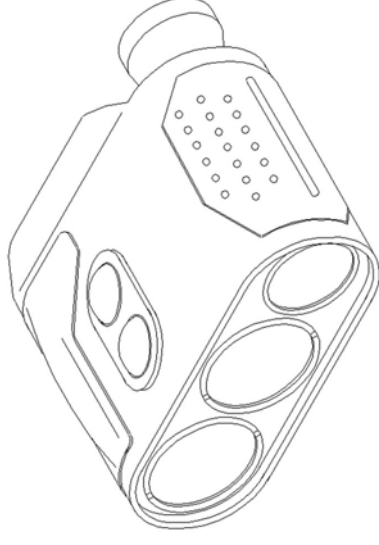




Operation Manual



LRM 2000PRO / LRM 2000PRC LASER RANGE FINDER MONOCULAR

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2331 Superior Ave., Cleveland, OH 44114, USA
105 Sparks Ave., Toronto, ON M2H 2S5, Canada

11. QUALITY CERTIFICATE

LRM 2000PRO LRM 2000PRC

The Unit indicated above has passed the quality inspection.

Production date _____

Serial number _____

Quality Inspector _____

Purchase date _____

10. CUSTOMER SUPPORT

Should you experience any difficulties with your NEWCON OPTIK product, consult this manual first. If the problem remains unresolved, contact our customer support department at (416) 663-6963 or toll free at 1-877-368-6666. Our operating hours are 9am-5pm, Monday - Friday, Eastern Standard East Time. At no time should equipment be sent back to Newcon without following the instructions of our technical support department. NEWCON OPTIK accepts no responsibility for unauthorized returns.

To locate NEWCON Authorized Dealer call:

Tel: +1(416) 663-6963 Fax: (416) 663-9065

Email: newconsales@newcon-optik.com

Web: www.newcon-optik.com

The defective products should be shipped to:

From the USA only:

2331 Superior Ave. Cleveland, OH 44114

From all other countries:

105 Sparks Ave., Toronto, ON, M2H 2S5, CANADA

IMPORTANT INFORMATION

Read prior to activation

You have just purchased a sophisticated electro-optical device that emits invisible laser radiation. To operate it properly, please, read this manual carefully.

- **NEVER** direct laser beam at the eyes of people or animals
- **NEVER** aim the unit at the Sun or bright sources of light
- **NEVER** subject the unit to impacts
- **NEVER** transport the unit without the case
- **NEVER** disassemble the unit. This may be hazardous for you due to high voltage
- **ALWAYS** keep the unit out of the reach of children
- **ALWAYS** remove the battery when the device is not in use for a long period
- **ALWAYS** store the unit in a dry place
- **Caution** - use of controls or adjustments, or performance of procedures other than those specified herein may result in hazardous radiation exposure
- **Caution** - use of optical instruments such as binoculars, loupes, mirrors, lenses, etc. with this product increases eye hazard
- Avoid eye exposure to direct laser beam or its close reflection

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If shipping from North America please include a cheque or money order payable to NEWCON OPTIK for the amount of US\$15.00 to cover handling and return shipping.

9. WARRANTY

NEWCON warrants this product against defects in material and workmanship for one year from the date of the original purchase, but no more than 18 months from the date of manufacturing.

Longer warranty is available, subject to the terms of the specific sales contract. Should your Newcon product prove to be defective during this period, please deliver the product securely packaged in its original container or an equivalent, along with the proof of the original purchase date to your Newcon Dealer.

Newcon will repair (or at its option replace with the same or comparable model), the product or part thereof, which, on inspection by Newcon, is found to be defective in materials or workmanship.

What This Warranty Does Not Cover:

NEWCON is not responsible for warranty service should the product fail as a result of improper maintenance, misuse, abuse, improper installation, neglect, damage caused by disasters such as fire, flooding, lightning, improper power supply, or service other than by a NEWCON Authorized Service.

Postage, insurance, and shipping costs incurred while presenting your NEWCON product for warranty service are your responsibility.

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**CAREFULLY READ ALL THE INSTRUCTIONS
BEFORE USING THE UNIT!**

**FAILURE TO OBEY THE INSTRUCTIONS WILL
VOID THE WARRANTY AND MAY CAUSE
INJURY!**

1. BRIEF DESCRIPTION

LRM 2000 Laser Rangefinder Monocular (the Unit) is an advanced laser range finder system that enables instant distance and azimuth measurement.

The Unit complies with CFR 21, Part 1040.10.

An outstanding fully multi-coated optics coupled with an original circuitry design creates a system that outperforms any other product in its class and price range.

1.1 Principle of operation

The Unit sends invisible, eye safe laser beam pulses to the target. The pulses reflected from the target are captured and processed by the digital circuitry. The time-of-flight delay between the sent and received pulses allows calculating the distance to the target.

8. TROUBLESHOOTING

The ranging does not work. The display is transparent.

Check the charge of the battery. Replace it if it is weak.

The ranging mode does not work. The display shows results of the last measurement or is transparent.

Wait for 8 seconds, and press the Action button again.

Compass shows zero at any direction.

Wait for 8 seconds, and press the Action button again. If this does not help, perform compass calibration.

Black dots are visible on LCD.

Liquid Crystal Display may have small black dots, scratches and other blemishes inherited from the manufacturing process. These flaws are strictly regulated by number, area and location and do not degrade the product's measurement capabilities.

Range measurement cannot be obtained.

- Make sure that neither your hand nor finger is blocking objective lens, laser emitting lens or receiver lens.
- Hold the unit firmly (avoid hand tremor) while pressing the Action button.
- Check that the target is within measuring range of the device.

7. STORAGE AND MAINTENANCE

The Unit is a sophisticated precision optical instrument equipped with laser and electronics. Therefore, it should be handled with due care.

- Keep away from direct sunlight.
- Avoid impacts, jolts, dust, moisture, and sharp changes of temperature.
- Do not use the device at temperatures higher than 50°C (122°F).
- Do not touch optical surfaces. Doing so may damage the anti-reflection coating.
- Clean optical surfaces only with professional camera lens cleaning supplies.
- Clean the exterior of the Unit with a soft clean cloth.
- Keep away from heating appliances and central heating.
- Remove the battery when storing the device for long time.
- All repair works must be performed only by an authorized service.

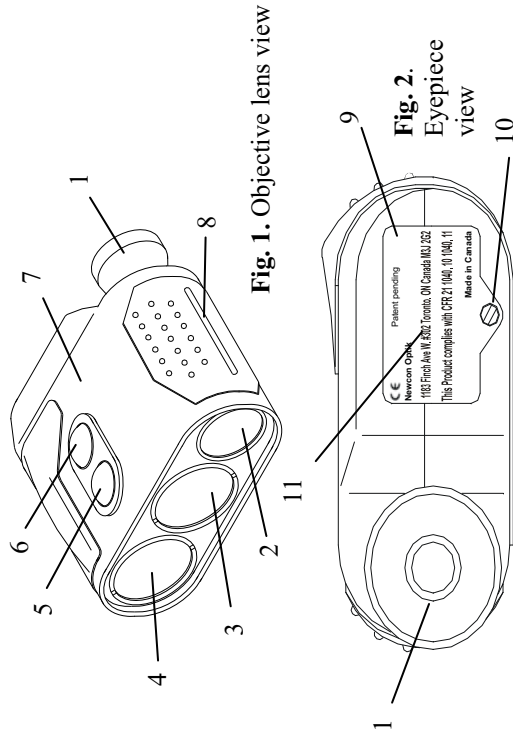
Built-in digital compass measures azimuth simultaneously with ranging.

1.2 Key Features

- Selection of the First, last or the most reflective target
- Distance is displayed in meters or yards
- Original digital circuitry allows ranging through most types of glass, bushes and other obstacles
- Three channel optical solution (optical, laser and receiver) provides high accuracy
- Two reticle shapes: ---|--- or \square
- Target quality display indicator assures results are reliable
- Built-in digital compass
- On-board memory keeps results of last 10 measurements, that can be recalled to the LCD
- The Unit automatically turns off when no button is pressed for 8 seconds
- Black (LRM 2000PRO) or camouflage (LRM 2000PRC) rubberised weatherproof body

2. DEVICE APPEARANCE

a wire in front of a building, selecting the “first” target (Code 12) will produce a more reliable result. Alternatively, when aiming at a chimney behind the trees, selecting “last” target (Code 11) will be better. By default the System assumes “auto” target selection, that is the object producing the most reflections will be considered a target.



- 1 - Eyepiece
- 2 - Objective lens
- 3 - Laser emitter lens
- 4 - Receiver lens
- 5 - M (Mode) button
- 6 - A (Action) button
- 7 - Body of the device
- 8 - Rubber grip
- 9 - Battery compartment cover
- 10 - Screw
- 11 - Identification imprint

Reliability of ranging depends on the number of impulses that reflect from the target and reach the Unit. The Unit informs the user:

TARGET REFLECTION LOW – ranging results have low statistical reliability,

TARGET REFLECTION MED – ranging results have medium statistical reliability,

TARGET REFLECTION HIGH – ranging results have high statistical reliability.

6. BEST MEASURING TECHNIQUE

Laser range finder measures distance by catching laser beam reflected from the target. Everything that improves reflection increases the measurement reliability and maximum range.

1. Use tripod when ranging remote targets. The longer is the distance, the greater is the beam shift due to hand tremor.
2. Aim at a surface on the target that is the closest to perpendicular to the laser beam. The closer you get – the stronger will be the reflection.
3. The Unit deploys sophisticated software that tries to understand which target you are aiming at. However, due to beam divergence several objects may produce a strong reflection. To help the System recognise the target the *Target Selection Logic* may be used. For example, if ranging

3. DELIVERY SET

3.1 Standard delivery set

LRM 2000 is supplied in the following assembly:

	Qty
LRM 2000PRO	1
9V Lithium (non-magnetic) battery	1
Soft carrying case	1
Neck strap	1
Operation manual	1
Warranty card	1

4. SPECIFICATIONS

Optics

Magnification	7x
Objective lens diameter	25 mm
Exit pupil diameter	3.6 mm
Field of view	8°
Type of coating	Fully multi-coated optics

Range Finder

Laser	Class 1, eye safe, 905 nm
Measuring range	20 m – 2,000 m
Accuracy	± 1 m
First, last and auto target selection	Yes
Meters/Yards display	Yes
Last 10 readings recall	Yes
Reticle	- + or □
Target quality indicator	Yes

Choosing **Cd 16** in Setup mode will cause all display segments and indicators to flash for 8 seconds. Flashing can be interrupted by pressing either button.

5.10 Compass calibration

If the System was exposed to a strong magnetic field or was inoperable for a long time, the compass accuracy may diminish. To prevent mistakes compass will then show 0° in any direction.

To return the compass into working condition:

- Select **Cd 17** in *Setup* mode
- Keeping the Unit horizontally perform one full rotation around vertical axis within one minute.
- If one rotation does not restore calibration – perform two rotations.

The normal compass functioning will be restored.

5.11 Additional display information

Additional indication is displayed in *Ready to Measure* mode:

Y or M	Indicates that distance is displayed in yards or meters; azimuth may or may not be measured
°	Indicates that only azimuth is measured

Mode	Display name	Distance	Azimuth	Reticle	Target selection logic
	Cd 9 - -	No change	No change	- -	No change
	Cd 10 <input type="checkbox"/>	No change	No change	<input type="checkbox"/>	No change
	Cd 11	No change	No change		Auto
	Cd 12	No change	No change		First
	Cd 13	No change	No change		Last
	Cd 14 ^{KMH}		Not implemented		
	Cd 15 ^{MPH}		Not implemented		
	Cd 16		Display test		
	Cd 17		Compass calibration		
<i>Data Recall</i>	rEC	Recalls last 10 measurement sets			
<i>Data Clear</i>	CLr	Clears all recorded data			

Some codes though displayed, perform no function, those are reserved for modifications of this device.

Once set, the mode parameter is stored in on-board power independent memory and will be kept current until reset in *Setup* mode.

Compass

Measured azimuth range

360°

Accuracy

±2°

Power

Battery

9V Lithium (non-magnetic)

Battery capacity

Min 5,000 measurements
(Scanning regime)

'Low Battery' indicator

Yes

Environmental

Operational temperature range

-25 / +50°C (-13 / +122°F)

Storage temperature range

-45 / +65°C (-49 / +149°F)

Mechanics

Tripod thread

1/4" x 20

Weight without battery

420 g

Dimensions

120 mm x 122 mm x 60 mm

5. OPERATION INSTRUCTIONS

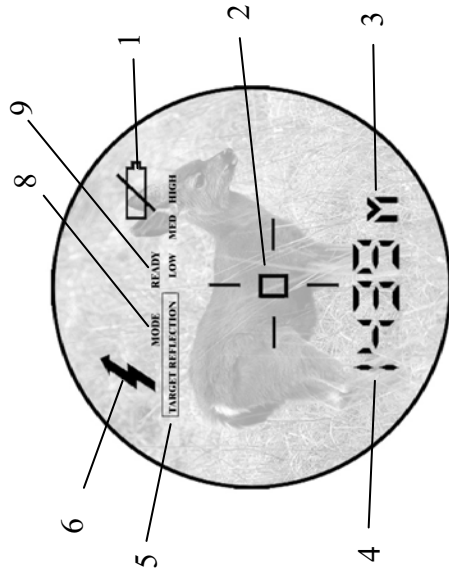


Fig. 3. Liquid Crystal Display as seen through the eyepiece

- 1 – Low battery indicator
- 2 – Reticle (either ---| or \square)
- 3 – Units of measurement
- 4 – Measurement result
- 5 – Target quality indicator
- 6 – Laser active indicator
- 8 – Setup mode indicator
- 9 – Ready mode indicator

With word *Ready* on the display press **M** button till display name **COdE** is displayed and press **A** button.

- Select the desired parameter modification (see table below). Press **M** button till the code name of the desired parameter is displayed and press **A** button.

To leave the *Setup* mode without changing measurement parameters press and hold **M** button for two seconds. This works like computer Esc key. The rangefinder will then keep the last set of parameters and return to the *Ready to Measure* mode.

Mode	Display name	Distance	Azimuth	Reticle	Target selection logic
<i>Ready to Measure</i>	Ready	As set at previous session			
<i>Standard1</i>	Std 1	m	°	-	Auto
<i>Setup</i>	COdE	Entrance point into Setup mode			
	Cd1 M	m	Not measured	No change	No change
	Cd2 Y	yd	Not measured	No change	No change
	Cd3 - °	Not measured	°	No change	No change
	Cd8	yd	°	-	Auto

distance and azimuth are measured – the set will consist of two numbers.

To enter *Data Recall* mode press M button in *Ready to Measure* mode until **rEC** is displayed and then press A button. First measurement set number (display name: **rEC 1**) will start flashing.

Pressing M button moves the Unit along the list of measurement set numbers and measurement results:

rEC 1, distance 1, azimuth 1, **rEC 2**, distance 2, azimuth 2, ...,

rEC 0, distance 0, azimuth 0.

If either azimuth or distance was not measured it shall not appear in the list.

Measurement sets are numbered in reverse order: first recalled set is the result of the last measurement.

Pressing A button at any moment within the list of recalled results (or pressing M button at the end of the list) brings the Unit to *Ready to Measure* mode.

Choosing **CLR** in *Setup* mode will erase all measurement data.

5.9 Setup mode

To modify the four *Ready to Measure* mode parameters:

- Enter Setup mode.

5.1 Changing battery

To install a battery:

- Unscrew the screw (10) and open the battery compartment cover (9) (Fig. 2)
- Take battery snap from the battery compartment and connect it to the battery
- Direct contact side of the battery towards the eyepiece
- Make sure cloth band is straightened across the battery and outside the battery compartment
- Slide the battery into the battery compartment contact side first; make sure wires are completely inside the battery compartment, while the end of the cloth band is outside
- Hook the farther from the screw edge of the battery compartment cover (9) over the edge of the battery compartment, close the cover and tighten the screw (10).

If the battery compartment cover does not close tightly and evenly check whether the battery snap wires are neatly packed inside the battery compartment and the cover is hooked over the edge of the battery compartment.

To take a battery out:

- Unscrew the screw (10) and open the battery compartment cover (9) (Fig. 2)

- Slide the battery towards the eyepiece a little bit with your thumb
- Pull cloth band up and take the battery out

Do not apply excessive power when changing battery.

Note: If other than non-magnetic battery is used calibrate the Unit after changing the battery (see *Compass calibration* below for more details).

The Unit is fully operational when battery voltage is higher than 7V. A 'LOW BATTERY' warning is displayed when battery voltage falls below 7.2V.

Note. Ni-MH rechargeable batteries capable of sustaining current drain of 250 mA could be used to power the System.

Note: Battery in metal casing will diminish compass accuracy. Non-magnetic batteries should be used for the utmost compass performance.

5.2 Measuring procedure

When the Rangefinder is off the LCD is blank. To activate it press and hold A button (6) for one second (Fig.1). At start the Unit comes into Ready to Measure mode indicated by the word 'READY' on the display visible through eyepiece.

Pressing A button (6) (Fig. 1) in *Ready to Measure* mode initiates measurement. The result of measurement is displayed in a form that depends on the measurement parameters (see Setup Mode).

- *Data Recall* mode (display name: **rEC**) and
- *Memory Clear* mode (display name: **clF**).

Flashing display name indicates the mode which can be selected by pressing A button (4).

Setup and *Data Recall* modes have submenus, so when A button is pressed to select these modes the Unit automatically enters the corresponding submenu. In the same way as with the mode switching M button switches between submenu items and A selects the needed one. When A button is pressed from the submenu the Unit comes into *Ready to Measure* mode with the selected parameter.

If no button is pressed for 8 seconds the Unit leaves the current mode, in *Ready* mode it switches off. Next time the Unit is turned on it assumes the last chosen combination of the four *Ready to Measure* mode parameters.

Note: On a special request menu of a particular unit can be simplified to show only required modes.

5.8 Data Recall mode

In *Data Recall* mode results of the last 10 measurements can be displayed.

Measurement results are saved in on-board memory in sets depending on the parameters set for measuring, for instance, if only distance is measured - the set will consist of one number, if

3. What reticle shape is visible: rectangular or crosshair, and
4. Which target is selected: first, last or most reflective (see *Target selection logic* for more details.)

Setup mode is described in more detail below.

The Unit has two standard sets of *Ready to Measure* mode parameters:

- **Standard1**: distance is displayed in meters, azimuth is measured, crosshair reticle is visible, auto target selection is used,
- **Code 8** sets the same set of measurement parameters as Standard1, except for distance measurement in yards.

At start the Unit assumes *Ready to Measure* mode with measurement parameters inherited from the previous setup. At manufacturing stage the Unit is set up into Standard1 set of measuring parameters.

5.7 Mode switching

Pressing M button (3) (Fig. 1) in *Ready to Measure* mode switches the Unit between modes of operation:

- *Ready to Measure* – **Ready** (9) (Fig. 3) is displayed
- Quick link to Standard1 set of measurement parameters (display name: **Std1**),
- *Setup* mode (display name: **C0dE**),

If measurement is unsuccessful four dashes ('----') will be displayed in the area (4) (Fig. 3). For successful measurement the target must be at least 20 m away.

If more than one parameter is chosen to measure, e.g. distance and azimuth, the results will replace each other on the display every second.

5.3 Maximum distance

Though maximum measurement distance depends on target reflectivity, weather conditions and other conditions, for most targets the Unit will provide accurate ranging for up to 2,000 meters.

Target reflectivity depends on its color, surface finish, size, shape, position in relation to the laser beam, etc. Bright target colors are more reflective than darks. A polished surface is more reflective than a rough one. Larger targets reflect better than small ones. Ranging a target perpendicular to the laser beam provides better results than the one positioned under a sharp angle to the beam.

Weather conditions that influence air transparency (rain, fog, snow, mist) reduce maximum range. Bright sunny days will reduce performance as well, as IR sun radiation may interfere with reflected laser impulses.

While the unit will measure through many glass types, measuring through glass may reduce accuracy.

Natural hand tremor decreases the accuracy of long distance ranging. Using of a tripod is highly recommended.

5.4 Target selection logic

On its way towards the target laser beam may reflect from various objects, thus decreasing ranging accuracy. The smaller, the farther, and the less reflective is the target – the higher is the possibility of obtaining an incorrect measurement.

To improve accuracy the Unit has a built-in target selection logic, which allows choosing which target to range: the nearest ('first'), the farthest ('last'), or the most reflective ('auto').

This mechanism helps selecting the target when ranging from behind the bushes, wires, through the falling snow, or in similar conditions. Similarly it enables ranging a target in front of a bigger object, such as a wire in front of the wall.

Note: Even with target selection logic the Unit may not always be able to range the desired target as its reflectivity may be too low to produce enough laser beam reflections for statistically reliable calculation. A warning will be displayed if result is not statistically reliable. See more about target reflectivity in *Additional display information*.

5.5 Individual Measurement and Scanning regimes

The Unit can operate in two regimes: (1) *Individual Measurement* and (2) *Scanning*. In *Individual Measurement*

regime the Unit performs single measurement when A button is pressed shortly, in *Scanning* regime the Unit repeatedly measures and displays results every second while A button is pressed.

Scanning or *Individual Measurement* regimes are available for any selected mode of measurement. When two parameters are measured in *Scanning* regime though both will be quickly displayed, the second one may be difficult to register by eye. Nevertheless all data is recorded and may be recalled (see *Data Recall mode* for details.)

5.6 Operation and service modes

The Unit has the following modes of operation:

- **Ready to Measure** – to perform measurements (Quick link to **StandardI** set of measurement parameters appears in mode selection menu for convenience and does not constitute a separate mode)
- **Setup** – to modify the *Ready to Measure* mode parameters,
- **Data Recall** – to recall the last 10 measurement results,
- **Data Clearance** – to clear measurement results.

In *Setup* mode four parameters of measurement can be set; these parameters define:

1. What the Unit measures: distance or azimuth or both,
2. In what units result of distance measurement is displayed: meters or yards, degrees