Continental Motors

ENGINE EXAMINATION REPORT
LEFT

ENGINE MODEL	TSIO520EB (8B)
ENGINE SERIAL NUMBER	271215-R
AIRCRAFT MAKE & MODEL	Cessna 335
AIRCRAFT SERIAL NUMBER	335-0023
AIRCRAFT REGISTRATION	N2707J
FILE NUMBER	18-174

NAME	SIGNATURE	DATE
Mike Council	[redacted]	1-2-2019

Template Issue Date: 06/2017

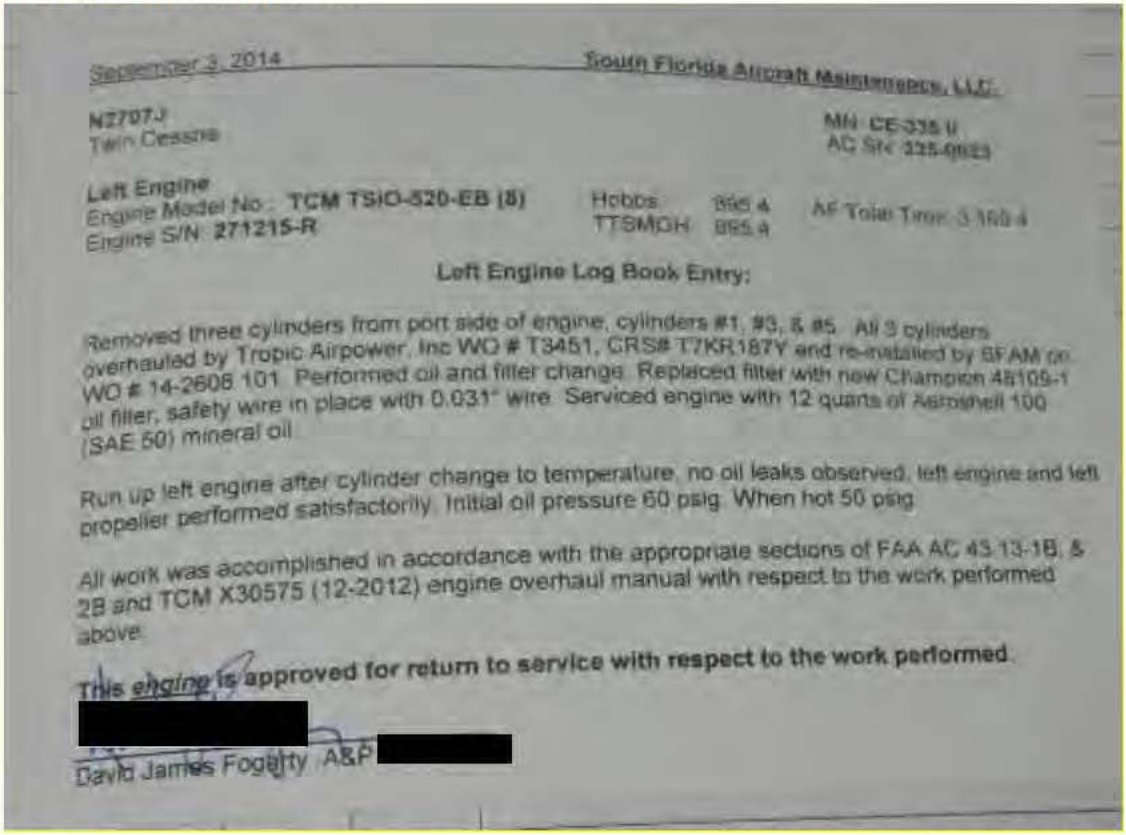
GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	9-10-2018 On-Site 9-11-2018 Recovery	NTSB ACCIDENT #	ERA18FA244
FACILITY	Florida Air Recovery	NTSB INVESTIGATOR	Doug Brazy
ADDRESS	Fort Pierce, FL	FAA INVESTIGATOR	NA
		ACCIDENT DATE	9-9-2018
		ACCIDENT LOCATION	Lake Worth, FL

ENGINE INFORMATION

ENGINE POSITION	Left
TOTAL TIME	1808.9 at last 100-hour inspection dated 7-23-2018
TIME SOH	NA
TYPE & TIME SLI	Undetermined. No recording tach or hobbs was located in the wreckage
BUILD DATE	9-6-1992
IN SERVICE DATE	9-18-1992

Significant logbook information:



September 3, 2014 — South Florida Aircraft Maintenance, LLC

N2707J
Twin Cessna

MN: CE-335 II
AC S/< 335-0023

Left Engine
Engine Model No.: TCM TSIO-520-EB (8)
Engine S/N: 271215-R

Hobbs 865.4
TTSMOH 865.4

AF Total Time: 3,160.4

Left Engine Log Book Entry:

Removed three cylinders from port side of engine, cylinders #1, #3, & #5. All 3 cylinders overhauled by Tropic Airpower, Inc WO # T3451, CRS# T7KR187Y and re-installed by SFAM on WO # 14-2606 101. Performed oil and filter change. Replaced filter with new Champion 48105-1 oil filter, safety wire in place with 0.031" wire. Serviced engine with 12 quarts of Aeroshell 100 (SAE 50) mineral oil.

Run up left engine after cylinder change to temperature, no oil leaks observed, left engine and left propeller performed satisfactorily. Initial oil pressure 60 psig. When hot 50 psig.

All work was accomplished in accordance with the appropriate sections of FAA AC 43.13-1B, & 2B and TCM X30575 (12-2012) engine overhaul manual with respect to the work performed above.

This engine is approved for return to service with respect to the work performed.

[redacted]

David James Fogarty A&P [redacted]

NOTE: The total time on this engine at this maintenance event was 1763.50 hours. The hobbs meter was replaced with zero-time unit 9-12-2002 with instructions to add 868.1 to hobbs for actual left engine time since factory rebuilt.

Report Summary: Search Code(s):

Examination of this engine was performed by the CMI Investigator under supervision of the NTSB Investigator. 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 will remain in the care, custody and control of Florida Air Recovery until released by the NTSB IIC.

INSPECTION WITNESSES			
NAME	Mike Council	NAME	Doug Brazy, IIC
ADDRESS	2039 South Broad Street Mobile, Alabama	ADDRESS	Eastern Region
ORGANIZATION	Continental Motors	ORGANIZATION	NTSB
PHONE	2[redacted]	PHONE	[redacted]
NAME	Andrew Hall	NAME	NA
ADDRESS	Wichita, KS	ADDRESS	
ORGANIZATION	Textron Aviation	ORGANIZATION	
PHONE	[redacted]	PHONE	

EXTERNAL INSPECTION OF ENGINE

The left engine exhibited impact and thermal damage. The propeller separated on impact by breaking the propeller attachment bolts. The engine crankshaft propeller flange remained intact.


LEFT
09.11.2018 14:46


LEFT
09.10.2018 14:45


LEFT
L1
L3
L5
09.11.2018 14:46


TELEDYNE
TSIO-520-EB (3)
1-6-3-2-5-4
300
09.10.2018 09:31

ENGINE AND COMPONENT EXAMINATION

EXHAUST SYSTEM	
Condition:	The exhaust components were impact damaged.

INDUCTION SYSTEM	
Condition:	The induction components were impact damaged including broken intake elbows, hoses and balance tube crushed.

IGNITION SYSTEM

LEFT MAGNETO	Manufacturer: Bendix	P/N: 10-163-020-3	S/N:640654
Condition:	The left magneto produced sparks at all ignition leads when the magneto was manually rotated using a drill motor.		

RIGHT MAGNETO	Manufacturer: Bendix	P/N: 10-163060-1	S/N: 801229
Condition:	The right magneto produced sparks at all ignition leads when the magneto was manually rotated using a drill motor.		

SPARK PLUGS	Manufacturer: Undetermined	P/N: Undetermined
Condition:	The top sparkplugs were removed and inspected. When compared to a Champion "Check-A-Plug" chart, all six top sparkplugs appeared to be "Normal" in both wear condition and coloration. The sparkplugs had been painted black and the manufacturer's name and part number were unreadable. The sparkplugs featured three massive electrodes instead of the usual two or a single fine-wire type electrode.	

FUEL SYSTEM

FUEL PUMP	Manufacturer: TCM	P/N: 646201-11	S/N: H2192-56
Condition:	The fuel pump was rotated manually, and no fuel was expelled. The pump imput shaft was thermally damaged and the pump impeller blades were intact. The unmetered fuel adjustment screw was impact damaged. The fuel pump case at the bellows assembly was broken.		

THROTTLE BODY METERING UNIT	Manufacturer: TCM	P/N: 1032916-8	S/N: 4219216AR
Condition:	The fuel metering unit was intact but exhibited thermal damage. The control cable was attached properly, and the fastener was tight on the shaft. The fuel screen was not secured with safety wire as required. The fuel screen was removed and was damaged during the removal process. The solder from the assembly of the screen melted attaching the mesh to the throttle body housing. The screen appeared to be uncontaminated.		

FUEL MANIFOLD VALVE	Manufacturer: TCM	P/N: 634632-10A7	S/N: 11209214CR
Condition:	The assembly screws were correctly secured with safety wire and a lead seal was intact. The assembly screws were removed, and the spring and diaphragm were intact. The fuel screen was uncontaminated, but the manifold cavity contained a small amount of unidentified debris. The debris was attracted to a test magnet.		


09.11.2018 16:03


09.11.2018 16:05

LUBRICATION SYSTEM

OIL SUMP		
Condition:	The oil sump was impact damaged due to contact with the ground.	
OIL FILTER	Manufacturer: Undetermined	P/N: Undetermined
Condition:	The exterior of the filter exhibited thermal distress and was correctly secured with safety wire. The paper filter media was thermally damaged inside the canister where exposed to the post impact fire. The less damaged filter media was cut from the assembly and examined. No contamination was noted.	

OIL COOLER	Manufacturer: Undetermined	P/N: Undetermined	S/N: Undetermined
Condition:	No data plate was attached to the oil cooler. The oil cooler was intact with thermal distress to the lower portion where it had been exposed to the post impact fire.		

CYLINDERS

An engine maintenance logbook entry dated 9-3-2014 indicated that cylinders 1, 3, and 5 had been removed, overhauled and reinstalled. See "*Significant logbook Information*" entry on page 3 of this report.

All six cylinders produced thumb compression when the engine was manually rotated. The cylinder rocker covers were removed, and all rocker arms were observed to move normally when the engine was rotated. Camshaft, valve train and crankshaft continuity were confirmed.

A lighted electronic borescope examination was performed on each cylinder. Piston domes exhibited normal combustion signatures. All intake and exhaust valves exhibited normal combustion patterns and were intact.

CRANKCASE ASSEMBLY

CRANKCASE	Casting Number:	1-3-5: Undetermined	2-4-6: Undetermined	S/N: Undetermined
Condition:	The crankcase exhibited impact damage on the lower portion of the left and right casting. The lower portion of the crankcase assembly was thermally damaged.			

ACCESSORIES

STARTER	Manufacturer: Undetermined	P/N: Undetermined	S/N: Undetermined
Condition:	The starter motor separated from the starter adapter was not presented for inspection.		
STARTER ADAPTER	P/N: Undetermined		
Condition:	The starter adapter was thermally damaged. The starter motor separated and the starter mount was broken. The oil scavenge pump remained intact and attached to the starter adapter.		

ALT/GEN #1	Manufacturer: TCM	P/N: 649304	S/N: L129403
Condition:	The engine driven alternator received impact damage.		

VACUUM PUMP	Manufacturer: Undetermined	P/N: Undetermined	S/N: Undetermined
Condition:	The data label was thermally destroyed. The pump was disassembled and inspected. Impeller blades were intact. Drive shaft was intact.		

TURBO	Manufacturer: Undetermined	P/N: Undetermined	S/N: Undetermined
Condition:	The turbocharger was exposed to the post impact fire. The compressor and turbine wheels were free to rotate.		

PROPELLER

PROPELLER	Manufacturer: McCauley	P/N: Undetermined	S/N: 650681
Blade 1 S/N:	Undetermined		
Blade 2 S/N:	Undetermined		
Blade 3 S/N:	Undetermined		
Condition:	The propeller hub and spinner received impact damage. The propeller blades were relatively straight without cordwise scratching or gouging. Blade C exhibited paint transfer from contact with the ground.		

Continental Motors

ENGINE EXAMINATION REPORT
RIGHT

ENGINE MODEL	TSIO-520EB (9A)
ENGINE SERIAL NUMBER	510540
AIRCRAFT MAKE & MODEL	Cessna 335
AIRCRAFT SERIAL NUMBER	335-0023
AIRCRAFT REGISTRATION	N2707J
FILE NUMBER	18-174

NAME	SIGNATURE	DATE
Mike Council	[redacted]	2-3-2019

Template Issue Date: 06/2017

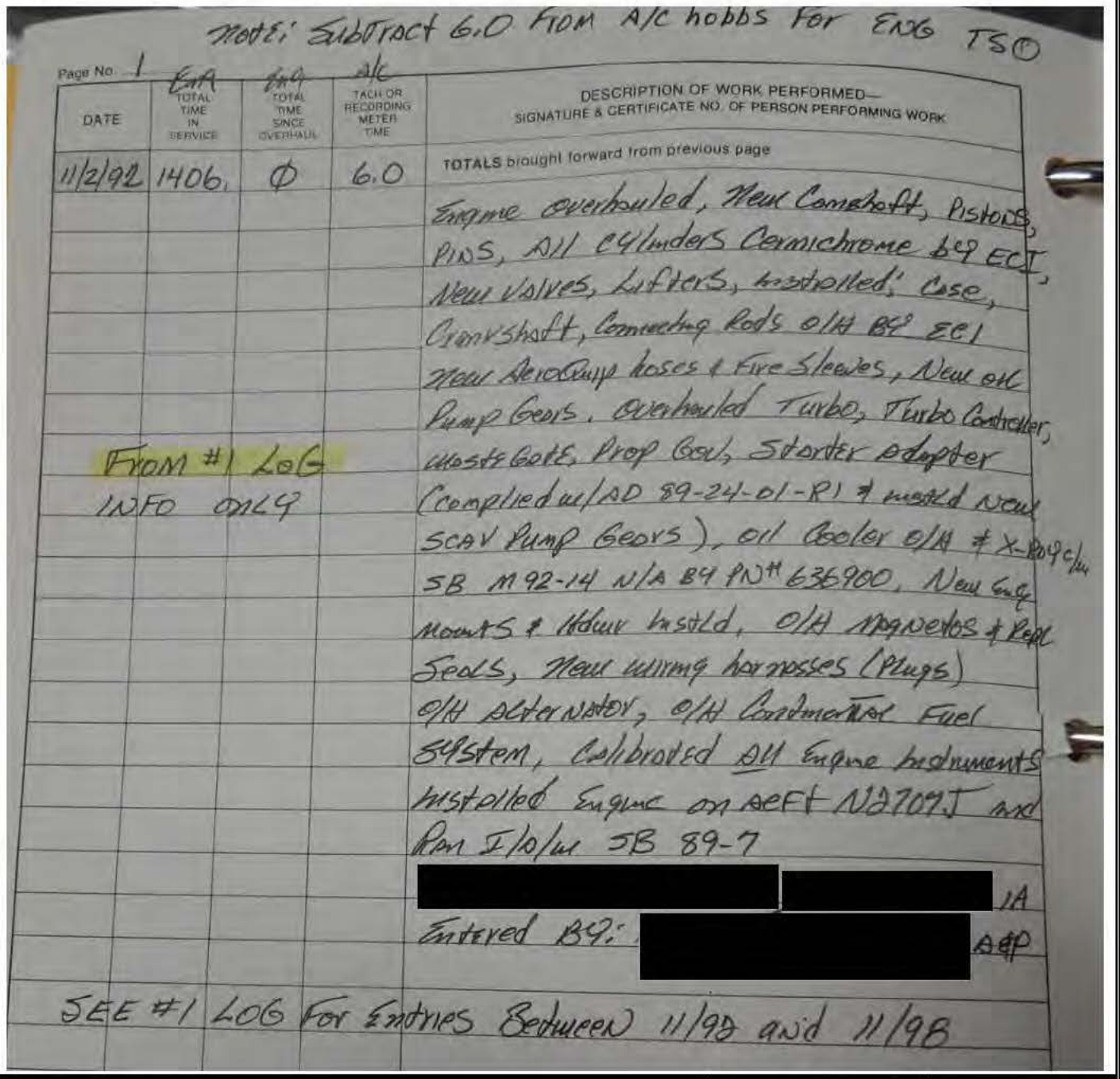
GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	9-10-2018 On-Site 9-11-2018 Recovery	NTSB ACCIDENT #	ERA18FA244
FACILITY	Florida Air Recovery	NTSB INVESTIGATOR	Doug Brazy
ADDRESS	Fort Pierce, FL	FAA INVESTIGATOR	NA
		ACCIDENT DATE	9-9-2018
		ACCIDENT LOCATION	Lake Worth, FL

ENGINE INFORMATION

ENGINE POSITION	Right
TOTAL TIME	3215.9
TIME SOH	1809.9 according last 100-hour inspection dated 7-23-2018
TYPE & TIME SLI	Annual Inspection dated 7-23-2018 at (tach) time 9784.1
BUILD DATE	8-27-1979
IN SERVICE DATE	Engine was overhauled 11-2-1992 and installed on N27074 same date. This engine only accumulated 288.7 hours between 11-2-1992 and 11-4-1998. No logbooks are available between those dates.

Significant logbook information:



NOTE: SUBTRACT 6.0 FROM A/C HOBBS FOR ENG TSO

Page No. 1

DATE	ENG TOTAL TIME IN SERVICE	ENG TOTAL TIME SINCE OVERHAUL	A/C TACH OR RECORDING METER TIME	DESCRIPTION OF WORK PERFORMED— SIGNATURE & CERTIFICATE NO. OF PERSON PERFORMING WORK
11/2/92	1406.	Ø	6.0	TOTALS brought forward from previous page

Engine overhauled, New Crankshaft, Pistons, Pins, All Cylinders Cermichrome by ECI, New Valves, Lifters, Installed; Case, Crankshaft, Connecting Rods O/H by ECI New AeroPump hoses & Fire Sleeves, New OIL Pump Gears. Overhauled Turbo, Turbo Controller, Waste Gate, Prop Gov, Starter Adapter (Complied w/AD 89-24-01-R1 & marked New Scav Pump Gears), Oil Cooler O/H & X-Reg c/w SB M92-14 N/A by PN# 636900. New Eng Mounts & Hdwr Installed, O/H Magnetos & Repl Seals, New wiring harnesses (Plugs) O/H Alternator, O/H Continental Fuel System, Calibrated All Engine Instruments Installed Engine on Aeft N2707J and Ran I/O/A SB 89-7

FROM #1 LOG INFO ONLY

[redacted] IA

Entered By: [redacted] A&P

SEE #1 LOG For Entries Between 11/92 and 11/98

Report Summary: Search Code(s):

Examination of this engine was performed by the CMI Investigator under supervision of the NTSB Investigator. 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 will remain in the care, custody and control of Florida Air Recovery until released by the NTSB IIC.

INSPECTION WITNESSES			
NAME	Mike Council	NAME	Doug Brazy, IIC
ADDRESS	2039 South Broad Street Mobile, Alabama	ADDRESS	Eastern Region
ORGANIZATION	Continental Motors	ORGANIZATION	NTSB
PHONE	[redacted]	[redacted]	[redacted]
NAME	Andrew Hall	NAME	NA
ADDRESS	Wichita, KS	ADDRESS	
ORGANIZATION	Textron Aviation	ORGANIZATION	
PHONE	[redacted]	PHONE	

EXTERNAL INSPECTION OF ENGINE

The right engine exhibited impact and thermal damage. The damaged propeller assembly was removed, and the crankshaft propeller flange was impact damaged with a portion of the flange separated. Cylinder # 5 exhibited impact and thermal damage.

ENGINE AND COMPONENT EXAMINATION

EXHAUST SYSTEM	
Condition:	The exhaust components were impact damage with upward crushing due to impact forces.

INDUCTION SYSTEM	
Condition:	The induction components were impact damaged including broken intake elbows, hoses and balance tube crushed.

IGNITION SYSTEM

LEFT MAGNETO	Manufacturer: Bendix Overhauled by Quality Aircraft Accessories, Inc.	P/N: 10-163020-3	S/N: 8035069
Condition:	The left magneto did not produce sparks when manually rotated. The left magneto was disassembled and inspected. Both sets of points operated normally, and the capacitor and wiring were intact. The plastic drive gears were intact. No internal thermal damage was noted and the reason for this magneto not producing spark normally was not determined.		

RIGHT MAGNETO	Manufacturer: Bendix	P/N: 10-163020-3	S/N: 8035069
Condition:	The right magneto produced sparks at all ignition leads when the magneto was manually rotated using a drill motor.		

IGNITION HARNESS	Manufacturer: Undetermined	P/N: Undetermined	S/N: Undetermined
Condition:	The ignition harness exhibited thermal distress near both of the magneto terminal attachments. Several individual leads were cut/pinched by impact forces.		

SPARK PLUGS	Manufacturer: Undetermined	P/N: Undetermined
Condition:	When compared to a Champion "Check-A-Plug" chart, all six top sparkplugs appeared to be "Normal" in both wear condition and coloration. The sparkplugs had been painted black and the manufacturer's name and part number were unreadable. The sparkplugs featured three massive electrodes instead of the usual two or a single fine-wire type electrode.	

FUEL SYSTEM

FUEL PUMP	Manufacturer: TCM	P/N: 632818-11	S/N: J138107RB
Condition:	The engine driven fuel pump exhibited thermal and impact damage. The lower portion of the pump was dark and the surfaces sooty from a post-impact fire. The unmetered fuel pressure adjustment bolt and lock nut received impact damage. The drive coupler was broken, and a sharp edge was evident around the circumference of the separated shaft. The broken area was concave/convex in shape. The broken portion of the drive coupler was removed, and the impeller shaft rotated smoothly when manually manipulated. A minute amount of fuel leaked from the pump cavity when the pump was disassembled. The pump shaft and impeller blades were intact. The outer mounting flange was partially broken. Fuel fittings were broken and remained with the thermally damaged flexible fuel hoses. The fuel pump and drive coupling will be examined at CMI at a later date and a metallurgical report prepared.		


09.11.2018 10:47


09.11.2018 10:47


09.11.2018 13:09


RIGHT
09.11.2018 13:09

FUEL MANIFOLD VALVE	Manufacturer: TCM	P/N: 634326-1	S/N: ?127932C
Condition:	The assembly screws were correctly secured with safety wire and a lead seal was intact. The spring and diaphragm were intact. The fuel screen was uncontaminated, and the pump cavity was clean. No fuel was present in the valve cavity.		

LUBRICATION SYSTEM

OIL FILTER	Manufacturer: Tempest	P/N: AA48109
Condition:	The canister exterior was thermally damaged.	

OIL COOLER	Manufacturer: Undetermined	P/N: Undetermined	S/N: Undetermined
Condition:	The data tag was thermally damaged and part number/serial number unreadable. The oil cooler remained intact		

CYLINDERS

All six cylinders produced thumb compression when the engine was manually rotated. The cylinder rocker covers were removed, and all rocker arms were found to move normally when the engine was rotated except cylinder 5. Cylinder 5 rocker cover was impact damage and the lower portion of the cover separated. The push rod (intake valve) was damaged and curled over. The lower portion of the intake valve rocker arm separated. Camshaft, valve train and crankshaft continuity was confirmed.

A lighted electronic borescope examination was performed on each cylinder. Piston domes exhibited normal combustion signatures. All intake and exhaust valves exhibited normal combustion patterns and were intact.

ROCKER ARMS AND SHAFTS	
Condition:	All rocker arms, springs and pushrods operated normally when the engine was manually rotated except # 5 which exhibited impact damage.

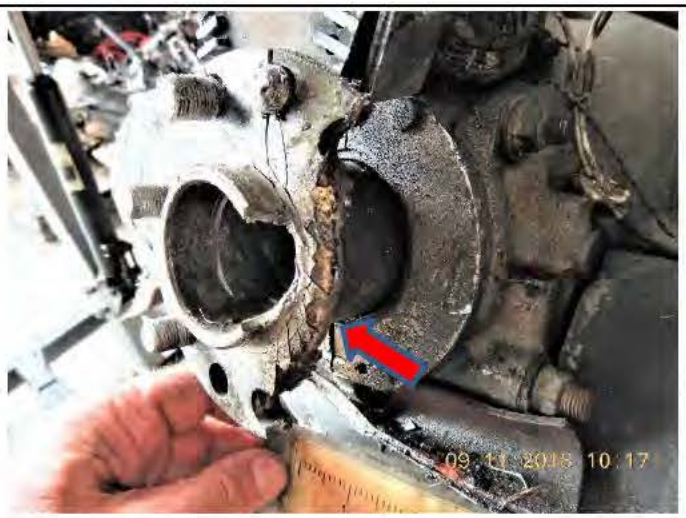



CRANKCASE ASSEMBLY

CRANKCASE	Casting Number:	1-3-5: Undetermined	2-4-6: Undetermined	S/N: Undetermined
Condition:	The crankcase halves were impact damaged on the lower front portion. Engine mounts were broken.			

CRANKSHAFT ASSEMBLY

CRANKSHAFT	Forging Number: Undetermined	S/N: Undetermined	Heat code: Undetermined
Condition:	The forward portion of the crankshaft including the propeller flange was impact damaged.		



ACCESSORIES

ALT/GEN #1	Manufacturer: TCM	P/N: 642056	S/N: E090358-539
Condition:	The alternator remained attached but exhibited thermal damage.		

VACUUM PUMP	Manufacturer: NA	P/N: NA	S/N: NA
Condition:	No vacuum pump was installed on the RIGHT engine		

TURBO	Manufacturer: Undetermined	P/N: Undetermined	S/N: Undetermined
Condition:	The turbine wheel was free to rotate in the housing.		

PROPELLER

PROPELLER GOVERNOR	Manufacturer: Overhauled by H&H Propeller Services	P/N: Undetermined	S/N: Undetermined
Condition:	The pitch change arm and shaft separated due to impact forces. The control cable was properly attached and secured.		

PROPELLER	Manufacturer: McCauley	M/N:3AF32087-N2R	S/N: Undetermined
Blade 1 S/N:	Undetermined		
Blade 2 S/N:	Undetermined		
Blade 3 S/N:	Undetermined		
Condition:	All three propeller blades exhibited s-bending, paint transfer and cordwise scratching/gouging. All three blades were loose inside the hub due to impact forces.