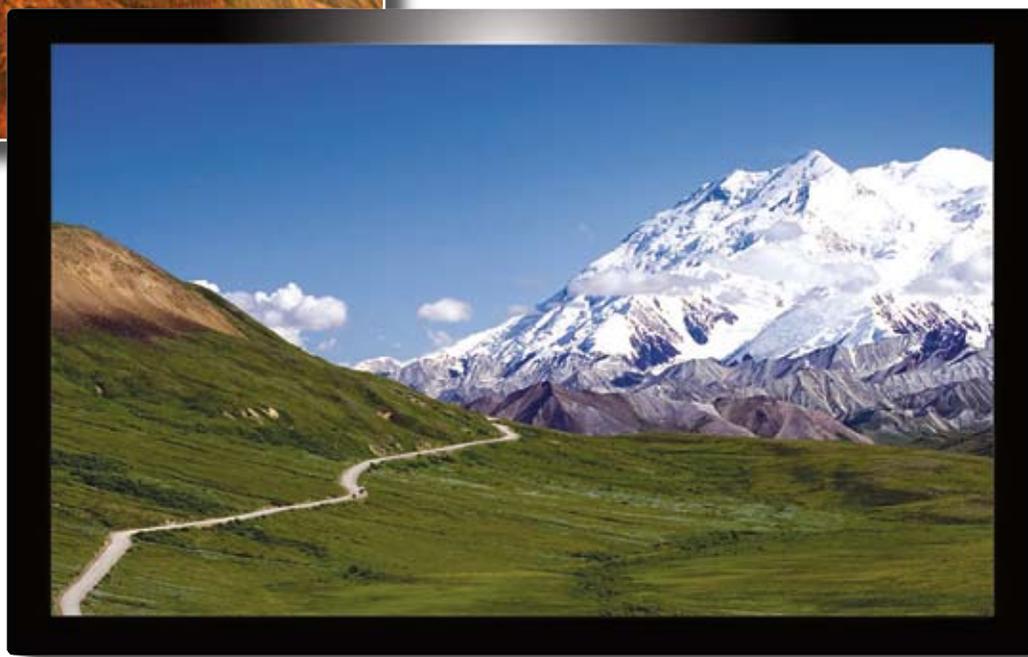




*ABOVE: Rosen Aviation's 24-inch high-definition monitor and Blu-ray DVD.*

*RIGHT: This 32-inch high-definition widescreen LCD monitor from Flight Display Systems recently was installed in a VIP head-of-state aircraft.*



# PIXEL PERFECTION

HD Displays Offer Eye Candy to the Aircraft Cabin

High-definition refers to any video with a higher resolution than standard-definition video. In short, HD video typically is 1280 x 720 pixels (720p) or 1920 x 1080 pixels (1080i/1080p).

S T O R Y   B Y   C H R I S T I N E   K N A U E R

**W**ith their sleek screens, razor-sharp images and multimedia interfaces, today's true high-definition (HD) displays offer some impressive eye candy. And now that this delicious treat has made the leap from the living room to the aircraft cabin, it's time to go behind HD's glossy good looks and peer behind the panel.

#### **What does high-definition mean?**

From DVD players and gaming systems to televisions and monitors, manufacturers are rushing to pronounce their products "HD," but what does it mean to be high-definition?

High-definition refers to any video with a higher resolution than standard-definition video. In short, HD video typically is 1280 x 720 pixels (720p) or 1920 x 1080 pixels (1080i/1080p).

A Blu-ray movie played on an HD monitor has up to six times the resolution of a standard DVD movie, according to Joe Little, vice president of research and development for Flight Display Systems, an Atlanta, Ga.-based manufacturer offering high-definition liquid crystal displays (LCD) in sizes from 17 inches to 42 inches.

"So, the LCD technology is significantly higher quality. Customers will see a more colorful, detailed picture with vivid and life-like scenes," Little said.

#### **Why is an LCD display for an aircraft more expensive than the LCD TVs we buy for our living rooms?**

Sales representatives, technicians and avionics installers alike are hearing customers ask, "Why is an HD display for my aircraft so expensive?"

While the answer is as complex as the engineering behind the system, the simple fact is, display products designed for aviation applications are significantly more costly to produce than commercial products developed for home use. Compliance with FAA regulations, the need for rugged designs capable of withstanding extreme environmental conditions, small production quantities and custom features conspire to drive up costs.

"These unique designs are created specifically for aviation applications, and therefore, serve a much smaller market than other home-use products. So, we can't achieve the same economies of scale," said Mark Cook, sales manager for Rosen Aviation, an Eugene, Ore.-based company manufacturing cabin displays.

"Additionally, LCD manufacturers typically maintain short product lifecycles, requiring us to invest heavily in inventory or risk facing part ob-

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## HD DISPLAYS

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solescence, which would result in another redesign effort,” Cook said.

Rosen Aviation offers a 24-inch high-definition widescreen display with a series of others in development, including 9-inch and 17-inch displays scheduled for first quarter 2010, as well as a 12-inch scheduled for release late 2010. Other sizes under consideration include 19-inch and 32-inch displays.

“While the LCD glass is usually very similar, sometimes identical, that is where the similarities end,” Little said. “Each monitor manufactured for aviation use must meet a variety of standards, such as DO-160 testing for electromagnetic interference, shock and vibration.

We use our own power supplies, aluminum housing, video boards, Lexan safety shields and standard aircraft connectors.

“So, all of this customization work makes an aviation-approved monitor more expensive than commercial LCDs,” Little said.

### **What are the technical challenges of bringing HD video to the aircraft cabin?**

Adding a high-definition display to an aircraft filled with a variety of electronics, avionics and electrical wiring poses unique technical challenges, including resolving noise interference and interfacing multiple forms of data transmission.

“We have some customers who like to transmit high-definition signals in HDMI (high-definition multimedia interface), others in

SDI (serial digital interface), and still others in DVI (digital visual interface); so, we’ve developed solutions that accommodate each of these options,” said Jeff Unger, vice president of engineering for Rosen Aviation.

Little at Flight Display Systems agreed, “We have been working through these issues for almost two years now...and we have solved many unexpected problems. The main issues are the new connector type, expensive wiring, signal encryption, lip sync and noise interference. It’s quite a trick to have a mix of high-definition and sharp, bright and vivid color, standard definition video on multiple monitors from 5 inches to 52 inches, through a 100 feet of cable, without problems with lip sync, compression artifacts or noise bars.”

For Flight Display Systems, noise interference was one of the first issues to tackle.

“There are instances all the time with our dealers using standard-definition video and having video noise as a result of their power or ground wiring. So, we knew that a high-definition signal, carrying much more information than a standard coaxial cable, would be susceptible to noise,” Little said.

“Our HD video converters were designed from the ground up with differential signaling and adjustable equalization to match the signal — from the source to the display. This optimizes the picture quality and ensures a quality signal. The early HDMI connectors had no locking



*A King Air 200 with Flight Display Systems' 17-inch HD LCD slide mount.*

mechanism. Many companies advertise locking connectors, but none so far have delivered on a reliable design. Flight Display Systems' source and distribution equipment has an adjustable ledge for reliable strain relief for HDMI cables," he said.

### When is it true HD?

For true HD video, all aspects of the system have to be high-definition, including the source of the video (such as a Blu-ray disc playing on a Blu-ray player), the cabling and the display. For Flight Display Systems, the biggest hurdle was the HDMI connector — the output format for most HD source equipment.

"Without HDMI, you cannot do a full quality 1080p signal. Conventional HDMI cables have 19 wires wrapped in a single cable. They are limited to 30 feet (10 meters) and can be very expensive," Little said. "We were seeing early quotes up to \$1,000 for the cabling of one monitor.

"Our team here at Flight Display Systems chose to address this issue by converting the HDMI signal to travel over an industry-proven Cat5 cable. Cat5 is short for Category 5, a twisted-pair cable type that is widely used due to its high level of signal integrity.

Translating the HDMI signal to Cat5 cabling allows us to extend a 1080p high-definition signal up to 130 feet. Cat5 provides our dealers with lower-cost cabling, lower weight, increased flexibility, a tighter

bend radius, and a smaller diameter when compared with HDMI wiring," he said.

Stephanie Wilcox, Rosen

Aviation's senior configuration specialist, added, "Addition-

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## HD DISPLAYS

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ally, compliance with HDCP (high-bandwidth digital content protection) requires significant

financial and technical investment.”

“Blu-ray and DVD players with an HDMI or DVI output use HDCP to encrypt the video so that it can-

not be readily copied,” Wilcox said. “The connected high-definition monitor must then decrypt the HDCP to actually display the video; otherwise, ‘snow’ or a black screen will result.”

Both Rosen Aviation and Flight Display Systems offer a Blu-ray DVD player, giving viewers high-quality HD video capability. Flight Display Systems’ FD932DVD-BLU includes both HDMI and composite (NTSC) output, making it backward compatible with older LCD and plasma monitors. Playback of traditional DVDs also is supported. Rosen Aviation plans to release its slot-loading Blu-ray DVD player this fall.

“As a retrofit-focused company, we were very aware of situations where a customer might not want to upgrade all of his displays to new technology,” Little said. “To that effect, we designed our Blu-ray player with both HD and standard definition outputs. It can simultaneously output 1080p video and standard, non-HD composite video.”

For more about high-definition video, contact Flight Display Systems, Rosen Aviation or your preferred HD display manufacturer. With these companies’ resourceful, innovative engineering, passengers now can watch Jason Bourne and Ethan Hunt outsmart their enemies in pixel-perfect high-definition at 30,000 feet. □

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