

*Owner's Manual*

*Automatic Meter  
Reader  
RF Transmitter*

6802973C65-A



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# INTRODUCTION

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## Scope of this Manual

This manual provides instructions for the installation and operation of the Automatic Meter Reader (AMR) RF Transmitter. For more information on testing and programming the RF Transmitter, see the online help of the AMR ToolBox.

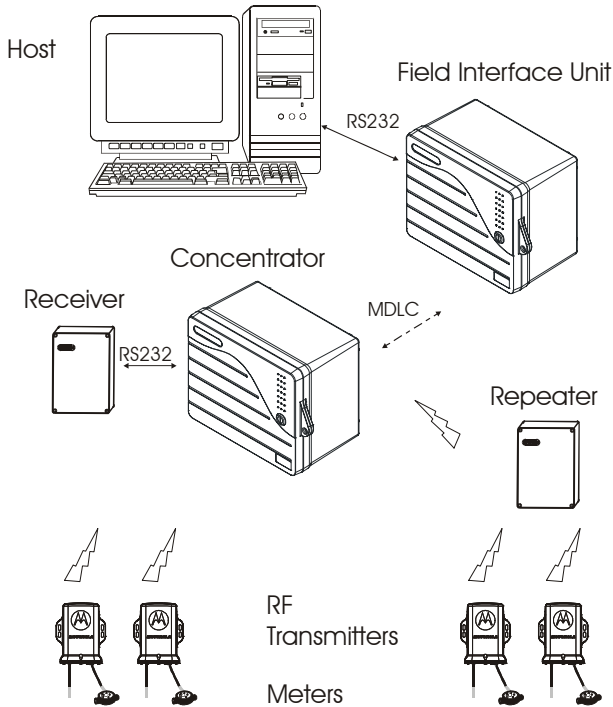
## The AMR System - Overview

The Automatic Meter Reader (AMR) system consists of remote units which collect meter information from the field and relay it to the host computer, via a network of intermediaries.

The AMR RF transmitter reads meter information and transmits it to a receiver in the AMR concentrator, over radio communication. When the distance between the transmitter and the receiver extends beyond the coverage area, a repeater should be added to forward the meter information to the receiver. The AMR concentrator forwards the meter readings to the AMR Field Interface Unit (FIU). The FIU collect the meter readings from a number of concentrators and forwards the data to the Host for processing. The Host application computer acts as a master station, communicating with units over various communication links.

Figure 1 provides a general view of the AMR System.

## Introduction



**Figure 1**  
Automatic Meter Reader –System View

The AMR concentrator and FIU are based on the Motorola MOSCAD/MOSCAD-L units. For more information on the MOSCAD/MOSCAD-L, see the System Overview manual of the MOSCAD Programming ToolBox.

## General Description

The AMR RF transmitter is a standalone unit used to transmit meter information from a single pulse-type meter to the AMR system for processing.

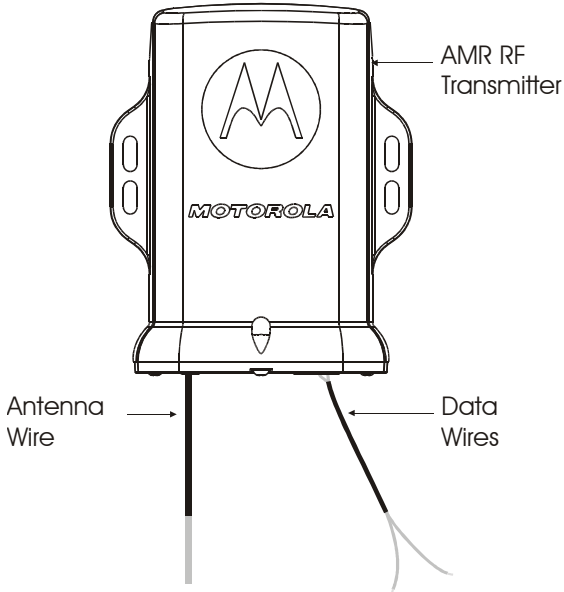
The AMR transmitter is designed to transmit meter information for at least ten years without power source replacement. The calculated battery life estimate is thirteen



years, based on six transmissions per day, zero repetitions, in 70° F temperatures.

The transmitter consists of a printed circuit board installed in a plastic case, suitable for either wall mounting or pit installation. The transmitter is intended for outdoor installation.

Figure 2 provides a general view of the transmitter.



**Figure 2**  
AMR Transmitter – General View

## **Safety Handling Instructions**

For information on safety handling instructions, see the Product Safety and RF Energy Exposure for AMR RF Transmitters booklet, Motorola publication no. 6802974C60, which is distributed with the transmitter.

# INSTALLATION

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## General

### SAFETY SUMMARY

**NOTICE: It is recommended that the transmitter be installed such that the antenna and the transmitter are kept 7.8 in (20 cm) from passersby when transmitting.**

**The AMR RF transmitter should be installed by qualified and authorized technicians.**

**Federal regulations forbid air transport of an enabled transmitter. If an enabled transmitter is to be transported by air, the transmitter housing must be opened and the battery terminals and capacitor must be unsoldered.**

The installation of the AMR RF transmitter includes the following steps, which should be performed in order below:

1. Programming any changes to the transmitter parameters, if necessary;
2. Enabling the transmitter;
3. Installing the transmitter (either on the wall or in a pit);
4. Recording transmission counter values/meter readings and forwarding them to the host.

## *Installation*

# Changing the Transmitter Parameters

The AMR RF transmitter is configured in the factory. If this configuration needs to be modified, use the AMR ToolBox to change the parameters, as necessary. For more information, see Appendix C below and the AMR ToolBox User Guide.

## Enabling the Transmitter



Caution

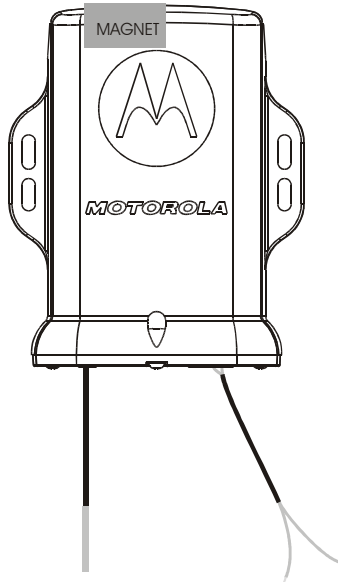
**The AMR RF transmitter should be enabled before mounting and installation. Do not enable the AMR RF transmitter if it is to be transported by air.**

The AMR RF transmitter can be enabled with or without the AMR ToolBox.

### Without the AMR ToolBox

The transmitter can be enabled and tested without the AMR ToolBox.

1. Short-circuit the two input wires by connecting the two exposed wire endings.
2. Place a magnet (such as the one supplied with the AMR Programming Kit) near the top of the housing as shown in Figure 3 below for at least three (and no more than five) seconds.



**Figure 3**  
Enabling the AMR Transmitter

3. When the magnet is removed, the transmitter is enabled and a transmission will be sent.

**IMPORTANT:** If the magnet is held near the unit for more than ten seconds, wait another 30 seconds before once again placing the magnet near the top of the transmitter to enable it.

4. To view this transmission from the concentrator which was configured to receive from this transmitter, connect a notepad or laptop computer to the concentrator (RS232 cable from COM port to RS232 port on MOSCAD/MOSCAD-L concentrator) and open the Viewer tool. (See AMR FIU and Concentrator Applications User Guide.) Look for the transmitter ID and timestamp.
5. To view this transmission from the Host computer (in the Central), use the Host application. (See the documentation of the relevant Host application.) Look for the transmitter ID and timestamp.

## *Installation*

### **With the AMR ToolBox**

The transmitter can be enabled and tested using the AMR ToolBox.

1. Connect the transmitter to the programmer unit as shown in Figure 11 in Appendix C.
2. Place the magnet for more than 10 seconds near the top of the transmitter and remove it. This will put the transmitter into programming mode.
3. Select the Transmitter in the AMR ToolBox menu panel and click on the Connection Check icon in the icon bar (or select the Connection Check command from the Comm menu.)
4. If the connection fails, repeat step 2. If the connection still fails, switch to the Repeater in the AMR ToolBox menu panel and repeat the Connection Check. If this too fails, check the physical connection and COM port setting of the programmer and the ToolBox PC. If the repeater connection now succeeds, repeat step 2. If the transmitter connection still fails, check the physical connection between the programmer and the transmitter.
5. If the connection succeeds, click on the Enable Transmitter button in the Transmitter Status tool to enable the transmitter.
6. If the screen shows that the Transmitter is enabled, click TX check on the Comm Test tab of the HW Test tool to test the transmission. If the TX check succeeds, OK will be displayed in the tool window.
7. If the screen shows that the Transmitter is disabled, click on the Enable Transmitter button. If it still fails, enable the transmitter as described in Without the AMR ToolBox again. If this too fails, replace the unit.

For more information on the AMR ToolBox, see Appendix C below and the AMR ToolBox User Guide.

## Recording Counter Values/Readings

### Initial Recording



Caution

**Record the initial meters reading and counter value AFTER installing the transmitter.**

The transmitter maintains a pulse counter which is advanced with every pulse of the meter. This counter is used in the Host for data collection. After the transmitter has been installed, the initial value of that counter along with the actual reading from the meter display, must be recorded in the Host.

1. Force a transmission with a magnet (as described in Appendix C.)
2. Use the AMR ToolBox, the Viewer tool in the concentrator, or the Host application to find the counter value in the transmission. (See AMR ToolBox, concentrator or Host user documentation.)
3. Record the initial value of the counter.
4. Record the actual reading of the meter (from the face of the meter).
5. Send both values to the Host (e.g. by phone, in person) where they can be synchronized for billing.

### Subsequent Recording during Reprogramming

Once the transmitter is already operating, the transmitter parameters may need to be reprogrammed. During the reprogramming, pulses may be missed by the transmitter. To ensure that the data collected by the Host is accurate, do the following:

1. Before disconnecting the transmitter from the meter, record the actual reading of the meter (from the display of the meter).

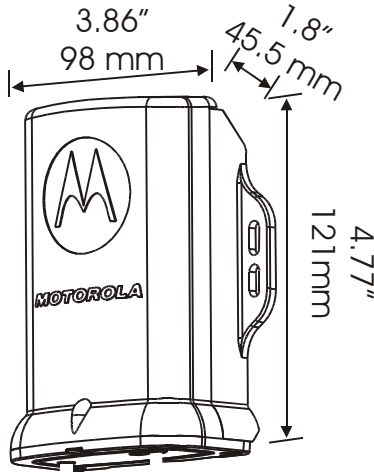
### *Installation*

2. Connect the transmitter to the programmer unit as shown in Figure 11 in Appendix C.
3. Using the AMR ToolBox, change the required parameters (as described in Appendix C and the AMR ToolBox User Guide.)
4. Reconnect the transmitter to the meter and read the meter reading (from the display of the meter).
5. Force a transmission with a magnet (as described in Appendix C) and read the counter value (using the AMR ToolBox attached to the programmer unit, Viewer tool in the concentrator or the Host application.)
6. Send the two meter readings and the counter value to the Host (e.g. by phone, in person) where they can be synchronized for billing.



## Dimensions

The dimensions of the transmitter are: width – 3.86" (98 mm), height – 4.77" (121 mm), depth – 1.8" (45.5 mm), weight – 8.82 oz (250 g) maximum (see Figure 4).



**Figure 4**  
Dimensions of AMR RF Transmitter

## Wall Mounting



**The AMR transmitter should be enabled before mounting. See the Enabling the Transmitter section above.**



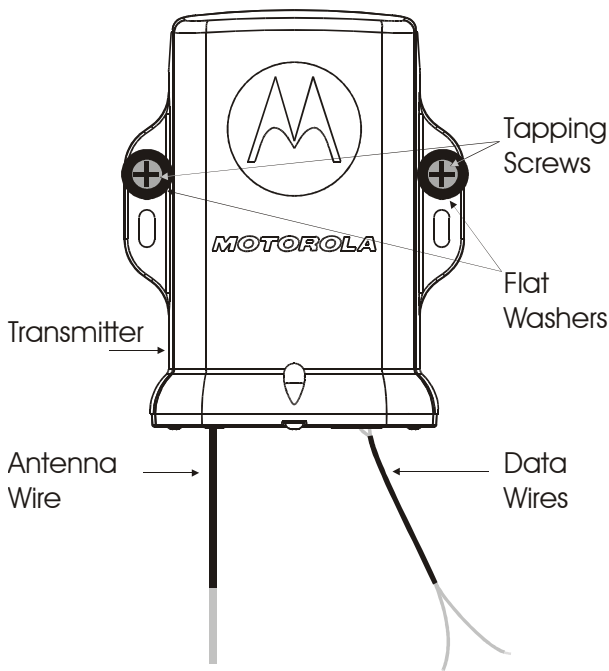
**Before installing the AMR transmitter, make sure that the transmission frequency and transmissions rate are appropriate. If not, reprogram as described in Appendix C and the AMR ToolBox User Guide.**

## Installation

The AMR transmitter can be installed on the wall using screws. Before installing, verify that there is sufficient space around the transmitter. Allow 6.3" (16 cm) from the bottom of the transmitter for the antenna.

The AMR transmitter can be mounted on the wall using screws, as shown in Figure 5 below.

1. Position the AMR transmitter as high as possible on the wall.
2. Secure with two stainless steel self-tapping screws (ST4.2, pan head) and two stainless steel flat washers, inner diameter: 0.17", outer diameter 3/8", thickness 0.032" (not supplied).



**Figure 5**  
Installation of AMR Transmitter – Wall Screw Mount

## Installation

3. Connect the transmitter wires to the meter wires, using gel cups (not supplied) to seal the connection. Use a 3M™ recommended tool to squeeze the gel cup until the connection is sealed.
  - If the meter wires are floating, connect the two data wires to the meter wires.
  - If one of the meter wires is connected to the ground/common (-), connect it to the black wire on the transmitter and connect the green wire to the switch (+).

The transmitter wires are 18" (45.7 cm) long. If this is not adequate to reach the meter, add up to 100 ft (30 m) of AWG20 wire.



**To ensure that moisture does not damage the transmitter, gel cups must be used to seal the connection between the data wires and the meter.**



**Make sure that the antenna is pointing downwards in as straight a line as possible. If necessary, bend the antenna into a vertical position.**

## Pit Installation



Caution

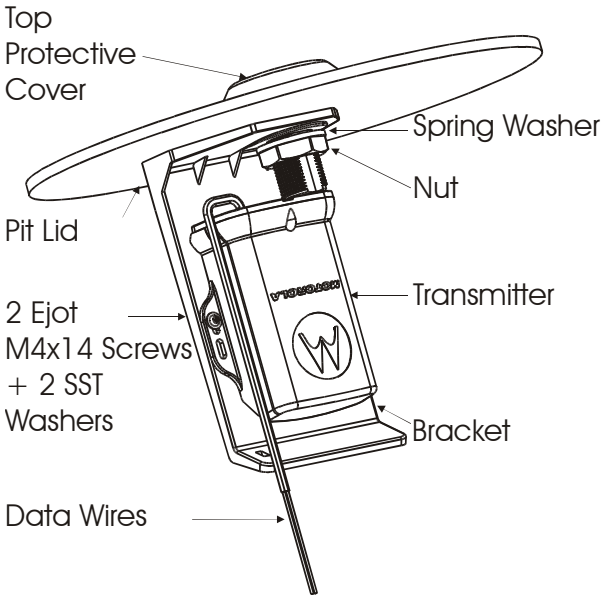
**The AMR transmitter should be enabled before installing. See the Enabling the Transmitter section above.**



Caution

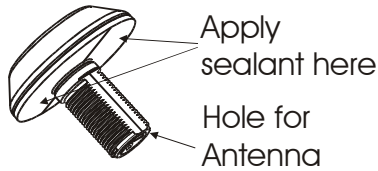
**Before installing the AMR transmitter, make sure that the transmission frequency and transmissions rate are appropriate. If not, reprogram as described in Appendix C and the AMR ToolBox User Guide.**

The AMR transmitter can be installed in a meter pit with a metal or plastic lid. Before installing, verify that the available space is at least 10" (25.4 cm) deep and 4.7" (12 cm) in diameter. The thickness of the lid can be between .25" (6.3 mm) and 1" (2.54 cm).



**Figure 6**  
Pit Installation

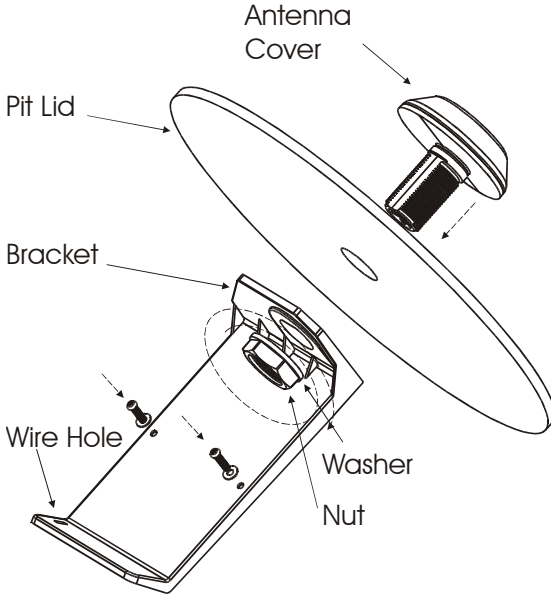
1. Remove the lid from the pit.
2. Drill 1.1" or 1 1/8" hole in the flat portion of the lid. (The flat portion should be at least 3.54 sq. in or 9 sq. cm.) Remove burrs from the edges of the hole.
3. Spread any type of RTV sealant on the bottom of the antenna cover.



**Figure 7**  
Antenna Cover

4. Insert the threaded bottom of the antenna cover through the top of the hole in the lid, and through the top hole of the bracket, aligning the flat edge of the threading with the flat edge of the hole.
5. Fix the top of the bracket on the internal side of the lid and secure it with the spring washer and nut (supplied).
6. Tighten the nut with a wrench (not supplied) with a torque of  $40 \pm 5$  in-lb.

## Installation



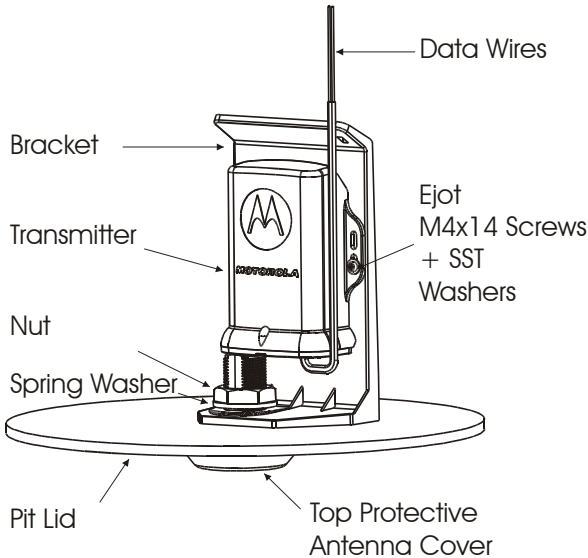
**Figure 8**  
Bracket Attached to Pit Lid



Caution

**Do not exert torque of more than  $40 \pm 5$  in-lb on the nut or it may be damaged.**

7. Invert the lid and bracket and place carefully on the ground, resting the full weight on the top of the antenna cover (with the Motorola symbol).
8. Insert the antenna (attached to the transmitter) downwards through the antenna hole at the bottom of antenna cover (see Figure 6) until the transmitter housing meets the threaded base of the antenna cover.
9. Secure the transmitter to the bracket with two Ejot M4x14 stainless steel screws and two stainless steel flat washers, inner diameter: 0.17", outer diameter 3/8", thickness 0.032" (supplied) as shown in Figure 9.



**Figure 9**  
AMR Transmitter Mounted on Pit Lid

10. Thread the transmitter input wires through the small wire hole at the base of the bracket (see Figure 8) OR attach transmitter wires to side of bracket, threading a strip (not supplied) through the small wire hole at the base of the bracket.
11. Connect the transmitter wires to the meter wires, using gel cups (not supplied) to seal the connection. Use a 3M™ recommended tool to squeeze the gel cup until the connection is sealed.
  - If the meter wires are floating, connect the two data wires to the meter wires.
  - If one of the meter wires is connected to the ground/common (-), connect it to the black wire on the transmitter and connect the green wire to the switch (+).

The transmitter wires are 18" (45.7 cm) long. If this is not adequate to reach the meter, add up to 100 ft (30 m) of AWG20 wire.

## Installation



Caution

To ensure that moisture does not damage the transmitter, gel cups must be used to seal the connection between the data wires and the meter.

12. Replace the lid on the pit with the antenna cover facing up.



Caution

The plastic bracket can withstand the weight of the lid (up to 330lb/ 150 kg). Care should be taken not to exert more than this weight or else the bracket might break.

## Connections

### Data Connection

Two data input wires from the transmitter are connected to the meter, one to each side of the switch.

### Programming Connection

The two data wires of the transmitter can be connected to the programmer unit for enabling, programming and testing the transmitter using the AMR ToolBox. Connect the black wire on the programming cable to the black wire on the transmitter and the green wire to the green.

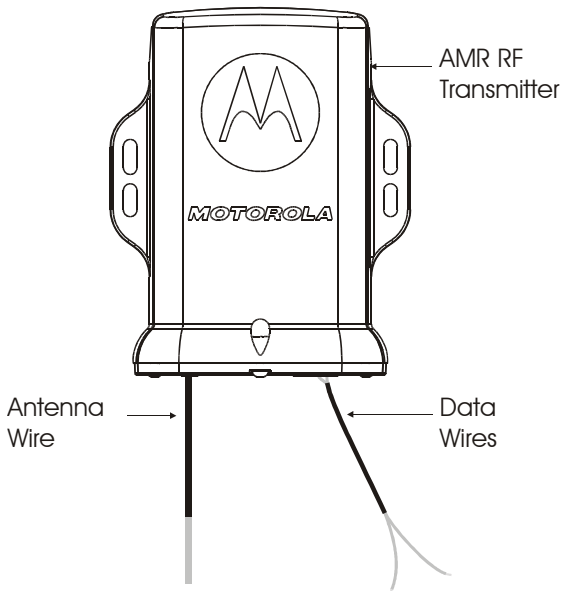


# THE AMR RF TRANSMITTER

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## Overview

The AMR RF transmitter contains a UHF radio (450-470MHz 12.5 KHz bandwidth) and a logic circuit interface to a single pulse-type meter. The transmitter includes an internal lithium battery.



**Figure 10**  
AMR RF Transmitter

## Communication

The transmitter communicates via receiver/ repeater or programmer units in two ways:

Meter data is sent via one-way UHF communication to a receiver.

When the data input wires of the transmitter are connected to a programmer unit which is connected to the AMR ToolBox PC, programming commands are received from the ToolBox and transmissions are sent to the air. See Appendix C for details.

## Connectors

The AMR transmitter has one internal connector for the data input wires.

## Internal Battery

The AMR RF transmitter is powered with an internal lithium battery. The calculated battery life estimate is 13 years, based on 6 transmissions per day, zero repetitions, in 70° F temperatures.

The battery can be replaced by performing a solder operation on the terminal leads by authorized personnel in lab conditions. See Appendix D below for instructions on replacing the battery.



**Once the transmitter has been enabled, it cannot be disabled, unless the battery and capacitor are detached. If an enabled AMR transmitter is to be transported by air, the transmitter housing must be opened and the battery terminals and capacitor must be unsoldered.**

### *The AMR RF Transmitter*

The transmitter sends a battery status signal as part of its transmission. When a low battery indication appears, the transmitter has enough calculated power for approximately five months ( $\pm 3$  months) of normal operation.

## *The AMR RF Transmitter*

# **APPENDIX A: SPECIFICATIONS**

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## **Transmission**

Frequency:	UHF 450-470 MHz (field configurable)
Channel Bandwidth:	12.5 KHz
Operation Mode:	Transmit only
RF Power:	100mW ERP, maximum 120mW ERP
ID	Globally unique serial number
Data Speed:	1200 bits per second
Transmission Rate:	Either 1/week, 1/day, 4/day or 6/day (factory and field configurable)
RF Cable:	RG316

## **Power Source**

Battery Type:	Tadiran TL-4903 internal lithium battery
Shelf Life:	~1-2% discharge per year
Replacement Method:	Solder operation on terminal leads
Capacitor:	Tadiran HLC-1520A

## Appendix A: Specifications

### Interface to Pulse Type Meter

Interface Cable:	18" (45.7 cm) 2-wire AWG20 teflon conductor cable with unterminated ends
Pulse:	Dry contact, open/close to the 2-wire conductor cable
Counter Rollover:	The counter embedded in the RF Transmit unit will rollover a counter value of $2^{31}$ (or approximately 2 billion) counts.

### Environmental

Operating Temperature:	-22°F to +140°F (-30°C to +60°C)
Storage Temperature:	-40°F to +158°F (-40°C to +70°C)
Installation:	Indoor/outdoor/pit
Water Resistance:	Submersible, IP 67
UL:	UL60950
FCC:	FCC parts 15 and 90

### Form Factor

Housing:	Injection molded plastic, UV resistant, UL94 V1
Dimensions:	3.86" x 4.77" x 1.8" (98x121x45.5mm)
Weight:	8.82 oz (250g ± 50g)

## **Pit Installation Kit**

Bracket Dimensions:	4.72"w x 9.8"h (12cm x 25 cm)
Bracket Screw:	1" threaded screw, spring washer, and nut
Bracket Strength:	Withstands torque of $40 \pm 5$ in-lb
Antenna Cover Dimensions:	3.23" (82mm) diameter
Antenna Cover Impact Resistance:	Withstands 330lb (150 kg)

Specifications subject to change without notice.

## *Appendix A: Specifications*



## APPENDIX B: MODELS AND ACCESSORIES

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### General

The chart below describes the models, options and accessories available.

<b>AMR Transmitter Models</b>	<b>Model</b>
AMR RF TRANSMITTER UHF 100MW 450-470MHZ 12.5KHZ	F4714A

<b>AMR Transmitter Accessories</b>	<b>Accessory</b>
ADD: Pit Antenna Installation Kit	FHN6584A

<b>Miscellaneous</b>	<b>Model/Option</b>
AMR Programming Kit (includes programmer unit, cables, AMR ToolBox software, and magnet)	F4604A+ V345AK

## *Appendix B: Models and Accessories*

# **APPENDIX C: THE AMR TOOLBOX**

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## **Programming the Transmitter**

The AMR RF transmitter can be reprogrammed using the AMR ToolBox. This is generally done during installation or when changing the meter. Basic programming functions include:

- Enabling the transmitter
- Testing the transmitter
- Forcing a transmission
- Changing the transmitter parameters

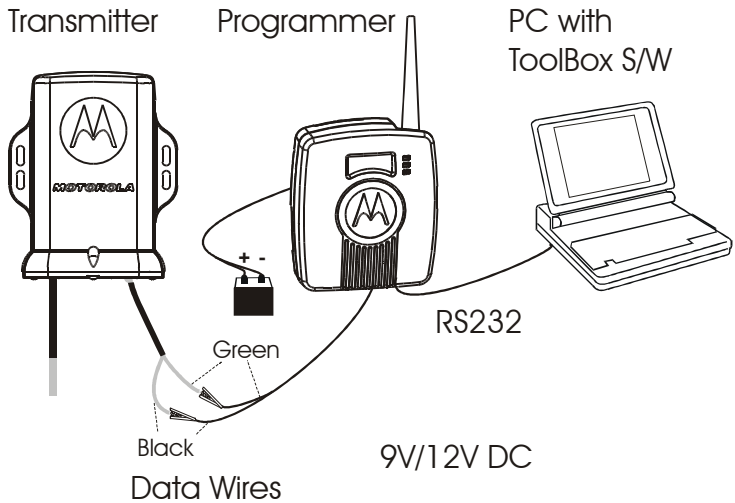
For more details on programming the transmitter, see AMR ToolBox User Guide.

If the transmitter parameters are changed once it is operational, the meter readings should be recorded, as described in the Recording Counter Values/Readings section of the Installation chapter, to ensure data collection integrity.

## **Connecting the Transmitter to the ToolBox**

In order to reprogram, the transmitter is connected to a programmer unit which is connected to a PC running the AMR ToolBox, as shown in the figure below.

## Appendix C: The AMR ToolBox



**Figure 11**  
Programming Equipment Setup

1. If the AMR RF transmitter is already connected to the meter, cut the data input wires (as close to the end as possible) and expose the tips.



Caution

**If the wires are connected incorrectly, the equipment may be damaged.**

2. Connect the programmer unit to a DC power source. For a standard 9V DC battery, use the short power cable supplied with the Programming Kit. For a 12VDC battery, insert the protection board (FCN6538A) into the DC power connector on the back of the programmer unit and then attach the 7 ft power cable (supplied with the Programming Kit).
3. Connect the programmer unit to the ToolBox PC, using the RS232 cable and RS232 connector (FTN6597A) supplied with the Programming Kit.
4. Power up the programmer unit by inserting the On/Off TB supplied with the Programming Kit into the GND connector.

5. Power up the PC.
6. Start up the AMR ToolBox.
7. Using crocodile clips, attach the green data input wire on the transmitter to the green wire on the programmer unit programming cable, and the black data input wire on the transmitter to the black wire on the programming cable.

After programming, be sure to remove the On/Off TB to power off the programmer unit in order to save battery power.

## Transmitter Parameters

The following parameters can be modified using the AMR ToolBox Configuration tools:

- Tx Frequency (450-470MHz), if the frequency is not suitable or if there is interference. Do not change the frequency without FCC approval. This parameter is changed in the Transmitter Radio Configuration tool.
- Transmissions Rate (6/day, 4/day, 1/day, or 1/week), as required. This parameter is changed in the AMR Parameters tab of the Transmitter Configuration tool.
- Number of Repetitions (0-3), generally when there are reception problems. This parameter is changed in the AMR Parameters tab of the Transmitter Configuration tool.



**Increasing the number of repetitions significantly reduces the life of the battery. This step should be taken only in extreme cases and with the approval of authorized personnel.**

To change a transmitter parameter, go to the relevant tab, change the value and save the change. For more information on transmitter parameters, see the AMR ToolBox User Guide.

## Appendix C: The AMR ToolBox

If the transmitter parameters are changed once it is operational, the meter readings should be recorded, as described in the Recording Counter Values/Readings section of the Installation chapter above, to ensure data collection integrity.

### Enabling the Transmitter

To enable the transmitter,

1. Click on the Enable Transmitter button in the Transmitter Status tool.



Caution

**Once the AMR transmitter is enabled, it cannot be disabled. Do not enable the AMR transmitter if it is to be transported by air.**

2. Select the Transmitter Status tool.
3. Click on the Enable Transmitter button.
4. The results (either Succeeded or Failed) will appear on the screen.
5. To check the status, click on the Upload button.
6. The status (either Enabled or Disabled) will appear on the screen.

### Testing the Transmitter

To test if the transmitter is operational using the AMR ToolBox,

1. Select the Transmitter Hardware Test tool.
2. Click on the Comm Test tab.
3. Click on the Start button.
4. Verify the OK/Fail status in the Test Result on the screen.

## **Forcing a Transmission**

Forcing a transmission is done when testing the transmitter and when recording the meter counter in the Host. To force a transmission,

1. Select the Transmitter Hardware Test tool.
2. Click on the Comm Test tab.
3. Click on the Force button.

The transmission information includes: Unit ID, meter counter value, battery status and the Transmissions Rate setting. This information can be read using the AMR ToolBox Comm Monitor tool on a programmer unit, concentrator Viewer or at the Host.

*Appendix C: The AMR ToolBox*



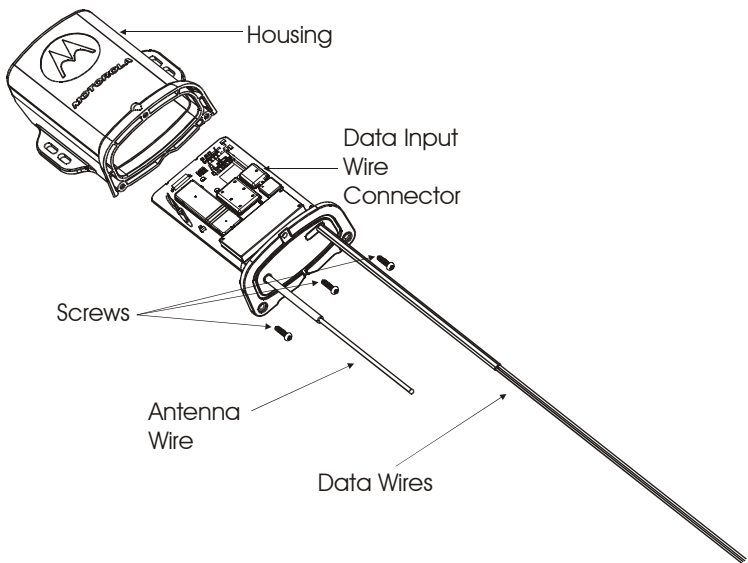
# APPENDIX D: BATTERY REPLACEMENT

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## Replacing the Battery

If it is necessary to replace the internal lithium battery, follow the procedure below:

1. Using a screwdriver, unscrew the three screws at the bottom of the transmitter.
2. Pull the housing away from the base to expose the printed circuit board.



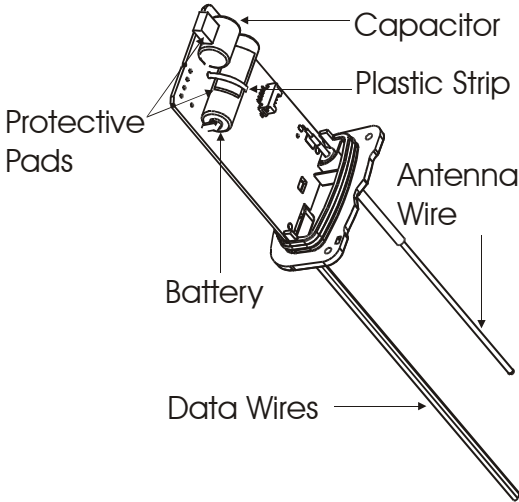
**Figure 12**  
AMR RF Transmitter- Exploded View



**When opening, closing and soldering the transmitter unit, take care not to damage the soldered connection of the antenna wire to the circuit board.**

## Appendix D: Battery Replacement

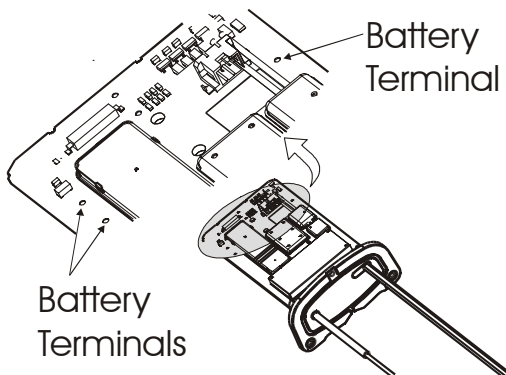
The battery and capacitor are soldered onto the printed circuit board, as shown below.



**Figure 13**

Battery and Capacitor on Transmitter Circuit Board

3. Cut the plastic strip tied around the battery.
4. Using a soldering iron, heat the legs on the battery connection until they become soft.



**Figure 14**

Battery Terminals- Top View for Soldering



**When soldering battery terminals, use caution to take care not to damage any other components on the circuit board.**

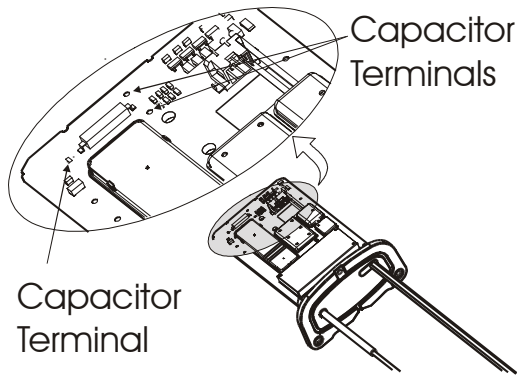
5. Remove the old battery from the circuit board.



**Always replace the battery with the type specified in this document to avoid risk of explosion.**

**Dispose of used batteries according to manufacturer instructions and local environmental laws.**

6. Using a soldering iron, heat the legs on the capacitor connection until they become soft.



**Figure 15**

Capacitor Terminals- Top View for Soldering

7. Remove the capacitor from the circuit board.
8. Peel the liner off a new protective pad (part number 7588383V65) and adhere it to the side of a new battery, as shown in Figure 13 above.
9. Place the new battery on the circuit board and secure with a new plastic strip, as shown in Figure 13 above.
10. Solder the battery leg connections from the top of the circuit board, using caution to avoid damaging other components on the board.
11. Place a new capacitor on the circuit board, as shown in Figure 13 above.

#### *Appendix D: Battery Replacement*

12. Solder the capacitor leg connections from the top of the circuit board, using caution to avoid damaging other components on the board.
13. Check that the data input wires are properly connected to the connector and that the antenna is properly soldered.
14. Peel the liner off a new protective pad (part number 7588383V66) and adhere it to the side of the new capacitor, parallel to circuit board, as shown in Figure 13 above.
15. Carefully slide the circuit board back into the housing, taking care not to disturb the antenna connection to the board.
16. With a screwdriver, replace the three screws at the bottom of the transmitter, applying torque of 6 in-lb.

Note: If it is convenient, the data input wire can be disconnected from the internal connector before soldering and reconnected after the battery and capacitor are replaced.



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# AMR RF TRANSMITTER

## Product Safety and RF Exposure for the AMR RF Transmitter

**BEFORE USING THIS RF TRANSMITTER, READ THIS BOOKLET WHICH CONTAINS IMPORTANT OPERATING INSTRUCTIONS FOR SAFE USAGE AND RF ENERGY AWARENESS AND CONTROL INFORMATION FOR COMPLIANCE WITH RF ENERGY EXPOSURE LIMITS IN APPLICABLE NATIONAL AND INTERNATIONAL STANDARDS.**

The information provided in this document supersedes information contained in user guides published for this product prior to July 2004.

The AMR RF Transmitter is designed for fixed locations.

### Compliance with RF Energy Exposure Standards

Notice: This RF transmitter is intended for use in uncontrolled environments.

### Federal Communication Commission Regulations

The FCC established limits for safe exposure to radio frequency (RF) emissions from two-way radios. The FCC requires manufacturers to demonstrate compliance with RF exposure limits before two-way radios can be marketed in the U.S.

Your AMR RF Transmitter is designed and tested to comply with a number of national and international standards and guidelines (listed below) regarding human exposure to radio frequency electromagnetic energy. This transmitter complies with the IEEE (FCC) and ICNIRP exposure limits for uncontrolled RF exposure environments. In terms of measuring RF energy for compliance with the FCC exposure guidelines, your AMR RF Transmitter radiates measurable RF energy only while it is transmitting, not when it is in standby mode.

### Your AMR RF Transmitter complies with the following RF energy exposure standards and guidelines:

- United States Federal Communications Commission, Code of Federal Regulations; 47CFR part 2 sub-part J
- American National Standards Institute (ANSI) / Institute of Electrical and Electronic Engineers (IEEE) C95. 1-1992
- Institute of Electrical and Electronic Engineers (IEEE) C95.1-1999 Edition
- International Commission on Non-Ionizing Radiation Protection (ICNIRP) 1998
- Ministry of Health (Canada) Safety Code 6. Limits of Human Exposure to Radio frequency Electromagnetic Fields in the Frequency Range from 3 kHz to 300 GHz, 1999
- Australian Communications Authority Radio communications (Electromagnetic Radiation - Human Exposure) Standard 2003
- ANATEL, Brazil Regulatory Authority, Resolution No. 303 of July 2, 2002 "Regulation of the limitation of exposure to electrical, magnetic, and electromagnetic fields in the radio frequency range between 9KHz and 300 GHz" and "Attachment to resolution # 303 from July 2, 2002"

### Compliance and Control Guidelines and Operating Instructions for the AMR RF Transmitter

To control your exposure and ensure compliance with the uncontrolled environment exposure limits, always adhere to the following procedures.

- Use only Motorola approved supplied or replacement accessories. Use of non-Motorola-approved accessories may exceed FCC RF exposure guidelines.
- The end-user would be provided with appropriate installation instructions for satisfying RF exposure compliance.

It is recommended that the transmitter be installed such that the antenna and the transmitter are kept 7.8 inches (20 cm) from passersby when transmitting. Keeping the transmitter at a proper distance is important because RF exposures decrease with distance from the antenna.

For additional information on RF exposure awareness information, visit the following Motorola website: [www.mot.com/rfhealth](http://www.mot.com/rfhealth).



## Electromagnetic Interference/Compatibility

Note: Nearly every electronic device is susceptible to electromagnetic interference (EMI) if inadequately shielded, designed, or otherwise configured for electromagnetic compatibility.

### Medical Devices

#### Pacemakers

The Advanced Medical Technology Association (AdvaMed) recommends that a minimum separation of 6 inches (15 centimeters) be maintained between the AMR RF Transmitter and a pacemaker. These recommendations are consistent with those of the U.S. Food and Drug Administration.

#### Persons with pacemakers should:

- ALWAYS keep the RF Transmitter more than 6 inches (15 centimeters) from their pacemaker when the RF Transmitter is enabled.
- Increase the distance from the enabled RF Transmitter immediately if you have any reason to suspect that interference is taking place.

#### Hearing Aids

Some digital wireless radios may interfere with some hearing aids. In the event of such interference, you may want to consult your hearing aid manufacturer to discuss alternatives.

#### Other Medical Devices

If you use any other personal medical device, consult the manufacturer of your device to determine if it is adequately shielded from RF energy. Your physician may be able to assist you in obtaining this information.



## Operational Warnings

### Potentially Explosive Atmospheres

Do not take an enabled RF Transmitter into any area with a potentially explosive atmosphere, unless it is especially qualified for use in such areas as "Intrinsically Safe" (for example, Factory Mutual, CSA, UL, or CENELEC).

Sparks in a potentially explosive atmosphere can cause an explosion or fire resulting in bodily injury or even death. The areas with potentially explosive atmospheres referred to above include fueling areas such as below decks on boats, fuel or chemical transfer or storage facilities, areas where the air contains chemicals or particles, such as grain, dust or metal powders. Areas with potentially explosive atmospheres are often but not always posted.

### Blasting Caps and Blasting Areas

To avoid possible interference with blasting operations, do not take an enabled RF Transmitter near electrical blasting caps or in a blasting area. Obey all signs and instructions.

## Operational Cautions

### Battery

There is a risk of explosion if this battery is replaced with an incorrect type. Dispose of used batteries according to instructions.