

Upgrading Legacy Aircraft

By: Phil Lightstone

In Canada, there are roughly 65,000 licensed pilots and 36,000 aircraft, 28,000 of which were built before January 2000. Many pilot owners are wondering how to upgrade their aircraft without investing a disproportionate amount of money versus its value. Upgrades fall into four categories: safety/reliability; performance; compliance; and wiz bang. Or Airframe, Power Plant and Avionics. John Leggat, President of Leggat Aviation (www.LeggatAviation.com) reports “aircraft owners are investing into their older aircraft not only for safety and avionics upgrades but also driven by a sense of pride in ownership.”



While little has changed from a Lycoming or Continental engine perspective, a number of companies have developed technologies designed to improve the manner in which engines perform. SureFly (www.SureFly.Aero) and ElectroAir (www.ElectroAir.net) have designed solid state magnetos designed to improve engine performance and fuel consumption. A standard mechanical magneto is usually overhauled at 500 hours, while Surefly’s magneto has no TBO or mandatory replacement time. Jason Hutchison of SureFly reports “that their design and manufacturing capabilities allow their magnetos to attain 3,000 hours, however, with the average engine being overhauled at 2,000 hours, it was natural to set the TBO in the middle”. Economically, a new Slick Champion magneto costs per hour (CND including tax and installation) is \$5.19, an overhauled magneto is \$3.33 while SureFly is \$1.17. See my article in the February 2018 edition of COPA Flight for more information.

Avionics manufacturers like Insight Avionics, JPI and EI manufacture Graphic Engine Monitors (GEM) which are in fact purpose-built computers. The GEMs are equipped with a micro processor, data storage, an LCD screen and electrical interface probes. Information is displayed and stored on the 2 ¼" or 3" instruments, with the ability to upload to Cloud based analytical providers such as Savvy Aviator (www.savvyanalysis.com). With the engine data captured during every flight, cloud-based analytics systems can provide meaningful insights into your engine providing proactive maintenance. The Commander which I fly came out of the factory with an Insight GEM602, which had no data storage capabilities. Upgrading to their G3 GEM (www.insightavionics.com) was a simple plug and play effort. The existing wiring harness connecting the EGT and CHT probes plugged directly into the G3. A second RS232 connector is used to connect optional probes such as RPM, MAP, Oil Temp, Oil Pressure, Fuel Flow, Vibration, and OAT sensors. The G3 is STCd by Transport Canada and the FAA as a primary instrument, replacing or backing up 6 legacy analog engine instruments, providing an additional safety benefit.

LoPresti Aviation (now part of Whelen Aerospace Technologies) has been manufacturing aircraft components such as fairings, wing root seals, hub caps and others airframe mods since 1991, designed to improve aircraft performance. A rule of thumb is \$1,000 USD for every 1 knot of increased speed. Bruce Cady, Sales Manager reports that the return on investment (ROI) is comprised of: 50% fuel savings; and 50% increased aircraft value at time of sale of the aircraft. Depending upon how long you keep your aircraft, a \$3,500 upgrade would break even in 1.5 years and over a 10-year term create a savings of \$3,750 (excluding fuel price increases over time).

In some cases, the transition from steam gauges to all glass panels can cost more than the value of the aircraft. Garmin and AeroVionics (www.AeroVionics.com) manufacture sold state glass products designed to replace the vacuum driven Attitude Indicator and Directional Gyro (and HIS). Priced from \$1,595 to \$3,075 USD (plus installation and tax), these units deliver glass capabilities on a reasonable budget, while displaying more information onto the instrument. Replacing 2 of the 6 components of the six pack consolidates information and allows other information such as altitude, airspeed, vertical speed, turn and bank to be displayed as well. Some year 2000 instruments have internal battery backup, allowing the vacuum system to be removed from the aircraft. The trade off is replacing the vacuum pump filters at annual and a 500-hour limit on the vacuum pump versus managing the internal batteries on the new instruments. For pilots concerned about electrical redundancy, Freedom Aviation (www.StandByAlternator.com) manufactures a certified standby secondary alternator system with automatic failover, making a failure of the primary alternator a non-event.

The past few years has seen a trend of avionics manufacturers certifying their experimental products, resulting in reasonably priced digital technologies. TruTrak Flight Systems (www.trutrakflightsystems.com) was founded in 1999 and by March 2000 produced their first prototypes of the DFC 250 autopilot and digital servo. Their certified PMA Vizion is a certified 2 axis autopilot which includes features such as: Bank Angle Select; Track Select; GPS Nav; GPSS Roll steering commands; Vertical Speed Select; Altitude Hold. Also included are Select & Pre-Select; Control Wheel Steering; Emergency Level; Bank Angle Protection Mode. The product

includes the avionics, wiring harness, roll and pitch servos, installation kit, **STC** and retails for \$5,100 USD (plus shipping and installation). Installation time varies from 20 to 30 hours, depending on the experience of the installation shop. TruTrak has an STC for Cessna 172/175/177/180/182/185, Piper PA-28/32 and is working on STCs for Mooney, Bonanza and other Cessna/Piper types. The certified version is \$3,000 USD more than their uncertified product, which has basic servos with less torque than the certified version. Since 2000, TruTrak has sold more than 10,000 autopilots and continues to innovative new products.

Most upgrades, at the time of the sale of the aircraft, might hold 40% or more of their value. The real value of investing into upgrades is safety and the pride it brings you, which are priceless.