



Piper M-Class Owners & Pilots Association

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M A G A Z I N E

Volume 14 Issue 1



Member Spotlight

Meet PMOPA Member
Colin Gibb

Safety in Avionics

Current Avionics Technology to Keep Us Safe

Voluntary SMS for our Safety Journey

How Owner-Pilots Can Benefit

Meet Your New Co-Pilot

the QRH

“Risky Business”

Liability for Running an Engine Past TBO



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Safety in Avionics

by Steve Nunn



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Avionics has advanced so much since our mighty PA-46 was conceived in the early 1980s and we are fortunate to fly such a great airframe, and most often updated with modern capabilities. Future articles will talk about new technology coming on stream, but the purpose of this article is to remind us all how we can use our current avionics technology to keep us safe.

What is your personal Minimum Equipment List?

Not every PA-46 has an MEL, but pilots should have their own personal list that you previously committed to

use, and that you wouldn't depart if the equipment is not working properly. We have all heard of the infamous accident chain and the connecting links that ultimately lead to aircraft mishaps. We so often see aviation accidents are not caused by a single critical failure but could have been prevented by breaking just one link in that chain. If you are reading this article, you are a single pilot in a high-performance aircraft, and it's vital to have all that equipment working to ensure a safe flight. If your co-pilot Attitude Indicator is failed or your autopilot pops the circuit breaker every 10th flight, then those should get those addressed before your next flight. You never know when you might need those backup instruments.

Remember the fatal JetProp flight in Edmonton, AB that departed with a known failing Attitude Indicator that ultimately caused a loss of control with all on board perishing. Another JetProp out of Shreveport, LA, took off with a known autopilot discrepancy that met with the same tragedy after spatial disorientation by the pilot.

Legacy vs. Modern Avionics?

Certainly, there have been big advancements in avionics and, although it's getting more difficult to operate with legacy cockpits, it can still be done safely provided:

- The equipment is all known to be working correctly; and
- The pilot knows how to properly use each system; and
- The pilot considers the cockpit limitations during the planning of each flight.
- Interestingly, modern avionics can be more dangerous unless:
 - The new systems have been properly test flown to ensure everything is working correctly; and
 - The pilot is familiar with the new systems and has had completed orientation/training flight(s) including approaches in VMC; and
 - The pilot has reviewed the Pilot Guides (PGs) and Flight Manual Supplements (FMS) and paid particular attention to the Limitations sections.

Do You Know Your Systems Failure Modes?

In the commercial airline industry, you need to know all your systems and are challenged on that knowledge on recurring check rides. When is the last time you cracked open the POH to look into the variety of systems, and importantly, have you or others updated it with the addition of new systems?

In the avionics business we are surprised to see how many pilots are unsure of their autopilot reference source. Is it coming from that new piece of glass, your old backup attitude indicator, or a turn coordinator? What happens if you lose your vacuum system? What systems will it effect? Does your modern glass cockpit have a backup digital AHRS and is it pilot selectable? A misbehaving autopilot in IMC at night is not the time to break out the manuals.

If you are lucky enough to have installed a modern digital autopilot, then you have some new autopilot modes and enhanced safety features

like envelope protection. Be aware that some of these only work when the autopilot is engaged while others are watching your speed and attitude all the time. There are even more nuances than that; for instance, Garmin's popular GFC600, when installed in the PA-46, is connected to the stall warning. It's important to understand the operations, for example:

- The Underspeed Protection Mode (USP) provides a pitch down command to maintain 2 KIAS above the stall warning.
- The Electronic Stability & Protection (ESP) mode operates when the autopilot is not engaged and takes control at attitudes greater than 20 degrees nose up or down, or 45 deg in bank, exceedance of a predetermined airspeed based on the airframe (typically just above VNE), or when the stall warning is active. This is a safe and sophisticated integration of the existing PA-46 system, but the weak link of ESP is the stall warning system, so make sure your stall vane is calibrated.

More importantly understand that this feature is not a "save your butt every time feature", but a good feature that may or may not activate at a high AOA.

Situational Awareness

There are not many PA-46s flying around with an original panel, and we are very fortunate to have a vastly improved digital representation for improved situational awareness. Modern Synthetic Vision is a great example of this, and I like to think of this as our virtual copilot tapping us on the shoulder saying are you sure you meant to turn in that direction? Synthetic Vision Technology (SVT) can be a huge help in an engine out scenario versus a terrain page. Most terrain pages only light up when within a 1000', SVT shows the valleys in mountainous terrain from the flight levels, allowing you to navi-

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gate across that ridge (or not) to get the safest landing zone. PA-46 instructors often tell me of installations where the owner cut the corner and didn't purchase the SVT option. It doesn't matter whether you fly over the flat plains of Kansas or the Rocky Mountains, you will benefit greatly from this inexpensive enablement (and yes you can order it after your installation).

Pretty much all of our cockpits have at least one Multifunction Display (MFD), usually multiple. A very good practice is to always have one display dedicated to a moving map page for continued situational awareness for not only you, but that person in the right seat. They might become a real asset when things start failing and they have a good understanding of where you are. I always find "Track Up" is the most intuitive mode to keep in, but if you deviate from that please explain it to your right seat passenger.


One last significant point is to make sure you have georeferenced approach plates turned on. There is no better example of where you want enhanced situational awareness than down low during an approach. We tend to cover up our moving map with an approach plate, but now with the invention of georeferenced approaches we now have a virtual airplane overlaid on the plate where we can maintain excellent situational awareness.

Personal Electronic Device (PED) Dependency

Tablets and flight planning apps have become so advanced in the past decade, and they make our flight planning so much easier. We see some pilots leaning a little too heavy on this piece of technology in the cockpit. Neither our tablets nor apps have any regulatory certification and they cer-

tainly do not stand up to the reliability testing your cockpit mounted equipment does. I personally have flown as a copilot in a Piper Malibu where both our iPads failed simultaneously due to overheating with the sun pouring at Flight Level 210. If you have had that happen, you will know that even taking it out of the heat takes some time to cool down and reboot. If you are using your PED for approach plates, then a paper copy is a good backup plan.

In my opinion, if you have a glass cockpit, then the iPad should be an ancillary device and not relied on for navigation or approaches. Cockpit displays keep your head up and a view outside can be accomplished with little head movement. The tablet forces your head down onto the yoke or kneeboard and that is an easy cause of spatial disorientation. Tablets and the associated apps are fantastic at home, your hangar, or an FBO and are likely the primary tool for flight planning. They have a useful purpose in the cockpit but should absolutely be considered as secondary tools.

For all these reasons, agreeing to a personal functioning equipment list, understanding thoroughly your specific avionics operation, knowing the failure mode ramifications, using all the tools in your toolbox for enhanced situational awareness, and not becoming dependent on your tablet, are crucial to operating our PA-46's safely.  PMOPA

Steve Nunn is director of business development at Maxcraft Avionics Ltd. Located in greater Vancouver, B.C. Canada, Maxcraft is one of the largest full-service avionics shops in Canada and provides professional avionics services to operators of all types of private and commercial aircraft, including piston, turboprops, jets and helicopters. Maxcraft owns a PA-46-310P and Steve flies both the Malibu and his personal Cessna 206 Amphib. He also serves on the PMOPA Board of Directors. He can be reached at steve@maxcraft.ca

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