MRX920™ Getting Started Guide

MRX920™ Getting Started Guide

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Federal Communications Commission (FCC) Statement

FCC ID: P2SMRXV4E (902-928 MHz ISM Band)

Contains: SQGBL653U (Bluetooth 2.4-2.48 GHz ISM Band)

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

(1) This device may not cause harmful interference, and

(2) this device must accept any interference received, including interference that may cause undesired operation. (US 47 CFR §15.19)

Any changes or modifications not expressly approved by Neptune Tech-nology Group Inc. for compliance could void the user's authority to operate the equipment. (US 47 CFR §15.21)

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation.

If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

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

RF Exposure

To comply with FCC/IC RF exposure limits for general population / uncontrolled exposure, the antenna(s) used for this transmitter must be installed on non-permanent objects and structures to provide a separation distance of at least 20 cm from all persons
(US 47 CFR §2.1091), and must not be co-located or operating in conjunction with any other antenna or transmitter.

This Radio transmitter has been approved by the FCC to operate with the antenna types listed below. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Approved External Antenna List

Manufacturer: Laird (P/N
B8965C) Type: Omni-Directional
Peak Gain: 5.1dBi
Impedance: 50 ohms
Freq: 896-970 MHz

Professional Installation

In accordance with section 15.203 of the FCC rules and regulations, the MRX920 must be professionally installed by trained installers.

Industry Canada (IC) Notice

IC:4171B-MRXV4E (902-928 MHz ISM Band)

Contains:3147A-BL653U (Bluetooth 2.4-2.48 GHz ISM Band)

This radio transmitter (4171B-MRXV4E) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain and required antenna impedance for each antenna type indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (4171B-MRXV4) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal et l'impédance requise pour chaque type d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur. undesired operation of the device

Approved External Antenna List

Manufacturer: Laird (P/N B8965C) Type: Omni-Directional
Peak Gain: 5.1dBi
Impedance: 50 ohms
Freq: 896-970 MHz

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions:

(1) This device may not cause interference; and
(2) This device must accept any interference, including interference that may cause undesired opration of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes:

(1) l'appareil ne doit pas produire de brouillage, et
(2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

RF Exposure

Cet équipement est conforme aux limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 20 cm entre le radiateur et votre corps. Cet émetteur ne doit pas être co-localisées ou opérant en conjonction avec tout autre antenne ou transmetteur.

NOM-208 Statement for Mexico

La operación de este equipo está sujeta a las siguientes dos condiciones:

1) es posible que este equipo o dispositivo no cause interferencia perjudicialy
2) este equipo o dispositivo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

Chapter 1: Introduction

About This Guide

The MRX920™ Getting Started Guide describes the system and its features. This guide also provides procedures on how to set up the R900 mobile data collector and use the Neptune 360 Mobile application. This guide contains the following chapters:

Table 1.1 Chapter Overviews

Chapter	Title	Description
1	Introduction	Give a brief overview of the guide and Neptune's mobile data collector.
2	Specifications	Provides a section that includes all product specifications, including dimensions, weight, and environmental conditions.
3	Getting Started with Neptune's R900 Mobile Data Collector	Provides an overview of the R900 mobile data collector. It also describes hardware setup instructions and power and antenna connections
4	Troubleshooting	Provides help and information with how to troubleshoot the mobile data collector.
	Please reference the Neptune 360 Mobile User Guide and/or the Help Pages in Neptune 360 for more information on the procedures for reading meters, reviewing account information, reading missed meters, data logging, and using the mapping features.	

Conventions Used in This Guide

This guide uses the following icons and typographical conventions to identify special information.

	The Warning icon identifies actions that can cause injury to the user or permanently damage the product.
	The Caution icon identifies important information that is critical to ensuring that data stored with the mobile data collector is not lost.

	The Note icon identifies information that clarifies a point within the text.

All small caps	Refers to keys. Examples: ENTER, ALT, TAB
All bold initial caps	Refers to field names, menus, buttons, and menu options. Examples: **Device** field or **File** menu.
+ between keys	Refers to pressing the keys at the same time. Example: ALT+B

Product Support within North American

Neptune offers various methods to receive high-quality, responsive Customer Support. However, before contacting Neptune, it is important to know the version of Neptune 360 Mobile being used. This information is useful to the Customer Support Specialist who addresses the call.

	The version number of Neptune 360 Mobile is located in the **About** section of the main menu.

Contacting Customer Support

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

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).
    - Pres 2 if you do not have a Technical Support PIN.
3. Type 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.

Email

To contact Customer Support by email, send your message with a description of the problem to support@neptunetg.com

Overview

Neptune's R900 mobile data collector is a compact, portable collection device used for meter reading of Neptune radio frequency (RF) equipped water meters. It is used in conjunction with the Neptune 360 Mobile application on a utility supplied smartphone or tablet. The data collected is then communicated through the host software to the utility's billing system.

Figure 1.1 R900 Mobile Data Collector

The mobile data collector provides the meter reading industry with many advantages over other meter reading methods.

- Suitable for any size utility
- Portable and easy to set up
- Significantly reduces man-hours needed to collect meter reading data
- Maximized meter reading success rates
- Improved meter readding accuracy
- Access for meters that are "hard-to-read" or "dangerous-to-read"
- Increased safety and minimized liability exposure

	Neptune's R900 mobile data collector is to be used for in-vehicle purposes only.

System Operations

Operators use the Neptune 360 host software to make route assignments for meter readers. The routes to be read are obtained from the utility billing system and imported into the Neptune 360 host software. Routes are then uploaded to the Neptune 360 Mobile application. Each meter reader drives through their assigned routes to collect meter data transmitted by R900 endpoints. The data collected is

synced/uploaded into the Neptune 360 host software. The host software transfers the data to the billing system to generate customer bills.

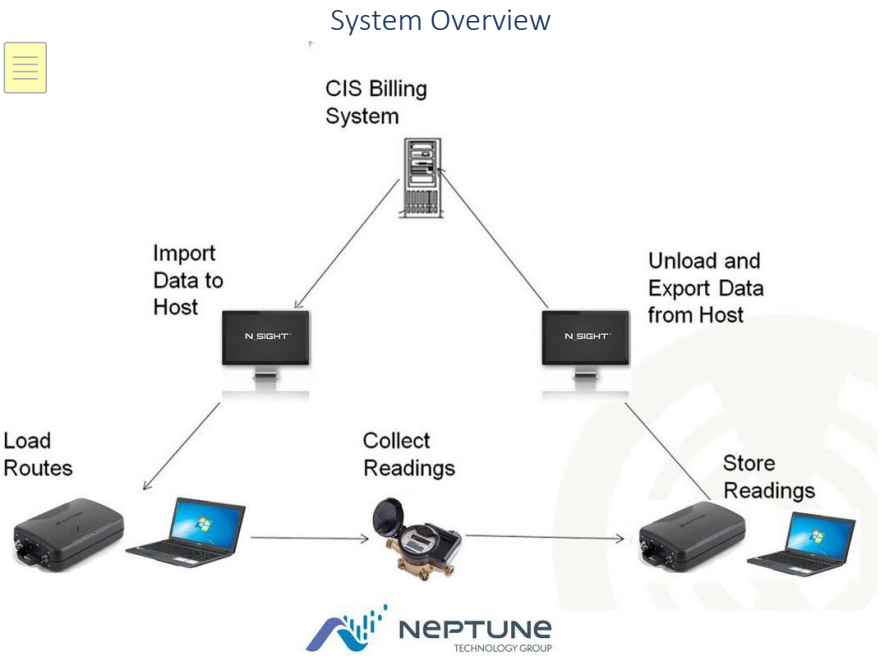

Figure 1.2 Mobile Data Collector Reading Operations

Chapter 2: Specifications

This chapter provides product specifications, including dimensions, weight, and environmental conditions for the mobile data collector.

Physical Conditions

The following table lists the specifications and weight for Neptune's R900 mobile data collector.

Table 2.1 Physical Specifications

Operating Temperature	-4F to +122F (-20C to +50C)
Storage Temperature	-40F to +185F (-40C to +85C)
Operating Humidity	5% to 95% non-condensing relative humidity
Weight	5 lbs

Dimensions and Weight of the Mobile Data Collector

The mobile data collector is light in weight and compact in size. Refer to Table 2.2 and Figure 2.1 for the dimensions and weight of the unit.

Table 2.2 Dimensions and Weight of the Mobile Data Collector

Dimensions	Refer to Figure 2.1, measurements in inches
Weight	Approximately 5.0 lbs (2.27 kg)

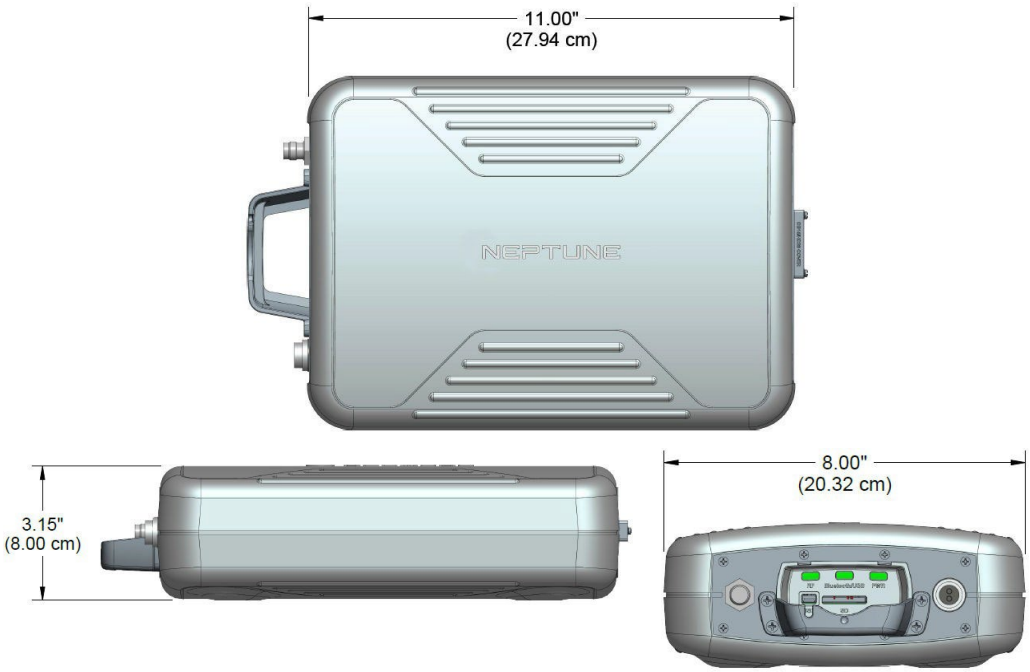

Figure 2.1 Mobile Data Collector Dimensions

Neptune 360 Mobile Specifications

Supported Devices and Operating Systems

Neptune 360 Mobile supports Android and Apple operating systems for both smartphones and tablets. Neptune has tested the mobile app on the following operating systems and performs additional testing as new versions of these operating systems are made available.

Android Operating Systems

- 7.0.X Nougat
- 7.1.X Nougat
- 8.1.X Oreo
- 9.0.X Pie
- 10.0.X
- 11.0.X
- 12.0.X
- 13.0.X

Neptune recommends using Neptune 360 Mobile on devices from the following Original Equipment Manufacturers (OEMs):

- Samsung
- Google
- Motorola

Apple iOS Operating Systems

- 13

- 14
- 15
- 16

Neptune 360 Mobile supports the following iOS devices:

- iPhone
- iPad

Required Devices and Equipment

The following are devices required to use Neptune 360 Mobile

- Mobile device – Android or iOS phone or tablet that runs one of the support operating systems listed above.

	The mobile device requires a minimum of 2 GB of RAM to run the software.

Required Credentials

Neptune 360 Mobile is linked to the Neptune 360 host software. Utility administrations must ensure that all mobile app users have an account established within the host system. Users can use their host system email address and password credentials to log into the mobile app.

Chapter 3: Getting Started

The chapter provides an overview of Neptune's mobile data collector along with Neptune 360 Mobile and hardware setup instructions including power and antenna connections.

Mobile Data Collector Overview

Neptune's mobile data collector is a portable collection device for automatic meter reading that is used in conjunction with a utility supplied smart phone or tablet and the Neptune 360 Mobile application. The data collected is then uploaded to the Neptune 360 head-end system and ultimately transferred to the utility's billing system.

The mobile data collector features the following:

- Durable construction in a compact design for everyday use in any vehicle
- Option map view with GPS capability in Neptune 360 Mobile
- Wireless and remote synchronization of routes
- Available Bluetooth connection to smartphones and tablets
- IR and RF activated data logging and off-cycle reading
- Ability to read R900 RF endpoints

Figure 3.1 shows the various components of the mobile data collector.

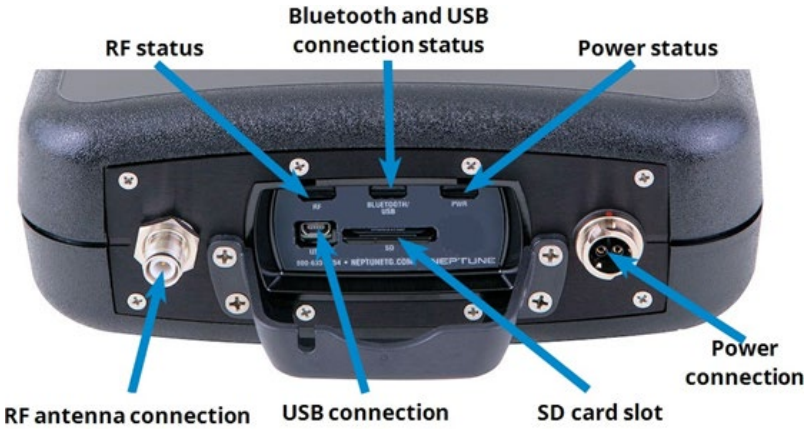

Figure 3.1 Mobile Data Collector

	Before using the mobile data collector, be sure that the SD card is securely inserted into the SD card slot. If not, the unit will not work. Sometimes in shipment, the SD card can become loose or partially ejected.

	WARNING: Attempting to repair or modify the mobile data collector on your own can result in personal injury or damage to the unit and voids the warranty.

Mobile Data Collector LED Light Status Indicators

The following table describes the LED light status indications.

Table 3.1 LED Light Status Indicators

LED Name	Description	Color Condition Indicator
Power (PWR)	Power Status	**Light Green –** *Solid* during power up process **Dark Green** – *Solid* when the unit is fully powered up **Yellow** – *Solid* during power loss **Red** – *Solid* if the unit has overheated
Bluetooth/USB	Bluetooth and USB connection status	**Off** – *None* when no Bluetooth or USB connection is made **Blue** – *Solid* during successful Bluetooth connection **Green** – *Solid* during successful USB connection **Red** – *Solid* could indicate an internal issue with the device. Contact customer support.
RF	RF Endpoint activity	**Green** – *Solid* during high RF endpoint activity

		Green – *Flashing* during low RF endpoint activity **Red** – *Solid* when there is no RF endpoint activity detected

Bluetooth and USB Supported Connections

Bluetooth

The mobile data collector supports Bluetooth Low Energy (BLE) connectivity from the device to a smart phone or tablet.

Setting Up Neptune 360 Mobile

This section includes the procedures to download and log into Neptune 360 Mobile, which is needed in conjunction with the Mobile Data Collector to collect meter reading data while in the field.

Downloading the App

Complete the following steps to download the Neptune 360 Mobile app.

1. Open the Google Play store (Android) or the App Store (Apple) on your device.
2. Search for Neptune 360 Mobile
3. Tap one of the following to install the app:

- **Install**, for an Android device, then go to step 4
- **Get**, for an iOS/Apple device. You can now open the app and log in.

4. On your Android device, review the app permissions and then tap **Accept** to continue the download.

Logging Into Neptune 360 Mobile

Complete the following steps to log into Neptune 360 Mobile.

1. Open the app.
   The Login screen is displayed.

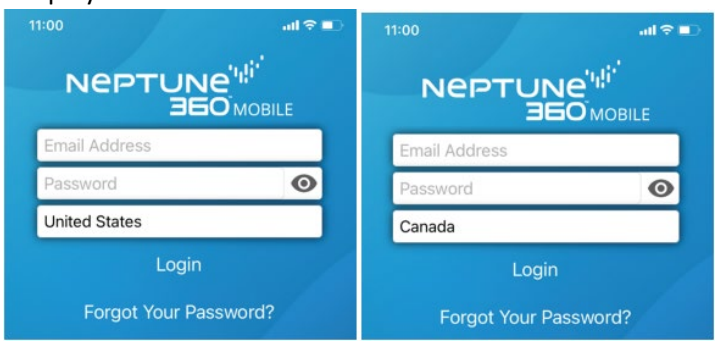

Figure 3.2 Neptune 360 Mobile Login Screen

2. To select a different default country than the one displayed, tap the country name to display the selections.
3. Tap of the country you want as your default and then tap **OK**.
4. In the **Email Address** field, type the email address you use for the Neptune 360 host software.
5. In the **Password** field, type the password you use for the Neptune 360 host software.
6. Tap **Login**

The system displays the Select Site ID screen, if you have access to multiple utilities. Otherwise, the landing screen as shown in Step 7 is displayed.

Figure 3.3 Select Site ID Screen

7. Type the five-digit Site ID for your utility.

The app displays the Neptune 360 Mobile landing page and you can select the function you want.

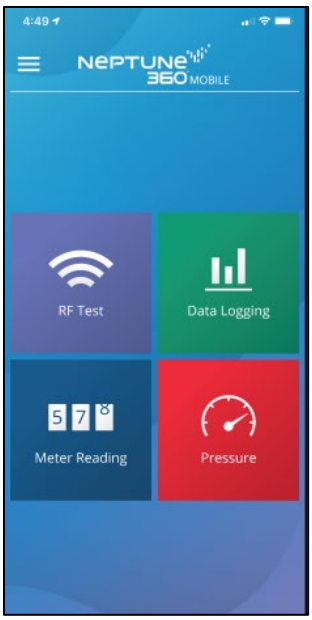

Figure 3.4 Selecting a Function

Setting Up the Mobile Data Collector

To set up the mobile data collector, please refer to the following sections of this guide:

- Installing the Mobile in the Vehicle
- Plugging in the Power Cable
- Installing the Antenna

Installing the Mobile Data Collector in the Vehicle

With the mobile data collector, you have flexibility as to where to place the unit, for example, under the seat, in the back seat, etc. The preferred way of using the unit is to place it in the passenger seat and fasten the seat belt through the straps on the carrying case (Part No. 13125-001), as shown below in Figure 3.5.

Figure 3.5 Mobile Data Collector Set Up

Plugging in the Power Cable

Complete the following steps to connect the vehicle power supply power cable to the mobile data collector and plug it into the vehicle power supply receptable.

1. Start the vehicle.

	It is very important to first start the vehicle before connection the cable.

2. Grip the vehicle power supply cable by the black sleeve, not the metal casing.
3. Line up the red arrows and insert the power connector until the metal locking mechanism twists and locks into place.

	You might need to wiggle the power supply cable a little to get the connector to click.

4. After the power supply cable is connected, the red dot and red arrow should align, ensuring the cable is connected.
5. Insert the appropriate end of the vehicle power supply power cable into the connector on the mobile data collector, as illustrated in Figure 3.6 below.

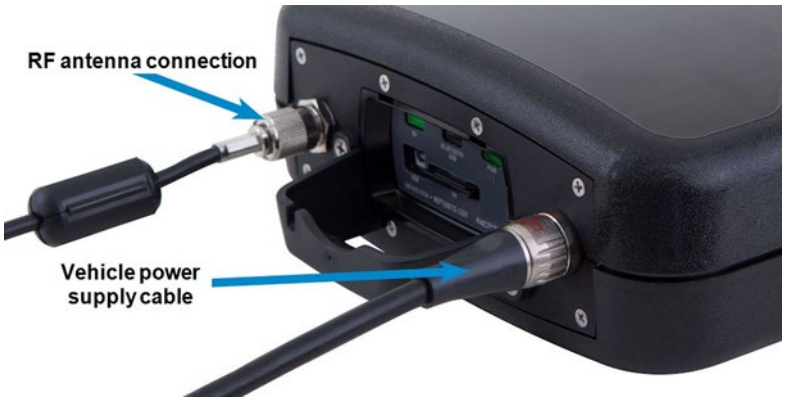

Figure 3.6 Vehicle Power Supply Power Cable

6. Plug the other end of the power able into the vehicle power supply receptable as illustrated in Figure 3.7.

Figure 3.7 Power Supply Cable Inserted in Vehicle

Installing the Antenna

The proper installation of the antenna cable is critical for the optimal performance of the mobile data collector. If the cable is crimped, the performance of the unit degrades significantly.

There are several options for running the cable. Whichever method works best for you depends on the type of vehicle being used. The most important consideration when installing the antenna is for the cable to remain undamaged.

To ensure proper installation of the antenna, complete the following steps.

	If there is a red cap on the base assembly, you must remove this cap prior to the installation of the antenna to its base, as show in Figure 3.8.

Figure 3.8

1. Connect the RF antenna to the mobile data collector, circle in Figure 3.9, and hand-tighten the connector by turning it clockwise until it is secured.

Figure 3.9 Mobile Data Collector RF Antenna Connector

2. Place the magnetic base of the antenna in the center of the roof approximately one foot (30 cm) behind the leading edge of the roof.

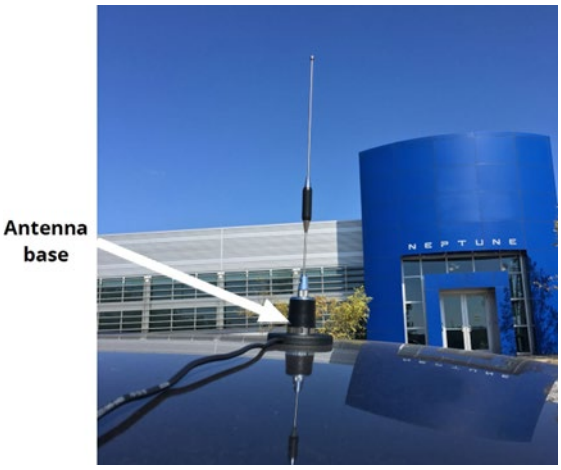

Figure 3.10 Antenna Installation

3. Route the antenna cable through the passenger window. To prevent the cable from crimping, protect the cable as illustrated in Figure 3.11.

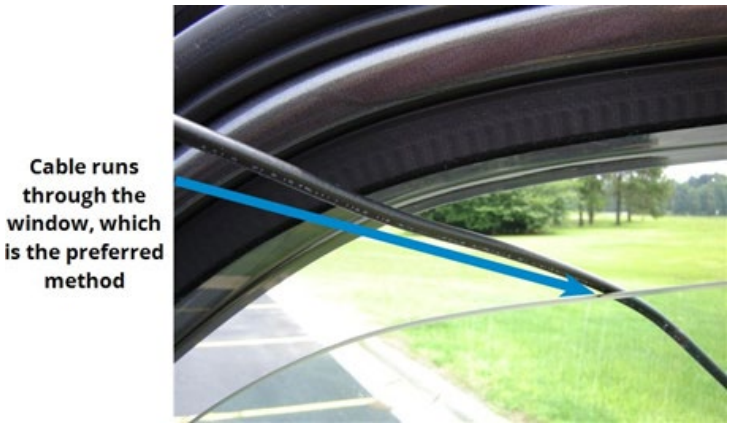

Figure 3.11 Antenna Cable Through Window

	Caution is necessary to ensure that there is sufficient room for the cable and that it does not get crimped.

4. Use the cable protector that is included with the mobile data collector to keep the cable from being pinched by the window.

Figure 3.12 Cable Protector

	In some vehicles, there is enough room to run the cable through the doorframe of the vehicle without crimping the cable. Other vehicles do not always have enough clearance (especially vehicles with rain gutters). Running the cable through the rear door can be an option.

5. Gently close the window, positioning the antenna cable so there is no pressure on it.

	WARNING: Pressure on the antenna cable can cause damage.

Setting Up the Connection

Before you can use your mobile data collector and Neptune 360 Mobile to read meters and manage routes, you need to establish a connection between the two. Before establishing a connection, make sure both the mobile data collector and Neptune 360 Mobile have been set up (Refer to Setting Up the Mobile Data Collector and Setting Up Neptune 360 Mobile).

Initial Bluetooth Connection

To establish a Bluetooth connection for the first time, complete the following steps.

1. On your Android or Apple/iOS device, enable Bluetooth capability. For Android, verify that the **Location** permission for the app is enabled. This permission handles Bluetooth functionality and is here in your Android settings: Settings > Apps > Application Manager > Neptune 360 Mobile.
2. In Neptune 360 Mobile, tap the menu icon in the top left corner of the screen to display the menu options.

Figure 3.13 Connecting to a Mobile Data Collector

3. Tap **Receiver**
4. Tap the serial number of the mobile data collector you want to connect to. If the mobile data collector does not appear in the list, tap **Refresh** toward the bottom of the screen and then retry connecting.

After successfully connecting, the Neptune 360 Mobile dashboard is displayed and toward the bottom of the screen the connected mobile data collector displays in green text.

Becoming Familiar with the Mobile Data Collector

When the set up is complete and a successful connection between the mobile data collector and Neptune 360 Mobile is established, you are ready to begin using the mobile data collector for meter reading.

For instructions and help with reading meters, please refer to the Neptune 360 Mobile User's Guide Chapter 5: Reading Meters.

RF Testing and Data Logging procedures are covered in Chapters 3 and 4, respectively, of the Neptune

Chapter 4 Troubleshooting

The troubleshooting section of this guide provides diagnostics procedures for troubleshooting MRX920 problems. It includes both a hardware section and a software section. It also includes recommendations on how to verify that the MRX920 is performing up to specification. Included are tables of possible symptoms, areas of focus, and actions that can be taken to try to resolve problems that can arise with either your MRX920 software.

4.1 Troubleshooting Hardware Issues

Use the following table to help identify possible solutions for hardware problems that can occur with the MRX920:

Table 4.1 Hardware Troubleshooting Table

Problem	Probable Cause	Things to Check
No power to the unit.	Loose connection at the vehicle plug. Loose connection at the MRX920.	Look for the LED on the power cable. Look for the LED on power cable, but not on the MRX920. Be sure the red arrow on the cable matches the red dot on the MRX920.
	Internal fuse blown on the power cable.	Look for the LED on the power cable.
	Dead battery or fuse in the utility vehicle.	Check the electrical status of the utility vehicle.
My USB connection isn't working.	Cable is unplugged.	Be sure the USB cable is secure on both the laptop end and the MRX920 end.
	Cable is damaged.	Try any other USB cable.
	Connected through other method.	Check Receiver Settings to ensure that you are connecting as you intended (Bluetooth vs. USB). Look at front of MRX920. The LED labeled Bluetooth/USB is: • Off when not connected • Blue when the selected connection method is Bluetooth • Green when a USB connection is made.

Table 4.1 Hardware Troubleshooting Table (Continued)

Problem	Probable Cause	Things to Check
Not getting readings.	Unit is not connected correctly.	As long as the RF LED is flashing or solid green, the MRX920 is receiving readings. Red indicates the MRX920 is not receiving readings.
	RF antenna is damaged.	Check the antenna for any crimps or damage.
Power is applied, the MX900 software executes, but no route data is available.	USB flash drive not inserted.	Make sure the USB flash drive is properly inserted into an available USB port on your laptop, or route files did not properly download from the network.
	Incompatible data on USB flash drive.	Select the Self-Diagnostics tab to verify that the data on the USB flash drive is compatible.

4.2 Software Issues

Use the following Table 4.2 to help identify possible solutions for hardware problems that can occur with the MRX920.

Table 4.2 MX900 Software Troubleshooting Table

Problem	Probable Cause	Things to Check
Cannot import route file.	Incorrect file type.	Make sure the file you are importing is an .imp file.
	Corrupt file.	Recreate the file in N_SIGHT.
Cannot hear audible tone while meter reading.	Audible tone check box is not selected.	Verify that there is a check mark next to the Enable Tone option in the upper left corner of the Routes window.
	Volume is not turned up on the laptop.	Verify that the volume on the laptop is turned up and is not on mute.
Unable to view all accounts in Missed and Captured Reads windows.	Filter is turned on.	Verify that the filter in the bottom right corner of the Missed and Captured Reads window has been removed.
Unable to export all routes.	Unload check box is not selected.	In the Unload window be sure to select all the routes to unload.
Unable to locate route file.	Route file has been saved to an unknown location, or cannot be located on network.	In the Routes window click Load in the bottom right corner. Browse to the proper location where the route file has been saved and select it.
Cannot install the software.		Refer to “Software Installation” on Page 3-4 in this guide

Glossary

B

Bluetooth –A facility allowing computers, smart phones, or other devices to connect to the Internet or communicate with one another wirelessly within a particular area.

C

Central processing unit – Often abbreviated and CPU, it is the brain of the computer. Sometimes referred to as the processor or central processor, the CPU is where most calculations take place. In terms of computing power, the CPU is the most important element of a computer system.

D

Database – The collection of information that is organized so that it can easily be accessed, managed, and updated.

Default setting – The default setting is one that the 360 Mobile app automatically supplies to an item. For example, the default setting for Enable Tone On/Off is Enable Tone On. The Enable Tone is always on unless the meter reader changes the Enable Tone setting.

Dialog – A window displaying some action required on the part of the user. For example, the user must click Yes or No to continue to the action.

Display – The top part of the laptop computer where selection and information about routes

E

Endpoint – A piece of equipment that collectors water usage readings and transmits them via radio frequency.

Endpoint ID – An endpoint's unique identifier, which is a discrete number used to identify a specific endpoint.

G

GPS – Global Positioning System, a satellite navigation system that allows users to determine their location.

I

IR – Infrared.

M

Message Area – A portion of a window that displays a message.

Meter Number – The number by which a utility identifies a meter.

MHz – Abbreviation for megahertz. One MHz represents one million cycles per second.

MIU – Meter Interface Unit, also called an endpoint.

O

OEM – Original Equipment Manufacturer

R

RF – Radio Frequency

Receiver – The portion of the radio that receives signals from the MIUs

T

Transceiver – Device that transmits and receives communications, in particular a combined radio transmitter and receiver.

U

Upload – The process of sending readings and route data to and from the Neptune 360 head end system and Neptune 360 Mobile.

USB – Universal Serial Bus that defines the cables, connectors, and communications protocol used for connection, communication and power supply between computers and electric devise.