

# Leica Rugby 300 SG



## User Manual

Version 1.1

English

- when it has to be **right**

**Leica**  
Geosystems



This manual contains important Safety Directions (refer to chapter Safety directions) as well as instructions for setting up the product and operating it.

Read Carefully through the User Manual before you switch on the product.

**The symbols used in the User Manual have the following meaning:**



**DANGER:**

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



**WARNING:**

Indicates a potentially hazardous situation or an unintended use which, if not avoided, could result in death or serious injury.



**CAUTION:**

Indicates a potentially hazardous situation or an unintended use which, if not avoided, may result in minor or moderate injury and / or appreciable material, financial and environmental damage.



Important paragraphs which must be adhered to in practice as they enable the product to be used in a technically correct and efficient manner.

## **Product Identification**

The instrument model and serial number of your product are indicated on the label on the base of the unit.

Enter the model and serial number in your manual and always refer to this information when you need to contact your agency or Leica Geosystems authorized service workshop.

Type-Serial No.: 300-\_\_\_\_\_ Date of purchase: \_\_\_\_\_

# Table of Contents

<b>Introduction</b> .....	4	<b>Safety Directions</b> .....	23
<b>Features and Functions</b> .....	5	General .....	23
<b>Operation</b> .....	6	Intended Use .....	23
Entering Grade .....	6	Permitted use .....	23
Direct Grade Entry .....	6	Adverse use .....	23
Grade Entry by Digit .....	6	Limits of Use .....	24
Grade Zero .....	6	Responsibilities.....	24
Grade Capability .....	6	Warranty .....	24
Grade Swap .....	7	Hazards of Use .....	24
Grade Matching .....	7	Laser classification .....	26
Identification of the Axes.....	8	Labeling .....	27
Slope - Percent of Grade .....	8	Electromagnetic Compatibility	
Alignment of the Axes .....	8	(EMC) .....	28
Precise Alignment of the Axes.....	9	Description.....	28
<b>Setup</b> .....	10	FCC Statement, Applicable in	
General Setup.....	10	U.S.....	29
Location .....	10	Labeling Rugby 300 SG .....	30
Recommended Head Speeds ...	10	<b>Technical Data</b> .....	31
Tripod Setup .....	10		
Setup Options .....	11		
Head Speeds .....	12		
H.I. (Height of Instrument) .....	12		
Automatic and Manual Mode: ....	12		
Manual Mode with Grade .....	13		
Wind Sensitivity .....	13		
Beam Masking .....	13		
Additional Setup Options .....	14		
<b>Checking Level Accuracy</b> .....	15		
Checking Level Accuracy .....	15		
Checking the X-Axis .....	15		
Checking the Y-Axis .....	15		
Adjusting Level Accuracy.....	16		
To Enter Adjustment Mode .....	16		
X-Axis Accuracy Adjustment .....	16		
Y-Axis Accuracy Adjustment .....	16		
<b>Accessories</b> .....	17		
Batteries.....	17		
The Sighting Scope .....	18		
<b>Troubleshooting</b> .....	19		
Display Screen Explanations .....	19		
Troubleshooting Suggestions .....	20		
<b>Care and Transport</b> .....	21		
Transport .....	21		
Storage .....	21		
Cleaning and Drying .....	22		

# Introduction

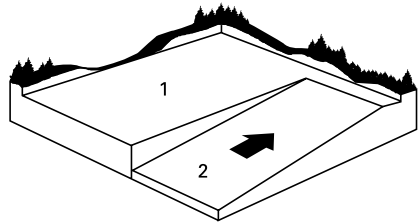
The Rugby Grade laser is designed to serve your needs in a wide variety of applications.

It is a proven tool for increased production with substantial reduction of labor, time and material costs. It can be used to accurately control land leveling, sloped or level grading, trenching, open cut mining, dredging, contouring of levees, general construction and excavation.

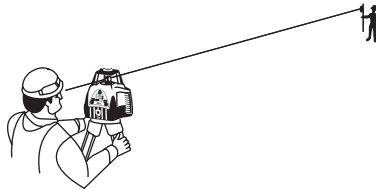
This manual contains operating and set-up procedures for common applications. Its purpose is to describe the features of the Rugby and how the Rugby operates. The manual is not intended to describe specific applications. Contact your local dealer or Leica Geosystems for information specific to your jobsite requirements.

The Rugby Grade lasers are rugged, accurate and fully electronic with an operating range up to 2,500 feet (770 meters) diameter.

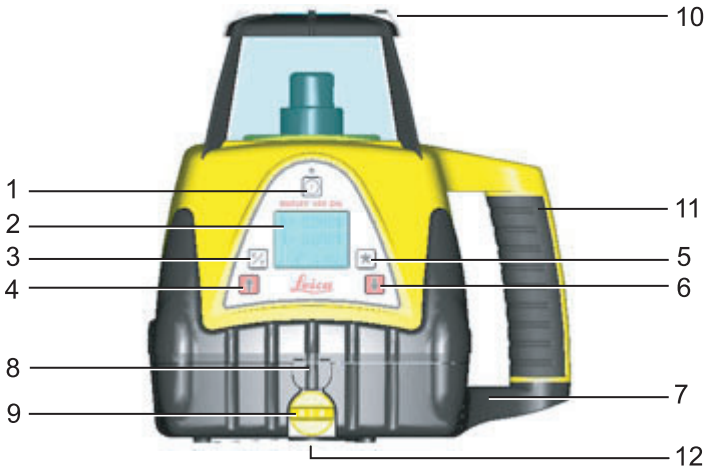
The Rugby 300 SG is a single grade laser and is capable of producing an accurate plane of laser light for applications that are level (1) or having a single grade (2).



Alignment is as easy as sighting over the top of the Rugby to your control point using the integrated alignment sights or the optional sighting scope assembly. For increased accuracy, follow the procedure for *Precise Alignment of the Axes*.



# Features and Functions



- 1 **POWER Button** – Powers the Rugby on and off.
- 2 **LCD Display** – Shows the grade setting for the X axis. The display shows also Beam Masking, Battery status, H.I. and Head Speed.
- 3 **X-axis Button** – Press to set grade in the X-axis.
- 4 **UP Arrow Button** – After pressing X, press to increase the grade shown.
- 5 **STAR Button** – Press to enter setup screens and the grade entry by digit screen.
- 6 **DOWN Arrow Button** – After pressing X, press to decrease the grade shown.
- 7 **Circular Level Vial** – For initial setup reference.
- 8 **12-volt input** – Charge the batteries or run the Rugby directly from 12-volts.
- 9 **Dual Batteries** – The Rugby will run with one or two sets of batteries for maximum flexibility and battery life.
- 10 **Raised alignment sights and mounting plate** for the optional sighting scope.
- 11 **Easy grip handle** for carrying and setup.
- 12 **Tripod mount** for attachment to a 5/8"-11 tripod.

## Entering Grade

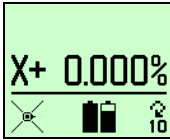
### Direct Grade Entry



Press **POWER** to turn the Rugby on.



Press **X** to enter X-axis grade mode.



Use the **UP** or **DOWN** buttons to set the desired grade.



Press **X** to exit.

### Grade Entry by Digit



While in the grade entry screens, press the **STAR** button and a cursor will appear on the +/- sign.



Press the **STAR** button to move the cursor to the right.



Press the **UP** or **DOWN** buttons to change the sign or the digit that is highlighted.



Press **X** to exit.

## Grade Zero

The grade in either axis can quickly be set to zero by pressing both the Up and Down buttons simultaneously while in either grade entry mode.

When changing grade using the direct entry method, the counter will always stop at zero. Release the button and press again to continue counting beyond zero.

## Grade Capability

The Rugby 300 SG can have up to 25.000% grade in the X-axis.

The Y-axis does not have grade capability, and is a “level only” axis.

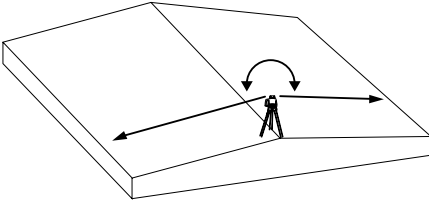


If no button is pressed, the display will revert to the main display after ten seconds.

## **Grade Swap**

The grade in the X-axis can easily be swapped from positive to negative in the *Grade Entry by Digit* screen.

Align the Y-axis (level) to the center line, the X-axis or cross axis grade can be made to fall to the right or lefthand side simply by changing the +/- sign on the display.

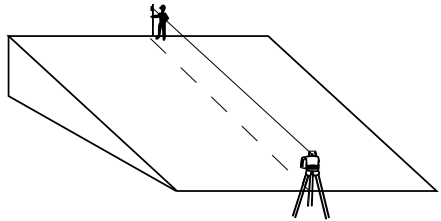


## **Grade Matching**

In Direct Grade Entry mode the movement of the leveling mechanism moves at the same speed as the grade counters.

To match an existing slope, set up the laser over the known gradebreak (base) of the slope, and align the cross axis (level only) of the laser to the end of the slope with both control points parallel to the direction of grade.

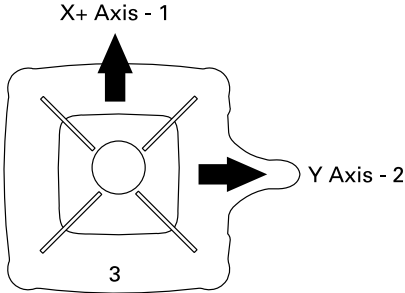
Adjust the Rod-Eye receiver on your grade rod for the elevation of the laser at the gradebreak next to the laser.



Move the grade rod to a point on the slope that is too be matched. Then, dial grade into the laser until the Rod-Eye indicates an on-grade reading.

The percent of grade in the display is now equal to the grade being matched.

## Identification of the Axes



- 1 **X+ Axis** – When positive grade is entered in the X-axis, grade will increase in this direction.
- 2 **Y Axis** – Always level
- 3 **Front of Rugby** – See also axis labeling on the side of the laser and inside the top windows.

## Slope - Percent of Grade

### Slope:

The change in elevation per unit of measure (foot, meter, etc.)

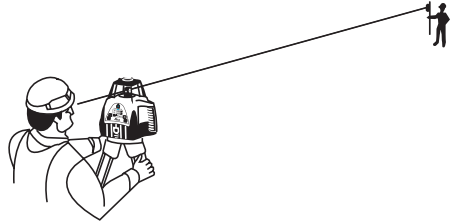
### Percent of Grade:

The change in elevation per 100 units of measure (feet, meters, etc.)

### Calculating Percent of Grade from the Slope:

Slope = 0.0059  
Conversion =  $0.0059 \times 100$   
Percent of Grade = 0.590%

## Alignment of the Axes



When the desired grade is correctly set in the display, it is necessary to align the X and Y axes to the jobsite.


Ensure the circular level vial is positioned near the center of the circle for maximum self-leveling capability.


Ensure the Rugby is properly positioned over a control point.

As shown, the direction of the X-axis is seen from the front of the Rugby, sighting over the top of the Rugby.

Rotate the Rugby slightly until the sights are aligned with your second control point.

Once aligned, work can begin.

 An optional sighting scope is also available.

 For very accurate alignment, refer to the steps for *Precise Alignment of the Axes*.



## Precise Alignment of the Axes

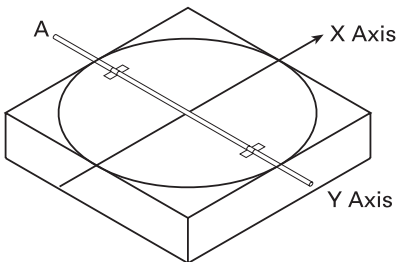
Under most conditions, the raised alignment marks on the top of the Rugby are adequate for alignment of the axes. However, for more precise alignment, use the following procedure.

### Objective:

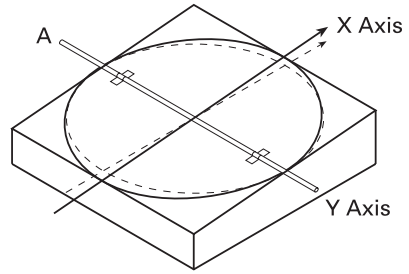
- To establish Point A on the Y-axis as a reference and take an elevation reading.
- To dial grade into the X-axis and then adjust the position of the laser until the original elevation at Point A is again found.

### Procedure:

- 1 With 0.000% grade in both axes, set up the Rugby directly over a grade stake and rough align the Y-axis to a second grade stake that we will call Point A.
- 2 Take an elevation reading at Point A using a Rod-Eye Receiver and a survey rod.



- 3 Enter +5.000% grade into the X-axis. When grade is entered in the X-axis, the Y-axis acts like a hinge or fulcrum.
- 4 With 5.000% in the X-axis, take a second reading at Point A.



### Alignment:

- If the second reading is equal to the first reading, the X-axis is aligned correctly.
- If the second reading is greater than the first reading, rotate the Rugby clockwise (to the right) until the two readings are the same.
- If the second reading is less than the first reading, rotate the Rugby counter-clockwise (to the left) until the two readings are the same.

## **General Setup**

### **Location**

Make sure the location is clear of possible obstructions that may block or reflect the laser beam.

Make the most efficient use of the Rugby's operating radius. The Rugby can be placed in the center of the working area or to one side.

Make sure the ground is stable. Ground vibration and extremely windy conditions can affect the operation of the Rugby.

If working in very dusty conditions, place the Rugby up-wind. The dirt and will then be blown away from the Rugby and reduce interference.

### **Recommended Head Speeds**

For surveying and manual machine control applications the typical head speed is 10 rps (600 rpm).

For automatic machine control applications it is recommended to use the highest head speed, 20 rps, to increase the frequency of updates.

When working at extended distances, decreasing the head speed (increasing the pulse time on the receiver) or changing the band width of the receiver to wide band can improve distance and performance.

## **Tripod Setup**

Attach the Rugby securely to a tripod or laser trailer, or mount on a stable level surface.

Always check the tripod or trailer before beginning work.

Make sure all screws, bolts, and nuts are tight.

If your tripod has chains, they should be slightly loose to allow for thermal expansion during the day.

On extremely windy days, secure the tripod. Placing a sandbag on each leg can do this. (See also adjustment for setting the wind sensitivity of the Rugby.)

If using a tripod with a quick disconnect adapter, point the control lever into the wind. This places the locking mechanism also into the wind, and will provide better stability.

## Setup Options

The Rugby has several setup options that are easily accessed and changed in the *first* setup screen.



From the main operating screen, Press **STAR** to access the setup screen.



Head Speed Selections – 5, 10, 15, 20 rps.



HI Function – Turns the H.I. function on and off.



Automatic, Manual or Manual with Grade.



Wind Sensitivity (1-5) – (1) for calm days, (3) for normal days, (5) for extremely windy days.



Beam Masking – Turns the beam off in the selected quadrants.

### Changing the Setup Options:

When entering the setup screen, the the EXIT window will be highlighted.

To change the setup options in this window the buttons are used in the following way:



Use the **STAR** button to select or deselect the setup parameters and exit the setup screen.



Use the **UP** and **DOWN** buttons to move the cursor or change the selected parameter.

Press the Star button and the cursor will become a thick border around the selected parameter. Once selected, use the Up and Down buttons to change the parameter.



**Beam masking** requires using also the X button.



With the beam masking option selected, press the X button to turn the beam on or off in the selected quadrant.



Use the Up and Down buttons to move around the quadrants.

The quadrant will become solid and dark when selected for the beam to be masked (off) in the quadrant.



Select the **EXIT** window, then press the Star button to exit and return to the main display.



If no button is pressed, the display will revert to the main display after ten seconds.

## Head Speeds

The Rugby can be set to any of four different head speeds – 5, 10, 15, or 20 rps. (300, 600, 900, 1200 rpm)

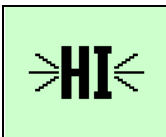
Select the head speed that provides the best performance for your application. The selected head speed is shown on the bottom, right corner of the main display screen.

## H.I. (Height of Instrument)

The H.I. function is used to prevent elevation changes caused by movement of the tripod.

When the H.I. Alert function is activated, the self-leveling accuracy remains the same, but the self-leveling range of the Rugby is reduced.

Movement of the Rugby beyond its self-leveling range will cause an “alert condition”. The Rugby will stop rotating and the following screen will appear on the display:



Stop the “alert condition” by pressing the Star or Power button and reset the function.

Check carefully the setup and elevation of the unit to determine what has caused the alert condition. Adjust as required to the correct elevation.

The H.I. function can be turned on or off in the *first* setup screen.

When the H.I. function is turned on, the letters “HI” will appear in the bottom, right part of the display.


The H.I. function becomes active 30 seconds after the unit has completely leveled and the head starts rotating.



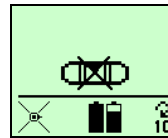
The H.I. function can be made to turn on automatically at power-up. This can be enabled in the *second* setup screen.

## Automatic and Manual Mode:

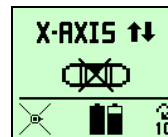
The Rugby will always turn on in automatic mode and will continuously self-level to maintain grade accuracy.

 In manual mode the self-leveling function is turned off.

The display screen will show the following:

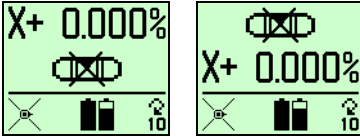


The X-axis slope can be changed using the X and arrow buttons, but the amount of change is not shown in the display.




## Manual Mode with Grade

In Manual Mode with Grade, the display will alternately show the grade entered for the X-axis and the crossed out level vial as shown here:



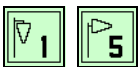
In this mode, grade can be entered into the X-axis. The Rugby will self-level to the grade input in the unit, then will lock into manual mode at this grade.

 Once locked in manual mode the self-leveling function is turned off.

If it is desired to change the manual grade shown, a new grade can be entered (same as in automatic mode) and the Rugby will level to this new grade, then lock in manual mode.

## Wind Sensitivity

The Wind Sensitivity setting allows the Rugby to operate in adverse environmental and windy conditions, while still ensuring maximum accuracy.



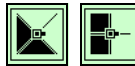
The sensitivity numbers can be set from 1 to 5. Select "1" for calm conditions. Select "5" for very windy conditions. Use the lowest setting for conditions present.

## Beam Masking

Electronic Beam Masking allows the operator to turn off the laser beam in specific quadrants to prevent interference with other operations on the job.

Using the setup menu, the beam can be turned off in up to three selected quadrants.

When a quadrant is turned off, the space will appear dark.



The quadrants selected can be either diagonals or corners of the Rugby. This selection is made in the *second* setup screen.



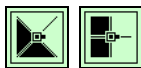
The settings for beam masking are normally not saved when the Rugby is turned off. The Rugby can be made to save the mask settings in the *second* setup screen.

## Additional Setup Options

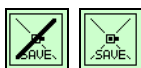
Additional setup options may be accessed in a second setup screen.



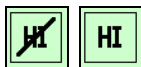
From the main operating screen, Press and hold the **UP** button, then press the **STAR** button to access the second level setup screen.



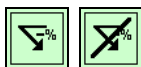
Selects beam masking at the diagonals or at the corners.



Allows the Rugby to always start up with no beam masking, or to save and start up with the last beam mask setting used.



Allows the Rugby to start up with the H.I. Alert automatically turned on, or turned off.



Allows the operator to disable the negative grade function of the Rugby. When disabled, negative grade cannot be entered in the grade displays.

## Changing the Setup Options:

When entering the setup screen, the EXIT window be highlighted.

To change the setup options in this window the buttons are used in the following way:



The **STAR** button is used to select or deselect the setup parameters.



The **UP** and **DOWN** buttons are used to move the cursor and change the parameters.



Press the STAR button and the cursor will become a thick border around the selected parameter. Once selected, use the UP and DOWN buttons to change the parameter.





Select the EXIT window, then press the **STAR** button to exit and return to the main display.




If no button is pressed, the display will revert to the main display after ten seconds.

# Checking Level Accuracy

 It is the responsibility of the user to follow operating instructions, and to periodically check the accuracy of the instrument and work as it progresses.

 The Rugby is adjusted to the defined accuracy specification at the factory. It is recommended to check your laser for accuracy upon receipt and periodically thereafter to ensure accuracy is maintained. If your laser requires adjustment, contact your nearest authorized service center or adjust the laser using the following procedure.

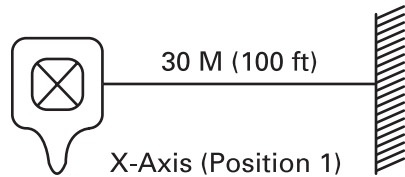
 Do not enter this mode or attempt adjustment unless you plan to change the accuracy. Accuracy adjustment should be performed only by a qualified individual that understands basic adjustment principles.

## Checking Level Accuracy

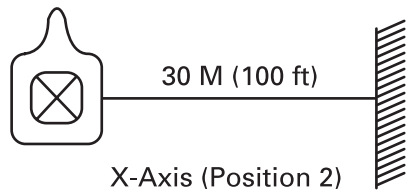
To check level accuracy of your Rugby, place the unit on a flat, level surface or tripod approximately 100 feet (30 meters) from a wall.

### Checking the X-Axis

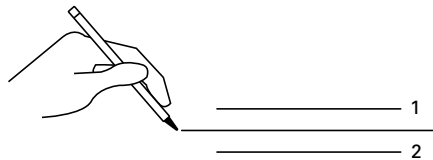
Align the X-axis so that it is square to the wall. Allow the unit to self-level completely (approximately one minute after the unit begins to rotate), and then, using your Rod-Eye receiver, mark the position of the beam (Position 1).



Rotate the Rugby 180°, allow it to self-level and then mark the opposite side of the X-axis (Position 2).



Mark the position half-way between the two marks. The X-axis is within its accuracy specification if the two marks are within  $\pm 1/16''$  ( $\pm 1.6$  mm) from center.



### Checking the Y-Axis

Align the Y-axis by rotating the Rugby 90° so that the Y-axis is now square to the wall. Allow the unit to self-level completely, then check the Y-axis in the same way as above.

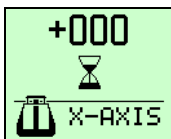
## Adjusting Level Accuracy

### To Enter Adjustment Mode

With the unit turned off, press and hold both the Up and Down buttons, then press the Power button to put the unit in adjustment mode.

### X-Axis Accuracy Adjustment

If entered correctly, the X-axis adjustment screen will appear.



When entering the adjustment screen, a small hour glass will appear. Wait until the hour glass disappears before checking and changing the adjustment numbers.

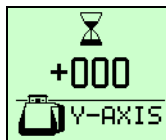
Use the Up and Down arrows to change the number and move the beam to the half-way point between the positions marked for the X-Axis. Five counts in the display are equal to approximately 1/16" at 100 feet (1.6 mm at 30 meters).

Press the Star button to accept this position and accept the number in the display for the X-Axis.

Press the Star button again to move to the Y-Axis adjustment screen.

### Y-Axis Accuracy Adjustment

If entered correctly, the Y-axis adjustment screen will appear.





Wait until the hour glass disappears before checking and changing the adjustment numbers.


Use the Up and Down arrows to change the number and move the beam to the half-way point between the positions marked for the Y-Axis.

Press the Star button to accept this position and accept the number in the display for the Y-Axis.

Press the Star button again to accept, save, store the adjustment activity, and to return to the main display screen.

 After adjustment, always check your work.

 Always check accuracy prior to critical applications. Repeated activation of the grade mechanism may result in accuracy variations up to  $\pm 20$  arc seconds.

 Pressing the power button at any time before completing the procedure will revert the accuracy to previously saved information.



# Accessories

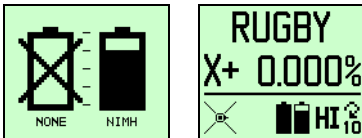
## Batteries

The unique battery solution in the Rugby has two independent battery compartments that will accept various combinations of NiMH packs or individual D-cell batteries (2).

The Rugby can also be run directly from a 12-volt source through the charge jack.



The battery status is displayed on power-up and as small icons on the main operating screen.



Install the NiMH batteries (1) as shown on the label of the pack.

Install individual D-cell batteries (2) as shown on the battery door cover.

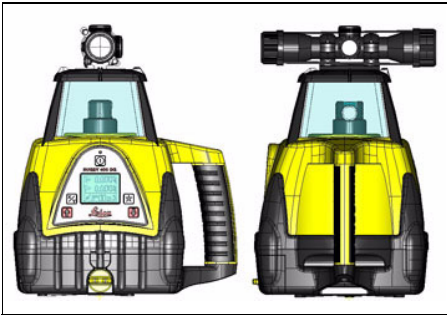
The charge jack (3) is located on the laser above the locking knob of the battery door (4).

Charge time is approximately 4-5 hours.

## The Sighting Scope

A sighting scope (739870) is available as an optional accessory for alignment of the axes and second day setups.

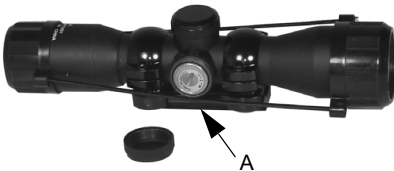
The scope is magnetically mounted to the top of the housing and once aligned has a repeatable accuracy of approximately  $\pm 0.2^\circ$ .



### Alignment of the crosshairs

If using the scope for reference or second day setup, use the raised sights on the top of the laser to align your Rugby to a second control point.

The scope is roughly aligned at the factory. If a more precise alignment is desired, first align the Rugby to a second control point using the procedure for Precise Alignment of the Axes found in this manual.



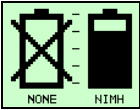
A = Vertical crosshair alignment

## Display Screen Explanations



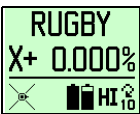
### Leica Start-up Screen

- Can be programmed to display customer's name and address.



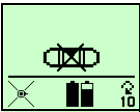
### Battery Status Screen

- Displays on power-up
- Displays also when batteries are empty.



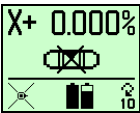
### Automatic Mode

- Main Display Screen
- Unit automatically self-levels.



### Manual Mode

- Unit will not self-level
- Grade can be changed with the grade/arrow buttons.



### Manual Mode with Grade

- Unit will self-level to grades input, then lock in manual mode.
- Grade can be changed with the grade/arrow buttons.



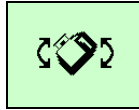
### H.I. Alert Warning

- Unit has moved and elevation may have changed.
- Press Power or Star to reset H.I. function.
- Check unit's elevation and adjust if required.



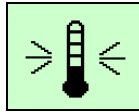
### Servo Limit Warning

- Unit is not level
- Check setup and circular level vial.



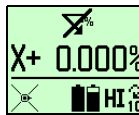
### Tilt Warning

- Unit is tilted more than 30°.



### Temperature Warning

- Unit is too hot or cold to operate properly.
- Shade unit if too hot.
- Warm unit before continuing if too cold.



### Negative Grade Disabled

- The ability to enter negative grade has been disabled in the second setup screen.

## **Troubleshooting Suggestions**

Whenever there are questions regarding your laser, check the basics first.

- Mode of operation - automatic, manual, manual with grade.
- Battery status
- Warning Screens - H.I., servo limit, temperature, adjustment.
- Head speed setting
- Beam mask setting

### **No beam**

- The Rugby beam is infrared and invisible to the human eye.
- Check with a receiver to verify.

### **No self-leveling**

- Check the basics above.

### **Cannot change grade**

- Check the basics above.
- Check the other axis.
- Check operation in manual mode.
- Check if at grade limit.

### **Loss of distance**

- Check the window surfaces.
- Check with a different receiver.
- At extended distances, decreasing the head speed may improve performance.

### **Head rotates slowly**

- Check the basics above.
- In low battery mode the Rugby will rotate slowly (7 RPS) to trigger the laser low battery function on the RE Pro.

### **Grade stakes do not match the laser.**

- Check for proper alignment of the axes.
- Check level accuracy of the laser.
- Check the grade stakes to verify their accuracy or to determine if they have moved.

### **Beam masking not saved when laser is turned off.**

- Set up this preference in the second set-up screen.



If none of the above suggestions results in a solution, contact your local dealer or nearest authorized service center.

## Transport

### Transport in the field

When transporting the product in the field, always make sure that you:

- Either carry the instrument in its original transport case
- Or carry the tripod with its legs splayed across your shoulder, keeping the attached instrument upright.

### Transport in a road vehicle

Never carry the instrument loose in a road vehicle. It can be affected by shock and vibration. Always carry the product in its transport container and secure it.

## Shipping

When transporting the product by rail, air or sea, always use the complete original Leica Geosystems packaging transport container and cardboard box, or its equivalent, to protect against shock and vibration.

### Shipping, transport of batteries

When transporting or shipping batteries, the person in charge of the product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping, contact your local passenger or freight transport company.

## Field Adjustment

After transport inspect the field adjustment parameters given in this user manual before using the product.

## Storage

### Product

Respect the temperature limits when storing the product, particularly in summer if the instrument is inside a vehicle. Refer to “Technical Data” for information about temperature limits.

### Field Adjustment

After long periods of storage inspect the field adjustment parameters given in this user manual before using the product.

### Nickel-Metal Hydride Batteries

- The storage temperature range is  $-40^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$  to  $+131^{\circ}\text{F}$ ).
- We recommend storage in the temperature range from  $0^{\circ}\text{C}$  to  $+20^{\circ}\text{C}$  ( $+32^{\circ}\text{F}$  to  $+68^{\circ}\text{F}$ ), in a dry environment to minimize self-discharge.
- In the recommended temperature range, fully charged NiMH batteries can be stored for a maximum of 180 days. NiMH batteries must then be recharged again.
- Remove the batteries from the product for storage.
- After storage, recharge the battery before use.

- Protect batteries from damp and wetness. Wet or damp batteries must be dried before storing or use.

## ***Cleaning and Drying***

### **Windows**

- Never touch the glass with your fingers.
- Use only a clean, soft, lint-free cloth for cleaning. If necessary, moisten the cloth with water or pure alcohol.
- Do not use other liquids; these may attack the polymer components.

### **Damp Products**

- Dry the product, the transport container, the foam inserts and the accessories at a temperature not greater than 40°C / 108°F and clean them.
- Do not repack until everything is completely dry.

### **Cables and Plugs**

- Keep plugs clean and dry.
- Blow away any dirt lodged in the plugs of the connecting cables

# Safety Directions

## General

The following directions should enable the person responsible for the product, and the person who actually uses the equipment, to anticipate and avoid operational hazards.

The person responsible for the product must ensure that all users understand these directions and adhere to them.

## Intended Use

### Permitted use

- The product casts a horizontal laser plane or a laser beam for the purposes of alignment.
- The product can be set up on its own baseplate or on a tripod.
- The laser beam can be detected by means of a laser detector.
- The product, combined with machine control receivers, is also suitable for guiding construction machinery.
- The product can be powered by rechargeable NiMH or alkaline batteries.

### Adverse use

- Use of the product without instruction.
- Use outside of the intended limits.
- Disabling safety systems.
- Removal of hazard notices.

- Opening the product using tools, for example screwdriver, unless this is specifically permitted for certain functions.
- Modification or conversion of the product.
- Use after misappropriation.
- Use of products with obviously recognizable damages or defects.
- Use with accessories from other manufacturers without the prior explicit approval of Leica Geosystems.
- Inadequate safeguards at the construction site (e.g. when using on or near roads).
- Deliberate dazzling of third parties.
- Controlling of machines, moving objects or similar monitoring application without additional control and safety installations.



### WARNING:

Adverse use can lead to injury, malfunction, and material damage. It is the task of the person responsible for the equipment to inform the user about hazards and how to counteract them. The product is not to be used until the user has been instructed how to work with it.

## ***Limits of Use***

### **Environment:**

Suitable for use in an atmosphere appropriate for permanent human habitation: not suitable for use in aggressive or explosive environments.



### **DANGER:**

Local safety authorities and safety experts must be contacted before working in hazardous areas, or in close proximity to electrical installations or similar situations by the person in charge of the product.

## ***Responsibilities***

### **Manufacturer of the product**

Leica Geosystems AG, CH-9435 Heerbrugg, hereinafter referred to as Leica Geosystems, is responsible for supplying the product, including the user manual and original accessories, in a completely-safe condition.

### **Manufacturers of non-Leica Geosystems accessories**

The manufacturers of non Leica Geosystems accessories for the product are responsible for developing, implementing and communicating safety concepts for their products, and are also responsible for the effectiveness of those safety concepts in combination with the Leica Geosystems product.

### **Person in charge of the product**

The person in charge of the instrument has the following duties:

- To understand the safety instructions on the product and the instructions in the user manual;

- To be familiar with local regulations relating to accident prevention;
- To inform Leica Geosystems immediately if the product and the application becomes unsafe.



### **WARNING:**

The person responsible for the product must ensure that it is used in accordance with the instructions. This person is also accountable for the training and the deployment of personnel who use the product and for the safety of the equipment in use.

## ***Warranty***

### **International Warranty**

The International Warranty can be downloaded from the Leica Geosystems AG home page at <http://www.leica-geosystems.com/internationalwarranty> or received from your Leica Geosystems dealer.

## ***Hazards of Use***



### **WARNING:**

The absence of instruction, or the inadequate imparting of instruction, can lead to incorrect or adverse use, and can give rise to accidents with far-reaching human, material, financial, and environmental consequences.

### **Precautions:**

All users must follow the safety directions given by the manufacturer and the directions of the person responsible for the product.



**CAUTION:**

Watch out for erroneous measurements if the product has been dropped or has been misused, modified, stored for long periods or transported.

**Precautions:**

Periodically carry out test measurements and perform the field adjustments indicated in the user manual, particularly after the instrument has been subjected to abnormal use and before and after important measurements.

**DANGER:**

Because of the risk of electrocution, it is very dangerous to use grade rods and staffs in the vicinity of electrical installations such as power cables or electrical railways.

**Precautions:**

Keep at a safe distance from electrical installations. If it is essential to work in this environment, first contact the safety authorities responsible for the electrical installations and follow their instructions.

**WARNING:**

By working during a thunderstorm you are at risk from lightning.

**Precautions:**

Do not carry out field work during thunderstorms.

**WARNING:**

Inadequate securing of the work site can lead to dangerous situations, for example in traffic, on building sites, and at industrial installations.

**Precautions:**

Always ensure that the work site is adequately secured. Adhere to the regulations governing accident prevention and road traffic.

**CAUTION:**

If the accessories used with the product are not properly secured and the product is subjected to mechanical shock, for example blows or falling, the product may be damaged or people may sustain injury.

**Precautions:**

When setting-up the product, make sure that the accessories, for example tripod, tribrach, connecting cables, are correctly adapted, fitted, secured, and locked in position.

Avoid subjecting the equipment to mechanical stress.

**CAUTION:**

During the transport, shipping or disposal of batteries it is possible for inappropriate mechanical influences to constitute a fire hazard.

**Precautions:**

Before shipping the product or disposing of it, discharge the batteries by running the product until they are flat.

When transporting or shipping batteries, the person in charge of the

product must ensure that the applicable national and international rules and regulations are observed. Before transportation or shipping contact your local passenger or freight transport company.



**WARNING:**

Using a battery charger not recommended by Leica Geosystems can destroy the batteries. This can cause fire or explosions.

**Precautions:**

Only use chargers recommended by Leica Geosystems to charge the batteries.



**WARNING:**

High mechanical stress, high ambient temperatures or immersion into fluids can cause leakage, fire or explosions of the batteries.

**Precautions:**

Protect the batteries from mechanical influences and high ambient temperatures. Do not drop or immerse batteries into fluids.



**WARNING:**

Short circuited battery terminals can overheat and cause injury or fire, for example by storing or transporting in pockets if battery terminals come in contact with jewelry, keys, metallized paper or other metals.

**Precautions:**

Make sure that the battery terminals do not come into contact with metallic objects.



**WARNING:**

If the product is improperly disposed of, the following can happen:

- If polymer parts are burnt, poisonous gases are produced which may impair health.
- If batteries are damaged or are heated strongly, they can explode and cause poisoning, burning, corrosion, or environmental contamination.
- By disposing of the product irresponsibly you may enable unauthorized persons to use it in contravention of the regulations, exposing themselves and third parties to the risk of severe injury and rendering the environment liable to contamination.

**Precautions:**

Dispose of the product appropriately in accordance with the regulations in force in your country. Always prevent access to the equipment by unauthorized personnel.



**CAUTION:**

Only Leica Geosystems authorized workshops are entitled to repair these products.

***Laser classification***

The rotating laser Rugby 300 SG produces an invisible laser beam that emerges from the rotating head.

The product is a Class 1 laser product in accordance with:

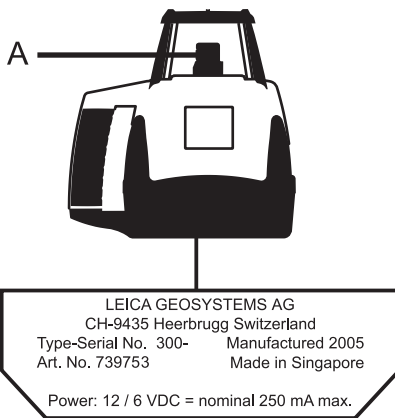
- IEC 60825-1 (2001-08): Safety of Laser Products"

- EN 60825-1:1994+A11:1996+A2: 2001: "Safety of Laser Products"

Class 1 laser products are safe under reasonable foreseeable conditions of operation and are not harmful to the eyes provided that the products are used and maintained in accordance with the instructions.

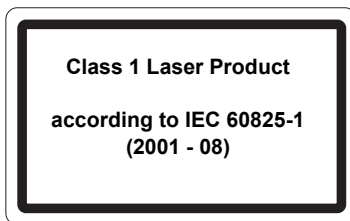
Maximum radiant power: (Rotating mode)	1.7 mW
Max. radiant power per pulse:	N/A
Pulse duration:	N/A
Pulse repetition frequency	N/A
Beam divergence:	0.2 mrad
Measurement uncertainty:	±5%

## Labeling



Complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No 50, dated July 26, 2001.

*This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*



A = Laser Beam

# **Electromagnetic Compatibility (EMC)**

## **Description**

The term "Electromagnetic Compatibility" is taken to mean the capability of the product to function smoothly in an environment where electromagnetic radiation and electrostatic discharges are present, and without causing electromagnetic disturbances to other equipment.



### **WARNING:**

Electromagnetic radiation can cause disturbances in other equipment.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that other equipment may be disturbed.



### **CAUTION:**

There is a risk that disturbances may be caused in other equipment if the product is used in conjunction with accessories from other manufacturers, for example field computers, personal computers, two-way radios, non-standard cables or external batteries.

### **Precautions:**

Use only the equipment and accessories recommended by Leica Geosystems. When combined with the product, they meet the strict requirements stipulated by the guidelines and standards. When using computers and two-way radios, pay attention to the information about

electromagnetic compatibility provided by the manufacturer.



### **CAUTION:**

Disturbances caused by electromagnetic radiation can result in erroneous measurements.

Although the product meets the strict regulations and standards which are in force in this respect, Leica Geosystems cannot completely exclude the possibility that the product may be disturbed by very intense electromagnetic radiation, for example near radio transmitters, two-way radios or diesel generators.

### **Precautions:**

Check the plausibility of results obtained under these conditions.



### **WARNING:**

If the product is operated with connecting cables attached at only one of their two ends, for example external supply cables, interface cables, the permitted level of electromagnetic radiation may be exceeded and the correct functioning of other products may be impaired.

### **Precautions:**

While the product is in use, connecting cables, for example product to external battery, product to computer, must be connected at both ends.

## ***FCC Statement, Applicable in U.S.***



### **WARNING:**

Changes or modifications not expressly approved by Leica Geosystems for compliance could void the user's authority to operate the equipment.



### **WARNING:**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC rules.

These limits are designed to provide reasonable protection against harmful interference in a residential installation.

This equipment generates, uses and can radiate frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications.

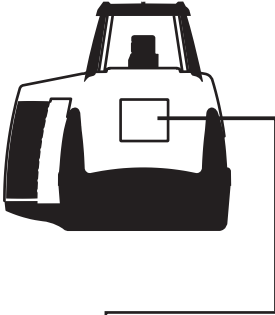
However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and the receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

## ***Labeling Rugby 300 SG***



*This device complies with Part 15 of the FCC Rules. Operation is subject to the following conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.*

# Technical Data

## The Rugby 300 SG

Operating range.....	1250 ft (385 meter) radius
Self-leveling accuracy* .....	±1/16" at 100' (1.5 mm at 30 meters)
Self-leveling range .....	± 5°
Grade Capability .....	-5% to +25%
Head Speeds .....	5, 10, 15, 20 RPS
Laser Diode Type .....	780 nm (invisible)
Laser Classification.....	Class 1 IEC60825-1
Operating Temperature .....	-4° to 122°F (-20° to 50°C)
Storage Temperature (without batteries).....	-40° to 158°F (-40° to 70°C)
Battery Life** .....	65 hours (4-alkaline), 130 hours (8-alkaline) .....50 hours (1-NiMH pack), 100 hours (2-NiMH packs)
Charging time .....	4.5 hours (approximate)
Dimensions (HWD) .....	10.4 x 10.2 x 7.92" (265 x 260 x 200 mm)
Weight without batteries .....	11.1 lbs. (5 kg)
Water resistance.....	Waterproof to IPX7 Standard

\* Accuracy defined at 25°C.

\*\* Battery life is dependent on many variables.

Leica Geosystems AG,  
Heerbrugg, Switzerland,  
has been certified as being  
equipped with a quality  
system which meets the  
International Standards of  
Quality Management and  
Quality Systems (ISO  
standard 9001) and  
Environmental  
Management Systems  
(ISO standard 14001).



**Total Quality Management -  
Our commitment to total  
customer satisfaction.**

Ask your local Leica  
Geosystems agent for more  
information about our TQM  
program.

- when it has to be **right**

*Leica*  
**Geosystems**

741894-1.1.0en

Printed in Switzerland - Copyright Leica Geosystems  
AG, Heerbrugg, Switzerland 2007  
Original text

Leica Geosystems AG  
CH-9435 Heerbrugg  
(Switzerland)  
Phone +41 71 727 31 31  
Fax +41 71 727 46 73  
[www.leica-geosystems.com](http://www.leica-geosystems.com)