DIGITRAK®

Mark IV Locating System

Operator's Manual

DIGITAL CONTROL INCORPORATED

DCI Headquarters
19625 62nd Ave. S., Suite B-103
Kent, Washington 98032 USA
Tel 425 251 0559 / 800 288 3610 *Fax* 253 395 2800
E-mail DCI@digital-control.com www.digitrak.com

DCI Europe
Kurmainzer Strasse 56
D-97836 Bischbrunn
Germany
Tel +49(0) 9394 990 990
Fax +49(0) 9394 990 999
DCI.Europe@digital-control.com

DCI India
SCO # 259, Sector 44-C
Chandigarh (UT) 160 047
Punjab, India
Tel +91(0) 172 464 0444
Fax +91(0) 172 464 0999
DCI.India@digital-control.com

DCI China
No. 41, Lane 500, Xingle Road
Minhang District
Shanghai P.R.C. 201107
Tel +86(0) 21 6432 5186
Fax +86(0) 21 6432 5187
DCI.China@digital-control.com

DCI Australia
2/9 Frinton Street
Southport, Queensland 4215
Australia
Tel +61(0) 7 5531 4283
Fax +61(0) 7 5531 2617
DCI.Australia@digital-control.com

DCI Russia
420059 Pavlyukhina Street
104, Kazan
Russia
Tel +7 843 277 52 22
Fax +7 843 277 52 07
DCI.Russia@digital-control.com

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Patents

The DigiTrak® Locating System is covered by one or more of the following U.S. Patents: 5,155,442; 5,337,002; 5,444,382; 5,633,589; 5,698,981; 5,726,359; 5,764,062; 5,767,678; 5,878,824; 5,926,025; 5,933,008; 5,990,682; 6,002,258; 6,008,651; 6,014,026; 6,035,951; 6,057,687; 6,066,955; 6,160,401; 6,232,780; 6,396,275; 6,400,159; 6,525,538; 6,559,646; 6,593,745; 6,677,768; 6,693,429; 6,756,783; 6,756,784; 6,838,882; 6,924,645; 6,954,073; 7,015,697; 7,049,820; 7,061,244. Sale of a DigiTrak® Receiver does not convey a license under any patents covering the DigiTrak® Transmitter or underground drill housing. Other patents pending.

Limited Warranty

All products manufactured and sold by DCI are subject to the terms of a Limited Warranty. A copy of the Limited Warranty is included with your DigiTrak® Locating System; it can also be obtained by contacting DCI Customer Service, 800-288-3610 or 425-251-0559, or by connecting to DCI's web site, www.digitrak.com.

Important Notice

All statements, technical information, and recommendations related to the products of Digital Control Incorporated (DCI) are based on information believed to be reliable, but the accuracy or completeness thereof is not warranted. Before utilizing any DCI product, the user should determine the suitability of the product for its intended use. All statements herein refer to DCI products as delivered by DCI and do not apply to any user customizations not authorized by DCI nor to any third-party products. Nothing herein shall constitute any warranty by DCI nor will anything herein be deemed to modify the terms of DCI's existing limited warranty applicable to all DCI products.

FCC Compliance Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the Rules of the Federal Communications Commission. 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 DigiTrak Receiver.
- Increase the separation between the problematic equipment and the DigiTrak Receiver.
- Connect the equipment into an outlet on a different circuit.
- Consult the dealer for help.

Changes or modifications to the DCI equipment not expressly approved and carried out by DCI will void the user's limited warranty and the FCC's authorization to operate the equipment.

Table of Contents

Safety Precautions and Warnings

IMPORTANT NOTE: All operators must read and understand the precautions and warnings given below and listed in the *DigiTrak Directional Drilling Locating System Operator's Manual*.

Serious injury or death can result if underground drilling equipment makes contact with an underground utility such as a high-voltage electrical cable or a natural gas line.

Substantial property damage and liability can result if underground drilling equipment makes contact with an underground utility such as a telephone, fiber-optic, water, or sewer line.

Work slowdown and cost overruns can occur if drilling operators do not use the drilling or locating equipment correctly to obtain proper performance.

- Directional drilling operators MUST at all times:
  - Understand the safe and proper operation of drilling and locating equipment, including the use of ground mats and proper grounding procedures.
  - Ensure that all underground utilities have been located, exposed, and marked accurately prior to drilling.
  - Wear protective safety clothing such as dielectric boots, gloves, hard-hats, high-visibility vests and safety glasses.
  - Locate and track the drill head accurately and correctly during drilling.
  - Comply with state and local governmental regulations (e.g., OSHA).
  - Follow all other safety procedures.

- Carefully review this manual and the *DigiTrak Directional Drilling Locating System Operator's Manual* to ensure you know how to operate the DigiTrak System properly to obtain accurate depth, pitch, roll, and locate points.

- Prior to the start of each drilling run, test the DigiTrak System with the Transmitter inside the drill head to confirm that it is operating properly.

- Regularly test system calibration while drilling using the ultrasonic function. Always test calibration after you have stopped drilling for any length of time.

- Test system for on-site signal interference. Background noise must be *below* 150, and signal strength must be at least 250 points *above* background noise during all locating operations.

The DigiTrak equipment is not explosion-proof and should never be used near flammable or explosive substances.

REMEMBER: If you are having difficulty on the job, call DCI (800-288-3610 or 425-251-0559), and we'll attempt to help you solve the problem.

Introduction

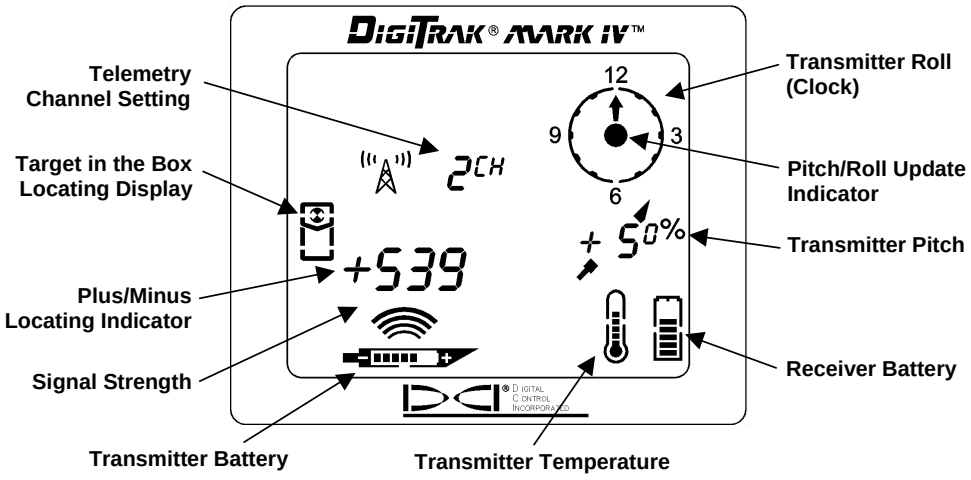
The DigiTrak Mark IV Locating System incorporates significant upgrades that enhance its performance over earlier DigiTrak systems. The Mark IV receivers and remotes have easy-to-read graphic displays and menu-driven controls that make using and locating easier than ever. You simply use the graphic display to guide you in positioning a target (or a line) in a box on the display window to locate the transmitter in the drill head. You can also locate using the peak signal or plus/minus signs, as on earlier DigiTrak models.

The DigiTrak Mark IV system uses the same transmitters, NiCad battery packs, and battery chargers as the Mark III system. The Mark IV is also available as an upgrade to the Mark III equipment.

This manual gives information and instructions for the DigiTrak Mark IV Locating System. Many of the principles are the same as in the previous DigiTrak systems, so we frequently recommend in this manual that you refer to the *DigiTrak Directional Drilling Locating System Operator's Manual* to understand how to best operate the system. We have provided a copy of the locating system manual here behind the tab divider marked "DigiTrak Locating Information". If you need a copy of the "DigiTrak Locating Information" section, please call Digital Control Incorporated at 800-288-3610 or 425-251-0559.

On/Off

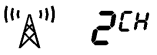
On – The Mark IV receiver is turned on by clicking the trigger once. You will then see the locating screen. The display symbols that appear on the locating screen, as shown below, are described in the next section (see page 6).



Locating Screen

Off – To turn the unit off, you must first access the menu choices. Click the trigger until you reach the power on/off menu ⏻, then hold the trigger in during the countdown from 3 to 0 to shut off the receiver.

Display Symbols



Telemetry channel setting – Shows the current channel setting for the receiver. The receiver must be set to the same channel as the remote display. There are four channel settings (1, 2, 3, 4) and an Off setting, which indicates that the telemetry function is turned off and there is no signal to the remote display.

Locating icon – Represents a bird's eye view of the receiver. The locating icon is referred to as the "box" when using the *target-in-the-box* and *line-in-the-box* locating techniques.

Target – Represents the front and rear negative locate points (FNLP and RNLP). When the receiver is positioned directly above a locate point, the target will be in the box.

Line – Represents the positive locate line (PLL). When the receiver is positioned directly above the PLL, the line will be in the box. The PLL also allows for off-track locating when access over the tool is limited (see *DigiTrak Directional Drilling Locating System Operator's Manual*).

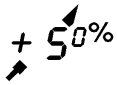
Plus/minus locating indicator – The plus or minus sign in front of the signal strength value is used to guide the operator in finding the locate points (FNLP and RNLP) and the locate line (PLL).

Signal strength – Displays the amount of signal from the transmitter. The signal strength scale ranges from 0 to 999, where 0 indicates no signal and 999 indicates signal saturation (receiver and transmitter are very close).

Transmitter battery – Depicts the transmitter's battery status.

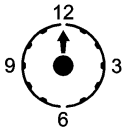
Transmitter temperature – Shows temperature status of transmitter. An arrow pointing up next to the thermometer indicates increasing temperature; an arrow pointing down indicates decreasing temperature. A digital temperature reading is displayed below the clock whenever the trigger is held in.

Receiver battery – Depicts the receiver's battery status.



Transmitter pitch – Represents the inclination of the transmitter (tool). The pitch can be monitored in either percent slope or degrees. The pitch value will be shown with the drill tool indicator behind it; the drill tool indicator will point up for positive pitch and down for negative pitch. Note the smaller superscripted "0" after the "5" in the transmitter pitch symbol. This smaller number represents pitch in tenths of a percent (0.1%) and is only displayed when using sensitive-pitch transmitters.

Pitch/roll update indicator - The dot in the center of the clock should blink every 2.5 seconds, indicating that current pitch and roll information is being received from the transmitter. This also means that transmitter battery and temperature status updates are being received.



Transmitter roll – The clock shows the 12 roll positions of the transmitter (tool).

General Operation

When you first turn on the Mark IV receiver, you see the locating screen (see page 5). You can then access the menu functions, or you can proceed to locating (see "Locating Instructions," page 15).

To access the menu functions, you simply **click the trigger**; each trigger click advances you to the next menu function. Each menu has a countdown sequence. To change a menu setting, you **hold the trigger in** while the counter goes down to 0. Once the counter reaches 0, release the trigger and you will hear three confirmation beeps indicating that the menu setting has been changed. The display will then go back to the locating screen.

During locating, to display the transmitter temperature and depth or predicted depth, you **hold the trigger in**. Before locating you also need to **hold the trigger in** for 1 second at one of the three locate points: the front or rear negative locate point (FNLP or RNLP) or the positive locate line (PLL). This is necessary to lock in on a reference signal strength so that the receiver knows where it is with respect to the transmitter.

NOTE: If you are changing a transmitter, you must reinitiate the receiver (shut it off and power it back up) after installing the new transmitter. You must then recalibrate the receiver using either the 1-point or 2-point technique (see pages 10-12).

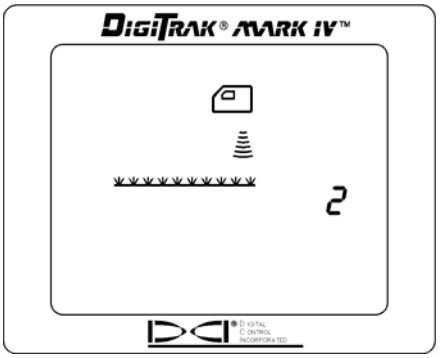
Display Menu Functions

Each of the display menus is described below along with instructions for how to change the menu settings. The menus are listed in the order that they appear.

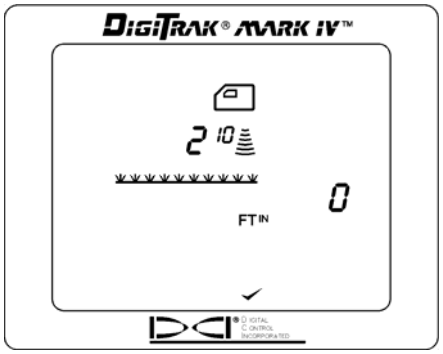
ULTRASONIC 

This display menu allows you to take an ultrasonic (height above ground) measurement.

1. Click the trigger to advance to the ultrasonic menu.
2. Hold the trigger in while holding the receiver steady through the countdown sequence from 2 to 0.
3. When the counter reaches 0, you will hear three confirmation beeps and the ultrasonic height will be displayed along with a checkmark at the bottom of the display.
4. Release the trigger to return to the locating screen.

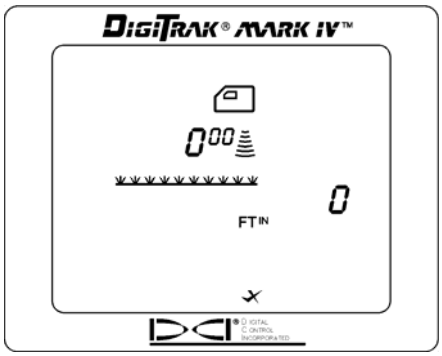


Ultrasonic Menu Screen



Successful Ultrasonic Measurement

NOTE: If the receiver is less than 12 in. (30 cm) above the ground or sitting on the ground or if the ultrasonic function is not operating properly, an ultrasonic reading of 0 will be displayed, you will hear two long tones, and a crossed check mark will appear at the bottom of the display.



Display Showing Zero (0) Ultrasonic Measurement

DATALOG 

This display menu allows you to record a DataLog reading. The procedure sends information to the remote display at the drill rig for recording by the DataLog module. The drill operator must push the "record" button on the DataLog module before a DataLog reading can be recorded.

NOTE: The DataLog menu only appears when the telemetry system is on.

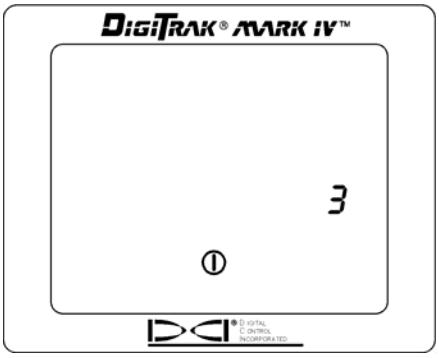
1. Click the trigger to access the DataLog menu.
2. Hold the trigger in while holding the receiver level and steady through the countdown sequence from 3 to 0.
3. When the counter reaches 0, you will hear three confirmation beeps and will see a checkmark at the bottom of the display, indicating that a reading has been sent back to the DataLog module.
4. Release the trigger to return to the locating screen.
5. The remote display will also sound three confirmation beeps when it receives the receiver's signal, and the LCD reading on the DataLog module will be incremented by one count. If the DataLog unit fails to increment one count, the above steps must be repeated.

DataLog Display Menu

POWER 

This display menu allows you to turn off the receiver power.

1. Click the trigger to advance to the power menu.
2. Hold the trigger in through the countdown sequence from 3 to 0.



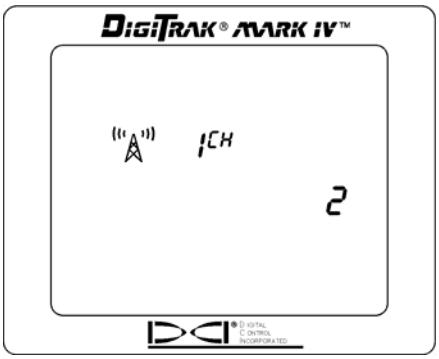
Power Off Screen

3. When the counter reaches 0, you will hear three confirmation beeps and will see a checkmark at the bottom of the display.
4. Release the trigger and the unit will shut off.

TELEMETRY

This display menu allows you to change the telemetry channel setting. This is the channel that the receiver uses to communicate with the remote display. The two must be set to the same channel.

1. Click the trigger to advance to the telemetry menu, where the current channel setting is displayed.
2. Hold the trigger in through the countdown sequence from 2 to 0.
3. When the counter reaches 0, you will hear three confirmation beeps and will see a checkmark at the bottom of the display.
4. While still holding the trigger in, the channel settings will cycle slowly through all five settings—Off, 1, 2, 3, 4.
5. Release the trigger when the correct setting is displayed, and you will return to the locating screen.



Telemetry Channel Setting

BACKLIGHT

This display menu allows you to turn on or off the display backlight.

1. Click the trigger to advance to the backlight menu; a light bulb will appear on the display. If the backlight is on, the bulb will be lit up; if it is off, the bulb will appear unlit.
2. Hold the trigger in through the countdown sequence from 2 to 0.

Backlight Is Turned Off

Backlight Is Turned On

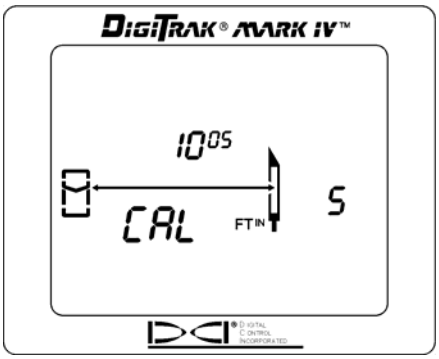
3. When the counter reaches 0, you will hear three confirmation beeps and the light bulb will either light up as the backlight comes on or it will become unlit and the backlight will turn off.
4. Release the trigger to return to the locating screen.

NOTE: The backlight automatically comes on for a few seconds at startup, then it defaults to the off setting, even if you have reset it previously.

1-PT CALIBRATION

This display menu allows you to calibrate the receiver using a 1-point calibration procedure. The receiver and transmitter must be turned on and placed on the ground parallel to each other. Use a tape measure to position the receiver so that its inside edge is 10 ft 5 in. (3.13 m) from the center of the transmitter housing.

1. Click the trigger to advance to the 1-point calibration menu.
2. Hold the trigger in while holding the receiver steady through the countdown sequence from 5 to 0.
3. When the counter reaches 0, you will hear three confirmation beeps and will see a checkmark at the bottom of the display to indicate a successful calibration has been conducted.
4. Release the trigger to return to the locating screen.



1-Point Calibration Screen

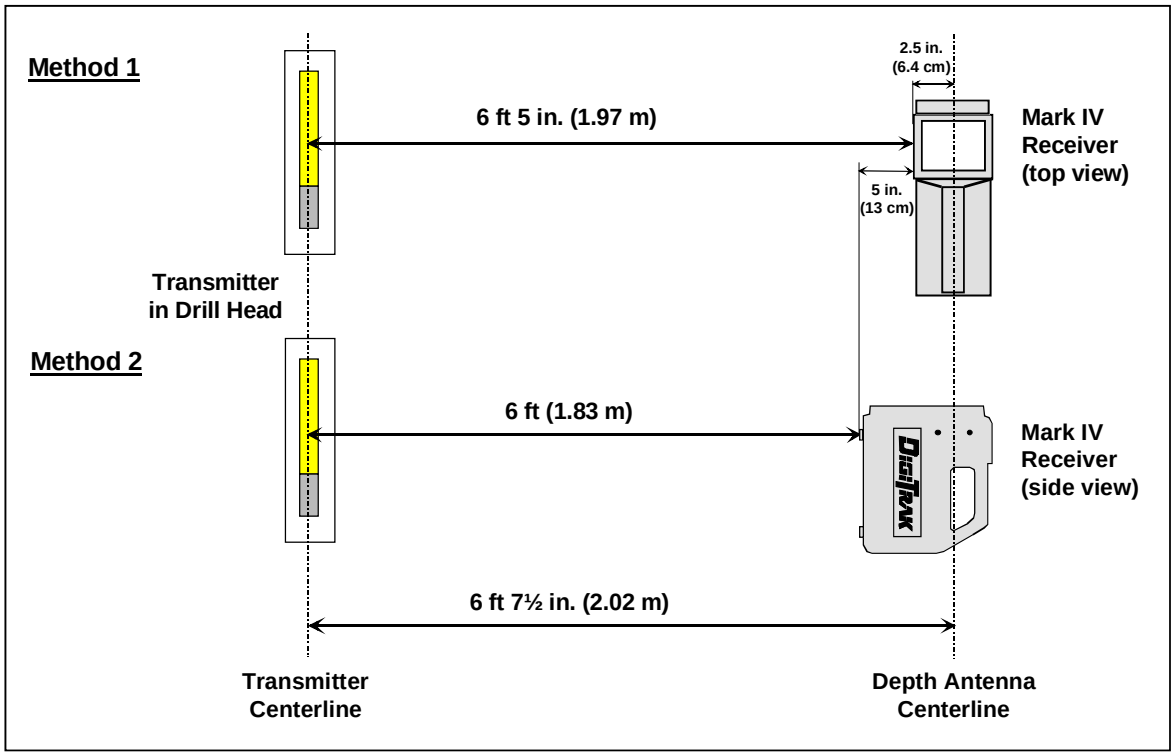
5. You must now verify that a successful calibration was made to ensure that you get accurate depth readings. You can use either of the two methods described below to check the depth (distance) in at least three locations, one of which should be at your intended/target depth. The sketch given below shows precisely how to place the transmitter and the receiver for each method.

Method 1

- Using the tape measure, place the receiver on the ground parallel to the transmitter so that the distance from the centerline of the transmitter to the inside edge of the receiver measures a given amount; in the example shown in the sketch, a distance of 6 ft 5 in. (1.97 m) is used. Due to the position of the depth antennas in the receiver, you must add a 5-in. (13-cm) allowance to the distance you intend to check.
- Pull in the trigger to view the depth display, which should in our example read 6 ft (1.83 m).* Note that the depth shown will be the measured distance minus the 5-in. (13-cm) allowance.
- Repeat the above two steps in at least two more locations.

Method 2

- Using the tape measure, place the receiver on the ground on its side so that the distance from the centerline of the transmitter to the bottom of the receiver measures a given amount; in the example shown in the sketch, a distance of 6 ft (1.83 m) is used.
- Pull in the trigger to view the depth display, which should in our example read 6 ft (1.83 m).* Note that the depth shown will match the measured distance. You do not need to add the 5-in. (13-cm) antenna allowance using this method; however, it can be difficult to view the display for depth readings.
- Repeat the above two steps in at least two more locations.

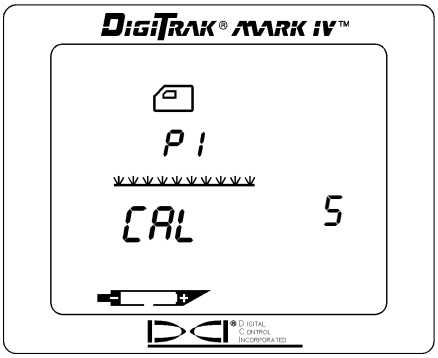


*Depth tolerance is 5%; thus, at a distance of 6 ft (1.83 m), the error tolerance is 3.6 in. (9 cm).

2-PT CALIBRATION

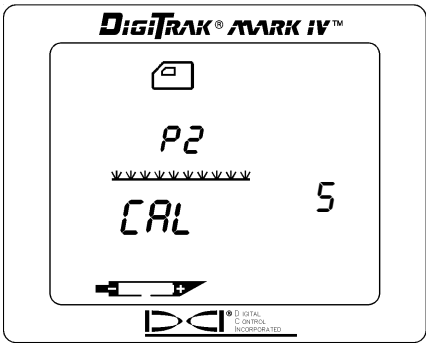
This display menu allows you to calibrate the receiver with the transmitter in the ground using a 2-point calibration procedure. The receiver and transmitter must be turned on, and the receiver must be held directly over the transmitter and about 12 in. (30 cm) above ground. The transmitter's pitch needs to be less than ±20% for the calibration to be accurate. During the 2-point calibration procedure, the receiver must be raised straight up at least 20 in. (51 cm)—be sure to hold the receiver level and in the same plane with the transmitter.

1. Click the trigger to advance to the 2-point calibration menu.



2-Point Calibration Screen – First Point

2. Hold the trigger in while holding the receiver level and steady through the countdown sequence from 5 to 0.
3. When the counter reaches 0, you will hear three confirmation beeps and will see a checkmark at the bottom of the display.
4. Release the trigger, and the display will show the receiver (side view) with P2 on the display and the countdown will be restarted at 5.



2-Point Calibration Screen – Second Point

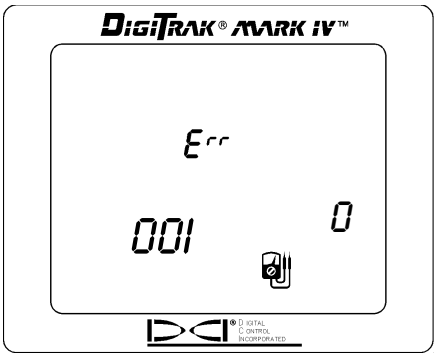
5. Raise the receiver straight up at least 20 in. (51 cm), and then hold the trigger in.
6. When the counter reaches 0, you will hear three confirmation beeps and will see a checkmark at the bottom of the display to indicate a successful calibration has been conducted.
7. Release the trigger to return to the locating screen.
8. The 2-point procedure may need to be completed a few times to get a good calibration.
9. Refer to the *DigiTrak Directional Drilling Locating System Operator's Manual* (Receiver Section, under "Calibrating the Receiver") for instructions on how to verify a proper 2-point calibration.

SELFTEST

This display menu allows you to conduct a self-diagnostic test on the receiver. This test must be conducted in an interference-free area with no active transmitters within range.

1. Click the trigger to advance to the selftest menu.
2. Hold the trigger in through the countdown sequence from 2 to 0, and then release the trigger.
3. When the counter reaches 0, there will be a pause and then you will hear three confirmation beeps and will see a checkmark at the bottom of the display, unless a fault is detected. If a fault is detected, you will see Err displayed along with an error code indicating the nature of the problem (for example, the 001 error code indicates that there is background noise). Before continuing, you must trouble-shoot the problem or retest in a different area.

Selftest Menu Display



Selftest Error Screen

DEPTH UNITS

This display menu allows you to set the Mark IV system to display values (depth and temperature) in either English (inches or ft/in. and °F) or metric (m/cm and °C) units.

1. Click the trigger to advance to the depth units menu. The display will indicate the current setting.
2. Hold the trigger in through the countdown sequence from 3 to 0.
3. When the counter reaches 0, you will hear three confirmation beeps and will see the unit setting change and a checkmark appear at the bottom of the display.
4. Release the trigger to return to the locating screen.

Depth Units Display Menu

PITCH UNITS %

This display menu allows you to set the Mark IV system to display pitch values in either degrees or percent of slope.

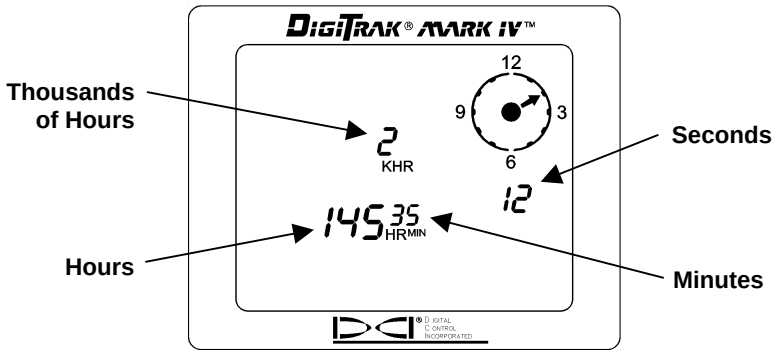
1. Click the trigger to advance to the pitch units menu. The display will indicate the current setting.
2. Hold the trigger in through the countdown sequence from 3 to 0.
3. When the counter reaches 0, you will hear three confirmation beeps and will see the unit setting change and a checkmark appear at the bottom of the display.
4. Release the trigger to return to the locating screen.

Pitch Units Display Menu

HOUR METER

This display menu allows you to view the actual run time for the Mark IV receiver.

1. Click the trigger to advance to the hour meter menu.
2. The hour meter will display the run time in hours, minutes, and seconds, and the hand on the clock will be rotating to count down 5 second increments. (You do not need to hold the trigger in.)
3. The display will return to the locating screen when the trigger is clicked once.



Hour Meter Display

Locating Instructions

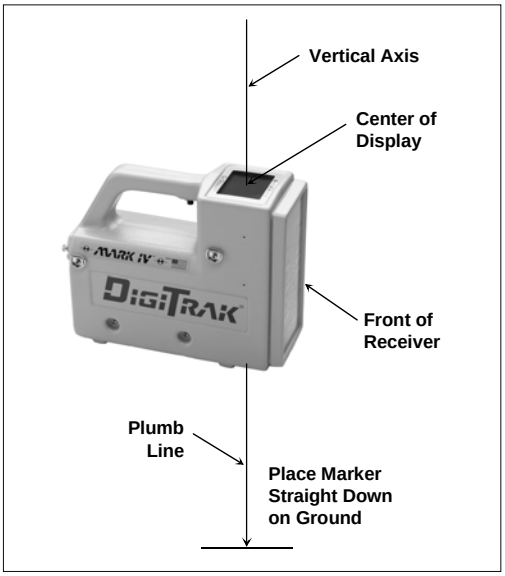
Handling the Receiver

IMPORTANT NOTE: It is critical that you hold the receiver correctly to obtain accurate readings. You must hold the receiver level at all times and maintain a constant height-above-ground distance.

Marking Locate Positions

The front and rear negative locate points (FNLP and RNLP) and the positive locate line (PLL) must be found and accurately marked during the locating procedure. To mark a locate position after you have found it, stand with the receiver level immediately above the locate point. Look down the vertical axis that runs through the center of the display to project a plumb line to the ground. The point where this plumb line hits the ground is the location that you should mark.

HINT: If you mark the FNLP and the RNLP, and then find the PLL, you can determine the exact location of the transmitter/tool. It will be immediately below the point where the line connecting the FNLP and the RNLP intersects the PLL. For complete information on the FNLP, RNLP, and PLL, see the *DigiTrak Directional Drilling Locating System Operator's Manual*.



Plumb Line for Marking Locate Points

Locating the Transmitter

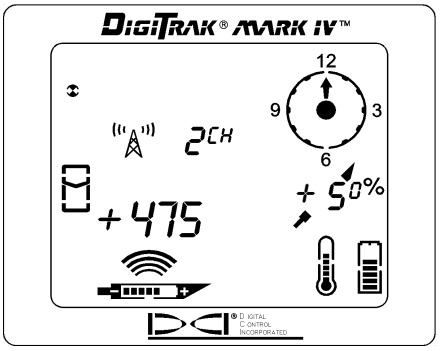
With the DigiTrak Mark IV, you can locate the transmitter/tool *and* its heading while it moves, whether standing in front of it, behind it, *or* toward the side. You can also locate the tool either facing toward or away from the drill rig.

The following technique guides you to the tool while standing out in front of it, facing the drill rig. This is the recommended method for locating. As you continue to drill or as the borepath curves, you may be facing the last marked locate point rather than the drill rig.

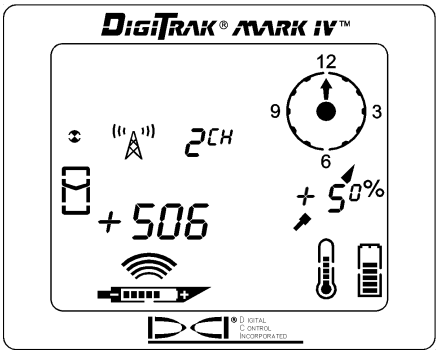
The first position to find is the front negative locate point or FNLP. The FNLP gives you the heading of the tool and the predicted tool depth. The FNLP's distance ahead of the tool is dependent upon the tool's depth and pitch; the deeper the tool, the further in front the FNLP will be. The FNLP is represented as a target ✣ on the receiver's display.

Finding the FNLP

1. Stand out in front of the tool (facing the drill) at a distance approximately 2 times the assumed depth.
2. Hold the trigger in for 1 second and release to lock in the signal, then begin walking toward the drill.
3. As you approach the FNLP, the target appears in the top left corner of the display and the signal strength increases.

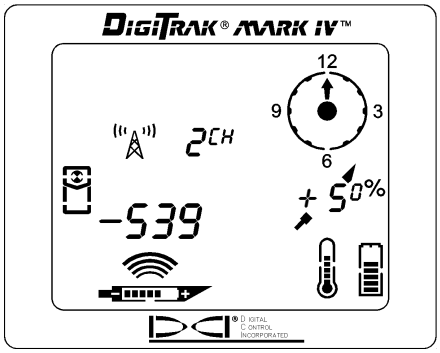


Target in Top Left Corner



Target Moving Toward the Box

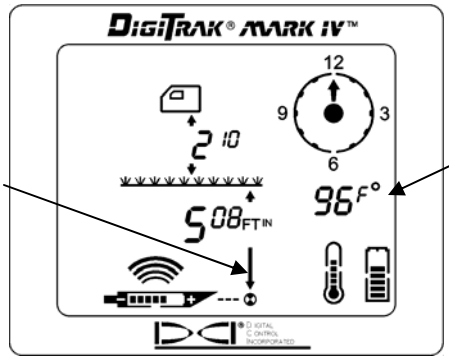
4. Continue to walk forward until the target moves into the tracking icon (box). Note that the "+" sign changes to a "–", like it does with the Mark III system.



Target in the Box

5. Turn the receiver 90° to the tool's direction, and again center the target in the box by moving the receiver forward or backward as needed. This is the FNLP, which is where the tool will end up if it does not get a steering command.
6. With the target in the box, hold the trigger in for at least 1 second to lock in the signal. During this time, you will see the predicted depth (with an arrow pointing down to a target ahead of the transmitter) and the ultrasonic height. The predicted depth is the depth the tool will be at when it reaches this point (the FNLP) if you do not give a steering command.

Arrow pointing to target indicates the target is in the box and the receiver is above the FNLP or the RNLP. If there is not an arrow, then the reading is the slant distance to the transmitter.



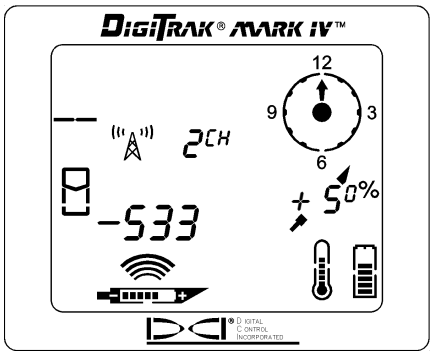
Transmitter temperature replaces pitch reading when trigger is held in.

Predicted Depth Screen

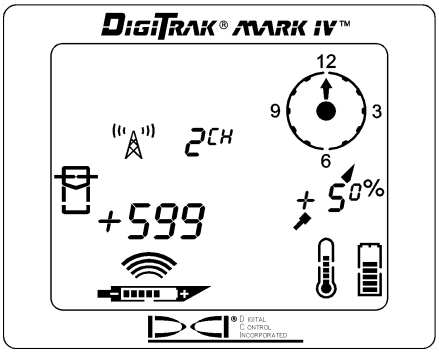
7. Mark the location directly below the display screen as the FNLP.
8. Release the trigger to return to the locating screen.

Finding the Tool and the PLL

1. At the FNLP, turn again to face the tool (and drill) and walk forward toward the last rod locate point.
2. Note that the PLL appears in the top left of the display.
3. Walk forward and the PLL moves closer to the box.
4. Center the PLL in the box. Note that the "–" sign changes to a "+" sign, like it does with the Mark III system.



PLL Moving Toward the Box

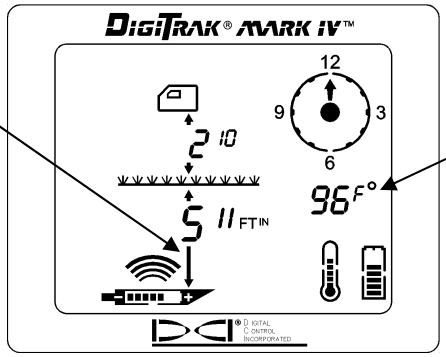


Line in the Box

5. Hold the trigger in to see the depth display. Note the ultrasonic setting to verify a correct height-above-ground measurement.

NOTE: The arrow that appears below the depth measurement and that points to the transmitter also appears on the remote display when a depth reading is taken.

Arrow pointing to tool head indicates the line is in the box and the receiver is above the transmitter or the PLL. If there is not an arrow, then the reading is the slant distance to the transmitter.



Transmitter temperature replaces pitch reading when trigger is held in.

Depth Screen

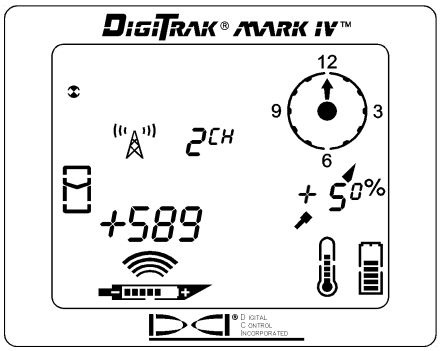
6. Mark this location as the PLL. You should now be standing above the tool.
7. Release the trigger to return to the locating screen.

Confirmation of Exact Heading when Tool Deflects Left or Right

Like the FNLP, there is a point behind the transmitter called the rear negative locate point or RNLP. When the FNLP and RNLP are connected, they make a line that represents the transmitter's heading. Where this line intersects the PLL is the position of the tool. Using the locate points and the PLL to find the tool is more reliable and efficient than using the peak signal. The RNLP is represented as a target on the receiver's display.

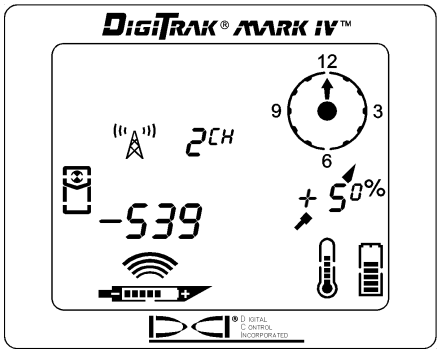
Finding the RNLP

1. While standing above the tool still facing the drill, continue walking toward the drill; the target will appear in the top left corner of the display and the signal strength will decrease.



Target in Top Left Corner

2. Walk forward until the target moves into the box. Note that the "+" sign changes to a "–" sign, like it does with the Mark III system.



Target in the Box

3. Turn the receiver 90° to the tool's direction and again put the target in the box by moving the receiver forward or backward as needed.
4. Mark this location as the RNLP.
5. Connect the RNLP to the FNLP by a line. This line represents the transmitter/tool's heading.

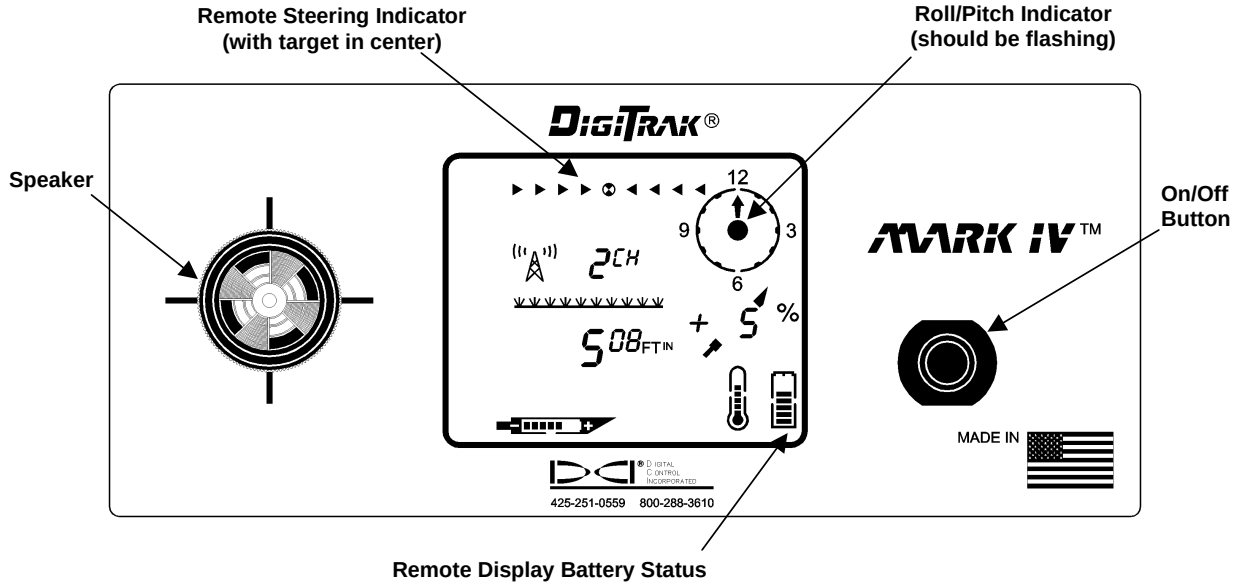
NOTE: If you hold the trigger in at the RNLP, you will see a predicted depth reading. This depth is only valid at the FNLP and must be ignored at the RNLP. The receiver cannot discern between the RNLP and the FNLP.

Mark IV Remote Display

The Mark IV remote display screen is configured in the same way as that on the receiver, and it uses the same display symbols. The remote display, however, has a main information screen and then only four menu options (power on/off, telemetry channel selection, backlight on/off, and hour meter). The main information screen is described below, and then the menu options are explained. Specific information on remote steering with the Mark IV remote display and its use with a cable transmitter and with a DataLog mapping system is also included.

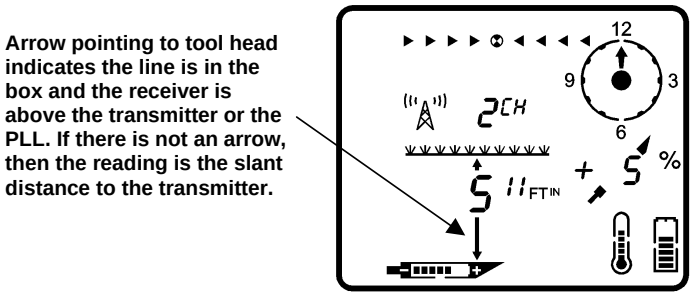
Main Information Screen

The main information screen shown below is displayed when you turn on the Mark IV remote display unit. The on/off button on the remote works similar to the trigger on the receiver. The speaker on the remote warns the operator if the transmitter's temperature is increasing—temperature increases are accompanied by tones from the speaker to indicate that appropriate and immediate attention is required. The speaker also emits tones during the DataLog function when a DataLog reading is received.



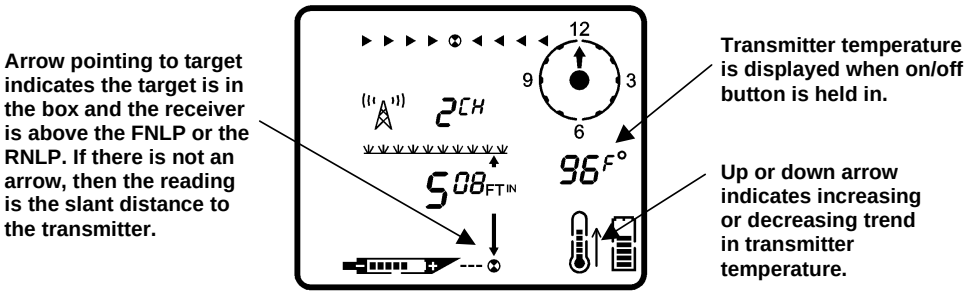
Front of Mark IV Remote Display

The main information screen changes when the receiver is over the transmitter or the positive locate line (PLL), as shown below. The depth reading has an arrow below it pointing to the transmitter to indicate that the reading is the actual depth of the transmitter or PLL rather than the slant distance. If there is not an arrow pointing down from the depth reading (as shown in the above graphic), then the distance is the slant distance to the transmitter rather than the actual depth.



Depth Reading When Receiver Is Above Transmitter or PLL

By holding in the on/off button for 2 seconds or more, the transmitter temperature is displayed in place of the pitch information, as shown below. Note that the arrow below the depth reading is pointing to a target in front of the transmitter—this indicates that the receiver has the target in the box and is above the front or rear negative locate point (FNLP or RNLP). If the receiver is over the FNLP, then the reading is the predicted depth. If there are no arrows with the depth reading, then the distance is the slant distance to the transmitter rather than the actual depth.



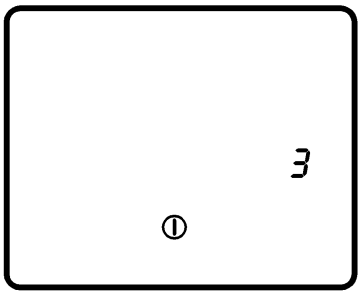
Predicted Depth Reading When Receiver Is Above FNLP or RNLP with On/Off Button Held in to Display Transmitter Temperature

Menu Options

The menu options are accessed in the same way as on the receiver. Click the on/off button to get to the menu screens, and then hold the button in for the countdown.

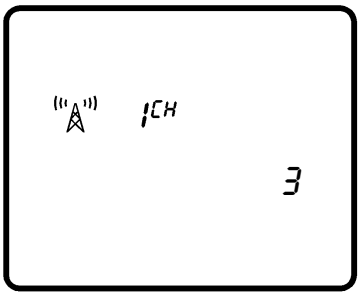
Power On/Off

With the power on/off menu displayed, as shown in the picture to the right, hold the button in for the countdown sequence from 3 to 0 to turn the unit off.



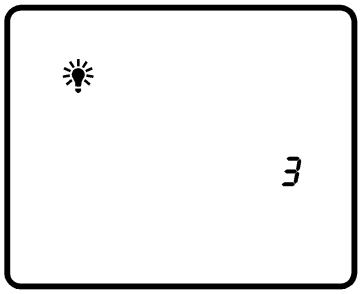
Telemetry Channel Selections

The telemetry channel menu, shown in the picture on the right, allows you to change the telemetry channel setting. Hold the button in to cycle through the four channel options (1, 2, 3, 4), and release when the desired setting is selected.



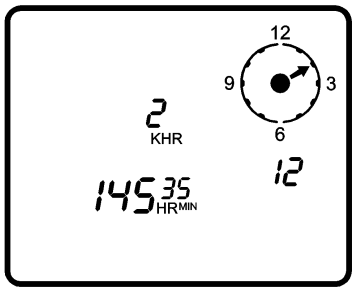
Backlight On/Off

At the backlight on/off menu option, shown in the picture on the right, hold the on/off button in to turn the display backlight on or off.



Hour Meter

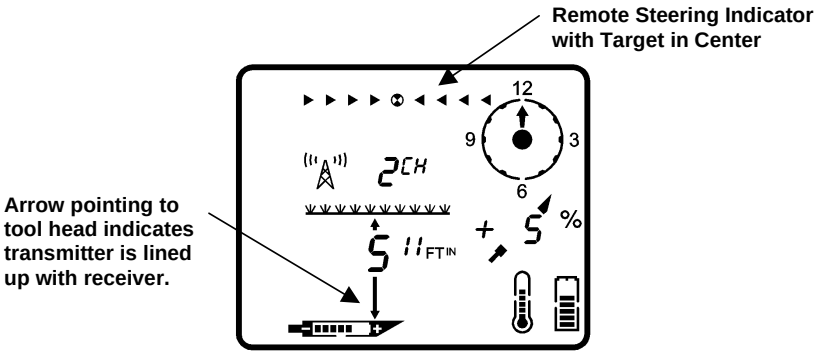
The hour meter menu option displays the amount of time that the remote display unit has been running (turned on). In the picture on the right, the hour meter shows that the remote display unit has been running for 2,145 hours, 35 minutes, and 12 seconds. Click the on/off button once to exit the hour meter and return to the main information screen.



Remote Steering Instructions

Instructions for using the Mark IV system for remote steering are given below. Please refer first to "Remote Steering" under the Remote Display section in the *DigiTrak Directional Drilling Locating System Operator's Manual* for instructions on how to set up the equipment.

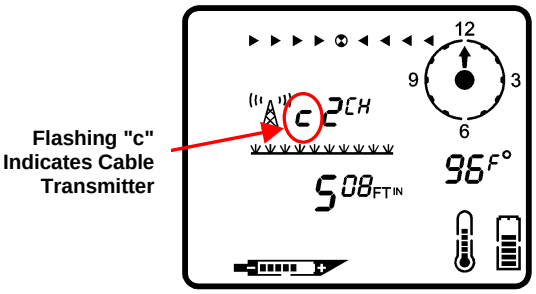
Once the transmitter is lined up with the receiver, the arrow will appear below the depth reading and, when perfectly aligned, the target symbol in the center of the remote steering indicator will blink. If the tool gets off course, then the arrows to the left or right will start flashing, depending on the direction in which it has gone off course. The further the tool goes off course, then the further to the left or right of the target symbol the flashing arrows will be. For example, the arrow to the left of the target symbol will start blinking if the tool deviates to the left, and as it goes further to the left, then the arrows further to the left of the target symbol will be flashing.



Display During Remote Steering When Transmitter is Aligned with Receiver

Cable System

When using the cable transmitter, a "c" will appear next to the channel setting, indicating that a cable transmitter is being used to send the data to the remote display. The "c" will flash each time a pitch/roll update is received from the cable transmitter.



Remote Display when Cable Transmitter Is Used

NOTE: The flashing "c" may appear when not using the cable transmitter if the remote display receives a very strong signal from a battery-operated transmitter within very close range (5 ft or 1.5 m).

DataLog Function

The DigiTrak Mark IV remote display unit works differently when using the DataLog function than earlier DigiTrak remote displays. The correct procedure for taking a DataLog reading using the Mark IV system is given below. Please also refer to the *DataLog Operator's Manual*.

1. Press the "Write" button on the DataLog module to place the unit in standby mode, which is indicated by a flashing LCD on the DataLog module.
2. At the Mark IV receiver, record a DataLog reading (see instructions on page 8).
3. The remote display will sound three confirmation beeps when it receives the DataLog information, and the LCD count on the DataLog module will be incremented by one.

3-4000-00-C