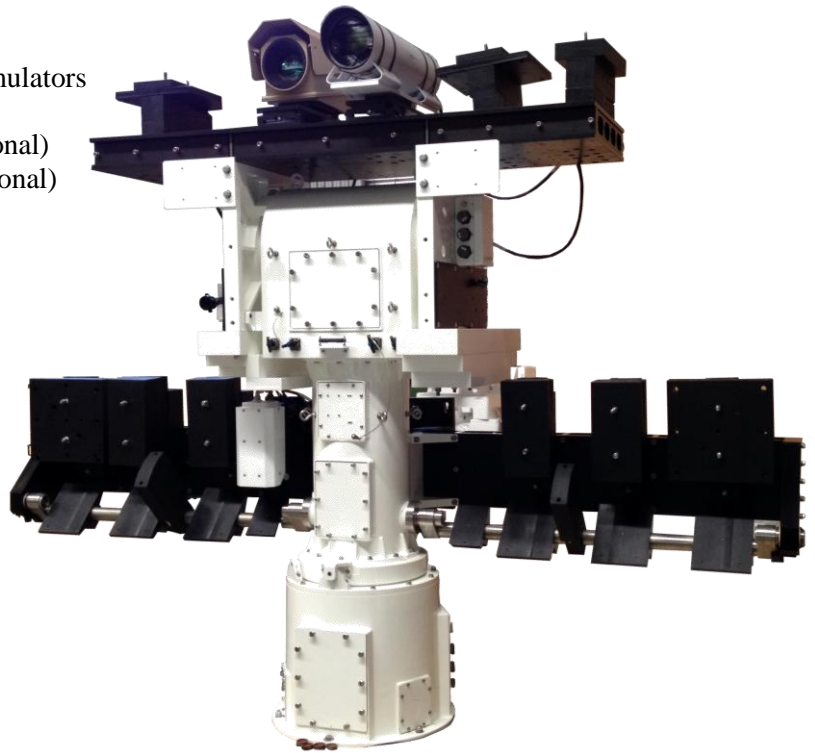




## LARGE TRACKING MOUNT (LTM) SYSTEM

The Large Tracking Mount (LTM) System, as shown in Figure 1, is a fully integrated turnkey system developed to provide the end user a flexible tool for evaluating and testing IR/EO countermeasures and sensors. The system also can be configured to support EW and RF system requirements (Figures 3 and 4). The LTM is divided into three major subsystems:

- Payload
  - Electro-Optic Sensors and Stimulators
  - Visible Zoom Optics/Camera
  - IR Zoom Optics/Camera (optional)
  - Laser Rangefinder (LRF) (optional)
  - Payload Structure
- Pedestal Subsystem
  - Azimuth Drive Assembly
  - Elevation Drive Assembly
  - AZ/EL Position Sensors
  - Mirror Axis (optional)
  - Mirror Axis Encoder
  - Servo Control Unit
  - Custom Cabling (application dependent)
- Control Subsystem
  - Computer System
  - Series 7000 Video Tracker
  - Model 702 Control Unit
  - Remote Designate
  - Digital Video Recorder (DVR)
  - GPS/IRIG-B Capable
  - 19-inch LCD Displays
  - Video Distribution System
  - Data Logging



**Figure 1. Large Tracking Mount (LTM) System**

The various subsystem components are discussed in the following sections. Figures 1, 2 and 4 show typical Large Tracking Mount (LTM) configurations.

### 1.0 PAYLOAD

The sensor subsystems are composed of the following elements and represent a typical system configuration:

- **Boresight Assembly**

The boresight fixture provides precision mechanical adjustment in both the X and Y axis and incorporates position lock downs to ensure proper boresight alignment between the various payloads. Boresight alignment fixtures are supplied with the LRF and secondary optical payloads for boresighting these systems to the main tracking lens.

- **Optical Systems**

E-O Imaging's Model 901 35X (19mm to 700mm) and Model 902 dual 60X fields of view (FOV) zoom optical systems (12.5mm to 700mm / 25mm to 1500mm) are offered as standard accessories for the LTM system. These lenses are housed in ruggedized environmental enclosures, ensuring the camera and optics are protected from the effects of rain, wind, dust and sand and providing reliable operation over a temperature range of -20°C to +60°C. The enclosure incorporates internal heaters to stabilize the temperature of the lens/camera under low temperature operating conditions and a sun shield to reduce the affects of solar loading. The enclosures are ultra dry air/nitrogen purged to further protect housed components.

E-O Imaging also offers a series of fixed focal length lenses, the Model 903. This series of lenses are designed for long range, precision tracking applications and are available in fixed focal length configurations from 2300mm to 4000mm.

The LTM system is easily configurable to accept customer-furnished (CFE) camera/lens systems.

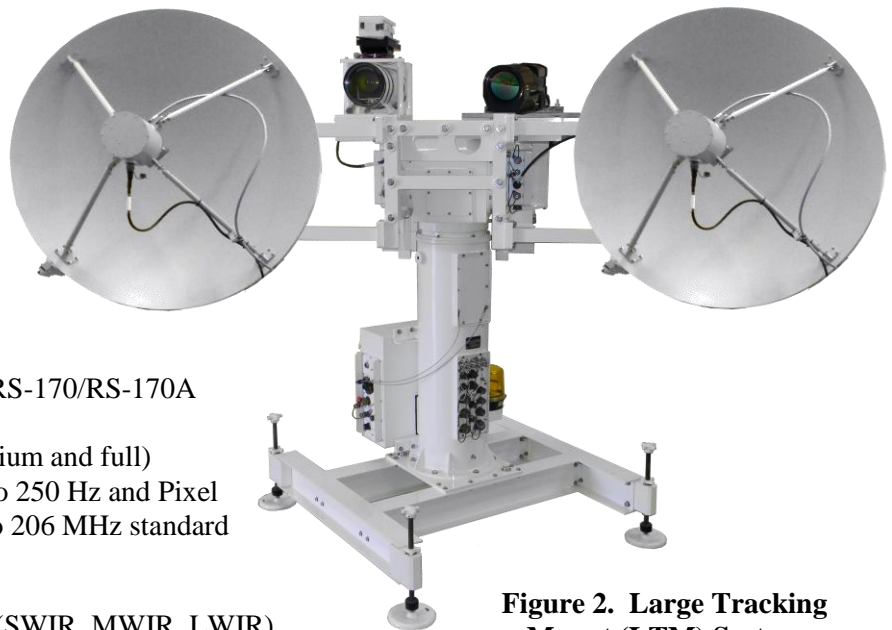
- **Sensor System**

The LTM can be interfaced with a wide variety of sensor/lens systems, supporting arrays sizes up to 2K x 2K x 16.

- NTSC, PAL CCIR and RS-170/RS-170A analog cameras
- Camera Link (base, medium and full)
  - Frame Rates up to 250 Hz and Pixel Clock Rates up to 206 MHz standard
- High definition 3G-SDI
- IR camera/lens systems (SWIR, MWIR, LWIR)

- **Laser Rangefinder**

The LTM offers the User a selection of laser rangefinders (LRF) depending on range and accuracy requirements. Note that the laser rangefinders provided are eye-safe.



**Figure 2. Large Tracking Mount (LTM) System**

### 2.0 PEDESTAL SYSTEM

The tracking mount is a precision gear-driven elevation-over-azimuth pedestal designed for the mounting of optical and electro-optical instrumentation. The pedestal incorporates a dual opposed motor drive configuration resulting in zero backlash, providing performance equivalent to direct drive systems. Payloads up to 4000 lbs. (1800 kg) can be rapidly and accurately positioned to within better than 0.02 deg (350  $\mu$ r). The unit has a maximum tracking velocity and acceleration of 60° sec<sup>-1</sup> and 60° sec<sup>-2</sup>.

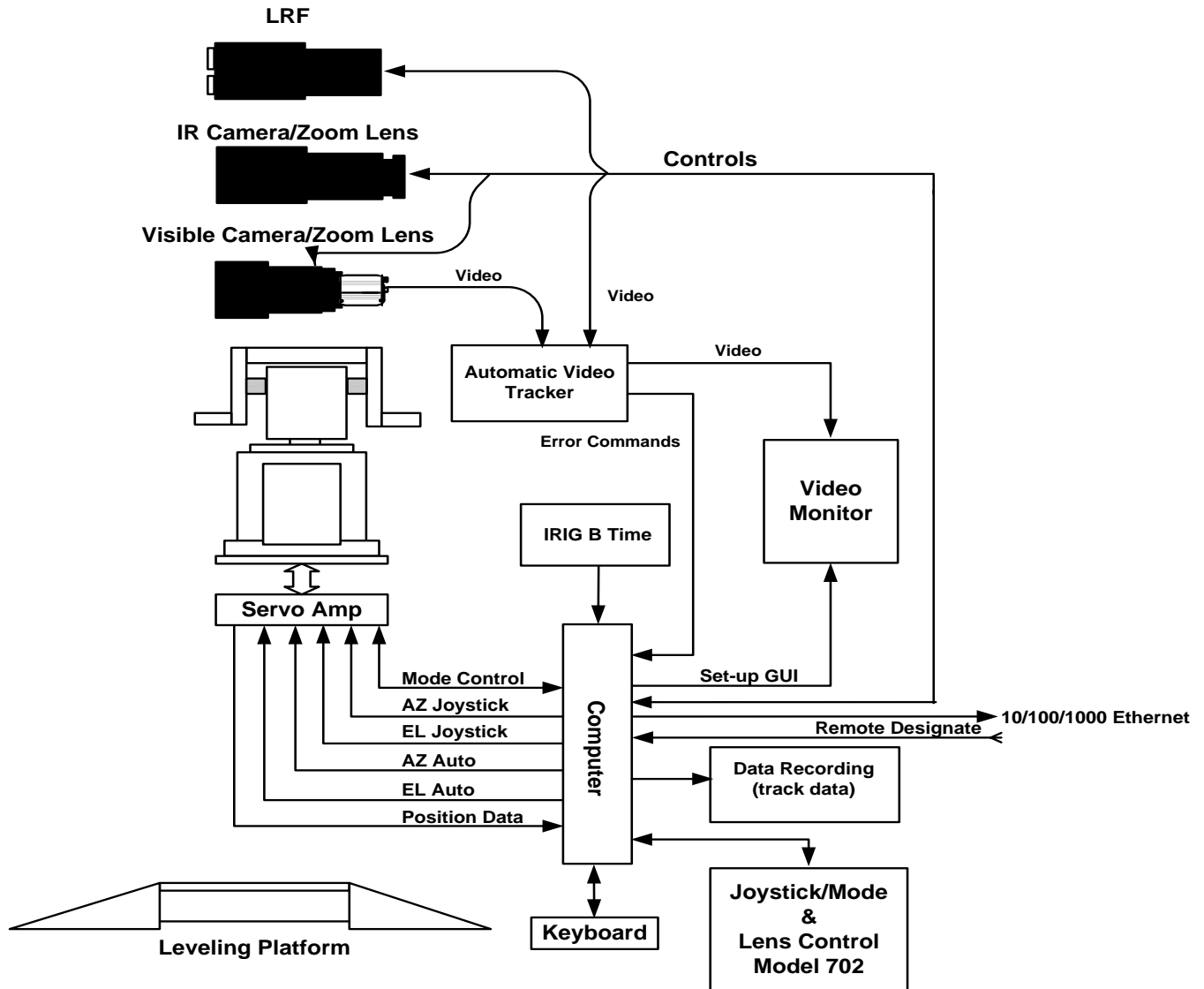


Figure 3. System Block Diagram (Typical)

The characteristics of the Pedestal are:

- **Performance**

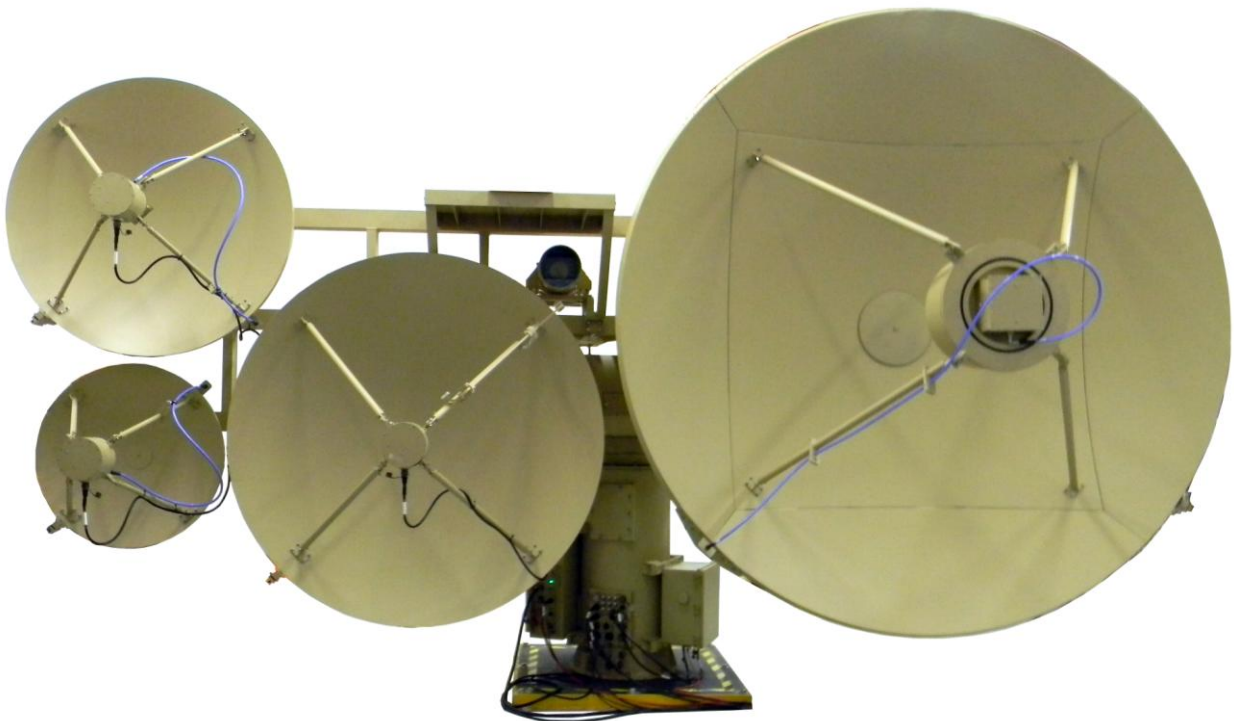
Velocity (max)	60° sec-1 (nominal)
Acceleration (min)	60° sec-2 (nominal)
Encoder	19-25 bits (application dependent)
Backlash	00.0 degrees both AZ&EL axis (dual opposed drive)
Travel	±220° AZ, -30° to +90° EL (nominal) (360° degree AZ rotation optional)
Limits	Electrical Limit Switch prior to mechanical stops set at the above travel requirements. Azimuth axis: CW, CCW, and Secondary. Elevation axis: Up, Down, Secondary
Brakes	Brakes on both AZ and EL axis

- **Environmental Conditions**

Operating Temperature	-20°C to +60°C (typical)
Storage Temperature	-40°C to +80°C (typical)
Operating Humidity	0% to 100% relative
Operating Wind	0-40 knots (operational)
Storage Wind	70 knots
Operating Rain	To 4"/hour
Operating Sand/Dust	Particle size 10-20 microns

- **Configuration**

Pedestal Type	Elevation over Azimuth, 2-Axis (optional mirror axis)
Drive Motors	Dual opposed, gear driven (0.00° degree backlash AZ&EL)
Payload	Up to 4000 lbs (1820 kg)



**Figure 4. Large Tracking Mount (LTM) System**

### 2.1 Servo Control Unit (SCU)

The Digital Servo Controller Unit (DSCU) is a high-precision pedestal motion controller. It provides independent axial control for dual axis pedestals. The DSCU can obey position and velocity commands. Its 1 kHz sample rate enables high precision motion control with velocity accuracy to within 0.01 degree per second.

The controller has a flexible set of analog, digital and messaging control and status interfaces. A set of cascaded digital filters helps provide smooth yet responsive motion. These filters are configurable for resonance and noise suppression.

The DSCU has a wide array of safety features, including control of velocity, acceleration and position limits. Runtime system error checking prevents unsafe operating conditions which may cause damage to the pedestal or payload.

#### SCU Operating Modes

- **Velocity** (drive pedestal at commanded velocity)
- **Position** (trapezoidal move to commanded position and hold)
- **Analog** (following analog input profile)
- **Position Track** (follow profile based remote designate input))
- **Stow** (drive to predefined stow positions)

### 2.2 Levelling System

The LTM can be provided with an optional precision inclinometer when high accuracy TSPI data is required. An optional levelling system can be provided allowing the LTM to be easily located at unimproved locations with up to 10 degree slopes.

## 3.0 CONTROL SUBSYSTEM

All electronic equipment mounts in a standard 19" rack and includes a Dell server or ruggedized computer system, interface electronics, servo control unit, GPS/time code generator, Series 7000 video tracker, LCD displays, Model 702 Controller, joystick assembly, and DVR for recording FLIR and CCD camera video.

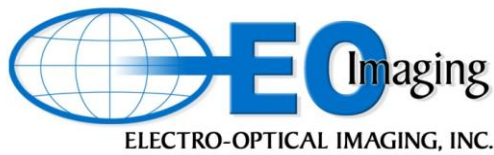
The control system also provides time-tagged data for post mission analysis. Additionally, the control system performs coordinate transforms for controlling up to eight (8) slave systems based on the pointing angles of the primary tracking system (Master).

### 3.1 Environment

The unsheltered equipment has a specified operational temperature range of  $-20^{\circ}$  to  $+60^{\circ}\text{C}$ . Sheltered equipment has an operational temperature range of  $0^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$ . (Extended temperature range configurations are available.)

## 4.0 POWER BUDGET

The nominal power budget is 120V A/C 60 Hz @ 20 amps / 230V A/C 50 Hz @ 10.0 amps and includes the pedestal, servo and controller, video tracker and supplied lens. (Single phase, two phase and three phases power configurations available.) Final power requirements are payload dependent.



## LARGE TRACKING MOUNT (LTM) SYSTEM

**Electro-Optical Imaging, Inc.**, is a leader in the development and manufacture of high performance Video Trackers and Tracking Systems with a legacy of over forty years of providing quality products. From board level tracker products to fully integrated turnkey systems, quality products and customer support are our number one priority.

We offer a diverse line of off-the-shelf video tracker products easily adapted to the most complex and demanding test range, tactical and surveillance applications. E-O Imaging is committed to providing customers with innovative, cost-effective solutions for the most stringent requirements.

Consult factory for available options and configurations.



West Melbourne, FL 32904

phone: 321-435-8722 • fax: 321-435-8723  
email: [sales@eoimaging.com](mailto:sales@eoimaging.com) • website: [www.eoimaging.com](http://www.eoimaging.com)