Leica ALS80-CM

City Mapping Airborne LIDAR
Product Specifications

- when it has to be **right**

Leica Geosystems

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Overview

Leica ALS80-CM is a compact laser-based system designed for the acquisition of high-density topographic and return signal intensity data from a variety of airborne platforms, at flying heights up to 1600 m AGL. The data is computed using range and return signal intensity measurements recorded in flight along with position and attitude measurements from an airborne GNSS/inertial subsystem. The ALS80-CM falls into the category of airborne instrumentation known as LIDAR (Llght Detection And Ranging). This document establishes the minimum requirements for the Leica ALS80-CM, referred to as "the system" herein.

Basic Design

Operating Principle: By measuring the location (latitude, longitude and altitude) and attitude (roll, pitch and heading) of the aircraft, the distance to ground and scan angle (with respect to the base of the scanner housing), a ground position for the impact point of each reflected laser pulse can be determined. In addition, the strength of the reflected return signal is digitized, allowing the creation of georeferenced TIF images. Finally, an optional waveform digitizer allows recording of digitized waveforms of the return signal.

What is included: The system is a turn-key airborne LIDAR mapping system and includes all required airborne equipment needed for system operation. The system includes all post-processing software necessary to produce latitude / longitude / elevation / intensity output, and this software is designed to process output for a wide variety of Leica ALS40, ALS50, ALS60, ALS70 and ALS80 configurations.

What is not included: The user normally supplies the following:

- Survey grade dual-frequency GNSS base station, or equivalent accuracy reference station source
- Mission planning and post-processing computers (a high-end PC – see separate Technical Note)
- Data archiving hardware/software
- Aircraft, modified as needed, including appropriate power outlet
- Aircraft power outlet mating plug

Accessories

Ground Power Supply: The system normally operates on 28 VDC. For ground operations, the PS56 Ground Power Supply is provided which allows operation of the system from standard AC (110/220 VAC) mains.

Download Station: A Download Station Assembly allows data transfer from the MM70 in-flight storage media to the user's computer system via USB connection.

Standard Components

The system consists of the following physical assemblies:

- LS80-LP Scanner Assembly
- SC80-CM System Controller
- OC60 Operator Interface
- PD60 Pilot Interface
- Vibration-isolated interface plate assemblies for both scanner and system controller
- GNSS + GLONASS antenna
- Interconnecting cables

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LS80-LP Scanner Assembly

The Scanner Assembly produces controlled movement of the transceiver aim point by galvanometer actuation of a scan mirror. The aim point of the laser output (relative to the scanner housing) is measured by a high accuracy optical angle encoder. The scanner is a sealed, desiccated volume with a rigid optical window. The following major components form the Scanner Assembly.

Laser: The laser produces output laser pulses using a diode-pumped transmitter. It also contains an optical trigger output and beam expansion/collimating optics that bring the dual laser outputs to the scan mirror.

Receiver: The receiver collects a sample of the laser output pulse and detects laser pulses reflected by terrain below the aircraft.

Scanner Mechanization: A high-performance galvanometer scanner is used to actuate the scan mirror.

Mirror and Window Assembly: Standard systems are shipped with a large-aperture low-inertia/high-speed scan mirror optimized for fields of view up to 72 degrees at altitudes to 5000 m AGL (in up to 6PiA mode), allowing upgrade of Leica ALS80-CM and ALS80-HP to the ALS80-UP configuration.

Digital Camera: An XGA-resolution (1280 x 1024 pixel) digital camera is included in the scanner. This integrated camera allows a real-time view of the terrain below the aircraft, as well as providing recorded images at fixed intervals. The recorded images contain embedded annotation data. Leica LCam Viewer software allows the user to search for a particular frame by GNSS time, enabling selection of the appropriate frame for any given portion of the LIDAR mission, and accesses the embedded annotation data in order to provide automatic north-up image orientation. Zoom functions are also provided.

Interface plate: A vibration-isolated interface plate is provided to allow Scanner Assembly mounting to aircraft. Specific interface plate selection will depend on installation type (pod versus in-cabin and standard versus low-profile mounting) and auxiliary sensor usage.

SC80-CM System Controller

The System Controller contains assemblies responsible for subsystem coordination, raw data measurement and data recording. The following major components make up the System Controller:

SCM80-CM System Controller Module: The System Controller Module controls laser operation, measures range to ground via the high-speed time interval counter, measures the intensity of reflected return signals, generates electrical signals needed to direct the optical scanner, reads the encoded scan angle, reads GNSS timing information and formats all these data for recording on a high-speed data logger.

NovAtel SPAN GNSS/IMU Subsystem: This subsystem provides and records master timing and aircraft position/attitude information using a GNSS receiver, a high-accuracy IMU (mounted inside the scanner housing) and an integral processor. The NovAtel SPAN subsystem records data via an Ethernet connection to the DLM65 Data Logger Module.

GCM60 Galvanometer Controller Module: The Galvanometer Controller Module provides drive current to the scanner assembly's galvanometer by comparing a commanded scan position signal (provided by the System Controller Module) to the galvanometer's actual position (provided by the galvanometer's position detector).

DLM65 Data Logger Module: The Data Logger Module stores output from both system controller and SPAN modules, including GNSS timing and position, unprocessed IMU data, range, return signal intensity, synchronization data and scanner position information, for later processing. The data is stored on a removable solid state disc drive (SSD). Four removable SSDs are supplied with the system allowing rotation of storage media from the field back to the processing center.

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PDM60 Power Distribution Module: The power distribution module provides reverse polarity protection, conducted EMI suppression and power connections to each SC80-CM functional module from a single DC input, as well as providing regulated DC power for the OC60 or PD60 operator and pilot interface and the LS80 Laser Scanner.

OC60 and PD60 User Interface Hardware

The OC60 and PD60 provide airborne-qualified, outdoor-readable display platforms for operator interface and flight navigation software, respectively. The operator interface software provides a graphical user interface for system setup, operation, monitoring and flight navigation.

OC60 Operation Controller: Primary input to the operator interface software is via the OC60's large touch-screen display. The OC60 display unit is mounted to the IS40 pedestal or to the PHT50 holder, providing optimal viewing angles and height for the display.

PD60 Pilot Display: The primary navigation display for the system is the PD60. The compact display with "hot keys" allows ready switching between available navigation views.

Software

The following software is included with the system:

AeroPlan80: This proprietary mission planning template is a subset of Leica MissionPro Flight Planning and Evaluation Software and is provided to aid users in determining proper system set-up and flight line spacing.

Leica MissionPro Flight Planning and Evaluation Software: Calculates optimal flight line layout and embeds layout and optimized system settings in a flight plan database file for transfer to the system.

Leica FlightPro Sensor Control and Flight Management Software: Accepts flight plan database files from MissionPro and provides aided navigation for pilot and automatic or manual system operation for the system operator.

NovAtel Inertial Explorer GNSS/IMU Processing Software: Combines GNSS base station data or precise ephemeris corrections with NovAtel SPAN airborne GNSS data to provide a DGNSS aircraft position solution; combines the DGNSS solution with Scanner Assembly IMU data to provide smoothed position and orientation data. Post processed output features a "tightly-coupled" solution, allowing steep bank angles during turns. This software also allows download of real-time (non-differentially corrected) position and orientation data for "quick-look" processing.

Leica CloudPro: Assembles trajectory output from GNSS/IMU processing software with raw scanner files into a master data file and processes the master data file into a ground coordinate point cloud including latitude, longitude, elevation and intensity values. File output is in a variety of projections including WGS84 and UTM as well as in a variety of formats, including:

- ASCII XYZ in WGS84 and UTM coordinates worldwide, as well as state-plane coordinates in the USA. All coordinate conversions are compatible with CORPSCON
- LAS (LAS 1.2 for standard discrete-return data and LAS 1.3 for full-waveform data, or LAS 1.4 for both discrete-return and full-waveform data)
- User-required custom projections or geoid corrections. Customers can customize CloudPro by providing mathematical definitions for custom projections
- Gray-scale intensity image output (i.e., x/y/intensity images in *.tif format)

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Optional Components

WDM65 Waveform Digitizer Module: Allows capture of full waveforms from returned pulses. WDM65 is integrated into the SC80-CM System Controller and allows parallel operation in both waveform collection and discrete-return range measurement modes.

IS40 Stand: Provides a pedestal on which to mount the OC60 display.

PHT50 Adapter: Allows mounting of OC60 displays to IS40 stands already having another display attached.

Technical Specifications

Critical Item Definition

The system consists of all hardware and software necessary to meet the specifications herein. All assemblies are designed for rugged environments sustained on unpressurized light aircraft. As such, the system is capable of operation while being subjected to variations in temperature, humidity and altitude experienced in flight. In addition, surfaces of the system exposed during flight are capable of operation during exposure to precipitation and blowing dust.

Physical Requirements

Size: The system is within the following envelope dimensions, as shown in drawings 791370, 200 (Integration Drawing, LS70-LP Scanner w/o RCD), 791370, 201 (Integration Drawing, LS70 Scanner w/ CH6x/8x) and 791370, 305 (Integration Drawing, SC70). The standard configuration for the System Controller is a "rackless" 5.4U-tall assembly on a vibration-isolated interface plate assembly. Mounting provisions are available on the top and bottom of the front and rear panel handles of the System Electronics for users wishing to install additional equipment (e.g., CC31 Camera Controller for Leica RCD30).

Scanner Assembly Dimensions (all IMUs):

Length (no handles, no interface plates)	23.68" (602 mm)
Length (parallel to flight direction, with handles, no interface plate)	26.68" (678 mm)
Length (no handles, on 785696 isolated interface plate assembly)	33.33" (847 mm)
Width (no interface plate)	14.50" (369 mm)
Width (on 785696 isolated interface plate assembly)	18.50" (470 mm)
Height (no interface plate)	10.05" (255 mm)
Height (on 785696 isolated interface plate assembly)	10.56" (269 mm)

System Controller Dimensions:

Depth (including handles, cabling)	24.50" (622 mm)
Width (bare stack)	17.63" (448 mm)
Width (on 767347 isolated interface plate assembly)	19.52" (495 mm)
Height (bare stack)	9.49" (241 mm)
Height (on 767347 isolated interface plate assembly)	11.64" (296 mm)

Operator Interface Dimensions:

Depth	3.50" (89 mm)
Width	13.39" (340 mm)
Height	9.25" (235 mm)

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Pilot Display Dimensions:

Depth (display vertical)	1.93" (49 mm)
Width	7.52" (191 mm)
Height (display vertical)	5.59" (142 mm)

Weight:

The maximum weight of system components is as follows:

Scanner (max, with CUS6 IMU, incl. IMU, main cables)	103.0 lb (46.7 kg)
Scanner (on 753564 isolated assembly for LS only)	121.2 lb (55.1 kg)
Scanner (on 785696/789917 isolated assembly for LS + 1x CH6x)	130.5 lb (59.3 kg)
System Controller (including MM70, no interface plate)	71.5 lb (32.4 kg)
System Controller (on 767347 isolated assembly)	79.9 lb (36.3 kg)
OC60 Operation Controller	8.9 lb (4.1 kg)
PD60 Pilot (745210)	2.2 lb (1.0 kg)
OC60 Cable, 5 m	1.2 lb (0.6 kg)
OC60 Cable, 7 m	1.7 lb (0.8 kg)
Power Cable (765173. 4.0 m)	1.9 lb (0.9 kg)
GNSS Antenna (777441)	0.5 lb (0.2 kg)
GNSS Antenna Cable (821218, 10m)	1.1 lb (0.5 kg)
Total (typical, LS on 753564)	218.6 lb (99.5 kg)

Mounting

Scanner Assembly: The Scanner Assembly is mounted to the aircraft using the included vibration-isolated interface plate. Mounting features are shown in drawings 791370, 200 (Integration Drawing, LS70-LP Scanner w/o RCD), 791370, 201 (Integration Drawing, LS70-LP Scanner w/ CH6x/8x) and 791370, 305 (Integration Drawing, SC70). All mounting surfaces are black anodized per MIL-A-8625 TY II CL 2 to resist corrosion. The default vibration-isolated interface plate assembly (753564) allows Scanner Assembly mounting directly to aircraft already equipped to accept Leica/LH Systems/Wild PAV-series or other stabilized camera mounts. The Scanner Assembly is designed so that no structures protrude below the aircraft floor.

System Controller: The System Controller is normally mounted using the included 767347 vibration isolated interface plate assembly. Optional mounting "wings" are available as an accessory to allow installation of system electronics in EIA-standard 19-inch racks.

Operator Interface: The Operator Interface is designed for mounting to sturdy horizontal or vertical surfaces, to the optional IS40 mounting pedestal or to the optional PHT50 Holder. Mounting for this assembly should be provided by the user in an appropriate fashion to minimize strain on the high-density electrical connectors used for interface between the System Controller and the OC60 Operation Controller, and to minimize movement of the assembly or cables when exposed to atmospheric turbulence during flight.

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Environmental Requirements

Specification	Reference to Standard / Environmental Test Index
Operating Temperature and Altitude	RTCA DO-160G, Section 4, Cat B1, Max 40 C up to 2000 m AMSL or equivalent cabin pressure, then declining at 6.6 C per 1000 m to max 26.8 C at 4000 m AMSL or equivalent cabin pressure, then constant at max 26.8 C to 25000 feet (7620 m) AMSL or equivalent pressure, minimum 0 C at all altitudes.
Storage Temperature	RTCA DO-160G, Section 4, Cat B1, -40 to +70 C
Temperature Variation	RTCA DO-160GG Section 5, Cat B
Humidity	RTCA DO-160G, Section 6, Cat A, 0 - 95% RH
Operational Shocks and Crash Safety Level 2 for all Fixed-Wing Aircraft Types and Helicopter	RTCA DO-160G, Section 7, Cat E (FAR 27.561), 20g
Vibration	RTCA DO-160G, Section 8, Cat S
Magnetic Effect	RTCA DO-160G, Section 15, Cat B
Power Input	RTCA DO-160G, Section 16, Cat B
Voltage Spike	RTCA DO-160G, Section 17, Cat A
Audio Frequency Conductive Susceptibility – Power Inputs	RTCA DO-160G, Section 18, Cat B
Induced Signal Susceptibility	RTCA DO-160G, Section 19, Cat BC
Radio-Frequency Susceptibility (Radiated and Conducted)	RTCA DO-160G, Section 20, Cat R
Emissions of Radio Frequency Energy	RTCA DO-160G, Section 21, Cat M
Lightning Induced Transient Susceptibility	RTCA DO-160G, Section 22, Cat A3XXXX
Electrostatic Discharge	RTCA DO-160G, Section 25, Cat A

Performance Requirements

Slant Range: The recommended maximum slant range for the system is approximately 1977 m (see graph describing maximum pulse rate for given flying height and all SPiA/MPiA configurations). Systems can not be operated at longer slant ranges, unless upgraded to ALS80-HP configuration. Recommended minimum slant range is 100 m.

Field of View (FOV): System FOV is adjustable over the range of 0-72 degrees, in 1-degree increments. Contact Leica Geosystems for inquiries regarding maximum unvignetted FOV for installation in specific aircraft.

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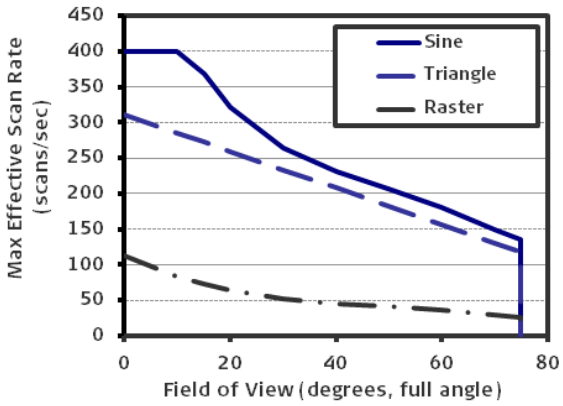
Scan Pattern: The system provides 3 scan patterns, all in a plane nominally orthogonal to the longitudinal axis of the scanner, nominally centered about nadir:

- Sinusoid scan: with data collection on both left-bound and right-bound scans
- Triangle scan: with data collection on both left-bound and right-bound scans
- Raster scan: with unidirectional scanning

Scan Rate: Maximum scan rate degrades as a function of increasing FOV. Maximum scan rates (in Hz) as a function of FOV (in degrees, full angle) are defined in the following table:

Scan Pattern	Maximum scan rate function (Hz)	Absolute Maximum (Hz)
Sinusoid	$-2.11161387594222E-08\ (FOV+2.25)^5 + 2.39640751412990E-05\ (FOV+2.25)^4 - 4.85238584953128E-03\ (FOV+2.25)^3 + 3.90365933090094E-01\ (FOV+2.25)^2 - 1.51874883452176E+01\ (FOV+2.25) + 3.53112587418088E+02$	200 Hz
Triangle	$-1.28635419945581E+00\ (FOV+2.25) + 1.58293326854730E+02$	155 Hz
Raster	$-3.65199025243180E-04\ (FOV+2.25)^3 + 5.91996857602394E-02\ (FOV+2.25)^2 - 3.61365678536448E+00\ (FOV+2.25) + 1.20188139776174E+02$	112 Hz

Scan rate maximum limits are summarized in the graph below:



The scan rate (cycle rate in Hz) is user-selectable from 0 to 200 Hz (depending on scan pattern selected) in 0.1 Hz increments via the graphical user interface. System control software prevents out-of-range inputs for scan rate based on user selection for FOV and scan pattern.

Roll Stabilization: Automatic adaptive roll stabilization is provided. Any portion of the maximum accessible 72-degree FOV that is not being used for the commanded FOV is available for automatic roll stabilization.

Illuminated Footprint: Output beam divergence is 0.20-0.26 mr, measured at the $1/e^2$ point. For reference, this is equivalent to 0.15 - 0.18 at the 1/e point.

Pulse Rate: The maximum achievable pulse rate of the system is related to the maximum slant range setting. The graph below summarizes maximum pulse rates at various flying heights, assuming a 40-degree FOV.

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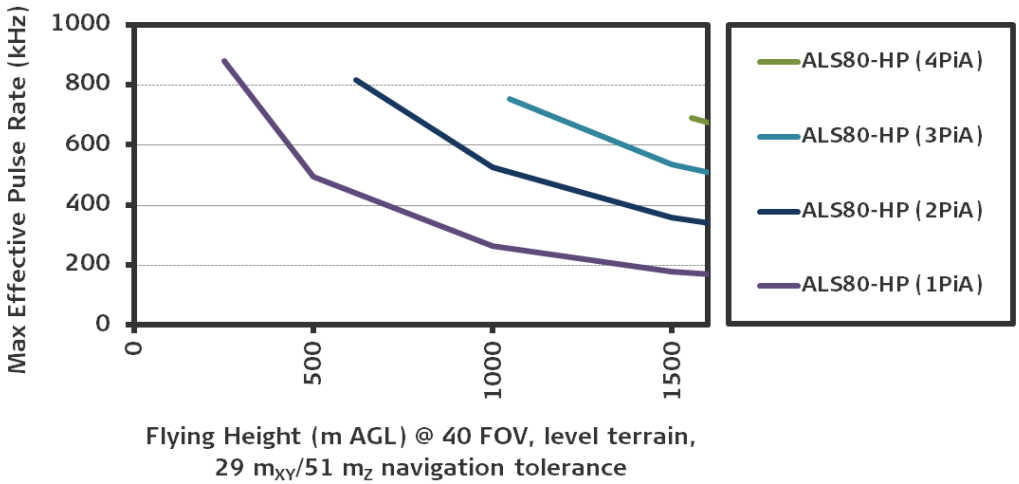
Multiple Pulses in Air: The system is equipped with a Multiple Pulses in Air (MPiA) feature, which allows increased maximum pulse rates over that offered by non-MPiA systems for any given flying height. The system can be operated in conventional SPiA (Single Pulse in Air) or MPiA modes from 2-5PiA, and the range accommodation envelope (maximum slant range minus minimum slant range) is the same in both MPiA and SPiA modes for any given pulse rate. Maximum achievable pulse rates are shown in the graph below.

Target Detection Rate: The system is capable of detecting 90% of targets having at least 10% diffuse reflectivity and fully intercepting the laser footprint. Return reflection for targets with less than 10% diffuse reflectivity may not produce adequate signal strength and may result in "drop-outs". The ability to measure range associated with a given return is dependent on the surface having adequate reflectivity and intercepting a sufficient portion of the laser footprint. Targets intercepting less than the full laser footprint will require proportionally higher reflectivity for successful detection.

Multiple Target Detection: The system is capable of detecting an unlimited number of returns for each outbound laser pulse, provided each reflecting surface results in adequate signal strength for detection. Vertical discrimination distance is approximately 2.8 m.



Multi-Return Intensity: Systems are shipped with a multiple-return intensity measurement feature. With this feature, the sizes of the reflected returns at various elevations (up to the first three returns from each outbound pulse) are measured in addition to the distances to each reflecting surface measured by the range counter. An 8-bit scale is used to digitize return signal intensity from both high-gain and low-gain detection channels. 16-bit output scale is used for outputting the integrated data from both high- and low-gain channels. The ability to digitize the signal strength is dependent on the surface having adequate reflectivity and intercepting a sufficient portion of the laser footprint. Targets intercepting less than the full laser footprint will require proportionally higher reflectivity for successful detection.

Gain Setting Capture: The system digitizes the gain setting being used during detection of each return. An 8-bit scale is used for gain setting digitization. Since the system normally operates in a fixed-gain mode, this gain logging can be used to verify the gain value used during flight. In addition, the captured gain value can be used in combination with a Gain-Based Intensity Correction (GBIC) table to produce high-quality intensity images when using automatic gain control (AGC). Automatic gain control mode is typically only used when collecting full-waveform data.

Accuracy: The system produces data after post processing with a lateral placement accuracy of 5 – 19 cm and vertical placement accuracy of 5-9 cm (one standard deviation) from full-field-filling targets of 10 percent diffuse reflectivity or greater with atmospheric visibility of 23.5 km or better for flying heights up to 1600 m AGL (MPiA mode) and nominal FOV of 40 degrees. Accuracy estimates for particular mission profiles (i.e., flying height above terrain and position within FOV) are shown below and can be provided in detail by using the AeroPlan80 mission planning template. Estimates below are made assuming a 40-degree FOV, CUS6 IMU and a nominal 5 cm GNSS error.

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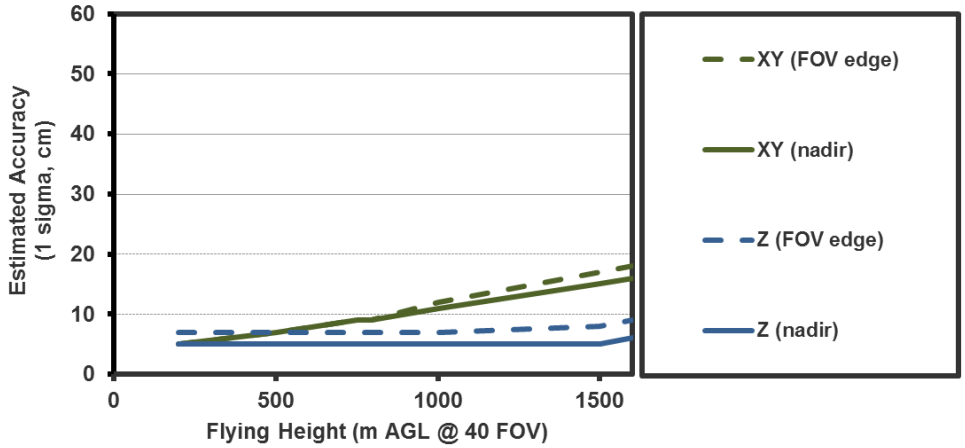

Side Lobes: The laser output beam does not have any side lobes outside the main beam. Note that the system has two laser outputs.

Input Voltage: See "Environmental Requirements".

Input Power: The system is designed to minimize damage due to out-of-range supply voltage. Maximum average power draw is 922 Watts including the FWD option.

Reverse Polarity Protection: The system is designed to sustain accidental exposure to reverse polarity applied to the main power input. The system will not operate under such a condition.

Laser Output Control: The system provides control over laser output over an approximate 100:5 range in 1% increments.

Beam Uniformity: The ratio of the laser's peak beam intensity to average beam intensity should not exceed 4:1.

Warm-Up Time: The system is ready for use within 10 minutes of application of primary power.

Duty Cycle: The system is capable of continuous operation at maximum pulse rate. Recording capacity is defined below.

Design Requirements

Laser Output Shutter: The system has an integrated shutter allowing full output or complete obscuration of the output laser beam. The assembly is remotely actuated using the graphical user interface software. The assembly provides status signals to the system controller sufficient to allow confirmation of assembly position (closed or open).

Emission Indicator: A CDRH-compliant laser emission indicator is provided on the underside of the Scanner Assembly. When the Scanner Assembly is installed in the aircraft, the emission indicator is readily visible from points below the scanner output window.

Warning Buzzer: A CDRH-compliant warning buzzer is incorporated into the Scanner Assembly.

Sighting Window: A sighting window is provided on the Scanner Assembly. The sighting window allows the user to view the condition of the scanner output window from inside the aircraft for evidence of fogging, icing or gross contamination. The sighting window provides high visible light transmission while providing attenuation of 1064 nm laser energy with an optical density of 6.0 or greater.

OS Installation: Non-mechanical drive

OS Protection: Protected from improper shutdown via EWF on Windows XPe

Data Storage: Removable SSD (MM70)

Recording Capacity: The system has a nominal recording capacity of approximately 10.3 hours on a single MM70 Mass Memory when operating at maximum pulse rate and assuming an average of 2 returns per outbound pulse. Capacity is proportionally longer at lower pulse rates or fewer returns per outbound pulse. Capacity is lower when using optional WDM65 Waveform Digitizer module and also depends on waveform rates and/or waveform size. Data drives can be swapped in flight, after system shut-down, re-start and in-air GNSS/IMU initialization.

Built-In Test (BIT): The system has a BIT mode that provides simulated multiple-return target signals to the range finding subsystem. These signals allow system self-test of all range processing circuits.

Circuit Breakers / Fuses: Circuit breakers or fuses are provided to fuse primary power or limit damage due to an electrical fault inside major subassemblies. The primary (mains) breaker is a 50A magnetic-type breaker for accurate operation over a variety of ambient temperatures.

Hazardous Voltage Exposure: When the system is installed in the aircraft, no exposure to potentially harmful voltages is possible.

Electrical Connectors: Connectors will not disconnect or become loose under the environmental conditions specified elsewhere in this document during the service life of the equipment. All connectors are keyed and/or labeled where needed to prevent damage due to improper mating.

Strain Relief: Interconnecting cables connected to the System Controller are restrained by two clamping assemblies on the System Controller rear handle in order to prevent damage. An integral strain relief is provided where the main cable bundle enters the Scanner Assembly. Retention for the remaining portions of the interconnecting cables must be installed by the end user in such a fashion as to prevent a tripping hazard in the aircraft.

Pressure Relief: The Scanner Assembly features a pressure relief valve to prevent pressure or vacuum build-up of more than 0.5 PSI (differential).

Desiccation: The Scanner Assembly has provisions for a disposable desiccant packet to remove moisture from any air entering the scanner housing via the relief valve. Desiccation is adequate to prevent fogging or condensation on the interior of the scanner housing when operated in the environments specified elsewhere in this document.

Post Processing Software: Software is provided which processes raw data collected in the air and on the DGNSS base station and produces an output data set in WGS84 coordinates. Industry standard LAS format is used for output of the post processed data. Post processing software is designed to run under all Microsoft Windows 64-bit operating systems XP and higher.

Documentation

Test Report: Each system is supplied with an outgoing test report. Unless otherwise specified, all data are provided at maximum pulse rate. The test report provides at least the following information:

- Beam diameter (1/e and $1/e^2$, nominal), at the exit aperture of the beam expander
- Beam divergence (1/e and $1/e^2$, nominal)
- Pulse width (Full Width Half Max)
- Maximum single-pulse energy
- Emitted wavelength

- IMU offset (boresight) settings
- Encoder and range calibration offsets, including IBRC and GBIC files

User Documentation: A User Manual is provided with the delivered system. This documentation includes the following:

- System Description
- Installing the System
- Care and Handling
- System Operation
- Safety Directions
- Technical Data
- Warranty - Software License Agreement

Proprietary information is supplied at the discretion of Leica Geosystems. All technical data shall remain proprietary to Leica Geosystems and is provided for the sole purpose of assisting in system usage and maintenance.

Upgrade Availability

Upgrades are available from all Leica ALS60 and Leica ALS70 configurations, including ALS Corridor Mapper (ALS60 generation) and ALS70-CM, -HP and -HA to all ALS80 configurations. Upgrade information is provided below. Leica ALS50-II and earlier systems (including ALS50-II generation Corridor Mapper systems) cannot be upgraded to any Leica ALS80 configuration.

Prep Kit, Non-FWD-Ready SC60 to SC70: Available as factory upgrade at time of Leica ALS60 to ALS80 upgrade for early ALS60 systems (Article number 785743; consult factory for ordering information)

FWD-ready Leica ALS60 to ALS80-UP: Available as factory upgrade (consult factory for ordering information). For ALS60 Corridor Mapper to ALS80-HA, add also ALS80-CM to ALS80-UP upgrade below.

FWD-ready Leica ALS60 to ALS80 dual-output: Available as factory upgrade (consult factory for ordering information). Covers also ALS60 Corridor Mapper to ALS80-CM upgrades

Leica ALS70 to ALS80-UP: Available as factory upgrade (consult factory for ordering information). For Leica ALS70-CM to ALS80-UP, add also ALS80-CM to ALS80-HP upgrade below.

Leica ALS70 to ALS80 dual-output: Available as factory upgrade (consult factory for ordering information). Covers also ALS70-CM to ALS80-CM upgrades.

Leica ALS80-CM to ALS80-HP: Available as on-site upgrade (consult factory for ordering information). Can also be used concurrently with other upgrades. For example, ALS60 Corridor Mapper to can be converted to ALS80-HP by purchasing both the FWD-ready ALS60 to ALS80-dual-output upgrade and the ALS80-CM to ALS80-HP upgrade.

Training, Support and Maintenance

Training: Systems include three (3) one-week training sessions at the customer's site to support installation, operator training and processing technician training. Additional training support is available on a fee-for-service basis.

Warranty: One year on system and peripheral components.

Customer Care Packages (CCPs): An extended support program including provisions for replacement parts and labor can be purchased. Extended warranty provisions do not cover desiccant replacement and/or customer-damaged items.

Whether you want to capture airborne data of an agricultural area or of a city, record the challenges in a disaster area or the expanse of a high tension line, you need reliable measurements and solutions for your entire workflow to build image-based maps. Leica Geosystems' broad array of airborne sensors and integrated software solutions capture data efficiently, reference imagery accurately, measure easily, analyze and present spatial information in 3D.

Those who use Leica Geosystems products every day trust them for their precision, their seamless integration and their superior customer support. When data really counts, Leica Geosystems delivers geospatial imaging solutions with precision, integration and service.

When it has to be right.

TQM
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Class 4 Laser Product
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