GARMIN'S G300

A Light-Sport Stepping Stone to Bigger Things

For the steam-gauge, six-pack pilot with little or no time behind an EFIS stack, Garmin's G300, debuting in Cessna's SkyCatcher, offers a step forward. And its integration with other systems serves to reduce panel clutter.

STORY BY DAVE HIGDON

There's the spot, my mind noted, glancing at the multi-function display side of the dual-screen Garmin G300 in the panel of Cessna's first 162 SkyCatcher.

The primary flight display gave me the heading, distance, ground, airspeed and time remaining to reach my destination, a small residential airport outside the city.

Invited by a friend who lives on the airport, he worried the coordinates might be necessary to help find the place because his home field doesn't show up in the database of his Garmin GNS 530 — except as a user-defined waypoint, which he created after moving in a little more than a year ago.

In Garmin's new G300, however, the small private field and all its salient information appeared on the screen with the entry of the designator, surprising my friend. This was but one of the many attributes of what my Cessna-flying companion likes to call the "mini-G1000."

In many ways, Garmin's G300 system mimics Garmin's flagship integrated panel in how it works with the installed Garmin SL 40. And the G300 does its work with an easy-to-learn interface, which should make stepping up to other Garmin big-screen solutions relatively easy for pilots who learn the G300 capabilities.

For a pilot already familiar with the visual architecture of modern electronic flight instrument systems (EFIS), learning to read and think in its terms should come easily; similarly, a raw student with little or no prior exposure to a light-plane panel should find the depicted data easy and clean to read and interpret.

For the steam-gauge, six-pack pilot with little or no time behind an EFIS stack, Garmin's G300, debuting in Cessna's SkyCatcher, offers a step forward. And its integration with other systems serves to reduce panel clutter.

One or Two Screens, and More Unseen Behind the Scene

The basic element of the G300 system consists of the main display-and-control unit mounted in the panel: Garmin's GDU 37X display unit.

Sporting a high-resolution screen measuring 7 inches diagonally, this unit serves as the common foundation of a package capable of several levels of configuration. The GDU 37X is configured at the factory to serve one of three ways: as the primary flight display or the multi-function display

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in the two-screen set-up, or as the stand-alone in a single-screen panel serving both roles: PFD and MFD.

The unit also varies internally depending on whether or not it has the receiver required to receive the optional WxWorx data-link weather service and XM satellite radio. Configuring the GDU 37X for a single-screen installation — without the WxWorx receiver — makes the unit a GDU 370. Giving the GDU 37X the optional WX/XM receiver makes it a GDU 375.

In the optional two-screen configuration, one GDU 37X is configured as a GDU 370 to serve as the PFD, while a second GDU 37X is configured as a GDU 375 to handle the MFD chores.

Regardless of the configuration or designation, the control inputs on the units match exactly.

Starting on the right bezel is a range key at the top with a FMS joystick and rotating knob control immediately below. Below the joystick, six hard keys sit in a stack with "Enter," "Clear," "Menu," "Flight Plan," "Direct-To" and "Nearest" functions assigned them. Five soft keys line the bottom bezel with functions varying according to the page opened by the hard key chosen.

Behind the display-and-control unit and out of sight of the pilot, other Garmin hardware feeds the display-data information to the GDU.

The GSU 73 sensor unit sports three major elements: the air-data computer (ADC); attitude and heading reference system (AHRS); and the engine/airframe unit (EAU).

The ADC portion of the GSU 73 calculates and delivers air-data information — outside air temperature (from an external sensor), airspeed, altitude and vertical speed — and sets it up for use by the display. The GSU 73's AHRS senses attitude, heading, turn rate and slip/skid movement. The engine/airframe unit receives and processes signals from the engine and airframe sensors.

Separately, the system includes a GMU 44 magnetometer to provide a constant heading reference for the AHRS. The GTP 59 temperature probe feeds the ADC ambient temperature, just as the pitot/static system feeds pressure and speed data to the ADC.

This is the system architecture for both the single- and dual-display G300 installations, with an additional bus from the GSU 73 sharing data with the second screen.

Rounding Out the SkyCatcher Package

In Cessna's new 162 SkyCatcher light-sport aircraft, the G300 integrates with a Garmin SL 40 VHF com transceiver and an optional TruTrak autopilot.

The integration between these devices is quite good and is designed to help reduce pilot workload and allow the G300 to become a lightweight FMS system.

The Garmin GTX 327 and a standalone intercom complete the basic package, with a Garmin audio panel as an available option.

One System,Two Layouts

Regardless of the screen set-up, one screen or two, the G300 provides the pilot with the same information. The two-screen system differs in presentation thanks to display space twice as large.

Set-up as a single-screen panel, the GDU 370 or 375 presents a display split horizontally with the PFD and MFD in a top-to-bottom stack on the screen.

Above the PFD, the G300 shows flight-plan information in a horizontal, left-to-right depiction, including current waypoint, bearing to the waypoint, distance and the estimated time en route.

Immediately below the route data,

the single-screen G300 displays engine information. A graphic analog and digital tachometer is on the left, complete with green arc and redline arc.

To the right of the tach, one above the other, are oil pressure and temperature — both depicted as horizontal bar graphs with a floating needle and digital readout. Next to it are a carburetor temperature gauge and an ammeter employing the same display format as the oil gauges. On the far right, is a trim indicator.

Together, the flight-plan and engine-information sectors take about one-fifth of the screen space vertically.

Next on the display, and taking up half of what remains, is the PFD and its wealth of information.

On the PFD, the air data is split on the left and right sides, with the left getting a vertical indicated airspeed indicator with a magnifying window at the center; marks for flap and stall speeds appear on the inside of the vertical bar, and green, white and red segments make up the vertical bar between the numbers display and the limit markers.

Above the airspeed indicator, a window shows groundspeed while a corresponding window below shows true airspeed.

On the right side, altitude and vertical speed appear, again with a magnifying window at the center. The altitude tape also sports a bug that can be set to the desired altitude. On the vertical-speed tape, the needle moves vertically with colored bars extending from zero to the needle. Above the altimeter readout, a window displays the altitude setting from the altitude bug, while another window below shows the altimeter setting.

Between these two air-data displays, the screen sports the combination attitude indicator, compass heading, bank-angle indicator and, at the bottom, a horizontal slip/skid ball.

On the remaining display space below the PFD's two-fifths of a screen, the MFD maps and controls appear, along with a 120-degree-arc DG and, along the bottom, the indication of the chosen functions of the soft keys.

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The pilot uses the soft keys to access maps and weather pages, change the layout of the PFD, and for control of the display of engine information, XM radio and terrain avoidance functions.

It sounds like a lot to cram into a small space, but Garmin's layout covers the needs without making it seem overly cluttered or confusing.

Dual-Screen Version: So Much More

The two-screen system naturally airs out the depictions considerably, giving every item more space to play. But there are some differences.

For example, the flight-plan data at the top on the single-screen stays at the top of the dual-screen's PFD; however, the same route information and the engine-information displays move to the right to top off the MFD.

The PFD's AI graphics and all the air-data readouts get slightly more space and remain in the same orientation as on the single-screen version. But the gyro-compass display on the dual-screen system gets the entire lower half of the screen, along with a HSI-type CDI needle and indicators, including the heading bug.

The lower half also provides room for four windows, one in each corner of the HSI/DG depiction, with heading in the upper left, course in the upper right, local time in the lower right and OAT in the lower left. A separate window displays wind information, both velocity and approximate direction.

On the MFD are the engine and route data and a near-full-screen map — with all the page functions a pilot needs: terrain, weather and maps, as well as access to the flight-planning pages and airport information available in the database.

Special Modes: Just in Case

If the MFD of a dual-screen G300 fails, the PFD side reverts to look like the same screen in a single-display G300 system, but with one functional rescission: the satellite-based functions become unavailable because the receiver is part of the failed box; therefore, no WxWorks weather or XM radio.

If the PFD side fails, the remaining MFD screen does double duty and appears as the single-screen system; however, with the XM functions retained. This set-up allows the G300 to retain all of its critical functions and continue to provide information regardless of which display remains, with the XM functions as the only real loss

Although both GDUs sport their own WAAS/GPS engines, the G300 cannot provide full navigational redundancy because the GPS antenna connects only to the PFD in a dual-screen installation.

In the SkyCatcher, the GPS is the only navigation system available; there is no VHF navigation available.

Beyond its navigation role, the dual-screen G300's PFD needs GPS input to provide valid attitude information should either air data or magnetometer inputs fail. Failure of air data has no effect on the AHRS output as long as the AHRS receives valid GPS data.

If GPS, airspeed or magnetometer fail, the system provides an appropriate flag warning of heading or heading and attitude failure or position-data failure.

If the GPS alone fails, the AHRS can continue to provide attitude and heading information as long as airspeed and magnetometer data continue.

Using the System

As Garmin systems go, the G300 seems more user-friendly in its interface than prior systems of my sampling — not surprisingly, it shares some characteristics with the G1000 and G600.

The system starts simply enough, whether dual or single screen: with a click of the Sky Catcher's master switch. The G300 begins to sequence through its initialization process; the AHRS starts to align; and the GDU checks its database types and operating dates before prompting the pilot to continue.

The system prompts the pilot to keep wings level, but the AHRS can align itself while taxiing or in level flight — helpful in the event of a power failure requiring a breaker to be reset.

Once the AHRS aligns and the systems check is complete, the pilot pushes the "Enter" button to continue. The system operates pretty much automatically and autonomously aside from pilot input for flight plans, screen choices and the like.

The pilot can flight-plan and activate the plan using the G300's integral database of airports, airport information, airways and navies.

The pilot can select a map display showing terrain elevation relative to the aircraft's altitude or one showing the weather overlaying an IFR-type map or on the VFR screen. The pilot also can set a heading bug from the PFD — the twist-knob function of the joystick defaults to the "Heading" function.

The soft keys at the bottom can provide for setting either the barometric pressure or an altitude bug. When either heading or altitude bugs are set, the PFD shows the selected heading above the AI and on the HSI. The heading and altitude bugs both serve a function as settings or references, with or without the autopilot.

Set an altitude bug, and the altimeter heading shows the selected altitude and a flag appears alongside the selected altitude and works its way to the center, where it highlights the altitude when reached.

The G300 provides an excellent vertical-navigation mode as well, using a pilot-set arrival altitude, airport elevation data, a pre-selected descent rate, and the aircraft's altitude and position data.

When the time arrives to begin a descent at the selected rate, a glide slope-like indicator appears to the left of the altimeter scale and shows how closely the descent rate matches up with the needed rate.

Additionally, the engine data on either single- or dual-screen installations can be switched on or off with alarms still appearing as required.

A nice fuel-flow function and precise exhaust gas temperature gauge make easy work of leaning for maximum fuel efficiency.

The G300's terrain and obstacle databases also inform an active alert system that flags "Obstacle" or "Terrain" when the aircraft flies to near or too low. The obstruction flag on the PFD is accompanied by a box showing the location of the obstacle on the MFD; the terrain flag appears when the aircraft drops below 1,000 above the ground outside an airport area. Both warnings first show up as yellow flags, then red if the threat becomes more imminent.

Another useful feature of the G300 is its ability to look up frequencies for an airport or ATC facility on the appropriate page, highlight it with the cursor, then load it directly into the standby position of the SL 40 VHF com radio.

The system also provides a page for selecting channels to listen to with the XM satellite radio service. Because this is not a FAR 23 airplane or a TSO'd product, the radio does not have to mute each time the com radio breaks its squelch or someone speaks over the intercom.

In a Nutshell: G300 Covers the Bases

As a category, the light-sport aircraft (LSA) was created to provide a lower-cost aircraft alternative to the FAR 23 hardware for both pilots and sport pilot license holders.

While Cessna equipped the SkyCatcher for day and night VFR work, the sport pilot is restricted to day-only VFR flying, and the G300 system in the SkyCatcher reflects this focus.

The GPS provides ample navigation power and accuracy, particularly when coupled with the G300's power blend of airport, airways, navigation, terrain and obstacle databases. The single- and dual-screen installations offer an excellent entry into the dominant world of EFIS cockpits and integrated panels.

The G300's overall package, installation, integration and operation more than fulfill the need for a modern trainer set up as an entry point into more sophisticated aircraft and avionics packages — and it does it well.

The worst thing it might do — spoil a new pilot for flying anything other than an EFIS panel — likely is not a problem for Garmin or Cessna. ❑

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