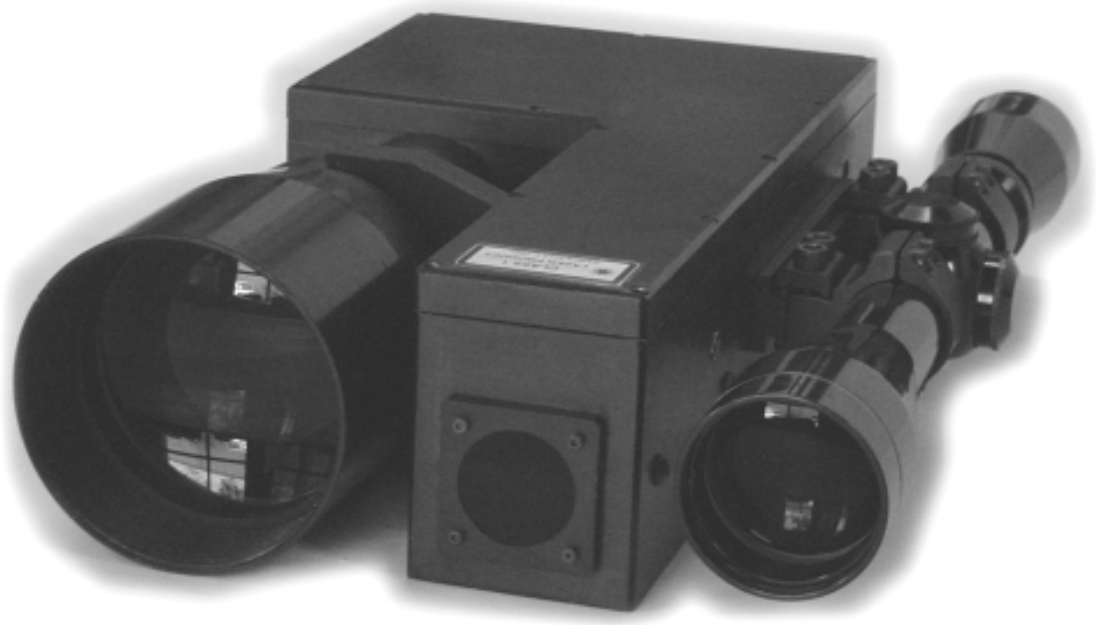
RangePRO Model L20LC Laser Rangefinder Module



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$$P_R = \frac{P_L \times \chi^2 \times \delta \times D_L^2 \times A_I \times \cos\beta}{4 \times R^2 \times A_L}$$

1 DESCRIPTION

The RangePRO Model L20LC is an OEM laser rangefinder module providing an advanced digital rangefinding capability for military, paramilitary and commercial applications.

It integrates with host systems such as weapon, sensing, or surveillance and tracking stations, and thermal imaging cameras. It requires power and control command input, and provides range-to-target and self-diagnostic data output.

The L20LC ranges at low repetition rates over distances to 20km depending on target size, target reflectivity, atmospheric conditions and customer supplied external optics (typically greater than 10km for vehicle type targets).

The system is fitted with an alignment telescope to facilitate alignment and pointing.

The transmitter is a collimated eye-safe laser system. It can provide ranging rates from single shot up to 1Hz bursts.

The unit is fully sealed, purged and backfilled with dry air.

Advanced digital signal processing techniques are employed to provide accurate, reliable ranging. Signals from the detector are digitally sampled. The samples are examined to determine all potential real target returns. If a valid target is detected within the user-set range gate, it's range data is output, if more than one target is detected within the range gate, the nearest or farthest may be selected for data output.

All signal and range computation is done "on the fly". Using this philosophy, the only task remaining after the sampling has expired is to transfer the range data through the serial port. Effectively the speed of the signal processing is limited only by the data output rate.

The system employs an adaptive range threshold to compensate for changing noise levels. The worst case for noise is when the system electronics are being operated at the high end of their temperature specification and when ranging is being performed in strong sunlight. The best case is the reverse situation. The adaptive range threshold feature results in more reliable ranging (fewer false alarms) when noise is elevated and higher sensitivity (further ranging) when noise is reduced, thus maximising the system capability under varying conditions. The threshold is calculated on a "shot-by-shot" basis.

RangePRO laser rangefinder software is easily upgradeable, upgrades can be downloaded in the field via a PC.

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2 SYSTEM SPECIFICATIONS

Notation - use of brackets in tables: [*notes & qualifications*] (*units*) {*alternate units*}.

2.1 System Performance

PARAMETER		SPECIFICATION
Control		
Control Functions		all control functions and range data via comms port
Ranging		
Laser Type		Nd:YAG/OPO
Wavelength (nm)		1,565 to 1,575 [1,570 nominal]
Output Energy (mJ)		nominally 8 [up to max. allowable for Class 1M]
Beam Diameter [at exit] (mm)		20
Receiver Aperture (mm)		75
Detector		InGaAs with time variant gain
Range Read-out Limits (m)	**minimum**	200
	maximum	20,000
Ranging Performance [Standard Clear Atmos-phere [1]] (m)	**standard [1x1m] [2]**	6,500
	vehicle [2.3x2.3m] [3]	10,000
	building [8x8m]	18,000
Range Accuracy (m)		± 5 [4m rms]
Target Discrimination (m)	**Lateral [1m² targets at 5,000m]**	≤ 20
	Axial [between 100 & 5,000m]	≤ 100
Ranging Rate [max.]	**single shot (per minute)**	10 [continuously]
	burst mode (Hz)	1 [4]

[1] Extinction coefficient = 0.0448km^{-1} @ 1,570nm; sea level visibility = 23.5km.
[2] Target albedo = 0.1 (black) @ 1,570nm.
[3] Target albedo = 0.2 @ 1,570nm.
[4] Continuous operation at 1Hz requires appropriate thermal mounting by the integrator. Otherwise operation is at 1Hz at a max. 70% duty cycle, e.g. max. 20s at 1Hz and 9s off. (Refer to manufacturer for modes of operation particular applications.)

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PARAMETER		SPECIFICATION
Safety & Protection		
Laser Safety Classification [5]		Class 1M
Nominal Hazard Distances	**eye [NOHD]**	< 0
for: (m) [3]	**skin [NSHD]**	< 0
Visible Emission Filter		blocking
Visible Emission [@ ≥ 10m]		nil
Audible Emission [@ ≥ 10m]		nil
Support		
MTBF	**hours**	14,000 in standby (25degC)
(MIL-HDBK-217FN1)	**laser shots**	> 500,000
Operational Life (years)		10
Reliability % (100hrs)		99.3

2.2 Communications

PARAMETER	SPECIFICATION
Port(s)	One Serial port [shared with power input]
Type	RS-232 or RS-422 bidirectional [customer specified]
Data Format	8 bit; no parity
Data Rate (Baud)	9,600 [others on request]
Data Sent	Range [diagnostics optional]

2.3 Physical Characteristics

PARAMETER		SPECIFICATION
Mass [approx.] (kg)		3.4
Dimensions [approx.]	**Length**	273
(mm) [6]	**Width**	143
	Height	80.3
Specific Gravity		> 1 [non-floatation]
Mounting		3-point mount

[5] Australian/New Zealand Standard AS/NZS 2211.1:1997 *Laser Safety Part 1: Equipment classification, requirements and user's guide.*
[6] Excluding connectors, mounting feet or optional telescope.

2.4 Electrical Requirements

PARAMETER		SPECIFICATION
Supply Voltage [external] (Vdc)		12 to 32 [28 nominal]
Power Consumption (W)	**typical (standby)**	< 1
	peak (while charging)	< 12

2.5 Environmental

PARAMETER			SPECIFICATION
Temperature (°C)	**Operate**	**min.**	-20
		max.	+44 [plus 1,120Wm^{-2} solar radiation]
	Survive	**min.**	-46
		max.	+70
Vibration and Shock [7]			MIL-STD-810E, wheeled vehicle
Sealing [8]			immersion proof
EMI/EMC [7, 8]			MIL-STD-461D
Resistance to Contaminants			ARMY(AUST) 6656, para. 3.2.2.5

2.6 Connector/Pin Details

PARAMETER		SPECIFICATION	
Connector A: Power Input & Comms Port Connection: Connector, MilSpec, Panel, Plug, Bayonet, 8 Way, 12 Shell, Pattern 105, square flange, Mil-C26482, MS3112E12-8P			
Purpose		dc power input and Serial Comms	
Pins		**if RS-232**	**if RS-422**
	A	+V, dc power in	
	B	TX	TX+
	C	GND	TX-
	D	RX	RX+
	A	GND	RX-
	B	GND POWER	
	C	GND CHASSIS	
	D	unused	

[7] Refer to manufacturer for details.
[8] With compliant line connectors attached.

$$P_R = \frac{P_L \times \chi^2 \times \delta \times D_L^2 \times A_t \times \cos\beta}{4 \times R^2 \times A_L}$$

3 SET-UP

3.1 Mounts

The RangePRO has three mounting points, being M6 tapped holes, 6.5mm deep, located on the underside of the module. All three should be used when mounting the module.

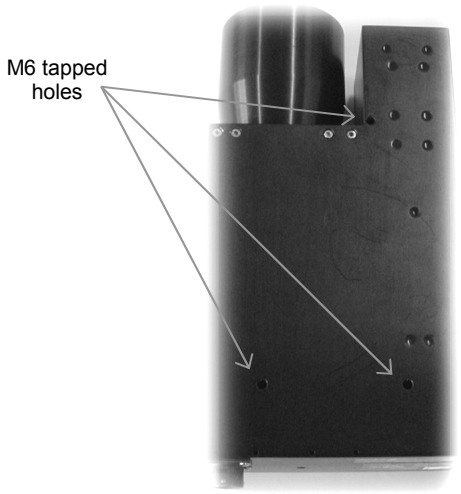

Figure 3-1: Mounts

3.2 Connections

CAUTION: do not connect or disconnect when external power is applied;
user-supplied connections must be correctly wired (see Connector/Pin Details).

The RangePRO has one connection point, being an 8 Way MilSpec panel plug on the rear of the module. Connect the appropriate user-supplied cable to this connector.

Figure 3-2: Connections

$$P_R = \frac{P_L \times \pi^2 \times \delta \times D_L^2 \times A_I \times \cos\beta}{4 \times R^2 \times A_L}$$

4 OUTLINE DRAWINGS

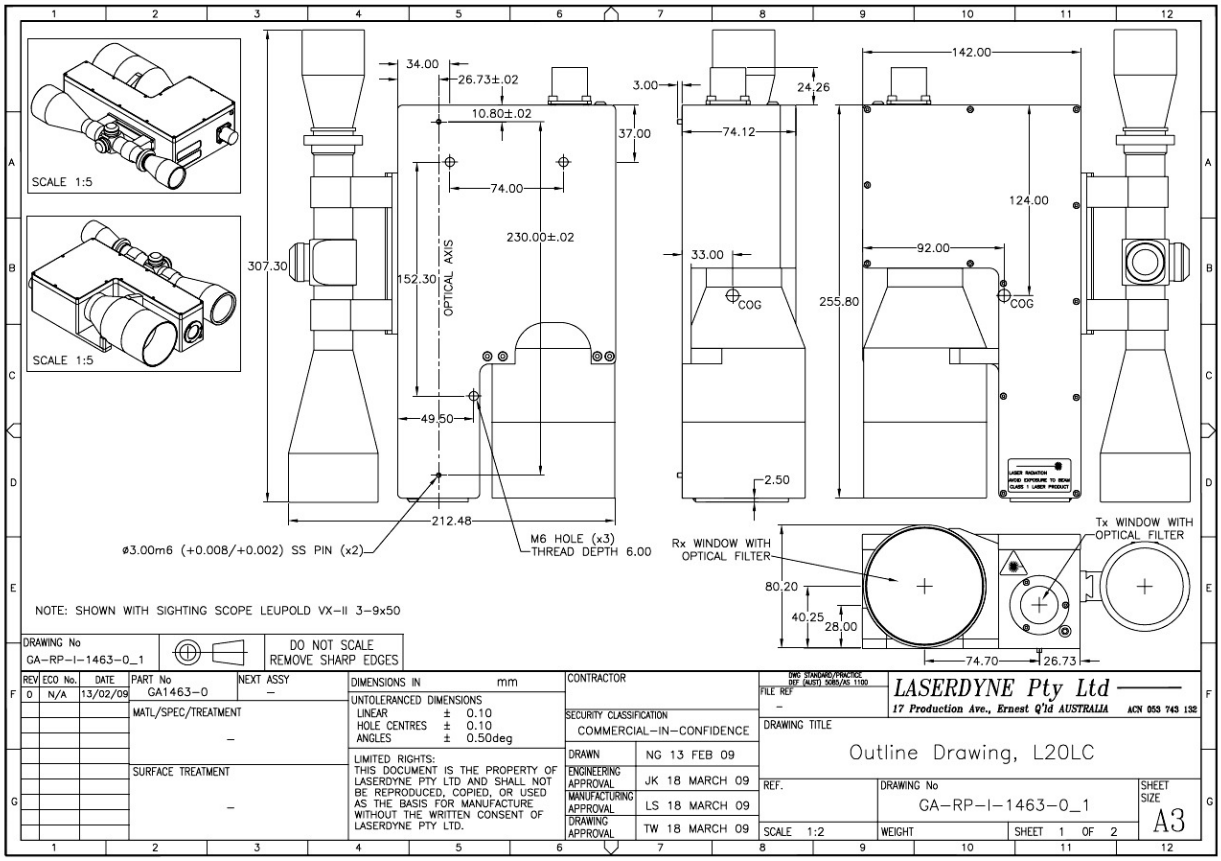

Figure 4-1: Outline Drawing

A Division of Laserdyne Pty Ltd
A.C.N. 053 743 132

17 Production Ave
Molendinar
Queensland 4214
Australia

Tel: (07) 5594 9772 Int'l Tel: 61 7 5594 9772
Fax: (07) 5594 9981 Int'l Fax: 61 7 5594 9981

email: laserdyne@laserdyne.com.au
website: www.laserdyne.com.au