UNIVERSAL RADIO FREQUENCY INTERROGATOR (URFI) USER'S MANUAL

(PRELIMINARY VERSION)

AMERICAN METER COMPANY

AUTOMATED SYSTEMS BUSINESS UNIT

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Overview

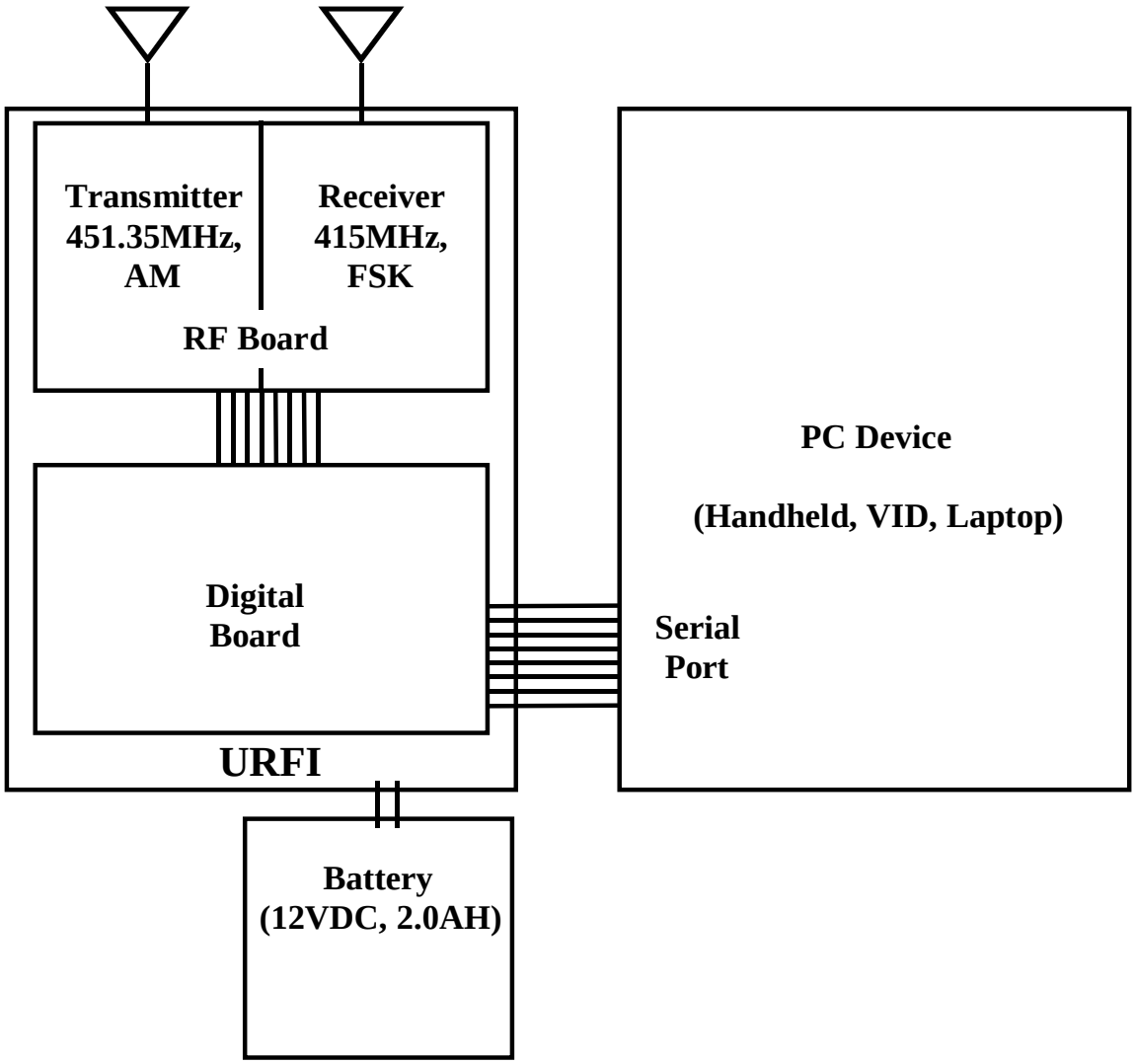
The Universal Radio Frequency Interrogator® (URFI®) is a portable radio transceiver used in conjunction with any customer-supplied handheld or portable computer to provide remote meter reading of Trace® system transponders. The Trace system is designed to convert the mechanical index reading of a utility meter to a duplicate electronic register reading. This electronic register reading is transmitted via radio frequency (RF) signals to the URFI. The URFI reads each transponder by means of an RF interrogation that consists of a unique serial number along with a command requesting the contents of the electronic register. The meter reading route data, which contains the street address and serial number of each transponder that is to be read, is stored by the computer, as is the actual meter reading following a successful interrogation; no data is stored in the URFI itself.

The URFI is controlled by a number of commands sent from the computer. Primary functions controlled by the computer's route-reading application are: initiation of interrogation; setting of receiver channel; and setting of power up/down modes.

A typical interrogation sequence consists of the following.

1. The computer powers up the URFI and the URFI performs its initialization routine, which includes programming the receiver and transmitter frequency synthesizers.
2. The computer sends the serial number of the transponder to be interrogated to the URFI through a serial port connection.
3. The URFI transmits a synchronization data pattern followed by the transponder serial number. This transmission is approximately 1.5 seconds in length.
4. A transponder 'wakes up' at some point during the URFI's synchronization data pattern transmission, hears the serial number and replies with the meter reading data if the serial number heard matches its own. Otherwise, the transponder goes back to sleep.
5. The URFI receiver listens for the transponder reply. If no valid data is detected, the receiver scans a range of adjacent channels for valid data. In this way, the receiver finds a drifted transponder signal, and the URFI sends the transponder channel to the computer; the URFI then re-interrogates with its receiver set to the new channel.
6. When the URFI receiver receives a valid transponder reading, this data is passed from the URFI to the computer for storage.

URFI System Components



Connections

The URFI has four ports which need to be connected to peripheral devices.

1. **Transmit BNC connector.** The transmit BNC connector is the connector on the left side of the front face of the unit. This shall be connected to an antenna having a nominal 50 Ohm impedance at 451 MHz. Three antennas are available from American Meter: 1) roof mount antenna for mobile use; 2) right angle 5/8 wavelength antenna; and 3) right angle 1/4 wavelength antenna.

2. **Receive BNC connector.** The receive BNC connector is the connector on the right side of the front face of the unit. This shall be connected to an antenna having a nominal 50 Ohm impedance at 415 MHz. Three antennas are available from American Meter: 1) roof mount antenna for mobile use; 2) right angle 5/8 wavelength antenna; and 3) right angle 1/4 wavelength antenna.

3. **Serial port connector.** The nine-pin serial port, located on the bottom of the unit, is connected to the appropriate serial port (COM port) of the user's computer via a serial cable.

4. **Power connector.** The DC power connector, located on the bottom of the unit, is connected to the right angle plug of the power cord supplied with the unit. The other end of the power cord shall be connected to the supplied 12VDC battery for portable use or directly to the cigarette lighter receptacle of an automobile for mobile use.

Indicators

Two light emitting diodes (LEDs) are located on the top end of the unit.

The green LED indicates that the URFI is powered on. For the URFI to be powered, it must have a sufficient DC supply and a logic level 'high' on the DTR pin (pin 4) of the serial port, which is supplied by the computer.

The red LED indicates that the URFI is in the transmit mode.

Specifications

Power source:	12 VDC vehicle power or sealed, rechargeable 12VDC lead acid battery
Transmit frequency:	450 – 460 MHz (determined by customer's FCC licensed frequency)
Transmit power:	2 Watts average power into 50 Ohms at antenna connector (factory set)
Transmit modulation:	Double-sideband, large carrier AM; 85% nominal modulation index
Receive frequency:	412 – 416 MHz, wideband FSK
Receive bandwidth:	200 kHz
Receive sensitivity:	-100dBm typ. (50 Ohm source at antenna connector)
Operating temperature:	-30ºC to +60ºC (-22ºF to +140ºF)
Storage temperature:	-40ºC to +85ºC (-40ºF to +185ºF)
Size:	6.25 x 4.25 x 2.00 inches (does not include connector protrusion)
Weight:	2 lbs. (approximate)
FCC compliance:	Part 90 (FCC ID: G8JURF01)