Aircraft Performance Monitoring

The General Aviation Steering Committee (GAJSC) System/Component Failure Working Group asserts that pilots continue to hold unreasonable expectations of their personal performance, and the performance of their aircraft, which has contributed to fatal GA accidents. Reasonable performance expectations, based on realistic data from flight data monitors, can help to forecast system/component problems before they reach the point of failure, resulting in safer flight operations.

Flight Data Monitoring

Flight Data Monitoring (FDM) has been around since before the jet age and commercial airplanes make extensive use of the technology. Systems comprised of sensors, computer hardware, and software acquire and archive flight data for use in trend analysis and investigations of accidents and incidents. While it's true that most general aviation (GA) aircraft don't have dedicated automatic flight data recording devices now, we will be able to enjoy the benefits of equipage in the future. In the meantime, it's often surprising to see what we already have.

Tools You Can Use Now

Changes in aircraft performance can be a sign of developing mechanical issues. Your Pilots Operating Handbook (POH) will help you to predict your aircraft's performance, but only by monitoring your personal performance can you know what to expect. Comparing your performance with the POH will enable you to develop accurate performance predictions and reasonable performance expectations.

Many data monitoring operations involve no automation at all. Basic instrumentation such as airspeed indicators, attitude indicators, angle of attack indicators, manifold pressure, RPM, and G indicators give immediate feedback as to whether design limitations have or are about to be exceeded. Pilots can track engine power, fuel flow, oil temperature and pressure. Panel mounted GPS systems and many hand held units are already capable of recording position, heading, speed, and altitude. Some engine monitors have recording capability and many aircraft owners participate in oil analysis programs — a tool for gauging engine health and heading off expensive or, in some cases, disastrous problems.

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The Future is Here

Manufacturers are already offering self-contained flight data and visual data recorders for GA airplanes and helicopters. We're seeing multi-sensor analysis programs on high-end GA aircraft with integrated performance, navigation, and route information. Auto landing systems are making their way into some GA aircraft now and, over time, they'll become available in lower-priced platforms.

It's true that modern avionics have made the collection of flight data and flight performance analysis much more accessible to GA, but the question is how do GA pilots access and use that information? Unlike in the commercial world where you have a structured system like Flight Operations Quality Assurance (FOQA) that can be easily used to tap the data from operators, the GA community has more limited options, despite its much greater footprint on NAS operations.

To provide a solution to that problem, the FAA partnered with academia and industry to create a portal that could collect data from the wide variety of GA operations. The end result was the National General Aviation Flight Information Database (NGAFID).
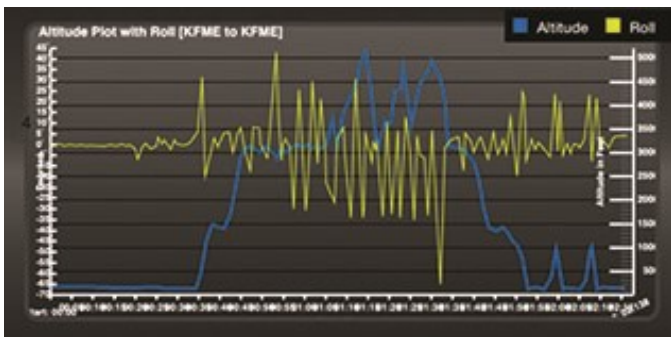

Image from NGAFID that allows users to view flight data.

The NGAFID allows GA pilots to analyze and share their flight data in two ways. First, operators equipped with avionics capable of recording flight data can upload flight and engine data anonymously into NGAFID. Devices that record flight data offer an easy, and free way for pilots to visually analyze flight performance for trends and changes over time to improve their flying. Second, pilots can share their data with NGAFID from a smart phone/tablet using the General Aviation Airborne Recording Device, or GAARD™, mobile app. Depending on your method of logging data, you can even use the NGAFID to monitor for airworthiness/maintenance concerns. All data collected from onboard avionics, an FDM recorder, or the GAARD app is anonymous and de-identified so pilots can share their data without any fear of reporting or reprisal. The NGAFID is managed by GA community members and associations.

Thanks to GA data sharing and analysis programs, more safety issues can be detected, resulting in more interventions, leading to fewer accidents, and fewer lives lost. As more data is shared and analyzed, groups like the GAJSC develop safety enhancements and raise awareness in the community through targeted outreach efforts like the #FlySafe Campaign. FAASafety.gov and the FAA Safety Team's (FAASTeam) WINGS/AMT airmen proficiency programs are great resources for pilots and mechanics to help improve their skills and knowledge. More developments are on the way, including a complete redesign of FAASafety.gov with artificial intelligence capability that will use data to suggest customized training and flight activities.

We are certainly in an age of innovation where information, technology, and pilot performance combine to make flying safer than ever before.

Resources

• National General Aviation Flight Information Database and GAARD™ App
www.ngafid.org

• *FAA Safety Briefing* Sep/Oct 2020, "The Missing Link Contributing to the Future by Examining Your Past," p. 13
medium.com/faa/the-missing-link-abdc1fda5de6

GAARD App on iTunes Store (Android/Google Play Store version coming soon . . .)

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