Continental Motors, Inc.

ENGINE OPERATIONAL TEST

REPORT

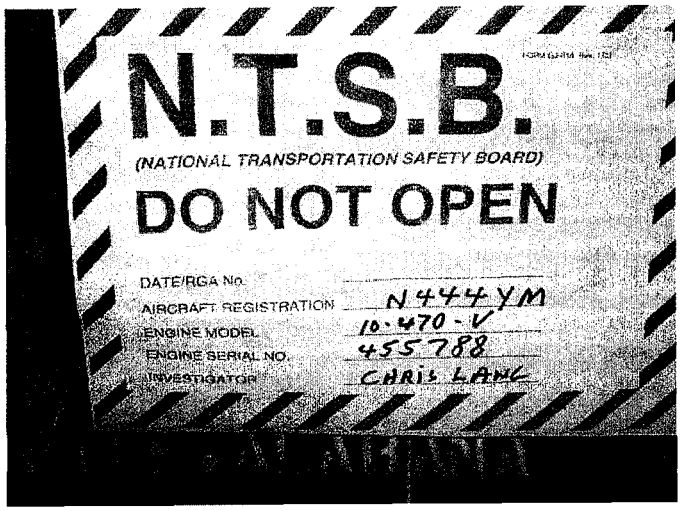
DATE	October 5, 2011
REGISTRATION #	N444YM
ENGINE MODEL	IO470VO
ENGINE SERIAL	455788
INSPECTOR	Phillip Grice
SEARCH CODE	15-12-68

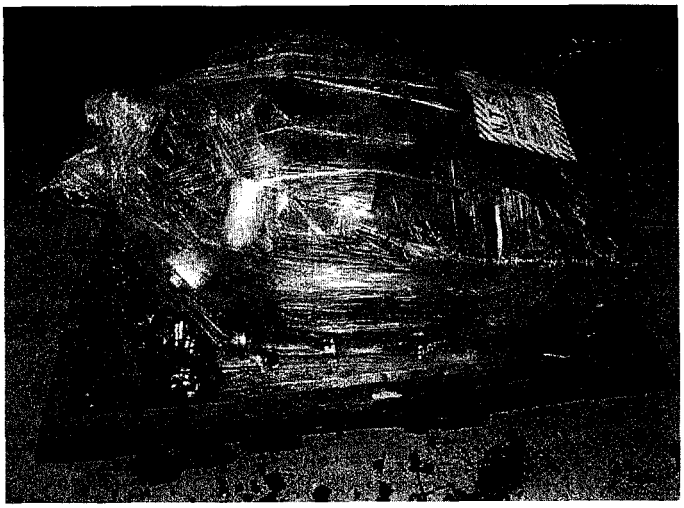
ENGINE HISTORY

Annual inspection completed 8-16-2011 Number 2 cylinder replaced with overhauled part. Normal maintenance and service reported in the engine log book from time of installation.

EXTERNAL EXAMINATION

The engine exhibited impact damage concentrated at the bottom of the engine. The oil sump, exhaust runner on the 2, 4, 6 side, induction tube cylinder 6, and the balance tube was replaced before the test run. All engine mount legs were replace to facilitate mounting to run stand.





Date	Engine Model	Engine Serial No.	Aircraft Registration	Page
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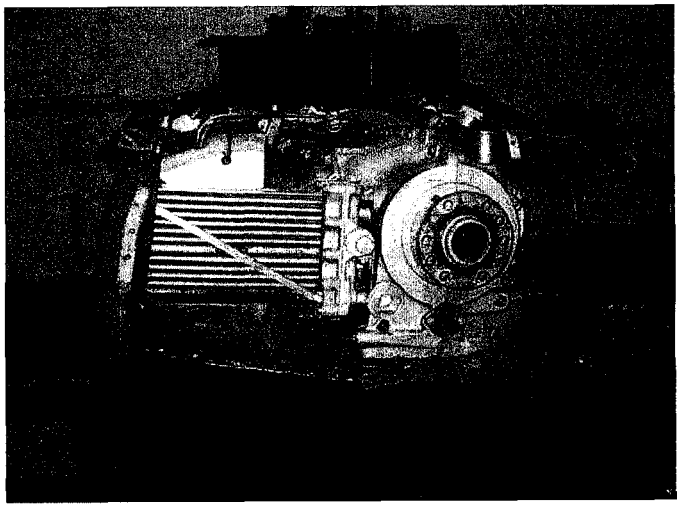
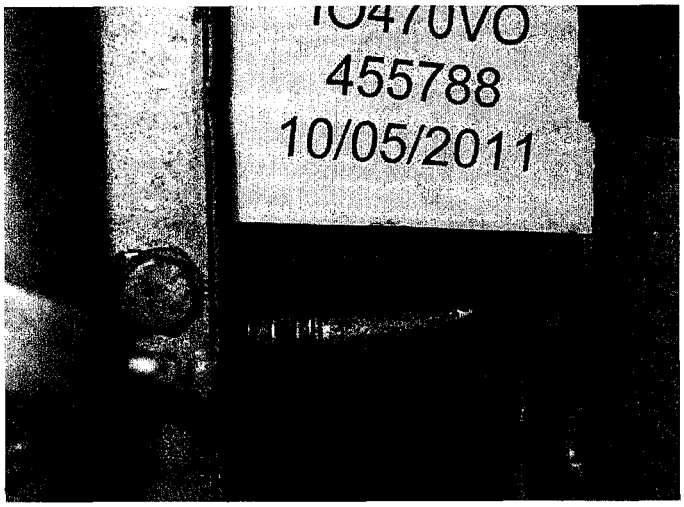
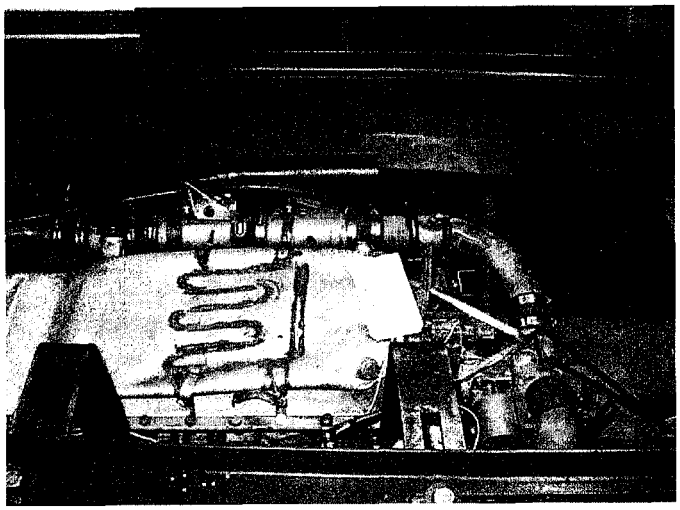
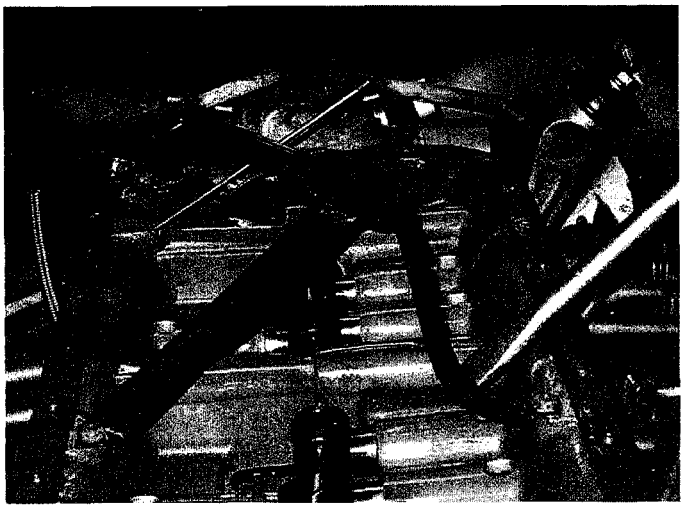
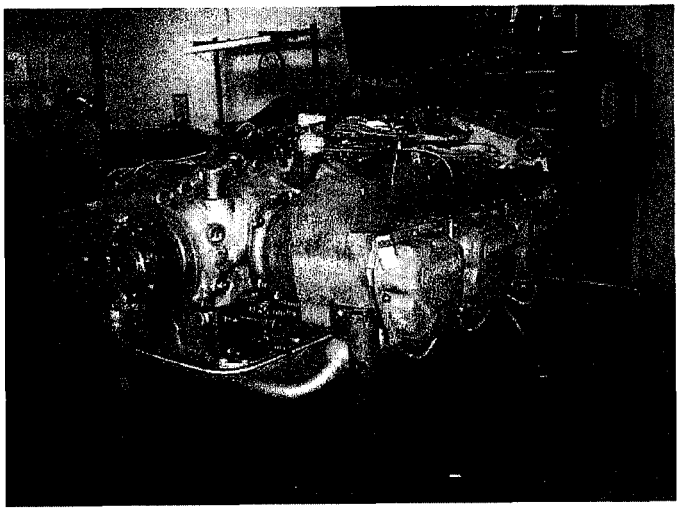
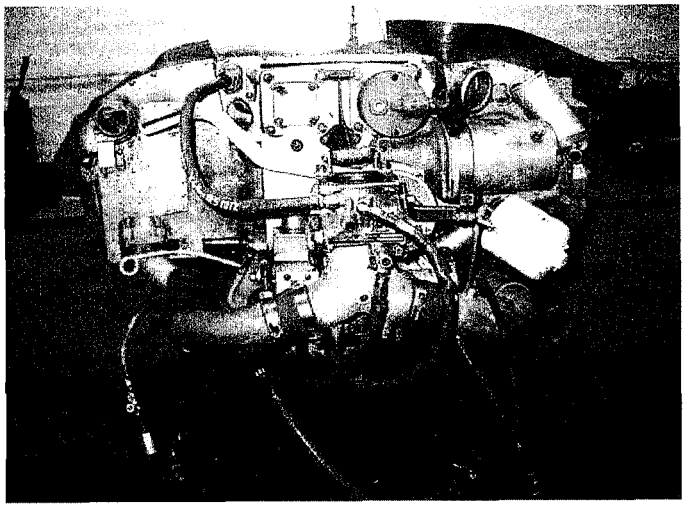












Magneto to Engine Timing TCM Spec. - 20 ° BTDC	Left Magneto: 21 ° BTDC	Right Magneto: 20 ° BTDC

The engine was not disassembled prior to the engine run.

The crankshaft end-play measured .009" and the crankshaft flange run-out was .002"

The engine was then prepared for operation by installing the appropriate thermocouples, pressure lines and test pads for monitoring purposes.

The engine was then moved to TCM test cell number 43 and mounted for operation.

The engine was fitted with a test club propeller for the IO470VO engine model.

DESCRIPTION OF OPERATIONAL TEST

The engine experienced a normal start on the first attempt without hesitation or stumbling in observed RPM. The engine RPM was advanced in steps for warm-up in preparation for full power operation. The engine throttle was advanced to 1200 RPM and held for five (5) minutes to stabilize. The engine throttle was advanced to 1600 RPM and held for five (5) minutes to stabilize. The engine throttle was advanced to 2450 RPM and held for five (5) minutes to stabilize. The engine throttle was advanced to full open position and held for five (5) minutes to stabilize. The engine throttle was rapidly advanced from idle to full throttle six times where it performed normally without any hesitation, stumbling or interruption in power.

Throughout the test phase, the engine accelerated normally without any hesitation, stumbling or interruption in power and demonstrated the ability to produce rated horsepower.

Engine Operational Test Log

Time		RPM	MP "Hg	Oil		Fuel				Cell	Cylinder Head Temperature °F					
Reading	Minutes			PSI	°F	Lbs/Hr	Nozzle PSI	Pump PSI	Fuel °F	°F	# 1	# 2	# 3	# 4	# 5	# 6
1	5	1200	14.7	24	85	24.8	4.9	12.0	69	64	249	229	257	219	210	178
2	5	1600	18.4	34	122	40.4	6.0	15.1	69	65	268	267	296	239	255	199
3	5	2100	24.8	54	153	81.21	9.7	21.3	69	65	339	300	344	271	232	231
4	5	2450	26.5	48	174	108	14.7	27.5	73	65	349	401	372	322	366	273
5	5	F/T	29.2	46	185	134.8	19.3	30.1	74	67	358	409	380	328	371	246
6	5	Idle	16.8	10	147	10.2	4.2	8.0	74	68	271	342	269	273	239	204

Ambient Air Temperature °F	Ambient Air Pressure	Transfer Collar ΔP		Maximum Rated Power Engine Operational Parameters				
		In	Out	RPM	" Hg MP	Fuel Flow Lbs/Hr	Metered PSI	Unmetered PSI
70.5	30.14	47	46	2632	N/A	134.8	19.3	30.1

Notes: Operator – Johnny Little, 30524. Transfer collar pressure delta measured at full throttle power setting.

Engine Performance Test				
Test RPM	Left Magneto RPM	Left Magneto RPM Drop	Right Magneto RPM	Right Magneto RPM Drop
2100	2016	84	1988	112

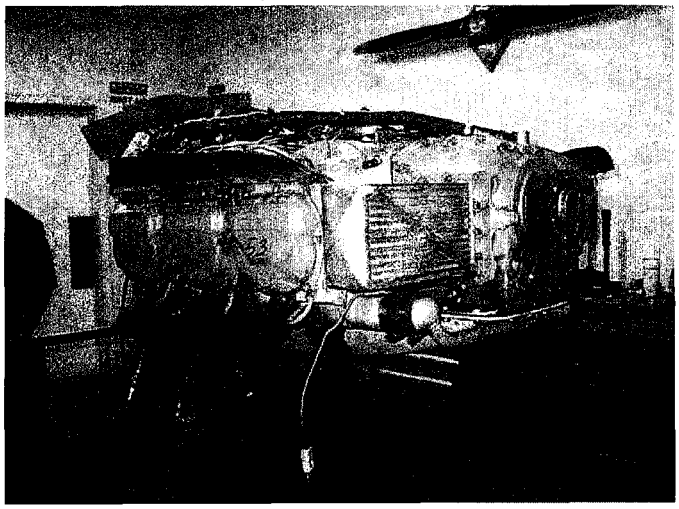
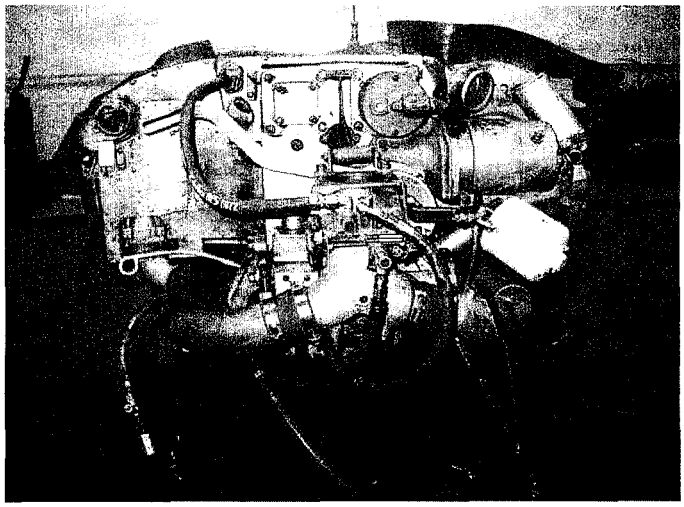
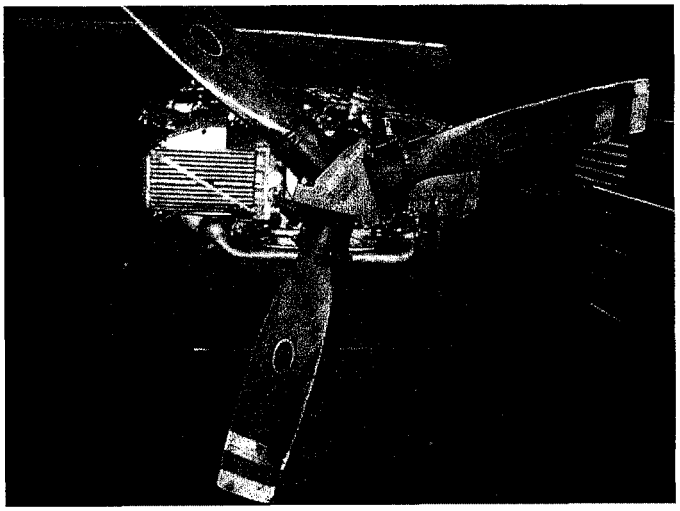
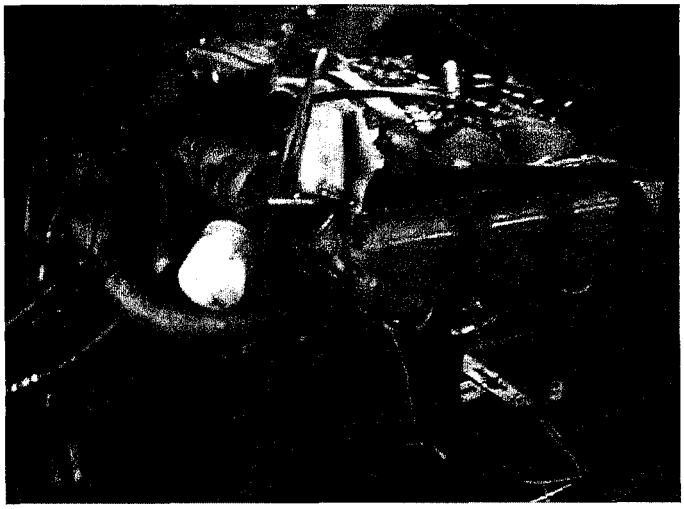
A post engine test cylinder leakage test was performed in accordance with the latest revision of TCM Service Bulletin SB03-3 on each cylinder with the engine hot. The results are as follows:
Master orifice reading – 39 PSI

Cylinder #1 - 64/80 PSI (rings)
Cylinder #2 - 71/80 PSI (rings)
Cylinder #3 - 70/80 PSI (rings)
Cylinder #4 - 54/80 PSI (rings)
Cylinder #5 - 70/80 PSI (rings)
Cylinder #6 - 56/80 PSI (rings)

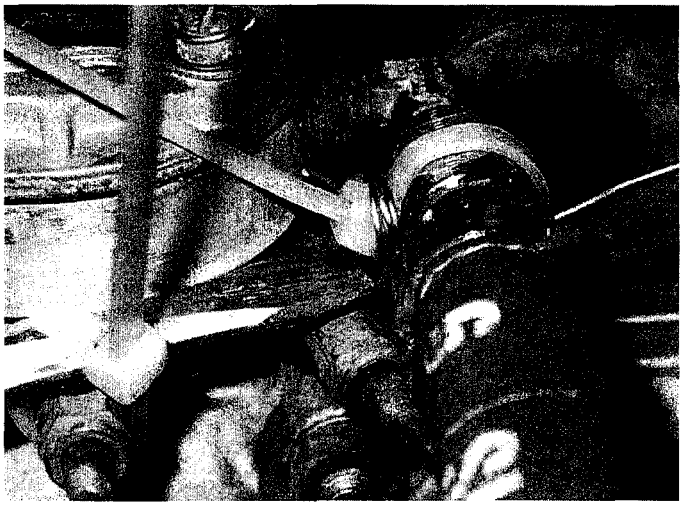
(*) – Leakage Source

ENGINE OPERATIONAL TEST CONCLUSION

The operation of this engine was normal and did not reveal any abnormalities that would have prevented normal operation and production of rated horsepower.

During the on site investigation the fuel line attached to the manifold valve was found loose. After completion of the engine test run the fuel line was set at finger tight torque. A wire was attached to loosen the hose during the engine run. A stop was in place to limit the rotation. Engine was set at full throttle and the fitting loosen to slightly over ¼ turn. When the hose was loosened the engine lost power and shut down.



ENGINE DISPOSITION

The engine was shipped to the following address per the NTSB IIC upon the completion of the operational test:

Gulf Coast aircraft Recovery

[redacted]

Baton Rouge, La. 70815

Continental Motors, Inc.

ENGINE OPERATIONAL TEST

REPORT

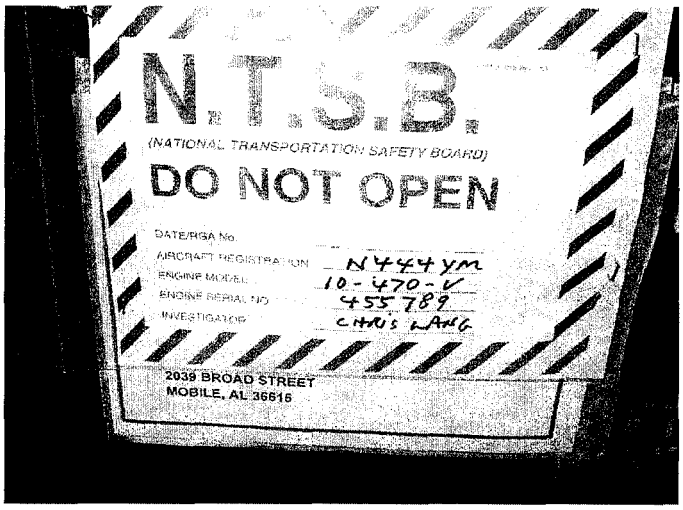
DATE	October 6, 2011
REGISTRATION #	N444YM
ENGINE MODEL	IO470VO
ENGINE SERIAL	455789
INSPECTOR	Phillip Grice
SEARCH CODE	15-12-68

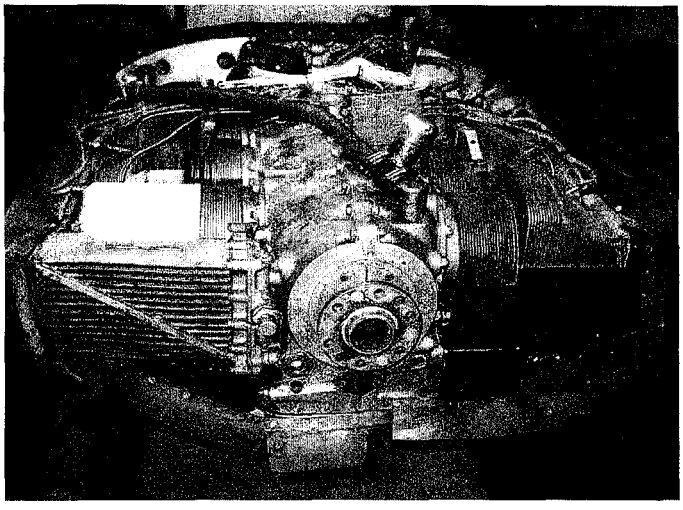
ENGINE HISTORY

Annual inspection completed 8-16-2011. Normal maintenance and service reported in the engine log book from time of installation.

EXTERNAL EXAMINATION

The engine exhibited impact damage concentrated at the bottom of the engine. The external surfaces of the engine were. The oil sump, exhaust runner on the both sides, induction tube cylinder 5, and the balance tube were replaced before the test run. All engine mount legs were replace to facilitate mounting to run stand.





Magneto to Engine Timing TCM Spec. -20° BTDC	Left Magneto: 20° BTDC	Right Magneto: 20° BTDC

The engine was not disassembled prior to the engine run.

The crankshaft end-play measured .011" and the crankshaft flange run-out was .032".

The engine was then prepared for operation by installing the appropriate thermocouples, pressure lines and test pads for monitoring purposes.

The engine was then moved to TCM test cell number 43 and mounted for operation.

The engine was fitted with a test club propeller for the IO470VO engine model.

DESCRIPTION OF OPERATIONAL TEST

The engine experienced a normal start on the first attempt without hesitation or stumbling in observed RPM. The engine RPM was advanced in steps for warm-up in preparation for full power operation. The engine throttle was advanced to 1200 RPM and held for five (5) minutes to stabilize. The engine throttle was advanced to 1600 RPM and held for five (5) minutes to stabilize. The engine throttle was advanced to 2450 RPM and held for five (5) minutes to stabilize. The engine throttle was advanced to full open position and held for five (5) minutes to stabilize. The engine throttle was rapidly advanced from idle to full throttle six times where it performed normally without any hesitation, stumbling or interruption in power.

Throughout the test phase, the engine accelerated normally without any hesitation, stumbling or interruption in power and demonstrated the ability to produce rated horsepower.

The engine operational test was limited due to the frontal impact that the engine had experienced and the uncertainty as to the extent of the internal damage resulting from the accident impact.

Engine Operational Test Log

Time		RPM	MP "Hg	Oil		Fuel				Cell	Cylinder Head Temperature °F					
Reading	Minutes			PSI	°F	Lbs/Hr	Nozzle PSI	Pump PSI	Fuel °F	°F	# 1	# 2	# 3	# 4	# 5	# 6
1	5	1200	15	54	94	29.6	5.1	10.9	73	69	218	220	220	200	227	185
2	5	1600	18.5	57	134	45.6	6.2	14.6	73	70	263	258	268	236	264	215
3	5	2100	24.0	50	159	81.6	9.4	20.0	73	70	324	245	342	267	317	236
4	5	2450	26.5	46	175	110.6	13.7	26.3	80	71	347	379	355	332	355	255
5	5	F/T	28.8	42	187	130.0	17.5	28.0	82	71	366	390	366	351	355	260
6	5	Idle	16.2	20	163	17.4	4.5	8.1	77	72	215	248	207	210	188	168

Ambient Air Temperature °F	Ambient Air Pressure	Transfer Collar Δ P		Maximum Rated Power Engine Operational Parameters				
		In	Out	RPM	" Hg MP	Fuel Flow Lbs/Hr	Metered PSI	Unmetered PSI
73.1	30.19	41	40	2625	N/A	130	17.5	28.0

Notes: Operator – Johnny Little, 30524. Transfer collar pressure delta measured at full throttle power setting.

Engine Performance Test				
Test RPM	Left Magneto RPM	Left Magneto RPM Drop	Right Magneto RPM	Right Magneto RPM Drop
2100	2004	96	1964	136

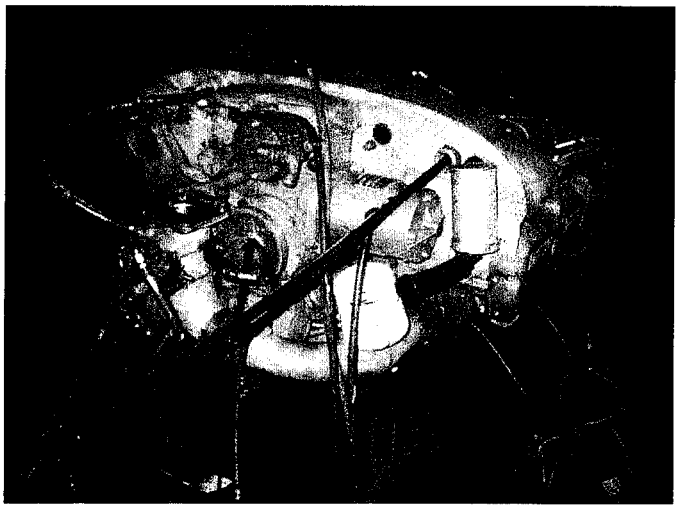
A post engine test cylinder leakage test was performed in accordance with the latest revision of TCM Service Bulletin SB03-3 on each cylinder with the engine hot. The results are as follows:
Master orifice reading – 39 PSI

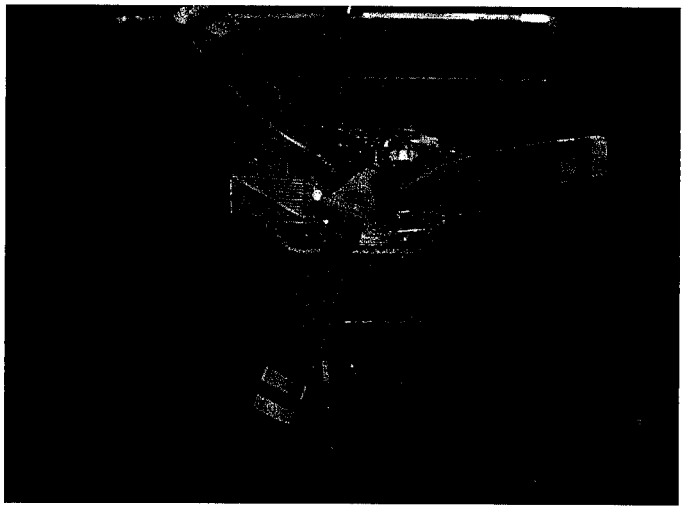
Cylinder #1 - 61/80 PSI (rings)
Cylinder #2 - 65/80 PSI (rings)
Cylinder #3 - 68/80 PSI (rings)
Cylinder #4 - 70/80 PSI (rings)
Cylinder #5 - 69/80 PSI (rings)
Cylinder #6 - 70/80 PSI (rings)

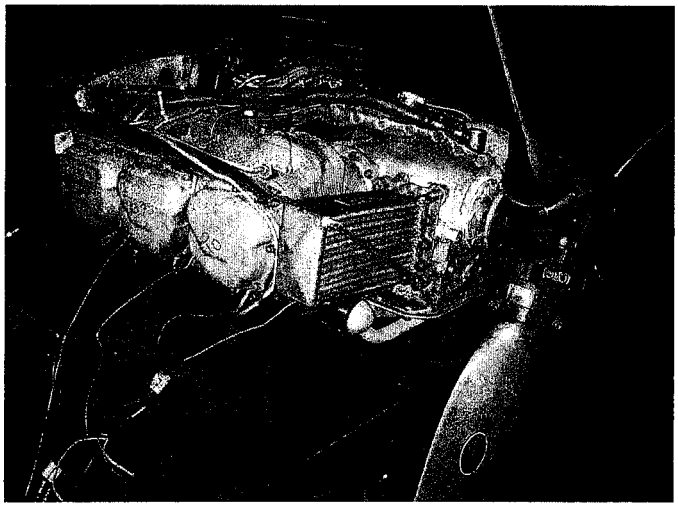
(*) – Leakage Source

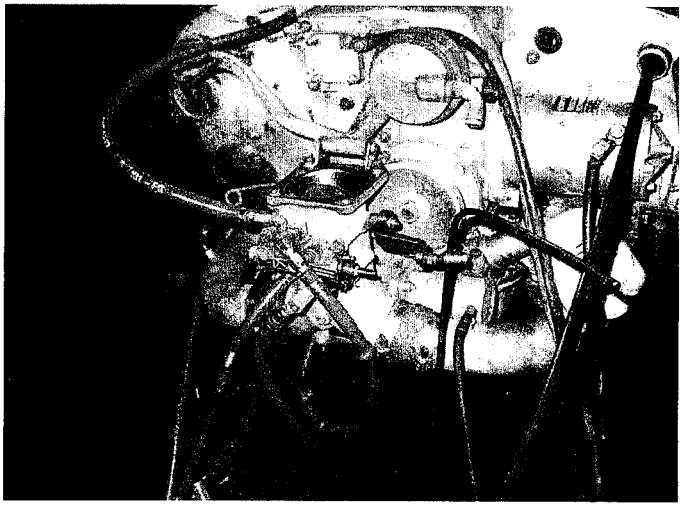
ENGINE OPERATIONAL TEST CONCLUSION

The operation of this engine was normal and did not reveal any abnormalities that would have prevented normal operation and production of rated horsepower.

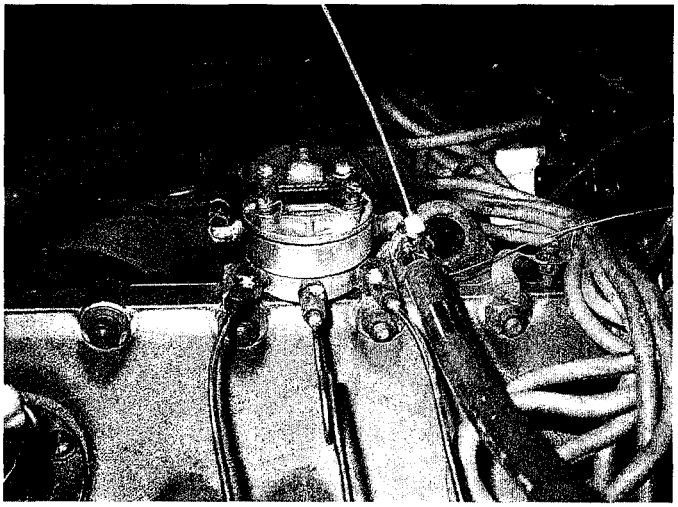


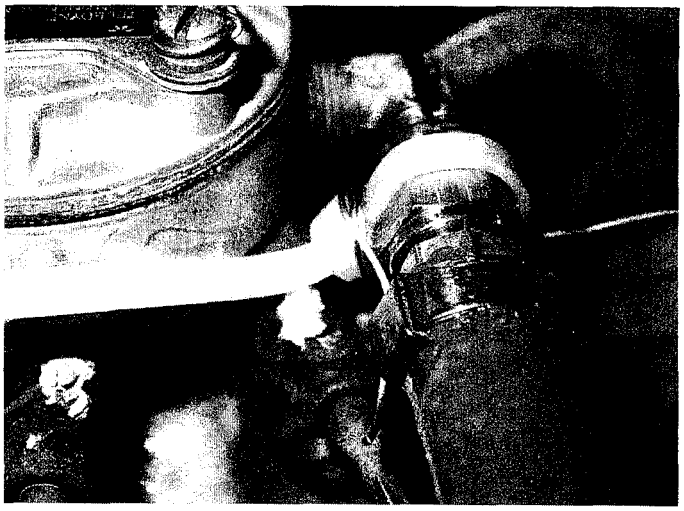






At the request of the NTSB this right engine was tested in a similar manner as the left engine from this aircraft. After completion of the engine test run the fuel line was set at finger tight torque. A wire was attached to loosen the hose during the engine run. Engine was set at full throttle and the fitting loosen to slightly over ¼ turn. When the hose was loosened the engine lost power and shut down.





ENGINE DISPOSITION

The engine was shipped to the following address per the NTSB IIC upon the completion of the operational test:

Gulf Coast aircraft Recovery

[redacted]

Baton Rouge, La. 70815