Aviation Investigation Final Report

Location:	Sidney, Ohio	**Accident Number:**	CHI07LA121
Date & Time:	April 16, 2007, 09:30 Local	**Registration:**	N3529H
Aircraft:	Mooney M20C	**Aircraft Damage:**	Substantial
Defining Event:		**Injuries:**	1 Minor
Flight Conducted Under:	Part 91: General aviation - Ferry		

Analysis

The pilot reported that shortly after takeoff, he noticed that the engine was "slowing down." While attempting to return to the airport, the engine came to a "complete and abrupt stop, as if it seized up." The airplane was about 500 feet above ground level when the pilot executed a forced landing to a field. He lowered the landing gear, but the field was soft and the airplane sustained substantial damage during the landing roll. The engine teardown inspection revealed that the damage to the engine components was consistent with oil starvation. The mechanic who conducted the annual maintenance inspection had not put oil, the oil filter, or the belly skins back on the airplane when he had signed the maintenance logbook indicating that the airplane was in an airworthy condition. The fixed base operator, who employed the mechanic, reported that he ran the engine without engine oil, but he did not notify the pilot that the engine had been run without oil.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The total loss of engine power during initial climb due to oil starvation as a result of improper maintenance. The fixed base operator's failure to advise the pilot that the engine had been operated without oil in the engine and soft terrain were factors.

Findings

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings
1. (C) MAINTENANCE,ANNUAL INSPECTION - IMPROPER - OTHER MAINTENANCE PERSONNEL
2. (F) OPERATION WITH KNOWN DEFICIENCIES IN EQUIPMENT - NOT ADVISED - COMPANY/OPERATOR MANAGEMENT
3. (C) FLUID,OIL - STARVATION/EXHAUSTION

Occurrence #2: FORCED LANDING
Phase of Operation: EMERGENCY DESCENT/LANDING

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: EMERGENCY DESCENT/LANDING

Findings
4. (F) TERRAIN CONDITION - SOFT
5. TERRAIN CONDITION - GROUND

Factual Information

On April 16, 2007, at 0930 eastern daylight time, a Mooney M20C, N3529H, sustained substantial damage during a forced landing to a field about two miles west of Sidney Municipal Airport (I12), Sidney, Ohio, following a loss of engine power during the take-off climb. The commercial pilot, the only occupant, received minor injuries. The 14 CFR Part 91 ferry flight departed I12 with Stellar Airpark (P19), Chandler, Arizona, as the intended destination. Visual meteorological conditions prevailed at the time of the accident. No flight plan was filed.

The pilot reported he was ferrying the airplane to the new owner in Arizona. He reported that he had aborted the first takeoff because the "aircraft didn't seem to be accelerating as I thought it should." He thought that he might have been riding too high on the rudder pedals thereby applying pressure to the brakes that had been replaced during the recent annual maintenance inspection. He performed another engine run-up and cycled the propeller to make sure everything was operating properly prior to the second takeoff attempt.

He reported that during the takeoff climb he noticed that the engine was "slowing down." He checked all the gauges and everything seemed normal, but the engine continued to lose power. While attempting to return to the airport, the engine came to a "complete and abrupt stop, as if it seized up." The airplane was about 500 feet above ground level when the pilot executed a forced landing to a green field. He lowered the landing gear, but the field was soft and the airplane sustained substantial damage during the landing roll.

A Federal Aviation Administration (FAA) airworthiness inspector examined the aircraft after it had been relocated to a hangar located at I12. The visual inspection revealed that the airplane had sustained substantial damage. Continuity was established from the cockpit to the flight controls. Fuel was present in the wing fuel tanks and fuel strainer. The propeller and propeller flange was separated from the crankshaft. The oil sample taken from the oil sump and oil cooler was dark and had a burnt odor. The oil level indicated on the dipstick was 7.5 quarts. The tachometer time indicated 1,400.60 hours.

The aircraft wreckage was transported to the Highland County Airport (HOC), Hillsboro, Ohio, for storage and engine examination. An engine teardown inspection with the FAA airworthiness inspector present was performed on May 2 and May 7, 2007. The inspection revealed that the engine was unable to be rotated due to the broken crankshaft. The oil filter was removed and cut open. The filter was contaminated with ferrous and non-ferrous particles. The oil suction screen was removed and it was found about 75 per cent full of ferrous and non-ferrous metal pieces. The oil sump was removed and it contained a large quantity of metal in the bottom of the sump.

The cylinders were removed from the case. The connecting rods were loose on the

crankshaft. The connecting rods were removed. The connecting rod bearings on cylinders 2, 3, and 4 were melted and the remains were found on the crankshaft. The connecting rod bearing on cylinder 1 was melted and the extruded remains were found attached to the connecting rod.

The pistons were removed from the connecting rods. All four pistons exhibited severe scoring damage. The pistons contained imbedded metal in the sidewalls and metal particles were found in the underside of the piston skirt.

The accessory case was removed and the oil pump was examined. The oil pump contained small metal particles and was intact. The oil pump gears did not show signs of failure. The oil pump body showed signs of overheating (melted aluminum) on the boss that accepts the oil pump drive shaft.

The engine case halves were split and the case, crankshaft, and camshaft were examined. The center camshaft bearing area had scoring and overheating damage. The center crankshaft bearing had abrasion and scoring damage.

The crankshaft was fractured aft of the propeller flange. The crankshaft propeller flange was still attached to the propeller. The fracture was consistent with an overstress bending fracture without evidence of torsion.

The aircraft logbooks indicated that the last annual inspection conducted on the airplane was completed on April 5, 2007. The aircraft time written in the "Recording Tach Time" column of the airframe and engine logbooks had been changed from 1,435 to 1,389. The engine logbook stated the following:

"Drained oil & removed oil filter. Serviced w 8 qts Aeroshell 15W50. Removed spark plugs. Ran compression check #1 74/80 #2 74/80 #3 72/80 #4 76/80. Installed new spark plugs. Lubed controls. Cleaned fuel screens. Checked lines & hoses. Test ran checked for leaks None found Checked AD's to date. Reinstalled cowling. I certify that this engine has been inspected I/A/W Annual Inspection and was determined to be in airworthy condition. [Name of A&P]"

In a written statement, the airframe and powerplant (A&P) and inspection authorized (IA) mechanic who performed the annual inspection reported the following information to the FAA inspector:

1. The oil was drained. The oil filter was removed and cut open. No noticeable debris was found.

2. The spark plugs were replaced with new plugs.

3. A compression check was completed and the timing was checked.

4. "All normal things needed for [an] annual were done."

The A&P/IA stated that the fixed base operator who employed him needed him to make the logbook entries. The A&P/IA stated, "I not very willingly went ahead and made logbook entrys [sic] for him. At this time the belly panel cowling, oil filter, and oil was not installed. [The fixed base operator] told me that he needed to take the aircraft to the paint shop on the other side of the airport for paint and to install oil & filter & cowling. I had other planes that he wanted me to work on. They were finished without any problems. I shortly after within a day or two moved to Gainesville, GA. That was the last time I seen the aircraft or talked to [the fixed base operator]. Whatever happened after that I had no control of."

In a written statement, a witness reported that two or three day's before the accident he was at the airport and observed the fixed base operator putting safety wire on the oil filter of the accident airplane. There was oil all over the ground and the airplane. The witness asked what had happened, and the fixed base operator told him that he had bought the airplane and resold it to someone, and that the A&P/IA had performed the annual maintenance inspection on the airplane. The fixed base operator said that he was doing a run up on the airplane, but it had no oil PSI indication. He checked the oil level using the dipstick and discovered there was no oil, so he added eight quarts of oil to the airplane and ran it again. He stated that there was still no oil PSI indication. He told the witness that there was no oil filter on the airplane, and that's where all the oil had came from. The witness reported that the accident pilot arrived and asked the fixed base operator when was he going to deliver the airplane. The accident pilot also saw the oil and asked the fixed base operator what it was from. The fixed base operator told him that he had changed the oil and that the wind had blown it all over and that the airplane was fine. The witness reported that he left the airport at that time.

The National Transportation Safety Board (NTSB) investigator in charge (IIC) conducted a telephone interview with the fixed base operator concerning the accident of N3529H. The fixed base operator reported that he had run the engine without oil in the engine. He reported that the annual maintenance inspection had been completed on the airplane about two weeks prior, and it was about 3 - 4 days before the accident flight. He reported that he wanted to make sure that the battery was okay, so he started the airplane. He ran the airplane for about 1 - 1.5 minutes before he shut the engine off. He recognized that there was no oil pressure so he immediately shut the engine down. He checked the oil dipstick and there was no oil showing on the dipstick. He put oil in the engine and did another engine run. He reported that the engine oil gauge was in the green arc. After he shut the engine down, he saw oil on the ground. He discovered there was no oil filter installed on the engine. He installed an oil filter and then put a quart of oil in it. He reported that he restarted the engine and ran it for about 2 - 3 minutes and it ran fine with a good oil pressure indication.

The fixed base operator reported that he discussed that the engine had been run without oil with a self-employed IA mechanic the morning after the engine had been run without oil. He reported that the IA thought that the engine should be fine.

In a telephone interview with the NTSB IIC, the IA reported that he did not discuss the engine being run without oil until after the accident had occurred, and not prior to the accident occurring. The IA reported that the fixed base operator had told him that he ran the engine and found it did not have oil in it. He put oil in it, but then found there was no oil filter on it. The IA said the fixed base operator had asked him, "if it would hurt if the engine was started for a few seconds at low RPM's." The IA stated, "for a few seconds it probably wouldn't hurt, but who knows how long it had been run?" He stated, "[The fixed base operator] didn't say a word to me before the accident. He absolutely did not ask me about that before the accident. It was about an hour after the accident that I talked to [him]."

In a telephone interview with the NTSB IIC, the pilot reported that the fixed base operator never told him that the engine had been run without oil.

Pilot Information

Certificate:	Commercial; Private	**Age:**	63,Male
Airplane Rating(s):	Single-engine land; Multi-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 2 With waivers/limitations	**Last FAA Medical Exam:**	August 1, 2005
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 1, 2006
Flight Time:	3360 hours (Total, all aircraft), 110 hours (Total, this make and model), 3255 hours (Pilot In Command, all aircraft), 37 hours (Last 90 days, all aircraft), 23 hours (Last 30 days, all aircraft), 0 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Mooney	**Registration:**	N3529H
Model/Series:	M20C	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	20-1224
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	March 1, 2007 Annual	**Certified Max Gross Wt.:**	2575 lbs
Time Since Last Inspection:		**Engines:**	1 Reciprocating
Airframe Total Time:	1400 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	Installed, not activated	**Engine Model/Series:**	O-360-A1D
Registered Owner:	On file	**Rated Power:**	180 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	DAY,1009 ft msl	**Distance from Accident Site:**	21 Nautical Miles
Observation Time:	09:56 Local	**Direction from Accident Site:**	189°
Lowest Cloud Condition:	Clear	**Visibility**	10 miles
Lowest Ceiling:	None	**Visibility (RVR):**	
Wind Speed/Gusts:	20 knots / 25 knots	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	310°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	29.94 inches Hg	**Temperature/Dew Point:**	6°C / -4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	Sidney , OH (I12)	**Type of Flight Plan Filed:**	None
Destination:	Chandler, AZ (P19)	**Type of Clearance:**	None
Departure Time:	09:25 Local	**Type of Airspace:**	

Airport Information

Airport:	Sidney Municipal Airport I12	**Runway Surface Type:**	Grass/turf
Airport Elevation:	1044 ft msl	**Runway Surface Condition:**	
Runway Used:		**IFR Approach:**	None
Runway Length/Width:		**VFR Approach/Landing:**	Forced landing

Wreckage and Impact Information

Crew Injuries:	1 Minor	**Aircraft Damage:**	Substantial
Passenger Injuries:		**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Minor	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	Silliman, James
Additional Participating Persons:	Robert Holdridge; FAA Columbus FSDO; Columbus, OH
Original Publish Date:	February 28, 2008
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=65744