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# Chapter 5: Pit Installation

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This chapter describes storage and unpacking instructions, preliminary tests, tools, materials, site selection, and pit installation of the L900 MIU.

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## Prior to Installation

### Storage

Upon receipt, inspect shipping containers and contents for damage prior to storage. After the inspection is complete, store the cartons in a clean, dry environment. Keep in mind that the L900 MIU has an internal battery. Storage for more than one year can affect product life. Be sure to use a first-in first-out inventory control system. See "Environmental Conditions" on page 4

### Unpacking

As with all precision electronic instruments, the L900 MIU must be handled carefully; however, no additional special handling is required.

After unpacking the L900 MIU, inspect it for damage. If the L900 MIU appears to be damaged or proves to be defective upon installation, notify your Neptune sales representative. If one or more items requires reshipment, use the original cardboard box and packing material.

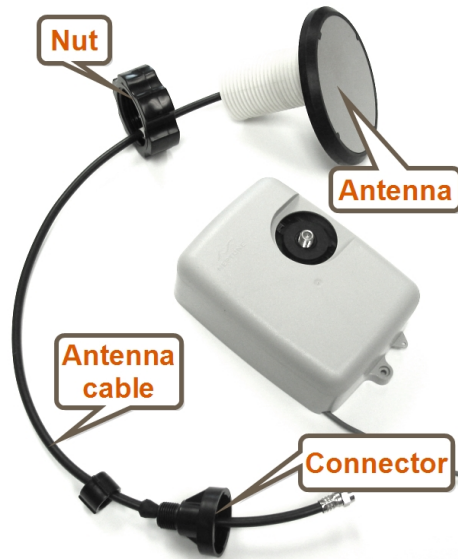


Figure 23 – L900 MIU Kit

## Tools and Materials

Table 8 on page 9 and Table 9 on page 10 show the recommended tools and materials you need to successfully install the L900 MIU.



Some items may not apply to your specific installation, or the list may not contain all required tools or materials.

## Site Selection



Always follow your company's safety practices and installation guidelines when installing an L900 MIU. Never perform an installation during a lightening storm or under excessively wet conditions.

Installation and operation in moderate temperatures increase reliability and product life. See "L900 MIU Pit Environmental Conditions" on page 4.

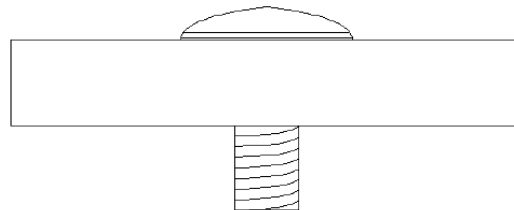
Follow these guidelines when selecting a location to install the L900 MIU.

- For best results, select a location where there is no chance that another object can be set over the antenna.
- Avoid installing the L900 MIU behind metal fences or walls.
- Make sure the pit location gives adequate room for installing both the L900 MIU and the pit antenna.



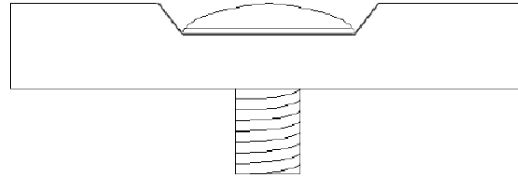
For maximum performance, the flange of the pit antenna needs to be located above the pit lid.

- For maximum performance, Neptune recommends that pit antennas be installed above the lid as illustrated in Figure 24.



**Figure 24 – Antenna Placement for Low Traffic Areas**

- When installing in a high traffic area, Neptune recommends that the dome of the antenna be recessed in the pit lid as shown in Figure 25.
- Recessing the installation reduces the range of the antenna.



**Figure 25 – Antenna Placement for High Traffic Areas**

- For best results, Neptune recommends installing the L900 MIU in a location that provides a direct line of site to the path of the meter reader.
- Although the L900 MIU has a cable already attached (2 feet or 6 feet), some installations can require additional cable. In these cases, the maximum cable length between the encoder register and L900 MIU depends on the register's manufacturer and model. Refer to Table 11 for maximum cable lengths.

**Table 11 – Cable Length and Manufacturer**

Encoder Register	Maximum Cable Length
Neptune ARB V*	300 feet (91 meters)
Neptune ProRead / E-CODER	500 feet (152 meters)
Sensus Protocol Register	200 feet (61 meters)

\* Meets manufacturer's published specification for wire length between encoder and remote receptacle.

---

## L900 MIU Pit Installation

The following section describes how to install a single L900 MIU in a pit location.



Select a location for the L900 MIU that meets the recommendations in "Site Selection" on page 24.

## Installing the Antenna



**Figure 26 – Inserting the Antenna into the Pit Lid**

1. Insert the antenna cable and housing through the 1¾-inch hole in the meter pit lid. See Figure 26.



**Figure 27 – Locking Nut on Antenna**

2. Thread the locking nut onto the antenna (unthreaded end towards lid). See Figure 27.



**Figure 28 – Securing the Locking Nut**

3. Hand tighten the nut securely to the lid. See Figure 28.



**Figure 29 – Installation Completed**

Figure 29 shows a completed installation of the antenna.

### Begin the Installation



**Figure 30 – Black Thread Guard from Male F-Connector**

Complete the following steps to install the L900 MIU in a pit.

1. Remove black plastic thread protector cap from the male F-connector on the L900 MIU.



**Figure 31 – Seating Washer**

2. Place the flat black rubber washer around the male F-connector on the L900 MIU as shown in Figure 31.



Figure 32 – Apply Novaguard

3. Apply a coating of Novaguard around the base of the F-connector and on the flat rubber washer. See Figure 32.
4. Using a torque wrench, connect the coaxial cable connector to the F-connector on the L900 MIU/housing, tightening it to 15 inch-pounds.



Antenna connection should have Novaguard applied inside the connector.

### Threading the F-Connector



Figure 33 – Tightening Connector

Complete the following steps to thread the F-connector.

1. Make sure the flat washer is properly seated, and then connect the black plastic cable connector housing to the three-lobed plastic latch plate.
2. Tighten the connector by making a  $\frac{1}{4}$  turn to the right as shown in Figure 33.
3. Slide the black cone-shaped gasket down the cable until it seats against the connector housing.

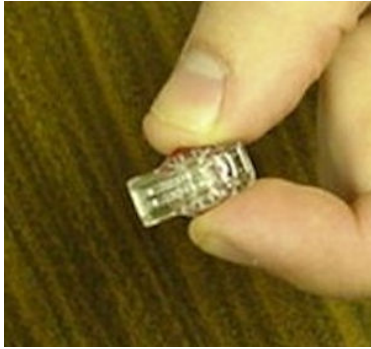


Figure 34 – Gasket and Connector

4. Slide the black plastic female-threaded connector down the coax cable.
5. Seat on top of cone-shaped rubber gasket and thread onto the three-lobed plastic latch plate as shown in Figure 34.
6. Finger-tighten the connector to depress cone-shaped rubber gasket.

This seals the coax cable from moisture intrusion.

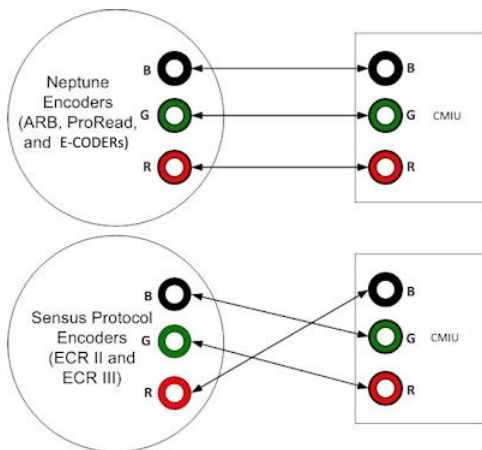
## Installing the Scotchloks



**Figure 35 – Scotchloks Connector**

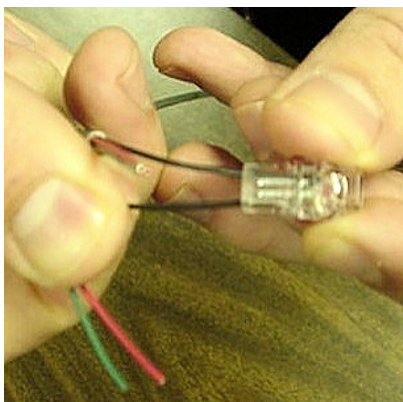
Complete the following steps to install the Scotchloks.

1. Complete steps outlined in "L900 MIU Pit Installation" on page 25 to install the L900 MIU through the lid.
2. Use 3M Scotchloks type UR connector to connect the L900 MIU wires to the encoder wires.
3. Hold the Scotchloks connector between the index finger and thumb with the red cap facing down. See Figure 35.



**Figure 36 – Color Code for Wires**

4. Pair the wires according to the color diagram. See Figure 36.



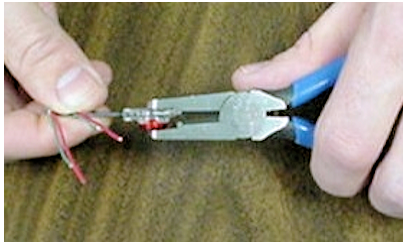
**Figure 37 – Seating Connector Wires**

5. Take a non-stripped black wire from the pigtail and a non-stripped black wire from the L900 MIU and insert wires into the Scotchloks connector until fully seated in the connector. See Figure 37.



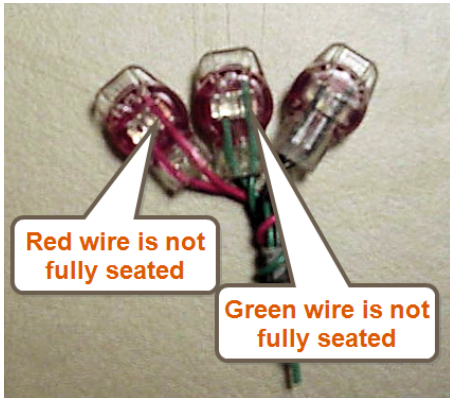


Do not strip colored insulation from wires, or strip and twist bare wires prior to inserting in a connector. Insert insulated colored wires directly into the Scotchloks connector.



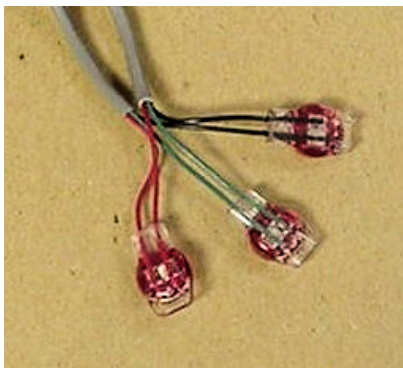
**Figure 38 – UR Crimping Tool**

6. Place the connector (red cap side down) between the jaws of the UR crimping tool as shown in Figure 38.



**Figure 39 – Improper Connections**

7. Check to ensure the wires are still fully seated before crimping the connector. Figure 39 illustrates improper connections due to wires not fully seated.



**Figure 40 – Three Color Wires Connected**

8. Squeeze the connector firmly with the proper crimping tool until you hear a pop and gel leaks out of the end of the connector.
9. Repeat steps two through seven for each color wire. See Figure 40.
10. After all three color wires have been connected, go to "Wall Installation" on page 15 to ensure proper connections and the L900 MIU is functioning properly.

## Connecting the Splice Tube

To finish the installation of the Scotchloks, complete the following steps to install the connector king splice tube.

1. Take all three connected Scotchloks and push into the splice tube until fully encapsulated by the silicone grease. See Figure 41

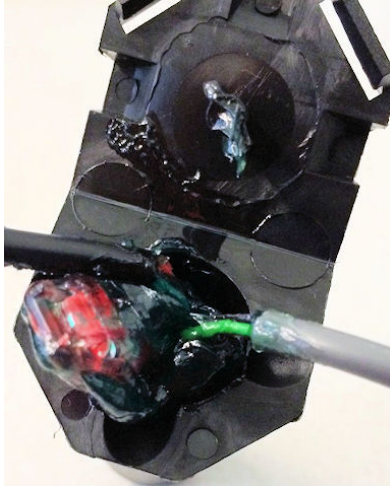


Figure 41 – Splice Tube

2. Separate each gray wire and place in the slots on each side as shown in Figure 42.

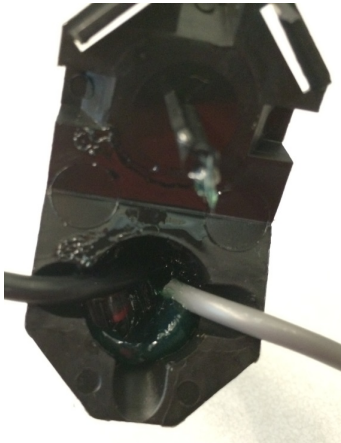


Figure 42 – Gray Wire in Slots

3. Snap cover closed to finish the installation as shown in Figure 43.



Figure 43 – Cover in Place

## Tying the Cable and Magnet Swiping the L900 MIU

Complete the following steps to tie the cable and magnet swipe the L900 MIU.



Figure 44 – L900 MIU Attached to Antenna

1. Place the L900 MIU in the pit location using the following suggestions.
  - In a shallow pit application, you can place the L900 MIU beside the meter.
  - In deep pit applications, use a cable tie to suspend the L900 MIU from the antenna shaft, as shown in Figure 44.



Be careful not to lodge the L900 MIU between the meter box and any components inside the box.

Make sure the L900 MIU is placed in such a way that it does not lodge itself when the pit lid is removed.

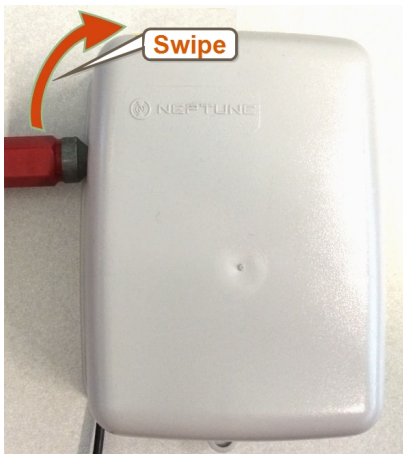


Figure 45 – Magnet Swipe the L900 MIU

2. Swipe the L900 MIU with a magnet.
  - Position the magnet against the left side of the L900 MIU directly in line with the Neptune logo.
  - Move the magnet up and over the top left corner of the L900 MIU. See Figure 45.

---

## Testing the Installation

If the L900 MIU is connected to an E-CODER register or another register with an eight-digit output, the L900 MIU will transmit an eight-digit read. For example, read 12345678 (E-CODER or other eight-digit register output).

To test the installation, complete the following steps.



To avoid RF signal saturation of the HHU, position yourself at least two to three feet from the L900 MIU.

1. Power up the HHU test device and start the testing programs provided.
2. When the L900 MIU is installed correctly, its ID number(s) and meter reading(s) appear on the display of the HHU. Verify the correct meter reading(s) by comparing it to the meter's dial. If the reading(s) is the same, proceed to the next section.
3. If a meter reading does not appear on the HHU display, or the meter reading in the HHU display is not the same as the reading on the meter's dial:
  - Magnet swipe the L900 MIU using the magnet.
  - Verify all electrical connections.
  - Test the installation again.
4. If a ProRead encoder register is used:
  - Ensure the unit is programmed in three-wire mode.
  - Verify all electrical connections.
  - Magnet swipe the L900 MIU. (See Step 1.)



If a problem still exists, contact your Neptune sales representative.

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# Chapter 6: Data Logging Extraction

## About Data Logging



The L900 MIU is capable of storing interval data for data logging. The L900 MIU is activated using the Trimble® Nomad® and R900® Belt Clip Transceiver (R900 BCT) and is explained in more detail in the following section.

The L900 MIU stores consumption in hourly intervals for a rolling total of 96 days. This is equal to 2,304 hourly intervals of consumption. The data logging data is extracted through RF activation. The RF activation allows the utility workers to visit the location and extract the data without physically interacting with the meter itself. This limits the worker's exposure to animals or other dangerous situations. The extraction process, once started, takes approximately 30 seconds. The activation is done through the HHU connected to the R900 BCT via Bluetooth. The activation signal is sent by the R900 BCT to the L900 MIU which in turn sends the data intervals to the R900 BCT and are saved in the HHU.

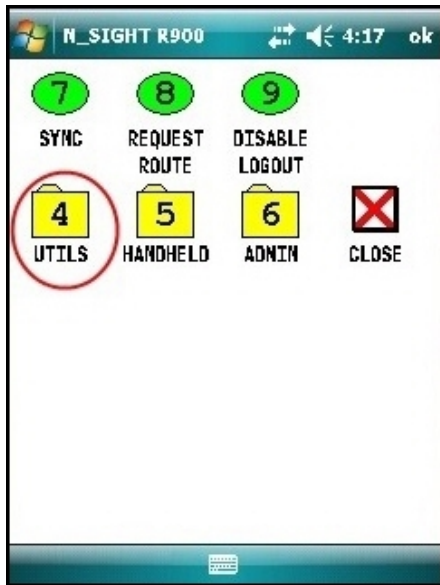
## Accessing Data Logging

Complete the following steps for data logging.

1. From the host software home screen on the HHU, click **MENU**. See Figure 46.

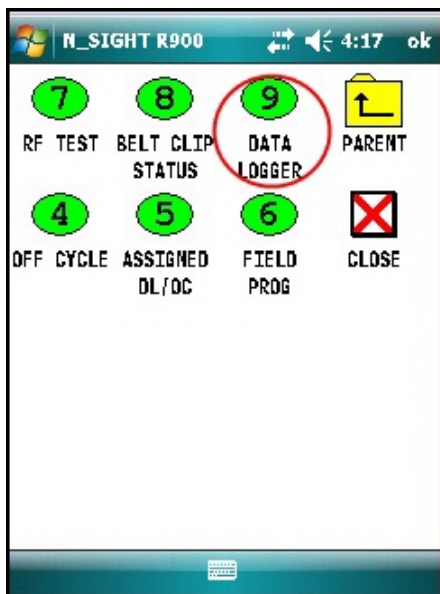


Figure 46 – HHU Home Screen



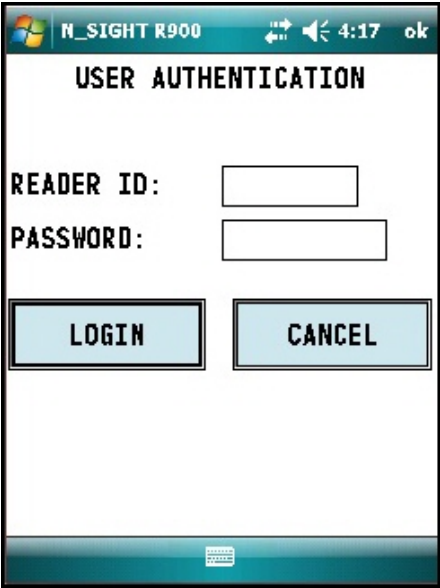
2. From the HHU Menu screen, click **UTILS** (option 4). See Figure 47.

Figure 47 – N\_SIGHT Main Screen



3. Click **DATA LOGGER** (option 9). See Figure 48.

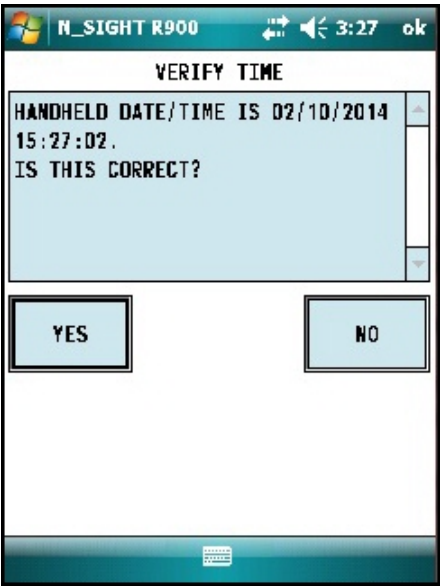
Figure 48 – Data Logger Options



- 4. Type your reader ID and password (if applicable) for the host software. Click **LOGIN**. See Figure 49.


Figure 49 – Reader ID Input

### Initializing the Data Logger

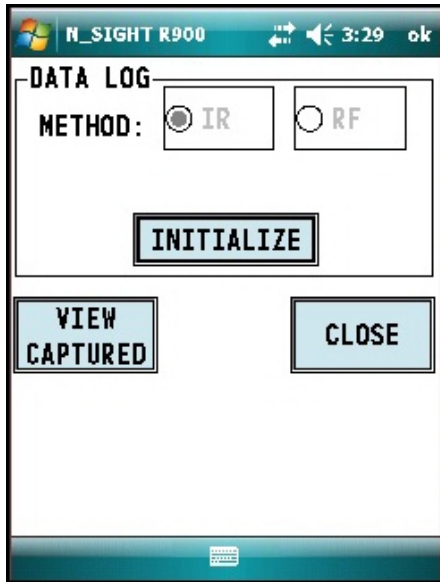


- 1. Verify the time is correct, and click **YES**. See Figure 50.

Figure 50 – HHU Time Confirmation

 The HHU must be synchronized prior to data logging in order to set the clock.



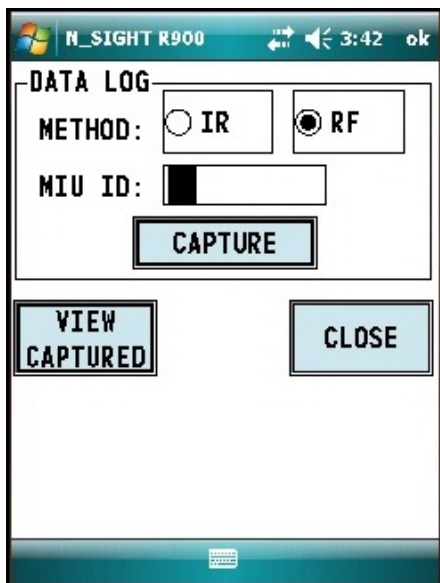


2. The Initialize Device screen appears if you are not connected or you are not in range of your R900 BCT. Click **INITIALIZE**. See Figure 51.

Figure 51 – Initialize RF Device



You must initialize the R900 BCT each time you attempt to data log.

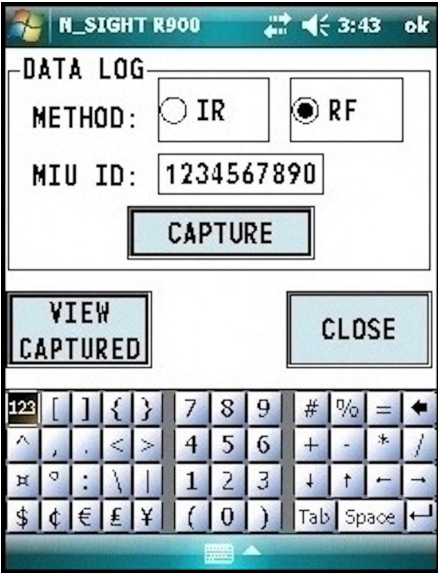


3. Select **RF** and type the L900 MIU ID. See Figure 52.

Figure 52 – L900 MIU ID Entry



You can type the L900 MIU ID with the number pad keys or expand the on-screen keyboard.



- 4. After you type the L900 MIU ID, click **CAPTURE**. See Figure 53.

Figure 53 – Capture Button



- 5. You are prompted to provide meter size and unit of measure. You can type this information now and click **OK** or after the data logging has completed. See Figure 54.

Figure 54 – Meter Size Selection

## Initiating RF-Activated Data Logging

Complete the following steps to initiate RF-activated data logging.

1. Click START to initiate RF-activated data logging. See Figure 55.

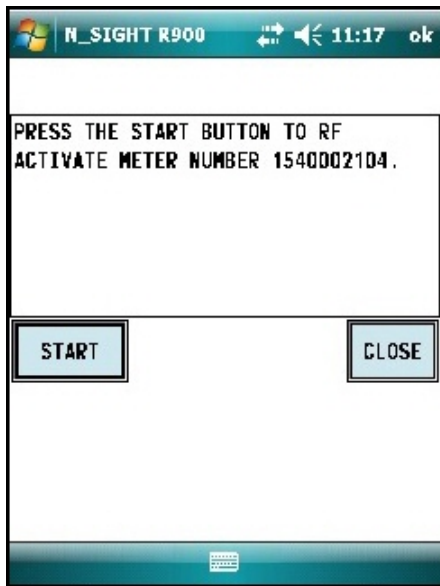


Figure 55 – Start Button

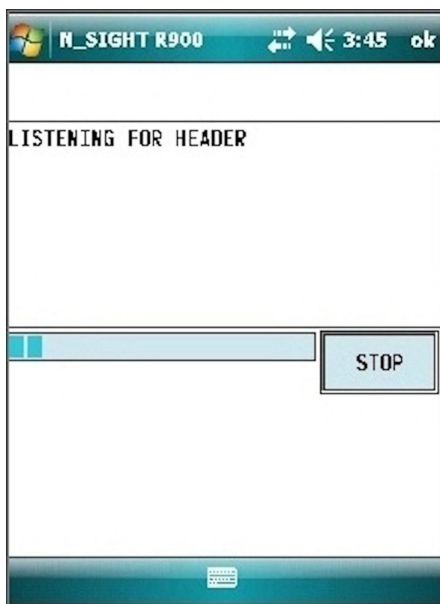



Figure 56 – Listening for Data

 The R900 BCT activates the L900 MIU and listens for the data logger to start transmitting. See Figure 56.

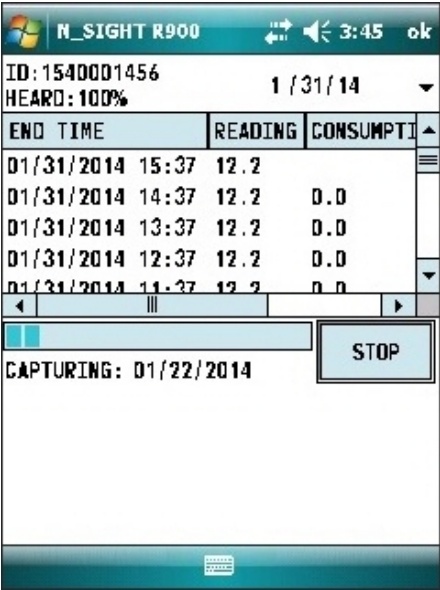


Figure 57 – Receiving Data

The data appears on the screen. See Figure 12.

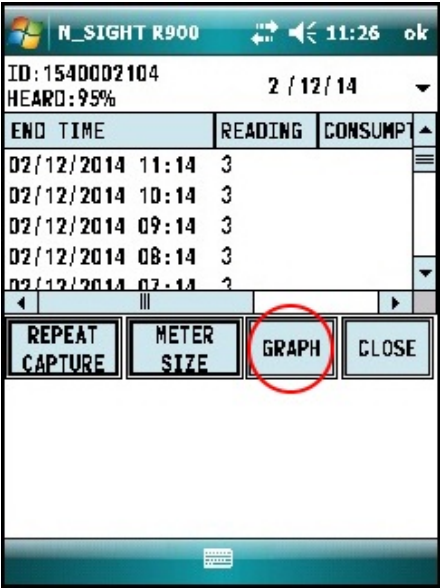


Figure 58 – Graph Button

1. After the data logging process is completed, choose the meter size (see Step 5 on page 33).
2. Click **GRAPH** (see Figure 56) to display the data in a graph. Examples of graphs are shown in Figure 59 on the next page.

The HHU processes and saves the data. After closing the data logging screen, the unit performs a backup.

### Sample Data Logging Graphs

The following are two examples of the graphs that can be produced with data logging.

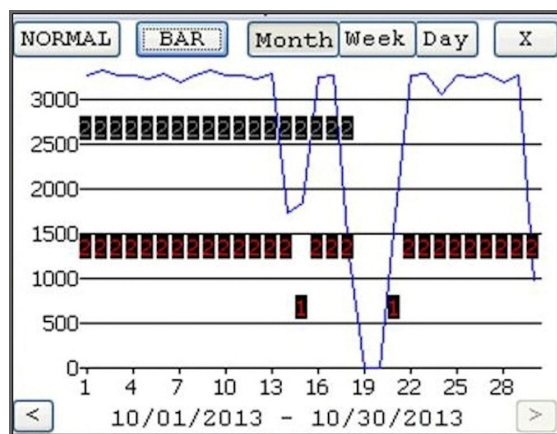
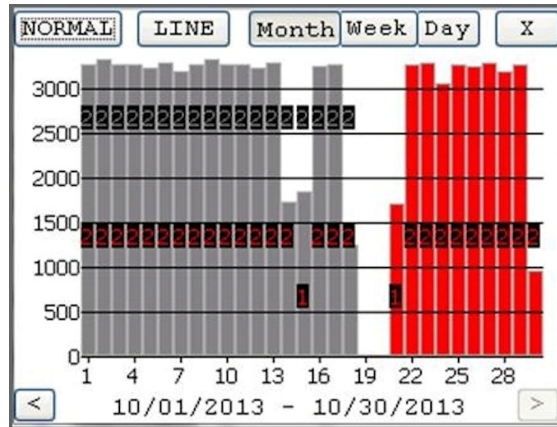


Figure 59 – Examples of Data Logging Graphs

Table 12 – Data Logging Graph Legend

Color Code	Description
1 red	Intermittent Leak
2 red	Continuous Leak
1 gray	Minor Backflow
2 gray	Major Backflow
Blue bars	No Flags
Red bars	Leak
Gray bars *	Backflow

\* If the Backflow flag and the Leak flag appear at the same time, Backflow (Gray bars) has precedence over Leak.

## Off-Cycle Data Extraction

Off-cycle reads are 96 days of daily reads. These are to allow utilities to retrieve move-out reads or monitor vacant usage to prevent theft.

To navigate to off cycle, complete the following steps.

1. From the host software home screen on the HHU, click **MENU**. See Figure 60.



Figure 60 – HHU Home Screen

2. From the HHU Menu screen, click **UTILS** (option 4). See Figure 61.

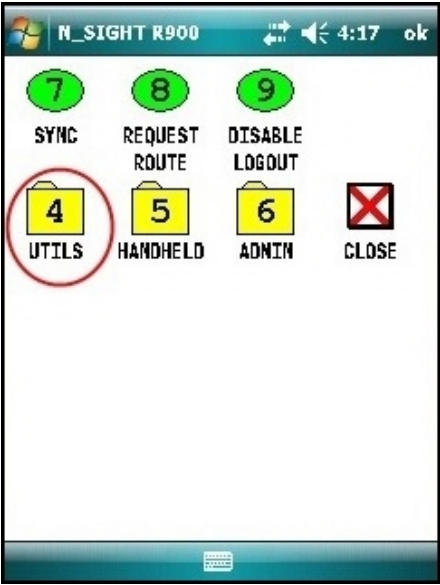
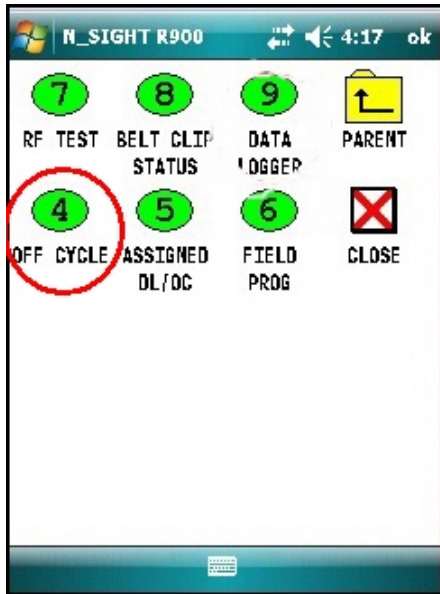


Figure 61 – HHU Menu Screen



3. Click **OFF CYCLE** (option 4). See Figure 62.

Figure 62 – Off-Cycle Option

4. Type the read ID and/or the password.
5. Click **LOGIN**.
6. Confirm date and time are correct.
7. Click **YES**.

## R900 Belt Clip Transceiver

To pair with R900 BCT, complete the following steps.

1. Change date if you have a specific day to target.
2. Click **INITALIZE** to pair with R900 BCT.
3. Type the L900 MIU ID.
4. Click **CAPTURE**.

The reads come in just like the data logger reads. The data logger has 96 days of hourly reads and off cycle has 96 days of daily reads.

# Chapter 7: Maintenance and Troubleshooting

---

This chapter takes you through maintenance and troubleshooting procedures for the L900 MIU.

---

## Six- and Four-Wheel Encoders

### Six-Wheel Encoders Normal Operation

If the odometer reads 123456, the display should show 1 2 3 4 5 5 0 0.



The sixth digit displayed is a five if the last digit on the odometer is five through nine. The sixth digit is a zero if the last digit on the odometer is zero through four. The L900 MIU adds an additional two zeros on the end to provide an eight-digit reading to the host software.

---

### Four-Wheel Encoders Normal Operation

If the odometer reads 1234, the display should show 1 2 3 4 0 0 0 0.



The L900 MIU adds an additional four zeros on the end to provide an eight-digit reading to the host software.



## Troubleshooting

This section provides examples of possible reading values, and what they indicate.

**Table 13 – Examples of Reading Values**

Reading Value	Definition	Troubleshooting
.....	Failure to retrieve reading	<ul style="list-style-type: none"> <li>Usually indicates a cut wire. Check the connection between the register and L900 MIU.</li> <li>If using a non-autodetect ProRead register, verify that it has been programmed for three-wire mode.</li> </ul>
????????	<ul style="list-style-type: none"> <li>Indicates an ambiguous, bad read</li> <li>Replaces ----- and HHHHHHHH</li> </ul>	

## Replacement Parts

Table 14 lists the available replacement parts for the L900 MIU.

**Table 14 – Available Replacement Parts**

Part Name	Part Number
Solid 3 Conductor Wire, 22 awg (1000 ft.)	6431-352
Dow Corning #4 compound (5.3 oz tube)	96018-064
GE Novaguard (4cc packet)	96018-072
Scotchlocks (UG)	8138-125
Mounting Adapter for ProRead Register	12539-001
Mounting Bracket for E-CODER Register	13443-000
Fastener Screw	8328-302
Magnet	12287-001
Antenna	12527-000
Flat Washers	8340-054

## Chapter 8: Contact Information

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Within North America, Neptune Customer Support is available Monday through Friday, 7:00 AM to 5:00 PM Central Standard Time by telephone, email, or fax.

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### By Phone

To contact Neptune Customer Support by phone, complete the following steps.

1. Call **(800) 647-4832**.
2. Select one of the following options.
  - Press **1** if you have a Technical Support Personal Identification Number (PIN).
  - Press **2** if you do not have a Technical Support PIN.
3. Enter the six-digit PIN number and press **#**.
4. Select one of the following options.
  - Press **2** for Technical Support.
  - Press **3** for maintenance contracts or renewals.
  - Press **4** for Return Material Authorization (RMA) for Canadian Accounts.

You are directed to the appropriate team of Customer Support Specialists. The specialists are dedicated to you until the issue is resolved to your satisfaction. When you call, be prepared to give the following information.

- Your name and utility or company name.
- A description of what occurred and what you were doing at the time.
- A description of any actions taken to correct the issue.

---

### By Fax

To contact Neptune Customer Support by fax, send a description of your problem to (334) 283-7497. Please include on the fax cover sheet the best time of day for a Support Specialist to contact you.

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### By Email

To contact Customer Support by email, send your email message to [hhsupp@neptunetg.com](mailto:hhsupp@neptunetg.com).

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# Glossary

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## A

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### **antenna (pit)**

L900 MIU antenna used for pit installations.

## C

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### **conical-shaped gasket**

Cone-shaped rubber gasket on antenna cable used to seal cable at top of connector housing.

### **connector housing**

Black plastic 1/4-turn connector for waterproofing antenna cable connection to L900 MIU pit.

### **connector nut**

Black plastic nut used to depress conical-shaped gasket and seal antenna cable at the top of connector housing.

## F

---

### **flat washer**

Washer used to seal cable connector housing to L900 MIU pit.

## L

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### **L900 MIU**

Term used for meter interface unit.

### **LoRa**

Term that stands for Long Range; a technology that uses unlicensed spectrum below 1GHz along with a form of direct sequence spread spectrum modulation that provides signal detection below the noise level.

### M

---

#### **main housing**

Main body of the L900 MIU that attaches to the mounting adapter.

#### **main housing fastener screw**

Set screw (Hi-Lo fastener) that holds the main housing to the mounting adapter.

#### **maximum cable length**

Length set by the manufacturer for the wire between the encoder and the remote receptacle. The specifications for this length are based on a solid 3-conductor wire.

### **MIU**

See L900 MIU.

#### **mounting adapter**

Back plate of the L900 MIU that is attached to the wall.

### N

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#### **Novaguard sealant**

Moisture protection compound.

### P

---

#### **potting**

Covering of an electronic or electrical device to protect it from the surrounding environment.

### R

---

#### **register read time**

Default time for all registers is 15 minutes. Custom time is not available.

**S**

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**Scotchloks**

Gel caps used to connect the register to the pigtail from the L900 MIU.

**seal wire**

Wire inserted into the seat holes adjacent to the main housing fastner screw. This seal must be broken to remove the main housing from the mounting adapter.

**serial number**

Unique identification number given to each L900 MIU at the factory. Custom serial numbers are not available.

**splice tube**

Device used to join two pieces of wire.

**strain relief posts**

Posts located on the encoder register and the back of the main L900 MIU housing.

**T**

---

**terminal screw**

Screws on the encoder register face that are used to connect and anchor the three (3) conductor wire to the register.

**terminal screw cover**

Plastic cover on the encoder register that protects the terminal screws and exposed wires.

**transmission time**

Time between L900 MIU transmissions. The default is approximately fourteen (14) seconds. Custom time is not available.

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# Index

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## A

### access

data logging 35

HHU home screen 35

### activate

L900 MIU 20, 35

with magnet 32

with Nomad 35

### active L900 MIU 9

### adapter 20

### antenna

cable 26

shaft 32

## B

### battery 3, 15

### black cone-shaped gasket 28

## C

### cable 3, 10

22 AWG 4, 11

exit notch 19

maximum length 3

### coaxial cable 28

### color diagram, wire 29

### conditions, functional 4

### conductor wire 4, 12

### connector

female-threaded 28

housing 28

Scotchlocks 29

### contact information 47

by email 47

by fax 47

by phone 47

### crimping tool 9, 30

## D

### data logging 35

extraction 35

graphs 41

RF activated 40

### dimensions 4, 6

## E

### E-CODER 4, 11

### electrical specifications 3

### encoder register interface 3

### encoders

four wheel 45

six wheel 45

### environmental conditions 4

### extraction

data logging 35

off-cycle data 43



### F

FCC 3  
frequency hopping 1  
functional conditions 4

### G

gasket 28  
gel cap 19  
gel caps, Scotchloks 18  
graphs, data logging 41

### H

HHU menu screen 36  
high traffic 25

### I

installation guidelines 9

### L

L900 MIU 9  
    product description 1  
    specifications 3  
latch plate 28  
locking nut 26  
LoRa 1, 3

### M

magnet 9, 36-38

magnet (illus) 20, 32  
maintenance 45  
materials 9  
mounting adapter 17

### N

Novaguard sealant 10, 28

### O

odometer 45  
on-screen keyboard 39  
operating humidity 4, 6

### P

pipe clamp 18  
pit antenna 24  
preliminary checks 10  
prewired 14  
product description 1  
ProRead 4, 10

### R

recommended materials 10  
recommended tools 9  
register  
    install 11  
    potted only 11  
relief guides 19

**S**

safety

- checks 10
- practices 16, 24

Scotchloks 10, 14, 19, 29

sealant 13

set screw 20

site selection 16

specifications 3

- electrical 3
- environmental 4
- functional 4
- transmitter 3

splice tube 31

spread spectrum 1

storage 15

strain relief posts 13

swipe, L900 MIU with magnet 20, 32

**T**

temperature

- operating 4, 6
- storage 4, 6, 15

terminal screw 11

tool kit 9

tools 9, 15

transmitter specifications 3

troubleshooting 45

**W**

weight 4

wires, color-coded diagram 29

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