# invensys
Metering Systems

RadioRead AMR
ADVANCED METER READING TECHNOLOGY FOR UTILITIES

"Sensing the Future with Advanced Automatic Meter Reading Systems"

High-tech radio transmission that provides choices and flexibility

The RadioRead® system from Invensys offers utilities a variety of off-site meter reading options. For example, the radio frequency hand-held device (AR 4002) can be used for gathering radio transmitted readings from meters set inside homes, buildings, and underground meter pits. At the same time, it can be used with the TouchRead® System
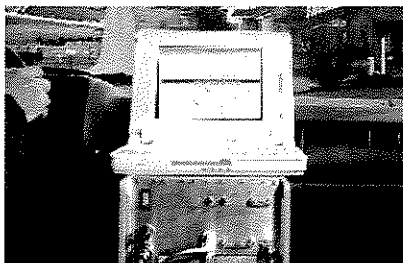
reading guns and for manually entering readings on the built-in keypad. This flexibility enables the utility to utilize a variety of meter reading methods to accommodate various situations.

The portable RadioRead Vehicle Transceiver Unit (VXU) provides even greater range and reading speed and can be used in any vehicle.

RadioRead Features
* Reads inside sets and pit-set meters
* Built-in TouchRead System capability
* Hand-held and vehicle units
* Upgradable to fixed base reading
* Built-in error detection diagnostics
* Choice of blind or geographic reading modes
* Reliable operation — MXU can be used in flooded pit environments
* Multi-Meter Interface Units

Direct Sequence Spread Spectrum for superior modulation performance

RadioRead Meter Transceiver Units (MXU) utilize Direct Sequence Spread Spectrum (DSSS) modulation to ensure reliable, safe and virtually interference-free

Direct Sequence Spread Spectrum enables higher data transmission
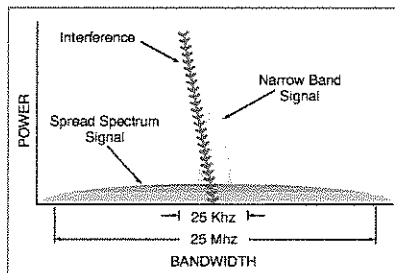
meter reading. Compared to conventional radio signals, DSSS minimizes interference from outside radio transmissions and produces very little interference of its own.
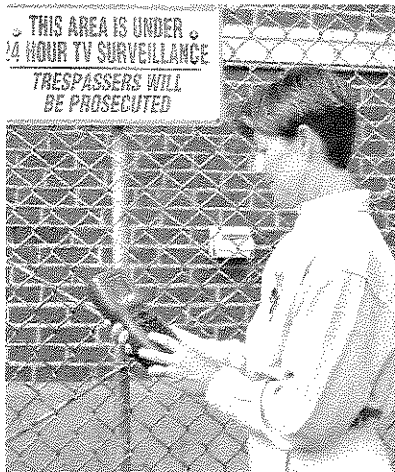
Greater Range
DSSS modulation provides expanded transmission range and is highly dependable for use in hard to transmit locations such as under meter box lids or inside basements.

The MXUs include an unobtrusive built-in antenna. Unlike narrow band modulation, DSSS technology provides higher rates of data transmission plus greater range and reliability.

Ready for the Future
The RadioRead Meter Reading System works with the same Electronic Communications encoders used for other Invensys AMR systems in gas, water and electric utilities. TouchRead System equipped meters can easily be converted to a RadioRead application. The Invensys RadioRead system is designed to work with Invensys AutoRead® software, also used by our other AMR systems. The RadioRead system can be converted to fixed base meter reading.

For more information, contact your Invensys representative or call 1-800-METER-IT (1-800-638-3748).

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AMR SYSTEM

RadioRead®

METER TRANSCEIVER UNIT (MXU)

invensys

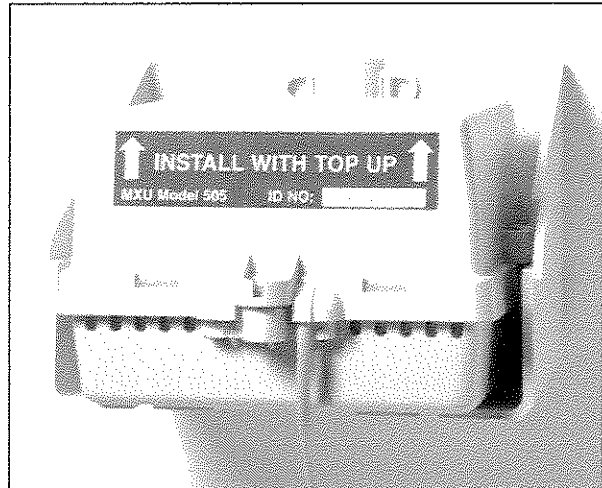Metering Systems

DESCRIPTION

APPLICATION: The Invensys RadioRead Meter Transceiver Unit (MXU) is a radio signal device which permits off-site meter reading via radio signals. The MXU interfaces any compatible absolute encoder equipped utility meter with a Invensys RadioRead interrogation device. The MXU is used for both inside and pit-set utility meter installations to provide safe, off-site meter reading. It eliminates a number of meter reading problems such as lockouts, entering unsafe meter vaults, "curb side" reading estimates, estimated billing and errors associated with manual meter reading methods.

The Invensys MXU provides the industry's only two-port radio interface device. In addition to the two-port design, the MXU is compatible with the Invensys MultiRead™ Module that permits two, four, or eight meter connections per MXU port. This features provides enhanced cost effective AMR where multiple meter installations exist.

RADIOREAD OPERATION: When used with a Invensys hand-held or vehicle interrogation unit, the Invensys RadioRead system provides two-way communications between the reading unit and system equipped utility meters. The MXU connected to the meter receives an activation wake up signal from the interrogation unit. The MXU then obtains the meter's absolute encoder identification number and meter reading which are transmitted back to the interrogation device. Low battery indicator is also transmitted. After the interrogation unit receives valid data, it transmits an acknowledgment signal back to the MXU which returns it to the power down mode. This helps maintain battery life and also optimizes the efficiency of the system by eliminating unnecessary radio transmissions

RADIOREAD INTEGRITY: When interfaced with an absolute encoder, RadioRead system meter reading is virtually error free. The meter read is taken from the actual positions of the encoder's odometer wheels to ensure valid up-to-date readings. Any errors or nonreads are immediately indicated on the meter reading equipment. This information can also be generated on management reports when the data is downloaded at the end of the reading cycle. In addition, high/low reading parameters can also be verified during the meter reading process.

PROGRAMMABILITY: For special meter reading applications such as commercial routes and multi-utility installations, the MXU can be programmed to respond only to certain meters through the use of class and password codes. The MXU can also be programmed to transmit in one-way mode for use in fixed base systems.

SPECIFICATIONS

SERVICE	Wall mounted or pit-set installation interfacing utility meter to the Invensys RadioRead Meter Reading System.
PHYSICAL CHARACTERISTICS	6.00" (152.4mm) W x 3.18" (81mm) H x 5.05" (128.27mm) D
WEIGHT	1 lb. (0.4536 Kg.)
COLOR	Tan
POWER	Lithium Maganese Dioxide battery
RF TRANSMITTER	Direct Sequence Spread Spectrum with synthesized channels, crystal controlled
RF RECEIVER	SAW stabilized super regenerative
FCC COMPLIANCE	Complies with Part 15
OPERATING TEMPERATURE	- 22° F to +140° F - 30° C to + 60° C
HUMIDITY	100% condensing. Water immersible
COMPATIBILITY	Invensys ECRII, Schlumberger ARB VI (Proread) water and gas encoders, Invensys Electronic Watthour Register for Landis & Gyr, GE, and ABB Electric Meters, Invensys encoder indexes for Energy Metering and American (Canadian) Gas Meters, and MultiRead Modules for two, four or eight meters per port.

The Invensys RadioRead MXU is designed to work in underground meter pits and vaults, and with above-ground and inside set meters...
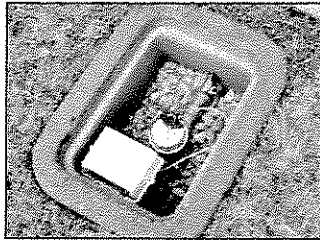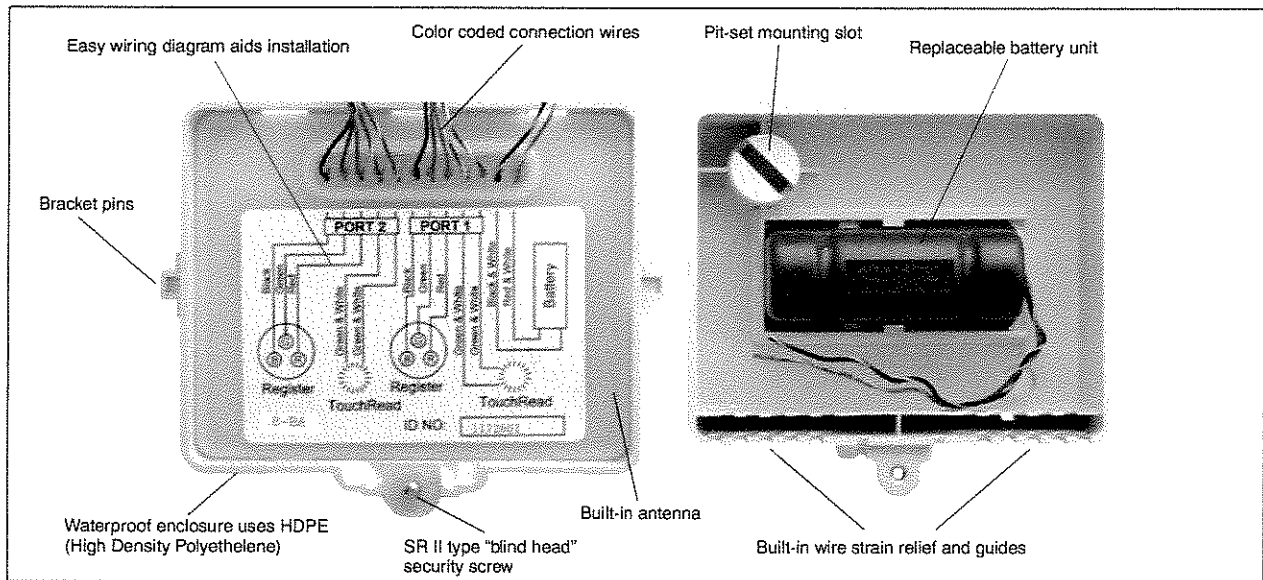
METER TRANSCEIVER UNIT (MXU)

TouchRead® System: The MXU has built-in connections for optional hookup to TouchRead System sensors. Use the TouchRead options as a reading back-up or for making visual readings, if desired. (Note — The hookup is not compatible for use with Schlumberger Proread protocol registers.)

Replacement Battery: The lithium manganese dioxide battery provides long service and is the industry's first replaceable battery cartridge system. This design provides fast, easy battery replacement. The battery is made of materials proven to have significantly less toxicity compared to those used in other brands. This battery design helps minimize the environmental impact of used battery disposal.

Installation: The MXU can be installed in meter pits, vaults, and inside or outside building locations. A mounting bracket is available for installations requiring mounting on vertical walls. Wire connections are made using 3M gel-cap (UY-2) splicing kits to ensure dependable MXU operation in damp, wet conditions such as inside meter pits or vaults which may be subject to flooding. The electronics are protected by a high density polyethylene sealed enclosure for superior moisture protection, especially in water filled pit-set environments.

MultiRead™ Module: A compatible module that permits two, four, or eight meter connections to be made to each MXU port.

Easy wiring diagram aids installation

Color coded connection wires

Pit-set mounting slot

Replaceable battery unit

Bracket pins

PORT 2   PORT 1

Register   Register

TouchRead   TouchRead

ID NO:

Waterproof enclosure uses HDPE (High Density Polyethelene)

SR II type "blind head" security screw

Built-in antenna

Built-in wire strain relief and guides

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AMR SYSTEM

Invensys
Metering Systems

MultiRead ™ MODULE
8-Channel Module Model MR-8
4-Channel Module Model MR-4
2-Channel Module Model MR-2

DESCRIPTION

APPLICATION: The MultiRead™ module allows the utility to connect multiple meters to one Invensys meter reading interface device. The MultiRead capability is available for all Invensys AMR systems. These include the TouchRead® System, the RadioRead® System, and the call inbound PhonRead® System. It is ideal for installations where multiple meters are installed in close proximity such as apartment buildings and shopping center complexes.
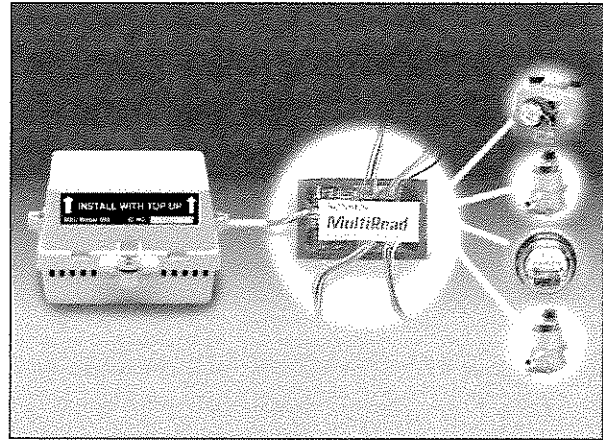
EXPANDABILITY: The MultiRead module provides convenient expandability that helps make AMR cost justifiable and operationally efficient. With the choice of 2-channel (Model MR-2), 4-channel (Model MR-4) and 8-channel (Model MR-8) modules, the utility can choose for optimum installation. With an 8-channel module, up to 8 meters can be connected to a single module. When two 8-channel modules are connected to a 2-port radio or phone interface unit, up to 16 meters can be read with one AMR interface device. (Refer to Invensys bulletin AMR-308 for optimal MultiRead installation.)

OPERATION: The MultiRead module can be used with any Invensys AMR system to read multiple meters equipped with compatible absolute encoder registers. When using either a 4-channel or 8-channel module, meters can be connected to each port of the AMR device up to the maximum amount for the model selected. The module has one three-wire connection to the AMR interface, be it a PhonRead MIU, RadioRead MXU, or a two-wire connection to a TouchRead sensor. When interrogated by the respective AMR system, the MultiRead module scans its channels and transmits the meter reading data back through the system. If fewer meters are connected to a module, the module senses the number of connections and reads the meters attached.

The MultiRead module requires no programming. A simple three-wire connection to compatible encoder registers is all that is required.

CONSTRUCTION: The MultiRead modules are housed in a plastic waterproof enclosure using an environmentally safe epoxy coating. Each meter channel connection is clearly identified with its own channel letter, as is the connection to the interface device.

FLEXIBILITY: The construction of the MultiRead modules permits installation anywhere a meter is installed. They can be installed inside buildings or in underground pits. The modules are submersible through the use of field installed sealed wire connectors and factory sealed electronics, keeping them operating reliably, even in harsh wet environments. For added protection, an optional protective field enclosure is available.


SPECIFICATIONS

| SERVICE	Provides capability to connect up to four or eight compatible meters to one of the Invensys AMR systems' interface devices. Electronics in a plastic housing sealed in environmentally safe epoxy.
PHYSICAL CHARACTERISTICS	Model MR-8: 2-1/2" x 1-3/4" (76.2 mm x 50.8 mm) Model MR-4: 1-3/4" x 1" (50.8 mm x 25.4 mm) Model MR-2: 1-3/4" x 1-1/2" (50.8 mm x 38.1 mm) Two enclosures (optional): Wall mount: 8" (203.2 mm) W x 6" (152.4 mm) H x 2" (50.8 mm) D Pit mount: 6" (152.4 mm) W x 3.18" (81 mm) H x 5.05" (128.7 mm) D
WEIGHT	MR-8: 2 oz. (55 grams) MR-4: 1.4 oz. (40 grams) MR-2: 1.08 oz. (28 grams) Enclosure (optional): 12oz. (.3402 kg.) for both
POWER	Power provided by reading device. No individual power supply required.
COMPATIBILITY	Invensys ECRII, Schlumberger ARB VI (Proread) water and gas encoders, Landis & Gyr AMR Electric Meters, Invensys ECI for residential gas meter, and Invensys EWR for electromechanical electric meters.

SAMPLE INSTALLATIONS: MULTIREAD®

Refer to the MultiRead installation information sheet
AMR-306 for details on the MultiRead module installa-
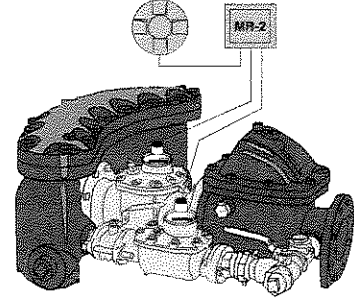tions to the various Invensys AMR systems.

TOUCHREAD®
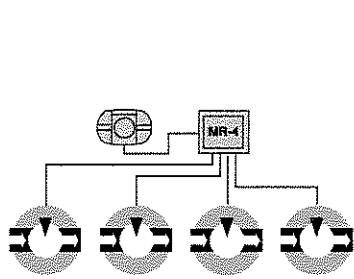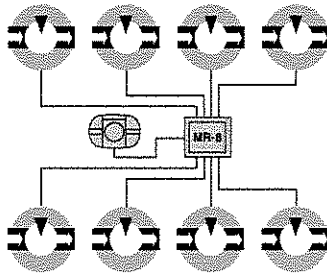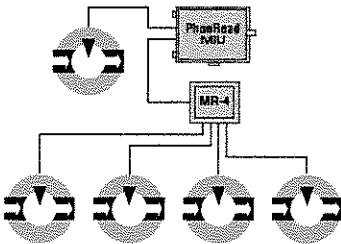
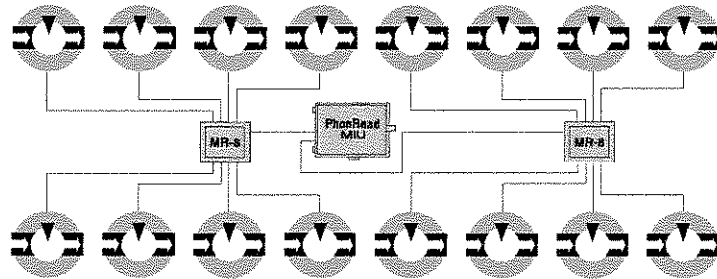**4 meter connection using MultiRead**   **8 meter connection using MultiRead**   **Fireline**

PHONREAD®: FOR MIU MODEL 205 OR HIGHER

The PhonRead Meter Interface Unit (MIU) has two ports
for connecting meters and MultiRead modules. Any
combination of meters and MultiRead modules can be
used up to a maximum of 16 meters (two 8-channel
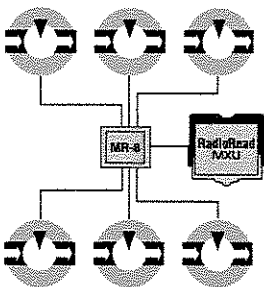MultiRead modules connected to the two MIU ports).

5 meter connection using MultiRead   **16 meter connection using MultiRead**

RADIOREAD®: FOR MIU MODEL 505 OR HIGHER
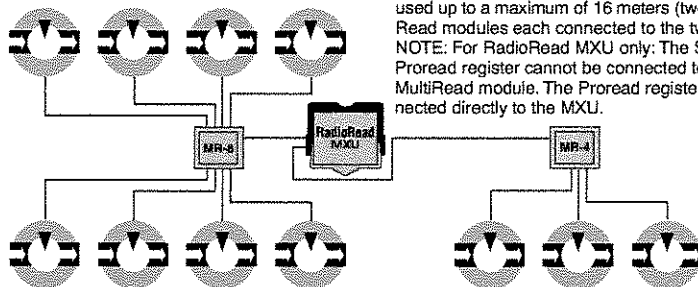
The RadioRead Meter Transceiver Unit (MXU) has two
ports for connecting meters and MultiRead modules. Any
combination of meters and MultiRead modules can be
used up to a maximum of 16 meters (two 8-channel Multi-
Read modules each connected to the two MXU ports).
NOTE: For RadioRead MXU only: The Schlumberger
Proread register cannot be connected to read through a
MultiRead module. The Proread register must be con-
nected directly to the MXU.

6 meter connection using MultiRead   **11 meter connection using MultiRead**

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AMR SYSTEM

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AutoRead® HANDHELD DEVICE/PROGRAMMER

Standard Model - AR 4001
RadioRead™ Model - AR 4002

DESCRIPTION

APPLICATION — METER READING: The Invensys AutoRead® HandHeld Device [HHD] is primarily designed to collect and store utility meter readings with built in capability for expanded uses. The HHD interfaces to a personal computer [PC] through a communications/charging stand used for uploading preprogrammed meter reading route information. The computer must be operating with Invensys AutoRead® System software.

The Model AR-4001 accepts meter reading data entered manually on a built-in keypad or electronically through TouchRead® System reading guns used for interrogating encoders. Reading gun options include cable-connected and RF (no cable required) styles.

The Model AR-4002 includes all features of the Model AR-4001 and is also capable of reading Invensys RadioRead® Meter Transceiver Units [MXUs].

PROGRAMMING: The AR-4001 HHD model can be used to program Invensys PhonRead® Meter Interface Units (MIUs). RadioRead MXUs and MIUs can be programmed using the Model AR-4002. More programming applications will be added as new AMR products are introduced.

CONSTRUCTION: The HHD is housed in a weather resistant high impact, UV-stabilized plastic, with elastomeric over-mold. Surface mounted circuitry in the specially designed watertight case and RCA tested keypads allow the HHD to be used in rugged field conditions over a wide range of temperatures.

FEATURES

ERGONOMIC DESIGN — The HHD's ergonomic-minded design offers a well balanced, easy-to-handle unit. It includes a graphical liquid crystal display [LCD] for ease of viewing during operation. The HHD can be manually carried during operation or function in the optional HHD carrier belt. The contrast value of the LCD automatically adjusts based on the ambient temperature, but can also be easily field adjusted to compensate for use in varying lighting conditions.

BACKLIGHTING: A backlight feature provides illumination to both the LCD and keypad for convenience in data entry and ease of reading data in areas with insufficient lighting.

FLEXIBLE DATA ENTRY: When used with Invensys meter reading guns, the HHD automates the reading process. Reading data from Invensys and compatible absolute encoder equipped meters is obtained and stored in the HHD. Manual entries can also be made using the keypad which features elastomeric, tactile response keys. Preprogrammed "high" and "low" range limits, calculated and passed from the utility billing software, can be sent to alert the user of possible reading errors. In addition, the Model AR 4002 provides expanded features for reading and programming Invensys RadioRead MXUs.

CORDLESS AUTOGUN: Used in conjunction with the AutoRead HHD, the cordless AutoGun provides reading capability of up to 99 meters in the palm of the user's hand. Information is stored in the AutoRead HHD through a bi-directional low power RF link.

AUTOMATIC, ERROR-FREE DATA COLLECTION: When used with a TouchRead System reading gun, the HHD collects and stores readings automatically from Invensys or compatible absolute encoders. Regardless of the route sequence programmed into memory, the HHD software identifies each meter encoder using the encoder's internal identification number. *(Continued on back)*
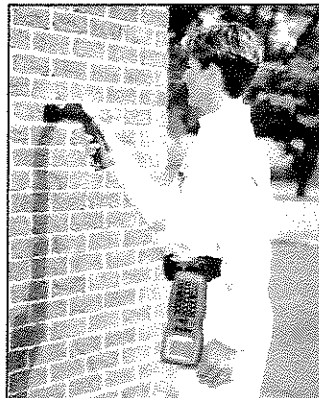
SPECIFICATIONS

SERVICE PRIMARY	Hand-held or belt carried electronic meter reading collection and data storage device for manual, TouchRead System, and RadioRead meter reading.
OPTIONAL	Programmer for Invensys AMR meter interfaces.
PHYSICAL CHARACTERISTICS	Case material molded of high impact, UV-stabilized plastic with elastomeric over-mold. Gray color standard. Optional colors available. Reading device/programmer connection built in. Carrying belt with matching safety-release clip included.
DIMENSIONS	9.6" [243.8 mm] (H) x 4.1" [104 mm] (W) AR 4001 = 2.0" [50.8 mm] (D) AR 4002 = 2.4" [60.96 mm] (D)
WEIGHT	AR 4001= 31 oz. [879 grams] AR 4002 = 35 oz. [992 grams]
OPERATING SYSTEM	Licensed DOS Operating System Microprocessor: AMD Elan AM386 SC300 Operating Memory: 2M FLASH Ics for system ROM Data Storage Memory: 2 Mbytes of self-refreshing SRAM Expandable Memory: Type II version 2.1 PCMCIA slot availability (Factory accessible only)
KEYPAD	Alphanumeric back light display. Large keys which can be operated while wearing gloves
DISPLAY	AR 4001/ 10 lines x 20 characters, back lighted, operable AR 4002 in both a text and graphics mode. Additional lines can be accessed by scrolling. Will display meter reading information, route information from hand-held and any additional system information.
POWER SUPPLY	NICAD batteries, field replaceable battery packs maintain functionality of up to 3,000 touch type readings for at least 12 hours
OPERATING TEMPERATURE	-20° F -12° C to 120° F 49° C
HOUSING	Tested to withstand being dropped on any surface from a four foot height without damage. Tested to withstand three feet of water immersion.
READING COMPATIBILITY	Able to read Invensys encoders, Invensys MultiRead Modules, and Schlumberger Proread (ARB VI). Contact Invensys for additional reading options.
COMMUNICATIONS/ CHARGING STAND	Holds one HHD per stand. Microprocessor controlled. Load/Unload speed: 115k/9600 Baud Communications Interface: Serial RS 232C

## The AutoRead HHD provides utilities with user-friendly features and meter reading versatility...
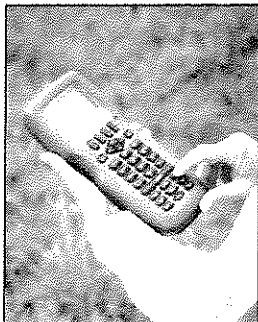
Manual entries can be made on the HHD keypad while the unit remains on the carrier belt and used in the swing up position, or when hand-held.

Communications/Charging Stand interfaces the HHD to the utility's PC and software for downloading of stored data and uploading of new meter route or programming data on command. Also provides charging for HHD and AutoGun.
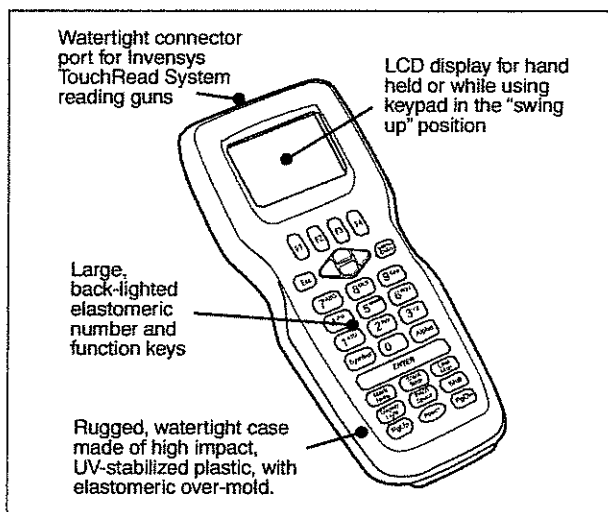
TouchRead AutoGun or AutoGun Pit-Probe can be used with the HHD for electronic reading of meters equipped with TouchRead System encoders: AutoGun reading gun and PitProbe extension can be used without a connecting cord.
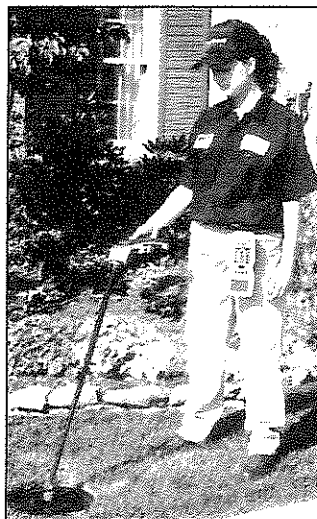
The Invensys 4000 Series HHD provides flexibility for utilities needing a reliable electronic hand-held meter reading and programming device. In addition to accepting meter readings via its keypad, the HHD also accepts readings from TouchRead® System and RadioRead® System equipped meters where those systems are used.

Watertight connector port for Invensys TouchRead System reading guns

LCD display for hand held or while using keypad in the "swing up" position

Large, back-lighted elastomeric number and function keys

Rugged, watertight case made of high impact, UV-stabilized plastic, with elastomeric over-mold.

(Continued from front:)

The software then searches the route program and automatically stores the meter reading in the correct customer account. The process eliminates errors and increases meter reading speed. The utility's meter readers need only refer to instructions on the HHD screen when they're alerted to a special condition or hazard via an audible alert tone from the HHD.

ADJUSTABLE AUDIBLE VERIFICATION/WARNING: The audible tone can be disabled if desired. The tone also confirms completed TouchRead and RadioRead System readings and alerts the user to faulty or out of limit readings. It can be programmed to alert the meter reader to hazardous situations or to respond to field survey questions.

COMMENTS/NOTES: The HHD uses preprogrammed utility defined note codes or free form notes [using the alphanumeric keypad]. Meter readers can identify accounts requiring special attention or to note unusual conditions and account survey information.

REPLACEABLE BATTERY: The rechargeable, self-contained Nickel Cadium [NICAD] battery pack is field replaceable to minimize downtime. The HHD is also equipped with a lithium battery backup system for extra data security.

PRODUCTIVITY MONITORING: The HHD's built-in clock can record the time and day of each meter reading. The software can note and store the type of reading made; manual, automatic, and/or multiple data entry reads to provide an overview of time spent reading the route and special problems related to readings or equipment use.

SERVICE AND WARRANTY: No service should be necessary if reasonable care is taken during normal use. Invensys offers the Invensys Equipment Maintenance Program [SEMP] to extend the protection of HHDs and related equipment beyond the one [1] year warranty covering materials and workmanship. Warranty and service policy details are available from Invensys representatives and authorized AMR distributors.

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Metering Systems

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RadioRead ®

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METER READING SYSTEM VEHICLE TRANSCEIVER UNIT (VXU)
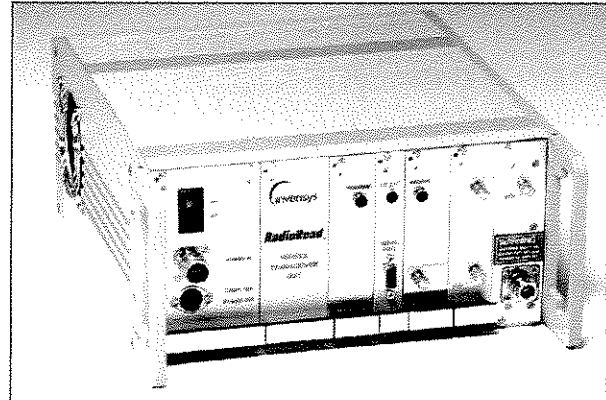
DESCRIPTION

APPLICATION: The Invensys RadioRead® Vehicle Transceiver Unit (VXU) is a portable radio-based meter reading device which can be used in any vehicle providing 12-volt DC power. The operator simply sets up the system in the vehicle, loads the desired meter reading route into the computer and drives along the meter reading route in proximity to the meters to be read. The meter reading data is collected while the vehicle traverses the route. The complete VXU package includes everything needed to read meters that are equipped with Invensys Meter Transceiver Units.

RADIOREAD® OPERATION: The Invensys RadioRead system uses two-way data communications between the VXU and Meter Transceiver Units (MXU) connected to compatible utility meters. When reading meters, the VXU transmits an alert signal to the MXUs, with the operator having the option of directing the alert signal to all MXUs within range (blind reading mode), or to individual MXUs (geographic reading mode). When the alert signal is received, each MXU responds by transmitting its data in direct sequence spread spectrum modulation. The VXU receives this data and acknowledges by sending the MXU a message to return to its low power sleep mode.

SYSTEM RELIABILITY: The Invensys RadioRead system's communication architecture ensures reliable meter readings. The VXU determines clear channels in the 902-928 Mhz spread spectrum radio frequency band. When the VXU transmits the alert signal to the MXUs it also establishes the frequency to be used to transmit back this meter reading data. This signal selecting and synchronization capability provides a highly efficient meter reading process that is reliable even in a noisy radio frequency environment.

Meter reading is virtually error-free when using RadioRead to read meters equipped with Invensys absolute encoder registers. The absolute encoder registers provide readings taken from actual positions of their odometer wheels. When readings cannot be obtained due to damage, vandalism or tampering, the error condition will be indicated at the time of reading. High or low customer usage patterns can also be verified at the time of the reading.

PORTABILITY: Through the use of advanced miniaturized design, the radio electronics can be packaged in a very compact enclosure. With the addition of a portable computer, connecting cables and antenna, the complete VXU package can be stored in its handy carrying case, ready for fast and easy setup in any vehicle. This portability eliminates the need to purchase and maintain a dedicated meter reading vehicle.

SPECIFICATIONS

SERVICE	Radio based mobile utility meter reading system
PHYSICAL CHARACTERISTICS	VXU in metal case with carrying handles. Portable computer in plastic housing. Connection cables, magnetic mount antenna and hardside component carrying case included.
DIMENSIONS VXU	Wide: 15.10" (383.54 mm) Deep: 11.24" (285.49 mm) High: 5.22" (132.58 mm) Weight: 21 lbs. (9.53 kg)
Computer	Wide: 11.8" (299.72 mm) Deep: 8.9" (226.06 mm) Weight: 6.64 lbs. (3.01 kg)
Carrying Case	Wide: 19.25" (488.95 mm) Deep: 13.78" (350 mm) High: 11.87" (301.49 mm) Weight: case: 11 lbs. (4.99 kg) Complete assembly: 39 lbs. (17.69 kg)
POWER VXU with Portable Computer	12-volt DC DC adapter through VXU (with battery back-up; computer only)
COMMUNICATIONS	Transceiver to computer: Radio Transmit: 956 Mhz (AM) Receive: 902-928 Mhz. Direct Sequence Spread Spectrum
READING RANGE	Dependent on MXU installation and RF propagation at time of reading
APPROVALS US: Canada: Mexico:	FCC Industry Canada SCT
LICENSE REQUIREMENTS	Equipment licensing requirements are coordinated by Invensys for FCC, Industry Canada and Mexican SCT. Radio licensing may be required by government agencies for other countries. Users should consult their respective government agencies for licensing requirements.

RadioRead ®

METER READING SYSTEM VEHICLE TRANSCEIVER UNIT (VXU)

The RadioRead VXU package in its handy carrying case is fully portable.

Plug-in-and-go set-up is fast and easy to use.

User Friendly Software: STRIPES (Invensys Interface Polling Equipment System) is a software program especially designed for operating the VXU. STRIPES features an easy to use pull-down menu system that permits convenience and simplicity for directing the meter reading process. STRIPES allows manual entries and special route notes to be made by the meter reader/operator via the portable computer's keyboard. The meter reader/operator can also easily edit configurations in the route data when necessary.
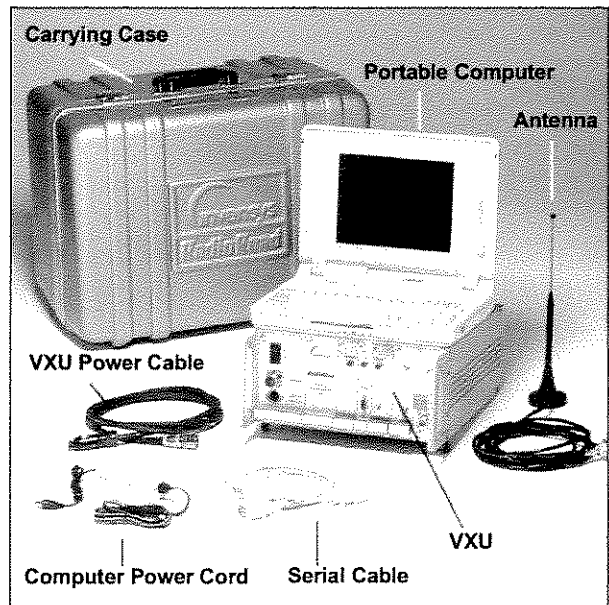
STRIPES works in conjunction with Invensys Automatic Meter Reading System (AutoRead®), a software program designed to manage utility meter reading data by interfacing with a utility's own billing software.

RadioRead® Makes Reading Utility Meters Fast, Easy and Reliable

The RadioRead System can be used to read more meters in a matter of minutes than a typical meter reader, using a manual entry system, can usually read in a day. The portable RadioRead Vehicle Transceiver Unit (VXU) plugs into a vehicle's standard 12-volt electrical system enabling it to be used in any car or truck. Coupled with a portable computer and AutoVu software, the VXU package provides utilities with maximum meter reading efficiency while requiring a minimum of operator training for operation.

Thanks to direct sequence spread spectrum modulation technology, RadioRead also provides greater meter reading reliability with fewer non-reads, range limitations and errors compared to other types of radio based meter reading systems. The system's higher reliability produces a higher number of completed meter readings to further enhance operating efficiency and minimize customer relations problems.

Because the RadioRead System works with the same absolute encoder registers used by the Invensys PhonRead® System and TouchRead® System, utilities have greater flexibility such as mixing and matching to meet specific needs or situations—or for planned migrations from one system to another without requiring the meters and registers to be exchanged. The RadioRead System is also easily upgradeable to a fixed base meter reading system.

Carrying Case

Portable Computer

Antenna

VXU Power Cable

VXU

Computer Power Cord   Serial Cable

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AutoVU™
software module

**User-friendly full color
MS Windows screens
and graphics**

STRIPES for Windows
Configuration RouteManager RunRoute RouteInformation Quit Help

Route
Name: PAJEFF
Status: Running
Last Error: None
Mode: Blind

Features
GPS: ACTIVE
Mapping: ACTIVE

Expected / Received:
NonRoutes Received:
Total ECRs Received:
High/Low Violations:

VXU Communication Monitor V1.06

File Edit Objects Query Table Options Window Map Tools Help

**Route maps are
automatically
repositioned as the
vehicle moves along**

Graphic on-screen mapping for the Sensus RadioRead® system

**Each meter location is shown
and readings are verified as
the route is traversed**

The AutoVU software module enhances vehicle-based radio reading.

- Provides GPS based mapping interface to graphically depict the location of each meter along a meter reading route and instantly verify each reading

- Uses precise locating and mapping technology made possible by existing low earth orbiting Global Positioning Satellites

- Meter locations along each RadioRead route can be optionally set by the utility to change color or disappear from screen as each meter reading is successfully collected by the Vehicle Transceiver Unit (VXU)

- Includes full version of mapping software for use by a utility to customize maps and use as a GIS (geographic information system)

- The on-screen map automatically shifts position when used with the GPS System, keeping the meter reading vehicle location "positioned" on the map as it travels along the meter reading route

- Provides ability to include map layers - i.e., water, street names, etc. when the maps are displayed. Also allows the utility to add custom map layers to existing maps through the use of the GIS mapping software

- Shortens meter reading time and helps reduce costs

- On-screen instant reading verification helps eliminate the need to re-drive the complete meter reading route to obtain readings which may have been missed

- Helps eliminate guesswork in establishing the most efficient routes for VXU radio based meter reading

- Alerts the meter reader of "high" and "low" reading limit discrepancies and MXU low battery signals

- Non-radio equipped meters can be depicted on the digital route maps to alert the VXU user that manual or special readings are required at specified locations

- Reading route statistics are saved and displayed as the routes are loaded and being read.

AUTHORIZED SENSUS DISTRIBUTOR
Your Local Sensus Distributor

![Invensys Metering Systems logo] # The Invensys Guarantee

I. GENERAL PRODUCT COVERAGE

Invensys guarantees products and parts to be free from material and workmanship defects for a period of one (1) year from date of shipment and as set forth below.

II. SR II® 5/8", 3/4" & 1" METERS...

will be guaranteed to perform to AWWA New Meter Accuracy Standards for a period of five (5) years from date of Invensys shipment or the registration shown below, whichever occurs first. Invensys further guarantees that the SR II meter will perform to at least AWWA Repair Meter Accuracy Standards for an additional ten (10) years or the registration shown below, whichever occurs first:

	New Meter Accuracy	Repair Meter Accuracy
5/8" SR II Meter	500,000 gallons	1,500,000 gallons
3/4" SR II Meter	750,000 gallons	2,250,000 gallons
1" SR II Meter	1,000,000 gallons	3,000,000 gallons

III. SR® 5/8", 3/4" & 1" METERS...

will be guaranteed to perform to AWWA New Meter Accuracy Standards for a period of one (1) year from date of Invensys shipment. Invensys further guarantees that the 5/8", 3/4" and 1" SR meters will perform to at least AWWA Repair Meter Accuracy Standards for an additional fourteen (14) years or the registration shown below, whichever occurs first:

Repair Meter Accuracy	
5/8" SR Meter	1,500,000 gallons
3/4" SR Meter	2,250,000 gallons
1" SR Meter	3,000,000 gallons

IV. SR 1-1/2" & 2" METERS...

will be guaranteed to perform to AWWA New Meter Accuracy Standards for a period of one (1) year from date of Invensys shipment. Invensys further guarantees the 1-1/2" and 2" SR meter will perform to at least AWWA Repair Meter Accuracy Standards for an additional nine (9) years from date of Invensys shipment or the following registration, whichever occurs first:

Repair Meter Accuracy	
1-1/2" SR Meter	5,000,000 gallons
2" SR Meter	8,000,000 gallons

V. PMM, PMX 5/8", 3/4", 1" METERS...

will be guaranteed to perform to AWWA New Meter Accuracy Standards for a period of one (1) year from date of Invensys shipment. Invensys further guarantees that the 5/8", 3/4", and 1" PMM & PMX meter will perform to at least AWWA Repair Meter Accuracy Standards for an additional fourteen (14) years or the registration shown below, whichever occurs first:

Repair Meter Accuracy	
5/8" PMM, PMX Meter	1,500,000 gallons
3/4" PMM, PMX Meter	2,000,000 gallons
1" PMM, PMX Meter	3,000,000 gallons

VI. PMM, PMX 1-1/2", 2" METERS...

will be guaranteed to perform to AWWA New Meter Accuracy Standards for a period of one (1) year from date of Invensys shipment. Invensys further guarantees that the 1-1/2", and 2" PMM & PMX meter will perform to at least AWWA Repair Meter Accuracy Standards for an additional nine (9) years from date of Invensys shipment or the following registrations, whichever occurs first:

Repair Meter Accuracy	
1-1/2" PMM, PMX Meter	5,000,000 gallons
2" PMM, PMX Meter	8,000,000 gallons

VII. MAINCASE...

of the SR, SR II, PMM and PMX meters will be free from defects in material and workmanship for a period of twenty-five (25) years from date of Invensys shipment.

EnviroBrass II and E-coated maincases will be free from defects in material and workmanship for a period of fifteen (15) years from date of shipment.

VIII. INVENSYS "W" TURBO METERS, SRH COMPOUND METERS, PROPELLER METERS...

will be guaranteed to be free from defects in material and workmanship for a period of one (1) year from date of shipment. Invensys further guarantees these meters to meet AWWA new meter accuracy for a period of one (1) year from date of shipment.

The Invensys Guarantee (continued)

IX. INVENSYS REGISTERS...

will be guaranteed to be free from defects in material and workmanship from the date of Invensys shipment for the periods stated below or until above repair meter accuracy registrations are surpassed, whichever occurs first:

5/8" thru 2" SR, SR II, PMM, Standard Registers	25 years
5/8" thru 2" SR, SR II Encoder Registers	10 years
Electronic Communication Index (ECI)	10 years
Electronic Watthour Register (EWR)	1 year
All HSPU, IMP Contactor, R.E.R. Elec. ROFI	1 year
Standard and Encoder Registers for:	
"W" Turbo, SRH Compounds and Propeller Meters	1 year

X. INTERFACE DEVICES...

will be guaranteed to be free from defects in material and workmanship from date of Invensys shipment for the following periods:

Electronic TouchPad	10 years
PhonRead® MIU	2 years*
RadioRead® MXU	2 years*
RadioRead® MXU Batteries	5 years
Act-Pak™ Instrumentation	1 year
TouchRead® and AMR Equipment	1 year

* Invensys RadioRead MXU's and PhonRead MIU's shipped after September 1, 1998 are guaranteed to be free from material and workmanship defects for a period of two (2) years from date of shipment. Invensys will repair or replace a non-performing RadioRead MXU at no cost during the first two (2) years, and at a prorated, discounted cost during the remaining three (3) years.

XI. GUARANTEE CLAIMS...

on meters returned to Invensys must include customer test results specified by meter serial number obtained according to AWWA standards. Test results will not be valid if meter is found to contain foreign materials. Invensys reserves the right to request meter reading record history by serial number to validate warranty claims.

If customer chooses not to test a Invensys meter prior to returning it to Invensys under the performance guarantee, Invensys will repair or replace the meter, at Invensys' option after the meter has been tested by Invensys. The customer will be charged a testing fee as stated in the Invensys Meter Maintenance Program.

MXU's and MIU's returned to Invensys must be affixed with a completed return evaluation label.

XII. LIMITS OF GUARANTEE...

Invensys' obligation, and customer's exclusive remedy, under this Guarantee is, at Invensys' option, to either repair or replace the product, provided the customer returns the product to the location designated by Invensys within the guarantee period and prepays the freight costs both to and from such location.

This Guarantee does not include replacement labor or material costs, which are the responsibility of the utility, and does not apply to meters, registers or maincases which have been either: installed in non-water utility or other non-recommended installations; repaired with parts not recommended by Invensys; converted, altered or treated by other than Invensys-recommended procedures; read by equipment not approved by Invensys; or damaged due to improper care or maintenance, or improper periodic testing.

In no event shall Invensys be liable for special, incidental, indirect or consequential damages, including, without limitation, lost revenue.

THIS GUARANTEE IS MADE IN LIEU OF THE WARRANTIES OF MERCHANTABILITY AND FITNESS FOR PARTICULAR PURPOSE, AND ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, AND MAY NOT BE VARIED EXCEPT IN WRITING SIGNED BY AN OFFICE OF INVENSYS METERING SYSTEMS.

DARE TO COMPARE RADIOREAD SYSTEMS

	SENSUS	OTHERS
Read the MXU a minimum of 2000 feet	Yes	?
MXU has 100 milliwatts of power	Yes	?
MXU has a non-hazardous battery	Yes	?
MXU can read up to 16 different meters	Yes	?
MXU has more than one port	Yes	?
MXU is submersible	Yes	?
MXU has a TouchPad backup	Yes	?
One MXU can read Water/Gas/Electric	Yes	?
MXU is non-pulse based	Yes	?
True two-way communication	Yes	?
One vendor supplier (meter/MXU/reading equipment/ software/support)	Yes	?
No MXU reprogramming after battery replacement	Yes	?
Operating temperature range of -40° to 160° degrees	Yes	?

Grand Haven Twp-Gd Haven
Mark Verberkmoes
(616) 842-5988
(HHD-RF) (VXU) (Mapping)

Allendale Twp-Allendale
Garry Scholten
(616) 895-5195
(SSI-RF) (VXU)

Lansing BWL
Tim McKim
(517) 702-6119
(HHD-RF) (VXU)

City of Williamston
Gary
(517) 655-2770
(SSI-RF)

Superior Twp
Rick Church
(734) 480-5500
(HHD-RF) (VXU)

Ypsilanti Comm Util Auth
Ralph Walls
(734) 544-7311
(HHD-RF) (VXU)

Canton Twp-Canton
Theresa Fliss
(734) 394-5240
(HHD-RF) (VXU)

Earth Tech-Wixom
Tim Sikema
(248) 624-6421
(SSI-RF) (VXU)

Grand Blanc Twp-Gd Blanc
Norm Riopelle
(810) 424-2642
(SSI-RF) (VXU) (Mapping)

City of Cadillac
Brian Cardinal
(231) 775-7671
(HHD-RF) (VXU)

Bridgeport Twp-Bridgeport
John Melzahn
(517) 777-0974
(SSI-RF) (VXU) (Mapping)

City of Dexter
Ed Lobdell
(734) 426-4572
(SSI-RF)

City of Jackson
Ron Shaw
(517) 788-4092
(SSI-RF) (HHD-RF)

Meridian Twp-Lansing
Larry Ondrias
(517) 349-4640
(HHD-RF) (VXU)

City of Lapeer
Pam Reed
(810) 664-4711
(HHD-RF)

Northville Twp-Northville
Rick Renault
(248) 348-5820
(HHD-RF) (VXU) (Mapping)

Augusta Twp-Ann Arbor
John Linville
(734) 260-9531
(SSI-RF) (VXU)

Gaines Twp-Grand Rapids
Shirley VanderLaan
(616) 698-6640
(HHD-RF)

Berlin Twp-Newport
Dave Roberts
(734) 586-8680 ext 6
(SSI-RF) (HHD-RF) (VXU)

Byron Twp-Grand Rapids
Julie Cremeans
(616) 878-0660
(SSI-RF)

City of Midland
Gary Tusciuk
(989) 631-0814
(HHD-RF) (VXU)

New Radioread Accounts
Spring Lake Twp-Spring Lake
Burt Twp-Grand Marais
Mancelona Area Water & Sewer Auth
City of St. Ignace
City of Cass City
City of Norton Shores
City of New Buffalo
City of Sault Ste. Marie

Accounts with Equip not using RF
City of Tawas City   Scio Twp-Ypsilanti
City of East Tawas   Earth Tech-Mio
City of Hudsonville   Holland Twp-Holland
City of Durand   City of Livonia
City of Ludington   Union Twp-Mt Pleasant
City of Hudson   City of Reed City
City of Benton Harbor
Van Buren Twp-Ypsilanti
Kinross Twp-Kinross