Without SwathTRAK: 13 flightlines

The Problem:
Fixed-FOV sensors produce variable swath width in variable terrain

With SwathTRAK: 8 flightlines

NEW G2 Sensor System

G2 Sensor System for Corridor and Wide Area Surveying

» Teledyne Optech’s new G2 sensor system for the ALTM Galaxy is the perfect solution for doubling your collection efficiency and productivity on those really large survey projects.

» Designed specifically for the USGS 3DEP lidar program collections, the G2 sensor system enables efficiency and resolution comparable to FLASH lidar while maintaining independent range measurement and superior data fidelity.

» Leveraging the compact form factor of the award winning ALTM Galaxy, the G2 sensor system combines two Galaxy sensor heads and a 150 MP camera over a standard 19” aircraft sensor portal.

» The sensors are oriented and tilted in opposing directions to provide optimum scan geometry and point distribution of the combined data streams.

» The G2 sensor system enables full use of Galaxy’s proprietary SwathTRAK capability to dramatically reduce collection and processing times in hilly and mountainous terrain, compared to fixed-FOV sensor configurations (see inset).

» A single flight management system controls and monitors both sensors, and is supported by a single high-accuracy Position Orientation System.

» The data from the sensors are co-processed and co-registered automatically in Optech’s Lidar Mapping Suite, a lidar production workflow capable of processing both lidar and imagery.

www.teledyneoptech.com
G2 Sensor System

Key Features and Benefits
All the Features and Benefits of the ALTM Galaxy, now x2!

**High Productivity — Reduce Your Collection Times in Half!**

» The unique compact form factor of the ALTM Galaxy enables maximum configuration flexibility with a new option to install **two sensors into a single aircraft portal**, and/or fly separately for smaller jobs.

» Maintain all the unique Galaxy feature sets of SwathTRAK™ and PulseTRAK™ to stay ahead of your competition.

» With a doubling of the effective sampling rate, the G2 sensor system lidar point densities rivalling that of much more expensive FLASH lidar systems, but with the ease of collection, processing and data quality found only in a linear-mode lidar sensor.

**Superior Data Fidelity**

» Maintain the high measurement confidence possible only from independent range measurement (no data averaging required).

» 8 discrete returns with 8 intensity measures.

» Superior smooth surface repeatability.

**Ease of Use**

» Using your existing Optech workflows, plan and control both sensors via a single flight and mission management system.

» Single production workflow that processes, calibrates, co-registers and outputs survey-grade LAS files from both sensors, simultaneously.
Galaxy Configuration Options

1. **Galaxy x2: Double Duty!**
   Two sensor heads co-mounted on a single sensor platform.
   - Galaxy 1
   - Galaxy 2
   - G2 mount
   - Shared POS
   - Shared FMS
   - Lidar/camera processing software (Optech LMS)

2. **Galaxy 1+1: Divide and Conquer!**
   Separate and create two independent configurations for multiple projects.
   - **GALAXY SYSTEM 1**
     - POS
     - FMS
     - Lidar/Camera Mount
     - Lidar/camera processing software (Optech LMS)
   - **GALAXY SYSTEM 2**
     - POS
     - FMS
     - Lidar/Camera Mount
     - Lidar/camera processing software (Optech LMS) for both systems

**Beam Geometry and Application Enhancement**
Alternative laser beam geometry has unique advantages for improving data quality.

1. Inwardly facing fore/aft sensor tilt (±5° pitch) enables forward and reverse look angles at the target in the flight direction, across the entire swath width. This helps to:
   - Increase resolution of vertical surfaces/objects.
   - Minimize ground “shadowing”, or occlusions, for improved ground coverage.
   - Provide a double pass over the target to increase overall model density and vegetation penetration success.

2. Opposing sensor orientations (±10° yaw) help to:
   - Create a more regular point pattern on ground, and avoids scanline phasing for more consistent point density.
   - Provide different look angles to the terrain for additional target coverage.

Opposing sensor orientations enable more regular point distribution and improved target coverage.
## 2x Galaxy T2000 Installed on G2 Sensor System Specifications

### Mount Details

<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>SPECIFICATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>G2 Mount Dimensions (with sensors)</td>
<td>1168 mm x 533 mm x 286 mm</td>
</tr>
<tr>
<td>Weight (G2 Mount)</td>
<td>16 kg</td>
</tr>
<tr>
<td>Weight (G2 mount + 2x Galaxy + iXM-RS150MP)</td>
<td>79 kg</td>
</tr>
</tbody>
</table>

### Sensor Performance

- **Range Performance**: 150–6500 m AGL, nominal
- **Absolute horizontal accuracy**: 1/10,000 × altitude; 1 σ
- **Absolute elevation accuracy**: < 0.03–0.25 m RMSE from 150–6500 m AGL

### Laser Configuration

- **Topographic laser**: 1064-nm near-infrared
- **Laser classification**: Class IV (US FDA 21 CFR 1040.10 and 1040.11; IEC/EN 60825-1)
- **Pulse repetition frequency (effective)**: Programmable, 100–4000 kHz
- **Beam divergence**: 0.16 mrad (1/e) or 0.23 mrad (1/e²)
- **Laser range precision**: < 0.008 m, 1 σ
- **Minimum target separation distance**: < 0.7 m (discrete)
- **Range capture**: Up to 8 range measurements, including last
- **Intensity capture**: Up to 8 intensity measurements, including last (12-bit)

### Sensor Configuration

- **Position and orientation system**: POS AV™ AP60 (OEM); 220-channel dual frequency GNSS receiver; GNSS airborne antenna with iridium filters; high-accuracy AIMU (Type S7); non-ITAR
- **Scan angle (FOV)**: 10–60°
- **Maximum scan frequency**: 640 scan lines/sec
- **Flight management system**: Optech FMS (Airborne Mission Manager and Nav) with operator console
- **SwathTRAK™**: Dynamic FOV for fixed-width data swaths in variable terrain
- **PulseTRAK™**: Multipulse tracking algorithm with no density loss across PIA transition zones
- **Roll compensation**: ±5° minimum
- **Data storage**: Removable SSD (primary); internal SSD (spare)
- **Power requirements**: 28 V: 400 W x 2 = 800 W

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1. Galaxy T2000; Target reflectivity ≥20%; 99% detection probability
2. Dependent on selected operational parameters; assumes nominal FOV of up to 40° in standard atmospheric conditions (i.e. 23-km visibility) and use of Optech LMS Professional software suite
3. Angle of incidence ≤20°
4. Target size ≥ laser footprint
5. Under Teledyne Optech test conditions, 1 sigma per sensor
6. Dependent on aircraft portal diameter and fuselage depth