

Comparison Profile: Beech King Air B100

The Garrett AiResearch powered brother to the A100 may seem lost in the competitive world of King Airs, but it's finding a place for itself.

By John W. Olcott

In the realm of King Airs, Beech's B100 seems unnecessary — at least at first glance.

Aside from its Garrett AiResearch TPE-331 powerplants, the B100 has little to differentiate it from the other King Airs, each with its particular version of Pratt & Whitney Aircraft of Canada PT6A turbines. The aircraft shares the same fuselage design with the A100 King Air and has interior dimensions that are identical to those of the higher performing Super King Air 200, the sales leader in Beech's line of turboprops. Although the B100 has a performance advantage over the A100, the differences are not dramatic and its base price is \$27,500 more than its P&WAC powered brother.

Furthermore, Beech announced last year that the company was planning to offer a C100 with PT6A-135 turbines, which would have performance capabilities that virtually duplicate those of the Garrett powered B100. (The C100 King Air program, incidentally, has been given a low priority, and certification of the aircraft is not scheduled until nearly one year from now, and further slippage is possible.)

So why the B100 King Air, other than to provide Beech with an alternate engine source with which to protect against interruptions in the supply of PT6As from P&WAC?

The B100 was certificated late in 1974 and first delivered in 1975, shortly after P&WAC settled a lengthy strike that caused Beech to generate an inventory of completed but engineless King Airs. But there has been a steady flow of PT6As from Canada since that strike ended in 1975, so it might appear that the B100 has served its purpose and can reside in the back of Beech's shop until the next PT6A crisis arrives — which might be a long wait.

But the B100 is not waiting. In a market area that is dominated by the Super King Air 200, demand for the B100 has been strong. Although Beech sold more than 120 Model 200s within the last year as opposed to only 27 King Air 100s, all but four of the 100s were B models.

Also, Beech is expanding its service commitment to the Garrett powered B100. There are 21 Corporate Aviation Centers in the King Air distribution network, and two of them are now authorized by Garrett AiResearch to conduct hot section overhauls on the B100's TPE-331-6-252B powerplants; these facilities are Cutter Aviation, Inc., Albuquerque, and Ohio Aviation in Dayton. Nine others are approved for line maintenance on the TPE-331, and Beech anticipates more Corporate Aviation Centers will join the move toward offering detailed service facilities for the B100's turbines. (Naturally, any TPE-331 can be overhauled at Garrett's facility in Phoenix and at other Garrett approved facilities.)

Although 23 or so new B100s entering the business aviation community in a year's time means that the chances of seeing a brand new Garrett powered King Air are low, such activity does indicate that the aircraft is far from superfluous in Beech's overhaul King Air program. Quite to the contrary, the B100 offers operators who have established ties with Garrett AiResearch the opportunity to maintain those relationships even though they wish to move into Beech equipment. The ability to offer a King Air to prospective buyers who have a predilection for TPE-331s has strengthened the King Air's dominant hold on the turboprop market.

Obviously the Garretts have been responsible for the B100's success relative to the A100 and the Super King Air 200. Since the Model 200 provides the same cabin volume and noticeably

more payload, speed, range and altitude capability than either version of the 100 Series King Air, yet costs only about 25 percent more to purchase than a similarly outfitted A100 when equipped to B/CA standards, the operator who can justify the purchase price of a 100 probably can make an equally strong argument for the popular 200 - particularly since the cost per mile of those models differs by only about seven cents.

The relationship between the A100 and the Super King Air, both powered by P&WAC turbines, has reduced the demand for the former aircraft, while the B100 has a unique appeal to those operators who, for whatever reasons, choose to fly behind TPE-331s.

Positioning the B100 . . .

. . . is a matter of assessing its capabilities with respect to other King Airs. Approximately 50 percent of the purchasers of B100s previously owned a Beech product and were firmly entrenched in the King Air camp before they considered a new turboprop. For them the choice of a B100 certainly involved an assessment of the PT6A King Airs as well. For the prospective buyer who is not locked into Beech products, we suspect he also will want to know where the B100 stands in relation to the other King Airs, assuming that any one of the Beech turboprops is within the original aircraft group to be evaluated.

Thus, our B100 Comparison Profile compares the Garrett powered Beech with the A100, the E90 (since it is the King Air that is the next notch down in performance, size and price) and the Super King Air 200 (the next notch up).

Although the Profile may appear similar to those drawn for other Comparisons, the spread between high and low percentages is considerably less than has been the case when we compared aircraft not within the same family. In the plus areas, above the "no compromise" line, the maximum excursion is 20 percentage points, while the maximum difference in the area below the average is about 15 percentage points. But most of the B100's values fall close to the average line. (By the nature of B/CA comparisons, we feel that a value must be about three percentage points greater or less than the value to which we are comparing for the difference to be significant.)

Therefore, we can see from the Profile that the B100's comparative values fall very close to the average of the four King Airs we evaluated. It is marginally better in the general area of cabin accommodations, particularly in its maximum payload and its payload with maximum fuel; it is four and 20 percentage points, respectively, above the "no compromise" line in these two areas. (A value of 217 pounds in this last area for the E90 distorts the percentages for the other King Airs, each of which has a payload with full fuel of nearly 900 pounds.)

The certification values for the B100 are identical to or better than those for either the E90 or A100, but they fall below those of the Super King Air 200, whose figures have a significant effect on the average values for our Profile. Thus, the B100 appears to be marginally below the "no compromise" line for V_{mo} and V_{LO/VLE}, although its 226-knot maximum operating speed and its 156-knot gear speed are highly competitive values. The B100 does have the highest full flap speed (V_{FE} = 156 knots) of any of the King Airs; it is eight percentage points above the average in this category.

The B100's basic performance values drop seven percentage points below the "no compromise" line in the area of single engine rate of climb, 13 percentage points below in single engine climb gradient, 12 points below in single engine ceiling and 13 points below in fuel flow at FL 160. In each of these areas, however, the average value is significantly affected by the Super King Air's performance.

For instance, the B100's 501 feet per minute single engine rate of climb is second only to the Super King Air 200's 740 fpm; the B100's 233 feet per nautical mile single engine climb gradient is

only slightly less than the E90's 254, but it is 36 percent less than the Super King Air's 364 feet per nautical mile; and the B100's single engine ceiling of 12,050 feet is about 2,000 feet less than that of the E90, but it is about 7,000 feet below the Super King Air's altitude capability on one engine.

Except in the specific area of fuel flow at a typical operational altitude of 16,000 feet, the B100's basic performance is better than the A100's. Long range fuel flow at FL 160 for the B100 is the highest of all the King Airs: 494 pounds per hour compared with 470 for Super King Air and 420 for the A100. The B100 achieves its long range cruise at 225 knots, however, which is 16 knots faster than the speed used by the Super King Air to fly its maximum range. In fact, the B100 produces .08 more seat miles per pound of fuel than does the Model 200 and has a fuel efficiency that equals the average in our Profile.

The B100's mission performance reflects the higher fuel flows of its Garrett powerplants. Except for the areas involving range and, endurance, the Garrett powered King Air holds its own with respect to the PT6A models, and its mission time for a 500 nm trip at its long range cruise speed of 225 knots is three minutes less than the Super King Air 200's time.

Notice where the B100's price line falls with respect to the average; it is one percentage point below the "no compromise" line, which reveals that the B100's price is about average for the King Airs in this Profile.

Compared with non-Beech-manufactured turboprops, the B100 possesses all the characteristics that have spelled either success or failure for the King Air salesman. The Rockwell 690B, the Mitsubishi MU2s, the Cessna Conquest and the Merlin IIIB all are faster than the B200, but rarely has an operator selected any King Air on the basis of its speed. The B100 has the size, ruggedness and quality for which Beech has earned a solid reputation.

In addition to possessing traits of the long and successful King Air lineage, the B100 brings to both Beech and operators the option of Garrett powerplants. The aircraft has been well received and is clearly a solid member of the Beech family. In fact, it may just be the father of a new Garrett powered branch within the King Air clan. B/CA

Systems

Flight control — Dual controls operate surfaces through push-pull rods and conventional cable systems. Adjustable trim tabs on the rudder and left aileron. Dual electric horizontal stabilizer trim system.

Ground control — Nose gear steering is accomplished by the use of individually adjustable rudder pedals. Wing tip turning radius is 33 ft.

Landing gear — Torque shafts drive main gear; duplex chains drive nose gear. Emergency extension is provided through a separate, manually powered chain drive system.

Flap — Selectable positions are zero (0%), approach (30%) and any position between approach and landing (100%).

Fuel — Integral wing cells and bladder type cells in the box section provide 2,600 lbs. usable in the mains and an additional 550 lbs. in the aux tanks. Use of avgas is permitted under some circumstances.

Electrical — Dual starter generators provide a total of 540 amps at 28.25 volts for operation of the avionics, flaps, gear and fuel pumps. Standard equipment includes two 24-volt nickel-cadmium batteries.

Environment — Heating is provided by bleed air from the engines. An electric supplemental system is available. Cooling is provided by a 16,000-BTU air conditioner and bleed air intercoolers. Max pressurization is 4.6 psi.

Specifications and Performance

Manufacturer	Beech Aircraft Corporation
Model	King Air B100
Type	9- to 15-place, twin turboprop, pressurized executive transport
Price (typically equipped)	\$1,050,000
Certification	FAR 23, 2/1/75, Amendment 7. IFR, known icing.
Powerplants	2 Garrett AiResearch TPE 331-6 252B turboprops rated at 715 shp ea. turning Hartzell four-blade, full-feathering, full-reversing, variable pitch propellers.
Design weights (lbs./kg.) B/CA equipped BOW	
Max ramp	7,834/3,553
Max takeoff	11,875/5,386
Max zero fuel	11,800/5,352
Max payload	9,600/4,354
Max landing	1,766/801
Max fuel	3,150/1,428
Payload with max fuel	892/405
Fuel with max payload	2,471/1,121
Design characteristics	
Wing loading	42.2 lbs./sq. ft.
Power loading	8.25 lbs./hp

Performance (max gross takeoff, S.L., no wind, ISA unless noted)

Climb rate	(two engines)	2,139 fpm/652 mpm
	(engine out)	501 fpm/153 mpm
Climb gradient	(two engines)	1,052 fpm/321 mpm
	(engine out)	233 fpm/71 mpm
Service ceiling	(two engines)	28,000 ft./3,673 m
	(engine out)	12,050 ft./3,673 m
Rate	(max fuel) *	1,317 nm
	(seats full)	1,062 nm

*At optimum attitudes except cabin altitude limited to 8,000 ft.; long range cruise, 225 kts.