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Flat Glass for Old King Airs

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NEW GLASS

for Old King Airs

Avidyne and S-Tec team up to offer

*new flat-panel displays and autopilot
for King Air 200 and others.*

Alliant is a cooperative effort between Avidyne and S-Tec to transform the cockpit—and enhance the autopilot performance—of Beech King Airs. The Alliant system replaces all flight

instruments, gyros and air data computers with an integrated package of dual primary flight displays (PFD), a FlightMax multifunction display (MFD) and a new digital electronic autopilot.

The Alliant system was first certified on the Super King Air 200 family last fall, but approvals are expected soon for other members of the King Air line, the most popular turboprop family of all time. And priced at about \$170,000, the Alliant conversion makes economic sense for King Airs of most any age.

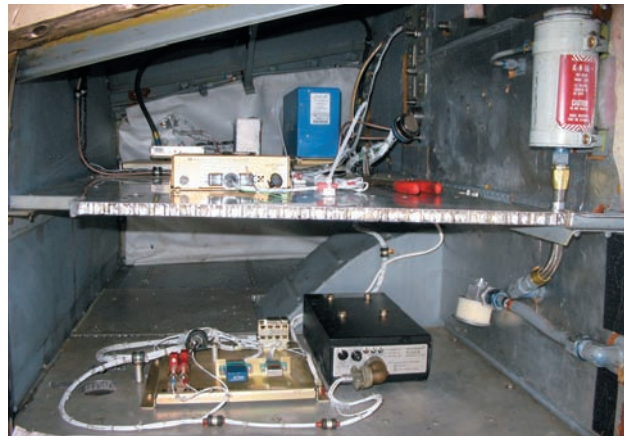
The Alliant system very closely resembles the avionics package Avidyne and S-Tec developed for the single-engine Piper Meridian turboprop. The core of the system is the dual EXP5000 10.4-inch diagonal PFD displays that show everything necessary to fly

the airplane, and much more than was available on the host of mechanical instruments they replace. Housed within the PFDs are electronic attitude and heading reference systems (AHRS) and digital air data computers. Without need of any moving parts, the AHRS and air data computers perform all of the functions of at least six separate spinning gyros and six mechanical-pneumatic instruments that they replace.

In the Alliant system all information critical to safe IFR flight is completely dual, and is constantly compared to detect errors. For example, if one of the air data computers were to fail or develop a leak in the static system, a warning message would appear on the PFD. Armed with that information the pilot could then compare the two PFDs with the standby instruments and easily determine what had failed and continue the flight using only the valid information.

Because the Alliant system is all digital electronic there is no need for the alternating current bus or inverters that are essential to operate the mechanical flight instruments they replace. A total loss of AC power in a conventional King Air avionics system is a true life-threatening emergency, but won't be a big deal in





the Alliant system. After the conversion the only instruments that depend on AC electrical power are the engine torque gauges, and pilots can easily set power by reference to the other engine instruments if those were to fail.

Multifunction display chores are handled by Avidyne's EX500 system, which can show XM satellite weather, Jeppesen charts, the airplane's weather radar, terrain and traffic warnings and text messages via Avidyne's MultiLink system. The EX500 is the size of a traditional weather radar, so it is not as large as the multifunction displays in some glass cockpits, but the system's capability is enormous.

The third major element of the conversion is S-Tec's 2100 autopilot that is fully integrated into the system. The 2100 has the modes you expect to find in an autopilot designed for turbine airplanes, and uses the precise attitude and yaw rate from the Avidyne AHRS to control the airplane.

I had a chance to fly the first King Air 200 converted to the Alliant system and the transformation is impressive. The 25-year-old airplane had new paint and interior, so it looked great, and then when I looked in the cockpit, it looked new, too. The dual stacks of engine gauges and the toggle switches to control lights and systems were still there, but the big glass displays dominated the cockpit and lent an up-to-date feel compared to the old "steam gauges" they replace.

New radios are not part of the Alliant package, but most owners will use the opportunity to update the com and nav. This airplane had new dual Garmin GNS 430 com/nav/GPS systems, Garmin Mode-S transponders and a new audio panel, so the transformation was complete.

The Avidyne AHRS can now align while the airplane is moving so there is no need to delay taxiing as there was with early systems. The PFDs are very easy to operate with bezel buttons beside menus used to select modes or change the display. However, to set a target altitude you need to use the knobs on the autopilot control panel, not the PFD. The selected altitude is displayed on the PFD, as are all autopilot modes.

For takeoff I used the normal turbine airplane techniques and selected go-around mode to have a flight director target pitch attitude and heading mode. After liftoff and gear retraction I engaged the yaw damper and autopilot and put it to work in bumpy air. The yaw damper is powerful and effective and has a feature that as far as I know is unique to S-Tec—yaw damper trim. A little knob on the panel allows you to fine-tune rudder trim without touching the mechanical rudder trim tab control.

The 2100 autopilot flies the King Air well, and is unusually gentle and gradual in its altitude captures or pitch changes.

Many of the new digital autopilots in turbine airplanes are able to capture altitudes or make airspeed or vertical speed changes quickly with absolute smoothness, but the 2100 does the job cautiously, much like a very careful and precise human pilot would fly.

I climbed out in airspeed hold mode and the 2100 captured the assigned altitude with no need for extra button pushing to arm the system. When you engage vertical or airspeed hold modes they come up synchronized to the present speed, and then you can adjust up or down using a rocker switch on the autopilot control panel. The selected target values appear on both the PFD and autopilot control.

The Alliant system uses GPS roll steering commands from the Garmin 430s to capture and track nav or approach courses, and that, too, was smooth and precise. I even pulled one power lever all the way back to idle with the other side at high power while in a rapid descent and, after one or two yaw excursions to catch up, the autopilot then flew the airplane perfectly despite the great drag of the idling propeller on the left side. Part of that performance is from the rudder bias system in the King Air that automatically steps on the proper rudder when an engine is pulled back, but much of the engine-out capability also comes from the powerful yaw damper in the 2100 system.

To give the system a really tough—even unfair—test, I flew toward the localizer at an 80-degree angle just a couple miles outside the outer marker with approach mode armed. To add to the challenge, I threw out approach flaps and landing gear at near maximum speed as the little airplane on the moving map neared the ILS line. The autopilot grabbed for the centerline as soon as the localizer came alive and rolled aggressively to capture the signal. It did fly through the course, as you would expect, but with only one excursion to correct, it captured the ILS and was stable on the centerline as we got to the marker. This system can handle the worst vector a controller can ever give you.

The Alliant system doesn't quite match a complete glass cockpit because it leaves the mechanical engine gauges in place, and doesn't have a large MFD, but I think those are excellent tradeoffs for the price. By getting rid of the old mechanical gyros, and a whole bunch of wiring and remote avionics boxes, the conversion will also save a bunch of weight, about 50 to 150 pounds, I would estimate, in many installations. Removing the old gyros and avionics boxes also opens up space in the nose for a baggage compartment that is available as an airframe modification.

There is a lot of life left in thousands of King Airs, and the Alliant conversion will allow these graceful and comfortable turboprops to live out their years with a new heart. ✈



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