

## **THE PORTABLE INTERROGATOR 400 - INTRODUCTION -**

### Welcome

Welcome to The Portable Interrogator 400, the Interrogator to use for all meter reading technologies. The Portable Interrogator 400 is unique in automated meter reading in that it is the most lightweight and easy to use hand held interrogator, using touch screen technology to simplify the meter reading process.

The Portable Interrogator 400 can gather meter readings in a number of different ways.

- It can interrogate TRACE transponders to receive meter readings via radio.
- It also can interrogate Dialog close proximity meter reading modules using the Dialog meter reading wand connected to the Portable Interrogator 400's serial port.
- It can interrogate meters equipped with other manufacturer's "touch" meter reading equipment using a Universal Reading wand.
- Finally, it can accept meter readings that are visually read and manually entered.

### To Our New Friends

If you are new to Badger Meter Automated Meter Reading (AMR) products, or are new to AMR products in general, please take some time to go through all the sections of the user manual. We think it will be well worth your time. In particular, please pay attention to how each segment of The Portable Interrogator 400 performs its function in relation to the goal: getting a meter reading from the meter to the billing system in the quickest and easiest way possible. Keeping this goal in mind as you learn about The Portable Interrogator 400's features will make your learning easier, too.

### To Our Established Friends

If you are already familiar with Badger Meter AMR products, you will still find it helpful to go through the Introduction and Details sections in order to understand how the features in The Portable Interrogator 400 work together, and what information is needed to perform each feature.

### What Is The Portable Interrogator 400?

The Portable Interrogator 400 is the Hand Held AMR Interrogator for all Badger Meter AMR products. It can be used as a replacement for the older TRACE Portable Interrogator (TPI), because The Portable Interrogator 400 can perform all interrogation and programming functions for TRACE transponders and can use the same communications methods as the TPI. As a result, the host software package will not know the difference between The Portable Interrogator 400 and a TPI. If you are currently using a PI, you'll find that The Portable Interrogator 400 can be immediately

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used in place of a TPI. You'll also find that The Portable Interrogator 400's features are much easier to use than the features of the TPI.

### The Portable Interrogator 400's Features

When using CONNECT, The Portable Interrogator 400 can perform all the TRACE functions as well as functions for the DIALOG AMR technology. Specifically, The Portable Interrogator 400 performs these types of meter reading:

- Reading TRACE transponders
- Programming TRACE transponders
- Reading Dialog modules using the Dialog wand
- Programming Dialog modules using the Dialog wand
- Reading competitive "touch" AMR modules using a Universal Meter reading probe
- Reading manually read meters including high and low audit checking

In addition, The Portable Interrogator 400 performs a number of additional functions to make working with AMR much easier.

- The Portable Interrogator 400 contains a feature called "Quick Read" with which you can enter a transponder's serial number and perform an immediate interrogation. (The Quick Read feature also performs Dialog interrogations.) This feature makes Final Reads and trouble shooting much easier to perform.
- The Portable Interrogator 400 accepts the information from a bar code reader, connected via the serial port, in the Quick Read feature. This allows you to check in a shipment of TRACE transponders simply by scanning each of the bar code labels on the outside of the shipping box for each transponder's serial number.
- The Portable Interrogator 400 allows you to easily search through the route you are reading for any information that is displayed on the reading screen
- The Portable Interrogator 400 allows you to send Trouble codes back to the PC host software. When The Portable Interrogator 400 is working with CONNECT, you can also send a text message back to CONNECT. This feature is very handy when the trouble code doesn't fully describe the issue that the meter reader wants to report.
- The Portable Interrogator 400 reports its progress in reading the current route at your request. The Progress feature displays the current statistics for the route being read.
- The Portable Interrogator 400's responses to different meter reading conditions can be customized. For example, you can choose how The Portable Interrogator 400 responds when a meter reading module does not report, or reports a tamper. In this way, The Portable Interrogator 400 responds to the way you read meters. You do not have to change your meter reading procedures in order to accommodate The Portable Interrogator 400.
- In the future, The Portable Interrogator 400 and CONNECT will allow you to choose what account information you wish to see on The Portable Interrogator 400's read screen. Using this feature you can customize The Portable Interrogator

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400 to best meet your meter reading needs. And all of the information you show on the screen is searchable.

About This Manual

The manual is divided into these sections:

- Introduction - What is The Portable Interrogator 400?
- The Portable Interrogator 400 Glossary
- The Makeup of The Portable Interrogator 400
- The Details – a number of sections explaining how to perform The Portable Interrogator 400's functions
- What If Things Go Wrong

You've almost completed the Introduction section. The summary sections describe how The Portable Interrogator 400 performs meter reading when used to replace a PI, or when used as a collector in CONNECT. The Details devotes a chapter to each The Portable Interrogator 400 feature, showing you everything you need to know about each one. Finally, the What If Things Go Wrong section details the steps you need to follow to successfully solve just about any problem you might run into.

## THE PORTABLE INTERROGATOR 400 GLOSSARY

Listed below in alphabetical order are a number of terms used in The Portable Interrogator 400. Take a few minutes to look them over. It will help to make the following chapters easier to understand. (You may want to mark this page so that if you have a question about a term later on, you can reach this page quickly.)

<b>TERM</b>	<b>DEFINITION</b>
Clear Readings	This function will remove an unneeded route from The Portable Interrogator 400 in the event you wish to load The Portable Interrogator 400 with another route.
Comment codes	Comment codes consist of up to three sets of two alphanumeric characters each, which represent a message to the utility office.
DIALOG	The Badger Meter close proximity meter reading technology
Field	A piece of information in The Portable Interrogator 400, such as the service address or the meter serial number, that resides on the Read screen.
Final read	A meter reading that is taken at the end of a customer's relationship with the utility in order to send the customer their final bill.
Main menu	The screen in The Portable Interrogator 400 that is displayed immediately after successfully logging in
Module	In general, an electronic product used to report a meter's reading. Specifically for the DIALOG technology, the electronic circuitry used to gather and report meter readings by communicating to the Dialog wand.
Programming menu	The Portable Interrogator 400 screen which allows programming of either DIALOG modules or TRACE transponders
Quick read	The Portable Interrogator 400 feature that reads a TRACE transponder whose serial number you just entered, or a DIALOG module whose network ID you just entered.
Reading menu	The Portable Interrogator 400 screen holding the list of different functions that you can perform when reading meters
Receive a route	The Portable Interrogator 400 function that communicates with the route management software to transfer the route from the PC to The Portable Interrogator 400.
Restore a route	The Portable Interrogator 400 function that brings back the route information that was last uploaded to the route management software on the PC.
Route	A list of meters to read
Route Management software	The software product or system that loads route information into the hand held computer, and accepts completed meter readings from the hand held computer.

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Route progress	The Portable Interrogator 400 function that displays the number of meters read in the current route, along with other related information.
Send readings	The Portable Interrogator 400 function that communicates with the route management software to transfer the completed meter readings from The Portable Interrogator 400 to the PC.
Service	The type of utility being measured by the meter, for example Gas, Water, Electricity
Settings	The Portable Interrogator 400 variables that can be changed by the user to control behavior to certain conditions.
Tamper	A status reported by a TRACE transponder showing that the lead line is cut or shorted (water transponder), or that the transponder has been tilted (gas transponder). Also, a status reported by a Dialog module showing that the lead line has been cut or shorted (water module only).
Text message	A message entered by the meter reader to be sent to the route management software
TRACE	The Badger Meter AMR technology for reading meters via radio.
Transponder	The electronics module used in TRACE meter reading technology that both transmits meter reading information and receives interrogations
Trouble code	A two digit code entered by the meter reader that is sent back to the route management software to document a condition or status at the meter.

## THE MAKEUP OF THE PORTABLE INTERROGATOR 400

The Portable Interrogator 400 is made up of a number of modules that all work together to perform meter reading quickly and easily.

- The Portable Interrogator 400 has an internal computer utilizing an Intel CMOS 80186 processor running the DOS operating system to perform all of its functions
- The Portable Interrogator 400 uses a touch screen for easy operation
- The Portable Interrogator 400 has special transmit / receive circuitry to send interrogations to TRACE transponders and receive meter readings from them
- The Portable Interrogator 400 has a serial port that can be used for
  - transferring routes to and from the route management system
  - reading DIALOG meters using the DIALOG reading wand
  - read competitive meters using touch AMR technologies by using a Universal Reading Wand
  - read bar coded transponder Ids for interrogation
- The Portable Interrogator 400 has an easily replaceable and rechargeable battery that will provide power for up to 1500 readings (a minimum of 4 hours)
- The Portable Interrogator 400 has a hand strap that makes holding the unit seem almost effortless. The strap allows you to hold the unit and use the thumb on the same hand for performing meter reading functions: true one-handed operation!



### THE PORTABLE INTERROGATOR 400 COMPANION CRADLE

An optional companion cradle is also offered with The Portable Interrogator 400. The cradle assists The Portable Interrogator 400 in a number of ways.

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- In the office, the cradle holds The Portable Interrogator 400 in place to recharge the battery.
- When connected to the PC, the cradle allows the PC and The Portable Interrogator 400 to exchange route information.
- When used for meter reading in a vehicle, the cradle holds The Portable Interrogator 400 in place for convenient meter reading as well as battery charging.
- When used for meter reading in a vehicle, the cradle connects to separate transmit and receive roof mount antennas for better range in meter reading. When The Portable Interrogator 400 is inserted into the cradle, it will automatically use the external antennas. When not in the cradle, The Portable Interrogator 400 will use the attached antenna.

### THE TOUCH SCREEN AND THE UNIT

The most important feature of The Portable Interrogator 400 is the touch screen. The screen is large enough to make viewing the meter reading functions very easy. The screen is designed so that glare is not a problem, even in very bright sunshine.

The touch screen is actually a pane of glass with special electronics to know where you touched the screen. The screen is then sealed and a plastic cover is used to protect it. You actually touch the plastic cover, not the touch screen itself. This protects the electronics from moisture, dirt, oil, etc.

In addition to the plastic covering for the touch screen, The Portable Interrogator 400 also has an additional plastic cover that fits over the touch screen. This optional cover protects the touch screen from stones, dirt, grime, and sharp objects. The cover can be removed and replaced when needed.

When The Portable Interrogator 400 displays a screen, there will be boxes shown on the screen that represents your choices for the next step in meter reading. To choose the function described by the box, simply press the screen inside the area of the box. The Portable Interrogator 400 will perform the next step of that function.

The Portable Interrogator 400 software has been designed so that the buttons are easy to see and touch. If you read meters in cold climates, you'll be happy to know that the buttons are designed so that they can be pressed even when you are wearing gloves.

### THE PORTABLE INTERROGATOR 400'S CONTROLS

Besides the touch screen, The Portable Interrogator 400 has four additional control buttons across the top of the screen. The outside buttons are marked "READ" and will begin the reading process for the meter displayed on the screen. If the meter is attached to a TRACE transponder, The Portable Interrogator 400 will interrogate the transponder. If the meter is attached to a DIALOG module, The Portable Interrogator 400 will

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interrogate the module through the reading wand connected to the serial port. If the meter uses no automatic meter reading technology, The Portable Interrogator 400 will display the numeric keyboard for entering the meter reading manually.

The left-inside button marked with “I/O” is the on / off button. Pressing the button when the unit is off will turn it on. Pressing the button when the unit is on will turn it off. When you turn the unit back on, The Portable Interrogator 400 will display the same screen that was active when you turned the unit off.

The right-inside button marked with a “ ” is a special key to use when you are unsure of your next The Portable Interrogator 400 entry. The “ ” key will cancel the current The Portable Interrogator 400 function and return you to the main menu screen. This key is especially handy if you believe you are in the wrong function and you wish to restart at a known state, or if you are lost and not sure what you should do next. Simply press the “ ” key and The Portable Interrogator 400 will cancel the current function and return to the main menu.

### USING THE PORTABLE INTERROGATOR 400 TO REPLACE THE TPI

If you are currently using the Badger Meter Portable Interrogator 400 for gathering TRACE meter readings, The Portable Interrogator 400 can replace the TPI directly. The Portable Interrogator 400 will communicate with your Route Management software using the same communications method and passing the same information as the TPI. Your Route Management software will not know the difference between a TPI and The Portable Interrogator 400.

### CONSERVING THE BATTERY

The Portable Interrogator 400 conserves battery power by turning itself off when not in use. If you are using The Portable Interrogator 400 as a replacement for the TPI, The Portable Interrogator 400 will turn itself off after three minutes of no use. If you are using The Portable Interrogator 400 as a collector for CONNECT, you can choose the timeout period that The Portable Interrogator 400 uses, from one minute up to five minutes.

### CHANGING THE BATTERY

Changing The Portable Interrogator 400's battery is quick and easy. Because of The Portable Interrogator 400's design, meter readings will not be lost when changing the battery. However, The Portable Interrogator 400 should be turned off when replacing a battery. If The Portable Interrogator 400 is on, press the power button to turn The Portable Interrogator 400 off.



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First, if you have the hand strap connected, disconnect the back portion of the strap from the bottom of the case. Underneath the strap is the battery compartment. Unscrew and remove the battery compartment cover. Remove the battery pack noting the position of the power leads. Insert the new battery so that the leads are in the same position as the battery you just removed. Now replace the cover and tighten the screw for the cover. Note that The Portable Interrogator 400 will restart itself. This is normal and will happen each time you change the battery. Note that even though The Portable Interrogator 400 restarts, no meter readings are lost.

**BATTERY MONITORING**

As you use The Portable Interrogator 400, it constantly checks the power in the battery. If the battery power starts running low, The Portable Interrogator 400 will display a yellow BATT light. If the battery power is too low to interrogate a meter, The Portable Interrogator 400 will display a red BATT light. You'll always know the status of The Portable Interrogator 400 battery just by monitoring the BATT light.

**COMPARING THE PORTABLE INTERROGATOR 400 AND THE TPI**

The following chart compares The Portable Interrogator 400 with the TPI for reading meters.

<b>FEATURE</b>	<b>TPI</b>	<b>THE PORTABLE INTERROGATOR 400</b>
<b>HARDWARE</b>		
- Type of battery	NiCad	Lithium
- Voltage	???	???
- Life on one charge – Interrogations	3000	1500
- Life on one charge – time in hours	8 hours	4 hours
- Change the battery during meter reading?	Yes, but the backup battery must be turned on and working.	Easily with no loss of data possible and no backup battery needed
- Backup battery needed for integrity	Lithium required for data integrity when changing batteries.	None needed
- Display the date / time	Yes	Yes
- Data Entry	Membrane keyboard for function buttons, numeric, and alphanumeric entries	Touch screen for all entries. Also interrogation buttons on either side of the unit.
- Automatic shutoff to conserve battery	No	Adjustable from 1 to 5 minutes of no activity

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- Screen backlight	Must turn on and off manually	Light sensor turns backlight on and off automatically
<b>COMMUNICATION INFORMATION</b>		
- Port type for load and unload	Serial	Serial or USB
- Protocol used	Proprietary	Proprietary or Y-Modem
- baud rate	19200	19200 or 156K
<b>ROUTE INFORMATION</b>		
- Max number of meters that can be loaded at one time	3000	3000
- Possible to overwrite and loose readings?	Yes	No
- Ability to add a new account?	Yes	Yes
<b>DISPLAY</b>		
- Size of the display	4 X 20	
- Information displayed	Name, address, meter serial #, transponder ID	Up to 5 fields you wish to use from Connect OR Name, address, meter serial #, transponder ID
- Searching	Yes, but not easy to do	Search any portion of any field
- Find next unread	Yes	Yes
- Find start of next route	No	Yes
- Ability to view the previous read	No	Can be configured to allow or disallow viewing
- Ability to immediately go to the main screen when lost	No	Yes, if lost press one button to return to the main screen
<b>CODES / MESSAGES</b>		
- Number of 2 digit codes	1	4
- Length of text message	20 characters	80 characters
<b>INTERROGATIONS</b>		
- Transmission power	1 watt	1 watt
- Time to receive a reading	1.5 seconds	1.5 seconds
- Reports lead line tamper	Yes	Yes
- Ability to reset tamper	Yes	Yes
- Ability to read a particular meter for final	Using Edit mode feature, or using New Account	Using Quick Read feature

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read	function in the Data Collection mode	
- Ability to read a module without knowing its serial number	Yes, using edit mode	Yes, using the Quick Read feature
- Types of audible alerts given	High reading, low reading, tamper received, no response received	High reading, low reading, tamper received, no response received
- Automatically retry when no response is received from a transponder	No	Yes
- Automatically attempt to clear a tamper condition	No	Yes
<b>PROGRAMMING</b>		
- Ability to program units	Yes	Yes
- Clear tamper when programming	Yes	Yes
<b>TOUCH METER READING</b>		
- Ability to read Dialog	No	Yes
- Ability to program Dialog modules	No	Yes
- Ability to read competitive meters using Universal Wands	No	Yes
<b>CHECKING TRANSPONDERS</b>		
- Ability to read the transponder ID using a bar code scanner, then interrogating the unit	No	Yes
<b>MANUAL READS</b>		
- Direction of reads	Choose L-R or R-L for the route	Choose L-R or R-L for each meter
- Verify a high or low entered reading	No	Yes, choose re-entering the reading or visually verifying the entered read
- Verification reads for interrogated meters	Reading entered over the first 7 digits of the address field	Reading entered in a special field
<b>READING OTHER TECHNOLOGIES</b>		

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- Touch technologies supported	No	Dialog readings via the Dialog wand, and Touch readings via a Universal Reading wand
- Other RF technologies supported	No	No
- Other Reading Features?	No	Can read any touch meter out of sequence and unit will search for the correct account
OTHER		
- built-in calculator	No	Yes

GENERAL CARE OF THE PORTABLE INTERROGATOR 400

Cleaning The Portable Interrogator 400 is easy. Use only a slightly dampened (water only) chamois or a clean dry cloth to remove fingerprints or residue from the touch screen and the case. Do not use alcohol or ammonia based cleaners. If you are using the optional screen cover to protect The Portable Interrogator 400's touch screen, it is best to remove the cover, clean it separately in the same manner, and reinstall the cover.

## **THE DETAILS – THE PORTABLE INTERROGATOR 400 OPERATION**

### THE READING CYCLE USING THE PORTABLE INTERROGATOR 400

Using The Portable Interrogator 400 for meter reading is easy. The reading cycle consists of these steps:

- STEP 1 – Prepare The Portable Interrogator 400 to accept the route from the Route Management software by pressing the Transfer Routes button from the Main Menu. On the Transfer File Menu, press the Receive Route button. If a route is already loaded into The Portable Interrogator 400, The Portable Interrogator 400 will alert you to unload the current route before loading the new route. If The Portable Interrogator 400 is ready to accept the route, communications begins and the route is transferred from the Route Management software to The Portable Interrogator 400.
- STEP 2 – You can begin meter reading by pressing the Read / Program Meters button. The Portable Interrogator 400 will display the Reading screen that allows you to interrogate TRACE or DIALOG meters and enter manual meter readings for those meters without a TRACE transponder.
- STEP 3 – To begin the reading process for the meter shown on the Read screen, press either of the two Read button, or press the information area on the Reading screen. If the meter is monitored by TRACE or DIALOG, The Portable Interrogator 400 will interrogate the transponder, report the reading, and display the next meter in the route. If the meter is manually read, The Portable Interrogator 400 will display a numeric keypad, allowing you to enter the reading manually.
- STEP 4 – The Portable Interrogator 400 is unloaded, when all the readings have been gathered, by pressing Transfer Routes from the main menu, and then Send Readings on the Transfer Readings screen. The Portable Interrogator 400 will communicate the readings to the Route Management system on the PC.

### Starting The Portable Interrogator 400 software

The Portable Interrogator 400 unit is a computer, and can be reset like a desktop computer. A desktop computer can be reset by turning the power switch off and then on. The Portable Interrogator 400 can be turned on and off with the On/Off button, but that does not take power away from the unit (like turning off your desktop computer does). Replacing The Portable Interrogator 400's battery will have the same effect as turning off your desktop computer.

Your desktop computer can also be reset by pressing three keys (Ctrl, Alt, and Delete), all at the same time. You can reset The Portable Interrogator 400 by pressing three buttons at the same time: the left Read key, the back arrow key, and the right Read key, all at the

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same time. (The easiest way to do this is to place The Portable Interrogator 400 on a flat surface before pressing the keys.)

Whether you restart The Portable Interrogator 400 by changing the battery or by pressing the three restart keys, the effect is the same. The computer restarts itself, performs checks to insure that it can operate properly, and then starts The Portable Interrogator 400 software. Note that any route information or meter readings stored in The Portable Interrogator 400 during a restart are safe. No information is lost when restarting The Portable Interrogator 400.

The Portable Interrogator 400 begins its processing by displaying the copyright screen.

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Building Search List

Pressing the Continue button brings you to the Log-in screen.

Logging-in to The Portable Interrogator 400

The Log-in screen looks like this.

Log In
Exit to DOS

Pressing the Log In button brings you to the ID screen.

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Enter your PIN:

1	2	3	4
5	6	7	8
Back	9	0	Enter

The Log-in screen accepts your 4 digit personal ID number (PIN) and validates it. As you enter your PIN, The Portable Interrogator 400 displays the asterisk character (“\*”) in the spot for the digit, so that others cannot see your PIN. When you have entered your PIN, the screen looks like this.

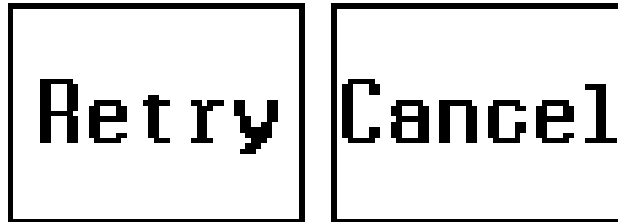
Enter your PIN:

1	2	3	4
5	6	7	8
Back	9	0	Enter

If you enter a valid PIN, The Portable Interrogator 400 displays the Main Menu. If your PIN is not valid, The Portable Interrogator 400 will tell you so. The screen looks like this.

# LOG IN ERROR

Your PIN is incorrect



Press the Retry button on the screen and reenter your PIN correctly to display the Main Menu.

If you press the Cancel button, you will return to the Log-in screen.

On the Log-in screen, if you press the Exit to DOS button, you will have to enter a special PIN. The Portable Interrogator 400 will display the PIN keyboard for your entry. Note that you should not Exit to DOS unless directed to do so by Badger Meter Technical Support.

## The Portable Interrogator 400 Main Menu

After successfully logging into The Portable Interrogator 400, you will see the Main Menu.

MAIN MENU	
Read/Program Meters	Logout
Transfer Routes	Quick Read
07/20/2000	13:36:00

There are four functions on the main menu to choose from:

- Logout – Return to the Log-in screen for the next The Portable Interrogator 400 user



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- Quick Read – Use The Portable Interrogator 400 to read meters when you do not have a route loaded (i.e., for checking a transponder, for obtaining final reads, troubleshooting, etc.)
- Transfer Routes – Send routes to The Portable Interrogator 400 for reading, or send readings in The Portable Interrogator 400 back to the PC route software
- Read / Program Meters – Read the route that is loaded, or program transponders (when installing new units or changing out meters)

The Portable Interrogator 400 also displays the current date and time on the bottom of the screen. Pressing any of these buttons begins that function's operation.

Transfer Routes

**Transfer Files Menu**

<b>Receive Route</b>	<b>Send Readings</b>
<b>Restore Route</b>	<b>Clear Readings</b>
<b>Return to Main Menu</b>	

The Transfer Routes functions are used when communicating with your Route Management software. Routes are sent from the Route Management software to The Portable Interrogator 400 for reading, and the completed reads are sent from The Portable Interrogator 400 back to the Route Management software.

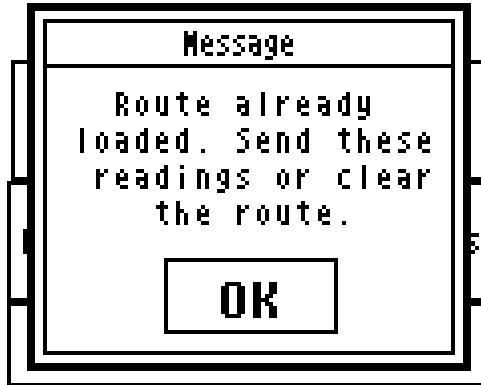
The Portable Interrogator 400 also insures that you do not lose meter readings by accidentally loading a new route before sending the completed meter readings to the Route Management software. If you try to Receive a new Route before transferring completed meter readings back to the Route Management software, The Portable Interrogator 400 will remind you that you need to Send the completed meter readings first.

Receive Route

To receive a route from the Route Management software, connect the serial cable from the PC serial port to The Portable Interrogator 400's serial port (near the top of the back cover) and push the Receive Route button. If The Portable Interrogator 400 already has a route loaded, you will be reminded to either send the current readings in The Portable Interrogator 400 to the Route Management software, or to clear the route from The

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Portable Interrogator 400. (See the Send Readings and Clear Readings functions for more information.)

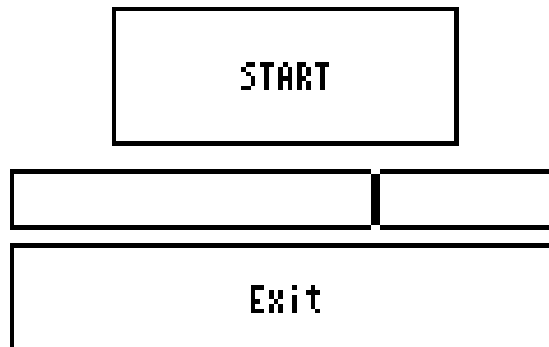


If The Portable Interrogator 400 currently has no route for meter reading, The Portable Interrogator 400 will remind you to connect the cable to its serial port and the port on the PC.



When you do this and press the Continue button, the serial communications process begins and the route is transferred from the Route Management software to The Portable Interrogator 400. As the route is transferred, you will see the screen update showing the number of bytes of information that have been successfully transferred.

## Receive Route



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Note that The Portable Interrogator 400 uses the same serial communications method and the same transfer file format as the PI. You can use The Portable Interrogator 400 for meter reading while your Route Management software thinks it is sending readings to and from a PI.

Send Readings

When you have finished reading meters, you are ready to send the readings to the Route Management software. From the Transfer Routes menu press the Send Readings button. If The Portable Interrogator 400 has no route stored, it will suggest that you first load a route before sending readings back to the Route Management software.

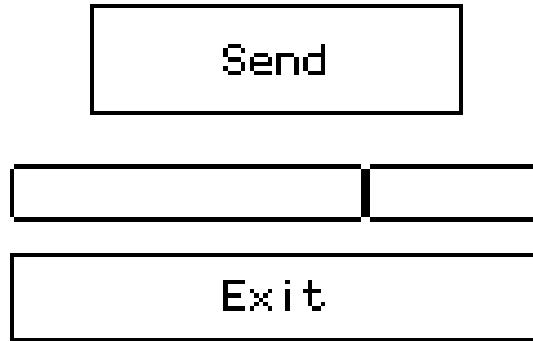


If The Portable Interrogator 400 has a route loaded, it will remind you to connect the serial cable to The Portable Interrogator 400 serial port, and to verify that the PC is also correctly connected to the serial cable.



Once that is complete, you can press the OK button and the serial communications will begin. As the route is transferred, you will see the screen update showing the number of bytes of information that have been successfully transferred.

## Send Readings



When the route has been sent to the Route Management software, The Portable Interrogator 400 will ask you if the route was successfully transferred. The Portable Interrogator 400 does this to insure that problems in other systems do not cause the readings to be lost.

If the readings were successfully transferred and the Route Management software now has them, press the Successful button. If a problem occurred, press the Not Successful button. (Note that when the route is successfully transferred to the PC, The Portable Interrogator 400 automatically clears the route and reading information. This allows you to load the next route without manually clearing out the old readings.)

### Canceling Communications

Sometimes communications between two computers has problems. One computer might crash, stopping the communications process in its tracks, or the cable between the two computers becomes dislodged from one of the two ports. When these types of conditions occur, the communications process must be cancelled and both computers returned to their original states.

The Portable Interrogator 400 has two important communications safeguards. First, if The Portable Interrogator 400 sees no communications on the serial line for more than three minutes, it will automatically stop the communications process and return to the Transfer Routes menu as if nothing happened. Second, a button will appear on the screen showing that the communications are in progress that allows you to cancel the communications process. If you push the button, the communications process will be halted and The Portable Interrogator 400 will return to the Transfer Routes menu.

These safeguards insure that, whether you are monitoring the communications or you have just stepped out, if a problem occurs in the communications with the Route Management software, The Portable Interrogator 400 will detect the problem and take the appropriate action.

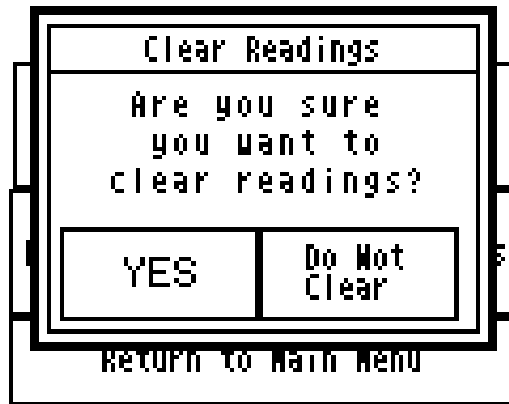
### Clear Readings

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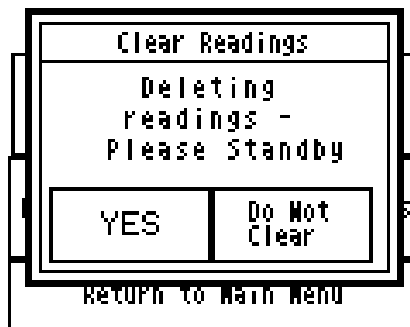
In the event that The Portable Interrogator 400 has a route stored in it for meter reading, and you wish to replace it with a different route, you can use the Clear Reading function. For example, if you just loaded The Portable Interrogator 400 with the wrong route, you can use Clear Readings to remove the incorrect route before loading the correct one. Clear Readings will remove the current route and all gathered meter readings from The Portable Interrogator 400, as if it had never been loaded.

We recommend that you use the Clear Readings function ONLY when you are absolutely sure that no meter readings will be lost. If you are not sure, it is best to use the Send Readings function to send the route back to the Route Management software.

The Clear Readings function begins when you press the Clear Readings button. The Portable Interrogator 400 will show you this screen, reminding you that if this route contains meter readings, those readings will be lost.



Pressing the Yes button will remove the route from The Portable Interrogator 400. Pressing the Do Not Clear the button will return you to the Transfer Routes menu without removing the route information from The Portable Interrogator 400. If you press the YES button, The Portable Interrogator 400 will clear the route. You'll see this screen.



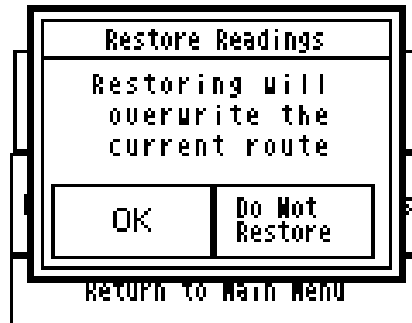
When The Portable Interrogator 400 has completed its work, you will return to the Transfer Files menu.

### Restore Route

Sometimes a route that you have already unloaded to the Route Management software needs to be sent again. For example, you might find that a communication error occurred and the readings in the Route Management software are unusable. Restore Route allows you to transfer the readings from The Portable Interrogator 400 to the Route Management software a second time.

In The Portable Interrogator 400, after you successfully send readings to the Route Management software, the route is removed to make room for a new route. However, The Portable Interrogator 400 stores a backup copy of the route last sent to the Route Management software. If you need to send the readings to the Route Management software again, the Restore Route function will restore the route information, including any gathered meter readings, from The Portable Interrogator 400's backup copy. The backup copy remains in The Portable Interrogator 400 until you send the next group of readings to the Route Management Software. Then that group of readings is held as the new backup.

The Restore Route function begins when you press the Restore Route button. The Portable Interrogator 400 will check to be sure that no new route information has been loaded. If so, The Portable Interrogator 400 will remind you that restoring the old route will overwrite the current route, including any meter readings that might have been gathered.



If you still wish to restore the route, press the OK button. The current route will be removed from The Portable Interrogator 400 and the previous route will be restored. If you do not wish to restore the route, press the Do Not Restore button.

## THE DETAILS – READING METERS WITH THE PORTABLE INTERROGATOR 400

After loading a route, the next step in the reading cycle is to read the meters in the route. To begin reading, press the Read / Program Meters button on the Main Menu. You will see the first account in the route. (If you have pressed the Read / Program Meters button and have read some meters in the route already, when you press the button The Portable Interrogator 400 will display the account that was next to be read in the route when you left the Read / Program Meters function.) The Read screen looks like this.

```
Dolenz Mickey  
111 1ST St.  
T# 2855446  
M# 99000001
```

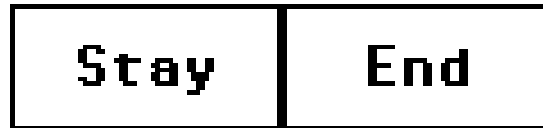
```
TRACE Water Read TC??  
Reading: 520
```

Previous Account	Next Account	Menu
---------------------	-----------------	------

The reading screen display shows customer information in the top section of the screen, and three buttons along the bottom of the screen. The first two of the bottom buttons allow you to browse through the meters in the route. When you press the Previous Account button, The Portable Interrogator 400 will display the meter just before the current one in the route.

If the current meter is the first one in the route and you press the Previous Account button, The Portable Interrogator 400 will ask you if you want to stay at the beginning of the route or if you wish to go to the end of the route.

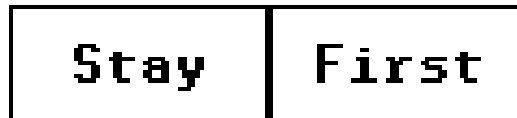
```
First account in route
Press 'Stay' button
  To stay at First
  Account or 'End'
  Button to go to the
  End
```



Pressing the Stay button will keep you at the first meter in the route. Pressing the End button will take you to the last meter in the route.

Similarly, if you press the Next Account button, The Portable Interrogator 400 will display the next meter in the route. If you are viewing the last meter in the route, The Portable Interrogator 400 will ask you if you want to stay at the end of the route or if you want to display the first meter in the route.

```
Last account in route
Press 'Stay' button
  To stay at last
  Account or 'First'
  Button to go to the
  Beginning
```



Pressing the Stay button will keep you at the last meter in the route. Pressing the First button will display the first meter in the route.

### The Reading Menu

Pressing the Menu button will show you the different functions that can be performed.



**READ MENU**

Search	Comments
Manual Read	View Hi/Lo
Program	New Account
Utilities	Main Menu
Back to Read Screen	

The functions are:

- Searching for specific accounts
- Entering comment codes and messages
- Perform a manual read for this meter
- View the High and Low audit limits for this meter (if you have the permission to do so – more on this later)
- Program this meter
- Define a new account
- View Progress, settings, or RF diagnostics via The Portable Interrogator 400 Utilities
- Return to the main menu
- Return to the Read screen

More on these functions later in this section is included below.

Reading Meters

The Read Screen shows specific information about the meter to be read including:

- An account name
- The service address
- The serial number of the TRACE transponder or AMR Reading module
- The serial number of the meter
- The type of meter reading technology in use for this meter (TRACE, DIALOG, or MANUAL)
- The service that this meter is measuring (Water, Gas, Electric, Reclaim, etc.)
- The meter reading (after the reading has been gathered)

Here is an example.

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Dolenz Mickey  
111 1ST St.  
T# 2855446  
M# 99000001

TRACE Water Read TC??  
Reading: 520

Previous Account	Next Account	Menu
---------------------	-----------------	------

In this example, the customer's name is Mickey Dolenz, and he lives at 111 1<sup>st</sup> St.. The transponder ID number is 2855446 and the meter serial number is 99000001. (Note that the order of the name is determined by the Route Management software. If the Route software downloads the last name first, The Portable Interrogator 400 will display the name in that manner. If the Route software downloads the first name first, The Portable Interrogator 400 will display the name in that way.)

#### Starting the Reading Process

To gather a reading for any meter, press either of the READ buttons on the unit above the screen on the left and right sides. If it is more convenient, you can also start the meter reading process by pressing the touch screen anywhere in the customer and meter information area.

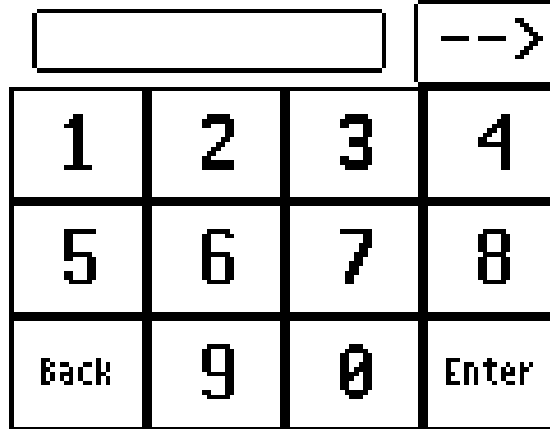
Once the meter reading processing has started (by pressing the screen or one of the READ buttons), The Portable Interrogator 400 will begin the reading process for the AMR technology for this meter.

- For TRACE meters, The Portable Interrogator 400 will interrogate the transponder to gather the meter reading.
- For DIALOG meters, The Portable Interrogator 400 will communicate with the Dialog module through the Dialog reading wand or the Universal Reading wand connected to The Portable Interrogator 400's serial port.
- For meters read manually, The Portable Interrogator 400 will display a numeric keypad to allow you to enter the manual meter reading.

#### Manual Meter Reading

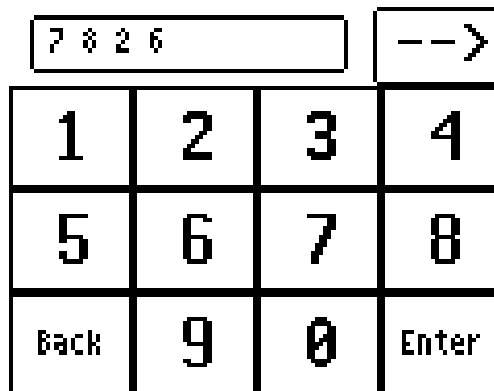
When you press a READ button or the customer area on the read screen for a meter that is read manually, The Portable Interrogator 400 will display a numeric keypad to allow you to enter the meter reading.

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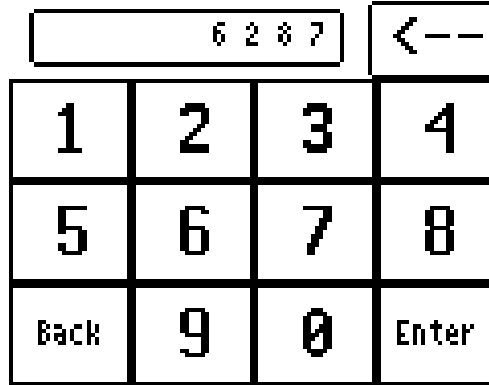
To enter a manual meter reading once the numeric keypad is displayed, view the meter's register and note the reading. Next, enter the reading onto the keypad that is displayed on the touch screen and press the enter key when you are done.

Water meters are typically read from left to right, while electric meters are typically read right to left. The Portable Interrogator 400 can handle meter readings gathered in either direction. When the numeric keypad is displayed, the upper right hand corner of the display shows the direction of the read. An arrow pointing to the right ( --> ) denotes that the meter reading is from left to right. When you enter a meter reading, the reading will be displayed in the box at the top of the display, from left to right. For example, if you entered the reading as 7826 going from left to right, you'd see this screen.



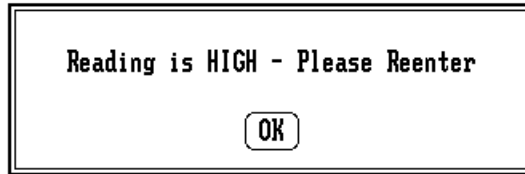
To change the direction of the meter reading, press the arrow. The Portable Interrogator 400 will change the direction of the arrow to pointing to the left ( <-- ). When you enter a meter reading now, the reading will be shown on the display from right to left. Using the same example, if you entered 7826 going from right to left (the arrow pointing to the left), you'd see this screen.

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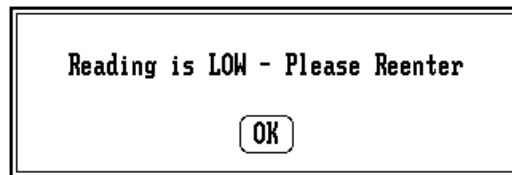


In either case, when the meter reading is completely entered, press the Enter key.

If the reading is within the high and low limits, The Portable Interrogator 400 will record the meter reading and advance the display to the next meter in the route. If the reading is above the high limit or below the low limit, The Portable Interrogator 400 will tell you that the entered meter reading was high or low, and it will ask you to re-enter the reading. This is what you will see if you enter a reading that is above the high limit.

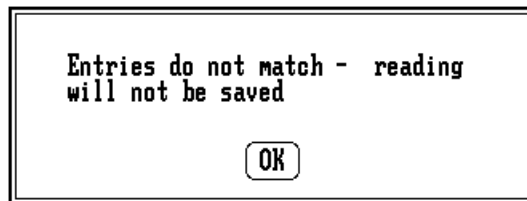


Here is what you will see if you enter a reading below the low limit.



Press the OK button and The Portable Interrogator 400 will display the numeric keypad again. Re-enter the meter reading and press Enter.

If the second meter reading matches the first meter reading, The Portable Interrogator 400 records the reading and displays the next meter in the route. If the two meter readings do not match, The Portable Interrogator 400 will alert you that the two readings are different and will return to the read screen for this meter as if nothing happened.



In this case, the meter reading process begins again for this meter.

### Reading TRACE Meters

Once either of the READ buttons have been pressed, or the touch screen has been pressed in the customer and meter area, The Portable Interrogator 400 begins the reading process. For TRACE meters, The Portable Interrogator 400 interrogates the transponder whose serial number is shown on the Read Screen.

A number of possible results can occur when a transponder is interrogated.

- The transponder receives the transmission and sends its meter reading response, which is received by The Portable Interrogator 400 successfully. The Portable Interrogator 400 reports a successful reading.
- The transponder receives the transmission and sends its meter reading response, but The Portable Interrogator 400 does not successfully receive it. The Portable Interrogator 400 reports a bad response received.
- The transponder receives the transmission and sends its meter reading response, but The Portable Interrogator 400 is too far away for the transmission to be received given the current conditions. The Portable Interrogator 400 reports no response received.
- The transponder is too far away to receive the transmission. As a result it does not respond. The Portable Interrogator 400 reports no response received.
- The transponder receives the interrogation but has lost its programming or has not yet been programmed. The transponder sends its current state as a response. The Portable Interrogator 400 successfully receives the response and reports a Corrupt Data response received.

Note that each successful meter reading response includes the meter reading and the current Tamper status.

In the event that no response is received, one of two conditions has occurred.

- The Portable Interrogator 400 is too far away from the transponder for the transponder to receive the interrogation signal.
- The transponder receives the interrogation signal from The Portable Interrogator 400 but, because The Portable Interrogator 400's transmission power is greater than the transponder's, The Portable Interrogator 400 was not close enough to the transponder to receive the signal.

In either of these cases, getting closer to the transponder and trying the interrogation again may result in receiving the transponder's response.

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Keep in mind that a TRACE transponder's radio transmissions are affected by weather conditions and by the way the transponder was installed. Summer conditions, such as warm humid air and lots of leafy foliage can affect a transponder's response distance. As a result, a transponder's response can be received from a particular spot during one reading cycle, and yet the same transponder's response may not be received in the next reading cycle, even when interrogated from the same spot. Keep this in mind when determining if a transponder is not read on the first attempt. It may just be the weather.

When The Portable Interrogator 400 cannot receive a response from a transponder, it sounds the No Response audio signal and flashes the XMIT light red for three seconds (on-off-on-off-on-off, 1/2second each).

### Processing the TRACE Meter Reading

Once The Portable Interrogator 400 has received a transponder response, it processes the information in a number of steps:

- Determine if the message from the transponder was received correctly
- Determine the tamper status of the transponder
- Determine the reading value reported by the transponder
- Evaluate the reading value against the high and low audit values to determine if the reading is high or low

The Portable Interrogator 400 first analyzes the transponder response to determine if the communication was completed without errors. If an error is found, The Portable Interrogator 400 assigns the status as Bad Response. If no error is found, The Portable Interrogator 400 determines if a tamper was reported by the transponder. If a tamper condition was reported, The Portable Interrogator 400 assigns the correct tamper status. If the transponder is tamper free, the reading is compared to the high and low audit values that were sent to The Portable Interrogator 400 from the Route Management software. If the reading value is greater than the high audit value or lower than the low audit value, The Portable Interrogator 400 assigns either the High Reading or Low Reading status. If the reading is within the audit values, The Portable Interrogator 400 assigns a Good Reading status.

If the reading is within limits, The Portable Interrogator 400 will beep and light the XMIT light green for three seconds to denote a successful completion of the reading process, and advance the display to the next meter in the route. If the reading is high or low, the next step that The Portable Interrogator 400 takes depends on the Settings. One of the choices is to advance to the next meter in the route if the reading is high or low. If the setting is chosen, The Portable Interrogator 400 will advance the display to the next meter. If the setting is not chosen, The Portable Interrogator 400 will keep the current meter displayed. In either case The Portable Interrogator 400 will beep two tones for a high meter reading or three tones for a low meter reading.

On a high or a low reading, The Portable Interrogator 400 will also display a green XMIT light for three seconds to denote a successful reading. If the setting is not chosen to

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advance on a high or low reading, the XMIT light will flash green on and off for three seconds (on-off-on-off-on-off, for ½second each).

Advancing the Display

In the case of a high or low reading, The Portable Interrogator 400 allows you to control the advance of the display through the settings. If there are tasks to perform when a meter reading is high or low (such as dropping off a brochure on finding leaks when a high meter reading is received or checking the meter itself on a low reading or a tamper), not advancing the display allows you to perform the necessary tasks and report information via codes and messages. Once the steps are performed and any necessary codes or messages are entered, you can press the Next Meter button on the display and continue reading the route.

Processing Tamper Reports

If the transponder reports a tamper, The Portable Interrogator 400 will sound the special tamper audio signal and flash the XMIT light yellow three times (on-off-on-off-on-off, ½ second each). The Portable Interrogator 400 then shows you the different options you can choose to respond to the tamper report.

**MODULE TAMPER**  
Please choose on of the  
following options:

Skip	Manual Read
Trouble Code	Retry

Choose one of the four options by pressing the corresponding button.

- Skip – You can skip this meter and go on to the next one in the route. This is a handy option if someone will come back later to do some troubleshooting on the meter or the transponder.
- Manual Read – This option brings up the manual read numeric keypad so that you can enter the reading manually. This is handy if the meter is in a pit, but less helpful if the meter is inside (unless you can access the meter).
- Trouble Code – Using this option you can enter a trouble code to report the status of the meter to the office. See the Trouble Code section for more details.
- Retry – Pressing this button causes the interrogation process to be repeated.

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If you choose Manual Read or Trouble Code, The Portable Interrogator 400 will return to this screen once the reading or code is entered and stored. For example, if you choose Manual Read and you have entered the manual read, The Portable Interrogator 400 will display this screen again to allow you to enter a trouble code. Similarly, if you first pressed the Trouble Code button and entered that code, The Portable Interrogator 400 will display this screen to allow you to enter a manual read.

When you have completed entries for this meter, press the Skip button.

#### Automatic Retry and Tamper Clearing

Two additional The Portable Interrogator 400 settings offer convenience in reading the meters. They are:

- Automatic Retry for meters with a No Response status
- Automatic Tamper Clearing for meters reporting tamper conditions

If you have chosen Automatic Retry in the Settings, and The Portable Interrogator 400 assigns a No Response status, The Portable Interrogator 400 will automatically retry the interrogation a second and third time. If No Response is received after three attempts, The Portable Interrogator 400 keeps the No Response status, sounds the No Response tone, and flashes the XMIT light red three times (on-off-on-off-on-off, 1/2second each).

If you have chosen Automatic Tamper Clearing in the Settings and The Portable Interrogator 400 assigns a tamper status, The Portable Interrogator 400 will automatically attempt to clear the tamper by interrogating the transponder a second time and asking it to clear its tamper. If the tamper is cleared, The Portable Interrogator 400 reports the status as Tamper Reset, shows the green XMIT light, and proceeds to check if the reading is high, low, or within limits. If the tamper is not cleared, The Portable Interrogator 400 reports the status as Tamper Failed to Reset and flashes the XMIT light yellow (on-off-on-off-on-off for 1/2second each).

Note that if you have chosen either the Automatic Retry or the Automatic Tamper Clearing, The Portable Interrogator 400 will not show a status of any kind (audible tones or light) until all of the automatic operations have completed. However, if an automatic operation is in progress, the display will be updated to show that an automatic operation is in progress.

#### Reading Dialog Meters

For interrogating Dialog meters, the reading process is started when either one of the READ buttons are pressed, when the customer meter information area of the touch screen is pressed, or when the DIALOG wand thumb button is pressed. The Portable Interrogator 400 communicates through the wand to the module to receive the meter reading information. The Portable Interrogator 400 follows a similar method of processing a DIALOG meter readings as is used for TRACE meter readings:

- Determine if the message from the module was received correctly



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- Determine the tamper status of the module
- Determine the reading value reported by the module
- Evaluate the reading value against the high and low audit values to determine if the reading is high or low

The Portable Interrogator 400 first analyzes the module response to determine if the communication was completed without errors. If an error is found, The Portable Interrogator 400 assigns the status as Bad Response, sounds the Bad Response tone, and flashes the XMIT light red (on-off-on-off-on-off, ½second each). If no error is found, The Portable Interrogator 400 determines if the module reported a tamper. If a tamper condition was reported, The Portable Interrogator 400 assigns the tamper status. If the module is tamper free, the reading is compared to the high and low audit values that were sent to The Portable Interrogator 400 from the Route Management software. If the reading value is greater than the high audit value or lower than the low audit value, The Portable Interrogator 400 assigns either the High Reading or Low Reading status. If the reading is within the audit values, The Portable Interrogator 400 assigns a Good Reading status.

If the reading is within limits, The Portable Interrogator 400 will beep and display a green XMIT light for three seconds to denote a successful completion of the reading process, and advance the display to the next meter in the route. If the reading is high or low, the next step that The Portable Interrogator 400 takes depends on the Settings you give it. One of the choices is to advance to the next meter in the route if the reading is high or low. If the setting is chosen, The Portable Interrogator 400 will advance the display to the next meter. If the setting is not chosen, The Portable Interrogator 400 will keep the current meter displayed. In either case The Portable Interrogator 400 will beep two tones for a high meter reading or three tones for a low meter reading. The Portable Interrogator 400 will also flash the XMIT light green for three seconds (on-off-on-off-on-off for ½ second each) to denote a high or low reading in which the display is not advanced.

If The Portable Interrogator 400 assigned a tamper status to the reading, The Portable Interrogator 400 will sound the special tamper signal and flash the XMIT light yellow three times (on-off-on-off-on-off, ½second each). The Portable Interrogator 400 then shows you the different options you can choose to respond to the tamper report.

**MODULE TAMPER**  
Please choose one of the  
following options:

Skip	Manual Read
Trouble Code	Retry

Choose one of the four options by pressing the corresponding button.

- Skip – You can skip this meter and go on to the next one in the route. This is a handy option if someone will come back later to do some troubleshooting on the meter or the transponder.
- Manual Read – This option brings up the manual read numeric keypad so that you can enter the reading manually. This is handy if the meter is in a pit, but less helpful if the meter is inside (unless you can access the meter).
- Trouble Code – Using this option you can enter a trouble code to report the status of the meter to the office. See the Trouble Code section for more details.
- Retry – Pressing this button causes the interrogation process to be repeated.

Please refer to the TRACE tamper options section for a complete description of the operation of these buttons.

### Advancing the Display

In the case of a high or low reading, The Portable Interrogator 400 allows you to control the advance of the display through the settings. If there are steps to perform with a meter reading is high or low (such as dropping off a brochure on finding leaks when a high meter reading is received or checking the meter itself on a low reading), keeping the display at the current meter allows you to perform the necessary tasks and report information via codes and messages. Once the steps are performed and any necessary codes or messages are entered, you can press the Next Meter button on the display and continue reading the route.

### Interrogating Meters using Universal Wands

The Portable Interrogator 400 can also read meters using close proximity (touch) automatic meter reading technologies from other manufacturers by using one of two Universal Reading Wands:

- The different reading wands from Metre-Pro Technologies
- The VersaProbe from Logicon

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All of these wands plug into the serial port at the top and back of the case.

The operation of the Universal Wands is nearly the same as the Dialog wand. To start the reading process, push the button on the wand (or push the Metre-Pro wand head into the DIALOG module). The Universal Wand will search for the correct communications protocol to retrieve the meter reading. When the correct protocol is found, the meter reading is gathered and forwarded to XAVAIR.

High and low reading processing occurs when the reading is gathered successfully. Also, if the module reports a tamper condition, the wands will report No Response from the module.

For Universal Wand reads, The Portable Interrogator 400 will respond with the appropriate audio tones and XMIT lights for normal, high, and low readings, and no response, in the same manner as for DIALOG reads.

Verification Readings

In some states, water utilities are required to gather a visual read periodically when using AMR equipment. The Portable Interrogator 400 Verification Read is built to perform this very function. If the Perform Verification Read setting is set, The Portable Interrogator 400 will request a manual reading immediately after every successful reading. This second reading is stored separately and reported to the Route Management software, which will report on any reading differences. Because it is a manual reading, the normal checking for high and low entries will occur. Once the verification reading is entered, The Portable Interrogator 400 will advance the display to the next meter in the route.

Searching

The Portable Interrogator 400 gives you a number of ways to find a particular meter through the searching menu. From the reading menu, press the Search button. The Portable Interrogator 400 will show you the Search Menu.

**Search Menu**

Search Fields	Select Route
Start of Route	Next unread
Return to Read Menu	

There are four different ways to search for a particular meter.

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- Find a meter that has a particular value in one of the four The Portable Interrogator 400 fields (name address, transponder serial number, or meter serial number)
- Find the start of a particular route within The Portable Interrogator 400 (Future)
- Go to the first account in the current route
- Go to the next unread meter in the current route.

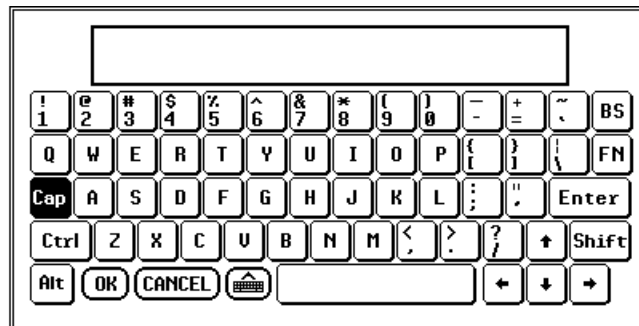
If you wish to go to the start of the current route or the next unread meter in the current route, press the corresponding button. The Portable Interrogator 400 will display the read screen for that meter.

If you wish to find a meter that has a particular name or is at a particular address, press the Search Fields button. The Portable Interrogator 400 will display the Search Fields screen to allow you to specify the information.



Choose what you want to search for by pressing on the name of the field. If you wish to search for someone's name, press Name. If you wish to search for an address, press Address, and so on.

Let's say you want to search for a particular name. After pressing Name, use your Stylus to double-tap (tap the inside of the box twice, quickly) in the box under "What are you looking for?". The Portable Interrogator 400 will display a PC keyboard like this.



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Use your stylus to choose letters in the name you are searching for. You do not need to enter the entire name, just a small section. Let's say that you entered the letters L and A. Use your stylus to press the L and A keys on the keyboard; then press the OK button on the bottom row of the keyboard. The Portable Interrogator 400 will summarize your search like this.

Select field to search	
Name	
Address	
Transponder Number	
Meter Number	
What are you looking for?	
LA	
Search	Search Menu

If this is what you want to search for (a name with the letters LA in it), press the Search button. The Portable Interrogator 400 will display the first account it finds and ask you if this is the one you are searching for.

Search Results

Laine Cleo 999 9TH St. T# 2855446 M# 99000009
--

Is this correct?

Yes	No	Cancel
-----	----	--------

If this is the meter you are looking for, press the Yes button. If this is not the meter you are looking for, press the No button and XAVAIR will continue searching. If you wish to stop the search, press the Cancel button and you will return to the Search Menu.

If The Portable Interrogator 400 cannot find a meter with the information you entered, you'll see this screen.

Account not found
OK

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Searching for a specific address, transponder number, or meter serial number works exactly the same way.

Comments and Trouble Codes

If you find that you need to send information about the meter you are reading back to the office, The Portable Interrogator 400 provides a number of ways to do so. They are:

- The Trouble Code
- The three Comment Codes
- The Text Message

The Trouble Code and Comment Codes are two-digit codes you can define and use to send information back to the office. The Trouble Code is usually used to specify a problem. The Comment Codes are usually used to provide additional information about the meter or the process of reading it. For example, you might enter a Trouble Code that would indicate that the meter needs repair, while the Comment Codes might indicate a vandalism problem.

To log a Trouble Code or one or more Comment Codes, touch the Comments button from the Reading Menu.

**Comments Menu**

Comment Code	Trouble Code
Text Message	Read Menu

From there you can choose the Trouble Code button or the Comment Code button, depending on which code you wish to use. If you choose the Trouble Code, you'll see this screen.

Enter Trouble Code:

1	2	3	4
5	6	7	8
Back	9	0	Enter

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Enter the two digits that correspond to the information you wish to log and press the Enter button. If you enter the code "37" you'd see this screen.

Enter Trouble Code:

1	2	3	4
5	6	7	8
Back	9	0	Enter

After pressing the Enter button, The Portable Interrogator 400 again displays the Comments Menu to allow you to enter additional information if you wish. To return to meter reading, press the Read Menu button.

To enter one or more Comment Codes, press the Comment Code button from the Comments Menu. The Portable Interrogator 400 will display buttons for Comment Codes 1, 2, and 3.

**Comment Codes**

Code 1	<input type="text"/>	<input type="text"/>
Code 2	<input type="text"/>	<input type="text"/>
Code 3	<input type="text"/>	<input type="text"/>
Comment Menu	OK	

Pressing one of the Code buttons brings up a numeric keyboard. Enter the two digits that correspond to the information you wish to log and press the Enter button. The Portable Interrogator 400 again displays the Comment Code Screen showing the code you entered. You can enter additional Comment Codes if you wish.

For example, if you entered code 1 to be 91 and code 2 to be 65, you'd see this screen.

## Comment Codes

Code 1	91
Code 2	65
Code 3	
Comment Menu	OK

When you have completed entering information, press the Comment Menu button to return to the Comment menu. To return to meter reading, press the Read Menu button from the Comment Menu screen and the Back To Read Screen button from the Read Menu.

### Viewing High and Low Audit Values

If you wish to see the high and low audit values, the account number, or the previous reading, from the Read Menu press the View Hi/Lo button. The Portable Interrogator 400 will display the account number for the meter being read, and the high, low, and previous reading values for the meter.

```
Account Number:  
010-0131-TRACE  
High Value:    480  
Low Value:     398  
Previous:      398
```

Return to Read Screen
-----------------------

To return to the Read screen, press the Return to Read Screen button.

In some cases, The Portable Interrogator 400 might not display the high, low, or previous readings. On the Settings screen in the Utilities section, there are two choices that control the display of this screen. The high and low audit values will be displayed if you have chosen the Show High / Low setting. The previous reading will be displayed if you have chosen the Show Previous Reading setting. If these settings are not chosen, you will not be able to view the associated information on the View High/ Low screen. For example, if the settings will show the high and low values but not the previous reading, the screen would look like this.



Account Number:  
010-0131-TRACE  
High Value: 480  
Low Value: 398  
Previous:

Return to Read Screen

Utilities

The Portable Interrogator 400 provides you with a number of functions to provide you with information that can be helpful while meter reading. These functions are accessed from the Read Menu by pressing the Utilities button. Pressing the button brings you this screen.

**Utilities Menu**

Progress	View Settings
Diagnostics	Calculator
Read Menu	

The four functions on the Utilities Menu are:

- Progress – a display of meter reading statistics to help you determine how far along you are in the route
- Diagnostics – when reading TRACE transponders, this screen will show some technical information about the meter reading received that can be helpful when investigating a problem
- View Settings – which displays the settings currently being used by The Portable Interrogator 400
- Calculator – a simple calculator in the event you need one

Progress

The Portable Interrogator 400 keeps records on the total number of meters in The Portable Interrogator 400, the number of meters read, the number of meters that were interrogated but failed to report, the number of tamper reports received, etc. If you wish to view this information, press the Utilities button from the Read Menu followed by the

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Progress button from the Utilities Menu. The Portable Interrogator 400 will display these statistics:

- Total number of meters stored in The Portable Interrogator 400
- Current number of unread meters, including meters in which an attempt to read has not occurred
- The total number of meters that have been read
- The total number of meters whose read attempts have failed
- The percentage of meters of the total meters in The Portable Interrogator 400 that have been read
- The percentage of meters within the current route that have been read
- The number of tamper conditions reported (this total does not include any meters in which the tampers have been reset)
- The number of unexpected manual reads (of meters equipped with automatic meter reading equipment)

The screen looks like this.

```
Total Meters:          1234
Unread Meters:         34
Read Meters            1200
Failed Reads           4
Pct. of Meters         19.5
Pct. of Each Route     12.3
Number of Tampers      7
Unexpected Manual Reads 13
      Touch Screen to Exit
```

When you have finished examining the statistics and information, press anywhere on the touch screen. The entire Progress screen is defined as one button that will return you to the Utilities Menu. To return to meter reading, press the Read Menu button and then the Back to Read Screen button.

### Diagnostics

If you need additional information regarding the results of the interrogation of the last meter, press the Diagnostics button from the Utilities menu. The Portable Interrogator 400 will display the additional TRACE read information that is not required for meter reading:

- Battery Strength
- Signal Strength
- Read Channel

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TRACE Read Data From  
Last Read

BATTERY:	11.2
Signal Strength:	2.3
Read Channel:	C-5

Return to Utilities Menu

To return to the Utilities Menu, press the Return to Utilities Menu button.

View Settings

As mentioned earlier, The Portable Interrogator 400 has the ability to change how it operates or what it displays based on your choices. These choices are called Settings, and are accessed from the Settings button from the Utilities Menu. The Settings are displayed and changed in a series of three screens. Each setting describes a behavior in The Portable Interrogator 400 that you can control. If the box has an "X" in it, The Portable Interrogator 400 will perform that function. If the box has no "X" in it, The Portable Interrogator 400 will not perform the function. Here are samples of the three Settings screens.

SETTINGS SCREEN #1

<input checked="" type="checkbox"/>	Adv. on High/Low
<input type="checkbox"/>	Beep on High/Low
<input type="checkbox"/>	Verification

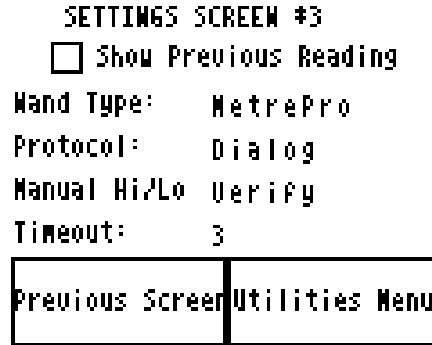
Exit	More Settings
------	---------------

SETTINGS SCREEN #2

<input checked="" type="checkbox"/>	Find on Wrong
<input checked="" type="checkbox"/>	Run Consumption
<input checked="" type="checkbox"/>	Auto Retry
<input type="checkbox"/>	Auto Clear Tamper

Previous Screen	More Settings
-----------------	---------------

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To choose a setting, touch the screen on the empty box and an “X” will appear in the box. To remove a setting, touch the “X” and the box will be cleared.

Here’s the list of each of the different settings and how it controls The Portable Interrogator 400’s operation.

SETTING	WHAT IT DOES	HOW YOU MIGHT USE IT
Advance on High / Low	When a high or low reading is encountered in an interrogated reading and this setting is chosen, The Portable Interrogator 400 will advance the display to the next account. If not chosen, The Portable Interrogator 400 will continue to display the current meter being read.	If you wish to investigate a high or low reading, leave a brochure to the customer, or perform some other function on a high or low reading, clear this setting and choose the next one. You will be alerted to the high and low meters by the audio tones and the display.
Beep on High / Low	When a high or low reading is encountered for a meter that is interrogated and this setting is chosen, The Portable Interrogator 400 will sound the high and low audio signals. If not chosen, The Portable Interrogator 400 will sound the successful read audio tone.	If you wish to investigate a high or low reading, leave a brochure to the customer, or perform some other function on a high or low reading, choose this setting and clear the previous one. You will be alerted to the high and low meters by the audio tones and the display.
Verification	When this setting is chosen, The Portable Interrogator 400 will request a manual reading for each successful reading. This manual verification of the interrogated	If you are required by state law to periodically verify an interrogated meter reading with a visual reading, The Portable Interrogator 400 will

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	reading can be used to satisfy requirements in some states.	request your required visual reading when this setting is chosen.
Find on Wrong	This setting pertains only to touch meter reading. The gathered meter reading information contains the module ID number. If the number is different than the ID number for the current meter on the read screen, The Portable Interrogator 400 will search for the correct meter if this setting is chosen. If the setting is not chosen, The Portable Interrogator 400 will alert you to the fact that the reading indicates that the wrong meter is being read.	This setting is very handy for touch meter reading because it allows you to read meters out of the normal reading sequence. If you need to resequence the route, using this setting you can read the route in the new reading sequence order with ease.
Run Consumption	This setting pertains only to programming modules. When chosen, The Portable Interrogator 400 will request you to run a unit of consumption after successfully programming a transponder or a module. Once the consumption is performed, The Portable Interrogator 400 will request that you again read the meter to verify that the consumption shows on the meter reading.	The setting is useful only when you wish to verify that the meter is registering flow correctly. In almost all cases, you will not need this setting.
Auto Retry	This setting is used for TRACE meter reading only. When this setting is chosen and The Portable Interrogator 400 finds a transponder that has not responded to the interrogation, The Portable Interrogator 400 will automatically retry the interrogation. The Portable Interrogator 400 will perform two retries before setting the meter reading status to No Response.	This setting provides a great convenience when reading TRACE meters, in that retries due to location or weather are performed automatically. The only drawback is that the time to perform a reading is a bit longer when The Portable Interrogator 400 retries the interrogation.
Auto Clear Tamper	This setting is used for TRACE meter reading only. When this setting is chosen and The Portable Interrogator 400 finds a transponder that has responded to the interrogation with a tamper report,	This setting provides a great convenience when reading TRACE meters, in that when a tamper condition is reported, it is one that could not be reset. Such a

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	<p>The Portable Interrogator 400 will automatically interrogate the meter again requesting the transponder to clear its tamper condition. If The Portable Interrogator 400 receives a tamper condition after requesting it be cleared, The Portable Interrogator 400 will set the tamper status to Tamper Failed to Reset.</p>	<p>transponder will require service before it can operate correctly again.</p> <p>To be on the safe side, if a transponder reports that a tamper has been reset, it is a good idea to verify that the meter is operating correctly, and that the reported meter reading matches the odometer reading.</p>
Show Previous Reading	<p>This setting and the next one control the amount of information available to the meter reader. When this setting is chosen, the previous reading value is displayed when the View High / Low button is pressed.</p>	<p>To insure accuracy of the meter readings, some utilities will choose to clear this setting. Other utilities will choose this setting so that if an investigation on the operation of the meter is needed, this information is available. You need to determine which option is right for you.</p>
Show High and Low	<p>This setting and the previous one control the amount of information available to the meter reader. When this setting is chosen, the high and low audit values are displayed when the View High / Low button is pressed.</p>	<p>To insure accuracy of the meter readings, some utilities will choose to clear this setting. Other utilities will choose this setting so that if an investigation on the operation of the meter is needed, this information is available. You need to determine which option is right for you.</p>
Wand Type	<p>This setting is used for Touch meter reading only. This setting selects the type of reading wand used to collect the touch reads.</p>	<p>If you have a problem reading touch meters, check this setting to see that you have the correct reading wand specified.</p>
Protocol	<p>This setting, which is used only when the U.S. Microtel PMR 2000 is used for collecting touch meter readings, specifies the default communications to use when reading a meter. The PMR 2000 will use this protocol first to make</p>	<p>When the PMR 2000 is taking a long time to gather a meter reading, check this value to verify that the most common reading technology in your system is specified.</p>

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	contact with the meter reading module.	
Manual High / Low	This setting specifies the method by which a high or low manual meter reading is verified. If the setting is Verify, The Portable Interrogator 400 will require the meter reader to reenter the manual meter reading to verify that the meter reading is correct. If the setting is View, The Portable Interrogator 400 will display the meter reading and allow the meter reader to visually verify the meter reading. If the entered meter reading matches the actual meter reading, the reader presses the Read Matches button.	This setting is a trade-off of time to perform the meter reading versus the accuracy of the meter reading process. When the Setting is Verify, the meter reader will spend more time reentering the reading than if the setting were View. However, the reading values tend to be more accurate when the readings are verified. You need to determine which method is right for you.
Timeout	This setting controls the amount of time The Portable Interrogator 400 will wait before turning itself off to conserve battery when no activity is occurring.  To turn The Portable Interrogator 400 back on, press the ON button. The Portable Interrogator 400 will resume where it left off.	This setting is a trade-off of convenience and battery life. A shorter timeout value means you will save battery but will need to turn The Portable Interrogator 400 on more often. A longer timeout value means you'll have to turn The Portable Interrogator 400 on less often but will use more battery. You need to determine which method is right for you.

Calculator

If you find you need a calculator, possibly to compute a consumption value, press the Calculator button on the Utilities menu. The Portable Interrogator 400's built in calculator will start. You'll see this screen.

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[ ]			
<b>7</b>	<b>8</b>	<b>9</b>	<b>+</b>
			<b>-</b>
<b>4</b>	<b>5</b>	<b>6</b>	<b>*</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>/</b>
			<b>.</b>
Clear	<b>0</b>	Exit	<b>=</b>

Simply enter the first number and press the function button you wish

- Add – by pressing the “+” button
- Subtract – by pressing the “-“ button
- Multiply – by pressing the “\*” button
- Divide – by pressing the “/” button

Note that decimal numbers can be entered using the decimal point button. Next enter the second number and press the Equal sign button. The Portable Interrogator 400 will display the result in the box.

Let’s do an example. Enter “355” and press the divide by ( / ) key. Next, enter “113” and press the equal sign. You should see this screen.

3.14159292			
<b>7</b>	<b>8</b>	<b>9</b>	<b>+</b>
			<b>-</b>
<b>4</b>	<b>5</b>	<b>6</b>	<b>*</b>
<b>1</b>	<b>2</b>	<b>3</b>	<b>/</b>
			<b>.</b>
Clear	<b>0</b>	Exit	<b>=</b>

Pressing the Exit button will return you to the Utility Menu.

Transferring the Settings to The Portable Interrogator 400 via CONNECT

If you are using CONNECT, The Portable Interrogator 400 settings can be chosen from the Load Collector Page. CONNECT will download the settings to The Portable Interrogator 400 when the route information is downloaded.



**Note that, if the Collector type in CONNECT is chosen to be PI, the settings will not be sent to The Portable Interrogator 400. The Portable Interrogator 400 will operate on the settings that it currently stores.**

Entering New Accounts

The Portable Interrogator 400 can add accounts to the list of stored accounts it received from the Route Management software. But before you add a new account in The Portable Interrogator 400, be sure that your Route Management software and your billing system can process the new account. Both systems must be able to add new accounts from a file of meter readings in order to take advantage of the adding of a new account within The Portable Interrogator 400.

If you need to enter a new account into The Portable Interrogator 400, press the New Account button from the Read Menu.

Search	Comments
Manual Read	View Hi/Lo
Program	New Account
Utilities	Main Menu
Back to Read Screen	

Pressing the New Account button will bring up this screen.

Name	Address	Trans #	
Exit	OK	Clear	Read

The buttons perform these functions.

- Name – Enter the name for the new account
- Address – Enter the service address for the customer

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- Trans # – Enter the transponder number if this is a TRACE account, or the Dialog module number if this is a DIALOG account
- Exit – Return to the Read Menu (if you have not saved the new account information, the new account will not be added to the route list)
- OK – Saves the new account information in the route list, and clears the entries
- Clear – Clear the name, address, and transponder number fields
- Read – Perform a reading of the meter for this account (TRACE only)

Pressing the Name, Address, or Trans # buttons will produce the same result. A special keyboard screen will be displayed to allow you to enter alphanumeric information into the field. It looks like this.

Space			Back
A	B	C	J - R
D	E	F	S - Z 0 - 9
G	H		Enter

Pressing any of the letter buttons displays that letter in the top center window. Pressing the space button adds a space. If you wish to use the letters J through R, press the “J-R” button; if you wish to use the letters “S-Z” or the numbers 0 to 9, press the “S-Z / 0-9” button. If you want to delete the last letter or number entered into the window, press the Back button. When you have completed the entry, press the Enter button, and you will return to the New Account screen with the field filled in with your entry.

If you have entries for a new account for name address and transponder number, your New Account screen might look like this.

GENERAL HOSPITAL			
10 MAIN ST.			
3322147			
Name	Address	Trans #	
Exit	OK	Clear	Read

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Pressing the OK button will add the account to the route list and clear the fields. Pressing Exit before pressing OK will return you to the Read menu but you will be able to reenter the New Account screen and the information remains on the screen. The information will remain on the screen until the OK or Clear buttons are pressed, or when The Portable Interrogator 400 sends its readings to the Route Management software.

If you press the OK button and return to the Read screen, you will return to the place in the route where you left off. At the end of the route you will see the new account you added. In our example above, the read screen for the new account would look like this.

```
GENERAL HOSPITAL  
10 MAIN ST.  
T# 3322147
```

```
TRACE Service Read TC  
Reading:
```

Previous Account	Next Account	Menu
---------------------	-----------------	------

Summary of the Meter Reading Process in The Portable Interrogator 400

The process of meter reading using The Portable Interrogator 400 is simple and easy to remember. Here's a summary of the steps in the meter reading process that includes the buttons you need to press to perform The Portable Interrogator 400 function.

- Choose the route or routes you wish to read in the Route Management software
  - No The Portable Interrogator 400 function is needed for this step
- Transfer the route or routes to The Portable Interrogator 400 via the serial communications
  - Transfer Routes from The Portable Interrogator 400 Main Menu
  - Receive Route from the Transfer Routes Menu
  - When the transfer is complete, Return to Main Menu from the Transfer Files menu
- Read the meters in the route or routes
  - Read / Program Meters from The Portable Interrogator 400 Main Menu
  - Press either of the Read buttons or the upper portion of the Read Screen to perform a meter reading
  - Change to a different meter in the route using the Next Meter and Previous Meter buttons
  - Press the Menu button to choose the different reading functions you might need to perform

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- When finished, transfer the readings from The Portable Interrogator 400 back to the Route Management software via the serial communications
  - Transfer Routes from The Portable Interrogator 400 Main Menu
  - Send Readings from the Transfer Routes Menu
  - When the transfer is complete, Return to Main Menu from the Transfer Files menu

## THE DETAILS – PROGRAMMING METERS USING THE PORTABLE INTERROGATOR 400

The Portable Interrogator 400 can program TRACE transponders and DIALOG modules. Regardless of the technology you are using for meter reading, the programming process usually occurs in one of these ways.

- The meters to program are listed on one or more work order sheets and the sheets are filled out when the installation and programming of the transponder is completed.
- The meters to program are included in the computerized work order system and the installation information is entered into the work order system.
- The meters to program are loaded into The Portable Interrogator much like a route is loaded for reading.

In most cases, the first two methods are used. In some cases, the third alternative is most convenient. You need to determine which system is best for you. The Portable Interrogator 400 can handle all of these methods for programming transponders and modules.

### Programming with a list of TRACE meters loaded in The Portable Interrogator 400

If you choose to load the meters to program into The Portable Interrogator 400, use the Transfer Routes screen and the Receive Route function to load the meters much like you would load a route for meter reading.

**MAIN MENU**

Read/Program Meters	Logout
Transfer Routes	Quick Read

07/20/2000 13:36:00

To program a transponder, from The Portable Interrogator 400 Main Menu first press Read / Program Meters to display the first meter in the list for programming. To begin programming the meter, press the Menu button to display the Read Menu.

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READ MENU

Search	Comments
Manual Read	View Hi/Lo
Program	New Account
Utilities	Main Menu
Back to Read Screen	

Then press the Program button. You'll see this screen.

Enter Transponder Number:

Program Reading to:

Program

Read Menu

Each transponder must be prepared to receive the programming transmission. For new transponders, you must place a magnet on the Programming switch. For older transponders, you must connect a special jumper on the transponder to enable the transponder to receive the programming message. Please consult the technical brief for your model of transponder for the exact procedure for preparing the transponder to be programmed.

To set the transponder ID that you will be programming, press the Enter Transponder Number button. The Portable Interrogator 400 will display the numeric keypad, allowing you to enter the ID number of the transponder you are programming. Use the Back button to erase an incorrect entry. When the ID number is correct, press the Enter button.

To set the reading value to which the transponder will be programmed, press the Program Reading To button. The Portable Interrogator 400 again displays the numeric keyboard to allow you to enter the initial reading. For TRACE transponders, enter the full 6 digits of the odometer as well as the position of the sweep hand to build a 7 digit reading. For DIALOG modules, enter the six odometer digits only.

Here's an example. If you want to program transponder number 3212345 to have a value of 7691, the programming screen would look like this.

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Enter Transponder Number:	
3 2 1 2 3 4 5	
Program Reading to:	
7 6 9 1	
Program	Read Menu

When you press the Program button, The Portable Interrogator 400 will send the programming transmission to the transponder. The Portable Interrogator 400 will interrogate the transponder to verify that the programming was successful and will then display the results of the programming. Here's an example of the programming results.

When you have recorded the results that you choose, press the touch screen anywhere. The Portable Interrogator 400 will display the read screen for this meter. You are now ready to proceed to the next meter requiring programming.

#### Programming using a Work Order System

Because the Work Order system holds all the information required for installation, The Portable Interrogator 400 is only used to program the transponder. No information is loaded into The Portable Interrogator 400 before programming any transponders.

Be sure to prepare each transponder to receive the programming transmission by using either the magnet or the special jumper. Please consult the technical brief for your model of transponder for the exact procedure for preparing the transponder to be programmed.

When you are ready to program a transponder, press Read / Program Meters from The Portable Interrogator 400 Main Menu. Because no meters are loaded, The Portable Interrogator 400 will display the Read Menu. Press the Program button and enter the transponder ID and the initial reading as described above. Press the Program button to program the transponder in the manner described above. The Portable Interrogator 400 will program the transponder and verify it by performing an interrogation.

#### Programming DIALOG modules

Programming DIALOG modules is nearly the same as programming TRACE transponders, regardless of whether you use a Work Order system or you wish to load the meters for programming into The Portable Interrogator 400. The procedure is the same:

- Enter the DIALOG module number to be programmed
- Enter the 6 digit odometer reading to be programmed
- Press the Program button or press the thumb button on the DIALOG wand

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- The Portable Interrogator 400 will program the DIALOG module and verify the programming by performing a read



## THE DETAILS – OTHER USES FOR THE PORTABLE INTERROGATOR 400

The Portable Interrogator 400 can be used to perform a number of functions other than reading a route of meters.

- Read a transponder whose ID number you do not know
- Read a transponder whose meter reading you need for a special use (such as testing and troubleshooting, gathering a final meter reading, etc.)
- Interrogate a transponder to verify that it is working

Some of these functions are performed at customer sites while others are usually performed in the meter shop. But they all use The Portable Interrogator 400 Quick Read function.

The Quick Read function allows you to read one meter at a time without having a route loaded in The Portable Interrogator 400. Quick Reads can be performed by interrogating TRACE transponders or by reading Dialog modules. The Portable Interrogator 400 gathers the meter reading and displays the result on the touch screen. **The Portable Interrogator 400 does not store the reading information and cannot send any Quick Reads back to the Route Management software.**

The most common uses of the Quick Read feature are:

- Gathering a reading from one or more transponders when creating a route to get these readings is not practical, such as for final readings
- Interrogating a transponder when troubleshooting or testing at a customer's site
- Interrogating a transponder whose ID number you do not know or are not sure of
- Interrogating one or more transponders that are about to be installed at customer sites, to verify that they are working correctly
- Testing a newly installed transponder

The Quick Read Menu is accessed from The Portable Interrogator 400 Main Menu, and looks like this.

**Quick Read**  
Select read type:

<b>Trace</b>	<b>Dialog</b>
<b>Return to Main Menu</b>	

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The Quick Read Choice screen allows you to perform TRACE Quick Reads or DIALOG Quick Reads by pressing the TRACE or DIALOG buttons.

TRACE Quick Reads

The TRACE Quick Read process follows these steps:

- Enter the ID number of the transponder you wish to interrogate
- Press the READ button
- Record the reading that is displayed

The screen looks like this.

Trace Quick Read

Transponder #	<input type="text"/>
Reading:	<input type="text"/>
Quick Read Menu	<b>Read</b>

To enter the transponder ID number, press the Transponder button. The Portable Interrogator 400 will display the numeric keypad. Enter the ID number (use the Back button to erase an entry) and press the Enter button when done. The Portable Interrogator 400 displays the TRACE Quick Read screen with the transponder ID number displayed. For example, if the transponder you want to interrogate has ID number 3876239, the quick read screen would look like this.

Trace Quick Read

Transponder #	3876239
Reading:	<input type="text"/>
Quick Read Menu	<b>Read</b>

To perform the interrogation process, press the Read button. The Portable Interrogator 400 will interrogate the transponder and display the reading results in the Reading box.

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Trace Quick Read

Transponder #	3876239
Reading:	2334455
Quick Read Menu	Read

Note that the reading displayed is the full six-digit odometer plus the numeric location of the sweep hand.

If the transponder reports a tamper condition, The Portable Interrogator 400 will display the tamper condition in the Reading box. Once displayed, you can record the reading in any convenient manner you choose.

TRACE Wild Card Read

If you do not know the transponder ID of a module, you can still perform a TRACE Quick Read without specifying the transponder ID number. This process is called a Wild Card Read. If the transponder ID is not specified on the Quick Read screen, The Portable Interrogator 400 will transmit the interrogation but at a very low power. As a result, you must position The Portable Interrogator 400 antenna as close to the transponder as possible before pressing the Read button. The display will show the transponder ID as well as the reading.

Checking Transponders before Installation

When you receive a shipment of transponders, or when you are ready to install a set of transponders, you can use the Quick Read function to verify that the transponder is operating. But it can be tedious entering transponder ID after transponder ID, so The Portable Interrogator 400 offers you another way to enter that information.

For transponders you have just received or are ready to install, each of the IDs is bar coded on a label on the outside of the box. Using the optional bar code scanner connected to the serial port, The Portable Interrogator 400 will accept the transponder ID from the scanner and immediately interrogate the transponder and display the results.

To verify that transponders are operating, follow this simple procedure.

- Display The Portable Interrogator 400 TRACE Quick Read screen
- Connect the bar code scanner to The Portable Interrogator 400's serial port
- Read the transponder number from the bar code on the side of the shipping box by squeezing the trigger on the bar code reader while lining the scan line on the bar code you want to read

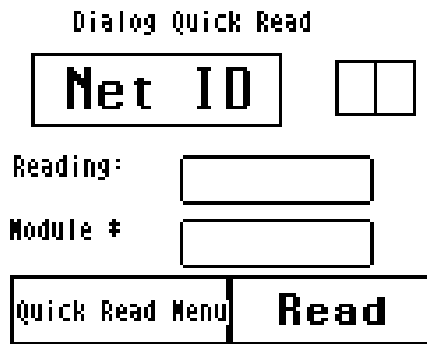
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The Portable Interrogator 400 will perform the quick read and display one of these results:

- The reading will be displayed in the reading box, and the successful audio tones will be sounded.
- The tamper status will be displayed in the reading box and the tamper audio tones will be sounded.
- No Response will be displayed in the reading box and the no response audio tones will be sounded.

DIALOG Quick Read

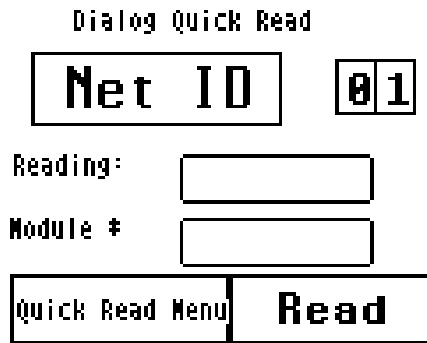
The Dialog Quick Read screen is very similar to the TRACE Quick Read screen.



The DIALOG Quick Read process follows these steps:

- Enter the Network ID number of the module you wish to interrogate
- Press the READ button or the thumb button on the DIALOG wand
- Record the reading and or the module number that is displayed

To enter the network ID number, press the Net ID button. The Portable Interrogator 400 will display the numeric keypad. Enter the Network ID number (use the Back button to erase an entry) and press the Enter button when done. (Remember that the network ID must be between 1 and 63.) The Portable Interrogator 400 displays the DIALOG Quick Read screen with the Network ID number displayed.



To perform the interrogation process, press the Read button on the screen or press the thumb button on the DIALOG wand. The Portable Interrogator 400 will interrogate the

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module and display the module number and the reading results in the appropriate boxes and sound the successful read audio tone. If the module reports a tamper condition, The Portable Interrogator 400 will display the tamper condition in the Reading box and sound the tamper audio tone. If no response is received, The Portable Interrogator 400 will display No Response in the reading box and sound the no response audio tone. Once the read status is displayed, you can record the reading in any convenient manner you choose.

If the module does not respond, two possible problems are occurring. First, the network ID of the module may not be the network ID that The Portable Interrogator 400 is using. You may want to use other network ID values and try the Quick Read again. The other possible problem is that the module is not communicating correctly.

## WHAT IF THINGS GO WRONG

During the normal course of operations, The Portable Interrogator 400 may run into problems. These problems can occur in a number of different areas:

- The Portable Interrogator 400 finds information in the route that it was not expecting
- The Portable Interrogator 400 finds no information in the route, but was expecting to find something
- The operating system on The Portable Interrogator 400 reports a problem

While errors do not occur normally, errors can happen in any software product. This section gives you guidelines on how to respond to the times when The Portable Interrogator 400 reports a problem.

### Questions

If The Portable Interrogator 400 displays something very different or strange, there is no need to panic. Although the information on the touch screen means little to you, it means a great deal to the software engineers at Badger Meter. Record the information on the screen and call the Badger Meter Technical Support telephone number: 1-800-456-5023. The technical support specialist will help you gather any additional information, and will assist you in restarting The Portable Interrogator 400. Your telephone call will alert the software engineers to your problem, who will investigate to find the cause of the problem.

It is also very helpful for you to record the situation that led to the strange behavior. Record the steps you took, and the entries you made, that brought about the display. This information will be very valuable in the investigation, and will help find the solution more quickly.

### When You Call the Technical Support Hotline

When you call the 800 technical support number, a support specialist will answer. Explain the situation that you find yourself in, and go over the information you recorded. This is where your notes on the display or the behavior and the steps you took will be very valuable. If possible, give this information to the support specialist:

- The Portable Interrogator 400 screen that was active
- The steps being performed at the time
- Any entries that were made on the screen
- Any error message displayed, including any error code or explanation that is shown
- The current state of The Portable Interrogator 400

Your support specialist may ask you to fax notes or other information to Badger Meter to assist in the investigation.

### What To Report To Technical Support

It is important that you report all occurrences of errors to the Technical Support Hotline. It allows Badger Meter to improve its products and improve your system at the same time. In some cases, the problem may have already been solved, and the Specialist can send you a software upgrade to correct the problem. In other cases, the Specialist can direct you to perform a function in a certain way so that the error does not occur.

In some cases, the Specialist will direct you to perform some steps if the problem happens again. This is very valuable information that will speed the investigation of the problem. If the problem does happen again, please follow those steps and call the Hotline. The Specialist will gather the information for that particular problem, and direct you if further action is needed.

### Faxing the Technical Support Group

The Badger Meter Technical Support Group can also be reached by fax at 1-888-371-5982. This may be a convenient way to follow up with your support specialist on particular steps. The number is available 24 hours per day, 7 days per week.

### E-Mailing the Technical Support Group

The Badger Meter Technical Support Group is also available via electronic mail through the Internet. To send questions or comments to the Technical Support group, address your e-mail to [TechSupport@BadgerMeter.com](mailto:TechSupport@BadgerMeter.com). The Technical Support Group can respond to your comments or questions via phone, fax, or e-mail. Just let us know in your message the type of response you would prefer.