My Other Plane is a

Globe "Super" Swift

PART 2:
Applying COPA Knowledge to 65-Year-Old Aircraft Operations

by Matt McDaniel

In the Sept./Oct. 2008 issue of *Cirrus Pilot*, we began the "My Other Plane is …" series with Dr. Bruce Kaufman's 1946 Globe Swift. That article promised a follow-up to detail the airplane's on-going transformation from antiquated to cutting-edge. What follows here is how the mindset and knowledge of the COPA community was channeled to increase the safety, efficiency and mission-flexibility of a non-Cirrus aircraft.

When Dr. Kaufman first found his Swift in 2007, it had just returned to airworthy status after 30 years of neglect, disrepair, ownership changes, and a 15-year restoration. While he bought it in flyable condition, it was still a work-in-progress in many ways. He saw an opportunity. The Swift, N3389K, was a low-time bird, restored with marvelous attention to detail in the airframe, engine and systems. Its interior, however, was bare metal; its panel was basic-VFR; and its engine and systems monitoring capabilities were limited, at best. We devised a plan to bring Bruce's Swift up to modern IFR standards, with an intense focus on safety, reliability and systems-monitoring. While we gathered the required information for this project in many places, none proved more valuable than the COPA community and its first-hand knowledge of operating all generations of Cirrus aircraft and the variety of equipment they incorporate.

Interior and Noise Reduction

Bruce helped to design a custom interior that would complement the plane's gorgeous polished aluminum and royal blue exterior. Before the new interior was installed, noise and vibration absorbing materials were installed around the entire cabin area, from the firewall to the aft bulkhead. ANR headsets were a must and a pair of Bose X's were chosen both for their quality and small physical size (as the bubble canopy restricts headroom for taller occupants).

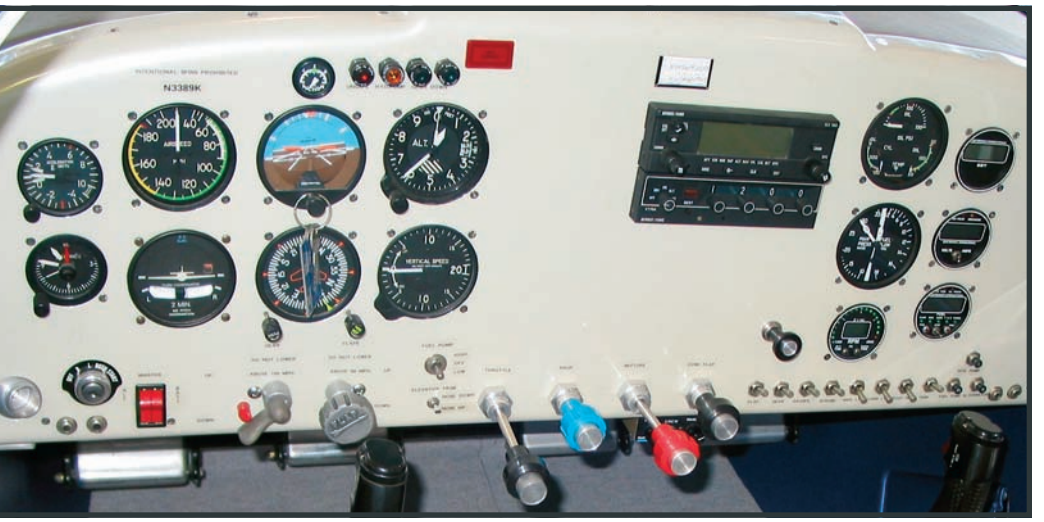
Instrument Panel Design and Inspiration

Dr. Kaufman flies a late-2002 SR22 G1, with a Sandel 6-pack and E-Max engine monitoring. He'd always flown it with in-flight weather capabilities via a Tablet PC with WxWorks and GPS inputs. His primary goals in redesigning his Swift's panel were to make it at least as capable as his Cirrus, without going over the top. The Swift is based in Racine, Wis. (RAC) where weather is often thin-IFR due to lake-effect fog. So, while the plane's mission doesn't call for hard-IFR flying, full IFR capabilities would be required to consistently operate from RAC. Redundancy and safety, as found in the Cirrus, would be incorporated while trying to minimize weight to keep the Swift's Basic Empty Weight (BEW) in check. The Swift's side-by-side seating arrangement gives it a reasonable amount of panel width. However, the panel is not tall, and close attention was required to incorporate everything, while avoiding a cluttered or disorganized arrangement.

Primary and Backup Flight Instruments

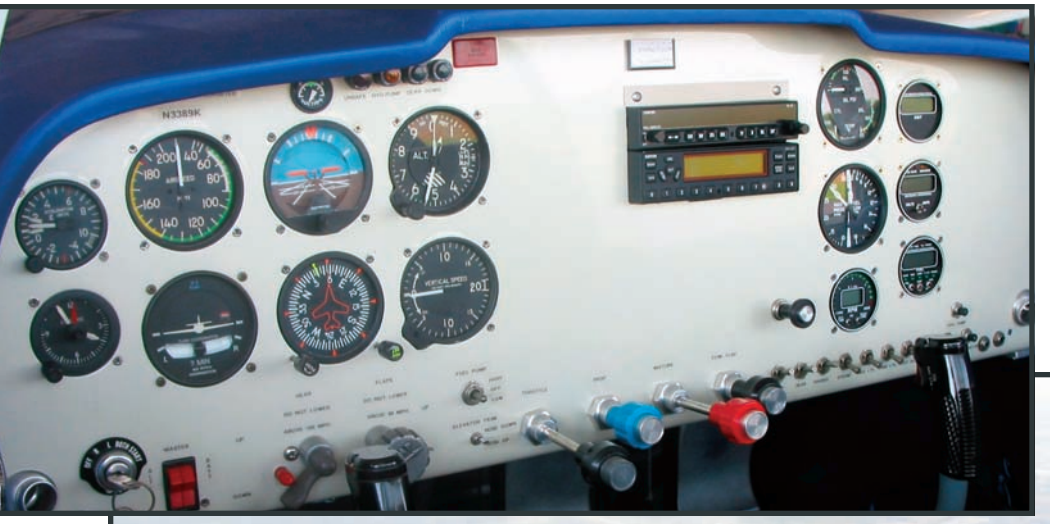
To replace the standard 6-pack, the Aspen Evolution EFD1000 Pro PFD was the obvious choice. Its physical size and weight was appropriate and it's chocked full of features that today's glass-cockpit pilots expect. The only problem was the unit was not yet certified and the Swift was not on Aspen's list to be included in the upcoming Supplemental Type Certificate (STC). I contacted Aspen and requested that all models of the Swift be added to their Aircraft Models List (AML). Since Swift's were certified under the Civil Aviation Regulations, Part 4a (CAR-4a) in the 1940s, that certification was sufficient to add them to the STC-AML. Initial certification of the Aspen PFD did not include any "conventional-gear" aircraft, but with a few additional FAA hurdles cleared, a variety of taildraggers, including all Swifts, were soon added.

The Aspen PFD would require backups for airspeed, altitude and attitude information for IFR flight. The intention was to use a second Aspen for this purpose. Aspen's Evolution EFD1000 MFD is the same hardware as their PFD, but additional software allows it to function principally as a Multi-Function Display, and secondarily as a backup PFD (in reversionary mode). Unfortunately, the MFD took an additional year for certification, necessitating



The Swift's panel before the upgrades began.

Panel after Phase I upgrade.

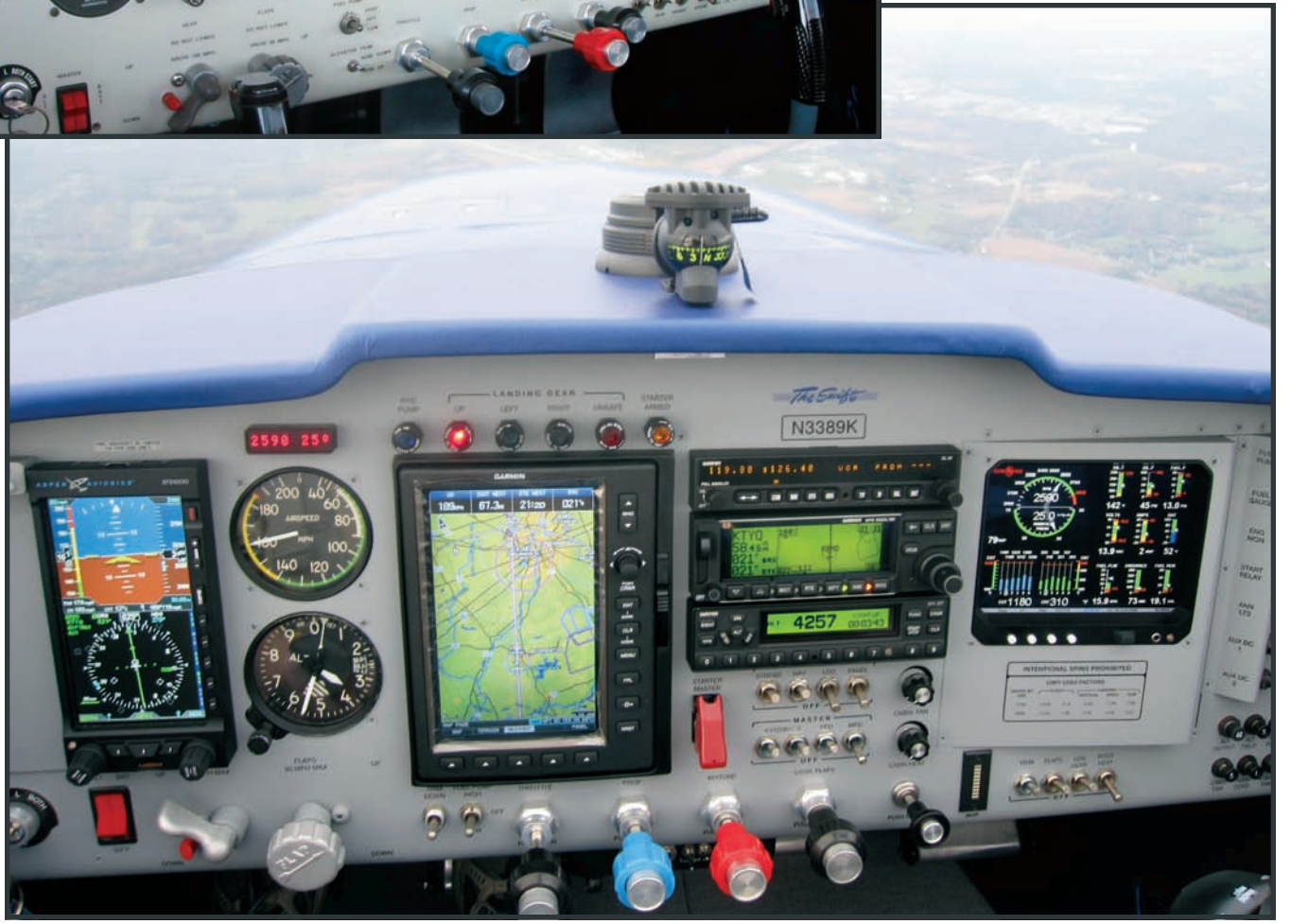


a multi-phased panel makeover (see sidebar). Upon certification, the Aspen MFD was able to act as the backup airspeed indicator and altimeter, but the FAA demanded that the backup attitude information come from a completely separate source. To address this complication, a Mid-Continent 4300-Series LifeSaver® electrical attitude indicator was installed.

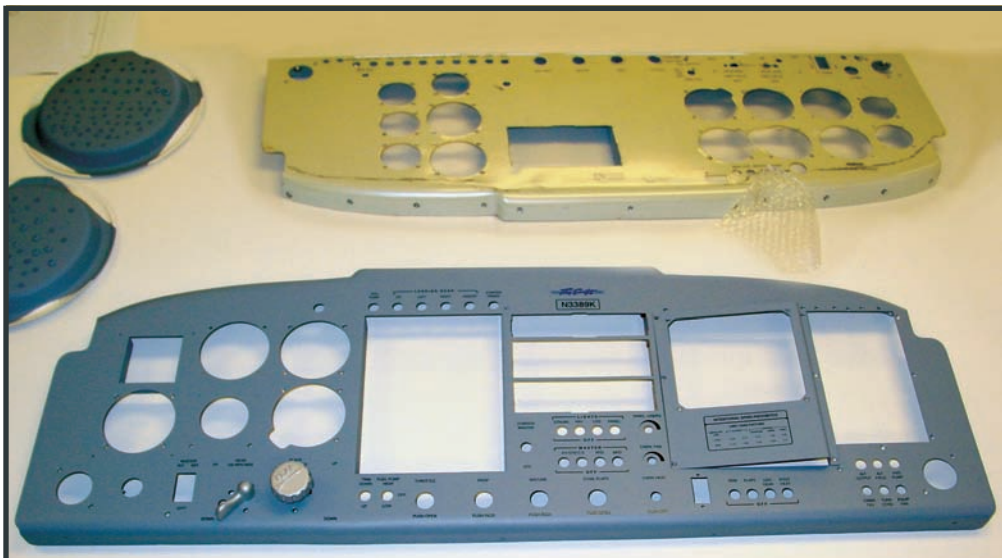
On-Board Weather, Charts, and Entertainment Systems

Most of us operating Cirrus aircraft are accustomed to having satellite weather information available at all times. Therefore, getting weather into the Swift's panel was a high priority. The Aspens now have a WX option, but did not at the time we installed it. Plus, using the Aspens for weather would require installing a separate WX receiver. In addition, Bruce was

Phase II panel upgrade in-flight (about to overfly the Bloomington, Ind. airport).



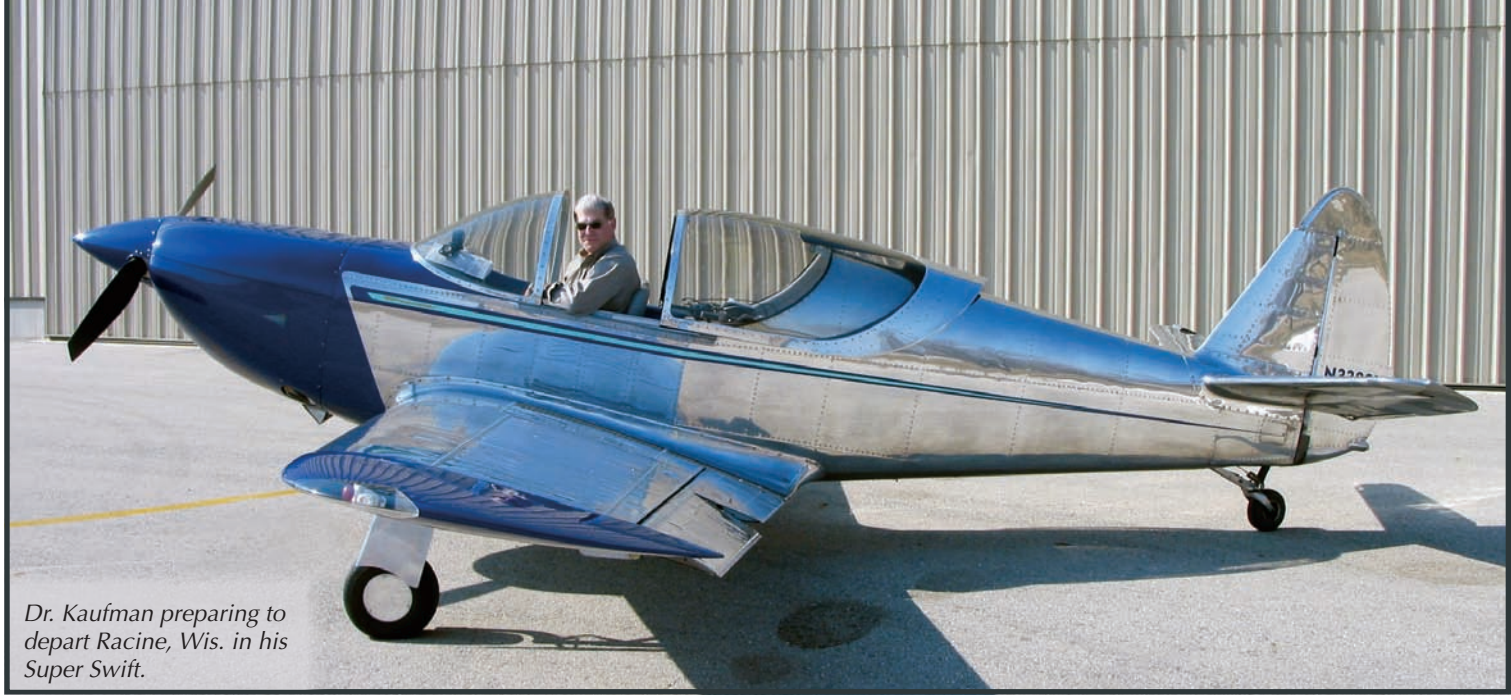
looking for a portable weather system he could use in both the Swift and his Cirrus. The solution was the Garmin GPSMAP 696®. We were placed on the waiting list for one of the first AirGizmo panel-mounting docks for the 696. Via this mount, the 696 can be easily removed (along with its WX receiver) and taken to the Cirrus, where Bruce uses it in a knee-board setup to replace his older system. Presto, two planes, both XM WX-equipped, but only one subscription required. A GPS antenna for the 696 was permanently mounted inside the Swift's fiberglass wingtip. In the Cirrus, a portable GPS antenna is used.



The new (grey) and old (white) panels on the workbench.

The 696 also incorporates many features useful in the Swift. It can export Nav and Comm frequencies into the radios. It provides real-time graphic TFRs, XM Entertainment, downloadable flight tracking/logging, weight-and-balance calculator, audible and graphic terrain alerts, full AOPA airport database including SmartTaxi® airport diagrams, and more. XM Entertainment is selected via the 696 and piped into a PS Engineering PM3000 Stereo intercom. Music mute switches are incorporated into the control stick grips and the intercom sub-panel. An additional Aux Audio jack was included for inputting music from an outside source (MP3 player, etc).

Another factor in choosing the 696 was its IFR Approach Plate database and screen size, making them readable without clumsy zooming and panning. The Aspen MFD also has plates; therefore, with two independent sources available, paper copies are unnecessary. The 696 also incorporates IFR Enroute Charts and sectional-like terrain maps (but current paper copies of those are also carried).



Dr. Kaufman preparing to depart Racine, Wis. in his Super Swift.

Engine and Systems Monitoring

As tithe-paying members of the Church of Lean-of-Peak, we wanted very much to be able to operate the Swift's 210 hp IO-360 in LOP mode. Doing so dramatically increases the plane's range, efficiency and utility. But, the "Super" Swift's big engine is tightly cowled and temperature-sensitive. While it was possible to run LOP, we were originally doing so with insufficient information about the engine's health.

An all-inclusive engine monitor to replace all engine and electrical system instruments seemed to make the most sense. We soon discovered only one such system was certified for this aircraft/engine combination. The JPI EDM-930 which could even replace all fuel gauges, although we elected to stick with the Swift's simple, but effective, original ones. So, like the Cirrus, we now input the known fuel quantity at startup and the fuel totalizer gives us on-going fuel status (in gallons and minutes), fuel at the fix/destination, and issues alerts for fuel quantity, and flow or pressure abnormalities. It creates fuel awareness levels that most Swift pilots can't imagine.

Before the EDM-930, we thought the engine was oil-temp limited. With the plethora of new engine information, we discovered the engine is really more CHT limited, causing us to modify our procedures accordingly. GAMIjectors® allow routine LOP operations with no complications. Additionally, the EDM-930 provides detailed electrical system status and all information is downloadable for trend analysis.

Safety and Redundancy

This project injected 21st century safety into a 1940's design. The biggest factors involved were eliminating failure-prone components, such as the vacuum system, mechanical gyros, and analog instruments. Today, N3389K is an all-electric airplane. While it maintains the original 12-volt system, it's now enhanced with multi-layered redundancy, including:

- Aspen PFD: Solid state AHRS and ADC, internal backup battery and GPS (good for more than 30 minutes).
- Aspen MFD: Solid state AHRS and ADC, Reversionary mode to PFD format, external backup battery and GPS (good for about two hours).
- LifeSaver 4300 electric ADI: Integrated backup battery (good for more than 30 minutes).
- Garmin GPSMAP 696: GPS Nav, Charts, XM WX, etc., internal backup battery (good for about four hours).

In the event of an electrical system failure, all remain powered via individual dedicated batteries. Additional safety enhancements include:

- Equipment: Permanently installed fire extinguisher, egress hammer, and seat-belt cutter.
- Spares: Headset Jacks, 2 12V power outlets.
- Fuses/Breakers: All fuses eliminated, all CBs are now located within view and reach of pilot.
- ELT: Wired for 406Mhz (with GPS input) installation.
- Hands-free starting system: Allowing one hand on the throttle and one on the control stick during engine start.
- Enhanced gear warning system.
- Ground Power: A standard GPU receptacle was added for ground avionics training, GPU-starting, battery charging, and aircraft maintenance needs.

Dr. Kaufman's Swift is an ongoing project and further steps will be taken to enhance it aesthetically and operationally. Undoubtedly, more ideas from Cirrus/COPA will be incorporated. But, going forward, the aircraft's main mission remains unchanged … *FUN flying.* COPA

About The Author: *Matthew McDaniel is a 20-year professional pilot with a background in airline, corporate, and charter opertions. He's owned and operated Progressive Aviation Services, LLC* (www.progaviation.com) *since 2002, specializing in Cirrus, TAA, and Glass Cockpit training. Matt has been actively instructing for 18 years, has logged over 11,000 hours in 70+ aircraft types, and holds five turbine aircraft type-ratings. He is one of only 53 instructors in the world to have earned the "Master Certified Flight Instructor" recognition four consecutive times. Mr. McDaniel can be contacted at (414) 339-4990 or matt@progaviation.com.*

Pimp My Panel

A Multi-Phased Instrument Panel Makeover

Because of the ultra-modern nature of the Super Swift's panel upgrade, the process had to be completed in phases. Several major components were planned into the design before they were even fully certified. When one phase was finished, the plane would return to flying status until another component received its certification, allowing another phase to begin. Below is a chronology of the process.

Before (Fall 2007): A very basic VFR panel: Standard 6-pack flight instruments, a mix of analog and digital engine gauges, a vertical card compass, a King KT-76A transponder, and King KLX-135A GPS/COMM (the GPS portion of which, was INOP).

Phase I (Fall 2008): A custom glareshield and new small-form compass were added and the first components of the radio stack were installed: A new Garmin SL30 Nav/Com and GTX327 Transponder.

Phase II (Summer 2009): The biggest single phase of the project. A new panel was cut, effectively setting the final layout. The 6-pack was replaced with a single Aspen (but backup analog ASI and altimeter remain). The radios are completed by adding the Garmin 696 GPS/Moving Map and the 155XL IFR-GPS. All engine/systems information is now consolidated into the JPI EDM-930 (which, along with most the circuit breakers, is tilted towards the pilot).

Phase III (April 2010): The Aspen MFD replaces the backup ASI and altimeter. An unseen fresh air system was removed in favor of external air scoops (weight savings). An improved electric trim system (pre-wired in Phase II) is completed and functional. The blank panel to the far left hides an analog G-meter and a spare 3-inch hole to be used in Phase IV. The plane is still limited to VFR due to lack of a certified backup attitude indicator. Also unseen is the under-glareshield panel lighting, which illuminate in the same shade of blue as the interior leather. This phase only lasted a couple weeks, and we have no specific photos of it. It looks just like the Phase IV panel (Picture 1), but with the area left of the Aspens being blank.

Phase IV (May 2010): The backup electric attitude indicator is installed in the spare 3-inch hole on the far left (below a recessed G-meter). The aircraft is once again IFR certified and legal. Note the custom checklist hanger on the far left (Picture 2).