The big picture
Garmin’s GNS 530 brings integration to a new level
BY THOMAS B. HAINES

Feigned complete understanding as the Garmin demonstration pilot in the right seat of the company Mooney enthusiastically pointed out the nuances of operating the pioneering GPS 155 TSO in the panel. We were flying GPS approaches to Topeka, Kansas, on that early spring day in 1994. The truth is I was so far behind the box that I didn’t know where we were. Fortunately it was VFR. And fortunately the first generation of IFR GPS receivers with their confounding operating logic is behind us.

In a contest akin to the 1960s’ space race, Garmin, only five years old in 1994, was the first company to earn the coveted IFR approach certification. The GPS 155 TSO was state of the art. Every pilot lounge buzzed with talk of GPS approaches to both ends of every runway. NDBs were dead; VORs had one foot in the grave; a revolution in air navigation was under way; a chicken in every pot. Those were heady days.

Today there are hundreds of GPS approaches, although not one to each end of every runway, and many models of IFR GPSs to choose from. The one consistency in the tumultuous market has been the leadership by Garmin. The aggressive young company from Olathe, Kansas, has stood the entire industry on its ear.

About a year after that 1994 flight to Topeka, I was offered a chance to glimpse the future, once again at Garmin. I was invited to a conference room at the company’s new headquarters to provide feedback on a concept under development: an integrated IFR GPS, VHF nav/com, and moving map. Little did I know that a few years later the final product would once again revolutionize the way we fly.

Today that final product, a Garmin GNS 530 resides at the top of my avionics stack, guiding me point to point with GPS precision and allowing me to fly both GPS and VOR/ILS approaches, and to talk to ATC. All the while, my position is clearly depicted on a large color moving map. These are heady days.

Exploring the multifunction frontier
With additional sensors, the Garmin GNS 530 shows lightning data (bottom right of screen) and nearby traffic. Other companies have introduced standalone multifunction displays (MFDs). Still others have avionics stacks where the individual GPS, nav, and com radios all talk to one another and display data on an MFD. Garmin is unique in that with its 530 and the smaller 430 it combines it all in one box. The obvious concern is about the single-point failure: Lose the display and you’re out of business. But, according to avionics shops, it’s not been a problem. The Garmin units have been extremely reliable and, even to Garmin’s surprise, many, many pilots have opted to install two units, including oftentimes two of the large 530s.

Garmin began shipping 530s last summer, only about a year after the GNS 430 debuted. The units are very similar, aside from the displays. The 430 has a 1.8-by-3.3-inch, eight-color liquid crystal display, compared to the 530’s 3-by-4-inch LCD. The 530’s screen resolution is higher at 234 by 320 pixels, compared to the 430’s 128 by 240 pixels.
The fuel-planning page (above) can show results based on pilot-entered data, or the system can interface with a fuel computer to give live data.

Trip planning can be for the present flight or for future flights based on pilot-input groundspeed (above). The flight-planning page (below) is well-designed. Users can select data to be displayed in the three right-hand columns.

In flight
The Garmin software provides the pilot the opportunity to customize the display a great deal. About the only thing that can’t be customized are the locations of the com and nav frequency windows in the upper left of the display. The frequencies are turned by turning knobs in the lower left corner. But why enter the frequencies if they’re already in the database? Any frequency in the Jeppesen database can be sent over to the standby window, whether a nav or com frequency. By highlighting it with the cursor and hitting the enter button, so no more scanning a chart for the chosen frequency, for example. Simply pull up the list of frequencies for your destination airport, highlight the one you want, and send it to the standby window. This is particularly helpful for listening to ATC on a specific frequency. Use the map’s cursor to highlight an airport en route, bring up the nav and com windows, and then the ATIS or AWOS frequency, and easily move it to standby before flipping to the active window for the latest weather.

Below the nav and com windows, you can configure another small window to display a variety of information, including a thumbnail image of nearby traffic if you have a Goodrich SkyWatch, Ryan TCAD, or TCAS. Other options include a digital display of the True Airspeed or, with the latest software version, the distance from it—giving the unit almost the same capabilities as a DME.

The rest of the display is yours to set up how you like. On the map page, you can opt for a column of five windows down the right side showing about any data you want, such as way-point ID, desired track, track, distance, and groundspeed, among others. This map page also allows you to turn on a cursor by pushing the right concentric knob. Using the knob, you can then scroll the cursor around the map highlighting any detail you want. A push of the enter button brings up details about the item, whether it’s an airport, navaid, intersection, or some type of airspace. For special-use airspace, the system calls up additional details from its database, such as the floor and ceiling altitudes so you can easily circumnavigate if it like the map also shows highways, state and national bound-aries, cities, railroads, lakes, and rivers. You can decide what map ranges any or all of the detail shows up when. For example, add a collision avoidance system to a storm page to get the full picture of the weather. You can decide what map ranges any or all of the detail shows up when. For example, add a collision avoidance system to a storm page to get the full picture of the weather.

OnDisplay

ONDISPLAY

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The procedures procedure
The Garmin interface really shines when it comes to building a flight plan or flying a procedure. A touch of the flight-plan key on the face of the unit brings up the flight-planning section. From there you can activate an already-stored flight plan or build a new one. It’s all very logical and simple. You enter the waypoints from start to finish using the right knob. If you need to delete one, you highlight it with the cursor and hit the dedicated clear button. If you need to insert a waypoint, push the cursor to where you want it inserted and enter it, bumping those below it down a notch.

The interface also simplifies setting up any terminal procedure, whether it’s an approach, a transition, an arrival, or a departure. A touch of the dedicated procedures key brings up a window showing the various procedure types. If you choose approach, for example, it displays all of the instrument approaches associated with the destination airport. Choose the approach you want. You will then be given a choice of all of the initial approach fixes associated with that approach. You can choose one of them or “vectors to final.” If you choose the vectors option, the system will draw a line on the map extending from the runway centerline. As you are veered toward the approach, you will see yourself nearing the centerline. Once you’re turned inbound, the procedure begins sequencing through subsequent fixes.

This type of software logic is what really sets the current generation of units apart from earlier IFR GPS receivers. In the first generation, the boxes forced the pilot to decide whether the software should cycle from one waypoint to another. Pity the pilot who forgot to suspend the sequencing when flying outbound on a full procedure approach or when flying a holding pattern. With current systems, the software understands where you are on the procedure and knows whether it should sequence or not based on your position.

Not only does the Garmin know when to sequence the way-points based on where you are on the procedure, but it also draws the full procedure, including procedure turns, holding patterns, and a route to the missed approach waypoint so you can easily follow them and see your position relative to the correct course. The type of positional awareness is essential when you’re in the clouds flying a complex approach. When set to enter a holding pattern, the system unrolls the prop-er entry procedure in a small message in the lower right cor-ner. Once established, you can see your position relative to the system-drawn holding pattern. If you’re inside or outside of the circle, adjust your heading to get back on the line. When entering the hold, a timer automatically appears on the nav page so that you can easily time your legs. It automatically resets as you turn inbound. And DME arcs—the mystery goes away. The arc and the associated waypoints are shown on the map. Just keep the little airplane on the arc and you’ll be fine.
**ON DISPLAY**

Because they contain both GPS and VHF nav sensors, the Garmins simply fly all types of approaches, not just GPS approaches. In fact, every approach, whether it’s a VOR, ILS, localizer, or GPS, is set up exactly the same way. You go through the same steps to initialize the approach and to fly it. The only thing the pilot must do differently is plan the descent, following the glide-slope to the decision height in the case of an ILS or descending to the minimum descent altitude for a nonprecision approach. The user can choose to have the GNS automatically switch from GPS guidance to localizer guidance once intercepting the localizer center line on an ILS approach, removing one more demand on the pilot at that busy time. When that happens, the annunciator in the lower left corner switches from GPS to VLOC. This all presumes that you’ve bothered to flip the localizer frequency from the standby position to the active position in the nav window. The system volunteers the localizer frequency to the standby nav position when you select the approach.

Once you reach the final approach fix or the missed approach point, you can touch the OBS button to have the system volunteer the missed approach waypoint and to give guidance to it. But it is up to you to fly the proper missed approach procedure as described on the chart.

Garmin provides one of the simplest and easiest to use vertical navigation systems available. A touch of the dedicated VNAV button brings up a single page where the pilot chooses the altitude to descend or climb to, the distance from the waypoint where the level-off should occur, the waypoint name, and the desired climb or descent rate in feet per minute. The system then displays the calculated vertical speed required to meet the profile. If it is not yet time to start down, for example, the system displays the number of hours and minutes until you reach the descent point. Once you reach that point, a message light will announce, advising you of the need to descend. The system not only provides descent guidance to an airport, but also for ATC-assigned crossing restrictions. So now when the controller advises you to cross 30 west of XYZ VOR at 5,000 feet, you can quickly enter the information and set up a safe and accurate descent or climb profile.

The GNS products provide not just basic navigation information and simplified approaches, but a plethora of other information. Using the Waypoint pages, you can find the details of any approach or the point of any type of active waypoint, including 1,000 that you can enter yourself. One of the choices is the “nearest” page, which gives you information on the nearest airports, VORs, NDBs, intersections, flight service stations, air traffic control centers (including frequencies), and airspace.

The auxiliary pages provide additional information on fuel and trip planning and true airspeed calculators, for example. On the fuel-planning page, you can enter total fuel available and a fuel burn, and the system calculates required fuel amounts. Or, you can provide input from a fuel transducer and have interactive information. In my case, I have an input from the JP Instruments EM400 engine analyzer. Using the fuel data input, the GNS 530 automatically knows how much fuel I have on board and the flow rate. It then calculates the amount of fuel to the final destination, landing fuel on board in gallons, hours and minutes of fuel on board at landing, the endurance, range at the current groundspeed, and the nautical miles per gallon. The trip planning page shows distance, estimated time en route, and estimated time of arrival to the final destination, as well as the estimated safe altitude for the trip and the sunrise and sunset time at the destination. You can use this page to plan other trips. For example, you can figure out ahead of time how long it will take you to fly the second leg of your flight, based on various groundspeeds that you can set.

The 530 also includes a true airspeed calculator that computes density altitude and winds aloft. It can be tied to an air data computer, alleviating the need for the pilot to enter current information, such as altitude and temperature.

Another nice feature is the scheduler. With it, you can set a reminder to alert you to change fuel tanks every 15 minutes or whenever you like or to change your oil at certain hourly increments. The scheduled events can be one-time events or periodic.

The cross-fill feature comes into play when you have more than one 400 or 500 series Garmin installed. With it, you can allow the two units to communicate with one another. For example, any active or stored flight plan or user waypoint can be transferred from one unit to another.

This feature will be particularly handy to the winner of AOPA’s 2001 Sweepstakes Bonanza. That airplane comes with both a 530 and a 430, along with a Garmin audio panel and transponder (see “AGlass-Cockpit Bonanza,” p. 83).

Other auxiliary features include a host of timers and trip statistics (the system tracks your fastest groundspeed and number of miles flown, for example), the number of hours it’s been used, and time since takeoff. And another aux page stores checklists that you can input.

The GNS 430 lists for $9,250 while the larger and more capable GNS 530 goes for $14,995. You can justify the price easier to your spouse or accountant when you remind them that it includes a conventional nav/com, an IFR GPS, and a color moving map. Plus it provides a place to display information from other devices, such as a Stormscope—particularly important in situations where panel space is at a premium. Expect to spend about $600 a year for a Jeppesen database subscription service; you can reduce that price by using Jeppesen’s Internet site to download your data. The data resides on a small card plugged into the front of the unit.

Using It

When reviewing all of the capabilities of a GNS 530, one might assume that such a capable box is difficult to master. Not true in this case. You can use the 530 at any level you like. Hit the direct-to button, enter a waypoint, and fly away. It’s that simple. Or you can stretch the box and build complicated flight plans with departure procedures on the front end and arrival procedures and instrument approaches on the other end. Nab all of your frequencies out of the database and use it for all of your fuel and time planning. It’s all there; use as much or little as you please.

I installed a GNS 430 a little more than a year ago and upgraded to the 530 last fall. I use most of the features most of the time. And yet, when I talk to other users or the factory reps, there’s always some other little feature that I didn’t know was there, or one way to set up a screen that makes it even more intuitive. I most recently added a Goodrich WX-500 Stormscope to the 530’s repertoire. Overlaying the lightning data on the route is extremely helpful when making en route weather decisions. In the end, it’s that situational awareness and integration that makes the 530 such a useful device in the cockpit—all of the information is in one place and accessible from one interface and one set of knobs and buttons.

After I installed the 430, I wondered how much better navigating could get. Well, then came along the 530, which brought the bigger and brighter display. I find ... I don’t yet know the answer, but I suspect the folks at that pioneering company named Garmin are already working on it.

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The days of guessing which holding pattern entry procedure to use are over. The Garmin prompts you (below). Setting up an approach is as simple as choosing the procedure from a list (bottom).