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TURBINE *EDITION*

The Voice of General Aviation

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Turbine

A SPECIAL SECTION FOR THE TURBINE OWNER-PILOT

First-class step up

Sure, PC–12s are known for their utilitarian aspects, but the new PC–12 NGX brings a heavier emphasis on creature comforts. The seats, lighting, and environmental systems have all been given makeovers based on customer input.

Where: Stans, Switzerland

Photography: Courtesy of Pilatus Business Aircraft


Crafted in Switzerland
PC-12 NGX
PILATUS
PILATUS
THE BEST TIME TO FLY THE BEST IS NOW
Introducing the brand-new PC-12 NGX, the most advanced single-engine turboprop ever. Featuring general aviation's first Electronic Propeller and Engine Control System, a digital autothrottle, enhanced avionics with smart touch screen controller, a completely redesigned cabin with larger windows and new BMW Designworks interior. And all that at reduced operating costs and more speed. With the PC-12 NGX, Pilatus just made the best even better.
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DIGITAL PIONEER

Optimizing an enduring favorite

TO THE CASUAL OBSERVER, ALL PILATUS PC-12S MAY LOOK ALIKE. True, their basic appearance hasn't changed a great deal since the original PC–12 made its 1994 debut, but deep down the airplane has gone through a series of gross weight increases and other significant improvements. In 2008, the PC–12 NG brought Honeywell's Apex glass cockpit to the airplane, among other performance and system upgrades. The Apex avionics suite replaced the original PC–12's old-school Bendix/King panel, with its round gauges and KLN90B GPS navigator. But the biggest news came in 2019 with the introduction of the latest model: the PC–12 NGX.

BY THOMAS A. HORNE

PHOTOGRAPHY COURTESY OF PILATUS BUSINESS AIRCRAFT LTD.


PC-12 NGX

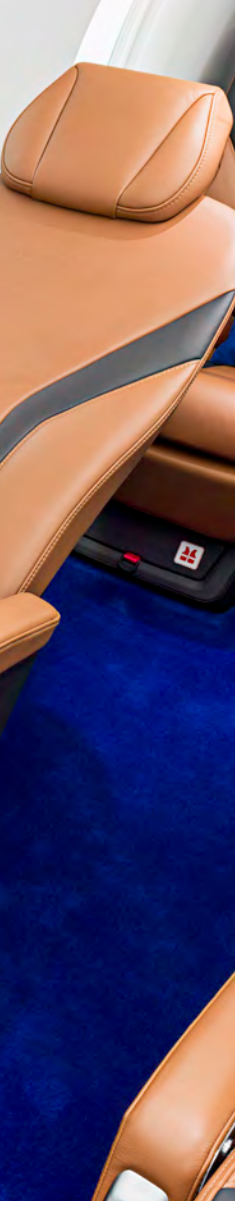
THE NEW PC-12 NGX retains Pilatus' signature large aft cabin door (above) but there are many new enhancements as well—like the redesigned leather seats (above right) with optional footrests, new sidewall ledges with oxygen mask stowage compartments, down-wash lighting, and cabin windows 10 percent larger than previous models. All cabin seats are fitted with quick-release hardware, where before only the last two seats had this feature.

TURBOPROP REVOLUTION

In a recent video (aopa.org/turbine/engine-start), I explained the basic steps in starting a Pratt & Whitney PT6 turboprop engine—similar to the ones in PC–12s and PC–12 NGs. It featured the sequence familiar to many PT6 drivers: checking the battery for adequate power, spooling up to 13 percent Ng, moving the condition lever to low idle, waiting for the lightoff, switching on the generator at 50 percent Ng, and watching out for an ITT rise that signals a hot start. Well, the PC–12 NGX does away with all that by automating the start with the single flip of a switch.

Yes, for those pining away for a Pratt & Whitney PT6 with a single-lever power control and full-authority digital engine controls (FADEC), the NGX has answered their prayers. The airplane's PT6E-67XP is the launch platform for Pratt & Whitney's first, and long-awaited, foray into the world of turboprop engine automation. In addition to push-button start, this means that a digital electronic engine control (EEC) unit applies its logic to control and monitor the -67XP. About to have a hot start? The FADEC will automatically shut the engine down. And for all the other steps in a start sequence, the FADEC handles them as well. There are still other protections—against overtorques, surges, and flameouts, to name a few. If it's above 26 degrees Celsius during shutdown, the engine will motor itself for a few seconds to help it cool down.

But wait, as the late-night TV ads say, there's more. The NGX's PT6E-67XP (the "E" is for electronic) also comes with autothrottle. Press the AT button and set a desired airspeed on the glareshield-mounted flight guidance panel, and the autothrottle responds with the power required, whether in climb, cruise, or descent. Meanwhile, the power control lever (PCL) moves on its own as power



SPEC SHEET
Pilatus PC-12 NGX

BASE PRICE: $4.39 MILLION
TYPICAL EXECUTIVE CONFIGURATION PRICE: $5.37 MILLION

SPECIFICATIONS

Powerplant | **Pratt & Whitney PT6E-67XP, 1,200 shp**
Propeller | **Hartzell 105-in dia, 5-blade composite, feathering and reversible**
Length | **47 ft 3 in**
Height | **14 ft**
Wingspan | **53 ft 6 in**
Wing loading | **37.6 lb/sq ft**
Seats | **1 + 8-10**
Cabin length | **16 ft 11 in**
Cabin width | **5 ft**
Cabin height | **4 ft 10 in**
Cabin volume | **330 cu ft**
Basic empty weight | **6,173 lb**
Max ramp weight | **10,495 lb**
Max takeoff weight | **10,450 lb**
Max zero fuel weight | **9,039 lb**
Max useful load | **4,277 lb**
Max landing weight | **9,921 lb**
Fuel capacity | **406.8 gal (402 gal usable)**
Max cargo weight, baggage area | **400 lb, 40 cu ft**
Cabin | **3,300 lb, 330 cu ft**

PERFORMANCE

Takeoff distance over 50-ft obstacle | **2,485 ft**
Rate of climb, sea level | **1,920 fpm**
Max cruise speed | **290 KTAS**
Max range, 4 pax | **1,803 nm**
Max operating altitude | **30,000 ft**
Landing distance over 50-ft obstacle | **2,170 ft**

LIMITING AND RECOMMENDED AIRSPEEDS

V_R (rotation) | **82 KIAS**
V_X (best angle of climb) | **120 KIAS**
V_Y (best rate of climb) | **130 KIAS**
V_A (design maneuvering) | **166 KIAS**
V_{FE} (max flap extended, 15 degrees) | **165 KIAS**
30 degrees | **130 KIAS**
40 degrees | **130 KIAS**
V_{LE} (max gear extended) | **240 KIAS**
V_{LO} (max gear operating) | **180 KIAS**
V_{REF} (reference speed, final approach) | **82 KIAS**
V_{MO} (max operating speed below 16,300 ft) | **240 KIAS**
M_{MO} (max Mach number, above 16,300 ft) | **M 0.49**
V_{SO} (stall, in landing configuration) | **67 KIAS**

FOR MORE INFORMATION contact pilatus-aircraft.com/en/fly/pc-12

AOPA Finance estimates a monthly payment of $23,100 with 15 percent down, a 4.2-percent rate, a five-year term, and 20-year amortization.

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

requirements rise or fall—as if a ghostly hand were in charge. Looking for a manual override (MOR) or condition lever? Don't bother. The dual-channel FADEC handles those functions as well.

Digital engine control offers other benefits in the PC–12 NGX. The PCL is linear in its power application, free of any of the flat spots or lags of the sort that can affect fuel control units managed by traditional, manually controlled pushrod linkages. And although the NGX's engine has the same 1,200-shaft-horsepower maximum power output as previous PC–12s, its digital torque limiting function is much more precise, which Pilatus says permits up to 10 percent more thrust in climb and cruise. This gives the airplane a published maximum cruise speed of 290 knots—five knots faster than earlier PC–12 models.

Another innovation is a low, 1,550-rpm propeller setting. Down on the center pedestal is a push-button for shuttling between the electronic propeller governor's normal, 1,700 propeller rpm and a lower, 1,550-rpm mode for a quieter cabin. Except for takeoff—when the FADEC will automatically command 1,700 rpm—you can use low-speed mode at any time. In cruise, Pilatus says that the penalty is a paltry one to two knots.

The new engine also has the latest single-crystal compressor blade metallurgy and improved cooling for the power turbine section. Together with the other enhancements, this gives the PT6E-67XP a 5,000-hour time between overhauls (it was 3,500 hours in earlier PC–12s), and maintenance intervals every 600 hours—twice that of previous PC–12s.

WARMER FUEL

Changes to the fuel system yield another advantage: Prist, an anti-icing fuel additive, is not required. New, higher-pressure jet pumps and boost pumps in the wing collector fuel tanks now create higher fuel temperatures, and fuel is delivered through smaller-diameter, insulated fuel lines to a fuel filter attached to an engine-mounted fuel control unit. Before reaching that fuel filter, fuel is warmed by an oil-to-fuel heat exchanger. A fuel temperature gauge on the cockpit multifunction display indicates fuel temperature as it enters the filter.

ACE AVIONICS

The PC–12 NGX retains the PC–12 NG's Honeywell Epic-based glass cockpit platform, but in view of some added elements Pilatus calls the NGX's panel the Advance Cockpit Environment (ACE)—which is also the name Pilatus gave to the avionics suite in its jet, the PC–24.

The ACE's four huge display screens sure look like those of the EASy cockpits in newer Falcon jets, especially the primary flight displays that show flight information, engine data, and nav/com frequencies on their split screens. The display screens have higher contrast and resolution than the PC–12's earlier


SYSTEM TEST
FIRE WARN
LAMP
STICK PUSHER
ELECTRICAL POWER MANAGEMENT
AV 1 BUS
STBY BUS
CABIN BUS
AV 2 BUS
MASTER POWER
GEN 1
BUS TIE
GEN 2
FUEL PUMPS
LH
RH
ON
AUTO
BAT 1
EXT PWR
BAT 2
AVAIL
ENGINE
RUN
STARTER
IGNITION
EXTERNAL LIGHTS
WING
NAV
BEACON
STROBE
TAXI
LANDING
PULSE RECOG
PASSENGER WARNING
NO SMOKING
SEAT BELTS
PILATUS

Honeywell Apex displays. There's also a new night mode for the MFDs, which gives them black backgrounds; a visual approach mode that lets you define the lateral and vertical waypoints for visual approaches; and Honeywell's Smart Runway and Smart Landing, which gives alerts to prevent runway incursions, takeoffs from taxiways, and landings on too-short—or incorrect—runways. Throw in airborne weather radar, SiriusXM datalink weather, global graphic weather, emergency descent management, and envelope protection, and you've got a panel every bit as capable as that of a large business jet. There's even the capability for controller-pilot datalink communications, should you need to fly to Europe.

The most evident new features to a current PC–12 owner? A new touch-screen controller, plus a thumbwheel for vertical speed adjustments. Previous models used up and down push-buttons for altitude changes.

INTERIOR MAKEOVER

The NGX cabin is markedly improved from that of its predecessor. To be sure, it retains the split personality (able to handle cargo and/or passengers) and big aft door that so identify the Pilatus brand. But the new leather seats are taller and narrower, can fully recline, and all have quick-release attach points for turning seating areas into cargo storage; before, only the last two seats were quick release. Thanks to a redesigned seat base there's one inch more headroom, and gone are the old-style storage drawers that opened into the aisle. Other nice touches include downwash lighting, USB and AC charging outlets, an air conditioning system that puts out more volume of air at less velocity, optional footrests, and—yes—bigger cup holders. Seems the old ones were a tight fit.

NORTH PLATTE AND BACK

The cabin's nice but we all know that the best seats are up in the front office. That goes double for the PC–12 cockpit, with its transport-category seats, generous dimensions, and attention to ergonomic detail. To get a close-up look I went to Pilatus' American headquarters at the Rocky Mountain Metropolitan Airport in Denver, Colorado, and met with Pilatus' chief pilot Jed Johnson and Tom Aniello, vice president of marketing. Johnson, who with 4,000-plus hours behind the wheel must be the world's highest-time PC–12 pilot, showed off the engine's new fuel system components and the R2-D2-looking electronic propeller control that sits atop the gearbox, fed by a wiring harness instead of mechanical connections.

Then we got in, went through the prestart checklists as presented on the ACE's INAV MFD display, and it was a matter of flipping the overhead panel's start switch to get the engine turning. From there, the job was to monitor the goings-on. Entering the wind and temperature data, then the flight plan came next, then the mandatory check of the stall warning system's stick shaker-pusher system. You bring up the power, then hold the yoke back for three shakes and a push—which wants to yank the yoke out of your hands. After taking the runway, it's time to arm the autothrottle, bring the PCL up halfway, and let the automation take over.

It seems somehow odd that an airplane weighing as much as 10,450 pounds could have a rotation speed that hovers around 75 knots, but the airplane's massive wings and five-blade propeller make it so. With the three of us aboard, we were light at 8,400 pounds but lifted off at 74 knots and went into a 130-knot climb doing 2,300 fpm on our way to FL270. Using the autothrottle's FMS speed mode, the climb speed then went to 140, then 180 knots as we neared cruise altitude. Up at 270 we set maximum continuous power and burned 414 pph using the 1,700 rpm propeller setting, then 416 pph with the low speed setting. The true airspeed—282 knots—was identical for each prop setting, but the noise levels were noticeably quieter in the low-speed, 1,550 rpm mode.

North Platte, Nebraska's Regional Airport was 242 nautical miles away, and with our

UP FRONT, there's the Honeywell Epic 2.0 avionics suite (opposite page), plus some major high-tech improvements. A single start switch is in the lower left corner of the overhead panel; new touch-screens let you arrange display views and screen views the way you like (above left); and there's a single-lever power control (above). Gone are the propeller and condition levers in the new FADEC system. To transition between a high-speed (1,700 rpm) and low-speed propeller rpm mode, simply press a square push-button mounted ahead of the power lever.

THE NEW, digitally controlled propeller governor—dubbed "R2-D2" by some—sits atop the prop gearbox (above left), fed only by a wiring harness. Earlier PC-12s make generous use of pushrods and other mechanical controls (above right) to adjust power, fuel flow, and propeller rpm. A Hartzell five-blade composite propeller (right) helps give the more efficient, 1,200-shp Pratt & Whitney PT6E-67XP deliver a maximum cruise speed of 290 knots.

average speed of 237 knots we arrived in the pattern in 50 minutes. During the descent the autothrottle dialed back the power to maintain our selected airspeed. Johnson set up the arrival using the visual approach mode, making waypoints defining the downwind, base, and final with 1.5, 1.5, and two-mile legs, respectively. This mode is great for VFR arrivals at unfamiliar airports.

On final it was autothrottle off, and on short final our V_{REF} airspeed was a mere 76 knots; with 30 degrees of flaps (maximum is 40 degrees) and reverse thrust we used just 800 feet or so to stop. Incredible. Even better, the airplane is easy to land. Just flare slightly and let it settle on the trailing link main gear for a soft touchdown.

Next came lunch at the airport's Lincoln Highway Diner, where breakfast is served all day, plus a stop next door to pay the fuel bill at friendly Trego-Duncan FBO, and then up to FL200 for the return trip. This time I checked the airplane's envelope protection by entering a 60-degree bank. At 51 degrees, the yoke fights back. It wants to return the airplane to 31 degrees in a measure to prevent the pilot from entering an unusual attitude.

No Pilatus demonstration would be complete without a stick-pusher exercise. And an exercise it is. There's no missing the cues that this airplane does not want you to stall. The airspeed tape turns red as you slow to stall speed, then the stick begins to vibrate in your hands. Meanwhile, if you persist with aft stick pressure, the PFD's entire terrain depiction turns red and the shake continues, along with the stern "stall, stall" automated aural alert. When the push comes, it can drop the nose in a big way. "Most pilots reflexively grab the yoke and try to haul it back," Johnson said of stall practice. But that can complicate things. "A secondary stall can happen, and a second push. Only this time the system will really push the nose down, as if to say 'I've had it with this guy,'" Johnson said. Full disclosure: I yanked it back, but not to the point of a secondary stall.

Soon enough, Rocky Mountain's RNAV GPS Runway 30L activated and we started down, finishing up with a V_{REF} of a whopping 82 knots and a pretty nice landing for someone who hasn't been in a PC–12 for five years.

Total sales of PC–12s have hit the 1,700 mark, and all 80 of 2020's PC–12 NGX production positions have sold out. The marque has found its niche and its place in turboprop history is secure. Some of its signature elements—the airstair door, its ability to fly off of unimproved strips, the large aft door—have become items to emulate among its competitors. And now, its digital engine controls join them. Soon, it may well be that every new turboprop comes with FADEC. **AOPA**

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