

Departed PNE ~1700 EST for local flight. Turned north and circled about 4NM north of field for 15 min. Returned entering right downwind for RWY 24. Landed uneventfully about 1500 feet beyond threshold. Ground roll about 40 feet. Commenced takeoff on RWY 24 entered left downwind for RWY 33. On touchdown about 1500 feet beyond threshold aircraft began a roll to the right. Left aileron not effective in arresting the roll. Aircraft rolled over onto it's right side. Rotors damaged. Propeller damaged. Right stub wing broken about 2 feet from fuselage.

The Pitcairn PA18 Autogiro is a smaller version of the Pitcairn PCA2 Autogiro which was the first rotor craft to receive a type certificate in the United States around 1931. This design uses a fixed spindle for the main rotor. There is no direct control of the main rotor as there is in modern gyroplanes. Instead there are standard airplane controls - elevator, rudder, and ailerons on stub wings. These impart the forces necessary for flight control indirectly to the rotor by moving the entire fuselage, and pylon to which the rotor is affixed. At speeds above 35 MPH or so the controls are effective and the PA18 responds very much like a fixed wing aircraft in flight. With a rotating airfoil the PA18 can be slowed for landings that result in a very low airspeed and short roll-out. While the rudder and elevator remain relatively effective at these low speeds primarily due to propeller slip stream, the ailerons are not very effective. It becomes important to be positioned correctly in the last few moments before touchdown so that roll control is not needed.

Aircraft was restored to flying condition and first flown 09/10/2014. First landing was on pavement and resulted in a ground loop resulting in a surprised pilot but no damage. Additional flying took place a week later with multiple successful landings on the grass. Aircraft is much more docile and forgiving when landing on turf. Circumstances led to a two year and two month period of no flying. Annual completed about two weeks prior to the accident flight. Conditions on 11/18/2016 were ideal. Calm. Temperature in the 70's. After the short flight I returned to land on the pavement RWY 24. The landing was uneventful, with a short roll out under complete control. I decided I would make a few more landings before putting the aircraft away for the season. Took off again from RWY 24 and entered a left downwind for RWY 33 I was again mentally preparing so as not to get into a ground loop situation. The round out prior to touchdown was such that I could not tell when the wheels touched the ground and then the right roll began. I have thought much on how this could have been prevented, as I intend to repair and fly the aircraft again. What I think happened is that only the right main had touched the ground and the aircraft was aligned such that it started tracking to the left. Gyroscopic precession due to the flare would induce a slight right rolling moment. Couple that with the aircraft tracking to the left and I was now in a situation I had not experienced before. The instinctive slap of the control stick to the left did nothing to stop the roll due to the lack of aileron effectiveness at the 15-20 MPH the aircraft was moving. A burst of throttle and right rudder may have got the wheel tracking to the right and stopped the rolling, but my mental preparedness was biased to preventing a ground loop, not a dynamic rollover. My takeaways are these. My lack of experience in this early design clearly played a part in the accident. The limited roll controllability at low speeds inherent in the design of the machine (and perhaps the low time in type) make the aircraft seem to reach the point of no return more quickly than the other aircraft I am accustomed to flying. Landing on turf provides a much more forgiving environment. More time flying may have produced similar situations that ended up recoverable and learned from. I know of only

one or two other pilots operating this type of Autogiro today. I have had lengthy conversations with them before and after flying this machine, and after the accident. This machine was designed when paved runways were few and most flying was done off grass. I think using turf runways when operating this type of antique provides the safest way to gain experience.