Pro Shot Alpha C

Cone Laser Operations Guide

Introduction

You now own the Pro Shot Alpha C Cone Laser, a custom made, specialty laser used to provide a conical reference for the curved portion of running tracks, containment areas around storage tanks, or baseball fields. It is a high accuracy, servo leveled automatic laser for the most demanding leveling or grade checking operations.

The Alpha c can also be used as a conventional laser level when the cone rotor is replaced with the standard rotor cap.

Please take a moment to read this manual. It contains vital information on safely operating and getting the best results from your new laser.

Case Contents (will vary depending on package ordered)

Batteries

Receiver

Instruction packet

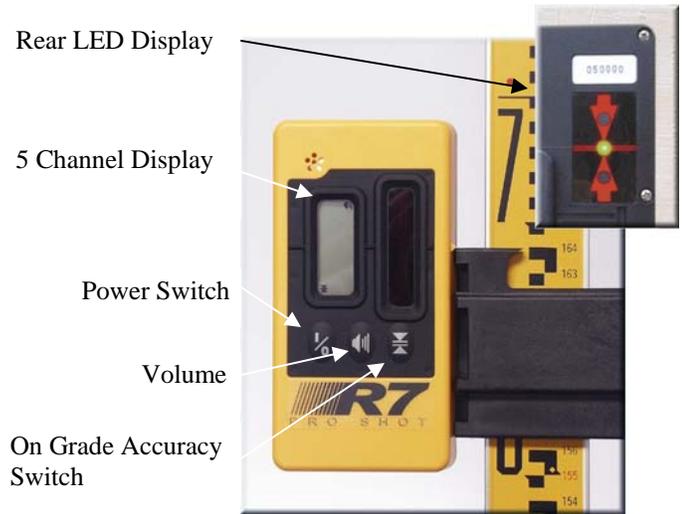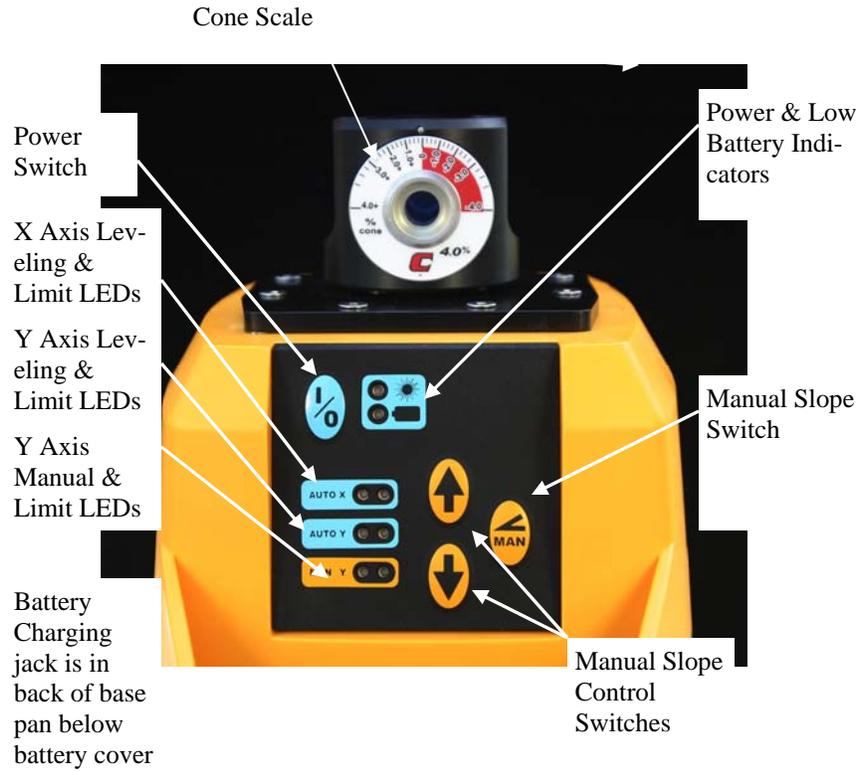Conventional rotor cap

Battery Installation

Pull on tab at base of door to remove.

Install 4 C (alkaline or NiMH rechargeable) according to instructions molded on battery holder. Carbon batteries are not recommended.

Replace battery door by hooking cover into slots at the top of the housing and pressing the tab closed. *Do not plug the charger into the laser unless NiMH batteries are installed!*

NiMH batteries should be fully charged (about 12 hours) prior to initial use. *Caution, charge NiMH rechargeable batteries only!*

Cone Scale

Power & Low Battery Indicators

Power Switch

X Axis Leveling & Limit LEDs

Y Axis Leveling & Limit LEDs

Manual Slope Switch

Y Axis Manual & Limit LEDs

Battery Charging jack is in back of base pan below battery cover

Manual Slope Control Switches

Rear LED Display

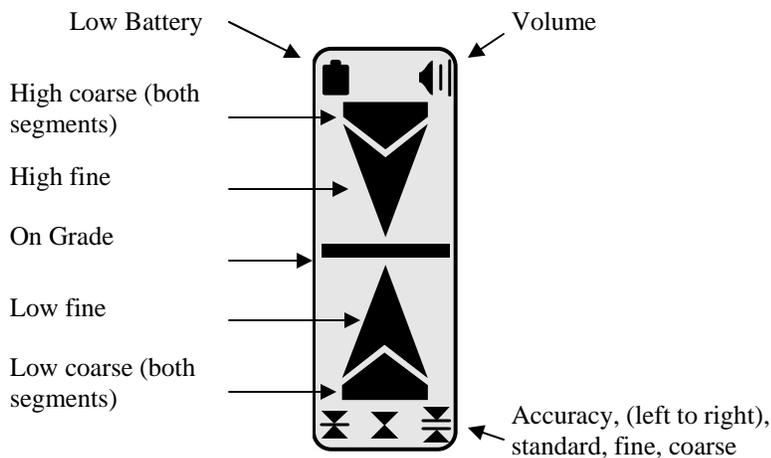5 Channel Display

Power Switch

Volume

On Grade Accuracy Switch

Laser Controls

- **Power Switch** turns the laser on and off.
- **Cone Scale** set conical reference ±4%
- **X axis Leveling LEDs:** green LED lights when unit is leveling, both red LEDs (X & Y axis) flash if a leveling limit is reached.
- **Y axis Leveling LEDs:** green LED lights when unit is leveling, both red LEDs (Y & X axis) flash if a leveling limit is reached.
- **Y Axis Manual LEDs:** amber LED lights when in Slope Matching mode, red LED flashes (with X red LED) if leveling limit is reached.
- **Power LED** is lit green when unit is on. When the laser finishes leveling, the LED will flash 5 times, indicating that the <u>Height Alert</u> is active.
- **Battery Life Indicator** flashes amber when battery power is low.
- **Manual Slope Switch**, a deliberate (1/2 second) press and release will set the laser into manual grade matching mode. Laser continues to self level in the cross axis, but is not self leveled in the slope axis.
- **Manual Slope Control Switches** are used to tilt the laser plane to the desired slope.

Receiver Controls & Display

- **Power Switch** turns receiver on & off
- **Volume Switch** toggles sound from high to low to off.
- **On Grade Accuracy Switch** toggles from standard to fine to coarse.

Low Battery   Volume

High coarse (both segments)

High fine

On Grade

Low fine

Low coarse (both segments)

Accuracy, (left to right), standard, fine, coarse

Precautions to follow 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 operating the instrument.

US OSHA requirements for operating visible lasers.

- Only qualified, trained employees may operate the laser.
- Laser operators must carry proof of qualification.
- The work area where the laser is in operation 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 lunch hour or during breaks.

Warning Placard
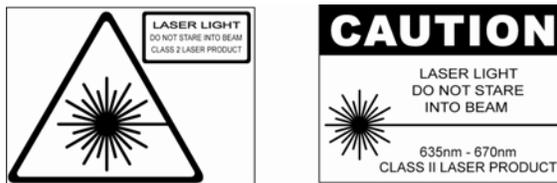
Safety Labels
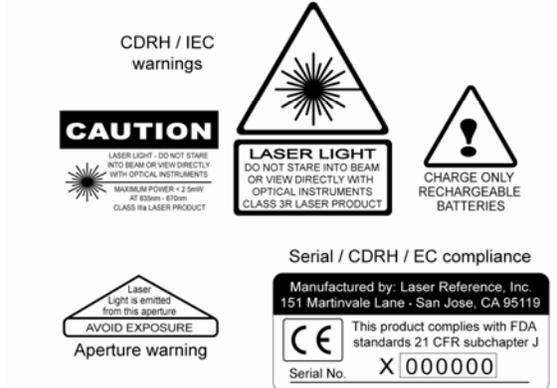
Note: The Alpha C is a CDRH class II laser and an IEC 60825 class 2 laser. It conforms to applicable EC directives regarding RFI and EMI, and to FDA performance standards 21 CFR subchapter J.

Conical Reference Setup

Set the tripod so the laser is directly over the center of the cone to be graded. The warning placard should be displayed on the job, and the operator should have an operator's certificate card. These are included in the instruction packet. Rotate the Cone setting ring to the desired cone angle. Cone angle range is ±4%. There is an optional high resolution cone setting ring that provides cone angle range of ±1.7%. (This needs to be ordered from the factory.

Turn on the laser and allow it to level. We recommend using engineered benchmarks to assure that your setup is correct and matches job specifications. If no benchmarks are provided, it is good practice to set your own, using the Alpha c in conventional laser level mode.

Conventional Laser Operation

To use the Alpha c as a conventional laser level, using a 5/64ths allen wrench, remove the hex head screws from the top of the cone rotor and remove the rotor. Fit the conventional rotor cap and reinstall the hex head screws.

Maintain your equipment.

Make sure your tripod and mounting hardware are tight, and that your grade rods are in good condition. This can prevent errors and performance problems.

The standard cone scale provide a cone angle of ±4.0%. There is an optional cone rotor that has a higher resolution scale and provides a cone angle of ±.17%.

Automatic Leveling

Press the power switch to turn the laser on. The green LEDs in the "Auto X" and "Auto Y" axis windows come on solid or flash to indicate motor drive signals while the laser is auto-leveling. When leveling is completed, height alert will become active, signaled by the Laser Power LED flashing five times. When level is reached in both axes, the laser beam and green power LED will light, and the rotor will spin. The Height Alert is activated about 5 seconds after the laser finishes leveling. Height alert flashes warning LEDs and turns off the laser if the instrument is disturbed to the extent that accuracy could be affected. If the Height Alert turns the laser off, power the laser down and turn it on again, allow it to relevel, and reset your receiver against your bench-marks. If a leveling limit is reached, (the leveling drive reaches the end of its travel), the green LED for the affected axis turns off and the both red X & Y limit LEDs flash. Adjust the laser so that it is within its leveling limit and re-start the laser.

Disabling Height Alert *Caution!*

To disable the height alert, when turning the laser on, press and hold the rota-tion speed button, press and release the power button, and then release the rota-tion speed button. <u>The height alert prevents the laser from releveling at a dif-ferent height of instrument if the tripod is moved while the laser is in opera-tion. Disabling the alert could compromise working accuracy.</u>

## Slope Matching Mode, Y axis manually adjusted, X axis auto levels.

- Slope Matching is useful when the conventional rotor cap is installed and the laser is used as a planar reference.
- Use the sights on top of the laser to align it with the slope direction axis.
- Press the power switch to turn the laser on.
- Press the "Man" button for about 1/2 second. The "Man Y" axis amber LED flashes quickly, (indicating the Y axis is in manual mode). Both "Auto Y" LED's become inactive while the "Auto X" LED's continue to operate in automatic mode.
- Use the arrow up and down buttons to move the laser plane to the desired slope in the Y axis. When facing the control panel, the Up button moves the far plane down and the Down button moves the near plane down. The X axis will continue to auto level.
- The slope axis is manually set and does not self level. It is good practice to set reference benchmarks in both axes and check to make sure your setup has not changed.
- Note: Any press of the "Man" or arrow buttons restarts the Height Alert.
- If a Y axis leveling limit is reached while manually setting slope, the red LED in the "Man Y" axis window and the X axis red limit LED will flash. The laser must be turned off to return to automatic mode.
- The green power LED and the laser beam will turn on once the X axis reaches level.
- To exit this mode, press the "MAN" button (a deliberate ~1/2 second press). The laser will switch to full automatic leveling mode. If the laser is powered down, when it is restarted, it will always start in full automatic leveling mode.

Calibration is your responsibility, check it often

It is well worth the effort to check calibration before you first use your laser, and then periodically to ensure that you are doing the highest quality work. Always check calibration if the laser has been handled roughly.

Follow the steps below to check the calibration of the laser and make adjustments if necessary.

1. Remove the cone rotor. Attach the laser to a flat head tripod approximately 100 feet from a wall or other stable vertical surface, (at telephone pole or building wall will work). The tripod head must be level enough to allow you to turn the laser 360 degrees with minimal re-leveling needed. Use the tripod leg adjustments to level the tripod head. Position the laser so that either direction of the cross (X) axis is pointed at the target.
2. Turn the laser on and allow it to level.
3. Take the receiver to the target and move it up or down until you get a on grade display in the LCD, or a steady tone. Make an on grade mark using the receiver's beam center notch.
4. Return to the laser, rotate it 180 degrees, and allow it to re-level. The opposite cross axis direction is now aimed at the target. Use the receiver to make another on grade mark at the target.
5. If there is a difference between the two marks, make another mark half way between them. This third mark represents true level. If the distance between the outer marks and the center mark is within the accuracy specification of the laser, go to step 9. If not, continue with the next step.
6. Remove the battery door and the rubber plug on the lower left side of the battery holder. The four buttons switches control calibration of the laser. A label shows the axis and direction of travel that each button controls. Each push of a button moves the calibration by approximately 3 arc seconds, (1/64" @ 100') / .4mm @ 30m). Use a small screwdriver or dull pencil to press the plus or minus X axis button to bring the beam to the true level mark. Go to the target and check the beam elevation. If the elevation is correct, continue to the next step, if not, repeat this step until the beam reaches the correct height.
7. Check the cross axis adjustment by rotating the laser 180 degrees to the first position, let it re-level, and check that the beam is on the true level mark.
8. Rotate the laser 90 degrees so that either direction of the Y axis is aimed at the target. Allow the laser to re-level and make an elevation mark at the target. If the distance between this mark and the true level mark is within the laser's accuracy specification, calibration is complete. If not, continue to the next step.
9. Use the Y axis push buttons to move the beam until it coincides with the true level mark. Calibration is complete.

-Y

-X

+X

+Y
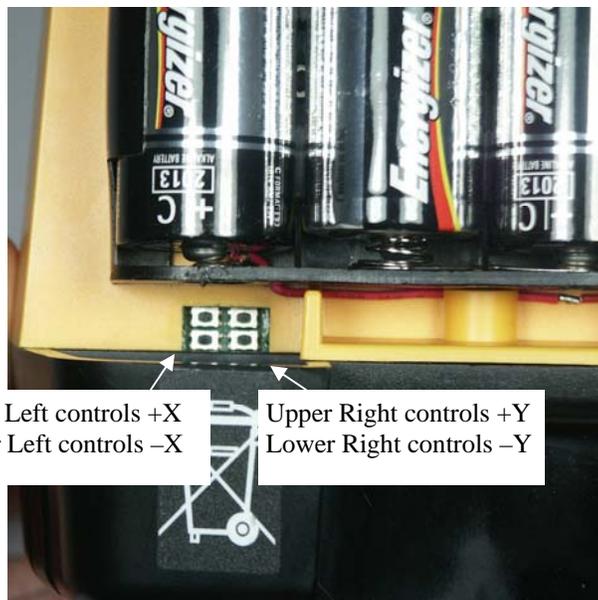
Upper Left controls +X
Lower Left controls –X

Upper Right controls +Y
Lower Right controls –Y

The R7 senses the plane of laser light projected by the Alpha transmitter and indicates a height position relative to the plane (high, low, or on grade). The R7 uses a five channel front LCD and a 3 channel rear LED display to convey elevation information. Along with the visual displays, an audio tone also indicates when the receiver is high, low, or on grade. When the R7 is exactly centered at the beam height, an on grade bar indication is displayed and a steady tone can be heard. If the R7 is too high, an arrow shows the direction to move the receiver and a fast beep will be heard. If the R7 is too low, an up arrow shows the way to move the receiver and a slow beep will be heard.

The R7 has three control switches, power on/off, tone high/low/off, and on grade accuracy selection. Pressing the power switch activates the R7. The audio tone will sound and the LCD display will show the tone and accuracy icons. The R7 is ready to operate in standard accuracy with loud tone. Pressing the volume switch one changes to low volume, twice turns the volume off. When the volume is off, there will still be a single tone the first time the R7 senses a laser signal. Pressing the accuracy switch once changes to the coarse setting, twice changes to fine. The R7 automatically turns off if no laser beam strikes are received for twelve minutes. The R7 is powered by a 9V battery that lasts approximately 60 hours. When the battery is nearly 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 the door toward the bottom of the receiver. Remove the battery from the compartment (you may need to tap the R7 on your palm to free to battery). Replace the battery following the diagram molded on the battery door.

R7 Specifications

Reception Height	2 inches (50mm)
Reception Angle	120 degrees
On Grade Accuracies	±1/16" std, ±1/8" coarse, ±1/64" fine
Power Supply	9V alkaline, 60 hours run time
Automatic Shut Off	After 12 min. (no laser strikes)
Environmental	Sealed against dust & water
Mount Clamping Range	5/8" to 2-1/2" (16 –65mm)

The optional NiMH rechargeable battery kit is an environmentally friendly and economical alternative to alkaline batteries. NiMH batteries can be charged up to 500 times under optimum conditions and contain no hazardous materials.

To use the NiMH batteries, install a set into the laser and charge them fully prior to initial use (12 hours). *DO NOT PLUG THE CHARGER INTO THE LASER UNLESS NIMH RECHARGEABLE BATTERIES ARE INSTALLED!* It is recommended that new NiMH batteries be conditioned by charging them fully, and running them until fully discharged for two or three cycles. After that, the batteries may be charged before they are fully discharged without running into "memory" problems. A fully charged set of NiMH batteries should provide about 65 hours of run time.

Note: ***Do Not Charge Alkaline or Carbon batteries.*** *To do so could cause them to rupture and damage your instrument.*

If the laser is to be run while connected to the charger, the rechargeable NiMH batteries must be installed. The laser may not function properly if it is run off the charger when the NiMH batteries are not installed. The laser should never be run off the charger when alkaline or carbon batteries are installed.

Use only factory prescribed charger with NiMH batteries. Use of non authorized chargers may result in damage to batteries or laser electronics.

Calibration: Calibration should be checked periodically or if the laser has been handled roughly or shipped.

Batteries: Occasionally remove the batteries and check the contacts for corrosion. Remove the batteries if the laser is to be stored for an extended period.

Laser Output Windows: Check the output windows regularly for dust and dirt, and clean with a camera brush or compressed air if necessary.

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

Moisture: Never store the laser in a carrying case that is wet inside. If moisture gets inside the laser, place it in a warm area with the battery cover off until it is completely dry.

Troubleshooting

If the laser will not operate and there is no obvious damage, check to see if the low battery light is on and replace the batteries. Check the battery contacts and make sure they are clean.

The receiver shows an on-grade at two different heights– Check for windows or mirrors that could reflect the laser light, or for other lasers on the jobsite that could cause the second reading.

Laser knocked over– Inspect the optics and housing for damage. Use the receiver to make sure the laser is transmitting. Check the calibration and adjust if necessary.

Laser works only at short distances– Check the output windows for dust or moisture. Remove dust with a camera brush or with clean compressed air.

Receiver will not give on grade display at long distance– You may be at the edge of the laser's specified working radius or there may be dust or moisture in the optical path the is reducing beam power.

A single flashing (blinking) red LED for either the X or Y axis indicates the laser's internal diagnostics have detected a problem and a service center should be consulted.

There are no user serviceable components inside the laser!

24 month warranty

The Pro Shot Alpha c 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, laser transmitters (except for transportation costs), if the product is found to be defective in workmanship or materials. Maintaining the calibration of the laser is not the responsibility of Laser Reference or its authorized service centers. If service is needed, the product must be sent FREIGHT PREPAID to the nearest authorized service center or to Laser Reference.

Alpha c Specifications

Range with R7 receiver	2000' diameter (610m)
Leveling Accuracy	±10 arc seconds (.060"@ 100') (1.5mm@ 30m)
Leveling Technology	Servo Motor
Cone Angle	±4.0%
Self-Leveling Range	±5 degrees
Slope Matching Range	Single Axis, X Axis Self Levels, 8%
Height Alert	Normally Active, can be disabled
Rotation Coverage	360º
Machine Control Compatible	Yes
Warranty	24 Months Defects Coverage
Power Supply	4 C Alkaline or NiMH rechargeable
Run Time	115 Hours (Alkaline), 65 Hours (NiMH)
Laser Beam Type, Power	670nm, <1mW
Automatic Shut-off	12 Minutes Out of Level
Environmental	Dust & water resistant (IP56)
Laser Rating	CDRH Class II, IEC Class 2
Laser beam type / power	Visible 670nm / <1.0mW
Operating Temperature	-20ºc to +60ºc (-4ºf to +140ºf)

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Customer Information

Laser Serial Number _____

Receiver Serial Number _____

Date of Purchase _____

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