setting the stand

A whole new panel for the Cessna 182

BY JULIE K. BOATMAN

PHOTOGRAPHY BY MIKE FIZER

A new Cessna 182B graces the March 1958 cover of *AOPA Pilot*. When this magazine launched, the Skylane—born in 1956 as an upgrade of the 182—was flying out of Wichita's Cessna Aircraft Company Field at the rate of more than three a day.

While current production of the 182 is lower than during those heady days, the name *Skylane* still signals to pilots a reliable, capable ride, straightforward enough for most of us to fly with ease. When we looked at the first new Skylanes in 15 years (see "The New 182: A Sturdy Bird Flies Again," July 1997 *Pilot*), we were happy overall with the company's update of its proven design. And the minor misses we found are, by and large, addressed with the model's latest incarnation, the 182T.

But the question of the moment is about the avionics, not the airframe. That question—

standard

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what's in the panel?—was answered last fall when Cessna announced that it would bring the Garmin G1000 integrated flight deck to one of the most popular general aviation airplanes of all time.

There is no doubt that glass cockpits have taken GA by storm, sweeping into the latest airframes—airplanes made of "glass" of a different kind. But when Cessna, the old guard, the airplane manufacturer with indubitable staying power, slots the Garmin G1000 into the panel of its steady player, you know that glass is here to stay. That it adds this Garmin glass almost concurrently with Diamond Aircraft's similar upgrade to its fleet (see "Diamond DA40-180: The Gee Meter," January *Pilot*) means that the words *old guard* really don't apply anymore.

Going glass

We flew the newly equipped Skylane—the G1000 is officially part of the Nav III avionics package for the airplane—from AOPA Expo in Philadelphia to our home base in Frederick, Maryland, last fall.

Turning on the master switch launches the primary flight display (PFD) in a prestart mode, allowing you to view fuel, electrical system, and engine gauges during preflight and while starting the airplane. This was perhaps the biggest mental shift I made, as years of conditioning on how to preflight and start a single-engine Cessna flew out the window. I had landed on the moon and was searching for the familiar in a strange new world. How ingrained in a pilot is it to open the door, take the control lock out of the yoke, look at the ignition switch, flip on the master, and watch for the fuel gauge needles to rise? Where were they?! Oh—there!

The moment passed.

When it came time to hop in and start up, I again had to refer to the map—in my case, asking Kirby Ortega, Cessna's flight training supervisor, for a hand with the checklist—and substitute the electronically rendered displays now in front of me for the analog gauges I remembered.

Again, the moment passed.

One nice change that takes *all* 182Ts—regardless of avionics package—into the "pro plane" category is the presence of a split electrical bus selectable on the avionics master, plus an additional essential bus with a standby battery and battery controller. The two sides of the bus power different avionics, allowing you to instantly shed load in case of an electrical system emergency or malfunction while preserving com and nav capability. (For those aircraft with the Nav I and II packages, Bus 1 drives the Honeywell Bendix/King KLN 94 on those aircraft so equipped, and the number-one nav/com. Bus 2 powers the Bendix/King KMD 550 multifunction display [MFD], if installed the number-two nav/com, and the transponder.)

The overall health of the standby battery is tested during normal start-up procedures by way of a switch, with a green light indicating that the battery has the juice to power the PFD, primary flight sensors for the air data computer (including outside air temperature, airspeed, pressure altitude, and vertical speed), engine monitoring sensors, and a single nav/com/GPS for at least 30 minutes. Nonelectric backup instruments—an airspeed indicator,

A new cowling shrouds the same engine as on the 182S, providing extra speed and efficient cooling. The panel (above right) offers a lot of real estate for the pilot to customize—although the latest avionics package doesn't leave much out.

vacuum-driven directional gyro, altimeter, and compass—complete the panel. Ortega pointed out that with the replacement of the traditional instruments with the G1000 may come a substantial weight *decrease:* The engineering airplane lost about 7 pounds when Cessna took out the old hardware and wires and replaced them with the new.

The primary flight display came online within a few seconds of start-up, and I soon found everything I needed. We departed Philadelphia International Airport on Runway 35, on an IFR flight plan, into 3 miles visibility in a high-pressure haze. I was glad I'd had my fill of Philly's sights during our stay, as the view inside the cockpit was far more compelling than the murky landscape outside.

The engine instrument displays on the G1000 in the 182 use green arcs to assist in setting typical percent power for normal cruise. I found this the path of least resistance, though finding a specific setting was a little more challenging. But for those who like keeping engine management simple, the green arcs make it so, as does a "lean find" feature, accessed by pressing the Engine soft key from the main G1000 MFD page.

I'd had a few hours working with the Garmin GNS 530 on a recent business trip, so the navigation and communication inputs for the G1000 came fairly easily as much of the logic is similar between the two units. In fact, as we headed southwest, the airplane and I soon settled into a quiet, relaxed partnership. Though I had far more layers of capability to explore within the G1000, the basics of flight management were just that, basic—and all this in an airplane that has been a friend for many years.

Good questions

One of the challenges confronting Cessna and other aircraft companies is how to incorporate new airplanes with advanced avionics smoothly into the training environment.

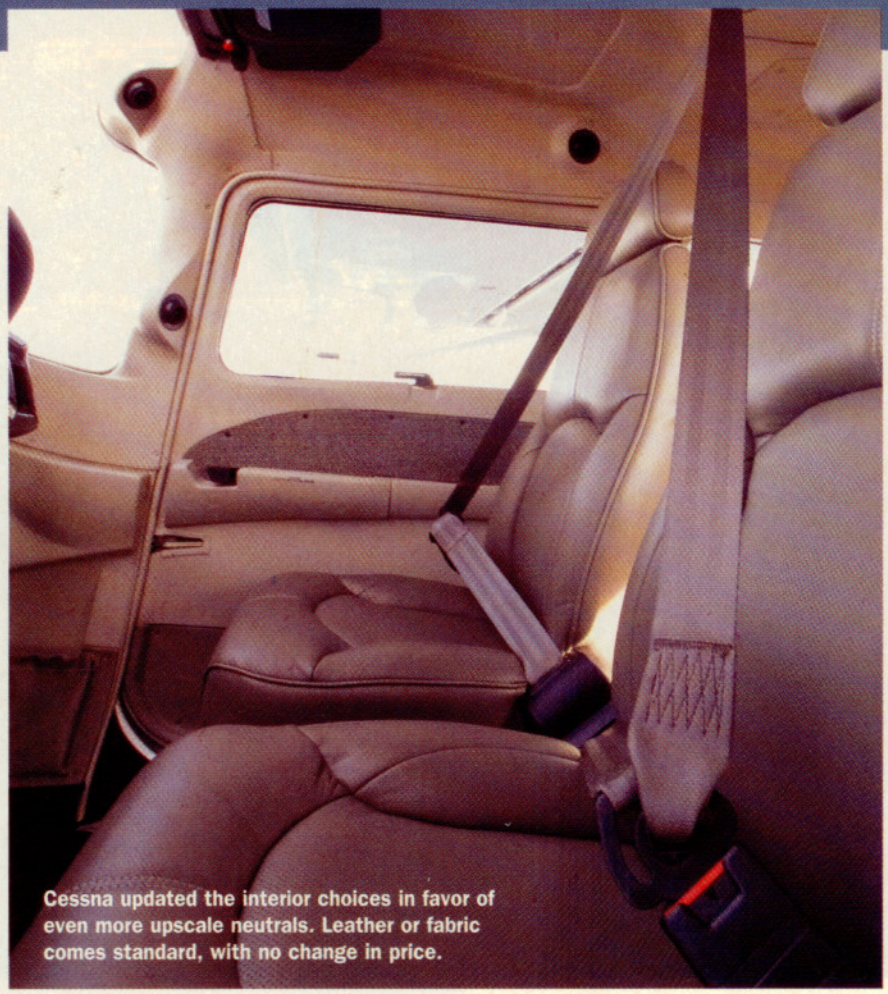
"How do you test partial panel during a checkride?" Ortega asked me during a subsequent flight. He has a point. Whereas previous integrated flight deck systems (such as Avidyne's FlightMax Entegra, as installed in the Cirrus SR20 and SR22 and Diamond aircraft) have relied upon a separate GPS navigator for course input, the G1000 is an all-in-one deal. If you turn off the PFD to simulate the "black screen of death," you lose course information, too. While at the outset this seems a frightening proposition as well as a training conundrum, realize that the chances of truly losing both displays are extremely slim.

A flight test is meant to test *realistic* failures, not once-in-a-lifetime events, according to Bruce Landsberg, executive director of the AOPA Air Safety Foundation: "The big question is the single-point failure." When the vacuum system was the main thing, the FAA tested on its loss because, as we well know, loss of the vacuum system or a single gyro-driven instrument was likely to happen in a given 1,000-flight-hour period. Mean time between failures for the AHRS (attitude heading and reference system) is 10,000 hours—a tenfold margin of safety. And if one screen toasts, the other screen automatically or manually reverts to a primary flight display function, and any required information for safe flight is displayable on that screen. In the event

of total electrical failure, there's the standby battery, practically dedicated to the G1000, in addition to the ship's battery. In a nutshell, the chance of both screens failing, the AHRS failing, or the electrical system *and batteries* failing is roughly the same as my chance of winning an Olympic luge event.

"There is no single-point, or common mode, failure which would take a pilot down to standby instruments only," says Tom Carr, chief test pilot for Garmin. "In the event of a PFD failure, the pilot would activate the display backup switch, and the MFD would revert to a composite display [showing smaller chunks of the EFIS and HSI information as well as a moving map and engine information]," says Carr. "The same option is available for composite on the PFD, which allows monitoring of engine parameters. In the event of an AHRS failure, there is a backup attitude indicator—everything else on the PFD works correctly." If the air data computer fails, you can use the standby airspeed indicator and altimeter. If one of the integrated avionics units fail, you have another one, and therefore at least one nav/com. If the engine and airframe sensors fail, you lose engine data. And the backup plan for that loss? Use your ears—and probably land at the nearest suitable airport, as with any critical system failure.

During a subsequent flight, Ortega turned off the avionics master and main master switches to simulate a massive electrical failure and induce an in-flight restart of the G1000's PFD. We were in about a 20-degree-bank turn at the time, and maintained the turn for the duration of the reboot. The PFD came back on line within the time it took us to turn from downwind to base—about 15 seconds.



Cessna updated the interior choices in favor of even more upscale neutrals. Leather or fabric comes standard, with no change in price.

Skin deep

The turquoise, black, and white Skylane of the late 1950s is immediately distinguished from those 182s produced after 1997, when Cessna restarted its Skylane production. The newer models came from the factory painted white with two trim options, classic deep red and silver, or blue and gray. Instead of painted trim on the 182S and 182T introduced in 2001, Cessna went with a decal application that, while it saved time and looked sharp at first, fell prey to what might be called V_{DR}, or *critical decal-in-rain speed*. Seems that a few ragged edges have appeared on these model 182s. For a number of reasons, Cessna has returned to painting exterior trim with the 2003 model year.

The 182T now features the same interior color choices as the T182T (the turbo'ed version). Leather or fabric seats—it's up to the owner as both are available with no price difference. A more neutral color on the side panels weighs in as a minor change but one to please aesthetes. And—certain happiness to those of us with sweaty palms in the hot months—the 182T has leather-wrapped control yokes. Keeping that powerful nose up during the landing roundout won't be such a challenge (sweaty hands tend to slip on plastic yokes). LED glareshield lighting similar to that on the T182T adds pop to the panel. A polished spinner completes the upscale look.

The T182T won a speed advantage (besides its turbo'ed engine) with several aerodynamic refinements. Similar changes slim the 182T's drag profile over its 182S predecessor. The airplane picked up a total of four knots through the following mods: a sleeker step for cockpit entry, reclocked fairings on gear legs and teardrop main wheel fairings, refined wing tips, and an improved cowling. The same 230-horsepower Lycoming IO-540, derated to 2,400 rpm, and three-blade McCauley prop that powered the S model now power the T. The match of engine to airframe is a good one. To the great relief of 182-model owners everywhere, the less-stressed version of the IO-540 on the 182S and T was not affected by 2002's snowstorm of emergency crankshaft airworthiness directives (ADs) aimed at those -540s producing 300 hp or more (see "Waypoints: Crank Calls From Lycoming," January 2003 *Pilot*). A lone AD calls for the replacement of a crankshaft gear retaining bolt on certain 182S and T engines prior to 2002.

However, the 182S took its share of other AD hits early on. A bum oil pressure switch that threatened to fail and send oil through the vent hole was found in some 182S serial numbers through 660. An angle stiffener on the wing was left out on other serial numbers through the 1997 model year, re-

quiring installation of a reinforcement strip. And a weak exhaust muffler end plate—which could crack during backfires on engine start and vent fumes to the cabin—needed replacement in some 1997 models. A loose fastener in the autopilot servo actuator on the Bendix/King KAP 140 was possible as well through the 1999 model year. The good news is that none of the ADs are associated with any accident reports.

That's probably because the folks at Cessna watch these birds closely. What rolls off the line in Independence, Kansas, is Cessna-dependable, and the 182T is no exception. The controls still fall to hand, with the comforting feel of a flap indicator showing that you indeed have the flaps in your hand, and the elevator and rudder trim manipulated in the directions you'd expect. In fact, Cessna can credit a large part of its success over the years to adhering to a strategy of similarity. If ever you could compare a GA airplane to a rental car—you get into a new one in a distant city and you're ready to navigate unfamiliar territory after a cursory checkout—Cessna airplanes evoke that kind of "yeah, I've been here before" feeling. The airplane excels because it does what you expect it to do, and all the important things are where you'd expect to find them.

But, depending on the equipment installed, the 2004 182T includes a few things you might *not* expect, even if you don't opt for the big-screen Garmins.

Other avionics packages range from the standard Honeywell Bendix/King IFR package, which offers a single KX 155A nav/com with a matching indicator and KAP 140 two-axis autopilot, to the next package up, Nav I, which adds a KLN 94 GPS and KMD 550 multifunction display. Another upgrade, to the Nav II package, takes you into a KCS 55A HSI (horizontal situation indicator) system, including an analog KI 525 HSI replacing the VOR/LOC/GS display, and a KX 165A nav/com. The KMD 550 with Bendix/King's IHAS (integrated hazard avoidance system) is an option for $34,800, along with the KDR 510 datalink ($6,400), which delivers Nexrad radar, graphical METAR, and textual weather information from Bendix/King's network of ground stations (see "Weather to Go," page 74). The 850 also displays EGPWS (enhanced ground proximity warning system) information from an internal KGP 560 processor and traffic information from the internal KTA 870 traffic advisory system. At any level, you can put in an L3 Stormscope WX-500 processor for lightning detection. And an ADF is an option for $5,800, though at this stage in the nav game, not many opt.

For redundancy's sake, the modern line of 182s has instrument power neatly divided between the electrical and vacuum systems. The HSI or directional gyro runs off the electrical system, while the attitude indicator is vacuum driven. Dual vacuum pumps provide the backup in Nav I and II-equipped 182s, now thought of as necessary for most new aircraft, and both pumps run all the time—if one fails, the other automatically picks up the slack, with no action required by the pilot. A single vacuum pump drives the standard attitude indicator in Nav III airplanes.

Addressing one minor but sometimes frustrating gotcha in the 182S is the addition of a 12-volt power outlet in the T. Nope, no cigarette lighter on this airplane, but you can run a personal digital assistant or other gear in the cockpit with a 12-volt adapter. The 182 has a 24-volt electrical system.

Base price on the 2004 182T is $250,000, for a Nav I-equipped 182, and a Nav II-equipped model retails for $260,000. The Nav III package, including the G1000, goes for the same price as a 2003 182T equipped with the Nav II package: $297,500. The price point was announced at AOPA Expo 2003, to the delight of potential owners, and the possible groans of 2003-model buyers. Air conditioning can be had for an additional $23,500. The 1997 182S, with its much less sophisticated avionics, was originally offered at $190,600 and is currently holding steady at $169,000 resale, so even in a soft market these trusty companions hold their value reasonably well, at least better than your average luxury car—and you still can't fly a Lexus. While you pay a little more compared to similar aircraft on the market, you get the reputation of the Cessna name and service network, and a rock-solid safety record.

Ah, the benefits of flying with the old guard—*ahem*, with a proven performer. AOPA

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SPECSHEET

2004 Cessna 182T Skylane

Base price: $250,000
Price as tested: $297,500

Specifications

Powerplant	Lycoming IO-540-AB1A5 230 hp @ 2,400 rpm
Recommended TBO	2,000 hr
Propeller	McCauley 3-blade, constant speed, 79-in dia
Length	29 ft
Height	9 ft 4 in
Wingspan	36 ft
Wing area	174 sq ft
Wing loading	17.8 lb/sq ft
Power loading	13.5 lb/hp
Seats	4
Standard empty weight	1,897 lb
Max ramp weight	3,110 lb
Max takeoff weight	3,100 lb
Max landing weight	2,950 lb
Max useful load	1,213 lb
Payload w/full fuel	661 lb
Fuel capacity, std.	92 gal (88 gal usable) 552 lb (528 lb usable)
Baggage capacity	200 lb

Performance

Takeoff distance, ground roll	795 ft
Takeoff distance over 50-ft obstacle	1,514 ft
Max demonstrated crosswind component	15 kt
Rate of climb, sea level	924 fpm
Cruise speed/range w/45-min rsv (fuel consumption), 6,000 ft @ 75% power, best-power mixture	140 kt/845 nm (16.5 gph)
@ 55% power, best-economy mixture, 10,000 ft	120 kt/968 nm (9.6 gph)
Service ceiling	18,100 ft
Landing distance over 50-ft obstacle	1,350 ft
Landing distance, ground roll	590 ft

Limiting and Recommended Airspeeds

V_R (rotation)	55 KIAS
V_X (best angle of climb)	63 KIAS
V_Y (best rate of climb)	80 KIAS
V_A (design maneuvering)	110 KIAS
V_{NO} (max structural cruising)	140 KIAS
V_{NE} (never exceed)	175 KIAS
V_{FE} (max flap extended, full flaps)	100 KIAS
V_{S1} (stall, clean)	54 KIAS
V_{SO} (stall, in landing configuration)	49 KIAS

For more information, contact Cessna Aircraft Company, One Cessna Boulevard, Wichita, Kansas 67215; telephone 800/423-7762 or 316/517-6056; or visit the Web site (www.cessna.com).

All specifications are based on manufacturer's calculations. All performance figures are based on standard day, standard atmosphere, sea level, gross weight conditions unless otherwise noted.

i Links to additional information about Cessna 182s may be found on AOPA Online (www.aopa.org/pilot/links.shtml). Keyword search: Cessna 182.