| Badger® ORION® Automated Meter Reading System | Laptop Training Guide | Training Guide |
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ORION®

| Badger® ORION® Automated Meter Reading System | LAPTOP TRAINING GUIDE |
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# Table of Contents

# Features and Benefits of the ORION Automated Meter Reading System

| Feature | Benefits |
|---|---|
| The ORION transmitter uses a bubble-up technology, bubbling-up every four seconds. | Eliminates the need for FCC licensing. |
| System uses a single transmitter for indoor and submerged applications. | Allows transmitters to be placed in a variety of locations, ensuring communication in extreme environmental conditions. |
| Uses Badger's patented Recordall® Transmitter Register (RTR®) and its superior design features. | ✓ Simplicity<br>✓ Long Service Life<br>✓ Excellent Reliability<br>✓ Reduced Friction<br>✓ Digital Output<br>✓ Highest System Resolution |
| Uses Badger's Absolute Digital Encoder (ADE®) | ✓ Frictionless, non-contact wheel position encoding.<br>✓ Light Emitting Diode (LED) Technology.<br>✓ Requires no programming during installation or repair.<br>✓ Available in 4, 5, or standard 6 dial resolution.<br>✓ Designed for Integral, Remote, or Pit Installations. |
| Tamper Detection | If the wiring has been cut or shorted, a tamper code will be received. |
| Leak Detection | Badger ORION transmitters with an RTR look at a 24-hour time period for one hour of non-usage. If there is continuous water consumption, a leak flag will be received.<br><br>Badger ORION transmitters with an ADE look at a 24-hour time period of two hours of non-usage. If there is continuous water consumption, a leak flag will be received. |
| Digital Meter Reading Accuracy | Reading by unique ID number eliminates wrong meters read. Meter reading validation and data error detection features work together to achieve a high accuracy level. |
| Mobile Versatility | Flexibility in reading water meters with a walk-by handheld device or a drive-by solution with the Badger ORION laptop. |
| Compatibility with Badger® Reading Data Management Software | Provides the ability to load/unload the ORION Laptop through Badger Meter's user-friendly Windows® based data management software. |

# What Is ORION?

The ORION Automated Meter Reading (AMR) system uses radio-frequency technology to transmit meter readings between a transmitter that is connected to Badger's encoder register and a data-collection device. This communication works by assigning a unique ID number for each individual transmitter. A signal containing this ID number is sent from the transmitter to the collection device. The Badger ORION system uses the ORION laptop to collect meter readings. After data from the meter is captured into the collection device, it is unloaded into Badger Meter's reading data management software program and then passed to a billing system.

# Badger ORION Hardware

## Recordall Transmitter Register (RTR®)

The Recordall Transmitter Register is designed for use with all Recordall Disc Series, Turbo Series (excluding Turbo I), Compound Series meters, and Fire Series meters and assemblies. It provides a digital output from Badger's piezoelectric solid-state switch to the transmitter which, when read, sends a signal to the ORION Laptop. The RTR is mounted on top of the meter using a bayonet style mounting system and is driven by a high–strength magnetic coupling through the meter body to the meter's magnet. The RTR must be ordered by meter model and unit of measure. The RTR glass and metal enclosure is manufactured with a trademarked, adhesive seal to withstand harsh pit environments.

## Absolute Digital Encoder (ADE®)

The Absolute Digital Encoder is designed for use with all Recordall Disc Series, Turbo Series (excluding Turbo I and Recordall Compound) meters, Compound Series meters, and Fire Service meters and assemblies. It provides an industry-standard output compatible with all Badger transmitter solutions. Digital output from the ADE includes the option of four-, five-, or six-dial resolution. The ADE is mounted on top of the meter using a bayonet-style mounting system and is driven by a high-strength magnetic coupling through the meter body to the meter's magnet. The ADE must be ordered by meter model and unit of measure. The ADE may be ordered with a glass and metal enclosure that is manufactured with a trademarked adhesive seal to withstand harsh pit environments.

# Badger ORION Hardware (continued)

**Pit and Remote Transmitters**

The pit and remote transmitters are designed for any underground pit installations where the system may be subject to submergence or mounting in the interior of the building for a customer who is concerned about cosmetic appearance of their building's exterior. The transmitters are entirely waterproof and can be mounted either through the pit lid or with a one-inch to two-inch air gap under the lid. The radio transmission performance will depend on a number of factors including lid design, foliage, below-grade mounting, and metal objects in the path of or near the desired line of site.

Both transmitters can be mounted up to 75 feet away from the meter.

The optional, data-profile feature provides utilities with 21,000 consumption data points with leak detection and tamper alarms for analysis of water usage patterns. It is helpful when addressing customer service issues, billing complaints, leak detection studies, audit conservation programs, and other water usage studies.

**Integral Transmitter**

The integral transmitter is designed for wet, dry and fully water-submersible applications (i.e. meters located in pit and indoor applications such as closets, utility rooms, etc.). The integral will give excellent tamper resistance. Unlike the pit and remote transmitter, the integral does not have any exposed wires. Installation is as simple as taking the integral unit, placing it on the meter's bayonet and positioning it in the desired location.

The optional data profile feature is also available with the integral transmitter. It is suggested that if this feature is available, the integral should be mounted at a 90-degree angle relative to the water piping to facilitate ORION profiling.

**Universal Transmitter**

The Badger ORION Universal transmitter is available in a three-wire pit or remote transmitter configuration for connection to approved Sensus®, Neptune®, AMCo®, and Hersey® meters and encoder registers. All Badger ORION Universal transmitters are shipped from the factory preprogrammed and can be connected to any compatible encoder. Electronic readings broadcast from the Badger ORION Universal transmitter contain the active number of wheels programmed into the encoder, up to a maximum of seven digits.

The optional, data-profile feature is also available with the Universal transmitter.

# Installing Badger ORION System Components

## Pit Transmitter

Badger ORION pit transmitters are supplied with a Badger encoder register and are completely wired and factory sealed for use in meter pits or vaults subject to submersion. The standard length of the encoder-to-module lead wire is three feet. For deep meter settings, additional wire lengths up to 75 feet are available at an additional charge. The pit transmitters include an integral antenna assembly with provisions for a through-the-lid mounting. Depending on the lid design and the material with which the lid is constructed, the pit transmitter can be mounted in a variety of ways.

With cast iron or metal lids, Badger recommends using a through-the-lid mounting system (see **Diagram 1**). If there are limitations that prevent the use of this mounting system, an under-the-lid mounting bracket is available. Keep in mind that mounting under the pit lid will hinder radio transmission and limit the distance of a receivable signal.

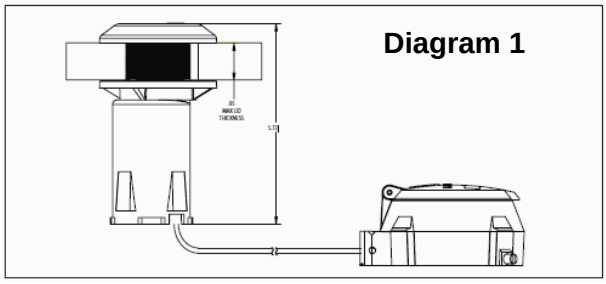


**Diagram 1**

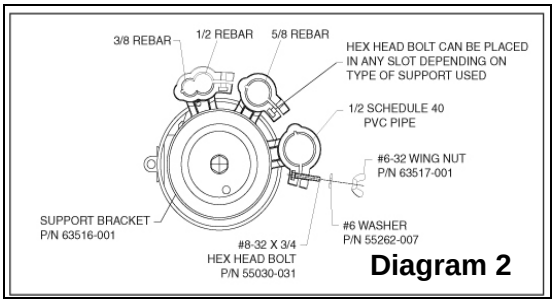



**Diagram 2**

For concrete meter lids, the transmitter may be mounted below the lid using either the pit mounting bracket or the “C” clamp bracket (see **Diagram 3**). The pit transmitter should be mounted between one to two inches below the lid.

With plastic meter lids, the transmitter can be mounted similar to the system used for concrete lids. Or, the transmitter could be mounted through the lid, as with metal lids. Some plastic lids have a molded bracket on the underside of the lid designed to hold the radio transmitter.

A Badger pit transmitter support bracket (see **Diagram 2**) is available for installations that do not allow for mounting directly through the water meter pit lid. The support bracket is designed to hold the transmitter upright under the pit lid using 3/8-inch rebar, ½-inch rebar, 5/8-inch rebar, and/or ½-inch schedule 40 PVC pipe.

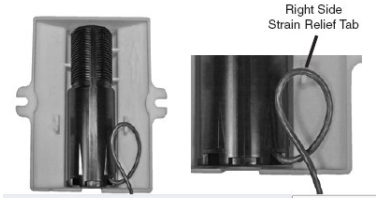
The mounting clamp pictured in **Diagram 3** can be used in a variety of applications. The bracket has two holes that can be used to mount the bracket. The transmitter is inserted into the bracket and turned to lock it in place. For best results, the transmitter must be mounted in a vertical position.

**Diagram 3**

# Installing ORION System Components (continued)

## Indoor Transmitter

Remote transmitters come from Badger Meter pre-wired to the register and require only the mounting of the module and the register. The standard length of the lead wire is 10 feet. Optional wire lengths of up to 75 feet may be ordered at an additional charge. To mount a transmitter indoors or outdoors, an ORION Remote Box Enclosure Kit (64394-021) may be needed. If a splice was needed to get the transmitter outdoors, the ORION Remote Enclosure Kit also allows for a secure space to protect the gel caps from the elements.




Transmitters manufactured for remote application will be labeled with non-metal on the serial label. It is essential that the correct transmitter be used for indoor applications. Failure to do so will result in a violation of FCC regulations.

## Mounting a Remote Transmitter

To install, mount the clamp (pictured in **Diagram 3,** on the previous page) in a secure location on a wall or joist that is away from metal objects and faced insulation that typically reduce the performance of the radio. The transmitter must be installed in an upright vertical position with the bottom of the transmitter (end with wire) pointing toward the ground.

For outdoor installations, locate the transmitter in the best “line of sight” location to the reading route and away from any devices that produce electrical interference. The transmitter should be installed a minimum of three feet above grade and away from shrubs and other foundation plantings.

After installation, a Quick Read function can test the transmitter for radio transmission and range.

# Retrofitting Badger ORION System Transmitter

**⚠CAUTION The Badger encoder register and ORION transmitter should only be connected to a Badger Meter approved product. Connection to an unapproved product will void the respective product warranty.**

**Should an RTR, ADE, or transmitter require replacement or the lead line wire require repair, use the following splicing procedure:**

The factory lead line is a double insulated RFI shielded three-wire cable (one wire is red, one wire is black and one wire is green).

1. Using caution not to damage the inner wire's insulation, strip approximately 1½ inches of the outer insulation off of the ends of the transmitter and RTR/ADE lead line wires.
2. Remove the foil that provides radio interference protection, revealing the three control wires. Spread these three wires apart.
3. Cut the red and black insulated wires down to approximately ¾-inch length; leave the green insulated wire at 1½ inches in length.

   **Note:** When splicing a box style remote transmitter, if possible, make the splice indoors or inside of the Remote Box Enclosure for extra protection of the splice.

4. Use gel-connectors (Badger Meter Part # 59761-001) to splice the black-to-black wires, red-to-red wires and green-to-green wires together.

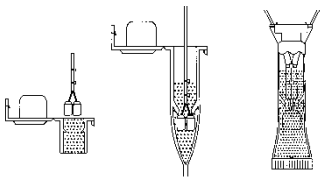
   **Note:** When splicing a Universal ORION Transmitter to competitor encoders refer to the ORI-I-39 Installation Data sheet for wiring instructions.

5. Use wire ties to provide strain relief to the splices by securing the two cables together, approximately one inch and again at two inches from the gel-connections.
6. To reprogram the transmitter using the Trimble® Ranger™, follow the instructions on page 33 of this guide, the "Program Odometer" Section.
7. Test the entire installation after splicing and reprogramming the transmitter by reading the meter and verifying that the tamper has cleared.

**Pit Product Splicing**

Perform the above steps and then insert the entire splice into the splice enclosure assembly (Badger Meter Part # 62085-001). Ensure lead wires exit the tube on alternating sides and close the splice enclosure. See **Diagram 4**.

**Diagram 4**



# ORION® Hybrid/Mobile Radio Frequency System

## Catch A Rising Star

The ORION® system is Badger Meter's most flexible automated meter reading system for water and gas utilities. Developed as a state-of-the-art radio frequency system, ORION transmitters utilize bubble-up (broadcast) technology, which eliminates the need for FCC licensing.

Built upon a mobile system platform, this flexibility also results in a true multi-utility fixed network AMR solution and allows utilities to build upon their Badger® ORION system to meet their current and future information needs.


*Badger® Trimble® Ranger™ handheld data collector*

### Flexibility Is The Key!

- No FCC license required. Uses bubble-up (broadcast) technology.
- Tamper, potential leak, reverse flow, and no usage notification provides tools necessary to manage the utility's system.
- Data Profile Option with 21,000 historical data points to evaluate usage patterns (2.3 years of hourly data).
- Designed for use with Badger's RTR® and ADE® encoder registers and many other competitive encoder registers.
- Fast and easy transmitter installation.
- FCS Permalog+® leak detection system effortlessly integrates into your ORION AMR system to monitor leaks in your critical water main infrastructure.

## Features and Benefits of the ORION Laptop

| Feature | Benefits |
|---|---|
| Developed as a Drive-by System | • Low-cost, fast and efficient data collection.<br>• Significant reduction in manpower and hours.<br>• Unread, potential leak and tamper meters are displayed.<br>• No entry into the customers' premises is required. |
| Perform Multiple Tasks with One Unit | • The laptop allows meter reader to program the module during installation and retrofitting, and obtain quick reads.<br>• Extract profile information from the transmitter. |
| Microsoft® Windows® Operating System | • Multi-tasked orientation.<br>• User-friendly task commands.<br>• Input data using the keyboard, touch screen or touchpad. |
| Rugged Design and Construction | • Full magnesium-alloy case with handle.<br>• Moisture and dust resistant LCD, keyboard and touchpad.<br>• Sealed port and connector covers.<br>• Shock mounted removable hard drive in stainless steel case.<br>• Anti-glare screen to view display even in bright sunlight. |
| ORION Optical Sensor | Provides programming capabilities for ORION transmitters. |
| Search Functions within the ORION Laptop | Allows meter readers flexibility when searching for a particular account. Searches by displayed information, names, addresses, transmitter numbers, etc. |
| Detailed Mapping Program | • Wireless GPS Bluetooth technology.<br>• Provides the most detailed and up-to-date maps for the ORION meter reading application. |
| Intelligent Lithium-Ion Battery | • Maximum usage between charges.<br>• Battery provides an average of six hours of use with a full charge. |

**Important Notice:** The ORION laptop is intended to be a meter reading device with programming capabilities. The ORION laptop includes the latest version of Windows approved for use by the computer manufacturer. This laptop can be vulnerable to viruses and malware if pre-cautions are not taken. The customer is solely responsible for securing the ORION laptop PC. Badger Meter makes no warranties about the security of the laptop after the customer takes possession. Returning the ORION laptop to Badger Meter for servicing in no way requires Badger Meter to detect or remedy security vulnerabilities or exploits on the PC.

# ORION Reading Software (ORS)

## Equipment Setup

1. Place the magnetic-mount antenna on the roof of the vehicle. Pick a spot where the surface area of the roof around the base is equal to the height of the antenna.
   ***Keep this antenna at least two feet away from all other antennas.***
2. Connect the antenna to the ORION receiver, and the receiver to the ORION laptop. Turn on the ORION receiver.
3. Plug in the power adapter from the cigarette lighter to the ORION laptop.
4. Turn on the ORION laptop.
5. Type your password: **orion** (in lowercase letters).
6. Turn on the GPS antenna.

## Starting the ORION Reading System (ORS)

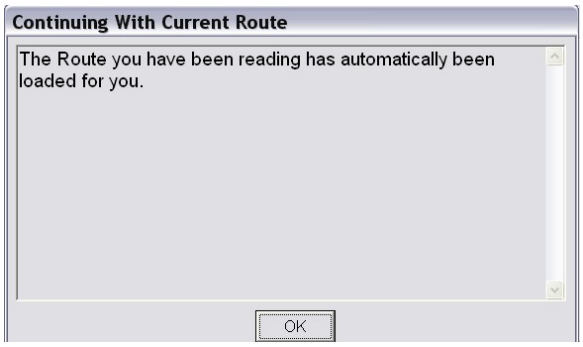
Double-click the ORS icon to start the ORION Reading Software.


The following screen will display:


← Reader ID/Initials

The **Warning Screen** alerts the meter reader to the dangers of watching the ORS screen while driving. This warning must be acknowledged by typing your meter reading ID or initials in the Reader ID/Initials box and selecting **"I Accept."** This is a three-character alphanumeric field.

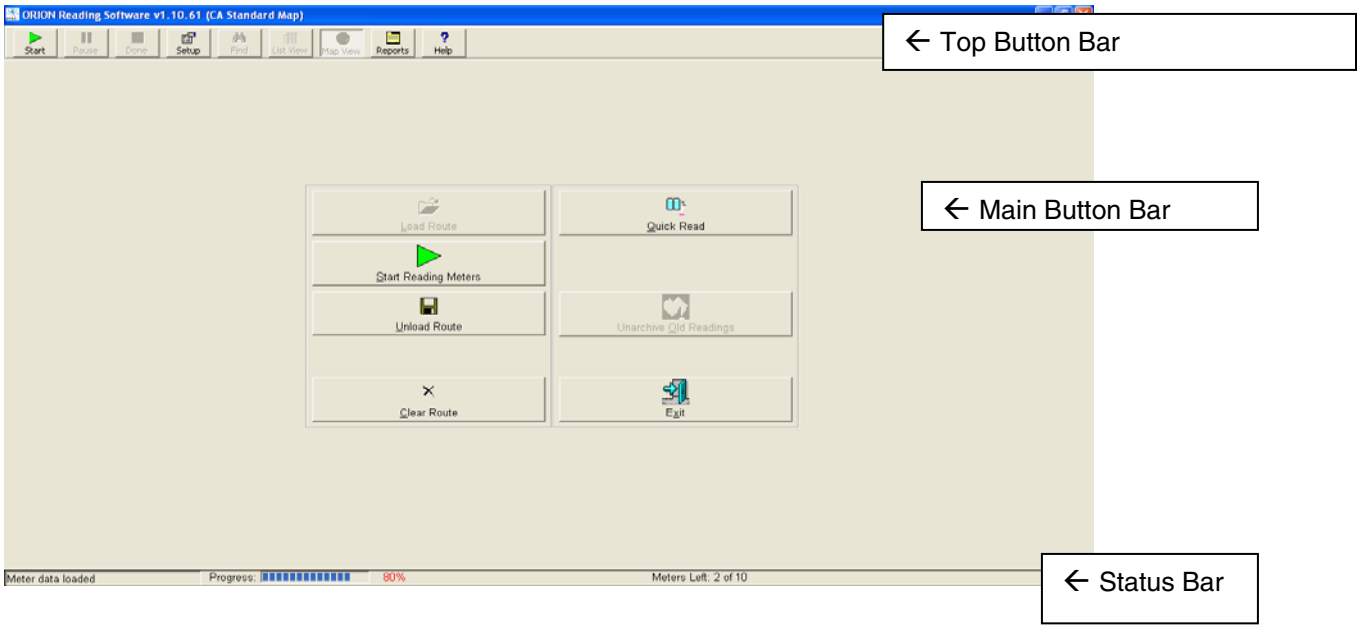
If a route had previously been loaded and you exited the software without unloading the route, the following message box opens, stating that the route will automatically be loaded. If this occurs, click **OK** to continue ORS Startup.



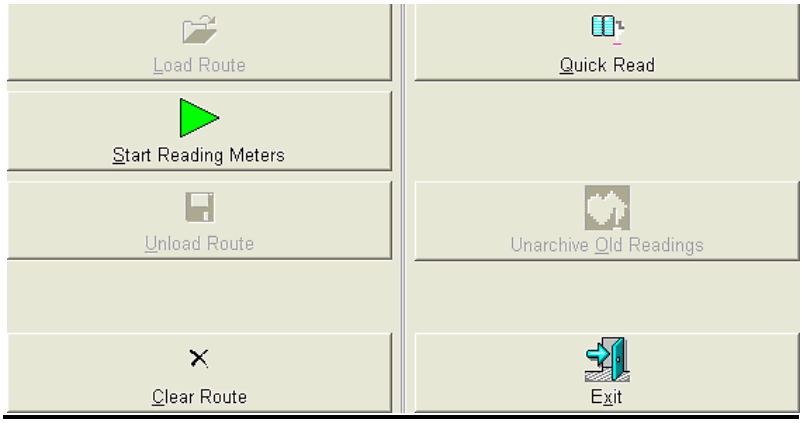

If a route is not currently loaded, you will be taken to the main menu of the software.

## ORS Main Menu

**Note:** To protect the user from overwriting important information, some options will not be available at select times throughout the reading process.



The **Main Button Bar** contains all of the central controls for gathering meter readings. The left side contains the functions used in a reading cycle.

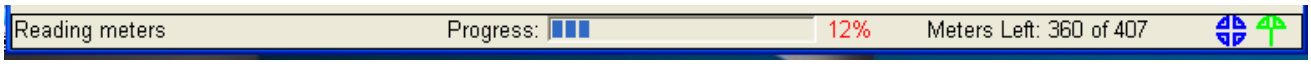



- **Load Route** – loads the route from a specific location, typically the E drive when using the memory stick.
- **Start Reading Meters** – activates the GPS and the ORION receiver. Updates the Status Bar and displays the List View and Map View.
- **Unload Route** – prepares the meter reading data for transfer to the reading data management software. **Unload Route** will also archive the data in case the memory stick is misplaced or destroyed before uploading to reading data management software.
- **Clear Route** – deletes all meter reading information currently being processed.
- **Quick Read** – reads an ORION unit without the need to load a route. This is helpful for final reads or to verify that the unit is operating correctly.
- **Unarchive Old Readings** – retrieves a prior route of readings so that the user can save the data (unload) to a memory stick. The 10 most current routes are stored.
- **Exit** – closes the application and returns the user to the Windows desktop. **Exit** can be selected without having to **Unload Route.**


The **Top Button Bar** contains the different commands and configuration options that are used during a typical reading cycle.

- **Start** – begins or resumes the meter reading process.
- **Pause** – temporarily pauses the meter reading process.
- **Done** – completes the meter reading process and prepares the readings for transfer to Reading Data Management and displays the Main Menu.
- **Setup** – accepts changes to the setting that control the behavior of the ORS software.
- **Find** – allows the ability to search for meter records.
- **List View** – is an active list of unread meters. Allows access to individual customer records by clicking on the **Meter Details** button.

- **Map View** – displays the location of the meter reading vehicle and all meters with their current status on the area map.
- **Reports** – displays the different reports available.
  - Summary Report
  - Audit Report
  - Not Read Report
  - Read Report
  - Tamper Report
  - Leak Report
  - Missed Report
  - High/Low Report
  - Alert Report
  - Permalog Report
- **Help** – provides the ability to search for information regarding operation of the ORS software.




The **Status Bar** shows a quick view of the status of the loaded route. The Status Bar will update to show the number of meters left to read in the route, the percent completed and displays the communication status of the GPS system  and the ORION receiver  .

## ORION Transmissions

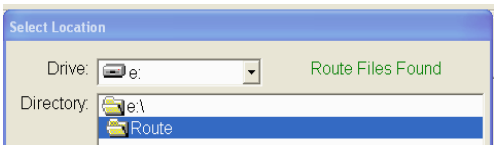
A number of possible results can occur when an ORION transmitter sends a reading.

- The ORION receiver receives the transmission. The ORS software stores the reading and drops the customer information from the List View as well as updates the icon on the Map View if latitudes and longitudes have been set.
- The ORION receiver receives the transmission that reports either a tamper condition or a potential leak. ORS stores the reading and logs the condition.
- The ORION receiver receives a transmission but not all of the transmission was received. The transmission is ignored and no accounts in the route are updated.
- No transmission is received from the meter. Here are some reasons for not receiving the reading:
  - Transmitter ID number is wrong.
  - Transmitter has not been started.
  - Transmitter not loaded into the current route.
  - The reading vehicle is too far away from the transmitter.
  - There may be something obstructing the line of sight between the ORS system and the transmitter.

## Loading a Route File


The Reading Data Management operator will create a memory stick of files that contain the information for the route intended to read. The maximum number of accounts that can be loaded to a memory stick is 10,000. The first step of the reading cycle is to load the route into the laptop.

- ❑ Insert the route memory stick received from the Reading Data Management operator into an available USB port.
- ❑ Select **Load Route** from the main menu.
  - o The Select Location box will default to the location the last files were retrieved (typically the E-Drive).
  - o When the proper path is located the Select Location box will indicate “Route Files Found”.




- ❑ Click **OK** to confirm the route file directory/path.

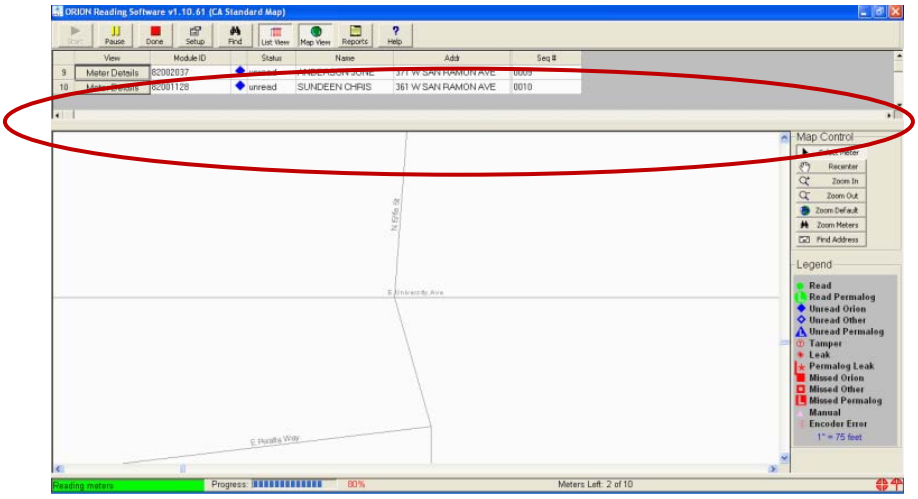
**Note:** Once a route is successfully loaded, the function of Load Route is no longer available.

You may now remove the memory stick from the USB port.

## Reading Meters


Now that the route files are loaded, ORS is ready to read meters.

- ❑ Select **Start Reading Meters** from the main menu which activates:
  - o The reading cycle
  - o Split View (List View & Map View)
  - o The functions of the Top Button Bar
  - o Updates the Status Bar
    - ▪ Progress
    - ▪ GPS
    - ▪ Receiver

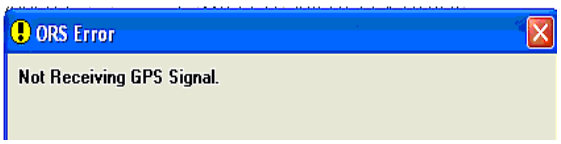


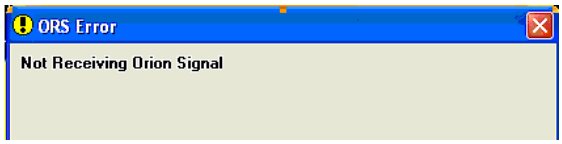

When starting the reading cycle the screen defaults to the Split View, which displays the List View and Map View in a split format. The current route is listed at the top of the screen as well as the current map on the bottom of the screen. Place the cursor on the bar between the two areas, click and drag to adjust the view.

Toggle between both views by pressing and depressing the List View and Map View keys.

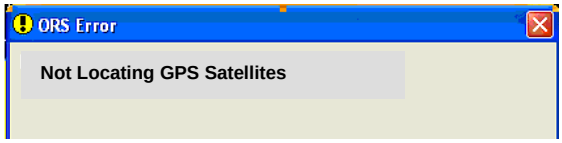
The **Status Bar** found on the bottom of the screen summarizes the current status of the reading cycle


## ORS Errors — GPS & Receiver




If you receive the message box **"ORS Error – Not Receiving GPS Signal"** and/or **"ORS Error – Not Receiving ORION Signal,"** be sure to check the receiver connection and check that the GPS and receiver are turned on.

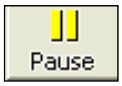



Another message box could indicate, **"Not Locating GPS Satellites,"** meaning the GPS connection is active but the unit is not finding a clear signal and is unable to determine a location.

## Top Button Bar


The **Top Button Bar** contains the different commands and configurations that make up ORS.


**Start** begins or resumes the meter reading process. When beginning the reading cycle the Split View (List & Map on) will default.




**Pause** temporarily halts the reading cycle. To resume the reading process, click on **Start**.


**Done** completes the meter reading process and prepares the readings for transfer to Reading Data Management software.

Select **Done** to return the user to the Main Menu.

**Setup** allows changes to the settings ORS uses in its operations.

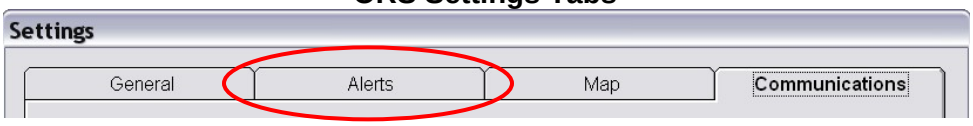

- A password is required to access and change the settings information. The default password is "**orion"** using lower case letters.
- Setup can be accessed without being in the reading cycle.

**ORS Settings Tabs**


The **General** tab allows the user to change the font size and Out-of-Route processing settings.

- **Font Size** – allows user to change size of fonts used in ORS applications.
- **Collect Out-of-Route Reads** – allows user to read meters not loaded into current route. Also gives user the ability to send reads back to Badger Reading Data Management.
- **Verify Collection of Out-of-Route Reads** – when this box is checked a message will appear stating, "You have elected to collect out-of-route reads, is this correct." This message is to verify user wants to gather out-of-route reads. If user selects "no," the ORS software will only look for ORION signals loaded in the route.
- **Display Out-of-Route Icons on Map –** will display an icon on the map when a read is captured that is not in the loaded route.

**ORS Settings Tabs**




The **Alerts** tab allows changes to the settings that control display preferences and audible alerts. Display preferences should be changed through the Reading Data Management operator.

- **Display Comments** – will display a message when the vehicle gets within reading range of the meter. The comments are passed from the Reading Data Management operator to the meter reader such as, "Seasonal," "Bad Dog" or "Shut Off Water."
- **Display Flashing Icons** – activates icons that notify the reader about the GPS and ORION receiver status.

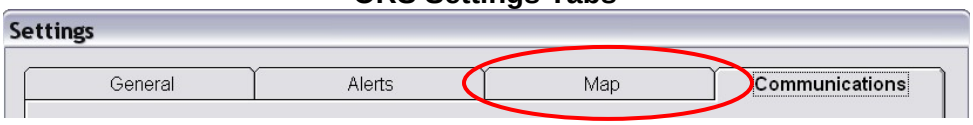
When the remaining displays are selected, a pop-up message displays for each assigned warning and it will generate the Alert Report:

- **Display Missed Meters** –when the latitudes and longitudes are set and the reader enters into the meter's reading range and exits the meter's range without getting a reading, the meter is displayed as "missed."
- **Display Tampers** – a tamper is a cut or broken wire.
- **Display Leaks** – transmitter is monitoring the meter for 24 hours and looking for a one-hour period where no water has passed through the meter. Continuous water usage reports a potential leak.
- **Display Reverse Flow** –current ADE's reading is lower than previous reading.
- **Display No Usage** – meter has not registered water usage for 30 days.
- **Display Permalog Leaks** – indicates a potential water main leak when the optional Permalog AMR/AMI acoustic leak loggers are installed.

- **Play Alerts** – allows selected sounds to play when the ORS is in use. Click on **Hear Alert** to hear what each alert sounds like.
    - **Error Alert** – indicates errors have occurred such as “Not Receiving GPS Signal” or “Not Receiving ORION Signal.”
    - **Warning Alert** – indicates a warning such as “Route Complete” or “Low Battery.” If the ORION Receiver battery is getting low it should be recharged or replaced.
    - **Read Alert** – indicates a meter has successfully stored a reading.
    - **Tamper Alert** – indicates a transmitter is reporting a cut or damaged wire.
    - **Leak Alert** – indicates a meter is reporting “Continuous Usage.”
    - **Permalog Leak** – indicates a potential water main leak when the optional Permalog AMR/AMI acoustic leak loggers are installed.
    - **Missed Alert** – indicates the reader has entered and exited the meter area but a reading was not received.
    - **Reverse Flow** –the current ADE reading is lower than the previous reading.
    - **No Usage Alert** – indicates the meter had not registered water usage for 30 days.

**Note:** Display preferences should be changed through the Reading Data Management operator or they will reset at every reading cycle. Audible alerts should be changed in the General Tab using the drop-down box, to select the desired alert sound.

**ORS Settings Tabs**




The **Map** tab allows changes to the settings that control the map functions.

- **Range Entry Zone** – Tells ORS when to consider a meter to be in range for receiving data. This is used in conjunction with the Range Exit Zone to determine if a meter reading has been missed. In order for this feature to function, GPS latitude and longitude values must be stored in the customer account.
- **Range Exit Zone** – Tells ORS when to consider a meter to be out of reading range.
- **Starting Address** – Tells ORS the location the map should display at the start of the meter reading process.
- **Zoom Default** – Will return the map displayed on the screen to its default value.
- **Map Orientation**
  - **North Orientation** – The map always displays north as up. The cursor will slide across the page as the vehicle moves and will always point up as north.
  - **Rotating Map** – As the vehicle moves, the map display moves in the same direction.
  - **North Orientation and Rotating Pointer** – The map always displays north as up but the cursor points in the direction the vehicle is moving.
- **Show Meter Information on Map** – Displays customer information with the meter icon, such as customer name, address or account number.

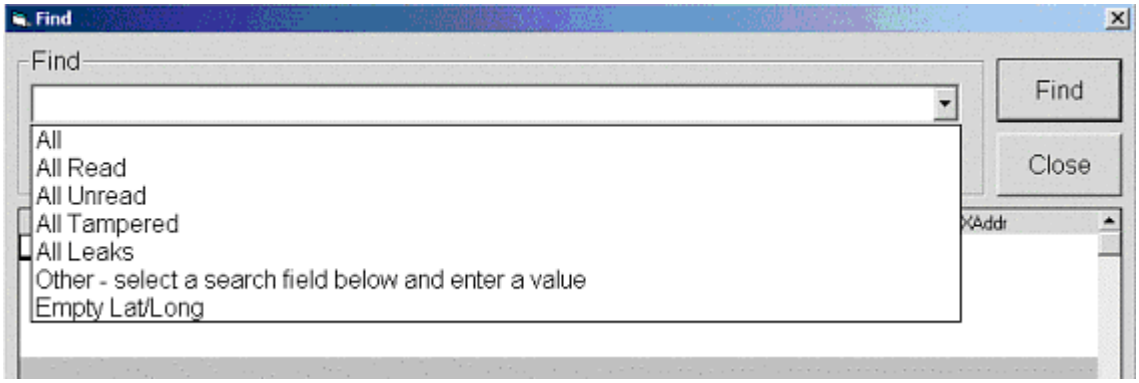
**ORS Settings Tabs**


The **Communications** tab displays the plug-in connections required for communication to the GPS and receiver on the laptop.

***Changes to the fields on the Communications tab should only be made under the direction of Badger Meter Technical Support.***

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

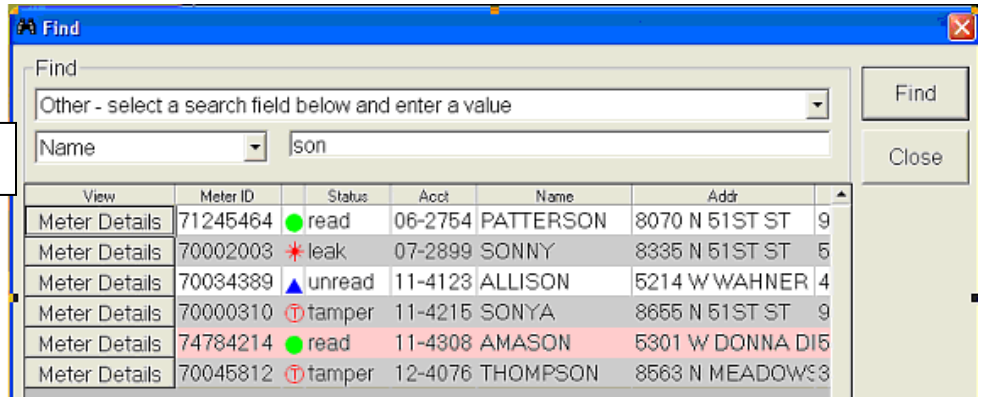

**Find** allows the meter reader to search for a customer record by selecting an option from a drop-down list. All findings are displayed in a List View format.




The drop-down list contains the following search options:

- **All** – All meters in the route.
- **All Read** – All meters in the route that have current readings.
- **All Unread** – All meters in the route that have not been read.
- **All Tampered** – All read meters that have a cut or damaged wire.
- **All Leaks** – All meters with continuous usage over a 24-hour period.

Drop Down Box →



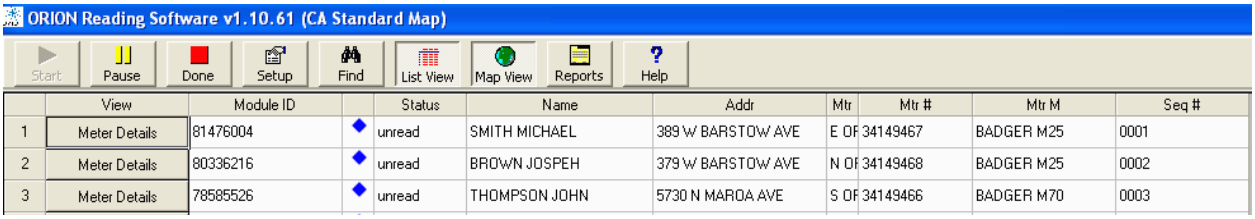

- **Other** – *See sample above.*

  Select a search field from the drop down box. These search fields are chosen by the Reading Data Management operator and downloaded from the Reading Data Management software. In this example we are searching by ***Name***. With the value of "**son**" entered we will find all customer names with the letters "son" within their record such as Patter**son**, **Son**ny, Alli**son**, **Son**ya, Ama**son** and Thomp**son**, regardless of their meter status. Meter status icons will be further described in the Map View section.

- **Empty Lat/Long** – Displays all meters in the route that have not been assigned latitude and longitude values.

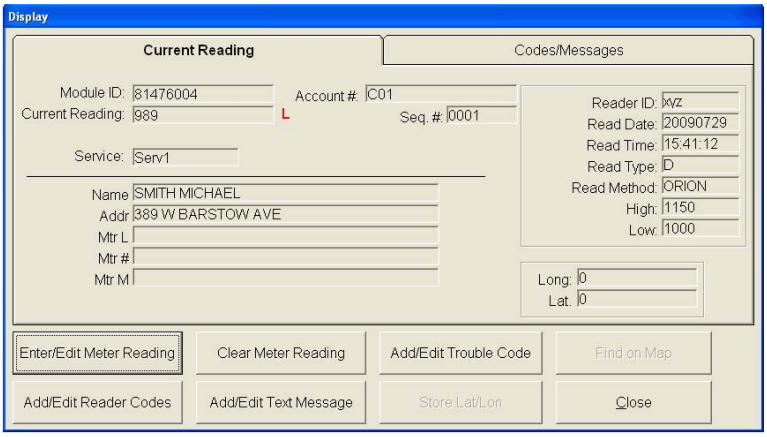

**List View** displays the unread meters in the order they were loaded from the Reading Data Management system. As a reading is captured the customer data drops from the list.

**Note:** The meter reader can adjust the size of any column by clicking between the column headings and dragging to expand or condense the column width.



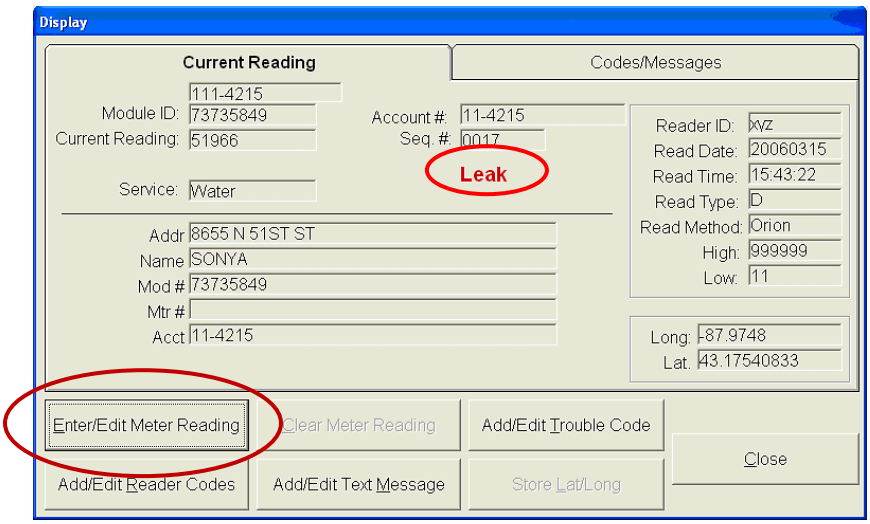

## Meter Details

By selecting the **Meter Details** button in the left column, the user can view the details stored in the ORS for the select customer, and enter codes, messages and manual meter readings.




- **Edit/Enter Meter Reading** – Allows the meter reader to enter manual readings.
- **Clear Meter Reading** – Deletes the current reading.
- **Add/Edit Trouble Code** – Sends a code back to the office such as “Broken Wire,” “Missing Unit” or “Damaged Unit.” **Note that Trouble Codes are defined in Reading Data Management and sent to ORS**.
- **Add/Edit Reader Codes** – Allows the meter reader to send more detailed information regarding the selected meter back to the office such as “Name Change,” “Left Card” or “Make Appointment.” Up to three **Reader Codes** can be attached to each customer record. Reader codes are also defined in the Reading Data Management system and sent to ORS.
- **Add/Edit Text Message** – Allows the reader to send an alphanumeric message back to the office. This is a free-form field of up to 140 characters.
- **Store Lat/Long** – Allows the meter reader to assign latitude and longitude values to the meter. **Note:** The vehicle must be in the location of the meter and the GPS unit must be active.

The information found on the **Current Reading** tab includes:




If the meter were to report a **Tamper** the word "**Leak**," in this sample, would be replaced with the word "**Tamper**" in bold red letters. The current reading would also show "**Tamper Set**" with no reading but could be manually overwritten using the Enter/Edit Meter Reading button.

- **Module ID** – The transmitted serial number.
- **Current Reading** – The numeric value of the register, Unread or Tamper Set.

  ***Note:*** *The letter "L" in the sample of the previous page indicated the reading was a low read. If the meter registered a potential leak the word "Leak" would appear as shown below*:

- **Account #** – Account number sent by the Reading Data Management system.
- **Seq #** – Sequence number of this meter used for reading.
- **Service** – The description of service being measured by the meter, such as "Water," "Electric," "Gas," or "Service 1," "Service 2," "Service 3."

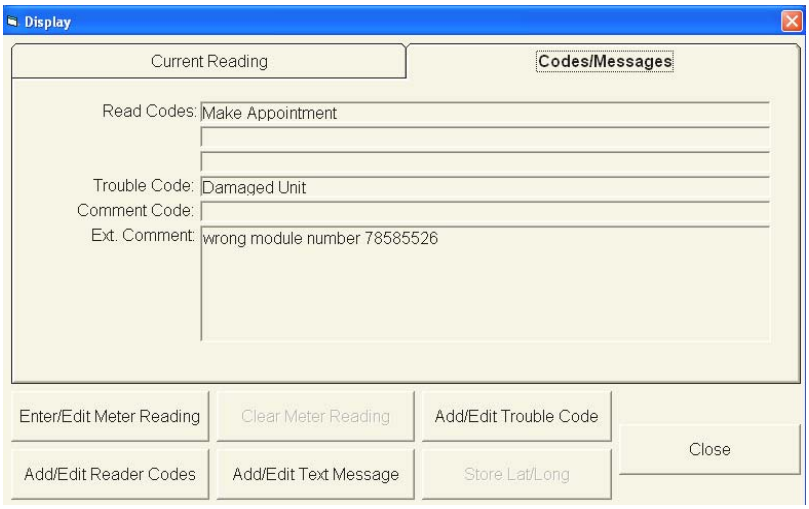
The customer information fields and their listing order are chosen in the Reading Data Management system and are downloaded to the ORS. They are the same search options selected for the **Find** function.

- **Addr** – Service address.
- **Name** – Customer name.
- **Mod#** – Transmitter serial number.
- **Mtr#** – Meter serial number.
- **Acct –** Customer account number as sent by the Reading Data Management system.

The last of the meter reading fields on the right side of the screen pertain specifically to the meter reading that was gathered.

- **Reader ID** – Meter reader initials as entered at log-in.
- **Read Date** – Date the current reading was entered – YYYYMMDD.
- **Read Time** – Time the current reading was entered.
- **Read Type** – How the reading was gathered (a code for Reading Data Management software).
- **Read Method** – Type of AMR, or manual.
- **High** – High value typically set in Billing.
- **Low** – Low value typically set in Billing.
- **Long** – Longitude value stored.

- **Lat** – Latitude value stored.
- The **Codes/Messages** tab displays all messages relating to a customer record.

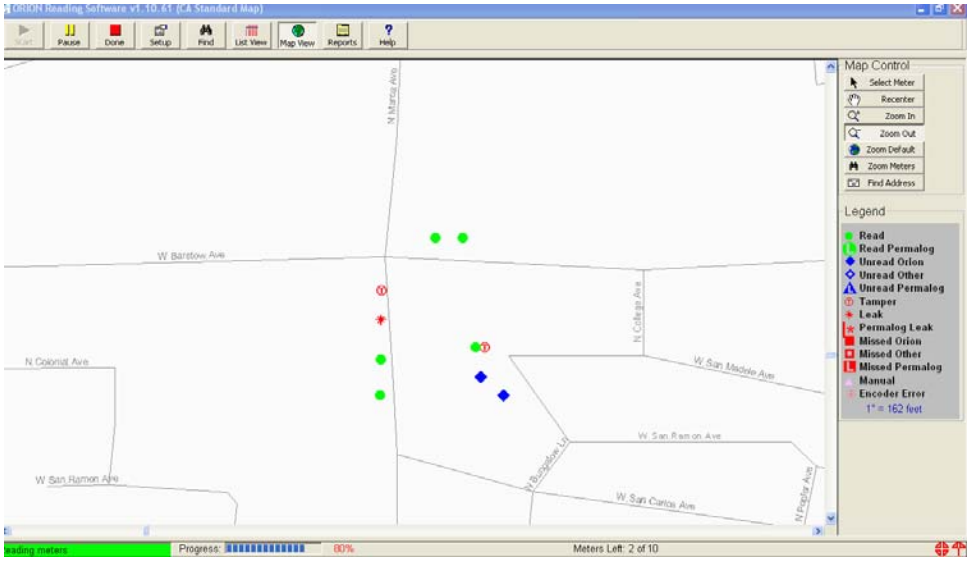


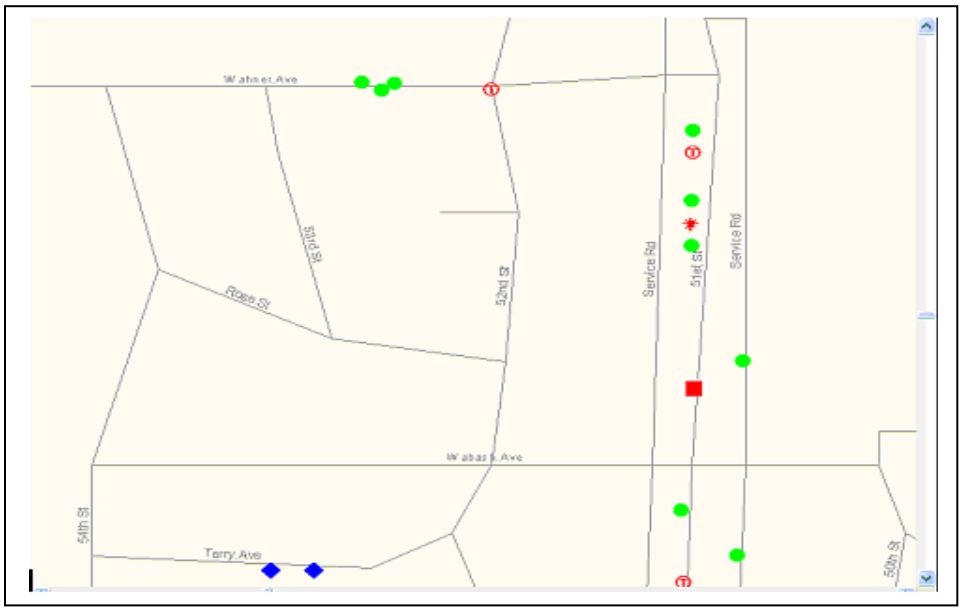

**Comment Codes** are sent to the meter reader from the Reading Data Management operator.

**Read Codes, Trouble Code** and **Text Comment** are sent from the reader to the Reading Data Management operator and are cleared at the process of the next billing cycle.

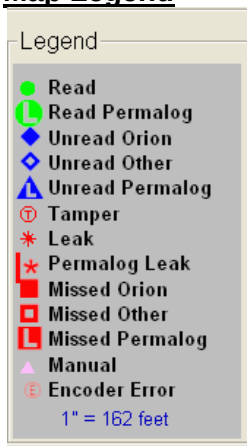
To exit **Meter Details**, select **Close**.


The ORS can display meter information on the map using Bluetooth® GPS technology. In order to use the features associated with the map, the meter's latitude and longitude values must be set first. A meter icon identifies each meter's status and location. The placement on the map denotes the location, while the color and shape of the icon denotes the status.



## Map Legend

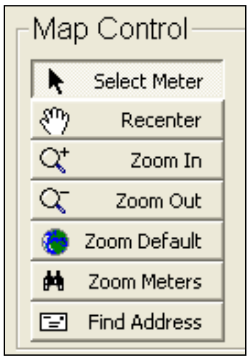



The Map **Legend,** in Map View, is located to the right of the screen and identifies the icons used for the reading cycle. When a meter reading is received the meter icon will change to reflect the status of the meter.

- **Read** – A green circle denotes the meter reading was received and no problems have been reported.
- **Unread ORION**– A blue diamond denotes meters that are equipped with ORION transmitters and do not have a current reading stored. If the vehicle does not drive close enough to gather a reading the icon remains a blue diamond.
- **Unread Other**– A hollow blue diamond denotes meters that are equipped with compatible non-ORION RF transmitters, such as RAMAR® or Datamatic®, and do not have a current reading stored. If the vehicle does not drive close enough to gather a reading the icon remains a blue diamond.
- **Tamper** – A red circle with the letter “T” denotes a meter that has reported a cut or damaged wire while capturing the current reading.
- **Leak** – A red asterisk icon denotes a meter that has shown continuous usage over a 24-hour period.
- **Missed ORION** – A red square means the vehicle drove close enough to the meter with an ORION RF transmitter, based on stored latitude and longitude values, and exited the area, but the current reading was not captured.
- **Missed Other** – A hollow red square means the vehicle drove close enough to the meter with a non-ORION RF transmitter, based on stored latitude and longitude values, and exited the area, but the current reading was not captured.
- **Manual** – A pink triangle denotes meters equipped with technologies other than ORION, also those meters that are read manually.
- **Read Permalog** – A green circle with a hollow "L" denotes the Permalog AMR Acoustic Leak Logger reported to the wired ORION transmitter. The transmission was received during routine ORS reading operations.
- **Unread Permalog** – A blue triangle with a hollow "L"+ denotes ORION transmitters that are wired with a Permalog AMR Acoustic Leak Logger but the vehicle has not been close enough to capture the transmission.

- **Missed Permalog** – a red square with a hollow "L" denotes the vehicle was close enough to capture the transmission of an ORION transmitter that is wired with a Permalog AMR Acoustic Leak Logger, but a transmission was not received.

## Map Control




The **Map Control** buttons are located to the right of the screen in Map View and allow navigation of the map.

- **Select Meter** – click on a meter icon to display the details of the meter. If two or more meters overlap in the same area, all the available meters will be in List View form.
- **Recenter** – Moves the map in any direction. Click, hold and drag the map to move the map to the desired location.
- **Zoom In** – Magnifies the map view area, and centers it on the spot tapped on.
- **Zoom Out** – Shrinks the map view area, and centers it on the spot tapped on.
- **Zoom Default** – Returns the map to the default view setting.
- **Zoom Meters** – Displays the location of all meters in the route, currently loaded.
- **Find Address** – Centers the map on a specific address within the state.

## Reports


The **Reports** feature organizes meter reading information by a number of different results making it easy to find needed information quickly. When the Reports button is selected, the Summary Report displays as well as the buttons for selecting the remaining report options.

- **Summary Report** – Creates a summary of the current reading cycle. This report will show the following information:
  - Total Meters
  - Read Meters
  - Unread Meters
  - Percent Read
  - Number Missed Meters
  - Unexpected Manual Reads
  - Number of Tampers
  - Number of Leaks
  - Total Read Time
  - Elapsed Pause Time
  - Last Stopped Time
  - Out-of-Route AMR Modules

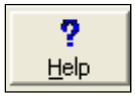
- **Audit Report** – Shows all error conditions encountered in ORS according to date and time.

- **Alert Report** – Shows the number of alerts received during this reading cycle such as low battery or route complete. Also tamper, leak and missed meters if "display" has been selected in the General Settings tab.

The following reports use the List View format, which allows the user to view and update a customer record by selecting **Meter Details**:


- **Not Read Report** – Lists all the unread meters in the route.
- **Read Report** – Lists all of the meters that have been read.
- **Tampered Report** – Lists any meters that have reported a cut wire tamper.
- **Leak Report** – Lists all meters that have reported 24-hours of continuous flow.
- **Missed Report** – Lists any meters that were missed within a route.
- **High/Low Report** – Lists all meters reporting a high/low read based on the values set in the billing system.
- **Permalog Report –** Lists all of the Permalogs that have been read.
- **Close** – Closes the report window.

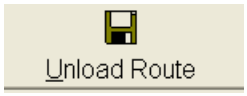
## Help




The last button on the Top Button Bar is the **Help** key. **Help** allows the meter reader to search for information on the operation of the ORS in the event they are unsure of the next step.

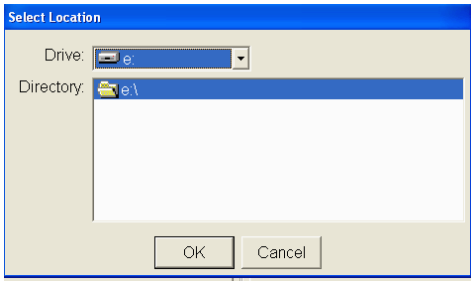
## Unloading The Route

When the reading cycle is complete, select **Done** to return to the main menu. You will now unload the route.




The **Unload Route** option on the main button bar is used to write the data to a memory stick for transfer to the Reading Data Management system, and to archive the data in ORS in case the memory stick is misplaced or destroyed before the billing cycle is complete.

Insert the memory stick into the USB flash drive. Click **Unload Route** and confirm the correct Drive letter, typically the E-Drive.




Click **OK**. A "Saving" progress bar will appear.

When the route has unloaded to the memory stick, you will see the following window:

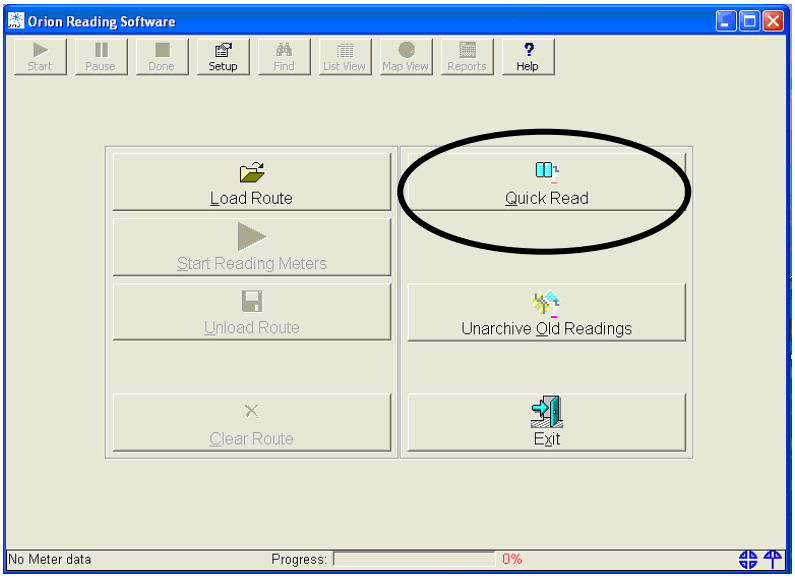

Select **OK** before unplugging the memory stick.

Return the memory stick to the Reading Data Management operator for completion of the billing cycle.

## Clear Route


The **Clear Route** button deletes all meter sequence data that is currently being processed. ORS will send a command prompt, "Are you sure you want to clear the data?" If **Yes** is selected, the reading information will be cleared.

## Quick Read



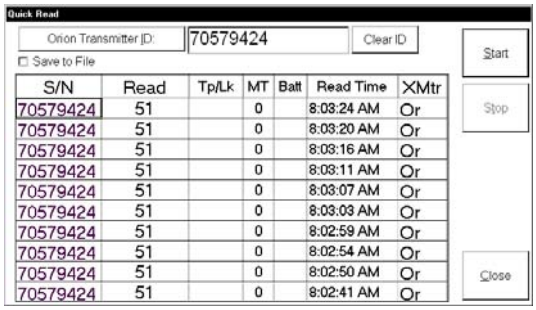

On the main button bar, the **Quick Read** option lets you obtain a current meter reading without having to load a route.

This is a handy way to verify the installation of an ORION transmitter or to gather a final read.

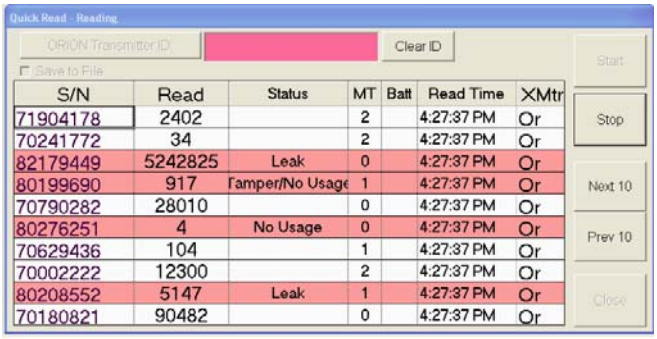
- ❑ Verify the ORION receiver is connected, turned on, and the antenna is in place.
- ❑ Enter the transmitter ID number to be read in the Transmitter ID field.
- ❑ Select the **Start** button.

**Note:** The **Save to File** function is not designed to store the reading for customer use. It produces data that is stored to a text file for Badger Meter Technical Support troubleshooting and analysis.

The **Quick Read** screen (right) will display the reading and update the information every four seconds while in range of the transmitter. The last 10 readings collected will remain on the screen.




If a transmitter ID number is not entered, readings will be displayed for all active ORION transmitters in range (see below). These reads will also update on screen every 4 seconds until the user selects **Stop**.



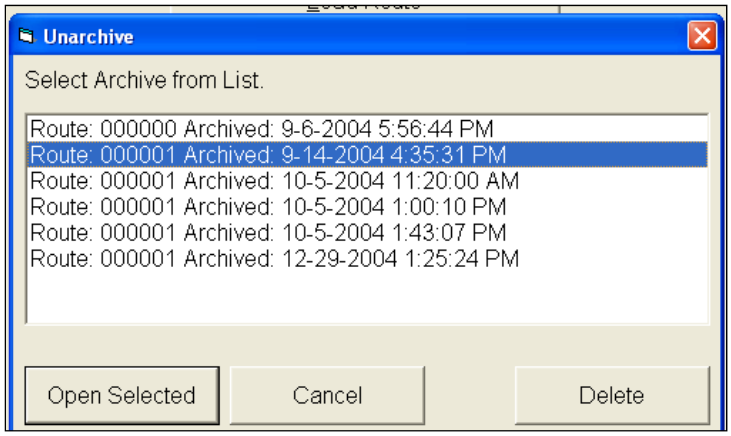

The **Quick Read** screen shows how many meter readings have been received since the **Start** button was selected. View the readings, 10 at a time, by clicking on the **Next 10** or **Prev 10** buttons.

- ❑ When reading is complete, select **Stop**.
- ❑ Select **Close** to exit to the main menu.

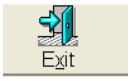
## Unarchive Old Readings


**Unarchive Old Readings** allows prior reading sessions to be recovered and unloaded (10 max).

When selected, a list of the previous reading sessions will be displayed. Choose the reading session to be restored, based on the date and time, and click **Open Selected**. The reading session will be restored. From the main menu, click on **Unload Route** to **Unload** the readings.

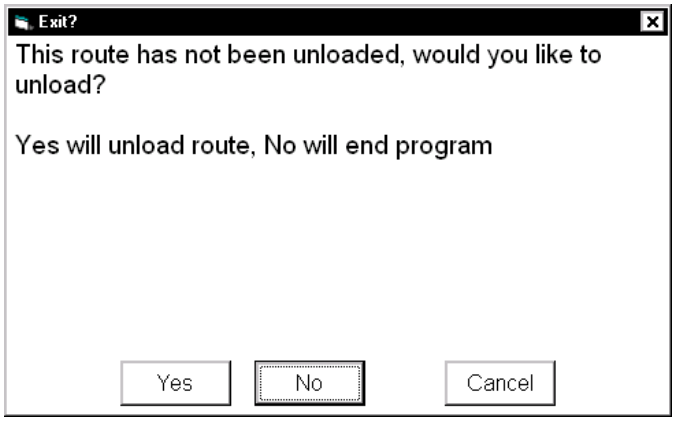



## Exiting The Program




The **Exit** button closes the ORS application and returns you to the Windows desktop.

To **unload** the route and exit the program, select **Yes** on the screen shown below.




You can **Exit** without having to **Unload** your route if you want to shut the laptop down and take a temporary break from the reading process.

If you want to **Exit <u>without</u>** unloading, click **No**. You will be able to return to the route when you restart the laptop.

**Note:** To conserve the battery, remember to turn the ORION Receiver off when you shut the laptop down.

## Badger ORION Utility Software

All Badger ORION transmitters are factory programmed to begin transmitting the meter reading as soon as the register senses flow through the meter. When water usage has been recorded the transmitter will broadcast a signal every four seconds. As a result, Badger ORION transmitters can be installed on meters without the need to manually start the transmitter. However, to start the transmitter before installing the meter, use the **Start Radio** function of the Badger ORION Utility Software. The Badger ORION Utility Software can also be used to set the RTR odometer after a unit has been repaired, or to pause the radio signal and conserve the battery life of a unit that has been taken out of service. **Note**: It is not necessary to pause a transmitter unless it is out of service for a significant length of time.

**Getting Started**

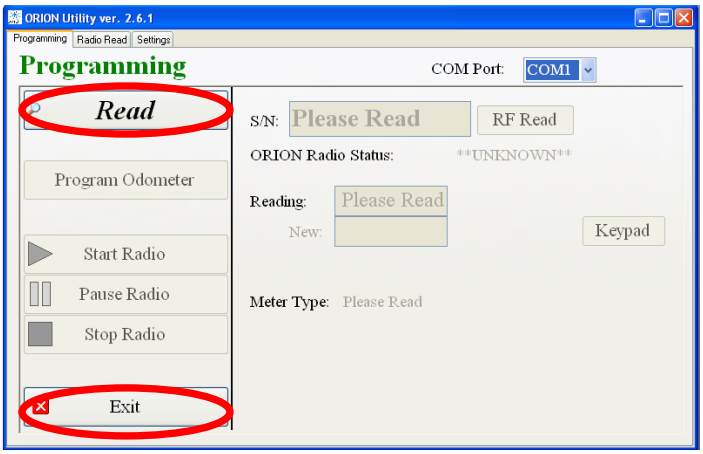
The Badger ORION Utility Software uses the Optical Programmer device connected to the PC to communicate with the transmitter through the transmitter's Optical LED. The communications link allows the user to perform the following functions:

- **Read** – Imports and displays the transmitter's current stored information.
- **Keypad** – Allows changes to the transmitter's odometer value.
- **Program Odometer** – Stores the new odometer value when used in conjunction with the keypad.
- **Start Radio** – Starts the transmitter broadcasting its reading every four seconds.
- **Pause** – Causes the transmitter to temporarily halt transmitting its meter reading. It will transmit again once flow is registered through the meter or the **Start Radio** function is used.
- **Stop Radio** – Stops the transmission until the **Start Radio** command is used. **Stop Radio should never be used unless the Badger ORION transmitter is authorized to ship via air.**

Each transmitter has an Optical LED that protrudes from the transmitter.

## Starting The Badger ORION Utility Software

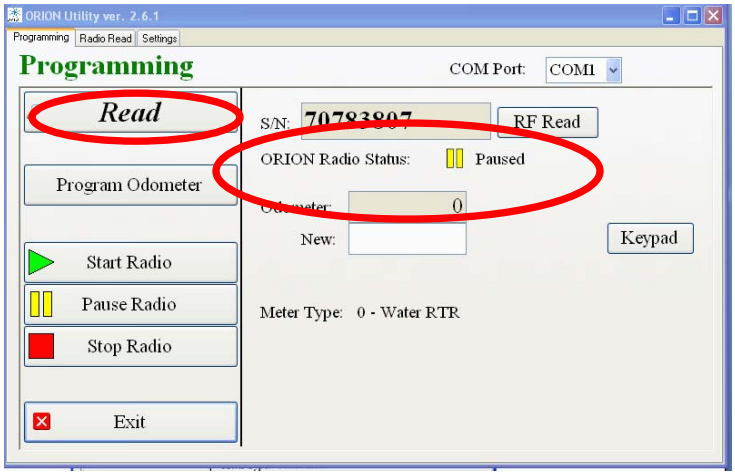
Start the Badger ORION Utility Software by double-clicking on the Badger ORION Utility icon on the desktop.




When opening the Badger ORION Utility Software there are only two Programming options available, **Read** or **Exit** (the software). The **Read** function will import the transmitter's serial number and current information relating to this specific module. The serial number cannot be manually entered or altered. **A Read must be done before performing any other function.**

## Reading a Transmitter with the Optical Programmer

Connect the Optical Programmer cable to the PC serial port. Align the center of the Optical Programmer to the LED and click the **Read** button.

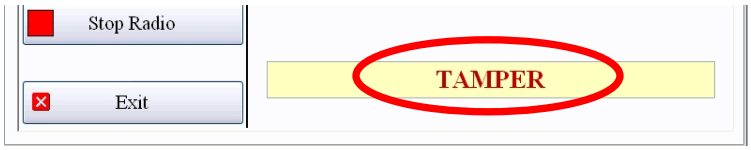



**Note:** If the Optical Programmer and the LED are not correctly aligned, or if the Optical Programmer is not properly connected to the PC, you will see an alert box.

Click **OK** to acknowledge the message, line up the ports, and click the **READ** button again.

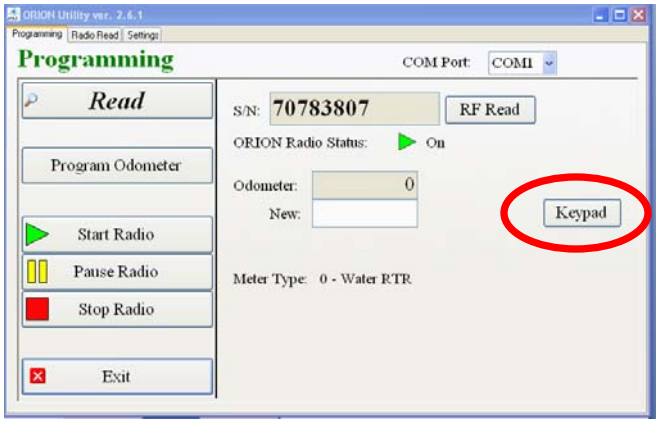
Notice that the Radio Status says "Paused." This is because water has not been used and/or the module has not been activated using the **Start Radio** function. A **Read** can be done with the Optical Programmer without having the transmitter turned on.

If the Badger ORION module has a damaged or cut wire the word **TAMPER** will display in bold red letters.

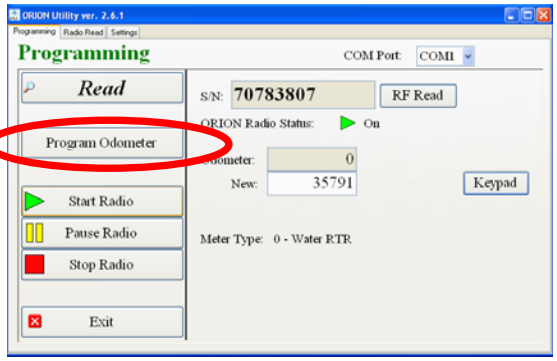


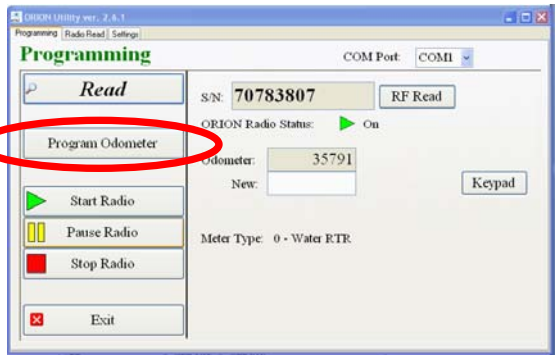

If the unit has had continuous water usage over a 24-hour period, the word **LEAK** would appear in place of the word **TAMPER**.

## Program Odometer






**Note:** Program Odometer function is used only with the RTR.

**Step 1:**
After a **Read** function is performed, the odometer value can be adjusted.

**Step 2:**
Select the **Keypad** button to begin the process. When programming any Badger ORION transmitter, enter the value of all six moveable wheels plus the sweep hand for all meter types (gallons, cubic feet, etc.) and all meter models.

In this example the odometer wheels display 003579 and the sweep hand is between the 1 and 2. Since the sweep hand has not yet passed the 2, use 1 as the last digit of reading. The odometer value would then be 0035791. It is not necessary to enter preceding zeros but may be helpful to have a placeholder when programming large meters.

**Step 3:**
Using the keypad, enter the seven digits, and click **OK** to continue.

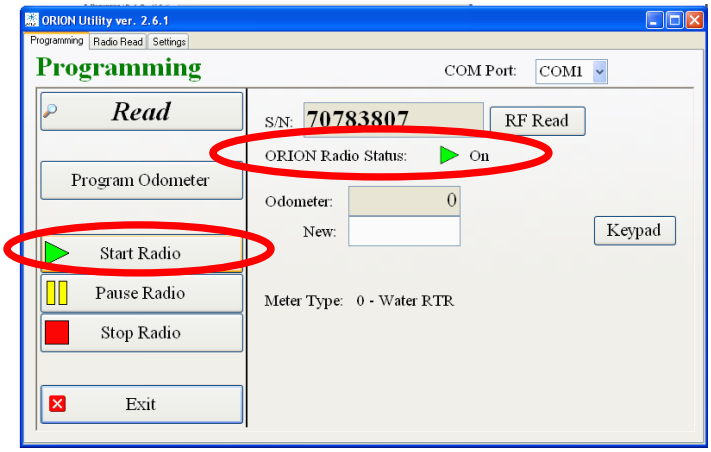
After the odometer value has been entered it must be programmed into the Badger ORION transmitter.

**Step 4:**
Align the Optical Programmer and the transmitter's LED.

Select **Program Odometer**

**Note**: If the transmitter's radio was paused prior to programming the odometer, the odometer value will be stored and the transmitter will remain paused.

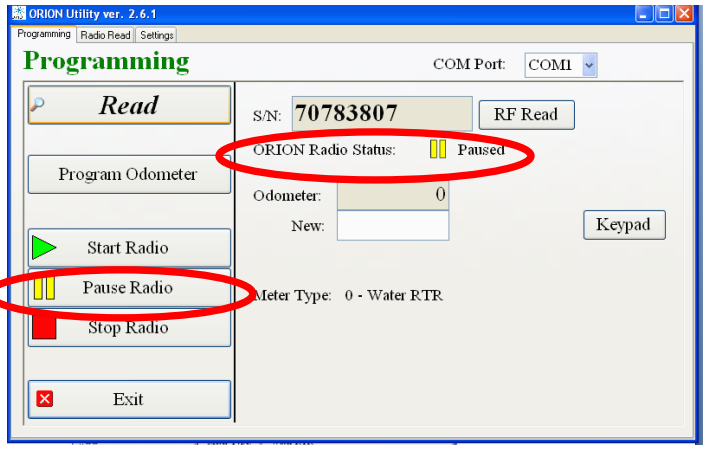
## Start Radio




After a successful **Read**, select **Start Radio** to activate the transmitter's signal broadcast.

The Radio Status box will now display **On**. The transmitter will broadcast its information every four to five seconds.

## Pause Radio

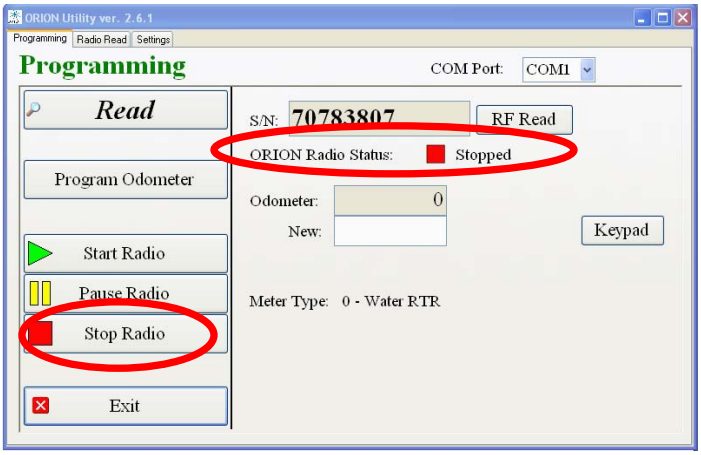



Pausing a transmitter returns it to the "soft sleep" mode.

After a successful **Read,** select **Pause Radio** while the Optical Programmer and LED are aligned.

The Radio Status box will now display "Paused."

## Stop Radio




Stopping a transmitter puts it in a "hard sleep" mode.

After a successful **Read,** select **Stop Radio** while the Optical Programmer and LED are aligned. This will cease the transmitter's broadcast.

The Radio Status box will now display "Stopped."

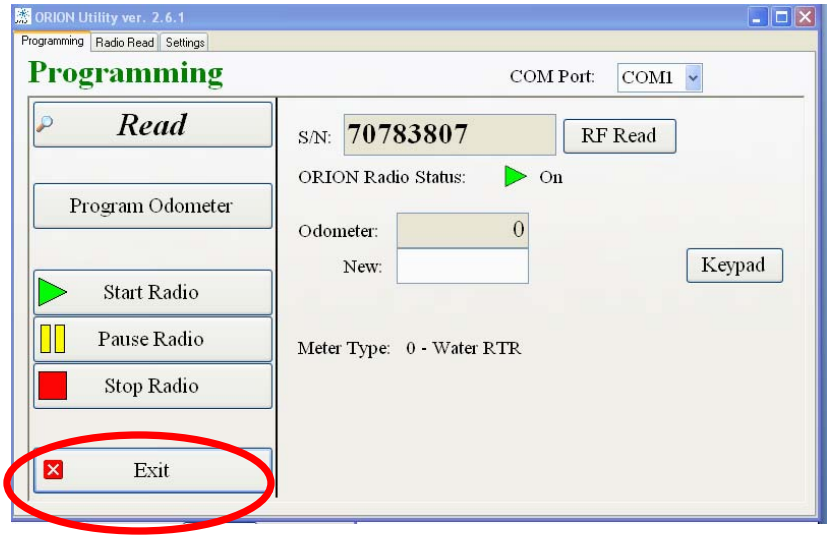
**Remember:**

The difference between **Pause Radio** and **Stop Radio:**

- A **paused** radio will start after a unit of water flows through the meter.
- A **stopped** radio **must be** started using the programming mode of the Badger ORION Utility. Although the Badger ORION transmitter is stopped, it will continue to record the usage as shown on the register. When a stopped radio is started, it will begin transmitting the read shown on the register.

**We recommended that you verify any programming changes by completing a test Read after you modify any programming functions.**

**Exit**




To close the ORION Utility Software, select **Exit** to return to the Windows desktop.

## What If Things Go Wrong?

While errors are not typical, they can occur with any software. If you have a problem, record the events leading up to the error (see list below) and call the Badger Meter Technical Support Hotline: **1-800-456-5023**. A Technical Support Specialist will help you gather any additional information, and will assist you in restarting the ORS, if needed. Your telephone call will alert the Badger Meter software engineers to investigate.

### When You Call the Technical Support Hotline

If possible, give the following information to the support specialist:

- The ORS screen active when the error occurred.
- The procedure 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 laptop.

Your support specialist may ask you to fax or e-mail notes or other information to Badger Meter to assist in solving the problem.

### 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 to restore your system. In some cases, Badger software engineers may already have addressed the errors, and a software upgrade may be available to correct the problem. In other cases, a specialist can walk you through the steps necessary to fix the error.

In some cases, a specialist will direct you to perform some steps, if the problem reoccurs. This will help you gather valuable information to speed in troubleshooting the problem. If a problem does reoccur, please follow the steps and call the Hotline. A specialist will gather the information for that particular problem, and further direct you.

### Faxing the Technical Support Group

In addition to the Hotline, you can reach the Badger Meter Technical Support Group by fax at 1-888-371-5982. This may be a convenient way to follow up with your support specialist on a particular incident. The fax is available 24 hours per day, seven days per week.

### E-Mailing the Technical Support Group

The Badger Meter Technical Support Group is also available via e-mail at: 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.

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Please see our website at
**www.badgermeter.com**
for specific contacts.

Due to continuous research, product improvements and enhancements, Badger Meter reserves the right to change product or system specifications without notice, except to the extent an outstanding contractual obligation exists.



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