



JEFF SKILES
COMMENTARY / CONTRAILS



The Humble E-6B

A computer that doesn't speak binary code

BY JEFF SKILES

I'M ON A MISSION OF DOUBTFUL UTILITY, more of a search really, a crusade, a quest to find a vestige of my youth. You see, I last saw my wedding ring somewhere more than a decade ago but probably less than two. Like most people, with the passing of years my increasing waistline has been matched by a corresponding expansion of the circumference of my ring finger. This unwelcome event caused me to set aside my wedding ring some time ago lest it become a tourniquet and forever remain as a permanent part of my anatomy.

For no bad reason that I know of I have lost quite a bit of weight lately, and I had the thought that just perhaps I could slip my wedding ring on once again. It's probably a lost cause with the general fattening of fingers that seems to affect men over time, but since I currently have a bit of time on my hands, a wedding ring search shows promise to fill the day.

THE TOP DRAWERS OF OUR LIVES

This search for my band of betrothal has brought me to review the top drawers of my life. You know what I'm talking about; we all have

top drawers, and they are the places where we store the detritus of our lives. The crucial, must save items that we have no other place for and yet simply must, must retain for no obvious purpose. Normally these items take up permanent residence in our top drawers, and as we dig down through the layers we encounter things that we may not have cast our eyes upon for many years.

I actually have several top drawers. There's the top drawer of my bedroom dresser, my bedside table drawer, the one drawer in the bathroom vanity that my wife has allowed me (she uses the other five), and a drawer in my workbench in the basement. All would be appropriate possibilities for long-term wedding ring storage in my book. So I set upon my quest.

For navel gazers, the objects taking residence in one's top drawer could probably serve as a window to our souls, not an attractive proposition for me. Every single item is important enough to keep until the end of time yet are in no way needed for daily use—if even yearly. As I dig down through my drawer I find to-do lists from 15 years ago, a fully filled out jump seat form from the 1980s, loose change, one lone captain epaulet, a tie I haven't seen in years, more loose change, an electronic chess game I never played, an ear mold for a long gone headset, my collection of non-working Indiglo Timex wristwatches with broken expandable wristbands with their hands ever frozen at the exact moment that the battery gave its last...even more loose change.

I pause here to ponder the possible value of the loose change deposited in top drawers and under sofa seat cushions. "Hey, Barb," I yell, "I think we may be able to retire after all!"

Moving on...a Waco belt buckle given to me by Addison Pemberton that I never quite got around to getting a belt for, ear plugs, in fact, a whole lot of ear plugs, a pair of those socks they give you on international flights to pad around in, and at the bottom of the pile, the very bottom of my drawer, a brown vinyl cover that proves to contain my E-6B.

Or more accurately my father's E-6B, which would certainly put its date of manufacture sometime in the 1950s. The E-6B is a device that answers the Jeopardy question, "What does every pilot own yet has little reason to use?" For most of us, actual use diminishes dramatically following the successful accomplishment of our private pilot checkrides. For some reason the accuracies of a magnetic course calculated to an absolute nth degree rarely seems necessary in the real world. Whether it takes 53 minutes or 56 to reach a pancake breakfast is not a life or death statistic on which future empires may

hinge. We just sally forth and figure it out. This "never read directions" philosophy so fits with the pilot psyche.

PLAYING WITH THE NUMBERS

The most critical calculations are best accomplished in our head anyway. How do we calculate a top of descent? Modern avionics can do it for us, but in the old days we did it ourselves. Quick now, if you have 7,000 feet to lose at 500 feet per minute, and you're traveling 150 knots, when do you start your descent? Five hundred into 7,000 is 14, minutes that is. To translate 150 knots into like digits divide by 60 to yield 2-1/2 miles per minute. Fourteen times 2-1/2 is 35. It will take you 35 miles to descend to pattern altitude.

I once flew Douglas DC-9s for a living, and while they traveled at 35,000 feet and could do so at 450 knots, they still had only the most rudimentary of avionics. Specifi-

Every **GRAM**
has a purpose.



Learn more at cubcrafters.com

Yakima, WA | 509.248.9491

HTP America Inc.

TIG 221

Our Invertig 221 AC/DC TIG welder puts 220 amps of power in an affordable, compact package, yet pulls only 36amps.



- Independent AC amperage adjustment
- 220 amps of welding power, weighs just 40 lbs.
- 3-year warranty
- Three models to choose from

One Source for all your welding needs.

Call for our FREE Catalog
800-USA-WELD
www.USAWeld.com



Free Shipping on All Orders Over \$35

BEST SINGLE-PLACE PERFORMANCE PER \$!!!

onex

- Single-Place
- Folding Wing
- Sport Pilot Legal
- Aerobatic • Fast



Fits Your Budget
and Your
Garage!

Build & Fly
onex Single-Place
\$27,380
Store a squadron in your hangar!

920.231.8297

www.SonexAircraft.com

sonex
aircraft LLC

JEFF SKILES

cally we only had a DME readout; ground-speed calculation was still apparently off in the distant future when the Douglas design engineers laid down their slide rules. So how do we calculate ground-speed? Take a 15-second hack on your watch. Let's say that you travel 2.1 miles in 15 seconds. Multiply by 4 to get the distance traveled in a minute. Then multiply by 60 to get your speed over an hour. For the math, 2.1 times 4 is 8.4, then multiply by 6 in your head. So 8 times 6 gives you 48, and 4 times 6 equals 24; add 48 and 2.4 together and you get 50.4. Move the decimal place, and you are traveling at 50.4 knots. The mental satisfaction at coming to this conclusion without a pen touching paper is unbelievably rewarding and can be compounded by using that speed to calculate your descent as before. We're traveling at more or less 8-1/2 miles a minute for those who haven't quite picked up on this game just yet. And you always wondered what airline pilots are doing up there in the cockpit while you are sleeping in back.

A MECHANICAL COMPUTER

All these mental gymnastics aside, I have a fondness for my E-6B. Maybe it's because it is entirely mechanical and doesn't rely on electrons whizzing around on circuit boards to achieve its function. You see, I am old enough to have learned the manipulations necessary to operate a slide rule. When I was in high school in the mid-1970s handheld calculators were still a few years off, and we had the choice between learning with a traditional bar slide rule and a circular slide rule. My budding aeronautical interest drew me to the circular variety from the start. After all, an E-6B, which I fancied that I had already mastered in my private pilot course, was merely a specialized circular slide rule designed to ease the calculations required to turn numbers quantified in hours like speed, distance, and fuel burn into minutes. It can also calculate true airspeed, groundspeed, wind correction angle, and density altitude, a veritable fount of knowledge in the hands of those who know it well.

My family E-6B is of the aluminum variety, which in this day of plastics seems to evoke quality. The aluminum wheel slides so effortlessly it makes calculating an almost joy. Press down the plastic tab that acts as a brake, and the card slides easily up and down as well. It is a joy to operate.

WHO OR WHAT IS NAV-COMP INC.

My E-6B was constructed by a company called Nav-Comp Inc. I know this because the name is proudly emblazoned across the face of the device. In fact, mine is a Nav-Comp model NC-1 strongly implying that there was an NC-2 and perhaps even an NC-3 in Nav-Comp's product lineup. The NC-3 would certainly hold the promise of amazing refinements in E-6B calculating potential. Alas, Nav-Comp seems to have no presence today so I can only conclude that E-6B production must not be a gold-mine opportunity.

I believe that we can learn much from exploring the derivation of an object. We tend to do too much judging of things in the here and now rather than in the context of when and why they were created. Learning the answers to the five W's of investigative research, who, what, when where, and why can evoke its own kind of enlightenment.

I've researched the humble E-6B so I'll save you the trouble. The E-6B was created by two enterprising young men in the years leading up to World War II, Philip Dalton and Philip Van Horn Weems. Both were brilliant naval officers and had developed a series of flight computers and plotters for naval aviation uses. This of course was in the day when a computer was a device to help you calculate numbers and not a beeping throbbing machine that only speaks binary code. The E-6B was the result of an evolutionary development process combining many of the best features of the various computers of Dalton and Weems' design.

THE WHIZ WHEEL GOES TO WAR

World War II cemented the E-6B "Whiz Wheel" as the computer of choice for decades to come when the military ordered more than 400,000 copies for use by

airmen of all services. The designation E-6B sounds as if it would be worthy of protection as a Pentagon secret, but in truth it is entirely arbitrary. The letters and numbers have no particular meaning in the vernacular of military supply chain management. In fact, it was only officially called an E-6B for two years before other identification numbers were attached to the device. Nevertheless, E-6B is what it is fondly known as to this day. Eventually the patents ran out, and many companies began manufacturing their own versions, ergo my Nav-Comp model.

The E-6B has made a few TV appearances, too, most noticeably on *Star Trek*. In one episode Mr. Spock used his E-6B to calculate the time in which the Enterprise might shortly impact a planet. I guess he didn't have a pocket calculator either—10 years too soon for Spock as well.

The E-6B was held in the hands of tens of thousands of servicemen during the war, but

in the end the device didn't do Mr. Dalton much good; he died in a plane crash in 1939 while teaching spins to a student.

For those who may not know how to use an E-6B, the Internet is absolutely rife with instructional documents and videos. Teaching someone how to use an anachronism from the 1930s over the World Wide Web seems incongruous, but no better device than the E-6B has surfaced for making aeronautical calculations these long years.

Today we try to bring modern convenience to cockpit flight planning with myriad devices that add amazing capability. We share our cockpits with GPS devices, ADS-B receivers, and iPads, but lamentably their associated power cords and antennas also snake like tentacles across our aircraft interiors making them rather resemble the table of an old-time switchboard operator.

Maybe Dalton and Weems had it right. Simplicity is a virtue. I think that my E-6B needs to be liberated from residence in my top drawer to be positioned in a more fertile place for the application of its unique and varied properties. There is a nice little pocket right next to my ankle in the Skywagon that appears as if it was designed for just this purpose. My E-6B shall fly once again.

Note: I found my wedding ring! It was in repose beside my Pinewood Derby ribbon (2nd place!) from 1969 in a bed of vintage Tic Tacs that have somehow escaped their tin. It still doesn't fit. EAA

Jeff Skiles, EAA Lifetime 336120, is an ATP and CFII-ME who has been flying as an airline and light airplane pilot for 38 years. He has owned a Cessna 140 and a Waco YOC and currently flies a Cessna 185. Jeff can be reached at JeffreyBSkiles@gmail.com.



Elevate your flying.

IFR. Trust, when it matters most.

Mobile FliteDeck – Full USA IFR charting coverage for your mobile device now only \$299/year*.

Get a free 30-day trial at jeppesen.com/flitedeck-ifr31

*Limited time offer, good through December 31, 2014. Purchase of Jeppesen navigation services at \$299 per year, for two years. Used with Mobile FliteDeck (JeppFD) and Mobile TC for Apple iOS and Android.