



CEN22FA216
FAA ENGINE EXAMINATION NOTES

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FAA Inspector John Welsh responded to the accident and made the following observations:

On November 8, 2020, at Circleville, Ohio airport (CYO), N33DW, a Piper PA-32-300, was taking off from Runway 1 when the engine stopped functioning. The pilot who holds an instrument rating turned slightly right into the wind and executed an off-field landing in the harvested farm field next to the airport. Upon touching down in the field both wing spars cracked and bent down from the weight of the fuel in the auxiliary tanks. The aircraft rolled out for about 100 feet until the nose gear collapsed and bent the propeller. The pilot was able to exit the aircraft on his own.

Ground scars at the accident site were consistent with the main gear hitting the ground then the nose gear hit very shortly thereafter. The aircraft rolled out for about 100 feet when the nose gear collapsed. The propeller hit the ground and was damaged when the nose gear collapsed. The propeller blades were bent back approximately 30 degrees. Both wing spars were cracked and bent down. The wing spars were bowed and cracked low on the spar. The cracked area exhibited no evidence of corrosion and appeared normal in all other regards. There was a significant amount of fuel in each tank to include the auxiliary tanks. The auxiliary tanks are on the far outboard part of the wing. The fuel was sumped and did not exhibit evidence of water or any other contamination. The engine did not exhibit damage to the case and was properly serviced with oil. The flight controls were free and clear save for the rudder. We were not able to move the rudder due to the damage to the nose gear. The throttle, mixture and prop controls all functioned smoothly. The fuel selector moved to each position smoothly and had an indent at each location.

The airplane was transported to Lancaster, Ohio where a more detailed examination took place.

On December 1, 2020, engine examination was conducted.

- Log book research revealed that a Lycoming IO-540-K1A5 with s/n L-9012-48 was installed in N33DW, installed on 07/29/95.
- The engine has a total of 1,512.88 hours since the last major overhaul on the engine.
 - o Lycoming Service Instruction 1009BD dated February 13, 2019 has a time between overhaul schedule for this engine of 2,000 hours.
 - o It also has a calendar frequency for overhauls of 12 calendar years.

- The aircraft had its wing removed and the fuselage was sitting on some pallets. The props were bent approximately 30 degrees. In order to facilitate the inspection, the end of one of the propellers was cut in order to rotate the crank shaft.
- When rotated, the crankshaft rotated smoothly and generated compression in cylinders 2 and 3 only. This indicated that the accessory gear drive was likely disconnected from the crank shaft.
- The magnetos were removed and the prop again rotated, this resulted in no movement of the gears in the accessory case.
- The magnetos were removed and rotated by drill. They were able to generate a spark at each cylinder both top and bottom.
- An examination of the spark plugs revealed normal wear top and bottom. The bottom spark plugs did have some oil fouling. Note this engine has been sitting for 25 days since the accident in Circleville.
- The throttle was observed to move smoothly stop to stop.
- The mixture was observed to move smoothly stop to stop.
- The prop control was able to hit the high pitch stop, but was not able to hit the low pitch stop due to damage in the nose landing gear area.
 - o When the prop control cable was removed the prop governor was able to hit both stops by hand and moved smoothly with no binding or friction.
- A borescope inspection of all cylinders revealed normal wear.
- All of the valves had normal wear and appeared to have a clean seating area.
- The air filter was removed and no abnormalities were noted.
- The valve in the fuel servo valve was observed to actuate smoothly completely open and closed.
- No evidence of fuel staining was noted on the exterior of the servo.
- The axillary fuel pump was actuated and using a substitute fuel source, all 6 fuel injectors appeared to deliver fuel to each cylinder.
- The engine driven fuel pump was removed and using a substitute fuel source and driven by a drill was able to pump fuel.
- The oil dip stick was removed and it was noted that the engine had about 9 quarts of oil.
 - o The oil was black in color.
- The oil filter was disassembled and exhibited normal wear. A magnet was passed under the pleats and no ferrous material was noted.

The fuel selector was removed from the airplane and examined at Ametek BNS on December 11, 2020.

- Before the teardown the technician did a pressure test on the unit in which they forced air into the outlet nozzle of the valve. The unit should be able to withstand 10 PSI, but could only withstand 5 psi.
- With the valve selected to the "off" position, all 4 fuel inlets leaked air.
 - o It is likely that the spring-loaded ball bearing seals inside the unit were not holding pressure.

- This condition might allow fuel to pass through all four inlets no matter which selection was made.
 - No indication was found of any blockage within the valve itself, when each port was selected significant air flowed through each passage as should be.
- During teardown, a couple of the fuel outlet fittings had rust deposits
- When the bowl assembly was removed, a “significant” amount of sand was discovered in the bowl (a sample was bagged and returned with the unit).
- The quick drain was missing from the valve (it was removed to facilitate shipping the valve).
- There were signs of abrasion found in the outlet fittings indicating the sand had passed through the valve.
- AD 72-12-01 appears to have been completed and comprised of an aluminum ring that is fitted over the selector shaft where the retaining pin is inserted to keep the retaining pin from working itself out and allowing the selector shaft to no longer manipulate the valve.

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