

# The Electronic Helmet Evolves with Gentex Scorpion

The helmet in the video below has come a long way from the version flown at NASA Dryden in the early 1990s and later at the Edwards AFB Life Support shop. With the Scorpion, you can have all the data you need in a much more manageable package than the earlier Joint Helmet Mounted Cueing System, which made pilots look more like Martian unicorns than sky-sweeping swashbucklers. The version flown at NASA Dryden is below.



The new version is a leap between something that can be plugged into the flight systems of an aircraft and something akin to a more elegant Land Warrior capability.

[CLICK HERE TO SEE THE NEW HELMET](#)

Color is beginning to enter the world of aviators' helmet-mounted displays as new digital technology displaces analog systems.

The color head-mounted display developed by Gentex has been installed aboard MC-130Ws flown by Air Force Special Operations Command, as well as the service's A-10s and the Air National Guard's older-model F-16s.

But Gentex's Scorpion color HMD, developed in 2008, isn't alone. A color HMD is under development by Vision Systems International, called the TARGO Color HMD. Vision Systems International and Gentex will compete to supply an alternative helmet for the F-35 joint strike fighter.

The F-35's current helmet — now being developed by Vision Systems International — is having problems with jittery images and lag time. The company promises it will fix the helmet, but JSF program officials want another option. Gentex will be offering a display with its color technology. Vision Systems International declined to offer specifics on any alternative helmet it might offer. Britain's BAE Systems also is reportedly in the hunt to supply an alternative helmet for the F-35. Calls to the company were unreturned.

The new generation of displays follows older HMDs, such as the Defense Department's Joint Helmet Mounted Cueing System, developed and produced by Vision Systems International.

More than 3,200 Joint Helmet Mounted Cueing Systems have been delivered by Vision Systems International and mounted on fighters such as the F/A-18,

F-15 and most F-16s. Built on the same cathode-ray-tube technology as old pre-flat-screen computer monitors and TVs, the Joint Helmet Mounted Cueing System is relatively bulky and limited to monochromatic images.

It has taken a long time to integrate color into HMDs because although it is comparatively simple to display the color green in a brightly lit airborne environment, red is much more difficult to display and blue even tougher than that, said Bob Foote, Vision Systems International's chief technical officer. The problem was overcome by a combination of improved optical lenses and new digital liquid crystal display technology, which allows images to be far brighter.

Both Gentex and Vision Systems International use digital LCD technology, which also allows displays to be far smaller while adding color and simplifying software processing. However, every aspect of HMD technology, including the optical systems, has been improved since the debut of the Joint Helmet Mounted Cueing System and similar displays

But the two companies take different approaches.

Gentex's Scorpion presents the information on a "paddle display," which is mounted on a standard pilot's helmet and puts a roughly inch-square transparent display in front of the wearer's right eye.

Despite the small viewing area, Atac said, the field of view is superior to the Joint Helmet Mounted Cueing System. Moreover, he said, it can smoothly show data and video, and it runs faster than any current HMD on the market.

"It's really a beautiful display," Atac said.

The arrangement has several advantages over displays that cover the face, he added. Scorpion is lighter, reducing neck strain and the risk of ejection. It requires just the paddle, not an entire helmet, to be assigned to an aircraft. And it can be used with conventional night-vision devices.

“Visor projection has proved to be problematic in almost every HMD that’s used it,” Atac said. “So we were the first out there with a paddle-style display that’s color.”

But Vision Systems International said its TARGO Color HMD’s full-visor approach is actually safer, with a design proven to handle ejections at airspeeds up to 600 knots, which is just below the sound barrier at higher altitudes.

“This is the first [of] what we consider [a] fully ejection-safe fighter system that’s been done,” Foote said. “We know it’s much safer; it’s proven to be much safer.”

He said the new helmet is considerably more compact and far lighter than older models, and its electronics operate at a far lower voltage, which is safer for the pilot. Most importantly, he said, the visor projection system provides far better situational awareness through a wider field of view.

Like the Scorpion, the TARGO can display full-motion color video and data. But the pilot must remove the visor to don night-vision goggles.

Retaining a familiar night-vision format is important for operational aviators, Foote said.

Vision Systems International hopes to fit its new helmet aboard the C-130J cargo plane, as well as the F-15, F-16, F/A-18 and other aircraft, Foote said. He said the new Vision Systems International technology also could be retrofitted to the Joint Helmet Mounted Cueing System.