Warranty

TOPCON Laser Systems Limited Warranty

TOPCON’s laser and machine control systems are warranted against defective material and workmanship under normal use and application for the time period specified on the Warranty Card provided with the system.

The warranty against defects in any TOPCON battery, charger, cable, valve, hose and mechanical part is 90 days.

During the warranty period, TOPCON will, at its option, repair or replace the product at no additional charge. Repair parts and replacement products will be furnished on an exchange basis and will be either reconditioned or new. This limited warranty does not include service to repair damage to the product resulting from accident, disaster, misuse, abuse or modification of the product.

Calibration of components, labor and travel expenses incurred for in-field removal and replacement of components are not covered under this warranty.
Warranty service may be obtained by contacting the TOPCON dealer who made the original sale. Purchaser agrees to insure the product or assume the risk of loss in transit, to prepay shipping charges to the warranty service location and to use the original shipping container or the equivalent. A letter should accompany the package describing the problem and/or defect.
Warranty Disclaimer

The above warranties are in lieu of all other warranties, whether expressed or implied, including all warranties or merchantability, or fitness for a particular purpose. In no event will TOPCON Laser Systems, Inc.™ or its Representative be liable for lost profits or other consequential damages arising from the purchase or use of TOPCON Laser Systems, Inc.™ LS-B2 or any performance hereunder or any claims of negligence, even if TOPCON Laser Systems, Inc.™ has been advised of the possibility of such damages.

Service assistance can be provided by contacting your local TOPCON Laser Systems, Inc.™ dealer or by calling the Corporate Service Center.

Travel charges will be applied for any on-site service whether warranty or non-warranty in nature.

Phone: (800) 443-4567
8am to 5pm Pacific Time, Monday through Friday

FAX: (800) 443-7503
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LS-B2 Laser Sensor

Introduction

Thank you very much for purchasing this product from Topcon. In order for it to serve you long and well, we ask that you read and carefully follow the instructions contained in this manual. If you have any questions, please contact your local authorized Topcon dealer for assistance.

Topcon’s LS-B2 is a machine mounted laser sensor. Used in conjunction with a rotating laser elevation reference, the LS-B2 helps operators get to grade quickly and accurately.

In manual control, the LS-B2 senses the position of a rotating laser reference and flashes a clearly visible raise, lower, or on-grade signal to the operator. The operator then corrects the position of the cutting edge according to the signal. In automatic control, the LS-B2 sends the signals directly to the machine’s hydraulics which make the correction automatically.

The LS-B2 transfers easily from machine to machine and offers the choice of on-board batteries or machine battery powered operation.

The LS-B2 has a unique infrared communication option called the IR-2. The IR-2 receives an infrared signal from the LS-B2 and transfers that signal to the RD-2 remote display mounted in the cab. Used with the on-board battery pack, the infrared option removes the need for cables between the LS-B2 and RD-2. This is an advantage where routing cables from the sensor to the cab or from the sensor to the battery is difficult and prone to accident.
Nomenclature

LS-B2 NOMENCLATURE

![Diagram of LS-B2 with labeled parts]

- MOUNTING KNOB
- MOUNTING BRACKET
- PHOTO CELL RECEIVING WINDOW
- LED'S for GRADE INDICATORS
- "DEAD BAND" PRECISION INDICATORS
- ON-GRADE PRECISION OR "MODE" BUTTON
- POWER BUTTON
- CABLE CONNECTOR AND BATTERY PACK CLAMP CONNECTORS UNDERNEATH
**RD-2 NOMENCLATURE**

IR-2 CONNECTOR LOCATED ON BACK OF RD-2

*Functions only when RD-2/LS-B2 are Cable Connected*
Installation

Mounting the System

Before installing your LS-B2 system, turn to page 7 to confirm that you have received all system components. If you have not, contact your local Topcon Laser Systems dealer for help.

The LS-B2 has been fitted with a clamp that attaches the unit to any round pipe or pole 1.74" to 2.0" (44.45mm to 50.8mm) in diameter or square pipes with sides from 1.5" to 1.95" (38.1mm to 50mm).

To Mount on a Machine Stick

To mount the LS-B2 on a backhoe or excavator, you must first have a pipe attached to the machine stick. Weld two brackets to your stick. Bolt or otherwise attach your mounting pipe to the brackets. Then, clamp the LS-B2 onto the pipe.

Example of Mounting Pipe on Excavator or Backhoe Stick

To Mount LS-B2:
A: Close Bracket Over Pipe.
B: Close Other Half of Bracket so Threaded Shaft w/Centering Ball Sits Firmly in Slot.
C: Turn Handle Until Tight.
To Mount on a Blade or Screed

With pavers, motor graders, dozers, and scrapers, the LS-B2 attaches to a pole or mast that is mounted on the screed or blade. Clamp the LS-B2 to the pole just as you clamp it to a pipe.

To Mount the RD-2 Remote Display

Using the head bolts and nuts supplied, mount the RD-2 to either a vertical or horizontal surface in the cab.
Wiring the System

To supply power from your machine’s battery, wire as shown. Otherwise, connect the LS-B2 battery pack BT-39Q.
## Components

These are the four basic LS-B2 component configurations:

### D-Set

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
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</thead>
<tbody>
<tr>
<td>LS-B2</td>
<td>1</td>
</tr>
<tr>
<td>PC-18 Power Cable, 25’ (7.6m)</td>
<td>1</td>
</tr>
<tr>
<td>Carrying Case</td>
<td>1</td>
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</table>

### C-Set

<table>
<thead>
<tr>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>LS-B2</td>
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</tr>
<tr>
<td>BT-39Q NiCad Pack/Alkaline Batteries</td>
<td>1</td>
</tr>
<tr>
<td>Adapter, 12VDC, 120VAC or 230VAC</td>
<td>1</td>
</tr>
<tr>
<td>Carrying Case</td>
<td>1</td>
</tr>
</tbody>
</table>

### B-Set

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS-B2</td>
<td>1</td>
</tr>
<tr>
<td>RD-2*</td>
<td>1</td>
</tr>
<tr>
<td>PC-18 Power Cable, 25’ (7.6m)</td>
<td>1</td>
</tr>
<tr>
<td>JC-4 Communication Cable</td>
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</tr>
<tr>
<td>Carrying Case</td>
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### A-Set

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>LS-B2</td>
<td>1</td>
</tr>
<tr>
<td>RD-2*</td>
<td>1</td>
</tr>
<tr>
<td>IR-2*</td>
<td>1</td>
</tr>
<tr>
<td>BT-39Q NiCad Pack/Alkaline Holder</td>
<td>1</td>
</tr>
<tr>
<td>PC-18 Power Cable, 25’ (7.6m)</td>
<td>1</td>
</tr>
<tr>
<td>Adapter, 12VDC, 120VAC or 230VAC</td>
<td>1</td>
</tr>
<tr>
<td>Carrying Case</td>
<td>1</td>
</tr>
</tbody>
</table>

---

*Includes the IR/RD-2 Adapter with the following parts:

<table>
<thead>
<tr>
<th>Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Base</td>
<td>1</td>
</tr>
<tr>
<td>M8×20mm Soc, Hd Screw, SS</td>
<td>2</td>
</tr>
<tr>
<td>M8 Hex Nut, SS</td>
<td>2</td>
</tr>
<tr>
<td>M8 ID Lock Washer, SS</td>
<td>2</td>
</tr>
<tr>
<td>M8 Flat Washer, SS</td>
<td>2</td>
</tr>
</tbody>
</table>

---

Operation

Your LS-B2 can be used alone or with a remote display.

**LS-B2 Only**
Using the LS-B2 only, manually control grade by raising or lowering your cutting edge according to the LS-B2’s LED display signals.

Basic automatic control is available using only the LS-B2, although we recommend automatic control capability with the LS-B2/RD-2 combination.

**LS-B2 and RD-2**
The LS-B2 provides either automatic or manual control when used with the RD-2 remote display. The RD-2 improves LS-B2 ease-of-operation.

Mount the RD-2 in the machine’s cab so that the grade display signals are within easy view. Grade signals become much easier to see when used with the RD-2 remote display.

When the RD-2 is connected to your machine’s valves, a switch on the front panel allows operators to select either manual or automatic control, depending on the application. Also, the RD-2 features switches to manually raise or lower the machine cutting edge. These switches override automatic control.

**IR-2**
The LS-B2/RD-2/IR-2 combination provides an infrared communication option for convenient wireless operation in manual control applications. The IR-2 is an infrared receiver that connects to the RD-2 and enables the LS-B2 grade display signals to be transferred to the RD-2 cab-mounted display *without a cable.*
To Use the Infrared Option:

1 Position the IR-2 receiver so that it faces and is within clear line of sight of the LS-B2.

2 Connect the IR-2 to the RD-2 with the attached cord. Normally the IR-2 mounts on top of the RD-2. However, by using an optional IR-2 extension cord, you can mount the IR-2 in a location of your choice. See your Topcon dealer for information.

3 Position the LS-B2 on the pole or pipe so that the grade display window faces the IR-2.

When using the LS-B2 infrared option, power comes from the BT-39Q battery pack, so no cords are necessary between the LS-B2 and the RD-2 or between the LS-B2 and the machine’s battery.

LS-B2 and Automatic Control Systems

The LS-B2 can be used as part of most Topcon automatic control systems. By connecting the LS-B2 to a Topcon control box and integrating it into the system, the LS-B2 helps provide high precision grade control to excavators, graders, pavers, dozers, milling machines, and Ag land leveling machines. See your machine control manual for operating and installation details.

Consult your dealer to equip your LS-B2 for automatic control using its valve drivers and RD-2 control panel.
Operating the System

To Operate the LS-B2

1. Set-up and power-on the rotating laser.

2. Set your machine’s cutting edge at the desired elevation.

3. Mount the LS-B2 to the pole or pipe. Connect the LS-B2 to the machine’s battery with the cable or attach the BT-39Q battery pack and power-on.

4. Select the desired level of on-grade precision from 1 for super-high precision to 4 for very rough grading. See page 20 for details.

**NOTICE**

When cable-connected, the On/Off Switch is disabled, and the LS-B2 is always on. Cable communication always overrides infrared communication.
5 Move the LS-B2 up or down until the on-grade symbol appears in the display (LS-B2 indicates on-grade by flashing a horizontal bar across the center of its display).

6 Tighten the LS-B2 firmly on its mounting pipe or pole.

To Operate with the RD-2
1 Set-up and power-on the rotating laser.
2 Set your cutting edge at the desired elevation.
3 Mount the LS-B2 on the pole or pipe. Connect the LS-B2 to the RD-2 with cable or attach the battery pack for cordless infrared operation with the IR-2 and power-on.

4 Position the RD-2 in the cab for easy monitoring, then wire it to the machine’s battery.

5 Power-on the RD-2.

6 Press the on-grade precision button on the RD-2 control panel to select the desired level of on-grade precision from “1” for super-high precision to “4” for very rough grading. See page 20 for details.
7 Move the LS-B2 up or down until the on-grade symbol appears in the display (LS-B2 indicates on-grade by flashing a horizontal bar across the center of its display).

8 Affix the LS-B2 firmly to its mounting pipe or pole.

1. PLACE LS-B2 ON BRACKET LOOSELY
2. MOVE LS-B2 UP AND DOWN UNTIL “ON-GRade” SIGNAL APPEARS
3. TIGHTEN LS-B2 TO BRACKET

The RD-2 will flash all four display panel lights if it is not receiving communication from the LS-B2. If this occurs while you are using the infrared option, an adjustment to the position of the IR-2 may be necessary.

To Use the RD-2 Automatic Controls
If you or your dealer has connected the RD-2 to your machine’s hydraulic valves, you can switch from manual to automatic control and the reverse by pressing the RD-2 AUTO button.
Also, if you have connected the RD-2 to your machine’s hydraulic valves, you can raise or lower the machine’s cutting edge by pressing the “Bucket” up/down switch on the RD-2 control panel.

**Grade Display Signals**

Both the LS-B2 and RD-2 have grade displays which show the direction of adjustment needed to reach grade. The display consists of grade arrows if a correction is required and a horizontal bar signal when on-grade.

Note which adjustments correspond to which grade indicate display signals:

<table>
<thead>
<tr>
<th></th>
<th>TOO HIGH</th>
<th>A LITTLE TOO HIGH</th>
<th>ON GRADE</th>
<th>A LITTLE TOO LOW</th>
<th>TOO LOW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grade Arrows</td>
<td>![Arrows]</td>
<td>![Arrows]</td>
<td>![Arrows]</td>
<td>![Arrows]</td>
<td>![Arrows]</td>
</tr>
<tr>
<td>LED Arrow</td>
<td>The LED arrow is solid</td>
<td>The LED arrow flashes</td>
<td>The LED arrow flashes</td>
<td>The LED arrow flashes</td>
<td>The LED arrow is solid</td>
</tr>
</tbody>
</table>

*Lower Cutting Edge to Reach Grade*

*Raise Cutting Edge to Reach Grade*
Calibrating Valve Offsets

Because valve drivers are installed in your LS-B2 laser sensor, you can have automatic control of grade without a control box. Consult your authorized Topcon dealer for automatic control installation and operation information.

Through the RD-2 Remote Display you can calibrate and adjust both the hydraulic valve gain and offsets.

To Calibrate Valve Raise and Lower Offsets

The valve offset controls the duration of the signal the LS-B2 sends to the hydraulic valves. If the signal is too short, the valves will not adjust. A signal that is too long will cause the valves to adjust too much.

1 Press the Power button and the Precision Mode button simultaneously when powering up. Panel light “1” begins to flash and the Up arrow is displayed on the grade indicate display.

The system enters the calibration mode. The Up arrow indicates that raise valve offset is ready for adjustment.

2 Push the Auto button to activate the valve.
3 Press the Raise button again to lengthen the valve offset and the Lower button to shorten it. When the valve just begins to move the cutting edge, release the button.

4 Press the Precision Mode button again the lower valve offset. Panel light “2” begins to flash and a Down arrow is displayed on the grade indicate screen.

5 Push the Auto button to activate the valve.
6 Press the Raise/Lower buttons to set the valve offset as done in step 3.

7 Press the Precision Mode button once to select your settings. Press the Precision Mode button once more to exit calibration mode. Your valve offsets are now stored in the LS-B2.

Calibrating Valve Gain
In automatic control, whenever the LS-B2 senses a change in elevation, it signals your machine’s hydraulic valves to raise or lower the cutting edge. Those raise or lower signals are what keep you on-grade.

The Gain setting controls the speed of those hydraulic adjustments by controlling the flow of hydraulic fluid through the valves. By calibrating the valve Gain, you can set the speed that works best for your machine.

When setting the Gain, the objective is to allow rapid adjustments in cutting edge elevation, but not so rapid that the cutting edge “overshoots” grade.

To Set the Valve Gain
1 Press the Power button and the Precision Mode button simultaneously when powering up. Panel light “1” begins to flash and an on-grade symbol is displayed on the grade indicate display.

2 Press the Precision Mode button two more times. The system enters the Gain calibration mode. Panel light “3” begins to flash.
3 Push the Auto button to activate the valve.

4 Press the Raise button to increase the valve gain and the Lower button reduce it.

5 Press the Precision Mode button to select your setting and to exit the valve gain calibration. Your gain settings are now stored in the LS-B2

You may have to fine tune your Gain setting after trying LS-B2 automatic control on your machine. Remember if your cutting edge is adjusting too quickly and overshooting grade, you need to reduce the valve gain. If the cutting edge is adjusting too slowly, you need to increase it. Trial and error will show which settings are most appropriate for your machine.
Setting On Grade Precision

With the LS-B2, you can select the width of your on-grade band according to the level of precision required by the job. When the job calls for extremely high precision, select mode 1. When high precision is required, select mode 2. When rough grade suffices, select mode 3. And when speed is more important than precise grade accuracy, select mode 4.

<table>
<thead>
<tr>
<th>Mode</th>
<th>On Grade Band Width</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mode 1</td>
<td>±0.01ft. (±3.0mm)</td>
<td>Super High Precision</td>
</tr>
<tr>
<td>Mode 2</td>
<td>±0.02ft. (±6.0mm)</td>
<td>High Precision</td>
</tr>
<tr>
<td>Mode 3</td>
<td>±0.05ft. (±15.0mm)</td>
<td>Rough Grade</td>
</tr>
<tr>
<td>Mode 4</td>
<td>±0.10ft. (±30.0mm)</td>
<td>Very Rough Grade</td>
</tr>
</tbody>
</table>

When 1 panel light is lit, on grade deadband is ±3.0mm. When 2 panel lights are lit, on grade deadband is ±6.0mm. When 3 panel lights are lit, on grade deadband is ±15.0mm. When 4 panel lights are lit, on grade deadband is ±30.0mm.
To Select an On-Grade Precision Mode

1. Press the On-Grade Precision mode button. One of the four LED’s which correspond to a precision mode number will illuminate.

2. Continue to press the precision mode button until the mode number you want illuminates.

The LS-B2 saves its settings when shut down and always powers up in the last mode used.

LS-B2 Battery Pack Model BT-39Q

The BT-39Q battery pack offers approximately 50 hours of operation with 3 D-cell NiCad rechargeable batteries or approximately 80 hours (depending on battery brand and grade) of operating life with three D-cell alkaline batteries.

Low Battery Indication

When the battery is low, the active on-grade precision mode light blinks. When the low battery indicate light begins to blink, the battery will provide approximately 30 more minutes of operation. When the battery is out of power, the LS-B2 will shut off.

If the RD-2 and IR-2 are in use, RD-2 indicates low power by blinking its green power LED.

Auto Shut-off and Sleep Mode

If the LS-B2 is on for 15 minutes without sensing a laser beam, it will automatically suspend operation. Operation remains suspended or in sleep mode until the LS-B2 senses a beam. Operation then resumes.

If the LS-B2 is on and does not sense a beam for 60 minutes, it shuts down completely.

Sleep mode and automatic shut-off have been added to your LS-B2 battery system to conserve energy and lengthen operation.
Recharging and Maintenance

- Recharge the NiCad batteries with the supplied charger.
- Recharging takes approximately 6 hours.
- Illuminated red LED next to the charging connector indicates that battery is being recharged.
- LED flashes when the battery is fully recharged.
- When shutting the battery door be careful to stuff the cable in the space provided beside the batteries and not on top of batteries. Avoid slicing cable by catching it between the door and battery pack body.
- Tightly screw door shut when using the battery pack.

If the LED is flashing quickly, the battery is not charging. This may indicate a problem with the battery or an ambient temperature which is either too hot or too cold.

There is also an optional 12VDC charging cable available, Part Number #3060-0110. Contact your dealer for details.
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