

GENERAL DYNAMICS

Ordnance and Tactical Systems



STRIKER
40mm

2014 NDIA Joint Armaments Conference

Next Generation Fire Control

Jonathan Piazza

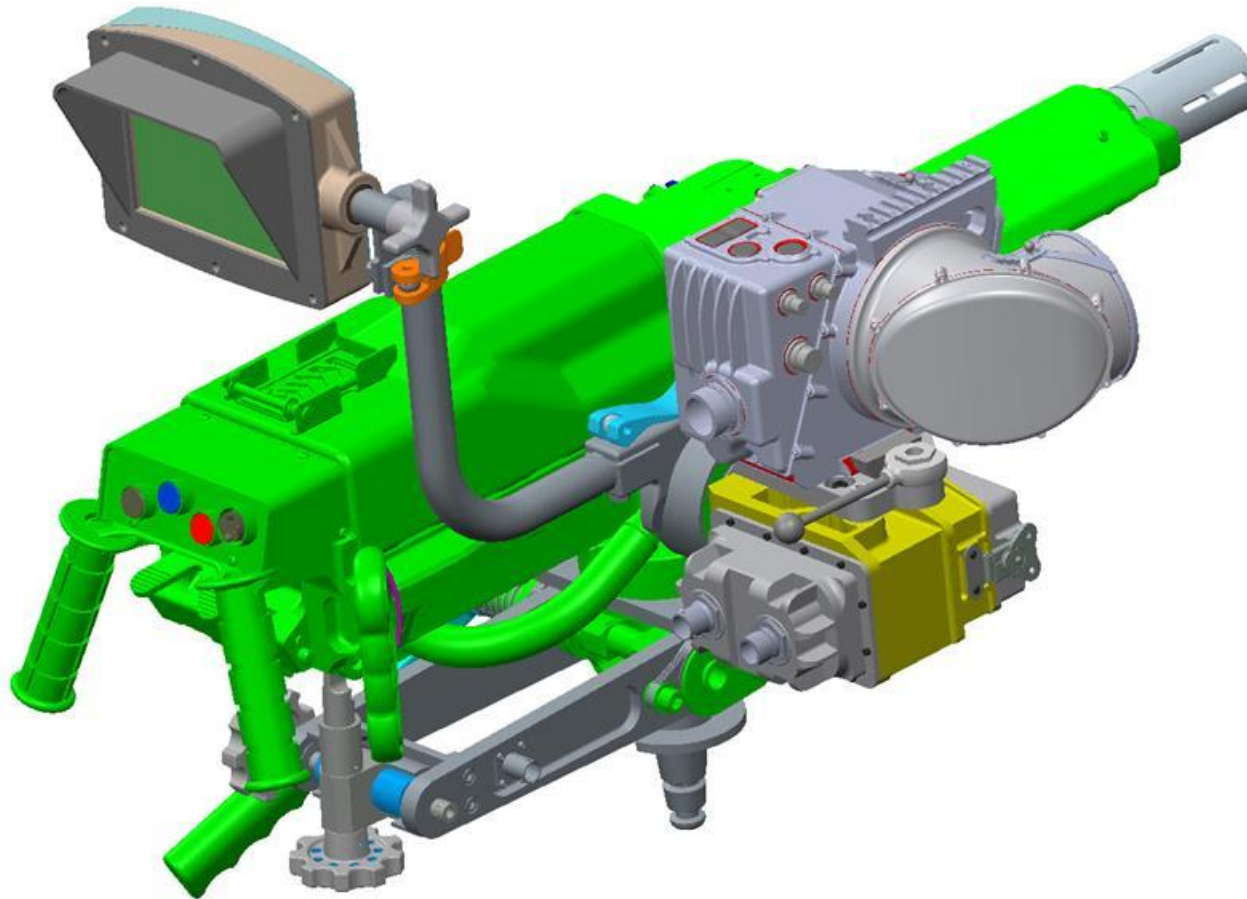
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Next Generation Fire Control

Introduction



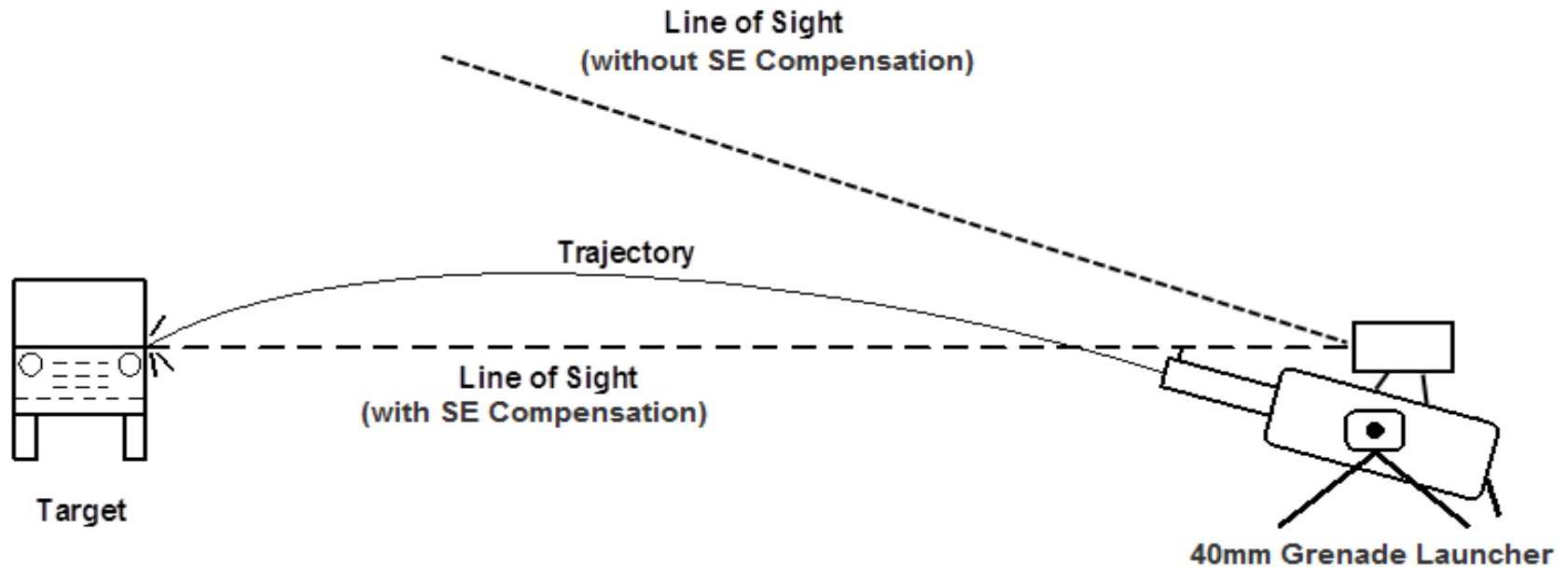
Next Generation Fire Control

Background



- GD-OTS saw the need to design and develop a new lower cost fire control as a replacement for the current Lightweight Video Sight (LVS) fielded with the MK47 MOD 0 40mm weapon system
 - Objective – reduced price, shorter delivery time and higher performance
 - Initially queried industry to see what capabilities currently existed.
- Unique Feature – Super Elevation Compensation
 - Fire Control must be capable of maintaining the target image in the field of view during super elevation

Next Generation Fire Control Background



Next Generation Fire Control

Background



- Design starting point - baseline attributes:
 - Video based system
 - Ballistic Computer
 - Laser Range Finder
 - Super Elevation Mechanism
 - Display
 - Battery compartment
 - Vehicle Power Adapter
 - Picatinny rail for other accessories
 - Ballistics for all 40mm rounds currently in the US inventory
 - M430A1, M430, M383, M918, M385, MK281

Next Generation Fire Control

Enhancements



- Next Generation Fire Control – Requirements based on feedback from both domestic and international users:
 - 1) Replace I² with Thermal based night vision
 - 2) High Resolution Color Camera
 - 3) High Resolution Color Video Display
 - 4) 3X magnification (with 6X E-zoom capability)
 - 5) Improved super elevation compensation
 - 6) Electronic Range Card and Pre-designated Target functionality

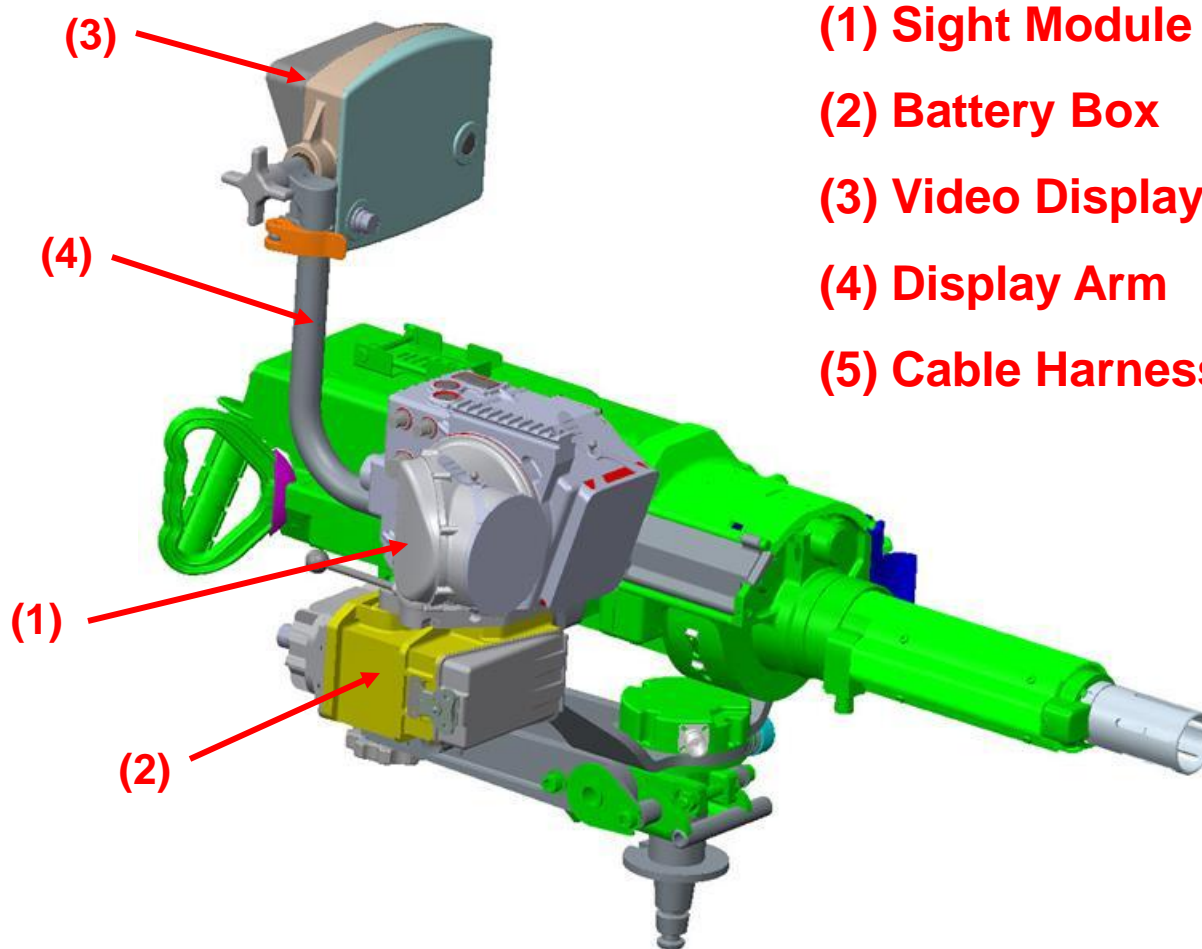
Next Generation Fire Control

Enhancements



- 7) Single boresight operation covers both cameras
- 8) Vehicle Power Kit – without separate conditioning box
- 9) Battery Charging when operating from vehicle power
- 10) Open Architecture – Ballistic computer sized for growth
 - ↗ Additional Round types
 - ↗ Embedded Training capability
- 11) Upgradeable for use with new Air Burst technologies
- 12) Reduced Weight

Next Generation Fire Control System Overview



(1) Sight Module

(2) Battery Box

(3) Video Display

(4) Display Arm

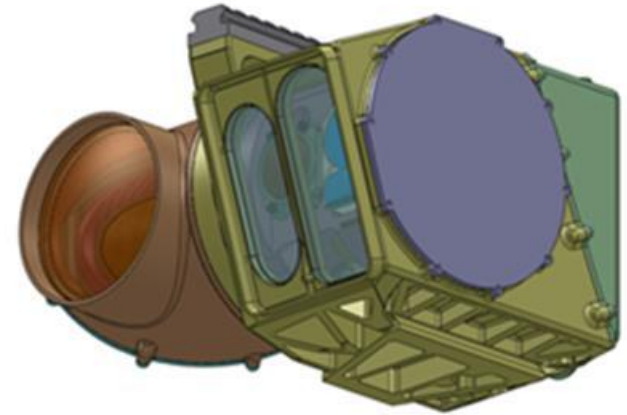
(5) Cable Harness (Not Shown)

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Super-Elevating Sight Module



- Super-Elevation functionality is handled internal to the sight module
 - Inclinometer measures sight angle relative to gravity
 - Servo system uses inclinometer value to hold the sight fixed on target when Super-Elevation mode is activated
 - Non back-drivable gear train locks elevation angle so that sight tracks with weapon when Super-Elevation mode is disengaged

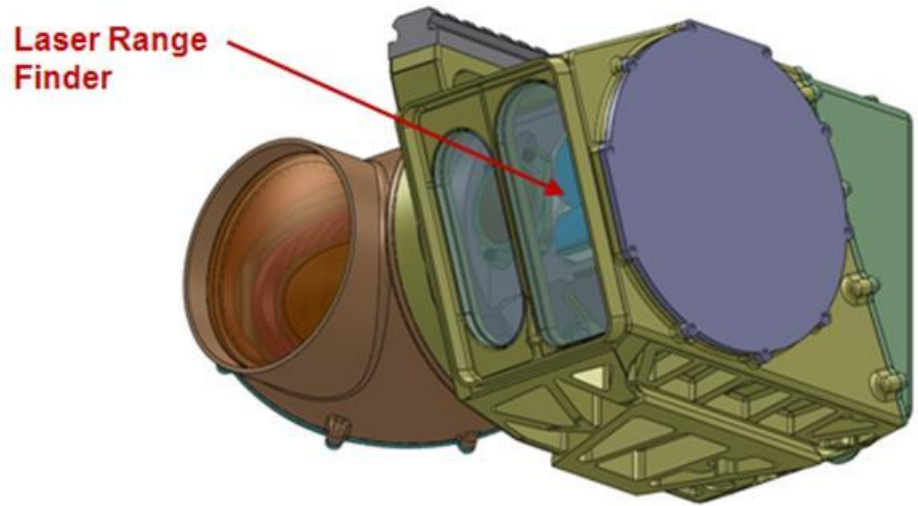


Next Generation Fire Control

Laser Range Finder



- 1550 nm wavelength laser
- Eye Safe per ANSI Z136.1 Class 1M
- Undetectable by night vision goggles (those based on image intensification)
- 10 meter to 5,000 meter total measuring range
- ± 1 meter accuracy out to 2,590 meters

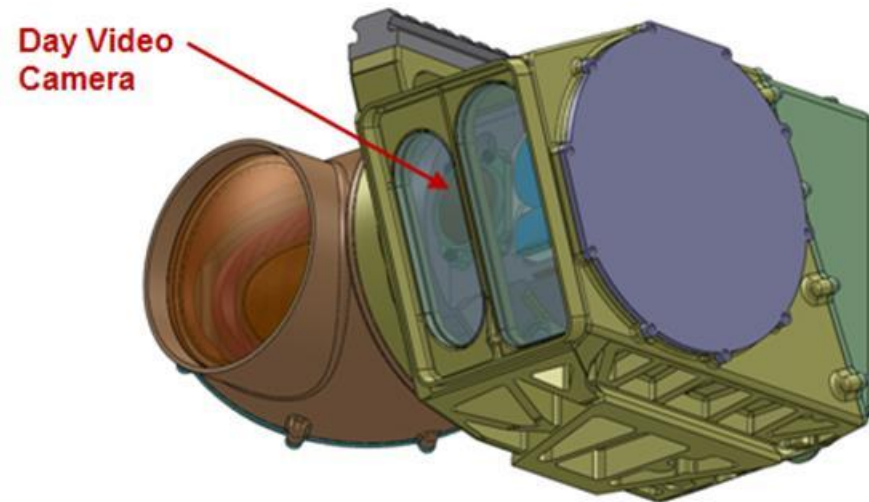


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Day Optics



- Full color, high resolution day video camera
- 5.19° H x 3.89° V Field of View
- Fixed 3X standard magnification
- 6X electronic zoom (image resolution is preserved)
- Adjustable continuous focus between 20 meters and infinity

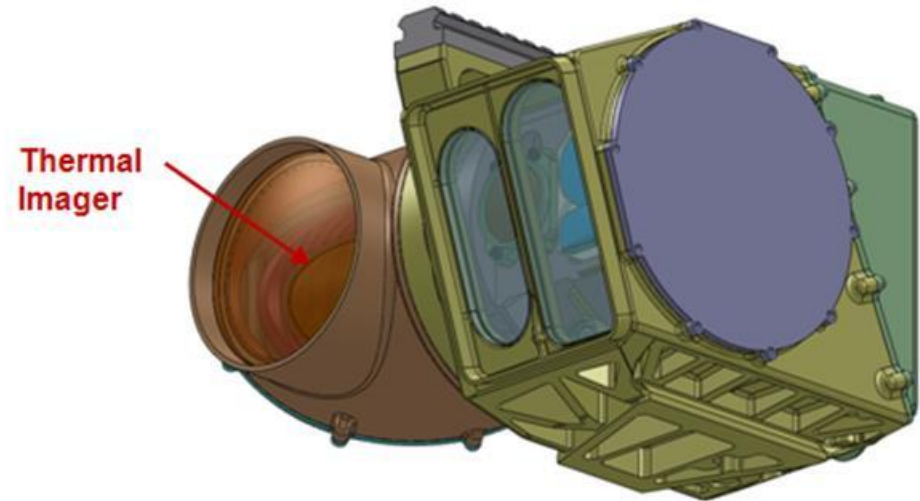


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Night Optics



- 17 μ m, 640 x 512, 30 Hz thermal imager
- 5.19° H x 3.89° V Field of View
- Fixed 3X standard magnification
- 6X electronic zoom (electronic magnification)
- Adjustable continuous focus between 20 meters and infinity



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Ballistics Processor Module



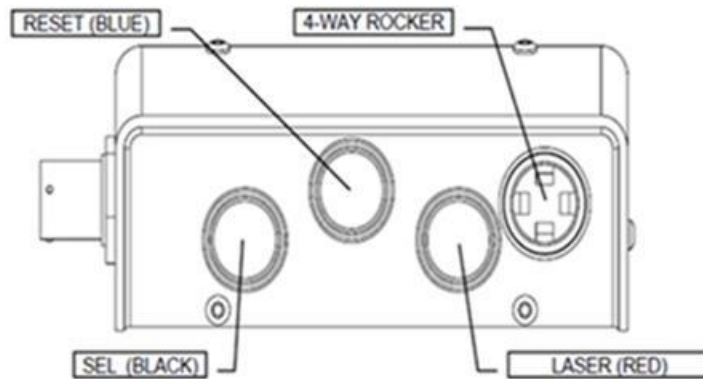
- 1 GHz dual core digital signal processor with 2 Gigabytes of memory
 - Support all 40x53mm ammunition types currently in US Inventory
 - Ample allocation for future addition of new ballistic data and incorporation of other upgrades
- Two RS-232 serial port interfaces
 - Allow access to software for system interface & update
 - Utilize external devices or sensors (GPS, next gen airburst programmer, wind sensing...etc.)
- Auxiliary/External Video port

Next Generation Fire Control

Operator Controls



- Primary operator controls are mounted to weapon back plate/grips:



Control	Marking	Description
Four-way Rocker switch		The Rocker switch is a four-position switch located on the weapon backplate. It enables navigation through the GUI and selection and entry of data items contained within the GUI menu structure.
LRF push button	Red Button	The LRF button, on the weapon backplate, initiates the Laser Range Finder when depressed.
Reset push button	Blue Button	The Reset button, on the weapon backplate, returns the operator to the main combat screen when depressed.
SEL push button	Black Button	The SEL button, on the weapon backplate, places the system into Super-Elevation Mode while depressed, so that the weapon's elevation can be changed relative to the TABS line-of-sight.

Next Generation Fire Control Power



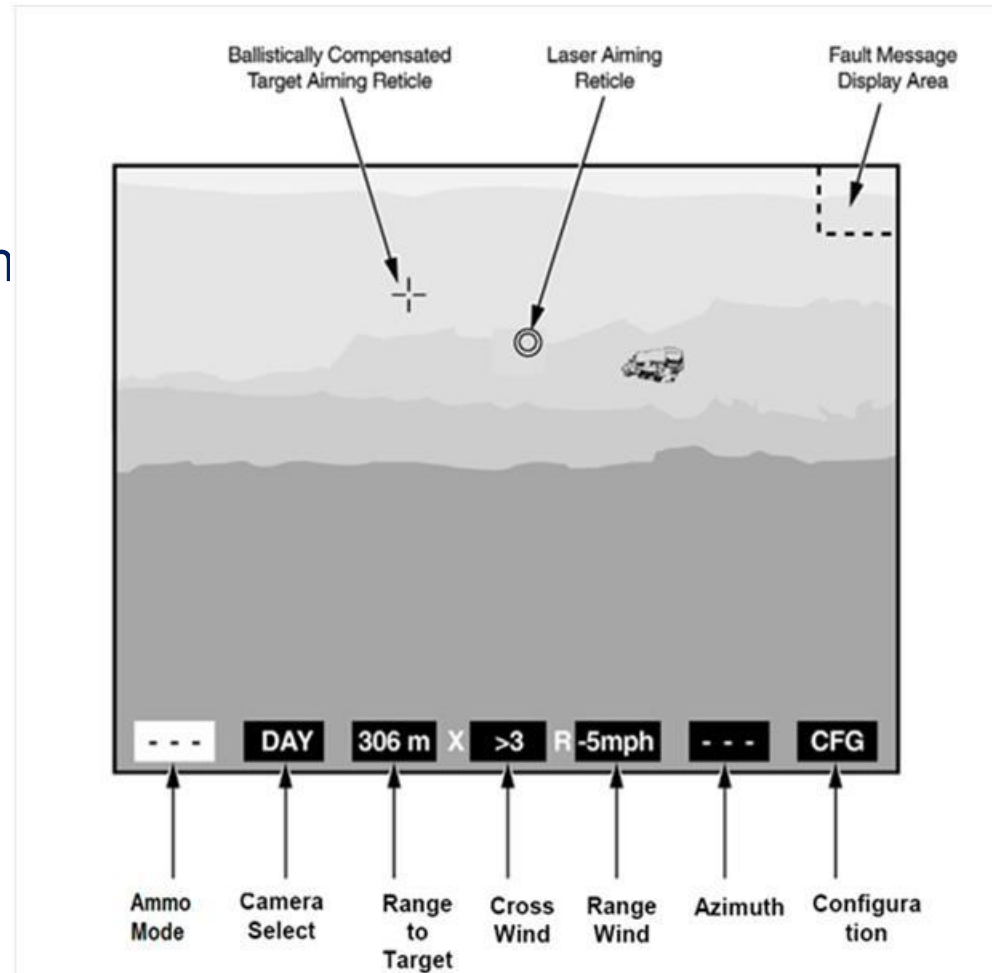
- Internal Battery
 - ↗ Powered by a single BA-5590 or BB-2590 battery
 - ↗ >8 hours battery life
- External Power
 - ↗ Accept external 28 volt DC power per MIL-STD-1275
 - ↗ Power conditioning is performed internal to unit
- Battery Charging
 - ↗ Capable of charging the BB-2590 rechargeable battery while operating on external power

Next Generation Fire Control

Graphical User Interface



- Main Combat screen:
 - Adjusted Aim Point reticle
 - Laser Range Finder Aim Point reticle
 - Ammunition Type/Mode
 - Sensor Selection
 - Range to Target
 - Cross Wind
 - Range Wind
 - Azimuth Bearing
 - Fault Messages



Next Generation Fire Control

Graphical User Interface



- Electronic Boresight
 - Need to only boresight one imaging channel
 - Ability to recall boresight for verification without having to repeat the operation
- Electronic Range Card
 - Set Azimuth bearing
 - Set Left and Right lateral limits
 - Pre-designate and store up to 8 targets
 - Range Card Zero function
- Electronic Ladder Sight

Next Generation Fire Control

Upgrade Potential



- Designed with a focus on embedding appropriate hooks for implementation of future upgrades:
 - Interface with external wind sensing technology
 - Interface with external GPS
 - Interface with external digital compass
 - Embedded training modes
 - Sensor fusion
 - Target designation capability using GPS technology
 - Indirect fire capability using GPS technology
 - Image / video capture mode
 - Interface with vehicle and battle field networks
- Integration with Other Weapons – MK19 & M2A1

Next Generation Fire Control Questions?



Technical POC:

Jon Piazza

GD-OTS Williston, VT

P: 802-662-7239

jonathan.piazza@gd-ots.com

Business POC:

Jeff Gramse

GD-OTS Saco, ME

P: 207-286-3136

jeffery.gramse@gd-ots.com

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