



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

AIRFRAME AND ENGINE EXAMINATION

WPR19LA128

Accident Date: May 1, 2019
Exam Date: October 23, 2019

This document contains 14 embedded images

A. ACCIDENT

Location: Sedona AZ
Date: May 1, 2013
Aircraft: Beech S-35, N6864Q, Serial # D-7479
NTSB IIC: Michael Huhn

B. EXAMINATION PARTICIPANTS:

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C. SUMMARY

The airplane had been recovered by and to Air Transport, Phoenix, Arizona shortly after the accident. The wings had been removed for recovery. The nose landing gear was fracture-separated from the fuselage. All other components remained attached, or had been unbolted/dissociated by recovery personnel.

An undamaged propeller was used to replace the accident damaged propeller, and three successful engine runs were conducted. Fuel was observed to be leaking from the fuel control unit during engine priming and operation. Several fuel-related components were detached from the engine for shipment to and examination at Continental Motors in Mobile, AL.

D. DETAILS OF THE EXAMINATION

1.0 Airframe Examination

- Both wings had been unbolted and separated from the fuselage for recovery
- The fuselage was on stands and the front seats had been removed for recovery
- The fuel lines from each tank, with their respective finger screens, remained intact and attached to the cockpit fuel selector valve
- The cockpit appeared intact
- The engine appeared nearly intact

- Engine Dataplate (new engine): TCM IO-520-BA (23) Serno 822910-R
- Two of the three blades of the propeller were damaged from impact and some rotation
 - One of those was loose in the hub
 - The third blade was intact and secure in the hub
- The forward lower cowl displayed minor impact damage
- The air intake and filter were partially damaged
- Aside from the air filter assembly, there was no evidence that the impact had caused the cowling to move or deform aft to the point where it affected the integrity or operability of any engine components
- The battery was intact and remained connected
- The electronic tachometer (with power applied) indicated 774.24 hrs
- The fuel totalizer (with power applied) indicated 63.3 gallons of fuel remaining
- All three cockpit engine controls (throttle, mixture, propeller) remained attached to their respective engine components
 - All three operated smoothly through their ranges, with apparent full travel
- The airplane was equipped with an EI brand engine monitor
 - This was determined to be a model UBG-16 from the airplane records
- The ignition key was not available
- Clear blue fuel was obtained from the fuel strainer that was attached to the bottom of the fuel selector valve

2.0 Engine Run Preparations

- The fuselage was secured to a forklift for the run
- The damaged accident propeller was replaced with an intact two blade propeller
- A small header tank with fuel was plumbed into the fuel pickup and return lines for the right tank
 - This was based on the fact that the pilot reported that he and the CFI attempted takeoff on the right tank
- External 12v power was applied via the airplane jack/port for this purpose
- The ignition switch contacts were exposed to facilitate an electrical jumper hookup (due to the lack of an ignition key)
- The P leads from the two magnetos were disconnected
- The Pilot's Operating Handbook start procedures were reviewed
- These were:
 - Master Switch ON
 - Throttle/Prop/Mixture controls full forward
 - Electric fuel pump ON until peak fuel pressure reached
 - Pump OFF
 - Throttle pulled fully aft then pushed about 1/4" forward
 - Ignition to start, then both

3.0 Engine Runs

- When the engine was initially primed, fuel was observed to be leaking/dripping/pooling under the fuel control unit (FCU) below the throttle body
- The exact leak location was not initially determined
- The rate appeared to be about 1-2 drops every 3 seconds
- The engine was started; it 'caught' after several blades, but ran roughly
 - Fuel continued to leak under the FCU
 - The engine was shut down after about 20 seconds
- The FCU was determined to be leaking from each side of the FCU where the shafts (throttle (R) & mixture (L)) exited the FCU body
- The dripping continued, and a second start was initiated
 - The same results were observed
 - This run was slightly longer (about 30 seconds)
 - The dripping appeared worse on the left side
 - The engine was shut down
- The engine cowl was opened, and examination of the engine revealed that only the two forward cylinders (#s 5 & 6) and their exhaust piping were warm to the touch; the other four cylinders were "cold"
- It was eventually determined that this was most likely due to an operational error
- The engine was started a third time and run for about 2 minutes
 - This time the engine ran & sounded very smooth
 - The fuel dripping continued; the drip rate on the throttle (right) side increased, with two (instead of one) discrete drip lines
 - The cockpit EI engine monitor screen did not illuminate or display any indications; Several 'switchology' configuration attempts to rectify this were unsuccessful
 - The engine was intentionally shut down
- The engine cowl was re-opened, and all six cylinders were warm to the touch
- After deliberation, it was decided to leave the engine installed (not ship entire engine back to Continental for test) and remove the three primary fuel system components for shipment to and testing at Continental
- These were:
 - Flow divider assy w/ lines and injectors
 - Throttle body w/ FCU
 - Engine-driven fuel pump (EDP)
- The components were removed; all were securely attached and except as listed below, no mechanical anomalies were noted
 - Unlike the throttle body and the remainder of the FCU, the FCU body did have some accumulated 'grime' surrounding the exit locations of the throttle & mixture shafts (the leak sources).
 - The grime suggested that these locations had been leaking for some time
 - Manual rotation of the mixture shaft in the FCU revealed a variation in resistance, akin to a partial 'dead band' (very little resistance)
- The shear shaft for the EDP was intact
- The three components were packaged and sent via UPS to Continental in Mobile AL

- The inner cowl and the exterior of the underside were examined for indications of fuel staining; none was observed
- Review of inner cowl photos taken before any engine priming or runs were conducted indicated some type of liquid staining/residue and grime on the upper surface of the NLG well (where the fuel was observed to drip and pool after priming and during engine runs).
- The memory unit for the EI engine monitor was removed and retained for data download by NTSB personnel
 - EI Monitor model UBG-16
 - Memory module MUX-8A SN 079395

E. MAINTENANCE RECORDS INFORMATION

- Some maintenance records were available for inspection. These were likely not the complete set based on the vintage of the airplane.
- The most recent annual inspection was completed on 8/25/18, at a Tach time of 751.08 hrs
- The next most recent annual inspection was completed on 8/1/17, at a Tach time of 698.81 hrs
- The records indicated that the Tach was changed on 1/11/06.
 - The new Tach registered 0.00 hrs when installed
 - The old Tach registered 5,132.59 hrs when removed
 - The records indicated the engine TSMOH, which was actually engine TT (engine installed new on 12/22/04 at Tach time 5,029.0)
- No entries regarding any maintenance to the throttle body or FCU were observed in the maintenance records

F. PHOTOGRAPHS



Figure 1 - Front View



Figure 2 - Front View



Figure 3 - Front Left View



Figure 4 - Damaged Blade



Figure 5 - Damaged Blade



Figure 6 - Right Tank Fuel Pickup



Figure 7 - Right Tank Fuel Pickup Finger Screen



Figure 8 - Tachometer



Figure 9 - Tachometer (decimal display)



Figure 10 - Fuel Flowmeter



Figure 11 - Fuel Sample from Fuel Strainer

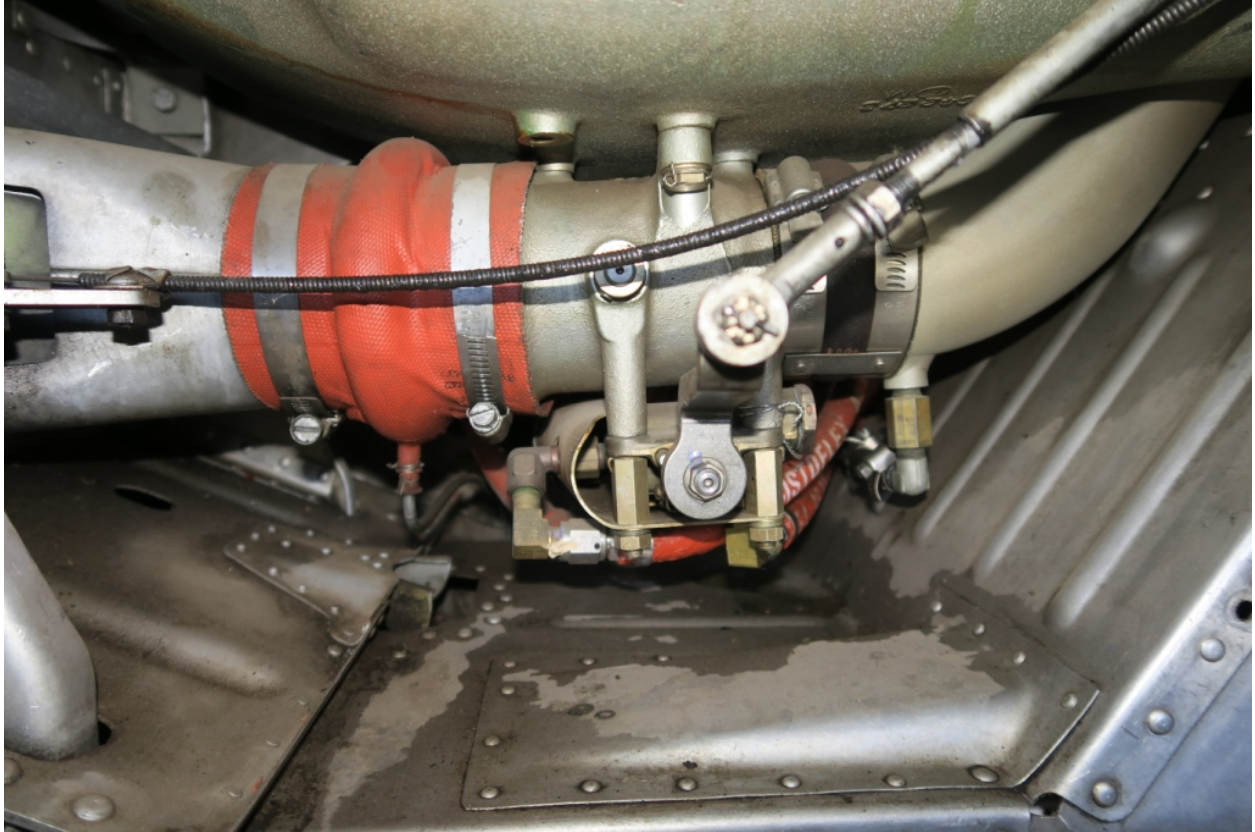


Figure 12 - Pre-prime/run Staining/leak indications

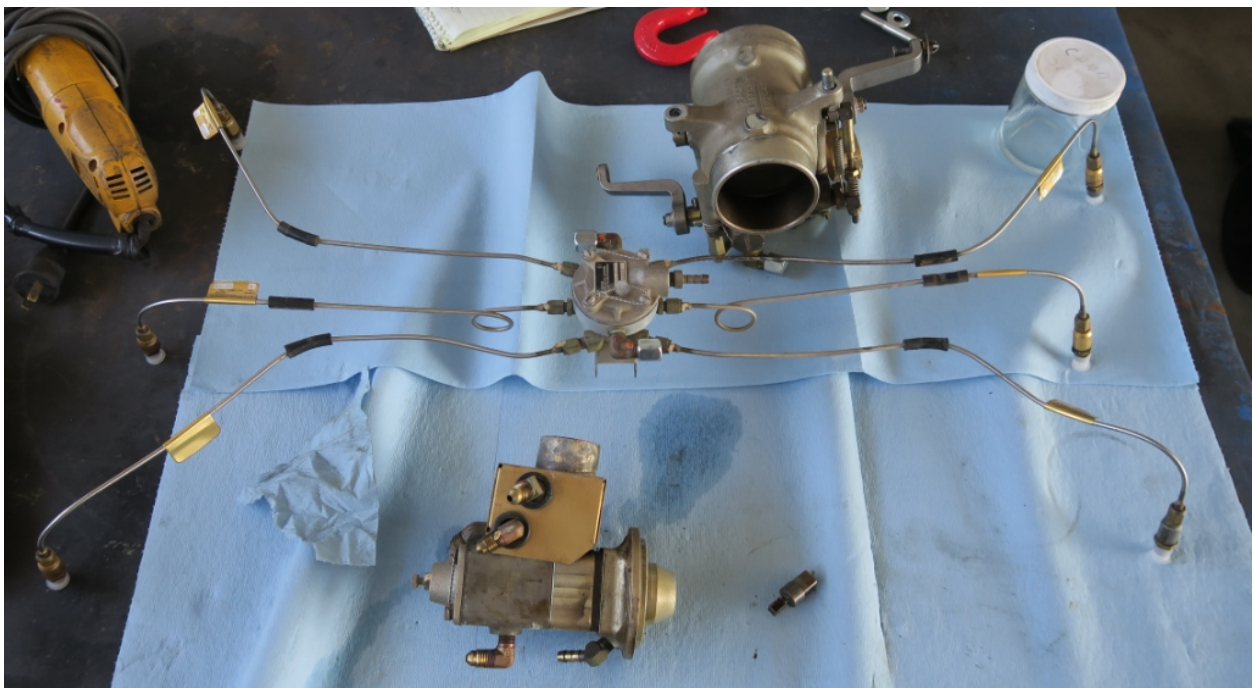


Figure 13 - Removed Components

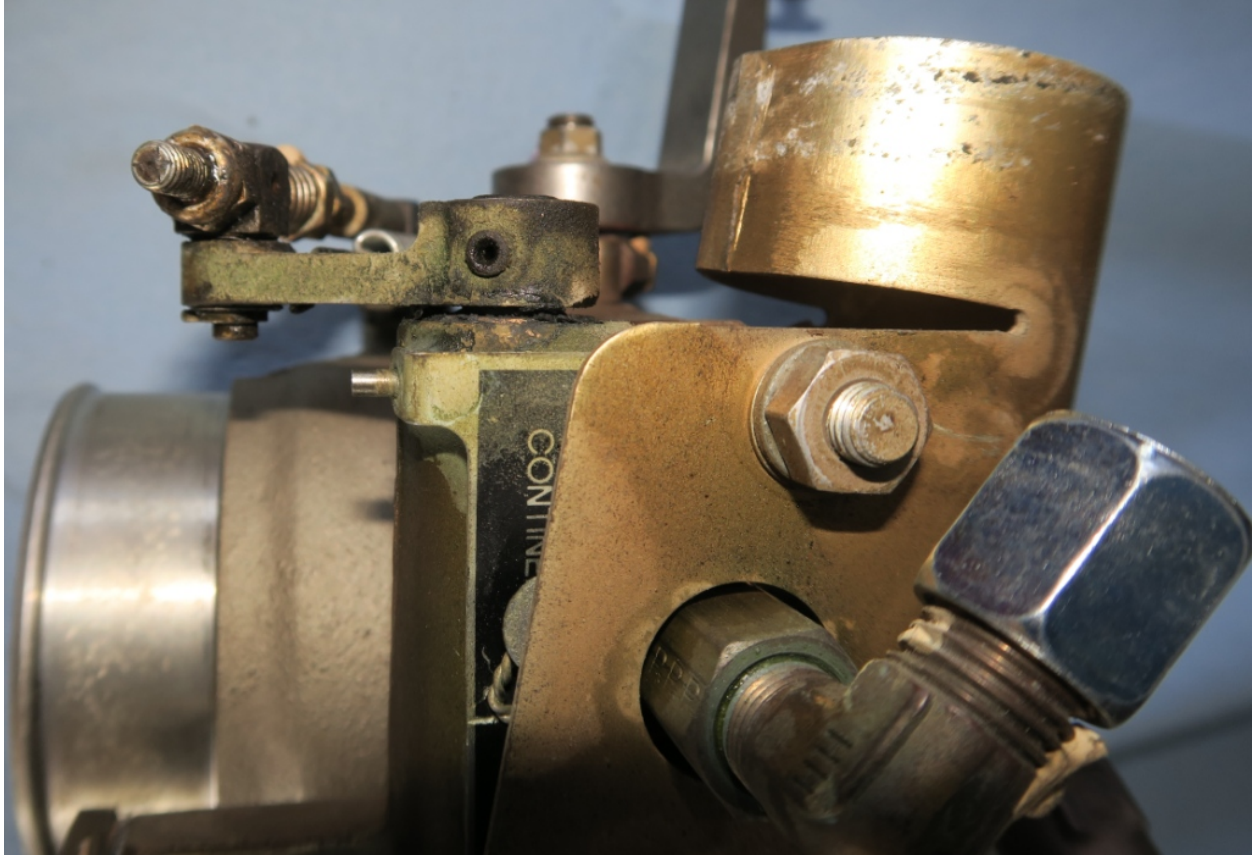


Figure 14 - Grime on FCU Shaft Exit