

# AVIONICS<sub>magazine</sub> TECH REPORT

## The Glass Box Project



Duncan Aviation's conceptual Glass Box Project solution for the Falcon 2000. The first installation is scheduled for late summer 2008.

Roughly five years ago, avionics experts at Lincoln, Neb.-based Duncan Aviation studied the future of the business aviation industry and began developing its Glass Box Project initiative. Today, thanks to that intensive research and applied industry experience, aided by some dramatic advances in avionics equipment, Duncan Aviation has established itself as the leader in the corporate aircraft liquid crystal display (LCD) installation market.

“The concept behind the Glass Box Project was to work with the various groups — FAA, Duncan Aviation, the manufacturers of the equipment and, most importantly, the customer — that are invested in bringing complex solutions to the marketplace, and proactively working together to do things differently in this industry,” explains Andy Biller, Glass Box Project sales for Duncan Aviation. “So more than five years later, we feel that we are leading the industry in the number of solutions that we offer, both owned STCs (Supplemental Type Certificates) and those we have access to, and in the number of

the multi-million dollar investment in a new aircraft. For those who are satisfied with their current aircraft’s capabilities, or want to upgrade to a later model but not necessarily a new aircraft, the Glass Box Project delivers the improved safety provided by new generation avionics at a fraction of the cost.

For example, a Falcon 900 owner “might have between \$18 million to \$20 million invested in his aircraft, and the airplane’s main systems were designed nearly 30 years ago,” relates Gary Harpster, Honeywell EPIC CDS/R sales specialist for Duncan Aviation. “So right now, the

“So instead of looking at the TCAS (Traffic Alert and Collision Avoidance System) on a small screen with a three-inch display, now they are looking at it on an 8x10 MFD (multifunction display). So the pilots have better situational awareness than they would have with the previous design,” he says.

Duncan Aviation’s modification capabilities offer not only cockpit retrofit solutions, but also interior solutions that will modernize the cabin. “When we look at it in the context of not just avionics, but a full retrofit, they then have something that looks and feels much closer to the newer or new airplanes. That’s the niche that we’re filling,” says Biller.

Research shows that aircraft with Glass Box Project systems stand out in the resale market. Experts forecast most of the retrofit investment will be retained, according to Dave Pleskac, Rockwell Collins Pro Line 21 sales specialist for Duncan Aviation.

Duncan Aviation’s first retrofit program involved the Falcon 50, installing the Collins Pro Line 21 full cockpit replacement dating back to 1998. “In the past, it was just one or two a year, but as of late we have found quite an expansion into that marketplace,” Pleskac says. In fact, due to the success of Proline 21 in the Falcon 50, simulator manufacturer FlightSafety International is in the process of building a full motion Falcon 50 Pro Line 21 simulator that will be available in May, Pleskac points out.

### Retrofit Installations

Duncan installs its Glass Box retrofits at its Lincoln and Battle Creek, Mich., major modification facilities. As of this writing, the company had installed 36 Glass Box Project systems. But in terms of momentum, Duncan Aviation in 2007 delivered one third of all systems delivered over the previous years. And in 2008, the company has another 12 installations scheduled or in progress, and expects to close out the year installing at least 18 additional systems.

Airframes on which the company has available solutions for Glass Box Project retrofits include the Falcon 50, 50EX, 900, 2000; the Challenger 600 and 601-1A/3A and 3R; the Hawker 800, XP and 1000; the Astra 1125/SP; King Air 300 and 350 and the Gulfstream III.



**Duncan Aviation’s Glass Box Project solution for the Challenger 600/601-1A, Universal’s EFI 890R.**

installations we are completing.”

The Glass Box Project is Duncan Aviation’s dedicated program to evaluate, install and certify the best of the emerging “glass cockpit” retrofit technologies for a broad range of popular business aircraft. The project involves identifying the types of aircraft that are to be retrofitted, determining which avionics solution would be the best and then doing a technical analysis to see how the various products would interface. Duncan Aviation then develops STCs in conjunction with the FAA, certifying and then bringing those solutions to the marketplace.

### Customers’ Choice

What factors determine a customer’s decision to have either a cockpit retrofitted, or buy a new, or newer aircraft? While timing is important — there is up to a 2-1/2 year waiting list to purchase some new corporate aircraft models — improved safety derived from modern systems tops the list of most customers who consider making

weakest link on that airplane is the dated avionics display technology in the cockpit. The aircraft’s desirable performance and cabin capabilities still meet all the mission profiles the customer has. With its Honeywell avionics platform, the best retrofit solution is the CDS/R (control display system/retrofit) package, because it interfaces with the existing digital architecture of the aircraft itself. When the owner asks ‘what will it take to update that technology,’ the answer is, for less than five percent of the value of the aircraft, you end up with a complete new cockpit from the display perspective. It changes out the symbol generators and puts four 8x10 large LCD displays linked to two optional file graphics servers in front of the crew.”

Harpster explains that as more aircraft are operating in the same airspace, pilots and owners are recognizing the safety benefits of large-format displays. For example, it is important that pilots can quickly identify any traffic that may cause a problem during their descent.

Although Duncan Aviation has concentrated on retrofitting select airframes, its presence in the global marketplace has created opportunities to install the digital display technology on more utility oriented, special mission aircraft. The company also is looking into the rotorcraft market.

### Service and Training

For more local avionics service of an aircraft, Duncan Aviation has more than 20 satellite avionics locations throughout the country, including five avionics installation centers located in Dallas, Teterboro, N.J., Las Vegas, Van Nuys, Calif., and Denver. So when customers return home with a new cockpit, they typically have someone in the vicinity who can assist them. All locations are linked to the same customer data computer system and are networked in real time. "In the past, when a new cockpit was put in, it was up to the crew to obtain the training they needed on this new system," Pleskac says.

As part of the Glass Box Project initiative, Duncan Aviation has developed an in-house training resource. It recently developed a program for the South African Air Force, providing maintenance and crew training on-site in Johannesburg.

"Training has become so important to some of our fleet operators that they cannot recommend a system if they can't show the decision makers in the company that the training will be there to support their crews," says Biller. "We'd like to see FlightSafety and SimuFlite look at other airframes where we have been successful, and develop those types of trainers and simulators as they did with the Falcon 50."

### Reducing Downtime

An out-of-service aircraft represents a significant inconvenience to the customer, and "we take that very seriously," Pleskac says. "We challenge our crews to brainstorm and try to come up with innovative ways to reduce downtime, and we've been highly successful in that."

In installing the Pro Line 21 full cockpit replacement, Duncan Aviation has reduced downtime from an initial 16 weeks to 10 weeks currently with shorter times possible in some cases. "That's a month and a half of downtime. It's a huge cost saving," Pleskac says. In a

further effort to reduce downtime, retrofits are planned to coincide with some aircraft periodic maintenance events.

Reduced maintenance costs and enhanced reliability are key selling points for installing Glass Box Project (GBP) retrofits on legacy aircraft. A Duncan Aviation study with one of its major avionics suppliers determined that 25-year-old avionics technology is six times more expensive to maintain than GBP technology.

### Avionics Equipment

Of Duncan Aviation's LCD Glass Box solutions, the three most popular are the Rockwell Collins Pro Line 21, Honeywell EPIC CSD/R and Universal Avionics EFI-890 retrofits.

Collins' Pro Line 21 includes three or four active matrix liquid crystal displays (AMLCDs) and can include a complete avionics replacement, or interfaces with existing autopilot and FMS's. Honeywell's Primus EPIC CDS/R also features large displays, enhancing situational awareness with a clear path for future upgrades. The Universal EFI-890R features from one to five 8.9-inch LCDs and can interface with air data and flight guidance systems, AHRS, radars and radios, along with

### A Satisfied Customer

One of Duncan Aviation's Glass Box retrofits involved a customer who had been flying a Citation CJ2 and decided to step up to an Astra, in this case an "Astra<sup>®</sup>." Owner Corbin McNeill purchased the refurbished aircraft, the second Astra<sup>®</sup> by Duncan Aviation.

"My experience with Duncan Aviation has been excellent," McNeill says. "They brokered the purchase of the Astra, conducted the pre-buy inspection, and in addition to the extensive modification, have done routine maintenance of the aircraft. Because of their extensive experience and detailed knowledge of the Astra, I intend to make Duncan Aviation my principal maintenance provider."

And "with sustained high prices for new aircraft," McNeill adds, "refitting an Astra to an Astra<sup>®</sup> is a sensible alternative that can provide long-range comfortable transportation, integrated with the most modern avionics that greatly enhance situational awareness and safety."



Duncan Aviation's Glass Box Project solution for the Falcon 900, Honeywell's EPIC CDS/R.

TCAS and terrain awareness and warning system (TAWS). Universal's system can also display that company's Synthetic Vision System (SVS) and an infrared Enhanced Vision System (EVS).

Customer requirements for avionics vary according to the mission. "We offer a baseline system of retrofits for the Glass Cockpit, and from there it becomes very personalized," Pleskac says. The baseline retrofit usually includes three or four

large-format LCD displays and some type of electronic standby instruments. "From there, you are dependent on existing systems in the aircraft. Typically most of those airframes will already have TCAS or TAWS, so we would be adding graphical weather, and a complete electronic chart and map system," he explains.

### Unique Capabilities

Duncan Aviation has unique capabilities,

allowing it to become one of the few companies capable of performing full service major retrofits “There are certainly other companies that can do maintenance on aircraft, but we feel that we have the most in-house capabilities,” Harpster says. “We have a large instrument shop, so we can repair those in-house without sending them out.

Duncan Aviation also designs and builds its own instrument panels using computer aided design and manufacturing. “The whole idea is to become less dependent on outside vendors, helping us to control quality and downtime,” Harpster maintains.

Coordination between the customer, avionics OEMs, the FAA and its Glass Box Project team is critical to Duncan Aviation’s success. Because of the volume of business it does, the company enjoys a good relationship with OEMs. “There is definitely value in being a leader. When it comes to these new systems, we are able to work with them, collaborate on engineering and technical reviews, and bring a customer base that we have relationships with,” Biller says.

Another advantage Duncan Aviation enjoys is that “we are a privately held company, and are family owned. At any given time, these customers and manufacturers can and do interact with our senior leadership team, and that gives them great confidence in terms of our ability to look ahead, to communicate, and then follow through on what we say,” notes Biller.

When Duncan Aviation was formulating the Glass Box Project, it determined that the customer base would tolerate a retrofit cost up to 18 percent of an aircraft’s current market value. For the most part, its solutions fall well under that mark.

### Future Direction

Duncan Aviation’s primary goal is to deliver to the customer an aircraft that offers enhanced safety and an upgrade path for future capabilities, and then to support that product like no other.

In the future, “as we look at growing this market, one of the approaches we’ve embarked on is a ‘packaging’ effort, where we market a

solution not specific to one department, but more inclusive of the larger scope of services we offer,” Biller says.

“As an example, an Astra, in addition to having a Collins Pro Line 21 added, may also have a new modern interior and exterior paint, and a number of maintenance items to bring the airplane to a standard that is unique. That aircraft is called an ‘Astra’ (for enhancement),” he explains. “What we’re working toward is

having the operator consider an aircraft Enhanced by Duncan Aviation® , for example a Falcon® 900, as one of the choices they have, and that we are the provider of that if they choose it.”



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**DUNCAN AVIATION PRESENTS**  
**THE GLASS BOX PROJECT**  
**MAJOR COCKPIT LCD INSTALLATIONS**

- > Improving safety and value with minimal downtime.
- > Offering real-time graphic weather, charts & maps, and a future upgrade path.

**Falcon 50**  
Rockwell Collins Pro Line 21





**Challenger 601-3A/3R**  
Honeywell EPIC CDS/R  
This installation was completed at RUAG.

**King Air 300/350**  
Universal EFI-890R



**WARNING**  
THE GLASS BOX PROJECT WILL FOREVER CHANGE YOUR FLIGHT DECK EXPECTATIONS.  
Check for updates on our website at: [www.DuncanAviation.aero/gbp](http://www.DuncanAviation.aero/gbp)

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