



GL-SYSTEM-515

USER'S MANUAL

Thank you for choosing Ningbo Golden Land Electronics Inc.
Read the manual before operating this equipment

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No. **1** **WARNINGS**

Ensure that proper safety gears are worn when using the locating system.

A horizontal directional drill machine can cause serious personal injury or death and property damages if it strikes an underground power line.

A horizontal directional drill machine can cause explosion, serious personal injury or death and property damages if it strikes a gas line.

A horizontal directional drill machine can cause property damages if it strikes underground phone line, television cable, fiber optic cable, sewer line, etc.

This locating system is only a tool to assist the operator in locating the drill head. The operator is responsible for identifying the drill head location.

No. 2 INTRODUCTION

GL-SYSTEM-515 locating system is a tool designed to assist Horizontal Directional Drill machine operator in locating underground drill head location and orientation. This system consists of a transmitter, a receiver, and a remote display. The transmitter sends pitch, roll, temperature and battery status information through a FM modulated signal. The receiver receives the information and uses RF signals to identify the transmitter's location. The receiver transmits the locating information to a remote display through a radio telemetry system.

A Horizontal Directional Drill machine operator can use the information from the display to guide the drill head to the desired path. The communication between the transmitter and the receiver provides more noise suppression than the traditional AM modulation widely used in this industry. GL-SYSTEM-515 locating system offers a very simple and clear method to locate an underground drill head. This locating system also offers 20 channels license free radio telemetries between the receiver and remote display. The user can easily register any receiver and display so that communication between the "pair" will not be interfered by other pairs.

This manual is intended to provide information and instructions on how to use the locating system properly. Ningbo Golden Land Electronics Inc. reserves the rights of improving the locating system and user's manual anytime without notice.



No. 3 SAFE OPERATIONAL PRACTICES

Ensure all underground utilities along the intended bore path are properly located, marked, and exposed if necessary.

Check that the locating system is working properly before the drill operation.

Walk the bore path before drilling. Wear proper safety gears such as goggles, hard hat, and electrical strike safe shoes.

Do not use the locating system near flammable and explosive substances

No. 4 RECEIVER



• 4.1 Introduction







- 6 keys and LCD user interface, the system offers an easy, fast, and accurate way of tracking and guiding a bore.
- Using advanced FM modulation, the system offers advantaged performance against noise compared to current products in the market.
- The system offers a 0.1% pitch based on advanced MEMS technology which will allow sewer applications.
- Over 20 data telemetry channels, the system provides instantaneous remote updates up to 1000 meters.
- Rugged, light in weight, and ergonomically designed plastic housing provides water resistant protection for the device and reduces the fatigue of the operator.
- Flash memory based technology allows in-field program updates.
- Easy to understand pictorial instruction decals provide convenient operational instructions for the operator.

• 4.2 Data Sheet







- System Freq: 30KHz
- Batteries: 6 C-cell alkaline batteries
- Battery Life: 20 hours continuous operation
- Telemetry: 20 license free radio channels
- Temperature: Under 85 °C

- Dimensions: 30cm x 14cm x 67cm
- Weight: 2.5KG (with batteries)
- Water Protection: IP65

• 4.3 Receiver Keys

-  Power key: press and hold to turn the receiver on or off: tap to turn the LCD back light on or off when the receiver is on.
-  Up key: move to next cursor selection.
-  Down key: move to last cursor selection.
-  Enter key: confirm the cursor selection.
-  Escape key: return to the previous page.
-  Setup and calibration key: press to enter calibration. Hold to enter setup.

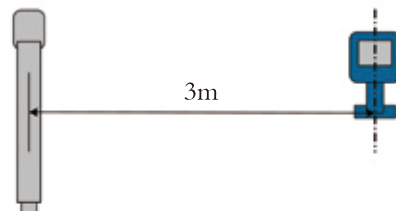
• 4.4 Receiver Icons

-  Transmitter signal strength
-  Receiver battery status: an empty flashing frame indicates that the batteries need to be replaced
-  Transmitter temperature status: a flashing icon indicates that the transmitter is overheating.
-  RF radio is enabled
-  +20% Transmitter pitch in percentage
-  Transmitter battery status: a flashing icon indicates the transmitter batteries are low and need to be replaced

• 4.5 Functions and Instructions

a) Distance Calibration

1. Check to ensure the transmitter is working properly. Place the transmitter in the housing.
2. Place the transmitter and receiver 3 meters apart in a place far from interference. Orientation shows in the picture below:



3. Press to enter the calibration page.
 4. Press to enter Depth Calibration.
 5. Press to confirm Depth Calibration.
 6. Press to start Depth Calibration.
- Wait until process is complete.
7. Press until returned to the main page.

b) Roll Calibration

1. Place the transmitter in the housing and orientate the housing to the 12 o'clock position.
2. Press to enter the calibration page.
3. Press to highlight Roll Calibration.
4. Press to enter Roll Calibration.
5. Press to confirm Roll Calibration.
6. Press to start Roll Calibration. Wait until process is complete.
7. Press until returned to the main page.

c) Back Light Function

Press to turn the LCD back light on or off.

d) Adjusting Back Light Contrast

1. Press and hold to enter the setup page.
2. Use or to select LCD Contrast.
3. Press to enter LCD Contrast.
4. Use or to adjust LCD contrast.
5. Press until returned to the main page.

e) Turn On/Off Search Tone

1. Press and hold to enter the setup page.
2. Use or to select Sound and press .
3. Use or to select Tone On/Off and press .
4. Use or to turn Search tone is On/Off.
5. Press until returned to the main page.

f) Adjusting Audio Volume

1. Press and hold to enter the setup page.
2. Use or to select Sound and press .
3. Press to enter Speaker Volume.
4. Use or to adjust the audio volume up/down.
5. Press until returned to the main page.

g) Battery Type

1. Press and hold to enter the setup page.
2. Use or to select Battery Type and press .
3. Use or to select battery type.
4. Press until returned to the main page.









h) Selecting the Distance Unit

1. Press and hold to enter the setup page.
2. Use or to select Unit System and press .
3. Press to enter Depth Units.
4. Use or to select a depth unit.
5. Press until returned to the main page.

i) Temperature Unit














1. Press and hold to enter the setup page.
2. Use or to select Unit System and press .
3. Use or to select Temp Units and press .
4. Use or to select temperature unit.
5. Press until returned to the main page.

j) Radio Enable/Disable

1. Press and hold  to enter the setup page.
2. Use  or  to select Radio and press .
3. Press  to enter Remote Connection.
4. Use  or  to select Radio Connection Enabled/Disabled.
5. Press  until returned to the main page.

k) Radio Registration

It is required the following procedure is performed on the display at the same time.

1. Press and hold  to enter the setup page.
2. Use  or  to select Radio and press .
3. Press  to enter Remote Connection.
4. Use  or  to select Radio Connection Enabled.
5. Press  to previous Radio On/Off page.
6. Use  or  to select Registration and press .
7. Press  to start radio registration. Wait until the screen confirms the Radio Registration OK.
8. Press  until returned to the main page.

• 4.6 Receiver Maintenance

- a) The receiver uses 6 C-cell batteries. The receiver will shut itself off if there is no key pressed over a time period of 20 minutes and there is no information received from the transmitter. It is strongly recommended that the batteries are taken out of the receiver if it is not to be used for a long period of time to avoid potential erosion from a leaking battery.
- b) The receiver is an electronic measurement device. Severe shocks and impacts can damage the housing and the electronics inside the housing. Treat the receiver as a measurement device.

- c) Keep the receiver from extensive heat to avoid damages to the plastic housing and electronics inside the housing.
- d) Do not soak the receiver in excessive amount of water.

No. 5 DISPLAY

• 5.1 Introduction

- 6 Keys and LCD user interface is identical to that of the receiver.
- Over 20 data telemetry channels, the system provides instantaneous remote updates up to 1000 meters.
- Rugged plastic housing with easy dash mounting to a machine as well as usability as a portable unit.
- Flash memory based technology allows in-field program updates.
Display can be powered with 6 C-cell batteries or by a 12-24 VDC of a HDD machine.
- Standard J1939 CAN bus, the display can be used to network among the receiver, the display, and the HDD for machine control or remote control applications.



● 5.2 Data Sheet

- Radio Freq: 2.4GHz
- Power: 6 C-cell batteries or 12-24 VDC of a HDD
- Battery Life: 20 hours continuous operation
- Telemetry: 20 license free radio channels
- Temperature: Under 85 °C
- Dimensions: 14cm x 13cm x 13cm
- Weight: 1.5KG (with batteries)
- Water Protection: P65

● 5.3 Functions and Instructions

The remote display has a similar user interface as the receiver's. Please refer to the receiver's Instructions.

● 5.4 Display Maintenance

- a) The display uses 6 C-cell batteries. The display will shut itself off if there is no key pressed over a time period of 20 minutes and there is no information received from the transmitter. It is strongly recommended that the batteries are taken out of the display if it is not to be used for a long period of time to avoid potential erosion from a leaking battery.
- b) The display is an electronic measurement device. Severe shocks and impacts can damage the housing and the electronics inside the housing. Treat the display as a measurement device.
- c) Keep the display from extensive heat to avoid damages to the plastic housing and electronics inside the housing.
- d) Do not soak the display in excessive amount of water.

No. 6

TRANSMITTER



● 6.1 Introduction

The transmitter provides the drill head position, location, battery status, and temperature reading signals for the receiver. The transmitter's electronics are in a water-proof housing and are potted to withstand shock and vibration during drilling. After 15 minutes without rotation, the transmitter will go into sleep mode to save battery power. Within about 10 seconds after rotation starts, the transmitter wakes up.

● 6.2 Data Sheet

- Transmitting Freq: 30KHz
- Batteries: 2 C-cell batteries
- Battery Life: 12 hours continuous operation
- Range: Up to 15 meters underground, 21 meters above ground
- Roll: 12 o'clock segment
- Pitch: 0.1%
- Temperature: Under 85 °C
- Dimensions: 3cm(diameter) x 38cm(length)
- Weight: 1KG (with batteries)
- Water Protection: IP67

● 6.3 Transmitter Information

- a) Pitch: Transmitter provides pitch information from -100% to +100% with 0.1% resolution.

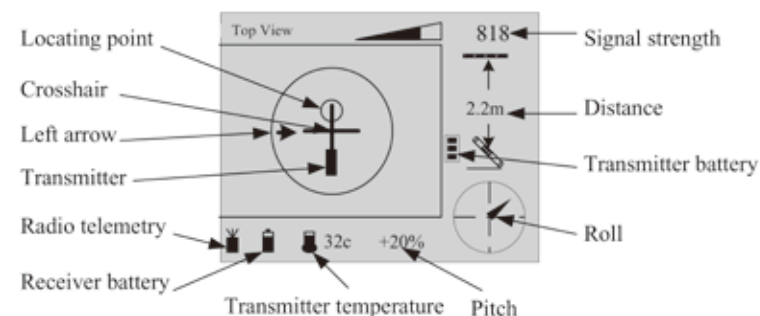
- b) Roll: Transmitter provides 1–12 o'clock rotational information with 1 hour resolution.
- c) Battery Status: Transmitter battery status has three conditions: full, 2/3 full, 1/3 full (low battery warning).
- d) Temperature: Transmitter temperature is transmitted in degrees with one degree resolution. Temperature icon will flash when it is over 85°C. Overheating the transmitter can permanently damage the transmitter.
- e) Transmitter Battery Life: 12 hours continuous operation at ambient temperature

● 6.4 Transmitter Maintenance

- a) Avoid exposing the transmitter to environments with extreme heat (over 85°C).
- b) Avoid exposing the transmitter to extreme shock and vibration.
- c) Remove batteries when not in use.

No. 7 LOCATING AND TRACKING

● 7.1 LCD Icons Information





Locating point: Front point is the locating point before the transmitter.

Rear point is the locating point behind the transmitter.

Crosshair: The center point of the crosshair is the location of the receiver antenna.

Left/Right arrow: Left/right arrow indicates if the receiver is on the left/right side of the transmitter.

Transmitter: Transmitter icon indicates the transmitter position relative to the receiver.

Radio telemetry:  Indicates the radio is enabled but there is no communication between the receiver and the display.
 Indicates there is communication between the receiver and the display.

Receiver battery: Receiver battery icon indicates receiver battery status. Flashing icon indicates the batteries need to be replaced.

Transmitter temperature: Transmitter temperature is displayed both graphically and numerically. Flashing icon indicates the transmitter is overheating. Stopping the rotation and the thrust, and increasing water flow are necessary to cool the transmitter.

Pitch: Indicates the inclination of the transmitter in percentage.

Roll: Indicates drill head clock position.

Transmitter battery: Transmitter battery icon indicates the transmitter battery status. Flashing icon indicates the batteries need to be replaced.

Distance: The number indicates the distance between the transmitter and the receiver.

Signal strength: Indicates the signal strength received by the receiver.

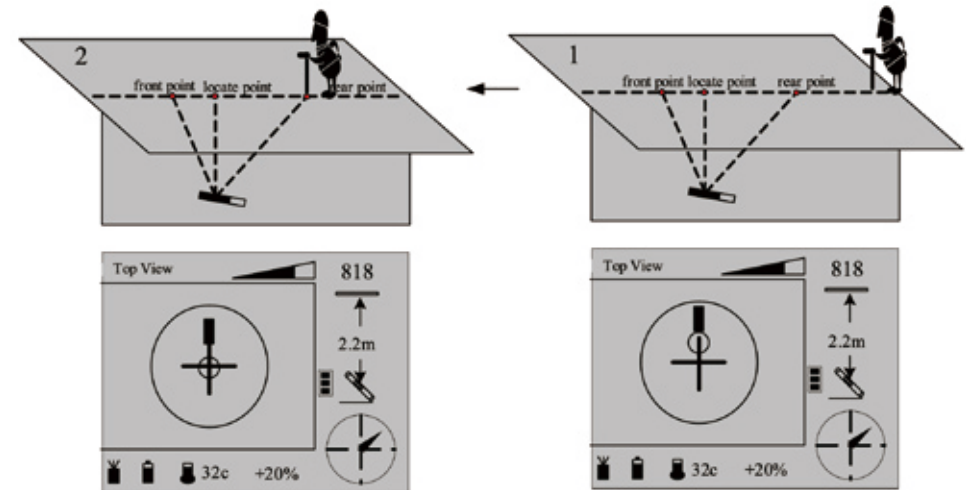
• 7.2 Tracking and Locating

Before drilling the pilot bore, make sure the depth and the roll are calibrated.

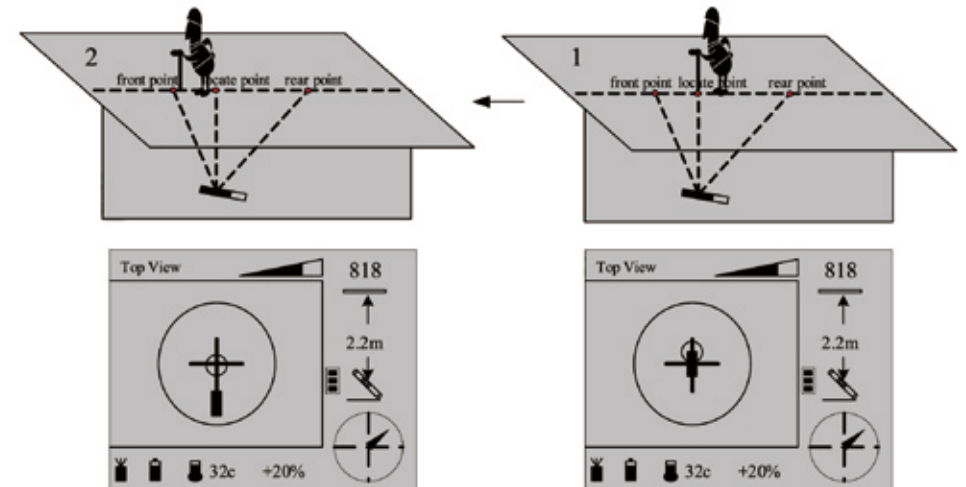
a) Three Points Locating(operator facing the drill direction)

Three points locating is the most accurate method of walk over locating. When the depth is deeper than 12 meters, the front and the rear points become more difficult to locate.

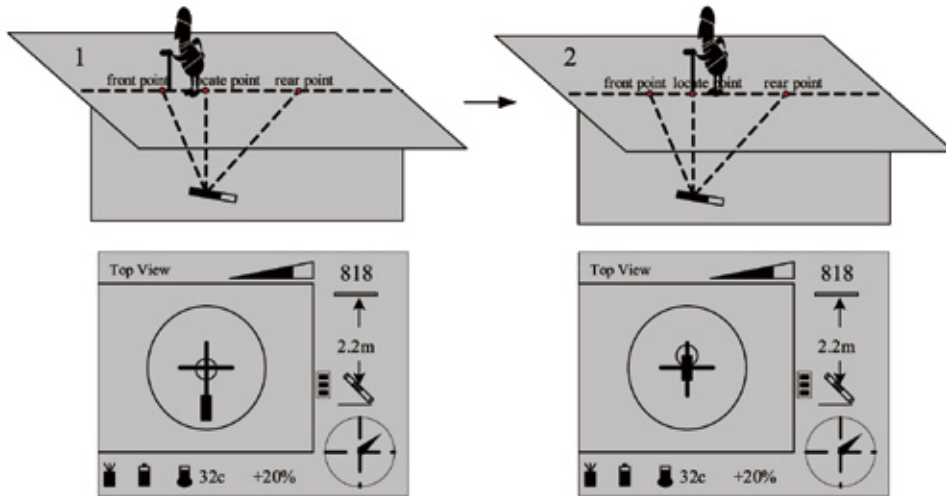
1. Locate Rear Point: The rear point is the circle behind the transmitter. Walk steadily towards the location where the crosshair is in the center of the point circle. The transmitter should be ahead of the receiver.



2. Locate the Front Point: The front point is the circle ahead the transmitter. Walk steadily towards the location where the crosshair is in the center of the point circle. The transmitter should be behind the receiver.



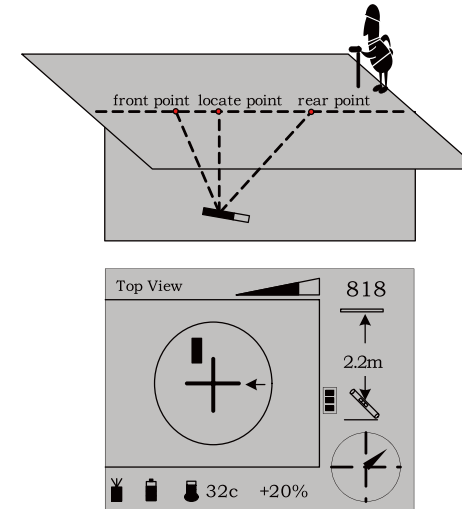
3. Find the Locate Point(Transmitter): Walk steadily backwards from the front towards the rear point until the transmitter icon is on the horizontal line of the crosshair. The transmitter should be directly below the receiver.



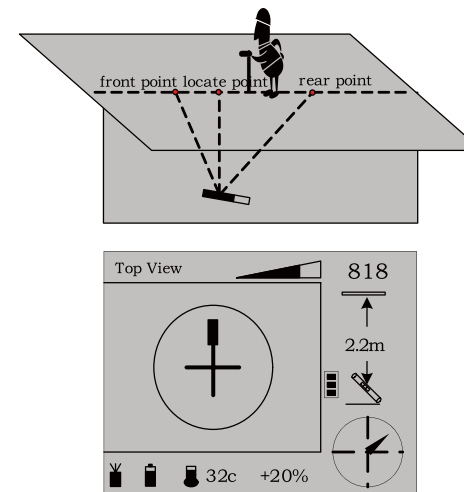
b) Tracking Method(operator facing the drill direction)

The tracking method is simpler. When the depth is over 2 meters, the tracking method is not as accurate as three points locating in finding the left and right points of a drill head. But when the depth is over 12 meters, this tracking method has more depth range than three point locating. This method works the best when there is no need for pin point accuracy and the bore depth is less than 2 meters deep.

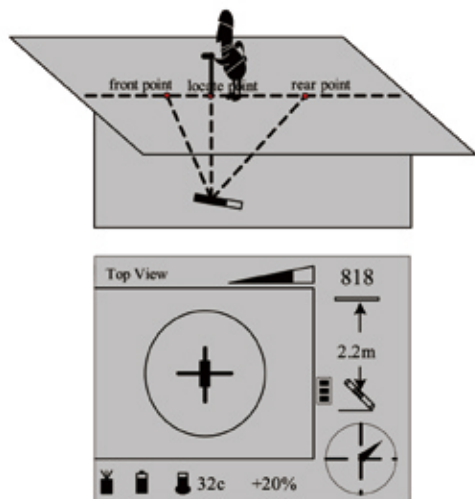
1. Keep the receiver parallel to the bore. Move steadily towards the transmitter. The receiver will display the relative position information of the receiver and the transmitter.



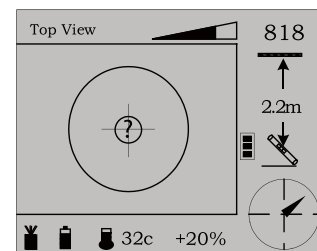
2. Steadily move to the position behind the transmitter where the transmitter icon is lined up with the crosshair vertical line.



3. Move steadily forward until the transmitter icon or horizontal line is directly over the center of the crosshair of the receiver. The receiver should be directly over the transmitter.



Cautions: The receiver calculates the transmitter location by the transmitter magnetic field. It requires the receiver moving steadily in the drilling direction. Sudden movements (forward, backward, left, right, up and down as well as rotation) can cause the receiver losing transmitter position. When that happens, a question mark appears in the center of the circle. The location information can be reestablished by moving the receiver back and forth steadily above the transmitter along the drilling direction. Once the receiver finds the transmitter again, the question mark disappears.





No. 8 WARRANTY

Under normal use, Ningbo Golden Land Electronics Inc. warrants GL-SYSTEM-515 receiver, display and transmitter against defects in materials and workmanship by our company. Receiver and display are covered for a period of one year. And transmitter is covered for a period of 90 days. The warranty starts from the day the customer receives the locating system. The warranty is not transferable and any attempt to open the device will void the warranty.

No. 9 LIABILITY

This locating system is only a tool to assist the operator in locating the drill head. Ningbo Golden Land Electronics Inc. is not responsible for any losses, damages, or injuries when using this locating system. Read the manual before operating this equipment.



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