

GDGL *Panel Animals* IGINE

Part 5: Learning to Fly



By Tom Machum

Editor's note: The following is the fifth installment of an ongoing series chronicling a professional panel upgrade on a single-engine, legacy aircraft; in this case, the author's 1979 PA-28-236 Dakota.

As mentioned, the overriding goal of this series is to provide a behind-the-scenes look

at what the owner of any legacy GA aircraft – be it Piper, Cessna, Beechcraft, Mooney or other – can expect when he or she decides to invest time and resources into a professional avionics upgrade.

The sixth and final installment will cover how the author and his plane partner, Paul, are addressing ADS-B (out and in). Enjoy!

With change comes adjustment, and this project had plenty of both! What started out as a modest upgrade gradually morphed into a much more ambitious project. Nevertheless, my plane partner, Paul, and I are pleased with the results.

Throughout the process we were able to consider our options carefully and make adjustment as needed. Not only did we have the benefit of working with the great team at Sarasota Avionics (www.sarasotaavionics.com), but we had numerous friends who offered their wisdom, experience and common sense to consult the regulations and to make sure that our new panel would exceed our expectations.

But now came the time for the rubber to hit the road – or more accurately, the wings to slice the air! We needed to learn how to interact with these new gadgets and make them sing in their new chorus.

Thankfully, it has proven to be a relatively easy transition, as the new generation of avionics brings smartphone and tablet-like logic to the cockpit. What follows is a review of the most used items: from Garmin, the G5 and GTN650, and from JPI, our EDM 900 primary.

GENERAL CONCEPTS

As you may recall from a previous installment, our goal was to have a state-of-the-art cockpit with great

ergonomics and, of course, we needed to ensure all regulatory requirements were met. We also wanted everything laid out in a way that made sense functionally and, more importantly, in a manner that would enhance safety.

To address this, we placed the G5 in a position where it could easily become the primary should the Aspen malfunction. We also placed the VOR/ILS display and the turn coordinator nearby to create an alternate “mini-scan” should we need it. Again, this would be in the event of a loss of primary flight instruments, but it’s also a good backup should the new GTN 650 fail. Along with that, the EDM 900 combines *all* engine information on a single, compact screen.

Another adjustment we made was to move the engine information away from traditional Piper placement, which is typically ahead of the pilot’s right knee and behind the control column with either side of it protruding from the panel, to front and center. I snickered to myself for the first few flights, as I instinctively looked to the top of my right knee to reference manifold pressure and RPM. Still, I was amazed at just how quickly I adapted to the new placement.

Let’s now take a look at the new instruments in a little more detail.

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PHOTO A



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While the G5 may only serve as a replacement for our secondary attitude display, it can be used for so much more.

There's really not much to say about this fantastic unit, other than it does what it's supposed to do and does it with ease and simplicity. The version for certified aircraft includes a mandatory four-hour backup battery, and although it displays more than attitude, it may only replace one of your primary instruments. However, when this article was being written, Garmin announced that a second G5 may be installed to replace an HSI in certified airplanes. It's a delight to see this sort of affordable technology becoming available for the vast certified GA fleet.

As you may recall, we already knew that our vacuum horizon would need to be overhauled in the not too distant future. Similarly, our technical logs indicated that the vacuum pump was well past the time at which such instruments are expected to fail. So when we did the cost analysis for the replacement of these two units, the investment in the G5 became a no-brainer.

Not only would we be gaining a reliable unit, but it would come with more than just horizon information; it also provided airspeed, GPS track and course, altitude, slip/skid, rate of turn and vertical speed. Of course, these are secondary displays, but in the event

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of a loss of primary information, the G5 will serve as a more-than-adequate means of getting back on the ground safely.

PHOTO B



Pilot viewable menus are only two layers deep. Here we see the back button highlighted. If the knob on the bezel is pressed, the submenu disappears. Also note that if the knob is twisted, the blue box moves across the bottom, eventually displaying the submenus that are out of view to the right of the screen.

On its face, the G5 has only one button and one knob; the latter of which also serves as a button (see Photo A). When the knob is pushed, a menu appears at the bottom of the screen (see Photo B). The knob may then be twisted to create a highlighted box around the selected menu option, and a second push of the button enters the menu and the parameter may be adjusted.

For example, we accessed the "pitch" selection to synchronize the aircraft display with the display on our Aspen. It's a very simple process that we completed without needing to reference the manual.

GTN650 GPS/NAV/COMM Garmin - www.Garmin.com

Twenty-first century, intuitive technology makes its way into the GA cockpit! Yet again, this upgrade was not a part of our original plan. However, once we weighed the benefit of the trade-in value being offered for our GNS430W against the fact that we'd be getting a state-of-the-art unit that adds significantly more utility and ease of use – not to mention a larger, brighter, higher resolution display – it wasn't long before our wallets got lighter!

Again, the 650 has fewer buttons and knobs than the unit it replaces and it sports the same sort of intuitiveness we've become accustomed to with our smartphones and tablets (see Photo C). Almost everything can be done with the touch screen via tapping, pinching and scrolling, and just like your other gadgets, there's more than one way to do most things. Even with around 20 hours of flight time with this unit, we're still learning shortcuts and alternate ways to utilize the capability and power of this unit.

As part of our preflight preparation, we downloaded Garmin's iPad app and set it up to "play" with the main

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features of the unit. This was a great way to learn about the unit without the costs and dangers of fidgeting in flight. We even bumped up the unit's speed to simulate 250 knots, which is more than 100 knots faster than we'd normally experience in our airplane.

This added speed kept us occupied and made us work harder than we hoped we'd ever work in the airplane, although, of course, there are other items to consider in real flight that would take one's focus away from the 650. Nevertheless, it was a fun and helpful learning experience. We also found some very helpful videos on the Web and even referenced the excellent Garmin manuals for even more information.

Transitioning from our old equipment to the new unit consisted of two basic aspects:

1. Learning how to anchor our hand so that we touched the correct area of the display in bumpy air.
2. Simply learning the sub-menus, shortcuts and new features of the unit.

With regard to hand placement, we practiced on the ground and became proficient with it rather rapidly. The 650 is equipped with a sort of ledge along the lower part of the unit and another on the right side of the display. These anchor points – and others on the adjacent panel – quickly became second nature.

As for features, the 650 does all of the tasks that our 430 did – and much more. The main functions we've discovered and are grateful for are the "SafeTaxi" and "Auto-fill" of airways. The former is a very detailed, high-resolution airport map that helps the pilot to avoid a runway incursion and maintain situational awareness. The latter is a tremendous time-saver when entering complex routes along airways. It simplifies the task and allows the pilot to get back to focusing on the other aspects of flight management.

Menus and sub menus are arranged in an intuitive way, and one can either back out of a sub-menu with ease, or press "Home" (one of the few buttons on the unit) to get back to the main screen lickety-split.

The "Nearest" function is also easier to access; better yet, it can be filtered to show only airports with specific parameters, e.g. runway surface and length. This is an excellent feature that would really show its full potential in a highly-charged situation. After all, one less button to press or knob to twist is *always* better!

Another main feature – that, in some ways, is more of a gee-whiz component than a practical, day-in-day-out necessity – is the ability to program and fly holds with ease. Though this is something that rarely occurs in the real world, it is a skill that can accumulate rust rapidly, thus it's a great safety procedure. The 650's data input menus allow the pilot to program and fly a hold like a superstar, thereby

letting him/her get back to managing other aspects of the flight as circumstances warrant.

In our case, we also have the 650 getting data feed from our new EDM 900 engine monitoring system. Fuel flow and fuel on board are automatically entered into the 650 so that we may use the flight planning options in the 650 to allow us to maintain situational awareness and make better strategic decisions.

Realize that we're just scratching the surface of what the GTN650 unit is capable of doing for the GA pilot. Suffice it to say that we're confident it will serve us well, and with time we will use as many of the options it has available to assist us in flying as safely as possible.

EDM 900 PRIMARY ENGINE DATA MONITOR

JPI Instruments - www.jp instruments.com

We hit yet another jackpot with this unit! Its all-in-one presentation, easy-to-read display and thoughtful menus and sub-menus make us wonder how we managed with the array of dials we used before.

We were familiar with the JPI operating philosophy with our EDM 700, but aside from viewing EGTs, CHTs, oil temp and battery voltage, the only other function we had was lean find. Of course, we also had the ability to store engine data, but we never used that function on the 700. We do, however, look forward to doing so with the 900, and perhaps that will serve as the subject of a future article – we'll see!

Viewing the unit (Photo D), you can see that the EDM 900's screen is broken into four distinct areas:

PHOTO D



The EDM 900 Primary condenses all engine parameters into one crisp display.

1. The two side-by-side segments in the upper left corner are understandably dominated by manifold pressure (MAP) and RPM.

- The upper two-thirds portion of the vertical segment to the right of the screen displays secondary engine indications.
- The lower left (and lion's share) of the screen is EGT and CHT for each cylinder. The small blue boxes in the upper corners of this area are dedicated to % HP and OAT in Fahrenheit respectively, and within the latter field are numeric displays for other ancillary measures.
- Finally, the lower right corner displays fuel on board by tank.

Also notice the four white buttons across the bottom of the unit and note the accompanying dark blue menu with white text just above them. These buttons are capable of multiple functions depending on the view to which the unit is set.

In this case, the view is set to "Normal" (displayed as "NRM" in the white box on the left) with the first button ready to manually step through all of the measured parameters. The second button (from left to right) would be pressed to initiate "lean find," which can be set to lean or rich of peak, while the third button introduces the screen dimming function.

As for the fourth button, note it is selected to "All." This means that *all* parameters are displayed in the large, white text on a rolling basis, meaning each is in view for just a few seconds before the unit scrolls to the next item. This button can also be set to "Temp" where the rolling display focuses exclusively on the EGTs and CHTs for each cylinder. As mentioned, the unit was scrolling through all parameters at the moment the photo was taken, thus it's displaying EGT and CHT for the #5 cylinder.

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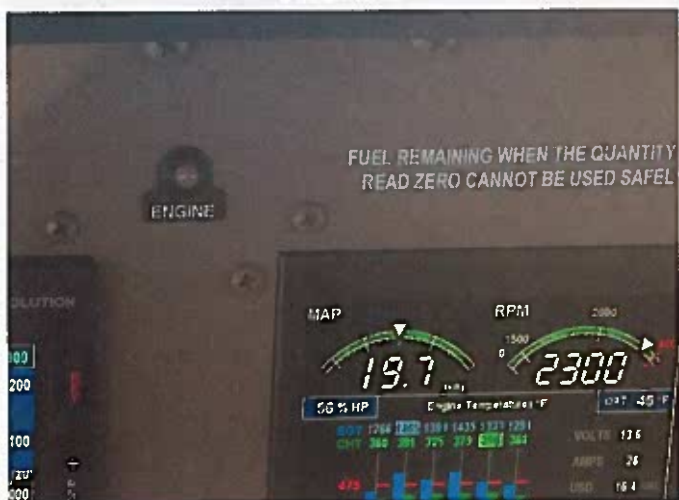
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PHOTO E



Note that with a combined unit such as this, there is also the need for an Engine Advisory light. This light must be installed in the pilot's primary field of view and, depending on the nature of the fault, it will glow red or amber to direct the pilot's attention to the primary unit and the offending parameter.

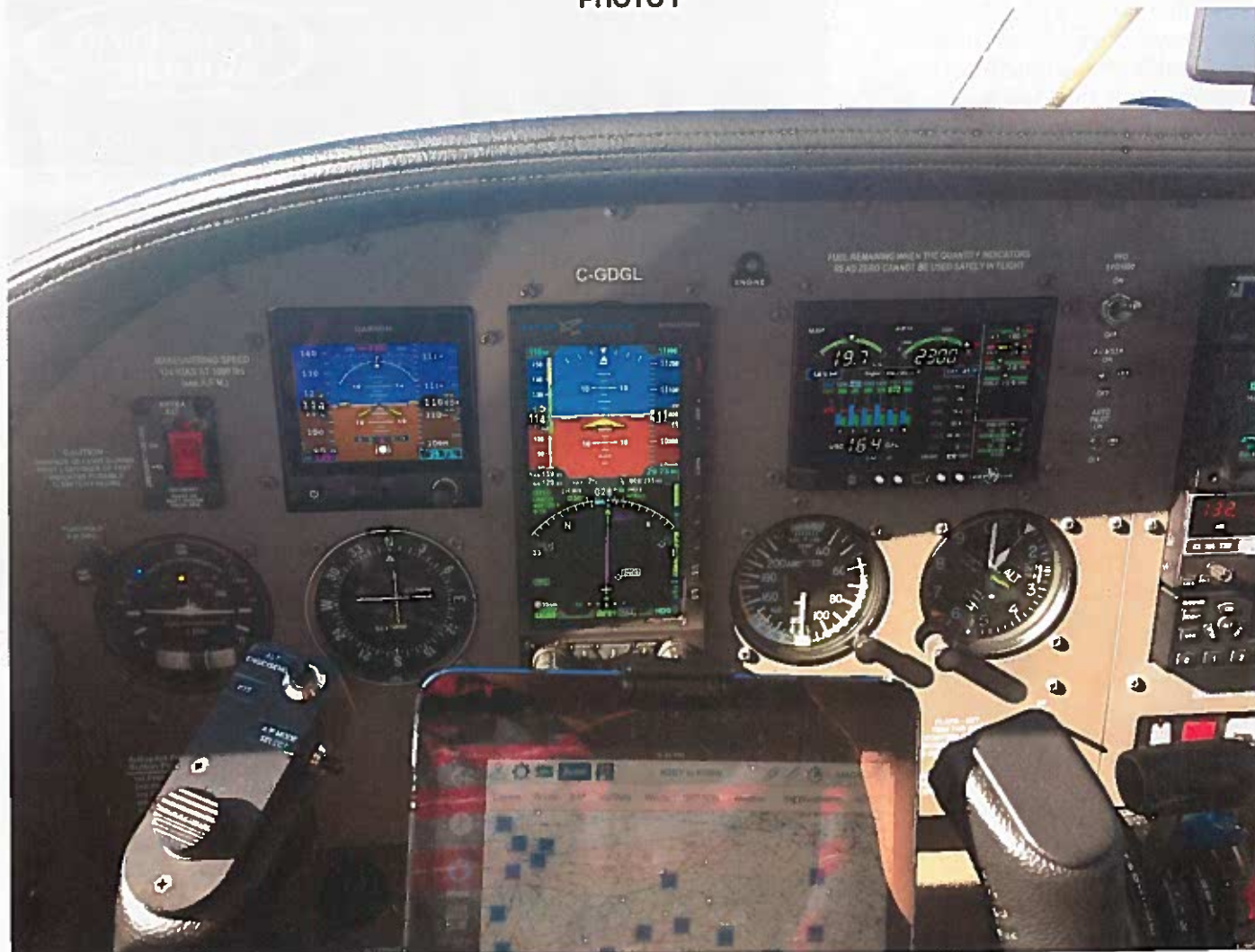
The manual supplied by JPI is very comprehensive and detailed, outlining all of the features of the unit. It also contains operating tips and troubleshooting notes for engine parameters, along with detailed calibration guides for fine-tuning the percent horsepower and fuel flow displays.

In addition to sending information to the GTN650, the unit also receives data from the GPS to display MPG, fuel at or to destination, and fuel over next waypoint. In short, it's a highly customizable unit.

SUMMING IT UP

Learning these new instruments has, of course, had a learning curve with it.

PHOTO F



Our new instrument scan is clean and compact. The G5 makes a nice view to the left of our primary flight instruments and the EDM 900 brings all engine parameters into direct view.

Thankfully, we know the airplane well, and these new items represent the best of what contemporary GA avionics has to offer - great displays, ease-of-use, and an abundance of information sources to learn the tricks. We know we have much more to learn, but we're enjoying every minute of it and we're looking forward to seeing where and to what adventures these gadgets will take us.

Next time, in the sixth and final installment of the "Panel Annals" saga, I'll share how we addressed ADS-B in and out. ✈️

Until then, fly safe!

In case you missed it, see:

Panel Annals Part 1:
Forming a Plan
April 2017 (page 42)

Panel Annals Part 2:
Out with the Old
May 2017 (page 34)

Panel Annals Part 3:
Beware of Scope Creep
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Panel Annals Part 4:
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July 2017 (page 42)

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