EXCLUSIVE AND ALLURING

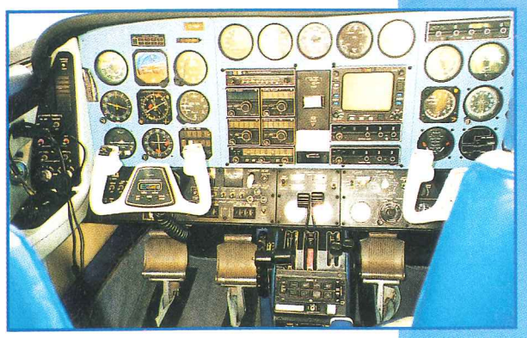
The Beech Duke

TEXT AND PHOTOS BY BOB GRIMSTEAD

PIREP NO. 50

The Duke in its element, barreling along at 220 knots and 25,000 feet

LOVELY TO BEHOLD and rewarding to fly, this sleek, six-seat, pressurized, turbocharged twin has real presence. When you enter the traffic pattern, all eyes follow that powerful drone. Taxiing in, the Duke's purposeful, nose-low and tail-high stance make it look as if it is still belting along but otherwise, it is similar to its larger (and far more costly) brother, the King Air. The proud owner can expect to start answering questions as soon as he parks, for this elegant eye-catcher is comparatively rare.



The cockpit may seem a trifle crowded, but controls and switches are systematically grouped on black subpanels around the light-blue instrument panels. This Duke has a comprehensive array of Collins Micro-Line avionics and a Century IV autopilot. The five main engine gauges are spread across the top and there is an eight-light annunciator panel directly above the left ADI.

Lovely to behold and rewarding to fly, this sleek, six-seat, pressurized, turbocharged twin has real presence.

The Duke is very stable in flight, although its controls are perhaps a mite heavy. Landing gear, flaps and cowl flaps are electric, and the wheels extend and retract with typical Beech rapidity in just four seconds. They can be dropped with 15 flap at up to an amazing 175 knots for a quick speed reduction or descent.

596 examples of Beech's macho Model 60 were built during the 15 years between 1968 and 1982, but production ceased after Beech was taken over by the giant Raytheon corporation. The basic design mated a beefed-up version of the established Bonanza/Baron wing and landing gear with a new pressurized fuselage, a taller, sharply raked vertical stabilizer and swept horizontal stabilizers. The icing on the cake was the use of more powerful (and rather more tolerant) 380-horsepower Lycoming engines, rather than Beech's traditional Continentals. These are housed in necessarily substantial squarish cowlings.

From 1971, the improved A60 Duke got lighter and more efficient turbochargers, a better instrument layout, a 50-pound gross weight increase (to 6,775 pounds) and other minor improvements. Incorporating optional outboard fuel tanks into the standard system raised fuel capacity from 142 to 202 gallons. The final and definitive B60 version, introduced in 1974, cost $600,000 at the end of its production run and had slightly more interior room, gained by levelling the previously sloping rear floor. Further optional tip tanks gave a 232-gallon fuel capacity, and a more reliable King Air-type AiResearch pressurization system headed the list of other minor improvements. The first B60s had a $2,500 NiCad battery, which suffered from poor cooling and lasted only a couple of years, so a lead acid battery conversion soon became available.

I was introduced to the breed by Graham Tickton, a South African enthusiast who has owned several examples. His latest is pristine, having previously had the classic "one careful owner from new." Even its gleaming paint work is the untouched 18-year-old original. The Baron-like wing is familiar but with wider flaps. The short exhausts on early Dukes caused some flap corrosion problems, but the later B60's longer tailpipes afford better (although not absolute) protection.

The wings' skins are flush-riveted to one-third of the chord to reduce drag. Graham has a $3,000 Boundary Layer Research vortex generator kit, to be fitted once the aircraft is back on the U.S. register. This improves the maximum gross weight to 7,004 pounds (enough for another passenger, plus 60 pounds of baggage) and yet, at this higher weight, the stall speed is claimed to be 7 knots less.

The TIO-541-E1C4 engines are similar to the lighter TIO-540-J2BD engines used in the much larger Piper Navajo Chieftain. The original versions were "throwaway units," only lifed at 1,200 hours between overhauls, and early (pre-no. 781) crankcases tended to crack. However, engines built since 1974 have a 1,600-hour TBO, and some last as long as 2,000 hours. Occasional problems with cylinder head cracking are mostly due to unsympathetic engine handling. Some early cast iron turbocharger housings also cracked, but most of these have long since been replaced by an improved stainless steel type.

Each engine has a beefy 125-amp Lear Siegler generator, turned by dual belts for redundancy. Either one provides enough power to start the opposite engine direct, even if the battery is flat. The big, three-blade propellers have only 9 inches ground clearance, but Graham says this has never been a problem, even off unpaved African airstrips.

The airframe has full de-icing, with pneumatic boots on its wings and tail and electric prop mats, and the aircraft is certified for flight into known icing. The workmanship is excellent. Strong as any

Although the big, three-blade propellers have only 9 inches ground clearance, this is not a problem, even off unpaved airstrips.

Beech, the Duke's structure is certified to 30,000 feet and will take a 4.6 lb./sq. in. pressure differential. This allows the cabin to be kept down at 10,000 feet while the airplane cruises at FL 250.

Everybody boards through a tall door at the left of the rear cabin. Pressing a catch and turning the sturdy handle first rotates retractable hinges out from under a couple of sprung fairing plates, then releases the latch. A single step on a long arm below the door extends with the landing gear. The cabin is quite roomy, with inward-facing club seating for four. This 1980 model B60's blue-and-white vinyl upholstery and trim are original equipment. Although still in good condition, they now perhaps seem a little dated. The windows are double-glazed with curtains, and a small table folds away into the right cabin wall. All occupants have lights, air vents, cup holders and (a sign of those times) ash trays, and there are storage bins under each seat. Below the right rear place is a chemical toilet; curtains can be drawn around this for privacy. Behind the rear seats, a narrow coat compartment will carry up to 70 pounds (or 140 pounds with only two cabin seats occupied).

Options

Expensive airplanes like Dukes tend to be fitted with all available options. This example was no exception, its comprehensive array of equipment (including air conditioning and full de-icing) pushing its empty weight up to 4,750 pounds. But it still had a very good useful load of over 2,000 pounds, although payload inevitably has to be balanced against fuel. Full-mains payload is 815 pounds, allowing carriage of four (mixed-sex) occupants with 137 pounds of luggage, giving a nearly 1000-nm range in five hours at 220 knots. Filling the aux tanks, as well, would limit passengers to 635 pounds (three big men and a few bags) but would allow a tremendous 1,200 nm to dry tanks at 65 percent power. Alternatively, six people with 150 pounds of baggage could still carry fuel for over 700 nm. Mechanical sight gauges on the upper wings outboard of the nacelles help greatly with such partial-fuel loads.

The aircraft has a tolerant CG range, helped by the restricted capacity of the rear coat space. Instead, the cavernous 32-cubic-foot baggage compartment in its long nose holds up to a whopping 500 pounds (including avionics). You could get a couple of people in here, and it is even big enough to take several sets of skis or golf clubs, thanks to the neat nosewheel retraction mechanism, which twists the wheel to lie flat below its unobstructed floor.

The Best Seats in the House

Undoubtedly, the pilots get the best seats in the house, once they have squeezed into the cockpit. Their seat backs have large pockets, and a storage space below these is big enough for even the bulkiest chart folders and flight bags. Between them on the spar carry-through are the two three-position (ON, OFF, CROSSFEED) fuel selectors. The seats are comfortable and adjustable, and the forward view, although limited by the high glareshield and low windshield tops, is quite adequate, and not unlike an airliner's. At first sight, the cockpit seems a bit crowded, but all controls and switches are systematically grouped on black subpanels around the light blue panels.

This Duke has two full sets of flight instruments, with a comprehensive array of Collins Micro-Line avionics in two stacks in the middle. The five main engine gauges are spread across the top, and there is an eight-light annunciator panel directly above the left ADI. The engine levers share a compact central quadrant with the Century IV autopilot controls. They are laid out as in modern twins with, from left to right, throttles, propeller pitch controls and mixture levers. (Earlier Beechcrafts had them aligned in the piston airliner order of props, power and mixture.)

The landing gear switch is left of the lower subpanel, with the three-position (UP, APPROACH, LANDING) flap switch and three lights to its right. The red light signals flaps in transit, approach flap (15 degrees) is indicated by the blue light and full flap (30 degrees) is shown by the amber light. The flap switch is pulled out to get the second setting, and this simple and nearly foolproof system saves the complexity of a flap position gauge. The gear, flaps and cowl flaps are all electric. The wheels extend and retract with typical Beech rapidity in just four seconds, and can be dropped with 15 degrees of flap at an amazing 175 knots for a quick speed reduction or descent.

The proud owner can expect to start answering questions as soon as he parks, for this elegant eye-catcher is comparatively rare.

Duke combines trusted Bonanza/Baron wing (with flush-riveted skins) and landing gear with a sleeker, pressurized fuselage, sharply raked vertical stabilizer and swept horizontal stabilizers. Workmanship is excellent. The airframe has full de-icing and the aircraft is certified for flight into known icing.

TOP: Everybody boards through a tall door at the left of the rear cabin. The step below extends with the landing gear. ABOVE: The roomy cabin has inward-facing club seating for four with a small fold-away table. The blue-and-white vinyl upholstery and trim are original equipment. The windows are double-glazed and curtained and the right rear seat hides a chemical toilet. LEFT: This final, definitive B60 version had slightly more interior room, gained by leveling the previously sloping rear floor.

Such a heavy airplane (fully loaded, it weighs over 3 tons) must put a strain on its landing gear, and collapses have been a problem from time to time. Graham said one cause is inadequate maintenance of the motors, which lose torque if the brushes become worn, causing the circuit breaker to trip just before the wheels are fully locked down.

Firing Up the Duke

Firing up the big six-cylinder Lycomings is no more difficult than starting a car, provided you wind them up with the mixtures in lean and then go to rich, once they are turning. They sound a great deal better than any automobile, so you can revel in the impatient thrum of their three-bladed props. Release the park brake hidden behind the yoke, apply a squeeze of power and the Duke moves off majestically. The steering is quite light, but a spring in the system gives it a slight lag. This makes a dab of differential brake and a burst of outboard engine power useful on the tighter corners.

The Duke looks as if it is doing 300 knots, even when parked, and this brawny beast was built before the advent of counterrotating props. The gear legs are a little short and stiff, while the nosewheel twists during retraction to lie flat below the baggage compartment.

This brawny beast was built before the advent of "namby-pamby" counter-rotating props, so when you open the taps, the combined thrust of the full 760 horses wants to drag you off to the left of the pavement. That weak steering spring does not help, and Graham's solution is to start the takeoff pointing 10 degrees to the right of runway heading. So, leading with the left throttle and lots of right rudder, I gradually increased the volume to a high-pitched howl and concentrated on keeping the willful brute on the center line. There is no need to modulate power; the automatic waste gates should do that for you, and the Duke just thunders away, nose-down and bellowing, like a bull at the charge.

I had suspected such a heavy airplane might use a lot of runway, but once again, Graham showed me the solution. He counters the negative angle of attack by holding the weight off the nose slightly as the elevator came alive. With this technique, and rotating positively at 85 knots, we used perhaps 600 yards of runway. Whipping up that speedy gear and setting the cowl flaps to TRAIL helped us accelerate rapidly to the 120-knot best-climb-rate speed. Reducing power to a smooth but vocal 36 inches and 2750 rpm, we thrummed upwards at a very respectable 1700 fpm. With just three men aboard and 480 pounds of fuel, we weighed perhaps 5,830 pounds, or nearly 1,000 pounds less than the 6,775 maximum. The published full-power climb rate at top weight is 1600 fpm, and the Duke will maintain this well up to the mid-tens of thousands of feet. Graham says he routinely climbs to 24,000 feet in under 30 minutes from a max-weight takeoff.

At 5000 feet with 30 inches and 2500 rpm, we ate up the countryside at 167 knots IAS (175 TAS), using 112 pounds per side per hour (the fuel flow dials are also calibrated in percentage power). Normal cruise is a highly competitive 220 knots (TAS) with 70 percent power at 24,000 feet, still using 112 pph a side, or 38 to 40 gallons per hour, total. Reducing to 55 percent power burns just 30 gph, but the speed drops to 185 knots (which is still fast), and there can be a problem keeping the cabin pressurised at high altitude with such a low power setting. The 14,000-Btu air conditioning works well (and does not have to be switched off on takeoff), while the optional propeller synchrophaser eliminates annoying prop beating.

Flight Stability

The aircraft is smooth and comfortable, with almost no vibration, and its high wing-loading ensures that it rides the bumps well. Because the engines and props are set well forward, the internal sound level is never high and quickly drops as the pressurization gets to work. It was soon possible to hold a normal conversation between the cockpit and rear-seat occupants. The Duke is very stable in flight, although its controls are a mite heavy. With classic harmony, the ailerons require the least pressure to move, the elevator is heavier and the rudder, while highly effective, is the heaviest. If you make enough effort (and add a touch of rudder), the aircraft will roll quickly, but at its normal high-cruise speeds, it does have a large turn radius. Elevator loads are soon relieved by the electric trim, and visibility is fine at up to 45 degrees of left bank, but is restricted by the roof at over 30 degrees to the right.

Stability is good in all axes, even in yaw without the standard yaw-damper. Switching it back on immediately kills any wiggle that might take a second or so to stop naturally, and roll stability is dead-beat, meaning that after rolling on some bank, once you let go of the wheel, it stays put.

To sample its single-engine handling, we reduced power on the left engine (the critical one) to zero thrust by setting 12 inches of manifold pressure and pulling its pitch lever to the feather detent. Significant right rudder pedal pressure was needed at the 85-knot Vmca, but this was quickly trimmed out. At the 110-knot blueline speed (for best single-engine climb rate), the VSI showed a steady and most impressive 600-fpm climb at 4000 feet at our weight of approximately 5,800 pounds. Sea-level ISA single-engine climb rate at max weight is claimed to be over 300 fpm, which is unusually good. The rudder force, although high, could be held without trimming, and it was easy to pin the exact speed. Single-engine ceiling is 15,100 feet.

Stalling revealed no surprises. The Duke has a high, 31.8 lb./sq. ft. wing loading, so the comparatively high 73-knot clean-stall speed and 20-degree left wing drop were only to be expected. The horn preceded this at 83 knots and there was some aerodynamic buffet just a knot or so before the break. With gear and full flap, the horn stayed quiet until 80 knots, and the shuddering break came (after a high pull force) at 60—again, with a sharp, but easily controlled, wing drop.

Descent is made at cruise power to retain engine heat, and it is wise to anticipate slowing this fast, heavy machine a mile or two before sweeping imperiously into the traffic pattern. I flew downwind at 120 knots, using 28 inches and 2400 rpm, with approach flap and gear down. Both flap and gear extension cause minimal pitch changes. Establishing our initial approach at 110 knots with 24 inches in a slightly nose-down attitude, I reduced to 85 on short final. The airplane seemed to be a good, solid instrument platform, and was very speed-stable and surprisingly easy to control.

The Duke's mass, coupled with the engines' high, 1000-rpm idle (set for Johannesburg's 6000-foot altitude),

The powerful and tolerant 380-hp Lycomings are like those in the much larger Navajo Chieftain. They have slightly old-fashioned (but necessarily substantial) squarish cowlings.

Beech Duke B60

SPECIFICATIONS

Length	33 ft., 10 in.
Height	12 ft., 4 in.
Wingspan	39 ft., 3 in.
Wing area	212.9 sq. ft.
Cabin length	11 ft., 10 in.
Cabin width	4 ft., 2 in.
Cabin height	4 ft., 4 in.

Weights and Loadings
(Test Aircraft)

Equipped empty	4,750 lb.
Maximum takeoff and landing weight	6,775 lb.
Useful load	2,025 lb.
Useable fuel	202 gal.
Optional fuel	232 gal.
Baggage	500 lb.
Maximum wing loading	31.8 lb./sq. ft.
Maximum power loading	8.9 lb./hp

Engines

Two Avco Lycoming TIO-541 six-cylinder, air-cooled, turbosupercharged, horizontally opposed 541-cu.-in. engines, each producing 380 horsepower at 2900 rpm. Recommended TBO: 1,600 hours.

Propellers

Hartzell fully feathering, constant-speed, three-blade aluminum.

Manufacturer's Stated Performance

Maximum speed (TAS, midweight, 25,000 ft.)	246 kt
(74 percent) cruise speed (ditto)	233 kt
Long-range cruise @ 15,000 ft.	199 kt
Stall (full flap)	72 kt
Range at 74 percent power (std. tanks)	1045 nm
Sea level climb rate	1,600 fpm
Single-engine climb rate	307 fpm
Service ceiling	30,000 ft.
Single-engine ceiling	15,100 ft.
Takeoff distance	2626 ft.
Landing distance	3065 ft.

Manufacturer

From 1968 to 1982: Beech Aircraft Corporation, Wichita, Kansas 67201

Price

$600,000 in 1982; perhaps $275,000-$350,000 today.

meant we inevitably floated a couple of hundred yards after my flare (which needed quite a pull). The gear legs are surprisingly short and stiff, so when we finally settled, we contacted the ground with a bump, but easily stopped within 700 yards with little braking and no directional problems.

Although (like any other powerful pressurized twin) a Duke can be pricey to run, these elite, sexy airplanes usually have proud pilot-owners who often love them dearly. Exclusive and alluring, the Duke is a fast, nice-to-fly, stratospheric mini-airliner and has long been known as "The Mercedes-Benz of twins." Although a little costly to maintain, this just adds to its desirability in the eyes of its devotees. For me, this splendid airplane remains "the twin with attitude."

A neat nosewheel retraction mechanism twists the wheel to lie flat below the big baggage compartment in its long nose. Thanks to its unobstructed floor, the cavernous 32-cubic-foot baggage compartment will hold up to a whopping 500 pounds, including avionics. You could get a couple of people in here, and it is even big enough to take several sets of skis or golf clubs.