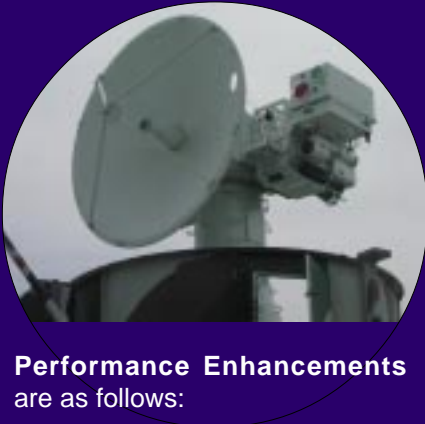


# Laser Tracker Enhancement



**Performance Enhancements** are as follows:

- Elimination of loss of track or data errors due to RF multipath interference effects
- Significant improvement in low level tracking ability
- Distinguishes desired target with retroreflector from other targets in close proximity
- Data update rate of 50 pps synchronous with radar master timing system
- Greater tracking precision in angles and range over conventional radar

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BAE SYSTEMS introduces its latest addition to range instrumentation equipment - Automatic Radar Multipath Suppression System (ARMS). The ARMS is a newly developed laser tracker subsystem designed to be installed onto existing instrumentation radar systems or other tracking systems. The ARMS is designed to overcome the effects of RF multipath typically incurred during low-elevation RF radar tracks. This is accomplished by taking advantage of the extremely narrow beamwidth and short pulse width of the laser. The combination of the eye-safe laser transmitter, quad-cell monopulse receiver detector and laser processor control embedded into a range instrumentation radar provides an unprecedented enhancement in a single sensor's accuracy and precision. The ARMS is designed for tracking targets equipped with a single retroreflector array, and with reduced range capability, targets marked with reflective tape. On an ARMS modified system, TSPI data is available via radar track, laser track or optical track. The ARMS laser tracker subsystem provides the next level of data accuracy and precision levels for range instrumentation equipment.

The ARMS system operates as a fully integrated subsystem of the instrumentation radar, taking advantage of existing radar signal processing hardware, the radar pedestal servo system, radar data correction/recording/processing and the radar system software. As part of this enhancement modification, laser system controls, indicators and displays are integrated into the existing radar console and are logically grouped by subsystem function to allow seamless operation by a single radar operator.

Functions added to the radar console include:

- Real-time mode control (manual, calibration, auto acquisition, auto-track)
- Beamwidth control
- Display of ARMS servo error and range data
- Display of ARMS mode status and error messages
- Calibration and setup menu modifications

The ARMS subsystem consists of two major components: the ARMS sensor and digital signal processor, as follows:

**ARMS Sensor**

- Laser Transmitter
- Beam diverger/attenuator
- Quad-cell Receiver
- Laser timing system
- Cooling System

**ARMS Digital Signal Processor**

- VME-based PowerPC 32-bit computer system for data acquisition and control
- Real-time UNIX-based embedded operating system
- All application specific firmware written in C code
- 32-bit architecture-based software/firmware
- VME-based digital video processor
- Software/firmware for real-time digital video processor control, diagnostics, and data processing
- Software based algorithms for pedestal servo drive and ranging measurements
- Real-time data interface to instrumentation radar computer systems.

# Laser Tracker Enhancement



## ARMS SYSTEM SENSOR SPECIFICATION

Transmitter:	Solid State, eye-safe 1.574 micron laser
Effective Output Peak Power:	700 kw typical
Transmit Beam Width:	Continuously variable Minimum 0.5 mrad Maximum 10 mrad
Receiver Type:	Monopulse, four channel digitizing
Transmitter PRF Rate:	50 Hz, synchronous with radar master timing

## LASER CHARACTERISTICS AND SPECIFICATION

System Type:	CFR 200-50-OPO-EGW Pulsed Nd: YAG Laser System
Application:	Lidar
Spectral:	Wavelength - 1574 nm Resonator configuration - Stable

### Energy

Energy per Pulse 10 mJ (includes a 10% drop in energy due to EWG)

Warm-up Time <10 seconds

Q-Switch Delay 100 Lamp Pulses

Energy Ramp time 50 Q-Switch Pulses

### Temporal:

Repetition Rate To 50 Hz

PRF Optimated for 50Hz

Pulse Width 8 - 10ns

Pulse Timing Stability +/-20ns from flash lamp trigger

Duty Cycle: Continuous

### Spatial:

Traverse Modes Multiple

Near Field Profile Uniform, Multi-mode

## SYSTEM SPECIFICATION

Precision: Angular: 0.05 mils  
Range: 1.0 meters @ 20 km

Minimum Target Detection Range:

- 45 km in a standard clear atmosphere (visibility >50 km) assuming a cooperative target equipped with retroreflector array.
- 30 km in a clear atmosphere (visibility >35km) assuming a cooperative target equipped with single retroreflector

Data Rate: 50 Hz Synchronous with radar  
master timing system

## ENVIRONMENTAL SPECIFICATION

### Exterior Equipment

Ambient Operating Temperature Range:

Operating -10 to +40 degrees C

Non-Operating -20 to +70 degrees C

Altitude: Sea level to 3000 meters

Relative Humidity:

Operating 0 to 100%, without precipitation

Non-Operating 0 to 100%, without precipitation

Winds:

Operating 30 km/hr maximum

Non-Operating 100 km/hr maximum

### Interior Equipment

Ambient Operating Temperature Range:

Operating +5 to +35 degrees C

Non-Operating 0 to +50 degrees C

Altitude: Sea level to 3000 meters

Relative Humidity:

Operating 20 to 70%, non-condensing

Non-Operating 0 to 90%, non-condensing

Winds:

Operating 30 km/hr maximum

Non-Operating 100 km/hr maximum

