

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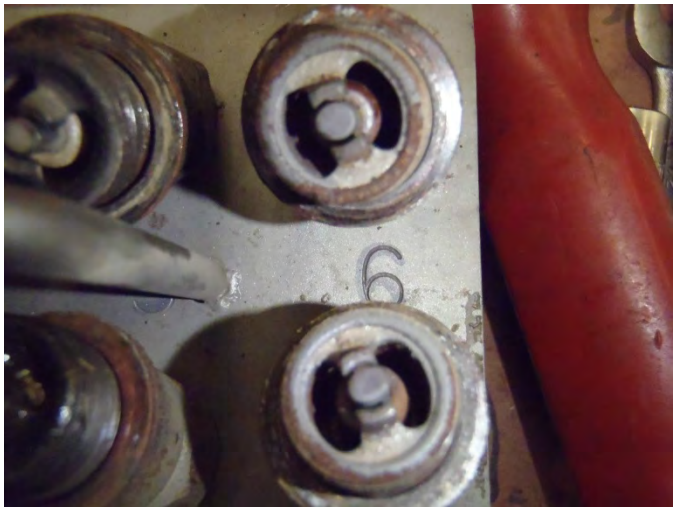
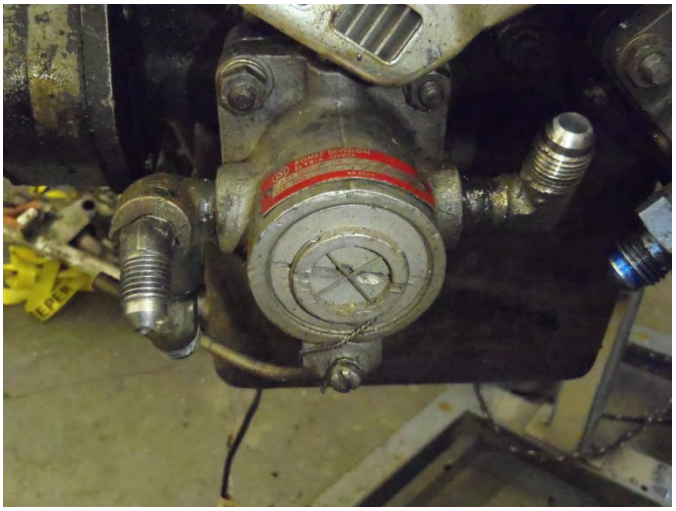


#6

FUEL SYSTEM

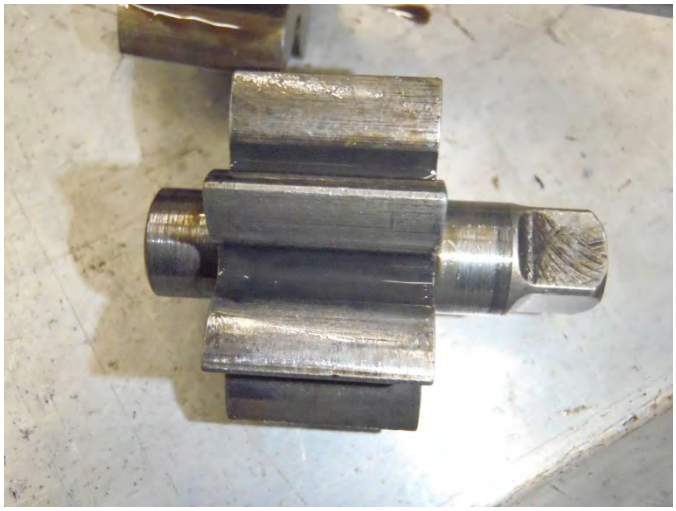
FUEL PUMP	Manufacturer: LSI	P/N: RD 7790	S/N: F-57318
Condition:	The fuel pump remained attached to its respective installation point and was undamaged. The fuel pump was removed and it was noted that the drive shaft remained intact and was capable of rotating by hand. There were no anomalies noted with the fuel pump.		

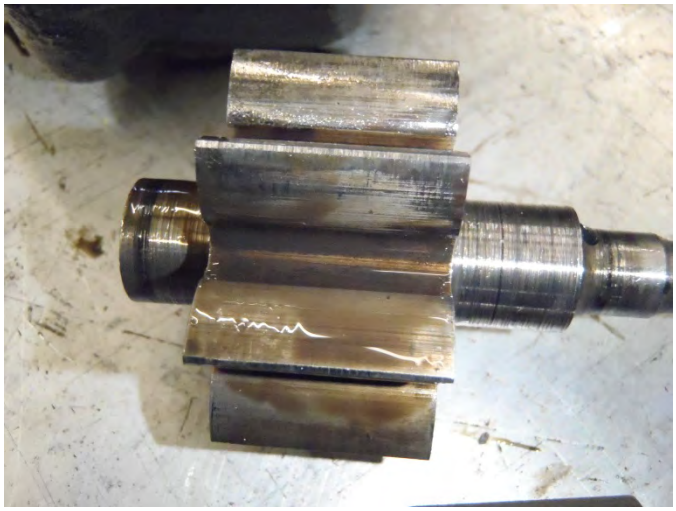


CARBURETOR	Manufacturer: Bendix	P/N: 391318-10	S/N: 735685
Condition:	The carburetor remained attached to the engine and to the airbox. The carburetor sustained damage consistent with impact damage to the carburetor mixture control components. The carburetor was removed from the engine and disassembled for an internal examination. It was noted that the fuel inlet screen had a significant amount of material consistent with rubber and there was a significant amount of particulates noted in several of the carburetor chambers. It also noted that there was fuel present within several of the chambers of the carburetor. There were no further anomalies noted.		

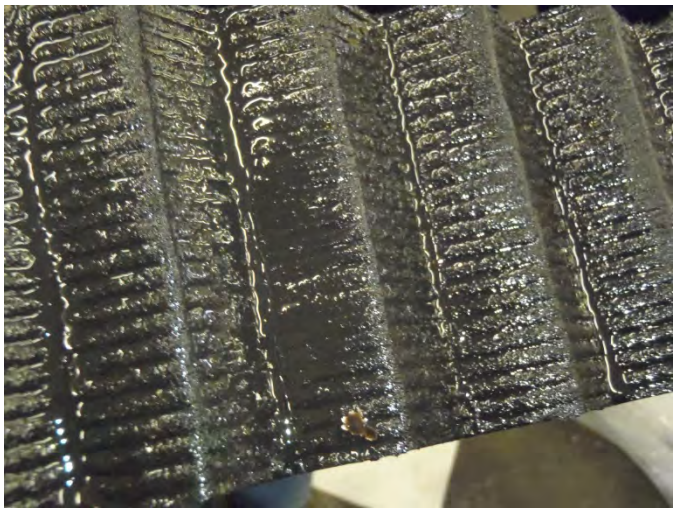
LUBRICATION SYSTEM

OIL SUMP	
Condition:	The oil sump remained attached to the engine and was undamaged. There were no anomalies noted with the oil sump.
OIL PICK-UP TUBE & SCREEN	
Condition:	The oil pick-up tube and screen remained installed to its respective installation point and was undamaged. The screen was clear of contaminates.
OIL PUMP	
Condition:	The oil pump remained installed in its respective installation point and was capable of normal rotation. The oil pump was disassembled and it was noted that the oil pump housing displayed scoring consistent with hard partical passage. The oil pump gears displayed small chips in several of the gear apexes consistent with hard partical passage. There were no further anomalies noted with the oil pump.





OIL FILTER	Manufacturer: Champion	P/N: CH48109-1
Condition:	The oil filter remained attached to the oil filter adapter and was undamaged. The oil filter was removed and the filter housing was cut open for inspection of the filter element. The filter element displayed several large flakes and small metallic particulates within the oil filter pleats. The oil filter pleats were placed into solvent and then the solvent was poured through a paper filter; additional metallic particulates were noted in the filter. There were no further anomalies noted.	

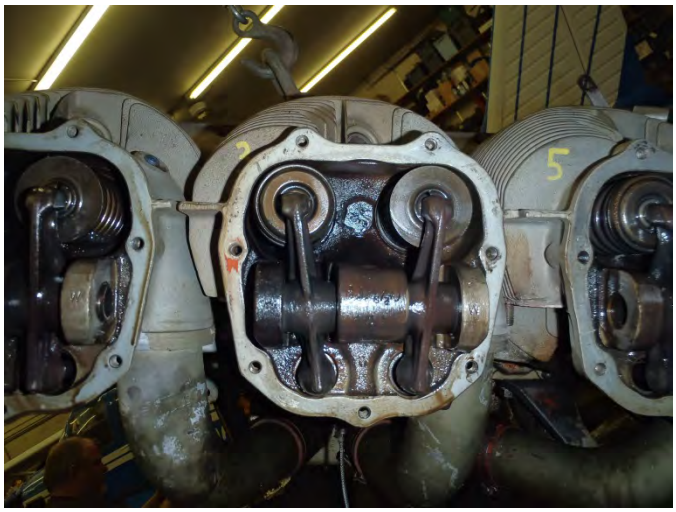


OIL COOLER	Manufacturer: Inaccessible	P/N: Inaccessible	S/N: Inaccessible
Condition:	The oil cooler remained attached to its respective installation point and was undamaged. There were no anomalies noted with the oil cooler.		

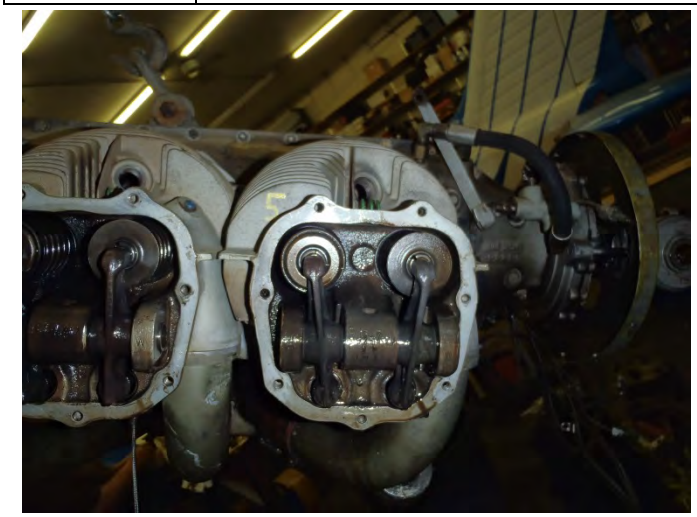
CYLINDERS

CYLINDER #1	P/N: Illegible	S/N: Illegible	
Condition:	The cylinder remained attached to the engine and there was no spot putty noted on the cylinder hold down nuts. The crankshaft was rotated and it was noted that the cylinder had good thumb compression and suction. The cylinder was removed from the engine and visually inspected. The external and internal components of the cylinder displayed normal operating signatures; there were no anomalies noted with the cylinder.		

CYLINDER #3	P/N: Illegible	S/N: Illegible	
Condition:	The cylinder remained attached to the engine and there was no spot putty noted on the cylinder hold down nuts. The crankshaft was rotated and it was noted that the cylinder had good thumb compression and suction. The cylinder was removed from the engine and visually inspected. The external and internal components of the cylinder displayed normal operating signatures; there were no anomalies noted with the cylinder.		

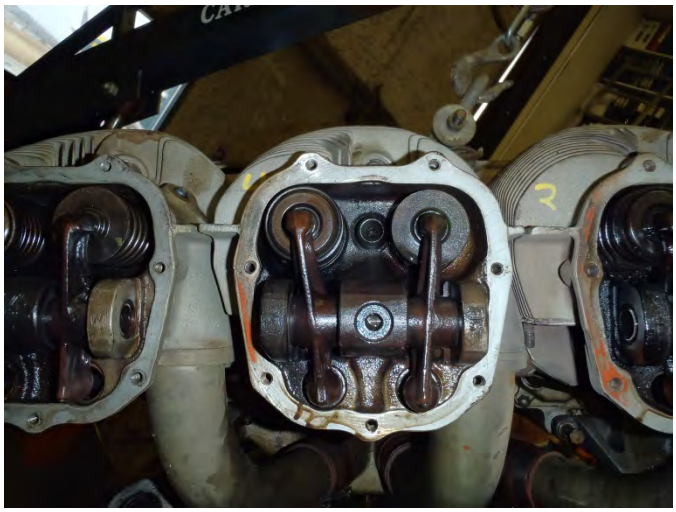


CYLINDER #5	P/N: Illegible	S/N: Illegible	
Condition:	The cylinder remained attached to the engine and there was no spot putty noted on the cylinder hold down nuts. The crankshaft was rotated and it was noted that the cylinder had good thumb compression and suction. The cylinder was removed from the engine and visually inspected. The external and internal components of the cylinder displayed normal operating signatures; there were no anomalies noted with the cylinder.		

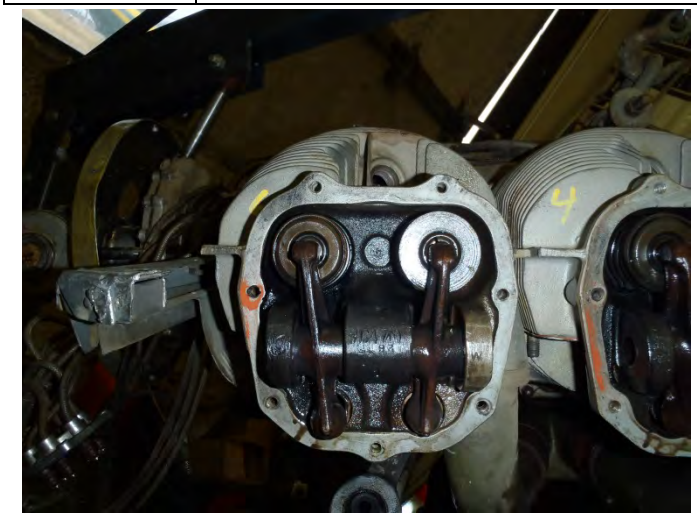


CYLINDER #2	P/N: Illegible	S/N: Illegible	
Condition:	The cylinder remained attached to the engine and there was no spot putty noted on the cylinder hold down nuts. The crankshaft was rotated and it was noted that the cylinder had good thumb compression and suction. The cylinder was removed from the engine and visually inspected. The external and internal components of the cylinder displayed normal operating signatures; there were no anomalies noted with the cylinder.		

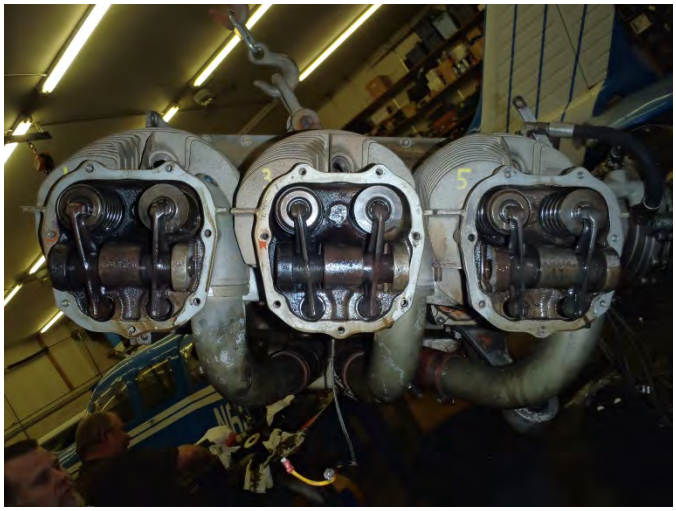
CYLINDER #4	P/N: Illegible	S/N: Illegible	
Condition:	The cylinder remained attached to the engine and there was no spot putty noted on the cylinder hold down nuts. The crankshaft was rotated and it was noted that the cylinder had good thumb compression and suction. The cylinder was removed from the engine and visually inspected. The external and internal components of the cylinder displayed normal operating signatures; there were no anomalies noted with the cylinder.		



CYLINDER #6	P/N: Illegible	S/N: Illegible	
Condition:	The cylinder remained attached to the engine and there was no spot putty noted on the cylinder hold down nuts. The crankshaft was rotated and it was noted that the cylinder had good thumb compression and suction. The cylinder was removed from the engine and visually inspected. The external and internal components of the cylinder displayed normal operating signatures; there were no anomalies noted with the cylinder.		



VALVES AND GUIDES	
Condition:	The valves remained installed in their respective cylinders and were undamaged. The intake and exhaust valve heads displayed normal operating and combustion signatures. During crankshaft rotation the valves operated normally.
ROCKER ARMS AND SHAFTS	
Condition:	All of the rocker arms displayed normal operating signatures. The rocker arms all operated normally during crankshaft rotation; there were no anomalies noted with the rocker arms.



#1 PISTON, RINGS AND PIN	Piston P/N: AE109
Condition:	The piston displayed normal operating and combustion signatures. The piston rings were intact and free in their grooves. There were no anomalies noted with any of the pistons.

#3 PISTON, RINGS AND PIN	Piston P/N: AE109
Condition:	The piston displayed normal operating and combustion signatures. The piston rings were intact and free in their grooves. There were no anomalies noted with any of the pistons.

#5 PISTON, RINGS AND PIN	Piston P/N: AE109
Condition:	The piston displayed normal operating and combustion signatures. The piston rings were intact and free in their grooves. There were no anomalies noted with any of the pistons.

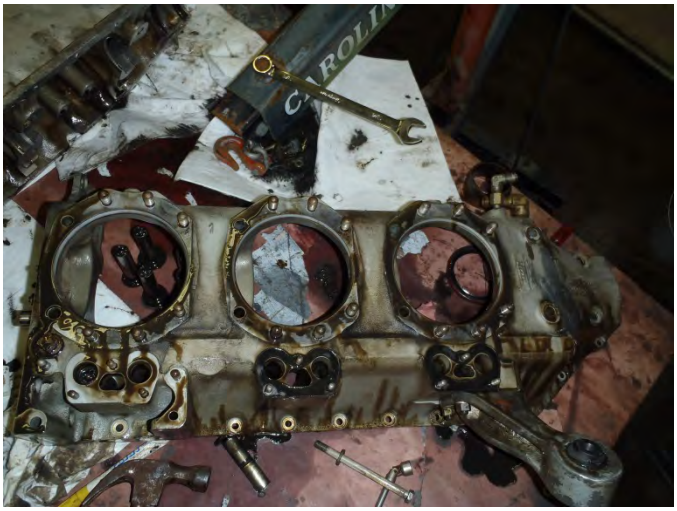
#2 PISTON, RINGS AND PIN	Piston P/N: AE109
Condition:	The piston displayed normal operating and combustion signatures. The piston rings were intact and free in their grooves. There were no anomalies noted with any of the pistons.

#4 PISTON, RINGS AND PIN	Piston P/N: AE109
Condition:	The piston displayed normal operating and combustion signatures. The piston rings were intact and free in their grooves. There were no anomalies noted with any of the pistons.

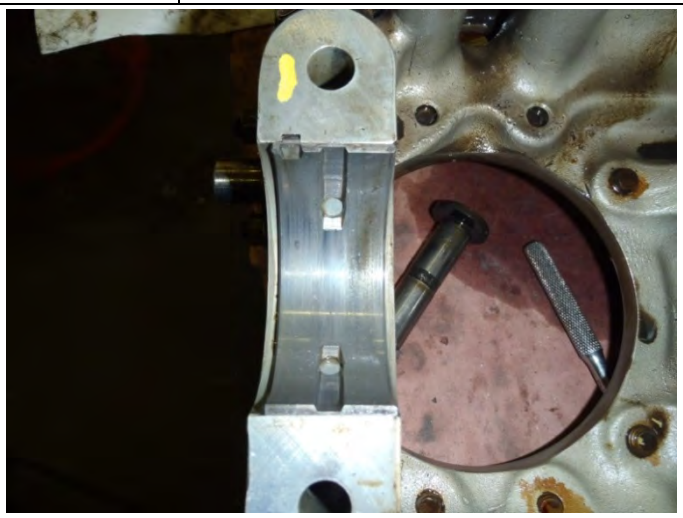
#6 PISTON, RINGS AND PIN	Piston P/N: AE109
Condition:	The piston displayed normal operating and combustion signatures. The piston rings were intact and free in their grooves. There were no anomalies noted with any of the pistons.

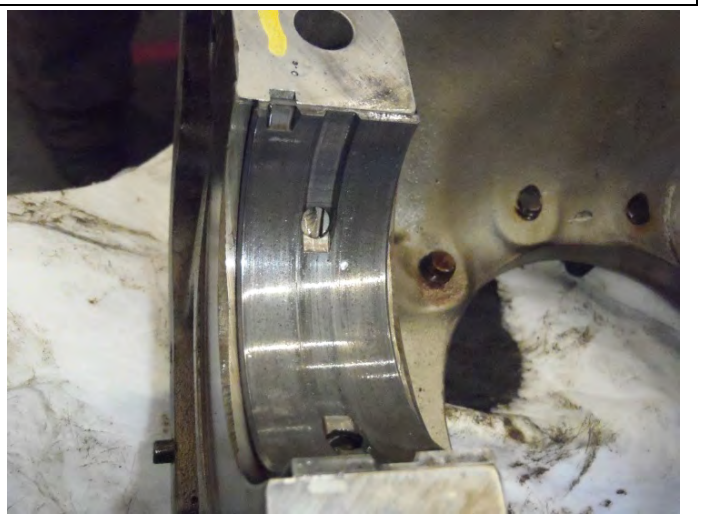
CRANKCASE ASSEMBLY

CRANKCASE	Casting Number:	1-3-5: 532271	2-4-6: 532272	S/N: 544
Condition:	The crankcase remained intact and there were no signs of impact damage. The engine was disassembled and the internal portions of the crankcase were inspected. It was noted that a small crack on both halves of the crankcase forward of the #5 main bearing at the nose seal area. There was wear noted on the #2, #3, and #4 main bearing bosses consistent with the crankshaft contacting the crankcase. There were no further anomalies noted.			

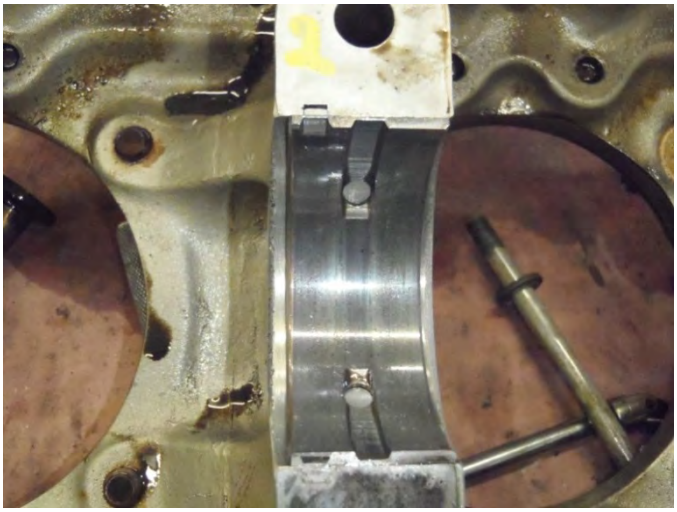


#1 MAIN BEARINGS	P/N: ASC530386	Date Code: 4/4
Condition:	The bearing remained installed within its respective bearing saddle and there was no signs of bearing shift. The bearing displayed normal wear and lubrication signatures. There were no anomalies noted with the bearing.	

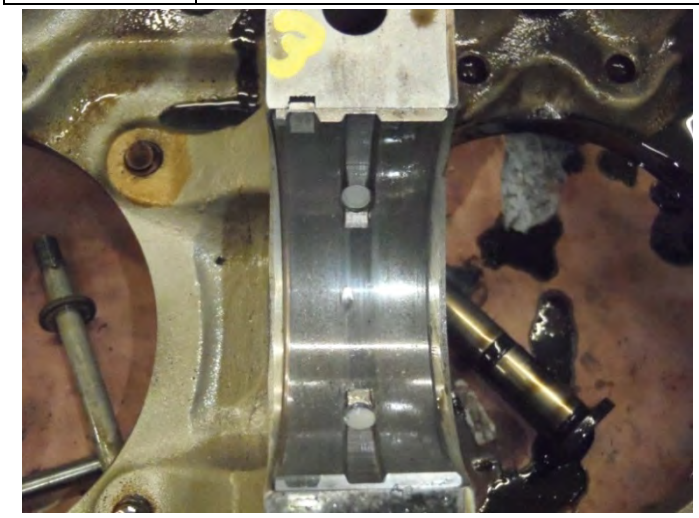


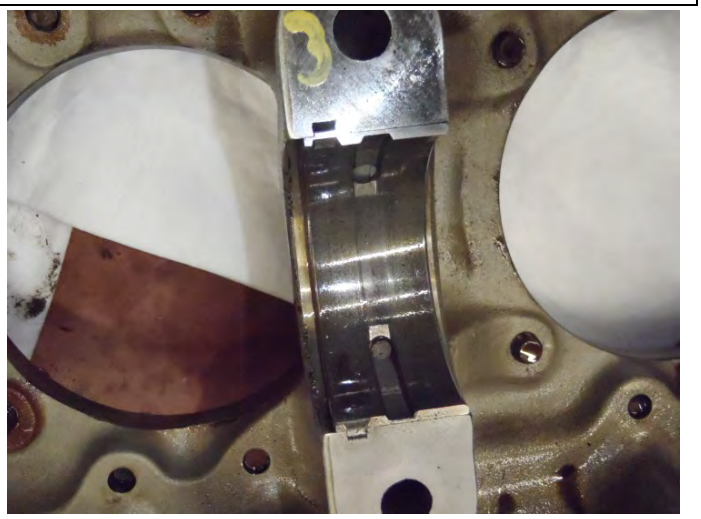


#2 MAIN BEARINGS	P/N: ASC530386	Date Code: 4/4
Condition:	The bearing remained installed within its respective bearing saddle and there was no signs of bearing shift. The bearing displayed normal wear and lubrication signatures. There were no anomalies noted with the bearing.	

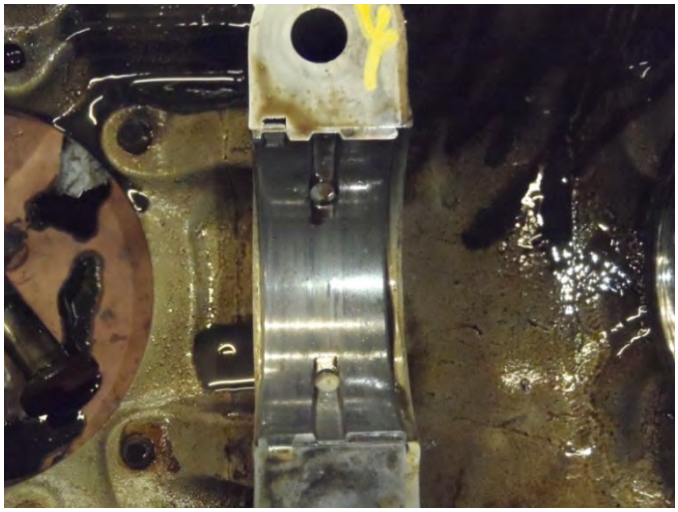


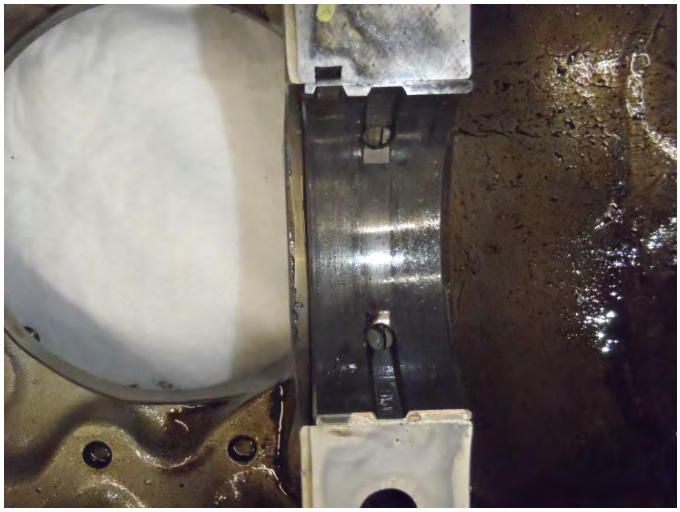
#3 MAIN BEARINGS	P/N: ASC530386	Date Code: 4/4
Condition:	The bearing remained installed within its respective bearing saddle and there was no signs of bearing shift. The bearing displayed normal wear and lubrication signatures. There were no anomalies noted with the bearing.	



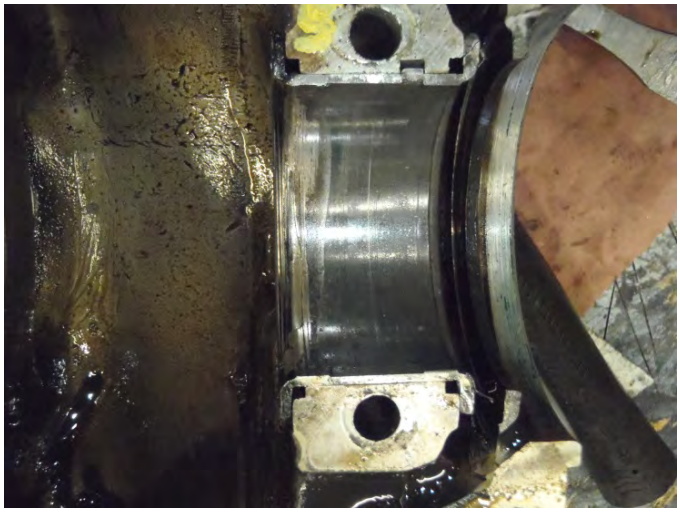


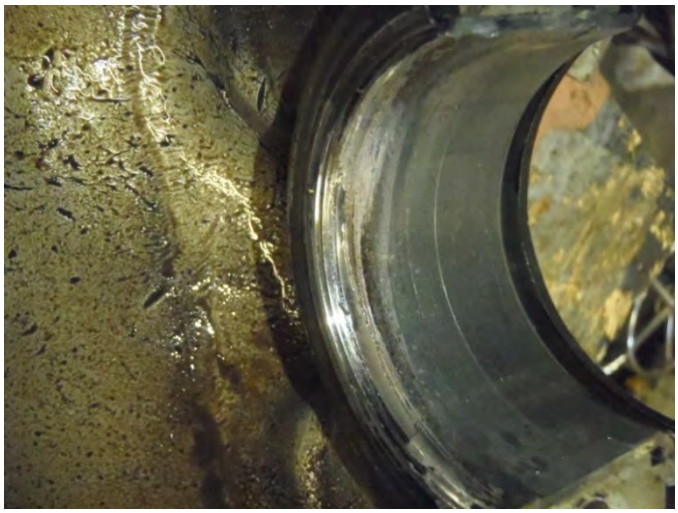
#4 MAIN BEARINGS	P/N: ASC530386	Date Code: 4/4
Condition:	The bearing remained installed within its respective bearing saddle and there was no signs of bearing shift. The bearing displayed normal wear and lubrication signatures. There were no anomalies noted with the bearing.	





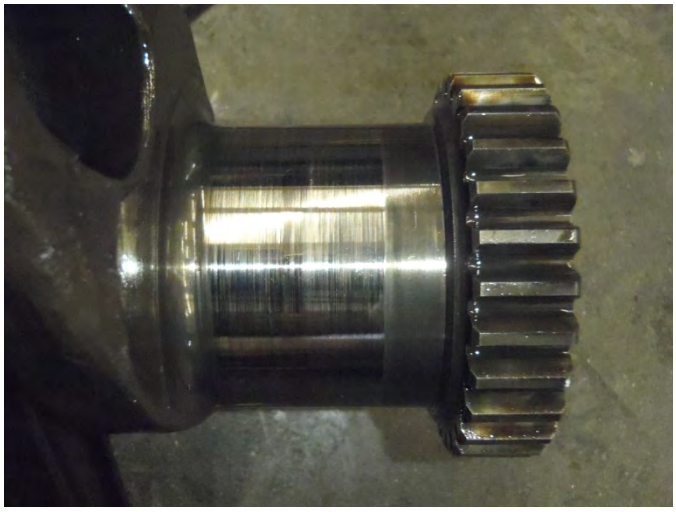
#5 MAIN BEARINGS	P/N: Illegible	Date Code: Illegible
Condition:	The front bearing remained installed within its respective bearing saddle and there were no signs of bearing shift. The bearing displayed damage concentrated to the rear portion of the bearing; several large, flat portions of the bearing had broken free from the bearing. Several portions of the bearing were located in the crankcase. The bearing displayed normal lubrication signatures.	

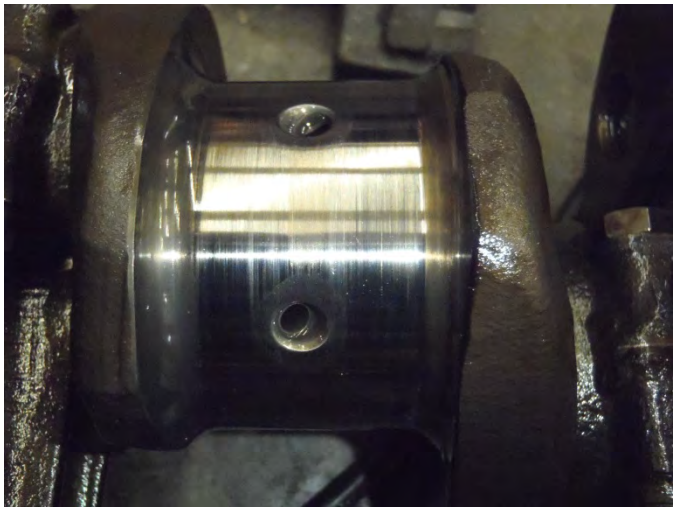




CRANKSHAFT ASSEMBLY

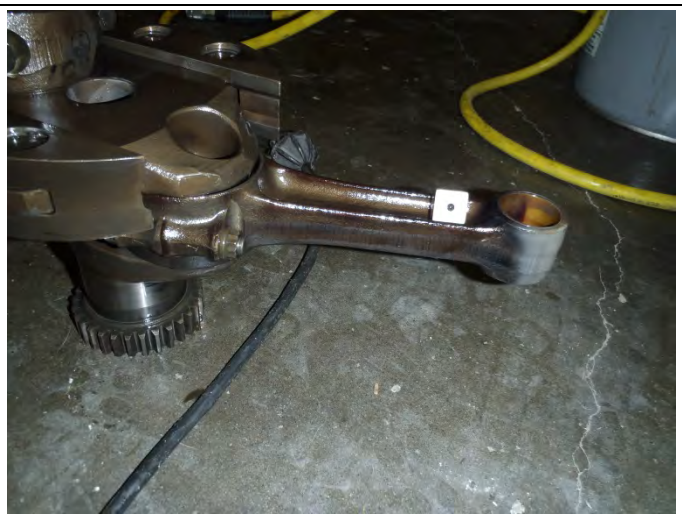
CRANKSHAFT	Forging Number: 50996	Identifying #: EC8858?-01	Heat code: L45
Condition:	The crankshaft remained intact and there were no signs of damage. The crankshaft gear was secure and the bolts were safety wired. The crankshaft spline shaft displayed normal operating signatures. The crankshaft main bearing journals displayed normal operating and lubrication signatures. All of the connecting rods were capable of rotating freely around their respective connecting rod journal. There were no anomalies noted with the crankshaft.		





COUNTER WEIGHTS	
Condition:	The counterweights remained installed in their respective locations and were undamaged. Both of the counterweights were capable of normal movement around the counterweight hangers. There were no anomalies noted.
INTERNAL TIMING	
Condition:	The internal timing was verified by matching the crankshaft and camshaft timing marks.

#1 CONNECTING ROD	P/N: Illegible	Forging or Serial Number: Illegible
Condition:	The connecting rod remained intact and was undamaged. The connecting rod bolts and nuts were secure. The connecting rod was rotating around the crankshaft connecting rod journal freely. There were no anomalies noted with the connecting rod.	



#3 CONNECTING ROD	P/N: Illegible	Forging or Serial Number: Illegible
Condition:	The connecting rod remained intact and was undamaged. The connecting rod bolts and nuts were secure. The connecting rod was rotating around the crankshaft connecting rod journal freely. There were no anomalies noted with the connecting rod.	

#5 CONNECTING ROD	P/N: Illegible	Forging or Serial Number: Illegible
Condition:	The connecting rod remained intact and was undamaged. The connecting rod bolts and nuts were secure. The connecting rod was rotating around the crankshaft connecting rod journal freely. There were no anomalies noted with the connecting rod.	

#2 CONNECTING ROD	P/N: Illegible	Forging or Serial Number: Illegible
Condition:	The connecting rod remained intact and was undamaged. The connecting rod bolts and nuts were secure. The connecting rod was rotating around the crankshaft connecting rod journal freely. There were no anomalies noted with the connecting rod.	

#4 CONNECTING ROD	P/N: Illegible	Forging: Atlas 940742
Condition:	The connecting rod remained intact and was undamaged. The connecting rod bolts and nuts were secure. The connecting rod was rotating around the crankshaft connecting rod journal freely. There were no anomalies noted with the connecting rod.	

#6 CONNECTING ROD	P/N: Illegible	Forging: 40262
Condition:	The connecting rod remained intact and was undamaged. The connecting rod bolts and nuts were secure. The connecting rod was rotating around the crankshaft connecting rod journal freely. There were no anomalies noted with the connecting rod.	

CAMSHAFT

CAMSHAFT	P/N: Illegible	S/N: Illegible
Condition:	The camshaft remained intact and was undamaged. The camshaft gear was secure and the bolts were safety wired. The camshaft lobes and journals displayed normal operating signatures. There were no anomalies noted with the camshaft.	

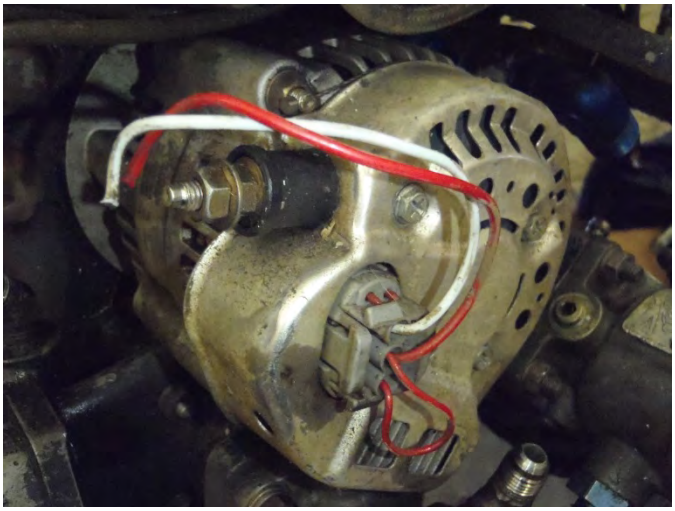
LIFTERS	
Condition:	All of the lifters were intact and displayed normal operating signatures. There were no anomalies noted with the lifters.

ACCESSORY GEARS	
Condition:	All of the accessory gears were secure and displayed normal operating signatures. It was noted that both of the magneto drive supports were secured with regular nuts; according to the E-225 parts catalog the drive supports are to be secured using a castellated nut and a cotter key.

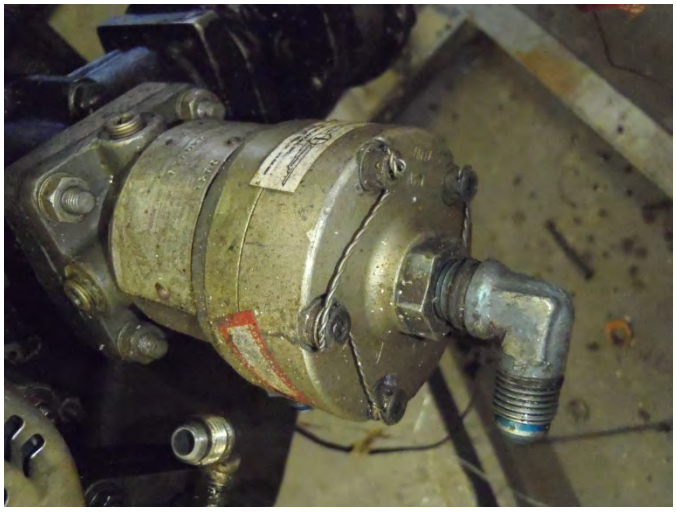
ACCESSORIES

STARTER	Manufacturer: Bendix	P/N: E 80	S/N: R031811
Condition:	The starter remained attached to its respective installation point and was undamaged. There were no anomalies noted with the starter.		

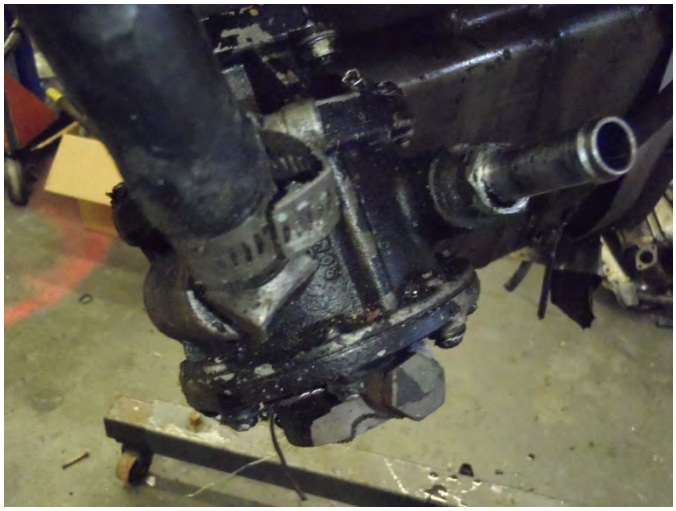
ALTERNATOR	Manufacturer: Plane-Power	P/N: ER14-50	S/N: ER-103002
Condition:	The alternator remained attached to its respective installation point and was undamaged. There were no anomalies noted with the alternator.		



HYDRAULIC PUMP	Manufacturer: Stratopower	P/N: 67A025	S/N: AO-337
Condition:	The engine driven hydraulic pump remained attached to its respective installation point and was undamaged. There were no anomalies noted with the hydraulic pump.		

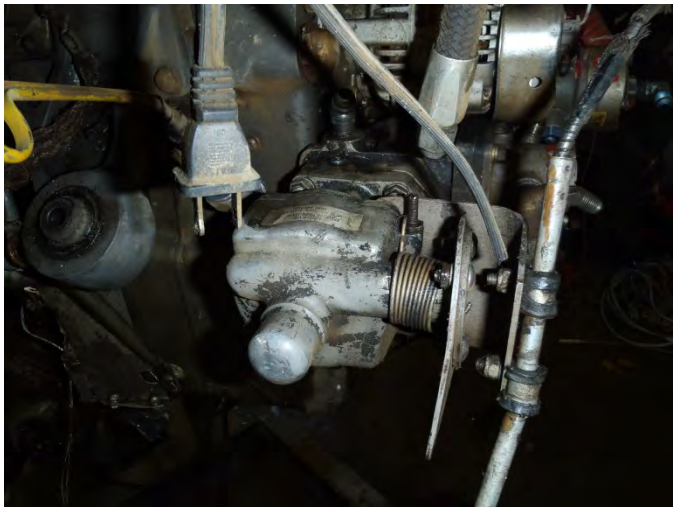


VACUUM PUMP	Manufacturer: Romec	P/N: B-2-B	S/N: V-10887
Condition:	The vacuum pump remained attached to its respective installation point and was undamaged. There were no anomalies noted with the vacuum pump.		

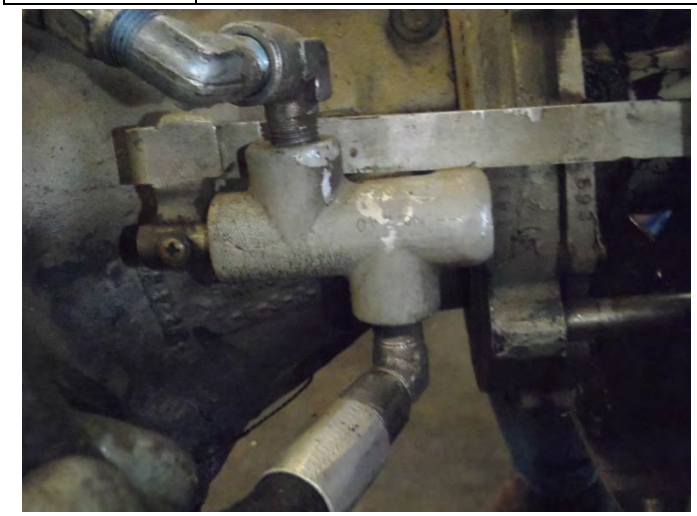


PROPELLER

PROPELLER GOVERNOR	Manufacturer: Illegible	P/N: Illegible	S/N: Illegible
Condition:	The propeller governor remained attached to its respective installation point and was undamaged. There were no anomalies noted with the propeller governor.		



PROPELLER ACTUATOR	Manufacturer: Illegible	P/N: Illegible	S/N: Illegible
Condition:	The propeller actuator remained attached to its respective installation point and the oil lines remained secure. There were no anomalies noted with the actuator.		



PROPELLER	Manufacturer: Hartzell	P/N: Not examined	S/N: Not examined
Condition:	The propeller was not examined at the time of the engine examination. Refer to the Hartzell examination report for details of the propeller examination.		