The Q-Sight™ family of helmet display products
The Q-Sight™ family of helmet display products uses revolutionary patented technology to move light using holographic waveguides. Tested in flight trials in the United States and the United Kingdom, the technology delivers significant improvements in weight, cost, flexibility, simplicity, and optical performance. The Q-Sight design eliminates bulky projection optics to provide maximum safety and comfort and avoid undesirable center-of-gravity issues. The lightweight, miniature display clips to any standard helmet, giving the pilot “plug-and-play” capability. Q-Sight technology features a large exit pupil that allows the eye to keep the image in view under high vibration and g loads, when the helmet and display are subject to movement. Q-Sight technology also offers seamless transition between day and night, increasing pilot situational awareness and mission capability. The improved visibility and lightweight design minimize eye and neck strain, common problems for pilots managing the demands of longer missions and increasingly complex rules of engagement. The display’s reduced size and weight give the pilot complete freedom of movement in the cockpit.

**Modular modernization**

The Q-Sight display’s modular design allows for the low-cost addition of new, mission-specific capabilities. The display is easily retrofittable, upgradable, and compatible with other helmet display technologies. The basic monocular Q-Sight architecture offers plug-and-play solutions for any cockpit with analog (stroke) or digital video interface connections. Symbology drawing capacity is unlimited. Binocular solutions, of particular benefit for sensor overlay, are available as add-ons. Helmet tracking capability can be added by simply attaching the tracker pads to the helmet.

**Key features:**
- Seamless transition between day and night
- Very large exit pupil
- Lightweight
- Low cost
- Large eye relief (15 to 50 millimeters)
- Clips on to existing helmet
The system can be supplied with a BAE Systems thermal weapon sight (TWS) and works with existing sights. The battery pack can be configured around any suitable rechargeable battery already available from the user’s inventory for simplicity of support. If required, the GRSS crew-mounted option also can be configured to use onboard power instead of battery power.

**GRSS integrated option**

In addition to the features of the GRSS basic version, the GRSS integrated option interfaces with the aircraft sensor suite and the observer or copilot. This permits the sharing of threat warnings and sensor data between the cockpit crew and the door gunner. The GRSS can relay a target acquired via a forward-looking infrared (FLIR) sensor to the door gunner and advise configuration of a target before it becomes visible to the gunner. The gunner can relay his acquired target to another crew member for verification prior to engagement.

**GRSS offers advanced features including:**

- Wider cone of engagement
- Up to four times better image resolution than a lone thermal weapon sight (TWS)
- Day and night capability
- Interoperable with night vision goggles
- Improved probability of first shot on target
- Video recording of engaged target, including sight reticule with a suitable recording device
- Reduced reliance on tracer ammunition, resulting in a greater weight of fire
- Intercrew target identification
- Symbology overlay to improve door gunner or crew chief situational awareness of altitude and ground speed

Wider cone of engagement
Optional configuration

The display’s modular design enables incremental upgrades in capabilities, such as the helmet tracker and binocular or external interfaces. The sight will operate from X/Y/Z stroke, analog signals, or DVI input.

The Q-Sight™ family of helmet display products

The world leader in helmet-mounted displays

BAE Systems is the world leader in helmet-mounted display technology and innovation. The company has a long heritage of firsts in the world of airborne displays — the first head-up display (HUD), introduced in 1960; the first primary flight reference display in the 1980s; and the first holographic HUD, providing wide-field-of-view displays, in the 1980s. In the 1980s and 1990s, BAE Systems developed the world’s first binocular helmet-mounted display for a fixed-wing aircraft, the Eurofighter Typhoon. This display provides a helmet solution that integrates night vision and full crew head protection.

- Single Q-Sight display provides day and night operations
- Interoperable with night vision goggles
- Low cost
- Modular design allows spiral capability upgrades without major modification

Features

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BAE Systems developed the Gunner’s Remote Sighting System (GRSS), a weapon aiming system, around its patented Q-Sight helmet-mounted display to address the restrictions and limitations faced by helicopter door gunners.

GRSS is a modular system that offers a range of scalable capabilities from an independent, crew-mounted, battery-powered system that requires no aircraft interface, to an integrated solution capable of displaying shared mission data and sensor images between the door gunner and cockpit crew. GRSS takes a “line-out” signal from a thermal weapon sight (TWS) and displays it on the Q-Sight display directly in the gunner’s line of sight, relieving him of having to look directly through the TWS viewfinder — like watching a camera on a remote-mounted screen.
Gunner's Remote Sighting System

Overcoming crew limitations
With traditional helicopter door-gun installations, the airframe and weapon installation pose inherent challenges to effective weapon use. These challenges include restricted weapons operator movement, having to look through installed sights, reliance on tracer rounds for accuracy, and reduced efficiency during night operations.

GRSS offers the solution to these restrictions:
• The gunner no longer needs to line up his eye with the weapon and can aim it without looking directly through the sight.
• GRSS increases “first-round-on-target” probability.
• GRSS uses a thermal weapon sight to provide full day and night targeting capability.
• The system’s Q-Sight display has higher image resolution when compared to the viewfinder image of a TWS.

GRSS crew-mount option
The basic version of GRSS is crew-mounted and requires no integration with the aircraft. It is 100 percent walk on/walk off, with only a lead to connect to the TWS.

The system consists of:
• Q-Sight 100
• Video converter box with video recording output
• Battery interface
• Belt kit, back-mounted pack, or custom pack
Simpler quantum technology

Conventional helmet display systems use complex and expensive lens groups to move the image from an LCD mini-display or CRT to an objective lens. These lens groups introduce distortions, losses, and severe weight penalties.

BAE Systems’ patented quantum technology overcomes these factors by using holographic technology to directly couple the output of an LCD projector to a combining lens, eliminating the need for intermediate lenses.

User benefits include improved flight safety, reduced neck strain, and seamless transition between day and night.

System description

The Q-Sight display attaches to all standard in-service aviators’ helmets with minimal modification. The combiner lens is placed approximately 15 to 50 millimeters from the eye, providing eye relief and allowing operation with pilots’ eyewear and with chemical, biological, radiological, and nuclear (CBRN) equipment. Symbology and video can be displayed to give users eyes-out operation.

Q-Sight is designed for compatibility with all standard aviator night vision goggles. Operation at night can be achieved by simply clipping on the goggles and deploying in the normal manner. The sight is located in its own mount and positioned behind the goggle’s eyepiece.