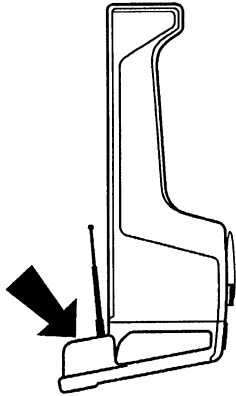


SERVICE

SERIAL NUMBER RECORD

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



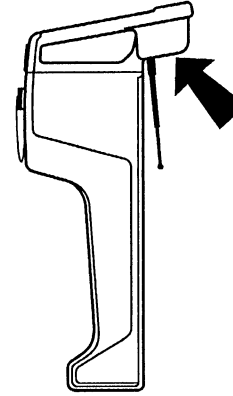
ss1026.tif

	Date of manufacture:
	Date of purchase:
	Tracker serial number:
	Beacon model & serial number
	Beacon model & serial number
	Beacon model & serial number
	Beacon model & serial number

SERVICE

SERIAL NUMBER RECORD

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



ss1026.tif

Date of manufacture:	
Date of purchase:	
Tracker serial number:	
Beacon model & serial number	
Beacon model & serial number	
Beacon model & serial number	
Beacon model & serial number	

SERVICE PROCEDURE

If your equipment does not operate properly, see "General Troubleshooting" section later in this manual. If the equipment still does not operate properly, notify your Ditch Witch dealer.

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

Return damaged unit to dealer for inspection and Warranty consideration.

RESOURCES

Ditch Witch Training Center

At the Ditch Witch training center, dealers, customers, and operators review theory and operation and gain hands-on experience. During Subsite locating seminars, Ditch Witch training personnel cover the theory and technique behind locating underground utilities. During directional boring seminars, training personnel cover the entire boring procedure including the use of Subsite locating equipment. For information about the training seminar that's right for you, contact your Ditch Witch dealer.

SERVICE PROCEDURE

If your equipment does not operate properly, see "General Troubleshooting" section later in this manual. If the equipment still does not operate properly, notify your Ditch Witch dealer.

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

Return damaged unit to dealer for inspection and Warranty consideration.

RESOURCES

Ditch Witch Training Center

At the Ditch Witch training center, dealers, customers, and operators review theory and operation and gain hands-on experience. During Subsite locating seminars, Ditch Witch training personnel cover the theory and technique behind locating underground utilities. During directional boring seminars, training personnel cover the entire boring procedure including the use of Subsite locating equipment. For information about the training seminar that's right for you, contact your Ditch Witch dealer.

FOREWORD

This manual is an important part of your equipment. It provides safety information and operation instructions to help you use and maintain your Ditch Witch 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, write to the following address:

The Charles Machine Works, Inc.
PO Box 66
Perry, OK 73077-0066
USA

The descriptions and specifications in this manual are subject to change. The Charles Machine Works, Inc. reserves the right to improve equipment. Some product improvements may have taken place after this manual was published. For the latest information on Ditch Witch equipment, see your Ditch Witch dealer.

Thank you for buying and using Ditch Witch equipment.

FOREWORD

This manual is an important part of your equipment. It provides safety information and operation instructions to help you use and maintain your Ditch Witch 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, write to the following address:

The Charles Machine Works, Inc.
PO Box 66
Perry, OK 73077-0066
USA

The descriptions and specifications in this manual are subject to change. The Charles Machine Works, Inc. reserves the right to improve equipment. Some product improvements may have taken place after this manual was published. For the latest information on Ditch Witch equipment, see your Ditch Witch dealer.

Thank you for buying and using Ditch Witch equipment.


Operator's Manual

66TKR


Issue No. 1/OP-6/95

Part Number 754-033

Copyright 1995,
by The Charles Machine Works, Inc.,
Perry, Oklahoma, 73077-0066

 , Ditch Witch, AutoCrowd, Jet Trac, Modularmatic, Sidekick, Perma-Soil, ProTech, Roto Witch, and Subsite are registered trademarks of The Charles Machine Works, Inc.

Pierce Airrow is a registered trademark of Oklahoma Airrow, Inc.

 , Ditch Witch, AutoCrowd, Jet Trac, Modularmatic, Sidekick, Perma-Soil, ProTech, Roto Witch, and Subsite are registered trademarks of The Charles Machine Works, Inc.
Pierce Airrow is a registered trademark of Oklahoma Airrow, Inc.

Copyright 1995,
by The Charles Machine Works, Inc.,
Perry, Oklahoma, 73077-0066

Operator's Manual
66TKR
Issue No. 1/OP-6/95
Part Number 754-033

CONTENTS

SERVICE 1.1
 Serial Number Record 1.1
 Service Procedure 1.2
 Resources 1.2

FOREWORD 2.1

KEYPAD AND DISPLAY 4.1
 Buttons 4.2
 Symbols 4.3
 Display 4.4

SAFETY 5.1
 Classifications 5.2
 Alerts 5.3

SET-UP 6.1
 Tracker 6.1
 Beacons 6.4
 System Calibration 6.7

SERVICE 1.1
 Serial Number Record 1.1
 Service Procedure 1.2
 Resources 1.2

FOREWORD 2.1

KEYPAD AND DISPLAY 4.1
 Buttons 4.2
 Symbols 4.3
 Display 4.4

SAFETY 5.1
 Classifications 5.2
 Alerts 5.3

SET-UP 6.1
 Tracker 6.1
 Beacons 6.4
 System Calibration 6.7

CONTENTS

OPERATION 7.1
 Check For Hazards 7.1
 Locate Beacon 7.2

MAINTENANCE 8.1
 General Care 8.1
 General Troubleshooting 8.2

SPECIFICATIONS 9.1

OPERATION 7.1
 Check For Hazards 7.1
 Locate Beacon 7.2

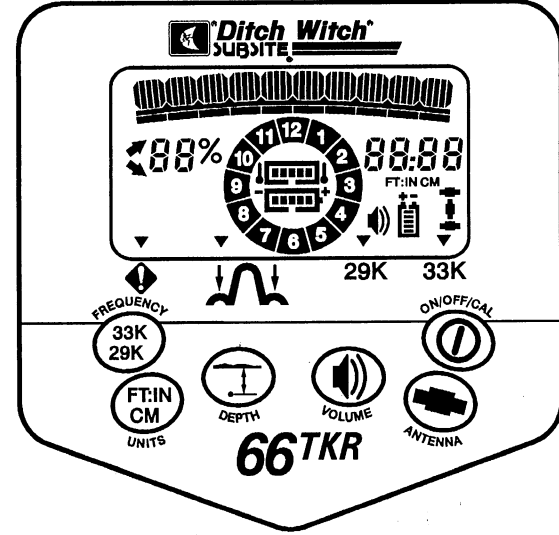
MAINTENANCE 8.1
 General Care 8.1
 General Troubleshooting 8.2

SPECIFICATIONS 9.1

KEYPAD AND DISPLAY

The Subsite Discovery System uses a tracker and beacon to locate a boring tool head. The 66^{TKR} tracker can track beacons and calculate depths to 100 ft (30.5 m). Actual performance depends on beacon and housing used.

The 66^{TKR} remote transmitter option sends depth, roll, pitch, temperature, and battery status to the 80D remote display. Once installed, the transmitter turns on and off with the tracker.



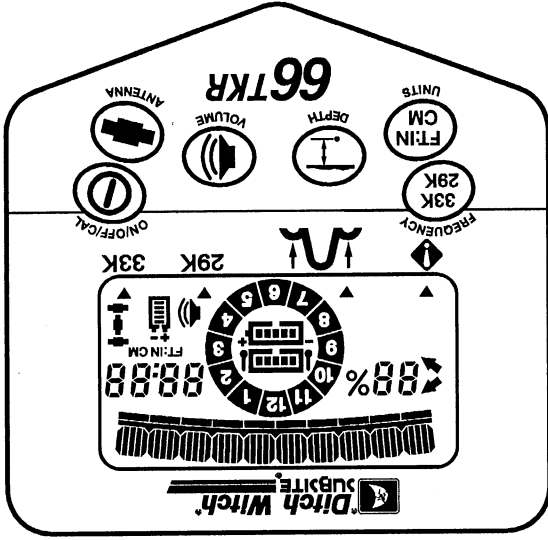
ss1027.tif

Each of the six buttons on the keypad have one function to make operation simple and accurate. The simple, easy to use display continuously shows beacon roll, pitch, temperature, and battery information. Four symbols below display help you process tracker information.

A brief description of the buttons and symbols on the 66^{TKR} and units of measurement follows.

Each of the six buttons on the keypad have one function to make operation simple and accurate. The simple, easy to use display continuously shows beacon roll, pitch, temperature, and battery information. Four symbols below display help you process tracker information. A brief description of the buttons and symbols on the 66^{TKR} and units of measurement follows.

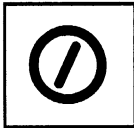
ss1027.tif



The 66^{TKR} remote transmitter option sends depth, roll, pitch, temperature, and battery status to the 80D remote display. Once installed, the transmitter turns on and off with the tracker. The Subsite Discovery System uses a tracker and beacon to locate a boring tool head. The 66^{TKR} tracker can track beacons and calculate depths to 100 ft (30.5 m). Actual performance depends on beacon and housing used.

KEYPAD AND DISPLAY

BUTTONS



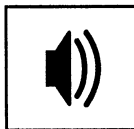
si1000.tif

On/Off/Cal - turns unit on and off. When pressed with Depth button, unit enters into calibration mode. See "Set-up" for further information.



si1022.tif

Frequency - overrides automatic frequency selection feature.



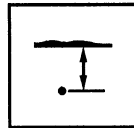
si1019.tif

Volume - changes volume between off, low, medium, and high settings.



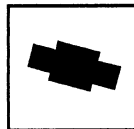
si1021.tif

Units - changes depth units between feet:inches, inches, and centimeters.



si1020.tif

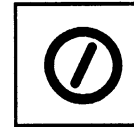
Depth - sets gain for a signal strength of approximately 50% when tapped and estimates depth of properly located beacon. Performs a ghost check when held down for two seconds.



si1018.tif

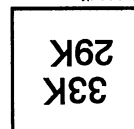
Antenna - changes between single, twin, or null antenna.

BUTTONS



si1000.tif

On/Off/Cal - turns unit on and off. When pressed with Depth button, unit enters into calibration mode. See "Set-up" for further information.



si1022.tif

Frequency - overrides automatic frequency selection feature.



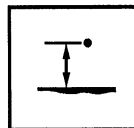
si1019.tif

Volume - changes volume between off, low, medium, and high settings.



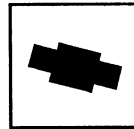
si1021.tif

Units - changes depth units between feet:inches, inches, and centimeters.



si1020.tif

Depth - sets gain for a signal strength of approximately 50% when tapped and estimates depth of properly located beacon. Performs a ghost check when held down for two seconds.



si1018.tif

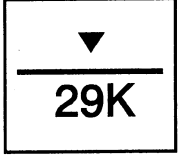
Antenna - changes between single, twin, or null antenna.

SYMBOLS

An arrow appears on the display over the symbols to indicate setting.

Frequency

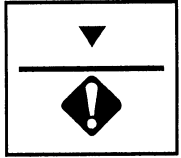
Tracker can detect two beacon frequencies: 33 or 29K.



ss1028.tif

Critical Error

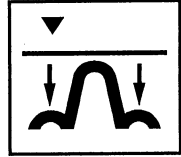
Signals error in tracker operation. See "Maintenance" section for further information.



ss1029.tif

Ghost

Indicates beacon has not been properly located when Depth button is pressed and held.



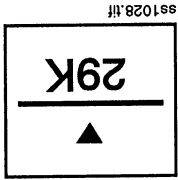
ss1030.tif

SYMBOLS

An arrow appears on the display over the symbols to indicate setting.

Frequency

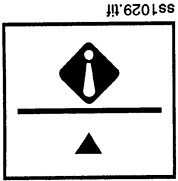
Tracker can detect two beacon frequencies: 33 or 29K.



ss1028.tif

Critical Error

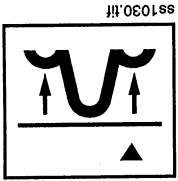
Signals error in tracker operation. See "Maintenance" section for further information.



ss1029.tif

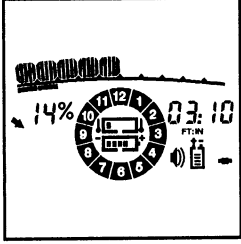
Ghost

Indicates beacon has not been properly located when Depth button is pressed and held.



ss1030.tif

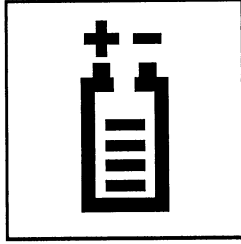
DISPLAY



ss1031.tif

Depth

Tap button to set gain for a signal strength of approximately 50% and to show distance to beacon. Hold down button to check that beacon has been properly located. If ghost signal is located, arrow above ghost will light. If beacon is properly located, all roll segments will light.



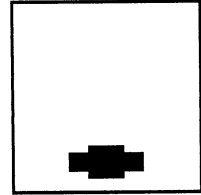
ss1032.tif

Tracker Battery Level

Tracker battery level is shown graphically. The display shows battery status in 20% steps. When tracker battery drops below 10%, tracker battery symbol outline flashes. At this point, tracker can operate for about 15 minutes before second level battery warning occurs. At this warning, replace tracker batteries.

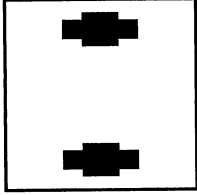
Antenna

Indicates whether the tracker is in single, twin, or null antenna mode.



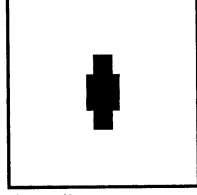
si1011.tif

Single



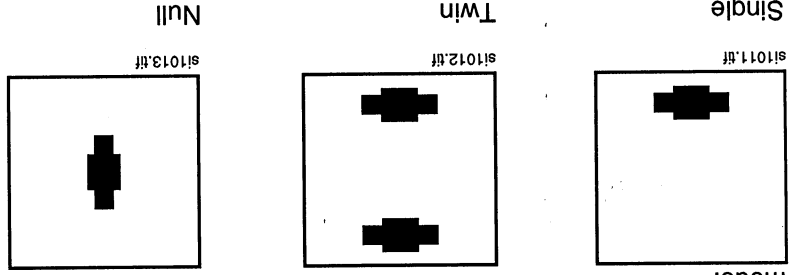
si1012.tif

Twin



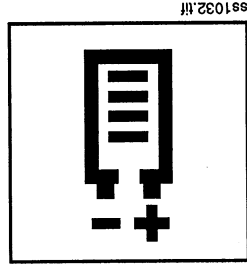
si1013.tif

Null



Indicates whether the tracker is in single, twin, or null antenna mode.
Antenna

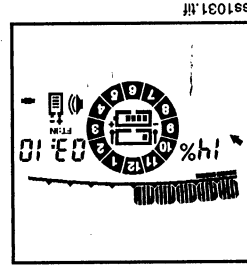
Tracker battery level is shown graphically. The display shows battery status in 20% steps. When tracker battery drops below 10%, tracker battery symbol outline flashes. At this point, tracker can operate for about 15 minutes before second level battery warning occurs. At this warning, replace tracker batteries.



ss1032.tif

Tracker Battery Level

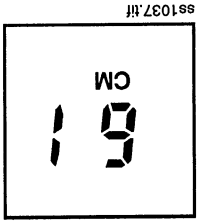
Tap button to set gain for a signal strength of approximately 50% and to show distance to beacon. Hold down button to check that beacon has been properly located. If ghost signal is located, arrow above ghost will light. If beacon is properly located, all roll segments will light.



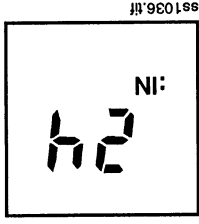
ss1031.tif

Depth

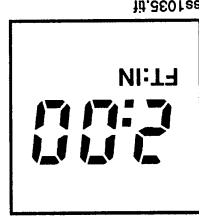
DISPLAY



ss1037.tif

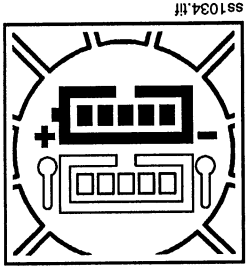


ss1036.tif



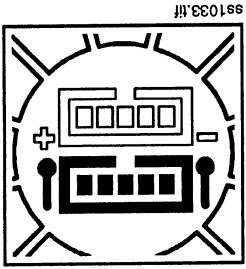
ss1035.tif

Depth Units
 Depth can be measured in three ways: feet:inches, inches, and centimeters. To change between types of measurement, press Units button.



ss1034.tif

Beacon Battery Level
 Beacon battery level is continuously shown in 20% steps. When beacon battery is below 10%, beacon battery outline will flash.

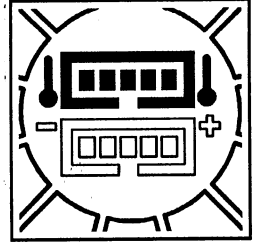


ss1033.tif

Beacon Temperature
 Temperature is continuously shown in 20% steps. At temperatures greater than 100%, beacon temperature outline will flash. Operating beacon at temperatures above 100% will cause beacon overheating and damage.

Beacon Temperature

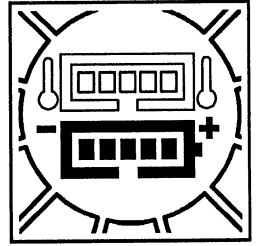
Temperature is continuously shown in 20% steps. At temperatures greater than 100%, beacon temperature outline will flash. Operating beacon at temperatures above 100% will cause beacon overheating and damage.



ss1033.tif

Beacon Battery Level

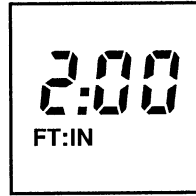
Beacon battery level is continuously shown in 20% steps. When beacon battery is below 10%, beacon battery outline will flash.



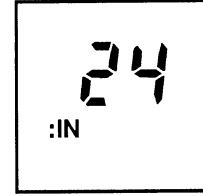
ss1034.tif

Depth Units

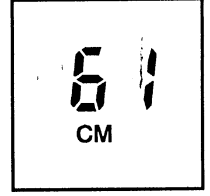
Depth can be measured in three ways: feet:inches, inches, and centimeters. To change between types of measurement, press Units button.



ss1035.tif



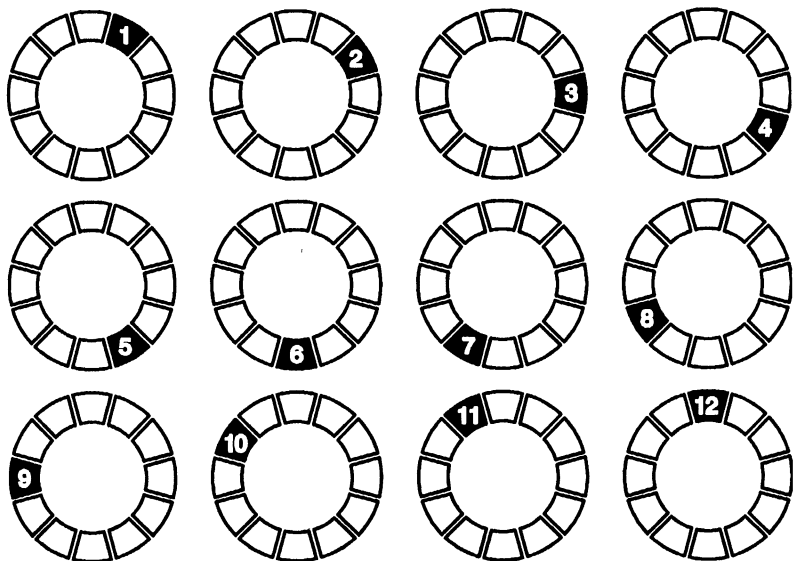
ss1036.tif



ss1037.tif

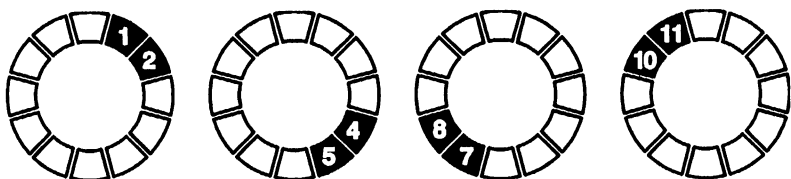
Beacon Roll

Beacon roll is shown in a twelve segment roll indicator for all beacons. The sections of the roll indicator light to indicate beacon roll position. Most beacons send 12-position roll as shown below:

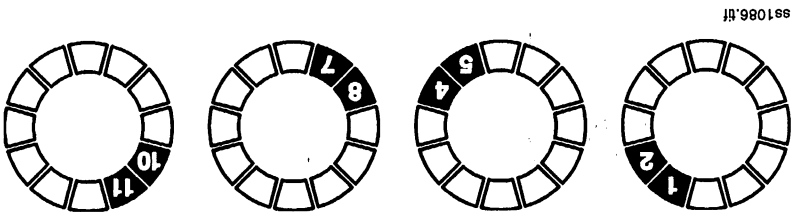


ss1038.tif

The 80B and 82B beacons send 16 position roll and will show additional roll positions as follows.

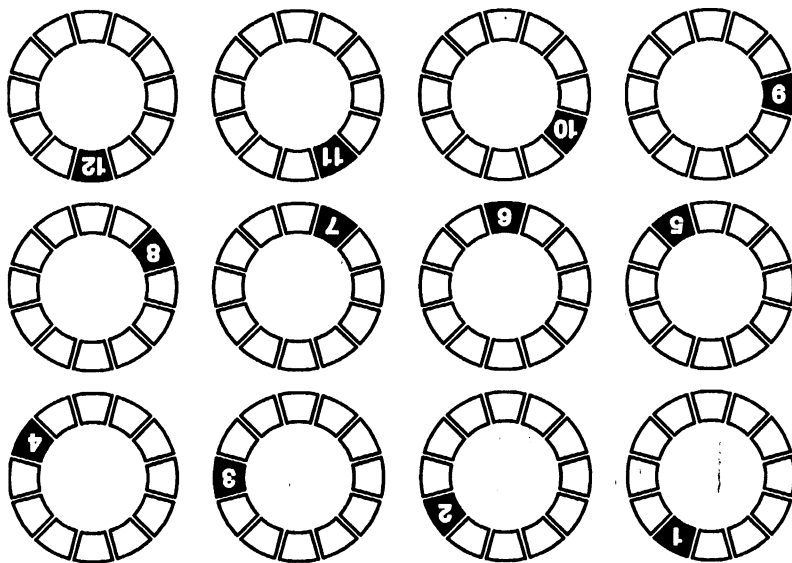


ss1086.tif



ss1086.tif

The 80B and 82B beacons send 16 position roll and will show additional roll positions as follows.




ss1038.tif

Beacon roll is shown in a twelve segment roll indicator for all beacons. The sections of the roll indicator light to indicate beacon roll position. Most beacons send 12-position roll as shown below:

Beacon Roll


SAFETY

 This safety alert symbol appears in this book. When you see this sign, carefully read and follow what it says. **YOUR SAFETY IS AT STAKE.**

Follow these guidelines before operating equipment:

- Read and follow all safety precautions.
- Do not operate equipment unless you have completed proper training and read the operator's manual.
- Use equipment only as directed.
- Wear personal protective gear.
- Contact your local One-Call or utility company. Have all underground lines and cables located and marked before boring.
- Check that equipment is in good condition.
- Contact your Ditch Witch dealer if you have any question about operation, maintenance, or equipment use.

SAFETY


 This safety alert symbol appears in this book. When you see this sign, carefully read and follow what it says. **YOUR SAFETY IS AT STAKE.**


Follow these guidelines before operating equipment:


- Read and follow all safety precautions.
- Do not operate equipment unless you have completed proper training and read the operator's manual.
- Use equipment only as directed.
- Wear personal protective gear.
- Contact your local One-Call or utility company. Have all underground lines and cables located and marked before boring.
- Check that equipment is in good condition.
- Contact your Ditch Witch dealer if you have any question about operation, maintenance, or equipment use.

CLASSIFICATIONS

You will see the following safety symbols:

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

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

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


In this book, you should look for two other words: **NOTICE** and **IMPORTANT**.


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


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

CLASSIFICATIONS

You will see the following safety symbols:

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

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

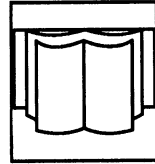
 **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

In this book, you should look for two other words: **NOTICE** and **IMPORTANT**.

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

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

ALERTS



pages.tif

WARNING

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

NOTICE: If depth and location are critical, confirm by hand digging.



phone.tif

WARNING

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



exclaim.tif

WARNING

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



exclaim.tif

WARNING

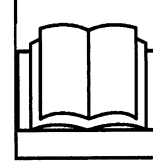
Moving traffic - hazardous situation. Death or serious injury could result. Avoid moving vehicles, wear high visibility clothing, post appropriate warning signs.



phone.tif

WARNING

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



pages.tif

WARNING

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

NOTICE: If depth and location are critical, confirm by hand digging.

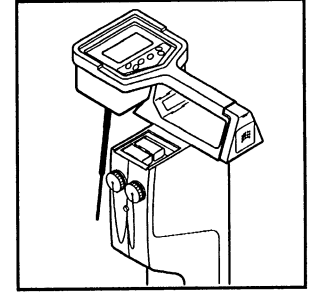
SET-UP

Before leaving for jobsite, check that the tracker and beacon are both operating properly and have enough battery power to complete the job.

TRACKER

Install 9V Batteries

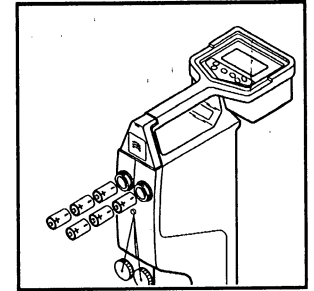
1. Rotate display housing to reveal battery compartment cover.
2. Slide cover off.
3. Remove old batteries from battery compartment.
4. Insert two 9V alkaline batteries into battery compartment.
5. Replace battery compartment cover.
6. Rotate display housing back to its original position.



ss1039.tif

Install 1.5V Batteries

1. Unscrew both battery caps.
2. Remove old C-cells.
3. Install 6 C-cells (3 each side) with negative end in first.
4. Screw on battery caps.



ss1040.tif

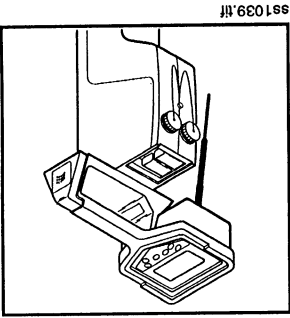
1. Unscrew both battery caps.
2. Remove old C-cells.
3. Install 6 C-cells (3 each side) with negative end in first.
4. Screw on battery caps.

Install 1.5V Batteries

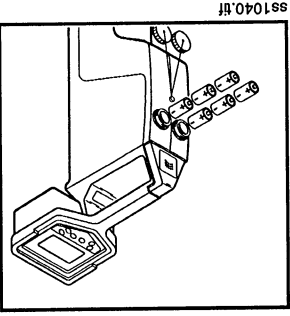
1. Rotate display housing to reveal battery compartment cover.
2. Slide cover off.
3. Remove old batteries from battery compartment.
4. Insert two 9V alkaline batteries into battery compartment.
5. Replace battery compartment cover.
6. Rotate display housing back to its original position.

Install 9V Batteries

TRACKER



ss1039.tif



ss1040.tif

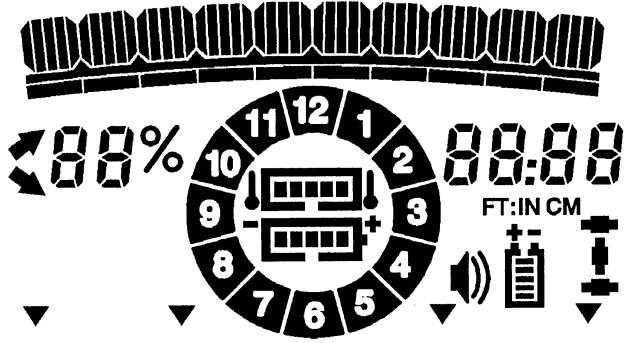
Before leaving for jobsite, check that the tracker and beacon are both operating properly and have enough battery power to complete the job.

SET-UP

Check Operation

1. Press On/Off/Cal key.

A tone will sound, all segments will light briefly, and tracker will scan for an active beacon.



ss1041.tif

The tracker stores the current frequency, antenna, depth units, volume level, and last depth calibration in permanent memory when turned off. Tracker saves these settings even when batteries are removed, so display will vary.

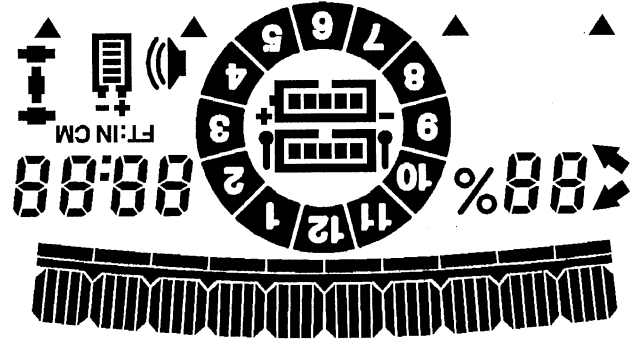
2. Check tracker battery status.

- 5 segments indicate full power
- flashing battery status indicator or only 1 or 2 segments shown indicates C cell batteries need to be replaced
- "-9V-" in display indicates two 9V batteries need to be replaced

Check Operation

1. Press On/Off/Cal key.

A tone will sound, all segments will light briefly, and tracker will scan for an active beacon.






ss1041.tif

The tracker stores the current frequency, antenna, depth units, volume level, and last depth calibration in permanent memory when turned off. Tracker saves these settings even when batteries are removed, so display will vary.

2. Check tracker battery status.




- 5 segments indicate full power
- flashing battery status indicator or only 1 or 2 segments shown indicates C cell batteries need to be replaced
- "-9V-" in display indicates two 9V batteries need to be replaced

- Set volume to desired level by pressing the Volume button. Tracker has four volume settings: low, medium, high, and off. Volume level appears in the display as shown in table.

 Low <small>ss1054.tif</small>	 High <small>ss1056.tif</small>
 Medium <small>ss1055.tif</small>	Off

- Press on/off/cal key.

- Press on/off/cal key.

Off	 Medium <small>ss1055.tif</small>
High  <small>ss1056.tif</small>	 Low <small>ss1054.tif</small>

- Set volume to desired level by pressing the Volume button. Tracker has four volume settings: low, medium, high, and off. Volume level appears in the display as shown in table.

BEACONS

Beacons are battery operated transmitters used for tracking trenchless boring tools, or locating and tracing non-metallic pipes. There are two types of beacons: directional and non-directional.

Directional beacons can be installed in directional boring tools to track bore progress, to measure boring tool depth, and to indicate tool face roll angle and pitch (% grade) for making steering corrections.

Non-directional beacons can be installed in boring tools to track bore progress and to measure boring tool depth. They can also be placed in a non-metallic pipe to trace its path, locate blockages, and measure depth.

Choose Correct Beacon

The beacons that can be used with the 66^{TKR} are shown below. Choose the beacon best suited to jobsite demands.

Beacon	Freq	Battery	Features available					
			Roll Positions	Temp	Battery Status	Pitch	Sleep	Max. Depth
SBR**	33 kHz	PX28L	12	Yes	Yes	No	Yes	15 ft
BI**	33 kHz	4 AAA	None	No	No	No	No	15 ft
10B**	29 kHz	AAA	None	No	No	No	No	10 ft
80B**	29 kHz	Custom	16	No	No	No	Yes	10 ft
83B**	29 kHz	Custom	12	No	No	No	Yes	10 ft
84BRP	29 kHz	2 C	12	Yes	Yes	Yes	Yes	25 ft
84BRPH	29 kHz	2 C	12	Yes	Yes	Yes	Yes	35 ft
85BRP	29 kHz	2 C	12	Yes	Yes	Yes	Yes	35 ft

** These beacons have an unregulated power output so signal strength changes as battery discharges. To ensure depth accuracy, calibrate tracker regularly during the bore. Use these beacons only when bore is less than 15 ft (4.8 m) deep.

Beacon	Freq	Battery	Features available					
			Roll Positions	Temp	Battery Status	Pitch	Sleep	Max. Depth
SBR**	33 kHz	PX28L	12	Yes	Yes	No	Yes	15 ft
BI**	33 kHz	4 AAA	None	No	No	No	No	15 ft
10B**	29 kHz	AAA	None	No	No	No	No	10 ft
80B**	29 kHz	Custom	16	No	No	No	Yes	10 ft
83B**	29 kHz	Custom	12	No	No	No	Yes	10 ft
84BRP	29 kHz	2 C	12	Yes	Yes	Yes	Yes	25 ft
84BRPH	29 kHz	2 C	12	Yes	Yes	Yes	Yes	35 ft
85BRP	29 kHz	2 C	12	Yes	Yes	Yes	Yes	35 ft

The beacons that can be used with the 66^{TKR} are shown below. Choose the beacon best suited to jobsite demands.

Choose Correct Beacon

Non-directional beacons can be installed in boring tools to track bore progress and to measure boring tool depth. They can also be placed in a non-metallic pipe to trace its path, locate

blockages, and measure depth. Directional beacons can be installed in directional boring tools to track bore progress, to measure boring tool depth, and to indicate tool face roll angle and pitch (% grade) for making steering corrections.

Directional beacons can be installed in directional boring tools to track bore progress, to measure boring tool depth, and to indicate tool face roll angle and pitch (% grade) for making steering corrections.

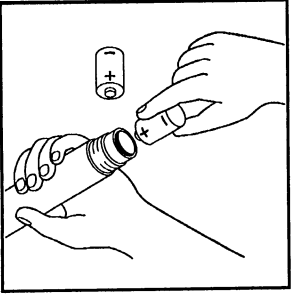
BEACONS

Beacons are battery operated transmitters used for tracking trenchless boring tools, or locating and tracing non-metallic pipes. There are two types of beacons: directional and non-directional.

Install Batteries

To install batteries in most beacons:

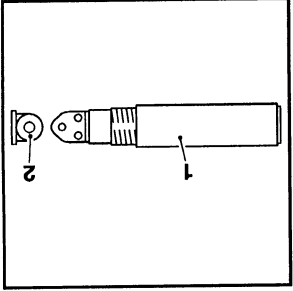
1. Unscrew cap.
2. Insert batteries. Make sure battery contacts are pointing the right direction. (See instruction sheet included with beacon.)
3. Replace cap.



ss1042.tif

To install batteries in beacons with custom battery packs:

1. Unscrew cap (not shown) from main housing (1).
2. Insert custom battery pack (2). Make sure battery contacts are pointing the right direction. (See instruction sheet included with beacon.)
3. Replace cap.

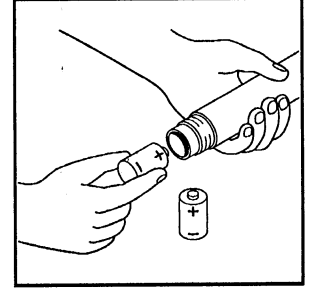


ss1057.tif

Install Batteries

To install batteries in most beacons:

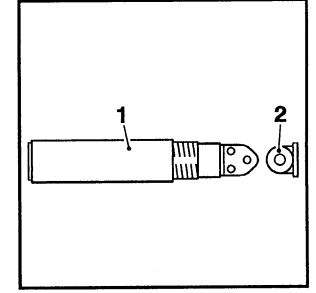
1. Unscrew cap.
2. Insert batteries. Make sure battery contacts are pointing the right direction. (See instruction sheet included with beacon.)
3. Replace cap.



ss1042.tif

To install batteries in beacons with custom battery packs:

1. Unscrew cap (not shown) from main housing (1).
2. Insert custom battery pack (2). Make sure battery contacts are pointing the right direction. (See instruction sheet included with beacon.)
3. Replace cap.



ss1057.tif

Check Operation

The beacon will start transmitting 2-4 seconds after batteries make contact. To test beacon:

- turn on tracker
- check that tracker frequency matches beacon frequency (if not, press 29K/33K button)

The tracker display should indicate beacon presence.

To further test directional beacons:

- roll and tilt beacon

The tracker display should indicate beacon roll and pitch.

Check beacon battery level and beacon temperature shown on tracker display:

- all 5 segments indicate full battery power
- 1-2 segments indicate normal operating temperature

Check Operation

The beacon will start transmitting 2-4 seconds after batteries make contact. To test beacon:

- turn on tracker
- check that tracker frequency matches beacon frequency (if not, press 29K/33K button)

The tracker display should indicate beacon presence.

To further test directional beacons:

- roll and tilt beacon

The tracker display should indicate beacon roll and pitch.

Check beacon battery level and beacon temperature shown on tracker display:

- all 5 segments indicate full battery power
- 1-2 segments indicate normal operating temperature

SYSTEM CALIBRATION

The tracker can be calibrated by using either of two methods:

- **Above ground calibration** is more accurate and should be used when boring deeper than 30 ft (9 m).
- **Underground calibration** is more convenient, but should only be used when boring shallower than 30 ft (9 m).

Keep several things in mind when calibrating system:

1. Beacon must be properly located for either calibration method to be accurate.
2. Beacon and tracker should not be moved or rotated until calibration is complete.
3. Only depth accuracy is affected by calibration. Roll, pitch, temperature, and battery status are not changed.
4. Large metal objects and rebar will interfere with calibration.
5. Results are saved in permanent memory and are not affected by removing battery or turning tracker off.

SYSTEM CALIBRATION

The tracker can be calibrated by using either of two methods:

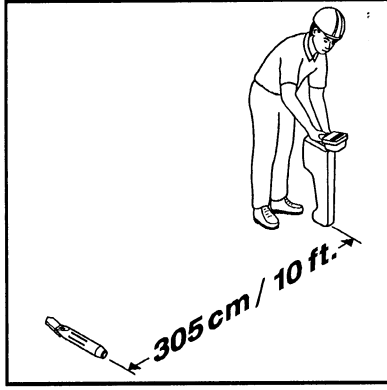
- **Above ground calibration** is more accurate and should be used when boring deeper than 30 ft (9 m).
- **Underground calibration** is more convenient, but should only be used when boring shallower than 30 ft (9 m).

Keep several things in mind when calibrating system:

1. Beacon must be properly located for either calibration method to be accurate.
2. Beacon and tracker should not be moved or rotated until calibration is complete.
3. Only depth accuracy is affected by calibration. Roll, pitch, temperature, and battery status are not changed.
4. Large metal objects and rebar will interfere with calibration.
5. Results are saved in permanent memory and are not affected by removing battery or turning tracker off.

Above Ground Calibration

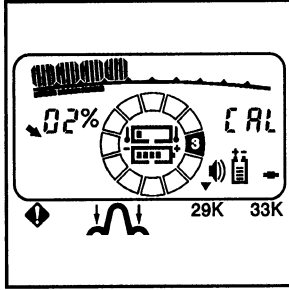
1. Install beacon into toolhead and place on ground at least 10 ft (3 m) away from any metal objects.
2. Turn tracker on.
3. Measure 10 ft (3 m) away and position tracker vertically and in line with (parallel to) toolhead.
4. Press and hold Depth button; press Antenna button. "CAL" will show in display during calibration. Tracker will turn off when calibration is complete.



ss1046.tif

Underground Calibration

1. Bore at least two pipe lengths away from boring unit. Make sure pitch is 20% or less and depth is 3-15 ft (.9-4.6 m).
2. Turn tracker on and locate beacon.
3. Press and hold Depth button; press On/Off/Cal button. "CAL" will show in display.
4. Release On/Off/Cal button to see depth. Make sure displayed depth is stable.
5. Release Depth key after displayed depth has been stable for more than three seconds.

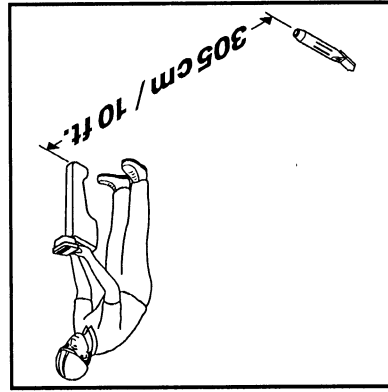


ss1044.tif

Tracker remains in calibration mode until tracker is turned off to allow additional calibration. Turn unit off to exit calibration mode. Remote transmitter will not work while unit is in calibration mode.

Above Ground Calibration

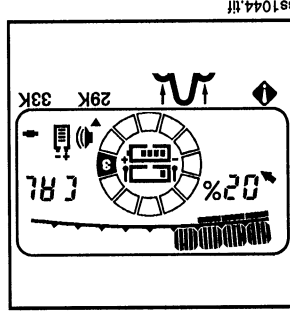
1. Install beacon into toolhead and place on ground at least 10 ft (3 m) away from any metal objects.
2. Turn tracker on.
3. Measure 10 ft (3 m) away and position tracker vertically and in line with (parallel to) toolhead.
4. Press and hold Depth button; press Antenna button. "CAL" will show in display during calibration. Tracker will turn off when calibration is complete.



ss1046.tif

Underground Calibration

1. Bore at least two pipe lengths away from boring unit. Make sure pitch is 20% or less and depth is 3-15 ft (.9-4.6 m).
2. Turn tracker on and locate beacon.
3. Press and hold Depth button; press On/Off/Cal button. "CAL" will show in display.
4. Release On/Off/Cal button to see depth. Make sure displayed depth is stable.
5. Release Depth key after displayed depth has been stable for more than three seconds.



ss1044.tif

Tracker remains in calibration mode until tracker is turned off to allow additional calibration. Turn unit off to exit calibration mode. Remote transmitter will not work while unit is in calibration mode.

OPERATION

To properly locate and track a beacon, several things must be done. The area must first be checked for hazards, then the beacon must be turned on and installed into beacon housing. See boring unit operator's manual for set-up procedures. Once these tasks are performed, there are several steps to follow to locate beacon and get accurate roll, pitch (if available), and depth estimates.

CHECK FOR HAZARDS

When using Subsite equipment with a trenchless boring system:

- read trenchless boring system operator's manual
- locate jobsite hazards
- notify One-Call
- locate potential problem situations

Operating Subsite equipment near rebar, railroad tracks, overhead power lines, large metal objects, or cellular phones can interfere with the tracker's ability to detect beacon signal.

OPERATION

To properly locate and track a beacon, several things must be done. The area must first be checked for hazards, then the beacon must be turned on and installed into beacon housing. See boring unit operator's manual for set-up procedures. Once these tasks are performed, there are several steps to follow to locate beacon and get accurate roll, pitch (if available), and depth estimates.

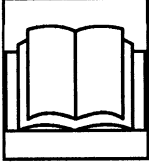
CHECK FOR HAZARDS

When using Subsite equipment with a trenchless boring system:

- read trenchless boring system operator's manual
- locate jobsite hazards
- notify One-Call
- locate potential problem situations

Operating Subsite equipment near rebar, railroad tracks, overhead power lines, large metal objects, or cellular phones can interfere with the tracker's ability to detect beacon signal.

LOCATE BEACON



pages.tif

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

Location

To locate beacon:

1. Check that tracker is on same frequency as beacon.
2. Select antenna mode.

Antenna Set-up	Advantages	Disadvantages
Single	More range	Less precise
Twin	Most precise	Less range
Null	Sharp response	Easily distorted in congested area

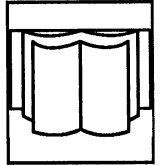
3. Set gain.

Tracker has an AutoSet feature which sets gain for a signal strength of approximately 50% when Depth button is pressed.

IMPORTANT: The tracker automatically turns itself off after five minutes if no key is pressed and no beacon information is received.

IMPORTANT: LCD display clears after 40 seconds with no reception of roll, temperature, battery, or pitch information.

LOCATE BEACON



pages.tif

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

Location

To locate beacon:

1. Check that tracker is on same frequency as beacon.
2. Select antenna mode.

Antenna Set-up	Advantages	Disadvantages
Single	More range	Less precise
Twin	Most precise	Less range
Null	Sharp response	Easily distorted in congested area

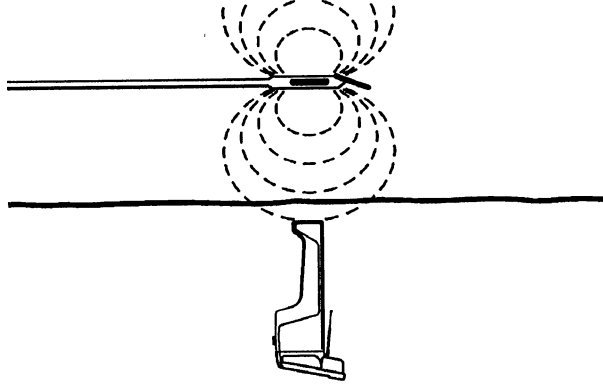
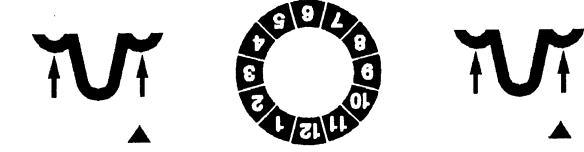
3. Set gain.

Tracker has an AutoSet feature which sets gain for a signal strength of approximately 50% when Depth button is pressed.

IMPORTANT: The tracker automatically turns itself off after five minutes if no key is pressed and no beacon information is received.

IMPORTANT: LCD display clears after 40 seconds with no reception of roll, temperature, battery, or pitch information.

4. Walk bore path with bottom of tracker parallel to beacon. Do not hold tracker at a right angle to beacon. **IMPORTANT:** There are secondary signals (ghosts) in front of and behind stronger main signal. Use care when locating beacon so one of the secondary signals is not marked instead of the main signal. Tracker warns operator if a ghost is located when Depth button is pressed.



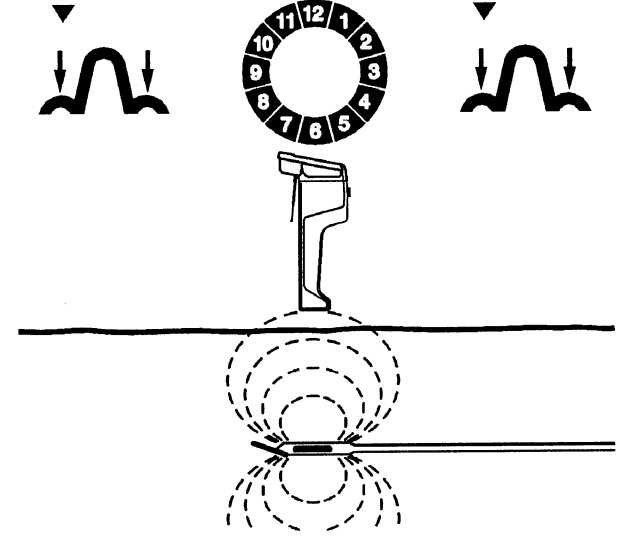
ss1083.tif

5. When signal rises and strongest (main) signal has been located, place a flag or marker on that spot.
6. Confirm beacon location by moving tracker side-to-side over this area until highest signal is indicated. Mark this spot as estimated beacon location.

After beacon has been properly located, depth can be estimated. Other information (roll, pitch, temperature, battery status) can also be received. Tracker automatically adjusts gain so that signal strength is always between 1 and 95%. This allows operator to receive all beacon information except depth when tracker is not directly over beacon.

4. Walk bore path with bottom of tracker parallel to beacon. Do not hold tracker at a right angle to beacon.

IMPORTANT: There are secondary signals (ghosts) in front of and behind stronger main signal. Use care when locating beacon so one of the secondary signals is not marked instead of the main signal. Tracker warns operator if a ghost is located when Depth button is pressed.

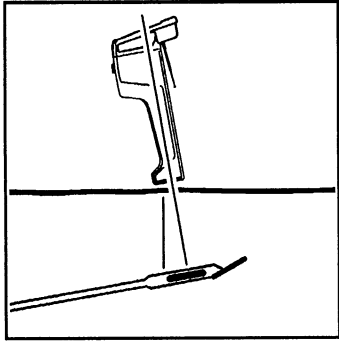


ss1083.tif

5. When signal rises and strongest (main) signal has been located, place a flag or marker on that spot.
6. Confirm beacon location by moving tracker side-to-side over this area until highest signal is indicated. Mark this spot as estimated beacon location.

After beacon has been properly located, depth can be estimated. Other information (roll, pitch, temperature, battery status) can also be received. Tracker automatically adjusts gain so that signal strength is always between 1 and 95%. This allows operator to receive all beacon information except depth when tracker is not directly over beacon.

Depth



ss1084.tif

To estimate beacon depth, press Depth button. Depth to the beacon will be displayed. To change depth units, press Units button.

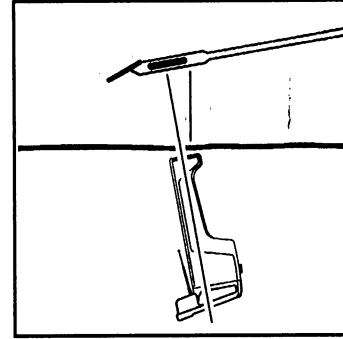
If the beacon is sloped up or down, depth measurement can be affected. To reduce effects of this slope, hold tracker perpendicular to beacon surface.

NOTICE: If depth and location are critical, confirm by hand digging.

If you suspect an interfering signal, try locating beacon with null antenna. If locations are not the same, an interfering signal is in the area and shown beacon depths are probably incorrect.

When tracker is used with a high-powered beacon, depth and location of beacon shallower than 5 ft (1.5 m) might be inaccurate. Raise tracker 1-3 ft (.5-.9 m) above ground to minimize distortion. Subtract height above ground from depth estimate.

Depth



ss1084.tif

To estimate beacon depth, press Depth button. Depth to the beacon will be displayed. To change depth units, press Units button.

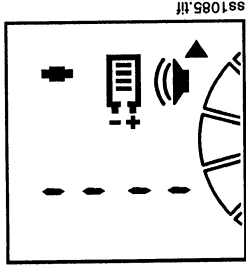
If the beacon is sloped up or down, depth measurement can be affected. To reduce effects of this slope, hold tracker perpendicular to beacon surface.

NOTICE: If depth and location are critical, confirm by hand digging.

If you suspect an interfering signal, try locating beacon with null antenna. If locations are not the same, an interfering signal is in the area and shown beacon depths are probably incorrect.

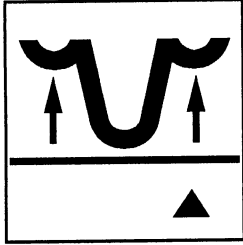
When tracker is used with a high-powered beacon, depth and location of beacon shallower than 5 ft (1.5 m) might be inaccurate. Raise tracker 1-3 ft (.5-.9 m) above ground to minimize distortion. Subtract height above ground from depth estimate.

The following messages can appear during depth estimation:



Dashes mean beacon appears to be above tracker or beacon signal is not detected. A double tone will sound and four dashes will appear in display. This message is usually caused by interfering signals. Try relocating beacon.

ss1085.tif

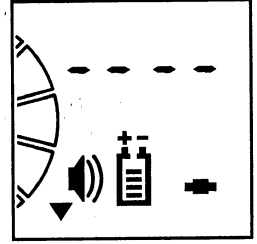


Ghost means peak beacon signal has not been located. Try moving forward or backward along bore path and then relocate beacon.

ss1030.tif

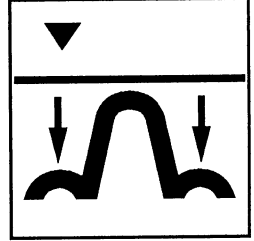
The following messages can appear during depth estimation:

Dashes mean beacon appears to be above tracker or beacon signal is not detected. A double tone will sound and four dashes will appear in display. This message is usually caused by interfering signals. Try relocating beacon.



ss1085.tif

Ghost means peak beacon signal has not been located. Try moving forward or backward along bore path and then relocate beacon.



ss1030.tif

Roll

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

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

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

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

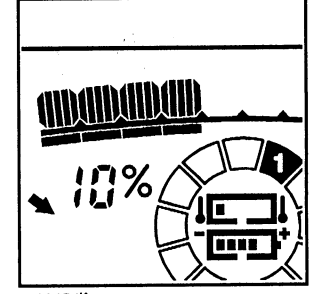
Roll

Pitch

The 66^{TKR} shows pitch (% grade) when used with beacons that provide this information (see beacon chart in "Set-up").

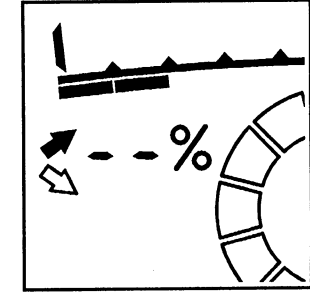
Pitch shows beacon slope (grade) in percentages from down arrow 99% (45 degrees down) to up arrow 99% (45 degrees up). Tracker displays this information to the left of roll display.

The example shows -10% pitch. This means beacon depth after boring 10 ft (3 m) will be approximately 1 ft (.3 m) deeper.



ss1045.tif

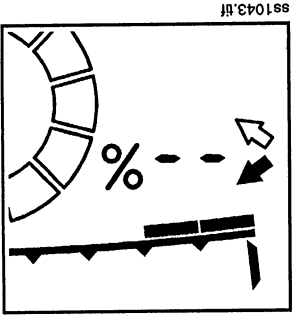
If pitch is greater than 99%, tracker will display one of the arrows, two dashes, and the percent sign.



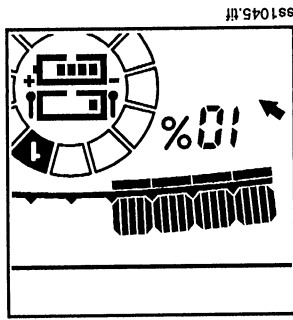
ss1043.tif

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

The example shows -10% pitch. This means beacon depth after boring 10 ft (3 m) will be approximately 1 ft (.3 m) deeper.



ss1043.tif



ss1045.tif

The 66^{TKR} shows pitch (% grade) when used with beacons that provide this information (see beacon chart in "Set-up").

Pitch

The following chart shows approximate rise or drop for slopes from ± 1 to $\pm 99\%$ after boring 10 ft (3 m). The slope values shown are the actual codes the beacon sends. If slope arrow is up, tool will rise. If slope arrow is down, tool will drop. If slope is zero, tool is horizontal.

% Slope	Rise/drop	% Slope	Rise/drop	% Slope	Rise/drop
1	1 in	12	1 ft 2 in	45	4 ft 1 in
2	2 in	14	1 ft 5 in	50	4 ft 6 in
3	4 in	16	1 ft 7 in	55	4 ft 10 in
4	5 in	18	1 ft 9 in	60	5 ft 2 in
5	6 in	20	2 ft	65	5 ft 5 in
6	7 in	24	2 ft 4 in	70	5 ft 9 in
7	8 in	28	2 ft 8 in	75	6 ft
8	10 in	32	3 ft 1 in	80	6 ft 3 in
9	11 in	36	3 ft 5 in	90	6 ft 8 in
10	1 ft	40	3 ft 9 in	99	7 ft

% Slope	Rise/drop	% Slope	Rise/drop	% Slope	Rise/drop
1	1 in	12	1 ft 2 in	45	4 ft 1 in
2	2 in	14	1 ft 5 in	50	4 ft 6 in
3	4 in	16	1 ft 7 in	55	4 ft 10 in
4	5 in	18	1 ft 9 in	60	5 ft 2 in
5	6 in	20	2 ft	65	5 ft 5 in
6	7 in	24	2 ft 4 in	70	5 ft 9 in
7	8 in	28	2 ft 8 in	75	6 ft
8	10 in	32	3 ft 1 in	80	6 ft 3 in
9	11 in	36	3 ft 5 in	90	6 ft 8 in
10	1 ft	40	3 ft 9 in	99	7 ft

The following chart shows approximate rise or drop for slopes from ± 1 to $\pm 99\%$ after boring 10 ft (3 m). The slope values shown are the actual codes the beacon sends. If slope arrow is up, tool will rise. If slope arrow is down, tool will drop. If slope is zero, tool is horizontal.

Tracking Beacon Under Railroad Tracks

Tracking a beacon under railroad tracks presents special problems because tracks often carry powerful signals which can interfere with beacon signal. Use caution when making a directional bore under multiple tracks; tracking a beacon might be impossible.

When beacon is under a railroad track and there is interference, raise tracker a few feet above the ground to minimize effect of interfering signal. Subtract feet above ground from depth estimates.

Moving Beacon Through Non-metallic Pipes

NOTICES:

- Metal lines can be detected with locating equipment. Other lines can only be detected by using a beacon.
- When estimating depth with beacon in non-metallic pipe or conduit, depth shown will be to center of beacon, not to top of pipe.

Beacons can be moved through non-metallic pipes and ducts by a number of ways. They can be:

- hand-carried through tunnels.
- pushed through pipes to locate blockages or trace path of the line using a flexible rod or pull cable attached to threaded stud on one end. This method may also be used when beacons are attached to a plumber's snake.
- propelled through a pipe by water pressure.

Tracking Beacon Under Railroad Tracks

Tracking a beacon under railroad tracks presents special problems because tracks often carry powerful signals which can interfere with beacon signal. Use caution when making a directional bore under multiple tracks; tracking a beacon might be impossible.

When beacon is under a railroad track and there is interference, raise tracker a few feet above the ground to minimize effect of interfering signal. Subtract feet above ground from depth estimates.

Moving Beacon Through Non-metallic Pipes

NOTICES:

- Metal lines can be detected with locating equipment. Other lines can only be detected by using a beacon.
- When estimating depth with beacon in non-metallic pipe or conduit, depth shown will be to center of beacon, not to top of pipe.

Beacons can be moved through non-metallic pipes and ducts by a number of ways. They can be:

- hand-carried through tunnels.
- pushed through pipes to locate blockages or trace path of the line using a flexible rod or pull cable attached to threaded stud on one end. This method may also be used when beacons are attached to a plumber's snake.
- propelled through a pipe by water pressure.

FCC Statement - Internal Transmitter

This equipment has been tested and found to comply with the limits for a Class A device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables and I/O cords must be used for this equipment to comply with the relevant FCC regulations.

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



iso141.tif

WARNING Explosion possible. Never operate transmitters near explosive devices or blasting operations.

NOTICE: Do not handle or carry tracker by the antenna. Removing antenna violates FCC regulations.

FCC Statement - Internal Transmitter

This equipment has been tested and found to comply with the limits for a Class A device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Shielded cables and I/O cords must be used for this equipment to comply with the relevant FCC regulations.

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



iso141.tif

WARNING Explosion possible. Never operate transmitters near explosive devices or blasting operations.

NOTICE: Do not handle or carry tracker by the antenna. Removing antenna violates FCC regulations.

MAINTENANCE

Under normal operating conditions, tracker needs only minor maintenance. Following these care instructions can ensure longer equipment life.

GENERAL CARE

- Do not drop the equipment.
- Do not expose the equipment to high heat (such as in the rear window of a car).
- Clean equipment with a damp cloth and mild soap. Never use scouring powder.
- Do not immerse in any liquid.
- Do not get line marking paint on tracker face.
- Inspect housing daily for cracks or other damage. If housing is damaged, contact your Ditch Witch dealer for replacement.
- Do not change batteries in the rain.

- Do not drop the equipment.
- Do not expose the equipment to high heat (such as in the rear window of a car).
- Clean equipment with a damp cloth and mild soap. Never use scouring powder.
- Do not immerse in any liquid.
- Do not get line marking paint on tracker face.
- Inspect housing daily for cracks or other damage. If housing is damaged, contact your Ditch Witch dealer for replacement.
- Do not change batteries in the rain.

GENERAL CARE

Under normal operating conditions, tracker needs only minor maintenance. Following these care instructions can ensure longer equipment life.

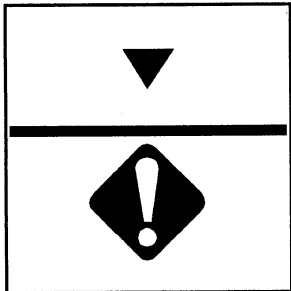
MAINTENANCE

GENERAL TROUBLESHOOTING

If equipment does not work properly, check that:

- battery contacts are free of dirt and corrosion. Clean using a pencil eraser or commercial contact cleaner.
- batteries are properly installed.
- alkaline batteries are fresh.

Critical Error



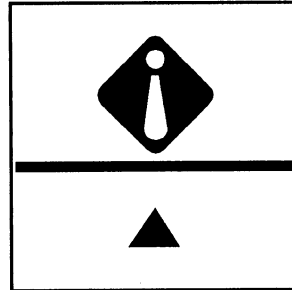
ss1029.tif

Error occurred during tracker operation. Internal calibration is incorrect. Stop operation and return unit to your Ditch Witch dealer for repair.

GENERAL TROUBLESHOOTING

- If equipment does not work properly, check that:
- battery contacts are free of dirt and corrosion. Clean using a pencil eraser or commercial contact cleaner.
 - batteries are properly installed.
 - alkaline batteries are fresh.

Critical Error

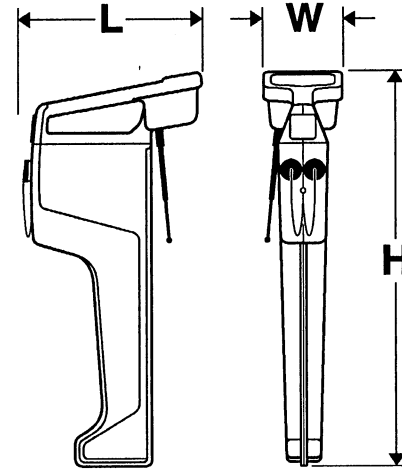


ss1029.tif

Error occurred during tracker operation. Internal calibration is incorrect. Stop operation and return unit to your Ditch Witch dealer for repair.

SPECIFICATIONS

Dimensions:



ss1047.tif

L, length: 12.2 in (31 cm)

H, height: 28 in (71 cm)

W, width: 5.5 in (14 cm)

Operating Mode: Beacon

Operating Weight: 7.5 lb (3.4 kg)

Antenna Configurations: Single Peak, Twin Peak, Null

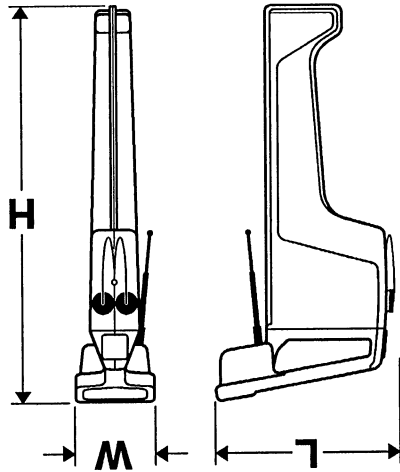
Audio Output: Speaker, FM tone with four volume settings

Frequencies: 33 kHz, 29 kHz

Internal transmitter (optional) for remote display (external antenna)

SPECIFICATIONS

Dimensions:



ss1047.tif

L, length: 12.2 in (31 cm)

H, height: 28 in (71 cm)

W, width: 5.5 in (14 cm)

Operating Mode: Beacon

Operating Weight: 7.5 lb (3.4 kg)

Antenna Configurations: Single Peak, Twin Peak, Null

Audio Output: Speaker, FM tone with four volume settings

Frequencies: 33 kHz, 29 kHz

Internal transmitter (optional) for remote display (external antenna)

Batteries: six C-cell alkaline and two 9V alkaline

Battery Life (continuous use):

9 hours for typical C-cells

60 hours for 9V

Battery Saver: unit shuts off after 5 minutes if no key is pressed or no beacon information is received

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

Storage Temperature Range: -22 degrees F (-30 degrees C) to 140 degrees F (60 degrees C)

Depth Calibration:

±5% between 3 ft (.9 m) and 10 ft (3 m)

±10% up to 50 ft (17 m)

Units are calibrated to these tolerances under test field conditions. Actual field conditions may cause signal distortions which result in depth estimates that vary more than stated above.

Batteries: six C-cell alkaline and two 9V alkaline

Battery Life (continuous use):

9 hours for typical C-cells

60 hours for 9V

Battery Saver: unit shuts off after 5 minutes if no key is pressed or no beacon information is received

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

Storage Temperature Range: -22 degrees F (-30 degrees C) to 140 degrees F (60 degrees C)

Depth Calibration:

±5% between 3 ft (.9 m) and 10 ft (3 m)

±10% up to 50 ft (17 m)

Units are calibrated to these tolerances under test field conditions. Actual field conditions may cause signal distortions which result in depth estimates that vary more than stated above.

**Ditch Witch® Subsite® Locating
Equipment & Accessories
LIMITED WARRANTY POLICY**

Effective 01/01/93

The following Limited Warranty covers only Subsite Locating Equipment & Accessories that are manufactured and distributed by Charles Machine Works, Inc. ("CMW").

**SUBSITE EQUIPMENT & ACCESSORIES
LIMITED WARRANTY**

1. Subsite Equipment & Accessories Covered.

The following Subsite Equipment & Accessories are covered by this Limited Warranty:

Transmitters
Receivers
Beacons
Accessories:
Rechargeable Batteries
Battery Chargers
Head Phones
Night Lights
Cables & Clamps
Remote Antennas

2. Warranty Periods.

- a. For a period of one year, beginning on date of delivery of any such new product to original purchaser, Subsite transmitters and receivers are warranted for defects in material or workmanship.
- b. For a period of 90 days, beginning on date of delivery of any such new product to original purchaser, Subsite Beacons, Rechargeable Batteries, Battery Chargers, Head Phones, Night Lights, Cables & Clamps, and Remote

**Ditch Witch® Subsite® Locating
Equipment & Accessories
LIMITED WARRANTY POLICY**

Effective 01/01/93

The following Limited Warranty covers only Subsite Locating Equipment & Accessories that are manufactured and distributed by Charles Machine Works, Inc. ("CMW").

**SUBSITE EQUIPMENT & ACCESSORIES
LIMITED WARRANTY**

1. Subsite Equipment & Accessories Covered.

The following Subsite Equipment & Accessories are covered by this Limited Warranty:

Transmitters
Receivers
Beacons
Accessories:
Rechargeable Batteries
Battery Chargers
Head Phones
Night Lights
Cables & Clamps
Remote Antennas

2. Warranty Periods.

- a. For a period of one year, beginning on date of delivery of any such new product to original purchaser, Subsite transmitters and receivers are warranted for defects in material or workmanship.
- b. For a period of 90 days, beginning on date of delivery of any such new product to original purchaser, Subsite Beacons, Rechargeable Batteries, Battery Chargers, Head Phones, Night Lights, Cables & Clamps, and Remote

Antennas are warranted for defect(s) in material or workmanship.

- c. The above-stated warranty periods are strictly enforced.
3. Defect(s) will be determined by inspection by CMW or an authorized repair center. Original purchaser must make the defective item available for inspection within 30 days of the date the part fails.
4. Warranty is limited to replacement of defective part. The replacement part may be new or remanufactured. Installation will be at no charge when product or item is delivered to CMW or an authorized repair center, freight prepaid. For item(s) that contain a defect in material or workmanship, CMW or an authorized repair center will return the product or item freight prepaid. Contact your local Subsite dealer for service and repair information.
5. These warranty periods do not represent the useful life of Subsite Equipment & Accessories.
6. Exclusions from Limited Warranty.

The following are specifically excluded from this Limited Warranty:

- a. All defects, damages or injuries caused by misuse, abuse, improper operation, alteration, neglect, or uses other than those for which the product was intended.
- b. All defects, damages, or injuries caused by improper or inadequate training, operation, or servicing of product inconsistent with manufacturer's recommendations.
- c. All incidental or consequential damages.
- d. Transportation and labor charges associated with inspection of product upon which no defect is found.
- e. Any product or item that has evidence of an attempt to repair on behalf of owner or non-authorized repair center.
- f. All implied warranties not expressly stated herein, including any warranty of fitness for a particular purpose and merchantability.

Antennas are warranted for defect(s) in material or workmanship.

- c. The above-stated warranty periods are strictly enforced.
 3. Defect(s) will be determined by inspection by CMW or an authorized repair center. Original purchaser must make the defective item available for inspection within 30 days of the date the part fails.
 4. Warranty is limited to replacement of defective part. The replacement part may be new or remanufactured. Installation will be at no charge when product or item is delivered to CMW or an authorized repair center, freight prepaid. For item(s) that contain a defect in material or workmanship, CMW or an authorized repair center will return the product or item freight prepaid. Contact your local Subsite dealer for service and repair information.
 5. These warranty periods do not represent the useful life of Subsite Equipment & Accessories.
 6. Exclusions from Limited Warranty.
- The following are specifically excluded from this Limited Warranty:
- a. All defects, damages or injuries caused by misuse, abuse, improper operation, alteration, neglect, or uses other than those for which the product was intended.
 - b. All defects, damages, or injuries caused by improper or inadequate training, operation, or servicing of product inconsistent with manufacturer's recommendations.
 - c. All incidental or consequential damages.
 - d. Transportation and labor charges associated with inspection of product upon which no defect is found.
 - e. Any product or item that has evidence of an attempt to repair on behalf of owner or non-authorized repair center.
 - f. All implied warranties not expressly stated herein, including any warranty of fitness for a particular purpose and merchantability.

7. If Subsite products are purchased for commercial purposes, as defined by the Commercial Code, no warranties extend beyond the specific terms set forth in this Limited Warranty. No implied warranties of any kind exist. All other provisions of this Limited Warranty apply, including the duties imposed.
8. Subsite products have been tested to deliver acceptable performance in most conditions. Therefore, to assure suitability, products should be operated under anticipated working conditions prior to purchase.
9. This Limited Warranty applies to original purchaser only. Some states or jurisdictions do not allow exclusion or limitation of incidental or consequential damages, so above limitation may not apply. Further, some states or jurisdictions do not allow exclusion or limitation of how long an implied warranty lasts, so the limitation may not apply. This Limited Warranty gives original purchaser specific legal rights and the original purchaser may also have other rights which vary from state to state or jurisdiction to jurisdiction.

For information regarding this Limited Warranty, contact CMW's Technical Service Department, P.O. Box 66, Perry, OK USA 73077-0066, or contact your selling dealer. 4/93

7. If Subsite products are purchased for commercial purposes, as defined by the Commercial Code, no warranties extend beyond the specific terms set forth in this Limited Warranty. No implied warranties of any kind exist. All other provisions of this Limited Warranty apply, including the duties imposed.
8. Subsite products have been tested to deliver acceptable performance in most conditions. Therefore, to assure suitability, products should be operated under anticipated working conditions prior to purchase.
9. This Limited Warranty applies to original purchaser only. Some states or jurisdictions do not allow exclusion or limitation of incidental or consequential damages, so above limitation may not apply. Further, some states or jurisdictions do not allow exclusion or limitation of how long an implied warranty lasts, so the limitation may not apply. This Limited Warranty gives original purchaser specific legal rights and the original purchaser may also have other rights which vary from state to state or jurisdiction to jurisdiction.

For information regarding this Limited Warranty, contact CMW's Technical Service Department, P.O. Box 66, Perry, OK USA 73077-0066, or contact your selling dealer. 4/93