Badger Meter

ORION®

Mobile Reading System (ORS) 2.5

ORI-UM-00039-EN (August 2014 FCC Draft)

User Manual

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APPENDIX

INTRODUCTION

The ORION® Mobile Reading System (ORS) 2.5.x is a software application designed for utility meter route reading using the Panasonic® Toughbook® laptop computer. This manual is the guide for using the software application.

About ORS

ORS is an automated route meter reading system that incorporates a global positioning system (GPS) to display the location of the reading vehicle on a map while reading meters. ORS is also a geographic information system (GIS) that displays meter reading information. The laptop connects to a radio frequency-controlled ORION FHSS mobile transceiver and/or mobile receiver.

Endpoint Solutions

- The ORION Fixed Network (SE) endpoint is a full functioning two-way water endpoint for use in either mobile or fixed network mode of operation. Once installed, ORION Fixed Network endpoints operate in mobile mode and automatically transition to fixed network mode of operation once ORION network gateway transceivers and ReadCenter® software are deployed. ORION Fixed Network endpoints automatically transition to a backup mobile mode of operation if the network is disrupted for a period of time.
- The ORION Migratable (ME) endpoint is a full functioning two-way water endpoint for mobile applications with the capability of migrating to fixed network mode to support future utility growth. In addition to providing the current reading, the ORION Migratable endpoint's two-way functionality allows users to capture data profile information wirelessly, without having to access the endpoint during the normal reading process. See *"Two-Way Communications" on page 57* for additional information.
- The ORION Classic (CE) endpoint is a one-way endpoint designed for mobile meter reading. ORION Classic endpoints support data profile and can be transitioned to fixed network application through approved electric connectivity partner solutions, or with strategic deployment of ORION gateway 4.0 and 2.0 receivers.

The FHSS mobile transceiver and receiver capture meter readings from endpoints installed on each meter. Meter information is then captured by the laptop system and displayed on the laptop screen.

Examples of displayed information are:

- Meter serial number
- Unread uncaptured meter information
- Meter and reading vehicle location
- Water meter leakage and tampering

Compatibility

This manual is written for ORS 2.5.x, and is compatible with Badger Meter reading data management software which acts as an interface between the utility's billing software and the meter reading devices. ORS will load route information *from* the reading data management software and unload meter information *to* the reading data management software.

Audience and Purpose

This manual is intended to be used by field technicians for collecting accurate utility meter readings from homes and businesses using ORS from the convenience of their vehicles.

The contents of this manual are accessible through the interactive ORS **Help**. Click the **Help** button on the ORS main tool bar to access the manual.

NOTE: Instructions for installing ORS software can be found in the *ORION Mobile Reading System Software Installation Manual*, available at *www.badgermeter.com*.

About This Manual

The ORION Mobile Reading System (ORS) user manual has three main parts:

- **Getting Started**
  The first part of the manual covers basic information including equipment set up, how to start and exit the software application, and how to set the COM ports for the equipment connected to the computer.
- **User Guide**
  The User Guide is the main part of the manual that includes process details and step-by-step procedures for using the software to read meters.
- **Appendix**
  Refer to the Appendix to find a glossary of terms used in this manual, as well as troubleshooting and technical support information.

NOTE: To provide the best solution for our customers, Badger Meter continually improves software programs and periodically updates this manual to reflect upgrades. Therefore, some discrepancies may be detected between the installed software and this manual.

Typographic Conventions

- Items on the software screens that you will be asked to select or choose by clicking a button, highlighting, checking a box or another similar means are in **bold** text and capitalized in the manual.
  Example: Click once on the **View Report** button.
- Names of options, boxes, columns and fields are *italicized*. In most cases, first letters will be capitalized.
  Example: The value displays in the *Status Information* field.
- Messages and special markings are shown in quotation marks.
  Example: "Service Stopped" is shown on the display.

NOTE: Names, addresses and other customer-related information displayed in screen examples were created for demonstration purposes in this manual. No actual customer information is included.

Product Unpacking and Inspection

Upon opening the shipping container, visually inspect the product and applicable accessories for any physical damage such as scratches, loose or broken parts, or any other sign of damage that may have occurred during shipment.

NOTE: If damage is found, request an inspection by the carrier's agent within 48 hours of delivery and file a claim with the carrier. A claim for equipment damage in transit is the sole responsibility of the purchaser.

License Requirements

ORION meter reading systems comply with Part 15 of FCC Rules. Operation of the ORS is subject to the following conditions: (1) The ORION meter reading systems may not cause harmful interference, and (2) the ORION meter reading systems must accept any interference received, including interference that may cause undesired operation.

In accordance with FCC Regulations, "Code of Federal Regulations" Title 47, Part 2, Subpart J, Section 1091, transmitters (endpoints) pass the requirements pertaining to RF radiation exposure. However, to avoid public exposure in excess of limits for general population (uncontrolled exposure), a 20 centimeter distance between the endpoint and the body of the user must be maintained during testing.

No FCC license is required by a utility to operate an ORION meter reading system.

ORION meter reading systems comply with Industry Canada license-exempt RSS standard(s). Operation is subject to the following two conditions: (1) they may not cause interference, and (2) they must accept any interference, including interference that may cause undesired operation of the device. Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:
(1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Any changes made, but not approved by Badger Meter, can void the user's authority to operate the equipment.

GETTING STARTED

SYSTEM COMPONENTS

Figure 1: USB-powered mobile transceiver, magnetic mount antenna and Panasonic Toughbook

Components of the ORION Mobile Reading System

- Panasonic Toughbook laptop computer with touch screen, DVD multi-drive and built-in GPS receiver
- Laptop AC power supply and DC power supply (not shown)
- ORS 2.5.x software, pre-installed on the Panasonic Toughbook

  NOTE: ORS 2.5.x is compatible with Panasonic CF-31 and CF-30 Toughbook laptop computers.
- ORION USB-powered mobile transceiver (pictured) and/or ORION mobile receiver with DC power supply (not shown)
- ORION mobile transceiver-to-laptop USB communication cable, or ORION mobile receiver-to-laptop nine-pin serial communication cable (not shown)
- 90 degree antenna connector
- Magnetic mount antenna
- Dual-socket adapter (not shown)
- Optical programming cable (not shown)
- Shipping and carrying case (not shown)

Toughbook Touch Screen

In addition to using a standard mouse or keyboard commands, the Panasonic Toughbook is also equipped with a touch screen. If you are using the software on a Toughbook computer, touch the screen using the stylus tool contained in the handle of the laptop to make a selection, or simply tap the screen with your finger. The laptop screen is sensitive enough to allow selecting with a tap even if you are wearing gloves. Throughout this manual, the term "click" is interchangeable with "tap."

Vehicle and Laptop Setup with ORION USB-Powered Mobile Transceiver Only

To set up the vehicle for meter reading using an ORION USB-powered mobile transceiver, follow these steps.

1. Place the magnetic mount antenna on the vehicle roof. Ensure that the free area around the base of the antenna equals the antenna height.

   NOTE: The antenna must be at least two feet away from other antennas and the cable must be in good condition.

2. Connect the antenna cable to the top of the mobile transceiver and tighten until snug.
3. Power on the laptop.
4. Plug the small end of the communication cable into the top of the mobile transceiver and the larger end into an available USB port on the laptop. Always connect it to the same USB port if possible.
5. Start the ORS software.

NOTE: Go to Device Manager on the laptop to verify that the mobile transceiver USB connection is recognized. If Windows does not recognize the mobile transceiver USB connection, disconnect the mobile transceiver from the USB port and contact Badger Meter Technical Support. Have your ORS 2.5.x DVD available when you call.

Vehicle and Laptop Setup with ORION Mobile Receiver Only

To set up the vehicle for meter reading using an ORION FHSS mobile receiver, follow these steps.

1. Place the magnetic mount antenna on the vehicle roof. Ensure that the free area around the base of the antenna equals the antenna height.

   NOTE: The antenna must be at least two feet away from other antennas and the cable must be in good condition.

2. Connect the antenna cable to the top of the mobile receiver and tighten until snug.
3. Power on the laptop.
4. The mobile receiver requires a DC power source to operate. Plug the mobile receiver DC power supply into the bottom of the mobile receiver and plug the other end into the vehicle's interior DC power source (utility or cigarette lighter).
5. Plug the communication cable into the top of the mobile receiver and the nine-pin serial end into the serial port on the laptop.
6. Switch ON the mobile receiver.
7. Start the ORS software.

IMPORTANT

Best practice recommends you always power on the laptop and connect the mobile transceiver (and/or mobile receiver) before you start the software. If you need to reboot the laptop, disconnect the mobile transceiver (and/or receiver) and then reboot the laptop. After the laptop reboots, reconnect the mobile transceiver (and/or receiver) power before you start the software.

NOTE: Refer to the ORION USB-Powered Migratable (ME) Mobile Transceiver and ORION Mobile Receiver product data sheets, available at *www.badgermeter.com*, for status indicators and replacement parts.

Vehicle and Laptop Setup with ORION USB-Powered Mobile Transceiver and ORION Mobile Receiver

Follow the steps on the previous page to set up the vehicle to use both an ORION USB-powered mobile transceiver and an ORION mobile receiver for mobile reading. Setup with both a transceiver and receiver should resemble *Figure 2* below.

NOTE: To ensure the communication (COM) ports are set up correctly for the mobile transceiver and receiver, refer to *"Communications Tab" on page 44*.

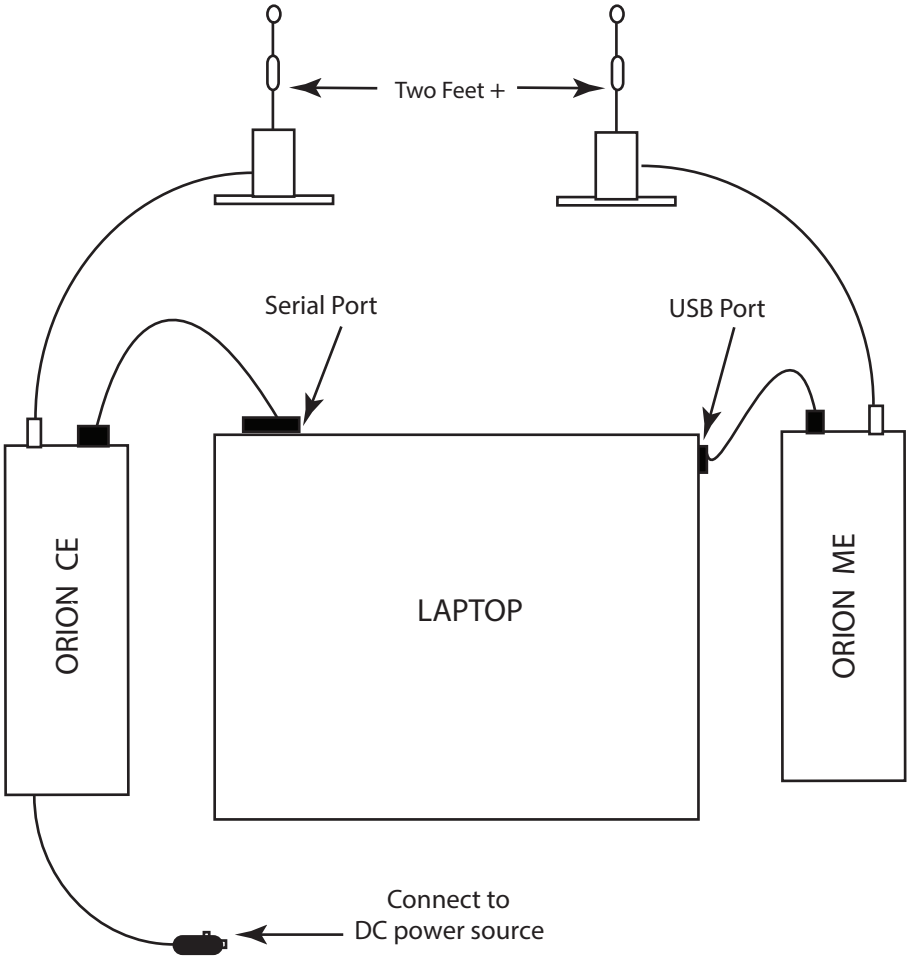


Figure 2: Set up with ORION USB-powered mobile transceiver and ORION mobile receiver

PROGRAM STARTUP / EXIT

NOTE: Close any other open ORION software application before starting up the ORS software application.

Starting the Software

1. Power on the laptop.
2. Switch on the mobile transceiver and/or receiver.
3. Type **orion** in the log in window.
   Result: The Windows® desktop is displayed.
4. Double-click the ORION ORS desktop icon shortcut (*Figure 3*).

Figure 3: Software desktop icon

Alternatively, you can initialize the software and start the program by clicking the **Windows Start** button in the lower left corner of the main task bar on the Windows desktop and selecting **All Programs> Badger Meter Inc> ORS**.

Result: The initial software Login screen opens. See Figure 6 on the next page.

Exiting the Software

1. To close and exit the software application, click **Exit** on the main menu.

Figure 4: Main menu

2. Click **OK** when you see the message asking you to confirm you want to exit.

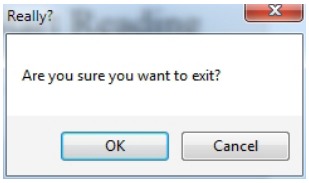


Figure 5: Confirm exit

Login Screen

The Login screen (*Figure 6*) is the initial screen that opens when you launch the ORS software application. Below the software copyright date, you will see the state for which maps are loaded. A warning message alerting the meter reader to the dangers of watching the ORS screens while driving is displayed prominently on the screen.

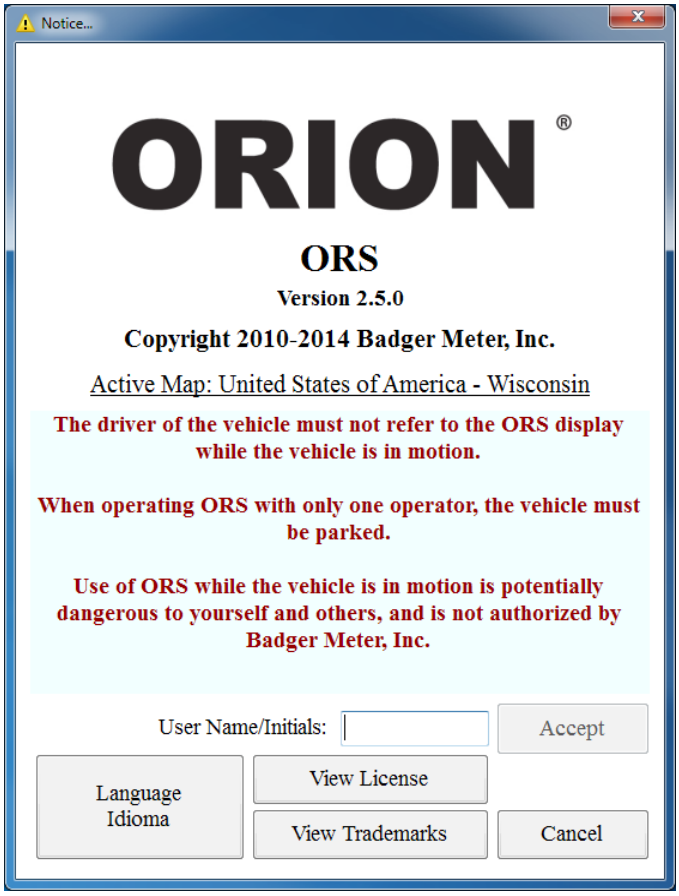


Figure 6: Login screen

1. In the *User Name/Initials* field, enter your three-character initials or another three-character, alphanumeric code as designated by your utility. For example, JAS, 123, TR1. The *User Name/Initials* must be entered by an authorized representative of the customer/licensee.

   A warning message in red on the Login screen alerts the meter reader to the dangers of watching the ORS screens while driving. By entering your *User Name/Initials* and selecting **Accept**, you are acknowledging the warning message.

   - Click **View License** to read the software license agreement (*Figure 7*).

   NOTE: The first time you access the software, the License screen opens automatically on top of the Login screen. Read the software license agreement and click **Accept License**.

   The License Agreement must be accepted by an authorized representative of the customer/licensee. The License screen closes automatically and the Login screen is shown.

   - Click **Language Idioma** to choose the appropriate language if other than English (*Figure 8*).
   - Click **View Trademarks** to see the Badger Meter trademark language (*Figure 9*).

2. Click **Accept** to acknowledge the warning message (see step 1) and start the software or click **Cancel** to close and exit the program.

   If the system detects that the communication (COM) ports are not properly set, a warning message will display. You must set the COM ports to proceed. See *"Communications Tab" on page 44*.

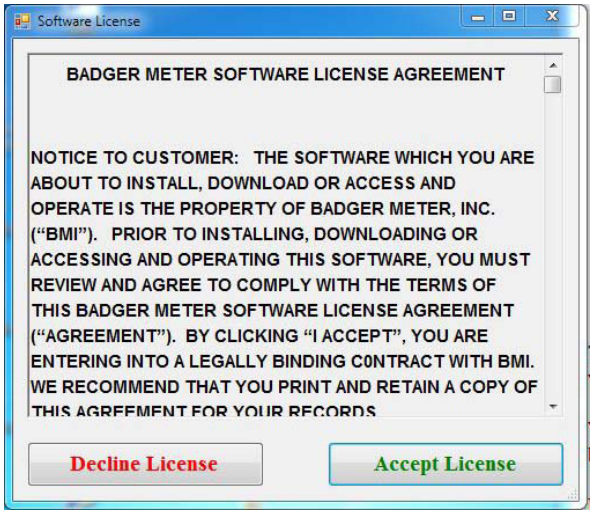


Figure 7: Software License Agreement

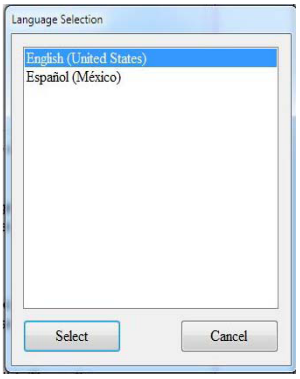


Figure 8: Language Selection screen

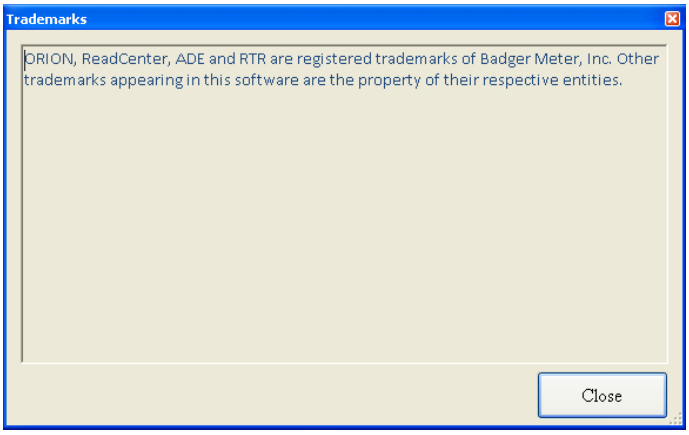


Figure 9: Trademarks screen

Main Screen

After the Login screen, the main ORS screen appears, displaying the main menu, tool bar and status bar.

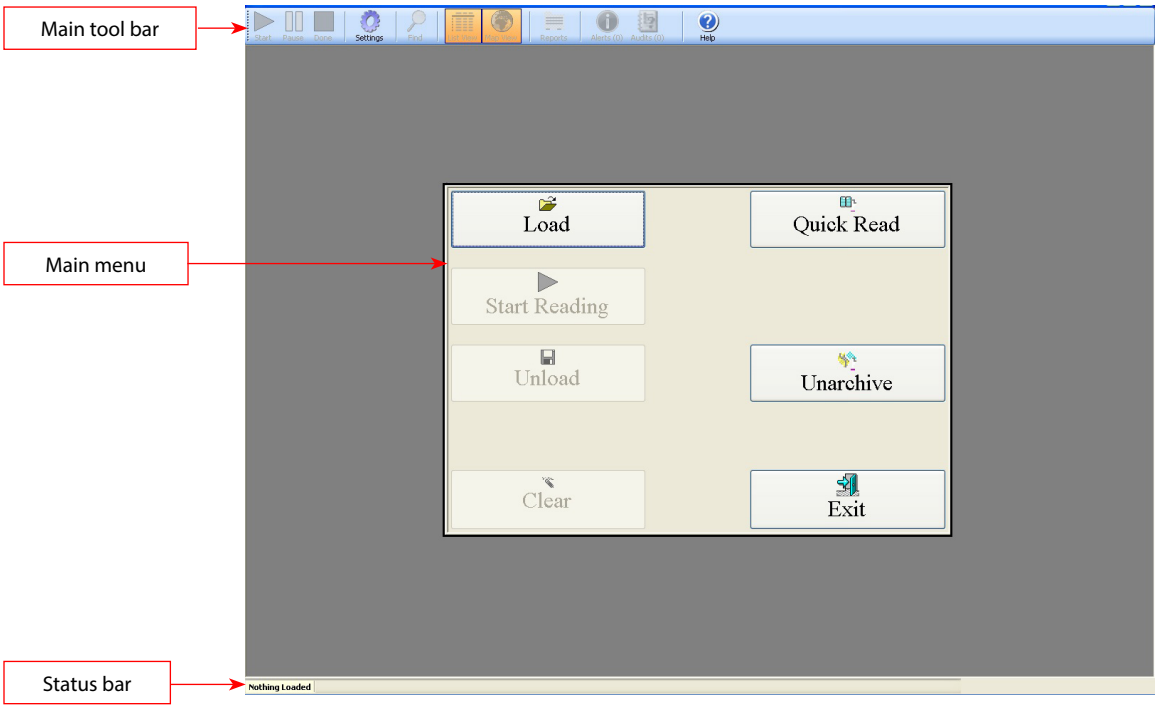


Figure 10: Main screen with main menu, tool bar and status bar

Main Menu

The main menu includes all the general functions for collecting meter readings.

Load — Loads the route from a specified location.

NOTE: If the **Load** button is inaccessible, the route was already loaded.

Start Reading — Activates the GPS and the ORION mobile transceiver and/or ORION mobile receiver. Updates the status bar and displays the List View and Map View screens.

Unload — Prepares the meter reading data for transfer to the reading data management software. When you have completed the meter readings, click the **Unload** button to transfer the meter reading data to a storage device, such as a memory stick. These readings will then be uploaded into the reading data management software. **Unload** also archives the data in case the memory stick is misplaced or destroyed before uploading to the reading data management software.

Clear — Deletes all meter reading information currently being processed.

Quick Read — Reads an ORION endpoint without the need to load a route. This is helpful for final reads and to verify an endpoint is operating correctly.

Unarchive — Reloads a prior route so the user can save the data (unload) again. All previously unloaded routes are stored.

Exit — Closes the application and returns you to the Windows desktop. **Exit** can be selected without having to unload a route. If you click **Exit**, a window opens to verify you want to exit without unloading.

Tool Bar

The **tool bar** at the top of the main screen contains the different commands and configuration options that make up ORS. Except for **Settings**, the buttons on the tool bar become active when you load a route.

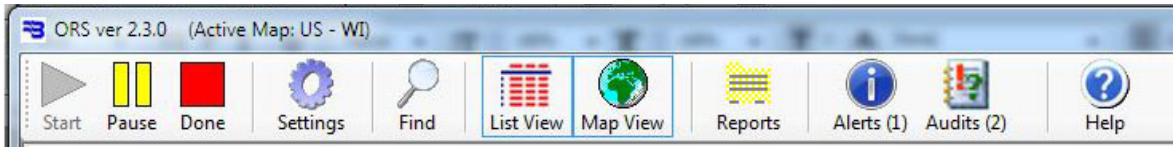


Figure 11: Main tool bar

Start Begins or resumes the meter reading process. Click **Start** to navigate to the next screens including List View or Map View.

Pause Temporarily stops the meter reading process. To resume the application, click **Start**. If you are finished reading meters, click **Done**.

Done Completes the meter reading process and prepares the readings for transfer to the reading data management software. Click **Done** to return to the main menu.

Settings Allows you to change the settings that control the behavior of ORS. It holds the information that controls all of the subsystems including the ORION transceiver and/or receiver and GPS connection information, and the map display options.

NOTE: A password is needed to access Settings. The password is set up during training. The Utility has the ability to change the password and is encouraged to record the new password for future reference as Badger Meter Technical Support does not have access to Utility-specific passwords.

Find Allows you to search for meter records using a number of different search criteria.

List View An active list of unread meters displayed in reading sequence order. It allows you to display the detailed information about each meter by selecting the **Details** button.

Map View Displays the location of the meter reading vehicle and all meters with their current status on the area map. It allows you to display the detailed information about each meter by selecting the meter's icon. In Map View, the map control buttons for map zooming and other functions are also displayed. See *"Map Tab" on page 42* for more information.

Reports Displays the different reports available. Select the report name to bring up a specific report.

Alerts Allows users to set appropriate alerts for potential issues that can occur when meter reading is in progress. The system allows the user to add warnings such as alarms, leak cautions or error signals. Each alert can be set to a desired sound option that a user can select from a "Sound Played" list. If **Alerts** appears grayed out on the tool bar it is accessible from the **Settings** option.

Audits Displays exception conditions in the ORS system. Examples: GPS is not seeing enough satellites to produce a location, or a receiver is not communicating. The Audits button will only be accessible if those types of exception conditions exist.

Help Displays this User Manual in a separate window to allow users to look up information about the software functionality from the laptop.

Status Bar

The **status bar**, located at the bottom of the Main screen, displays the number of meters left to read in the route, the percent complete and the number of routes and meters loaded. The colors displayed on the bar indicate the reading and communication status for the types of meters being read.

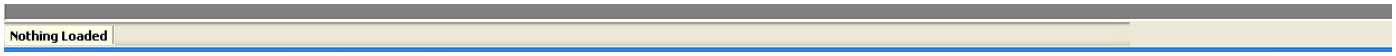


Figure 12: Status bar prior to loading route

Before the route is loaded, the status bar is gray and reads "Nothing Loaded" as shown in *Figure 12*. When the reading cycle starts, the status bar is activated.

The following information is available on the status bar during a reading cycle.

Meter Reading Status	Yellow indicates the reading is paused. Green indicates the reading is in progress.
Reading Progress	Indicates the progress of the reading application. As meters are read, the progress bar will increase. The ratio of read meters to unread meters is shown in numbers next to the progress bar.
Read X of Y	Provides the meter reader with the number of endpoints loaded in the software and the total number of endpoints that have been read. In *Figure 13*, **5 of 10** meter endpoints have been read.
ORION ME/ORION CE	Either ORION ME (when an ORION ME FHSS mobile transceiver is connected) and/or ORION CE (when an ORION CE FHSS mobile receiver is connected) will display in the lower right status bar to indicate communication status between the ORS software and the mobile transceiver and/or receiver. Green indicates good communication. Red indicates no communication. In *Figure 13*, both the ORION ME and ORION CE show good communications status.

Figure 13: Status bar after loading route

GPS OK	Displays when the GPS is operational. No message shows on the status bar if GPS is off.

USER GUIDE

LOADING A ROUTE

This section describes the procedure for loading a route. Before loading a route, make sure the ORS software is running and the main menu is displayed on the laptop desktop. If you need help, refer to *"Program Startup / Exit" on page 11*.

NOTE: For instructions on creating a route load file using the reading data management software, please refer to the reading data management manual.

1. Obtain a memory stick that contains route information files from the reading data management software operator for the route you intend to read.
2. Insert the memory stick into an available USB port on the Toughbook laptop computer.
3. Click the **Load** button on the main menu.

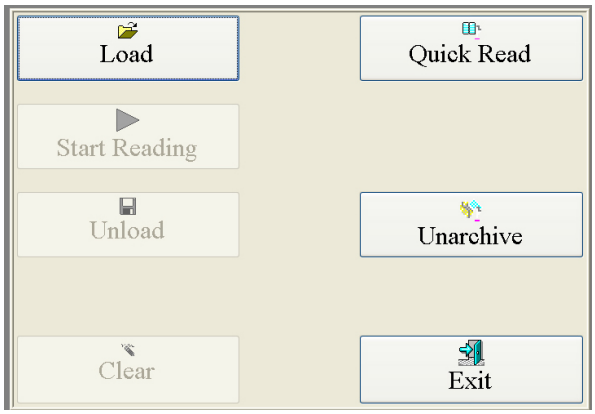


Figure 14: ORS main menu with active Load button

Result: The Select Folder screen opens.

NOTE: The Select Folder window will default to the location the last route files were retrieved.

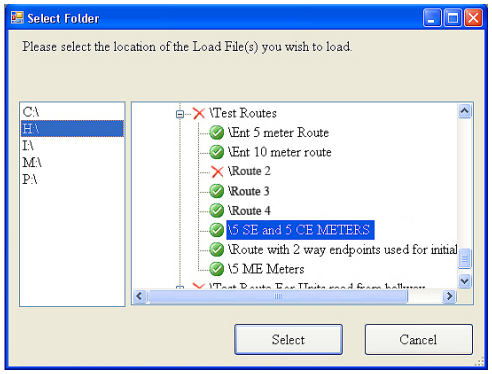


Figure 15: Select folder window

4. Click the drive letter for the memory stick. In *Figure 15*, the memory stick is using drive H.
5. Click the small plus sign (+) to open a folder and display the contents.
6. From the folder options, click the folder containing the route data.
   NOTE: A green check mark indicates ORS has identified the item as a valid route file.
7. Click **Select** to begin loading the route file.
   NOTE: When the route is successfully loaded, the Load button is grayed out (no longer available).
8. Safely remove the memory stick from the USB port. The route is ready to read.

READING A ROUTE

When the route files have been loaded, the **Start Reading** button on the main menu becomes accessible.

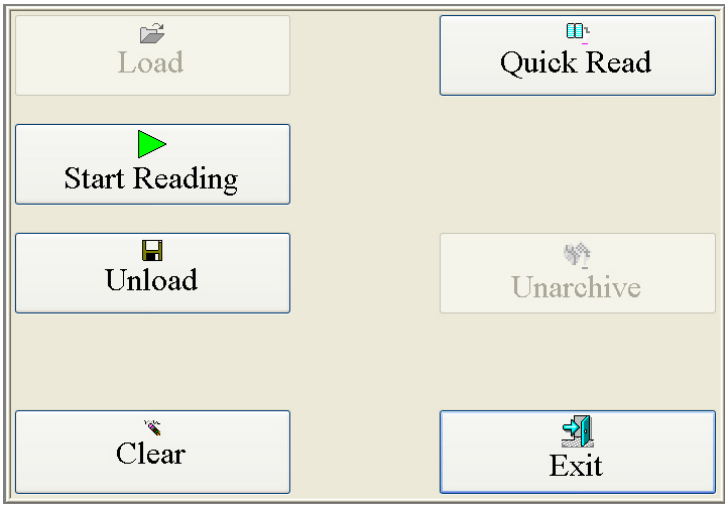


Figure 16: ORS main menu with active Start Reading button

IMPORTANT

When there is one operator, the recommended practice for meter reading is to drive through an area without observing the screen. Then stop when convenient to view progress.

Click the **Start Reading** button to begin. This activates the following functions:

- Reading cycle
- Split view (List View and Map View)
- Main (top) tool bar
- Status bar
  - Progress
  - GPS
  - Transceiver and/or receiver status

NOTE: If geocoding mode has been turned OFF, a message displays briefly at the start of the reading cycle to notify the user that GPS is not active. See *"General Tab" on page 39* for more information regarding geocoding options.

NOTE: If the software does not detect the route starting location, a message displays to notify the user that ORS is using the last known good address as the starting location. This ensures the route maps will display appropriately.

When you start the reading cycle, the screen defaults to the Split View which displays the List View (top) and Map View (bottom) in a split-screen format. It is described in more detail in the next section.

Split View

In Split View, the current route is shown in a list at the top of the screen and on a map below the route list.

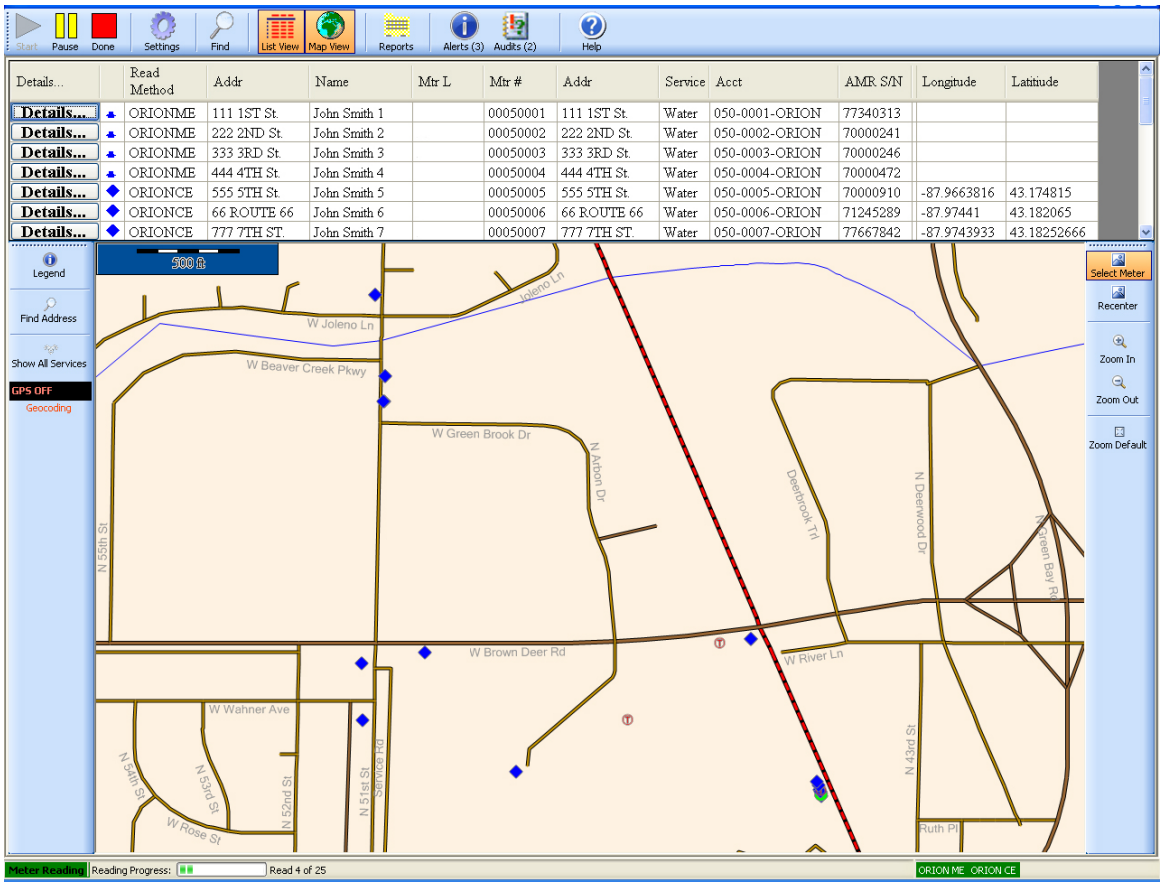


Figure 17: Split View screen

The status of Geocoding is shown in the bar on the left side of the map. In *Figure 17*, the status shows "**GPS OFF**" indicating that Geocoding is not active.

The status bar at the bottom of the screen gives the current status of the ORION ME mobile transceiver and ORION CE mobile receiver. In *Figure 17*, the status bar shows meter readings are in progress (green), the progress field (green dots) visually indicates the reading is about one-fifth completed and the number of meters read ("Read 4 of 25") displays next to the progress field.

In Split View, both the **List View** and **Map View** buttons are active on the main tool bar. The Split View display is static. The number of lines listed and the map size depend on the laptop monitor display and/or resolution settings.

To view the list or the map in full screen, click the button for the view you wish to close.

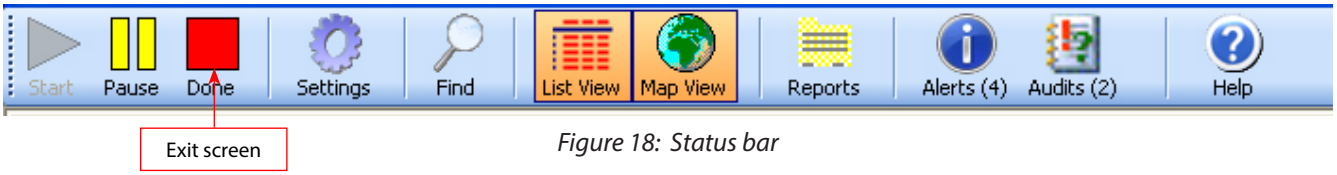
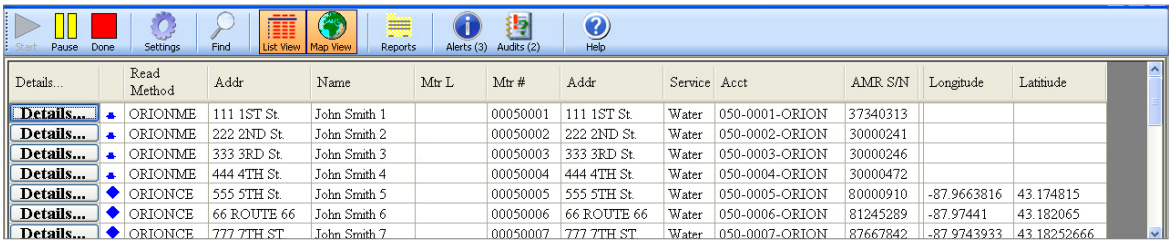


Figure 18: Status bar

To exit from this screen, click **Done** (red square icon) on the main tool bar as shown in *Figure 18*.

List View

In List View, unread meters are displayed as a list in the order loaded from the reading data management software.



Details...		Read Method	Addr	Name	Mtr L	Mtr #	Addr	Service	Acct	AMR S/N	Longitude	Latitude
Details...		ORIONME	111 1ST St.	John Smith 1		00050001	111 1ST St.	Water	050-0001-ORION	37340313		
Details...		ORIONME	222 2ND St.	John Smith 2		00050002	222 2ND St.	Water	050-0002-ORION	30000241		
Details...		ORIONME	333 3RD St.	John Smith 3		00050003	333 3RD St.	Water	050-0003-ORION	30000246		
Details...		ORIONME	444 4TH St.	John Smith 4		00050004	444 4TH St.	Water	050-0004-ORION	30000472		
Details...		ORIONCE	555 5TH St.	John Smith 5		00050005	555 5TH St.	Water	050-0005-ORION	80000910	-87.9663816	43.174815
Details...		ORIONCE	66 ROUTE 66	John Smith 6		00050006	66 ROUTE 66	Water	050-0006-ORION	81245289	-87.97441	43.182065
Details...		ORIONCE	777 7TH ST	John Smith 7		00050007	777 7TH ST	Water	050-0007-ORION	87667842	-87.9743933	43.18252666

Figure 19: List View screen

Adjusting Columns

When information is displayed in columns on any screen in ORS, column order can be changed by selecting a column heading and dragging it, right or left, to a new position. ORS retains the new column format until it is changed again. Adjust the size of any column by clicking between the column headings and dragging to expand or condense the column width.

Account information is displayed in the order of the route as loaded from the reading data management software.

Column Headings

The column headings in List View are based on user selections available in the reading data management software and may vary from those shown here. **AMR S/N** is selected automatically so it *always* displays in List View.

Details The **Details** button is used to access the Service Details screen for a specific listing. The Service Details screen provides account details stored for that customer and allows you to enter codes and messages or enter manual meter readings. For more information, refer to *"Service Details" on page 27*.

Meter Icon An icon/symbol representing the meter type appears in the second column. Meter icons and descriptions can be found in the Legend. For descriptions of the meter icons, refer to *"Meter Icons" on page 25*.

Read Method The type of meter endpoint being read. For example, ORION ME, ORION CE, etc.

Name The customer/account name.

Addr The street address of the meter location. *Addr* always displays in List View.

Meter L The physical location of the meter. This is a free text field used to describe the location of the meter in the best way determined by the utility. For example, west side of house, pit in northwest corner of property, etc.

Mtr # The number engraved on the meter body.

Service The type of meter service such as water or gas.

Acct Account number.

AMR S/N The endpoint serial number as loaded in the reading data management software. *AMR S/N* always displays in List View.

Longitude The numerical longitude of the meter location.

Latitude The numerical latitude of the meter location.

Sequence # The sequential order of the meter in the route as it is set up in the reading data management software.

Completed Readings

As meter readings are received from the ORION mobile transceiver and/or receiver, the line for that meter drops off List View so as to monitor the reading status and missed reads in real time. When all meters are read, List View disappears and a message displays briefly, confirming that readings have been completed.

Map View

In **Map View**, meters are marked by icons on a map of the area, with the reading location as the focal point. An example of a screen displaying unread meters in Map View is shown in *Figure 20*. Control buttons to the left and right of the map are available in this view. See *"Meter Icons" on page 25* for a detailed description of the meter icons.

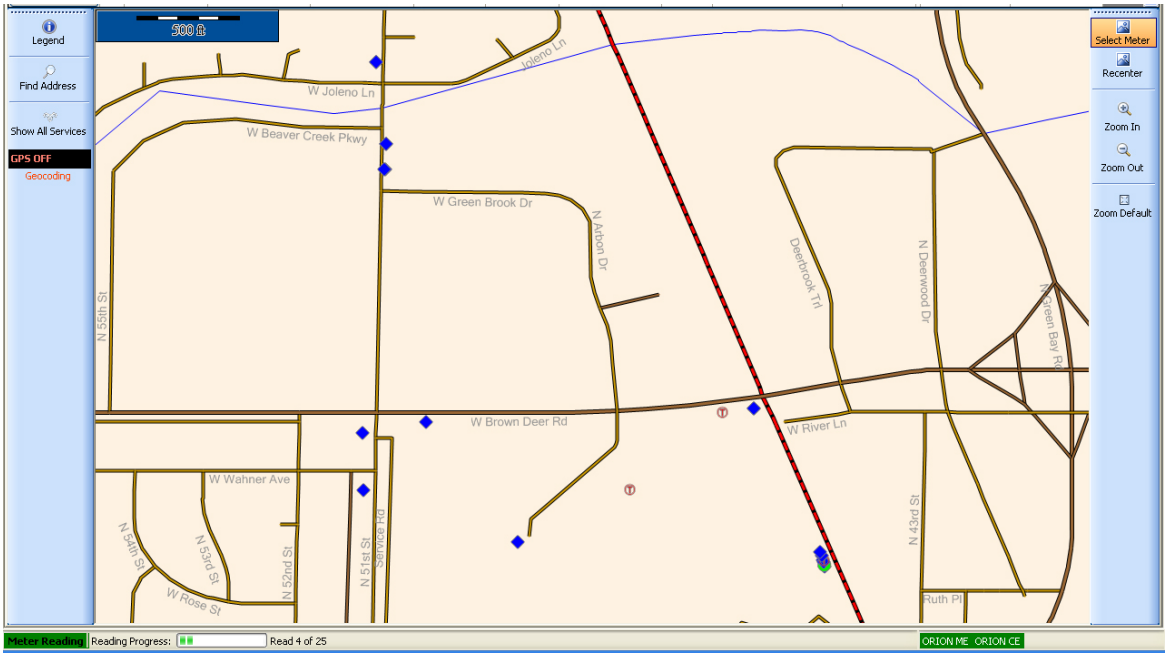


Figure 20: Map View

To view the service details for a specific meter, click the **Select Meter** button on the right side of the map, then click the meter icon on the map you wish to view.

NOTE: If more than one meter is present in the reading area, ORS displays a list of related meters from which to select (*Figure 21*). Click the **Details** button for the meter you wish to view.

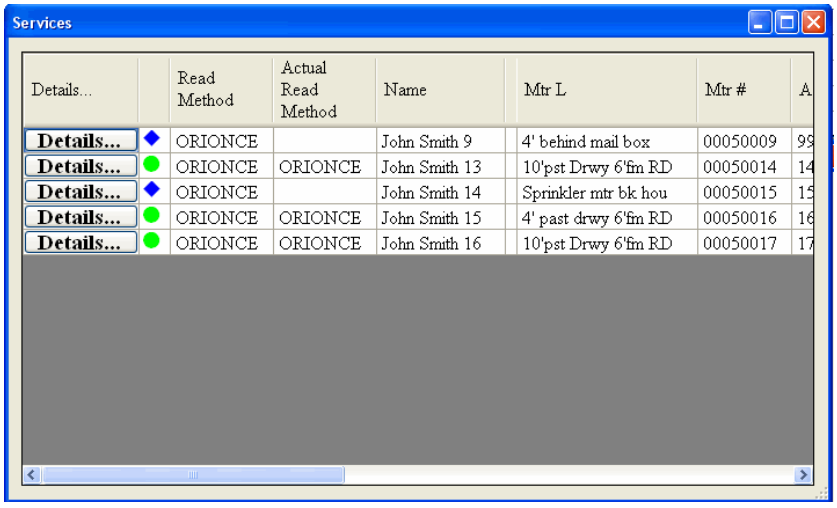


Figure 21: Meters in the same reading area

The meter icon changes to reflect the status of the meter throughout the reading cycle. For example, a successfully read meter changes to a green circle as shown in the lower right portion of the screen in *Figure 22*.

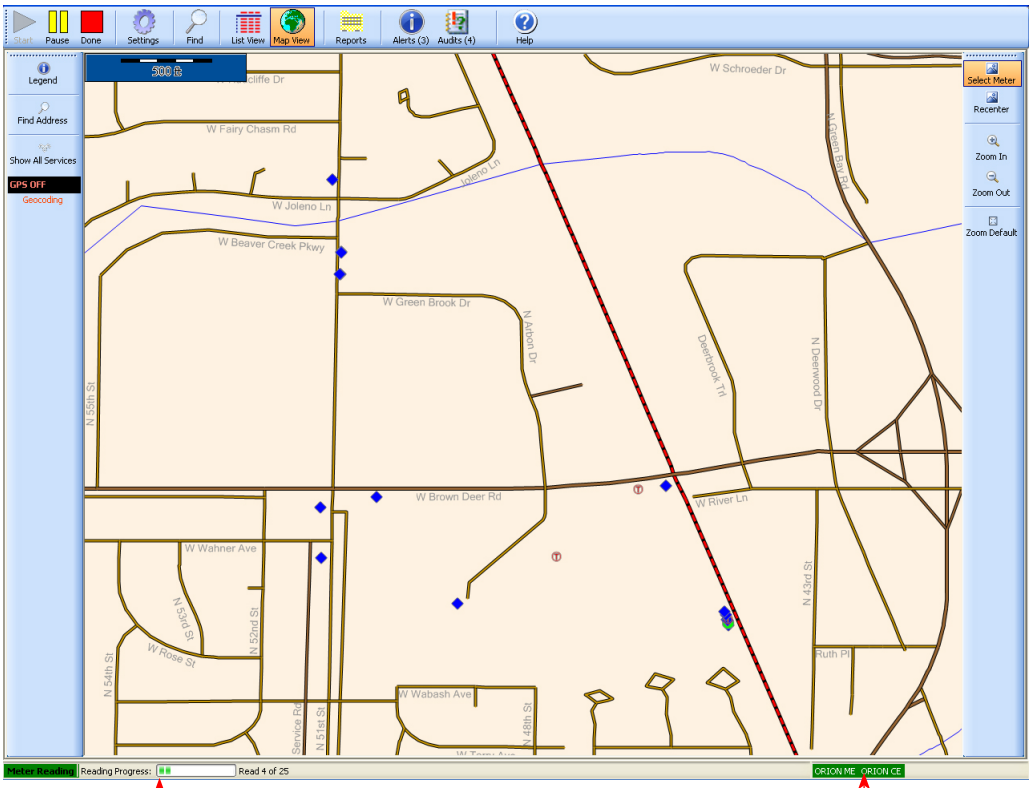


Figure 22: Route map with meter icons after reading

For a list of all the icons and what they represent, refer to *"Meter Icons" on page 25*.

The status bar in *Figure 22* shows meter readings have been captured for 4 of 25 endpoints loaded in the route file and the ORION mobile transceiver and ORION mobile receiver are in communication with ORS as indicated by the green background color where "ORION ME ORION CE" is displayed on the status bar.

Map Control

The Map control buttons are located on the right and left sides of the display when **Map View** is selected from the main tool bar.

Figure 23: Map buttons left side

Figure 24: Map buttons right side

Left Side Buttons

Legend Toggles between the *distance* legend and the *icon* legend. The distance legend displays on the map and defines the distance to which the map is scaled, inches per foot (*Figure 25*). The icon legend gives a description for the meter icons that display on the map. The icon legend has a dynamic display that changes based on the meter type(s) loaded in the route file. To see the icons and their descriptions, refer to *"Meter Icons" on page 25*.

Find Address Click this button to enter a specific address in the window that appears. Click **OK** when finished and the map centers itself to the address entered.

Show All Services To display the location information of all available meters, click the **Show All Services** button. This button centers all the meters and displays location information on the map.

Figure 25: Distance legend

Right Side Buttons

Select Meter Allows you to click a meter icon to display the meter details. If two or more meters are in the same place, a list with all the available meters in that location is displayed.

Recenter Pauses reading and allows you to move the map in any direction. Click, hold and drag the map to the location you desire. Then click the **Start** icon in the main tool bar to resume meter reading.

Zoom In Allows you to draw a box around an area and zoom into it. If you click this button, you can zoom into the map by centering the map on the spot that you selected.

Zoom Out Allows you to zoom out of the current map area using the selected point as the center of the map.

Zoom Default Returns to the default map view. To adjust the default setting, refer to *"Map Tab" on page 42*.

Meter Icons

Meter icons display on the map as visual indicators of the route status. Icons alert the meter reader to potential problems, show when the route reading has been completed and provide the status of any work items that have been assigned.

Work items are requests for ORION endpoint data which are included as part of the route file. See *"Two-Way Communications" on page 57* for additional information about work items.

Meter icons and their descriptions are listed below.

NOTE: To see the icon legend, click the **Legend** button on the left side of screen when Map View is selected. The icon Legend is a dynamic display of icons with brief descriptions. The Legend changes based on the meter type(s) loaded in the route file.

 **Unread ORION Classic water or gas endpoint**	A blue diamond denotes a meter equipped with an ORION Classic water or gas endpoint that does not have a current reading stored. If the vehicle does not drive close enough to get a reading, the icon does not change.
 **Missed ORION endpoint**	A red square indicates the reading vehicle has passed through the entry/exit zones without communication from the ORION endpoint.
 **Unread ORION Migratable water endpoint**	A blue meter symbol denotes a water meter equipped with an ORION Migratable or Fixed Network (in mobile mode) water endpoint that does not have a current reading stored. If the vehicle does not drive close enough to get a reading, the icon does not change.
 **Unread ORION gas endpoint**	A blue gas meter icon denotes an ORION gas endpoint that does not have a current reading stored. If the vehicle does not drive close enough to get a reading, the icon does not change.
 **Unread ORION Migratable water endpoints with work items pending**	A blue triangle with a white plus (+) sign denotes a water meter equipped with an ORION Migratable or Fixed Network (in mobile mode) water endpoint that does not have a current reading stored and has additional work items assigned but not completed.
 **Unread ORION Migratable gas endpoint with work items pending**	A blue gas meter icon with a white plus (+) sign denotes an ORION Migratable or Fixed Network (in mobile mode) gas endpoint that does not have a current reading stored and has additional work items assigned but not completed.
 **ORION Migratable water or gas endpoint with reading – work items pending**	A blue plus (+) sign denotes an ORION Migratable or Fixed Network (in mobile mode) water or gas endpoint with a current reading but work items that were assigned are missing or incomplete. To see the progress of the work items, click **Details** next to the account line item in List View.

Status Icons

The following icons denote the status of a meter. They are used for all ORION water and gas endpoints.

	**Read**	A green circle displays when the meter reading, and work items, if applicable, are received and no problems were reported.
	**Tamper**	A red letter "T" inside a red circle indicates a potential tamper situation where the meter is not working. For example, a cut wire. A pink letter "T" inside a pink circle also indicates a potential tamper situation where the meter is still working. For example, the meter cover is removed or low battery.
	**Encoder Error**	A red letter "**E**" inside a red circle is used for meters equipped with encoders to indicate a reading cannot be obtained.
	**Potential Leak**	A red starburst indicates a meter has shown continuous usage over the past 24-hour period, which indicates a potential leak.
	No Usage	A pink letter "**C**" inside a pink circle displays when the meter has not registered water usage for 30 days.
	Reverse Flow	A pink letter "**R**" inside a pink circle is used for meters equipped with an encoder when the current reading is lower than the previous reading.
	Out of Route	A pink question mark indicates a reading has been received from an endpoint that was not part of the route file loaded to the laptop.
	Unread Manual	A pink triangle denotes an unread meter equipped with technologies other than ORION that must be read manually.

Automatically Removing Meters After Reading

To remove successfully read meters from the screen automatically, change the map settings by following these steps.

1. Click **Settings** on the main tool bar.
2. Click the **Map** tab.
3. Check the box labeled **Remove Normal Read Services from Map**.
   Result: The meter icon will disappear from the map as it is read instead of displaying a green circle.

NOTE: For additional settings that control the map functions and display, refer to *"Map Tab" on page 42*.

SERVICE DETAILS

The **Service Details** screen displays all of the information stored in ORS for each account. You can view the details for the customer, enter codes, messages and manual meter readings. You can also access the two-way communication functionality for ORION Migratable and Fixed Network (in mobile mode) endpoints.

Access the Service Details screen by clicking the **Details** button next to the account line item in **List View**.

NOTE: The Service Details screen is also available when performing a Quick Read.

The Service Details screen has two tabs: **Current Reading** and **Comment Codes/Messages**.

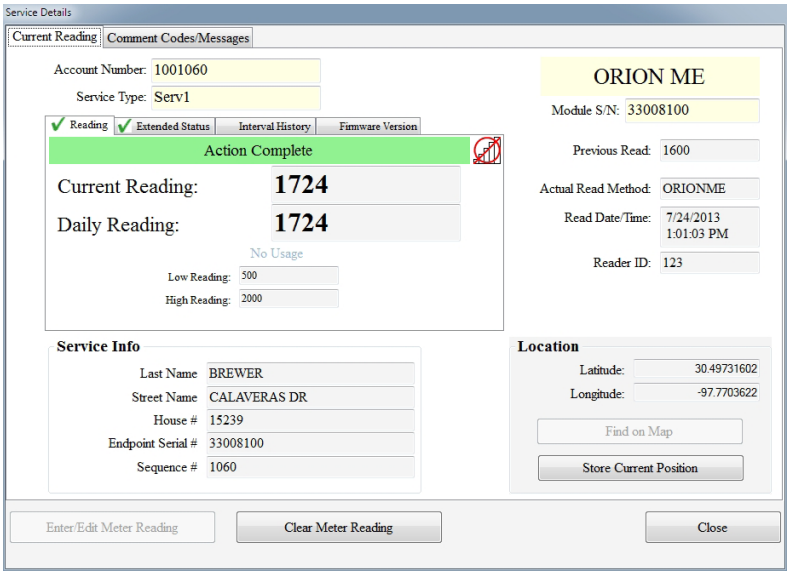


Figure 26: Service Details screen – Reading from ORION ME endpoint

Current Reading

The **Current Reading** tab of the Service Details screen displays the current meter reading, date and time along with meter information from the reading data management software. The type of endpoint technology is displayed in the upper right corner of the screen.

Account Number Indicates the account number from the reading data management software.

Service Type Describes the service type being measured by the meter, such as water, electric, gas, etc.

Module S/N The serial number of the ORION endpoint assigned to the meter. The serial number allows ORS to uniquely identify each meter. The serial number is sent from the reading data management software and is cannot be changed.

The *Actual Read Method*, *Read Date/Time* and *Reader ID* are displayed below the *Module S/N*.

Current Reading The current reading value is displayed in this field. If the meter is a gas meter, the index value displays instead of the subcount.

- **Unread** If the meter is not read, the word "Unread" appears in the reading field.
- **Low Reading** If the current reading is lower than this value, it will be considered low. "Low Read" displays below the reading.
- **High Reading** If the current reading is higher than this value, it will be considered high. "High Read" displays below the reading.
- **Potential Leak** If the ORION endpoint detects a potential water leak, "Pot. Leak" displays below the reading. See *Figure 27* on the next page.

Daily Reading	The time-synchronized daily read that displays below the Current Reading for ORION Migratable endpoints.
Service Info	Includes customer name, address and the meter serial number downloaded to ORS from the reading data management software. During Quick Read, these fields are blank unless the account is part of the route load file.
Location	*Latitude* displays the GPS latitude as a decimal number. *Longitude* displays the GPS longitude as a decimal number.
Find on Map	Finds the location of the endpoint on the map if the account has a lat/long.
Store Current Position	Stores the current vehicle location as the location for the meter. Click the button to store the lat/long manually for that account.
Enter/Edit Meter Reading	Enter or change meter readings manually. This button does not display when the **Clear Meter Reading** button is active.
Clear Meter Reading	Erases the current meter reading. This button does not display when the **Enter/Edit Meter Reading** button is active.
Close	Exit the Service Details screen.

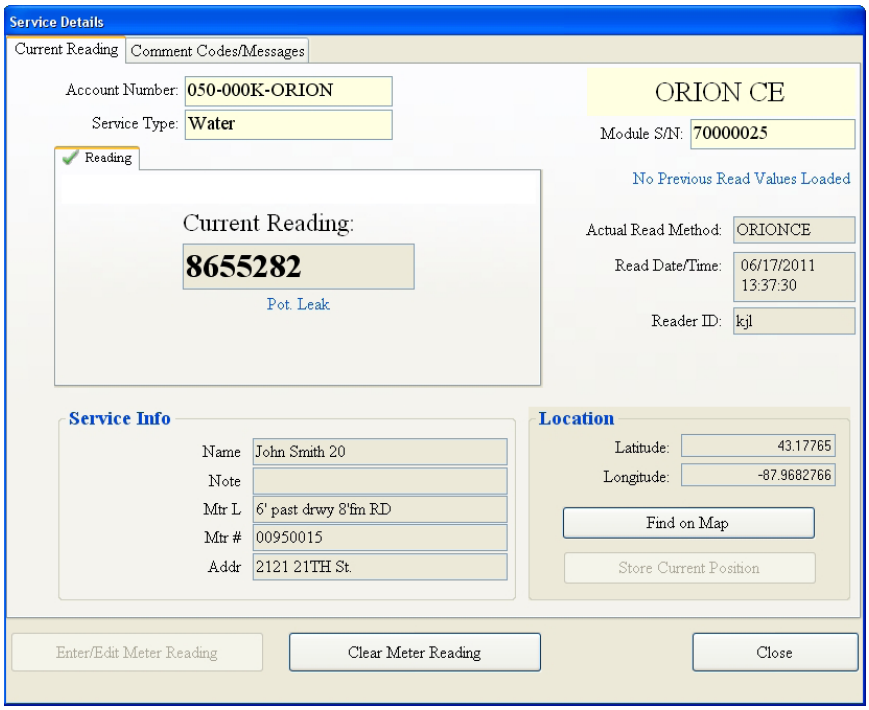


Figure 27: ORION endpoint reporting leak

The screen in *Figure 27* shows an example of a meter reporting a potential leak. If the meter were to report a tamper, the words "Pot. Leak" (below the **Current Reading** field) would be replaced with the word "TAMPER." The **Current Reading** field would also show TAMPER with no reading but could be manually overwritten using the **Enter/Edit Meter Reading** button which is grayed out in *Figure 27*.

ORION ME Service Details

The ORION Migratable or Fixed Network (in mobile mode) endpoints provide advanced functionality. In addition to the Current Reading information described above, the Service Details screen displays three more tabs with features that are available when reading meters with ORION Migratable or Fixed Network (in mobile mode) endpoints. See *"Two-Way Communications" on page 57* for more information.

Enter/Edit Meter Reading

Use the **Enter/Edit Meter Reading** button on the Service Details screen to manually overwrite a meter reading.

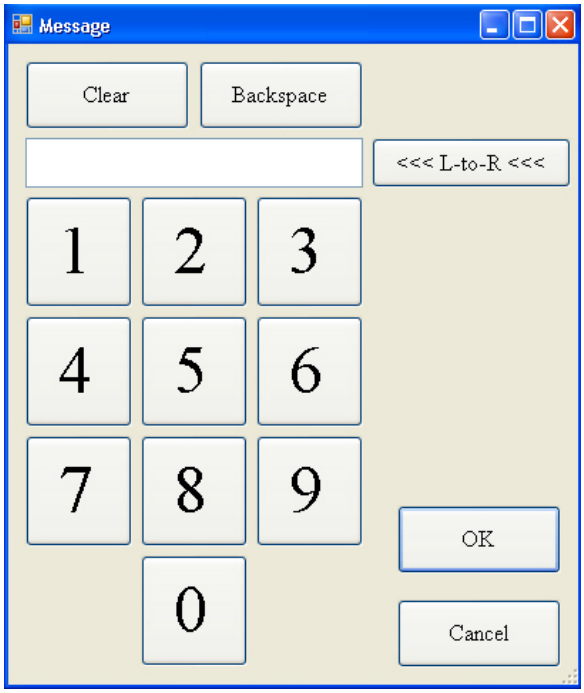


Figure 28: Keypad for meter reading entry

To enter a reading manually, follow these steps.

1. Click the **Enter/Edit Meter Reading** button on the Service Details screen.
2. Manually enter a meter reading using the touch screen keypad or type the reading on the laptop keyboard.
3. If the meter reading dials are set from right to left, click the **<<<L-to-R>>>** button. Clicking the button resets the option to **R-to-L**.
4. Click **OK** to enter the reading or **Cancel** to exit the touch screen keypad.

NOTE: If a tamper report is received from a meter and a manual reading for that meter is entered, the reading information relayed to the reading data management software will include both the manual reading and the reported tamper condition.

Comment Codes/Messages

The second tab of the Service Details screen is **Comment Codes/Messages**. This tab displays any codes or messages relating to a meter. The codes are pre-defined by the reading data management software operator. Reader Codes, Trouble Codes and Comments recorded by the meter reader are sent to the reading data management software operator and cleared at the process of the next billing cycle.

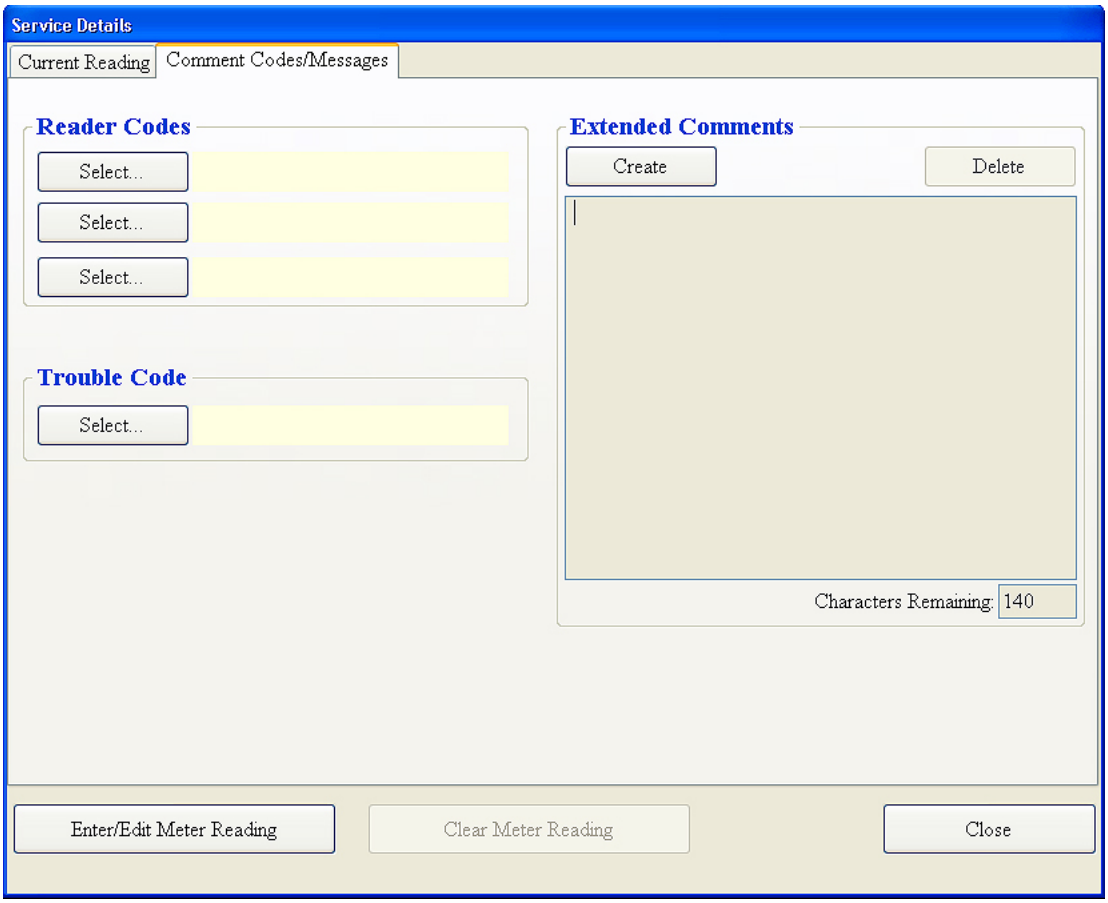


Figure 29: Service Details screen - Comment Codes/Messages

Reader Codes — Values the meter reader can choose about a specific meter. See *"Choosing Reader Codes" on page 31* for more information.

Trouble Codes — Values the meter reader can choose for problems related to a specific meter. See *"Choosing a Trouble Code" on page 32* for more information.

Extended Comments — Field in which the meter reader can create a free-form message for the account. The limit to the number of characters in this field is displayed by an automated **Characters Remaining** monitor. See *"Create/Edit/Delete Extended Comments" on page 33* for more information.

Choosing Reader Codes

Reader Codes are used to report non-trouble information about a meter, such as a name change or appointment. Reader Codes are defined in the reading data management software and downloaded to ORS.

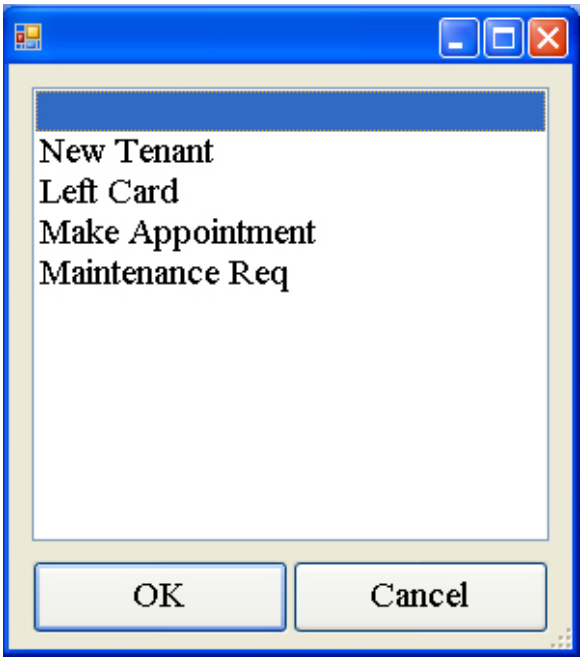


Figure 30: Reader Codes

1. With the **Comment Codes/Messages** tab selected on the Service Details screen, click one of the **Select** buttons under **Reader Codes**.
2. Click the appropriate code and then click **OK**.

   Result: The code becomes part of the information ORS collects from the Service Details screen for the account.
3. If you want to select another Reader Code, repeat steps 1 and 2. Up to three Reader Codes can be selected for each customer record.
4. To remove a Reader Code, click **Cancel**.

NOTE: When readings are sent back to the reading data management software, reports of meters with these codes can be generated.

Choosing a Trouble Code

A **Trouble Code** is used to report a meter problem to the utility office. Trouble Codes are defined in the reading data management software and downloaded to ORS.

1. With the **Comment Codes/Messages** tab selected on the Service Details screen, click the **Select** button under **Trouble Code**.
2. Click the appropriate Trouble Code and click **OK**.

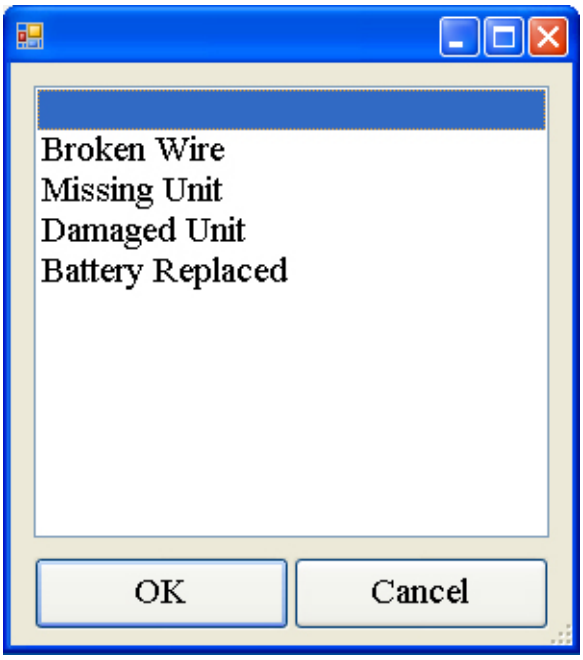


Figure 31: Trouble Codes

Result: The code becomes part of the information ORS collects from the Service Details screen for the account.

3. If a Trouble Code is entered and you wish to change it, select another code or click **Cancel** to remove the code.

Create/Edit/Delete Extended Comments

The **Extended Comments** option allows users to create text messages for the utility or notes that can be used later when reporting issues to Technical Support.

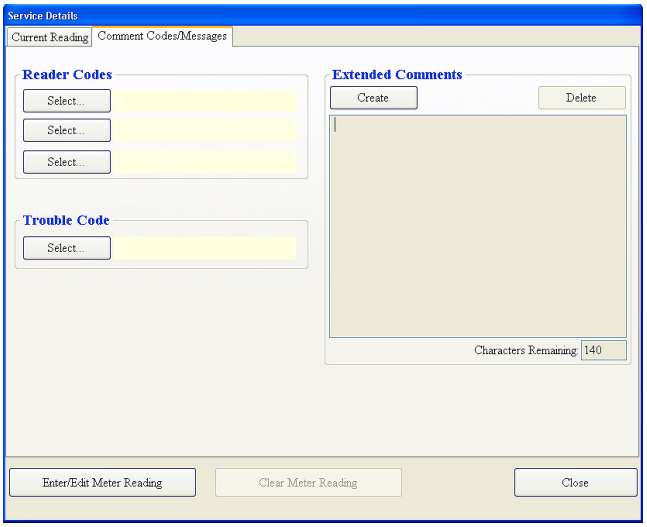


Figure 32: Extended Comments field

Create Comments

1. With the Comment Codes/Messages tab selected on the Service Details screen, select **Create** to activate the *Extended Comments* text box.
2. Use the laptop keyboard to type your message.

NOTE: Text messages up to a maximum of 140 characters can be sent back to the utility.

3. Select **Close** to save your message when it is complete.

   Result: The message becomes part of the information ORS collects from the Service Details screen for the account.

Edit Comments

1. In List View, select the **Details** button to display the Service Details screen for the account with the comment you wish to edit.
2. Select the **Comment Codes/Messages** tab.

   Result: The previously created message displays in the Extended Comments field.

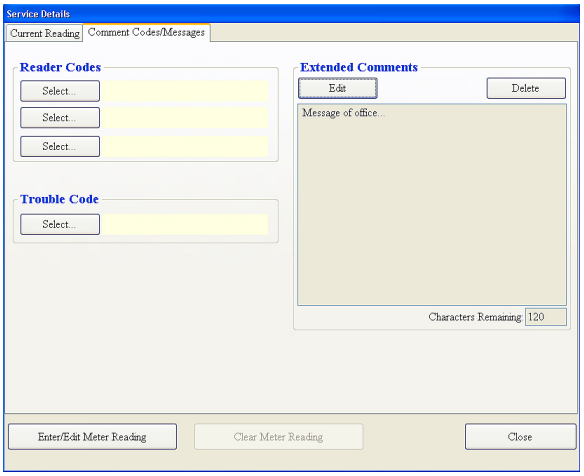


Figure 33: Extended Comments field with comment

3. Click the **Edit** button to activate the text box and type any changes using the laptop keyboard.

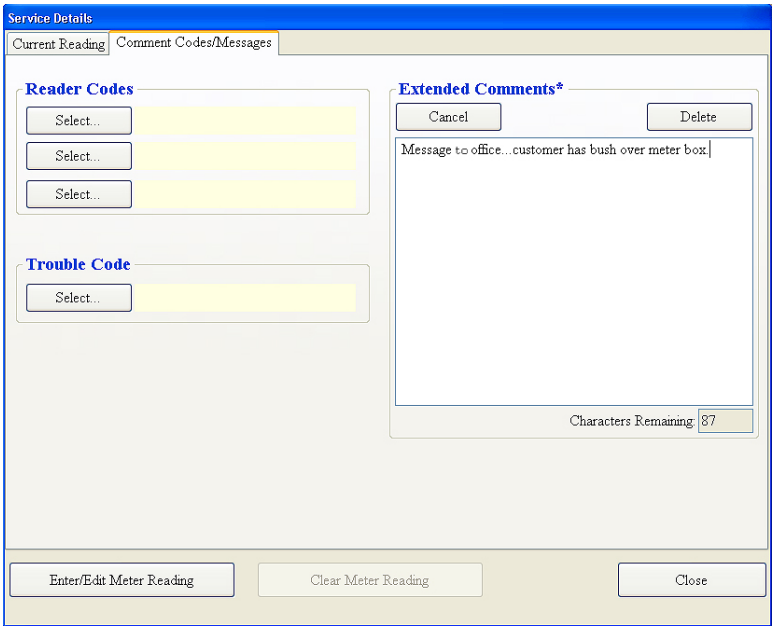


Figure 34: Extended Comments Field with Edited Message

4. Select **Close** to save the message when you are finished editing. The message stays with the account. If you want to remove the entire message without saving, select **Cancel**.

NOTE: If you select **Create** or **Edit** and start typing a message, an asterisk (*) appears after the *Extended Comments* field heading to indicate the message has not yet been saved (*Figure 34*).

Delete Comments

1. In List View, select the **Details** button to display the Service Details for the account with the comment you wish to delete.
2. Select the **Comment Codes/Messages** tab.

   Result: The previously created message displays in the Extended Comments field.
3. Click the **Delete** button to remove the previously saved message from the account.

UNLOADING A ROUTE

After the route is read, the **Unload** option is used to write the meter data to a memory stick for transfer to the reading data management software, and to archive the data in ORS in case the memory stick is misplaced or destroyed before the billing cycle is complete.

1. Insert the memory stick into an available USB port on the Toughbook laptop computer.
2. Click the **Unload** button on the main menu.

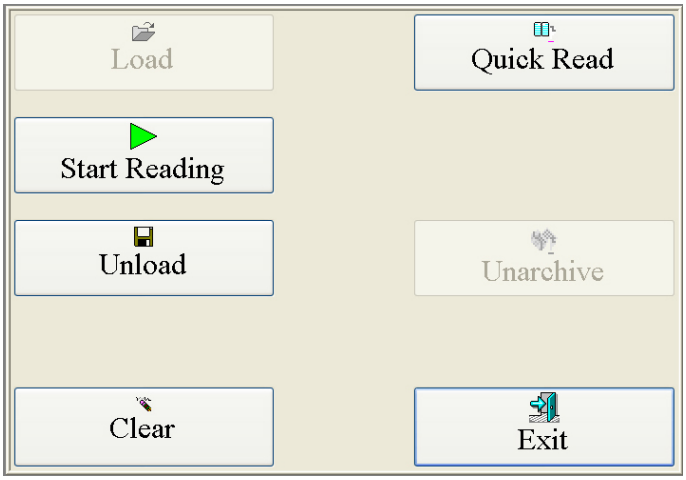


Figure 35: Main menu - Unload

Result: The Select Folder screen opens.

NOTE: If you are using the memory stick from which the route was loaded, the Select Folder location window defaults to the location from which the last route files were retrieved.

3. Select the folder where the meter readings should be stored.
4. Click the **Select** button.

   Result: The route data automatically unloads to the file location you selected and the Main screen reappears.
5. Safely remove the memory stick after the route unload is complete.
6. Return the memory stick to the reading data management software operator.

NOTE: If you do not want to unload the route, select **Exit** on the main menu.

CLEARING A ROUTE

The **Clear** option on the main menu deletes all meter account data that was collected for the route. If you select **Clear**, ORS prompts you to confirm: "Are you sure you want to clear the currently loaded route--any and all reads will be lost." Select **OK** to clear the reading information. Select **Cancel** if you do not want to clear the route.

NOTE: Cleared routes CANNOT be recovered.

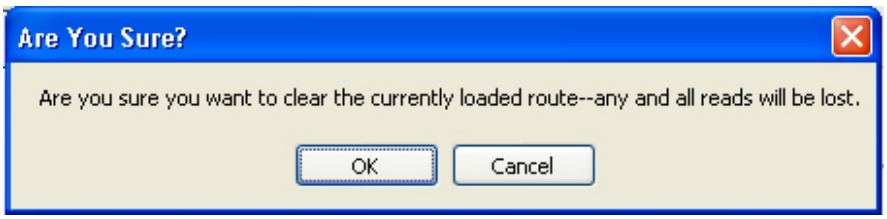


Figure 36: Clear confirmation

QUICK READ

The **Quick Read** option on the main menu allows you to read an ORION unit without having a route loaded. This option is handy when you want to verify that a unit is operating correctly or if you want to collect a reading and status of a unit without loading a route.

NOTE: Readings from the **Quick Read** option are not stored and cannot be transferred to the reading data management software.

Enter an endpoint serial number to get a quick read of one endpoint. If a serial number is not entered, readings are displayed for all active ORION meters in range. This screen also verifies proper ORION endpoint installation and can be used to obtain final meter reads.

Total Read Count	Displays the total number of reads. One endpoint may read multiple times during Quick Read.
Distinct Read Count	Displays the total number of endpoints read during Quick Read.

Performing a Quick Read

1. Verify the ORION mobile transceiver and/or receiver are connected and turned on, and the antenna is in place. See *"Vehicle and Laptop Setup with ORION FHSS Mobile Transceiver Only" on page 9* if you need help.
2. Select the **Quick Read** button on the main menu. See *Figure 35* on the previous page.

   Result: The Quick Read screen opens. (Figure 37).

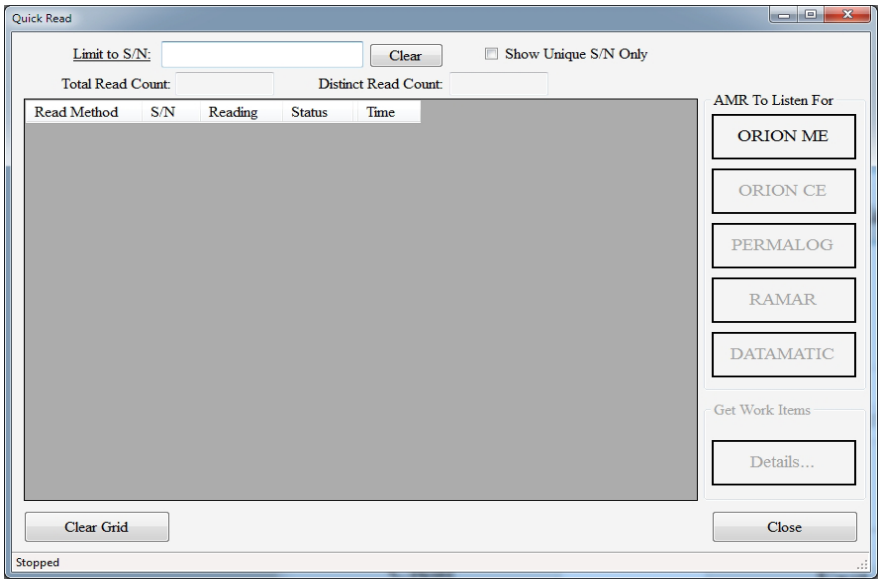


Figure 37: Quick Read screen

3. To begin a Quick Read, click one or more buttons for the desired *AMR To Listen For*. In this example, the **ORION ME** button is selected.

   Result: Quick Reads from meters with the selected AMR To Listen For within range of the mobile transceiver and/or receiver are displayed (Figure 38).

4. Readings will auto scroll as additional readings are received. To stop the auto scroll and pause the screen, click the *AMR To Listen For* button again. Then move the scroll bar up or down to view the readings.

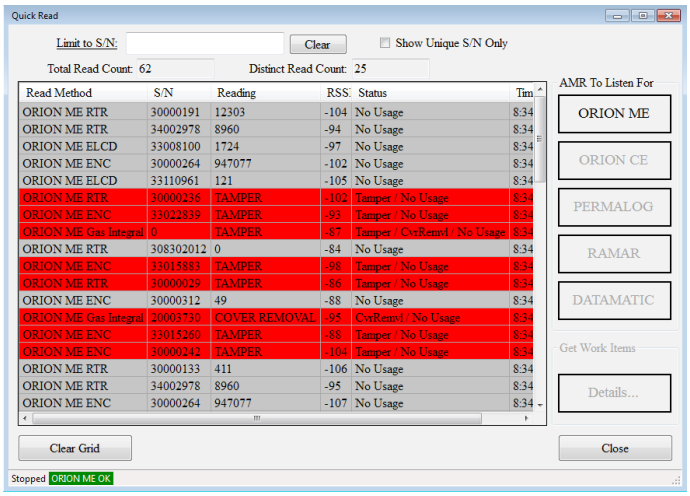


Figure 38: Quick Read results

5. Click the **ORION ME** button again to continue the Quick Read or click the **Clear Grid** button to clear the list.
6. To read a specific meter, key the endpoint serial number in the *Limit to S/N* field and click the appropriate *AMR To Listen For* button for that endpoint.

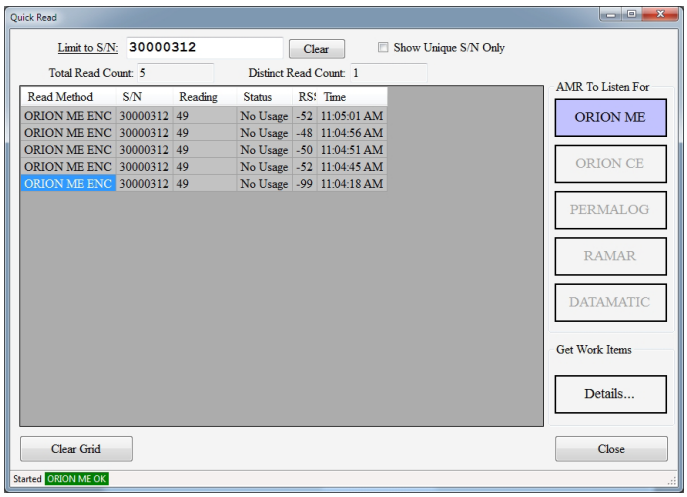


Figure 39: Single endpoint Quick Read

7. When a single ORION ME endpoint is selected, work items become available.

   Click the **Details...** button under *Get Work Items* to see the Service Details screen for selecting work items. For complete information on work items, refer to *"Two-Way Communications" on page 57*.

   NOTE: Interval profile data collected as part of a Quick Read is saved as either an .xml or .csv file. The file is sent back to the reading data management software operator with the route unload file. See *"Historical Interval File Type" on page 60* for complete information.

8. To end Quick Read, click **Close**.

SETTINGS

The **Settings** option on the main tool bar allows you to change the settings used by the software in its operations.

Figure 40: Main tool bar with Settings option

NOTE: A password is required to access and change the information on the Settings screen. See the Settings description at *"Tool Bar" on page 15* for more information.

When you click the **Settings** option on the main tool bar and enter the password, the Settings screen opens. The Settings screen has the following five tabs.

- General
- Alerts
- Map
- Communications
- User Interface

IMPORTANT

When using an ORION mobile transceiver, always perform the steps below, in order, before you access settings:

1. Connect the mobile transceiver to the USB port on the laptop. Connect it to the same USB port each time, if possible.
2. Power on the mobile transceiver.

If you access **Settings** without having the mobile transceiver attached and powered on, or you perform the steps in reverse order, the COM port setting may be lost and would need to be reset. Refer to *"Communications Tab" on page 44*.

General Tab

The **General** tab displays the **Units of Measure**, **Out-of-Route Options** and **Geocoding Options**.

When finished making changes to the settings on this screen, select **OK** and return to the reading cycle. Select **Cancel** to disregard any changes and return to the main menu.

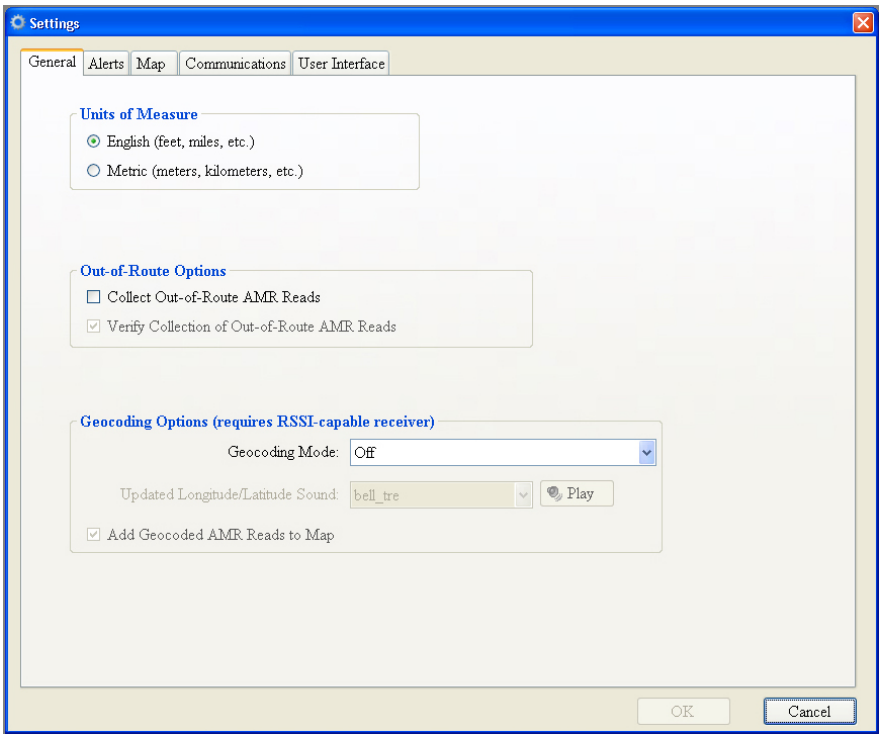


Figure 41: Settings screen - General tab

Units of Measure Select English or Metric units for entry and exit zone values.

Out-of-Route Options

- **Collect Out-of-Route AMR Reads**: Check this box to read meters not loaded into the current route. See *"Out-Of-Route Reads" on page 47* for details.
- **Verify Collection of Out-of-Route AMR Reads**: Check this box to send out-of-route readings back to reading data management.

NOTE: When collecting out-of-route readings, the unload file can become large and may slow down the performance of the laptop. Badger Meter does not recommend collecting out-of-route readings during regular meter reading.

Geocoding Options

- **Geocoding Mode**: Select from the drop-down menu to turn geocoding On or Off.
  If **Geocoding Mode** is On (and you have an RSSI transceiver/receiver), the software stores the vehicle latitude and longitude coordinates for the meter's location where the strongest signal is received. See *"Geocoding Meter Locations" on page 48* for additional information.
- **Update Latitude/Longitude Sound**: An alert may be added so you can recognize when geocoding is active. Choose a sound from the drop-down menu in this field. Click **Play** to preview the sound.
- **Add Geocoded AMR Reads to Map**: Check this box so geocoded endpoints display as icons on the map. This check box is not accessible if **Geocoding Mode** is Off.

Alerts Tab

The **Alerts** tab is used to set sounds and popups as audible and visual alerts for issues that occur during a route reading.

When finished making changes to the settings on this screen, select **OK** and return to the reading cycle. Select **Cancel** to disregard any changes and return to the main menu.

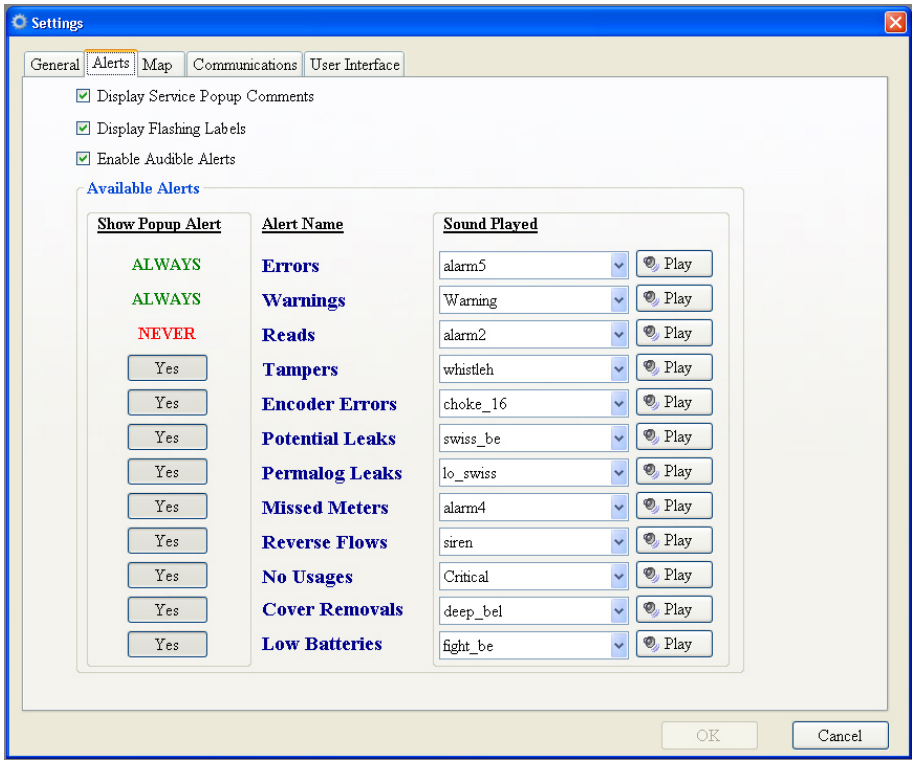


Figure 42: Settings screen - Alerts tab

NOTE: The sounds and popup alerts are pre-set. Badger Meter recommends keeping the pre-set alerts until the user determines the best set up for an individual route.

Display Service Popup Comments — Comments display when the vehicle is within reading range of a meter. Comments are created by the reading data management software operator and passed to the meter reader. Examples: seasonal, bad dog or shut off water

Display Flashing Labels — GPS and/or ORION endpoint labels flash on the main reading screen in map view and on the Quick Read screen when their radio signals are not functioning.

Enable Audible Alerts — Alert sounds are heard as meter readings are received.

NOTE: If the *Enable Audible Alerts* box is not checked, NO sounds are heard for ANY alerts.

Show Popup Alert — Popup alerts display based on the setting. ORS controls the settings for **Errors, Warnings** and **Reads**. Popup alerts ALWAYS display for **Errors** and **Warnings** and NEVER display for **Reads**. To choose the setting for all other alerts, click the button to select **Yes** or **No**.

Sound Played — A unique sound plays for each alert. Choose from a drop-down menu of available sounds. To hear the sound, click **Play**. If you do not want a sound to play for an alert, select the blank space on the drop-down menu.

Types of Alerts

Errors	A reading error such as, "Not Receiving GPS" or "Not Receiving ORION Signal."
Warnings	A software warning such as "Invalid Com Port" or "GPS is not Active."
Missed Meters	When the latitudes and longitudes are set, an alert is triggered when the vehicle passes through the entry and exit zones set for the meter without receiving a reading.
Reads	An endpoint reading has been recorded.
Tampers	Potential tamper situation.
Encoder Errors	Reading cannot be obtained because the encoder is reporting an error.
Potential Leaks	Continuous water usage for 24 hours, indicating a potential leak.
Permalog Leaks	A potential water main leak when optional Permalog AMR/AMI acoustic leak loggers are installed.
Reverse Flows	Endpoints connected to encoders have a current reading lower than the previous reading.
No Usages	The meter has not registered water usage for 30 days.
Cover Removals	Gas only: Alert is triggered when a cover is removed from an ORION Migratable or ORION Fixed Network (in mobile mode) endpoint.
Low Batteries	ORION Migratable or ORION Fixed Network (in mobile mode) gas or water endpoint battery life is low.

Map Tab

The **Map** tab primarily displays the settings for map location, features, orientation and entry/exit zones. Settings can be customized based on user preferences.

When finished making changes to the settings on this screen, select **OK** and return to the reading cycle. Select **Cancel** to disregard any changes and return to the main menu.

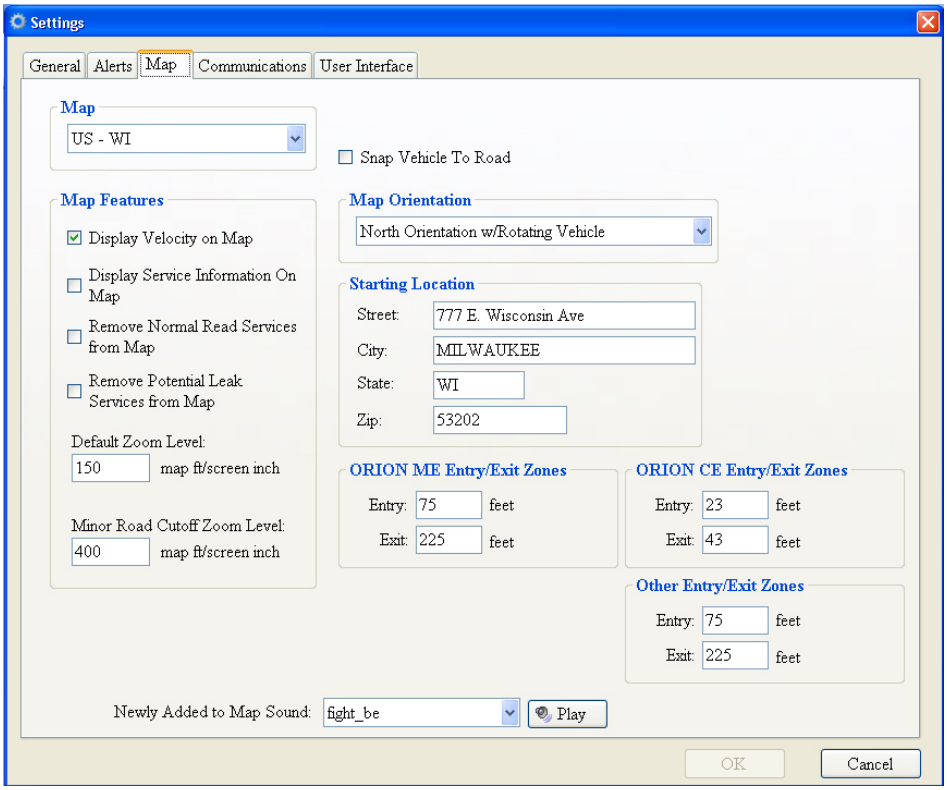


Figure 43: Settings screen - Map tab

Map — The state name for the map loaded in ORS is displayed in the drop-down field at the top of the screen. Click the drop-down menu to see any other state maps that may be available.

Snap Vehicle To Road — The approximate location of the meter reading vehicle is displayed as a bright yellow icon on the map (*Figure 44*) when geocoding is on. Checking this box "snaps" or moves the vehicle icon to the most precise location, placing it on the road nearest its location.

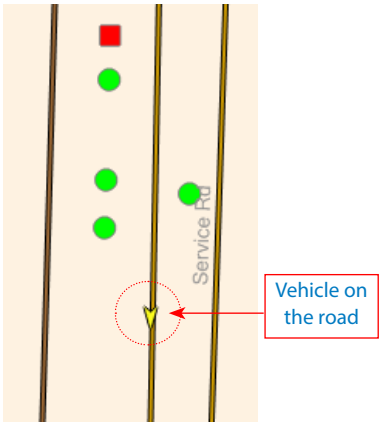


Figure 44: Vehicle icon "snapped" to road

Map Features

- **Display Velocity On Map** — When **Geocoding Mode** is on, this feature displays the current vehicle speed. The maximum speed for setting lat/longs is 15 mph. See *"Geocoding Meter Locations" on page 48* for more information.
- **Display Service Information On Map** — Displays an identifier for the account, such as the location or name, as determined by the reading data management operator.
- **Remove Normal Read Services from Map** — When a normal read is received, unread meter icons disappear from the screen rather than changing to a green circle. This includes manual reads.
- **Remove Potential Leak Services from Map** — Icons for potential leak situations will not display on the map.
- **Default Zoom Level** — The number entered is used to set the zooming feature in Map View. The setting returns to this zoom level when **Zoom Default** is selected using the Map Control buttons in Map View. For additional information, refer to *"Map Control" on page 24*.
- **Minor Road Cutoff Zoom Level** — The number entered is used to set the zooming level when major highways are shown and minor road names drop off the map when **Zoom Out** is selected in Map View.

Map Orientation Choose how the map is displayed while reading meters by selecting from the drop-down menu.

Starting Location The address shown on the map until the GPS antenna reports the current location of the vehicle. From then on, the map centers at the vehicle location. Location may also be displayed as latitude/longitude (lat/long). The location can be manually changed by typing in new information.

NOTE: If ORS does not detect a starting location, it uses the last known valid address to ensure the route maps display appropriately. An alert message displays when you start to read the route.

Entry/Exit Zones These distances specify the entry and exit zone distances for determining when there is a missed read. If the mobile transceiver/receiver passes through the entry/exit zone for an endpoint without receiving a reading, ORS records a "MISSED" alert for the endpoint.