SRI-500

Scanning Laser Rangefinder with Inertial Image Stabilization

The SRI-500 Laser Rangefinder is an omnidirectional scanning range image acquisition system for obtaining range images from stationary or mobile platforms at distances up to 500 feet and 800,000 points per second. Scanning is a combination of fast vertical scans at 439 lines/s combined with an azimuth sweep rate of up to 1080°/s.

3D point datasets are acquired by setting vertical and horizontal sweep rates, and commanding acquisition of a sequence of vertical scan lines through a specified elevation and azimuth range. The SRI-500 can be programmed to auto-cycle through an azimuth region repeatedly, automatically reversing direction.

The SRI-500 communicates with a host via a TCP-IP connection. The host may issue Laser Enable, Motor Speed, and Take Scan commands through software based on sample source code provided with the scanner. Each scan consists of a sequence of nearly vertical scan lines taken between start and stop platform azimuth and elevation angles. Elevation coverage may be programmed from +65° to -65° with unlimited continuous azimuth rotation.

Optional Inertial Measurement Unit

In mobile applications, the optional internal inertial measurement unit captures platform vibration and rotation at 200 Hz and is used to correct the 3D coordinates of each sample point to create a stabilized world referenced dataset. Data for each scan is corrected to the initial platform inertial orientation during acquisition. Platform orientation and velocity changes between and during scans are reported with each scan, so multiple scans may be registered in a world map and vehicle motion may be derived.

In static applications the internal IMU may be used to register earth vertical which provides absolute orientation information for structures captured.
### Specifications

**Scan Angles**
- **Azimuth:** ± Unlimited
- **Elevation:** ± 65°

**Scan Speed:**
- **Vertical:** 439 lines/s max
- **Horizontal:** 1080°/s max

**Measurement Acquisition Rate:** 800,000 points/sec peak during vertical scan

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Range Accuracy, 1s</td>
<td>1.5 inches</td>
</tr>
<tr>
<td>Maximum Range, 85% Reflectance Lambertian Surface</td>
<td>500 feet</td>
</tr>
<tr>
<td>Minimum Range</td>
<td>5 feet</td>
</tr>
<tr>
<td>Laser Wavelength</td>
<td>905 nm</td>
</tr>
<tr>
<td>Eye Safety</td>
<td>Eye safe</td>
</tr>
<tr>
<td>Average Laser Power in 7 mm Aperture</td>
<td>&lt; 1 mW</td>
</tr>
<tr>
<td>Laser Interlock</td>
<td>Vertical scan mirror encoder</td>
</tr>
<tr>
<td>Laser Spot Divergence</td>
<td>2 millirad H × 0.5 millirad V</td>
</tr>
<tr>
<td>Optical Aperture</td>
<td>2” × 8.5”</td>
</tr>
<tr>
<td>Scan Motors</td>
<td>Long life brushless DC</td>
</tr>
<tr>
<td>Azimuth Accuracy, Platform Relative</td>
<td>1.5 arc-min</td>
</tr>
<tr>
<td>Elevation Accuracy, Platform Relative</td>
<td>1 arc-min</td>
</tr>
</tbody>
</table>

**Weight:** 35 lb.

**Power:** 50-500 W, scan pattern dependent, 12 VDC

### Environmental

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Enclosure</td>
<td>IP65 / NEMA-4 waterproof</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>-20 to 70°C shade, -20 to 50°C direct sun</td>
</tr>
<tr>
<td>Storage Temperature</td>
<td>-40 to 85°C</td>
</tr>
<tr>
<td>Shock and Vibration</td>
<td>5G operating, 10G survival</td>
</tr>
<tr>
<td>Connectors</td>
<td>Waterproof, UV resistant power and ethernet</td>
</tr>
<tr>
<td>Optical Head</td>
<td>Sealed, dry nitrogen filled</td>
</tr>
</tbody>
</table>

### Inertial Measurement Unit Option

6-Axis quartz accelerometer/gyro AHRS system

**Image Stabilization**
- **Azimuth drift:** 0.05°/sec
- **Pitch/roll drift:** 0.02°/sec

**Pitch/Roll Earth Vertical Attitude Accuracy**
- **Stationary:** 0.1°
- **Maneuvering Vehicle:** 0.5° typical
Output Data

Physical Data Interface: 100 Base-T Ethernet
Application data rate: 20 Mbit/s at max scan rate
Data Output: Streaming scan packet data
Latency: 100 milliseconds maximum

Scan Packet
Packet Header
  Timestamp
  Initial Elevation Angle
  Initial Azimuth Angle
  Vertical Sample Spacing

Point Sample Data
  Range: 0.1 inch resolution, 0 to 6000 inches
  Azimuth: 0.02° resolution
  Relative Return Signal Strength

Reference Coordinate Systems for Output Data

With Inertial Option
  Elevation angle relative to Earth Vertical
  Azimuth relative to platform orientation at start of scan
  OR relative to instantaneous platform orientation

Without Inertial Option
  Elevation and azimuth relative to instantaneous platform orientation

Command Set

Set Azimuth Scan Speed, Start, Stop
Set Elevation Scan Speed, Start, Stop, Sample Interval
Start Scan
Move to Azimuth Location (Preposition)
Halt Scan at End of Current Scan
Abort Scanning Immediately

Maximum Scan Duration: Unlimited
Minimum Scan: 1 vertical line (2 milliseconds)