



AIRCRAFT ANALYSIS FOR THE NEBRASKA AIRCRAFT

Prepared for

Nebraska Legislature

Lincoln, Nebraska

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INTRODUCTION

The Executive Board of the Nebraska Legislature continues to study the purchase of a state plane. Following the Legislature's adjournment *sine die* early 2013, a request has been made for additional information.

One option under consideration is the purchase of a 2002 model year King Air B200 turboprop that is owned by the University of Nebraska Foundation. That aircraft had been jointly used by the State and the University. That agreement has ended and the aircraft has been placed for sale. The State is currently using that aircraft on a month-to-month lease at \$10,000 per month with an offer to purchase at \$2,164,760.

The State also operates an aging Cheyenne turboprop for aerial photography. This aircraft is not suitable for routine passenger trips.

The State has already determined that they need to make a long-term investment in air travel for the Executive and Legislative leadership. The Executive Board has inquired of Conklin & de Decker for assistance in analyzing the costs for various options for meeting that requirement.

1.0 APPROACH

The general requirements that have been established for the state's aircraft are as follows:

- Two turbine engines (safety and reliability)
- Two pilots (safety)
- Capable of flying 5-7 passengers anywhere in Nebraska and the neighboring states using public-use airports
- Provide a secure environment for senior officials
- Be immediately available in the case of State emergencies
- Provide secure communications with emergency management teams such as the State Police and FEMA
- Be a cost effective, timesaving asset

In order for security and emergency management, it has been determined that owning the aircraft is the best option for the effective use of an aircraft. Thus, a form of shared ownership and charter were not considered in this report.

Considering an initial review of documents provided by the Executive Board, there appears to be three suitable options for meeting Nebraska's air travel requirements:

1. Acquire the offered University King Air B200 at \$2.16 million
2. Acquire a new King Air 250, the current production variant of the B200 family.
3. Acquire a new King Air C90GTx, a smaller turboprop than the B200

This report looks at the three options above in terms of aircraft capability and 20-year total ownership costs. We used the Conklin & de Decker Life Cycle Cost model to evaluate the costs of owning and operating the above aircraft for 20 years.

2.0 CURRENT AIRCRAFT



The current aircraft being used by the state is a 2002 King Air B200, serial number BB-1782, registration N4NU. The aircraft had been provided by the University of Nebraska Foundation (UNF) and used for both University and other state business. UNF has determined that they no longer want to have this particular aircraft and offered it to the state at a firm asking price of \$2,164,760. The state can continue to dry-lease the aircraft for \$10,000 per month with the option to buy (see Appendix A).

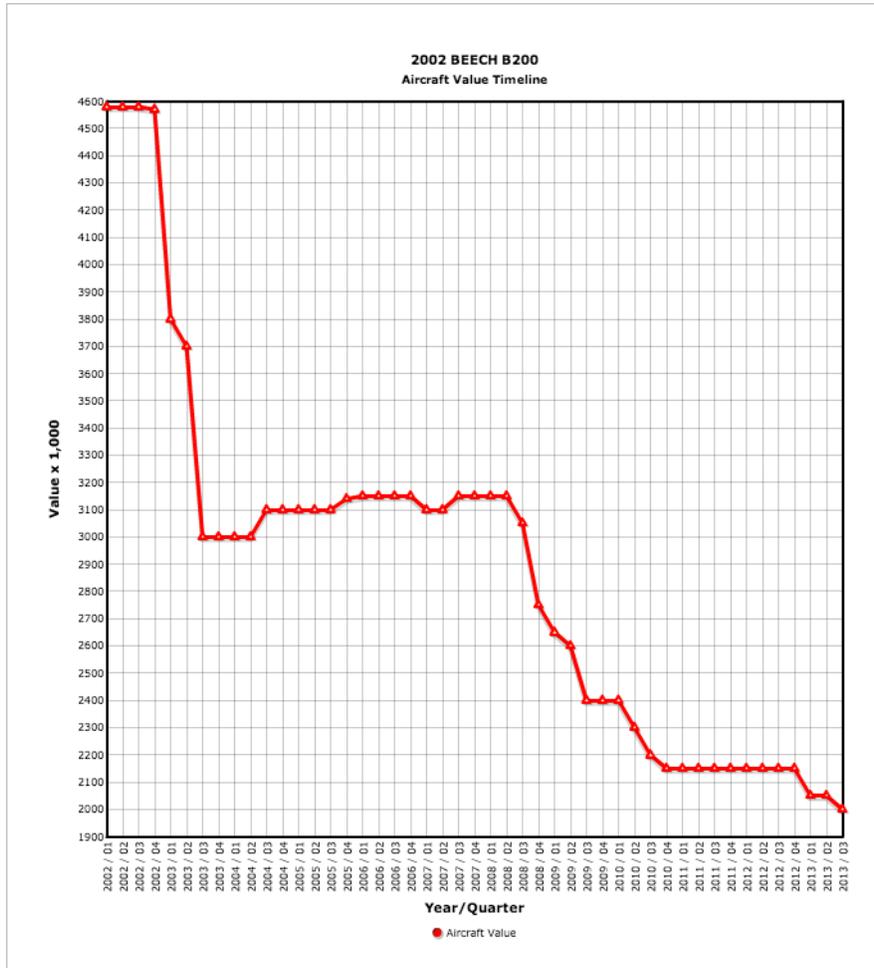
While awaiting a decision from the state, UNF has listed the aircraft as for sale with a broker, Holstein Aviation (see Appendix B). The advertised asking price as of 2013-09-17 is \$2,150,000.

The aircraft as listed shows a total flight time of 2,274 hours, or about 206 hours per year average. This is lower than average total flying hours and appears to be well equipped for that type of aircraft.

Current utilization was only available for 2011-07 to 2012-06 and indicates the aircraft flew 33,972 miles, or an estimated 135 hours in that period. Of that flying, 45% was for the University Foundation and University President (see Appendix C).

2.1 ESTIMATED VALUE

The aircraft offer to the state is for \$2,164,760. The advertised selling price is \$2,150,000. The price offer to the state was based on 2012 estimated value for the aircraft (see Appendix D1). Today, prices for used King Air B200s have dropped about 7%. This is an average decrease considering today's market for turboprop airplanes. The following graph is from the *Vref Aircraft Value Reference*, an industry standard used aircraft price guide.



This graph and the Appendix D2 indicate a fair market value of about \$1.98 million, or about 8% below the asking price of \$2.15 million. Used aircraft rarely sell for their asking price, so the Vref data is likely much closer to the current fair market value of the UNF King Air B200.

2.2 AIRCRAFT LEASE

The current lease to the state is for \$10,000 per month, or 0.5% of the estimated fair market value. This is well below the typical dry-lease rate of 0.8% to 1.0% per month.

For the short-term, the cost to the state to lease this aircraft is more than fair relative to the aircraft value. If the state were to acquire the UNF King Air B200, any lease payments made after July 2013 will be applied towards the firm price of \$2,164,760.

2.3 ADVANTAGES TO ACQUIRING THE UNF KING AIR B200

1. The UNF aircraft has been operated by the state since its acquisition in 2002. Thus, the aircraft physical condition and level of maintenance is a known factor to the state.
2. The King Air B200 has been stated as being a suitable aircraft for the air transportation mission of the state of Nebraska.
3. Since the aircraft is already being operated by the state, there would be no change in the flying operation or delay in putting another aircraft into service.

2.4 DISADVANTAGES TO ACQUIRING THE UNF KING AIR B200

1. The current Fair Market Value of the aircraft is below the firm price offered to the state, even allowing for several months' lease payments being applied to the purchase.
2. At age 11+, the aircraft may need upgrades and updates to its avionics system to bring it to the level of safety and mission effectiveness of a new aircraft.

3.0 HOW LONG TO RETAIN A TURBINE AIRCRAFT?

There are essentially two reasons to replace an aircraft:

1. Changes in mission render the aircraft no longer capable of performing the mission.
2. Costs and poor availability render the aircraft as ineffective or unable of performing the mission.

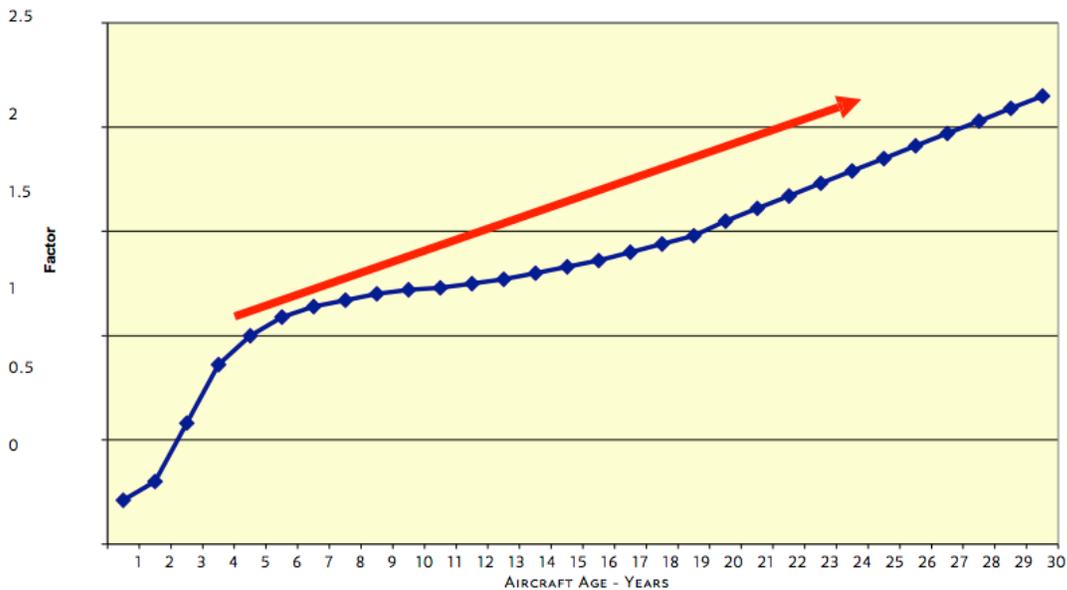
This section addresses number two above, based on research by Conklin & de Decker and industry data.

3.1 AIRCRAFT OPERATING COSTS INCREASE WITH AGE

As aircraft get older, they tend to be come more expensive to operate. Normal wear and tear items wear out. Routine things such as removing screws around an inspection panel take more time as screw heads may become worn, dirt may be in the way, etc. Some older aircraft face shortages of spare parts as parts suppliers focus on supporting newer models. Depending on the aircraft, its location, and operating conditions, corrosion may either become an issue or the manufacturer or FAA may mandate corrosion control measures. This is above the scheduled overhaul of major items such as engines, propellers and landing gear. Maintaining older aircraft takes both additional time and additional money.

The following chart contains a “Maintenance Aging Factor” curve showing how the average cost and labor for the routine maintenance (scheduled and unscheduled combined) increase as aircraft age. This data is derived from several different turbine aircraft sources, including Conklin & de Decker data, Boeing, Bell Helicopters and Gulfstream. We took data from different sources and normalized it to maintenance cost and labor multipliers – or factors.

AGING FACTOR – COSTS AND LABOR



As aircraft age, they cost more to maintain.

This graph shows very clearly that aircraft aging has a profound affect maintenance costs. The early years have very low maintenance costs – less than half of what they are at year 5. At age 20, they are about 1.5 times that of age 5. By the time the aircraft is 30 years old, the maintenance costs are 2.2 times what they were at year 5.

3.2 AIRCRAFT AVAILABILITY DECREASES WITH AGE

RELIABILITY/AVAILABILITY

Reliability is defined as the percentage of departures that leave within a specified period. Is the aircraft ready to fly when scheduled? Ninety-eight percent reliability is a standard that many aircraft operators achieve. To keep an aircraft reliable, it requires the aircraft to be kept in excellent condition, mechanically.

Availability is defined as the percentage of days an aircraft is available for flight in an operating year. To keep an aircraft reliable (not to mention, safe), it requires maintenance. When the aircraft is in for maintenance, it is not available for flight. The more time an aircraft spends in or waiting for maintenance, the less available time the aircraft has for flight.

As aircraft age, the increase in unscheduled maintenance associated with scheduled inspections also requires a great deal more maintenance down time. Similarly it will take increasingly maintenance to achieve any kind of acceptable dispatch reliability. Both detract from the availability of the aircraft for flight operations. Data shows that availability drops from the 95% range for aircraft up to 15 to 20 years of age to an average of 70% at age 25 and 55% at age 30. A summary of those figures is presented here:

Aircraft Age 0 – 20 years	Availability Up to 95%
25 years	Up to 70%
30 years	Up to 55%

For aircraft under 20 years of age, availability remains quite high. Somewhere between 20 and 25 years of age, an aircraft tends to see a lot more days spent in the maintenance facility compared to previous years. By age 30, many aircraft are spending as much time in the shop as being available to fly.

Availability is critical to being able to perform the assigned missions and for that reason, 20 years is the maximum recommended age at replacement.

3.0 ALTERNATIVE AIRCRAFT

The use of a turboprop aircraft allows for the Nebraska aircraft to use shorter runways than for most jet aircraft. Part of this results from the required safe operating parameters established for a jet aircraft being more restrictive than for a turboprops.

For this report, we looked at three aircraft that should meet the Nebraska air travel requirements:

1. The Current King Air B200
2. The King Air C90GTx
3. The King Air 250

Appendix E has detailed performance and specifications for these aircraft.

The King Air 250 is the current production variant of the King Air 200 family.



King Air 250

The model 250 has more powerful engines than the B200, and has updated avionics systems capable of flight anywhere in the US.

The King Air C90GTx is the smaller production model in the King Air family.



King Air C90GTx

The King Air C90GTx shares the same cabin cross section of the larger King Air B200 series. It is smaller, with a shorter cabin. It shares the same avionic system as the King Air 250. Appendix E has detailed performance and specifications for these aircraft. Below is a table comparing some of the salient characteristics for the Nebraska air transportation mission.

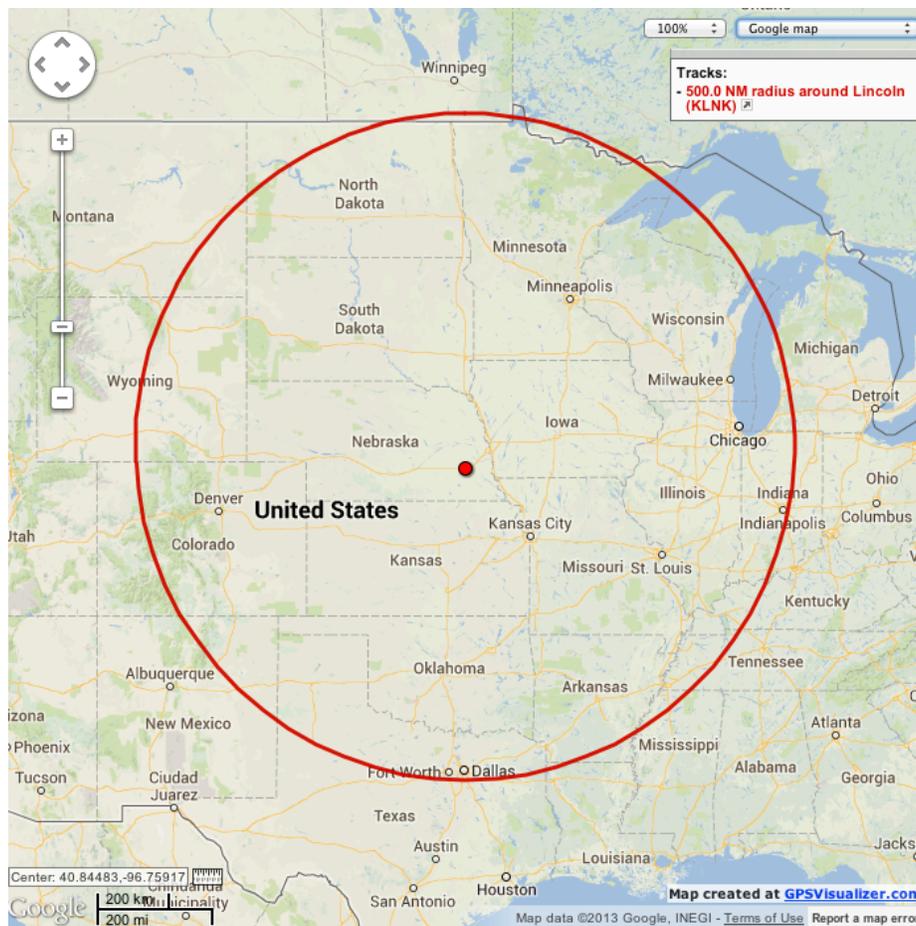
Aircraft Performance	King Air B200	King Air C90GTX	King Air 250
Maximum Take-off weight (lbs)	12,500	10,545	12,500
Typical Passenger Seats	6 - 7	5	6 - 7
Cabin height (ft)	4.8	4.8	4.8
Cabin Width	4.5	4.5	4.5
Cabin Length	16.7	12.6	16.7
Internal Baggage (cu ft)	54	48	55
Initial Cruise Altitude (ft)	21,000	25,000	35,000
Range with four Passengers (NM)	1,164	1,061	1,051
Depart 4,000 ft Runway?	Yes	Yes	Yes
Average Cruise Speed (Kts)	283	261	292

The range shown in the table is based on having a reserve fuel that will allow for a diversion 200 NM from the intended destination. All these aircraft can also operate safely from a 4,000 foot long runway under standard operating conditions.

If Nebraska were to use a King Air C90GTX, it would give up at least one passenger seat and just over four feet of cabin length. Internal baggage, although sufficient for the short trips flown, has less capacity than what is available in the King Air B200 series.

The initial cruise altitude is based on taking off at the aircraft maximum weight. Both the King Air C90GTX and King Air 250 can climb to higher initial altitudes than the King Air B200. The King Air 250 can climb direct to 35,000 feet at its maximum take-off weight. This would enable the aircraft to operate above most poor weather and result in a smoother ride.

Aircraft range for all three aircraft is more than sufficient for flights within and adjacent to Nebraska. The below image shows a 500 nautical mile (NM) range from Lincoln. Dallas, Denver and Chicago are all within 500 NM of Lincoln.



All three aircraft types are capable of performing the required air transportation mission for the state of Nebraska.

4.0 LIFE CYCLE COSTS

We compared the full costs of a 2002 King Air B200 with the costs of the possible replacement aircraft, as it would cost the real owner. Using the Conklin & de Decker Life Cycle Cost database, a projection for 20 years' utilization on each aircraft was performed. As the personnel level is expected to remain unchanged, no personnel costs save for aircraft specific training were included. Detailed costs can be found in Appendix F. A Total Cost of Ownership was calculated for a new model King Air C90GTx and King Air 250. A 20-year total cost of ownership was calculated to include:

- Acquisition Cost of a New Model (2013 Dollars): Civil aircraft without mission equipment
- Aircraft Operating Costs – including fuel, maintenance, insurance, and paint & interior refurbishment.
- Annual utilization adjusted based upon the speed differences of each aircraft relative to the King Air B200.
- Fuel cost per gallon based on reported costs
- Engine overhauls are to be paid for in the year they occur, versus an hourly accrual
- Self-Insurance was assumed
- Residual Value after 20 Years based on category of aircraft
- Inflation was assumed 2.5% per year (3.5% per year on part costs)

The below table of costs is summarized from the detailed reports (provided in Excel files)

Aircraft	Beechcraft KA B200	Beechcraft KA C90GTx	Beechcraft KA 250
Model Year	2002	2013	2013
Current Value	\$ 2,164,000	\$ 3,834,000	\$ 6,015,500
Hours for 10 Years	4000 Hours	4500 Hours	3600 Hours
Initial Acquisition (1)	(2,164,000)	(3,834,000)	(6,015,500)
Variable Costs	\$ (8,095,062)	\$ (6,713,748)	\$ (7,385,686)
Fixed Costs (2)	\$ (1,833,318)	\$ (1,608,337)	\$ (1,860,073)
Estimated Residual Value	\$ 242,973	\$ 1,397,092	\$ 2,699,552
Pre Tax Cash Flow	\$ (11,849,406)	\$ (10,758,994)	\$ (12,561,707)

Note 1. Initial acquisition assumes typical retail price for new, and the offered price for the King Air Nebraska B200.

Note 2. Fixed costs include refurbishing and modernization estimates, and training for two pilots 1x/year.

The estimated residual value is based on a standard market depreciation curve for a turboprops and includes an adjustment for the major components' wear and tear at the time of "sale" in 20 years.

- The highest predicted operating costs are for the current King Air B200.
- The lowest predicted operating costs are for the King Air C90GTx.
- Looking at 20-year total costs, the King Air C90GTx has the lowest total costs of this group.

5.0 RECOMMENDATIONS

1. The current King Air B200 is a suitable aircraft for the state of Nebraska's air transportation mission.
2. The current King Air B200 being offered to Nebraska at \$2,164,760 is priced higher than Fair Market Value.
3. A new aircraft will offer better long term aircraft availability and improved margins of safety with today's modern avionic systems.
4. The three aircraft analyzed: the King Air B200, King Air C90GTX and the King Air 250, are all capable of meeting the state of Nebraska's air transportation mission.
5. Of these three aircraft the King Air C90GTX has the lowest operating costs and the lowest total costs over a 20-year Life Cycle.

The new King Air C90GTX has a 9% lower 20-year cost difference versus the current King Air B200. This aircraft also offers a new aircraft warranty and better long-term reliability and availability over twenty years.

If the state of Nebraska desires to retain the current aircraft, it should be purchased at Fair Market Value, which is almost certainly lower the "firm offer" of \$2.16 million. We believe it to be closer to \$1.98 million.

Regardless of which aircraft is chosen, we do not recommend operating a turbine aircraft for longer than age 20 years in order to maintain high rates of availability and reliability.