



ARB[®] N_SIGHT[™] AMR New Customer Guide



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ARB® N_SIGHT™ AMR
New Customer Guide
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Chapter 1 Introduction

This is the ARB® N_SIGHT™ AMR New Customer Implementation Guide designed to prepare you for the arrival of the Neptune ARB® Mobile™ System or ARB® FixedBase™ AMR.

This chapter will provide you with an introduction to the implementation process. It will explain the focus of the guide, the pre-implementation personnel responsibilities and general information on system support.

About This Guide

This guide will provide you with basic information to help you get started with the implementation process. It is designed to be used by the utility manager and billing programmer to explain the steps that must be completed before on-site training can begin.

Typographical Conventions

Before you begin reading this guide, it is important to understand the typographical conventions used in the documentation. The following kinds of formatting in the text identify special information.

All small caps	Refers to keys Example: ENTER, ALT, TAB
All bold initial caps	Refers to field names, buttons, and functions. Example: Device field, OK button, or File menu

Lower case bold

Refers to the exact keystrokes you enter. What you type is always shown in lower case letters.

Example: Type **neptune** in the **Device** field.

ARB N_SIGHT AMR Compatibility

ARB N_SIGHT AMR is compatible with the CE5320B, CE5320X, CE8640X, TRX920™, MRX920™, MTX950™, and R900® Gateway. All these meter reading devices can be used with EZRouteMAPS, RouteMAPS, and ARB N_SIGHT AMR transfer files under ARB N_SIGHT AMR compatibility.

The standard 509- and 513-byte EZRouteMAPS or RouteMAPS file transfer formats are also supported.

Project Personnel Responsibilities

Responsibilities of the Utility Manager

Listed below are the responsibilities of the utility manager who is the primary contact at the utility between the utility staff, the utility billing programmer, and the Neptune support staff.

- Direct the billing system vendor to implement an interface to the ARB N_SIGHT AMR Host Software.



- Current Neptune customers can use ARB N_SIGHT AMR with their current standard EZRouteMAPS 509- and 513-byte and standard RouteMAPS transfer file formats.
 - v2 file layouts support the CE5230B and CE5320X handhelds, and R900 Gateway.
 - The CE5320X, CE5320B, CE8640X, TRX920, MRX920, MTX950, and R900 Gateway units can also be used with the standard EZRouteMAPS 509- and 513-byte file formats as well as the standard RouteMAPS file format.
- Send an electronic copy of a sample import file containing utility customer route data to Neptune Customer Support or Implementation Specialist for testing.

- Test the sample export file received from Neptune Customer Support to ensure compatibility with your billing system.
- Purchase the appropriate computer hardware, software, and peripherals to comply with the handheld system requirements.
- Coordinate training schedules with meter reading, billing, and implementation specialist.
- Unpack the equipment and set up the handhelds to be charged.

Responsibilities of Utility Billing Programmer

The Utility Billing Programmer must be able to produce a transfer process that does the following.

- Creates import files for meter reading
- Processes data from the ARB N_SIGHT AMR export file.

This is done in order for the information to be transferred between the utility billing computer and the desktop personal computer.

Responsibilities of Neptune

The Neptune Systems Implementation Specialist will work with the utility manager and the utility billing programmer to ensure that all aspects of the project have been successfully completed and that all required utility personnel have been properly trained on the system.

General Information

Toll-Free Customer Support

For toll-free Customer Support, please dial (800) 647-4832. Your call will be directed to the appropriate person.

Length of Warranty

The length of the standard warranty is one year from the ship date unless a maintenance contract was included in the bid or original order. Please contact your local Neptune sales representative or distributor for pricing on extended maintenance agreements.

Equipment Repair

If your equipment requires repair, please contact our support representatives in order to obtain a Returned Material Authorization (RMA) number. You can reach our support representatives by calling (800) 647-4832, emailing a request to hhsupp@neptunetg.com, or faxing a request to (334) 283-7497. Please be able to describe the nature of the problem, supply a serial number, and provide a contact name and telephone number for additional information.



Any item that is returned for any reason must be accompanied by an RMA number.

Ordering Additional Equipment

Please contact your local Neptune sales representative or distributor for prices on additional equipment. If in doubt about where you purchase Neptune equipment, please contact our Customer Service department at (800) 645-1892.

Additional Training

Once your order is processed, a Neptune Systems Implementation Specialist will contact you and schedule a tentative training date. Training schedules are subject to change if implementation phases are not completed.

Additional training is offered as refresher courses. Please contact your local Neptune sales representatives or distributor for pricing information.

Notes:

Chapter 2 Implementation Steps for Meter Reading

This chapter explains in detail the steps needed to prepare for meter reading implementation and is designed to be used as a checklist to monitor the progress of your implementation until its completion. Steps 1 through 4 are to be completed by the utility, and Step 5 will be completed by Neptune.

Step One: Complete File Conversion

The utility billing computer stores permanent records of customers with their account and meter information. To enable ARB N_SIGHT AMR to make use of the customer information contained in the billing computer, the data must be converted into a specific format called an import file. The import file must follow the ARB N_SIGHT AMR record structure as outlined in *Default Record Format on Page 4-1*. Your data processing staff should become familiar with the detailed ARB N_SIGHT AMR record format in order to develop a conversion file from your existing database.



We strongly recommend use of the default record format to ensure compatibility with future software updates. We cannot guarantee compatibility if you decide to use a user-defined format.

- Compare the field definitions of the v2 record format with the existing fields in your customer master database records.
- Identify conflicting and ambiguous definitions.
- Identify and define which fields in the record format are to be used in the conversion procedure.

- Determine which fields of your master database records fit into the corresponding fields that are to be used in the v2 file format.
- Verify that all the required fields contain valid characters and are correctly positioned in the import file.
- Verify that all required fields in the ARB N_SIGHT AMR export file are correctly positioned and accepted by the billing system.

Step Two: Install a File Transfer Method

The file transfer communication method should permit the transfer of data between the utility billing computer and the personal computer that will be running ARB N_SIGHT AMR. The ARB N_SIGHT AMR reading system uses standard American Standard Code for Information Interchange (ASCII) file representation.

Once the conversion program produces the ARB N_SIGHT AMR import file, it must be transferred to the local workstation.



A valid import file must contain a valid file extension.

Once the meter readings are collected by the ARB N_SIGHT AMR Host Software, an export file is generated so that it can be sent back to the billing computer for posting and billing.

Step Three: Sample Route Files

The utility should generate a sample file to be tested by Neptune. A Systems Implementation Specialist will notify you of any changes or modifications that are required to correct the file. Please follow the steps below to ensure proper delivery of your file(s).

- Convert a section of your sample test database to a file with a valid file extension.
- If you have Internet access, you can email the import file as an attached electronic file with a valid file extension. Email the sample file to hhsupp@neptunetg.com. Please put Attn: Systems Implementation Specialist in the subject line, and your name, utility company, and additional information in the body of the email.

Once your test file has been reviewed, an export file will be generated for testing against your billing system. This file will contain several readings, notes, and audit failures, which should generate a typical reading cycle. Once the export file is successfully accepted by your billing system, you are ready to schedule training.

Step Four: Schedule Training

Although on-site training dates can be scheduled in advance, Steps 1 through 3 need to be completed before training takes place. Any delays in these steps may postpone training dates.

When requesting training, please provide at least 60 days advanced notice of the desired dates to allow for preparation. For available training dates and to schedule training, please contact your assigned Systems Implementation Specialist at (800) 647-4832.

Step Five: On-Site System Training

The ARB N_SIGHT AMR System Training is composed of two segments, Field Personnel Training and PC Operator Software Training. The duration of this training will vary depending not only on the size and complexity of the installation, but also on the number of employees to be trained.

Below is a listing of the various topics to be discussed during training for both the meter readers and the PC operators. Please review these items and contact your Systems Implementation Specialist at (800) 647-4832 if you have any questions.

Meter Reader Training

- Collecting readings (manually and/or automatically)
- Entering notes and codes
- Performing searches
- Administrative settings and troubleshooting

ARB N_SIGHT AMR PC Operator Training

- Importing routes from billing
- Assigning/unassigning routes
- Communicating to handhelds and R900 Gateway
- Generating reports
- Exporting routes to billing
- Administrative functions
 - Editing/Searching
 - Custom reports
 - Customer Notes/Shortcut Keys

Chapter 3 System Overview

This chapter will help you become familiar with the meter reading system and the system requirements. The section on the handheld reading system will provide you with an overview of the operations and a breakdown of the components.



ARB N_SIGHT AMR also completely supports Neptune's MRX920/MTX950 mobile data collectors and R900 Gateway for reading R900, R900v2, and R900v3 radio equipped meters. The system can be handheld only, mobile only, fixed network only, or any combination thereof. All of the file information remains the same regardless of the data collection method.

Meter Reading System

The ARB N_SIGHT AMR Host Software can reside on a Personal Computer (PC) as a standalone software, or it can reside on both a server and a client machine at the utility location where the meter reading operations take place. Customer meter information is downloaded from the utility mainframe billing system in the form of an import file and sent to the ARB N_SIGHT AMR Host Software. The ARB N_SIGHT AMR Host Software interprets the downloaded data into individual routes and sends the route information to the designated device.

The meter reader collects readings from the field either by keying in the readings by hand or by using an inductive probe and stores the data in the handheld. Readings can also be collected and stored automatically through the use of RF transmitters. The meter reader may also enter special codes on an account to describe why a reading could not be obtained or to denote problems, changes, or other account information.

In ARB N_SIGHT AMR, once the handheld route information with readings is unloaded, the system operator can create an export file to be uploaded to the utility billing system. Various management reports may be produced to show the productivity or special notes for the meter readings taken for those routes.

Components

Reports can be generated and the readings can be transferred to the billing software package or the billing computer. The handheld system components include the following:

- **Handheld Computer** — electronically stores meter readings and other data collected by the meter reader.
- **Tablet Computer** — electronically stores meter readings and other data collected by the meter reader or service technician.
- **Mobile Data Collector** — portable, easy-to-use, meter reading unit for Neptune Radio Frequency (RF) equipped water meters.
- **Fixed Network Collector** — fixed data collector that reads, stores, and transmits meter readings back to the host software.
- **ARB N_SIGHT AMR Host Software** — manages the route information obtained from the utility billing system and coordinates route transfers to and from the data collection device. It also processes management reports on reading productivity.
- **Handheld Interface Unit (HHIU)** — processes radio frequency from Meter Interface Units (MIUs) to the handheld for storage.
- **Meter Interface Unit (MIU)** — transmits meter reading information from electric, water, and gas meters to the HHIU.
- **Handheld Accessories** — charging and communication cradles, communication cables, power supply, etc. used in conjunction with individual handhelds.

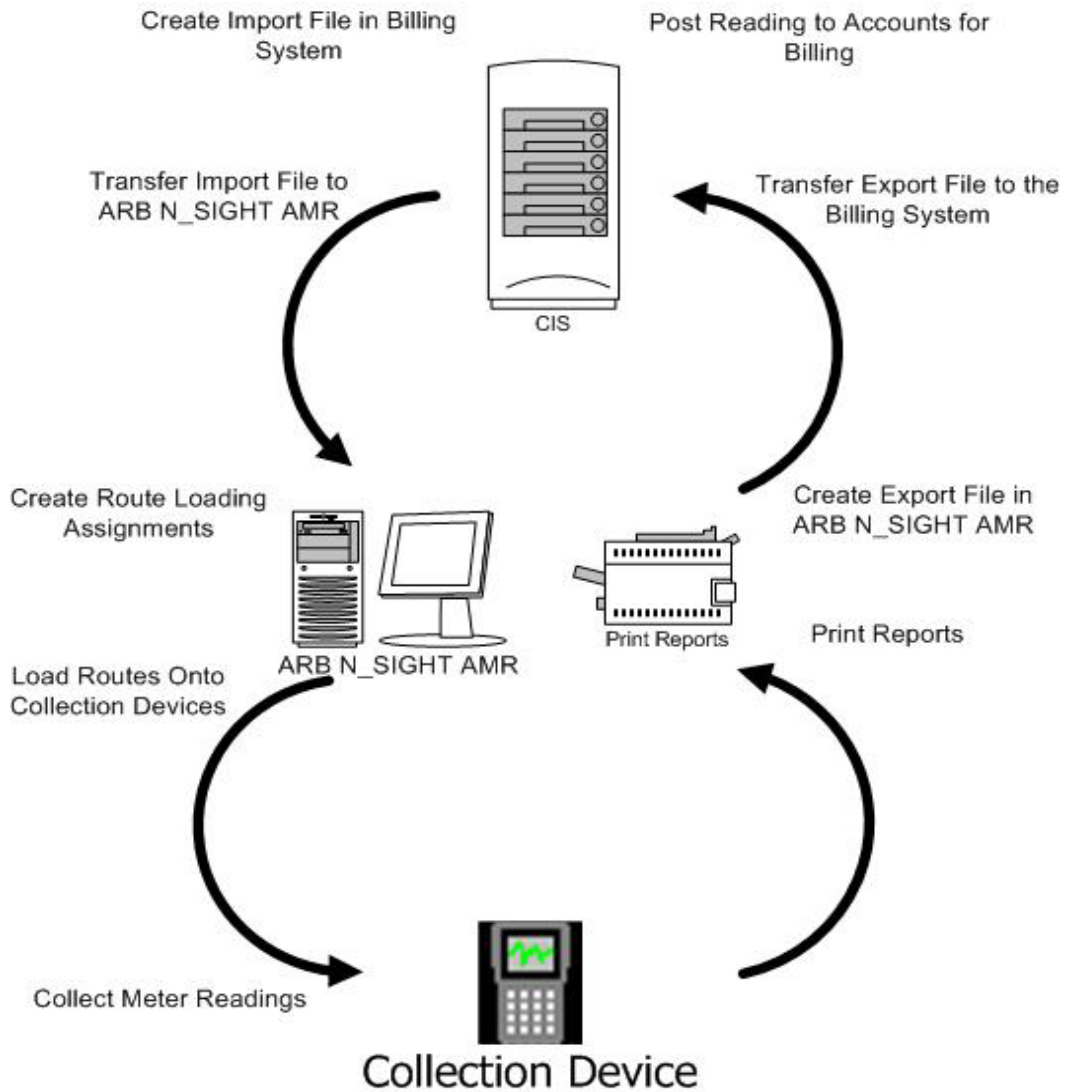


Figure 3.1 Billing System Diagram

System Setup

ARB N_SIGHT AMR provides several ways that you can set up your system depending on the size of your utility and the types of collection devices used. The following diagrams illustrate the different ways you can configure the ARB N_SIGHT AMR system.

Single Office System Setup

The following illustration demonstrates how ARB N_SIGHT AMR can be set up in a single office environment.

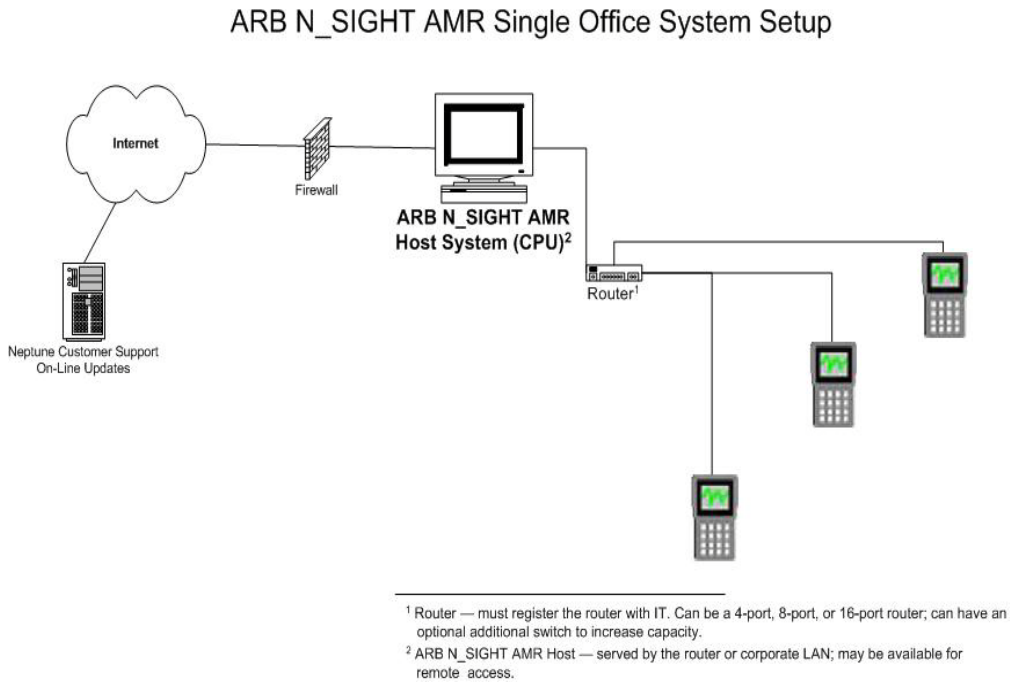
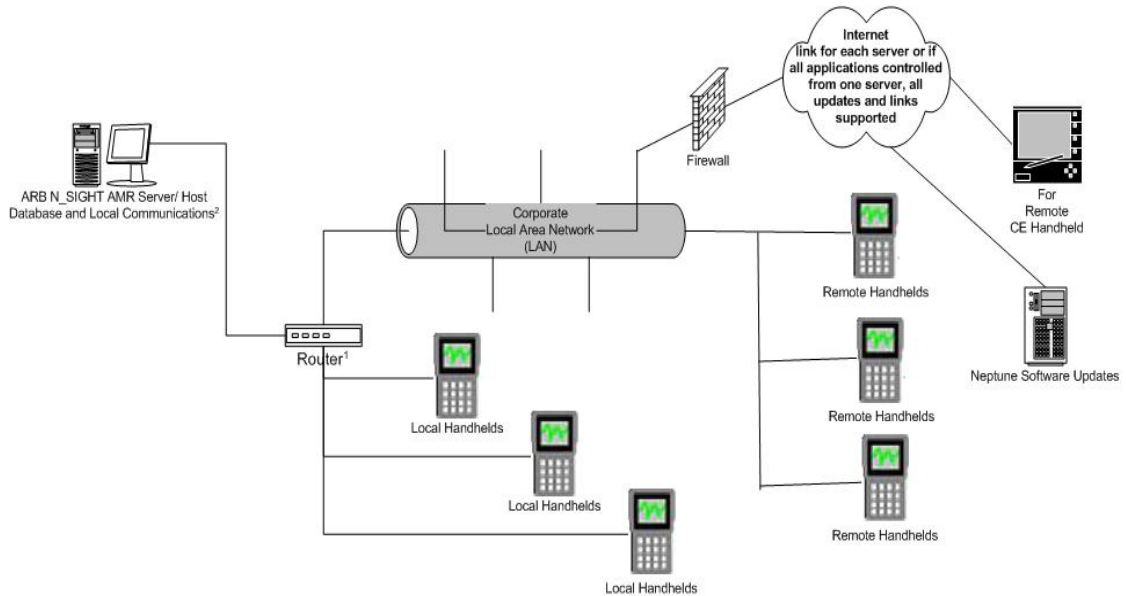


Figure 3.2 Single Office Setup

Single Host System Setup

The following illustration demonstrates how ARB N_SIGHT AMR can be set up for a single host system.

ARB N_SIGHT AMR Single Host System Setup



¹ Router — must register the router with IT. Can be a 4-port, 8-port, or 16-port router; can have an optional additional switch to increase capacity.

² ARB N_SIGHT AMR — must remain on the router or corporate LAN; may be available for remote access.

³ Local CE Handheld — served by the router; invisible to customer IT; NOT available to remote diagnose.

⁴ Remote CE Handheld — served by the corporate LAN; must register with IT; available for remote diagnosis.

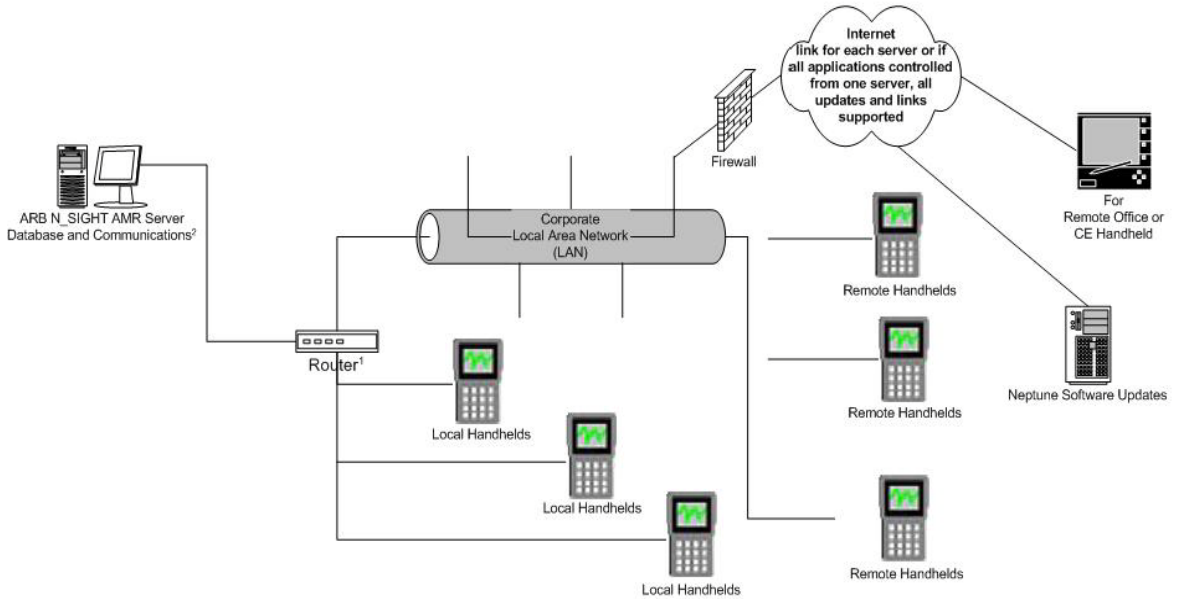
⁵ Admin System — served by the corporate LAN; must register with IT; available for remote diagnosis.

Figure 3.3 Single Host System Setup

Client / Server System Setup

The following illustration demonstrates how ARB N_SIGHT AMR can be set up for a client/server system.

ARB N_SIGHT AMR Single System Setup



¹ Router — must register the router with IT. Can be a 4-port, 8-port, or 16-port router; can have an optional additional switch to increase capacity.

² ARB N_SIGHT AMR — must remain on the router or corporate LAN; may be available for remote access.

³ Local CE Handheld — served by the router; invisible to customer IT; NOT available to remote diagnosis.

⁴ Remote CE Handheld — served by the corporate LAN; must register with IT; available for remote diagnosis.

⁵ Admin System — served by the corporate LAN; must register with IT; available for remote diagnosis.

Figure 3.4 Client / Server System Setup

System Architecture

The following illustration demonstrates the entire total system architecture for the ARB Mobile System or ARB FixedBase AMR System.

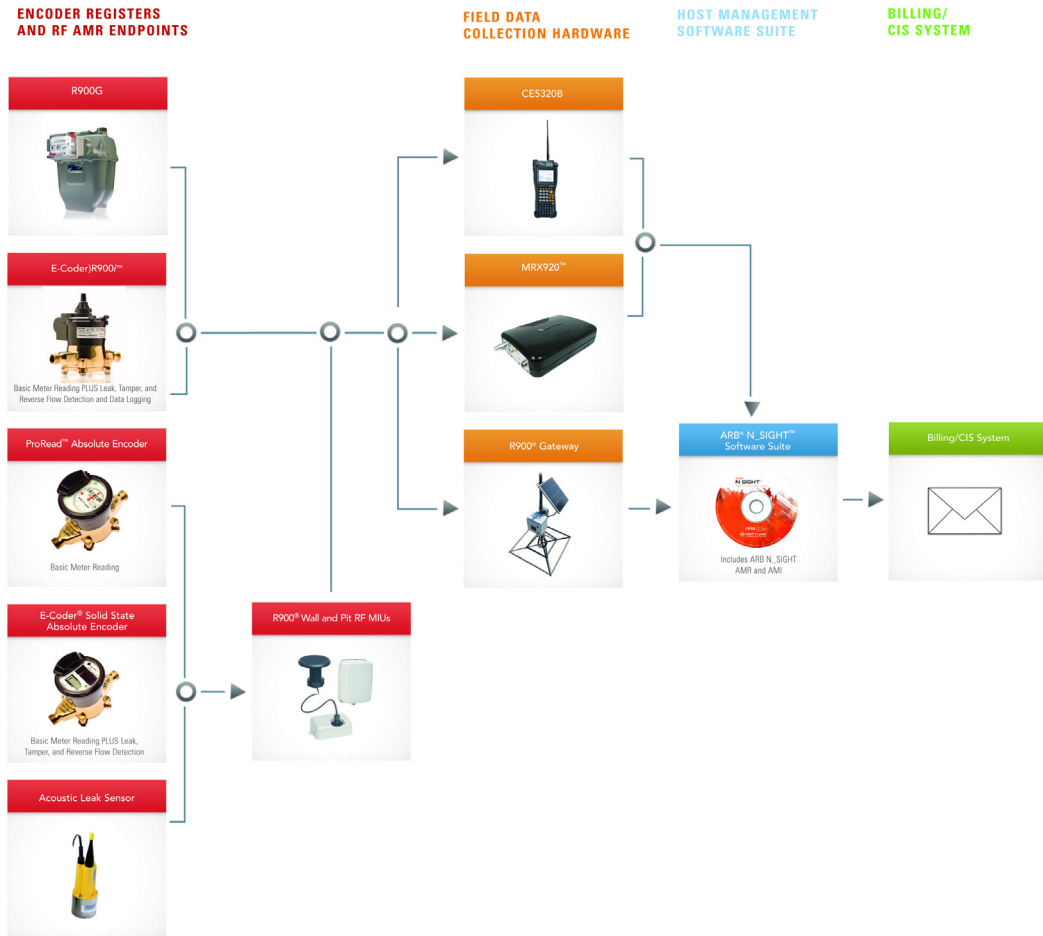


Figure 3.5 ARB Mobile System or ARB FixedBase AMR System

System Requirements

Meter Requirements

This system has been developed for use with any direct read meters (water, gas, or electric). It uses attachments to read a variety of Neptune meters and remote receptacles, all of which must contain unique ID numbers. The system can also read radio frequency equipped electric meters with the appropriate HHIU.

ARB Versions 1-5	Contains a 6-digit ID number and return either a 4- or 6-digit reading. The ID is programmed through jumper wires inserted into the back of the receptacle. The procedure can be performed in the meter shop or at the installation site.
ProRead (ARB VI) Registers	Contains an ID number of up to 10 digits. It returns typically a 4-, 5-, or 6-digit meter reading. When shipped from the factory, they are programmed with the ID number. However, this number can be changed at the meter shop using a Neptune Field Programmer.
E-Coder	The E-Coder is an electronic digital encoder register that has a Proprietary integrated circuit that provides absolute registration with no internal battery requirement. The E-Coder functions in two modes: E-Coder BASIC and E-CoderPLUS. The E-Coder BASIC mode functionality is the same as ProRead (ARB VI) featuring programmability up to a 10-digit ID number, three user characters and 3-6 digit meter reading. The E-Coder operates in E-CoderPLUS mode when connected to a R900v2 or higher radio. It provides a high-resolution, 8-digit meter reading and value-added features including leak, tamper, and backflow detection.
R900/R900v2/ R900v3	ID numbers are unique 10-digit numbers and are non-programmable.

Hardware, Software, and Peripheral Requirements

The following tables explain the requirements needed to run ARB N_SIGHT AMR efficiently in either a standalone or client server environment.

Client Only Requirements

The minimum requirements for ARB N_SIGHT AMR Client include the following.

Table 3.1 Client or Standalone Requirements

Component	Minimum Requirement
Operating System	Windows XP® Professional Windows Vista® Business Windows 7 Professional
Processor	Intel Pentium 4, 3.0-gigahertz (GHz) processor or faster
Memory	Minimum 1 gigabyte (GB) RAM (2 GB RAM or higher recommended), depending on the system configuration
Monitor	Video adapter and monitor with Super VGA (1024 X 768) or higher resolution
Hard Disk Drive	Minimum 5 GB of available space on the hard disk
CD-ROM Drive	CD-ROM or DVD-ROM drive
Network	For networking: Network adapter appropriate for the type of local-area, wide-area, wireless, or home network to be connected to, and access to an appropriate network infrastructure; access to third-party networks may require additional charges
Router	Router to be configured for the LAN topology of your utility.
CE Ethernet cradle	10 Mbps/full duplex

Software

ARB N_SIGHT AMR Host Software	CD
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Additional Items for Automatic Update Option

Network adapter	For networking and Web access: Network adapter appropriate for the type of local-area, wide-area, or wireless network you wish to connect to, and access to an appropriate network infrastructure; access to third-party networks may require additional charges.
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Additional Hardware

Parallel port and cables	One required if using local printer only.
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A serial port and cable are not needed for the CE5320X, CE5320B, and CE8640X devices. The CE handheld uses a standard ethernet cable.

Printer	Windows compatible or narrow column printer capable of condensed mode printing.
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Handheld	Neptune handheld reading device.
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Cradle	Handheld charging cradle and power cord.
--------	--

HHIU ¹	Handheld adapter for reading remote or radio-equipped registers.
-------------------	--

¹ Not required for manual entry.

Server Only Requirements

The minimum recommendation for ARB N_SIGHT AMR server computer installation includes the following.

Table 3.2 Server Requirements

Component	Minimum Requirement
Operating System	Windows Server 2003® Windows Server 2008®
Processor	Intel Pentium 4 3.0-GHz or compatible processor or higher, depending on the system configuration
Memory	2 GB RAM (4 GB RAM or higher recommended), depending on the system configuration
Network Adapter	For dial-up: 56 kilobits per second (Kbps) or higher-speed modem For networking: Network adapter appropriate for the type of local-area, wide-area, wireless, or home network to be connected to, and have access to an appropriate network infrastructure; access to third-party networks may require additional charges
Monitor	Video graphics adapter capable of 256 colors and 1024 X 768 pixels
Hard Disk Drive	10-GB available hard disk space (no R900 Gateways), or 250 GB available hard disk space for R900 Gateways)
USB Port	One required for USB Flash Drive ¹
CD-ROM Drive	CD-ROM or DVD-ROM
RAID ²	Neptune Technology Group Inc. recommends using a RAID ³ configuration for the ARB N_SIGHT AMR server installation. See the following section for more details.

¹ USB Flash Drive must be installed if MRX920/MTX950 is to be used.

² Redundant Arrays of Inexpensive Disks (RAID)

³ RAID information from Microsoft.com

General Terminology and Explanation

Before proceeding, note these standard industry terms. They will be used in the subsequent section.

AMR	Automatic Meter Reading. The automated process of reading meters.
ASCII	American Standard Code for Information Interchange. Standard text character set used by MS-DOS® applications.
ASCII File	A text file that uses the ASCII character set.
Blanks	Meters or accounts for which no reading was obtained and no other remarks, such as skip code or trouble code, were assigned.
Cradle	An interface device allowing the handheld to communicate with the ARB N_SIGHT AMR host computer. The routes and the readings are sent between the PC and the handheld by way of the cradle. The cradle has a built-in battery charger that will recharge the handheld batteries when the handheld is in the cradle.
Devices	In ARB N_SIGHT AMR, the term “device” is used to designate a database record. Not all devices represent a physical meter, but can be a “no reading” record that requires the meter reader to check a lock, gate, or a light at a substation.
Demand Device	The readings displayed on the meter can be entered on the handheld manually or collected using an optical probe.
Demand meter	A meter that measures the maximum and minimum usage for a specific time period (usually one month) and is reset each time it is read.
Downloading	The process of sending route information from ARB N_SIGHT AMR database to the handheld.
EMR	Electronic Meter Reading. Similar to AMR.

Flag	In software, a mark such as [X] indicates a certain option has been selected or enabled. It is also an option used in a command-line interface (such as DOS) usually following a command that enables or specifies certain options. For example, "format /y" where the "/y" is a flag. In MS-DOS, a flag is often referred to as a "switch".
Handheld	The portable computer carried by hand to collect meter readings or other data.
Header ID	The two-character indicator field at the beginning of the header record that defines the type of detail information for a particular route. "H0", "H1", and "H2" are Header ID values used with the ARB N_SIGHT AMR Host Software.
Header Record	The information at the top of an import or export file which designates the beginning of a route. This record contains basic route related information such as the cycle number, route number, survey information, start/end date and times, reader ID, totals, and vehicle information. Optional headers may be included in the import file for broadcast and route messages.
Host Billing Computer	The computer which performs the billing function for the utility company. The host billing computer generates the routes to be read which are sent to the ARB N_SIGHT AMR database server. The host billing computer can be a mainframe, minicomputer, UNIX [®] system, or PC. The host computer and the ARB N_SIGHT AMR database server, in some situations, can be the same computer.
Interval Data	Load profile data collected by an optical probe attached to the handheld for electric meters.
Meter	A device that measures a resource. Many utility companies use the term "meter" to refer to a set of readings. For instance, a demand meter may have two readings: one kWh reading and one KW reading. The ARB N_SIGHT AMR Host Software considers each reading a separate meter and a separate record. In the above example, the utility company's demand meter is considered two meters in the ARB N_SIGHT AMR Host Software: one kWh meter and one KW meter. Each record has the same meter number, address, etc., but each has its own read type code.

R900/R900v2/ R900v3	Neptune's one-way radio frequency transmitter that broadcasts a MIU ID and the meter reading from a Neptune encoder or Invensys ECR II and III register.
Record ID	<p>The 5-character indicator field at the beginning of a record that defines the import record type. The following are examples of Record ID values used with the ARB N_SIGHT AMR Host Software:</p> <ul style="list-style-type: none">• COMHD• RTEHD• PRMDT• MTRDT• RDGDT• RTETR• COMTR
Uploading	The process of sending meter reading from the handheld to the ARB N_SIGHT AMR database server. After uploading is complete, the ARB N_SIGHT AMR database server sends the meter readings to the host billing computer.

Chapter 4 v2 File Format

This chapter provides an easy reference to the v2 File Format.

Default Record Format

The v2 File Format consists of one layout that is used for both importing and exporting data. The data is broken down into record types with the most meaningful data contained at the beginning of the record. This allows you to browse the file to see pertinent data without scrolling to the right.

The following pages are a summary of all required and optional fields.



The default character for unused or blank positions throughout the record format is denoted as spaces.

In the export file that is returned from ARB N_SIGHT AMR to the billing system, you receive the default character that is specified in the ARB N_SIGHT AMR system setup (typically the same character you sent).

Table 4.1 Legend for v2 Record Format

Parameter	Description
Column	Name of the column in the record.
Use	Indicator for the use of this record: required (Req) or optional (Opt). Fields marked optional must contain blanks in the file if not populated with data.
Source	Indicates the system that populates data in the field: Handheld (HH), Utility Billing system (UB), or ARB N_SIGHT AMR Host Software (HS).
Offset	Positions of the field in the record.
Length	Character length of the field.
Type	Field type: can be numeric (NUM), alphanumeric (A/N), or Boolean (BOO). Boolean fields are case sensitive and must be either 'Y' or 'N.'
Comment	Additional notes concerning the field, valid format, etc. Quotation marks indicate the only acceptable data for the field.

Record Type Hierarchy

The following tables represent the format for the record type hierarchy used in v2 record layout.

Table 4.2 Record Type Hierarchy

Required Record Type	Name	Parent Record Type	Comment
Company Header	COMHD	File	Generally, most customers will have one Company Header Record per file. Customers who have one database for multiple locations may have multiple Company Header Records per file.
Route Header	RTEHD	Company Header	Indicates start of route. One or more per Company Header Record.
Premise Detail	PRMDT	Route Header	One per address.
Meter Detail	MTRDT	Premise Detail	One or more per Premise Detail Record.
Reading Detail	RDGDT	Meter Detail	One or more per Meter Detail Record.
Route Trailer	RTETR	Route Header	Indicates end of route. One per Route Header.
Company Trailer	COMTR	Company Header	Indicates end of routes for company. One or more per file.

Optional Record Type	Name	Parent Record Type	Comment
Alternate Premise Detail	PRMD2	Route Header	One per address. Route Header cannot have both a Premise Detail Record and Alternative Detail Record.
Premise Notes	PRMNT	Premise Detail	One per premise.
ERT Detail	ERTDT	Reading Detail	Required for ERTs. Reading Detail Record cannot have both an ERT Detail Record and Probe Detail Record.
Probe Detail	PRBDT	Reading Detail	Allows use of third party probes. Reading Detail Record cannot have both an ERT Detail Record and Probe Detail Record.

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Table 4.2 Record Type Hierarchy (continued)

Record Type (Export Only)	Name	Parent Record Type	Comment
Order Status	ORDST	Meter Detail	One per Meter Detail Record.
Vehicle Detail	VHLDT	Company Header	Multiple records exported if vehicle information is captured. The VHLDT records are not associated to a particular route.

Sample Layout

The following illustrates the sample layout for a typical import file:

One Company Header with One Route

COMHD

 RTEHD

 PRMDT

 MTRDT

 RDGDT

 PRMDT

 MTRDT

 RDGDT

 PRMDT

 MTRDT

 RDGDT

 PRMDT

 MTRDT

 RDGDT

 PRMDT

 MTRDT

 RDGDT

 RTETR

COMTR

One Company Header with Multiple Meters at Each Premise

COMHD
 RTEHD
 PRMDT
 MTRDT
 RDGDT
 MTRDT
 RDGDT
 PRMDT
 MTRDT
 RDGDT
 MTRDT
 RDGDT
 RTETR
COMTR

One Company Header with Compound Meters

COMHD
 RTEHD
 PRMDT
 MTRDT
 RDGDT
 RDGDT
 PRMDT
 MTRDT
 RDGDT
 RDGDT
 MTRDT
 RDGDT
 RDGDT
 RTETR
COMTR

Multiple Company Headers with One Route Each

```
COMHD
  RTEHD
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
  RTETR
COMTR
COMHD
  RTEHD
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
  RTETR
COMTR
```

Using Alternative Premise Detail Record

COMHD
 RTEHD
 PRMD2
 MTRDT
 RDGDT
 PRMD2
 MTRDT
 RDGDT
 PRMD2
 MTRDT
 RDGDT
 PRMD2
 MTRDT
 RDGDT
 PRMD2
 MTRDT
 RDGDT
 PRMD2
 MTRDT
 RDGDT
 RTETR
COMTR

Using Premise Notes

COMHD
 RTEHD
 PRMDT
 PRMNT
 MTRDT
 RDGDT
 PRMDT
 PRMNT
 MTRDT
 RDGDT
 PRMDT
 PRMNT
 MTRDT
 RDGDT
 PRMDT
 PRMNT
 MTRDT

continued on next page

Using Premise Notes (continued)

RDGDT
PRMDT
PRMNT
MTRDT
RDGDT
RTETR
COMTR

Using ERT Detail¹

COMHD
RTEHD
PRMDT
MTRDT
RDGDT
ERTDT¹
PRMDT
MTRDT
RDGDT
PRMDT
MTRDT
RDGDT
ERTDT
PRMDT
MTRDT
RDGDT
PRMDT
MTRDT
RDGDT
RTETR
COMTR

¹ Only accounts that have ERT devices require the ERTDT record.

Using Probe Detail'

```
COMHD
  RTEHD
    PRMDT
      MTRDT
        RDGDT
          PRBDT*
    PRMDT
      MTRDT
        RDGDT
    PRMDT
      MTRDT
        RDGDT
          PRBDT
    PRMDT
      MTRDT
        RDGDT
          PRBDT
    PRMDT
      MTRDT
        RDGDT
  RTETR
COMTR
```

Export: One Company Header with One Route

```
COMHD
  RTEHD
    PRMDT
      MTRDT
        ORDST
          RDGDT
    PRMDT
      MTRDT
        ORDST
          RDGDT
  VHLDT
    RTETR
COMTR
```

Export: One Company Header with Compound Meters

COMHD

 RTEHD

 PRMDT

 MTRDT

 ORDST

 RDGDT

 MTRDT

 ORDST

 RDGDT

 PRMDT

 MTRDT

 ORDST

 RDGDT

 MTRDT

 ORDST

 RDGDT

 PRMDT

 MTRDT

 ORDST

 RDGDT

 MTRDT

 ORDST

 RDGDT

VHLDT

 RTETR

COMTR

Record Formats

Header Formats

The following tables represent the format for the record layouts used by ARB N_SIGHT AMR.

Table 4.3 Company Record Format

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'COMHD'
Company Code	Req	UB	6-9	4	A/N	
Create Date	Req	UB	10-17	8	NUM	YYYYMMDD
Description	Opt	UB	18-57	40	A/N	
File Version	Req	UB	58	1	NUM	'2'
Service Orders	Req	UB	59	1	BOO	Y or N
CRLF	Req	UB	60-61	2		

Table 4.4 Route Record Format

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'RTEHD'
Office	Req	UB	6-9	4	A/N	
Cycle	Req	UB	10-13	4	A/N	
Route	Req	UB	14-23	10	A/N	

Column	Use	Source	Offset	Length	Type	Comment
Read Date	Req	UB	24-31	8	NUM	YYYYMMDD; 00000000 if not used.
Deactivate Date	Req	UB	32-39	8	NUM	YYYYMMDD; 00000000 if not used.
Route Message	Opt	UB	40-119	80	A/N	
CRLF	Req	UB	120-121	2		



The Route ID in ARB N_SIGHT AMR is a combination of the Company Code, Office, Cycle, and Route fields.

Table 4.5 Premise Details Record Format

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'PRMDT'
Address 1	Req	UB	6-31	26	A/N	
Address 2	Opt	UB	32-57	26	A/N	
Customer Name	Req	UB	58-83	26	A/N	
Premise Key	Req	UB	84-103	20	A/N	Uniquely identifies the premise. Use account number, unless the billing system has a better key.
Account Number	Req	UB	104-123	20	A/N	
Account Status	Req	UB	124-127	4	A/N	Account status codes
Premise Custom 1	Opt	UB	128-153	26	A/N	Custom display fields for premise screen.
Premise Custom 2	Opt	UB	154-179	26	A/N	
Utility Pass Through	Opt	UB	180-307	128	A/N	Any utility-defined information.
CRLF	Req	UB	308-309	2		

Table 4.6 Alternate Premise Detail Record Format¹

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'PRMD2'
Premise Key	Req	UB	6-25	20	A/N	
Customer Name 1	Req	UB	26-51	26	A/N	
Customer Name 2	Opt	UB	52-77	26	A/N	
Customer Contact	Opt	UB	78-103	26	A/N	
Account Number	Req	UB	104-123	20	A/N	
Account Status	Req	UB	124-127	4	A/N	Account status codes
Customer Address House Number	Req	UB	128-134	7	A/N	
Customer Address HSuffix	Req	UB	135-141	7	A/N	
Customer Address Unit	Req	UB	142-156	15	A/N	
Customer Address Predir	Req	UB	157-158	2	A/N	
Customer Address Street	Req	UB	159-183	25	A/N	
Customer Address SSuffix	Req	UB	184-187	4	A/N	
Customer Address Postdir	Req	UB	188-189	2	A/N	
Customer Address City	Req	UB	190-215	26	A/N	
Customer Address State	Req	UB	216-217	2	A/N	

¹Reserved for future use*continued on next page*

Table 4.6 Alternate Premise Detail Record Format¹ (Continued)

Column	Use	Source	Offset	Length	Type	Comment
Customer Address Zip	Req	UB	218-228	11	A/N	zzzzz-zzzz
Customer Phone 1	Opt	UB	229-238	10	A/N	
Customer Phone 2	Opt	UB	239-248	10	A/N	
Mail Name 1	Opt	UB	249-274	26	A/N	
Mail Name 2	Opt	UB	275-300	26	A/N	
Mail Address 1	Opt	UB	301-326	26	A/N	
Mail Address House Number	Opt	UB	327-333	7	A/N	
Mail Address HSuffix	Opt	UB	334-340	7	A/N	
Mail Address Unit	Opt	UB	341-355	15	A/N	
Mail Address Predir	Opt	UB	356-357	2	A/N	
Mail Address Street	Opt	UB	358-382	25	A/N	
Mail Address Suffix	Opt	UB	383-386	4	A/N	
Mail Address Postdir	Opt	UB	387-388	2	A/N	
Mail City	Opt	UB	389-414	26	A/N	
Mail State	Opt	UB	415-416	2	A/N	
Mail Zip	Opt	UB	417-427	11	A/N	zzzzz-zzzz
Mail Phone	Opt	UB	428-437	10	A/N	
Permit	Opt	UB	438	1	BOO	Y/N

¹Reserved for future*continued on next page*

Table 4.6 Alternate Premise Detail Record Format¹ (Continued)

Column	Use	Source	Offset	Length	Type	Comment
Premise Custom 1	Opt	UB	439-464	26	A/N	
Premise Custom 2	Opt	UB	465-490	26	A/N	
Utility Pass Through	Opt	UB	491-618	128	A/N	
CRLF	Req	UB	619-620	2	A/N	

¹Reserved for future use

Table 4.7 Premise Notes Record Formats (Optional)

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'PRMNT'
Hazard Code	Opt	UB	6-9	4	A/N	
Changed Hazard Code	Opt	HH	10-13	4	A/N	Changed value coming back from field
Hazard Text	Opt	UB	14-39	26	A/N	Freeform hazard text
Changed Hazard Text	Opt	HH	40-65	26	A/N	
Special Instruction	Opt	UB	66-365	300	A/N	
Special Instruction 2	Opt	UB	366-665	300	A/N	
Changed Special Instruction	Opt	HH	666-965	300	A/N	
Changed Special Instruction 2	Opt	HH	966-1,265	300	A/N	
Force Special Instruction	Req	UB	1,266	1	BOO	'Y' or 'N'
Force Special Instruction 2	Req	UB	1,267	1	BOO	'Y' or 'N'
Changed Force Special Instruction	Req	HH	1,268	1	BOO	'Y' or 'N'
Changed Force Special Instruction 2	Req	HH	1,269	1	BOO	'Y' or 'N'
CRLF	Req	UB	1,270-1,271	2		

Table 4.8 Meter Detail Record Formats

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'MTRDT'
Read Sequence	Req	UB	6-11	6	NUM	Right-justify, zero-fill
Changed Read Sequence	Opt	HH	12-17	6	NUM	Changed value coming back from field.
Meter Key	Req	UB	18-37	20	NUM	Key to identify the meter within the premise_key. Use meter number for this unless the billing system has a better key.
Meter Number	Req	UB	38-57	20	NUM	
Changed Meter Number	Opt	HH	58-77	20	NUM	Actual meter number found in field.
Meter Type	Req	UB	78-81	4	A/N	
Changed Meter Type	Opt	HH	82-85	4	A/N	
Meter Size	Opt	UB	86-93	8	A/N	
Changed Meter Size	Opt	HH	94-101	8	A/N	
Meter Manufacturer	Opt	UB	102-104	3	A/N	Three-character code for the meter manufacturer.

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Table 4.8 Meter Detail Record Formats

Column	Use	Source	Offset	Length	Type ¹	Comment
Changed Meter Manufacturer	Opt	HH	105-107	3	A/N	
Meter UOM	Opt	UB	108-110	3	A/N	Unit Of Measure - for display purpose only. <i>Example:</i> CF = cubic feet.
Changed Meter UOM	Opt	HH	111-113	3	A/N	
Meter Location	Opt	UB	114-117	4	A/N	
Changed Meter Location	Opt	HH	118-121	4	A/N	
Meter Location 2	Opt	UB	122-125	4	A/N	
Changed Meter Location 2	Opt	HH	126-129	4	A/N	
Read Instruction 1	Opt	UB	130-133	4	A/N	
Changed Read Instruction 1	Opt	HH	134-137	4	A/N	
Read Instruction 2	Opt	UB	138-141	4	A/N	
Changed Read Instruction 2	Opt	HH	142-145	4	A/N	
Seal Number	Opt	UB	146-155	10	A/N	
Changed Seal Number	Opt	HH	156-165	10	A/N	
Set Date	Opt	UB	166-173	8	A/N	YYYYMMDD. Optional; from billing system.

¹Only uppercase allowed*continued on next page*

Table 4.8 Meter Detail Record Formats

Column	Use	Source	Offset	Length	Type	Comment
Meter Custom 1	Opt	UB	174-199	26	A/N	
Meter Custom 2	Opt	UB	200-225	26	A/N	
Meter Condition Code 1	Opt	HH	226-229	4	A/N	
Meter Condition Code 2	Opt	HH	230-233	4	A/N	
Must Read Code	Opt	UB	234	1	BOO	'Y' or 'N' Must read if 'Y'.
Collector Error	Opt	HH	235-244	10	A/N	Values it contains will change based upon the collector type used.
Prev Read Date	Opt	UB	245-252	8	A/N	YYYYMMDD
Constant / Multiplier	Opt	UB	253-258	6	A/N	Data for electric meters.
Changed Constant / Multiplier	Opt	HH	259-264	6	A/N	
Xcoord	Opt	UB	265-276	12	A/N	Longitude
Ycoord	Opt	UB	277-288	12	A/N	Latitude
Xcoord2	Opt	UB	289-300	12	A/N	For future use
Ycoord2	Opt	UB	301-312	12	A/N	For future use
Xcoord3	Opt	UB	313-324	12	A/N	For future use
Ycoord3	Opt	UB	325-336	12	A/N	For future use
CRLF	Req	UB	337-338	2		

**Table 4.9 Order Status (Export
file only) Record Formats**

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	HS	1-5	5	A/N	'ORDST'
Completion Date	Req	HH	6-13	8	NUM	YYYYMMDD
Time Stamp	Req	HH	14-19	6	NUM	HHMMSS
Elapsed Time	Req	HH	20-24	5	NUM	Elapsed time in Seconds
Reader ID	Req	HH	25-44	20	A/N	
Order Status	Req	HH	45-46	2	A/N	IN - incomplete CO - complete SK - skipped
Skip Code	Req	HH	47-50	4	A/N	Only if order_status = 'SK'
Comment Code 1	Req	HH	51-54	4	A/N	
Comment Code 2	Req	HH	55-58	4	A/N	
Notes Back	Req	HH	59-186	128	A/N	
CRLF	Req	HS	187-188	2		

Table 4.10 Read Detail Record Formats

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'RDGDT'
Read Type	Req	UB	6-9	4	A/N	Details of a particular register, for example: <ul style="list-style-type: none"> • HIGH • LOW • KVAR • KW • KWH • WTR • W1
Collection ID	Req	UB	10-29	20	A/N	Use 'spaces' if device provides no ID value.
Changed Collection ID	Opt	HH	30-49	20	A/N	
Dials	Req	UB	50-51	2	NUM	
Changed Dials	Opt	HH	52-53	2	NUM	
Decimals	Req	UB	54-55	2	NUM	
Changed Decimals	Opt	HH	56-57	2	NUM	
Read Direction	Opt	UB	58	1	A/N	R, L, C, or blank only
Hi Limit	Req	UB	59-68	10	NUM	
Low Limit	Req	UB	69-78	10	NUM	
Prev Read	Req	UB	79-88	10	NUM	
Reading	Req	HH	89-98	10	A/N	

continued on next page

Table 4.10 Read Detail Record Formats

Column	Use	Source	Offset	Length	Type	Comment
Collector Reading	Req	HH	99-108	10	A/N	Actual reading that came from collector, before truncation
Read Code	Req	HH	109-110	2	A/N	
Re-entry Count	Req	HH	111-112	2	NUM	
Water No Flow 35 Days	Req	HH	113	1	NUM	
Peak Backflow	Req	HH	114	1	NUM	Reverse Flow Event
Leak 35 Days	Req	HH	115	1	NUM	
Current Leak	Req	HH	116	1	NUM	Leak Status
Previous Error Count	Opt	UB	117	1	NUM	R900 Electric or Gas tamper. Use '8' to suppress tamper check.
Current Error Count	Req	HH	118	1	NUM	Current error/tamper count for R900 Electric or Gas
Fatal Error	Req	HH	119	1	NUM	Fatal error flag for R900 Electric
Non-Fatal Error/Flags	Req	HH	120	1	NUM	Non-fatal error flag for R900 Electric or Gas
Voltage	Req	HH	121-123	3	NUM	Operating meter voltage for R900 Electric
MIU Type	Req	HH	124-125	2	NUM	Utility meter type
AMR Read Type	Req	HH	126-127	2	NUM	AMR reading type

continued on next page

Table 4.10 Read Detail Record Formats

Column	Use	Source	Offset	Length	Type	Comment
High Power	Req	HH	128	1	NUM	High versus low power indicator for all R900s
R900 Format	Req	HH	129-130	2	NUM	The R900 reading format: 0 - Binary 1 - BCD 2 - "Data Stream" (not used) 3 - E-Coder 4 - Mlog
Display Digits	Req	HH	131	1	NUM	Number of digits in main reading display
Multiplier Applied	Req	HH	132	1	NUM	
Gas No Flow	Req	HH	133	1	NUM	Period for which there has been no gas flow
Current Gas Backflow Tamper	Req	HH	134	1	NUM	
Current Gas Removal Tamper	Req	HH	135	1	NUM	
Current Gas Magnetic Tamper	Req	HH	136	1	NUM	
ERT Inversion Tamper	Req	HH	137	1	NUM	
ERT Reverse Tamper	Req	HH	138	1	NUM	
35-Day Gas Backflow Tamper	Req	HH	139	1	NUM	
35-Day Gas Removal Tamper	Req	HH	140	1	NUM	
35-Day Gas Magnetic Tamper	Req	HH	141	1	NUM	

continued on next page

Table 4.10 Read Detail Record Formats

Column	Use	Source	Offset	Length	Type	Comment
35-Day Program Flag	Req	HH	142	1	NUM	R900G only
Reed Switch Failure Flag	Req	HH	143	1	NUM	R900G only
Additional Flags	Req	HH	144-212	69		For future use
CRLF	Req	UB	213-214	2		

Table 4.11 ERT Detail Record Formats (Optional)

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'ERTDT'
Tone	Req	UB	6-7	2	NUM	
Freq Channel	Req	UB	8-11	4	NUM	
Prev Tamper 1	Req	UB	12	1	A/N	Use '8' to suppress tamper check.
New Tamper 1	Req	HH	13	1	A/N	
Prev Tamper 2	Req	UB	14	1	A/N	Use '8' to suppress tamper check.
New Tamper 2	Req	HH	15	1	A/N	
ERT Type	Req	HH	16-17	2	A/N	
CRLF	Req	UB	18-19	2		

**Table 4.12 Probe Detail Record
Format (Optional)**

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'PRBDT'
Internal Meter ID	Req	UB	6-35	30	A/N	Primary meter identifier programmed in meter memory
Meter Model	Req	UB	36-45	10	A/N	Meter model code
Password	Req	UB	46-55	10	A/N	Probing password code
Demand Reset	Req	UB	56	1	BOO	'Y' or 'N' Perform Demand Reset if 'Y'
Clock Reset	Req	UB	57	1	BOO	'Y' or 'N' Perform clock adjustment if needed per configurable reset parameters if 'Y'
Load Profile Start	Req	UB	58-65	8	NUM	YYYYMMDD Starting date for load profile data reading. Empty means all available load profile read up to configurable time span limit.
DST Used Expected	Req	UB	66	1	BOO	'Y' or 'N' Is Daylight Savings Time used on the meter
Battery Time	Req	HH	67-76	10	NUM	Elapsed time on meter battery in seconds
EEPROM Error	Req	HH	77	1	BOO	'Y' or 'N' Meter memory error in EPROM if 'Y'

continued on next page

Table 4.12 Probe Detail Record Format (Optional)

Column	Use	Source	Offset	Length	Type	Comment
RAM Error	Req	HH	78	1	BOO	'Y' or 'N' Meter memory error in RAM if 'Y'
ROM Error	Req	HH	79	1	BOO	'Y' or 'N' Meter memory error in ROM if 'Y'
Unprogrammed Error	Req	HH	80	1	BOO	'Y' or 'N' Meter not programmed if 'Y'
Firmware Version	Req	HH	81-100	20	A/N	Manufacturer firmware version
Hardware Version	Req	HH	101-120	20	A/N	Manufacturer hardware version
Meter Time	Req	HH	121-134	14	NUM	Time on meter clock when probed (YYYYMMDDHHMMSS)
Last Read Time	Req	HH	135-148	14	NUM	Time on meter clock when previously probed (YYYYMMDDHHMMSS)
Power Outage Count	Req	HH	149-152	4	NUM	Number of power outages
Probe Result	Req	HH	153-157	5	NUM	Probe session result. 0 for success, nonzero for various failures
Program Expiration	Req	HH	158-165	8	NUM	Last valid date for meter schedule programming (YYYYMMDD)
Program ID	Req	HH	166-175	10	A/N	The meter program identifier

continued on next page

Table 4.12 Probe Detail Record Format (Optional)

Column	Use	Source	Offset	Length	Type	Comment
Programming Count	Req	HH	176-179	4	NUM	The number of times the meter has been programmed
DST Used Actual	Req	HH	180	1	BOO	'Y' or 'N' Whether the meter is programmed to use DST
Low Battery Warning	Req	HH	181	1	BOO	'Y' or 'N' Meter battery is low on power if 'Y'
Demand Reset	Req	HH	182-185	4	NUM	The number of demand resets performed on the meter
Reverse Power Error	Req	HH	186	1	BOO	'Y' or 'N' Reverse energy flow has been detected on the meter if 'Y'
Self Read Error	Req	HH	187	1	BOO	'Y' or 'N' Meter memory error - self-read programming or consumption data if 'Y'
TOU Data Error	Req	HH	188	1	BOO	'Y' or 'N' Meter memory error - Time Of Use programming or consumption data if 'Y'
Last Demand Reset	Req	HH	189-202	14	NUM	The date/time of the last demand reset (YYYYMMDDHHMMSS)
Transformer Factor	Req	HH	203-212	10	NUM	Meter transformer factor
Wathour Constant	Req	HH	213-222	10	NUM	Meter wathour constant
CRLF	Req	UB	223-224	2		

Table 4.13 Route Trailer Record Format

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'RTETR'
Office	Req	UB	6-9	4	A/N	
Cycle	Req	UB	10-13	4	A/N	
Route	Req	UB	14-23	10	A/N	
# Premises	Req	UB	24-29	6	A/N	One input field may be blank if total is unavailable.
# Meters	Req	UB	30-35	6	A/N	One input field may be blank if total is unavailable.
CRLF	Req	UB	36-37	2		

Table 4.14 Vehicle Detail Record Format' (Optional)

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	HS	1-5	5	A/N	'VHLDT'
Reader ID	Req	HH	6-25	20	A/N	
Vehicle ID	Req	HH	26-45	20	A/N	
Date	Req	HH	46-55	10	NUM	YYYYMMDD
Start Time	Req	HH	56-59	4	NUM	HHMM
End Time	Req	HH	60-63	4	NUM	HHMM

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Table 4.14 Vehicle Detail Record Format¹ (Optional)

Column	Use	Source	Offset	Length	Type	Comment
Start Miles	Req	HH	64-73	10	A/N	
End Miles	Req	HH	74-83	10	NUM	
CRLF	Req	HS	84-85	2		

Table 4.15 Company Trailer Record Format

Column	Use	Source	Offset	Length	Type	Comment
Record ID	Req	UB	1-5	5	A/N	'COMTR'
Company Code	Req	UB	6-9	4	A/N	
# Routes	Req	UB	10-15	6	A/N	One input field may be blank if total is unavailable
CRLF	Req	UB	16-17	2		

Field Definitions


The following fields are defined in alphabetical order for your reference. Keep in mind the following:

- *Alphanumeric* means you can have a combination of numerical and/or alphabetical characters, which can include special characters or other punctuation marks.
- *Numeric* means the characters can be numbers only.
- *Alpha* means the characters are alphabetical only, but may include special characters or other punctuation marks.

35-Day Gas Backflow Tamper	A numeric, 1-digit code indicating tamper detection of gas backflow for R900G.
35-Day Gas Magnetic Tamper	A numeric, 1-digit code indicating tamper detection of magnetic tamper for R900G.
35-Day Gas Removal Tamper	A numeric, 1-digit code indicating tamper detection for removal of R900G.
35-Day Leak	A numeric, 1-digit code indicating number of days that flow has not gone to zero.
35-Day Program Flag	A numeric, 1-digit code indicating how many times the meter was programmed in the last 35 days.
Account Number	An alphanumeric, 20-character field used in identifying the customer account number. If the account number is less than twenty characters, the unused space is left blank. This unused space can also be used to display any other relevant account information and will be displayed just as it is sent from the host billing computer. Although the host billing computer master file may include the route number as part of the account number, the ARB N_SIGHT AMR system reserves a field in the route header record for the route number. Therefore, the account number field, which is in each meter record, need only include the account number.
Account Status	An alphanumeric, 4-character field indicating the current status of each account. These codes refer to four account status types, for example: <ul style="list-style-type: none">• 'ACTI' = Active• 'INAC' = Inactive• 'AWZ' = Active Warn on Zero Usage• 'IWU' = Inactive Warn on Usage. These codes may be sent from the host billing computer or created in ARB N_SIGHT AMR.

Additional Flags	A 69-character field for future growth.
Address 1	An alphanumeric, 26-character field containing the first line of the street name and assigned number of the residence.
Address 2	An alphanumeric, 26-character field containing the second line of the street name and assigned number of the residence.
AMR Read Type	A numeric, 2-digit field indicating the AMR reading type, for example: 00 = Itron ERT 01 = Advantage 02 = R900 ProRead 03 = R900 E-Coder 04 = R900 Electric 05 = R900 Gas 06 = RAMAR
Battery Time	A numeric, 10-digit field indicating elapsed time on meter battery in seconds.
Clock Reset	A Boolean, 1-character field that indicates if a clock reset is required: 'Y' or 'N'.
Collector Reading	A 10-character field that contains the actual reading that comes from the collector.
Comment Code 1	An alphanumeric, 4-character field containing a note or comments concerning the reading.
Comment Code 2	A second alphanumeric, 4-character field containing a note or comments concerning the reading.
Company Code	An alphanumeric, 4-character field. The Company field is used to define the entity governing the working regions and offices of a particular group of personnel. This also determines where cycles and routes are to be imported. The company must not change within a grouping of records in the import file.
Completion Date	A numeric, 8-digit field representing actual date the reading was taken. The date format is YYYYMMDD.
Consumption	An alphanumeric, 6-character field indicating the amount of water, gas, and electricity billed during the last billing cycle or for the overdue amount in a collection type.

Create Date	A numeric, 8-digit field representing the actual date the transfer file was created. The date format is YYYYMMDD.
CRLF	Carriage Return, Line Feed. Each line should end with one of each of these in the last 2 positions.
Current Error Count	A numeric, 1-digit field indicating error/tamper count for R900 Electric or Gas.
Current Gas Backflow Tamper	A numeric, 1-digit field indicating a tamper detection flag for no gas flow.
Current Leak	(E-Coder registers only). A numeric, 1-digit field based on the total number of 15-minute periods of recorded consumption in the previous 24-hour period. <ul style="list-style-type: none">• No Leak - less than 60 15-minute periods of recorded consumption• Intermittent Leak - 60 to 95 15-minute periods of recorded consumption• Continuous Leak - all 96 15-minute periods showing consumption
Current Gas Magnetic Tamper	A numeric, 1-digit field indicating a tamper detection flag for gas magnetic tamper.
Current Gas Removal Tamper	A numeric, 1-digit field indicating a tamper detection flag for gas removal.
Customer Address City	An alphanumeric, 26-character field indicating the city in which the customer address is located.
Customer Address House Number	An alphanumeric, 7-character field indicating the house number of the customer address.
Customer Address HSuffix	An alphanumeric, 7-character field indicating the house number suffix of the customer address.
Customer Address Predir	An alphanumeric, 2-character field indicating direction: N, S, E, W, NE, NW, SE, SW.
Customer Address Postdir	An alphanumeric, 2-character field indicating direction: N, S, E, W, NE, NW, SE, SW.
Customer Address SSuffix	An alphanumeric, 4-character field indicating the street name suffix.
Customer Address State	An alphanumeric, 2-character field indicating the two-letter state abbreviation code for the customer address.
Customer Address Street	An alphanumeric, 25-character field indicating the street of the customer address.

Customer Address Unit	An alphanumeric, 15-character field indicating the unit for the customer address.
Customer Address Zip	An alphanumeric, 11-character field indicating the postal zip code for the customer address.
Customer Contact	An alphanumeric, 26-character field that indicates the name of the contact person.
Customer Name	An alphanumeric, 26-character field that indicates the customer.
Customer Phone 1	An alphanumeric, 10-character field indicating the primary phone number for the customer.
Customer Phone 2	An alphanumeric, 10-character field indicating an additional phone number for the customer.
Cycle	An alphanumeric, 4-character field used to identify a group of routes in the meter reading process. These routes may be grouped according to what period they are to be billed, and then assigned a cycle number. When using letters, only uppercase are valid.
Date	A numeric, 8-character field indicating the date the vehicle was used for meter reading. The valid format is YYYYMMDD.
Deactivate Date	A numeric, 8-character field that indicates the date that the route is to be deactivated in ARB N_SIGHT AMR after exporting.
Decimals	A numeric, 2-digit field from 00-10 that determines the number of digits placed to the right of the decimal point on a meter reading. The value is generally set to a quantity greater than zero only when reading electric demand or electric probe meters. This field may be included in the CR read type code table record.
Demand Reset	A Boolean, 1-character field that must be either 'Y' or 'N' indicating whether or not to perform demand reset.
 Demand Reset	For the Handheld, this field is numeric, 4-character field indicating the number of demand resets performed on the meter
Dependent WO	An alphanumeric, 20-character field reserved for future use to link related orders together.
Description	An alphanumeric, 40-character field used to describe the company associated with the company code.

Dials	A numeric, 2-digit field from 00-10 used in the Reading Detail Record indicating the number of digits expected for a meter reading. This information is used to audit the entered reading and to control the reading field size displayed on the handheld. For readings with a decimal, the number of dials does not include the decimal even though a decimal appears in the Read field on the handheld display. This field may be included in the CR read type code table record.
Display Digits	A numeric, 1-digit field indicating the number of digits in the main reading display. This is the actual digit count, not the raw value of the R900 reading. For example, 6 digits has a value of 6, not the raw reading value of 2.
DST Used Actual	A Boolean, 1-character field that must be either 'Y' or 'N' to indicate whether the meter was actually programmed for Daylight Savings Time (DST).
DST Used Expected	A Boolean, 1-character field that must be either 'Y' or 'N' to indicate whether the meter is expected to use Daylight Savings Time.
EEPROM Error	A Boolean, 1-character field that must be either 'Y' or 'N' for meter memory error in EPROM if 'Y'.
Elapsed Time	A numeric, 5-digit field representing the time in seconds that have elapsed since the reading was taken.
End Miles	An alphanumeric, 10-character field used to track the ending miles of the vehicle used.
End Time	A numeric, 4-digit field representing the end time entered for the metering reading. The timestamp format is HHMM.
Entry Date	A numeric, 8-character field for the date an order was created or placed into the computer system. The format is YYYYMMDD.
ERT Inversion Tamper	A numeric, 1-digit field indicating a tamper detection flag for ERT inversion.
ERT Reverse Tamper	A numeric, 1-digit field indicating a tamper detection flag for ERT removal.
ERT Type	An alphanumeric, 2-character field indicating the type of ERT used.
Fatal Error	A numeric, 1-digit field used to signal an error for an R900.
File Version	An alphanumeric, 1-character field indicating the version of the file used.

Firmware Version	An alphanumeric, 20-character field indicating the manufacturer firmware version.
Force Special Instruction	A Boolean, 1-character field used to force the Special Instr field. This field displays notes as hazard if Y.
Force Special Instruction 2	A Boolean, 1-character field used to force the Special Instr 2 field. This field displays notes as hazard if Y.
Freq Channel	An alphanumeric, 4-character field used to identify the radio frequency of ERTs.
Gas No Flow	A numeric, 1-digit field indicating a period for which there has been no gas flow: 0: < 7 Days 1: 7 - 14 Days 2: > 14 Days 3: Undefined
Handheld ID	An alphanumeric, 20-character field supplied by the utility to identify the handheld device used for data capture.
Hardware Version	An alphanumeric, 2-character field indicating the manufacturer hardware version.
Hazard Code	An alphanumeric, 4-character code which identifies the hazard or warning, such as a code for electric fences, or warnings of potential hazards.
Hazard Text	An alphanumeric, 26-character field which provides free-form information that is returned from the reader. It may contain additional directions to help locate the meter, act as a reminder for electric fences, warnings of hazards, etc.
Hi Limit	A numeric, 10-digit field that can be either left or right-justified and is assigned by the billing system. This field defines the highest meter reading that is expected to be captured at a particular account.
High Power	A numeric, 1-digit field used as high versus low power indicator for all R900 meters
Internal Meter ID	An alphanumeric, 30-character field for the primary meter identifier programmed in meter memory.
Last Time Read	A numeric, 14-digit field that indicates the time on the meter clock when previously probed. (YYYYMMDDHHMMSS)

Last Demand Reset	A numeric, 14-digit field that indicates the date and time of the last demand reset. (YYYYMMDDHHMMSS)
Leak 35-Days	(E-Coder registers only). A numeric, 1-character field indicating the code for the number of days there was evidence of a leak in the last 35 days.
Load Profile Start	A numeric, 8-digit field that indicates YYYYMMDD for the starting date for load profile data reading. Empty means all available load profile read up to configurable time span limit.
Low Battery Warning	A Boolean, 1-character field that must be 'Y' or 'N' to indicate that the meter battery is low on power if 'Y'.
Low Limit	A numeric, 10-digit field that can be either left or right-justified and is assigned by the billing system. This field defines the lowest meter reading that is expected to be captured at a particular account.
Mail Address 1	An alphanumeric, 26-character field describing the mailing address.
Mail Address HSuffix	An alphanumeric, 7-character field indicating the house number suffix of the mailing address.
Mail Address House Number	An alphanumeric, 7-character field indicating the house number of the mailing address.
Mail Address Predir	An alphanumeric, 2-character field indicating direction: N, S, E, W, NE, NW, SE, SW.
Mail Address Postdir	An alphanumeric, 2-character field indicating direction: N, S, E, W, NE, NW, SE, SW.
Mail Address Street	An alphanumeric, 26-character field indicating the street name of the mailing address.
Mail Address SSuffix	An alphanumeric, 4-character field indicating the street name suffix.
Mail Address Unit	An alphanumeric, 15-character field indicating the unit for the mailing address.
Mail City	An alphanumeric, 26-character field indicating the city of the mailing address.
Mail Name	An alphanumeric, 26-character field indicating the name of the mailing address.
Mail Phone	An alphanumeric, 10-character field indicating the phone number for the mailing address.


Mail State	An alphanumeric, 2-character field indicating the code for the state for the mailing address.
Mail Zip	An alphanumeric, 11-character field indicating the postal zip code for the mailing address.
Meter Condition Code 1	The first 4-character, alphanumeric field used to identify the condition of the meter.
Meter Condition Code 2	The second 4-character, alphanumeric field used to identify the condition of the meter.
Meter Custom 1	The first alphanumeric, 26-character field representing custom display for meter screens.
Meter Custom 2	The second alphanumeric, 26-character field representing custom display for meter screens.
Meter Key	A numeric, 20-character code to identify the meter within the premise_key. This code uses the meter number unless the billing system has a better key.
Meter Location	<p>An alphanumeric, 4-character field that identifies where the meter or remote receptacle is located on a given property. Each code has a corresponding description. Examples of location codes are:</p> <p>BL=back left 01=basement FR=front right.</p> <p>These codes may be sent from the host billing computer, or they can be created in ARB N_SIGHT AMR.</p>
Meter Manufacturer	An alphanumeric, 3-character field used to identify the manufacturer of the meter.
Meter Model	An alphanumeric, 10-character field to indicate the meter model code.
Meter Number	A numeric, 20-character field used to identify the meter. The meter number often consists of the meter serial number and/or a code which identifies the manufacturer.
Meter Size	An alphanumeric, 8-character field used to describe the size of the meter.

Meter Time	A numeric, 14-digit field that indicates the time on the meter clock when probed. (YYYYMMDDHHMMSS)
Meter UOM	An alphanumeric, 3-character field used to identify the unit of measure for the meter.
Meter Type	An alphanumeric, 4-character field used to describes an individual class of meter. A meter type will define both the method of reading and the specific registers (Read type) of that meter. A single meter type cannot be specified for all meters unless they are all captured exactly the same way and have exactly the same register(s) attached. The capture method is defined in the meter type table. The register(s) on the meter is defined in the meter type/read type table.
MIU Type	A numeric, 2-digit code indicating the utility meter type: 00 - Electric 01 - Gas 02 - Water 03 - Other
Multiplier Added	A numeric, 1-digit field for a flag that indicates if the multiplier of 10 is to be applied to the main reading to get the real engineering unit value.
Must Read Code	A Boolean, 1-character field that must be 'Y' or 'N' for indicating that the meter must be read if 'Y'.
New Tamper 1	A numeric, 1-digit field representing a value that, if changed on return to the host billing computer, indicates inversion tamper on the meter.
New Tamper 2	A numeric, 1-digit field representing a value that, if changed on return to the host billing computer, indicates removal tamper on the meter.
No Flow Days	An alphanumeric, 1-character E-Coder code indicating a 4 for No FLOW Days (or consecutive days with zero consumption).
Non-Fatal Error/Flags	A numeric, 1-digit field defined by the meter manufacturer to signal no error for the R900 electric or gas meter.
Notes Back	An alphanumeric, 128-character field used to send notes back to the billing system.
# Meters	An alphanumeric, 6-character field indicating the total number of meters.
# Premises	An alphanumeric, 6-character field indicating the total number of premises.

# Routes	An alphanumeric, 6-character field indicating the total number of routes.
Office	An alphanumeric, 4-character field. The Office field is used to define the entity governing a working group of personnel. It also determines where cycles and routes are to be imported. The office must not change within a grouping of records in the import file.
Order Status	An alphanumeric, 2-character field indicating the status of the order: IN - incomplete, CO - complete, SK - skipped
Password	An alphanumeric, 10-character field indicating the password code used for probing.
Peak Backflow	(E-Coder registers only). A numeric, 1-character E-Coder code for peak backflow for the last 35 days. Defined as the highest amount of reverse flow in any 15-minute period during the past 35 days. The minimum and maximum values vary based on meter size and unit of measure. For example, the minimum value for a 5/8" T-10 gallon meter is 0.1 gallons and the maximum is 10 gallons.
Permit	A Boolean, 1-character field that must be 'Y' or 'N' to indicate a permit.
Power Outage Count	A numeric, 10-digit field indicating the number of power outages.
Premise Custom 1	An alphanumeric, 26-character area containing the first set of custom display fields for the premise.
Premise Custom 2	An alphanumeric, 26-character area containing the second set of custom display fields for the premise.
Premise Key	An alphanumeric, 20-character field that uniquely identifies the premise. Use the account number unless the billing has a better key.
Prev Read	A numeric, 10-digit field assigned by the billing system. This field shows the meter reading for the previous billing period.
Prev Read Date	An alphanumeric, 8-character field assigned by the billing system. This field contains the month, day, and year that the previous reading was entered. Valid Format: YYYYMMDD

Prev Tamper	A numeric, 1-digit field used in the ERT Detail Record, representing a value that, if changed on return to the host billing computer, indicates inversion tamper on the meter.
Previous Error Count	A numeric, 1-digit field used for R900 Electric or Gas tamper. Use '8' to suppress tamper check.
Probe Result	A numeric, 5-digit field indicating the probe session result: 0 for success; nonzero for various failures.
Program Expiration	A numeric, 8-digit field indicating the last valid date for meter schedule programming. (YYYYMMDD)
Program ID	An alphanumeric, 10-character field indicating the meter program identifier.
Programming Count	A numeric, 4-digit field indicating the number of times the meter has been programmed.
R900 Format	A numeric, 2-digit field indicating the R900 reading format: 0 - Binary 1 - BCD 2 - "Data Stream" (not used) 3 - E-Coder 4 - MLOG
RAM Error	A Boolean, 1-character field that must be 'Y' or 'N' for meter memory error in Random Access Memory (RAM) if 'Y.'

Read Code	<p>An alphanumeric, 2-character field indicating the type of read:</p> <ul style="list-style-type: none">• AH - Admin Hi Fail• AL - Admin Low Fail• AR - Admin Read• AU - Admin Inactive• AZ - Admin Zero Use• ER - External Read (Probe)• EF - External Failure; will add more for validation of radio and probe reads• FC - Failure Read Compare• KA - Keyed Alpha• KH - Keyed High• KI - Keyed Inactive• KL - Keyed Low• KN - Keyed, Negative usage• KR - Keyed Read• KV - Keyed Verified• KZ - Keyed Zero Consumption• RA - Radio Alpha Characters (:.....)• RH - Radio High Reading• RI - Radio Inactive• RL - Radio Low Reading• RN - Radio Negative Consumption• RR - Radio Read• RT - Radio Tamper• RV - Radio Verified• RZ - Radio Zero Consumption
Read Date	<p>A numeric, 8-character field representing the date that the route is expected to be read. The date format is YYYYMMDD.</p>
Read Direction	<p>An alphanumeric, 1-character field designating the direction the meter reading is input into the handheld. This field can be on of the following:</p> <ul style="list-style-type: none">• R = Right• L = Left• C= Center• blank

Read Instruction 1	<p>An alphanumeric, 4-character field that contains read instructions for the meter reader. Each code has a corresponding instruction code description. Certain codes may be designated as flash-and-beep or alert-and-hold to make the meter reader aware of the instruction attached to the meter. The system provides for two instruction codes per meter. Some examples include:</p> <p>GK=get key from neighbor LC=low ceiling KOG=keep off grass, etc.</p> <p>These codes may be sent from the host billing computer, or they may be created in ARB N_SIGHT AMR. When using letters, only uppercase is valid.</p>
Read Instruction 2	<p>A second alphanumeric, 4-character field for read instructions. See Read Instruction 1.</p>
Read Sequence	<p>A numeric, 6-digit field, mandatory, right-justified, and zero-filled. This field, assigned by the billing system, determines the order in which multiple meters at one account are to be read. All records are indexed based upon the combination of data in the Pg (Page) (priority 1 index) and the ReadSeq (priority 2 index) fields.</p>
Read Type	<p>An alphanumeric, 4-character field that describes the details of a particular register. Examples:</p> <ul style="list-style-type: none">• HIGH• LOW• KVAR• KW• KWH <p>It is important to note that a 6-digit register and a 4-digit register should have different Read Types if they are to be processed differently by the system. Read Types must match up with the values specified for the meter type because the import file will not override the association defined in the meter type/read type table.</p>
 Reader ID	<p>An alphanumeric, 20-character field identifying the reader used.</p>
Reading	<p>An alphanumeric, 10-character field assigned by the meter reader into the handheld. This field shows the meter reading that was recorded.</p>

Meter readings will usually be left-justified if the following conditions exist.

ReadDir = L or R





Meter readings will normally be right-justified if the following conditions exist.

- ReadDir = C
- The right justify meter reading parameter in the PC software in system setup is enabled. This particular adjustment takes place during unloading the handheld. Therefore, the setting applies to all meter readings but does not affect readings while they are being collected in the handheld.

Record ID	An alphanumeric, 5-character field used to define the type of header or detail record. The record ID's set by - ARB N_SIGHT AMR cannot be changed by the utility.
Re-entry Count	A numeric, 2-character field indicating the number of different reads entered.
Reed Switch Failure Flag	A numeric, 1-digit code indicating a reed switch failure for R900G.
Reverse Power Error	A Boolean, 1-character field that must be 'Y' or 'N' indicating that reverse energy flow has been detected on the meter if 'Y'.
ROM Error	A Boolean, 1-character field that must be 'Y' or 'N' indicating meter memory error in Read-Only Memory (ROM) if 'Y.'
Route	An alphanumeric, 10-character field assigned by the billing system identifying the route or book to which an account belongs. Any unused character positions to the right of this field must be defaulted to spaces. These must be left-justified, blank-filled in this field. "Found meters" are accounts that may be added by the meter reader.
Route Message	An alphanumeric, 80-character field used for free-form statements that are downloaded to the handheld for a particular route. The message is displayed on the handheld when the meter reader begins the route.
Seal Number	An alphanumeric, 10-character field used to prompt the meter reader to verify the Seal ID. This option may be sent from the host billing computer or selected through ARB N_SIGHT AMR.
Self Read Error	A Boolean, 1-character field that must be 'Y' or 'N' indicating meter memory error - self-read programming or consumption data if 'Y'.

Set Date	An alphanumeric, 8-character field used to determine the date to be set. Optional; from billing system. The date format is YYYYMMDD.
Skip Code	An alphanumeric, 4-character field used only in CS skip code table record. The Skip Code field contains a code entered on the handheld by the meter reader to explain why a meter reading was not obtained at a particular account. Each code identifies a specific reason such as NOAC=no access, DOG=bad dog, etc. The skip code is displayed in the reading field on the handheld with a prefix of "SK" followed by the 1 to 4 character skip code. Example: SKDOG or SKNOAC
Special Instruction	An alphanumeric, 300-character field that contains account instructions for the meter reader. Each code has a corresponding instruction code description. Certain codes may be designated as flash-and-beep or alert-and-hold to make the meter reader aware of the instruction attached to the meter. The system provides for two instruction codes per meter. Some examples include, GK=get key from neighbor, LC=low ceiling, KOG=keep off grass, etc. These codes may be sent from the host billing computer, or they may be created in ARB N_SIGHT AMR. When using letters, only uppercase is valid.
Special Instruction 2	A second alphanumeric, 300-character field for special instructions. See Special Instruction 1.
Start Miles	An alphanumeric, 10-character field used to begin tracking the starting miles of the vehicle used.
Start Time	A numeric, 4-digit field representing the start time entered for the meter reading. The timestamp format is HHMM
Timestamp	A numeric, 6-digit field representing the time the account was read by the meter reader or modified by the ARB N_SIGHT AMR host PC operator. The timestamp format is HHMMSS.
Tone	An alphanumeric, 1-character field that indicates the tone used for reads.
TOU Data Error	A Boolean, 1-character field that must be 'Y' or 'N' indicating a meter memory error - Time Of Use (TOU) programming or consumption data if 'Y.'
Transformer Factor	A numeric, 10-digit field indicating the meter transformer factor.

Trouble Code Description	An alphanumeric, 20-character field used only in the CT trouble code table record describing the corresponding trouble code. These descriptions may be sent from the host billing computer or created in ARB N_SIGHT AMR.
Trouble Type	An alphanumeric, 1-character field used only in the CT trouble code table record indicating a particular trouble type for the corresponding trouble code. These types may be sent from the billing computer or set through ARB N_SIGHT AMR. See Appendix E for a current list of trouble types.
Unprogrammed Error	A Boolean, 1-character field that must be 'Y' or 'N' indicating a meter not programmed if 'Y.'
Utility Pass Through	An alphanumeric, 128-character field assigned by the billing system. This field contains utility-defined data such as the account number, meter size, previous reading, etc. The Utility Passthru field is limited to printable characters and no carriage return or line feed is allowed. This data is not transferred into the handheld.
	Do not place any data that the meter reader needs in the Utility Field. They do not have access to the data in this field.
Vehicle Detail	Multiple records exported if vehicle information is captured. The VHLDT records are not associated to a particular route. (Export field only.)
Vehicle ID	An alphanumeric, 20-character field identifying the vehicle used for meter reading.
Voltage	A numeric, 3-digit field indicating operating meter voltage for R900 Electric.
Water No Flow 35-Days	(E-Coder registers only). A numeric, 1-character field indicating the consecutive days of no consumption detected in the last 35 days.
Watthour Constant	A numeric, 10-digit field indicating the meter watthour factor.
	Neptune recommends that the utility use a mnemonic associated the with desired process.
Xcoord	A numeric, 12-character field indicating longitude (x-coord).
Ycoord	A numeric, 12-character field indicating latitude (y-coord).

Notes:

Appendix A Meter Reading Explanation

Neptune Meter Dials

Meter odometers appear similar to these examples. All meters contain six indexing wheels, and the shaded dials are fixed zeros printed on the meter dial face. The E-Coder register displays a 9-dial output and transmits eight (8).

Typical Meter Dials

The cubic foot measurement dial is used in the following examples.

Table A.1 Meter Reading Display

Readings as They Appear For	Small Meters 5/8" - 1" 1 Cu. Ft. Dial	Intermediate Meters 1 1/2" - 4" 10 Cu. Ft. Dial	Large Meters 6" and up 100 Cu. Ft. Dial
Typical Meter Dials	1 2 3 4 5 6	1 2 3 4 5 6 0	1 2 3 4 5 6 0 0
Actual Cumulative Meter Reading	123,456 cu ft	1,234,560 cu ft	12,345,600 cu ft
4-Digit Meter Reading	1234	1234	1234
6-Digit ¹ Meter Reading	123455	123455	123455

¹The 6th digit in a 6-digit meter reading is rounded down to 5 or 0.

Meter Readings

As shown in Table A.1, typical 4-digit remote meter readings include only the four leftmost indexing digits on the meter odometer. They appear in the handheld as an uninterrupted string of numbers.

Example: 1234, 9876, 0617, etc.

If the reading includes a digit error, the error will be displayed.

Example: 123–

Typical 6-digit meter readings include all of the indexing digits on the meter odometer and also appear as an uninterrupted string of numbers.

Example: 123455, 987650, 051705, etc.

If the reading includes a digit error, the error will be displayed.

Example: 987–0, 051H05, etc.



In all remote meter readings:

- Non-encoded digits, including fixed zeros, are not included in the meter reading.
- The 6th digit in a 6-digit ARB reading is displayed as a 5 or 0.

The utility billing system must compensate for the number of billing units based on utility-specific requirements. This procedure is normally handled by the billing software by using a multiplier or type code for each meter type to calculate the billing amount. In a mixed meter environment, the billing system should track meter size, type, manufacturer, and multiplier for each account.

Example: Assume all customers are billed by 100-cubic-foot increments. All meters are 4-digit remotes. Using the same figures as in Table A.1, refer to Table A.2 for the required multipliers.

Table A.2 Required Billing System Multipliers

Elements Needed To Determine Billed Reading	Small Meters 5/8" - 1" 1 Cu Ft Dial	Intermediate Meters 1 1/2" - 4" 10 Cu Ft Dial	Large Meters 6" and up 100 Cu Ft Dial
Typical Meter Dials	1 2 3 4 5 6	1 2 3 4 5 6 0	1 2 3 4 5 6 0 0
4-Digit Meter Reading	1234	1234	1234
Actual Cumulative Meter Reading	123,456 cu ft	1,234,560 cu ft	12,345,600 cu ft
Required Billing Units	1234	12345	123456
Billing System Multiplier and Billed Meter Reading	1234 x 1 = 1234	1234 x 10 = 12340	1234 x 100 = 123400

*Required billing units = 100 cu ft increments

ProRead (ARB VI) Registers

The Neptune ProRead (ARB VI) register contains a programmable odometer. The odometers in the previous examples are hard-wired to present either a 4- or 6-digit meter reading. The odometer in the ProRead (ARB VI) registers is also available with those options, but the meter may be programmed to return up to the maximum number of digits that are hard-wired in the odometers. Programming always begins at the leftmost odometer digit.

Example:

1	2	3	4	5	6
---	---	---	---	---	---

A 4-digit hard-wired version can be programmed to read either:

- 4 digits = 1234
- 3 digits = 123

The 4-digit hard-wired version cannot be programmed to return 5 or 6 digits. If this accidentally occurs, the read would appear as an error.

Example: 1234–0

Example:

1	2	3	4	5	6	0	0
---	---	---	---	---	---	---	---

Likewise, a 6-digit hard-wired version can be programmed to read:

- 6 digits = 123455
- 5 digits = 12345
- 4 digits = 1234
- 3 digits = 123

Applying and programing these types of registers correctly for the appropriate meter size can greatly enhance billing accuracy. Instead of the previous meter reading examples, where multipliers of 10 are used to create zero billing digits at the end of the actual read digits, these meters can provide greater resolution. This results in an increase in billing accuracy.

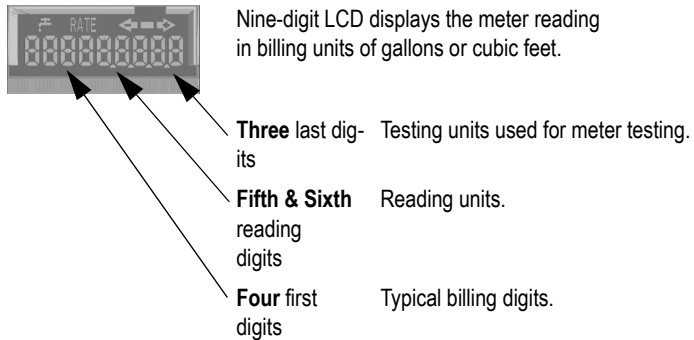
With the given scenario on the previous page (100-cubic foot increments), we would recommend using 4-digit, hard-wired meters for all small meters (since only 4 digits are required to obtain the appropriate billing unit accuracy). We would also recommend using 6-digit, hard-wired meters on all intermediate and large meters. The intermediate meters could be programmed to return 5 digits, and the large meters could be programmed to return all 6 digits.

E-Coder (ARB VII) Electronic Digital Register

The E-Coder (ARB VII) is an electronic digital encoder register that has a proprietary integrated circuit that provides *absolute* registration with no internal battery requirement. The E-Coder (ARB VII) functions in two modes: E-Coder (ARB VII) BASIC and E-Coder (ARB VII) PLUS.

The E-Coder (ARB VII) BASIC mode functionality is the same as ProRead (ARB VI) featuring programmability up to a 10-digit ID number, three user characters, and 3- to 6-digit meter reading. When connected to Neptune's R900v2 radio MIU, the E-Coder (ARB VII) operates in E-Coder (ARB VII) PLUS mode providing a high-resolution, 8-digit meter reading and value-added features including leak, tamper, and backflow detection.

Example:



The following sections describe the two modes in which the E-Coder (ARB VII) functions.

E-Coder (ARB VII) Basic Mode

E-Coder (ARB VII) Basic Mode applies when an E-Coder (ARB VII) is connected to a TouchPad.

The E-Coder (ARB VII) functionality is the same as a standard ProRead (ARB VI) encoder; that is, the odometer can be programmed with a field programmer to yield the following:

- 6-digit meter reading
- 5-digit meter reading
- 4-digit meter reading
- 3-digit meter reading

A specific ID number and User Characters can also be programmed into the unit just like the standard ProRead (ARB VI) Encoder.

Example

Example: E-Coder (ARB VII) Odometer--**Cubic Foot** Dial for Residential Meters, 5/8” through 1”

Example:

1	2	3	4	5	6	.	7	8	9
---	---	---	---	---	---	---	---	---	---

Digit position 6 = one cubic foot position.

This reading = 123,456 cubic feet (123,456.789 cubic feet).

If programmed as a 6-digit meter reading, the interrogator and DAP handheld display the following.

1	2	3	4	5	6
---	---	---	---	---	---

Once the DAP handheld is unloaded, the ARB N_SIGHT AMR Host Software Data Base* displays the following.

1	2	3	4	5	6
---	---	---	---	---	---

* Dependent upon # of dials, justification and zero-fill setting in the ARB N_SIGHT AMR Software Setup. In this example, # dials = 6.

Example

Example: E-Coder (ARB VII) Odometer--**Gallon** Dial for Residential Meters, 5/8” through 1”

Example:

1	2	3	4	5	6	7	.	8	9
---	---	---	---	---	---	---	---	---	---

Digit position 6 = 10-gallon position; digit position 7 = one-gallon position. This reading = 1,234,567 gallons (1,234,567.89 gallons).

If programmed as a 6-digit meter reading, the handheld displays the following.

1	2	3	4	5	6
---	---	---	---	---	---

The ARB N_SIGHT AMR Software Database* displays the following.

1	2	3	4	5	6
---	---	---	---	---	---

* Dependent upon # of dials, justification and zero-fill setting in the ARB N_SIGHT AMR Software Setup. In this example, # dials = 6.

E-Coder (ARB VII) PLUS Mode

The E-Coder (ARB VII) PLUS Mode applies when an E-Coder (ARB VII) is connected to an R900v2.

Example

Example: E-Coder (ARB VII) Odometer--**Cubic Foot** Dial for Residential Meters, 5/8” through 1”

Example:

1	2	3	4	5	6	.	7	8	9
---	---	---	---	---	---	---	---	---	---

Digit position 6 = one cubic foot position.

This reading = 123,456 cubic feet (123,456.789 cubic feet)

The DAP handheld receiving the RF transmission displays the following.

1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---



The read displayed appears like this example in either RF Test Mode or in Route Mode.

The ARB N_SIGHT AMR Software Database* displays the following.

1	2	3	4	5	6
---	---	---	---	---	---

* Dependent upon # of dials, justification and zero-fill setting in the ARB N_SIGHT AMR Software Setup. In this example, # dials = 6.

Example

Example: E-Coder (ARB VII) Odometer--**Gallon** Dial for Residential Meters, 5/8" through 1"

Example:

1	2	3	4	5	6	7	.	8	9
---	---	---	---	---	---	---	---	---	---

Digit position 6 = 10-gallon position; digit position 7 = one-gallon position.

This reading = 1,234,567 gallons (1,234,567.89 gallons)

The DAP handheld receiving the RF transmission displays the following.

1	2	3	4	5	6	7	8
---	---	---	---	---	---	---	---



The read displayed appears like this example in either RF Test Mode or in Route Mode.

The ARB N_SIGHT AMR Software Database* displays the following.

1	2	3	4	5	6
---	---	---	---	---	---

* Dependent upon # of dials, justification and zero-fill setting in the ARB N_SIGHT AMR Software Setup. In this example, # dials = 6.

Table A.3 Example E-Coder (ARB VII) Meter Reading Display for Cubic Feet and Gallons

Readings as They Appear For	Small Meters 5/8" - 1"	Intermediate Meters 1 1/2" - 4"	Large Meters 6" and up
E-Coder (ARB VII) Dial			
Cubic Feet	123456.789	1234567.89	12345678.9
Gallon	1234567.89	12345678.9	123456789.

Table A.4 Example E-Coder (ARB VII) Meter Reading Display for Cubic Metres

Readings as They Appear For	Small Meters 5/8" - 1 1/2"	Intermediate Meters 2" - 4"	Large Meters 6" and up
E-Coder (ARB VII) Dial			
Cubic Metres	12345.6789	123456.789	1234567.89

Manual Meter Readings

Manually entered meter readings are not restricted to the same digit rules as the remote meter readings. For consistency, Neptune prefers that meter readers enter manual readings in the same format that automatic reads would appear for a given meter. This is especially important in a mixed manual or automatic metering system. However, manual reads entered are based on instructions given to the meter reader by the utility.

Example:

1	2	3	4	5	6	0	0
---	---	---	---	---	---	---	---

Using the meter shown here, a typical manual read can appear as:

- 123
- 1234
- 12345
- 123456
- 12345600

The preferred manual reading for billing in 100-cubic-foot increments would be 123456. Any unused digit positions in the meter reading will default to spaces.

The meter reader is generally instructed to enter a specific quantity of digits to match the billing requirements. For example, if the billing system calculates bills based on 100-cubic-foot increments, the meter reader should enter all meter digits from left to right, down to the 100-cubic-foot position on the meter dial.

Example:

- | | |
|-----------------|---|
| 1 cu ft meter | Enter the 4 leftmost digits, including leading zeros. |
| 10 ct ft meter | Enter the 5 leftmost digits, including leading zeros. |
| 100 cu ft meter | Enter the 6 leftmost digits, including leading zeros. |



In some cases, the utility may instruct the meter reader to enter the reading without leading zeros. This can work because the billing system can construct the correct consumption and produce a bill from these types of readings.

Right Justify and Zero Fill Meter Readings

The ARB N_SIGHT AMR Host Software has the ability to right justify or zero fill the readings that are unloaded from the handheld. The settings of this parameter are determined by the utilities and their billing requirements.

Examples:

A typical 4-digit reading: 1527

Zero-filled enabled: 1527000000

Right-justify enabled: 0000001527

If a meter reading contains an error, no right-justify or zero-fill adjustments will be made. These readings are to be treated as rejects or re-reads or to be estimated by the billing system.

Adjust the R900/R900v2/R900v3 Readings for EZRouteMAPS

This section is only for EZRouteMAPS users.

After you install and configure the ARB N_SIGHT AMR system, the first time you start ARB N_SIGHT AMR you are directed to enter the initial setup values for your system so that it is ready for use.



Neptune strongly recommends that you do not change the locations for the directories created by the installation program.

Adjust R900 Readings is the option for an automatic adjustment of R900 readings. To enable this adjustment, check this box on the ARB N_SIGHT AMR Initial Setup Values Dialog.



The Adjust R900 Readings option reads only the first set of digits depending on the number of dials set in the Import file.

When this option is selected, the Adjust Dials option appears. This option allows you to set the number of dials. This option is only available if you check the box for Adjust R900 Readings.

Examples:

If the Number of Dials is set to 4, then the returned reading is adjusted to read the first four digits. If the Number-of-Dials is set to a number higher than 6, then the trailing zeros are dropped.

The Number of Dials in the Import file should be set to adjust to the actual number of digits of the register. If the Number-of-Dials is less than the actual reading digits, the readings have a shortened number of digits and are not accurate.

Enabling the R900/R900v2/R900v3 Adjustment

To enable the Adjust R900 Readings option, complete the following steps.

- 1 When you start ARB N_SIGHT AMR for the first time, the Enter Initial Setup Values dialog, as pictured in Figure A.1 on page Appendix A-13, appears asking you for the initial setup values.

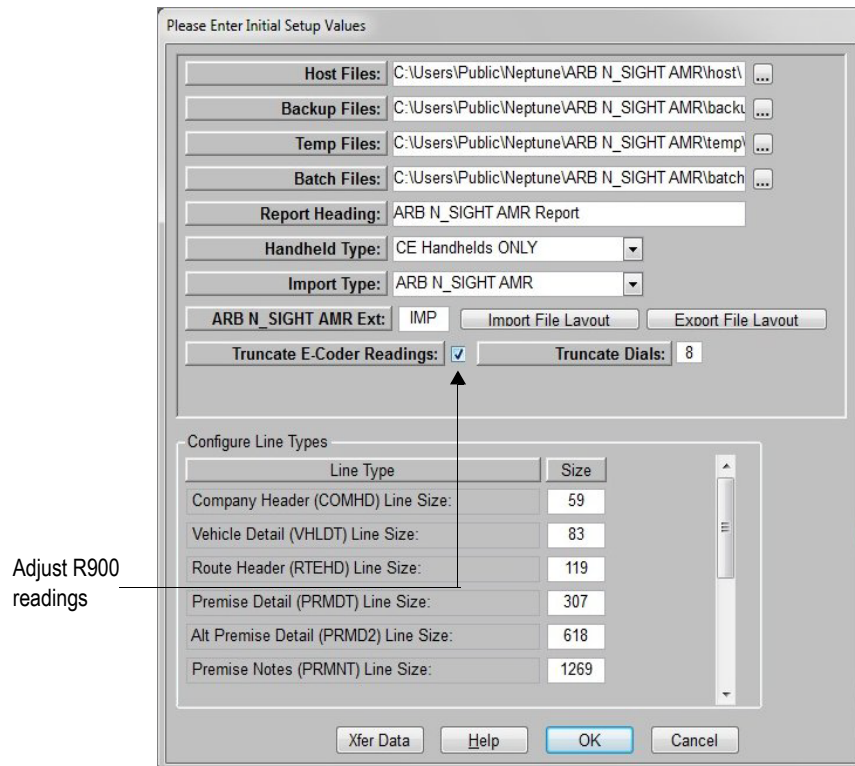


Figure A.1 Initial Setup Values Dialog

- 2 Select **Adjust R900 Readings** to enable this option.



The Adjust R900 Readings option reads only the first set of digits depending on the number of dials set in the Import file.

The Adjust Dials checkbox appears on the Initial Setup Value dialog as shown in Figure A.2.

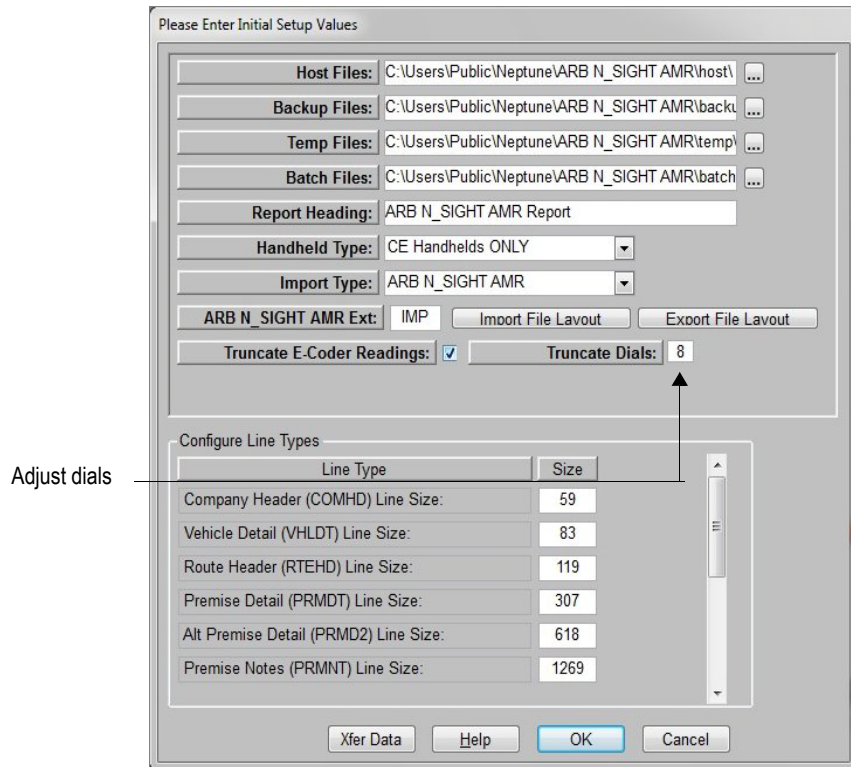


Figure A.2 Adjust Dials Check Box



This setting becomes the default for all R900 records if Adjust Dials is unchecked for EZRouteMAPS.

- 3 Select **Adjust Dials**, if applicable.
(This field only displays when you select Adjust R900 Readings.)
Refer to the “Example” on page A- 6.



The Number of Dials in the Import file should be set to adjust to the actual number of digits of the account number. If the Number of Dials is less than the actual reading digits, the readings have a shortened number of digits and are not accurate.

The maximum Number of Dials allowed is 9.

Notes:

Appendix B Reading Override

High/Low Limit Tests

As meter readings are entered, a high/low meter reading limit test will be performed on all accounts that contain data in the **High Reading Limit and Low Reading Limit fields**.

The characteristics of four fields affect high/low testing: the **Meter Reading** field, **High Reading Limit**, **Low Reading Limit**, and **Number of Dials** fields.

Meter Reading Field

Before continuing, review the definition of a **Meter Reading** field.

Meter Readings Review

The 4-digit meters transmit the four most significant digits on the odometer to the handheld. If the meter odometer has a reading of:

1	2	3	4	5	6
---	---	---	---	---	---

the handheld will receive 1234.

The 6-digit meters transmit all six indexing digits on the odometer to the handheld. For example, if the meter odometer has a reading of:

1	2	3	4	5	6
---	---	---	---	---	---

the handheld will receive 123455.*

*The last digit of a 6-digit meter displays a 5 or a 0.

In addition, remember that the utility can program ProRead (ARB VI) registers to transmit between three and six digits in a meter reading program.



Leading zeros in ARB readings are transmitted from the meter and are received by the handheld. If the **Read Direction** is **L** or **R**, the number of digits in the Hi/Lo fields must match the number of digits in the reading. If the **Read Direction** is **C**, then leading zeros in the accompanying **High Limit** and **Low Limit** fields can be omitted, but the **Number of Dials** field must contain the correct quantity of digits that are expected to be received by the handheld.

Manual Meter Review

For manually entered meter readings, the **Meter Reading** field may contain from 1 to 10 digits entered by the meter reader.

If the meter odometer reads 001234, the meter reader (depending on the value in the **Number of Dials** field and the utility instructions) may enter any of these valid reads:

001234	1
00123	12
0012	123
001	1234

High and Low Limit Fields

The data placed in the **High Limit** and **Low Limit** reading fields may be either left-justified or right-justified. However, all unused leading or trailing characters in the field must be spaces.

Example:

Using the same example from the Manual Meter Review section, if the low reading limit is equal to the previous reading, the value in the **Low Limit** field can be any of the following:

- **Number of Dials** = 6...**Low Limit** = 001234 or 1234
- **Number of Dials** = 5...**Low Limit** = 00123 or 123
- **Number of Dials** = 4...**Low Limit** = 0012 or 12

The data in the **High Limit** field would need to be equivalent quantities:

- **Number of Dials** = 6...**High Limit** = 001350 or 1350
- **Number of Dials** = 5...**High Limit** = 00135 or 135
- **Number of Dials** = 4...**High Limit** = 0013 or 13

Table B.1 Disabling the High/Low

High Limit Field	Low Limit Field	Test Results
Contains 9s	Contains 0s	All readings will pass the high/low test
Contains all spaces	Contains all spaces	Handheld will not attempt the test for that account
Contents equals Low Limit field	Contents equals High Limit field	All readings will pass the high/low test



If the **Number of Dials** field contains incorrect data, the handheld will attempt, but will not complete, the high/low test for that account. A warning will be issued to the meter reader.

Notes:

Appendix C Record Type

Table C.1 ARB N_SIGHT AMR Record Types

Record Type	Description
COMHD	Company Header
RTEHD	Route Header: Belongs to the company header it follows
PRMDT	Premise Detail: Belongs to the route header it follows
PRMNT	Premise Notes: Belongs to the premise details it follows
MTRDT	Meter Detail: Belongs to the premise notes it follows
ORDST	Order Status: Belongs to the meter it follows (Export file only)
RDGDT	Reading Detail: Belongs to the meter it follows
ERTDT	ERT Detail: Belongs to the reading it follows

Notes:

Appendix D Type of Read Codes

This table is intended for the ARB N_SIGHT AMR file format only.

Table D.1 Type of Read Codes

Value	Description
AH	Admin Hi Fail
AL	Admin Low Fail
AR	Admin Read
AU	Admin Inactive
AZ	Admin Zero Use
EF	External Failure; will add more for validation of radio and probe reads
ER	External Read (Probe Read)
FC	Failed Read Compare
KA	Keyed Alpha
KH	Keyed High
KI	Keyed Inactive
KL	Keyed Low
KN	Keyed Negative Usage

continued on next page

Table D.1 Type of Read Codes

Value	Description
KR	Keyed Read
KV	Keyed Verified
KZ	Keyed Zero Consumption
RA	Radio Alpha Characters (: :::::)
RH	Radio High Reading
RI	Radio Inactive
RL	Radio Low Reading
RN	Radio Negative Consumption
RR	Radio Read
RT	Radio Tamper
RV	Radio Verified
RZ	Radio Zero Consumption

Appendix E Meter Type, Read Type Configurations

The following tables are examples of Meter Type, Read Type configurations.

Table E.1 Single Read Type Examples

Read Type	Meter Type	Indicates
WATR	0001	Advantage
WATR	0002	R900
WATR	0003	ERT
WATR	0004	Keyed
WATR	0005	Ramar

Table E.2 Multiple Read Types Examples

Read Type	Meter Type	Indicates
WATR	0001	Advantage
WATR	0002	R900
WATR	0003	ERT
WATR	0004	Keyed
WATR	0005	Ramar
KWHR	0009	Keyed

continued on next page

Table E.2 Multiple Read Types Examples (Continued)

Read Type	Meter Type	Indicates
DEMA	0010	Keyed

Table E.3 Compound Meters

Read Type	Meter Type	Indicates
WATH	0004	Keyed
WATL	0004	Keyed



Meter Types cannot be shared with multiple Read Types unless involving the high and low sides of a compound meter.

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