

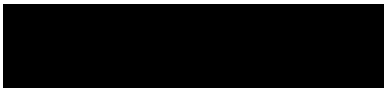


Continental Motors

ENGINE RUN REPORT

N6860W

ENGINE MODEL	TSIO-520-UB (12B)
ENGINE SERIAL NUMBER	809452
AIRCRAFT MAKE & MODEL	Beechcraft B-36TC Bonanza
AIRCRAFT SERIAL NUMBER	EA-411
AIRCRAFT REGISTRATION	N6860W
FILE NUMBER	18-125

NAME	SIGNATURE	DATE
Mike Council		03-13-2019
NAME	SIGNATURE	DATE
Phillip Grice		03-13-2019

ENGINE RUN REPORT

FILE NUMBER:

18-125

ENGINE S/N:

809452

PAGE 2 of 12

GENERAL INFORMATION

EXAMINATION		ACCIDENT DATA	
DATE	3-11-2019	NTSB ACCIDENT #	CEN18LA340
FACILITY	Mobile Alabama	NTSB INVESTIGATOR	Arnold Scott, NTSB IIC Non-Traveling
ADDRESS	[REDACTED] Mobile, Alabama 36615	FAA INVESTIGATOR	Ronald Jacobs, Houston FSDO-Non-Traveling. Joel Clark, Birmingham FSDO Inspector
		ACCIDENT DATE	08/20/2018
		ACCIDENT LOCATION	La Porte, Texas

ENGINE INFORMATION

ENGINE POSITION	Single
TOTAL TIME	1534.8 (calculated)
TIME SOH TOP OVERHAUL	NA-Factory rebuilt engine 6 Superior Cylinders installed 2-17-2017 at engine time 1260.2
TYPE & TIME SLI	100-hour inspection dated 3-23-2018, total engine time 1289.9 Hobbs time at accident site: 1428. Time since last 100-hour inspection, 138.2 hours.
BUILD DATE	2-28-2004
IN SERVICE DATE	4-7-2004

Significant logbook information:

- 1) 100-hour inspection of the engine dated 5-10-2006, Hobbs 49.7 included:
"Duct torn from intercooler to relief valve, installed new duct from intercooler to wastegate, ran and ops check good".
- 2) 100-hour inspection of engine dated 2-17-2017, Hobbs 1262.2 included: *"Removed all cylinders due to low compression and replaced all 6 cylinders with new complete Superior model SA-52006-A22P power assembly cylinders".*
- 3) Engine logbook entry 10-10-2005 *"Removed original Hobbs Meter 'Inop' hobbs time 1979.5".*
10-11-2005 *"Installed New Hobbs P/N 81092A- recording time 0. Engine time 106.8 hours.*

NOTE: The engine logbook excerpts furnished by the pilot/owner's insurance company did not include logbook entries prior to 4-26-2005. However, the aircraft FAA Airworthiness file for N6860W included a form 337 which approved the installation of a Merlyn Intercooler device IAW STC #SE3654NM dated 2-21-1992.

ENGINE RUN REPORT			
FILE NUMBER:	18-125	ENGINE S/N:	809452
			PAGE 3 of 12

Report Summary:	Search Code(s):	15-12-68
Examination of the engine was performed by the CMI Investigator under supervision of the FAA Inspector designated by the NTSB IIC. 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 be returned to Tri-Star Aviation, LaPorte, TX at the request of the NTSB IIC. See shipper AD01142 dated 3-13-2019		

ENGINE RUN REPORT**FILE NUMBER:**

18-125

ENGINE S/N:

809452

PAGE 4 of 12**INSPECTION WITNESSES**

NAME	Phillip Grice	NAME	Randy Bryant
ADDRESS	Mobile Alabama	ADDRESS	Mobile Alabama
ORGANIZATION	Continental Motors	ORGANIZATION	Continental Motors
PHONE	██████████	PHONE	██████████
NAME	Lisa Jersild	NAME	Mike Council
ADDRESS	Mobile Alabama	ADDRESS	Mobile, Alabama
ORGANIZATION	Continental Motors	ORGANIZATION	Continental Motors
PHONE	██████████	PHONE	██████████
NAME	Joel Clark	NAME	NA
ADDRESS	Birmingham, Alabama FSDO	ADDRESS	
ORGANIZATION	FAA	ORGANIZATION	
PHONE	██████████	PHONE	

EXTERNAL INSPECTION OF ENGINE

The engine was received in a shipping crate supplied by Continental Motors. The shipping crate was opened in the presence of the FAA Inspector who was acting as Governmental oversight approved by the NTSB IIC. All four engine mounts were broken as a result of impact damage. The exhaust system was crushed on the right and left side. The forward induction balance tube was impact damaged. The number 6 bottom ignition lead was damaged. The turbo discharge hose to the aftermarket intercooler was torn with oil saturation on the torn surface. The additional turbo discharge hose from the intercooler to the overboost valve was torn with evidence of red RTV repairs near the tear. The check-valve on the turbo oil feed was broken. The oil inlet fitting was damaged at the wastegate controller.

Several items were shipped loose in the shipping container:

Intercooler, shroud, and damaged discharge ducts.

Turbocharger and mounting bracket.

Fuel throttle body.

Turbocharger overboost valve assembly.

The turbocharger/tailpipe v-band clamp was damaged and consistent with side-overload caused by corresponding impact forces on the tailpipe.

ENGINE RUN REPORT

FILE NUMBER:

18-125

ENGINE S/N:

809452

PAGE 5 of 12

Several exhaust flange nuts were missing:

Cylinder # 1- one nut was backed off approximately half way, three other nuts were tight.

Cylinder # 2- two exhaust nuts missing.

Cylinder # 4- three exhaust nuts missing.

Cylinder # 6- all four exhaust nuts missing.

Note: This condition may have been a result of the engine removal process after the accident.



ENGINE RUN REPORT

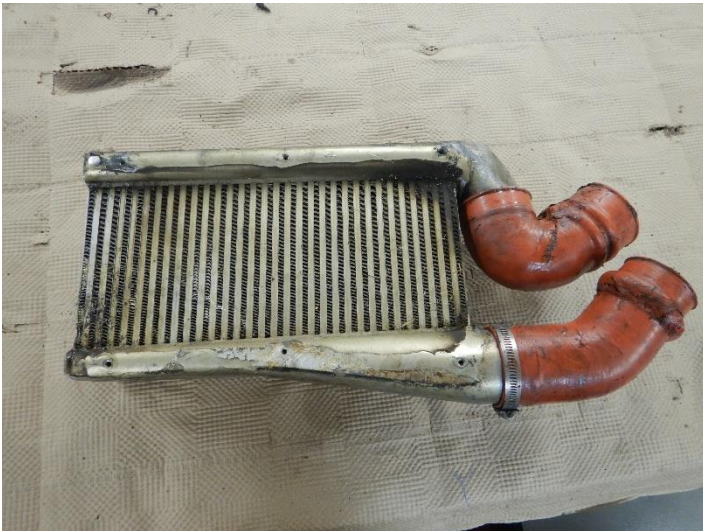
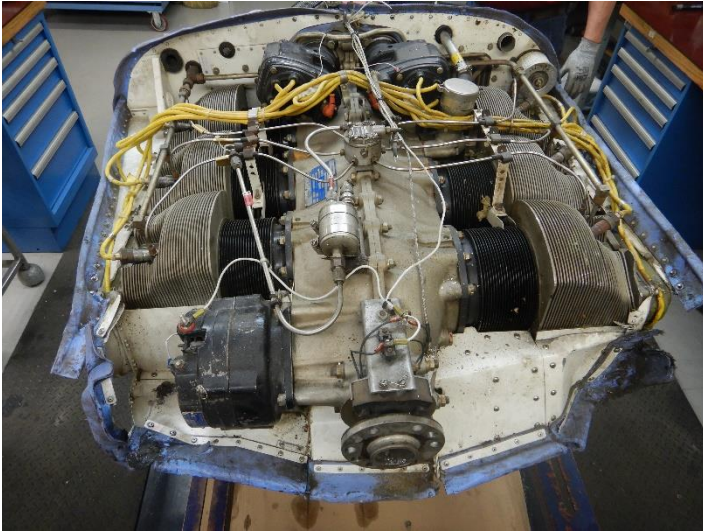
FILE NUMBER:

18-125

ENGINE S/N:

809452

PAGE 6 of 12



ENGINE RUN REPORT

FILE NUMBER:

18-125

ENGINE S/N:

809452

PAGE 7 of 12



ENGINE RUN REPORT

FILE NUMBER:

18-125

ENGINE S/N:

809452

PAGE 8 of 12

ENGINE PREPARATION PRIOR TO RUN

There were a number of airframe related items removed in preparation for operation on the CMI test bed.

Items removed:

Airframe cooling baffle system.

Fuel flow transmitter.

Propeller governor.

1 and # 2 Alternators.

Instrument air pump.

Turbo discharge inter-cooler and damaged hoses.

Propeller deice brush holder.

The following substitute or repaired parts were required for engine operation:

Induction forward balance tube.

Turbocharger compressor hoses.

Exhaust system.

Engine mounts.

Turbocharger oil-feed check valve.

The magneto-to-engine timing was checked and with the following results:

Magneto-to-Engine Timing (Specified):	Left Magneto:	Right Magneto:
22° BTDC	26° BTDC	28 °BTDC

A cylinder leakage test was performed prior to the test run in accordance with the latest revision of CMI Service Bulletin SB03-3 with the engine at room temperature with the following results (master orifice reading – 40 PSI):

Cylinder #1 - 24/80 PSI (exhaust valve/rings)

Cylinder #2 - 56/80 PSI (exhaust valve/rings)

Cylinder #3 - 7/80 PSI (exhaust valve/rings)

Cylinder #4 - 52/80 PSI (exhaust valve/rings)

Cylinder #5 - 19/80 PSI (exhaust valve/rings)

Cylinder #6 - 60/80 PSI (exhaust valve/rings)

(*) – Leakage Source

The engine was not disassembled prior to the engine run. The crankshaft end-play measured 012." and the run-out was 0.003". Deflection measured .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 CMI test cell number 43 and mounted for operation. The engine was fitted with a test club propeller for the TSIO520UB engine model.

ENGINE RUN REPORT

FILE NUMBER:

18-125

ENGINE S/N:

809452

PAGE 9 of 12

DESCRIPTION OF RUN

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 five 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 RUN REPORT

FILE NUMBER:

18-125

ENGINE S/N:

809452

PAGE 10 of 12



ENGINE RUN REPORT**FILE NUMBER:**

18-125

ENGINE S/N:

809452

PAGE 11 of 12

A cylinder leakage test was performed after the test run in accordance with the latest revision of CMI Service Bulletin SB03-3 with the engine hot with the following results (master orifice reading – 40 PSI):

Cylinder #1 - 69 / 80 PSI (rings)

Cylinder #2 - 63 / 80 PSI (rings)

Cylinder #3 - 70 / 80 PSI (rings)

Cylinder #4 - 66 / 80 PSI (rings)

Cylinder #5 - 68 / 80 PSI (rings)

Cylinder #6 - 63 / 80 PSI (rings)

(*) – Leakage Source

ENGINE RUN PARAMETERS

Time		RPM	MP / TDP " Hg	Oil		Fuel				Cell °F	Cylinder Head Temperature °F					
Reading	Minutes			PSI	°F	Lbs/Hr	Nozzle PSI	Pump PSI	Fuel °F		# 1	# 2	# 3	# 4	# 5	# 6
1	5	1200	15.93/30.20	66	74	23.26	4.17	9.7	66	70	332	288	297	249	272	199
2	5	1600	22.86/30.16	64	78	95.83	4.14	11.45	67	69	386	349	351	310	321	236
3	5	2100	30.68/30.33	65	85	118.66	8.53	14.85	67	70	445	373	399	341	363	267
4	5	2450	27.60/30.03	64	85	119.38	8.14	14.79	68	71	445	383	413	349	366	283
5	5	F/T 2680	35.00/30.72	69	89	186.34	14.75	29.16	68	72	451	375	410	353	360	287
6	5	Idle 836	15.32/30.13	24	79	13.72	4.37	8.23	67	73	344	321	296	228	240	142
Ambient Air Temperature °F		Ambient Air Pressure		Transfer Collar Δ P		Maximum Rated Power Engine Operational Parameters										
69.88		30.21		IN	OUT	RPM	" Hg MP	Fuel Flow Lbs/Hr	Metered PSI	Unmetered PSI						
				37	39	2700	36.0	195-205	14.4 – 16.0	33.0 – 37.0						

Notes: Operator – Lisa Jersild. Transfer collar pressure delta measured at full throttle power setting.

Engine Performance Test				
Test RPM	Left Magneto	Left Magneto	Right Magneto	Right Magneto
	RPM	RPM Drop	RPM	RPM Drop
2100	1769	331	2064	36

Note: Last run (6) was after replacement of slave induction tube for the test cell. Scat tubing used on 1 through 5 had a leak causing loss of turbo discharge pressure.