

FCC Part 101 Certification
Test Report

FCC ID: P2SMTX950

FCC Rule Part: 101

ACS Report Number: 05-0025-101

Manufacturer: Neptune Technology Group, Inc.
Equipment Type: Mobile Drive-by Data Collector
Model: MTX950

Manual



MRX920™/MTX950™

User's Manual

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FCC Notice:

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.



“NOTE: 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 or more 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”

Industry Canada Notice

This Class B digital apparatus meets all requirements of the Canadian Interference Causing Equipment Regulations. 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.

Cet appareillage numérique de la classe B répond à toutes les exigences de l'interférence canadienne causant des règlements d'équipement. L'opération est sujette aux deux conditions suivantes: (1) ce dispositif peut ne pas causer l'interférence nocive, et (2) ce dispositif doit accepter n'importe quelle interférence reçue, y compris l'interférence qui peut causer l'opération peu désirée.

"RF Exposure (Intentional Radiators Only)

This equipment complies with the FCC RF radiation requirements for uncontrolled environments. To maintain compliance with these requirements, the antenna and any radiating elements should be installed to ensure that a minimum separation distance of 67 cm is maintained from the general population."

MRX920™ User's Manual
Literature No. UM MRX920/MTX 02.05
Part No. 12508-002

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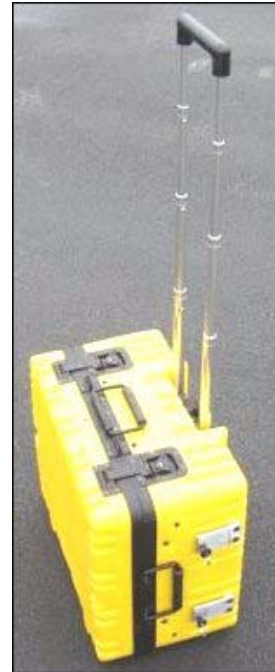
Notes:

Chapter 1 Introduction

The MRX920™ unit is a rugged, compact, portable, easy-to-use, meter-reading unit for Neptune Radio Frequency (RF) equipped water meters. It can be securely placed in the passenger seat of any vehicle using a standard seat belt and can be powered by the vehicle power supply receptacle.

The MRX920 unit provides the meter-reading industry with many advantages over current meter-reading methods:

- Suitable for any size utility
- Portable and easy to set up
- Significantly reduced man-hours needed to collect readings
- Maximized meter reading success rates
- Improved meter reading accuracy
- Access for meter that are “hard-to-read” and “dangerous-to-read.”
- Increased safety and minimized liability exposure



System Operations

Operators use Equinox-MR™ host software to make route assignments for meter readers. The routes to be read are obtained from the utility billing system and placed on the USB flash drive for the meter readers. Each meter reader inserts a USB flash drive into the MRX920 unit and then drives through the routes assigned to be read by collecting data broadcast by R900 Meter Interface Units (MIUs). When complete, the meter readers return the USB flash drives so the meter readings can be uploaded to the MTX950 host software. The host software transfers the customer information to the billing computer to generate customer bills. (See Figure 1.1.)

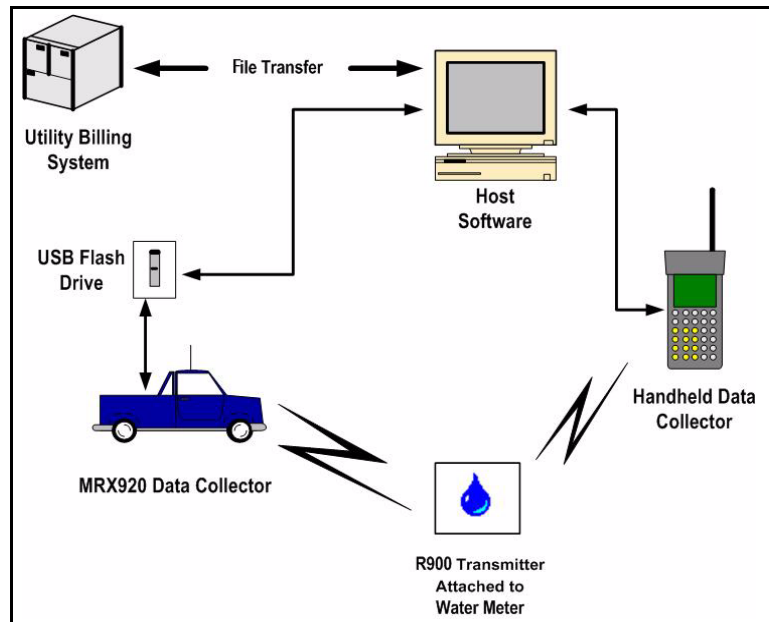


Figure 1.1 MRX920 Meter Reading Operations

About This Manual

The *MRX920/MTX950 User's Manual* describes the system and its features. The manual also provides procedures on how to use the MRX920 unit from setting up the unit and using its MTX950 software, to exiting and closing the unit.

This manual contains the following chapters:

Chapter	Title	Description
2	MRX920 Overview	Provides an overview of the MRX920 unit and software, including a description of function keys, screens, and MRX920 hardware.
3	Setting Up the MRX920 Unit	Describes hardware setup instructions, power and antenna connection, and instructions on how to turn on the laptop computer. The chapter also includes information on how to adjust system settings including keyboard backlighting, display intensity, and the beeper settings.
4	Using the MRX920 Unit	Explains how the product works, procedures for reading meters, reviewing account information, reading missed meters, and exiting the software.
5	Closing the MRX920 Unit	Provides a procedure for closing the MRX920 unit.
Appendix A	Specifications	Provides a reference section containing product specifications.
Appendix B	Keyboard	Provides a reference for the laptop keyboard and the LED activity and power indicators.
Appendix C	Troubleshooting	Provides diagnostics procedures for troubleshooting MRX920 problems.

Conventions Used in this Manual

This manual 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 MRX920 unit 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. Example: **Device** field or **File** menu.

+ between keys

Refers to pressing the keys at the same time. Example: ALT+B

Product Support within North America

Neptune offers various methods to obtain high-quality, responsive technical support. However, before contacting Neptune, it is important that you know the version number of the software that your MRX920 unit uses. This information is useful to the support technician who addresses the call.

To find the version number of MRX920 software, you must display the System Check screen. For instructions on obtaining the version number of the MRX920 software, see “Performing Diagnostics,” on page C-3.

Contacting Technical Support

Within North America, Neptune technical support is available Monday through Friday, 8:00 AM to 7:00 PM Eastern Standard Time by telephone, email, or fax.

To contact technical support by phone, call 1 (800) 647-4832. You will be directed to the appropriate team of specialists. These specialists are dedicated to you until the issue is resolved to your satisfaction. When placing a call, be prepared to give the following information:

- The exact wording of any message that appears on the screen of the MRX920 Unit.
- A description of what happened and what you were doing when the problem occurred.
- A description of how you tried to solve the problem.
- Your company's end user name.

You will be directed according to the options in Figure 1.2.

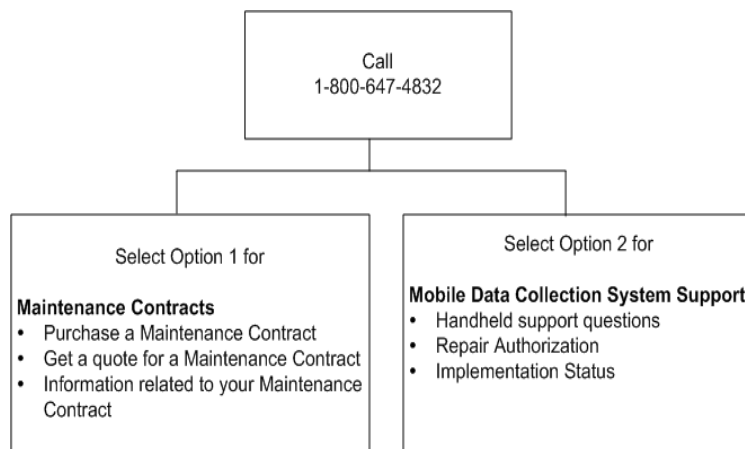


Figure 1.2 Support Options

To contact technical support by fax, send a description of your problem to 1 (334) 283-7497. Please include on the fax cover sheet the best time of day for a support specialist to contact you.

To contact technical support by e-mail, send your letter to the following address:

hhsupp@neptunetg.com

Chapter 2 **MRX920 Overview**

The MRX920 unit is a portable, mobile data collection device. It is used in conjunction with internal MTX950 software and host software to conduct automatic meter reading. The data collected is then communicated to the utility's billing system.

The MRX920 unit features the following:

- Durable carrying case designed for easy set-up and use in any vehicle
- Fully waterproofed keyboard
- A touch screen display to allow for easy navigation and option selection
- A beeper sound to indicate successful readings
- Exchange of route data between the MRX920 unit's laptop and host software
- Ability to read R900 radio transmitters
- Captured reads stored to the hard drive of the laptop

MRX920 Features

The MRX920 unit consists of a data collection receiver/processing unit and laptop computer in a portable case designed for easy set-up and use in meter reading (see Figure 2.1). The unit features meter reading software designed for simplified route collection.

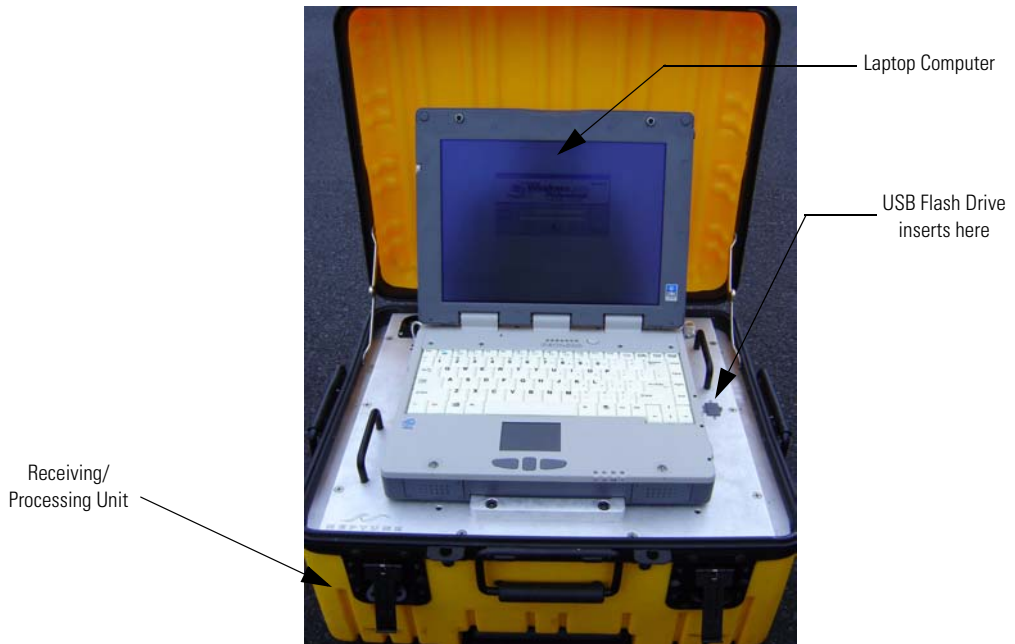


Figure 2.1 MRX920 Unit



Do not attempt to open the bottom of the MRX920 carrying case. Attempting to repair or modify the unit on your own can result in personal injury or damage to the unit and will void the warranty.

The Laptop

The laptop computer on the MRX920 unit, as shown in Figure 2.2, is part of the overall MRX920 data collector. It communicates with the receiver through a serial link using the software, which decodes and records the collected readings by the receiver.



Figure 2.2 Laptop

To protect the safety of the driver collecting readings, the laptop computer provides an audible indicator option that can be turned on or off as required. For more information, see “Beeper Settings,” on page 4-3. When turned on, the unit only beeps when receiving an MIU signal in the selected route. Other readings are silently inserted into other routes.



To protect the driver’s safety, use the Beeper function on the MRX920 unit to monitor meter reading.

The laptop computer retrieves meter readings from the receiver in real-time, and stores them in nonvolatile memory. It checks meter reading completeness against route files that are downloaded from the host software. About one second after a reading is received, the message area and progress bar update the reading status of the route.

USB Port

The USB port, shown in Figure 2.3, is located on the top plate of the MRX920 laptop unit. Another USB port is located on the rear of the laptop. You can use either slot for meter reading, but do not use both USB ports at the same time.



Neptune recommends that you use only the USB port located on the top plate of the MRX920 laptop for meter reading.








Figure 2.3 USB Port for USB Flash Drive



The MRX920 unit requires that you use only one USB port for the USB flash drive.

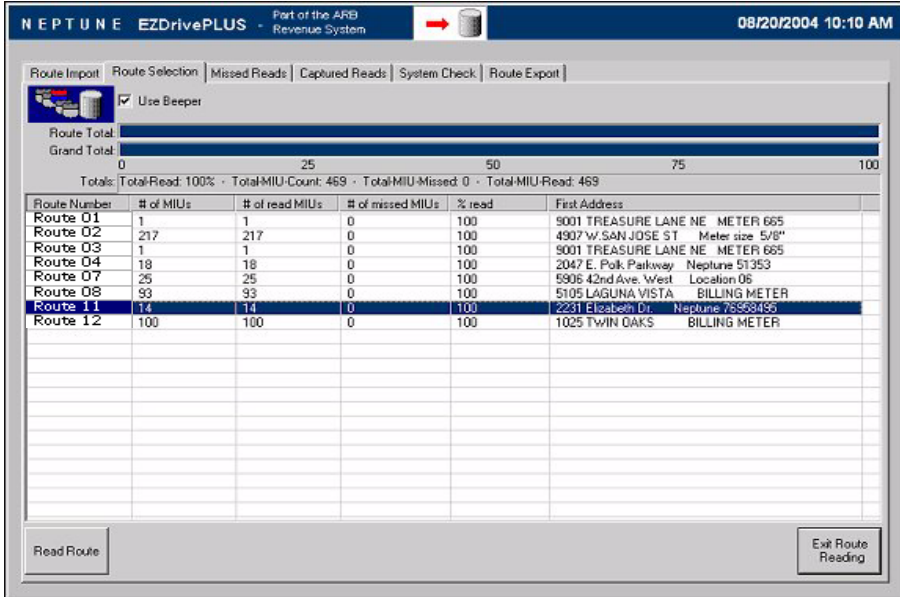
Navigation

All MRX920 functions are performed in one of two ways:

- Using the TAB  key or the arrow     keys to move the focus to the appropriate button and pressing ENTER.
- Using the provided stylus to touch the selections available on the laptop display.



Always use the stylus provided with the laptop to touch the display. Substituting a hard or sharp item can damage the display.



NEPTUNE EZDrivePLUS Part of the ARB Revenue System 08/20/2004 10:10 AM

Route Import | Route Selection | Missed Reads | Captured Reads | System Check | Route Export

Use Beeper

Route Total: _____
Grand Total: _____

Totals: Total Read: 100% - Total MIU Count: 469 - Total MIU Missed: 0 - Total MIU Read: 469

Route Number	# of MIUs	# of read MIUs	# of missed MIUs	% read	First Address
Route 01	1	1	0	100	5001 TREASURE LANE NE METER 665
Route 02	217	217	0	100	4907 W. SAN JOSE ST Meter size 5/8"
Route 03	1	1	0	100	5001 TREASURE LANE NE METER 665
Route 04	18	18	0	100	2047 E. Polk Parkway Neptune 51353
Route 07	25	25	0	100	5905 42nd Ave. West Location 06
Route 08	93	93	0	100	5105 LAGUNA VISTA BILLING METER
Route 11	14	14	0	100	2231 Elizabeth Dr. Neptune 78593456
Route 12	100	100	0	100	1025 TWIN OAKS BILLING METER

Read Route Exit Route Reading

Figure 2.4 Navigating Within the Software

For example, Figure 2.4 shows the Route Import screen with a route highlighted.

Software

The software application runs on the laptop computer that is part of the MRX920 unit. The purpose of the software is to log meter readings from routes where R900s are installed. Messages from MIUs outside of the route are identified as such and are discarded. The software also provides a visual interface for the operator to monitor route progress.

Although the software can start and stop the reading of message data, it does not control the receive frequency or the decoding of message data. Instead, the MRX920 unit contains a receiving and processing unit that collects data only from R900s.

The file transfer between the host software and the MRX920 is through the USB flash drive that store routes and accounts. The file transfer between the host software and the utility company billing system is in a file format specific to Neptune's software application.

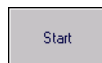
MRX920 Display

Information about the screen display for MRX920 unit is contained in "Laptop Specifications," found on page A-1.

MRX920 Function Buttons

Each software screen contains different function buttons pertaining to the specific information on that screen. Use the following list to identify the different buttons and their specific functions.

Welcome Screen



automatically launches the route import process






closes the software program




Route Import Screen





manually launches the route import process

	stops the import route process
	opens a dialog that allows the user to open a specific database
	closes the Route Import screen and returns to the Welcome screen


Route Selection Screen

	initiates the route reading process
	temporarily pauses the reading process
	closes the Route Selection screen and moves the user to the Route Export screen

Missed Reads Screen

	opens a dialog that provides the user with various details about the selected account, including the meter number, MIU, the collection method, the account name, coded notes, or skip codes
	returns the user to the first account in the selected route

Captured Reads Screen

	opens a dialog that provides the user with various details about the selected account, including the meter number, the type of MIU, the collection method, the account name, coded notes, or skip codes
---	---



returns the user to the first account in the selected route

Route Export Screen



launches the export of the loaded routes

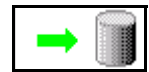


closes the Route Selection screen and returns the user to the Welcome screen

Reading Indicator



The Reading indicator, located on the title bar of the software, shows the activity status of the MRX920 unit. When the Route Selection screen is first accessed, the Reading indicator resembles the icon at the left with a red arrow, indicating that there is currently no reading activity.



When the reading indicator displays a pulsing green arrow, it indicates that the MRX920 unit is reading and storing meter-reading data. To initiate route

reading, select the **Read Route**  button.



If for any reason, the laptop is not receiving new data for a period longer than five seconds, the Reading arrow stops pulsing.



Once you begin reading meters, the **Read Route**

button changes to the **Pause Route** 

button. Selecting this button temporarily stops the reading process, and the Reading indicator no longer displays the pulsing arrow. When reactivated, the MRX920 resumes reading.

Message Area and Progress Bar

The message area on the software screens indicates the number and percentage of meters on the route that were read successfully. A graphical progress bar also shows the percentage of the route that is complete. Before meter reading begins, no accounts are reported as read, and the progress bar is blank.

While readings are captured, the Route Total progress bar shows the percentage complete of the route selected on the Route Selection screen. The Route Selection screen shows both the selected Route Total as well as the readings Grand Total.

Information Area

The information area of a MRX920 screen displays the route or addresses to be read. These following views are available:

- The route view includes the route number, number of MIUs to be read, first address on the route, and percentage of the route that was read.
- The account view provides a listing of the addresses and MIU IDs to be read for a specific route. If you display account detail, the information area displays information for the selected account.
- A meter reading and loading indicator area with a graphic progress bar and pulsing reading indicator.
- A message and information display area.
- An active function icon or reading indicator.

Route Selection Screen

The Route Selection display screen illustrated in Figure 2.5 shows loaded routes and the percentage of each route that has been read. The screen includes the Reading Indicator, an information area with a list of routes, and a selection box that allows you to turn the beeper on or off.

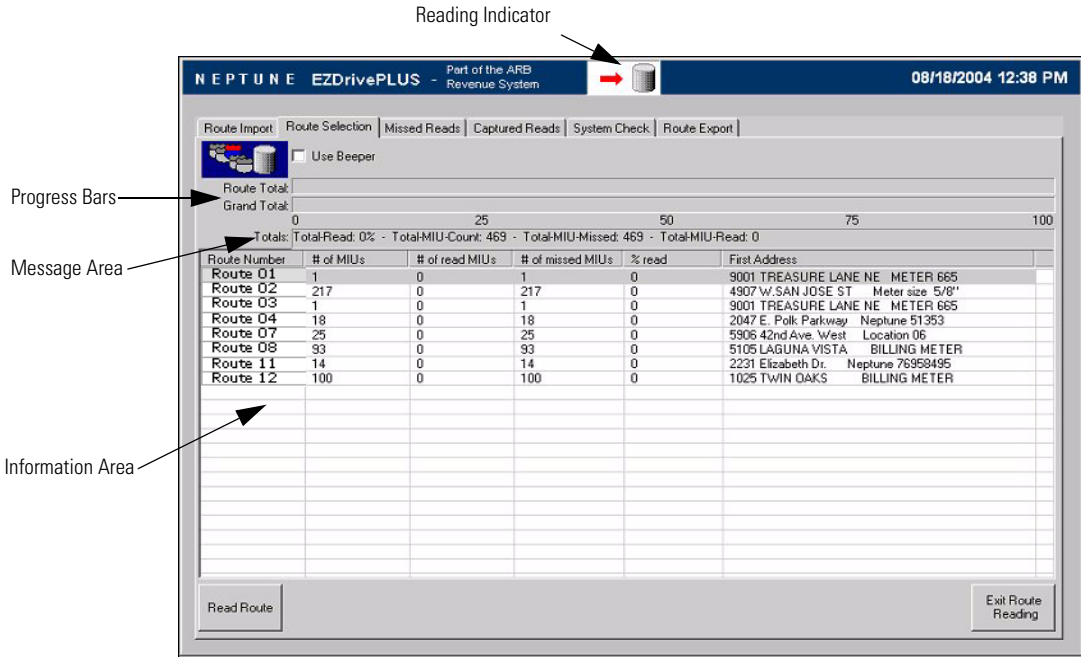


Figure 2.5 Route Selection Screen

Route Display Screens

There are two screens, the Missed Reads screen and the Captured Reads screen (Figure 2.6), that provide information for a selected route. Both of these screens have a message area for the selected route with the total number of meters on the route, the number that were read successfully, and the number that were missed. The Missed Reads screen also has a graphical progress bar that shows the percentage of the route that has been successfully read.

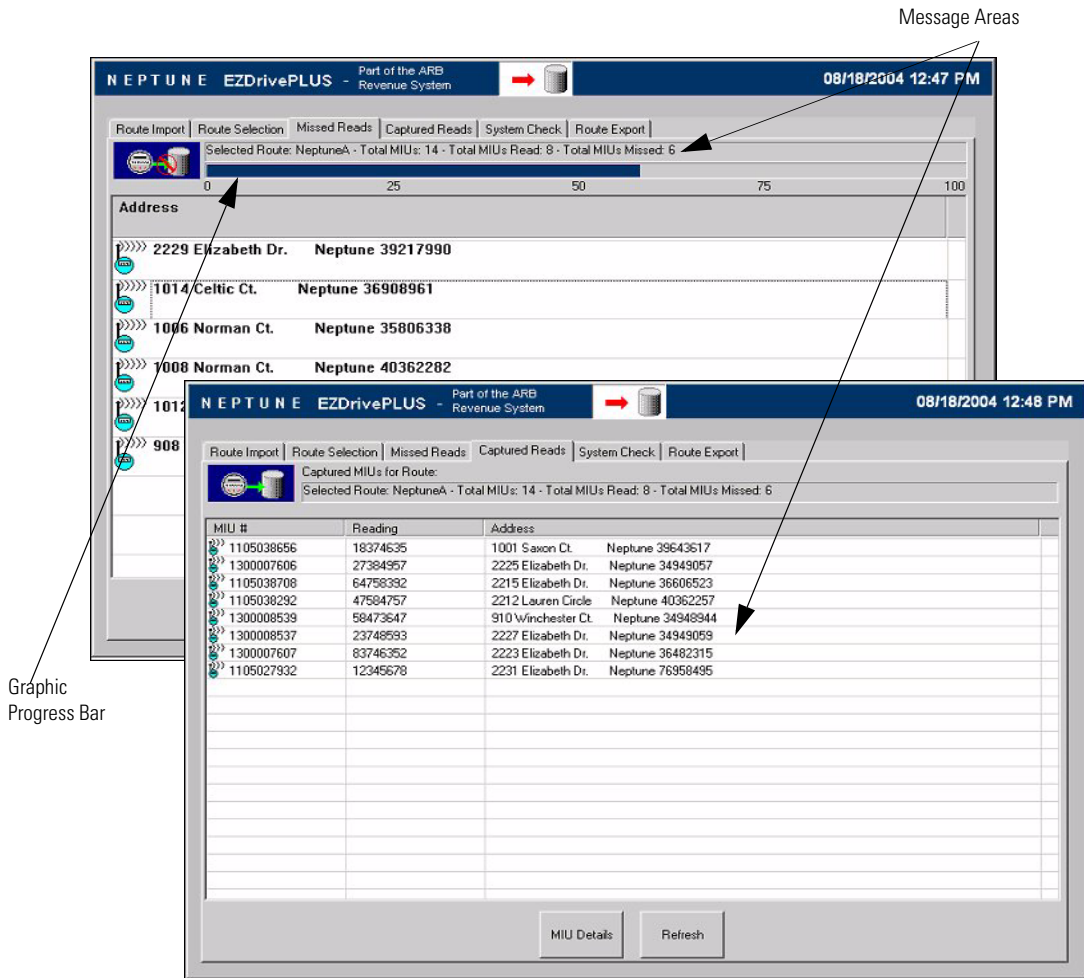







Figure 2.6 Missed Reads and Captured Reads Screens

Viewing MIU Details

It is possible to view the details of a specific MIU from either the Missed Reads or Captured Reads screen. The software allows you to immediately identify the type of MIU by looking at the icons to the left of each MIU in the information field.

-  The blue MIU icon represents a R900 RF transmitter.
-  The gray MIU icon with red circle around it and a red diagonal line through it represents an inactive meter. An “I” displays on the MIU Details screen in the Account Status field.

Use the following procedure to access more detailed information on a specific MIU.

- 1 Select the specific MIU by touching the screen with the stylus or by using the  or the  keys.
- 2 Press the **MIU Details**  button.

The MIU Details dialog (Figure 2.7) appears.

The screenshot shows a window titled "MIU Details" with the following fields and values:

- Parent Route: NeptuneA
- Account Number: [Empty]
- Meter Number: [Empty]
- Account Address: 908 Winchester Ct. Neptune 35511657
- Account Name: [Empty]
- Collection Method: SURF
- MIU-ID: 1300008538
- MIU Type: R9
- Channel: 0
- Wakeup Tone: 0
- Account Status: A
- Coded Notes: [Empty]
- Reading: [Empty]
- SkipCode: [Empty]
- TroubleCode Description: [Dropdown]
- SkipCode Description: [Dropdown]

Buttons: EXIT, SAVE

Figure 2.7 MIU Details Dialog

MRX920 Unit

The MRX920 unit consists of an RF receiver that is made up of the following 3 modules:

- RF (Radio Frequency) Front End
- Digital Multi-channel Receiver (DMR)
- CPU (based on a PC104 board)

RF Receiver

Radio Frequency (RF) Front End

The RF front end module receives the 910 - 920 MHz receiving band from the antenna through the duplexer. The duplexer functions as a translator, ensuring that the receiving band is

passed from the antenna to the RF receiver. The RF front end module then translates the RF spectrum from the 910 - 920 MHz band down to a 41 MHz band.

Digital Multi-channel Receiver (DMR)

The DMR module receives and decodes the bands from the RF front end module to determine if the signals are from an RF module that uses the R900 protocol or other supported protocols. Samples from up to 8 identified frequencies are processed to obtain the data signals. The signals are compared to a profile, and if there is a match, the signal is processed to extract and validate the data within it. The extracted data is stored in local cache memory.

The DMR processes 10 MHz of band with a full 128-channel receiver, of which only 77 channels are available, and extracts messages which are sent to the CPU. The DMR receives and demodulates up to eight simultaneous R900 messages. The MRX920 unit together with the MIU functions as a receiver that works together as a spread spectrum system.

The MRX920 unit reads signals from R900 MIUs with a high rate of success on the first pass. Inbound meter readings are collected and stored into memory. The receiver processes the MIU signals, and the application software ignores readings from MIU messages received that are not currently loaded into the unit. Readings from any MIU that are on one of the routes loaded into the MRX920 unit will be processed and stored into memory.

The receiver filters out duplicates in order to keep the best or last reading received. This optimizes memory storage space. Records for each reading are stored in the receiver database to eliminate duplicates and to keep track of reading data.

Central Processing Unit (CPU)

The Central Processing Unit (CPU), which temporarily stores received data, is based on a PC104 board. It receives the messages obtained from the band by the DMR module through the PC104 (ISA) bus. It then extracts the data and uses an RS-232 serial link to transfer it to the laptop computer.

Power Supply

The MRX920 unit is powered by a 12V DC power supply. Refer to Table A.5 located on page A-3 for the different operating voltages and current levels.

When components require more than 12 volts, additional voltage is generated using DC/DC converters; when components require less than 12 volts, linear regulators are used.



To prevent excessive use of the battery, the MRX920 unit **must not** be operated if the vehicle's engine is not running.

The power supply system has fuses and switches to control, protect, and limit its operation.

Antenna

The MRX920 antenna, used for filter and reception, is connected to the RF receiver subsystem.

The antenna is made of a corrosion-free material that is tolerant to ultra-violet exposure. It has a magnetic base and is capable of staying in place at speeds of up to 70 miles per hour (m.p.h.).



While the antenna is designed to stay in place at speeds of up to 70 m.p.h., Neptune recommends operating the MRX920 at speeds not to exceed the legal limits. For optimal performance, the MRX920 should not be operated at speeds greater than 30 m.p.h.

Notes

Chapter 3 Setting Up the MRX920 Unit

This section provides basic instructions for setting up the MRX920 unit so it can be used to perform mobile meter reading and exchange information with the host computer.



Neptune recommends that you insert the USB flash drive into the laptop after you place the unit in the vehicle.

Placing the MRX920 Unit in the Vehicle

Follow this procedure to set up the MRX920 unit in the vehicle passenger seat.



Never set up the MRX920 unit during a lightning storm or under excessively wet conditions.

- 1 Place the MRX920 unit in the passenger seat with the two seatbelt retention loops facing the back of the seat.
- 2 Press the blue button on the safety pin, and pull the pin out of the seatbelt retention loop. (See Figure 3.1 on Page 3-2.)

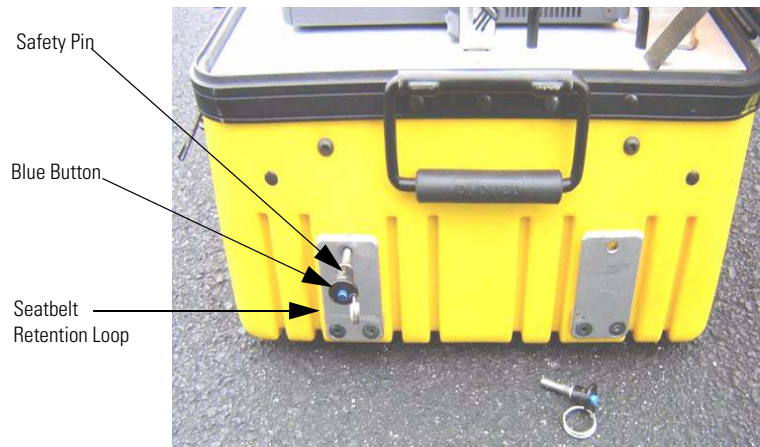


Figure 3.1 Removing the Safety Latch

- 3 Repeat Step 2 to remove the safety pin from the second seatbelt retention loop.
- 4 Guide the seat belt through the seat belt retention loops, as shown in Figure 3.2.



Figure 3.2 Placing Seatbelt in Retention Loop

- 5 Replace the safety pins in the seatbelt retention loops, as shown in Figure 3.3.

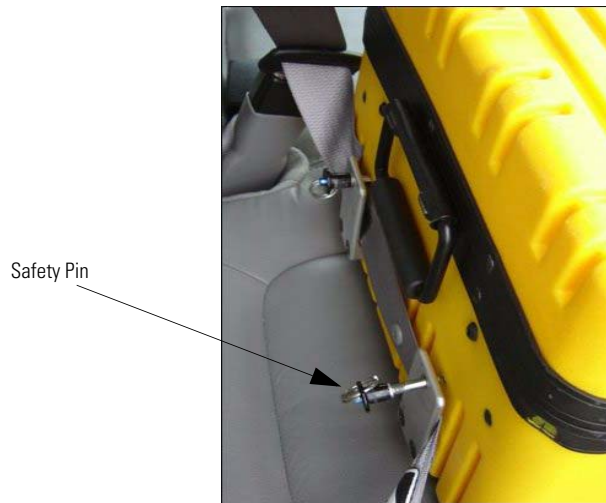


Figure 3.3 Replacing the Safety Pin

- 6 Adjust the seat belt so that the unit is secure in the passenger's seat.
- 7 To further secure the unit, slide it against the back of the seat.

Opening Carrying Case Cover

To set up the MRX920 unit in a vehicle, you must open the top cover by opening the latches on the cover. See Figure 3.4.

Follow this procedure to open the latches on MRX920 unit, shown in Figure 3.4, and open the carrying case top.

- 1 Lift the latch flap and turn it to the left.

The latch releases from the catch on the carrying case top.

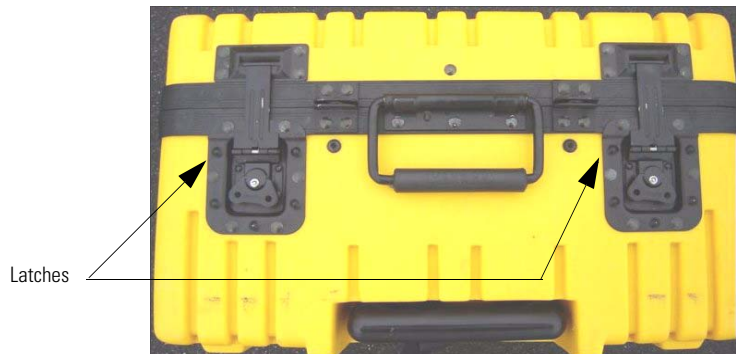


Figure 3.4 Latches on MRX920 Carrying Case

- 2 Repeat step 1 for the other latch.
- 3 Open the cover until it locks in place. (See Figure 3.5.)



Figure 3.5 Opening the Cover

- 4 To further secure the unit, slide it against the back of the seat (see Figure 3.5).



If the unit interferes with your vision for the passenger window, rest the cover on top of the laptop display to ensure maximum visibility.

Plugging in the Power Cable

Follow this procedure to connect the vehicle power supply power cable to the MRX920 unit and plug it into the vehicle power supply receptacle.

- 1 Start the vehicle.

- 2 Insert the appropriate end of the vehicle power supply power cable into the connector on the MRX920 unit, as illustrated in Figure 3.6.

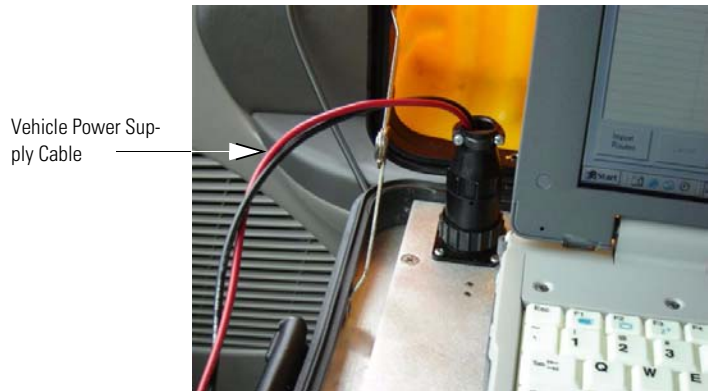


Figure 3.6 Vehicle Power Supply Power Cable

- 3 Plug the other end of the power cable into the vehicle power supply receptacle as illustrated in Figure 3.7.

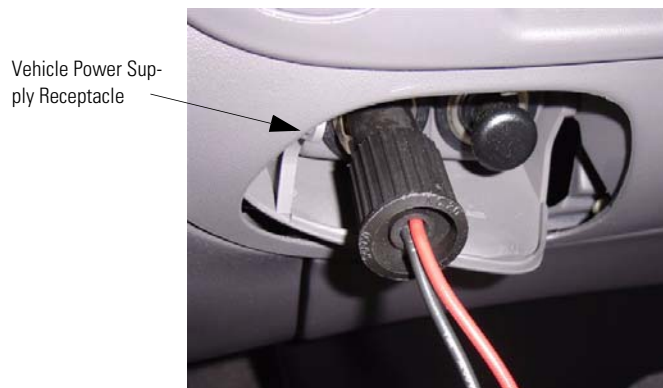


Figure 3.7 Vehicle Power Supply Power Cable Inserted In Car

Installing the Antenna

The proper installation of the antenna cable is critical for the optimal performance of the MRX920 Unit. If the cable is crimped, the performance of the unit will degrade significantly.

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

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

- 1 If the antenna cable is not plugged in, plug it into the socket on the top right side of the drive-by unit next to the laptop computer.
- 2 Place the magnetic base of the antenna in the center of the roof approximately one foot behind the leading edge of the roof.



Figure 3.8 Antenna Installation

- 3 Connect the antenna to the MRX920 unit, and hand-tighten the connector by turning it clockwise until it is secured.
- 4 Route the antenna wire through the passenger window or through the door. (See Figure 3.9.)

The cable runs through the window, which is the preferred method.



Figure 3.9 Antenna Cable Through Window



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

A rear vent window on a mini-van can be another good location. Caution must also be taken when opening the door with a cable running through the window. The cable can be pulled out of the connector, again adversely affecting performance.



In some vehicles, there is enough room to run the cable through the doorframe of the vehicle without crimping the cable. Also, the sound of the internal fan provides auditory evidence that the power supply is working. Other vehicles do not always have enough clearance (especially vehicles with rain gutters). Running the cable through a rear door can be an option. You can also run the cable through a window.

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



Pressure on the antenna cable can cause damage!

Inserting the USB Flash Drive

Neptune recommends that you insert the USB flash drive into the laptop after you place the MRX920 unit in the vehicle.

Follow this procedure to insert the USB flash drive containing the routes you plan to read.

- 1 Remove the cover from the USB flash drive.
- 2 Remove the dust cover from the USB port.



Neptune recommends that you use only the USB port located on the top plate of the MRX920 laptop for meter reading.

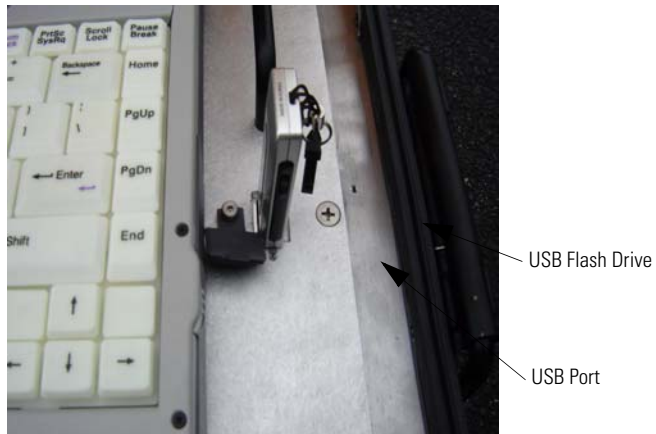


Figure 3.10 USB Port and Drive

- 3 Insert the USB flash drive into the port on the top plate of the MRX920 unit.




Be careful not to force the USB flash drive into the slot. Forcing can cause damage to the drive or to the metered data contained on the drive. If the drive does not insert easily, rotate it 180°, and try to insert it again.

Turning the Unit On

Follow this procedure to turn on the MRX920 laptop and start the MTX950 software.

- 1 With the laptop computer facing you, open the display.
- 2 Raise the display to a comfortable viewing position with the keyboard accessible to you.

- 3 Press the power button  located near the center of the back edge of the laptop.



The power button is a soft raised button on the right side of the LED light indicators. See Figure 3.11.

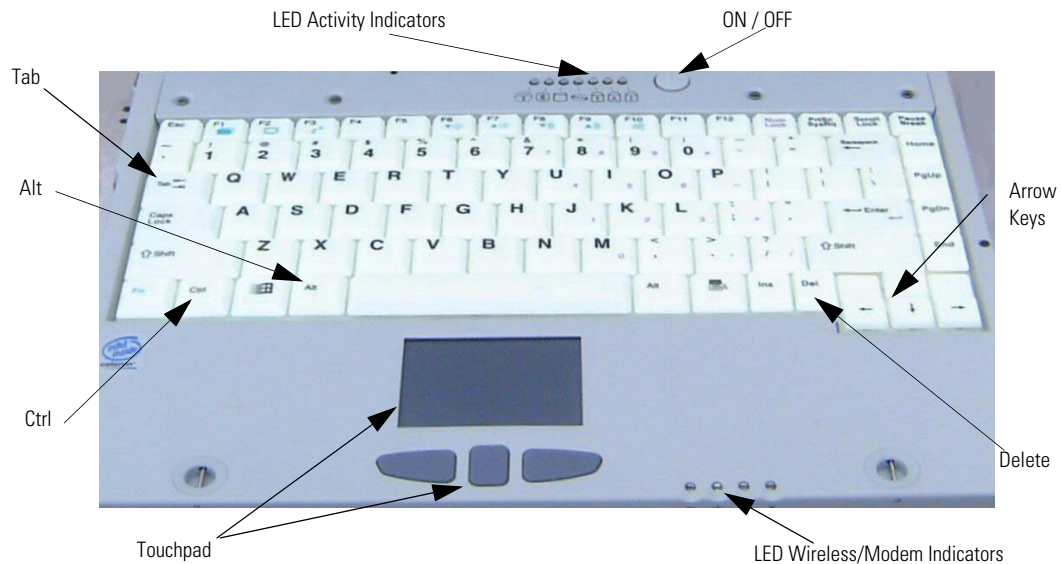


Figure 3.11 Laptop Keyboard



If the laptop fails to respond to the keys or to the stylus, reboot by pressing and holding down **Ctrl + Alt + Delete** (Figure 3.11) for at least 10 seconds. Release the buttons to restart the computer.

For additional information on MRX920 self-diagnostics or keyboard, see

- “Performing Diagnostics.” on page C-3.
- “Using the Keyboard.” on page B-1

Starting the Software

Follow this procedure to start the software for your MRX920 laptop.

- 1 Double-click on the MRX920 icon on your Windows desktop.

The software automatically tries to import a route file. When the import process is complete, the Route Selection screen appears.



If the route data file is not found, a message displays. See “If No Route Data File is Found.” on page C-5, for instructions.

- 2 Continue to “Using the MRX920 Unit.” on page 4-1, to begin using your MRX920 unit.

Adjusting System Settings

This section describes several settings you can make to the MRX920 unit to make it easier and more comfortable to use.

Contrast


The laptop XGA display is a transmissive color display designed to minimize glare and maximize transmitted light from the backlight so it has excellent readability in indirect light. The XGA display is easy to read in vehicles. However, to increase or decrease the brightness of the display, perform one of the following actions.

- Press FN + F6 to decrease LCD brightness.
- Press FN + F7 to increase LCD brightness.

Volume

The volume for the beeper setting can also be controlled:

- Press FN + F8—decreases the volume.
- Press FN + F9—increases the volume.
- Press FN + F10—toggles the volume mute on or off.

You can also adjust the volume with the Windows volume control feature, which is located on the taskbar and looks like this .



Adjusting the volume using the function keys produces only a slight change with each press. It may take several presses to increase or decrease the volume to the level that you want.

Notes:

Chapter 4 Using the MRX920 Unit

Using the MRX920 unit to collect readings begins with the host software building a route file that is transferred to the MRX920 unit via the USB flash drive. The meter reader inserts the USB flash drive in the MRX920 unit and begins automatic meter reading by driving the vehicle through the route and collecting readings. After the readings are complete, the meter reader returns to the utility, shuts down the MRX920 unit, and removes the USB flash drive to give it to the host computer operator. The host computer operator transfers the data from the USB flash drive to the host computer software and transfers the data to the utility billing system computer.

Reading Meters

Because the MRX920 automatically reads meters, efficient use of the system depends on two factors:

- the distance of the MRX920 unit from the MIU being read.
- the vehicle's driving speed.

In a typical meter reading scenario, you drive your vehicle through the routes listed on the route selection screen in any order. You can position your vehicle at any route or starting address as required by driving conditions and route distribution for the most efficient data collection. The MRX920 unit reads and stores readings regardless of the order of the routes displayed.

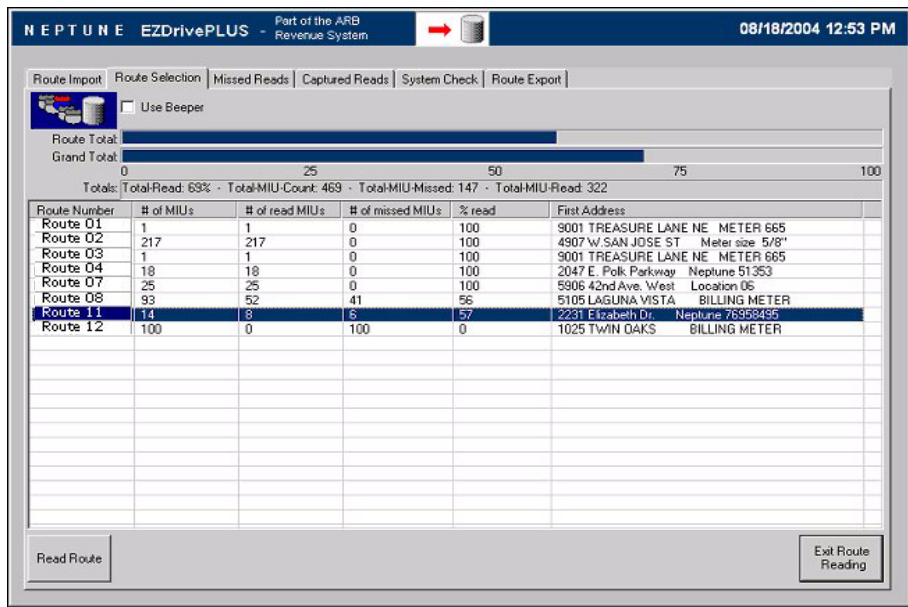
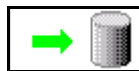


Figure 4.1 Route Display with Multiple Routes Being Read



When the MRX920 unit starts collecting data, the Reading indicator changes to display a pulsing green arrow. This icon continues to pulse as long as read data is received within a period of five seconds.



In normal use, you focus on driving and listening for beeps on the selected route. You **DO NOT** need to look at the screen on the MRX920 unit while you are driving. The MRX920 unit automatically receives and stores any readings within range for any MIU IDs that are loaded on the laptop.

Beeper Settings

A beeper is available in the MRX920 unit to emit a beep tone for every account that is read and stored in the MTX950 software. This helps to monitor the meter reading without having to look at the laptop display. This also offers a safe way to monitor reading progress while driving a route.

The beeper only sounds while the MRX920 is performing readings and stops when all readings are completed. You can turn the beeper function on or off while the unit is performing readings. The default setting in the MRX920 is for the beep tone to be turned off.

Turning the Beeper On or Off

Follow this procedure to switch the MRX920 beeper on or off.

- 1 Access the Route Selection screen.

At the top of the screen, there is a **Use Beeper** field with a check box, as shown in Figure 4.2.



Beeps are only heard when readings are posted for MIUs in the selected route.

Beeper check box

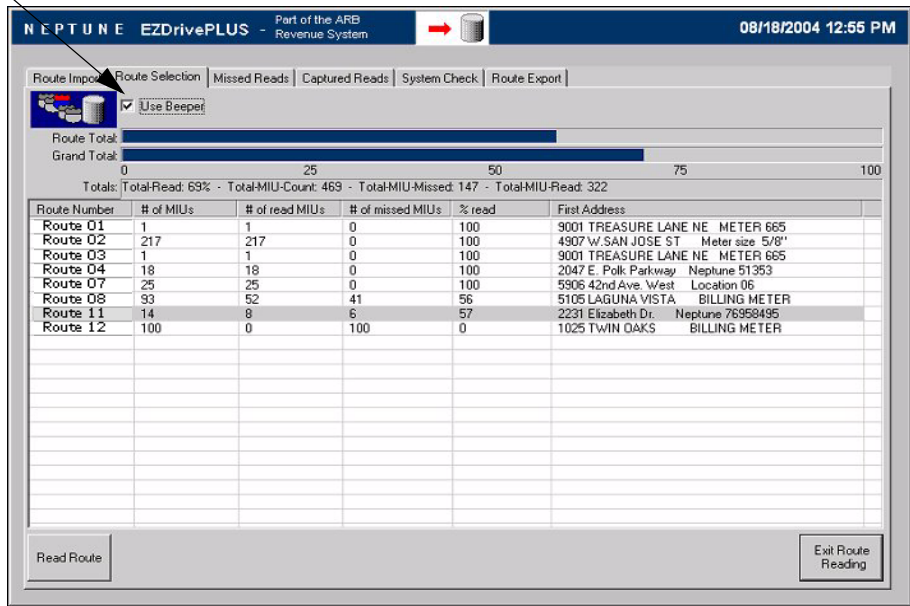


Figure 4.2 Use Beeper Field

- 2 Select the box using the stylus.

A check in the box indicates the beeper is on. An empty box indicates the beeper is off.

Selecting Routes

This is an optional step if you want to review selected routes to determine a good starting point for reading.

- 1 Access the Route Selection screen, shown in Figure 4.3, by pressing the **Route Selection** tab.

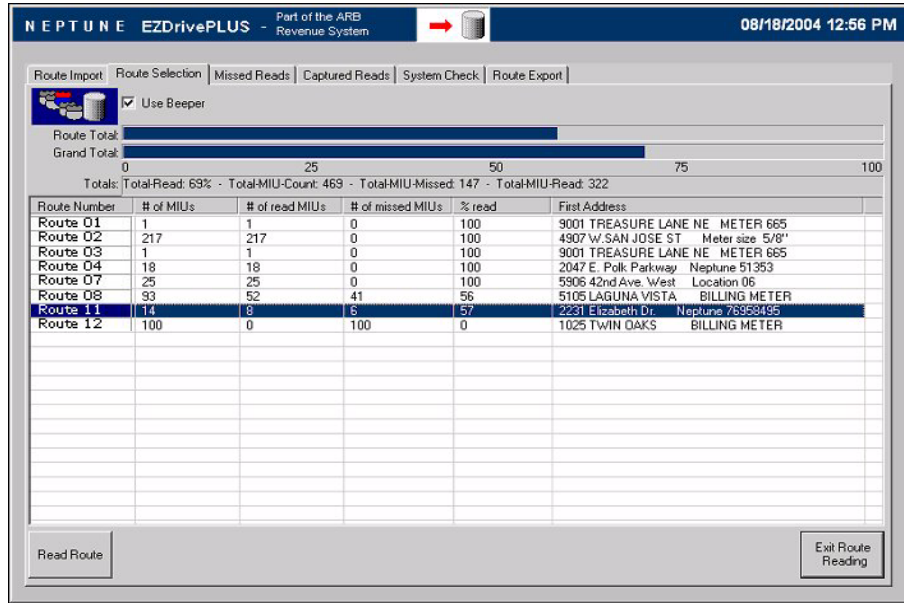


Figure 4.3 Route Selection Screen

- 2 Highlight the route to be viewed.
- 3 Select the **Missed Reads** tab to display the Missed Reads screen.

All accounts that are unread or missed during the reading process are displayed on the Missed Reads screen as shown in Figure 4.4.

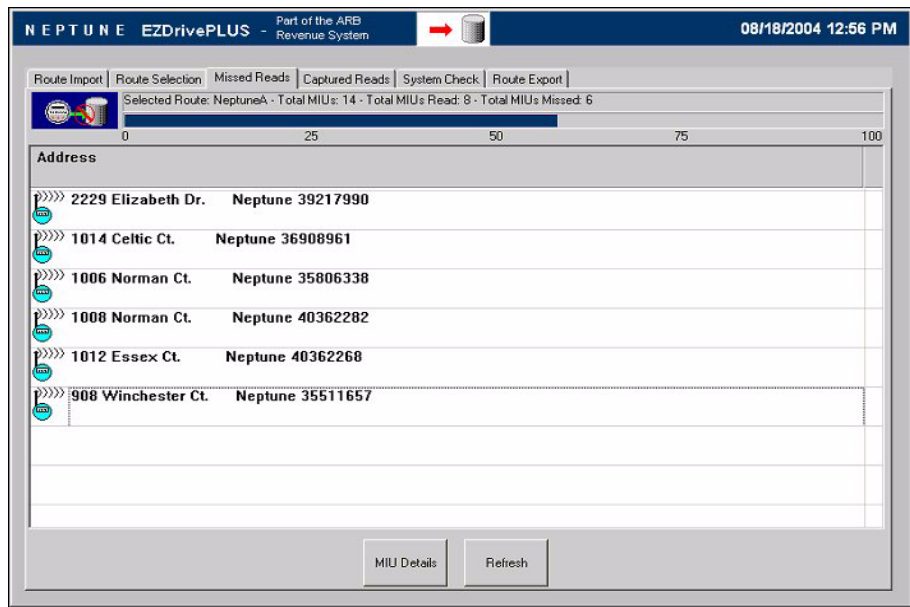



Figure 4.4 Missed Reads Screen

The Missed Read screen appears showing the accounts in the route, with the first address in the route on the first line.

- 4 If necessary, select another address for your starting point.
- 5 To get detailed information on an account, select that account and press the **MIU Details**  button.

The MIU Details dialog, shown in Figure 4.5, appears.

Figure 4.5 MIU Details Dialog

- 6 Go to the procedure “Starting Meter Reads,” on page 4-10 to begin reading the route.

Detail Settings

When viewing route information in the software, you can view the details of a specific account. Account details consist of the following:

- Parent Route
- Meter Number
- Account Name
- MIU-ID
- Channel
- Account Number
- Account Address
- Collection Method
- MIU Type
- Wakeup Tone

Viewing Account Detail

Follow this procedure to view account details for selected accounts.

- 1 From the Route Selection screen, highlight the route containing the account you want to view, as shown in Figure 4.6.

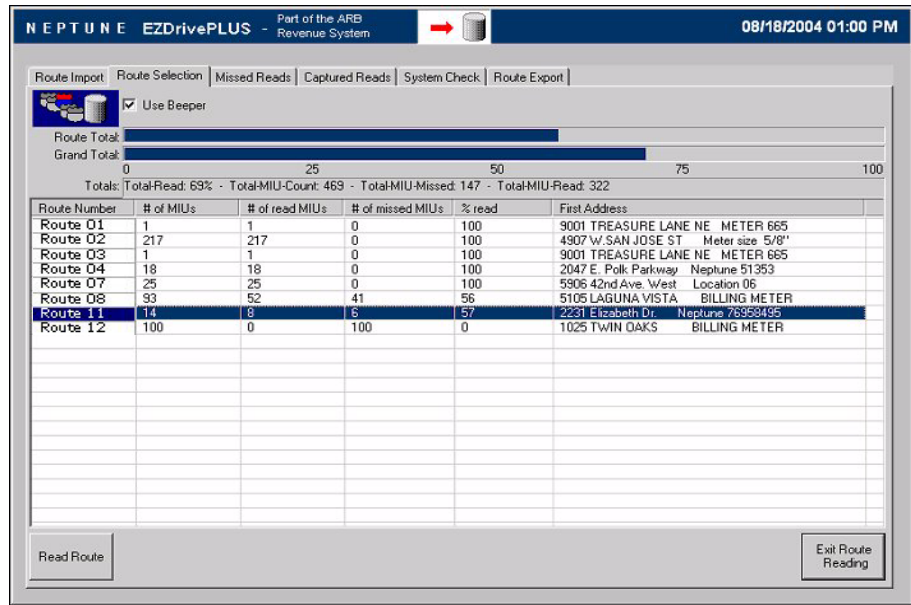


Figure 4.6 Route Selection Screen with Route Highlighted

- 2 Go to either the **Missed Reads** or **Captured Reads** screen, depending on whether or not the account has already been read. See Figure 4.7.

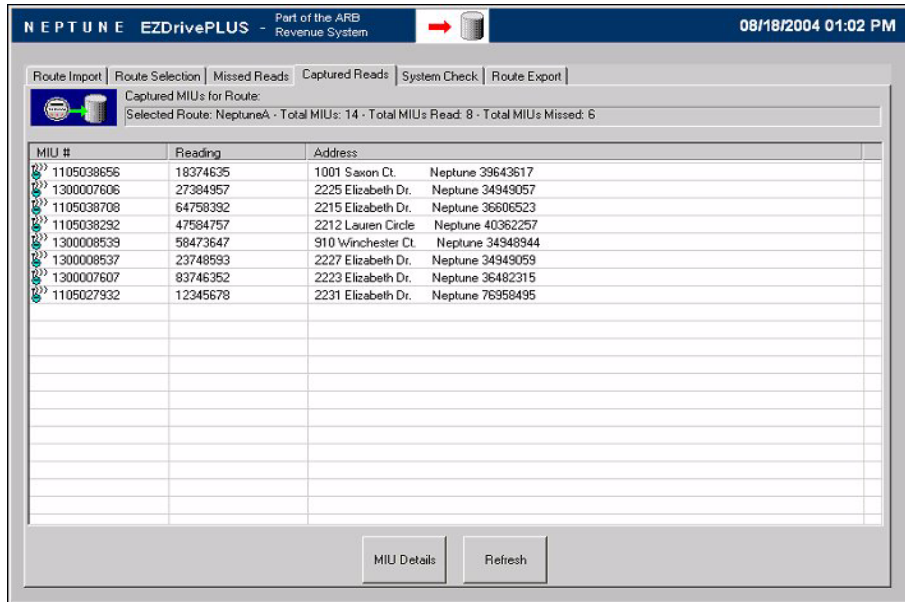



Figure 4.7 Captured Read Screen with Account Highlighted

- 3 Highlight the specific account.
 - 4 Press the **MIU Details**  button.
- The MIU Details dialog appears with the details of the selected account. See Figure 4.5.
- 5 To close the MIU Details dialog, select **OK**.

Collecting Readings



For the meter reader's safety, the MRX920 unit is designed so that there is no requirement to use the laptop display and keyboard while driving. To verify that the unit is reading properly, use the beeper option to monitor readings.


On occasion, it could be necessary for the driver to stop and view routes and display account detail. A meter reader can easily suspend meter reading and restart it before continuing on a route. See "Pausing and Restarting Meter Reading," on page 4-19.

Starting Meter Reads

Follow this procedure to begin collecting meter readings after you have positioned your vehicle at the starting address and started up the MRX920 laptop computer.



To read meters, the plug-in power cord on the MRX920 unit must be connected to the vehicle power supply receptacle. Make sure the red LED is lit on the power cable.

- 1 From the welcome screen, press the **Start**  button and the routes on the USB flash drive automatically load into the software.
- 2 Highlight the route where you begin reading.
The Route Selection screen automatically appears.
- 3 Click the route you want to see on the Missed Reads and Captured Reads screens.

- 4 Press the **Read Route**  button.

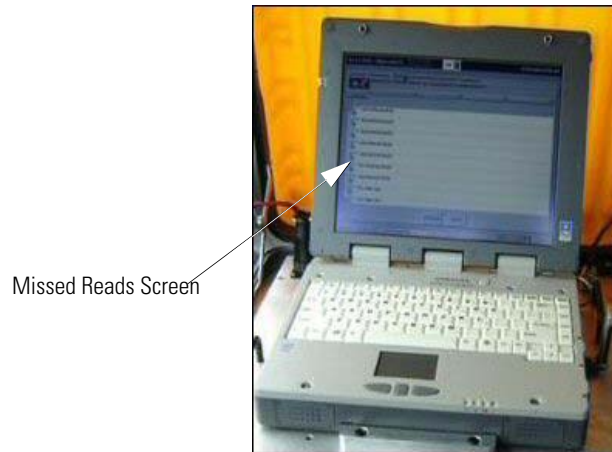
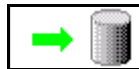



Figure 4.8 Reading a Route



The Reading indicator turns on and pulses to indicate that reading is in progress. Addresses and routes that are successfully read are listed on the **Captured Reads** screen. Any remaining unread or missed routes are listed on the **Missed Reads** screen. The Reading icon continues to pulse as long as read data is received within a period of five seconds.



If there are any inactive meters on this route, they are listed on the Captured Reads screen, represented by the icon —a gray meter enclosed in a red circle with a line through it. Refer to “Viewing MIU Details,” on page 2-12.

- 5 Start driving your vehicle by each address along the route at the posted speed limits.



While the antenna is designed to stay in place at speeds of up to 70 m.p.h., Neptune recommends operating the MRX920 at speeds not to exceed the legal limits. For optimal performance, the MRX920 should not be operated at speeds greater than 30 m.p.h.



Use the Beeper function on the MRX920 unit to monitor meter reading while driving. Use of the laptop display or keyboard can compromise driver safety. See "Turning the Beeper On or Off," on page 4-3.

- 6 If the message area at the top of the Captured Reads screen indicates that all accounts on the route have been read (as shown in Figure 4.9), select the next route to be read.

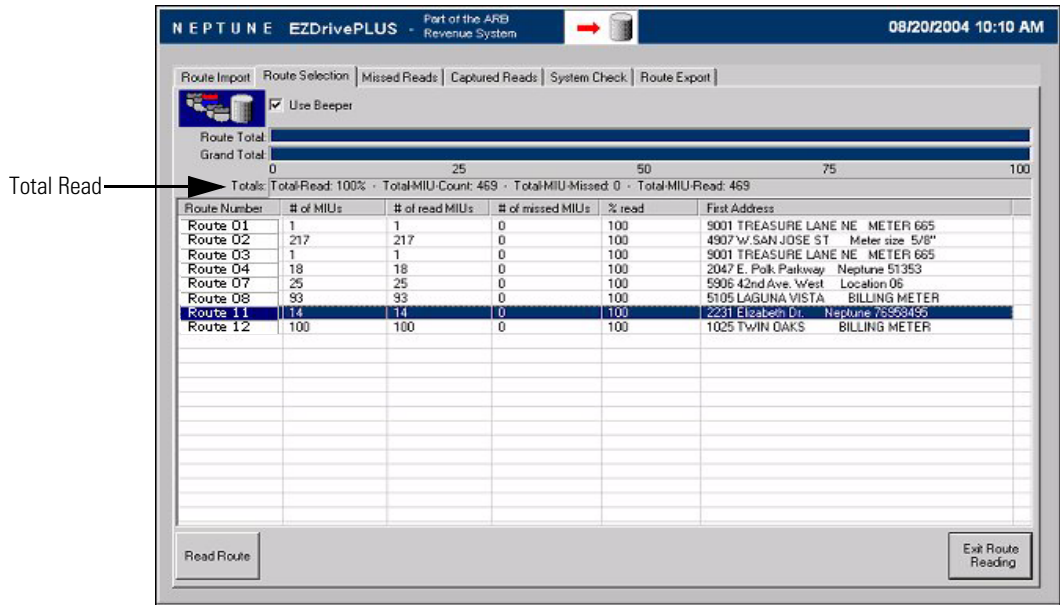
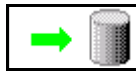


Figure 4.9 Route With All Reads Completed





The Reading indicator on the software screen pulses as you continue driving each route until all of the routes have been read. When reading is completed, check the Missed Reads screen to see if there are any missed accounts.

- 7 Choose from the following:
 - To pause the MRX920 meter reading before all routes have been read, see “Pausing and Restarting Meter Reading,” on page 4-19.
 - To reread missed meters, see “Using Coded Notes or Skip Codes,” on page 4-16.
 - To end meter reading and upload the read data to the Host software, see “Exiting the Software,” on page 4-21.

Navigation on the Route Display Screen

Before you complete readings for the MRX920 routes, you can move between routes on the route display screen to select the route information you want to view. This also gives you access to route details and individual account information.

You can move between the routes whether or not the MRX920 is actively reading meters.

- 1 Touch the screen with the stylus to select the desired route.
- 2 Press  to move backward through the route, or  to move forward through the route.

Viewing Routes

Follow this procedure to select routes to display route reading progress and route detail. You can perform this procedure whether or not routes are actively being read.

- 1 Press the **Route Selection** tab to access the Route Selection

screen, shown in Figure 4.10.

NEPTUNE EZDrivePLUS - Part of the ARB Revenue System 08/18/2004 01:07 PM

Route Import | Route Selection | Missed Reads | Captured Reads | System Check | Route Export

Use Beeper

Route Total: _____
Grand Total: _____

0 25 50 75 100

Totals: Total Read: 0% · Total MIU Count: 469 · Total MIU Missed: 469 · Total MIU Read: 0

Route Number	# of MIUs	# of read MIUs	# of missed MIUs	% read	First Address
Route 01	1	0	1	0	9001 TREASURE LANE NE METER 665
Route 02	217	0	217	0	4907 W. SAN JOSE ST Meter size 5/8"
Route 03	1	0	1	0	9001 TREASURE LANE NE METER 665
Route 04	18	0	18	0	2047 E. Polk Parkway Neptune 51353
Route 07	25	0	25	0	5906 42nd Ave. West Location 06
Route 08	93	0	93	0	5105 LAGUNA VISTA BILLING METER
Route 11	14	0	14	0	2231 Elizabeth Dr. Neptune 76969495
Route 12	100	0	100	0	1025 TWIN OAKS BILLING METER

Read Route Exit Route Reading

Figure 4.10 Route Selection Screen

- 2 Highlight the specific route you want to view.

The top graphical progress bar displays the percentage of the route that is complete.

- 3 Select the Missed Reads or Captured Reads screen. (See Figure 4.11)

Both screens display the individual accounts within the selected route. The message area at the top of the screen

display the route number, total MIUs, total MIUs read, and total MIUs missed.

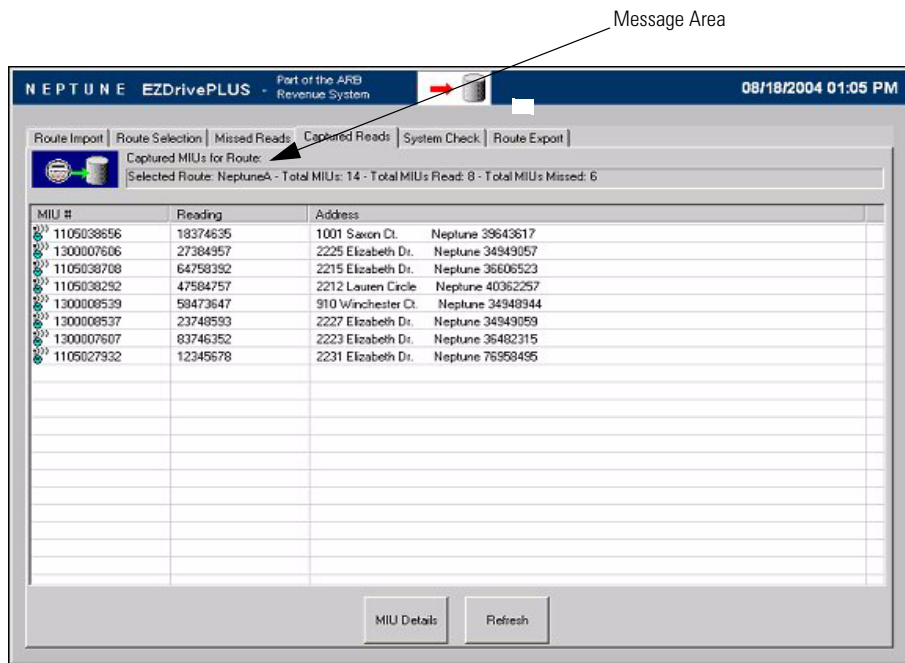


Figure 4.11 Captured Reads Screen Message Area

Identifying Missed Accounts

Occasionally, because of driving speed, RF interference, or problems with the MIUs, it is possible to miss a meter reading.

Usually, you can tell if meters are missed because the route does not progress to a read status of 100%. To view the missed accounts:

- 1 From the Route Selection screen, highlight the route containing the missed reads.
- 2 Press the **Missed Reads** tab to display the Missed Reads screen.

All missed accounts are listed in the information area of the screen.

Refer to the following section, "Viewing Account Details" for specific details of a missed account.

Viewing Account Details

Before reading begins, the Route Selection screen displays zeros for all routes in the **# of read MIUs** field. Once reading is initiated, the captured reads for each route are recorded in this field.

After meter reading is completed, only the missed or unread accounts remain on the Missed Reads screen. The meter reader then knows which addresses to reread.

If for any reason the MRX920 is not able to read missed MIUs on the second attempt, the meter reader can select specific accounts by using the MIU Details dialog to display more information for the account.

Using Coded Notes or Skip Codes

You can use the MIU Details screen to record trouble that you are having with the reading. Or if you choose to skip the reading, you can record the reason. However, you cannot have an automatic reading with a skip code. The skip codes means that you are skipping the reading.



When viewing details for an account, only two of the three notes fields can display. There is always the reading code, and either a trouble code or a skip code.

Entering a Trouble Code

To enter a trouble code, complete the following steps.

- 1 On the **MIU Details** screen, tab to the **Coded Notes** field.
- 2 Choose one of the following options:

- If you already know the trouble code, type it in the **Coded Notes** field.
 - If you do not know the code, tab to the **TroubleCode Description** field, and select the reason code from the drop-down selection list.
- 3 Press **Save** to record the reason for the trouble.

Entering a Skip Code

To enter a code for why you skipped a reading, complete the following steps.





EZRouteMAPS customers should NOT use skip codes.

- 1 On the **MIU Details** screen, tab to the **SkipNotes** field.
- 2 Choose one of the following options:
 - If you already know the skip code, type it in the **SkipNotes** field.
 - If you do not know the skip code, tab to the **SkipCode Description** field, and select the reason code from the drop-down selection list.
- 3 Press **Save** to record the reason for skipping the reading.


Moving From One Account to the Next

Before completing readings for the addresses in a route, you can move between accounts to select the account to display.

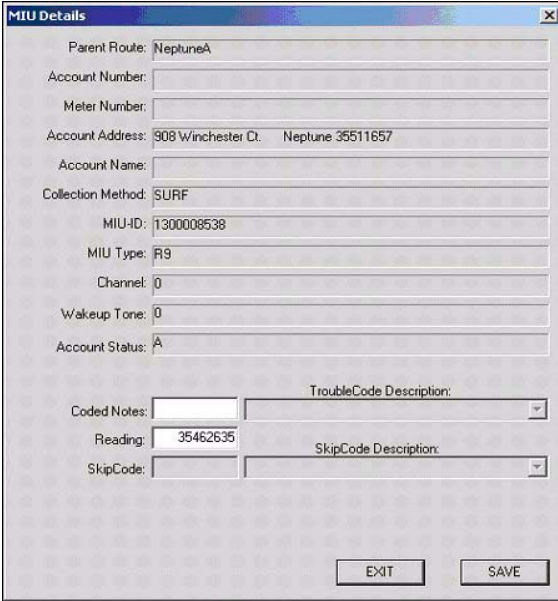
- 1 Touch the screen with the stylus to select the desired account.
- 2 Press  to move backward through the route or  to move forward through the route.

Displaying Account Detail

Follow this procedure to view route detail for selected routes.

- 1 From the Route Selection screen, highlight the appropriate account.
- 2 Select either the **Missed Reads** screen or the **Captured Reads** screen, depending on whether or not the account has been read.
- 3 Highlight a specific account.
- 4 Press the **MIU Details**  button.

The MIU Details dialog (Figure 4.12) appears.



The image shows a dialog box titled "MIU Details" with a close button in the top right corner. The dialog contains several fields for account information:

- Parent Route: NeptuneA
- Account Number: (empty)
- Meter Number: (empty)
- Account Address: 908 Winchester Ct. Neptune 35511657
- Account Name: (empty)
- Collection Method: SURF
- MIU-ID: 1300008538
- MIU Type: R9
- Channel: 0
- Wakeup Tone: 0
- Account Status: A

At the bottom, there are three rows of fields:

- Coded Notes: (empty) and TroubleCode Description: (dropdown menu)
- Reading: 35462635 and SkipCode Description: (dropdown menu)
- SkipCode: (empty) and (dropdown menu)

At the bottom right, there are two buttons: "EXIT" and "SAVE".

Figure 4.12 MIU Details dialog

The collection method on the Account Detail screen is unlicensed radio frequency (R900 MIUs). Usually route numbers are derived from the route numbers assigned at the time of previous meter reading routes, such as handheld meter reader routes.

In addition, the fields for **Coded Notes** or **Skip Codes** allow you to record information about this account. See “Using Coded Notes or Skip Codes,” on page 4-16.

Reading Missed Accounts

The procedure for reading missed accounts is similar to the procedure used on the initial reading. To assist in reading missed accounts, you need to view route and account details to locate the exact starting point for reading. It is also helpful to drive slower and get as close as possible to the missed meters to improve chances of receiving read data.

To identify a missed meter, select a route from the Route Selection screen that shows a read status of less than 100% in the progress bar at the top of the screen. Once selected, missed accounts from that route are shown on the Missed Reads screen.

If necessary, use the **MIU Detail** button for the missed account and determine if there are any problems with the account that prevent a successful reading. Note the address of any accounts for subsequent reading and reporting.

To read a missed meter, drive to the first unread account address on the route. Read the remaining accounts on the route.

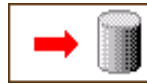
If you do not succeed in reading an account after a second attempt, the account remains with a status of “unread.” The utility can initiate follow-up action to investigate the source of the reading problem.

Pausing and Restarting Meter Reading

Follow this procedure to stop and then restart data collection using the MRX920 unit. This is useful if you want to review the route reading status of a route or individual account or if you need to look up the starting address for a route to be read.

- 1 While the Reading indicator is pulsing, press the **Pause**

Route  button.



The Reading indicator stops displaying the pulsing green arrow. When you press the Pause Route button, the red arrow displays.

- 2 To review account information before restarting, select either the Missed Reads or Captured Reads screen, depending on whether or not the account has already been read.

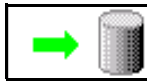
- 3 Select an account and press the **MIU Details** button.



- 4 To resume automatic reading, press the **Read Route**



button.




Reading continues and the Reading indicator switches back to a status of "Reading".

Creating an Export File

After you have completed reading all of your routes, you need to create an export file for your utility to upload the read data to the host software.

When all routes have been read, use the following procedure to create an export file:

- 1 Press the **Route Export** tab to display the Route Export screen.
- 2 Press the **Export Routes**  button to store the routes on the USB flash drive.

Exiting the Software

There are three screens, Route Import, Route Selection, and Route Export, that display the Exit Route Reading button. On the Route Import and Route Export screens, when you press this button you return to the Welcome screen. When you press this button from the Route Selection screen, the Route Export screen displays. Complete the following procedure to exit the software, then proceed to the procedure to turn off the laptop.

From the Route Import and Route Export Screens

- 1 Press the **Exit Route Reading**  button.

The Welcome screen displays.

- 2 Press the **Exit Program**  button.

the software closes.

It is now safe to turn off your computer. Proceed to "Turning off the Laptop".

From the Route Selection Screen

- 1 Press the **Exit Route Reading**  button.

The Route Export screen displays.

- 2 On the Route Export screen, press the **Exit Route Reading**



button again.

The Welcome screen displays.

- 3 Press the **Exit Program**  button.

The software closes.

It is now safe to turn off your computer. Proceed to "Turning off the Laptop".

Turning off the Laptop

- 1 From the Start menu, click **Shut Down**.
- 2 From the Shut Down Windows screen select **Shut Down**.
- 3 Click **OK**.
- 4 You can now safely remove the USB flash drive. (Refer to "Removing the USB Flash Drive," on page 4-23.)



Improperly removing the USB flash drive while the laptop is ON can cause data corruption on the USB flash drive. Refer to the following section for procedures to safely remove the USB flash drive while the PC is on.


- 5 Remove the power cable from the vehicle power supply receptacle.
- 6 Drive back to your utility to return the USB flash drive containing the read data so it can be uploaded to the host software.

Removing the USB Flash Drive

Follow this procedure to safely remove the USB flash drive from the laptop **while it is operating**.



Improperly removing the USB flash drive while the laptop is ON can cause data corruption on the USB flash drive.

- 1 Click the USB flash drive  icon located in the lower right corner of the Windows task bar.

The **USB flash drive properties** dialog appears.

- 2 Select the **Socket Status** tab.
- 3 Select the USB flash drive from the list provided.

As shown in Figure 2.3 on Page 2-4, the list provided shows one socket as being empty. (Refer to “USB Port,” on page 2-4.)

- 4 Click **OK**.

A dialog displays telling you that you can now remove the USB flash drive.

- 5 Remove the USB flash drive from the port on the back of the laptop.

Notes

Chapter 5 Closing the MRX920 Unit

Preparing to Remove the MRX920 Unit

Follow this procedure to close up the MRX920 unit, and prepare it for removal from the vehicle.

- 1 With the laptop computer turned off, close the laptop display.
- 2 Remove the power cable from the vehicle power supply receptacle.
- 3 Remove the antenna from the vehicle roof.
- 4 Remove the antenna cable from the MRX920 unit.



Figure 5.1 Laptop Prepared for Closing

- 5 Remove the vehicle seat belt from the seat belt retention loops on the MRX920 carrying case.
- 6 Close the cover on the MRX920 unit and secure it by closing the latches on the unit.



Figure 5.2 Cover Closed on the MRX920 Unit

Appendix A Specifications

Electrical Specifications

Table A.1 Electrical Specifications

Power Consumption	9A maximum
Power Supply	12V DC via plug-in power cord

Laptop Specifications

Table A.2 PC Specifications

System Type	Windows Based 1.7 GHz Intel® Pentium 4 Processor with 512 L2 Cache 256 to 1024 MB DDR SDRAM
Keyboard	12 Function keys Fully waterproofed design Built-in, solid state mouse Embedded numeric keypad 7 programmable function keys
Display	12.1" TFT XGA Outdoor transmissive ColorVue display with Touchscreen. VGA Graphics Controller with 2MB VRAM. User adjustable contrast and intensity Light sensor which adjusts screen intensity per ambient light Shock/scratch resistant anti-glare plate
Operating System	Windows 2000

Environmental Conditions

Table A.3 Environmental Conditions

Operating Temperature	32° to 122°F (0° to 50°C)
Storage Temperature	-40° to 185°F (-40° to 85°C)
Operating Humidity	5% to 95% non-condensing relative humidity

Dimensions and Weight

Table A.4 Dimensions and Weight

Dimensions	Refer to Figure A.1, measurement in inches.
Weight	48.0 lbs

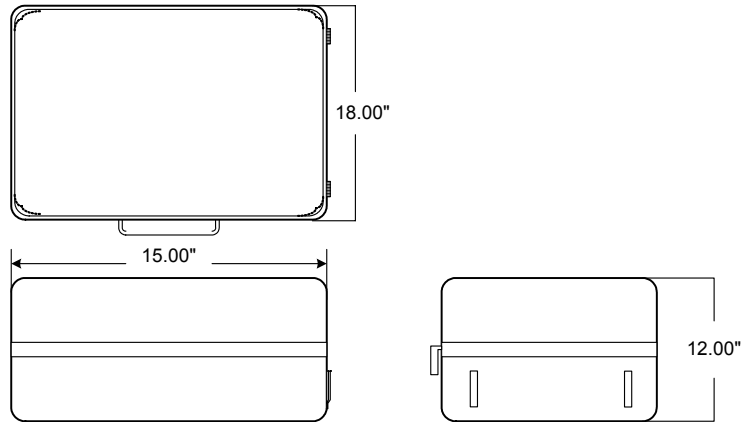


Figure A.1 MRX920 Unit Dimensions

Power Supply

Table A.5 Operating Voltage and Current

Component	Nominal Operating Voltage	Nominal Operating Current	Maximum Operating Current
MRX920- Laptop Computer turned ON	12V	3 to 6A	9A

Notes:

Appendix B Keyboard

Using the Keyboard

The MRX920 laptop has a US 89-key international keyboard. There are twelve function keys, F1-F12, and an embedded numeric keypad. Situated below the keyboard are the mouse keys and cursor control directional keys. See Figure 3.11 on Page 3-11.

Numeric Keypad

The numeric keypad is embedded in the keyboard area. The embedded keypad emulates the numeric keypad typically found on a full-size keyboard. It is arranged like a calculator for applications that require you to key many numbers or for use with the Calculator in the standard Windows Accessories.



Figure 1.6 Numeric Keyboard

Touchpad

The touchpad is a pointing device that provides all the features of a two-button mouse. Its primary function is to move the cursor around the screen.



Figure 1.7 Touchpad

Using Your Touchpad

Clicking

First, place your fingers on the keyboard in the normal typing position. The touchpad is easily accessible by moving either your left or right thumb off the space bar and on to the touchpad.

Gently move your thumb across the touchpad in the direction you want the cursor to move. The pad detects the change in pressure and moves the cursor in the corresponding direction.



The touchpad on your MRX920 laptop is electrically sensitive to finger touch. It will not respond if touched by anything other than your fingers, such as a stylus or pencil.

With the touchpad there is another method of making selections in a MTX950 software program. It is called double-tapping. This function corresponds to double-clicking with a mouse. Once the cursor has been moved to the object you want to select, lightly double-tap the pressure sensitive touchpad. This double-tapping on the touchpad will select the desired item and prompt the software to perform the related operation.

The left and right buttons located directly below the touchpad are the same in function as those on a two-buttoned mouse. Clicking these buttons makes selections, drags objects, or performs a

variety of other functions depending on the software. To select an object, first move the pointer over the object you want to select, and then press the left button one time. The functions of these buttons are software specific.

Double-clicking

Double-clicking is a common technique for selecting objects or launching programs from icons. Once you have moved the pointer over the object you wish to select, rapidly press the left button two times. This action is commonly referred to as “double-clicking” an object.

Dragging

Move the pointer to the desired location then press down the left button. While still holding down the left button, move the pointer to the desired location. Release the button.

Move the pointer to the desired location. Tap the touchpad twice quickly as if you were double-clicking, however do not remove your finger after the second tap. Move the cursor to the desired location. Lift your finger to finish dragging.

Adjust the touchpad settings by selecting Settings/Control Panel/Mouse/Buttons. These settings allow you to change the orientation of the touchpad from right-handed to left-handed, and fine-tune the pointer movement and timing of clicks.

Touchpad Precautions

If not properly cared for the touchpad can be easily damaged. Please take note of the following precautions.



Do not rest heavy objects on the touchpad or the touchpad buttons.

LED Activity Indicators

The activity indicators, located above the keyboard, light up when a particular function of the computer is active. Each indicator is marked with a corresponding symbol and is visible when the lid is open or closed. LED numbers are from left to right.

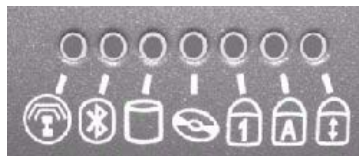









Figure B.8 LED Activity Indicators

Table B.1 LED Activity Indicators

Icon	Function	LED	Description
	Mini PCI	Lit	Power is on to the Mini-PCI Wireless LAN
	Bluetooth	Lit	Bluetooth Power is on
	Disk Status (hardware)	Lit	The hard disk drive is being accessed
		Not Lit	The hard disk drive is not being access
	Media Drive Bay	Lit	The computer is accessing the CD-ROM, the DVD-ROM, or the Floppy drive.
	Number Lock	Lit	The keyboard is in Num Lock mode.
	Caps Lock	Lit	The keyboard is in Caps Lock mode
	Scroll Lock	Lit	The keyboard is in Scroll Lock mode





LED Power / Wireless Modem Indicators

The case front LEDs indicate external power, unit ON/OFF, battery status, and wireless modem ON/OFF. The indicators remain active and viewable even when the LCD panel is closed.



Figure B.9 LED Power Indicators

Table B.2 LED Power Indicators

Icon	Function	LED	Description
	External Power	Green	External power is connected to the unit.
		LED Off	External power is not connected to the unit.
	Power	Green	Power is ON
		Flashing Green	Low Battery
	Battery	Green	Battery charging
		Flashing Green	The hard disk drive is being accessed
		LED Off	No battery or battery fully charged (always OFF without external power connected to the unit)
	Wireless Modem	Green	Wireless modem is ON
		Flashing Green	Message waiting
		LED Off	Wireless modem is OFF

Notes:

Appendix C Troubleshooting

Troubleshooting Problems

Use the following table to help identify possible solutions to problems that could occur.

Table A.10 Troubleshooting Table

Problem	Probable Cause	Things to Check
No Power to the unit.	Loose connection at vehicle power supply receptacle.	Make sure you can hear the unit's internal fans.
	Loose connection between MRX920 unit and power cable.	
	Bad power cable	Check the continuity of the cable with ohm meter.
	Dead battery or fuse in utility vehicle.	Check the electrical status of the utility vehicle.
Power is applied, the MTX950 software executes, but no route data is available.	No power to vehicle power supply receptacle.	Insert lighter and check to see if it heats up.
	USB flash drive not inserted	Make sure USB flash drive has been inserted.
	Incompatible data on USB flash drive. See "Performing Diagnostics," on page C-3.	Select Self-Diagnostics tab to verify that the data on the USB flash drive is compatible.

Table A.10 Troubleshooting Table


Problem	Probable Cause	Things to Check
Power is on but the screen is blank or unreadable.	Intensity settings too high or too low	Check Intensity settings.
	Power to PC not on	Make sure I-O (On/Off) key has been pressed.
The software appears to be working but does not collect data.	Antenna not connected properly or not installed Broken antenna cable	Check antenna connection.

Performing Diagnostics

The software performs diagnostics when you access the System Check screen. This allows you to check the status of the system components.

Displaying the Software Self Diagnostics

Follow this procedure to display the software System Check screen.

- 1 Press the **Start**  button from the software Welcome screen.

The Route Import screen (Figure C.1) appears.

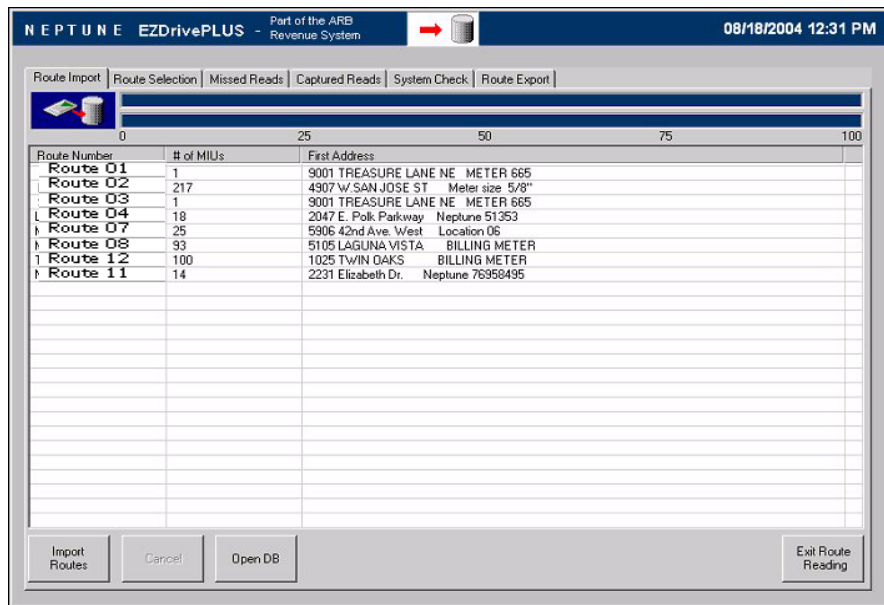


Figure A.1 Route Import Screen

- 2 Press the **System Check** tab to display the System Check screen, as shown in Figure C.1.

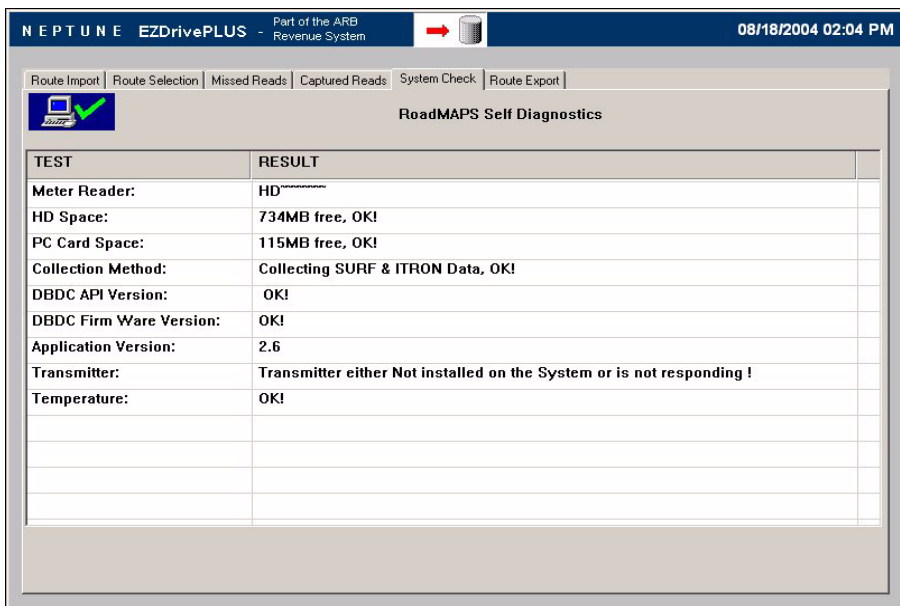


Figure A.1 System Check Screen

The software System Check screen contains the following fields for meter reading components:

- Meter Reader—name of the meter reader as obtained from USB flash drive files
- HD Space—verification that the laptop has sufficient hard disk space
- USB flash drive space—the amount of available free space on the memory card
- Collection Method—identification of the meter reading data collection method being used
- DBDC API Version—software version installed on the MRX920 unit
- DBDC Firm Ware Version—Firm Ware version on the DMR board

- Software Version—identification of the version number of the software
 - Temperature—notifies the user whether or not the temperature of the unit is okay for operation.
- 3 To exit the software System Check screen, select another screen from the tabs.

Importing Route Data

If No Route Data File is Found

If the USB flash drive is not inserted in the USB port when the software is started, the following screen appears with a warning message indicating that an import file was not found (see Figure C.1).

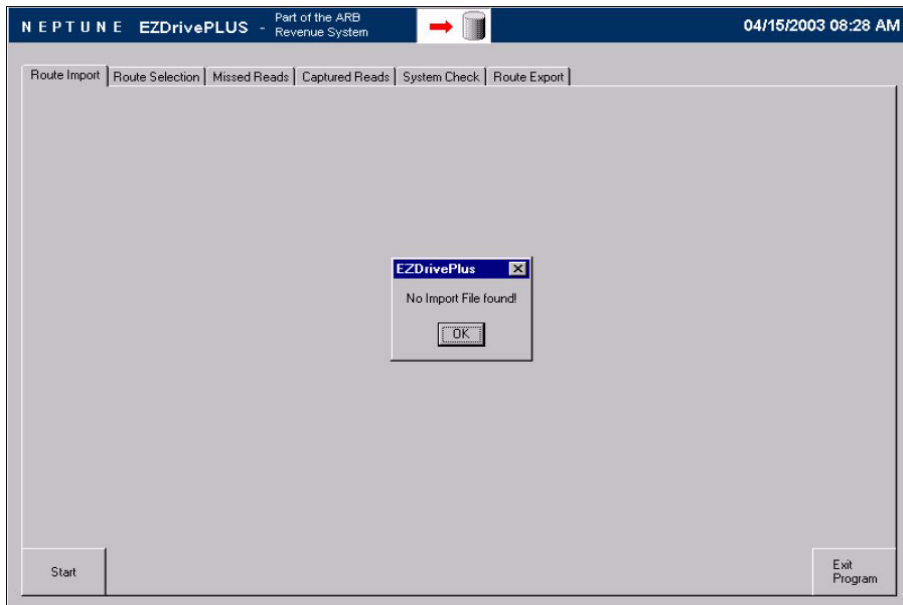


Figure A.1 Error Message on Start Up

This error can result from two possible situations:

- The MRX920 laptop does not recognize the USB flash drive.
- There is no `roadmaps.imp` file found on the USB flash drive.

Correcting the Import Error

To correct this error and load the import file, do one of the following:

- 1 Press the  to close the dialog, and press the EXIT PROGRAM



button to exit the software.

- 2 Go to **My Computer** or **Windows Explorer** to verify that the USB flash drive is recognized by the laptop.

If the USB flash drive is recognized, My Computer or Windows Explorer will show a drive letter for the USB flash drive, usually G:.



If the USB flash drive is not recognized by the laptop, try rebooting your laptop.

- 3 Click **G:** (or the appropriate drive letter) to verify that the **roadmaps.imp** file is located on the USB flash drive.
- 4 If the **roadmaps.imp** file is found, shut down the laptop as described in “Turning off the Laptop,” on Page 4-22.
- 5 Remove the flash drive.
- 6 Reboot the laptop and insert the USB flash drive. Then repeat steps 2 to 4 to verify that USB flash drive is recognized by the laptop and the import file is found on the USB flash drive.



If the `roadmaps.imp` file is not found, go back to the host computer and be sure the file is loaded on the USB flash drive. Once the file is loaded on the USB flash drive, restart the laptop.

Glossary

central processing unit	Often abbreviated as 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.
default setting	A computer term that is similar in meaning to factory setting. The default setting is one that the MTX950 software automatically applies to an item. For example, the default setting for Beeper On/Off mode is Beeper Off. The beeper is always off unless the meter reader changes the beeper setting.
direction keys	Special keys on MRX920 laptop keyboard that allow you to move up or down a list of items. The direction keys, the Up (F5) and Down (F4) keys are indicated by arrow key icons on the MRX920 display.
display	The top part of the laptop computer where selections and information about routes and accounts are shown.
download	The process of sending readings and route information from the Host Computer to the USB flash drive used for readings.
function key	Special key on the MRX920 keyboard that allows you to perform tasks quickly. The function keys used by the software are on the top row of the laptop computer (PF1 - PF7) and in the two rows of F keys (F1 - F17). PF keys and F keys have an equivalent function in the software.

Glossary

highlighted	Describes an item that is selected. When you select an item using the direction keys, the software lets you know that it has been selected by accenting the item in reverse video.
host computer	A computer that is accessed by a user working on another PC or workstation; for example, the host computer contains all the RouteMAPS or EZRouteMAPS data to which the billing computer and other PC operators can connect.
message area	A portion of a screen 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.
microprocessor	A chip that contains a central processing unit. At the heart of all personal computers and most workstations is a microprocessor. Microprocessors also control the logic of almost all digital devices.
MIU ID	An abbreviation for M eter I nterface U nit Identifier, which is a discrete number used to identify a specific meter interface unit.
operating system	A critical program that runs on a computer that is used to run other programs. Operating systems perform basic tasks, such as recognizing input from the keyboard, sending output to the display screen, keeping track of files and directories, and controlling any peripheral devices such as disk drives, ports, and printers.
PC	An abbreviation for Personal Computer, in the case of MRX920, refers to the laptop.
personal computer	A general-purpose, single-user microcomputer designed to be operated by one person at a time. All are based on the microprocessor technology that enables manufacturers to put an entire central processing unit on one chip.

screen	<p>The graphic portion of a display. The software screens show information in three different areas to present the information shown on the display:</p> <ul style="list-style-type: none">- a meter reading and loading indicator area with a graphic progress bar and pulsing reading indicator- a message and information display area- an active function key display bar.
select	<p>To choose a route or address by positioning a highlighted area using function keys. The highlighted item is selected.</p>
upload	<p>The process of sending readings and route data from the MRX920 laptop to the host computer via PC Memory cards.</p>
USB flash drive	<p>A small, device that allows you to add memory, mass storage, and other capabilities to portable computers. USB flash drives are sometimes called thumb drives.</p>
Windows 2000	<p>A major release of the Microsoft Window operating system released in 2000. Windows supports 32-bit applications.</p>

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