

# HAND-HELD GPS:

## Portable Wonders Useful Beyond Navigation

BY DAVE HIGDON

**M**aybe you've been flying "without" — you know, relying on that old, now deadweight Loran C box or the first-generation, panel-mounted satellite-navigation receiver, one with all the functionality of that old Loran, except that it still works.

Maybe you've been flying with an early generation portable GPS navigator. Or maybe you created your own navigator by using a personal digital assistant and the add-on hardware and software allowing it to work as a GPS when you don't need that something-  
berry to handle your e-mail or Rolodex.

If you're like many pilots, you've seen the latest in wonder boxes: the full-feature portable GPS navigator. You're hesitant to upgrade; from the hangar-flying conversations you've heard, there are so many features, so much money and so much confusion. For whatever reason, many pilots continue to love the one they're with.

Unless you're one of those early-to-adopt, gotta-have-the-latest aviators — the kind of customer cell phone companies and Apple adore — it's possible you're flying with some portable navigator that dates to the mid-1990s, when these powerful wonders first caught on and started flying off shelves and into cockpits.

Plenty of us still remember those smallish 254-level grayscale LCD displays with their crude-resolution iconography. Sure, we struggled to decipher the information in bright sunlight, but most of the time, we cruised along wowed by the capabilities stuffed into a package smaller than a cable-television remote and powered by four AA batteries

Time changes everything —and time has been good to the realm of the portable GPS navigation system.

First, those monochromatic screens grew in size and improved in detail, then — "Bang!" — they shrank again during the initial shift to color screens.

In parallel with the changes in display technology, manufacturers evolved the functionality of the handheld GPS. They morphed beyond the basics of navigation guidance into sophisticated flight-information tools.

First came complete navaid and airways data.

Airspace boundaries, airport databases, landscape mapping and color coding followed close behind.



*Garmin GPSMAP 695*



*Bendix/King by  
Honeywell AV80R*

Next, came a set of features that continues to drive both the upgrade and gotta-have-it instincts of pilots across the spectrum of aviation: weather-radar images and text-based information delivered via data-link and available on-screen with the navigation base map.

Today, the latest portable devices capable of serving as a GPS navigator also can provide synthesized 3-D navigation images, deliver modern digital Doppler weather radar imagery, and work with portable collision-avoidance hardware while legally substituting for paper charts.

As with so much of aviation, knowing the mission profile typical of the pilot goes a long way toward answering the age-old question: “What do you think I should buy?”

### LET NEED GUIDE YOUR SELECTION

Sometimes, the first question to answer on any aviation-buying topic involves first answering other questions.

“What do you want to do with it?” This is the most fundamental question of them all when buying an airplane. Apply the same question with “it” the subject of your GPS shopping.

Answering this question can help define and refine how much you actually need in a portable navigator, as opposed to how much you want to have in one — a question that always affects the spending decision.

Do you fly only short-distance trips or engage in free-time airport hopping? Or do you engage in serious business travel, where getting there on time isn’t a casual decision? Do you fly only clear-blue-sky aviating or all-weather flying?

Some portable GPS devices provide the option of adding new features after purchase, while others get fixed in their capabilities at the factory. You make your configuration choice in your purchase decision.

Matching up a unit to what you need and how you plan to use it can mean a long relationship with a product that fulfills your needs. Failure to do so can result in a short period of adulation followed quickly by buyer’s remorse when you realize you should have gone with more options, or less.

### THE BASICS

Current-production GPS navigators all feature the capability of using signals from multiple satellites, some with multi-channel GPS engines, others with engines that shift through the visible satellites several times a second.

The use of signals from multiple satellites helps the processors calculate the receiver’s position more accurately than if it used signals from only four birds — the minimum number required to get a good fix in three dimensions. The more channels the navigator can receive and process, the better — particularly during maneuvering flight.

As for the wide-area augmentation system (WAAS), it is common throughout the offerings of GPS navigators, although some older, lower-priced units still available new might lack this accuracy-enhancing improvement.

You might find a less-expensive solution in a portable

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GPS lacking WAAS, but because of the improved accuracy and more contemporary design, consider making WAAS capability a must.

### DATABASES

At their current level of development, GPS handhelds these days generally all cover the database basics. For example, airports, their identifiers, all ground-based nav aids, airways and special-use airspace depictions are pretty much standard across the board in contemporary models.

If your flying takes you across sectors and through myriad airspace types, consider shopping for a GPS with the ability to use those airspace borders to alert you prior to entry, as opposed to merely showing the boundaries.

More and more of these devices depict the terrain below in greater detail than just a few years ago; thanks to more high-resolution terrain datasets and more digital memory. Terrain elevation information generally works in 1,000-foot segments below 5,000 feet or so, then in larger increments above, with elevations higher than 10,000 msl the highest. Some might continue to code segments above 10,000 msl.

Most of these devices offer not only airport position, but they also provide airport information, with graphics of the runway layout and other information, such as elevation, runway orientation, lighting information, UNICOM or CTAF frequencies, and contact frequencies for approach control, ground, tower and more. Some even show approaches plates.

While not a legal substitute for FAR requirements to have this information available, it can work out more handily than cracking a book or making another Internet search before boarding.

You might find newer GPS navigators appealing, those showing your flight in a profile view, as if watching your own flight from out the right side. Profile view features tend to show airspace outlines, as well as terrain, obstacles and obstructions in relation to your cruising altitude. This makes the profile function a useful tool for avoiding an unpleasant encounter en route — or an unwanted registered letter from some friendly aviation official.

### GET YOUR UPDATES

The potential weak link in database-dependent functions is simply the update cycle. The following are a couple of tips worth noting when you're pricing units and their database-update costs.

First, database-update costs vary among GPS products, largely because they vary in sourcing.

Jeppesen products are the foundation of many company's database products, including Garmin. NACO Charts from the FAA are the foundation for other database products, some

sold for a specific product, such as the Seattle Avionics database packages produced for Honeywell's AV8OR line of GPS and EFB products.

Because prices can vary widely between similar products, it can pay long-term dividends to weigh database-update costs while shopping for a portable GPS, then fold your own needs to upgrade into your calculations.

The FAA issues updates on a 28-day cycle. Unless the handheld user updates regularly — or at least, before upcoming trips — information in the handheld can be out of date and no longer accurate. However, if you fly infrequently, you might need nothing more than an a la carte upgrade system.

Which brings us to the second point: database upgrades usually are less expensive per update if purchased in a package of 13, an entire year's worth.

For the power user and frequent flyer, updating the handheld every four weeks can pay benefits in the availability of up-to-date information on everything from frequencies and airspace boundaries to airways data. Manufacturers also can use database updates to upgrade their navigator products' operating software, sometimes improving features or offering new ones.

Thankfully, today's modern handheld GPS navigators offer easy updating, often by merely downloading the new package via an Internet connection and transferring it to the handheld with a cable or data card.

Regardless, taking the route of updating only annually is a set-up for finding something necessary changed from its last use — and this can cause safety-of-flight issues.

### CONTROL ISSUES

Increasingly, touch-screen control is moving into these products and buttons are moving out — or, at least, becoming fewer to the point that some of these boxes have little more than an on/off switch.

Because touch-screen displays lack any surface irregularity or tactile feel and controls can change function with the screen in use, they can require a little more focus and precision to use. Styli — a stylus — that generally accompany the touch-screen-control models can help; however, in rough air, the touch screen might seem a bit tougher to operate than a unit with the raised bumps of real buttons.

For your own needs, be sure you get a chance to play with the models you are interested in so you can get a feel for the touchy-feely control screen.

### CHARTING

While much of this article's thrust has been directed toward the aviation GPS navigator, another product is available for other needs but with the capability of serving as a portable navigation device. This product is the electronic flight bag.

More and more products offered as an EFB also provide

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GPS navigation chores on-par with dedicated navigators. Whether these devices are labeled as EFBs, GPSs or dual-purpose, they expand on the benefits of each device individually.

Honeywell's AV8OR Ace, for example, and the iFly700 from Adventure Pilot both qualify as legal EFBs when used with a current database of VFR sectional for the VFR pilot, or the appropriate IFR en-route charts, approach plates, arrival and departure procedures for the instrument pilot.

A portable, flight-bag-transportable GPS with WAAS that serves up the legally necessary charting for a flight adds utility to the box — that is, you can legally leave the paper products back in the hangar.

Some devices geo-reference the aircraft over the sectional, chart or plate, using the guidance the GPS provides. A growing number of pilots welcome this expanded utility. During uncomfortable circumstances of copying a third clearance change while trying to manage the instrument approach into the destination airport, having the right plate at fingertip control goes a long way toward a successful ending to the flight.

Of course, to remain legal as an EFB means always launching with a current database loaded into the device — again, something to weigh against your own flying habits.

EFB capability might not be something you set out to acquire, but consider the added value of a product that serves both purposes.

### FLIGHT PLANNING: IT'S IN THERE

Today's crop of modern compact GPS navigators generally all offer the ability to program flight plans into them and save them for future use, for those flown repeatedly.

While many of my flying colleagues still insist on sitting

down at their computer, plugging in the route and building a flight plan to print out for use, it always seemed more direct for me to take home the handheld in my possession and use its internal flight-planning function to lay in the routing, then save it in memory. At the appropriate time, I would file the plan. Once in the airplane, plugged in, fired up and ready to taxi, this plan was loaded from the GPS's memory. Usually this could be accomplished while waiting on the engine to get all the needles in the green. Thus, by the time the GPS initialized itself and the flight plan opened, we were ready to fly.

Doing the planning and loading at home also allowed me the luxury of "flying" the route in simulator mode as a preemptive check for any problems my route choices might create — airspace encroachment or terrain conflicts being my biggest concerns. This helpful new profile function has proven particularly helpful during the sim-mode faux flight.

### STRATEGIC PLANNING

Data-link weather actually has been around for more than a decade, initially through both ground-based and satellite-based networks.

Now available through multiple vendors, satellite-based data-link weather — text and images — has become a tool so coveted by the drives of business-turbine aircraft, they are big customers for handheld GPS navigators solely for the access they provide to this remarkable tool. They understand — as does anyone who has had a chance to use it in real-world flight conditions — data-link weather cannot be overstated as an important strategic tool.

And here's an area in which a little education can help customers get the most out of their handheld GPS-buying decision. The first thing worth stressing: Not all handheld navigators can provide data-link weather; although, these days more and more can.

Acquiring a unit with built-in, weather-data-link-capability typically costs more. Such is the case with Garmin's stand-

# Hand-Held GPS Manufacturers

➤ **ADVENTURE PILOT**  
[www.ifly.adventurepilot.com](http://www.ifly.adventurepilot.com)

➤ **ANYWHERE MAP**  
[www.anywheremap.com](http://www.anywheremap.com)

➤ **AVMAP**  
[www.avmap.us](http://www.avmap.us)

➤ **GARMIN\***  
[www.garmin.com](http://www.garmin.com)

➤ **HONEYWELL\***  
[www.bendixking.com/AV8OR](http://www.bendixking.com/AV8OR)

➤ **LOWRANCE**  
[www.lowrance.com](http://www.lowrance.com)

\* Members of the Aircraft Electronics Association

GPS Manufacturers



out tablet model, the GPSMAP 696 (weather capable) and 695 (not weather capable) or the 495/496, with the latter weather-data-link capable.

Worth remembering: Once you pick the version you want, there's no going back. The GPSMAP 495 cannot be fitted with the weather capabilities of the 496. If you have any inkling you might want the service later, get the 496 — or 696 for the larger touch-screen navigator. In other instances, the unit offers the capability through add-on hardware, leaving the owner with more flexibility in deciding whether to buy the add-on.

Honeywell's AV8OR compact, palm-sized MFD/GPS navigator and the AV8OR Ace EFB/GPS — two touch-screen-controlled models — both provide for a WxWorx/XM satellite weather input, with the choice of connections to the navigator — Bluetooth wireless or a wired connection at a lower price.

Garmin's four-model Aera navigators bring touch-screen technology to the company's portable compact GPS, along with features exclusive to the company, such as SafeTaxi on the higher-end versions; however, they require you to decide whether you want weather before purchasing.

Regardless of how one arrives at the capability to use data-link weather, buying the hardware covers only the entry cost. To actually use the hardware, it requires a subscription with the appropriate service provider — usually ranging from about \$30 per month for a basic package to \$50 a month for a full-scope weather package. And it's those weather products that offer the owner the opportunity to get more out of a handheld-navigator investment.

The full-service package generally includes in-flight Nexrad Doppler weather radar imagery downloaded to the handheld every five to six minutes. Beyond the Doppler radar images, these services also provide in-cockpit text and weather graphics.

METAR and TAF reports, airport by airport, generally are standard, as well as PiRep information. Some provide lightning-strike data; although, its delayed delivery aspect leaves it short of matching an in-panel spherics device.

The advanced service packages also might provide graphics showing icing, areas of turbulence and graphical METAR and TAF information, as well as IFR-condition graphics.

And you don't have to be an instrument pilot to benefit from data-link weather. Even a daylight-only, VFR-only pilot — particularly one who ventures forth in the plane under overcast and shifting conditions — can find this in-cockpit weather information helpful, even comforting, and, ultimately, decision-altering.

## TERRAIN TROUBLES

Another useful enhancement to the handheld-GPS world comes in the form of hazard avoidance. Some products offer a terrain-awareness function set as part

of the downloadable software.

Terrain color-coding or a passive form of terrain-avoidance, in the form of the terrain features changing color as the airplane gets closer to the feature, is a valuable feature. The horizontally viewed profile navigation option of some products offers its own variation on a guard against CFIT.

The more recent the database, the more accurate the data will be for providing the help and protection the device offers.

Traffic is another hazard today's portable GPS and even some EFBs can help pilots avoid.

Most importantly, users need to know such features exist and a bit about how to access the features to make the most of the handheld.

If any of these hazard-avoidance options are an option you covet, shop accordingly.

## OTHER FEATURES

Many of today's crop of handhelds can work with other aircraft equipment, including autopilots — making them popular among homebuilders — and traffic-alert and collision-avoidance hardware, specifically some excellent portable solutions.

Some of these portable navigators also work with some panel-mounted, fuel-management indicators, such as JPI's FS-450 fuel totalizer.

To improve the utility of these handheld powerhouses, after-market panel-mounted docking systems are available for some portable GPS models, allowing the pilot to pop them in and out as needed. And when not needed for aircraft use, most offer street-navigation functionality as either standard or as an optional upgrade.

So, the little handheld can get you to the airport, between airports and on to the hotel at your destination. Accessory features are emerging as well.

Garmin products come with the AOPA Airport Directory, which includes more than just airport data these days.

Honeywell's AV8OR offers a data service from the Flight Guides folks, which provides a year's worth of service for \$99 and can be updated daily. The package includes local attractions, hotels, motels and restaurants, as well as their numbers.

## MANUAL LABORS

All of today's crop of handheld GPS navigators come equipped with accessories useful for the buyer, often up to and including DC power plugs, external antenna and an instruction manual in some form.

Most of the important questions you need to get started might be included as a separate quick-start guide or get-started abbreviated manual. And manufacturers not only offer their own help lines, but often their products also are the subject of web blogs or other sites. □