

BATTLESPACE

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VEHICLES

COMMUNICATIONS

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The Enhanced Display Experts

12.1" Rugged Smart Display



- Low-latency video processing
- COTS open architecture
- Gigabit Ethernet connectivity
- Intel x86 dual-core processor

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systems to counter the latest threats on the battlefield including top down drone attack, a common feature on the Ukraine battlefield and hypersonic missile threats.

Components of the MUSS system include:

- MUSS sensor head
- Anti-tank guided missile warning sensor
- Laser warning sensor
- MUSS central electronics
- MUSS countermeasure IR jammer
- MUSS smoke electronics
- Adjustable smoke dispenser
- MUSS pyrotechnic ammunition

The multi-functional self-protection system MUSS is designed to counter threats posed by ATGMs and laser-guided ammunition. Over the past eight years, more than 350 MUSS systems have been delivered for the first batch of the PUMA IFV. This currently makes MUSS the only active softkill-based protection system for ground vehicles in operational use that has been delivered in series worldwide.

HENSOLDT is now expanding the performance of the MUSS system to detect and ward off current and newly emerging threats. With MUSS 2.0, HENSOLDT delivers a NextGen APS with a layered protection system solution for medium-weight armoured vehicles, self-propelled artillery vehicles, IFVs and MBTs.

MUSS 2.0 key enhancements

- Enhanced protection through Laser-based jamming
- Enhanced laser warning against laser-guided weapons through obscuration
- Enhanced laser detection capability against low energy laser threats
- Improved missile detection capability
- Detection of further threats, including



Above: IMUSS 2.0 can be recognised by the differently designed IR jammer, which is integrated above the commander's optics. It can be used to effectively disrupt and combat ATGMs (HENSOLDT).

- RPG, tracer ammunitions, muzzle flash and kinetic energy ammunition
- Wake-up sensor for other subsystems
- Multi-threat capability and prioritisation
- Lower SWaP
- MCE performance increase for interaction and connectivity between onboard systems
- NATO-standard Ethernet interface for NGVA compliance, STANAG 4754

Main Benefits

HENSOLDT's multi-functional self-protection system MUSS has successfully provided protection to frontline armoured vehicle crews for a decade and remains the only mature and proven

fully automated soft-kill system available on the market. Nonetheless, HENSOLDT is not standing still and is instead advancing with upgrades that will see MUSS optimised even further.

The traditional answer to the ATGM threat has been to add steel armour, spaced armour, novel armour and explosive reactive armour (ERA) to the platform. However, additional weight may well affect the platform's agility and ability to move across rough terrain. Other trade-offs potentially impact how many rounds can be carried and the size of the main armament, namely firepower.

In all operational concepts, MUSS offers the advantage of defeating the threat far from the platform, minimising collateral damage. The 360° surveillance up to a range of several kilometres is strictly based on passive sensing instead of relying on active radar sensors, thus keeping the platform signature to an absolute minimum. Providing the highest level of protection, the MUSS key components have a total weight of less than 60 kg, making them suitable for a wide range of vehicles, from unarmoured vehicles to tracked main battle tanks. In concept or as an applied fit, a fully integrated MUSS 2.0 offers significant advantages over hardkill-based APS, which are often subject to platform and operational restriction.

IEE Displays

IEE displays are a key component in a Counter-UAS security strategy of detection, identification, tracking, and defeat. Modern advanced sensors,





Above: MUSS self-protection system on top of the "Puma's" turret (HENSOLDT).

radars and other detection technologies enable the early warning and accurate identification of potential drone threats. IEE provides a line of operator console displays with resolutions of Full-HD, Ultra-HD and 4K that match the latest high resolution sensors and cameras, while still being able to operate in harsh outdoor fielded environments. For example, IEE's 13.3 inch Full-HD display is fit for use in both airborne and military ground vehicle applications with it's rugged sealed enclosure.

"High-resolution displays in combination with artificial intelligence algorithms can be used to analyze data from sensors, cameras and other sources to accurately differentiate between an actual threat and other flying objects," remarked Steve Motter, V.P. of Business Development for IEE. "These detection algorithms, combined with object recognition, and high resolution imaging, allow the operator to quickly review and validate the detected potential UAS threat – leading to effective, informed Counter-UAS responses. IEE has continued the development of several new high resolution, rugged displays. We are actively aligning our design efforts with the (worldwide) MOD/DOD objectives of Modular Open Systems Approaches for next generation vehicle system architectures. This includes open standards for digital video streaming, high

speed (secure) digital communications/ networking, and low-latency configurable video processing."

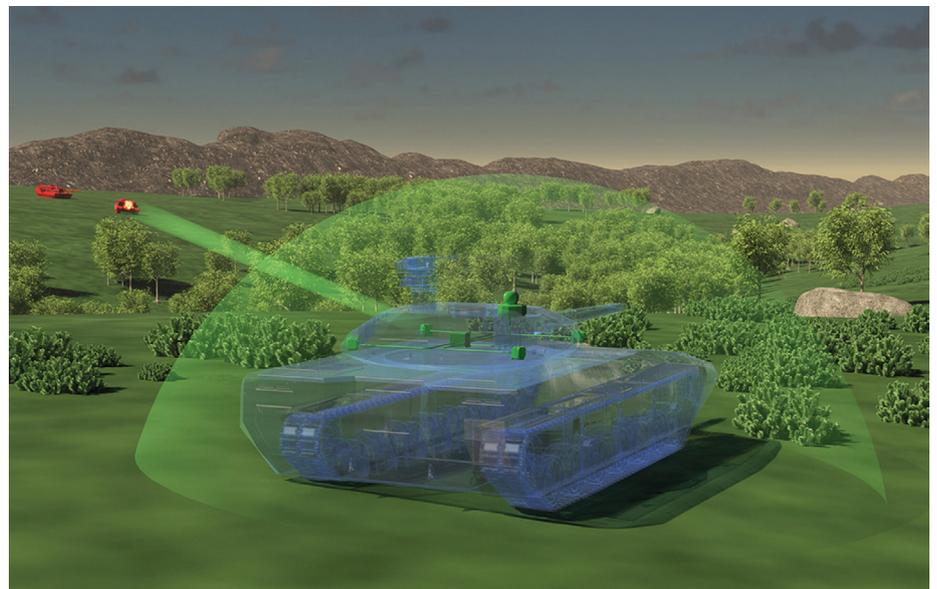
13.3-inch FHD Display Description

This full-HD display (1920 x 1080) is LCD bonded with high-strength cover glass, including EMI shield, heater and anti-reflective/glare treatments. The LED backlight enables both sunlight readable

and night (NVIS compatible) modes. The narrow bezel has eight backlit soft keys, and is optimized for side-by-side mounting to provide a panoramic view. The video interface includes 2x Composite NTSC/PAL and 1x 3G-SDI.

"The narrow left/right bezels of the 13.3" FHD allow for the creation of an extremely rugged, contoured side-by-side operator console," said Steve Motter, V.P. of Business Development for IEE. "This helps

Below: HENSOLDT further optimises the existing system with "MUSS 2.0" (HENSOLDT).





Above: 12.1" Commander's Control Display Unit (IEE).

the operator maintain a high level of situational awareness."

IEE 12.1" WXGA GVA Display

The 12.1" WXGA GVA display features include a very low latency video

Below: HENSOLDT has further developed its MUSS self-protection system for the PUMA IFV – MUSS 2.0 offers a number of improvements (HENSOLDT).

processing engine that selects the displayed video from one of multiple sources and also allows for an overlay on the input video (symbols, texts, reticles, etc.). Picture-in-Picture (PiP) windowing of alternate video information helps improve situational awareness.

The bezel keys are night vision compatible backlit, along with white on black legend for sunlight readability.

Product Features:

- High bright Enhanced 12.1" TFT display
- WXGA (1280x800) 24 bit color display
- Brightness 500 cd/m2 through optics
- Contrast Ratio: 700:1
- Single board computer Intel® Atom™ E3825 System-on Chip, Dual Core Genlock Synchronization
- Operating Temperature -40° to +60° C
- MIL-STD-810 Environmental
- MIL-STD-461 EMI/EMC Protection
- Inputs: VGA, Composite, S-Video, FLIR, Ethernet, HD-SDI, CAN Bus

- 32 Programmable Bezel Key per GVA layout
- Integral resistive touch screen

IEE's 10.4" Driver's Vision Enhancer (DVE) display

IEE's 10.4" Driver's Vision Enhancer (DVE) display as follows: IEE's 10.4" Drivers Vision Enhancer (DVE) display is built to efficiently provide a very high performance LCD display to the driver who relies solely on the sensors and displayed images to see through fog, dirt, debris and darkness of night to safely and rapidly drive the armored vehicle over rough unfamiliar terrain. This rugged display features low latency glass-to-glass video throughput (less than 25msec connector to glass), critical for wheeled and tracked vehicle applications.

Product Features:

- Resolution: XGA 1024 x 768
- 25msec maximum latency
- Brightness: 750 cd/m2 typical
- Contrast ratio: 700:1 typical
- Horizontal/vertical viewing angle: ± 80° typical
- Power consumption: 11 W typical, 60 W maximum at 28 Vdc
- Operating temperature: -32°C to +71°C
- Storage temperature: -51°C to +71°C
- Video interface: RHBHV
- Display area: 210.4 mm x 157.8 mm



- Size: 8.5" x 10.4" x 2.8"
- Maximum operating altitude: 15,000 ft
- Maximum transportation altitude: 50,000 ft 1 meter immersion Steam and water jet cleaning
- Shock: MIL-STD-810E transit shock and 40g/12.5 msec
- Vibration: MIL-STD-810 shock, including ballistic and high intensity
- Humidity: less than 85% to +50°C
- EMI/EMC: meets MIL-STD-461/462
- 28VDC MIL-STD-1275 power

Oxley Group

Oxley designs and manufactures several solutions for use on the turret of a main battle tank, the Oxley team has extensive experience in this area and works with 12 of the world's largest military vehicle manufacturers across the globe.

Oxley solutions are specifically designed for extreme rugged environments and incorporate high level EMC compliance and offer a high MTBF and outstanding durability.

In the sensitive environment of a turret, the electronics need to be self-contained in terms of emissions and Oxley lighting meets the most stringent classification on EMC. This is increasingly important with technology such as active drone protection systems and fire on the move capability. In the digital age with wider battlefield awareness and improvements in technical capability, it's important that lighting solutions are future proof to allow for compatibility with technology upgrades.

The benefits of LED technology far outweigh that of incandescent technology. The requirement to store, replace and dispose of bulbs is eliminated, maintenance time is reduced and it provides significant through life cost and energy savings. Space is at a premium in a turret and Oxley LED lighting can be designed to fit into compact space envelopes, whilst offering improved brightness removing dark and shadowy areas within the turret.

Interior Light

The DC Combi is a low profile and light weight unit delivering white light plus an integrated blackout mode in a choice of colours. These lights have many advantages compared to traditional incandescent and fluorescent lighting. In areas with limited space, such as a turret the low profile design increases the available headroom. LED technology makes this a fit and forget solution, reducing overall costs through extended working life. The unit was specifically developed for military vehicle use and features a MIL-38999 connector and meets the very stringent power input requirements of DEF-STAN 61-5 Part 6, Issue 6. It also features a separate electrically isolated input, which can be used for blackout mode selection as well as a range of external control options via PWM.

Task Light

The Oxley Gooseneck task light incorporates state-of-the-art LED technology to provide a rugged task light designed to meet the toughest military standards. This is an exceptionally bright and highly focused task light with a luminous intensity of 600cd. Sealed up to IP67 with high vibration & shock proof this is a popular choice for turret applications.

Cockpit Utility Light

Primarily designed to be used as a task or inspection light, the flexible pigtailed Oxley cockpit utility light is a small, lightweight, LED lighting solution that can



Above: 10.4" XGA Ground Vehicle Display (IEE).

be used in a turret application. Combining the functions of a fixed spot or floodlight and, when snapped out of the socket, a portable hand torch.

Breech Light

The new Oxley Breech Light has been designed to illuminate the end of the cannon with a fixed specific beam to aid the gunner in the activity of automatic reloading. This light meets the toughest environment standards given its position and, as with all of the Oxley solutions has high levels of EMC protection to prevent any interference with sensitive turret equipment.

BCB – The Evolution of Vehicle Camouflage

Camouflage is a vital system cloaking the turret and its vital systems from being located by advanced EO/IR systems and then engagement by enemy attack.



Above: IEE 13.3 Inch HD Video Display