Flying the simulator means perfecting both your "switchology" and your procedural expertise. The simulator is ultra-sensitive in pitch and keeps you busy—especially when your instructor throws you curves. If you can fly the sim, you'll have no problem in the real airplane.

Now you're in the club

Training for Twin Commanders

BY THOMAS A. HORNE

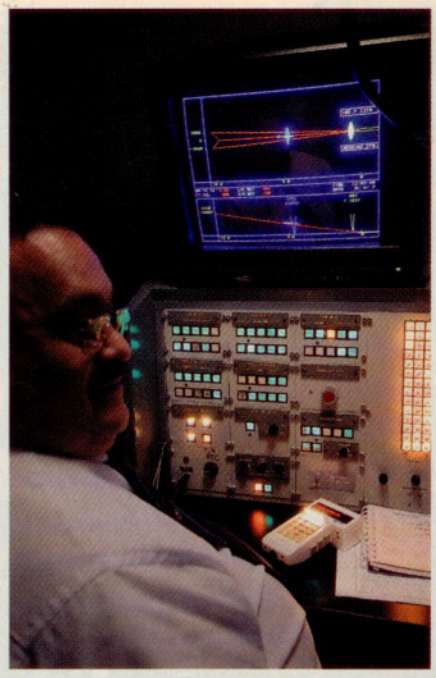
Congratulations! You've just purchased a turboprop twin—say, a Jetprop 840 Twin Commander. You've decided to take advantage of the airplane's hot-rod cruise performance (280-plus knots), 1,700-nm range, eight seats, and 31,000-foot maximum operating altitude to let you fly your missions faster, safer, and more efficiently. The airplane's earned a reputation as a "pilot's airplane," and now you're in the club. Now it's time to attend a five-day, intensive, simulator-based, type-specific training course. Without this, your transition to the left seat won't be as safe, insurance companies will shy away from coverage, and you'll have to learn the airplane's ins and outs in what could be a much less professional, less complete, less universally respected manner—such as flying with an instructor, or simply launching solo after a few trips around the pattern with a demo pilot. Far safer and complete training options are offered by FlightSafety International (FSI), PanAm SimCom, CAE SimuFlite, and other large training firms with professional staffs and technically advanced training aids.

So what can you expect from your training experience? I recently attended FlightSafety International's Twin Commander pilot initial training course, which focused on the Jetprop 840, to find out—and to get qualified in the airplane. Here are a few observations and insights.

The big league

FSI's Twin Commander training center is just across the street from Houston's William P. Hobby Airport, and from the moment you walk in the door you pick up on a very professional atmosphere. Many instructors are ex-military or airline pilots (or both), the motion-based simulators look impressive (and intimidating!) as they stand on their actuators in dedicated bays, and the classrooms are filled with the usual training aids (PowerPoint presentations, posters,

PHOTOGRAPHY BY MIKE FIZER AND CHRIS ROSE



Simulator instructor Fred Sandoval (right) put me through the wringer for four days straight. Using his control panel, he can cause multiple systems failures, flame out an engine, raise and lower ceiling and visibility, and much more. At least I'm flying the ILS acceptably, as seen on his viewing screens. Ground instructor Hugh Davis (below, at podium) goes over the pressurization system using PowerPoint presentations—and a real Garrett engine. Classroom instruction is four hours per day—enough to cover the airplane from radome to tailcone.

and other graphics) plus some real-world educational materials (such as a Twin Commander's Garrett TPE-331 engine, cut away to reveal critical components, and actual overhead switch panels for practicing checklist procedures).

From your first day in this environment, you come to understand certain unspoken assumptions about your flying background. You are an experienced, completely proficient instrument pilot, with a substantial amount of multiengine flying time under your belt. Here you won't be learning how to fly instrument approaches or holding patterns. You won't be asked to explain stalls, won't be delving into the aerodynamics of V_{MC}, and won't be learning about navigation. Those are givens. You've made it to the big league, so the emphasis is on learning the airplane, its systems, and how to best fly a wide range of procedures. Of course, if you have trouble in any area of your training it will be addressed. But this will only slow your progress—and perhaps require you to make a return visit for more training before you're signed off.

Ground school

The first of the five days of training started at 8 a.m., and I was paired with one other 840 trainee. We had ground school instructor Hugh Davis all to ourselves. Davis spent some time explaining his background (as an Army pilot in Vietnam and a Continental Airlines pilot flying DC–10s, Airbus A300s, Boeing 737s, and MD–80s) while we filled out forms and took the first of many looks at our huge systems manual, our pilot's operating handbooks (POHs), and checklist handouts.

After that, we got down to business. First came a training unit that dealt with cockpit resource management and aeronautical decision making. Special attention was given to situational awareness, both operational and human. Are you departing from standard operating procedures? Failing to meet targets? Is no one flying the airplane? Are you preoccupied? Are you confused, or have an "empty" feeling? These are just a few signs that you've lost situational awareness.

A unit called "Aircraft General" was next. This was an illustrated preflight

walkaround of the airplane, with additional commentary on Twin Commander peculiarities (for example, be sure the cabin door is fully open before anyone uses the step, or the step's linkage can be damaged). Like so many other informational tidbits, this will be all new territory for anyone stepping up to a turbine airplane.

This was followed by a detailed discussion of the Garrett engines (Honeywell manufactures current production versions of these engines, and thus bear the Honeywell-Garrett name), their pre-start checklists, and their start sequences. Once again, this presents a lot of new ground for the neophyte to plow. Unlike Pratt & Whitney turboprop engines, which use propellers that turn independently of the rotating components of the powerplant (the so-called free turbine design), Garretts use a single-shaft setup. This means that the shaft to the propeller gearbox is directly connected to the rotating engine's fan and compressor sections.

Practically speaking, this poses some critical issues in the event of a power loss or engine failure. Should this happen, the windmilling prop would generate huge amounts of drag, not to mention asymmetric thrust, as the prop turns the rest of the engine. So Garrett designers engineered an ingenious system that senses negative torque, then automatically sends the propeller of the sick engine to a nearly feathered condition (the pilot must manually complete the feathering) when it detects that the prop is driving the engine. Without this NTS (negative torque system) a V_{MC} rollover can be virtually guaranteed after an in-flight engine failure. That's why a check of the NTS is required before every flight. It's a no-go item. If the NTS doesn't pass the preflight checks, you're grounded.

Learning these and other checks takes time, but Davis laid the groundwork. Ditto the overspeed and underspeed governor checks. Garretts run at 96 to 100 percent rpm day in, day out—that's their normal engine speed in flight. Like other turboprops, you must check the governors, and learning this sequence takes time as well.

Other essential new information has to do with procedures for dealing with

start malfunctions—like a hot start or a hung start. That's when inter-turbine or exhaust gas temperatures head for redline, or when the engine won't accelerate during the start. To handle the first problem, an immediate shutdown is required. Same with the hung start, but you have to motor the engine (turn it without fuel or ignition on) to purge it of any raw gas before shutting down.

Monday was an all-day ground school. That night, there was plenty to study, and much more to anticipate. On Tuesday, we covered the electrical, fuel, fire-detection, and lighting systems. On Wednesday, it was the hydraulic landing gear system, the flight controls, and weight and balance. On Thursday, it was the pressurization, air-conditioning, ice-protection, and oxygen systems. All in all, we had information delivered via the fire-hose method, topped off with an oral quiz at the end of each session (the 70-question final knowledge test would come at the end of the course). It seemed I couldn't write or listen fast enough, and our ground school wrap-up time came in what felt like no time at all.

Simulator time

Twin Commanders are great-handling airplanes with simple, reliable systems. But simulators aren't meant to give you trouble-free rides. They exist to translate your book learning into practice. They exist to vex you, tax your mental resources, and thereby drill you in the fundamentals of normal, abnormal, and emergency flight situations. If you show any bluster or hubris in ground school, a simulator session has the power to smack it down in moments. In your darkest moments flying a simulator, you will truly come to know the dimensions of that "empty" feeling.

The angst began the moment you entered the huge bay containing the simulators, and entered Fred Sandoval's briefing room. Sandoval was my simulator instructor, and on his chalkboard, in capital letters, are his four simple rules for safe flying:

FLY THE AIRPLANE
SEE RULE #1
THE CHECKLIST NEVER FORGETS
RAW DATA IS ALWAYS PRIMARY

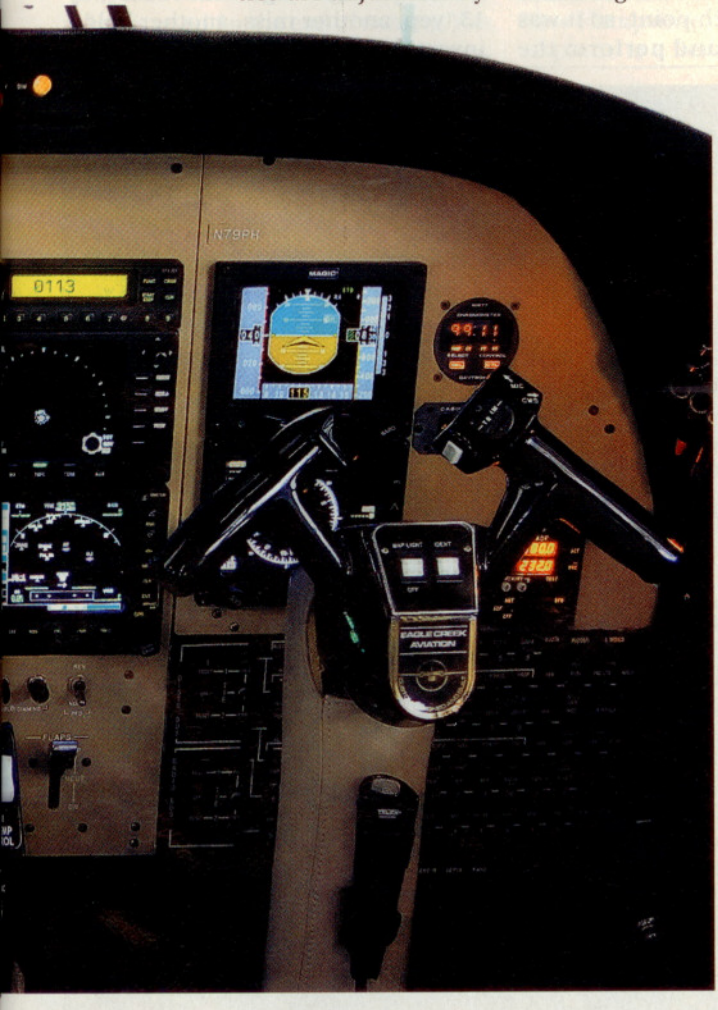
And underneath this list is another item: DO NOT FLY INTO BAD WX.

After a few words of advice, it's off to the simulator. Sandoval said to start with 22-percent torque, gear down, and half-flaps to obtain 120 KIAS for flying the final approach course. He also said that 60-percent torque yields a 650-to-700-fpm descent rate on approach; that gear speed is 200 KIAS; and that half-flaps can be put down at 180 KIAS, full flaps at 140 KIAS. He recommended crossing the threshold at 100 KIAS. Then you began the flare, and slow to a touchdown speed of 95 KIAS or so.

Once you're strapped in, you might as well be flying the real airplane. This particular simulator is an old one, as simulators go, and is rated as a Level A simulator. It's still pretty convincing, though, and it's your little world for some eight hours of training. It's good for logging approaches and airwork, but does not allow credit for takeoffs and landings. Its visual system has day, dusk, and night capability, and—of course!—cloud heights and visibilities are adjustable by the instructor, who has a control console. And you needn't ask. Except for the first few hops, nearly all your flights will be in instrument meteorological conditions.

Soon enough, the day's work began. Pre-start checks got big emphasis, as did NTS checks, and I was schooled in how to get the propellers off their start locks once the engines are running. The start locks keep the propeller blades in flat pitch; this minimizes drag during the start. You pull the power levers into reverse momentarily to release the start locks and let the propeller blades assume normal pitch angles.

A normal takeoff and climb to 6,000 feet came next, followed by steep turns and clean and dirty stalls. Slowly, I came to terms with the airplane. The simulator is supersensitive in pitch, but soon my oscillations and general jerkiness with the controls tamed a bit. Then came the real work.I was cleared for the ILS Runway 9 approach to Memphis International, and used the simulator's Garmin GNS 530 to set up the radios and call up the procedure. Following Sandoval's helpful advice, I



The Commander 1000 flown for this article belongs to John Wood and Dr. Tiron Pechet. It's a "Renaissance" Commander—a completely reworked and upgraded 1982 model. The panel features the Meggitt MAGIC glass cockpit display suite. With its overhead panels, windshield wipers, and ram's-horn yokes, the Twin Commander is known as a "pilot's airplane." The Meggitt upgrade is icing on the cake.

intercepted the ILS and started down. Sure enough, at decision height I was still in the clouds, so it was time for a missed approach and a hold at the published missed approach holding fix. This was followed by a second ILS to the same runway, but this time the ceiling and visibility were set to 500 feet and two miles, respectively, and a normal landing followed. Here's where I had my biggest problems—not with the landing, but with the nosewheel steering. Twin Commanders use hydraulically boosted steering. The first inch or so of rudder travel gives you, in essence, "power steering," and, brother, it is sensitive! Push some more, and you get very powerful brakes. I was forever weaving from one side of the runway to the other. To stop the overcontrolling I pushed even harder on the rudder pedals, which, while slowing the airplane, only made the weaving worse. Sigh. This would be one of my biggest learning challenges in the Twin Commander.

Shutdown checks came next, and back in the classroom Sandoval said I was making normal progress, which surprised me in view of my taxiing performance. Then he demanded that from now on he wanted to hear altitude call-outs on approach. He wanted to hear call-outs for 1,000 feet, 500 feet, and 100 feet, and a "minimums" call-out on all instrument approaches. Prevents controlled flight into terrain accidents, he said.

Are we having fun yet?

The next day's simulator session was more demanding. For the next three sessions, malfunctions would abound, and having two functioning engines would be a rarity. These sessions ultimately build confidence and bring out your best, and you work very hard. Sandoval's words of advice became far fewer, and much further apart.

There were unusual attitudes (30-percent torque, wings level, and nose on the horizon bring you back to sanity at 130 to 140 KIAS), an engine fire, and the mandatory in-flight engine shutdown, followed by an airstart.

Next came a VOR/DME approach to Runway 18R at Memphis. By this time I began to get the psychomotor routines of flying the airplane. I'd need them for what was to come.

Sure enough, I was still in cloud at the missed approach point, so it was time to power up and perform the missed approach procedure. Then all hell broke loose.

During the climbout the right engine flamed out. The Twin Commander is fairly tame during single-engine operations (not at all like the unforgiving Mitsubishi MU–2, another Garrett-powered turboprop twin), but you still have your hands full when one engine is putting out its full 717.5 shaft horsepower and the other is spooling down with its prop on the NTS. While I sorted out the control forces and feathered the bad engine, the airplane wandered a bit, but the main thing was that we were climbing. The Twin Commander can climb at 1,000 fpm on one engine. Not bad.

A hold at the published missed approach fix followed, then a single-engine ILS to a landing back at Memphis. This time Sandoval had mercy, and gave me a 500-foot ceiling and one-mile visibility. Did I mention it was night?

The next day we were set up to fly out of Hutchinson, Kansas. Aborted takeoffs, more engine failures, a single-engine NDB approach to Runway 13 (with a missed approach and hold, of course), a single-engine ILS to Runway 13 (yep, another miss, another hold), inverter failures, emergency landing

gear extensions, and simulated icing conditions were the *entrees du jour.*

The last day's workout involved sudden depressurization, followed by an emergency descent, various electrical problems, trim runaways, a two-engine (what a luxury!) ILS Runway 27 approach to Memphis, and a single-engine landing in VFR conditions (more luxury!). Then came a challenging single-engine Localizer Runway 27 approach with a circle-to-land maneuver to land on Memphis' Runway 18R. Ceiling was 600 feet and visibility was set at one mile, so it was an effective demonstration of the dangers of circling approaches. My attention was divided between looking outside for the runway environment, maneuvering at low altitude, and scanning the panel to make sure I didn't prematurely descend below the minimum descent altitude.

A final exercise, called "batting practice," was tailored to ingrain proper responses to the critical engine-failure-after-takeoff situation. Time and again, an engine fails, and each time your responses become more automatic and precise. This took some time, which is probably why it's saved for the end of training. You see, Garretts turn counterclockwise as viewed from the cockpit. This means you have to remember to apply left rudder on climbout—just the opposite of what you learned in conventional twin-engine trainers. Throw in an engine failure, and you've got the transition to the usual dead-foot, dead-engine rudder pressures to help you identify the bad engine. FSI adds another element to absolutely, positively confirm the offending engine: checking the engine gauges for ebbing life signs such as falling ITTs (inter-turbine temperatures), EGTs (exhaust gas temperatures), and torque values.

Before I knew it, my five days were up, I had my logbook endorsements and my certificate, and I was ready to fly—for real.

The real McCoy

Compared with the simulator, flying the real Twin Commander is a breeze. It's more stable, far, far less twitchy in pitch, and—much to my relief—not a problem to taxi. If you can fly the simulator, you'll do fine in the real McCoy.

My McCoy was a 1982 Model 1000 Twin Commander owned by John Wood and Dr. Tiron Pechet, of Nashua, New Hampshire. Wood's and Pechet's airplane is a Renaissance Commander—a totally upgraded airplane, with work performed under approvals obtained by Twin Commander Aircraft LLC. Eagle Creek Aviation Services Inc., of Indianapolis—a Twin Commander service center—did the extensive work package that transformed Wood's and Pechet's airplane. The airplane's original steam gauges were replaced with the Meggitt MAGIC glass cockpit, its engines and systems were overhauled, the interior was refurbished, and the airplane was upgraded for approval for flight under RVSM (reduced vertical separation minimums) at altitudes above Flight Level 290.

As you might expect, this Twin Commander was a pleasure to fly. The experience made for a great reward for all that hard work at FSI-Houston. Many thanks to FSI, Davis, Sandoval, and Wood and Pechet for a terrific reintroduction to a terrific airplane. AOPA

E-mail the author at tom.horne@aopa.org.

Links to additional information about Twin Commanders and turbine training may be found on AOPA Online (www.aopa.org/pilot/links.shtml).