



Photo-Sonics, Inc.
World Leaders in Specialized Photographic Instrumentation



Mounts not to scale

Nano-Sextant Tracking System

High Performance, Low Cost for Close-in Missions

The **Nano-Sextant** tracking mount is optimized for close-in tracking of high-dynamic airborne targets near the launch or termination stage of an event. Its compact design is ideally suited for small, lightweight sensors and optics best suited for capture of high-resolution images for Engineering Sequential Data (ESD) missions. Yet the Nano-Sextant has the necessary accuracy, payload capacity and dynamic performance to be member of a larger Optical Tracking network, gathering high-accuracy Time-Space-Position-Information (TSPI) data.



Maximum portability and versatility is supported with trailer-mounted, fixed-site and tripod-mounted configurations.

Configuration - The Nano-Sextant was designed for use under various deployment scenarios. The baseline configuration can be ordered with a ruggedized tripod, yet is small enough to be placed on an elevated tower to provide a better view of the event, avoiding the atmospheric effects near the ground including scintillation, heat shimmer, smoke and dust. For maximum portability, the Nano-Sextant can be installed on a 7-foot trailer for rapid deployment at semi-developed locations.

Payload Flexibility - Depending upon your mission needs, a fully-integrated Nano-Sextant can be configured with a combination of long-range / short-range optics or laser range finders. Payload can be mounted on either of the two vertical side plates of the elevation axis, or on horizontal platforms providing up to four sensor stations. While the recommended maximum total payload is 225 pounds, additional payload may be supported with reduced dynamics and accuracies.

Robust Pedestal Construction - Photo-Sonics utilizes Almag-35, an aluminum-magnesium alloy, which provides excellent corrosion resistance to support long life with minimal maintenance in the harshest environments. We use only full-size bearings to provide the highest stability and accuracies, as opposed to narrow-diameter bearings found in lesser systems. Powerful, low-maintenance DC torque motors are provided in both the azimuth and elevation axis, and are coupled to the 23-bit absolute-position Inductosyn® encoders.

Pedestal Support Electronics - The electronics support several installation scenarios. A single enclosure, containing the Digital Servo Amplifier (DSA) and the main I/O panel are packaged in single enclosure at the pedestal site. The remaining electronics such as the Base Computer Unit (BCU), Video Switches, Video Trackers, Recorders, etc. are installed in the Operator's Console which can be located in a mobile Operations Van or at the user's Mission Operation Center.

Photo-Sonics, Inc.

820 South Mariposa Street Burbank CA 91506
Tel 818-842-2141 Fax 818-842-2610
mail@photosonics.com www.photosonics.com



Control Software — The ARGUS control software provides all the functionality the user would expect of an advanced TSPI tracking system. It provides a single interface for the tracking pedestal, sensors, auto-tracking, ranging devices, calibration, target simulation and diagnostics of the complete tracking system. Control of the system is simplified via an intuitive touch screen GUI. The standard ARGUS application can control up to 10 sensor stations, in addition to ranging devices, allowing a single operator complete control of all aspects of a complex and highly capable system from a remote location. It also provides the control of single and dual-gate auto trackers and fixed focal length and zoom lenses and focus tables.

Automated Star Calibration and Turn-and-Dump Calibration are incorporated to yield the highest TSPI accuracy of any optical tracking system manufactured today.

Operator Console - Photo-Sonics offers a variety of console configurations, from our full-size console (for location in mission control center) to a smaller, compact console suitable for mobile command vehicles or multiple packing cases for easier transportability. The default connection between the pedestal and the remote console is via a single-strand, single-mode 'dark' fiber optic cable, which allows for up to 20 km separation. Alternative Interfaces, including shared fiber optics and microwave, are also supported.

A standard console consists of the following items:

- 19" Touch-Screen Monitor for the main GUI interface
- Video Monitors (2, 3, or 4 screens available)
- Operator Control Panel
- Mini Keyboard with Control Stick and Operator Controls
- Console Computer
- I/O Panel (Fiber optics, Ethernet switches)
- Optional UPS

Installation Options:

The compact, light-weight design of the Nano-Sextant easily supports several installation options:

- Fixed site
- Ruggedized Tripod
- Customized Trailer
- Tower mounting



The Remote Console is available in standard rack mounts or easily moved transit cases.

| Nano-Sextant System Specifications | |
|---|--|
| System Accuracy, Fixed Mount | ±20 arc-seconds (100 micro-radians), 2σ |
| Bearings | 14.75" diameter azimuth thrust bearing 7.5" diameter elevation ball bearing |
| Drive System | Direct drive DC torque motors (brush type) |
| Torque | Azimuth : 25 foot pounds (34 N·m) Elevation : 25 foot pounds (34 N·m) |
| Velocity (nominal payload) | Azimuth : 90°/second Elevation : 90°/second |
| Acceleration (nominal payload) | Azimuth : 90° sec ² Elevation : 90° sec ² |
| Closed Loop Servo Bandwidth | Azimuth : 18 Hertz Elevation : 25 Hertz |
| Nominal Payload | 225 pounds total <i>(at rated payload moment of inertia design specification)</i> |
| Non-Orthogonality | ± 10 arc seconds |
| Encoders | Azimuth and Elevation, 23-bit Inductosyn® |
| Elevation Travel | -30° to +210° |
| Azimuth Travel | ±270° <i>(cable wrap configuration)</i> |
| Transit Locks | Locking stow pins in AZ and EL every 90 degrees |
| Weight (with no payload) | 140 pounds <i>(base unit)</i> |
| Height | 20" <i>(bottom of azimuth axis)</i> |
| Power | 3-phase European or US AC power |