

Marksman Series

Operator's Manual



CMW®

Issue 1.4
Original Instruction

790-1230

Overview

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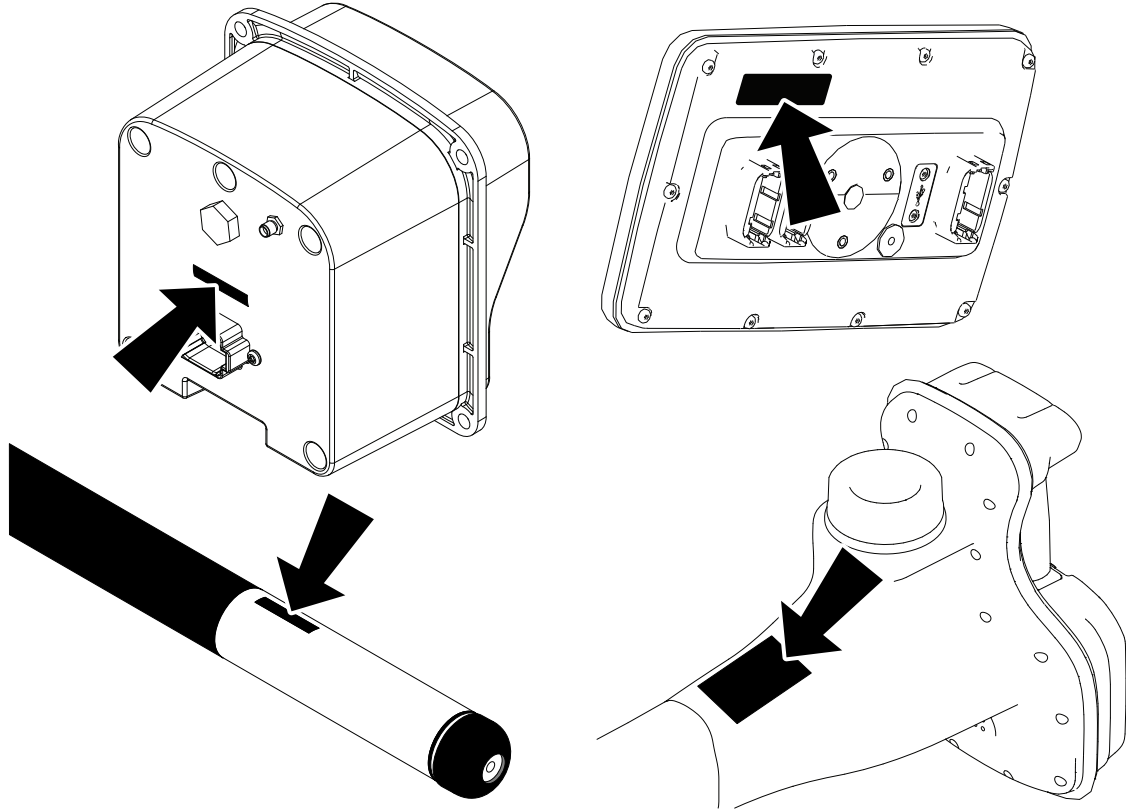
California Proposition 65



WARNING Cancer, birth defects, and other reproductive harm. www.P65warnings.ca.gov.

Serial Number Location

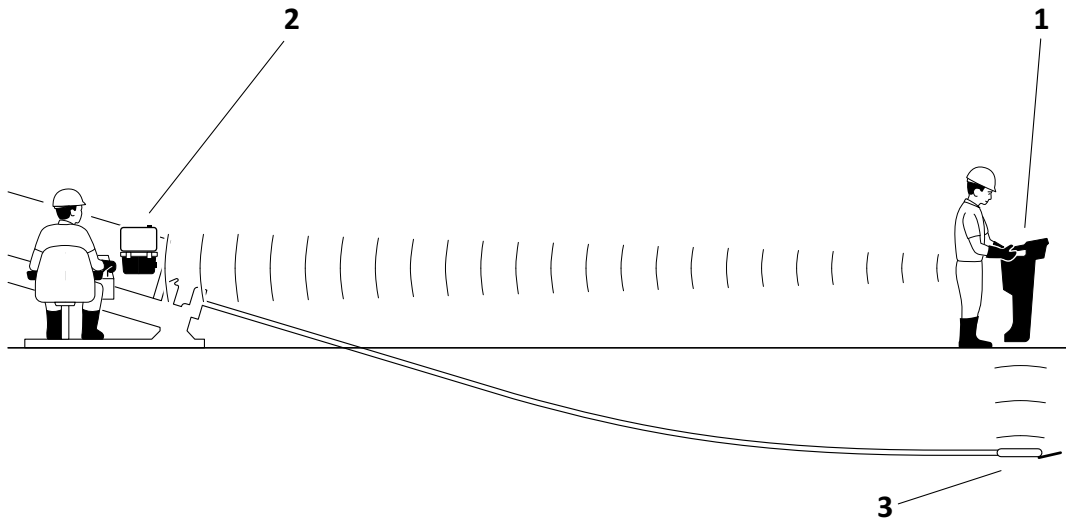
Record serial numbers and date of purchase in spaces provided. Serial numbers are located as shown.



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Item	
Date of purchase	
Tracker serial number	
Display serial number	
Beacon model and serial number	
Beacon model and serial number	
Beacon model and serial number	

System Components



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1. Tracker
2. Display
3. Beacon

Intended Use

The Marksman Series guidance system is intended to be used in horizontal directional drilling applications and consists of a Marksman Series tracker, Commander 7 or TD RECON display, and a Marksman Series beacon. The Marksman+ tracker detects beacon transmission to a depth of up to 125' (38m) and relays data to the display on the drill. The Marksman Base tracker detects beacon transmission to a depth of up to 70' (21.3m) and relays data to the display on the drill. The system offers both a walkover and Drill-To™ guidance mode and can be used to track bores. Both systems offer a walkover and Drill-To™ guidance mode that can be used to track bores.

This system is intended for operation only according to the instructions in this manual. Operate tracker and display in temperatures from -4° to 122°F (-20° to 50°C). For beacon operating temperature, see beacon operation sheet. Contact your Subsite Electronics® dealer for provisions required for operating in extreme temperatures. Use in any other way is considered contrary to the intended use.

Equipment Modification

This equipment was designed and built in accordance with applicable standards and regulations. Modification of equipment could mean that it will no longer meet regulations and may not function properly or in accordance with the operating instructions. Modification of equipment should only be made at authorized repair centers.

Regulatory Notices

IMPORTANT: Other compliance statements and marks may be viewed on equipment display screen(s).

United States

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

This machine has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, can cause harmful interference to radio communications. Operation of this equipment in a residential area could cause harmful interference which the user will be required to correct at his own expense. Changes or modifications not expressly approved by The Charles Machine Works, Inc. could void the user's authority to operate the equipment.

Marksman Series tracker:
Contains FCC ID: MCQ-XB900HP & XPYEMMYW161

Commander 7 display:
Contains FCC ID: MCQ-XB900HP & QOQWT12

TD RECON display:
Contains FCC ID: MCQ-XB900HP & QOQWT41

Canada

CAN ICES-003(A)/NMB-3(A)

This device complies with Industry Canada *license-exempt* RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.

Marksman Series tracker:
Contains IC ID: 1846A-XB900HP & 8595A-EMMYW161

Commander 7 display:
Contains IC ID: 1846A-XB900HP & 5123A-BGTWT12A

TD RECON display:
Contains IC ID: 1846A-XB900HP & 5123A-BGTWT41

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes: (1) l'appareil ne doit pas produire de brouillage, et (2) l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Marksman Series tracker:
Contient IC ID: 1846A-XB900HP & 8595A-EMMYW161

Commander 7 display:
Contient IC ID: 1846A-XB900HP & 5123A-BGTWT12A

TD RECON display:
Contient IC ID: 1846A-XB900HP & 5123A-BGTWT41

EU Declaration of Conformity

Hereby, Charles Machine Works declares that the radio equipment type *Marksman Series HDD tracking and guidance equipment* is in compliance with Directive 2014/53/EU. The full extent of the EU declaration of conformity is available by visiting <https://subsite.com/about-us/contact-us> or by emailing a request to service@subsite.com.

RF Exposure Statement

In order to comply with RF exposure requirements during normal operation, this device must be held in front of the body horizontally. The antenna must be vertical in line with the body with at least 8" (200mm) separation distance from the body.

This device complies with Health Canada's Safety Code Section 6.

Interference

NOTICE: If utility must be crossed:

- Expose line by careful hand digging or soft excavation.
- Tracker operator must watch the drill head during drilling and backreaming.
- Tracker operator must have communication with the drill operator or DrillLok® system must be enabled with the DrillLok key in the tracker operator's possession.
- Follow all safety precautions listed in the drilling unit operator's manual.
-

All tracking and locating equipment is subject to electromagnetic interference. The presence of interference can cause inaccuracies in both location and depth calculations.

Prior to the bore, check the jobsite for the presence of any active interference and be mindful of passive interference sources. Sources of both active and passive interference may be buried or otherwise not visible. During the bore, minimize the effects of interference by using the features of the equipment, such as changing beacon frequencies.

Active Interference

Active interference occurs when electromagnetic fields are radiated by nearby objects, which can cause the tracker to incorrectly interpret the beacon signal. Active interference can be caused by utilities, traffic loops, alternators, cell phones, radio towers, cathodic protection, etc. See "Analyze Bore Path - Available for Marksman+" on page 37.

Passive Interference

IMPORTANT: Setting beacon to a lower frequency typically lessens the effect of passive interference.

Passive interference is the distortion of the beacon's magnetic field by large, nearby metal objects. This distortion is not accounted for when measurements are taken with the tracker, which can cause calculation errors. Passive interference can be caused by rebar, metal fences, the drilling unit, buried metal pipe, etc.

About This Manual

This manual contains information for the proper use of this machine. Cross references such as “See page 50” will direct you to detailed procedures.

Bulleted Lists

Bulleted lists provide helpful or important information or contain procedures that do not have to be performed in a specific order.

Numbered Lists

Numbered lists contain illustration callouts or list steps that must be performed in order.

Foreword

This manual is an important part of your equipment. It provides safety information and operation instructions to help 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 Ditch Witch dealer. If you need assistance in locating a dealer, visit our website at www.subsite.com or write to the following address:

Subsite Electronics
ATTN: Product Support
1950 W. Fir
Perry, OK 73077-0066
USA

The descriptions and specifications in this manual are subject to change without notice. The Charles Machine Works, Inc. reserves the right to improve equipment. Some product improvements may have taken place after this manual was published. For the latest information on Ditch Witch equipment, see your Ditch Witch dealer.

Thank you for buying and using Subsite Electronics equipment.

**Marksman Series Guidance System
Operator's Manual**

Issue number 1.4/OM-03/23

Part number 790-1230

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This product and its use may be covered by one or more patents at <http://charlesmachine.works/patents/>.

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Safety

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Safety Alert Classifications

These classifications and the icons defined on the following pages work together to alert you to situations which could be harmful to you, jobsite bystanders, or your equipment. When you see these words and icons in the book or on the machine, carefully read and follow all instructions. **YOUR SAFETY IS AT STAKE.**



When you see this safety alert sign, carefully read and follow all instructions. **YOUR SAFETY IS AT STAKE.** Read this entire section before using your equipment.

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



DANGER indicates a hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations.



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



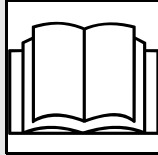
CAUTION indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

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

NOTICE indicates information considered important, but not hazard-related (e.g., messages relating to property damage).

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

Guidelines



⚠ WARNING

Misuse of equipment can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use.

Follow these guidelines before operating any jobsite equipment:

- Complete proper training.
- Read and understand operator's manual before using equipment.
- Wear personal protective equipment.
- Mark proposed path with white paint and have underground utilities located before working. In the US or Canada, call 811 (US) or 888-258-0808 (US and Canada). Also contact any local utilities that do not participate in the One-Call service. In countries that do not have a One-Call service, contact all local utility companies to have underground utilities located.
- Classify jobsite based on its hazards and use correct tools and machinery, safety equipment, and work methods for jobsite.
- Mark jobsite clearly and keep spectators away.
- Review jobsite hazards, safety and emergency procedures, and individual responsibilities with all personnel before work begins.
- Fully inspect equipment before operating. Repair or replace any worn or damaged parts. Replace missing or damaged safety shields and safety alert signs. Contact your Ditch Witch dealer for assistance.
- Replace missing or damaged safety signs.
- Use equipment carefully per the instructions in this manual. Stop operation and investigate anything that does not look or feel right.
- Contact your equipment dealer if you have any questions about operation, maintenance, or equipment use.

Safety Alerts



⚠ WARNING Lithium cell batteries. Fire or explosion can cause death or serious injury. Follow proper care, handling, and charging precautions. See operator's manual.

To help avoid injury:

- Turn off equipment and remove accessories before opening battery compartment.
- Only charge with approved battery charger.
- Do not crush, heat or incinerate, short circuit, dismantle, or immerse in fluid.
- Use proper disposal.
- Follow proper shipping procedures for Class 9 batteries.

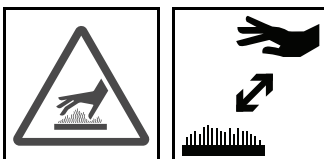


⚠ WARNING Misuse of equipment can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use.

To help avoid injury: Only operate away from explosive devices or blasting operations.



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



⚠ CAUTION Hot batteries. Contact can cause injury. Only touch when cool or wear gloves.



⚠ WARNING Potential radio frequency (RF) hazard. Operating this device within 8" (200mm) of your body may cause RF exposure levels to exceed FDD RF exposure limits and should be avoided.

Prepare

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Prepare Operator



⚠ WARNING Jobsite hazards. Exposure can cause death or serious injury. Use correct equipment and work methods. Use and maintain appropriate safety equipment.

To help avoid injury:

- Wear personal protective equipment including hard hat, safety eye wear, foot protection, hearing protection, and gloves (except when near rotating equipment).
- Remove jewelry.
- Tie back long hair.
- Wear close-fitting, high visibility clothing.
- Have other personal protective equipment, such as insulated boots and gloves, breathing protection, and face shield, etc. available for use depending on jobsite hazards or requirements.

Follow these guidelines before operating any jobsite equipment:

- Complete proper training and read operator's manual before using equipment.
- Plan for emergency services. Have the telephone numbers for local emergency and medical facilities on hand. Check that you will have access to a telephone.
- Review jobsite hazards, safety and emergency procedures, and individual responsibilities with all personnel before work begins. Safety videos are available from your Ditch Witch dealer or at www.ditchwitch.com/safe. Safety Data Sheets (SDS) are available at www.ditchwitch.com/support.
- Use equipment carefully. Stop operation and investigate anything that does not look or feel right.

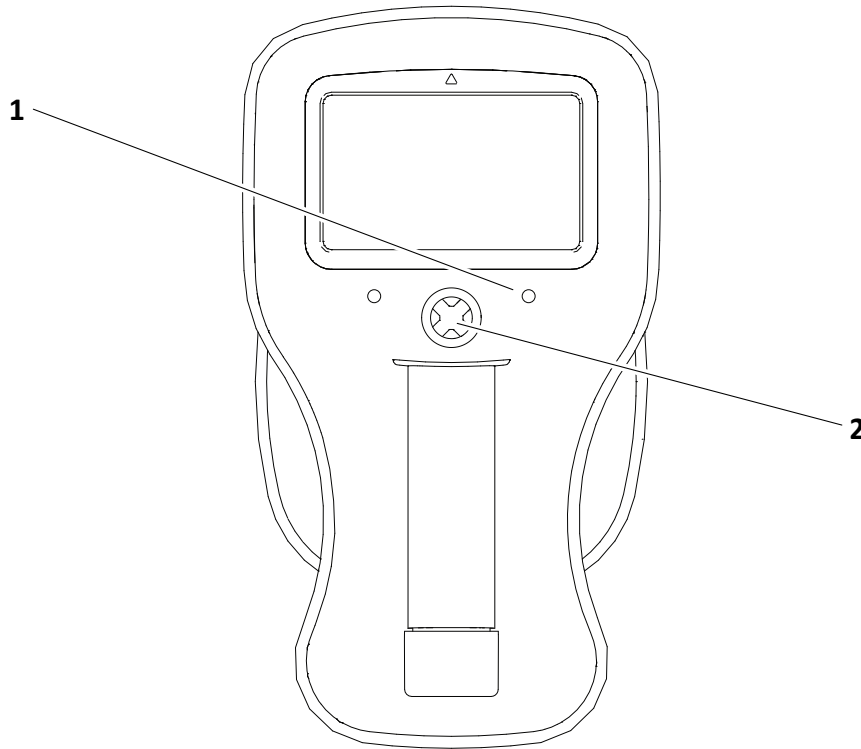
Any time jobsite is classified as electric, drill operator and tracker operator must wear protective boots, and the drill operator must have protective gloves within reach, all meeting the following standards:

- Boots must have high tops and meet the electric hazard protection requirements of ASTM F2413 or ASTM F1117 when tested at 18,000 volts. Tuck legs of pants completely inside boots.
- Gloves must have 17,000 AC maximum use voltage, according to ASTM specification D120.
- If working around higher voltage, use gloves and boots with appropriately higher ratings.

For information about classifying jobsite, see drill operator's manual.








Prepare Tracker

Controls

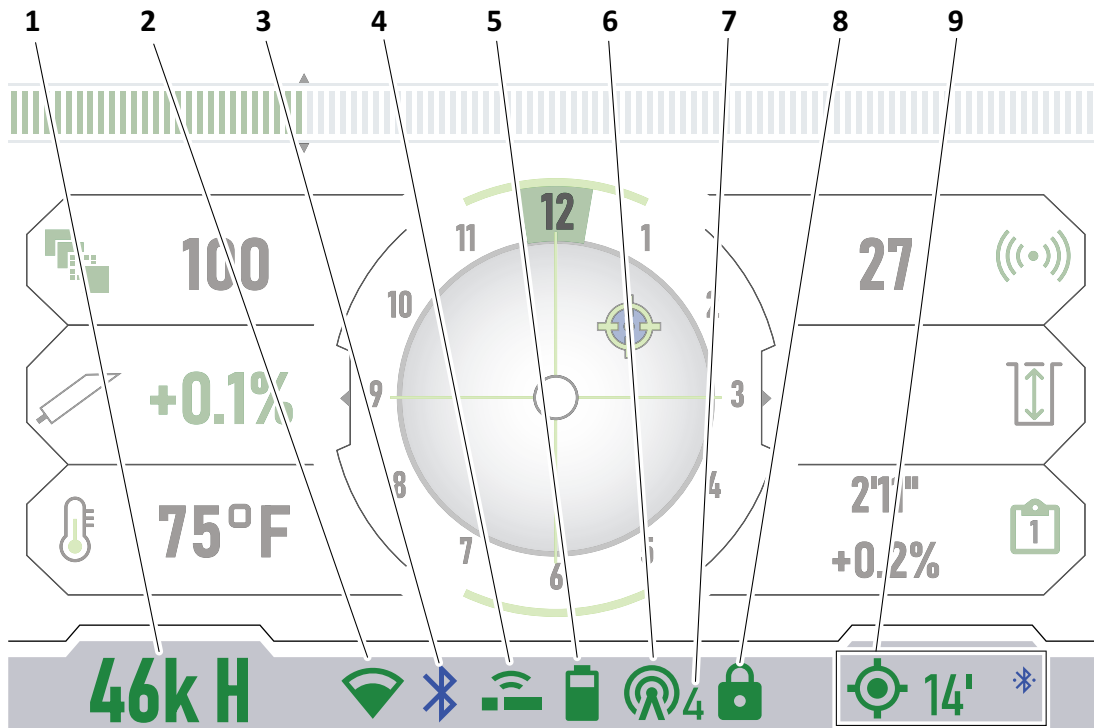


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Item	Description	IMPORTANT
<p>1. Activity Indicator</p>	<p>Flashes green to indicate DrillLok® is enabled.</p> <p>Flashes blue to indicate inactivity timeout.</p> <p>Flashes alternating red and blue to indicate too many incorrect password attempts.</p> <p>Lights orange when shutting down.</p> <p>Flashes red to indicate low battery.</p>	<p>Move tracker or joystick to wake.</p> <p>Enter dealer code or contact your Subsite Electronics dealer.</p>





Item	Description	IMPORTANT
<p>2. Joystick</p>	<p>  To return to previous screen, move left.  To select, move right.  To turn tracker on, press center. Walkover Mode:  To enable extended range mode, push and hold.  To autogain, press center.  To take depth reading, pull.  To average depth, pull and hold. </p>	<p>To disable, move up.</p> <p>Depth is sent to display when released.</p> <p>See "Walkover Procedure" on page 51.</p>

Status Indicators











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Item	Description	IMPORTANT
1. Frequency	Displays frequency and power level.	
2. Wi-Fi® signal indicator	 Indicates wireless signal strength.	
3. Bluetooth® indicator	 Lights to indicate Bluetooth connection.	
4. Beacon connection indicator	 Lights to indicate tracker is connected to beacon.	
5. Tracker battery indicator	 Indicates tracker battery level.	Lights red when battery level is less than 15%.
6. Telemetry signal indicator	 Indicates telemetry signal strength.	Icon lights red if telemetry test diagnostics is on. See “Wireless Menu” on page 23.
7. Telemetry channel indicator	Indicates telemetry channel.	






Item	Description	IMPORTANT
8. DrillLok indicator	 Lights when thrust and rotation are disabled.	See "Use DrillLok System" on page 43.
9. GPS status indicator	 Lights when no GPS fix or GPS accuracy is outside 328' (100m).  Lights when GPS fix is between 33-328' (10-100m).  Lights when GPS accuracy is inside 33' (10m).	<p>Only available with GPS capable models.</p> <p>Distance is displayed next to indicator.</p> <p>Bluetooth icon is displayed next to indicator when using external GPS device.</p>

Menus










IMPORTANT: Use joystick to navigate menus.


Item	Description	IMPORTANT
Logging menu	 To access logging menu, select.	See "Logging Menu" on page 21.
Power off	 To turn tracker off, select.	
Bore path analyzer	 To analyze bore path, select.	<p>Only available for Marksman+.</p> <p>See "Analyze Bore Path - Available for Marksman+" on page 37.</p>
Beacon	 To access beacon menu, select.	See "Beacon Menu" on page 21.
Noise Floor	 To analyze noise floor, select.	See "Analyze Noise Floor" on page 39.
Settings menu	 To access settings menu, select.	See "Settings Menu" on page 22.
System menu	 To access system menu, select.	See "System Menu" on page 22.
Wireless menu	 To access wireless menu, select.	See "Wireless Menu" on page 23.

Logging Menu









Item	Description	IMPORTANT
Logging settings	 To select logging mode, select.	
New log	 To create new log file, select.	
Log manager	 To manage log files, select.	
Delete all logs	 To delete all log files, select.	
Delete last pipe	 To delete last logged pipe, select.	

Beacon Menu




Item	Description	IMPORTANT
Depth calibration	 To calibrate depth, select.	
Frequency	 To select frequency, select.	
Information	 To view system information, select.	Displays beacon information such as model, serial number and software version.
Pitch offset	 To set pitch offset, select.	
Roll offset	 To set roll offset, select.	
Depth offset	 To set depth offset, select.	Use depth offset when operating tracker from swivel stand.
Locate response	 To select signal strength speed, select.	
Locate width	 To select range of locate window, select.	
Autogain setting	 To set target gain, select.	


Item	Description	IMPORTANT
Depth confirmation	 To confirm depth of selected frequencies, select.	

Settings Menu






Item	Description	IMPORTANT
Lock	 To set lock settings, select.	
Units	 To select units of measurement, select.	Units of measurement for depth, pitch, and temperature can be changed in this screen.
Power settings	 To set power savings settings, select.	
Audio	 To set audio settings, select.	
Classic view	 To select classic view, select.	
Display	 To adjust display brightness, select.	
Language	 To select language, select.	
Power grid	 To set power grid, select.	Selecting power grid limits operation to optimal frequencies based on location.

System Menu

Item	Description	IMPORTANT
Diagnostics	 To view diagnostics, select.	Troubleshooting and diagnostic information can be viewed here.
Time/Date	 To set time and/or date, select.	
Updates	 To update software, select.	

Item	Description	IMPORTANT
About	 To view system information, select.	Displays tracker information such as serial number, hardware version, and software version.

Wireless Menu

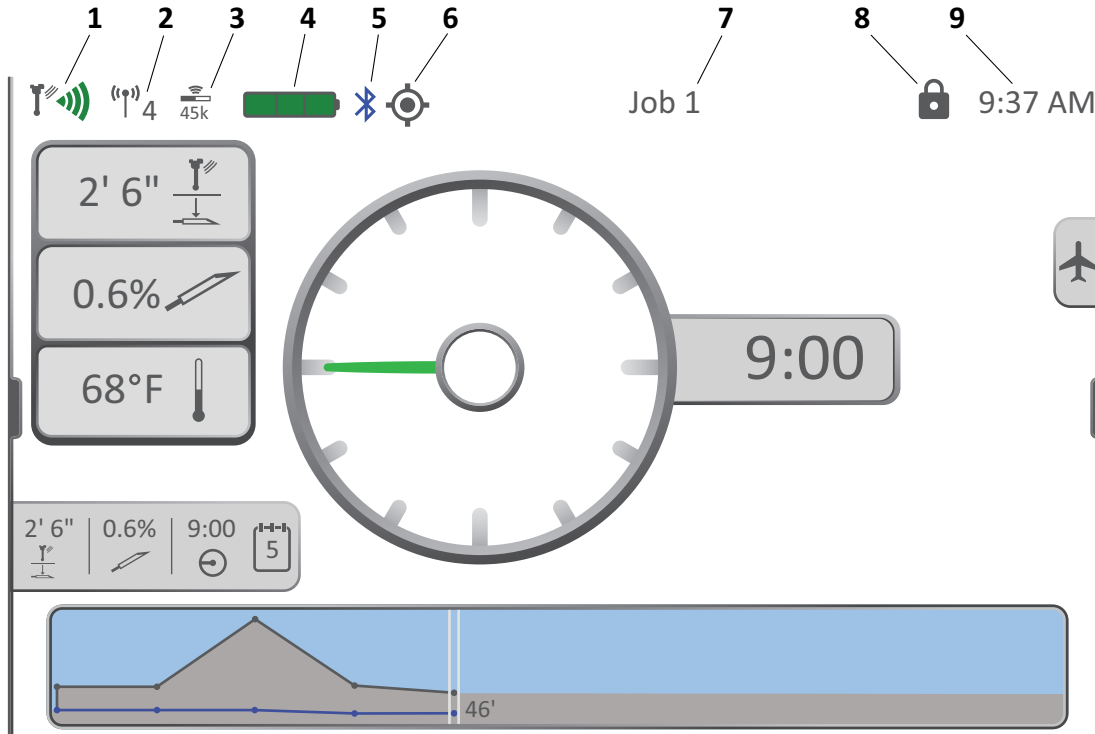
Item	Description	IMPORTANT
Telemetry enable	 To enable/disable, select.	
Telemetry channel	 To set channel, select.	
Wi-Fi enable	 To enable/disable, select.	
Beacon autoconnect	 To set autoconnect settings, select.	If enabled, tracker will automatically connect to most recently connected beacon.
DrillLok	 To set DrillLok settings, select.	Code is the last four digits of paired display serial number.

Set Up







1. Turn tracker on.
2. If needed, update software. See “Update Software” on page 66.
3. If needed, set depth offset.
4. Select logging mode.
5. If needed, set power grid limit.
6. Set telemetry channel.
7. Set DrillLok settings. See “Use DrillLok System” on page 43.


Prepare Display, Commander 7

Status Indicators

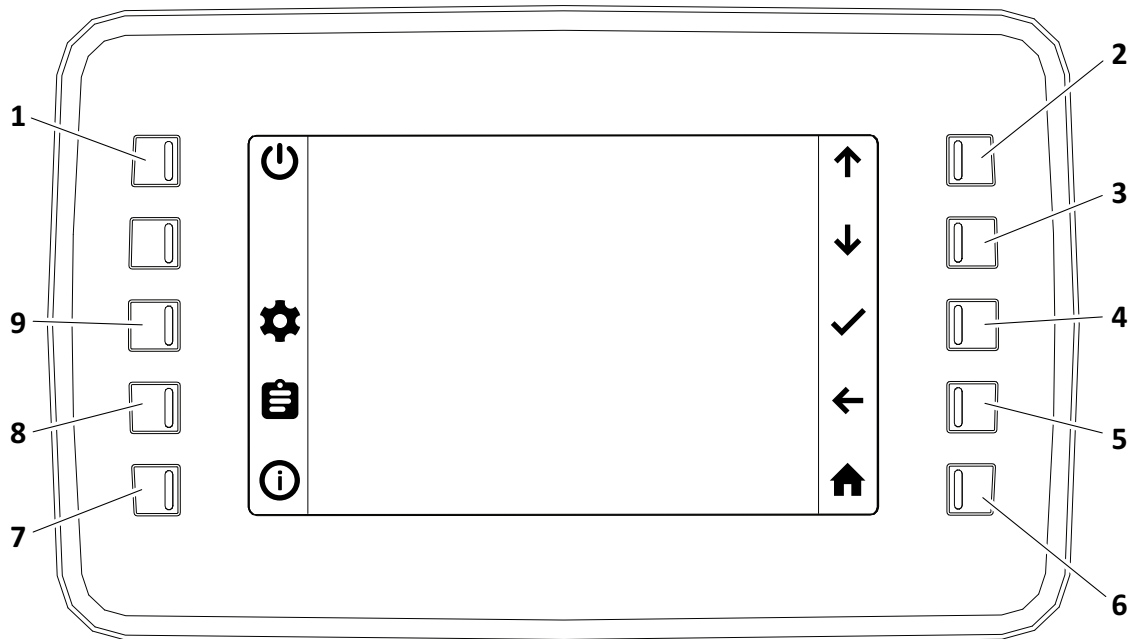


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Item	Description	IMPORTANT
1. Telemetry signal indicator	 Indicates telemetry signal strength.	
2. Telemetry channel indicator	 Indicates telemetry channel.	
3. Frequency indicator	 Displays frequency and power level.	
4. Beacon battery indicator	 Indicates beacon battery level.	
5. Bluetooth® indicator	 Lights to indicate Bluetooth connection.	
6. GPS indicator	 Lights to indicate GPS data has been received from tracker.	Only available with GPS capable models.
7. Message display	Displays operation messages.	








Item	Description	IMPORTANT
8. DrillLok indicator	 Lights when thrust and rotation are disabled.	See "Use DrillLok System" on page 43.
9. Real time clock	Displays time.	



Keys - Maximatec



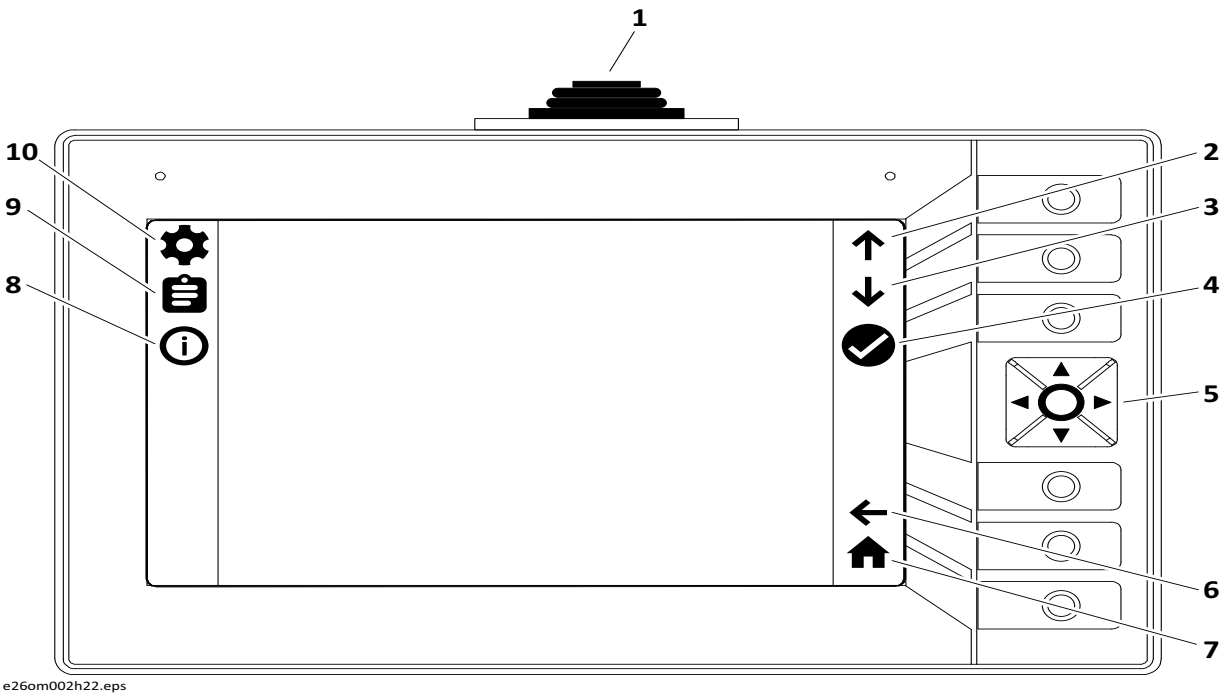
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IMPORTANT: Press and hold any key to turn display on. Press any button to access main menu.

Item	Description	IMPORTANT
1. Power key	 To turn display off, press.	
2. Up key	 To move selection up, press.	
3. Down key	 To move selection down, press.	
4. Select key	 To select, press.	
5. Return key	 To return to previous screen, press.	
6. Home key	 To return to main screen, press.	
7. System menu key	 To access system menu, press.	See "System Menu" on page 28.




Item	Description	IMPORTANT
8. Logging menu key	 To access logging menu, press.	If logging, press to log pipe. See "Logging Menu" on page 28.
9. Settings menu key	 To access settings menu, press.	See "Settings Menu" on page 29.






Keys - IFM



e26om002h22.eps





IMPORTANT: Press and hold any key to turn display on. Press any button to access main menu. Touch screen capabilities are available for main menu icons.

Item	Description	IMPORTANT
1. Power key	To turn display off, press.	
2. Up key	 To move selection up, press.	
3. Down key	 To move selection down, press.	
4. Select key	 To select, press.	


Item	Description	IMPORTANT
5. Multi-function keys	To navigate through menu and select menu options, press.	
6. Return key	 To return to previous screen, press.	
7. Home key	 To return to main screen, press.	
8. System menu key	 To access system menu, press.	
9. Logging menu key	 To access logging menu, press.	If logging, press to log pipe. See "Logging Menu" on page 28.
10. Settings menu key	 To access settings menu, press.	See "Settings Menu" on page 29.







Menus

System Menu








Item	Description	IMPORTANT
About	 To view system information, select.	Displays display information such as serial number, hardware version, and software version.
Diagnostics	 To view diagnostics screen, press.	Troubleshooting and diagnostic information can be viewed here.
Clock	 To set time, press.	
Operator's manual	 To display link to current operator's manual, press.	





Logging Menu

Item	Description	IMPORTANT
Logging mode	 To select logging mode, press.	

Item	Description	IMPORTANT
New log	 To create new log file, press.	If plans are available from Field Scout™ app, they will appear as options.
Log manager	 To manage log files, press.	Files can be viewed, deleted, or selected in this screen.
Delete all logs	 To delete all log files, press.	Cannot be undone.
Delete last pipe	 To delete last logged pipe, press.	Cannot be undone.
Plan manager	 To manage available plans from Field Scout app, press.	Plans can be viewed and deleted in this screen.
Set lengths	 To set pipe length, press.	Used to calculate bore distance. See “Walkover Procedure” on page 51.

Settings Menu

Item	Description	IMPORTANT
Telemetry channel	 To set channel, press.	Number of available channels varies based on region or country configuration.
DrillLok remote	 To pair remote, press.	Code is the last four digits of paired tracker serial number.
Set beacon	 To change beacon frequency or power level downhole, press.	See “Set Beacon” on page 68.
Brightness	 To set brightness, press.	
Display mode	 To toggle between day and night modes, press.	
Units of Measurement	 To select units of measurement, press.	
Drill-To mode	 To change Drill-To view, press.	See “Use Drill-To Mode” on page 53.

Item	Description	IMPORTANT
Depth view	 To select depth indicator interval, press.	
Language	 To select language, press.	
Beacon alerts	 To adjust beacon temperature alert threshold, press.	
Lock	 To set lock settings, select.	

Set Up

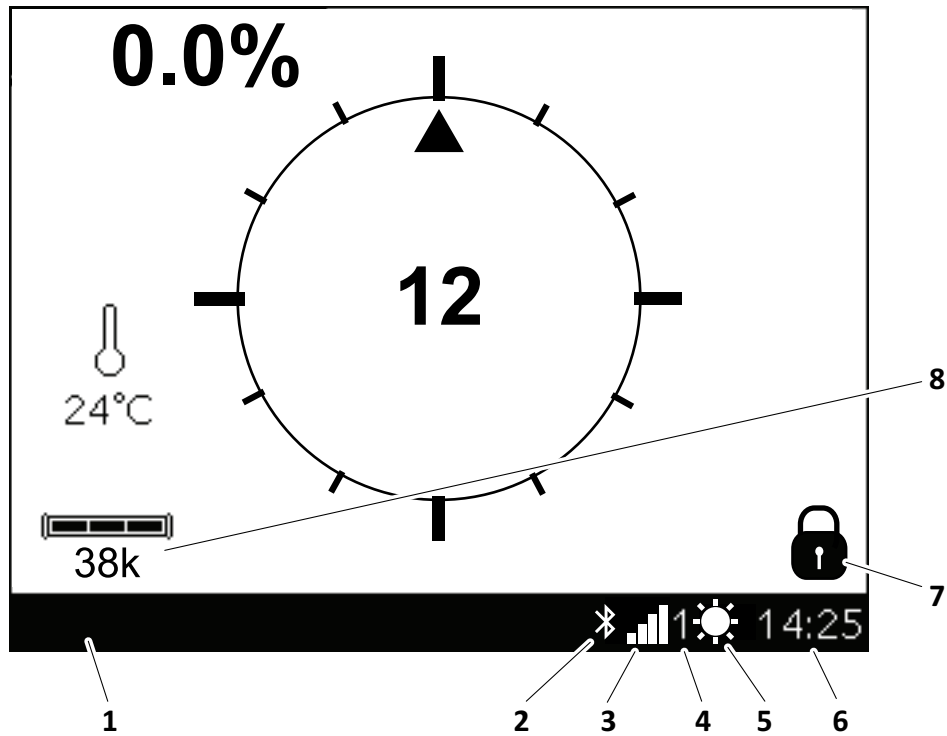
1. Turn display on.
2. If needed, update software. See "Update Software" on page 66.
3. Select logging mode.
4. Set pipe lengths. See "Walkover Procedure" on page 51.

IMPORTANT: If logging, set lengths to ensure a more accurate bore.





5. Set telemetry channel.
6. Set DrillLok settings. See "Use DrillLok System" on page 43.

Prepare Display, TD RECON

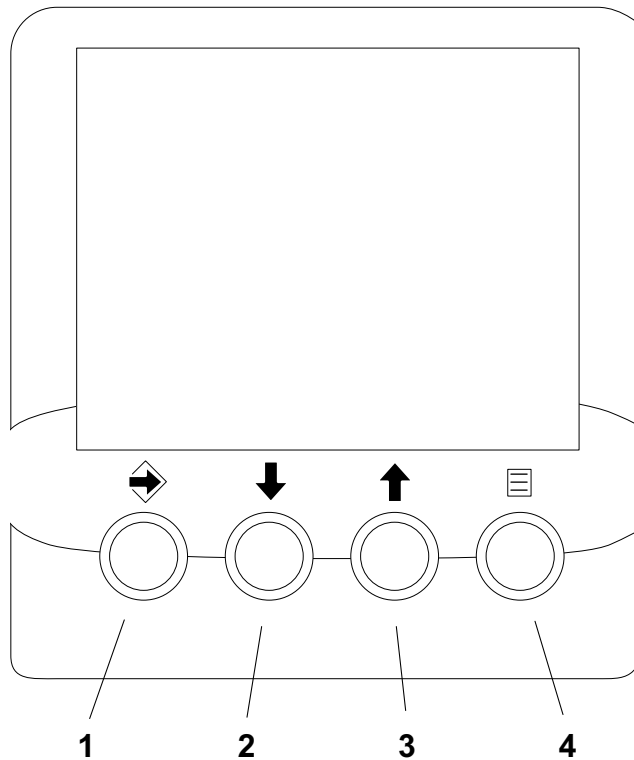
Status Indicators







e26om015w21.eps

Item	Description	IMPORTANT
1. Message display	Displays operation messages.	
2. Bluetooth indicator	 Lights to indicate Bluetooth connection.	
3. Telemetry signal indicator	 Indicates telemetry signal strength.	
4. Telemetry channel indicator	Indicates telemetry channel.	
5. Backlight indicator	 Lights when backlight is on.	
6. Real time clock	Displays time.	
7. DrillLok indicator	 Lights when thrust and rotation are disabled.	See "Use DrillLok System" on page 43.
8. Frequency	Displays frequency.	

Keys








e17om040w.eps





Item	Description	IMPORTANT
1. Select key	 To select item shown on screen, press.	If logging, press to log pipe.
2. Down key	 To move selection down, press.	
3. Up key	 To move selection up, press.	
4. Menu key	 To access main menu, press.	Press to turn display on. Press and hold to turn display off.

Menus




Main Menu



Item	Description	IMPORTANT
System menu		See "System Menu" on page 34.
Logging menu		See "Logging Menu" on page 34.
Wireless menu		See "Wireless Menu" on page 35.
Settings menu		See "Settings Menu" on page 35.
Set beacon	 To change beacon frequency or power level downhole, press.	See "Set Beacon" on page 68.

System Menu




Item	Description	IMPORTANT
About	 To access about screen, press.	Hardware and software versions, serial number, and copyright information can be viewed here.
Diagnostics	 To access diagnostics screen, press.	Troubleshooting and diagnostic options can be viewed here.
Clock	 To set system time, press.	
Software update	 To update software, press.	

Logging Menu




Item	Description	IMPORTANT
Logging mode	 To select logging mode, press.	
New log	 To create new log file, press.	
Log manager	 To manage individual log files, press.	Files can be viewed, deleted, or selected in this screen.

Item	Description	IMPORTANT
Delete all logs	 To delete all log files, press.	Cannot be undone.
Delete last pipe	 To delete last point information from current log file, press.	Cannot be undone.

Wireless Menu

Item	Description	IMPORTANT
Telemetry channel	 To set channel, press.	Number of available channels varies based on region or country configuration.
Bluetooth	 To manage Bluetooth connection, press.	
DrillLok remote	 To pair remote, press.	Code is the last four digits of paired tracker serial number.

Settings Menu

Item	Description	IMPORTANT
Language	 To select language, press.	
Backlight	 To select backlight setting, press.	
Units of Measurement	 To select units of measurement, press.	

Set Up

1. Turn display on.
2. If needed, update software. See “Update Software” on page 66.
3. Select logging mode.
4. Set telemetry channel.
5. Set DrillLok settings. See “Use DrillLok System” on page 43.

Prepare Beacon

IMPORTANT:

- For more information, see beacon operation sheet.
- Beacon will sleep after ten minutes of inactivity. To wake, roll slowly.
- Welding housings or drilling in soil rich in iron can cause housing to become magnetized, resulting in poor beacon performance. If housing has become magnetized, contact your Subsite Electronics dealer.

1. Turn beacon on.
2. Install beacon into downhole tool.

IMPORTANT: If needed, use tracker to set roll and/or pitch offset.

3. Ensure beacon pitch and roll are responsive.
4. Ensure beacon is connected to tracker. See “Beacon connection indicator” on page 19.

IMPORTANT: Follow on-screen prompts. If autoconnect is enabled, tracker will automatically connect to most recently connected beacon.

Prepare Jobsite

Analyze Bore Path - Available for Marksman+

IMPORTANT: See "Interference" on page 5.

- Bore path analyzer does not measure passive interference.
- Ensure no sources of active interference are in operating area while analyzing bore path.
- For Marksman Base, user must perform a visual survey of bore path for signs of active and passive interference.

For Marksman+, bore path analyzer measures active interference along the bore path and recommends frequencies that will ensure the best communication range and accurate depth and location.

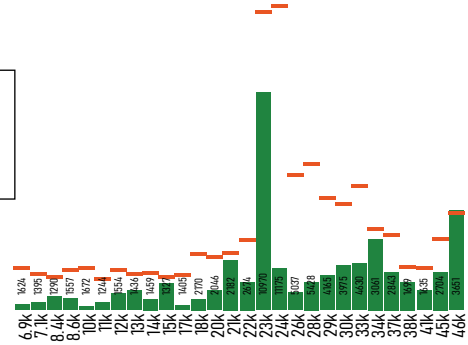
1. Ensure prepared beacon is asleep.
2. Place tracker at start of bore.
3. Use tracker to select bore path analyzer.
4. Follow on-screen prompts to analyze bore path.
5. Move tracker to next position along intended bore path.
6. Repeat steps 4-5 until end of bore. Bore path analyzer will display recommended frequencies.
7. Follow on-screen prompts to begin depth calibration.

Recommended

- 8.4k
- 15k
- 22k
- 41k

- HOLD TO SCAN
- CLEAR
- SELECT
- GRID LIMIT
- EXIT

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Calibrate Depth

IMPORTANT:

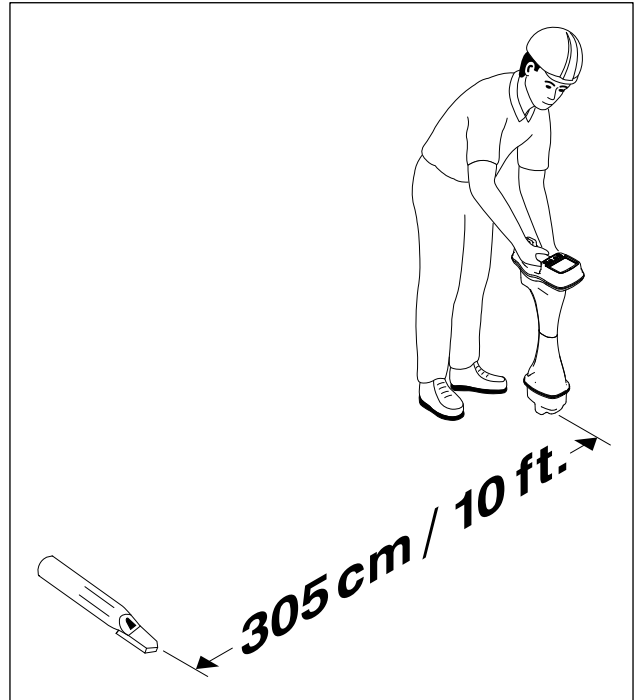
- Ensure no sources of passive interference, including directional drill and drill pipe, are within 20' (6m) of tracker and downhole tool. See "Passive Interference" on page 5.
- If beacon is not connected to tracker, only active frequency and power level can be calibrated.

1. After analyzing bore path (only available for Marksman+), wake beacon and ensure it is connected to tracker.
2. Select frequencies to be calibrated.

IMPORTANT:

- Frequencies recommended by bore path analyzer (only available for Marksman+) are automatically selected.
- For the Marksman Base, 3 frequencies will be used for 60 Hz power grid and 3 for 50 Hz power grid and go directly to calibration procedure (no frequency selection box will appear).

3. Place on ground with center of beacon exactly 10' (305cm) from tracker.
4. Position center of tracker parallel to center of beacon.
5. Follow on-screen prompts to calibrate depth for selected frequencies.
6. Once calibrated, follow on-screen prompts to confirm depth for each calibrated frequency and power level.



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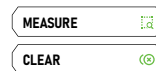
Analyze Noise Floor

IMPORTANT: See "Interference" on page 5.

- Values calculated by noise floor analyzer are estimates and change based on interference sources and levels.
- Ensure no sources of active interference are in operating area while analyzing noise floor.

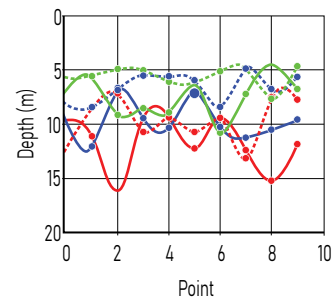
The noise floor analyzer allows the operator to estimate the system range of calibrated frequencies with interference along bore path. Range estimates can be reviewed after noise plot is recorded.

1. Ensure beacon is asleep.
2. Place tracker at start of bore.
3. Use tracker to select noise floor analyzer.
4. Follow on-screen prompts to analyze noise floor.
5. Move tracker to next position along intended bore path.
6. Repeat steps 5-6 until full noise plot is recorded.



Point # 5
Freq: 12k
Power: High
Depth: 7.14m

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Locate

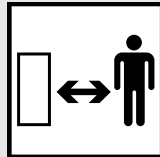
Chapter Contents



For additional precautions, see "Safety" and "Prepare" chapters.

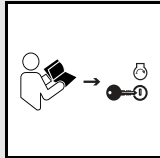
- Overview 42**
- Use DrillLok System 43**
 - Set Up System 43
 - Operate 44
 - Turn Off System 44
- Use Walkover Mode 45**
 - Indicators, Tracker 46
 - Indicators, Commander 7 48
 - Indicators, TD RECON 50
 - Walkover Procedure 51
- Use Drill-To Mode 53**
 - Indicators, Tracker 54
 - Indicators, Commander 7 56
 - Indicators, TD RECON 61
 - Drill-To Procedure 63

Overview



⚠ DANGER Rotating shaft. Crushing will cause death or serious injury. Stay away.

To help avoid injury: Do not stand or walk over bore path while drill string is moving.



⚠ WARNING Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

To help avoid injury: If location and depth are critical, confirm by hand-digging.

NOTICE: High temperature is the primary cause of beacon failure. Monitor beacon temperature carefully. See beacon operation sheet for more information.

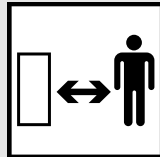
IMPORTANT: Use walkover mode when possible.

The Marksman Series guidance system tracks the bore two ways: walkover mode and Drill-To mode. Mode can be changed using the joystick.

When using walkover mode, the tracker is placed over the beacon and displays depth, pitch, and roll information that can be used to complete the planned bore. See "Use Walkover Mode" on page 45.

When using Drill-To mode, the tracker is placed along the intended bore path and uses depth, predicted depth, horizontal distance, pitch, and roll to provide steering correction information that can be used by the drill operator to complete the planned bore. See "Use Drill-To Mode" on page 53.

Use DrillLok System



⚠ DANGER Rotating shaft. Crushing will cause death or serious injury. Stay away.

To help avoid injury:

- Use DrillLok system every time downhole tools are changed or during other times when the drill string is exposed.
- If not using a DrillLok system, turn off machine and keep ignition key in tracker operator's possession while changing downhole tools.

NOTICE: The electric strike system (ESID) on drill does not prevent electric strike or detect strikes before they occur. If alarm sounds and ESID strobe indicator lights, a strike has already occurred and equipment is electrified.

IMPORTANT:

- Thrust and rotation are not disabled immediately. Functions are disabled within 16 seconds.
- Tracker operator cannot disable thrust and rotation if DrillLok key is installed and turned off.
- If thrust and rotation cannot be resumed after tracker operator has enabled DrillLok, insert DrillLok key and turn to disabled position to override DrillLok system.
- If not tracking backream, use DrillLok key to override DrillLok system.

The DrillLok system allows the tracker operator to disable hydraulic thrust and rotation to a compatible Ditch Witch directional drill. See drill operator's manual for more information.

Set Up System

Before first use of tracker/display system, pair tracker DrillLok mode to display on machine.

1. Enable DrillLok on machine. See machine operator's manual.
2. Enter base code on tracker.
 - 2.1 The base code is the last four digits of the TD RECON serial number or the last four digits of the Bluetooth ID (found on Info/About screen) for the Commander 7 display being connected.
 - 2.2 Enter MENU and select WIRELESS. Scroll to DRILLLOK and select SET BASE CODE.
 - 2.3 Use left and right keys to change highlighted box and use up and down keys to change the number in the box.

3. Enter remote code on display.
 - The remote code is last four digits of tracker serial number.
 - TK RECON: Enter menu and scroll to WIRELESS. Scroll to DRILLLOK REMOTE. Use up and down arrows to change numbers and press SELECT to move to next digit. After final digit is entered, press menu button twice to return to main screen.
 - Commander 7: Open menu and select settings. Scroll to DRILLLOK REMOTE and select check mark to enter base code settings. Use up and down arrows to change numbers and press check mark to move to the next digit. After final digit is entered, press home button to return to main screen.

Operate

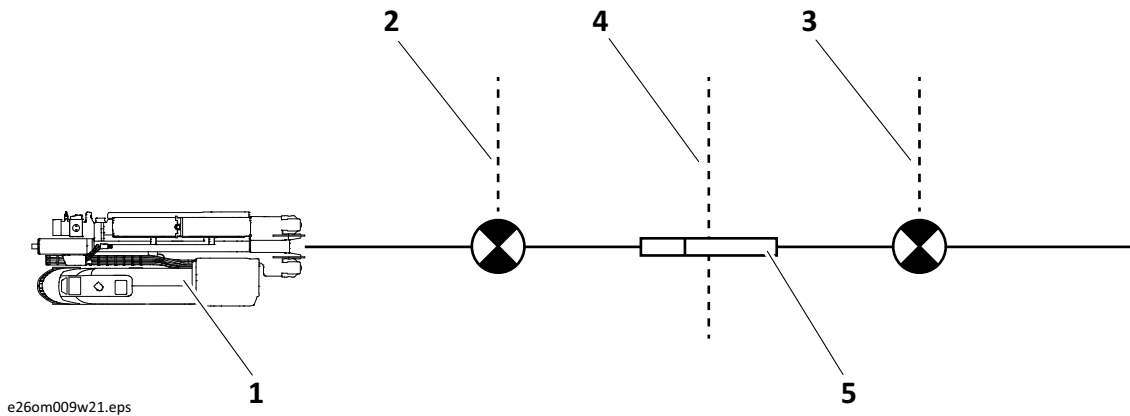
1. Turn DrillLok system on at drill using DrillLok key. See drill operator's manual. Remove DrillLok key and keep in tracker operator's possession.
2. Enable thrust and rotation from tracker.
 - 2.1 Use the joystick and follow this sequence: Enter MENU and select WIRELESS. Scroll to DRILLLOK and select ENABLE DRILL. Display will indicate ON.
 - 2.2 Green DrillLok indicator will turn off and both tracker and display will indicate thrust and rotation are enabled. Drill is now fully functional.
3. Track bore until drill head enters target pit or exits ground.
4. Disable thrust and rotation from tracker.
 - 4.1 Use the joystick to follow this sequence: Enter MENU and select WIRELESS. Scroll to DRILLLOK and select ENABLE DRILL to toggle off.
 - 4.2 Green DrillLok indicator on drill will flash and both tracker and display will indicate thrust and rotation have been disabled by showing a padlock indicator. Thrust and rotation are now disabled on drill.
5. Change downhole tool and exit pit.
6. Enable thrust and rotation from tracker.

Turn Off System

IMPORTANT: When DrillLok is enabled and tracker is turned off and back on, tracker will display a message that directs user to choose whether to keep DrillLok enabled.

Insert DrillLok key on machine and turn to override position. See drill operator's manual.

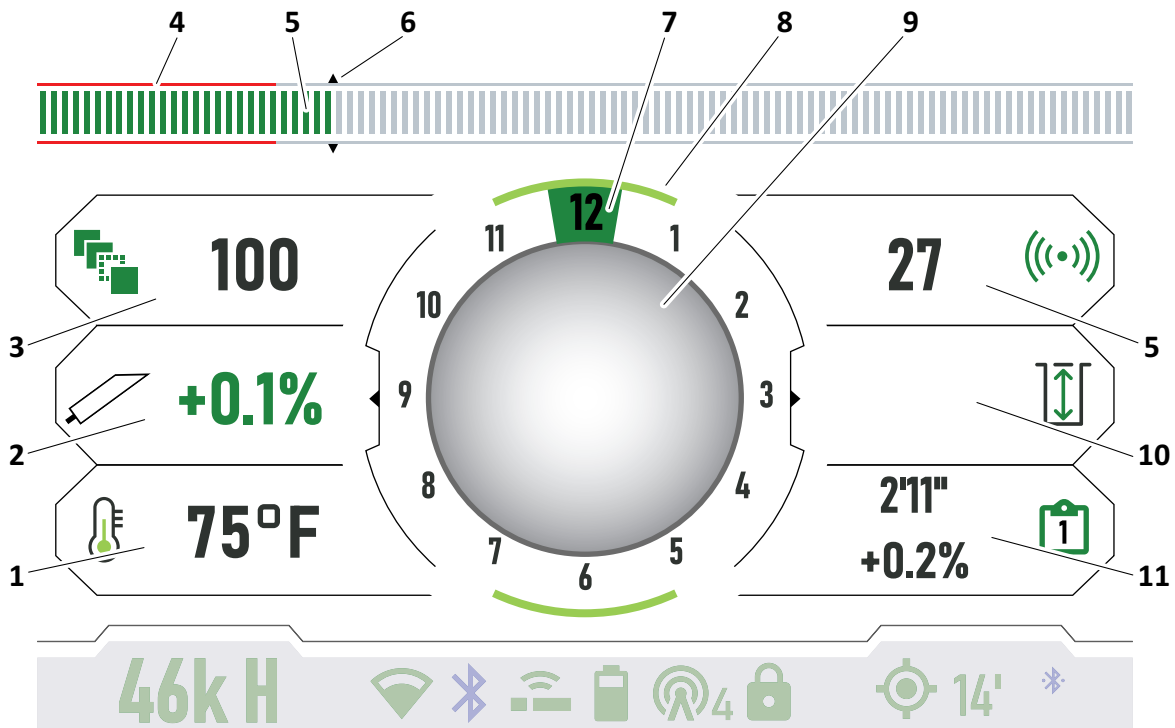
Use Walkover Mode



- 1. Drill
- 2. Rear null point
- 3. Front null point
- 4. Peak signal
- 5. Beacon






Marksman Series beacons emit a dipole magnetic field that can be used to determine beacon position. Beacon is always located at peak signal between front null point and rear null point. Peak signal is located directly over the beacon. The Marksman tracker uses the dipole field shape to guide the operator through a series of steps to locate the beacon.









Indicators, Tracker



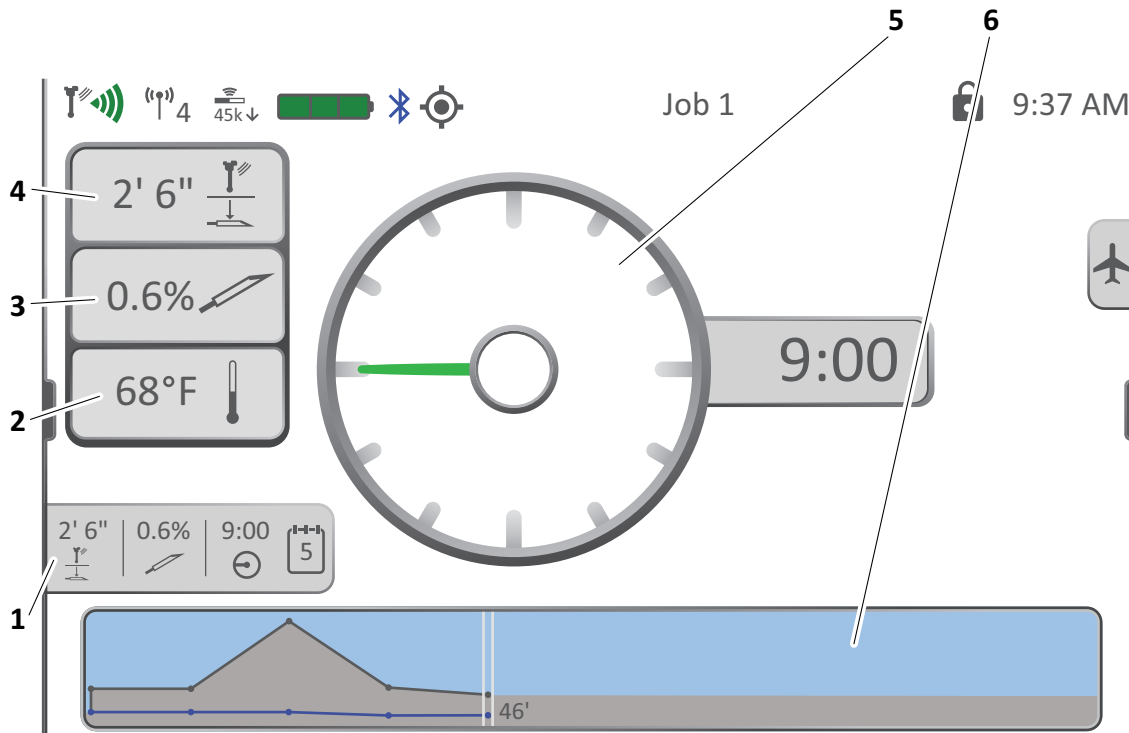
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IMPORTANT: When using classic view, locate arrows will replace locate line in locate window.




Item	Description	IMPORTANT
1. Beacon temperature/ battery indicator	 Indicates beacon temperature.  Indicates beacon battery level.	Lights red if over 120°F (49°C). Alarm sounds if over 156°F (69°C). Lights red when less than 10%. If logging, beacon battery indicator replaces logging indicator.
2. Pitch	 Displays pitch of beacon.	
3. Beacon communication indicator	 Indicates success rate of communication between beacon and tracker.	Lights red if less than 20%.
4. Gain	Displays gain.	
5. Signal strength	 Displays signal strength.	Lights red if signal is saturated.

Item	Description	IMPORTANT
6. Peak signal indicator	Indicates peak signal.	
7. Roll	Displays beacon roll position.	
8. Nearest null point indicator	Indicates direction to nearest null point.	
9. Locate window	Displays information used to locate beacon.	See "Walkover Procedure" on page 51.
10. Depth	<p> Green indicator displays current depth estimate.</p> <p> Orange indicator displays projected depth estimate.</p> <p> Lights to indicate depth is an estimate.</p> <p> Lights to indicate projected depth is only valid when tracker is over front null point.</p> <p> Lights to indicate beacon is regulating.</p> <p> Indicates pipe was logged.</p> <p> Indicates pipe can be logged.</p>	<p>Field is highlighted when depth is sent to display.</p> <p>NOTICE: Projected depth not valid over rear null point, even when displayed.</p> <p>Depth reading will be inaccurate.</p> <p>Used in manual logging mode only.</p>
11. Logging indicator	<p> Displays logged pipe information.</p>	When not logging, beacon battery indicator replaces logged pipe information.

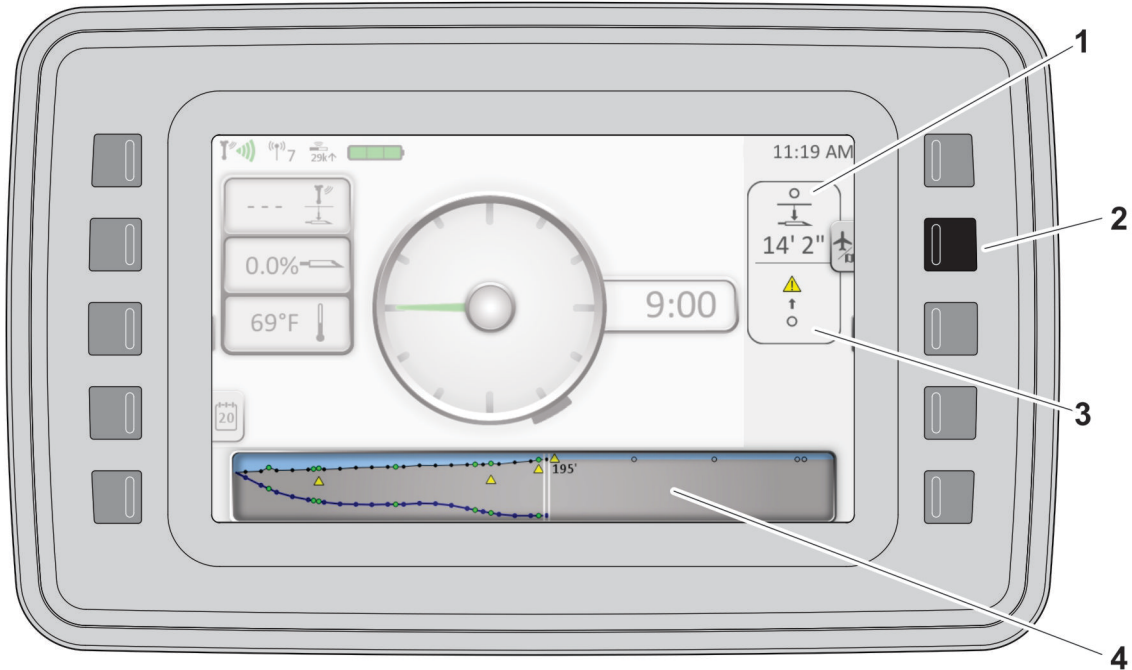
Indicators, Commander 7



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Item	Description	IMPORTANT
1. Logged pipe banner	Displays last logged pipe information.	Information includes depth, pitch, roll, and number of last logged pipe.
2. Beacon temperature indicator	 Indicates beacon temperature.	Lights red if over 120°F (49°C). Alarm sounds if over 156°F (69°C). See "Beacon alerts" on page 30.
3. Pitch	 Displays pitch of beacon.	
4. Depth	 Displays last depth received from tracker.	
5. Roll	Displays beacon roll position.	
6. As-Built view	Displays profile view of bore.	On certain Ditch Witch drills, engine information will also be displayed. See drill operator's manual.

Indicators, Commander 7 ScoutView™

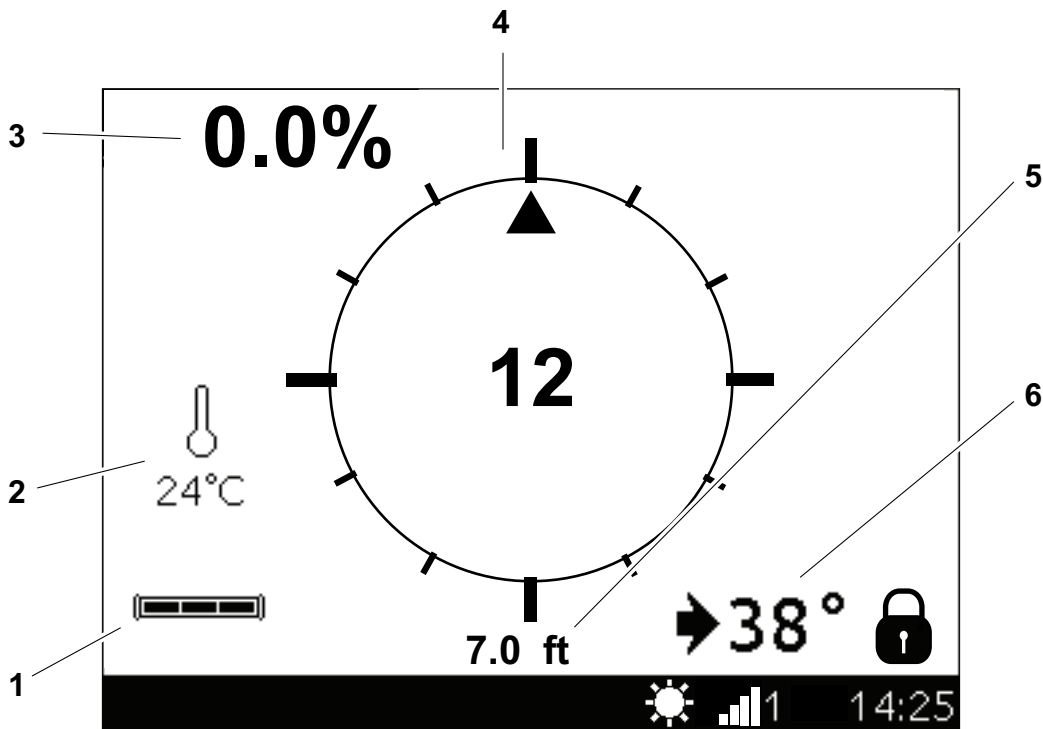


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IMPORTANT: For more information, see Field Scout™ operator's manual.

Item	Description	IMPORTANT
1. Target depth indicator	 Indicates target depth at next waypoint.	
2. Plan viewer	 To display overhead view of bore, press. To view plan waypoint list, press and hold.	
3. Obstacle position indicator	 Indicates obstacle position at planned depth of next waypoint.	
4. Planned/As-Built view	Displays profile view of bore including planned waypoint and obstacle information.	Circles indicate waypoints. Triangles indicate obstacles.

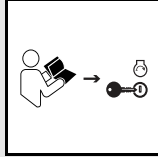
Indicators, TD RECON



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Item	Description	IMPORTANT
1. Beacon battery indicator	 Indicates beacon battery level.	
2. Beacon temperature indicator	 Indicates beacon temperature.	
3. Pitch	 Displays pitch of beacon.	
4. Roll	Displays beacon roll position.	
5. Depth	Displays last depth received from tracker.	
6. Rotation angle	Displays angle between tracker and beacon.	

Walkover Procedure



⚠ WARNING

Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

To help avoid injury: If location and depth are critical, confirm by hand-digging.

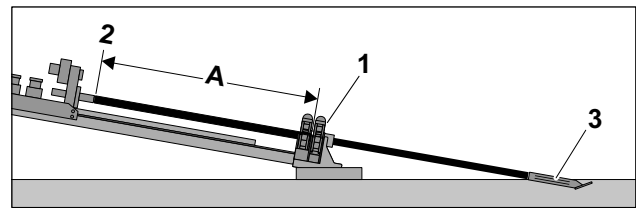
NOTICE:

- When displayed, projected depth assumes tracker is over front null point. See page 47 for more information.
- Beacon location changes with pitch and will not always be centered between front and rear null points.

IMPORTANT: To change beacon frequency and/or power level downhole, see "Set Beacon" on page 68.

1. If logging, record first pipe length.

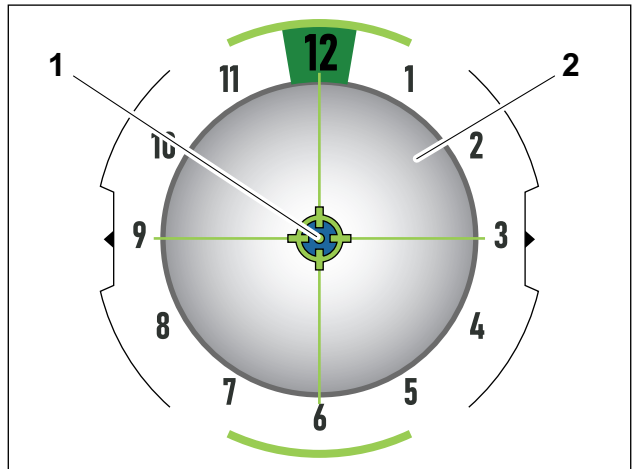
IMPORTANT: Length is measured before point is logged.



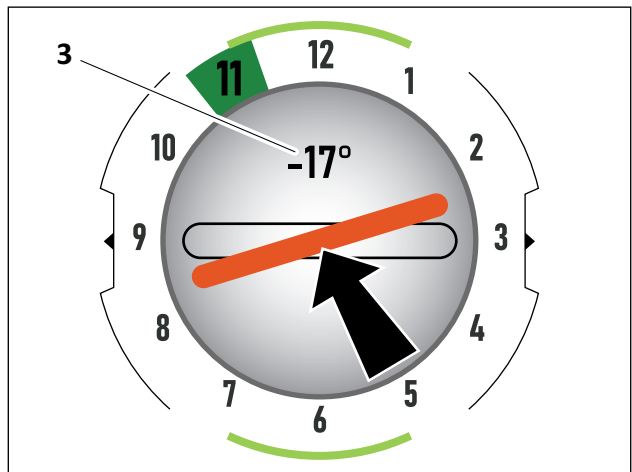
- 1.1 Slowly move carriage forward until downhole tool housing (3) is halfway into ground.
- 1.2 Measure distance (A) of drill pipe from end of pipe (2) to middle of wrenches (1). Note first pipe length.
- 1.3 Move carriage forward until next pipe is located between wrenches. Distance drilled will match measured first pipe length.

Use Walkover Mode

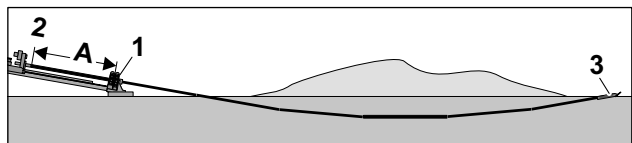
2. Beginning at drill, walk tracker along bore path until target (1) arrives in center of locate window (2) to find rear null point.
3. Mark location.
4. Continue walking forward until target reappears in center of locate window to find front null point.
5. Mark location.
6. Walk back along bore path toward rear null point until locate line is shown in locate window as shown.
7. Use rotation angle (3) to center locate line in outline to find beacon location.
8. To verify beacon location, sweep tracker from side to side and monitor signal strength. Beacon is located at peak signal.
9. Pull joystick to send depth to drill.
 - If autologging is selected, pipe is logged when depth is sent.
 - To log pipe when manual logging is selected, pull joystick while depth indicator is highlighted.
10. Repeat process until end of bore.
11. If logging, record last pipe length.
 - 11.1 After logging last pipe, slowly move carriage forward until downhole tool housing (3) is halfway out of ground.
 - 11.2 Measure distance (A) of drill pipe from end of pipe (2) to middle of wrenches (1).
 - 11.3 Subtract measured distance from pipe length used by drill. Note last pipe length.



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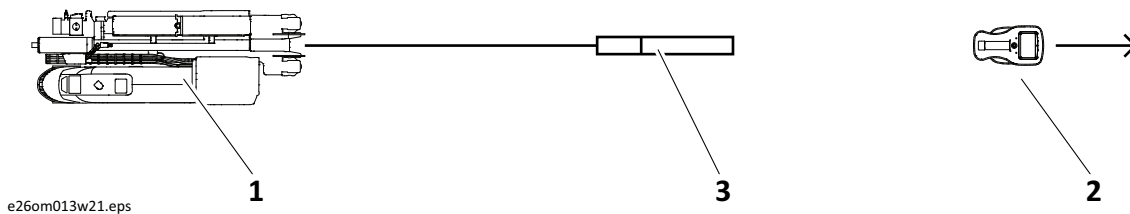


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MeasuringLastRodLengthB.eps

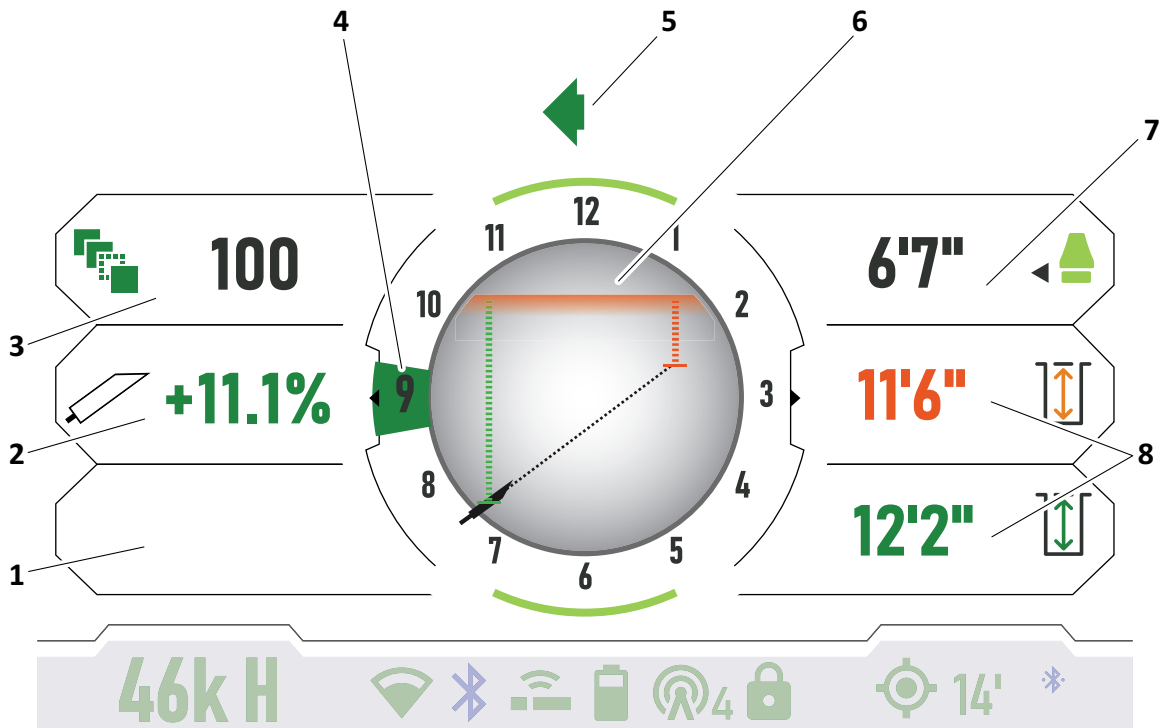
Use Drill-To Mode











1. Drill
2. Tracker
3. Beacon

Marksman Series trackers can use the shape of the beacon's magnetic field to determine beacon position. When positioned in front of the beacon along the beacon axis, tracker can calculate the horizontal distance between the drill and beacon, current depth, and projected depth. Tracker displays a steering indicator to guide beacon to intended bore path.

Indicators, Tracker



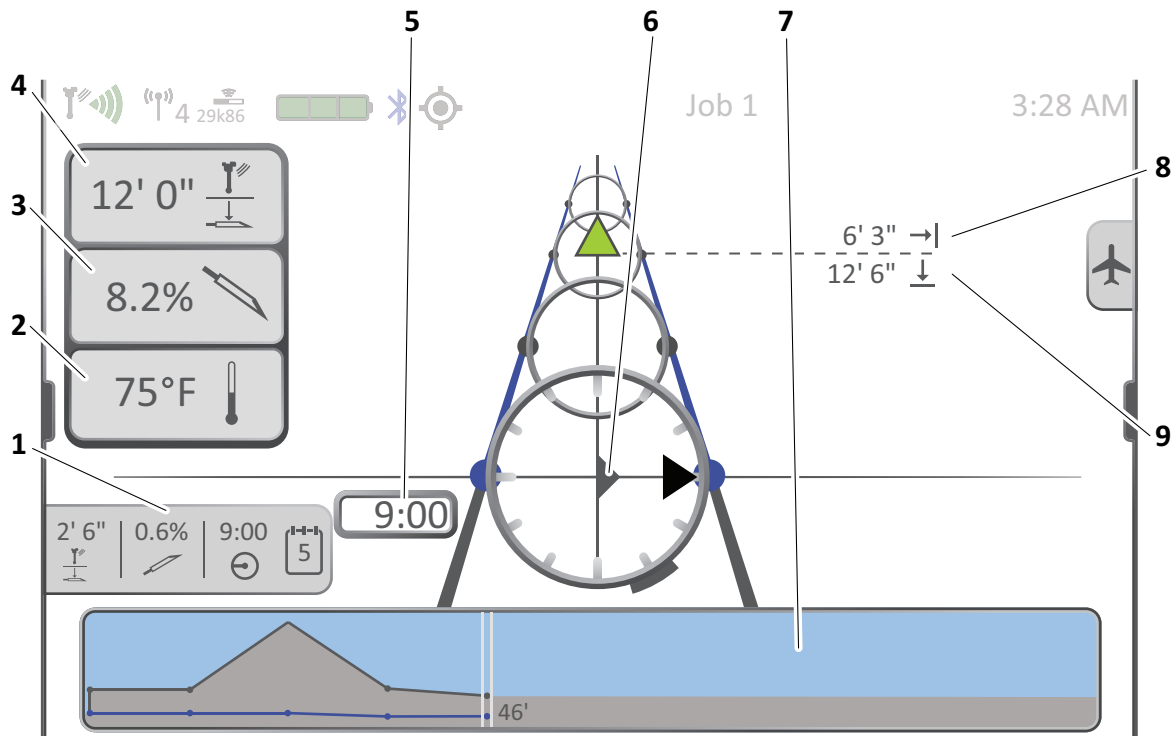
Item	Description	IMPORTANT
1. Beacon battery/ temperature indicator	 Indicates beacon temperature.  Indicates beacon battery level.	Lights red if over 131°F (55°C). Alarm sounds if over 162°F (72°C). Lights red when less than 10%.
2. Pitch	 Displays pitch of beacon.	
3. Beacon communication indicator	 Indicates success rate of communication between beacon and tracker.	Lights red if less than 20%.
4. Roll	Displays beacon roll position.	
5. Steering indicator	Indicates which direction beacon needs to move to correctly align with intended bore path.	Arrow changes to diamond when beacon is aligned with tracker. See "Drill-To Procedure" on page 63.
6. Locate window	Displays information used to locate beacon.	See "Drill-To Procedure" on page 63.

Item	Description	IMPORTANT
7. Horizontal distance	 Displays horizontal distance from tracker to a point directly above beacon.	
8. Depth estimate	 Green indicator displays current depth estimate.  Orange indicator displays projected depth estimate.  Lights to indicate beacon is regulating.	Indicators change position with pitch. Depth reading will be inaccurate.




Indicators, Commander 7



IMPORTANT: Display defaults to advanced view. To select change view, see "Drill-To mode" on page 29.

Advanced View

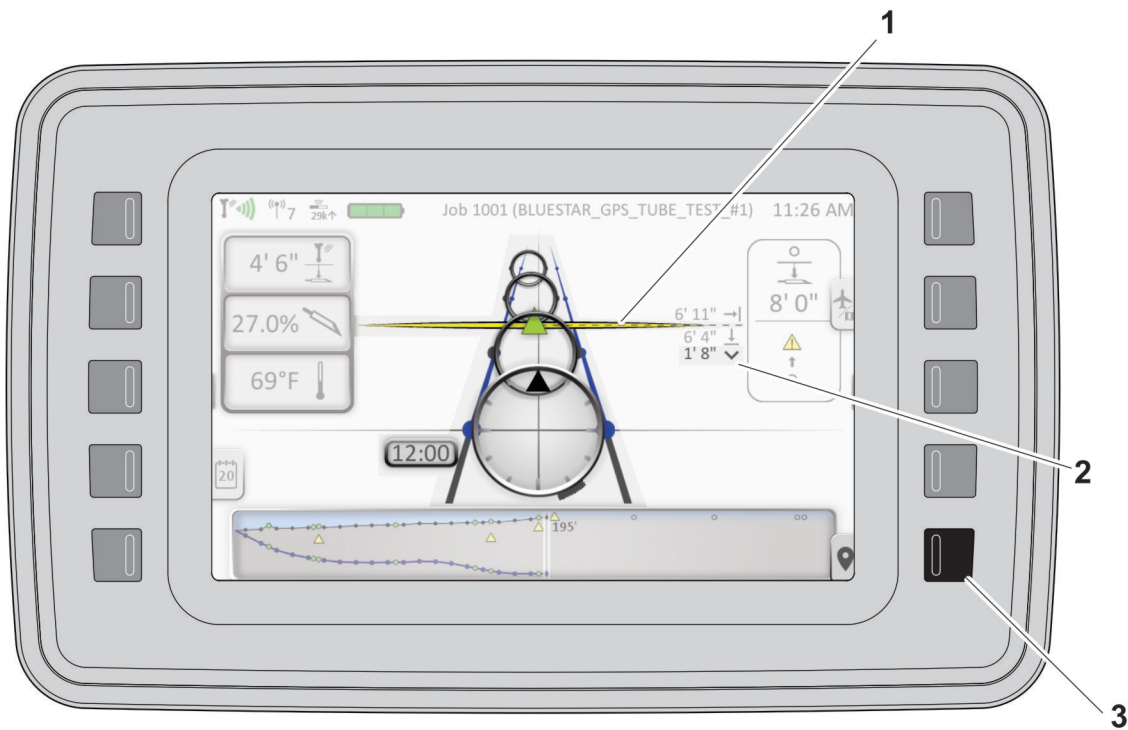


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Item	Description	IMPORTANT
1. Logged pipe banner	Displays last logged pipe information.	Information includes depth, pitch, roll, and number of last logged pipe.
2. Beacon temperature indicator	 Indicates beacon temperature.	
3. Pitch	 Displays pitch of beacon.	
4. Current depth estimate	 Displays current depth estimate.	
5. Roll	Displays beacon roll position.	
6. Steering indicator	Indicates which direction beacon needs to move to correctly align with intended bore path.	Arrow changes to diamond when beacon is aligned with bore path. See "Drill-To Procedure" on page 63.

Item	Description	IMPORTANT
7. As-Built view	Displays profile view of bore.	On certain Ditch Witch drills, engine information will also be displayed. See drill operator's manual.
8. Horizontal distance	 Displays horizontal distance from tracker to a point directly above beacon.	
9. Projected depth estimate	 Displays projected depth estimate.	

Advanced View, ScoutView™

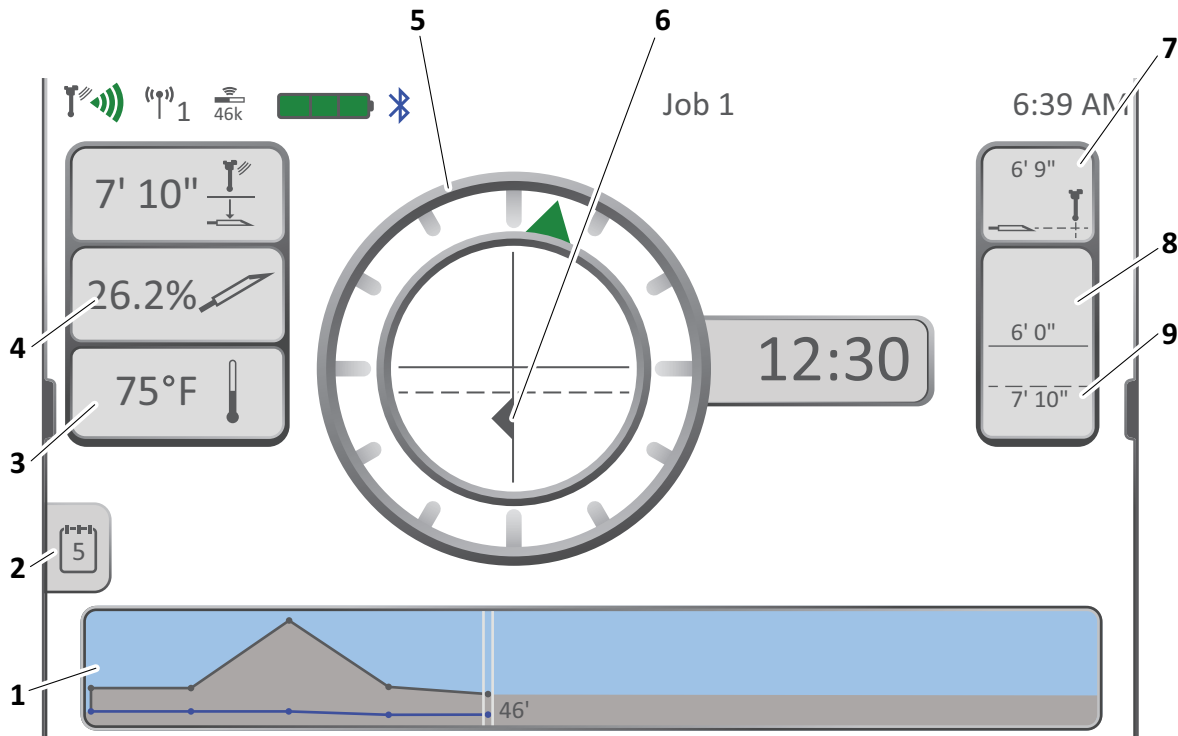


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
IMPORTANT: For more information, see Field Scout™ operator's manual.




Item	Description	IMPORTANT
1. Obstacle position indicator	Indicates obstacle position at planned depth of next waypoint.	
2. Depth difference indicator	Indicates any difference in depth from plan.	
3. Waypoint data key	To view additional waypoint data, press.	

Classic View

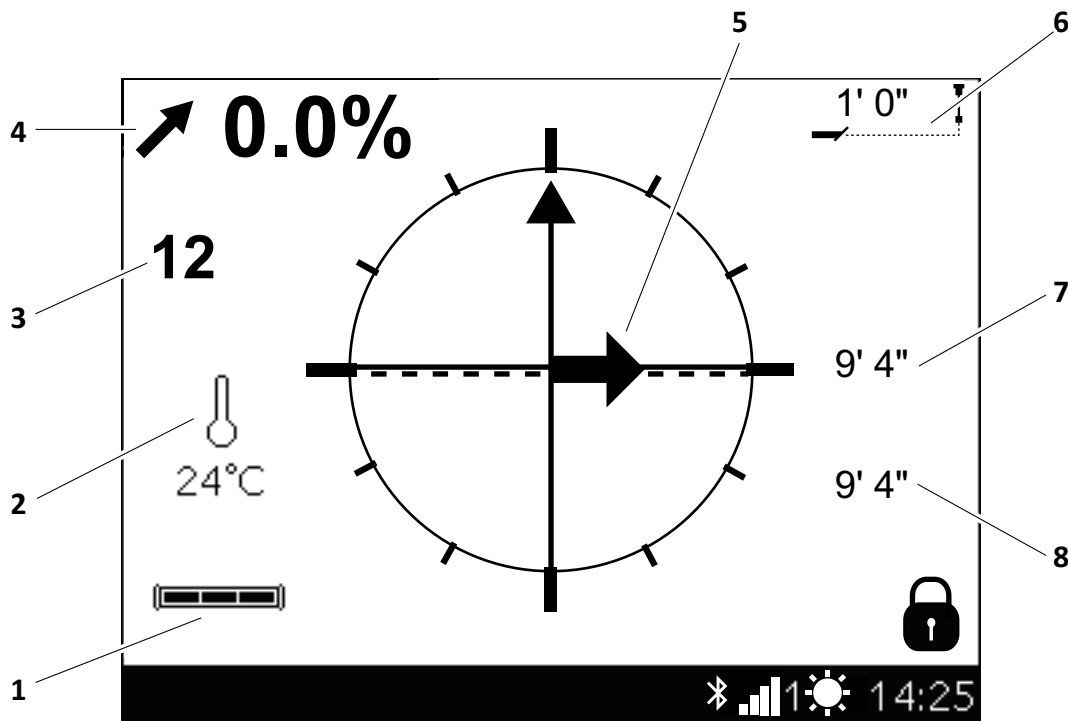


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Item	Description	IMPORTANT
1. As-Built view	Displays profile view of bore.	On certain Ditch Witch drills, engine information will also be displayed. See drill operator's manual.
2. Logged pipe banner	Displays last logged pipe information.	Information includes depth, pitch, roll, and number of last logged pipe.
3. Beacon temperature indicator	 Indicates beacon temperature.	
4. Pitch	 Displays pitch of beacon.	
5. Roll	Displays beacon roll position.	
6. Steering indicator	Indicates which direction beacon needs to move to correctly align with intended bore path.	Arrow changes to diamond when beacon is aligned with bore path. See "Drill-To Procedure" on page 63.

Item	Description	IMPORTANT
7. Horizontal distance	 Displays horizontal distance from tracker to a point directly above beacon.	
8. Projected depth estimate	 Displays projected depth estimate.	
9. Current depth estimate	 Displays current depth estimate.	Indicator changes location with pitch.

Indicators, TD RECON

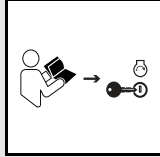


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Item	Description	IMPORTANT
1. Beacon battery indicator	 Indicates beacon battery level.	
2. Beacon temperature indicator	 Indicates beacon temperature.	Lights red if over 131°F (55°C). Alarm sounds if over 162°F (72°C).
3. Roll	Displays beacon roll position.	
4. Pitch	 Displays pitch of beacon.	
5. Steering indicator	Indicates which direction beacon needs to move to correctly align with intended bore path.	Arrow changes to diamond when beacon is aligned with bore path. See "Drill-To Procedure" on page 63.
6. Horizontal distance	 Displays horizontal distance from tracker to a point directly above beacon.	

Item	Description	IMPORTANT
7. Projected depth estimate	— Displays projected depth estimate.	
8. Current depth estimate Displays current depth estimate.	Indicator changes location with pitch.

Drill-To Procedure

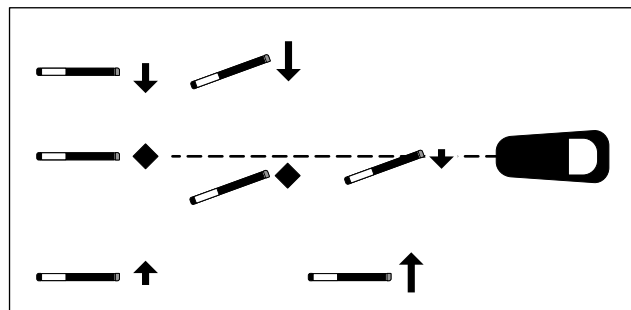


⚠ WARNING Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.

To help avoid injury:

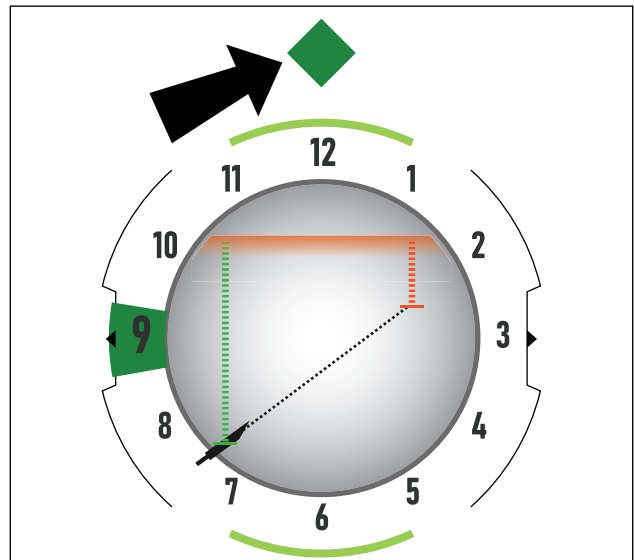
- If location and depth are critical, confirm by hand-digging.
- If distance between tracker and beacon is greater than 35' (11.7m), use information for reference only.
- Tracker must be in front of and above projected path of beacon.

1. Place tracker in stand along intended bore path with battery cap facing drill.
2. Drill as usual.
 - Use steering indicator to align beacon with intended bore path horizontally.
 - Use current and projected depths to align beacon with intended bore path vertically.



e170m004h.eps

Steering indicator changes to diamond (shown) when beacon is correctly aligned with intended bore path.



e260m024w21.eps

Maintenance

Chapter Contents



For additional precautions, see "Safety" and "Prepare" chapters.

General Care 66

- Update Software 66
- Change Batteries 67

Set Beacon 66

General Care

Under normal operating conditions, this equipment needs only minor maintenance. To ensure longer equipment life:

- Do not drop.
- Do not expose to high heat.
- Clean with damp cloth and mild soap.
- Do not immerse in liquid.
- Inspect housing daily for cracks or other damage. If damaged, contact your Subsite Electronics dealer for replacement.
- Remove beacon from housing before mud hardens and locks beacon into housing.

IMPORTANT: If beacon cannot be removed, do not use force. Soak housing in water until dried mud softens. If beacon still cannot be removed, contact your Subsite Electronics dealer.

- Do not mix new and used batteries.
- Remove battery when not in use.

Update Software

Tracker

IMPORTANT:

- Tracker must be connected to Wi-Fi network. If not connected, use Field Scout to set up Wi-Fi connection. See Field Scout operator's manual for more information.
- Tracker will restart after update.

Use system menu to view available updates. To update beacon software, beacon must be powered on and connected to tracker. Follow on-screen prompts.

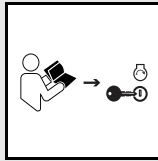
Commander 7

IMPORTANT: To update Commander 7 software, contact your Subsite Electronics dealer. After initial update, Commander 7 can be updated using Field Scout or TK Updater. See Field Scout operator's manual or www.subsite.com for more information.

TD RECON

IMPORTANT: TD RECON software can be updated using Field Scout or TK Updater. See Field Scout operator's manual or www.subsite.com for more information.

Change Battery



⚠ WARNING Misuse of machine can cause death or serious injury. Read and understand operator's manual and all other safety instructions before use. Know how to use all controls.



⚠ WARNING Corrosive fluid. Contact can cause death or serious injury. Avoid contact. Wear appropriate gloves. See Safety Data Sheet (SDS) for more information.

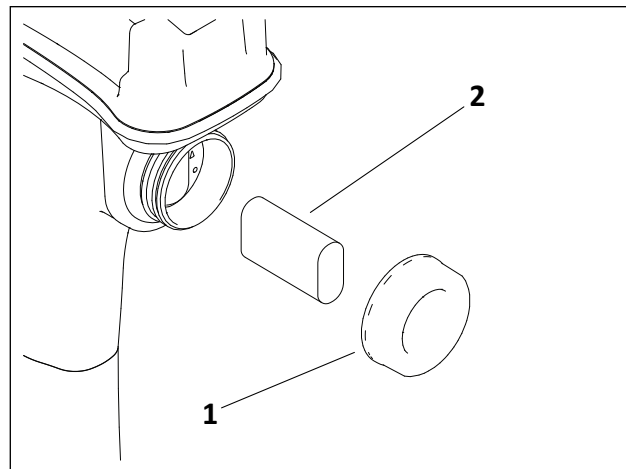
To help avoid injury: Never attempt to charge a battery that is leaking, bulging, heavily corroded, frozen, or otherwise damaged.

IMPORTANT: See beacon operation sheet for instructions on how to replace beacon battery.

1. Unscrew battery cap (1).
2. Remove battery (2).
3. Charge battery with provided charger.

NOTICE: See battery manual for charging instructions.

4. Reinstall battery.
5. Check operation.



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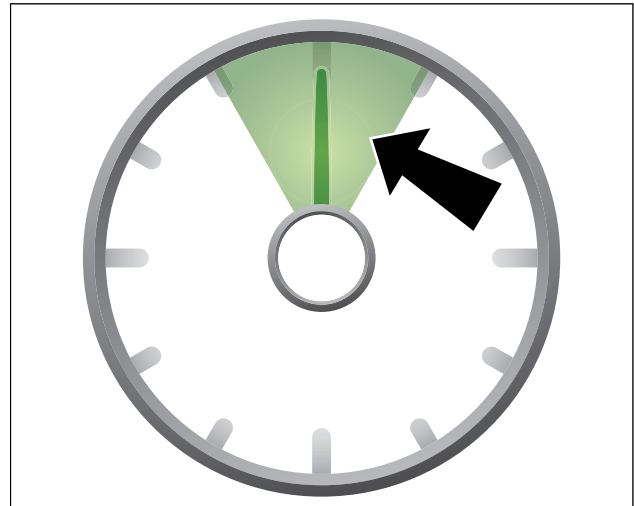
Set Beacon

The Commander 7 and TD RECON displays can be used to change frequency and/or power level of the beacon downhole.

1. Use the settings menu to set beacon.
2. Select frequency.

IMPORTANT:

- Frequencies recommended by bore path analyzer (only available for Marksman+) are automatically selected.
- For the Marksman Base, 3 frequencies will be used for 60 Hz power grid and 3 for 50 Hz power grid and go directly to calibration procedure (no frequency selection box will appear).



e26om025w21.eps

3. Select power level.

IMPORTANT: For Marksman Base, there is one power level (normal level).

4. Follow on-screen prompts to keep roll in highlighted section as shown.
5. Complete roll sequence to change frequency and/or power level. Pop-up message on tracker confirms change.

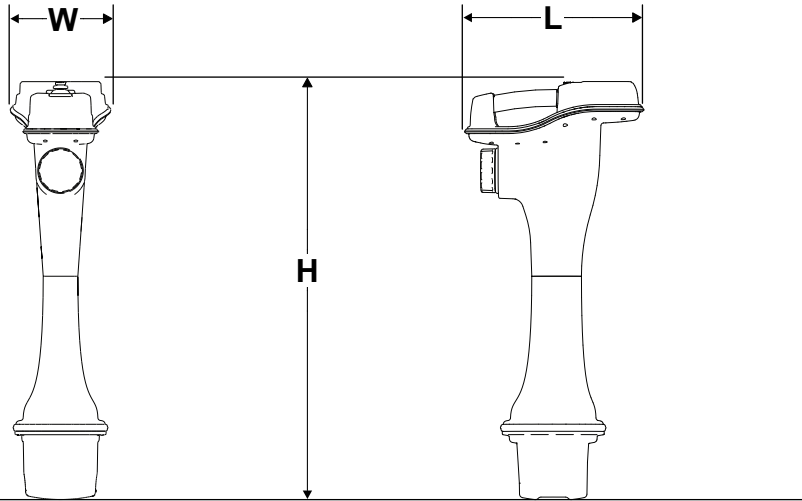
Specifications

Chapter Contents

IMPORTANT: For Marksman Series beacon specifications, see beacon operation sheet.

Marksman+ Tracker	70
Commander 7 Display - Maximatec	73
Commander 7 Display - IFM	76
TD RECON Display	79

Marksman+ Tracker



e26om026w21.eps

Dimensions		US	Metric
H	Height	29.1in	73.2cm
L	Length	12.5in	31.8cm
W	Width	7.0in	17.8cm
	Operating weight	6.9lb	3.1kg

Environmental		US	Metric
Operating temperature		-4 to 122°F	-20 to 50°C
Storage temperature		-22 to 158°F	-30 to 70°C
IP rating		IP65	

Performance	US	Metric
Depth distance*	up to 125ft	up to 38.1m
Depth accuracy	+/- 5% over testable range	
Telemetry radio range	2000ft	610m
Operating frequency		
North America	902.4-927.6MHz	
Europe (excluding Sweden)	863.0-870.0MHz	
Australia	915.6-927.6MHz	
Singapore	923.6-927.6MHz	
Brazil	902.0-907.5MHz 915.0-928.0MHz	
Korea	2.410-2.430GHz	
Japan	2.410-2.430GHz	
Global	2.410-2.430GHz	
Russia	863.8-864.4MHz 869.4-869.9MHz	
India	865.2-866.6MHz	
Sweden/UAE/South Africa	868.8-870.0MHz	
Bluetooth standard	Bluetooth 4.2	
Operating frequency	2.400-2.4835GHz	
Transmit power	10dBm	

*Range figures based on SAE Standard J2520. Actual ranges will vary based on environment, downhole tool housing, and frequency.

Batteries		
Battery type	Lithium-ion rechargeable	
Number of cells	1 battery pack	
Battery life	16 hours at room temperature	
Rating	7.2V, 10.2Ah, 73.4Wh	
Battery manufacturer	Inspired Energy (p/nNF2047QE34)	

EIRP

900MHz, 398mW, 24dBm, +2.0dBi antenna

	North America
	Australia
	Singapore
	Brazil

868MHz, 25mW, 12dBm, +2.0dBi antenna

	Europe (excluding Sweden)
	Russia
	India
	Sweden/UAE/South Africa

2.4GHz, 100mW, 18dBm, +2.1dBi antenna

	Global
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2.4GHz, 16mW, 10dBm, +2.1dBi antenna

	Korea
	Japan

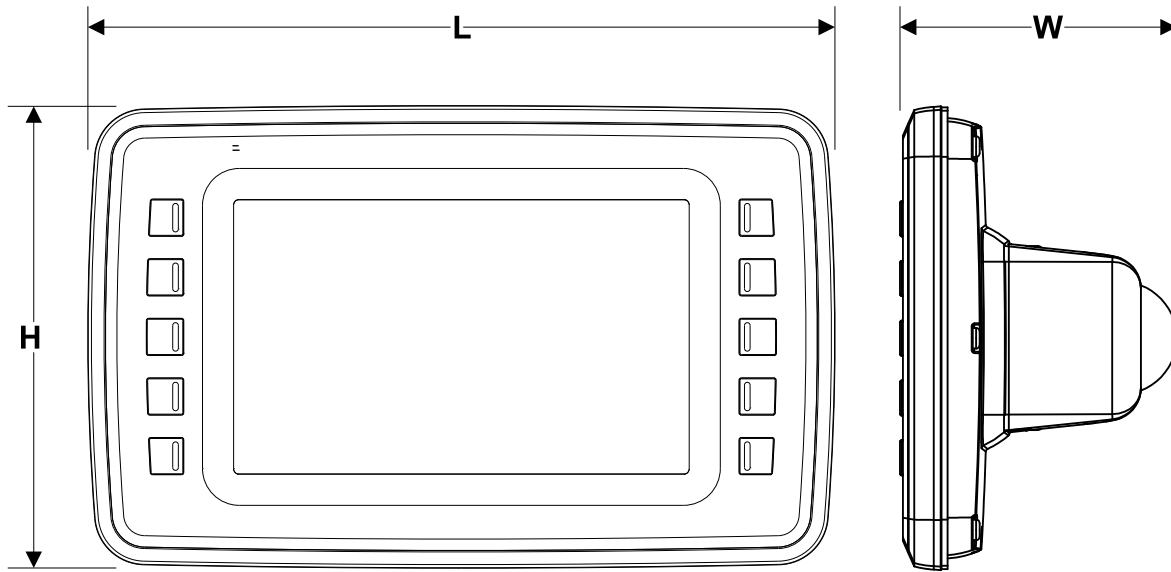
Antenna

Nearson S467AH-9155 900MHz, 58MHz bandwidth, 2.0dBi gain

Digi International A08-HASM-560 868MHz, 58MHz bandwidth, 2.0dBi gain

Digi International A24-HASM-450 2.4GHz, 100MHz bandwidth, 2.1dBi gain

Commander 7 Display - Maximatec



e20om007h.eps

Dimensions		US	Metric
H	Height	6.1in	15.5cm
L	Length	10in	25.4cm
W	Width	3.7in	9.4cm
Environmental		US	Metric
Operating temperature		-4 to 140°F	-20 to 60°C
Storage temperature		-22 to 158°F	-30 to 70°C
IP rating		IP66	
Electrical			
Commander 7		12-24V, 400mA	

Performance	US	Metric
Telemetry radio range	2000ft	610m

Operating frequency

North America	902.4-927.6MHz
Europe (excluding Sweden)	863.0-870.0MHz
Australia	915.6-927.6MHz
Singapore	923.6-927.6MHz
Brazil	902.0-907.5MHz 915.0-928.0MHz
Korea	2.410-2.430GHz
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EIRP

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Korea

Japan

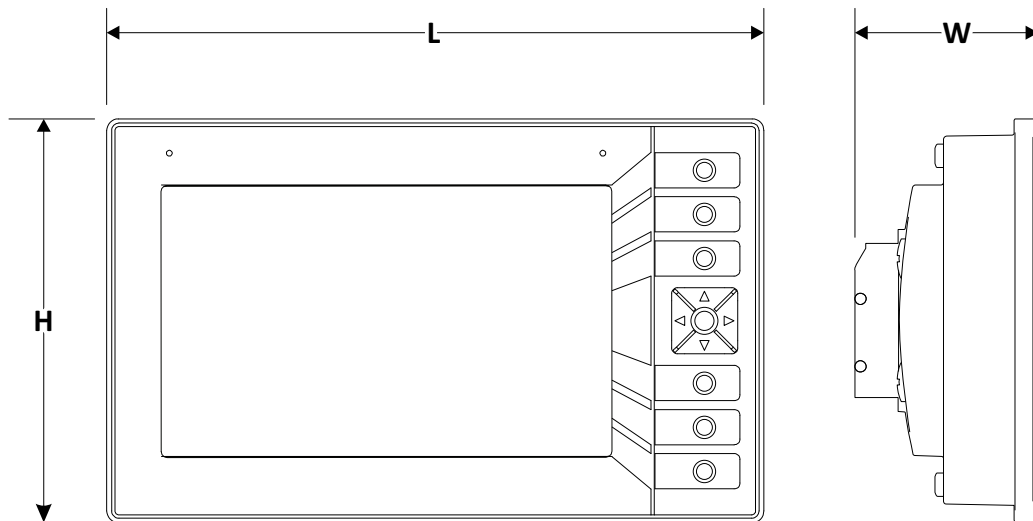
Antenna

Laird EXR902TN 900MHz, 58MHz bandwidth, 2.0dBi gain

Laird EXE821TN 868MHz, 58MHz bandwidth, 2.0dBi gain

Laird MAF94307 2.4GHz, 100MHz bandwidth, 3.0dBi gain

Commander 7 Display - IFM



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Dimensions		US	Metric
H	Height	5.4in	13.74cm
L	Length	8.8in	22.4cm
W	Width	1.83in	4.65cm
Environmental		US	Metric
Operating temperature		-31 to 140°F	-35 to 60°C
Storage temperature		-31 to 185°F	-35 to 85°C
IP rating		IP65 & IP67	
Electrical			
Commander 7		8-16V, 5A	

Performance	US	Metric
Telemetry radio range	2000ft	610m

Operating frequency

North America	902.4-927.6MHz
Europe (excluding Sweden)	863.0-870.0MHz
Australia	915.6-927.6MHz
Singapore	923.6-927.6MHz
Brazil	902.0-907.5MHz 915.0-928.0MHz
Korea	2.410-2.430GHz
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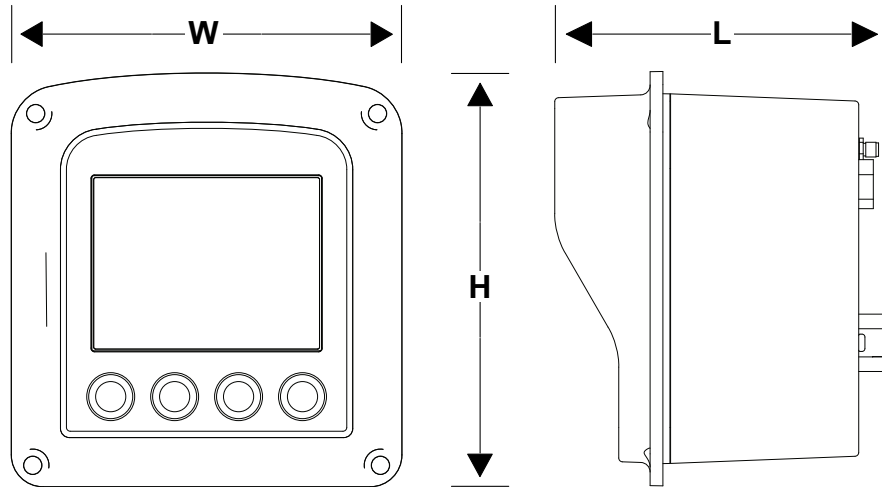
Antenna

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Laird EXE821TN 868MHz, 58MHz bandwidth, 2.0dBi gain

Laird MAF94307 2.4GHz, 100MHz bandwidth, 3.0dBi gain

TD RECON Display



Dimensions		US	Metric
H	Height	7in	17.8cm
L	Length	6.5in	16.5cm
W	Width	7in	17.8cm

Environmental		US	Metric
Operating temperature		-4 to 140°F	-20 to 60°C
Storage temperature		-22 to 158°F	-30 to 70°C
IP rating		IP66	

Electrical	
TD RECON	12-24V, 150mA

Performance	US	Metric
Telemetry radio range	2000ft	610m

Operating frequency

North America	902.4-927.6MHz
Europe (excluding Sweden)	863.0-870.0MHz
Australia	915.6-927.6MHz
Singapore	923.6-927.6MHz
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Laird MAF94307 2.4GHz, 100MHz bandwidth, 3.0dBi gain

Support

Procedure

Notify your dealer immediately of any malfunction or failure of Subsite Electronics equipment.

Always give model, serial number, and approximate date of your equipment purchase. This information should be recorded and placed on file by the owner at the time of purchase.

Return damaged parts to dealer for inspection and warranty consideration if in warranty time frame.

All repairs must be done by an authorized Subsite Electronics repair facility. Repairs done elsewhere will void warranty.

Resources

Publications

Contact your dealer for publications and videos covering safety, operation, maintenance, and repair of your equipment.

Training

For information about on-site individualized training, contact your dealer.

Warranty

Electronics Limited Warranty Policy

Subject to the limitation and exclusions herein, free replacement parts and labor will be provided when a unit fails due to a defect in material or workmanship within one (1) year of first commercial use. (See exceptions below for specific products.) Defects shall be determined through inspection by Manufacturer or authorized repair centers. An inspection must occur within thirty (30) days of the date of failure of the product or part by Manufacturer or its authorized repair facility. Manufacturer will provide the location of its inspection facilities or its nearest authorized dealer upon inquiry. Manufacturer reserves the right to supply remanufactured replacement parts under this warranty as it deems appropriate. Each warranty repair carries the remainder of the factory warranty or ninety (90) days, whichever is longer, for all repaired components and labor.

Product Warranty Exceptions:

- HDD guidance beacons, Locate Beacons and Accessories, carry a six (6) month warranty.
- HDD guidance beacons, M-Series and T-Series, carry a three (3) year 750 hour warranty.
- All Used (Cosmetic) Electronics products sold from Manufacturer carry a six (6) month warranty from date of sale to dealer

Exclusions from Product Warranty

- All defects or damages caused by misuse, abuse, improper installation, alteration, neglect, modification, lack of maintenance, or uses
- All defects or damages caused by misuse, abuse, improper installation, alteration, neglect, modification, lack of maintenance, or uses other than those for which the products were intended.
- All defects, damages, or injuries caused by improper training, operation, or servicing of products in a manner inconsistent with manufacturer's recommendations.
- All batteries, which are considered consumable and therefore not covered under this warranty.
- All damaged plastics are considered to be the result of misuse or neglect unless Manufacturer has determined otherwise.
- All repairs or attempted repairs by non-certified repair facilities or personnel will void the warranty.
- All incoming duties and freight charges.
- Manufacturer reserves the right to make changes in design and/or improvements to products from time to time, and user understands that Manufacturer shall have no obligation to upgrade any previously manufactured product to include any such changes.
- In no event shall Manufacturer or its agents, assigns, or parent company be liable for any indirect, special, incidental, or consequential damages or for any cover, loss of information, profit, revenue, or use based upon any claim by user for breach of warranty, breach of contract, negligence, strict liability or any other legal theory. In no event shall Manufacturer liability exceed the amount user has paid for the Manufacturer product.
- Manufacturer will not be responsible for loss of accessories or loss or erasure of data storage media.
- Should it be determined that applicable law prohibits enforcement of any provision of this Warranty Policy, then to the extent it is necessary to comply with the applicable law, this Warranty Policy shall be deemed amended.
- This Warranty Policy shall be the entire agreement between Manufacturer and the Purchaser. Any statements that purport to be different than or modify or expand the terms set forth in this written policy are not effective for any purpose. ANY IMPLIED WARRANTIES, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR USE ARE EXPRESSLY DISCLAIMED. IN NO EVENT SHALL SUBSITE ELECTRONICS, THE CHARLES MACHINE WORKS, INC., OR ANY AUTHORIZED SERVICING AUTHORITY BE RESPONSIBLE FOR ANY LOSSES, INCLUDING CONSEQUENTIAL AND INCIDENTAL DAMAGES, EXCEPT AS EXPRESSLY PROVIDED HEREIN.

Service and Repair

Units repaired at Manufacturer's location or an authorized service center will carry a 90-day warranty on all replaced components/parts and labor commencing on the date of repair.

HDD guidance beacons, M-Series and T-Series repairs: If a lower assembly is replaced on any T-Series beacons, the 750-hour count will start over at zero (0) hours. The warranty years will continue from date of product registration.

M-Series beacons: M-Series beacons are not repairable. Warranty assessments can only be done at an authorized Subsite Electronics repair center. If found to be defective, Authorized Service Center may replace with new beacon.

M-Series and T-Series beacons that are past the three (3) year warranty will have a 90-day repair warranty.

Extended Warranty

Consult your local Subsite dealer for extended warranty options.

Warranty Details

For information regarding this warranty policy, contact Subsite Product Support at (800)846-2713 ext. 1; mail us at 1950 W. Fir, Perry, OK 73077; or contact your local dealer.

April 2021

