



## **NATIONAL TRANSPORTATION SAFETY BOARD**

### **Office of Aviation Safety Alaska Region**

#### **Airframe and Engine Examination Summary**

May 1, 2018

AvTech Services, Auburn, Washington

#### **A. Accident**

NTSB Number: ANC18FA024

Location: Chuckanut, WA

Date: February 12, 2018

Aircraft: Mooney M20K, S/N 25-0060, TT 4,775.7

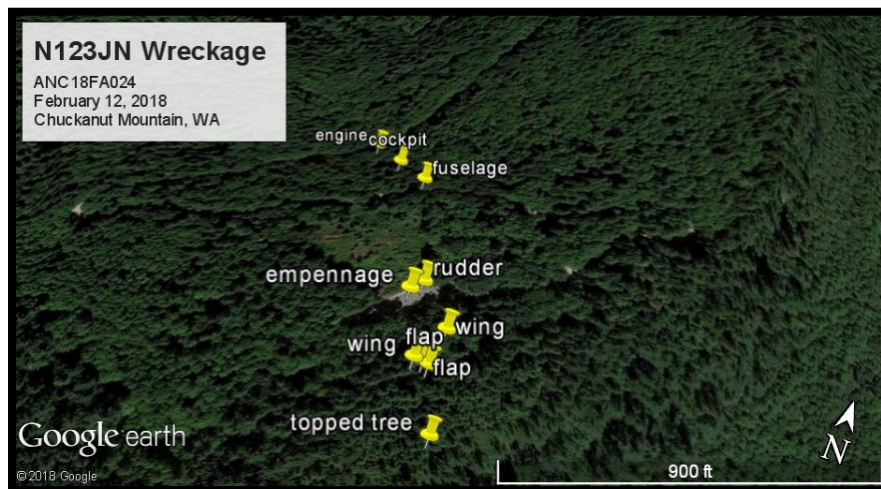
Engine: Continental TSIO-360-LB1B, S/N 247325-R, SMOH 1729.8

#### **B. Background**

On February 12, 2018, about 1913 pacific standard time, a M20K Mooney airplane, N123JN, was destroyed after impacting terrain on Chuckanut Mountain near Bellingham, Washington, while on a visual flight rules (VFR) approach to Bellingham International Airport (BLI). The private pilot sustained fatal injuries. The airplane was registered to Flying Llama LLC and operated by the pilot as a 14 *Code of Federal Regulations* Part 91 visual flight rules personal flight. Night visual meteorological conditions prevailed at the time of the accident, and no flight plan was filed. The flight departed Harvey Field (S43), Snohomish, Washington, at about 1851, and was destined for BLI.

Flight track data indicated that the airplane was on a descent profile at 146 knots just before the wreckage location which was about 9 miles south of the intended destination airport.

The accident site was located on the north face of the mountain in an area of dense forest with no lighted structures. Large portions of the fragmented airplane were scattered along a 1,200 ft debris path which started at the ridgeline above the Cyrus Gates Overlook at 1900 ft and continued on a course of 344° true downhill through large trees to an elevation of 1589 ft. (See figure 1.) Aerial photographs indicated the initial impact area was a section of tall trees (about 50 to 75 ft) that exhibited tree top fractures on the ridge above the wreckage. (See figure 2.) All major components were located at the site.



*Figure 1. Wreckage debris locations on Google Earth image.*



*Figure 2. Aerial photograph of tree top fractures on north side of ridge. (Courtesy of US Customs and Border Patrol)*

The wreckage was recovered in March after significant snow fall had melted on the mountain. The propeller was not recovered and likely was removed from the site before the recovery team arrived. A detailed examination was conducted on May 1, 2018.

### C. Participants in Detailed Examination

NTSB Investigator-in-Charge (IIC)	Noreen Price
FAA Aviation Safety Inspector IIC	Julie Summers
FAA Aviation Safety Inspector	Roy Dunn
Continental Motors Senior ASI	Nicole Charnon

### D. Airframe Examination

A review of the airframe logbooks revealed that the last inspection was a 100-hour inspection completed by Command Aviation on January 24, 2018, at a total airframe time of 4,474.0 hours.

The wreckage was in 9 primary sections: Engine, cockpit (2 sections), fuselage center wing section, aft fuselage, upper empennage, lower empennage, right wing, and left wing. Damaged flaps, aluminum skin sections, door, windows, torque tubes, plexiglass and other debris were recovered. See figure 3.

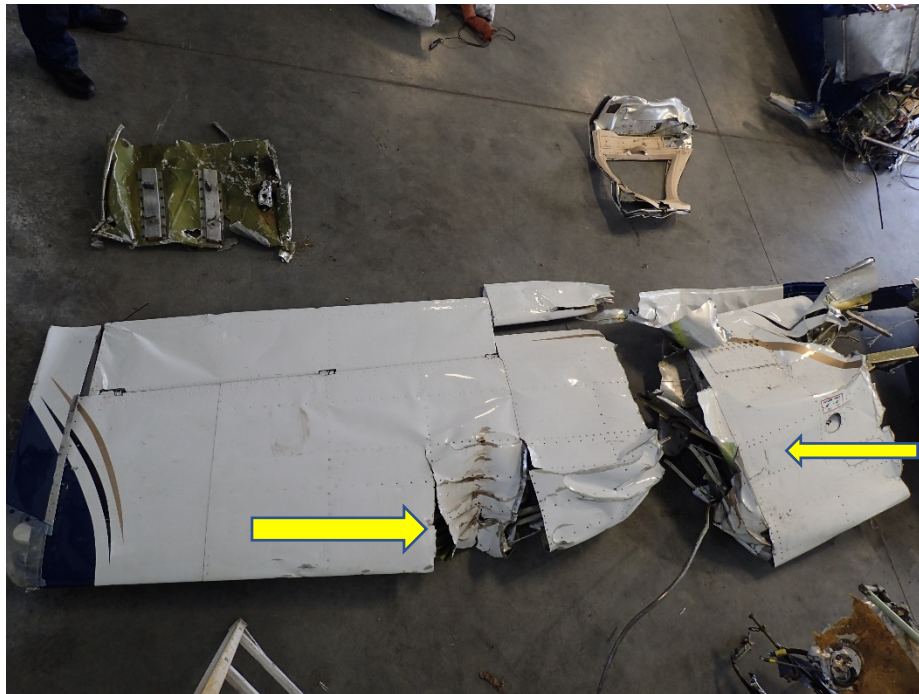


Figure 3. Wreckage at examination hangar with yellow pointers indicating tree strikes.

The separated flaps and wings were located near the beginning of the wreckage debris field (south). The left wing was separated from the center wing section and broken into two sections at wing station (WS) 59.25 and WS 43.5. The inboard section was deformed significantly with fractured spars, fuel lines and



aileron control tubes. The outer section exhibited upward and rearward compression buckling at the inboard trailing edge and fore to aft accordion buckling at the inboard leading edge. Another 14 inch section of the outboard leading edge exhibited deep semicircular compressions with some upward bending indicative of tree trunk strikes. The flap brackets were attached, however the flap was separated at torn skin sections with tension signatures present. The aileron was in tact and attached with impact related buckling. The right wing also separated into two sections at WS 103.5 and WS 88.75 and exhibited separation signatures and tree strike compressions similar to the left wing. The right flap was separated by fractured flap brackets and the aileron remained attached. The right and left speed brakes were intact and retracted. See figure 1.



*Figure 4. Right wing exhibiting tree strike impacts.*

The upper emennage was located north of the wings. The rudder and right horizontal stabilizer were separated from the vertical stabilizer. The stinger (lower empennage) was separated and had a pitch hinge attachment plate that exhibited some deformation and had 3 of the 9 attachment screws missing. The right horizontal stabilizer exhibited significant fore to aft buckling in a semi-circular shape indicative of a high speed tree trunk impact and tension separation signatures at the rivets. The left horizontal stabilizer was attached to the empennage structure and exhibited damage consistent with fore to aft tree strike at the mid span. Both elevator surfaces were attached and exhibited impact deformation. The rudder was separated from the vertical fin by fractured hinge attachments.

The center wing section was intact with the rear and front right seats attached. At the accident scene, the pilot's seat was wedged between two trees about 10 feet from the center section.. The pilot's seat lap belt was intact and functional. The floor, sidewalls, doors and top separated and highly fragmented into small pieces.

The forward fuselage was highly fragmented and two sections of the front cockpit, firewall and flight controls were recovered downhill from the main wreckage. The altimeter setting was 30.40. The mixture

and throttle levers were full out and the propeller control lever was full in. The landing gear selector was secure in the “up” detent.

Examination of the flight controls confirmed flight control continuity from the ailerons through fractured control rods to the forward end of fractured push rods in the center wing section. The left rudder pedals were displaced with multiple deformations and fractures present in the attached rods and crushed tubes. Continuity from the elevator to fractured control rod ends in the cockpit area was established. The pitch stabilizer jack screw (at the rear fuselage bulkhead) was fractured at the base with overload signatures present. The forward elevator trim assembly was located on the ground near the fuselage and the trim jack screw was bent at the housing. The traveling trim screw nut was against the rear stop nut, which according to Mooney corresponded to full nose down trim. See figure 5. Impact damage and missing and fractured debris prevented continuity checks forward of the center section. The flaps exhibited impact damage. The flap motor actuator was extended .2 ft which corresponded to flaps retracted (up) configuration.



*Figures 5. Fractured aft pitch trim jack screw (left) and Elevator Trim Assembly jack screw (right) indicating full nose down trim.*

The wing fuel tanks were breached and no fuel was present at the accident scene. The gascolator was disassembled and no debris was in the filter screen. The fuel selector valve was not recovered. Fuel was present in the engine manifold valve when disassembled.

### **Engine Examination**

Crankshaft and camshaft continuity were confirmed. Thumb compression was obtained, and rocker movement was verified during manual rotation of the crankshaft.

The ignition system was functionally tested with no evidence of pre-accident malfunction. The right magneto was observed separated from the mounting pad. This was likely recovery related damage. Both the left and right magnetos were functionally tested during manual rotation of the drive shafts with spark visible from the leads and audible snap of the impulse couplings.

The fuel system components revealed no evidence of pre-accident malfunction. The fuel manifold valve remained secure with all injector lines intact. The valve was disassembled, and residual fuel was found in the housing and the screen was unobstructed. The engine driven fuel pump components were disassembled and examined with no anomalies noted. The fuel injectors were removed, and all were unobstructed.

The throttle body and fuel metering unit were disassembled, and no pre-accident anomalies noted.

The tailpipe was removed from the turbocharger 's turbine housing and dirt and debris consistent with that found at the accident site was present. Examination of the intake bracket filter and intercooler revealed no pre-accident anomalies. Manual manipulation of the over boost valve revealed normal seating.

The vacuum pump was removed and disassembled. The shear coupling was intact but displayed permanent torsional twisting and a semi-circular score mark indicative of rotation at time of impact.

Refer to figure 5.

A JPI EDM 800 engine data monitor was removed and retained by the NTSB IIC for download.



*Figure 6. Continental TSIO-360 engine at examination.*

#### **E. Propeller** (McCauley 2A34C216-B, S/N 910305 PTSMOH 248 on 1/24/18)

The propeller was located north of the fuselage on the ground with the spinner pointing skyward. The rear spinner assembly was caked with dirt and the spinner was fractured open on one side and had compression buckling at tip. The assembly separated from the engine at the crank shaft near the nose seal. Overload fracture signatures were present on the shaft.



The hub exhibited impact related deformation.

One blade was secure in hub bent forward slightly and exhibited high blade angle. The other blade was secure in the hub and straight with low blade angle. Chordwise scratches were evident along the span from the leading edge back. One large nick was evident on the leading edge. Refer to figure 6.



*Figure 7. McCauley propeller at the accident scene.*

## **F. Summary**

There was no evidence observed at the examination of any preexisting engine, propeller or airframe discrepancies that would have resulted in a loss of control. The impact damage noted was consistent with the airplane striking trees at high speed while in a controlled descent. The elevator trim actuator position was beyond the full nose down trim position, which was likely the result of either pilot input during the accident sequence or impact forces. The elevator pitch trim assembly was located outside of the fuselage in the debris and likely sustained significant forces during impact.