

PRO SHOT™ L6

Operations Guide



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Customer information

Laser Serial number _____

Receiver S/N _____

Date of purchase _____

Part No. 051-9500 Version 1.1



Thank you for purchasing a Pro Shot™ L6 laser system. You now have superior laser accuracy and productivity available for all your projects.

The Pro Shot™ L6 laser is a rugged, reliable, high quality product, backed by a 24 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.

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24 month warranty coverage

The L6 laser transmitter is warranted for twenty-four (24) 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, the L6 laser transmitter 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.

Specifications

Visible Radius	100' (30m) typical
Range with R7 Receiver	500' rad./ 1000' dia. (152m/304m)
Horizontal & Vertical Accuracy	±14 arc seconds (.080" per 100') (2.0mm per 30m)
Self leveling technology	Servo motor, ±4 degree range
Vertical capability	Self plumbing (servo motor ±4°)
Rotation Coverage / Speed	360° / 0 to 450 rpm. variable
Rotating beam power	2.0mW (nominal)
Beam scan angles	10° to 90° variable
RC-1 Remote control	Optional accessory
Power source / Life	Two D-Cell alkaline / 60 hrs.
Rechargeable batteries	Optional Ni-Mh kit available
Automatic Shut-off	If off-level or vertical >5 minutes
Dust and water sealed	To international standard IP55
Warranty	24 Month defects coverage
Laser classification	CDRH Class IIIa • IEC Class 3R
Operating Temperature	-4°F to +122°F (-20°C to +50°C)
Storage Temperature	-40°F to +158°F (-40°C to +70°C)

Maintenance

Calibration • There is no set interval for calibrating the L6, 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.

Batteries • Occasionally remove the batteries and check the contacts for corrosion. Alkaline batteries will last far longer than carbon batteries. If you use rechargeable batteries: ⚠ *Never attempt to charge alkaline or carbon batteries.* Never run the laser from the charger unless there are rechargeable batteries installed. You can keep a spare set of 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.

⚠ **Caution** • Never store the laser in a carrying case that is wet inside. Moisture can get inside the laser this way. Should this happen, remove the battery cover and place the laser in a warm area until it is completely dry.

Troubleshooting

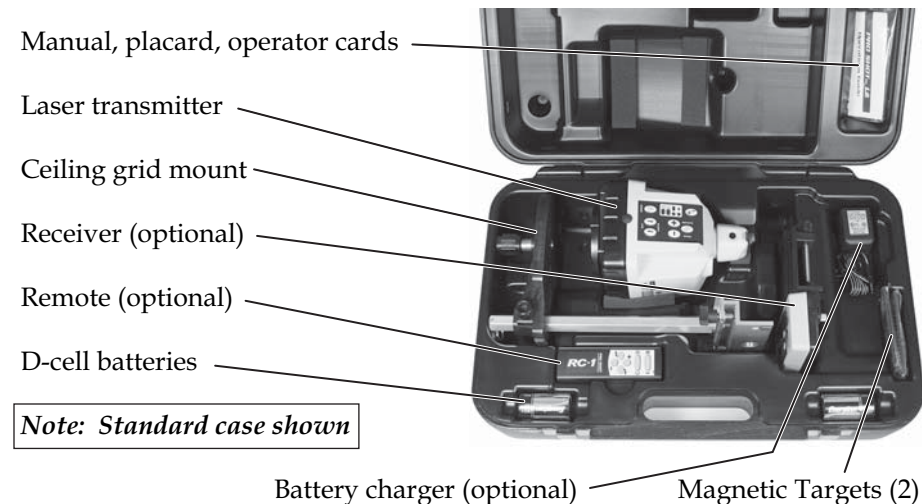
The laser will not operate, there is no obvious damage • If the low battery indicator is on, or you suspect the batteries may be dead, replace the batteries. Check the battery contacts to be sure that they are clean. Also be sure that the batteries were installed with the proper polarity (+ post to the + contact, - post to the - contact).

The receiver displays on-grade at two different heights • Check the jobsite for windows or mirrored surfaces that might be reflecting the laser and causing a second reading. Check the site for others using a rotary laser.

The laser was knocked over or handled roughly • Visually check the optics for damage. Inspect the laser for any other physical damage. Check that the laser is transmitting a beam. Check the calibration and adjust as needed. Check to see that the laser seems to level normally.

The laser only works at short distances with a receiver • Check the output windows for heavy dust or moisture - remove dust with a camera brush or blow off gently with clean compressed air - allow moisture to dry. Check the receiver window for heavy dust or moisture - clean as necessary. Replace the battery in the receiver if you are unsure of its time of use.

Case contents (will vary - may be ordered with different accessories and small case)



Note: Standard case shown

Battery Installation



Pull firmly on the tab at the base of the battery door to remove it



Install batteries as shown, or see diagram molded inside the battery holder



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



See PG 13 for optional rechargeable battery kit

NOTE: The L6 laser beam must be rotating and the rotation speed must be set to maximum when using a receiver.



Caution: when manual modes are used, the automatic leveling will not be active in one or both axes. Be sure that you have read this manual and thoroughly understand how to use manual modes. Be sure that you take proper measures to assure the accuracy of your work.

6. Verify the Y-axis adjustment you just made by rotating the entire laser 180° back to the first direction and let the laser re-level. Check that the reading is within the needed tolerance of the true level mark.

7. Now, rotate the entire laser 90 degrees to aim the X-axis at the target (see picture on opposite page). Let the laser re-level and check the reading at the target. If the reading is on, or within tolerance of the true level mark made when checking the Y-axis, calibration is complete. If not, continue on.

8. Remove the X-axis calibration plug (see picture on opposite page). There are two potentiometers inside this plug. Use a small straight head screwdriver to turn the *LEFT* potentiometer. Turning the potentiometer clockwise will raise the beam in the +X axis. A 1/8 turn of the screw will make approximately a 1/4" (6mm) change at 100' (30M) turn the screw a small amount each time, allowing the electronic leveling to adjust (re-level), until the beam matches the true level mark. Do not move the laser or platform during this adjustment.

9. Verify the X-axis adjustment by rotating the entire laser 180° (to the opposite direction of the X-axis) and allow time for the laser to re-level. Check that the reading is within the needed tolerance of the true level mark.

Vertical calibration *Note: check (and adjust if needed) horizontal calibration first*

1. Set the laser on a level area of concrete slab, to project a **horizontal** plane. Be sure you are in an area with at least 30' (9m) between two walls facing each other (50' (15m) distance, or more, is preferred). Start the laser, let it level and use the rotating (or scanning, or stopped) beam height to make a mark on each wall. These reference marks will be used to check calibration.

2. Lay the laser down in vertical mode very near one wall, with the plumb spot aiming at the mark on that wall. Once the laser is plumb, measure the vertical offset between the mark made in step 1 and the plumb beam spot. Go to the other wall and make a mark the same distance below the level mark. Calibration will be set to this second offset mark (calibration mark).

3. While keeping the laser in the same place on the slab, turn it 180° so the plumb spot is now aiming at the calibration mark. Allow the laser to plumb and re-aim the beam spot as needed. If the spot is on (or within your job tolerance) of the calibration mark, no adjustment is needed.

4. If adjustment is needed, remove the X-axis calibration plug (see picture on opposite page). There are two potentiometers inside this plug. Use a small straight head screwdriver to turn the *RIGHT* potentiometer (the one toward the keypad "slope/aim" buttons). Turning the potentiometer clockwise will raise the beam. A 1/8 turn of the screw will make approximately a 1/8" (3mm) change at 50' (15m). Turn the screw a small amount each time, allowing the laser to re-plumb until the beam matches the calibration mark.

Calibration should be checked from time to time

Although the L6 is calibrated at the factory and is very rugged, it's 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.

Horizontal calibration

1. Attach the laser to a stable tripod or stand at least 50 feet (15m) from a wall or other stable vertical surface (the target). Use a carpenter's level to be sure the tripod head is level enough to allow the laser to be aimed in different directions with minimal re-leveling. Turn the entire laser so that either direction of the Y-axis (picture below) is aimed at the target.

2. Turn the laser on in rotation mode, go to the target and find the laser beam. Make a mark at the center of the beam thickness. It is easiest to hold

your pencil on the sweeping beam line and move slightly up or down until you see that you are centered on the beam, then make your mark. If conditions make the beam difficult to see, you can slow the rotation or even scan the beam on the target surface.

3. Return to the laser and turn the entire laser 180 degrees. The opposite Y-axis direction should now be aimed at the target. Allow the laser to re-level and mark the laser beam on the target.

4. The difference between the two marks (if any) is double the difference between how the laser is calibrated and true level for the Y-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 8. If not, continue with the next step.

5. Remove the Y-axis calibration plug (see picture on opposite page). Use a small straight head screwdriver to turn the potentiometer. Turning the potentiometer clockwise will raise the beam in the -Y axis. A 1/8 turn of the screw will make approximately a 1/4" (6 mm) change at 100' (30M) turn the screw a small amount each time, allowing the electronic leveling to adjust (re-level), until the beam matches the true level mark. Do not move the laser or platform during this adjustment.



- ① Power button • Press the power button to turn the laser on or off.
- ② Power indicator • Displays a green light to indicate the laser has been successfully turned on.
- ③ Low battery indicator • Displays a flashing red light when there is approximately 10 hours of life left (alkaline), or 1.5 hours (Ni-Mh). When battery power drops below a usable level, the laser beam will shut off. If there is no laser beam and this indicator is flashing, replace the batteries.
- ④ Leveling indicators • When the power button is pressed, the L6 starts in full automatic leveling mode. When the leveling system is active, green indicator light(s) display leveling adjustments. A constant light indicates the L6 is leveling at high speed. The light flashes as the system nears level and turns off when level is achieved (at the same time, the laser beam turns on). If the L6 can't achieve level, the green light for one axis will flash alternately with the amber light next to it, indicating that the laser is mounted to, or resting on a surface that is greater than 4° off level. The surface will have to be rough leveled, or the laser will have to be shimmed closer to level before the automatic leveling can function.
- ⑤ Mode button • The mode button allows access to semi-automatic and full-manual operation. These are modes used only in limited, specific situations. *Extra care must be taken to assure that your work will be accurate when using these modes.* See page 10 for a description of how to enter and use these modes.
- ⑥ Rotor cap • When the rotation is stopped, or the beam is scanning, you can turn the cap by hand to manually position the laser spot or the scan area.
- ⑦ Rotate / Scan button • At start-up, the L6 rotates the beam. Pushing this button changes to a scanning beam to help visibility in brightly lit areas.
- ⑧ +/- buttons • These buttons perform two functions, depending on if the laser is rotating or scanning the beam (see #7 above). If the beam is rotating, the buttons will adjust the speed from 0 to 500rpm. A push of either button will adjust the speed slightly. Holding the + button takes the L6 to full speed (indicated when the green power light flashes). Holding the - button slows rotation to a stop. If the beam is scanning, the +/- buttons vary the scan width from 15° to 90°.
- ⑨ Slope / Aim buttons • When the L6 is set to project a horizontal (level) beam and beam scanning is selected, these buttons allow the scanned area to be positioned around the horizontal plane. When the L6 is in a vertical setup, these buttons align the vertical plane. *Note: When scanning the beam in vertical mode, position the scanned area by manually aiming the rotor cap (Hold the cap very still, stopping rotation for 3 seconds).*

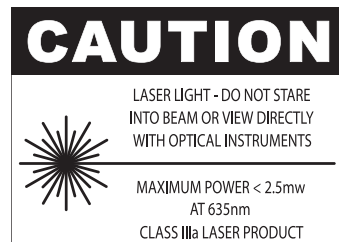
Precautions that should be followed when using any laser.

- 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.

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)
- 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.
- The laser should be set up above or below eye level and never intentionally aimed at anyone.
- Turn the laser off when it is not being used, such as during meal breaks, at the end of the day, or during other long stoppages in the work.

The warning placard shown here is included with all lasers shipped to the U.S. and Canada. It should be attached to the carrying case in the recessed area on the back of the case and the case should be placed on the jobsite near where the laser is being used to meet jobsite posting requirements.

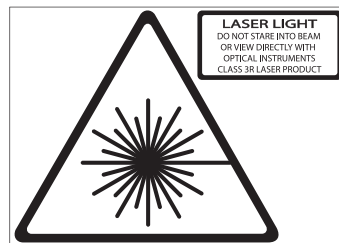


The L6 transmitter is a class IIIa (less than 2.5mW) laser under the United States C.D.R.H. guidelines.

The L6 complies with FDA performance standards 21 CFR subchapter J.

The L6 transmitter is a class 3R laser under the 1993 IEC 825-1 laser safety standard and the revised edition of the European Norm EN60825.

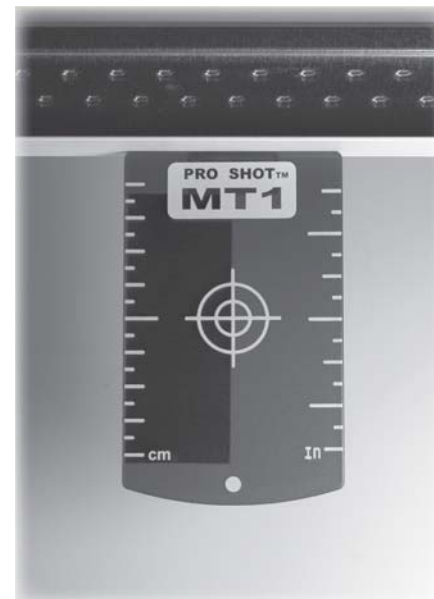
The warning placard shown here is included with all lasers shipped outside the U.S. and Canada. It should be attached to the carrying case in the recessed area on the back of the case and the case should be placed on the jobsite near where the laser is being used to meet jobsite posting requirements.



A re-chargeable battery kit is available, providing an environmentally friendly option to disposable batteries. The Ni-Mh batteries have a 50 hour operating time. Charge time is approximately 14 hours.

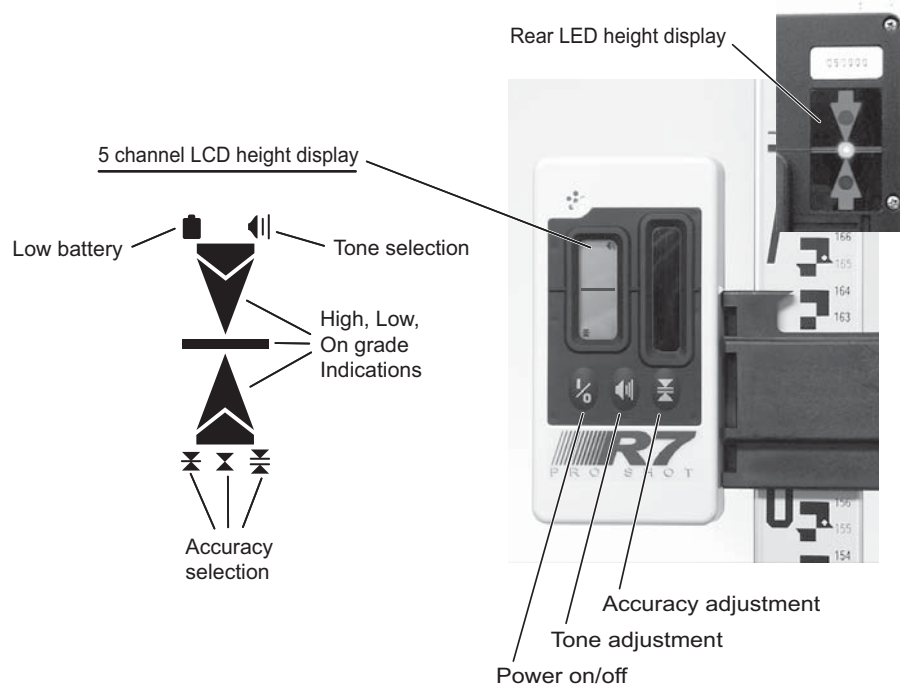


Battery charging jack



Two MT-1 magnetic targets come with the standard L6 package. Extra targets allow larger crews to all be able to use the laser reference at the same time.

The **R7** is a high performance receiver designed for maximum compatibility with Pro Shot lasers. Featuring adjustable accuracy and tone settings, front and rear displays, 5 channel front LCD display and universal rod clamp.



R7 Receiver specifications

Reception Height	2 inches (50mm)
Reception Angle	120 degrees
Standard mode accuracy ..	$\pm 1/16$ in. (± 1.6 mm) nominal
Coarse mode accuracy	$\pm 1/8$ in. (± 3.2 mm) nominal
Ultra-fine mode accuracy ..	$\pm 1/64$ in. ($\pm .4$ mm) nominal
Power Supply	9 volt battery
Battery life (alkaline)	>60 hours continuous
Automatic Shut Off	After 12 min. (no laser strikes)
Environmental	Sealed against dust and water
Rotation compatibility	250 to 850rpm
Warranty	Guardian warranty - 36 months



Aperture label

**CAUTION**

LASER LIGHT - DO NOT STARE INTO BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS
MAXIMUM POWER < 2.5mW AT 635nm
CLASS IIIa LASER PRODUCT



LASER LIGHT
DO NOT STARE INTO BEAM OR VIEW DIRECTLY WITH OPTICAL INSTRUMENTS
CLASS 3R LASER PRODUCT

C.D.R.H. / Osha Caution / Class IIIa label
IEC class 3R label and laser light logotype



Rechargeable battery warning

Serial / CDRH compliance and CE mark



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™ L6 Construction Laser**
RC1 Remote Control

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 • April 18, 2005

Calibration should be checked from time to time

The L6 is calibrated at the factory and is a very rugged laser, however it is well worth the effort to check calibration before you first use the laser (after shipment) and then from time to time to ensure that you are doing the highest quality work possible. Always check calibration if the laser has been handled roughly.

Check your setup

Although not required, it is good jobsite practice when using any laser or optical instrument to check your setup from time to time. Use any 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, taking a few minutes to verify the elevation marks you have been given to work from makes sense. Even engineered benchmarks may not be perfect and enough verification must be done to be confident you are properly set up. Having benchmarks to check is valuable 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. If you will need to setup the laser more than once for a particular operation, make reference marks, preferably 90° 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

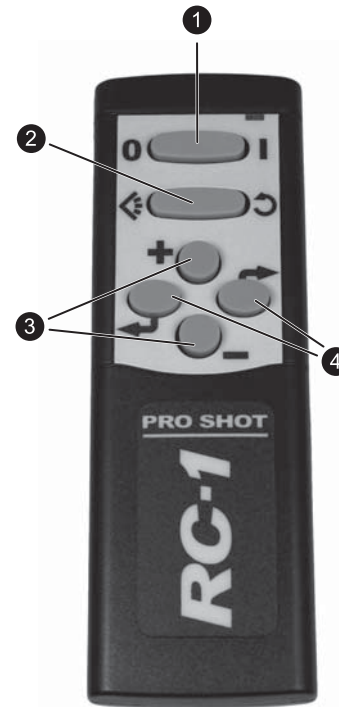
You can work up to 500 feet (152 meters) away from the L6 with the R7 receiver. As with all instruments, however, the further away you work, the more any error can add up. Set the laser in a safe place, as close to your work as possible for best results.

Maintain your equipment

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

See page 16 for laser maintenance guidelines.

The RC-1 remote can be a valuable addition to your system. It provides all of the normal adjustments on the laser control panel and allows you to make these settings from up to 100ft. (30m) away when working indoors. Especially when the laser is set-up out of normal reach, the remote provides a quick and convenient way to change the laser's settings.



1 On/Off rocker • For turning the laser on or off. To turn the L6 on, press and *hold* the on rocker for *approximately 5 seconds*. Release when the laser starts.

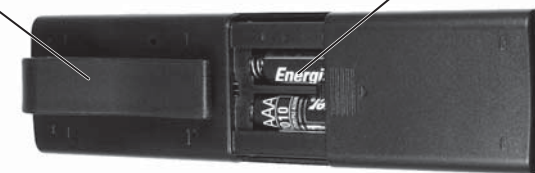
2 Rotate/Scan rocker • Selects rotating beam or scanning beam mode. If you want to scan the beam while in *vertical*, or *semi-automatic*, or *full manual* mode setups, the arrow buttons will aim the plane instead of changing the scan position. The scan position can still be aimed by repeatedly pressing the scan rocker. The scan area will move sequentially around the plane of rotation.

3 +/- buttons • Changes the rotation speed if the beam is rotating, or changes the width of the scanned area if the beam is scanning.

4 Aim buttons • Aims the scanned area (in horizontal mode), or aligns the rotating plane when the L6 is in a vertical, semi-auto, or manual setup. See No. 2 above for aiming the scan when the L6 is in vertical mode.

Belt clip to keep the remote handy

AAA alkaline batteries included



Note: When pressing any button on the remote, all indicator lights on the L6 control panel will flash to confirm that the command is being received.

The L6 defaults to full automatic leveling mode when it is powered-up. Although full automatic is best for most projects, there are situations where some manual adjustment is very useful. **⚠ Caution: when manual modes are used, the automatic leveling will not be active in one or both axes. Be sure that you have read this manual and thoroughly understand how to use manual modes. Be sure that you take proper measures to assure the accuracy of your work.**

There are two non-automatic modes, Semi-automatic and full manual. To enter semi-automatic mode, first press the power button to turn-on the L6. Then, press and **hold** the mode button for 6 to 7 seconds. Release the button when both amber indicator lights flash. The X axis will continue to self-level and the Y axis will indicate a flashing amber light (Pg. 14 has a picture of axis directions). The Y axis can now be sloped manually using the arrow buttons. Press the up button to raise the beam in the +Y axis, while lowering it in the -Y axis. Pressing the down arrow has the opposite effect. If more than 4 degrees of slope is needed, you will need to tilt the tripod or mount some to get within the range of the manual adjustment. If the laser is tilted more than 45 degrees from horizontal, it will switch back to automatic leveling mode.

Indicator lights
Arrow buttons
Mode button



To make the Y-axis self level and make the X axis adjustable, press and release the mode button. The X axis amber light will now flash, indicating that it is adjustable. Press the up arrow to raise the +X axis, while lowering the -X axis. Pressing the down arrow has the opposite effect.

To enter full manual mode, first enter semi-automatic mode as described above. Then, press and hold the mode button again for 6 to 7 seconds. Release the button when all four indicator lights flash. The X axis will display a constant amber light and the Y axis will display a flashing amber light. The Y axis can now be manually sloped using the arrow buttons. To make the X axis adjustable, press and release the mode button. The X axis amber light will now flash, indicating that it is adjustable, using the arrow buttons as described above. The Y axis will display a constant amber light.

To exit manual modes, power-down the L6 and restart it.

Note: When scanning the beam in either manual mode, you cannot aim the scanned area with the arrow buttons. Instead, turn the rotor cap by hand to aim the beam. Hold the cap very still at the desired position for 3 seconds so that the laser will accept the new position.

The L6 is a fully automatic self-leveling laser. A single press of the power button begins the leveling process.

Once the power button is pressed, the power indicator light and the leveling indicator lights on the control panel become active.

The leveling indicator lights display information on the status of the leveling system. When the system is far off level, each axis will display a constant green light. As the system nears level, the indicators will each begin to flash once their axis is close to level. When one axis reaches level, its green light will turn off. As the second axis reaches level, its indicator will also turn off and the laser beam will come on. At the same time, the rotor will begin to spin at full rotation speed.

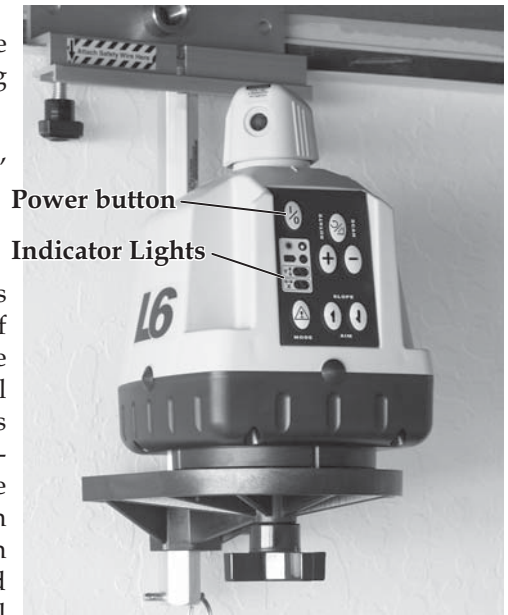
If the L6 is not able to completely level, one axis will display alternating green and amber lights. This indicates that the setup (wall mount, tripod, surface, etc.) is more than ± 4 degrees off-level. Adjust the setup to be within ± 4 degrees of level and the L6 will be able to operate.

Once operating in a level setup, the rotation speed can be controlled, or the beam can be scanned, or stopped and aimed. See pages 2 and 3 for a description of all controls and displays.

Height alert

Height alert is a feature designed to help keep your work accurate. The L6 has a very wide leveling range and height alert prevents the laser from re-leveling and operating if the setup changes significantly. In automatic mode, as soon as the L6 reaches level, height alert becomes active.

When height alert is active, the laser turns off if movement in your setup requires a large amount of re-leveling. Should this occur, the 4 leveling indicator lights will flash, alternating between green X / yellow Y and yellow X / green Y. Return to the laser and check your setup. Turn the L6 off and back on to reset the leveling.



Vertical and Line Layout Setup

8

The L6 has built-in feet that allow the laser to be set directly on a slab (or other stable flat surface) for vertical alignment and layout. Follow the steps below to make a vertical plane setup.

Put the L6 on the slab in a level position (see page 7) with its base on the slab. Start the laser and let it level completely. This centers the leveling range for fine line corrections later. Turn the laser off.

Determine two points that will serve as your control for aligning the laser plane.

Place the L6 in a vertical position as shown in the photo, with the rotating head over one point that will be called the "near" point. Press the power button and allow the L6 to automatically plumb (Y-axis leveling light will display the progress). Once it self-plumbs, the L6 will begin rotating the beam. Press the "-" button until the rotation stops. Manually aim the rotating head to point the laser beam down at the slab. Align the two marks that are molded on the housing and the rotating head in order to assure that the beam is straight down. Grasp the housing and slide the entire laser until the beam is on the near point. Now align to the second "far" point by manually turning the rotating head until the laser beam is on the surface (wall, slab, column, etc.) near the far point. Grasp the laser housing and "rough-in" the beam to the far point by moving the base of the laser, while keeping the rotating head over the near point (you just need to get close to the far point right now). Aim the beam back down at the near point and re-adjust if needed. Aim again at the far point and use the control panel arrow buttons to make fine adjustments. Re-check both points until you are accurately aligned. If you have the optional RC-1 remote, you can use its arrow buttons to make the fine adjustments.

When the L6 is aligned on the two points, adjust the rotation speed to suit jobsite conditions. You are now projecting an automatically plumbed plane aligned with your two control points. You can also use the beam without rotating it. Stopping the rotation and turning the rotor by hand will allow you to aim the laser spot to any position around the plane.

Note: When scanning the beam in vertical mode, you cannot aim the scanned area with the arrow buttons. Instead, turn the rotor cap by hand to aim the beam. Hold the cap very still at the desired position for 3 seconds so that the laser will accept the new position.

If lighting conditions do not permit easily seeing the beam, the R7 receiver can be used at the far point. When using a receiver, the beam must be rotating at full speed.



Plumb and 90° Layout Setup

9



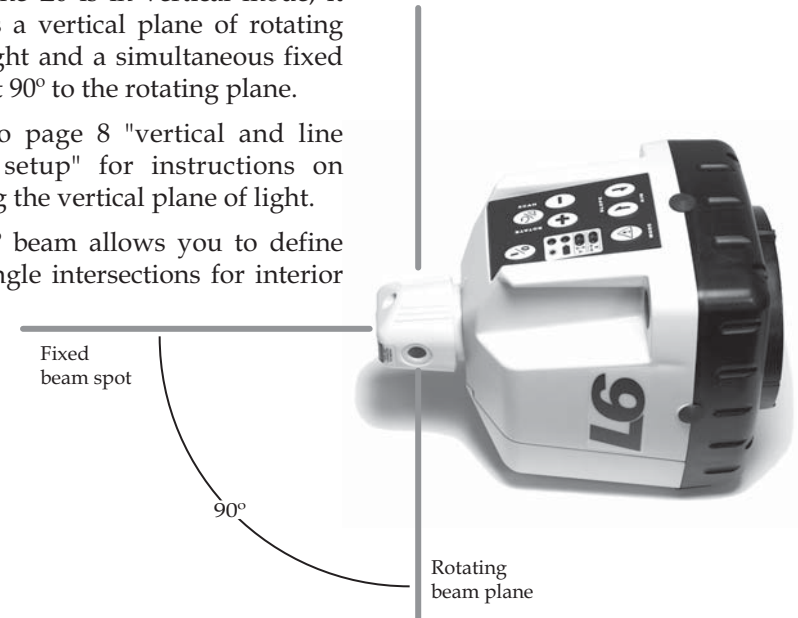
The L6 is designed for easily transferring points from floor to ceiling. As shown in the photo at left, once a point is established, simply draw intersecting lines through the point at 90° for a reference. The L6 has a notched base that allows you to quickly position the laser on this intersection, centering it over the point.

Next, push the power button and allow the L6 to self-level. A very accurate self-plumbed laser spot will project from the top of the rotor.

When the L6 is in vertical mode, it projects a vertical plane of rotating laser light and a simultaneous fixed beam at 90° to the rotating plane.

Refer to page 8 "vertical and line layout setup" for instructions on aligning the vertical plane of light.

The 90° beam allows you to define right angle intersections for interior layout.



NOTE: The L6 laser beam must be rotating and the rotation speed must be set to maximum when using a receiver.