



DUCHESS

ON TARGET AS A NIMBLE TRAINER, THE BEECH
MODEL 76 FINDS ITS NICHE AS A TRAVELER
WITH THOSE WHO WANT TWO OF EVERYTHING.

BY MARY F. SILITCH

continued

The aircraft lifted off Washington National's Runway 33 at 71 knots. Climbing out at 1,100 fpm and 85 knots, I put the gear up. Following the tower's directions to turn left to a heading of 320 degrees, climb and maintain 2,500, vectors out of the TCA, I switched to departure control.

Departure control crisply shot me a heading change, then asked abruptly, "Say again aircraft type?" Banking away from the Potomac and reducing power to 25 and 2,500, I replied, "Two-Seven-Delta, Beechcraft Duchess."

"Well," Departure declared unexpectedly, "It's not often we get to meet royalty," and he was off to give an altitude change to a departing airline jet.

Well, sir, it is not often we get treated like royalty. But flying the Duchess, even competing with the shuttle 727s, the Gulfstream IIs, the DC-9s, the Learjets and the Boeing 737s at National, there is no need to feel less than regal. With shapely lines that outclass any three-holer, the Duchess commands attention wherever it goes—from DCA to a small, airport in Maine.

Some 25 pilots in the Washington area now have multi-engine ratings on their licenses, thanks to working out in N6627D, the Duchess I have been flying for almost a year. The aircraft has been used for numerous flight checks by the local Federal Aviation Administration examiners, for airline transport pilot and certified flight instructor candidates, as well as for moving-up multi students. Doubling as a business air-

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LOW-SLUNG AND SLEEK, THE LIGHTEST BEECH TWIN HAS SIMPLE LINES.



craft, it put in 200 hours on business flights for its owner, Robert Hilterbrick, in the last year, and I have used it for that purpose also.

But the Model 76 Duchess was designed for training. Before the Duchess was introduced in the late 1970s, Beech Aircraft Corporation saw the need for a "fuel-efficient, straightforward, multi-engine aircraft," according to a Beech spokesman. The Aero Clubs, nationwide training and rental centers for Beech, were growing slowly but steadily; but there was no aircraft that

could be used by club members to transition from the single-engine Aero Club fleet of Sports (later dropped in favor of the Skipper), Sundowners and Sierras to the Barons, Dukes and other Beech high-performance twins. Just as the Sport, the Sundowner and the Sierra evolved from the Musketeer as the Aero Club concept started, the Duchess has evolved from the Club aircraft.

It was a more dramatic innovation than was its predecessors' change. Park a Duchess between the stolid, upright Sierra, the retractable in the Club line,

and a graceful Baron, and you would not guess at first glance that the Duchess sprang from the line of smaller aircraft. Its jaunty T-tail, rising above the basic Musketeer fuselage, bears a family resemblance to a King Air, and its nose slopes elegantly downward to give it an even more rakish look than a larger Beechcraft twin.

But the new lines were not mere cosmetic changes to the basic model (although one can imagine what a T-tail might do for the Sierra's looks). The high tail keeps the elevator out of the direct prop wash from the engines on either wing, thus fewer trim changes are needed. According to Beech, the T-tail also gives the aircraft a greater center of gravity range than a conventional tail would. Even so, Beech does not offer the optional fifth and sixth bench seat on the Duchess that the Sierra has, to prevent any loading out of CG.

In flight, the visibility over the nose is so good that a pilot new to the aircraft has an initial tendency to keep the nose too high when leveling off for cruise. By all rights, there should be something there blocking the view.

Even the addition of the engines on the wings adds to the grace of the lines, and their presence is certainly practical.

Beech not only gave the aircraft two engines, but added dual capability in several other essential areas. There are, of course, two alternators. Avionics and flight instruments are divided between two bus bars; so, in case of a failure in one, you will not lose both nav/coms, for example. (This is not a minor point to one who has lost all electrical capability IFR over the mountains in a single.) If one alternator goes out, the bus tie circuit breaker allows current to be drawn from the other bus. Circuit breakers are arranged according to which bus each instrument and piece of equipment is connected. The breakers are labeled schematically to show the bus connection.

There are two engine-driven dry pressure pumps for the flight instruments and autopilot, with one serving as backup for the primary pump.

As an option, you can order two 12-volt, 25-ampere-hour batteries to replace the standard single, 24-volt, 15.5-ampere-hour battery.

Out on each wing, there is a taxi light, plus the landing light on the left side. Nearby in the leading edges of the wings are two stall-warning sensing vanes. The left one warns of stalls

AND IT IS SIMPLE TO OPERATE.



continued

when the flaps are extended up to 16 degrees, and the right one triggers the horn if a stall is imminent when the flaps are beyond 16 degrees.

The elevator, high on the tail, has dual trim tabs, one on either side. This dual feature, according to a Beech engineer, was added to prevent asymmetric loading on the tail and to allow a lighter tail structure and a simpler control mechanism.

The dual features of the aircraft are impressive, especially to a confirmed single-engine pilot—but there is more. The best way to start becoming acquainted with a new airplane is to do a careful walkaround.

You get the immediate impression that Beech was perhaps too generous in providing more than one of an item when you start to drain the fuel. There are eight fuel drains to contend with—and contend is one of the more polite words that come to mind when you are

stooping awkwardly under the low wing, and stooping again and again. Beech provides a red metal tool that doubles as a fuel drainer and an emergency gear-extension device. (It also can be used to open the fuel filler cap and to turn the oil filler cap.) Starting with the fuel-tank sumps, outboard of the engines, you must brace for a large stream of fuel—the helpful tool would be more helpful if it were not an open cylinder but had a container to catch the fuel sample. Another outlet on the outboard side of each engine nacelle drains the fuel-selector valves, and at the wing root are flush drains for the crossfeed line—two on each side.

No fuel goes through the cabin, incidentally, as the fuel indications are transmitted electrically to the fuel-quantity indicators on the Duchess's panel.

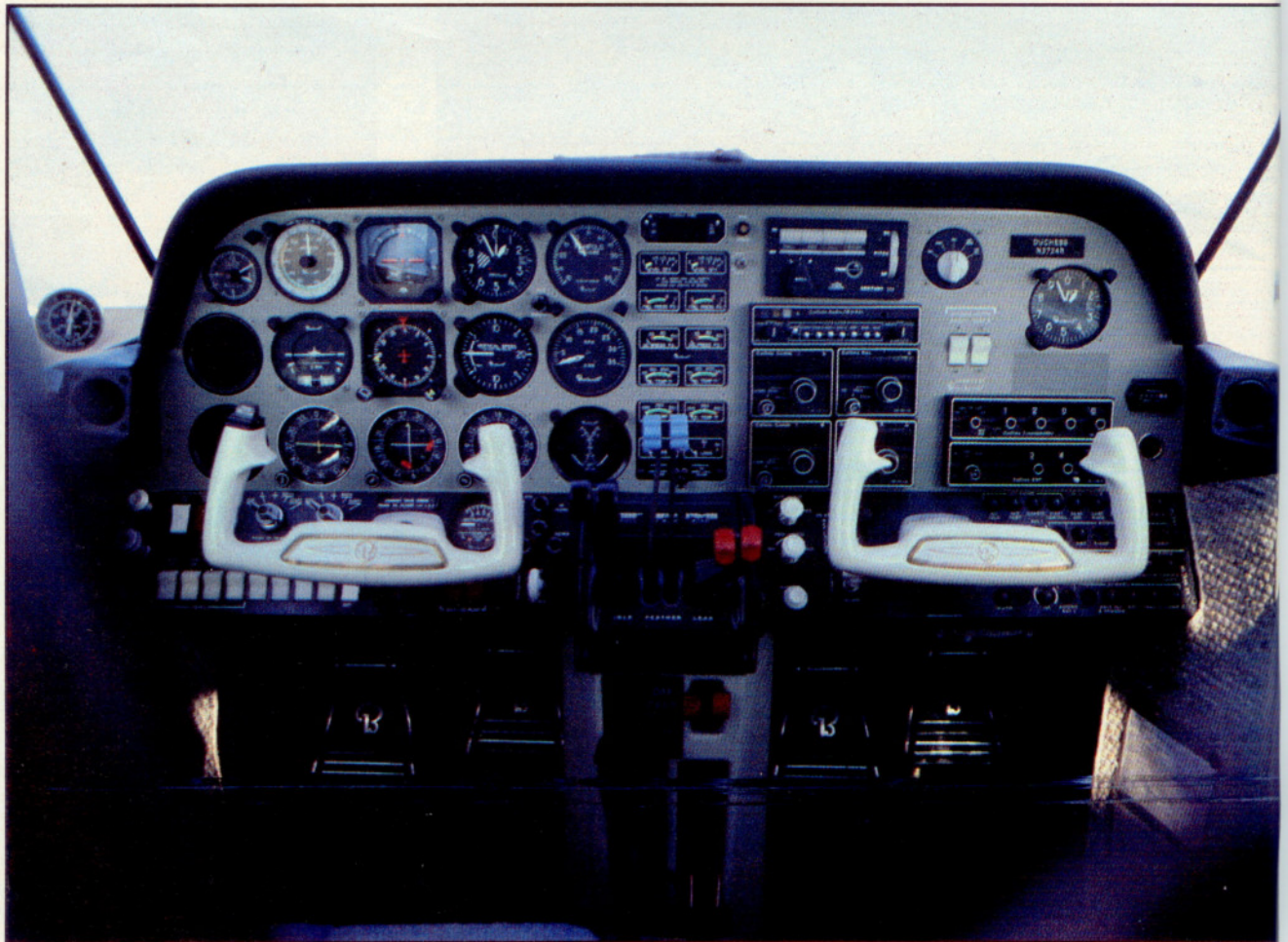
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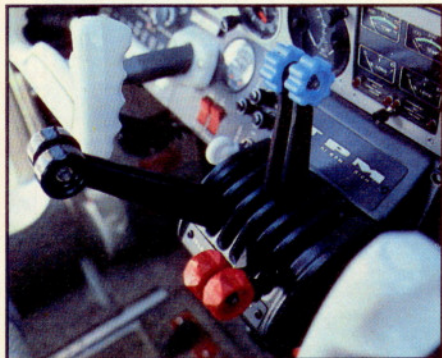
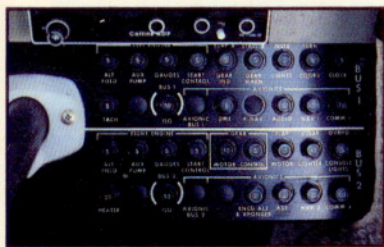
The two fuel tanks hold 51.5 gallons each, or 103 total of which 100 gallons are usable. Tab indicators in the fuel-tank filler necks indicate full at the top, 38.5 gallons usable at the center mark and 28.5 gallons usable at the bottom of the tab. The markings help take the guesswork out of partial filling when weight is a consideration.

Before you squeeze in between the propeller, the nacelle and the nose to drain the crossfeed fuel, you want to be certain that all the switches are off, as there is no room for error.

The awkward crouch you must assume there to reach the fuel drains puts you in perfect position to check the landing gear. The main gear is a modified version of that on the Sierra, except the Duchess gear has oleo shock absorbers instead of rubber doughnuts. Changing the gear—along with the longer wingspan, the T-tail and perhaps the addition of the engines to the

INSIDE, CLEAR MARKINGS AND A CLEAR VIEW DISTINGUISH THE DUCHESS.





wing—has made landing the Duchess a pleasure, especially for one whose good landings in a Musketeer were occasions rare enough to be notable.

The nose gear will look familiar to Bonanza pilots, but slightly askew. The Bonanza gear has been reversed—the scissor link is in the rear on the Duchess so that the nose gear can retract forward. This was done so that the slipstream will force the nose gear into place when it falls in emergency gear extension and because there was more space forward.

The gear is operated by an electrically driven hydraulic pump. Should the gear fail to lower in flight, you take the handy fuel drain/emergency landing-gear extension tool to turn the handle on the dump valve, located in front of the pilot's seat. The gear will fall free. (First, of course, you must slow to the gear-extension speed of 140 knots, put the landing-gear control switch down and pull the circuit breaker.)

After the preflight is completed, the Duchess makes the next step easy. There is a large 36- by 38-inch door on the pilot's side, and one on the right side. (The baggage-door is almost as large as the entry doors.) A Duchess pilot soon becomes adept at releasing the

door stays with his foot to avoid an extra stoop. And a good thump on the top of the door to the rear assures the door is closed tightly. There is no reassuring double lock.

The next thing to do inside the cabin is to stow the fuel-drainer tool, in case it is needed in its other capacity for emergency gear extension. There is a special pocket for it on the door.

If the Duchess's exterior good looks have not sold you on the airplane, sitting in the left seat and gazing at the instrument panel will. The panel is low and flat and organized in a simplicity that reflects Beech's progressive thinking on human factors engineering. Considerable thought went into the Duchess's panel layout.

The flight instruments are in the basic T in front of the pilot, with the avionics to the far right. In the center are the engine gauges, with sharp, clear, brightly colored markings. The gauges are so easy to read that you can tell at a glance whether you have sufficient fuel or oil pressure, or whether oil and cylinder head temperatures are within limits. The fuel-quantity gauges are on top of the stack, with yellow arcs marking the empty ends of the gauges. If the needle is in the yellow, there are

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fewer than nine gallons left in the respective fuel tank. The handbook warns that you should not take off with fewer than nine gallons in either tank. (Another limitation is the 30-second maximum duration for slips.)

Other powerplant instruments—manifold pressure and tachometer—are just to the left of the center gauges. Two tachometers are standard equipment on the Duchess. The more practical dual-needle single instrument is optional; it makes engine management easier, and it frees a space in the panel for another instrument. (The exchange also frees you of \$268.)

Beech will install any avionics you want. Factory packages include Collins Microline, Edo-Aire and King Silver Crown avionics. The newest option for the panel is RCA WeatherScout II radar. Price for the monochromatic version is \$10,995; the cost of the color radar has not been set, but is expected to be about \$4,000 to \$5,000 more.

Alternator and master switches are to the pilot's left, with the magneto/start switches next to them. No key is needed, and the prime is built into the switch. With the switch on Both, just push the switch in to prime, for three to five seconds, then crank the starter.

Engine controls are in the center quadrant, in the conventional order (not the Baron arrangement)—mixture

to the right, propeller in the middle and throttle on the left. The power quadrant is marked clearly. There is a large T, P or M over the appropriate throttle, prop and mixture control. The power controls are marked for position also—Full and Idle, Hi RPM and Feather, Rich and Lean.

Gear and flap switches also are conventional—the gear switch is to the left of the power console, and flaps are to the right. The flap switch has three positions—Down, Off and Up; you can select 10 or 20 degrees. It is a good idea when putting the flaps up to leave the switch in the Up position, rather than switch back to Off, lest you go too far and hit Down.

Just below the power quadrant are the only cockpit items that do not quite measure up to the rest of the systems. The carburetor heat is off when the levers are up, on when down; but from the pilot's vantage point, the Off indication cannot be seen. The levers for carb heat, cowl flaps and fuel selector do not move easily, and you cannot move the pairs of levers simultaneously. The levers are flat metal, and the slots and detents also are cut out of sheet metal. Because of the blunt edges, I am careful not to get a finger

too close while I am operating them.

All is forgiven, however, when you see the simplicity of the fuel system. The fuel selector console is on the floor between the pilot and the copilot, and the only choices distinctly are labeled On, Off or Crossfeed. If one engine is not operating, the fuel tank on that side should be switched off. If fuel from that side is needed for the operating engine, the selector is moved to Crossfeed and the fuel is pumped directly to the opposite engine. Crossfeed can be used only in level flight.

You do not have to become airborne to feel that the Duchess is a good multi-engine trainer. Once in the air, however, your initial impressions are confirmed—it is an airplane that is complex enough to acquaint a student thoroughly with the basics of multi-engine systems and procedures, but simple enough to avoid overwhelming him with the undue complexities of fuel-management and critical-engine problems.

The Duchess is easier to fly in climb or descent; straight and level, you discover it is not a hands-off airplane. But it responds gently to control pressures and generally is stable; however, work load increases in turbulence. Point a wing at a spot on the ground and the aircraft rotates 360 degrees about that point without a waver.

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COUNTERROTATING PROPS MEAN NO CRITICAL ENGINE.



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Point one propeller straight up and down, and the Duchess helps you through the one-engine-inoperative procedures. Your hand automatically goes to the right, adjusting the power controls, working from right to left in logical order. Mixture Rich, propellers high rpm, throttles Full. With one foot to the floor (there is rudder trim to alleviate that) and a five-degree bank into the good engine, you have no problem tracking straight ahead. The engines have counterrotating propellers, so there is no critical engine, and minimum control speed is the same for both engines.

Climb with only one engine can be marginal. I remember straining for 25 fpm on a go-around one 103° day, almost at sea level, with full fuel and 560 pounds of people aboard. As we gained altitude, we got up to 50 fpm before restarting the engine. With less extreme temperatures, of course, performance is better; but it was a good demonstration of what one should expect in less-than-ideal conditions.

Most of my single-engine approaches in the Duchess resulted in single-engine go-arounds, thanks to overexuberant check pilots and under-observant pilots who cut me off in the pattern; so I became well acquainted

with single-engine climbs under varied conditions. That hot day was the most extreme. The book figure for sea-level, standard-day, single-engine climb is 235 fpm.

Service ceiling is an impressive 19,650 feet; but with only one engine, it is 6,170—enough to give you some degree of confidence over the Eastern mountains, at least. (Piper's Seminole has the same engines, but the Seminole—nonturbocharged—has a single-engine ceiling of 4,100 feet.)

The Duchess is easy to handle in slow flight, with responsive, light controls. There is plenty of warning of a stall from the horn and from a pronounced aerodynamic buffet before a sharp break.

Since 85 knots is the single-engine best-rate-of-climb speed, it doubles as a good approach speed until you are assured a landing, just in case there is a last-minute change in the number of engines operating. Slow it a bit more over the threshold. The book recommends 75 on approach, flaps down. Less than 1,000 feet is needed for rollout. Because the longer, intersecting runways at National often are in use by slightly larger traffic, or are about to be, the Duchess usually is asked to hold short of crossing the runway on landing. It has never been a problem.

The Duchess now is being viewed by

Beech as a business vehicle by pilots and operators of larger aircraft who are taking a second look at their fuel bills. While its traveling credentials—in terms of speed and cost-effectiveness—are not as impressive as its training qualities, it serves for those who want the redundancy of a twin and the added redundancy of the Duchess's many backup features. And for a pilot moving down from a larger twin, the Duchess's fuel consumption will lighten the monthly envelope from the oil company. But if speed and economy are more important than redundancy, there are high-performance singles that cost less to buy and to operate.

I had a four-hour 15-minute flight from Washington to Bangor, Maine, for example, that came out to 19 gph total. Flying at 7,000 feet, at the recommended cruise power of 24 inches and 2,300 rpm (or full throttle), gave 140 knots indicated and 160 true. Economy cruise would have resulted in 15 gph, with a true of 143 knots. (Beech has moved away from using percentages of power and talks in terms of power settings instead. This makes comparisons with other aircraft difficult, and operators will have trouble with leaning procedures.)

For traveling, the Duchess will carry a reasonable, but not impressive, load. The standard-aircraft useful load is 1,470 pounds. With full fuel (103 gallons), 27D will carry four people, provided one of them is 19.88 pounds less than the 170-pound FAA standard—and provided no one brings baggage.

Cabin comfort over the long haul is good. In fact, the Duchess is two inches wider than the B55 Baron. The panel is too low-slung to allow maximum knee room for long-legged pilots—but what does these days? Four hours or more in the left seat is not too tiring, and the noise level does not seem high (although we did not measure it). Cabin air is quieted through a rear duct system, with an extra-large intake in the aft fuselage.

I rode in the rear seat for a short hop to test the legroom there. It is adequate—for a short hop. The main spar runs under the seat and protrudes a few inches into the space meant for your heels. The seat I tried was one of the optional separate third and fourth seats, for \$1,050 extra over the standard bench-type rear seat—a rather steep price for any added comfort.

Called easy to maintain by several owners, the Duchess has had few ma-

BEECHCRAFT MODEL 76 DUCHESS

Basic price (1981) \$120,750

Price as tested (1979) \$117,000

Specifications

Powerplant	Avco Lycoming O-360-A1G6D and LO-360-A1G6D 180 hp@ 2,700 rpm (counterrotating) Recommended TBO 1,500 hr
Propeller	Hartzell, constant-speed, full-feathering, 76 in
Wingspan	38 ft
Length	29 ft 5 in
Height	9 ft 6 in
Wing area	181 sq ft
Wing loading	21.64 lb/sq ft
Power loading	10.88 lb/hp
Seats	4
Cabin length	7 ft 11 in
Cabin width	3 ft 8 in
Cabin height	4 ft
Empty weight (basic aircraft)	2,446 lb
Empty weight (as tested)	2,655.88 lb
Useful load (basic aircraft)	1,470 lb
Useful load (as tested)	1,260.12 lb
Payload w/full fuel (basic aircraft)	870 lb
Payload w/full fuel (as tested)	660.12 lb
Maximum ramp weight	3,916 lb
Maximum takeoff weight	3,900 lb
Maximum landing weight	3,900 lb
Fuel capacity	103 gal (100 usable)
Oil capacity ea engine	8 qt
Baggage capacity	200 lb (19.5 cu ft)

Performance

Takeoff distance (ground roll)	1,017 ft
Takeoff over 50-ft obstacle	1,900 ft
Rate of climb (gross weight)	1,248 fpm
Single-engine ROC (gross weight)	235 fpm
Maximum level speed (sea level)	171 kt
Cruise speed (2,500 rpm, 8,000 ft)	160 kt
Cruise speed (2,300 rpm, 16,000 ft)	143 kt
Range @ 2,500 rpm, 8,000 ft (w/45-min res)	675 nm
Range @ 2,300 rpm, 16,000 ft (w/45-min res)	865 nm
Service ceiling	19,650 ft
Single-engine service ceiling	6,170 ft
Landing distance (ground roll)	1,000 ft
Landing over 50-ft obstacle	1,881 ft

Limiting and Recommended Airspeeds

<i>Indicated, not calibrated</i>	
V _{si} (Stall clean)	70 kt
V _{so} (Stall in landing configuration)	60 kt
V _{ne} (Never-exceed)	194 kt
V _{no} (Maximum structural cruising)	154 kt
V _{mca} (Minimum control speed w/one engine inoperative)	65 kt
V _{yse} (Best single-engine rate-of-climb)	85 kt
V _{xse} (Best single-engine angle-of-climb)	85 kt
V _{sse} (Minimum intentional one-engine-inoperative)	71 kt
V _{fe} (Maximum flap-extended)	110 kt
V _{le} (Maximum landing-gear-extended)	140 kt
V _a (Design maneuvering)	132 kt

Based on manufacturer's figures.

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major airworthiness directives (ADs) in its brief history. Most recent was a requirement to perform a dye-penetrant inspection for cracks in the lower tubes of the engine mount. The AD called for visual inspection each 50 hours thereafter. Any cracks found, of course, had to be repaired. Owner Hilterbrick said that the dye-penetrant inspection was done on 6627D during a regular 100-hour inspection and added only \$20 to his bill. He added that all of the ADs on 6627D came under warranty.

Another 1980 AD was issued to "prevent possible unbalanced rudder condition that could induce flutter." The problem was water trapped in the rudder and the rudder trim tab. Drain holes had to be drilled and gaps in the top of the rudder sealed.

An early AD required replacement of the rudder bellcranks with self-locking nuts to prevent binding.

A starter-relay problem led to another AD and revised instructions for the pilot's operating handbook. Several service difficulty reports compiled by the FAA noted stuck or seized starter relays, and Duchess and other Beech piston-engine models now have a starter annunciator light that warns you if the starter remains engaged after you release the switch, to prevent engine damage.

Main gear doors—which cover only the struts when retracted, not the wheels—had a few cracks early on; the doors have been reinforced.

A few pilots have had engine fires on start-up—in one rare instance, a float valve malfunctioned. According to a Beech spokesman, though, other incidents probably were caused by pumping the throttle during start—something the handbook warns against. If this happens in the Sundowner, the fuel runs forward into the intake manifold; but since the Duchess's engines are canted differently, it also can run aft into the carburetor airbox. There is a drain to vent excess fuel; in some cases, however, there was so much fuel it exceeded the drain capacity and ignited. A *Pilot* staff member following recommended procedures also experienced a fire. It was on a cold day, when the fuel did not vaporize and pooled in the manifold. So be aware of the potential for problems.

Perhaps the Duchess's trickiest management problem is the cabin heater. It

is a 45,000-BTU Janitrol combustion heater that burns about two thirds of a gallon an hour from the right fuel tank. The cabin air knob must be pulled out at least an inch from the panel for the heater to operate properly. If it does not have enough air and gets too hot, the overheat switch shuts off the system. The heater in 27D shut off once when I was shooting practice approaches to Dulles; the OAT was 10°F at 2,000 feet. Since the switch can be reset only when the airplane is on the ground, I had a cold return to National.

There are a couple of other improvements I would like to see. A better map light, perhaps on the yoke, and some illumination on the fuel selector and the cowl flap would make night flying much more enjoyable and less work intensive, as the flashlights now get a good workout.

Beech took a great step forward by mentioning in the manual the need for a five-degree bank into the good engine with the other engine out, but the mention is buried in the safety information in the back of the handbook. It is not part of the emergency engine-out procedures in the FAA-approved section of the book. Reference is made to the safety section for pilot technique, but more emphasis is needed.

And I would like to see all of the V-speeds listed in one place in the book.

Complaints are minor and do not detract from the overall quality and attractiveness of the aircraft. Although fewer than 400 Duchesses have been sold since first deliveries were made in 1978, the model is outselling its obvious competitor. Last year, 78 Duchesses were sold, compared with 26 Seminoles and 29 Turbo Seminoles, even though the base prices of both Pipers (\$99,110 and \$112,160, respectively) are considerably lower than the Duchess's \$120,750.

But in checking into used Duchess prices, I tracked down a few 1978 and 1979 aircraft with fewer than 200 hours, fully equipped, for \$66,000 to \$78,000. Prices such as that make it an appealing buy and more competitive with a high-performance single.

I have flown the Duchess in all extremes, from 10° to 103°, night, day, VFR, IFR, on one engine and two, at large airports and small ones. Many times, you get to know an airplane, finish your report and move on to another aircraft. With the Duchess, I think I will be back—especially for multi-engine proficiency work. □