The F-35 HMD

Enduring Legacy - Innovating for the Future

The U.S. Government recently approved the purchase of Harris Night Vision by Elbit Systems of America, LLC, ("Elbit America") the U.S. subsidiary of Israel's Elbit Systems Ltd. With revenue greater than $1 billion, Elbit America employs more than 2,000 people and operates key facilities in six U.S. states under a Special Security Agreement (SSA). The former Harris Night Vision, now known as Elbit Systems of America – Night Vision, provides the company with a huge leap forward as a recognized U.S. defense contractor trusted to own and manage one of the Pentagon's most strategic technologies: night vision, enabling warfighters to see in the dark.

Adding night vision to its portfolio complements Elbit America's worn, held and vehicle-installed electro-optical products used today by Naval Aviators, Air Force Pilots, dismounted Soldiers and Marines, and ground combat platforms. Previously, the two companies enjoyed an important customer-supplier relationship. By bringing night vision technology "in-house," Elbit America is better positioned to make investments in current and future products benefiting from integrated low-light operational capability. Strategically, the acquisition boosts the expanded company's position as a supplier of critical defense systems, increases its presence with important military customers, and advances its mission to provide innovative solutions that protect and save lives.

Elbit America continues its legacy as a leader in intelligent pilot interface solutions – Helmet Mounted

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The JHMCS HMD

Displays (HMDs), Head-Up Displays (HUDs) and Large Area Displays (LADs) – that increase situational awareness. These have been integrated across U.S. military fixed wing fighters, trainers, and cargo aircraft as well as vertical lift aircraft – including AH-64 attack helicopters and V-22 tiltrotor aircraft. Teamed in a joint venture for fixed wing HMD solutions with Collins Aerospace - Collins Elbit Vision Systems (CEVS) - Elbit America has also provided trusted HMD solutions to U.S. and international clients in support of F-15, F-16, and F/A-18 fighter jets for nearly two decades. Elbit America understands that, with the accelerating capabilities of potential adversaries, the next-generation of military pilots will need to be more decisive, more connected, and more capable of operating with increased levels of lethality. Elbit America is working daily to apply state-of-the-art technologies to evolving mission requirements.

The Night Vision Cueing Device with night vision goggles attached.

"We are constantly looking at new technology that can elevate the situational awareness capabilities we deliver to the warfighter," said Mark Mol, Elbit America's senior director for Fixed-Wing HMD programs and co-general manager of CEVS.

Its newest technology, the F-35 HMD, involves many innovations to display dynamic aircraft information critical to flight safety in all day and night operating conditions. It also allows safe and accurate weapons deployment using networked data from aircraft sensors. The F-35 HMD was the first to incorporate a wide field-of-view, binocular display and true integrated night vision. With thousands of operational flight hours, it remains the only widely fielded 5th generation HMD flying today. Additional investment is being made to further improve the F-35 HMD, incorporating feedback from the warfighter that can only be learned through actual combat operations.

"We want to provide the pilot a decisive edge on every mission," Mol added.

The system in use today is more than a helmet: it is a pilot's workspace. With the F-35 HMD, pilots

have access to a full sensor suite, integrated digital night vision and thermal image technology, and an information-packed display system. The F-35 helmet is the first HMD to provide a virtual display and eliminate the need for an aircraft HUD. Pilots using the F-35 HMD know first-hand that as their head moves, so does the data feed from their display. It integrates the real day or night scene with a synthetic overlay, presenting an unprecedented view outside the cockpit. The array of sensor cameras outfitted on the F-35 allows the HMD to provide pilots with views above, below and behind the aircraft. By incorporating a forward looking camera, the system is able to virtually remove the F-35's canopy bow from the pilot's line of sight, so that the pilot can see right through it. It is the equivalent of the pilot having X-ray vision.

Elbit America, in conjunction with CEVS, is building on the success of the F-35 HMD by working on new solutions to help pilots meet the challenges of increasingly complex mission sets. The "Next-Generation HMD" is the next evolutionary step in the intelligent pilot interface's development. The new system is being designed to be more affordable, more modular, and ever more lethal. It is expected to be ready for fielding during the early 2020s. The new features on the future helmet system will incorporate a number of different upgradeable components including the recently acquired advanced night vision technology.

"For example, we can enhance the pilot's performance and his safety by integrating sensors that identify exactly what the pilot is focused on," said Mol. "Integrating pilot health monitoring sensors in the helmet to measure critical biometrics significantly increases pilot safety and performance. We are also looking at enhancing the displays to provide additional synthetic tactical data overlays to the real world image the pilot sees."

Other near-term technologies include lightweight custom fits, missionized color symbology, integrated day/night capability, wide field-of-view 4K binocular resolution, and audio/haptic intelligence tools. Agile development and reinvestment allow Elbit America and its CEVS team to refine those solutions providing the warfighter the best available technology and capability.

The addition of night vision systems opens doors for integrating high-level night vision sensors into Elbit America's intelligent pilot interface solutions. Improved night vision sensors bring increased performance in very low light conditions, and an even better view during night operations projected on the pilot's visor for unparalleled situational awareness. Integrating Elbit America's newly acquired advanced night vision capabilities with increased night vision acuity will improve pilot lethality with even safer night operations and enhanced situational awareness.

"Sensors will continue to get smaller, displays will continue to get lighter, and night vision quality continues to improve and will soon surpass that which the American military and its allies currently rely on," Mol added.

Elbit America's Key Locations

HQ | Fort Worth, Texas

- Talladega, Alabama
- Washington, District of Columbia
- Boca Raton, Florida
- Orlando, Florida
- Choctaw, Mississippi
- Merrimack, New Hampshire
- San Antonio, Texas
- Reston, Virginia
- Roanoke, Virginia

Artist concept of a next-generation cockpit viewed through a next-generation HMD

Prior to the acquisition, Elbit America and the then Harris Night Vision enjoyed a positive customer-supplier relationship as part of the Night Vision Cueing Device (NVCD) program, a finalist for a major industry-sponsored program management recognition award. Under contract to the U.S. Navy, Elbit America designed and produced a patented, lighter weight and modular system to enhance aviator safety that is easy to snap onto the Joint Helmet Mounted Cueing System (JHMCS), has an embedded mission video recording system, and uses a smaller image intensified tube (I2T). NVCD is a full redesign of the night vision device (NVD), providing JHMCS cueing through a lighter, more efficient NVD than the standard issue set of night vision goggles (NVGs). NVCD enables the JHMCS to operate at night by inserting target cueing directly into the NVG. Aircrew are able to cue onboard weapons by looking at targets without the need to manually slew weapons sensors to designate targets. NVCD allows the F/A-18C/D/E/F & G aircraft to operate as effectively in the night as they do in the day.

“Before JHMCS, aviators had to find the target by manually slewing the infrared (“IR”) sensor to perform precision targeting. This process consumed valuable time in delivering ordnance in support of our engaged ground forces and exposed our aviators to enemy fire as they loitered over the battlefield searching for targets,” Mol said.

Elbit America has a long history serving as a leading global source for innovative, technology-based systems, and its unique heritage and experience in combat-proven solutions allows the company to bring its diverse, demanding international experience into the American aerospace and defense markets.

“We are proud of our legacy delivering HMDs and NVCDs to U.S. and allied fighter pilots for decades,” Mol said. “As we look to the future, we see significant new opportunities to deliver increasingly more modern and innovative capabilities that have the potential to improve agility, lethality, and pilot resiliency in an ever more complex battlespace.”

From delivering proven, mature intelligence pilot interface solutions to pushing the technological boundaries for the next-generation helmet mounted display system, Elbit America is committed to ensuring its military customers receive cutting-edge tools necessary to ensure their continued success today and well into the future.