New Technology Saves Millions in V-22 Program

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A technology used in laptop computers and flat screen television sets will find its way into the cockpit of the MV-22 Osprey later this year, resulting in substantial savings to the program, according to United States Marine Corps Col. Nolan Schmidt, V-22 program manager.

Active Matrix Liquid Crystal Displays (AMLCD), commonly known as flat panels, are slated to replace older technology Cathode Ray Tube (CRT) displays. CRTs are used in the V-22 Multi-Function Displays (MFD). There are four MFDs in the V-22 cockpit that provide pilots with primary flight symbols used to control and navigate the aircraft. They display video imagery, such as Forward-Looking Infrared (FLIR) and digital map data.

"This change in MFDs is expected to save approximately $500 million in procurement savings alone over the life of the program, which extends out to 2020," said Schmidt.

The new flat-panel displays will bring several benefits to the Osprey. The displays will be cheaper, lighter and have better performance than the CRT display. The flat panel displays also will correct a nighttime glow problem that exists with the current CRT MFDs. Background glow decreases the pilot's night visibility outside the cockpit when night vision goggles are not being worn.

"By installing the AMLCD we can resolve the technical deficiency and achieve other benefits, such as increased contrast and better sunlight readability," said Cdr. Don Mueller, former V-22 avionics system project officer and current deputy program manager for Systems Integration. "Better in the day and better at night--a combination difficult to achieve with CRT technology."

Affordability and reliability also are major forces behind the drive to flat panels. "For the cost of one CRT display, we will be able to buy 10 flat panels and have change left over," said Mueller. The flat panels will be more reliable than the CRTs, which are prone to frequent tube and power supply failures. The difference in reliability means that the predicted mean time between failure will be on the order of 4,500 hours for the new flat panels compared with 2,000 hours for the CRT system. CRTs have life-limiting components and require periodic adjustment. Additionally, the flat-panel displays are about 50 percent lighter than the CRTs, which weigh in at about 40 pounds each.

While AMLCD technology has been available for laptop computers and other commercial devices for several years, it was not practical to install a flat panel MFD in the V-22 during the engineering and manufacturing development (EMD) phase which began in 1994. However, the Osprey team chose to use flat-panel technology for other displays, such as the Standby Flight Display and the Engine Instrument Crew Alerting System, which do not have the vigorous performance requirements of the MFD.

"In 1994 flat panel displays (for aircraft) were relatively new. While they looked adequate for computer applications, which are relatively static, they did not have the clarity and color depth to display moving video," said James Negro, systems engineer supporting the Controls and Displays Integrated Product Team for the Navy. "In addition, the MFD needed square AMLCD glass verses the rectangular glass that was used in laptops."

There also was the concern that early AMLCDs would be vulnerable to the Electro-Magnetic Interference (EMI) generated in a shipboard environment. Not having the EMI capability, crisp resolution, or enough suppliers to make the flat panel displays accessible and affordable are a few reasons that this technology would not have helped the program five years ago, according to Mueller. Today, this technology is mature and affordable, and flat panels will be installed in all Marine MV-22 aircraft beginning in FY99 and in the Air Force variant CV-22 starting in FY01. A total of 410 Ospreys will be outfitted with the flat-panel displays. The new flat-panel MFDs are being manufactured by EFW of Fort Worth, Texas.

"This change means increased savings, increased reliability and decreased weight, a triple treat because it does not happen very often," said Cdr. Michael Ahern, V-22 deputy program manager for Business. The Bell Boeing Tiltrotor Team, comprised of Bell Helicopter Textron, Inc., in Fort Worth, Texas, and The Boeing Company in Philadelphia, developed the V-22 tiltrotor for the U.S. Marine Corps, Navy and U.S. Special Operations Command. Bell Helicopter Textron, Inc., is a wholly owned subsidiary of Textron, Inc. of Providence, R. I.

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