PRO SHOT™ L3

Operations Guide

Introduction

Thank you for purchasing a Pro Shot™ L3 laser system. You now have laser accuracy and productivity available for all of your work.

Your Pro Shot™ L3 is a rugged, reliable, high quality product, backed by a 12 month warranty. Warranty details are printed on page 17.

Please take the time to thoroughly read this manual. It contains vital information on how to safely get the most from your investment in laser technology.

Contents

Case contents (*can vary - may be ordered with different accessories*)

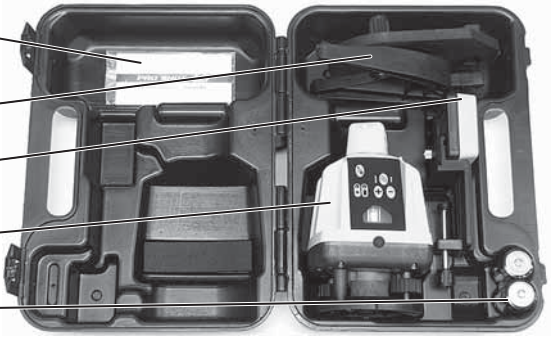
Manual, placard, operator cards

Vertical mount (optional)

Receiver (optional)

Laser transmitter

D-cell batteries



Battery installation

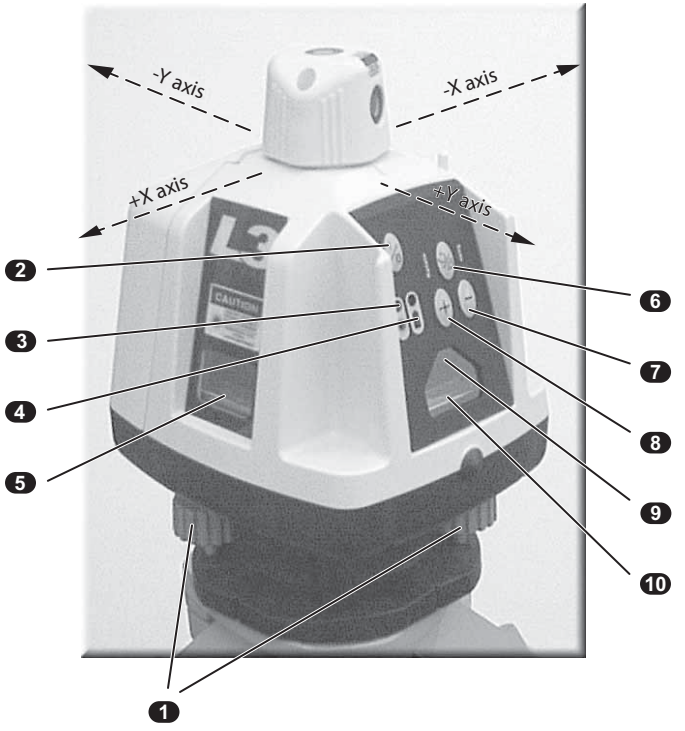
Always follow recycling directives for electronic waste

1 Pull firmly on tab at base of door to remove

2 Install batteries according to the instructions molded on the battery holder

3 Hook battery door at top of housing and push firmly at base of door to latch

CHARGE ONLY RECHARGEABLE BATTERIES


-Y axis
-X axis
+X axis
+Y axis
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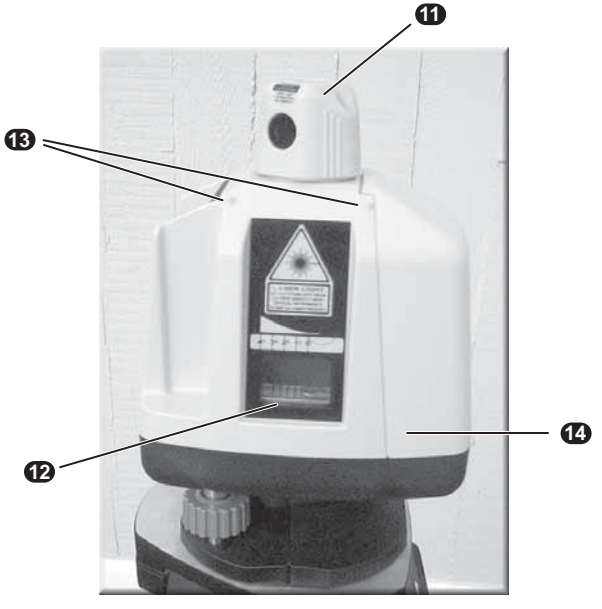
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12
14

1 Leveling knobs
Use the leveling knobs to center the precision level vials (No. 5 and 10 below) for horizontal work (see pg. 8 for setting slope vial). The leveling knobs are also used during vertical alignment (see pg. 10)

2 On / Off button
When the on / off button is pressed, the laser beam will be projected.

3 Laser-on indicator
This display comes on when the laser beam is being projected.

4 Low battery indicator
This indicator comes on when the batteries need to be replaced.

5 Y axis level vial
The Y axis level vial is used to indicate precise level in the Y axis. The leveling screw closest to the battery door levels this vial.

6 Rotate / Scan Selector Button
Use this button to change from 360° rotation to a scanning beam pattern.

7 Slower Rotation / Narrower Scan Button
Slows the rotation or narrows the beam scan pattern width.

8 Faster Rotation / Wider Scan Button
Speeds-up the rotation or widens the beam scan pattern width.

9 Vertical vial
The vertical vial is used to plumb the plane of laser light when the laser is in the vertical mode (see pg. 10).

10 X axis level vial
The X axis level vial is used to indicate precise level in the X axis. The leveling screw farthest from the battery door levels this vial.

11 Rotating Head
Turn the rotating head by hand to aim the stopped laser beam or scan sweep. After aiming the rotating head, there may be a 2-3 second delay before the beam begins scanning.

12 Slope vial
The slope vial allows the plane of light to be set to a slope. (see pg. 8)

13 Slope alignment sights
These sights are used to aim the direction of slope. (see pg. 8)

14 Battery charging jack
The charging jack is located inside the battery door next to the batteries. A rechargeable battery kit is available from the factory.

Calibration should be checked from time to time.

Although the **L3** is calibrated at the factory and is an exceptionally rugged laser, it is well worth the effort to check calibration before you first use it (after shipping) and then from time to time to insure that you are doing the highest quality work possible. Always check calibration if the laser has been handled roughly.

Check your setup.

Outdoors: Although not required, it is good jobsite practice when using any laser or optical instrument to check your setup from time to time. Use engineered benchmarks on the jobsite to assure that your setup is correct and matches the design of the job. On very large sites, or where accuracy is critical, take the necessary time to verify the elevation marks you have been given to work from. Realize that even engineered benchmarks may not be perfect and enough verification must be done to be confident you are properly set up. If there are not suitable benchmarks on the site, you can set your own by driving stakes and recording their elevations, or by marking the laser beam height on stable objects such as telephone poles, concrete walls, etc. The benchmarks should be 90^0 apart for greatest accuracy. Having benchmarks to check is of great value for jobs where setups need to match day after day. If you will only be using the setup for a brief time, this may not be needed.

NOTE: The laser beam must be rotating (not scanning) and the rotation speed must be set to maximum when using a receiver.

Indoors: The same logic applies, if you will need to setup the laser more than once for a particular operation, make reference marks, preferably 90^0 apart, along the plane of beam travel once you have set the laser up either horizontally or vertically. Check your setup from time to time using the marks as a guide. Use the marks as a guide for later setups.

Work as close to the laser as possible.

You can work up to 500 feet (152 meters) from the **L3** with the **R5e** receiver, or with the **MC-1** machine control receiver. As with all instruments, the farther away you work, the more any error can build-up. Set the laser in a safe place, as close to your work as possible.

Maintain your equipment.

Keeping tripod and mounting hardware tight, and being sure grade rods are in good condition, can prevent errors and performance problems.

Calibration
There is no set interval for checking the calibration of the L3, but calibration should be checked from time to time in order to ensure that the highest possible quality of work is being done. Calibration should always be checked if the laser has been handled roughly or shipped by common carrier.

Batteries
From time to time, remove the batteries and check the contacts for corrosion. Alkaline batteries will last far longer than carbon batteries. If you use NiMh rechargeable batteries, be careful to never charge alkaline or carbon batteries. Never run the laser from the charger unless there are rechargeable batteries installed. Keep a spare set of alkaline batteries in the carrying case to avoid down time.

Laser output windows
Regularly check the output windows for dust and dirt. Dust can be removed with a camera brush or clean compressed air.

Control panel and exterior
Clean the control panel and the other exterior surfaces of the laser with a soft damp cloth.

Tripod mounting thread
Occasionally, the threaded hole for the tripod bolt should be lubricated with a light oil.

Caution
Never store a laser in a wet carrying case. Moisture can get inside the laser this way. The laser can get wet from rain during normal operation and this is not a problem. However, once you are home or back at your shop, be sure to leave the laser out of the case long enough for both the laser and the case to dry off.

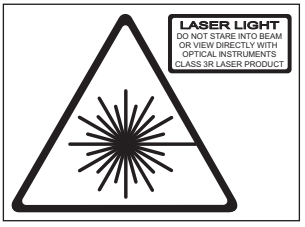
If the laser gets stored in the case wet for an extended period, and some water gets inside, remove the battery cover and place the laser and the open case in a warm, dry area until it is completely dry (free of condensation inside the windows).

Precautions that should be followed when using any laser.

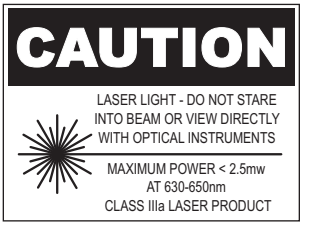
- Don't stare into the laser beam or view it directly with optical instruments.
- Don't disassemble the laser or attempt to service it.
- Don't use the laser until you have read the instruction manual and you are familiar with how to operate the laser properly.

U.S. OSHA requirements for operating visible lasers.

- Only qualified and trained employees are to install, adjust and operate the laser. (see operator card included with this manual package)
- Laser operators must carry proof of qualification.
- The area of a job site where a laser is being used must be posted with a laser warning placard (included with this manual package).
- The laser should be set up above eye level and never intentionally aimed at anyone.
- Turn the laser off when it is not being used, such as during lunch hour, at the end of the day, or during other long breaks in the work.



A warning placard is included with each laser. It may be attached to the carrying case - with the case placed in a visible location near the laser - for meeting job site posting requirements.



Note: The L3 transmitter is a class IIIa (less than 2.5mW) laser under the United States C.D.R.H. guidelines.

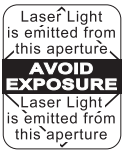
The L3 is a class 3R laser under the 1993 IEC 825-1 laser safety standard (revised edition of the European Norm EN60825).

The L3 conforms to applicable EC directives regarding RFI and EMI.

The L3 complies with FDA performance standards 21 CFR subchapter J.

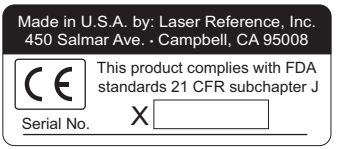
Caution and certification label locations

Aperture label



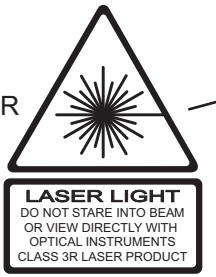
C.D.R.H. / Osha Caution / Class IIIa label

Serial / CDRH compliance and CE mark



Rechargeable battery warning (lower housing)

IEC class 3R label and laser light logotype



EC Declaration of Conformity

We, Laser Reference, Inc.
151 Martinvale Lane • San Jose, CA • USA
Tel. +1 408 361 0220 • www.proshotlaser.com

Declare that the products: **Pro Shot™ L3 Construction Laser**
R5e Laser Receiver

to which this declaration relates, comply with the relevant EMI and EMC requirements of European Standards EN 61000-6-1 and EN 61000-6-3

Responsible person	Signature	Place and date of issue
Colin L. Robson, President		San Jose, CA • January 2, 2006

Be sure to read "initial setup guidelines" (pg. 4) and set the laser on a quality tripod or a stable surface which will not change height or vibrate during your work. Do not use a pickup bed, plastic bucket or picnic table (we've seen all of these setups attempted with predictably poor results).

Use the two leveling knobs to center the bubbles in both precision level vials. When the bubbles are centered, start the laser by pressing the on / off (I/0) button.

If long distance operation is needed, the **L3** can be set-up in the middle of a site, covering a total diameter of 1000 feet (305 meters) with the R5e receiver, or the MC-1 machine control receiver.

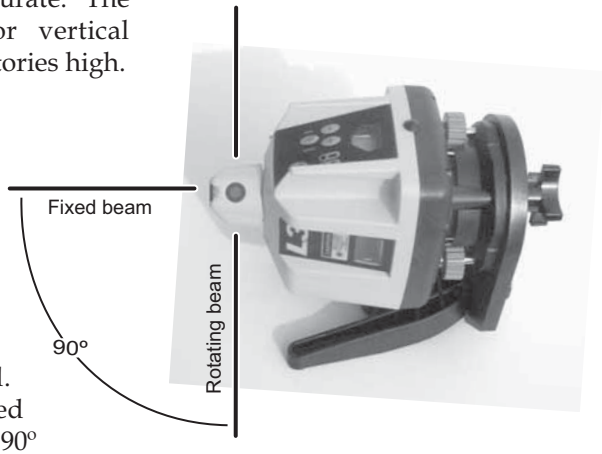
Note that there are three ways to project a level or sloped reference from the **L3** , full 360º rotation, scanning beam and fixed beam. 360º rotation is used when working outdoors with a receiver (always use maximum rotation speed when working with a receiver), or when indoors and a full plane is needed (at any speed that allows visibility). Scanning the beam is helpful when working indoors in brightly lit conditions, since the sweep of the beam is concentrated into a smaller area. Fixed beam (rotation off) can be used to locate the height of a specific spot. With the rotation off, the spot is aimed by manually turning the rotating head.

Slope setup

Aim the laser in the direction of the slope using the sights on the top of the laser housing, just above the slope vial window. Once aimed, adjust the Y-axis leveling knob until the left edge of the slope vial bubble is touching the desired slope mark. A sloped plane will be projected uphill from the front of the laser. The slope vial has increments for 0 to 4 percent slope. For slopes specified in inches per foot, use 1% for 1/8" per foot, use 2% for 1/4" per foot, etc. 1% is one cm per meter, etc. With the slope vial set, center the cross axis vial, re-check the slope vial and go to work.

Check both vials regularly to insure proper accuracy and check your setup against benchmarks from time to time.

When the L3 is in vertical mode, it is completely manual in operation and will not turn off if it is disturbed (just as when it is in horizontal mode). Check the vertical vial and your benchmarks regularly to be sure your work will be accurate. The L3 is designed for vertical alignment up to two stories high.



In vertical mode, the L3 projects a rotatable beam of laser light that can be used as a spot, rotated, or scanned. Simultaneously, a fixed beam is projected at 90º to the rotatable beam from the top of the rotating head. The 90º beam provides a convenient way to define right angle intersections for interior layout. See pg. 10 "vertical and line layout setups" for complete instruction on aligning the vertical plane of light.

The base of the L3 has four notches molded-in to quickly allow the transferring of points from floor to ceiling. By simply drawing an intersection with two lines, the base notches act as guides to align the L3 over the intersection. Once over the point, center the bubbles in the precision level vials. The laser will now be projecting a plumb spot overhead from the top of the rotating head.

Assemble the optional vertical mount and attach the laser to it. Remove the receiver from the rod clamp, turn it on and set it on your far point, laying it on its side. With the receiver pickup window facing the laser, use the beam center notch for alignment over the point.

Return to the laser/mount assembly and use the Y-axis leveling screw (now at the bottom of the laser) to rough center the vertical vial (visible through the window in the control panel now at the top of the laser) Note that the surface the vertical mount is resting on should be reasonably level. Turn the laser on and stop the beam rotation (using the - button). Turn the rotating head to project the beam downward toward your near point while you rough align the assembly. Turn-on the rotation while keeping the beam on the near point and sliding the base of the assembly until the receiver's audio tone begins.

The X-axis leveling knob (now near the top of the laser) is used as a fine mechanical line control to center the beam plane on the receiver. The receiver's audio tone will become constant when the beam is centered on the receiver. Make a final adjustment of the vertical axis vial after the alignment is done and re-align to the receiver if necessary. Note that the laser is completely manual when in the vertical mode and you will have to check the bubble from time to time to insure accuracy. Draw a line around the feet of the mount to allow you to verify that the mount has not been moved.

The mount can also be attached to a tripod for vertical setups.

Check the vertical vial and your benchmarks regularly to be sure your work is accurate. The L3 is designed for vertical alignment up to two stories high.

Level Alignment

The L3 Provides a planar reference for level alignment needs such as:

- Setting concrete forms
- Grading and landscaping
- Digging footers and basements
- Checking and leveling floors
- Soffets and cut-offs
- Plug and switch heights
- T-bar ceilings

Vertical Alignment (see photo on page 10)

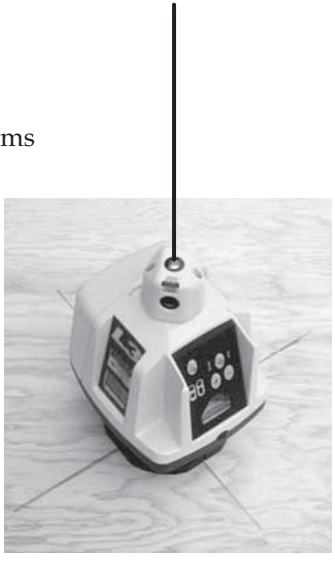
Along with its ability to project a level reference plane, the L3 has a built-in manual vertical vial. When the L3 is in the vertical position, the vertical vial located under the window in the control panel is used to plumb the rotatable beam of laser light. When the pl‹ ne can be used for:

- Aligning bolts and wall plates
- Layout work
- Plumbing walls and panels
- Transferring lines from floor to ceiling
- Aligning and plumbing posts and tall forms

Plumb Spot

The L3 projects a laser spot from the top of the rotating head that can be used for:

- A reference beam at 90° to the rotatable beam to assist with layout tasks when the laser is in vertical mode.
- A plumb beam for transferring points from floor to ceiling.



R5e Receiver

When your work takes you outdoors, a receiver is essential. No rotating laser can be used outdoors in direct sunlight without a receiver, as it would not be safe or legal to put out enough laser power to make the rotating beam visible in those conditions. The R5e receiver has been designed to provide excellent performance with the L3 laser.

- 2" reception height
- Five channel LCD front display
- Selectable tone (hi, low, off)
- Accuracy: ± 1/16"
- 60 hour battery life
- 120º reception angle
- One year warranty

NOTE: The laser beam must be rotating (not scanning) and the rotation speed must be set to maximum when using a receiver.

VM2 Vertical mount

The optional VM2 vertical mount allows the laser to be setup for vertical applications (see pg. 10 for more information on on vertical setups). The VM2 can be tripod mounted for vertical work and it can be fastened to a wall using the molded-in holes.

Aluminum Tripod

The model T2 adjustable aluminum tripod provides a stable platform for outdoor or indoor work. Allowing a beam height from approximately 4 feet to 6 feet above the surface it rests on, the T2 is an excellent choice for typical construction setups. The T2 is a flat head tripod with a 5/8-11 male mounting thread.

Aluminum Grade Rod

The model GR2 grade rod is a 14 foot long, 4 section aluminum grade rod available in either Feet / Inches / Eighths of an inch, or Feet / Tenths / Hundredths of a foot.

Ceiling Bracket

The CB bracket replaces the fixed "Y" shaped part of the optional VM2 mount to allow height adjustment for T-bar ceiling setups and more flexibility for vertical setups. If you often do T-bar ceiling work, or need more precise vertical adjustability than the basic mount provides, this bracket will be a great addition to your system.

Magnetic Target

The MT1 magnetic target is used to display the visible beam of the L3 and provide a relative position indication. Used when installing T-bar ceiling and steel stud wall framing, the magnetic target allows hands free alignment.

B5X Rechargeable Battery Kit

On the lower section of its housing, the L3 has a built-in jack for recharging batteries. The B5X rechargeable battery kit provides two industrial grade NiMh batteries and a battery charger designed for a 16 hour charge time. NiMh batteries provide approximately 2/3 the operating time of alkaline batteries and they are an environmentally friendly upgrade for your system.

Calibration should be checked from time to time.

Although the L3 is calibrated at the factory and is an exceptionally rugged laser, it is well worth the effort to check calibration before you first use it (after shipping) and then from time to time to insure that you are doing the highest quality work possible. Always check calibration if the laser has been handled roughly.

Calibration procedure.

Note: Refer to the picture on page 2 for a diagram of the "X" and "Y" axis directions used during this calibration procedure.

1. Start with a tripod or stand that has been leveled (using a carpenter's level) to allow the laser to be turned to different positions with minimal re-leveling of the level vials. Attach the laser to the tripod or stand approximately 50 feet (15m) from a wall or other stable vertical surface. We will call the vertical surface the target. If the target has direct sunlight on it, you may have to shade the surface to see the laser spot clearly.

2. Turn the entire laser so that either direction of the x-axis is aimed at the target. Turn the laser on and push the "-" button until the rotation stops. Precisely level the bubbles in the precision level vials.

3. With the rotation stopped, point the laser spot at the target by manually turning the rotating head and make a mark at the beam center on the target.

4. Return to the laser and rotate the entire unit 180 degrees so that the opposite direction of the X-axis is aiming at the target. Carefully re-level the bubbles in the X and Y axis precision level vials. Once again, point the laser spot at the target by manually turning the rotating head and mark the beam center.

5. The difference between the two marks (if any) is double the difference between how the laser is calibrated and true level for the X-axis. Half way between these two marks is true level. Make a long level mark at true level. If the difference between either outer mark and true level is within your working tolerance, go on to step 8. If not, continue with the next step.

6. Adjust the X-axis leveling screw until the beam is on the true level mark established in step 5. Remove the black rubber plug from the X-axis calibration port under the laser housing (shown in the picture on the next page). Using a 3/32" hex driver, adjust the X-axis vial until it indicates level.

7. Rotate the laser 90 degrees to aim the +Y-axis (control panel) at the target. Precisely re-level the bubbles in the precision level vials. Check the reading at the target. If the reading is on, or within tolerance of the true level mark, calibration is complete. If not, continue on.

8. Adjust the Y-axis leveling screw until the beam is on the true level mark established in step 5. Remove the black rubber plug from the Y-axis calibration port under the laser housing (shown in the picture on this page). Using a 3/32" hex driver, adjust the Y-axis vial until it indicates level.

Calibration is now complete.

Y-axis calibration port

X-axis calibration port

The receiver does not pick-up the laser or performs strangely.

• Be sure the laser is transmitting a beam (if in doubt, stop the rotation and view the laser spot on a target). ⚠ Never look into the beam output window! Make sure that the laser beam is rotating (not scanning) and that the rotation speed is set to maximum.
• If the above does not help, try replacing the receiver battery.

The laser will not operate, there is no obvious damage.

• If the low battery indicator is on, or you suspect the batteries may be dead, replace the batteries.
• Check the battery contacts to be sure that they are clean.

The receiver shows an on-grade at two different heights.

• Check the jobsite for windows or mirrored surfaces that might be reflecting the laser and causing the other reading.
• Check for others on the site using a rotary laser.

The laser was knocked over.

• Visually check the optics for damage.
• Inspect the laser for any other physical damage.
• Check to see that the laser is transmitting a beam by viewing the beam on a target. ⚠ Never look into the beam output window!
• Turn the laser rotation on and check for unusual noise or vibration.
• Check the calibration and adjust as needed.

The laser only works at short distances.

• Check the output window on the rotating head of the laser for heavy dust or moisture. Remove dust with a camera brush or blow off gently with clean compressed air. Allow moisture to dry.

The receiver does not indicate "on grade" at long distance.

• Be sure you have not exceeded 500ft (152m) from the laser.
• Check the output window on the rotating head of the laser and the red receiver window for dust or moisture. Remove dust with a camera brush or gently blow with clean compressed air. Remove any moisture.

The laser shuts off after running for only a few minutes.

• If the red low battery indicator is flashing, replace / recharge batteries.
• If there is no indication at all, check for dead batteries.

12 month warranty coverage

The L3 laser transmitter is warranted for twelve (12) months from the date of new equipment purchase from an authorized dealer. During the warranty period, Laser Reference, or its authorized service center, will repair or replace, at Laser Reference's sole discretion, laser transmitters free of charge, (except for transportation costs) if the products are found by Laser Reference, or its authorized service center, to be defective in either materials or workmanship. Maintaining the calibration of the product is not the responsibility of Laser Reference or its authorized service centers. If service is needed, the product(s) must be sent FREIGHT PREPAID to the nearest authorized service center or to Laser Reference at the address printed on the back of this manual.

L3 Transmitter Specifications

Range with R5e receiver	500' rad./ 1000' dia. (152m/305m)
Leveling accuracy	±40 arc sec. (± 1/8in per 50ft) (±3mm per 15m)
Vertical capability	Built-in vial, optional mount
Rotational coverage	360 degrees
Scan angle selections	15º, 30º, 45º, 90º (approximate)
Rotation speed	Variable in steps: 0 to 450 rpm
Rotating beam power	2.0mW (nominal)
Slope vial	Graduations of 1%, 2%, 3%, 4%
Power supply	Two D-cell batteries
Battery life	70 hours (alkaline)
Rechargeable batteries	Optional NiMh kit available
Environmental	Dust and water resistant (IP54)
Warranty	12 Months - defects coverage
Safety	CDRH Class IIIa • IEC 825-1 Class 3R
Operating temperature	14ºf to +122ºf (-10ºc to +50ºc)
Storage temperature	-40ºf to +140ºf (-40ºc to +60ºc)
Height / Weight	8.4in (21.5cm) / 3.0lb (1.36kg)

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Customer information

Laser Serial number _____

Receiver S/N _____

Date of purchase _____

Part No. 070-9500 Version 1.2