

TRANSPARENT TECHNOLOGIES



M1B Utility Radio Transmitter
Operations Manual

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References are made to Sony®, Clie™ and Palm©.

Version
M1B Version 1.00a
May 2005



M1B

Utility
Radio
Transmitter

***Operations
Manual***

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OVERVIEW

M1B

*Utility
Radio
Transmitter*



Universal

The M1 radio is a universal AMR device designed for every utility. Encoder and digital inputs for all major water meter registers.

Simple

The M1 operates in an unlicensed mode in the 900-Mhz range which requires no utility regulation. The radio is easily configured and interfaced with an off-the-shelf PDA.

Powerful

In addition to reliable meter reading, the M1 also provides powerful datalogging, consumption profiling and leak detection. The M1 transmit basic meter and leak detection information through the RF signal.

Basic Specifications

Transmission:	One-Way DTS (unregulated)
Regulatory:	FCC 15.247
Temperature:	-40°F to 158°F (-40°C to +70°C)
Humidity:	100%
Submersion:	IP-68 Rating
Packaging:	PCB 100% encapsulated
Housing:	Smoke or Clear Polycarbonate
Interface:	All Major Encoders All Major SC/Pulse See Compatability
Battery:	Replaceable 19.0 A-hr D-cell
Battery Life:	Up to 20 years



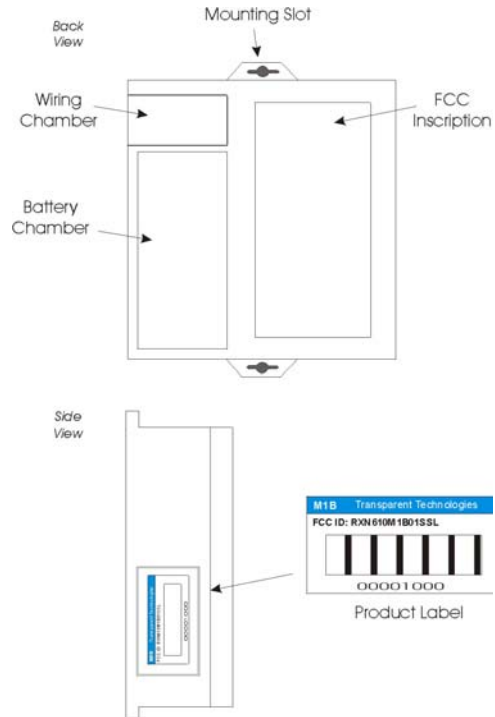
M1B Packaging

The M1B is housed in a polycarbonate shell with multiple levels of waterproofing. The housing is available in either a clear or smoke tint.

The housing is assembled with a UV-cure adhesive which provides the first level of environmental protection. The radio electronics are 100% encapsulated in a dielectric gel for 100% moisture protection. Finally, all cable entry/exit points are sealed with gel grommets to protect against long-term moisture penetration.

The rear of the radio unit provides the access chambers for the wiring connections and the replaceable battery.

The product label indicates a model number, a lot/serial number and the FCC identifier.





INSTALLATION &

Installation

The M1A is designed for all environments and can be installed either in indoor or outdoor environments.

Mounting Orientation

The most important consideration is to keep the M1B radio unit **UPRIGHT** when it is installed.

The antenna is located on the top of the radio board and the RF transmission pattern is optimized with an upright orientation.

In the UPRIGHT position:

- The hanging slot is at the top of the unit
- The T2 logo will be readable at the top of the housing
- The battery will be at the bottom

Other primary considerations for optimum transmission:

- Avoid mounting the radio unit directly against metal surfaces (pipes, valves, etc.)
- Avoid mounting the unit below typical water levels.
- Do NOT drive screws or mounting hardware into the unit's plastic housing.
- Always mount the unit at the highest grade possible.



In all cases, the installer should experiment with mounting techniques and RF performance prior to quantity installation.



Pit & Vault Installations

For best transmission, the unit should not be mounted directly on any metal surfaces, such as pipes or valves, or mounted below known water levels.

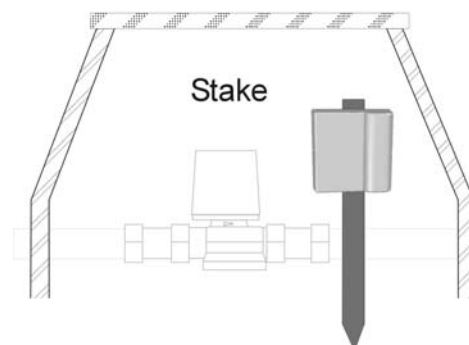
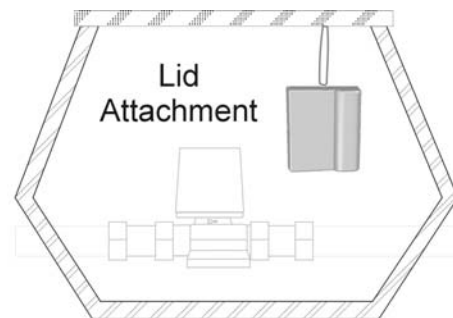
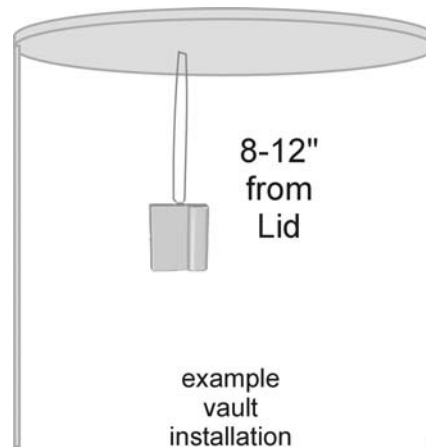
The M1B has multiple mounting options, including a slot for wire ties which can be used to hang the M1A, attach on a plastic stake or screw directly onto a wall.

An effective mounting technique for commercial meter vaults is to hang the M1A unit from a fixture (such as a ladder rung or the lid itself) near the top of the vault. Proper mounting in these types of vaults is essential for good RF performance.

For smaller vaults and meter boxes, a variety of acceptable mounting options are available. Two simple methods are hanging from the lid/cover and staking into the ground.

If time and space are available, the M1A can also be mounted on the side of a pit with a wall bracket.

For vaults or pits with metal lids, the M1B should be optimally mounted 6-18 inches below the lid/cover.



example
meter box
installations



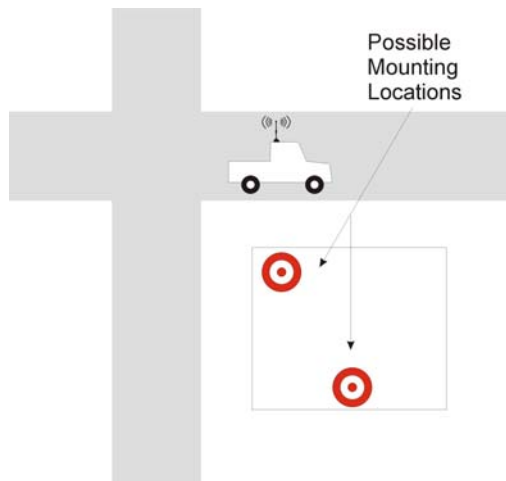
Indoor & Wall Installations

For best transmission, the unit should not be mounted backing on metal surfaces, reinforced concrete or other dense surfaces.

In indoor mounting situations, a higher mounting site will improve RF performance.

In below grade sites (e.g. basements), the installer should experiment with the best location before the final mounting. In these instances, the direction/bearing of the receiver should be considered.

For instance, if a unit is to be mounted in a basement with reinforced concrete walls, the best mounting location could be on the opposite wall, although this increases the overall distance.





Wiring

Encoders

As a default communication The M1B utilizes the ECR-II communications defacto-standard wiring conventions for encoder interfaces:

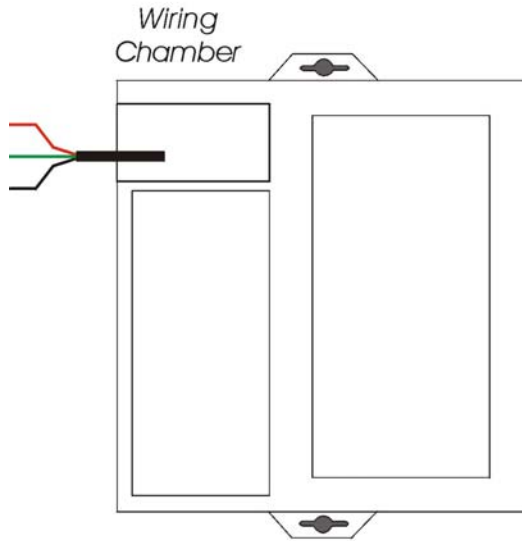
- Red:** Clock/PWR
- Green:** Data
- Black:** Ground

This wiring convention should be consistent with all Metron-Farnier, ECR-II and ECR-III registers.

The unit can be ordered with a pre-wired cable in 5-ft increments. In this case, the cable with leads will exit on the side or bottom of the unit.

For field retrofit applications, the unit can be ordering with leads ready for splicing in the wiring chamber.

Encoded Registers



- Red:** Clock / Power
- Green:** Data
- Black:** Ground

Wire Connections

The wiring connections are critical for reliable radio-to-register communications.

T2 recommends the use of 3m gel-cap type terminations. These connectors and the crimping tools are available at many hardware stores and online distributors.

Follow directions included with the gel-cap packaging to ensure proper terminations.



Pulse Wiring

For standard pulse wiring, the red and black wires should be connected to the pulse output of the register.

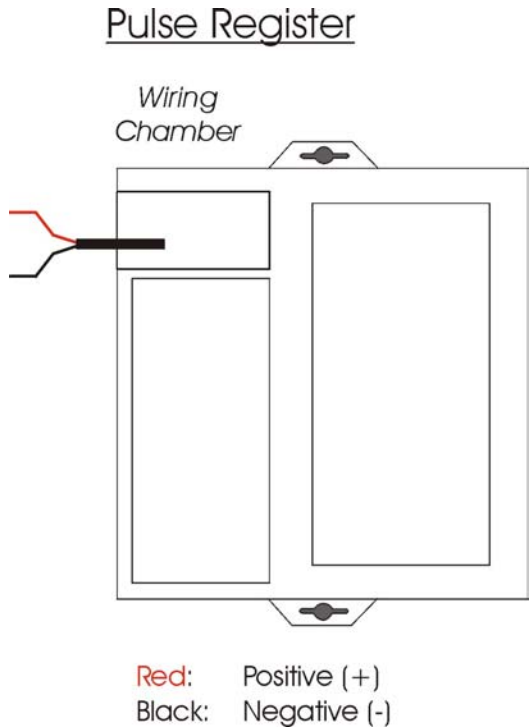
Check the T2 wiring guide for color coding for most registers.

Wire Connections

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Dual Encoder / Pulse

Metron-Farnier offers a unique register that supplies an encoder-output for meter reading purposes and a pulse output for datalogging purposes.

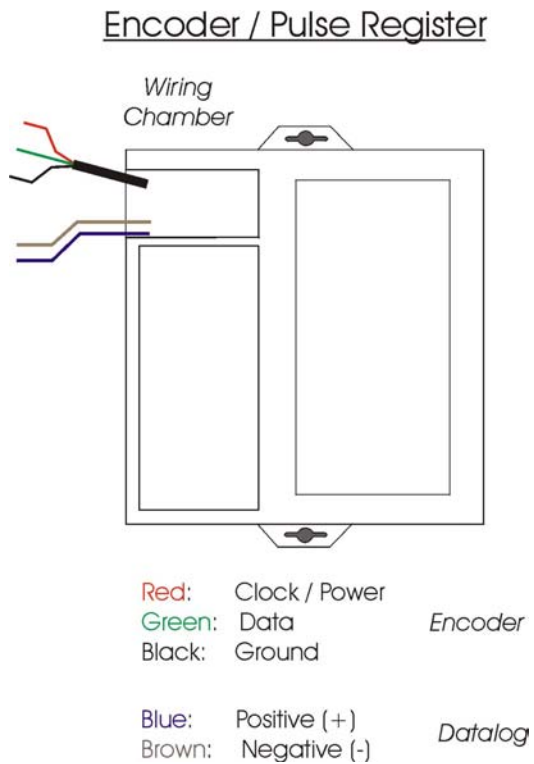
This special-order unit will have multiple wiring connections: one for the encoder output and one for the switch closure output.

Wire Connections

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OPERATION

Operation

The M1B radio operation is covered in three topics:

- ON/OFF Control
- Configuration
- Meter Reading
- Datalogging
- RF Operations

Refer to the FPDA Manual for detailed instructions on the operation of the M1B radio.

This manual only provides an overview on these topics.

ON/OFF Control

If the M1B radio has been purchased as a separate unit, it will be shipped in the default setting. This will be in the OFF mode.

The Field PDA provides the ability to set the M1B into one of three modes:

OFF: The RF transmission, meter interface and all data functions are off. The unit will monitor the IrDA port for ON/OFF commands.

Standby: The RF transmission function is off but the meter interface and all data functions are on. The unit will monitor the IrDA port for ON/OFF commands.

ON: The RF transmission, meter interface and all data functions are on. The unit will monitor the IrDA port for ON/OFF commands.



Configuration

The M1B radio is a flexible unit with configuration options available for tailoring the unit for a specific utility's needs.

Field PDA

The configuration is performed by the T2 Field PDA (FPDA). ***Refer to the FPDA Manual for detailed instructions on the configuration process.***

Configurable Parameters

The following items are configurable on the M1B radio:

Meter Settings

This screen allows the user to customize the settings the radio uses for the meter interface.

Transmit Settings

This screen allows the user to customize the settings the radio uses during its RF transmission.

Log Settings

This screen allows the user to customize the settings the radio uses during its data functions:

- Datalogging
- Leak Detection
- High Usage
- Zero Usage

M1B Configuration Parameters

Meter Settings

ID Type
Input Type
Encoder Value
Pulse Value
Meter Units
Meter Size
Meter Type
Meter Read (Pulse Inputs)

Transmit Settings

Transmit Scaling
Transmit Period
Group ID

Log Settings

Query Interval
Log Interval.

Leak Detection

- Leak Window
- Leak Period

High Usage

- High Usage Threshold
- Conservation Days



Meter Reading

Local Data Access

The M1B radio can be read locally via a standard Palm-OS based PDA. The T2 FPDA software is required for this function.

All configuration, meter reading and datalogs are accessible with the PDA software.

M1 Reading

GET DATA

ID: 123456

Raw Read: 2

Transmit Scaling: 0.1

Transmit Read: -2

View Statistics

View Configuration

done help

Meter Reading PDA Screen

M1 Meter Statistics

Battery Life: 100 %

Min Flow: 0

Min Flow Time: 8

Max Flow: 33

MaxFlowTime: 22

Meter Units: G (gallons)

Meter Size: 3"

Meter Type: MJ

Errors: 00000001 1

done help

Meter Statistics PDA Screen



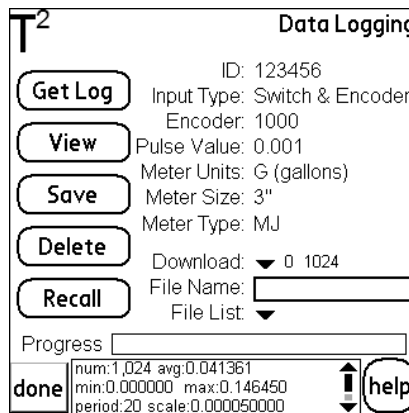
] Datalogging

The M1B radio logs data as an enhanced data function.

The basic data functions of the M1B radio – leak detection, backflow, high usage – are all detectable through the normal remote AMR operations (via the reading system).

The datalogging function offers a first-hand customer-service tool to examine the consumption pattern of a specific meter. For instance, if a customer has been flagged as having a possible leak, the water utility can use the FPDA to download the meter/radio’s data and immediately discuss the site’s usage data.

The FPDA will allow the user to view the data in a time bucket format (2, 4, 6, 12 or 24 hr) consumption bar chart format or in a flowrate line graph (for pulse-based systems only)



Data Logging PDA Screen



RF Operations

- Normal AMR Reading

The M1B radio transmits its RF signal on a regular interval (set by the transmit interval). The data is received by a mobile AMR receiver (either T2 R1 or RAMAR FastTrackIT).

The following data is available through the RF transmission:

- Meter Reading
- ID Number
- Leak Detect Flag
- Backflow Flag
- High Usage Flag
- Zero Usage Flag
- Low Battery Flag
- Register Communications Status

The screenshot shows the G1 AMR software interface. At the top, there is a menu bar with 'File', 'Run', 'View', 'Configuration', 'Utilities', and 'Help'. The main window is divided into several sections:

- Map:** A street map showing a grid of streets. A yellow line highlights a specific route. Various icons representing meters are scattered across the map.
- MetronFarnier:** A logo for 'MetronFarnier' with the tagline 'Advanced Single-Jet Technology'.
- Activity Window:** A section labeled 'Initializing...' with two red oval indicators for 'RF' and 'GPS'.
- Account Information:** A section containing the following data:
 - Account: RADIO READ OUTSIDE
 - MeterID: 284685
 - Reading: 5
 - Address: 200 HODGEMAN
 - Location:
 - Meter Type:
 - MeterSize:
 - Codes: 00
 - Tamper Count: 0
- Navigation and Control:** A bottom section with several buttons: 'Map View', 'Data View', 'Exit', 'Track View -OFF-', 'Map Move -ON-', 'Meter Filter -OFF-', 'Zoom IN (F5)', and 'Zoom OUT (F6)'. It also displays coordinates: 'Lat: 41.3115?' and 'Lon: -105.5923?'.
- Status Bar:** At the very bottom, it shows 'G1 AMR Profile: G1STest No GPS' and 'Zoom is 4X'.

G1 AMR Screen



BATTERY

The M1B radio has a replaceable battery.

Battery Specifications

Mfg: Tekcell
Type: Thionyl Lithium Chloride
Size: D-cell
Capacity: 19.0 A-hr



Battery Life

All battery calculations include a 20% environmental impact factor and use a baseline of regular function usage (PDA reads, datalogging, etc.)

The M1B's transmit period is directly related to the battery life of the M1 radio. The RF transmission is the largest power consumer and thus drives battery life.



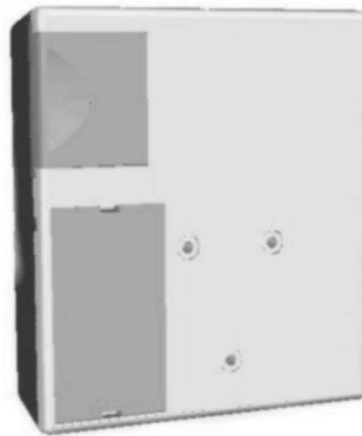
Battery Replacement

Transparent Technologies can provide replacement batteries for M1B radios.

The battery is replaced by first removing the battery cover and then removing the battery cell. The battery is connected to the board with a quick disconnect plug.

The replacement battery will come with the identical plug.

Once the replacement battery has been re-installed, the battery chamber will need to be filled with commercial grade silicone filler for waterproofing.







APPENDIX

FCC Information

Information to user. - The user's manual or instruction manual for an intentional or unintentional radiator shall caution the user that changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Special accessories.

(a) Equipment marketed to a consumer must be capable of complying with the necessary regulations in the configuration in which the equipment is marketed. Where special accessories, such as shielded cables and/or special connectors, are required to enable an unintentional or intentional radiator to comply with the emission limits in this part, the equipment must be marketed with, i.e., shipped and sold with, those special accessories. However, in lieu of shipping or packaging the special accessories with the unintentional or intentional radiator, the responsible party may employ other methods of ensuring that the special accessories are provided to the consumer, without additional charge, at the time of purchase. Information detailing any alternative method used to supply the special accessories shall be included in the application for a grant of equipment authorization or retained in the verification records, as appropriate.

The party responsible for the equipment, as detailed in §2.909 of this chapter, shall ensure that these special accessories are provided with the equipment. The instruction manual for such devices shall include appropriate instructions on the first page of the text concerned with the installation of the device that these special accessories must be used with the device. It is the responsibility of the user to use the needed special accessories supplied with the equipment. (b) If a device requiring special accessories is installed by or under the supervision of the party marketing the device, it is the responsibility of that party to install the equipment using the special accessories. For equipment requiring professional installation, it is not necessary for the responsible party to market the special accessories with the equipment. However, the need to use the special accessories must be detailed in the instruction manual, and it is the responsibility of the installer to provide and to install the required accessories.

(c) Accessory items that can be readily obtained from multiple retail outlets are not considered to be special accessories and are not required to be marketed with the equipment. The manual included with the equipment must specify what additional components or accessories are required to be used in order to ensure compliance with this part, and it is the responsibility of the user to provide and use those components and accessories.

(d) The resulting system, including any accessories or components marketed with the equipment, must comply with the regulations.



FCC Definitions

Class A digital device. A digital device that is marketed for use in a commercial, industrial or business environment, exclusive of a device which is marketed for use by the general public or is intended to be used in the home.

Class B digital device. A digital device that is marketed for use in a residential environment notwithstanding use in commercial, business and industrial environments. Examples of such devices include, but are not limited to, personal computers, calculators, and similar electronic devices that are marketed for use by the general public.

NOTE: The responsible party may also qualify a device intended to be marketed in a commercial, business or industrial environment as a Class B device, and in fact is encouraged to do so, provided the device complies with the technical specifications for a Class B digital device. In the event that a particular type of device has been found to repeatedly cause harmful interference to radio communications, the Commission may classify such a digital device as a Class B digital device, regardless of its intended use.

For a Class A digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

For a Class B digital device or peripheral, the instructions furnished the user shall include the following or similar statement, placed in a prominent location in the text of the manual:

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

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

The provisions of paragraphs (a) and (b) of this section do not apply to digital devices exempted from the technical standards under the provisions of §15.103.