



## **Buying A King Air**

By Gary Goltz

The King Air, built by Hawker Beechcraft, is undoubtedly the most popular turboprop aircraft ever built, with over 6,500 aircraft and 37 different models (not including the commercial airline and cargo variants that represent thousands more). It is estimated that they have flown over 40 million flight hours. Their popularity stems from having the largest cabin in their class, along with sturdiness and incredible reliability. Pilots laud them for their ease in flying and passengers love King Airs for their comfort. They are all equipped with turboprop engines that combine a propeller attached to a reliable turbine engine. The fixed annual operating expenses and the variable hourly operating costs are less than all but a few very light jets, like the Citation Mustang and the Embraer 100. Those light jets don't have the range and carrying ability that the King Airs have. All King Airs can be operated single pilot, and all are pressurized. Most are air-conditioned. They all have toilets, separated by doors or curtains in the aft portion of the fuselage.

Since 1964, Beechcraft has been constantly improving the design of the King Air while adding and discontinuing a variety of models. Today, there are three main King Air series: the 90s, 200s and 350s.

### **King Air 90s**

The 90 Series King Airs are very popular entry-level turboprops, and many are flown by owner-pilots. The 90 Series represents the shorter body King Air and has been continuously manufactured by Beechcraft since 1964. The aircraft generally has seating for 8, including 1 pilot, and a side-facing seat across from the entry stairs. A lavatory in the aft-most section of the aircraft can also serve as a belted seat.

The first variant of the 90s series covered in this article is the B90. 183 were made between 1968 and 1970. They cruised at 219 knots and had PT6A-20 engines. Pressurization was 4.6 psi with a range of 1,185 nautical miles. The B90 was enhanced in 1971 with the introduction of the C90 that had improved environmental systems, increasing the pressurization to 5psi, the current pressurization differential in the newest C90GTi. Approximately 516 C90's were made between 1971 and 1982, though there were a few made for the Japanese government from 1982-85.

In 1972, Beechcraft introduced the E90, which was a C90 with 90 gallons more fuel (474 gallons versus 384 in the C90) and the more powerful PT6A-28 engines increasing the cruise speed to 245 knots. Range increased from 1,120 nautical miles to 1,290 nautical miles. Nearly 350 E90s were manufactured from 1972-81. The E90 was discontinued with the introduction of the C90-1, discussed below.

In 1979, Beechcraft developed another variant of the C90, called the F90. It was a combination of a C90 fuselage, a T-tail similar to the B200 and a wing from a King Air 100. They installed the robust PT6A-135



engines, with 750 SHP and saw cruise speeds of 251 knots. From 1979-83, 203 F90s were built. Although fast, they lacked the ability to cruise over 21,000 feet because of the short wing. In 1983, Beechcraft improved the cowling on the F90 and changed the model designation to an F90-1. Cruise speed improved by 20 knots to 271 knots. 33 were made between 1983 and 1986. Both F90 variants carried 470 gallons of fuel and had a range of 1,235 miles.

In 1982, the C90 was again improved, with the addition of a new engine, the Pratt & Whitney PT6A-21 which provided more power. The C90 was now called the C90-1. They came with three-bladed props. Cruise speed increased to 231 knots. Only 46 were built between 1982 and 1983.

The C90A, made between 1984 and 1992, had improved engine cowlings that increased the cruise speed from 231 knots to 240 knots. 233 were manufactured during that time. The pressurization and heating systems were also improved over earlier versions. The engine from the factory was the Pratt & Whitney PT6A-21, a 550 SHP engine with a 3,600 TBO. Hot section inspections are recommended at 1800 hours. The C90A has a pressurization differential of 5.0 psi and holds 384 gallons of jet fuel. Many of the earlier 90 series can be equipped with the cowl modifications to increase the cruising speed to 240 knots for around \$42,000.

From 1991-2005, 439 C90Bs were produced. The main difference between the C90B and the C90A is that the C90B had 4-blade props installed as standard. They improved takeoff and climb performance and reduced cabin noise. Vibration dampening and insulation also further reduced cabin noise.

In 2006, Hawker Beechcraft took the C90B and added PT6A-135A engines that were de-rated from 750 SHP to 550 SHP. They called it the C90GT. The result was higher cruise speeds at altitude of 270 knots. Nearly 100 C90GTs were built between 2006 and 2007.

By 2008, all of the other larger King Airs, the B200 and the King Air 350, had the new fully-integrated Collins Pro Line 21 avionics suite with three large multifunction displays. Hawker Beechcraft added the Pro Line 21 to the C90GT and it became the C90GTi. Beechcraft built 125 C90GTi's.

In 2010, Beechcraft added winglets to the C90GTi and renamed it the C90GTx, increasing the cruise speed by 2 knots to 272 knots. The gross weight was also increased, increasing the ferry range from 981 nautical miles to 1,310 nautical miles.

Common modifications to C90s are the addition of Raisbeck wing lockers, which add storage behind each engine and dual aft body strakes that increase yaw stability. The cost of the wing lockers is approximately \$50,000 in the C90 and the strakes are around \$16,000. The wing lockers add 600 lbs of storage capacity. There are engine modifications to the C90As and C90Bs where the PT6A-21's engines are exchanged for the PT6A-35's or PT6A-135's, increasing the cruise speeds to 270 knots. The modification currently costs around \$675,000.



## B200s

The 200 Series King Air represents the medium body King Air and has been manufactured continuously since 1974. It is popular with owner-pilots, charter operators and corporate flight departments. The aircraft seats one pilot and 8-9 passengers, depending on the interior configuration. The newer aircraft have two aft-facing seats behind the pilots and then a four-place club seating arrangement aft of that. There is a cabin divider behind the pilot and another cabin divider in front of the side-facing lavatory near the rear of the aircraft where the baggage is stored. The older B200s have a two-place divan behind the co-pilot's seat instead of the aft-facing seat in the new King Airs. After 1998, the two-place divan, if installed by the factory, is only legal for one.

Here is a short history of the evolution of the B200. In 1969, Beechcraft built the first King Air 100. It was a B90, stretched 39 inches with a 7-inch taller tail and a 4.5-foot shorter wing. It has the PT6A-28 engines. There were 89 made between 1969 and 1971. Cruise speed on the 100 is 239 knots, with a range of 1,005 nautical miles. In 1972, Beechcraft added 4-blade props and 96 gallons more fuel with a 900 lb increase in gross take off weight and called it the A100. Cruise speed on the A100 is 235 knots with a 1,160 nautical mile range. There were 157 A100s produced until 1979. From 1976-83, Beechcraft made the B100; basically an A100 with Garrett TPE-331-6-252B engines. Cruise speed on the B100 is 258 knots with a range of 1,080 nautical miles.

In 1974, Beechcraft built the first 200 series aircraft, the King Air 200. They took an A100 and stretched it 4 feet, added a T-tail, increased the wing length by 8.5 feet and added 170 gallons more fuel. Cruise speed was up to 270 knots and a ferry range of 1,870 nautical miles. In 1981, Beechcraft built the first King Air B200. Since then, over 1,137 were built between 1981 and 2009. It was an improvement over the straight King Air 200 and added the PT6A-42s in place of the PT6-41 engines. The -42 engines increased the time between overhauls from 3,000 to 3,600 hours. Hot sections are now done at 1,800 hours instead of 1,500 hours. Most of the -41 engines have been modified at hot section or overhaul to -42s. Cruise speeds increased from 270 knots in the King Air 200 to 279 knots in the King Air B200. The pressurization differential in a B200 is 6.6 psi and the aircraft can maintain a sea level cabin to 15,000 feet. The ferry range in a B200 is over 1,500 nautical miles. Many of these King Airs are equipped with Raisbeck Engineering performance modifications, including improvements to the cowling ("Ram Air Recovery System"), modifications to the inboard leading edge ("Enhanced Performance Leading Edges"), additional aft body strakes for yaw stabilization ("Dual Aft Body Strakes"), additional storage aft of the engines ("Crown Wing Lockers"), four-bladed props ("Quiet Turbofan Propellers") and larger landing gear for unimproved runways ("High Float Landing Gear"). Together, the Enhanced Performance Leading Edges, Dual Aft Body Strakes, Quiet Turbofan Propellers and the Ram Air Recovery System are called the Raisbeck Epic package. We have seen increases in cruise speed for Epic modified aircraft in excess of 10 knots in cruise. Another common modification is the BLR winglets, which increase cruise speed and fuel savings. As of late 2010, the winglets cost approximately \$62,000 and the Raisbeck Epic Package was around \$124,000. Wing lockers will run approximately \$60,000 and add 600 lbs



of storage capacity.

Starting with the last few 2003 models, Hawker Beechcraft added the Collins Pro Line 21 avionics suite to the King Air B200, giving it three large multi-function displays. The Pro Line 21 is utilized in many corporate jets. In 2004, the IFIS package was offered as factory option. IFIS provides the Pro Line 21 system with IFR approach charts and XM satellite weather. The option costs approximately \$110,000 and can be retrofitted on aircraft where the option was not chosen. By 2006, all the B200s came standard with IFIS.

Although they were still manufacturing the B200 in 2009, in 2008, Hawker Beechcraft built the first B200GT. The major improvement was the addition of PT6A-52 engines that increased cruise speed from 290 knots to 305 knots. Raisbeck Engineering has also developed engine upgrades, which, in addition to the Epic Package discussed above, added the PT6A-52, the engines installed on the B200GT. There are mods for the older King Airs to add the PT6A-52 or the PT6A-61 engines, increasing the performance of a B200 to 310+ knots, or more, depending on the modifications that are added to the aircraft.

In 2011, Beechcraft continued to improve the aircraft and added BLR winglets as standard equipment and new composite four-blade Hartzell propeller, increasing runway performance, single engine ceiling by 2,000 feet, an electronic psynchrophaser, quicker climb to altitude. The aircraft was given a new name, the King Air 250.

Note that all the Pro Line 21 equipped King Airs are RVSM certified which allows them to cruise at 29,000 feet and higher.

## **King Air 350**

In 1990, Hawker Beechcraft began building the King Air 350, the largest King Air currently in production. There have been well over 700 built since 1990. It was a variation of the King Air 300, which itself was a B200 with PT6A-60A engines. In addition to the engines, the 350 has a 41-inch longer wingspan, 1,000 lbs additional gross weight, winglets and a 34 inch longer fuselage. Unlike other King Airs, the King Air 350 requires a Type Rating, just like corporate jets. That is because the aircraft gross weight exceeds 12,500 lbs. The Type Rating requires that the pilot have a check ride to determine their proficiency in flying the aircraft. The check ride can be in a simulator or in an actual aircraft. The interior arrangement adds one more row of seats than the B200. The seats are set up in a double club configuration. Assuming the aircraft is flown single pilot, you can seat 10 passengers, including the belted lavatory in the back. King Air 350s cruise at 320 knots, but most owners choose to fly them between 290 to 310 knots for fuel efficiency. Ferry range on a King Air 350 is 1,550 nautical miles and 1,440 nautical miles with the seats full. The engines have a TBO of 3,600 hours with hot sections done at 1,800 hours.



In 2010 Beechcraft made substantial improvements in the 350 interior and dubbed it the 350i. These interior improvements were quite substantial and include new seat designs, new wood trim, all new headliner and side panels along with a reduction in noise levels. Updated include LED lights, windows that darken electronically, iPod dock and a high-definition video monitor.

### General Comparison Chart

Below is a chart which compares the C90B, C90GT, B200, B200GT and the King Air 350. These aircraft represent the newer King Airs built by Hawker Beechcraft. The annual budget and fixed costs assume that the aircraft is flown 57,500 miles per year, approximately 204 to 225 flight hours, depending on which model King Air you utilize.

### General Comparison Chart

	C90B	C90GT	B200	B200GT	350
<b>Cabin Height (ft.)</b>	4.80	4.80	4.80	4.80	4.80
Width	4.50	4.50	4.50	4.50	4.50
Length	12.40	12.40	16.70	16.70	19.20
<b>Weight-Max Take-off (lbs.)</b>	10,100	10,100	12,500	12,500	15,000
Maximum Landing	9,600	9,600	12,500	12,500	15,000
Basic Operating	7,210	7,350	8,820	8,760	9,885
Usable Fuel	2,573	2,573	3,645	3,645	3,611
<b>Payload-Full Fuel (lbs.)</b>	377	237	125	185	1,604
Maximum	2,950	1,832	2,180	2,240	2,615
<b>PERFORMANCE COMPARISON</b>	<b>C90B</b>	<b>C90GT</b>	<b>B200</b>	<b>B200GT</b>	<b>350</b>
<b>Range-NBAA IFR Res (NM)</b>					
Seats Full	640	670	920	960	1,440
Ferry Range-(Pilot(s) only, no pax)	940	981	1,580	1,650	1,550
<b>Cruise Speed-Max (KTAS)</b>	250	270	290	305	320
Normal	234	270	283	298	310
<b>Ceiling -Service MTOW (Ft.)</b>	28,900	30,000	35,000	35,000	35,000
<b>ANNUAL BUDGET</b>	<b>C90B</b>	<b>C90GT</b>	<b>B200</b>	<b>B200GT</b>	<b>350</b>
<b>Utilization- (NM)</b>	57,500	57,500	57,500	57,500	57,500
Hours	259	239.5	223.5	213	204.5
<b>Variable Cost</b>	\$228,013	\$231,479	\$239,172	\$252,857	\$247,386
<b>Fixed Cost</b>	\$314,672	\$319,219	\$331,895	\$345,570	\$340,090
<b>Total Cost (No Depreciation)</b>	\$542,685	\$550,698	\$571,067	\$598,426	\$587,476
Per Hour	\$1,427	\$1,564	\$1,711	\$1,855	\$1,944
Per Nt. Mile	\$6.43	\$6.51	\$9.95	\$11.59	\$12.45
Per Seat Nt. Mile	\$1.29	\$1.30	\$1.66	\$1.93	\$1.56



<b>ANNUAL FIXED COSTS</b>	<b>C90B</b>	<b>C90GT</b>	<b>B200</b>	<b>B200GT</b>	<b>350</b>
Crew Salary	\$72,500	\$72,500	\$80,000	\$80,000	\$80,000
Hangar	\$23,500	\$23,500	\$31,600	\$31,600	\$35,700
Insurance	\$19,375	\$22,400	\$26,400	\$26,676	\$29,884
Training	\$9,000	\$9,000	\$9,000	\$9,000	\$9,000
Refurbishment & Modernization	\$38,400	\$38,400	\$40,080	\$30,080	\$33,440
Miscellaneous	\$10,000	\$10,000	\$11,000	\$11,000	\$12,000
<b>Total Annual Fixed Costs</b>	<b>\$172,775</b>	<b>\$175,800</b>	<b>\$198,080</b>	<b>\$188,356</b>	<b>\$200,024</b>

<b>VARIABLE COSTS-Per Hour</b>	<b>C90B</b>	<b>C90GT</b>	<b>B200</b>	<b>B200GT</b>	<b>350</b>
<b>Fuel</b>	\$465.30	\$532.51	\$584.21	\$697.95	\$703.12
<b>Maintenance Labor</b>	\$79.80	\$79.80	\$83.16	\$81.48	\$81.48
<b>Parts Airframe/Eng/Avionics</b>	\$80.58	\$74.26	\$75.20	\$75.20	\$80.09
<b>Engine Restoration</b>	\$174.70	\$198.62	\$206.14	\$212.20	\$219.46
<b>Propeller Allowance</b>	\$3.89	\$5.23	\$5.11	\$3.96	\$6.76
<b>Misc Exp.-Landing/Parking</b>	\$9.97	\$9.97	\$12.33	\$12.33	\$14.80
Crew Expenses	\$37.44	\$37.44	\$60.32	\$60.32	\$60.32
Supplies/Catering	\$28.68	\$28.68	\$43.68	\$43.68	\$43.68
<b>Total Variable Cost/Hour</b>	<b>\$880.36</b>	<b>\$966.51</b>	<b>\$1,070.12</b>	<b>\$1,187.12</b>	<b>\$1,209.71</b>
<b>Cost per Nautical Mile</b>	<b>\$3.97</b>	<b>\$4.03</b>	<b>\$4.16</b>	<b>\$4.40</b>	<b>\$4.30</b>

## Maintenance of King Airs

All King Airs are on a Phase inspection program, with some exceptions not relevant to this article. There are four Phases: Phase 1 and 3 relate to the airframe and Phase 2 and 4 relate to the engines. Normally, you do a Phase 1 and 2 after 200 flight hours and then do a Phase 3 and 4 after an additional 200 flight hours. The general rule is that all Phases must be accomplished every 24 months. As of late 2010, a Phase inspection cost \$4,000, but prices do vary. Since most owners combine the Phase inspection on the airframe with the Phase inspection on the engine, the cost to perform them together is usually discounted to around \$7,000. All four Phases can be done simultaneously for only \$10,000 because there is overlap.

Props are due every 6 years or 4,000 cycles. The cost is approximately \$15,000 for a prop overhaul and \$45,000 for a new prop. Landing gear is overhauled every 6 years or 8,000 cycles and is actually inspected and repaired as necessary (referred to as an "IRAN"). The cost ranges from \$18,000 to \$40,000. The flammable hoses and brake hoses are replaced every five years at a cost of \$3,600. The wing bolts on King Airs require the following: 1. wing bolt inspection (every 6 years); 2. wing bolt replacement (every 15



years); 3. wing bolt NDT (every 36 months); and 4. wing bolt lubrication (every 12 months) at a cost of around \$1,100.

Lubrication is done at 200, 400, 600, 800 and 1,200-hour intervals. The starter-generators are overhauled every 1,000 hours at a cost of approximately \$1,800 each.

### **Training**

Insurance companies require that the pilots that fly all the King Airs go to annual training. They have a preference for simulator-based training at a recognized flight school. The cost of the training varies from \$3,500 to \$7,000 per pilot. Initial school is 5 to 7 days. Annual recurrent school after the initial training is 3 days.

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