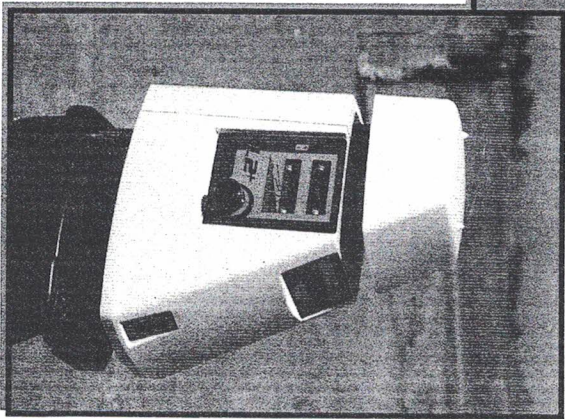
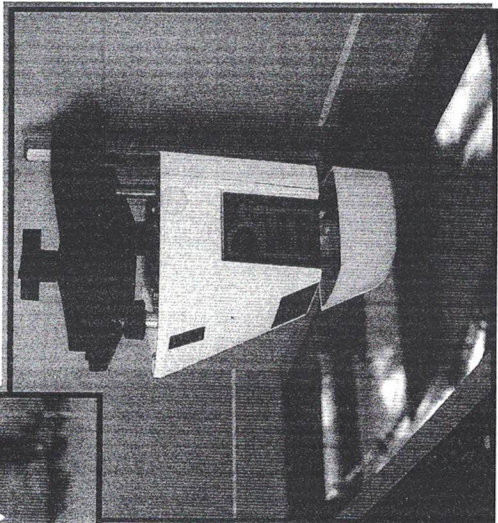
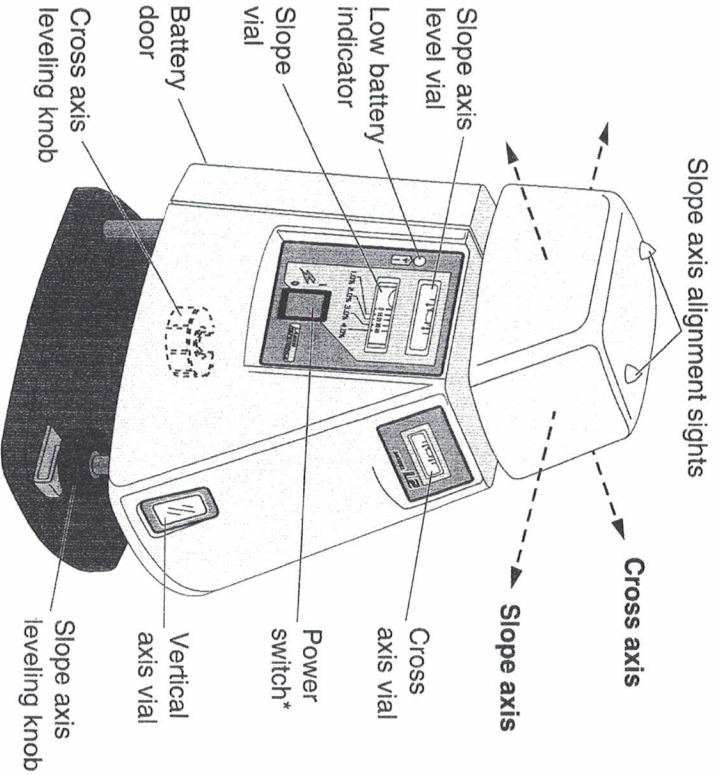


**PRO SHOT™ L2 & L2+**

**Operations Guide**



36 MONTHS  
Guardian Warranty • Guardian Warranty



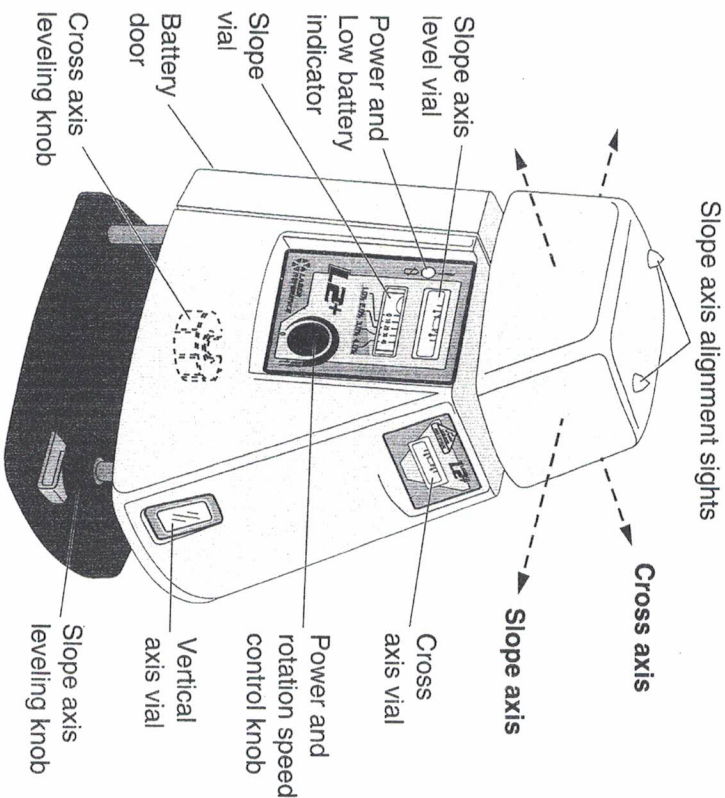
\*Note: When the power switch is turned on, the rotating mirror may spin at high speed for a few seconds.

**Before using the L2, please read through this manual to be sure that you have a complete understanding of how to operate the system properly and safely.**

The L2 projects a plane of invisible laser light by rotating a laser beam and can cover an entire job site with this plane. The projected plane of light is used as an alignment reference for level, vertical or sloped applications (see initial setup guidelines on page 6 and the more specific setup guidelines on pages 10 through 13). The plane of light is sensed using a hand held or rod mounted receiver (see page 14 for receiver information).

- Leveling the plane of light is accomplished by adjusting the slope axis and cross axis leveling knobs until the slope axis and cross axis level vials are centered.
- To set a slope into the plane of light, aim the laser parallel to the direction of slope using the slope axis alignment sights. adjust the slope axis leveling knob until the leading edge of the slope vial bubble touches the desired slope indication (see page 12 and 13 for more details). Check to be sure that the cross axis vial is still centered.
- To activate the laser, simply press the top of the power switch so that it rocks to the "I" position. When not in use, move the power switch rocker to the "0" position.
- The vertical axis vial is used to plumb the plane of light when the L2 is setup for vertical work (see page 11 for more details).
- The low battery indicator will flash when it is time to replace the batteries.
- To replace the batteries, the battery door is removed using a straight slot screwdriver or the end of the calibration wrench supplied with the laser.

The L2+ incorporates a vial illumination system to make leveling the instrument easy in low light conditions. Every time the power knob is rotated on, the vials will be illuminated for three minutes.



**Note:** When using a receiver to pick-up the laser height, be sure the laser rotation speed knob is fully clockwise for maximum (600 rpm) rotation speed.

**Before using the L2+, please read through this manual to be sure that you have a complete understanding of how to operate the system properly and safely.**

The L2+ projects a plane of visible red laser light by rotating a laser beam. The plane of light appears as a red stripe on the work surface for use indoors, or the beam can be sensed with a receiver outdoors (see pg. 14 for receiver information).

- Leveling the plane of light is accomplished by adjusting the slope axis and cross axis leveling knobs until the slope axis and cross axis level vials are centered.
- To set a slope into the plane of light, aim the laser using the slope axis alignment sights. Then, adjust the slope axis leveling knob until the leading edge of the slope vial bubble touches the desired slope indication (see page 12 and 13 for more details).
- To operate the laser, simply turn the power and rotation speed knob clockwise. Turning the knob adjusts the rotation speed. Slower speeds make the beam more visible in bright light conditions. When not in use, turn the knob to the "0" position. When using the receiver to sense the laser height, make sure the knob is turned fully clockwise (maximum speed).
- The vertical axis vial is used to plumb the plane of light when the L2+ is setup for vertical work (see page 11 for more details).
- The power/low battery indicator displays a constant green light when the power has been turned on and flashes rapidly with a red light when it is time to replace the batteries (S/N's below +033000 have a slow flashing red power on indication).
- To replace the batteries, the battery door is removed using a straight slot screwdriver or the end of the calibration wrench supplied with the laser.

**Check the stability of your setup**

The Pro Shot™ L2 and L2+ systems are manually leveled. You must check the vials periodically to ensure that your readings will be accurate. With a manually leveled laser, your setup is very important. When using a tripod, a wooden tripod is highly recommended due to the inherent stability of wood when exposed to temperature changes and sunlight. With an aluminum tripod, you will need to check the laser more often and fiberglass tripods are not recommended due to their inherent poor stability with temperature changes. Be sure that all tripod adjustment points are tight and push the feet of the tripod into the ground when possible. Check your setup from time to time using benchmarks to assure that your work will be accurate. The benchmarks should be 90° apart for greatest accuracy. If there are not suitable benchmarks on the site, you should set two of 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, curbs, hydrants, etc.

**Allow time to settle in**

After the Pro Shot™ is mounted securely to the tripod, give it a few minutes to settle in at the current temperature. This prevents having to re-center the vials too often.

**Work as close to the laser as possible**

Using a receiver, you can work up to 500 feet (150 m) from the laser. As with all instruments, the farther you go the more an error can add up. Set the laser in a safe place, as close as you can to your work.

**Precautions that operators should follow when using any laser.**

- Don't stare into a laser beam or view it directly with optical instruments.
- Don't dis-assemble 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.

**OSHA requirements for operating visible lasers (L2+).**

*(not required with the invisible beam L2)*

- Only qualified and trained employees are to install, adjust and operate the laser.
- 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 L2+).
- The laser should be set up above head 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 breaks in the work.

**Caution and certification label locations**

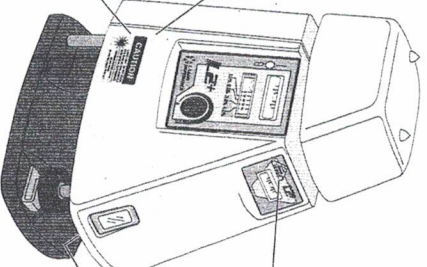
Labels for lasers sold where IEC standards apply



- or -

**CAUTION**

LASER LIGHT DO NOT STARE INTO BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS  
MAXIMUM POWER <math>2.5\text{mW}</math> AT 635nm  
CLASS II LASER PRODUCT



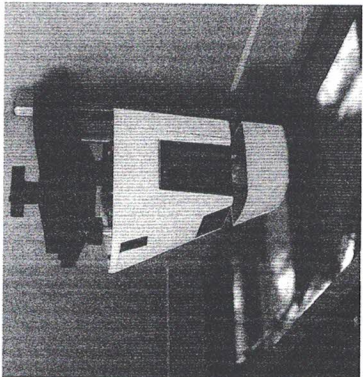
**AVIATION REFERENCE**  
480 Shiloh Avenue • Champaign, IL 61820  
MODEL SERIAL  
Complies with FAA performance standards 21 CFR subchapter J  
MANUFACTURED BY AVIATION REFERENCE

For lasers sold in the U.S. and Canada

**Interior Alignment**

With its highly visible red beam, the L2+ is naturally suited for common interior alignment needs such as suspended ceilings. The plane created by the rotating beam is also perfect for many other types of work:

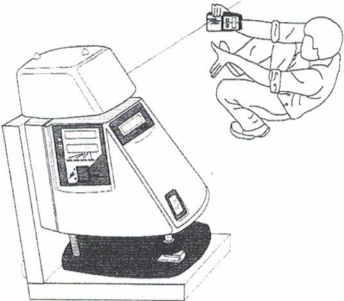
- Setting cabinets to height
- Chair rail and wainscoat
- Tile height and alignment



**Vertical Alignment**

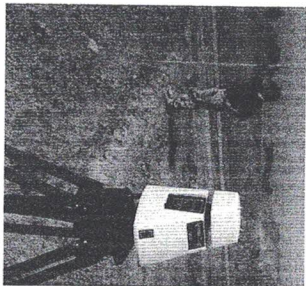
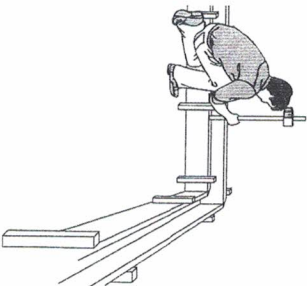
Along with their ability to project a level or sloped reference plane, both the L2 and L2+ have a vertical vial, allowing the projection of a plane of light that is plumb. This plumb plane can be used for layout indoors using the visible L2+ (or outdoors with a receiver using either laser) and for:

- Plumbing walls and panels
- Aligning and plumbing posts
- Replacing chalk lines on irregular ceilings

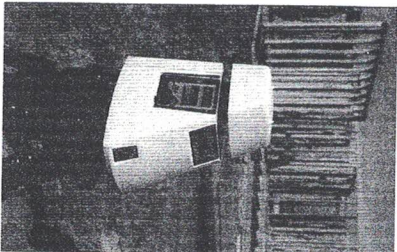


**Exterior Level And Sloped Alignment**

From setting concrete forms to checking grades with one person the plane of light projected by the L2 and L2+ can make your work more productive and accurate.



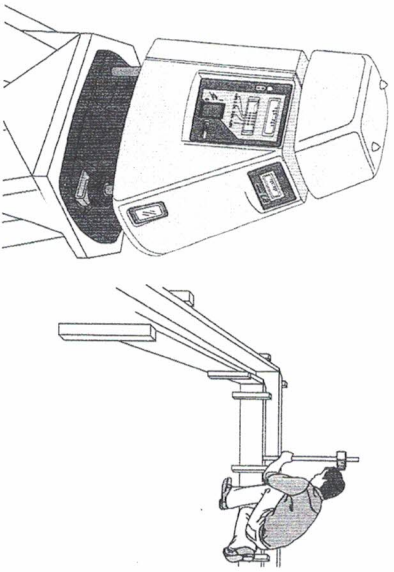
- Concrete forms - continuous or stepped
- Level or sloped pads and basements
- Excavating for drainage
- Septic tank and leach field excavating
- Leveling mobile buildings
- Decks and patios
- Post and stud cut-offs, siding alignment
- Pool excavating and setting tile height
- And much more



Follow the suggestions in the "Initial Setup Guidelines" section. Center the cross axis level vial and the slope axis level vial (upper vial). The level vial on the slope axis is the precision vial for level setups (refer to the controls and displays section on pages 2-5 for more information).

Aiming the laser when doing level work is only important due to the support post at the back of the laser when you are working more than 30ft (9m) away from the laser. The post blocks some of the beam sweep beyond 30ft (9m). Since the system will operate out to 500 feet (150 meters), simply setting the laser up at the edge of the work is usually sufficient. In the event that a very long distance must be covered, the laser can be set-up in the middle of the site allowing a total of 1000 feet (300 meters) in line with the cross axis.

**Regularly check the level vials to be sure they are still centered and check your setup against benchmarks.**



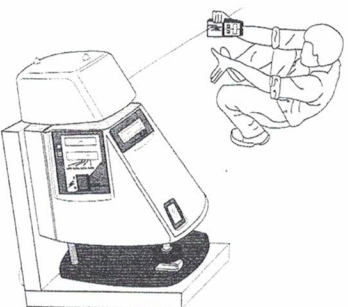
Follow the suggestions in the "Initial Setup Guidelines" section. Attach the laser to the optional vertical mount as shown. Go to the far point and set the receiver on the far point. Use the triangular center mark on the label at the base of the receiver for alignment. Turn the receiver on.

Return to the laser/mount assembly and set the edge of the mount that is just below the laser's beam exit slot over the near point. Rough-in the alignment of the assembly by sliding the end of the assembly where the securing knob is located until the receiver picks up the beam, keeping the other edge of the mount over the near point. Use the slope axis leveling screw (now at the top of the laser) to adjust the laser until the vertical axis vial (visible through the small window) is roughly centered.

Use the cross axis leveling knob to center the beam plane on the receiver. The audio indicator will be on constantly when the beam is centered on the receiver. Make a final adjustment of the vertical axis vial after the alignment is done.

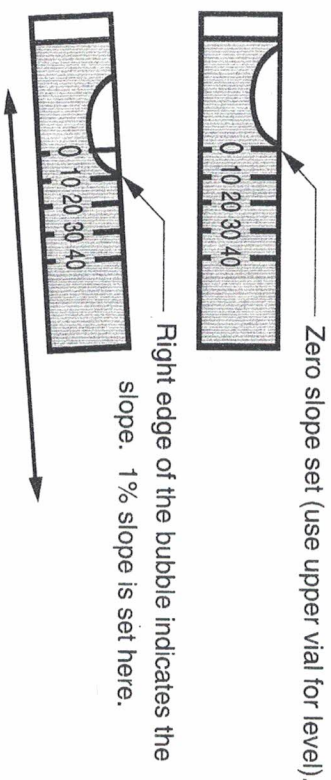
If it is necessary to use a tripod, attach the vertical mount to the tripod using the 5/8-11 threaded hole. Hang a plumb line over the edge of the mount just below the laser's beam exit slot. Shift the laser/mount assembly until the plumb line is over the point. Tripod setups can be difficult, setup at ground level whenever possible.

**Check the vertical vial and your benchmarks regularly to be sure your work will be accurate.**

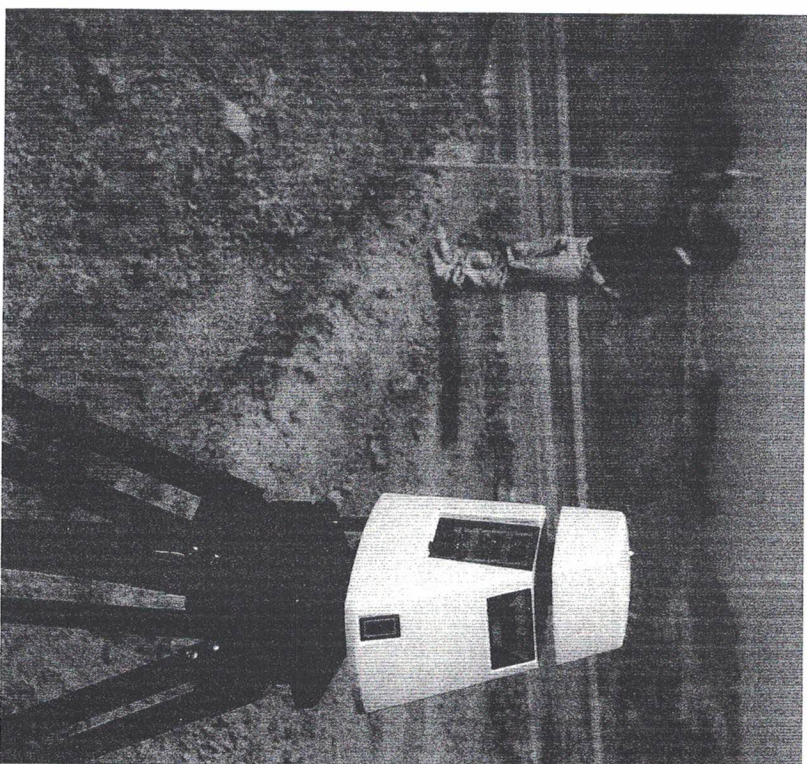


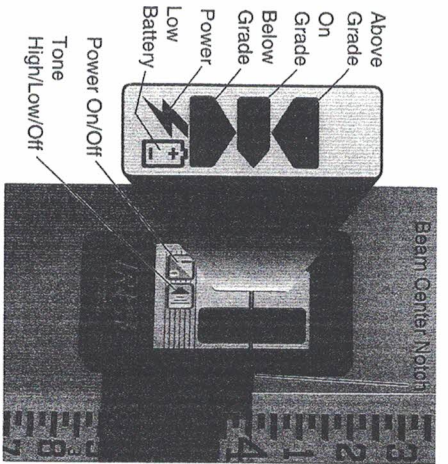
Follow the suggestions in the "Initial Setup Guidelines" (page 6). Aim the laser in the direction of your slope using the sights on the top cap of the laser housing. Once aimed, adjust the slope axis leveling knob until the right edge of the slope vial bubble is touching the desired mark (see picture below and refer to the controls and displays section on pages 2-5 for more information). Once the power switch is turned on, a sloped plane will be projected uphill from the front of the laser and downhill from the back of the laser. The slope vial is marked in increments from 0 to 4 percent slope. Finer slopes can be estimated between the marks. 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 centimeter per meter, etc. With the slope vial set, center the cross axis level vial and then check the slope vial again.

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



In the picture below, the laser is setup parallel to the centerline of the ditch at a slight offset, with fall running downhill from the rear of the laser. The laser may be setup at any offset as long as the sights are aligned parallel to the direction of the desired slope.

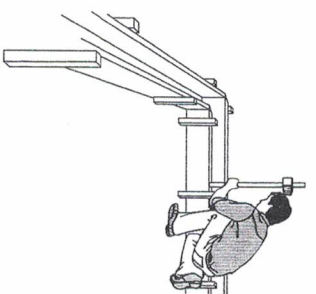




The R4 receiver can be attached to a grade rod, or removed from the clamp and used alone for reference marks on walls, floors, or other surfaces. The R4 senses the laser beam and displays elevation information. When the R4 is exactly at the beam height, the center segment is displayed. If the R4 is high or low, either the above grade or the below grade segment will be displayed and the direction to move the R4 to get on grade will be indicated. The R4 has two controls, a power on/off button and a tone high/low/off button. The R4 automatically turns off if no laser beam strikes are received for twelve minutes. The tone function will be on high (loudest) when the R4 is powered on. Pressing the tone button once changes the tone to low, twice turns the tone off. When the tone is off, there will still be a single tone the first time the R4 senses a laser signal. Pressing the tone button again will turn the tone back on loud. The R4 is powered by a 9 volt battery that lasts 60 hours. When the battery is used up, the low battery indicator will be displayed. To replace the battery, locate the battery door on the back of the housing and slide it toward the bottom of the receiver. The door can stay attached to the housing when it is fully open. Lift the battery out of the compartment (you may need to tap the R4 on your palm to release the battery). Replace the battery following the diagram molded on the battery door.

**R4 Receiver**

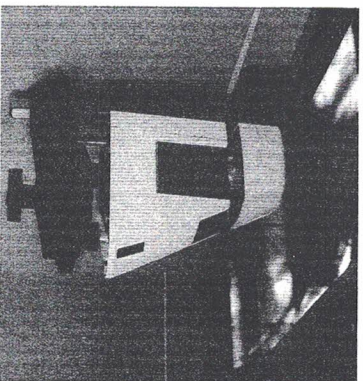
When operating the L2+ outdoors, a receiver is needed. Any visible beam rotating laser becomes essentially invisible when used outdoors during the day. The receiver (see opposite page) allows you to locate the height of the plane of light and comes with a clamp for attachment to a grade rod or stick. You can transfer an elevation to other places on a site for many uses including setting forms and checking grades.



Another big advantage of using a rotating laser is the ability for two or more workers to use the same laser reference plane at the same time by giving each person a receiver.

**Grid mount / Magnetic target**

The grid mount allows the laser to be hung from a piece of accoustical ceiling wall angle, or attached to the wall by screws. The mount is height adjustable for aligning the wall angle pieces (finished ceiling height) or when lowered, to use the magnetic target for setting the grid to height. The grid mount also functions as a vertical mount for performing layout and plumbing operations.





**Calibration**

Calibration of the laser should be checked from time to time following the procedure on page 18 and 19 of this manual. The calibration should be checked especially after shipping or any rough handling of the laser.

**Batteries**

From time to time, remove the batteries and squeeze the ends of the battery holder toward each other to increase contact tension. Check the contacts for corrosion. Remove the batteries if the laser will be stored for an extended period of time. Alkaline batteries will last far longer than carbon batteries.

**Laser output windows**

Regularly check the rotating mirror assembly and the output window below it for dust and dirt. Dust can be removed with a camera brush or clean compressed air.

**Protective windows**

Clean the windows that protect the level vials 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 put the laser into a carrying case that is wet inside. Moisture can get inside the laser. If this happens, remove the battery cover and place the laser in a warm area until dry.

**The laser will not operate and there is no apparent physical damage.**

1. For either the model L2 or the L2+, if the battery indicator light is flashing **rapidly**, the batteries need to be replaced. For L2+ lasers with S/N's below +033000, power on (and OK) is indicated by a slow flashing red light. For L2+ lasers with S/N's above +033000, a constant green light indicates power on (and OK).
2. Remove the batteries and squeeze the top and bottom battery contacts toward each other to increase contact tension.
3. Check to see that there is nothing physically preventing the rotating mirror from spinning.

**The receiver will show an on-grade indication at two different heights, or it will only show some of the segments.**

1. Check the jobsite for windows or mirrored surfaces that might be reflecting the laser and causing the other reading.

**The laser was knocked over, but still seems to work.**

1. Visually check the rotating mirror for damage.
2. Use the receiver to check that the laser is transmitting.
3. Check the battery holders for loose contacts.
4. Inspect for physical damage such as bent leveling screws.
5. Check the calibration and adjust as needed.

**The laser only works at short distance, or the receiver displays up and down arrows but doesn't display on grade.**

1. Check the rotating mirror and the window just below it for heavy dust or moisture. Remove dust with a camera brush or clean compressed air. Allow moisture to dry.

**(L2+) The receiver displays a level bubble with an "X" through it and will not give any height indication.**

1. Rotate the speed control knob fully clockwise to get the rotation speed up to 600 rpm.

••• *Calibration is your responsibility, check it regularly.*

*In most cases, the laser will not require calibration due to its rugged construction. It is, however, well worth the effort to check calibration after shipment or before you first use the laser and then at regular intervals to assure that you are doing the highest quality work possible. Always check calibration if the laser has been handled roughly.*

**Follow these steps to check the calibration of the laser and make any necessary adjustments.**

1. Attach the laser to a stable platform or tripod approximately 50 feet (15 m) from from a wall or other stable vertical surface (a telephone pole works well). We will call the vertical surface the target. **The tripod head or platform must be level enough to allow rotation of the laser 360 degrees with minimal re-leveling of the bubbles.**
2. Rotate the entire laser so that either direction of the cross axis (picture on page 2) is aimed at the target.
3. Level the laser using the leveling knobs until both level vials are on dead center. Be sure to use the level vial in the slope axis as it is more precise than the slope vial.
4. Take the receiver to the target and find the height of the laser beam by moving the receiver up or down until you get a display and tone. Now, find the center of the display and mark the target using the receiver's beam center notch as a guide.
5. Rotate the laser 180 degrees and re-center the level vials. The opposite cross axis direction is now aimed at the target. Find and mark the laser beam height (see step 4)

6. The difference between the two marks (if any) is double the difference between how the laser is calibrated and true level for the cross axis. Half way between these two marks is true level. Make a long mark at true level. If the difference between either outer mark and true level is within your working tolerance, go on to step 10. If not, continue with the next step.

7. Turn the cross axis leveling knob until the reading at the target is on the true level mark established in step 6.

8. With the 1/4" wrench provided, turn the hex head calibration screw that is under the main housing and next to the serial number label until the cross axis bubble comes to dead center. Do not move the laser or platform during this adjustment.

9. Check the adjustment by rotating the laser back to the first direction and re-leveling the bubbles. Check that the reading is within tolerance of the true level mark.

10. Now, rotate the laser 90 degrees to aim the front of the slope axis at the target. Level the bubbles and 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.

11. Adjust the slope axis leveling knob until the reading at the target is on the true level mark. Using the wrench, adjust the calibration screw located next to the rigid foot to center the level vial.

12. Check the backside of the slope axis. Rotate the laser 180 degrees and center both level vials. Check that the reading is within tolerance of the true level mark.

**Calibration is now complete.**

L2+ Visible range .....	100'(30m) indoor visible radius
Operating range for the L2 & L2+ with L.R. receiver ....	500' rad./1000' dia. (152m/305m)
Rotational coverage .....	360° 0-30'(0-9m), 310° full distance
Leveling .....	Manual with level vials (2 axis)
Accuracy - level .....	± 1/8" in 50' (3mm in 15m)
Grade capability .....	0-4% in 1% increments (1 axis)
Accuracy - grade .....	± 9/100 of grade setting (example: at 1% slope, ± .09)
Controls .....	On/off switch, 2 leveling screws
Operating temperature .....	-4°F to +122°F (-20°C to +50°C)
Storage temperature .....	-40°F to +140°F (-40°C to +60°C)
Rotation speed .....	L2+: 0 to 600rpm, L2: 600rpm
Power supply .....	Four C-Cell batteries
Run time on new batteries .....	70+ hours continuous (alkaline)
Height .....	9.5 inches (24cm.)
Weight .....	4.5 lbs. (2.0kg.) with batteries

**Guardian 36 month warranty coverage**

L2 and L2+ laser transmitters, along with R2, R3, and R4 receivers, manufactured on or after February 1, 1997, are warranted for thirty-six (36) 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, any of its products, 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. The **Guardian 36 month** warranty also covers the internal leveling mechanisms and optics against damage from any cause. 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.

Customer information
Laser Serial number _____
Date of purchase _____