

TEST RANGE INSTRUMENTATION

Setting the Standard for Performance and Reliability

L3Harris is a leading supplier of precision tracking mounts and optical instrumentation systems designed for rigorous use on the test ranges.

L3 HARRIS HAS DELIVERED MORE THAN 600 RANGE INSTRUMENTS

Weapon or aircraft system performance verification on the test range is a very critical and challenging phase during the development of these sophisticated assets. L3Harris is dedicated to assisting test ranges by providing solutions that answer today's testing needs and support future growth of the capabilities.

Systems include:

- > Kineto Tracking Mounts (KTM)
- > Cinetheodolites
- > Distant Object Attitude Measurement Systems (DOAMS)
- > Lightweight Tracking Mounts (LTM)
- > Tracking Pedestals



READY FOR HARSH TEST RANGE ENVIRONMENTS

L3Harris consistently meets these rigorous challenges of the test range environment by creating durable, reliable systems that integrate precision optics with smooth, accurate positioning systems along with the integration of the latest target sensing and data recording techniques.

- > Test range instrument systems must accurately provide TSPI (Time, Space, Position Information) on targets along their trajectories but must also differentiate the targets from cluttered background data. In the field, these demands are often complicated by extreme weather conditions and the need for mobility.

Typical missions include:

- > Real-Time Missile and Aircraft Tracking
- > Rocket Launch Tracking
- > Missile/Weapon System Evaluation
- > Bomb and Weapons Scoring
- > Satellite Tracking
- > Re-entry Vehicle Monitoring
- > Trajectory Analysis

KTM

KINETO TRACKING MOUNT

- > The workhorse of the range
- > Reliable and precise tracking for nearly 40 years

LTM

LIGHTWEIGHT TRACKING MOUNT

- > KTM performance in a smaller, lighter mount
- > Designed for remote operation

DCS

DIGITAL CONTROL SYSTEM

- > Digital control for optical tracking mounts
- > Highly reliable single-station control

Integrated Systems

TRACKING SYSTEMS, CONTROL SYSTEMS AND SENSORS

- > Designed for range missions



KINETO TRACKING MOUNT (KTM)

THE KTM IS CONSIDERED THE “WORKHORSE” ON THE TEST RANGES

A KTM may be configured for “manned” or “unmanned” operation and it is designed to track fast moving objects very precisely while providing time, space and position information (TSPI) as required by mission operators. The sensor mounting platforms incorporate a “rail” system to permit quick mounting and bore sight alignment for a wide variety of sensor packages.

CONFIGURATIONS TO SATISFY CRITICAL MISSIONS

The KTM meets the requirements of a wide variety of test range and scientific missions:

- > Center platform maximizes payload capacity; KTM will carry up to 1,200 lbs. for automated optical tracking applications (unmanned)
- > Center platform may be replaced with a conventional operator console to satisfy manual optical tracking applications (manned); KTM will carry payloads up to 600 lbs. plus the operator
- > Platform configurations with four (manned) or six (unmanned) payload positions to accommodate a variety of sensors to satisfy complex missions
- > Complete turnkey KTM systems are available integrated with cameras, sensors and/or lenses to meet specific customer requirements

FIELD-PROVEN RUGGED AND RELIABLE

The KTM consistently demonstrates its field-proven performance and durability:

- > Specifically designed to withstand harsh range environments; increasing tracking mount life
- > The KTM’s direct, torque-motor driven mount delivers smooth, jitter-free tracking to ensure precise (TSPI)
- > Self-contained and trailer-mounted, the KTM may be quickly and easily deployed via highway and unimproved roads to remote tracking sites

KTM’s meet the rigorous challenges of the test range environment integrating precision optics with smooth, accurate positioning systems and the latest target sensing and data recording techniques.



FLEXIBILITY TO SUPPORT DIVERSE MISSIONS AND NEEDS

Weapon or aircraft system performance verification on the test range is a very critical and challenging phase during the development of these sophisticated defense systems.

Real-Time Missile and Aircraft Tracking:

- > Rocket Launch Tracking
- > Missile/Weapon System Evaluation
- > Bomb and Weapons Scoring
- > Satellite Tracking
- > Re-entry Vehicle Monitoring
- > Trajectory Analysis
- > On-board operator, or remote analog or digital control
- > Payloads up to 1,200 pounds (unmanned) or 600 pounds (manned)
- > Mission configuration with four (manned) or six (unmanned) payload positions
- > Complete turnkey systems available
- > Detailed installation documentation



THE KTM DIGITAL CONTROL SYSTEM (DCS) INCLUDES:

- > High-speed communication via an ethernet interface to provide remote operation
- > Advanced servo loop control to optimize tracking performance
- > Built-in error correction to ensure precision tracking accuracy
- > Versatile chassis architecture that accommodates additional PC-104 cards and/or digital I/O to satisfy specific customer requirements and missions

LIGHTWEIGHT TRACKING MOUNT (LTM)

DELIVERING HIGH-QUALITY IMAGERY OF CRITICAL MISSIONS

Designed for remote operation, the two-axis gimbal assembly is proven in the harshest environments for high speed, very low jitter precision tracking. The mount can accommodate up to four sensors. The field-proven Digital Control System (DCS) provides superior control and commonality with other L3Harris range instruments.



INTEGRATED SYSTEMS (NITRO)

- > Fielded and mission-qualified integrated systems at multiple test ranges
- > Fully networked systems (e.g. LTMs and KTM) for remote data collection and video transmission
- > Centralized “real time” user interface to perform the following functions (not limited to): command the mount (precision manual joystick (stiff/force), discrete position/rate commands); slave to customer specific designation sources; command customer specific sensors (cameras, lenses, etc.); automatic video tracking; single or dual operator (split responsibilities) capability and video recorder interfacing (external trigger or fully integrated)
- > Mount error minimization techniques (system mount modeling): self location (mobile systems); mis-level calculations; inclinometer; ground calibration and star calibration
- > Data products compatible with post processing analysis software
- > Precision synchronization of mount position (angles) and imagery (SDI and high speed)
- > Customizable video annotation (including, but not limited to: time, mount angles, active slaving source, cable wrap indication, focal length, calibrated cross hair, video recorder status, range to target, tracking mode, etc.)
- > Customizable I/O for specific customer functions (including, but not limited to: independent sensor enabling, interfacing to customer safety switches, etc.)
- > Integration to legacy rotating environmental dome assemblies or clamshell style domes
- > Provides common timestamped output message of each integrated mount over network illustrating mounts current position
- > Backward compatible with L3Harris Digital Control System

FEATURES/BENEFITS

- > Ruggedized with weather-tight seals designed to withstand harsh range environments
- > Extremely high position and tracking accuracy for calculating TSPI solutions
- > Direct-drive motors for smooth tracking
- > Digital Control System (DCS) permits remote operation
- > Unlimited azimuth rotation; dump capability in elevation
- > Accommodates significant payload
- > Compact, flexible, easy to install
- > Commonality with existing KTM/DCS
- > HD capability throughout the system
- > Multi-sensor system
- > Outboard platform sensor interface provides camera and lens mounting flexibility

THE RELIABILITY OF A KTM IN A LIGHTWEIGHT MOUNT

The LTM can be used as a stand-alone mount or as part of a larger system.

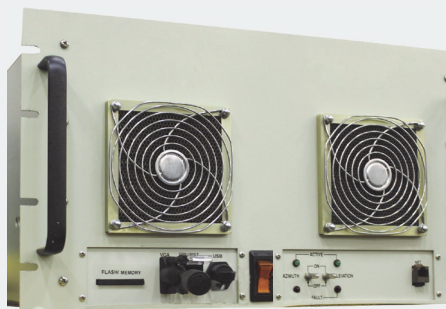
The LTM is fully integrated with the Digital Control System (DCS) to provide controlled commonality to customers already using the KTM systems.

DIGITAL CONTROL INSTRUMENTATION

The Digital Control System (DCS) provides additional functionality necessary to eliminate legacy closed loop position control systems while upgrading the Servo Power Amplifier Chassis and Encoder Chassis. This digital control system is implemented with a compact, high-reliability architecture using a Pentium CPU and the QNX real-time operating system.

The DCS includes:

- > Closed-loop position control
- > Advanced servo loop control with command generator and state observer for optimized tracking
- > High-speed communications for remote control via Ethernet communications
- > Analog rate command via joystick, stiff stick, or external computer is standard
- > IRIG-B time synchronization available
- > Software Tool Box provided for mount analysis and tuning
- > Built-in test (BIT), data logging and function generator
- > Built-in data logging allows post processing analysis of performance
- > Highly reliable digital architecture with EPLD executed safety functions
- > Detailed installation documentation
- > Field-proven installations on KTM, Cinetheodolites, optical tracking mounts, antenna tracking mounts, and radar systems, DOAMS telescopes



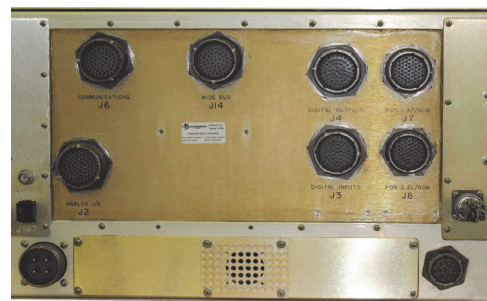
SINGLE STATION CONTROL, HIGH ACCURACY, AND RELIABILITY

The Digital Control System provides additional functionality necessary to eliminate legacy closed-loop position control systems while upgrading the Servo Power Amplifier Chassis and Encoder Chassis. This system is implemented with a compact, high-reliability architecture using a CPU and the QNX real-time operating system.

DIGITAL CONTROL FOR MULTIPLE TRACKING MOUNTS

The DCS instrumentation is designed to control a KTM, Cinetheodolite, two axis tracking mount, or any two axis telemetry pedestal. The DCS may be configured with a new tracking system or it may be retrofitted on an existing tracking system as part of a system refurbishment.

- > High-speed communication via an Ethernet interface enabling remote operation
- > Advanced servo loop control to optimize tracking performance
- > Built-in error correction to ensure precision tracking accuracy
- > Versatile chassis architecture that accommodates additional PC104 cards such as an “Automatic Video Tracker” (AVT) to satisfy specific customer requirements and missions
- > Rotating environmental enclosure slaving
- > Self-locating capability



Test Range Implementation

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