



National Transportation Safety Board Aviation Accident Final Report

Location:	Lakeland, FL	Accident Number:	ERA15FA191
Date & Time:	04/20/2015, 1440 EDT	Registration:	N608MR
Aircraft:	MOONEY M20TN	Aircraft Damage:	Substantial
Defining Event:	Loss of engine power (total)	Injuries:	1 Serious
Flight Conducted Under:	Part 91: General Aviation - Personal		

Analysis

The commercial pilot fueled the airplane with 20 gallons of fuel before departing on the 1-hour cross-country flight. While on final approach to the destination airport, the pilot advanced the throttle lever; however, the engine did not respond. The pilot attempted to restore engine power but was unsuccessful and subsequently conducted a forced landing to a small clearing. The airplane impacted terrain, trees, and a gate before coming to rest about 1 mile short of the runway and was largely consumed by postcrash fire.

Based on the minimal rotational damage to the propeller and propeller assembly, it is likely that the airplane experienced a total loss of engine power before impact. Due to the significant postcrash fire it was unlikely that the loss of engine power was the result of fuel exhaustion.

Postaccident examination of the airframe and engine, including the fuel and ignition systems, revealed no evidence of mechanical malfunctions or abnormalities that would have precluded normal operation. Although functional testing of the engine-driven fuel pump and the throttle body was precluded due to thermal damage, disassembly of the units revealed no anomalies.

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 for reasons that could not be determined due to thermal damage and because postaccident examination of the engine revealed no anomalies that would have precluded normal operation.

Findings

Not determined

Not determined - Unknown/Not determined (Cause)

Factual Information

History of Flight

Approach-IFR final approach	Loss of engine power (total) (Defining event)
Emergency descent	Off-field or emergency landing
Landing	Collision with terr/obj (non-CFIT)
Post-impact	Fire/smoke (post-impact)

On April 20, 2015, about 1440 eastern daylight time, a Mooney M20TN, N608MR, was substantially damaged during a forced landing following a total loss of engine power on approach to Lakeland Linder Regional Airport (LAL), Lakeland, Florida. The commercial pilot was seriously injured. The airplane was owned by Premier Aircraft Sales, LLC, and operated by the pilot under the provisions of 14 Code of Federal Regulations Part 91 as a personal flight. Day visual meteorological conditions prevailed in the area, and an instrument rules flight plan was filed for the flight, which departed from Stuart Airport (SUA), Stuart, Florida about 1340, with the intended destination of LAL.

In a written statement, the pilot stated that the airplane was on final approach with the landing gear and flaps extended, and that the engine's manifold pressure was indicating about 12 inches. As he advanced the throttle, the engine did not respond. The pilot attempted to troubleshoot the problem to restore engine power but was unsuccessful and subsequently conducted a forced landing to a clearing. The airplane impacted terrain, trees, and a gate about 6,000 ft from the runway 27 threshold at LAL; the forward fuselage, including the cockpit area, was consumed by a postcrash fire.

A fuel receipt indicated that, on the morning of the accident, the airplane was fueled with 20 gallons of 100LL aviation fuel before departure from SUA.

Pilot Information

Certificate:	Commercial; Private	Age:	55, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	Seat Occupied:	Left
Other Aircraft Rating(s):	Glider	Restraint Used:	3-point
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 3 With Waivers/Limitations	Last FAA Medical Exam:	05/01/2013
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	05/01/2014
Flight Time:	5735.4 hours (Total, all aircraft), 32.7 hours (Last 90 days, all aircraft), 12.4 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

According to Federal Aviation Administration (FAA) records, the pilot held a commercial pilot certificate issued August 25, 2003, with ratings for airplane single-engine land, multiengine land, and instrument airplane; and a private pilot certificate with a rating for glider. He held a third-class FAA medical certificate, which was issued in May 2013, with the restriction, "must have available glasses for near vision." His most recent flight review was conducted in May 2014. According to the pilot's logbook, he had 5,735.4 total hours of flight experience, of which 32.7 hours were in the 90 days preceding the accident, and 12.4 hours were in the 30 days preceding the accident.

Aircraft and Owner/Operator Information

Aircraft Make:	MOONEY	Registration:	N608MR
Model/Series:	M20TN	Aircraft Category:	Airplane
Year of Manufacture:	2015	Amateur Built:	No
Airworthiness Certificate:	Normal	Serial Number:	31-0132
Landing Gear Type:	Retractable - Tricycle	Seats:	4
Date/Type of Last Inspection:		Certified Max Gross Wt.:	3369 lbs
Time Since Last Inspection:		Engines:	1 Reciprocating
Airframe Total Time:		Engine Manufacturer:	Continental
ELT:	C126 installed, activated, did not aid in locating accident	Engine Model/Series:	TSIO-550-G
Registered Owner:	PREMIER AIRCRAFT SALES INC	Rated Power:	hp
Operator:	On file	Operating Certificate(s) Held:	None

According to FAA records, the airplane, serial number 31-0132, was issued an airworthiness certificate on March 2, 2015. It was powered by a Continental Motors TSIO-550-G5B, 310 hp reciprocating engine, serial number 1010446, which drove a Hartzell PHC-J3YF-1RF three-blade-model F7498 propeller. The airplane was new and had not yet received a 100-hour or annual inspection; however, it had undergone a new airplane inspection as required by the manufacturer.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	KLAL, 142 ft msl	Distance from Accident Site:	3 Nautical Miles
Observation Time:	1433 EDT	Direction from Accident Site:	277°
Lowest Cloud Condition:	Scattered / 1600 ft agl	Visibility	5 Miles
Lowest Ceiling:	Overcast / 2600 ft agl	Visibility (RVR):	
Wind Speed/Gusts:	8 knots /	Turbulence Type Forecast/Actual:	/ None
Wind Direction:	280°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.88 inches Hg	Temperature/Dew Point:	22° C / 19° C
Precipitation and Obscuration:	Light - Thunderstorms - Rain; No Obscuration		
Departure Point:	STUART, FL (SUA)	Type of Flight Plan Filed:	IFR
Destination:	Lakeland, FL (LAL)	Type of Clearance:	IFR
Departure Time:	1340 EDT	Type of Airspace:	Class D

The 1433 recorded weather observation at LAL included wind from 280° at 8 knots, visibility 5 miles, thunderstorms and light rain, scattered clouds at 1,600 ft above ground level (agl), overcast clouds at 2,600 ft agl, temperature 22°C, dew point 19°C, and an altimeter setting of 29.88 inches of mercury.

The 1450 recorded weather observation at LAL included wind from 360° at 6 knots, visibility 10 miles, thunderstorms and light rain, scattered clouds at 1,600 ft agl, overcast clouds at 3,300 ft agl, temperature 22°C, dew point 21°C, and an altimeter setting of 29.89 inches of mercury.

Airport Information

Airport:	LAKELAND LINDER RGNL (LAL)	Runway Surface Type:	Asphalt
Airport Elevation:	142 ft	Runway Surface Condition:	Dry
Runway Used:	27	IFR Approach:	RNAV; Visual
Runway Length/Width:	8499 ft / 150 ft	VFR Approach/Landing:	Forced Landing

Wreckage and Impact Information

Crew Injuries:	1 Serious	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	On-Ground
Total Injuries:	1 Serious	Latitude, Longitude:	27.993056, -81.989167

The airplane wreckage was moved before the investigative team's arrival; however, photographs revealed that the airplane was engulfed in flames shortly after impact. A video taken by the pilot immediately after he exited the airplane showed fire beginning predominantly forward of the wings but engulfing the wings within a few seconds of the start of the recording.

The initial impact point was indicated by three tire markings in the grass, corresponding to each of the airplane's three landing gear, which extended about 20 ft. The tire marks ended, and the airplane subsequently impacted a palm tree about 5 ft agl, then a 15-ft-tall archway over an entrance gate before impacting another tree and the ground. The debris path extended about 200 ft on a heading about 060° from the initial impact point, and the airplane came to rest on a heading about 260°.

The forward fuselage exhibited extensive thermal damage. The empennage was intact and not affected by the postcrash fire. The engine remained attached to its mounts and the firewall; however, all of the mounts displayed varying degrees of impact damage.

The propeller remained attached to the crankshaft flange and the propeller spinner was secured to the hub. The spinner exhibited no rotational scoring or signature marks around its circumference. The three propeller blades remained attached to the hub. One blade exhibited leading edge gouging, one blade tip was bent aft, and the other blade exhibited chordwise scratching and was bent aft about midspan.

Engine Observations

Examination of the engine revealed extensive thermal damage to the rear accessory pad and

top of the engine. The turbo controller was not observed and was presumed to be destroyed by the postimpact fire. The No. 5 cylinder exhibited impact damage on the cooling fins. All spark plug leads remained attached to their respective plugs and to their respective magnetos. The fuel injector lines remained attached. Portions of the lubrication line system were thermally destroyed. No external anomalies were noted.

The crankshaft was rotated by hand at the propeller flange, and thumb compression was obtained on all cylinders except No. 5 as a result of impact damage that restricted movement of the valves. Crankshaft continuity was observed from the propeller flange aft to the crankshaft gear bolts and the accessory end. Camshaft continuity was also confirmed. Removal of the oil pump housing cap revealed that the oil pump gears were intact with no signs of hard particle passage throughout the housing. The oil filter was in place and safety-tied. The oil filter was removed and cut open for examination. The filter element was thermally damaged but otherwise unremarkable.

The engine oil dipstick was present; the oil level was about 7 quarts, within the normal operating range, and the oil appeared normal in color and was free of contaminants. The propeller governor remained attached to the front side of the engine, and the cable remained secured and attached to the propeller lever.

Ignition System

The ignition wiring was thermally destroyed. The magnetos were secure on their mounting pads. The pressurization lines to the magnetos were secured in place but were destroyed by fire. The ignition harness was destroyed; however, the terminal leads to the sparkplugs were secured and in place. All spark plugs were secured and in place. The top spark plugs were removed and the cylinders were inspected with a borescope. All cylinders appeared normal in color and no abnormalities were noted within the cylinder barrels, intake valves, or exhaust valves. The sparkplugs appeared to be in new condition with little-to-no combustion deposits on the electrodes or insulators. During crankshaft rotation, the magneto impulse couplings were audibly observed. Removal of the vent plug on each magneto revealed the distributor gears were intact and the left magneto showed signs of thermal distress. The magnetos were removed for further testing. The shafts and gear rotated freely by hand. Removal of the ignition harness from the distributor towers did not show any signs of arcing or cracking.

Turbocharger System

The left and right turbochargers were manufactured by Hartzell. The slope control was not located during the examination and was presumed to have been destroyed by postcrash fire. The manifold pressure, upperdeck, and oil lines remained in the area of the slope controller. The wastegate actuator lines were secured to their respective locations. The wastegate actuator operated as intended with no anomalies noted when compressed air was applied. No foreign object debris-related damage was noted on either turbocharger's impeller, and the impellers could be rotated by hand. The oil lines to and from both turbocharger bearings were intact and secured to their respective fittings.

Engine Fuel System

The supply line to the fuel pump was attached and secured to the inlet. The inlet, outlet, and vapor return lines were attached and finger-tight, with numerous threads engaged. The upper-deck reference was also secured to the fuel pump. The mixture control remained attached to the mixture lever and the lever remained secured to the mixture shaft, at the full-rich position, as found. The engine-driven fuel pump remained attached and secure and the drive coupling was intact. The housing bolts were intact and safety-wired; however, there was considerable thermal distortion of the housing.

The throttle body was intact and attached to the intake plenum, and the throttle control cable was attached to the throttle lever, which was attached to the throttle shaft. There were no signs of binding. The manifold pressure lines and upper-deck pressure lines remained secured to the throttle body. The inlet fuel line and the fuel line from the fuel metering unit to the manifold valve were secured.

The fuel manifold valve was in place and sustained thermal damage; all fuel injector lines remained attached to the fuel manifold valve. The fuel injection lines remained secured to their respective fuel injection nozzles. The upperdeck reference lines were in place around the fuel injection nozzles. All fuel injection nozzles were free of debris.

The fuel selector valve was found in the left tank position and the fuel gascolator stem was down. The selector valve was removed and air was blown through the engine line; the valve operated normally through all settings. The fuel supply lines remained attached to the firewall. The fitting on the inlet and outlet lines to the boost pumps remained secured and in place. The electrical wiring was thermally destroyed. The engine controls were located, and the throttle and mixture levers were in the full forward position. The gascolator was removed and exhibited extensive thermal damage. The unit was disassembled and the screen was unobstructed.

Right Wing

The right wing exhibited impact crush damage and thermal damage outboard of the landing gear well. The flap was impact separated and segmented into two pieces, and the thermal damage extended from the root outboard to 70 inches from the wing tip. The aileron remained attached at its attach points. The pushrod that connected the aileron bellcrank to the aileron was not located; however, the fracture ends displayed soot damage on the fracture surface. The fuel cap was not located. The fuel system vent tube remained in the wing and the area around the vent tube was thermally damaged. Compressed air was applied to the vent tube and air was noted exiting the vent tube system into the fuel tank. The fuel tank was compromised and destroyed by postcrash fire. The landing gear remained attached, was observed in the extended position, and was thermally damaged.

Left Wing

The left wing was separated into three sections. The outboard section began at the inboard hinge of the aileron and extended to the wing tip. The segment was devoid of thermal damage, was impact-damaged, and the aileron remained attached. The middle section was cut during recovery and exhibited minimal thermal damage, mostly on the inboard portion of the section.

The middle section also contained the fuel cap, which was found secure and in place, and the fuel vent, which was bent approximately 15° about 5 inches from one end. The vent tube was removed from the fuel tank fitting. Air was applied to one end of the tube; however, air flow through the tube was restricted. A light was attached to one end and light was visible from the other end of the tube. No debris was observed exiting the tube when air was applied. The inboard section of the wing was about 5 ft in length, was thermally damaged, and remained attached to the fuselage; however, it was cut to facilitate transport. The fuel tank was destroyed by postcrash fire. The main landing gear was detached at the top of the gear strut and, according to recovery personnel, was located along the debris path. The landing gear did not exhibit any thermal damage. The flap was separated into two sections and appeared to have been cut for transport. The speed brake remained attached and was found in the retracted position.

Cockpit

The cockpit exhibited extensive thermal damage. The flight control column was destroyed; however, elevator continuity was observed from the area near the control column to the elevator. Aileron continuity was observed from the area near the control column to the fracture points along the segmented sections of the aileron tube. The cockpit and seats exhibited extensive thermal damage. The front seats were equipped with AMSafe inflatable seatbelts; however, the pilot did not recall the seat belts inflating. The bruising on the pilot's torso was consistent with an uninflated shoulder harness. The squibs for the AMSafe system seatbelt and shoulder harness were located and were thermally damaged. The buckles were not located for the front seats. The seats were co-located with their attach points; however, the seats were not securely attached due to thermal damage.

Empennage

The empennage aft of the cargo compartment was intact and exhibited no thermal damage. Measurement of the flap barrel indicated that the wing flaps were in the fully extended position. The elevator trim measured 1.75 inches, which correlated to a slightly nose-up trim setting. The right and left horizontal stabilizers remained attached at their respective attach points. The right horizontal exhibited minor crushing at the leading edge root. The left horizontal stabilizer counterweight was not located. Rudder continuity was confirmed from the rudder to the rudder pedals and to the nosewheel steering.

Additional Information

Throttle and Mixture Cable

The as found positions of the throttle and mixture cable were noted at the accident site. The cables and their respective assemblies were then sent to the NTSB Materials Laboratory in Washington, D.C. for further examination. Both control assemblies exhibited significant heat

damage; however, no pre-existing binding or obstruction to operation was observed on either of the controls. The throttle cable position was measured at 3.75 inches, which correlated to 74% open. According to the airplane manufacturer, the full-closed (idle) position would measure 1.3 inches, and the full (open)-throttle position would measure 4.620 inches. The mixture cable position measured 6.70 inches, about 57% rich. According to the manufacturer, the full idle-cutoff position would measure 5.35 inches, and the full-rich mixture position would measure 7.70 inches. The throttle control cable could not be easily moved, likely due to heat damage to the liner. The mixture control release rod was bent and unable to be moved, likely due to thermal damage.

Magnetos and Fuel System Component Examination

The ignition and fuel system components were examined at the manufacturer's facility under NTSB oversight. The magnetos could not be functionally tested due to thermal damage. Rotation of the drive shafts resulted in a coinciding rotation of the distributor gears (as observed through their respective housing ports). Disassembly of the magnetos revealed that the internal timing of each magneto was correct. The internal wires sustained thermal damage and some components were corroded. The cam follower opened and closed the points appropriately during drive shaft rotation.

The engine-driven fuel pump sustained thermal damage that precluded functional testing. The pump was disassembled and no pre-accident anomalies were noted with the internal components. The mixture control shaft o-ring was in place, but was thermally damaged.

The throttle body was disassembled and no pre-accident anomalies were noted with the internal components. The o-rings were in place.

The fuel manifold valve was disassembled and the diaphragm was intact with the plunger secured. The screen was clear with no debris or obstructions noted.

A test was conducted with an exemplar engine-driven fuel pump on an exemplar engine. The mixture control shaft o-ring was omitted to induce a known leak from the engine-driven pump. During priming operation, fuel was observed leaking from the mixture control shaft. The exemplar engine was started and run throughout production test parameters (idle to full power) with no misses or engine stumbling noted.

Throttle Body

The throttle body could not be functionally tested due to thermal damage; however, the manufacturer provided a new, exemplar throttle body for testing purposes. The valve's o-rings were removed to simulate a leak in the throttle body assembly. The assembly was then connected and bench-tested on a fuel test stand and subsequently attached to an exemplar engine and tested under the supervision of NTSB personnel. The throttle body operated within the acceptable range of a new unit and no anomalies or hesitations were noted.

Similar Previous Accident

A review of the NTSB database revealed an accident involving a similar airplane and engine that occurred on May 10, 2014, in San Antonio, Texas (NTSB accident number CEN14LA234). In that case, the pilot also advanced the throttle lever while operating in the airport traffic pattern and the engine stopped producing power. Postaccident examination of the engine revealed no anomalies, and the reason for the loss of engine power could not be determined.

Administrative Information

Investigator In Charge (IIC):	Shawn Etcher	Report Date:	07/20/2017
Additional Participating Persons:	Joseph W Gramanski; FAA/FSDO; Orlando, FL Robert Collier Jr.; Mooney International Corporation; Kerrville, TX Nicole L Charnon; Continental Motors Inc.; Mobile, AL Daniel Boggs; Hartzell Propeller; Piqua, OH Jeff Tayon; Orscheln; Moberly, MO Peter Koeing; Orscheln; Moberly, MO		
Publish Date:	07/20/2017		
Note:	The NTSB traveled to the scene of this accident.		
Investigation Docket:	http://dms.ntsb.gov/pubdms/search/dockList.cfm?mKey=91053		

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The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).