

SUPPORT

SERIAL NUMBER RECORD

Record the serial numbers and date of purchase of your Subsite components in the spaces below.

Date of purchase:	
Tracker serial number:	

SERVICE PROCEDURE

Notify Subsite immediately of any malfunction of Subsite equipment.

Always give model, serial number, and approximate date of purchase. This information should be recorded and placed on file by owner at time of purchase. Give detailed explanation of malfunction.

Return damaged parts to Subsite for inspection and warranty consideration.

Order genuine Subsite replacement or repair parts from your Subsite dealer. Use of another manufacturer's parts may void warranty.

FOREWORD

This manual is an important part of your equipment. It provides safety information and operation instructions to help you use and maintain your Subsite Electronics equipment.

Read this manual before using your equipment. Keep it with the equipment at all times for future reference. If you sell your equipment, be sure to give this manual to the new owner.

If you need a replacement copy, contact your Subsite Electronics dealer.

The descriptions and specifications in this manual are subject to change. The Charles Machine Works, Inc. reserves the right to improve equipment. Some product improvements may have taken place after this manual was published.

Thank you for buying and using Subsite Electronics equipment.

Operator's Manual
750 Tracker

Issue No.2.2/OP-4/01
Part Number 754-050

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Perry, Oklahoma

Subsite is a registered trademark of The Charles Machine Works,
Inc.

U.S. Patent No. 5,065,098; 4,881,083. Other U.S. and foreign patents
pending.

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CONTROLS

OVERVIEW



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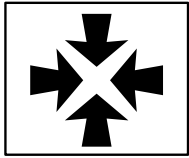
The 750 Tracker performs well with a variety of beacons and can track shallow or deep bores. It can send beacon information to a display mounted on the drilling unit operator's station. The 750 Tracker can also locate lines and cables. Available modes are 8 kHz active (when used with transmitter) and 60 or 50 Hz passive (for locating power cables).

A brief description of the buttons and display on the 750 Tracker follows.

CONTROLS

On/Off

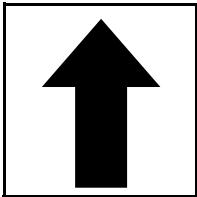
Pressing this button turns unit on and off.



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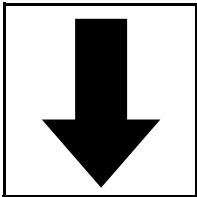
Fore/Aft/Left/Right

Pressing this button while in walkover tracking mode switches from fore/aft to left/right arrows. Only one set of arrows will show at a time. See **OPERATION** for further information.



Up

Pressing this button raises gain (increases signal).



Down

Pressing this button reduces gain (decreases signal).

Depth

This button estimates depth of properly located signal source when pressed. See **OPERATION** for information on locating signals.

Mode

Pressing this button changes location mode and operating frequency.

Depth + On/Off

Pressing these buttons when tracker is on cycles volume from low to high to off. Pressing and holding depth button before turning tracker on changes signal strength display. See "Signal Strength" section later in this chapter for more information.

Depth + Fore/Aft/Left/Right

Pressing these buttons switches LCD backlight off and on.

Depth + Up

Pressing these buttons enters tracker into calibration mode. See **OPERATION** for further information.

Depth + Down

Pressing these buttons selects radio channel. "CH-1" or "CH-2" or "OFF" will appear in display.

Depth + Mode

Pressing these buttons changes depth units from default setting of feet:inches to inches, centimeters, or meters.

On + Up

Holding up button and pressing on button switches left/right arrows off and on.

On + Down

Holding down button and pressing on button switches all guidance arrows off and on. NOTE: If all arrows are disabled, remote guidance will not work.

Fore/Aft/Left/Right + Mode

Pressing these buttons starts tracker control code transmission (see **OPERATION**).

Fore/Aft/Left/Right + On/Off

Pressing these buttons advances first two digits of tracker control code (see **OPERATION**).

Fore/Aft/Left/Right + Depth

Pressing these buttons lowers first two digits of tracker control code (see **OPERATION**).

Fore/Aft/Left/Right + Up

Pressing these buttons advances last two digits of tracker control code (see **OPERATION**).

Fore/Aft/Left/Right + Down

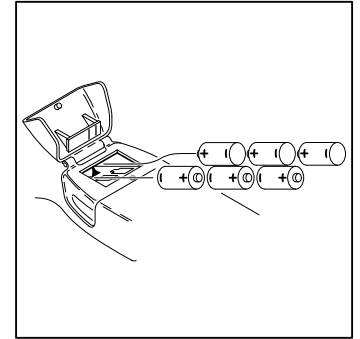
Pressing these buttons lowers last two digits of tracker control code (see **OPERATION**).

SETUP

Install batteries

Use 6 C-cell alkaline batteries in tracker. To install:

- unscrew battery cover
- insert batteries as indicated
- close cover and tighten screw
- check operation



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Check Operation

Always check that tracker operates before leaving for jobsite and after every battery change. To check operation:

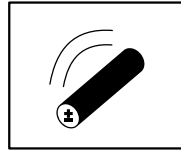
- turn on tracker
- entire display will light briefly
- battery level will be shown graphically
- unit defaults to 29 kHz mode

DISPLAY

Mode

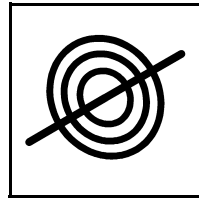
Tracker can track beacons and locate lines. Switch between modes by pressing mode button.

Beacon Mode Indicator



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Line Mode Indicator

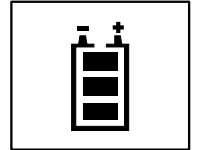


Tracker Information

A variety of tracker information can be monitored in the display window. Additionally, several tracker display settings can be changed.

Battery Level

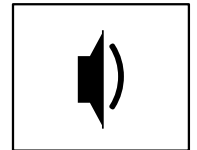
Tracker battery level is shown graphically. Display shows battery status in 33% steps. When tracker battery drops below 10%, tracker battery symbol outline flashes. Replace batteries immediately.



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Volume Level

Speaker volume can be adjusted by pressing the depth and on/off buttons. Available settings are low, high and off.



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Depth Units

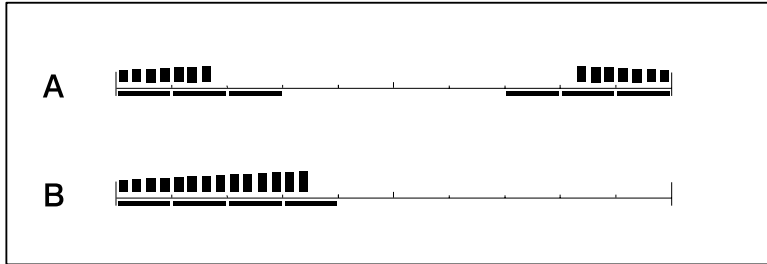
Depth estimates can be displayed in four ways: feet:inches, inches, centimeters, or meters. To change depth units, press depth and mode buttons.



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Signal Strength

Signal strength is shown graphically on bars at top of display and in numeric display. It can be displayed two ways: building from both sides into the middle (a) or building from left to right (b). To change signal strength display, turn unit off. Then press and hold depth button while turning unit on.



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Gain

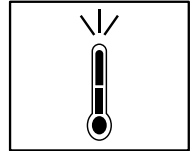
Gain (amount of signal amplification) is shown on bars below signal strength indicator. Gain increases to the right.

Beacon Information

Tracker displays a variety of information sent from the beacon. Actual information sent depends on beacon used.

Temperature

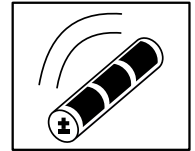
Beacon temperature is continuously shown in 33% segments. Operator should monitor beacon temperature throughout bore. Temperature icon will flash after third segment is lit. Watch for rapid changes in beacon temperature and cool beacon by pulling back a few inches and pumping fluid downhole.



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Battery Level

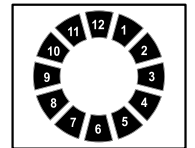
Beacon battery level is continuously shown. When beacon battery is below 10%, beacon battery outline will flash. Replace battery as soon as possible. Each segment represents 33% of battery life.



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Roll

Beacon roll is shown in a twelve segment roll indicator for all beacons. The sections of the roll indicator light to indicate beacon roll position.



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Depth

In walkover tracking and line locating modes, estimated depth is shown in numeric display when depth button is pressed after beacon has been properly located.

In remote guidance mode, approximate distance from beacon to tracker is shown in numeric display every 5 seconds.

SAFETY

Follow these guidelines before operating any jobsite equipment:

- Read and follow all safety precautions.
- Do not operate equipment unless you have completed proper training and read the operator's manual.
- Use equipment only as directed.
- Wear personal protective gear.
- Check that equipment is clean and in good condition.

Contact your Subsite Electronics dealer if you have any question about operation, maintenance, or equipment use.

CLASSIFICATIONS

Watch for the three safety alert levels: **DANGER**, **WARNING** and **CAUTION**. Learn what each level means.



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



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



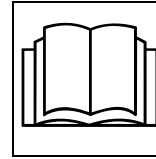
CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

Watch for two other words: **NOTICE** and **IMPORTANT**.

NOTICE can keep you from doing something that might damage the machine or someone's property. It can also alert you against unsafe practices.

IMPORTANT can help you do a better job or make your job easier in some way.

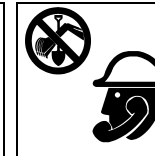
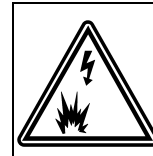
ALERTS



⚠ WARNING Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.



⚠ WARNING Moving traffic - hazardous situation. Death or serious injury could result. Avoid moving vehicles, wear high visibility clothing, post appropriate warning signs.



⚠ WARNING Jobsite hazards could cause death or serious injury. Use correct equipment and work methods. Use and maintain proper safety equipment.



⚠ WARNING Explosion possible. Do not operate transmitter near explosive devices or blasting operations.



⚠ CAUTION Potential radio frequency (RF) hazard. Operating this device within 4 in (10 cm) of your body may cause RF exposure levels to exceed FCC RF exposure limits and should be avoided.

OPERATION

The 750 tracker has four operation modes: tracker control, walkover beacon tracking, remote guidance, and line locating.



CAUTION

Potential radio frequency (RF) hazard. Operating this device within 4 in (10 cm) of your body may cause RF exposure levels to exceed FCC RF exposure limits and should be avoided.

IMPORTANT: Large metal objects, rebar, power lines and any other kinds of interference can adversely affect depth estimates.

BEACON TRACKING MODES

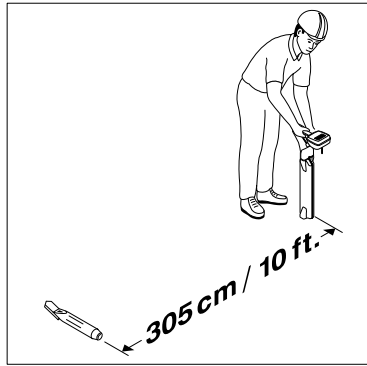
Set-up

You must calibrate tracker before beginning a beacon tracking job. After calibration, tracker can estimate depths from approximately 9 in (0.2 m) to 100 ft (30.5 m) depending on beacon used. Keep the following in mind when calibrating system:

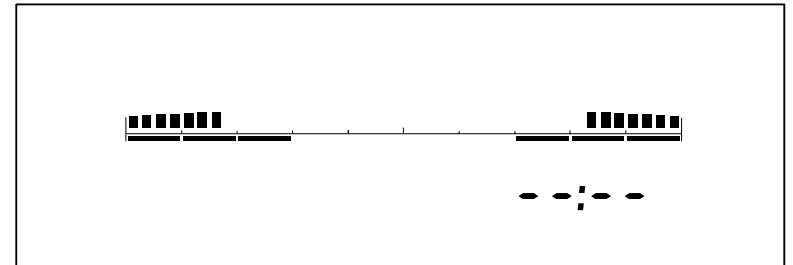
- Beacon and tracker should not be moved or rotated until calibration is complete.
- Only depth estimation is affected by calibration. Roll, pitch, left/right deviation, temperature, and battery status are not affected.
- Large metal objects, rebar, power lines, and any other kinds of interference will adversely affect calibration.

Calibration Procedure

1. Install beacon into toolhead and place on ground exactly 10 ft (3 m) away from tracker. Make sure no metal objects including drilling unit and drill pipe are within 20 ft (6 m) of tracker and toolhead.
2. Position tracker parallel to center of toolhead.
3. Turn tracker on and press and hold depth and up arrow keys until calibration mode is entered. Release keys.
4. Verify calibration by moving tracker 15 ft (4.5 m) away from toolhead. Check depth. If reading is not 15 ft (4.5 m), recalibrate tracker.



Troubleshooting

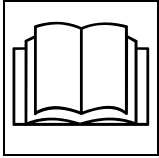


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If four dashes appear in the display, unit has not been calibrated or has been calibrated incorrectly, beacon is too close for depth estimate, or beacon is too far away for depth estimate.

Tracker Control Mode

Overview

**⚠ WARNING**

Incorrect procedures could result in death, injury, or property damage. Learn to use equipment correctly.

This mode allows 750 Tracker operator to disable hydraulic power to drilling unit thrust and rotation within 16 seconds. **This mode will not stop thrust and rotation immediately.**

When tracker and display communications cease, green tracker control light on drilling unit will come on and thrust and rotation will be disabled.

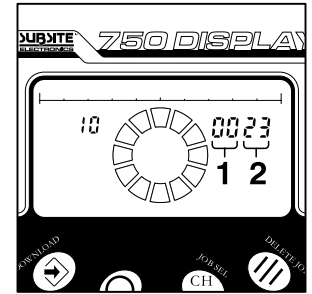
Troubleshooting tip: If thrust and rotation do not work, check whether tracker control light on drilling unit is on. If it is, communication has probably stopped between tracker and display or tracker is set to incorrect code. If communication cannot be restored, install tracker control key on drilling unit. Tracker control light will go off and thrust and rotation will function.

IMPORTANT:

- Tracker operator cannot stop thrust and rotation from tracker with tracker control key installed in drilling unit and turned to disable position.
- Tracker control mode is available on units with “TC” at the end of their serial numbers.

Operation

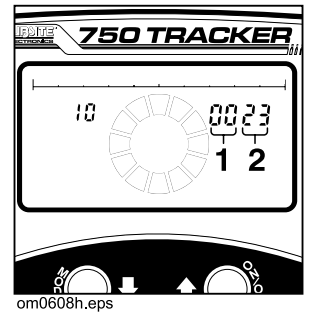
1. Turn on drilling unit. Press and hold download button to display serial number on 750 Display.



2. Turn on 750 Tracker and check four-digit display code.
 - Hold fore/aft/left/right button and press mode to review and start sending code.

IMPORTANT: Continue to hold down fore/aft/left/right button to adjust code.

- Use on/off button to advance first two digits (1) and use depth button to lower first two digits.
- Use up arrow button to advance last two digits (2) and use down arrow to lower last two digits.
- Press and hold button to advance or lower value quickly.



3. Remove tracker control key from drilling unit and keep in tracker operator's possession.
4. Drill and track bore until drill head enters target pit or exits ground.
5. Turn off tracker. After 8-16 seconds, tracker control light on drilling unit will come on and hydraulic power to thrust and rotation will be disabled.
6. Change downhole tools.
7. **If you are tracking backreamer's path**, turn on tracker and enable code transmission. After 8-16 seconds, tracker control light on drilling unit will go off and thrust and rotation will function.

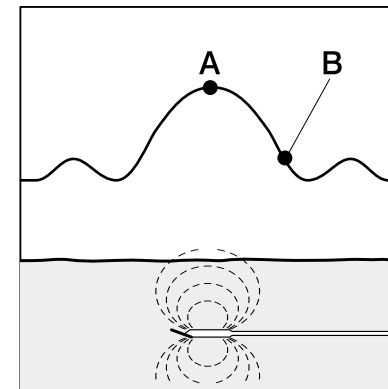
If you are not tracking backreamer's path, install tracker control key on drilling unit. Tracker control light on drilling unit will go off and thrust and rotation will function.

Walkover Tracking Mode

Location

1. Turn on tracker. Make sure you can see fore/aft arrows in center of display. If you see left/right arrows, press fore/aft/left/right key.
2. Walk bore path with bottom of tracker parallel to beacon. Do not hold tracker at right angle to beacon.

IMPORTANT: A common problem when locating a beacon is secondary or ghost signals. A typical beacon signal pattern shows a main signal and two weaker secondary signals. Track beacon at main signal. Familiarity with beacon signal pattern will lessen the effect of secondary signals. Also, the beacon tracking arrows will disappear when tracker is over secondary signal.



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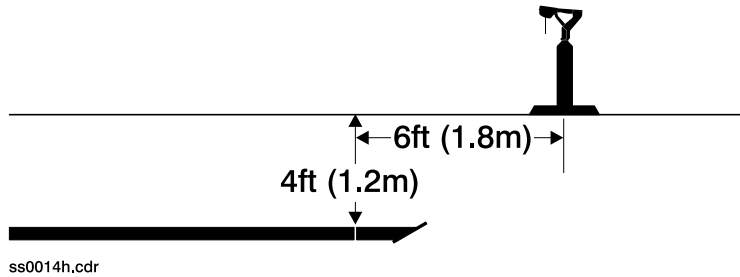
3. When both fore/aft arrows are on, sweep tracker from side to side and use signal strength display to find lateral location of beacon (point A).
4. Step back until ghost is located (no arrows in center of clock face and low signal strength) and then move slightly forward until only one arrow is lit

(point B).

5. Press fore/aft/left/right button to switch to left/right arrows and sweep tracker back and forth until both left/right arrows are on.
6. Switch back to fore/aft arrows and move forward until both fore/aft arrows and target is lit.
7. Take depth estimate and mark spot.

Remote Guidance Mode

Information is transmitted directly to display at drilling unit when tracker is in remote guidance mode. Approximate distance from tracker to beacon (not the estimated depth of the drill head) is shown every 5 seconds.



Distance will not be correct within one and a half times the toolhead depth. For example, if you are drilling at 4 ft (1.2 m), you will be able to drill within 6 ft (1.8 m) of tracker.

To operate in remote guidance mode, place unit in stand while it is turned off. Press and hold mode button while pressing on/off button.

Tracker and drill head can be up to 60 ft (18.3 m) apart when in remote guidance mode. **IMPORTANT:** Do not drill past tracker.

Displayed Information

Beacons send a variety of information to tracker. All Subsite Electronics beacons send pitch, roll, temperature and battery information.

Roll

Beacon roll information is useful in determining the direction that the drilling tool will tend to travel when pushed without rotation. The following chart shows typical tool face roll indications for directional drilling.

When beacon roll shows . . .	Drilling tool will move . . .
1 or 2 o'clock	up and right
3 o'clock	right
4 or 5 o'clock	down and right
6 o'clock	down
7 or 8 o'clock	down and left
9 o'clock	left
10 or 11 o'clock	up and left
12 o'clock	up

Depth

To estimate beacon depth, press depth button. Estimated depth to beacon will be displayed. To change depth units, press depth and mode buttons.

All tracking and locating systems are subject to interference. To quickly check for interference, raise tracker 1 ft (0.3 m) and make second depth estimate. If the difference between the two estimates is not 1 ft (0.3 m), there is interference.

Pitch

Tracker shows pitch (% grade) when used with beacons that provide this information (see specific beacon literature).

Pitch shows beacon grade in percentages from down arrow 99% (45 degrees down) to up arrow 99% (45 degrees up). Tracker displays this information to the left of roll display.

Grade beacons will send pitch in 0.1% increments from 1-45% and in 1% increments from 45-90%.

% of grade	Rise/drop US (metric)	% of grade	Rise/drop US (metric)	% of grade	Rise/drop US (metric)
1	1 in (25 mm)	12	1 ft 2 in (356 mm)	45	4 ft 1 in (1.24 m)
2	2 in (51 mm)	14	1 ft 5 in (432 mm)	50	4 ft 6 in (1.37 m)
3	4 in (102 mm)	16	1 ft 7 in (483 mm)	55	4 ft 10 in (1.47 m)
4	5 in (127 mm)	18	1 ft 9 in (533 mm)	60	5 ft 2 in (1.57 m)
5	6 in (152 mm)	20	2 ft (610 mm)	65	5 ft 5 in (1.65 m)
6	7 in (178 mm)	24	2 ft 4 in (711 mm)	70	5 ft 9 in (1.75 m)
7	8 in (203 mm)	28	2 ft 8 in (813 mm)	75	6 ft (1.83 m)
8	10 in (254 mm)	32	3 ft 1 in (940 mm)	80	6 ft 3 in (1.91 m)
9	11 in (279 mm)	36	3 ft 5 in (1.04 m)	90	6 ft 8 in (2.03 m)
10	1 ft (305 mm)	40	3 ft 9 in (1.14 m)	99	7 ft (2.13 m)

FCC Statement -- Internal Transmitter

This equipment has been tested and found to comply with the limits for a Class B 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 radio 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 equipment and receiver.
- Consult the dealer or an experienced radio/TV technician for help.

Section 15.19 (a) (1) states: "Receivers associated with the operation of a licensed radio service, e.g. FM broadcast under Part 73 of this chapter, land mobile operation under Part 90, etc., shall bear the following statement in a conspicuous location on the device: This device complies with Part 15 of the FCC rules. Operation is subject to the condition that this device does not cause harmful interference."

Changes or modifications not expressly approved in writing by **The Charles Machine Works, Inc.** may void the user's authority to operate this equipment.

LINE LOCATING MODE

To locate power lines, select the following:

- line locating mode
- frequency (50 Hz power, 60 Hz power, or 8 kHz active)

IMPORTANT: Transmitter is required to locate 8 kHz.

Setup

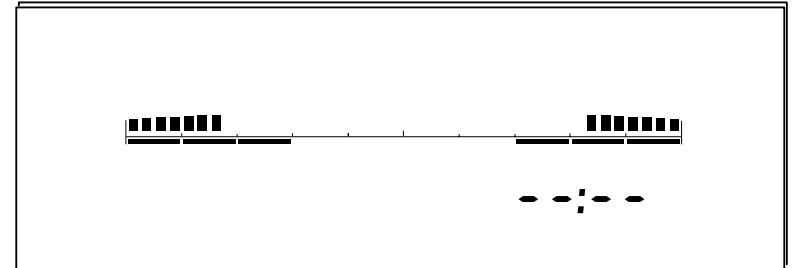
If you are locating a line with the help of a transmitter, connect transmitter as directed in transmitter operator's manual. Select frequency at transmitter to match tracker frequency.

Location

To locate a line:

1. Sweep suspected area of line location.
2. Strongest signal indicates location of line.
3. Take depth reading.

Troubleshooting



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If four dashes appear in the display, signal appears to be above receiver and unit cannot estimate depth. This message is usually caused by interfering signals. Try relocating target signal.

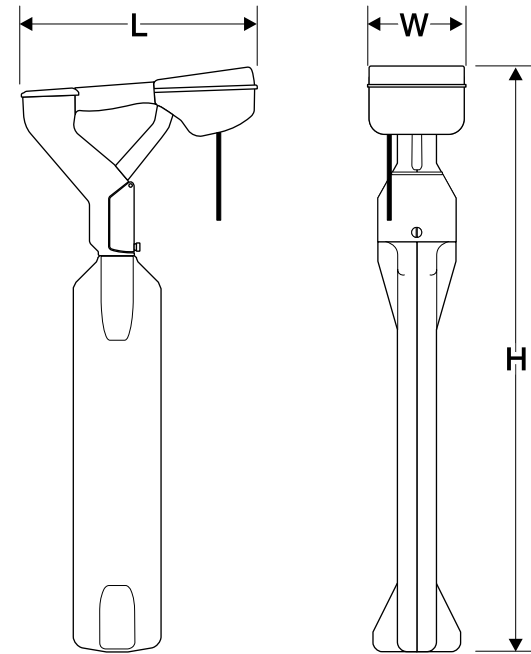
MAINTENANCE

GENERAL CARE

The 750 tracker needs only minor maintenance under normal operating conditions. Following these care instructions can ensure longer equipment life.

- Do not drop the equipment.
- Do not expose the equipment to high heat (such as in the rear window of a car).
- Clean equipment with a damp cloth and mild soap. Never use scouring powder.
- Do not immerse in any liquid.
- Inspect housing daily for cracks or other damage. If housing is damaged, contact your Subsite Electronics dealer for replacement.
- Protect LCD from sharp blows from hard objects.

SPECIFICATIONS



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Dimensions:

Length: 12.75 in (32.4 cm)

Height: 31.5 in (80 cm)

Width: 6 in (15.2 cm)

Operating Weight: 5.5 lb (2.5 kg)

Operating Temperature Range: -4°F to 122°F (-20°C to 50°C)

Antenna Configuration: peak

Operating Modes:

29K beacon

60 Hz power

50 Hz power

8 kHz line (active)

Maximum Locating Range:

Beacon: 0.75 ft - 99 ft 11 in (22.9 cm - 30 m)

Line: 0-10 ft (0-3 m)

Depth Calibration Tolerances * :

±4 in (10 cm) at 10 ft (3 m)

±5% from 10-20 ft (3-6.1 m)

±10% beyond 20 ft (6.1 m)

Line Location Tolerances:

Active mode: ±3% at 10 ft (3 m)

Passive mode: ±5% at 6 ft (1.8 m); ±10% at 10 ft (3 m)

Batteries: 6 C cell alkaline

Battery Life ** : approximately 20 hours

Battery Saver: unit shuts off after 5 minutes if no key is pressed

* Units are calibrated to these tolerances under test field conditions. Actual field conditions may cause signal distortions or may contain noise sources which result in depth estimates that vary from these figures.

** continuous use at 70°F (21°C)

WARRANTY

Ditch Witch Subsite Electronics Limited Product Warranty Policy

Warranty Periods

New Product

A twelve-month period starts on the date of delivery to the end user:

Trackers: 66TKRW, 750 Tracker Remote Displays: 90D, 750 Display
Transmitters: 950T, 75T Receivers: 950R, 75R, EML
Fault Finders: AF1, FT12

A six-month period starts on the date of delivery to the end user:

Beacons: 11B, 86B, 86BH, 86RS, 86BHL, SBRP, 822

A three-month period starts on the date of delivery to the end user:

Beacons: BI
Accessories: cables, clamps

Used Product (Cosmetics)

A three-month warranty starts on the date of delivery to the end user, non-returnable (RS added to serial number) for all products.

Service and Repair

A one-month warranty on **labor** starts on the date the unit is repaired, and a three-month warranty on **parts** starts on the date the unit is repaired for all products.

Extended Warranty

The extended warranty may be purchased at the time the equipment is sold or within thirty days of ownership. The extension is for an additional twenty-four months, for a total coverage of thirty-six months.

Exclusions

- The warranty includes only Ditch Witch Subsite products and accessories that are manufactured and distributed by Ditch Witch Subsite Electronics. The warranty compensates on defects in material or workmanship.
- Defects will be determined through inspection by Ditch Witch Subsite Electronics or authorized repair centers. Original purchaser must make the defective item available for inspection within 30 days of the date the part fails.
- The warranty is limited to replacement of defective part. The replacement part may be new or remanufactured. Repair and removal of defective part and installation will be at no charge when product or item is delivered to Ditch Witch Subsite Electronics or an authorized repair center. The product or item will be returned at no charge for return freight.
- The warranty period does not represent the useful life of Ditch Witch Subsite Electronics products and accessories.
- If Ditch Witch Subsite products are purchased for commercial purposes, as defined by the commercial code, no warranties extend beyond the specific terms set forth in this limited warranty. All other provisions of this limited warranty apply, including duties imposed.
- Ditch Witch Subsite products have been tested to deliver acceptable performance in most conditions. Therefore, to assure suitability, products should be operated under anticipated working conditions prior to purchase.
- This limited warranty applies to original purchaser only. Some states or jurisdictions do not allow exclusion or limitation of incidental or consequential damages so above limitation may not apply. This limited warranty gives original purchaser specific legal rights, and the original purchaser may also have other rights that vary from state to state or jurisdiction to jurisdiction.
- The Ditch Witch Subsite Equipment Registration Form must be completed for each serial numbered product and returned to Ditch Witch Subsite Electronics. The information on the form is used to establish the warranty period start date.
- When the Ditch Witch Subsite Equipment Registration Form is not processed and received by Ditch Witch Subsite Electronics, the Ditch Witch Subsite shipping date is used to establish the warranty period start date.

- Out-of-warranty repairs are automatically processed when the cost is two hundred dollars U.S. or less (<U.S.\$200.00). Repair estimates over two hundred dollars U.S. (>U.S.\$200.00) are held for approval by the dealer or customer.
- Product inspection and estimates may require that the unit be disassembled and tested.
- Out-of-warranty inspection costs include labor accrued at the full labor rate plus return freight.
- Approved out-of-warranty repair estimate costs include parts, labor accrued at full labor rate plus return freight.
- Products declined for repair will be shipped back to the Dealer/Customer and charged return freight costs.
- Unwanted product from repair declines will be discarded at Ditch Witch Subsite Electronics only with written authorization from the dealer/customer.