



**8841 Commercial
Outside-The-Glass (OTG)
Remote Monitor**

Installation & Operating Manual



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1.0 Product Description

The AAT 8841 Commercial Outside-The-Glass (OTG) Remote Monitor is used to remotely read and control an electric meter remotely. It is part of the Advanced AMR Technologies (AAT) wireless-to-internet 8800 Energy Information and Control System (EICS) software for AMR / Energy Management. It includes a 2-way UHF 450-470 MHz receiver and transmitter. The 8841 monitor collects, sends, and receives data to and from the Wireless Concentrator that, in turn, communicates via TCP/IP to it's designated Internet server. The 8800 EICS software running on the server monitors the network, collects and analyzes incoming energy usage data, and supports a browser-based interface that allows for charting and analysis of energy usage data for billing or energy management.

2.0 Security

Only outbound communication from the Commercial OTG to the Wireless Concentrator is enabled. The Commercial OTG can NOT be pinged or hacked in any way from the Internet. The wireless mesh network operates on a UHF licensed frequency 450 – 470 MHz and is not susceptible to radio interference as a non-licensed radio network.

3.0 Safety Considerations & Warnings

The AAT 8841 is an electronic device utilizing voltages sufficient to cause harm. Please review the following warnings and compliance issues.

WARNING:

- If the antenna or cables connected to this equipment come in contact with electrical power lines, DEATH or SERIOUS INJURY may result.
- Power handling gloves must be worn when working inside the meter socket.
- Changes or modifications to this equipment not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

FCC COMPLIANCE:

It is unlawful to operate this equipment without a valid FCC Part 90 Private Land Mobile radio license. FCC UHF license 450 – 470 MHz.

- This device complies with Part 15 of the FCC Rules, and is subject to the following two conditions:
 - (1) this device may not cause harmful interference, and
 - (2) this device must accept any interference received, including interference that causes undesired operation.

NOTE: 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 commercial 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.
- Keep water and moisture out of all antenna and radio fittings.
- Check all antenna connections – any imbalance in coax cable can cause radio interference and receive / transmit problems.

4.0 Environmental Considerations

Operating temperature range is -30°C to +60°C, -22°F to 140°F. Attach unit to a suitable, strong surface using proper fasteners being careful not to drill or puncture holes on the side, top, or bottom of enclosure that could render the NEMA 4 enclosure no longer watertight. Pre-cut holes with weather tight grommets are provided on the bottom of enclosure for wiring access. The 8841 is intended to operate Outside-The Glass of a mechanical or solid state meter.

5.0 Technical Specifications

- 2 watt transceiver
- 6 programmable (by factory) Input / Output circuits
- NO/NC detection circuit
- Load control output relay with up to 20 amp capacity

- Register reads for Landis & Gyr AXS4, and GE kV2c
[more makes and models of meters pending]
- 4 Radio Diagnostic LED Lights – HB i.e., Enrolled, Busy, RX, TX.
- Reset Button – When Pressed Resets Radio Configuration
- Unit Dimensions: 2.95” L X 7.48” W X 2.95” D [19cm L X 7.4cm W X 7.4cm D]
- Weight of 8841 excluding enclosure 2.2 Lbs, 1 Kilogram
- Enclosure weight 1.2 Lbs, .544 Kilograms
- Operating Temperature range -30°C to +60°C, -22°F to 140°F

The Maximum operating voltage for the 8841 unit is 240 VAC. For locations with only a 480 Volt AC service, use the optional toroid transformer, AAT part # 15-8841, to step down voltage to 240 Volts AC.

Requirements

Power Requirements: Input 90 – 240 Volts AC, self-ranging. Wiring must conform to local and national electrical codes. Conduit entry is designed to be at bottom of unit to allow for condensate weeping.

6.0 Installation

ATTACHING 8841 UNIT TO ELECTRIC METER

Solid State Meter Register Output – Run Minimum 20 gauge stranded [maximum size must not exceed 14 gauge] wire from the logic output terminal in the meter through connectors or conduit to the appropriate Wago clamp connectors on the 8841 board. Each make of meter - Landis & Gyr, Sensus, Elster or GE – will require a unique terminal type, cable, and interface isolation PCB. This configuration must be specified at time of order. An effective means of opening the Wago cage clamp connector is to use a small screw driver to gently push down on the Wago connector and slip wire through corresponding slot. *NEVER splice the meter interface cable* that connects to the meter register PCB board; the meter direct register PCB board hook-up must be within 5 feet of the 8841 unit. The 8841

will support direct register reads for DGCOM configured L&G AXS4 / AXS4E meters and the GE KV2c meters in order for the equipment to work [See Figure 1 & 2 on next page].

Data Wires Attaching 8841 Monitor To Electric Meter

Hard wire the data output of the electric meter to the indicated Wago clamp connectors. Terminal 14 is the last connector closest to the red, yellow, and green LED's in the photo below. The load following wires are user supplied, thus colors of wire varies from installation to installation.

Landis+Gyr AXS4 / AXS4E

Direct Register Read	Terminal	13	+5 Volts	Black wire
	Terminal	12	Receive	Yellow wire
	Terminal	10	Transmit	Red wire
	Terminal	9	Ground	Green wire

Important – L&G AXS4 / AXS4E meters must be configured for DGCOM format to work

<i>Load Following</i>	Terminal	2
	Terminal	3

GE KV2c Direct Register Read	Terminal	13	+5 Volts	Orange wire
	Terminal	12	Receive	Black wire
	Terminal	11	Output Enable	Brown wire
	Terminal	10	Meter Force	Green wire
	Terminal	6	Ground	Yellow wire
	Terminal	4	Meter Busy	Red wire

<i>Load Following</i>	Terminal	2
	Terminal	3

The “Load following” function tracks an attached device e.g., irrigation pump, generator, etc. to report when the device is off / on. When relay contact is closed it sends an event packet to the 8855 / 8856 Wireless Concentrator, which generates a report that can be viewed online.

An effective means of opening the Wago clamp connector is to use a small flat head screwdriver to gently push down on the Wago paddle and slip wire through corresponding slots. Contact technical support for other meter brands and terminal connections.

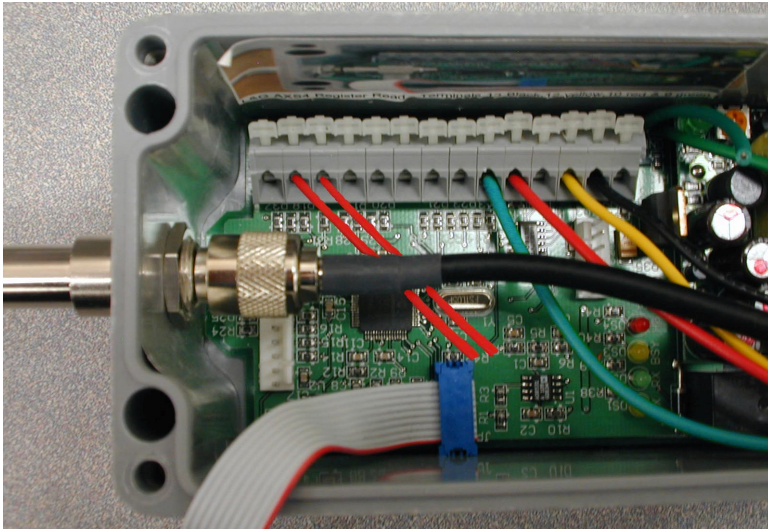


Figure 1 – Correct placement of L&G AXS4 isolation board wires and load following wires on Wago cage-clamp terminals [Photo found on top inside cover of enclosure]

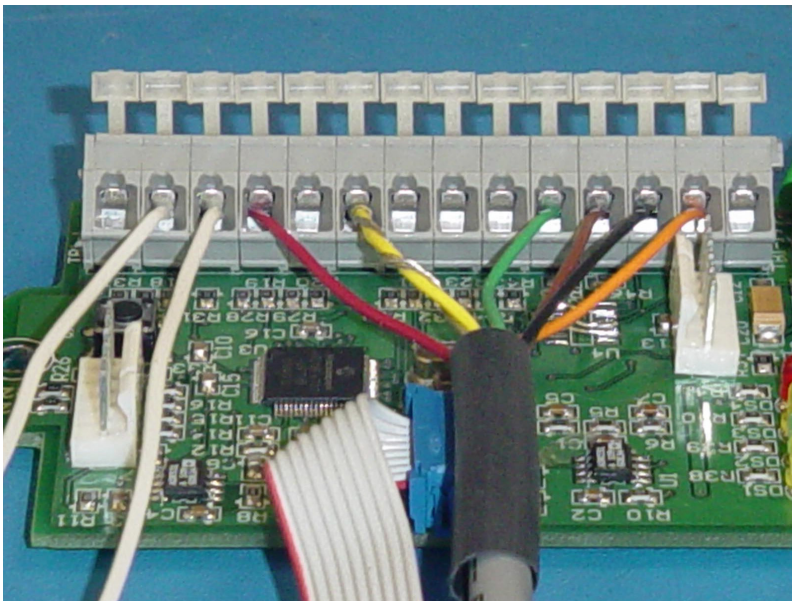


Figure 2 - Correct placement of GE KV2c isolation board wires and load following wires on Wago terminals [Photo found on top inside cover of enclosure]

7.0 Antenna & Enclosure Mounting

The standard antenna that comes with the Remote Monitor is the 2.5 db case-top, rubber flex-type. It is mounted through a fitting at the top of the enclosure. The expected range of this antenna is four to six miles. A five inch square ground plane must be used with this antenna (see diagram).

For installations requiring a remote antenna mounting, the antenna must be mounted in a vertical position, in a location as near as practical to the AAT 8841 to minimize signal loss due to coax length. To maximize VSWR impedance balance, the coax length should be cut to 3 feet multiples such as 6 feet, 9 feet and etc. RG-8 cable lengths should be no longer than 100'. Avoid tight bends or kinks, as these will cause signal loss. Contact technical support for lower loss coax options.

For outside installations antenna should be located as high as possible with rooftops and light poles as preferred locations. Keep the antenna away from metal surfaces, since this can cause significant radio loss [please refer to photo on next page illustrating an acceptable installation example]. Find a suitable location for good radio reception. The ground plane must be located above any nearby metal housings such as the transformer. The antenna should be line of sight unobstructed by any RF opaque structures to either the wireless concentrator antenna or another 8841 or equivalent installation.

Optional external antenna kits such as an antenna arm must be used for applications where the meter and antenna can not meet the conditions described above. The purpose of an antenna arm is to provide antenna separation from sources of metal or RF opaque structures, that could interfere with the RF performance [see diagram on correct way to mount an antenna arm to a pole]. Finding an antenna arm vender is easy. Some antenna arm venders include IIX Equipment Limited (708) 423-0605 <http://www.w9iix.com>, Antenna Systems & Solutions, Inc. (877) 288-6139 <http://www.antennasystems.com>, and etc.

Use four mounting screws for the 8841 enclosure to secure the box to a flat vertical surface. The mounting holes for the cover are intended to provide the box mounting. Use the tamper proof screws provided by Advanced AMR Technologies for added safety. Use the following template for locating these holes. (be careful to print to scale, confirm scale against dimension shown before drilling). Be sure to use a bit long enough to clear the drill with the four screws up tight against the enclosure bottom to have a tight fit.

Bottom view of 8841 enclosure – Arrows pointing to prefabricated holes to mount enclosure

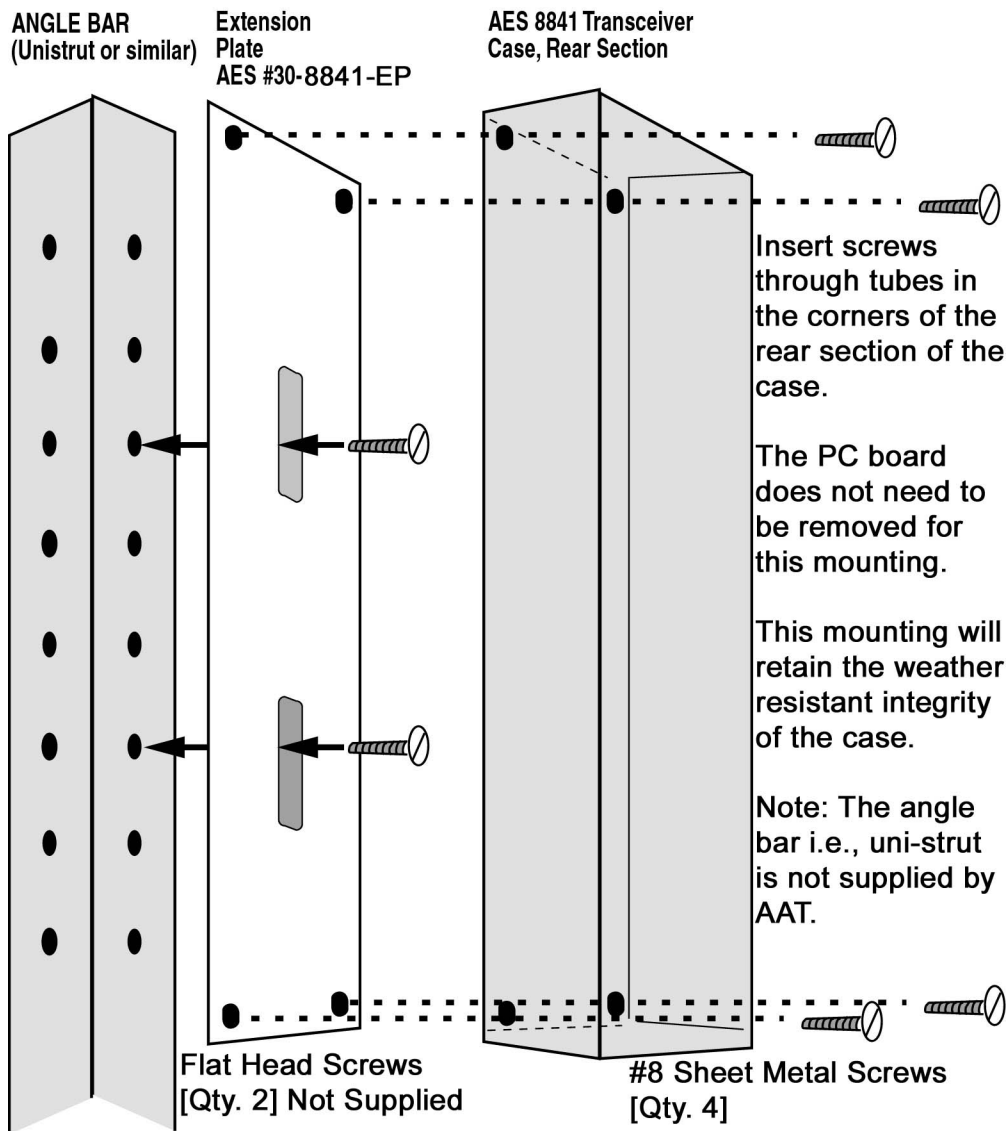


Important: NEVER drill holes into enclosure as this would render the enclosure non-weather tight

To enhance the weather-tight capability of the 8841 unit, please insert liquid tight fitting such as Carlon ½ STR LT connector using o-ring on outside to ensure water tight 2 places [please refer to diagram on next page correct installation when mounting to a metal transformer housing]. Apply liquid tight is where the pipe enters the meter housing and where the pipe enters the bottom of the 8841 unit. Right angle connectors are suitable keeping in mind that the conduit allows condensation to weep from the box. A waterproof fuse in series with the primary transformer is recommended.

The antenna must be grounded properly to prevent lightning damage in accordance with building codes. AAT has an optional lightning arrestor part # 7230 to help protect against lightning strikes. It is recommended that the installer tie 5 knots in the hot side of power source that terminates into the unit, to help protect the equipment from lightning damage.

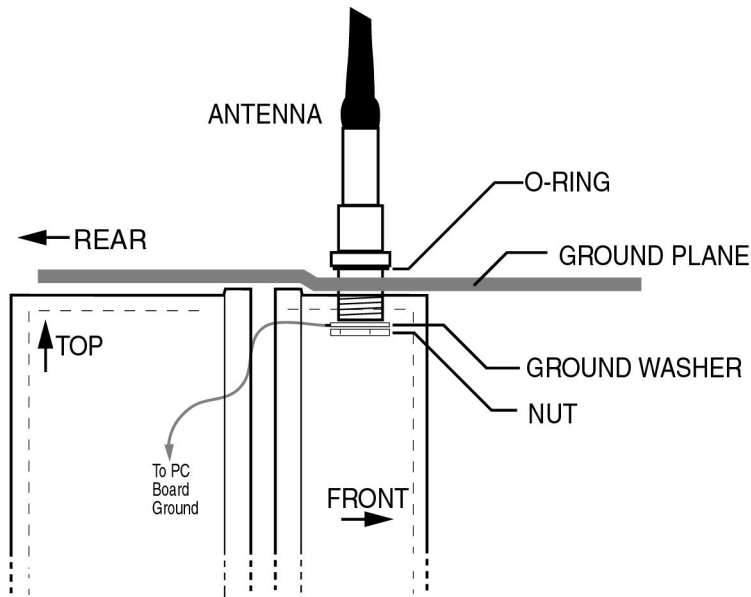
Mounting The 8841 Unit To Height Extension Plate



The purpose of the height extension plate is to install the 8841 unit above opaque RF areas such as metal pipes, transformers and etc. This will reduce or eliminate RF disturbances and interference.

Note: AAT does not supply the angle bar i.e., uni-strut, but supplies the extension plate with the 4 sheet metal screws as an option under part # 30-8841-EP.

Mounting The Antenna and Ground Plane

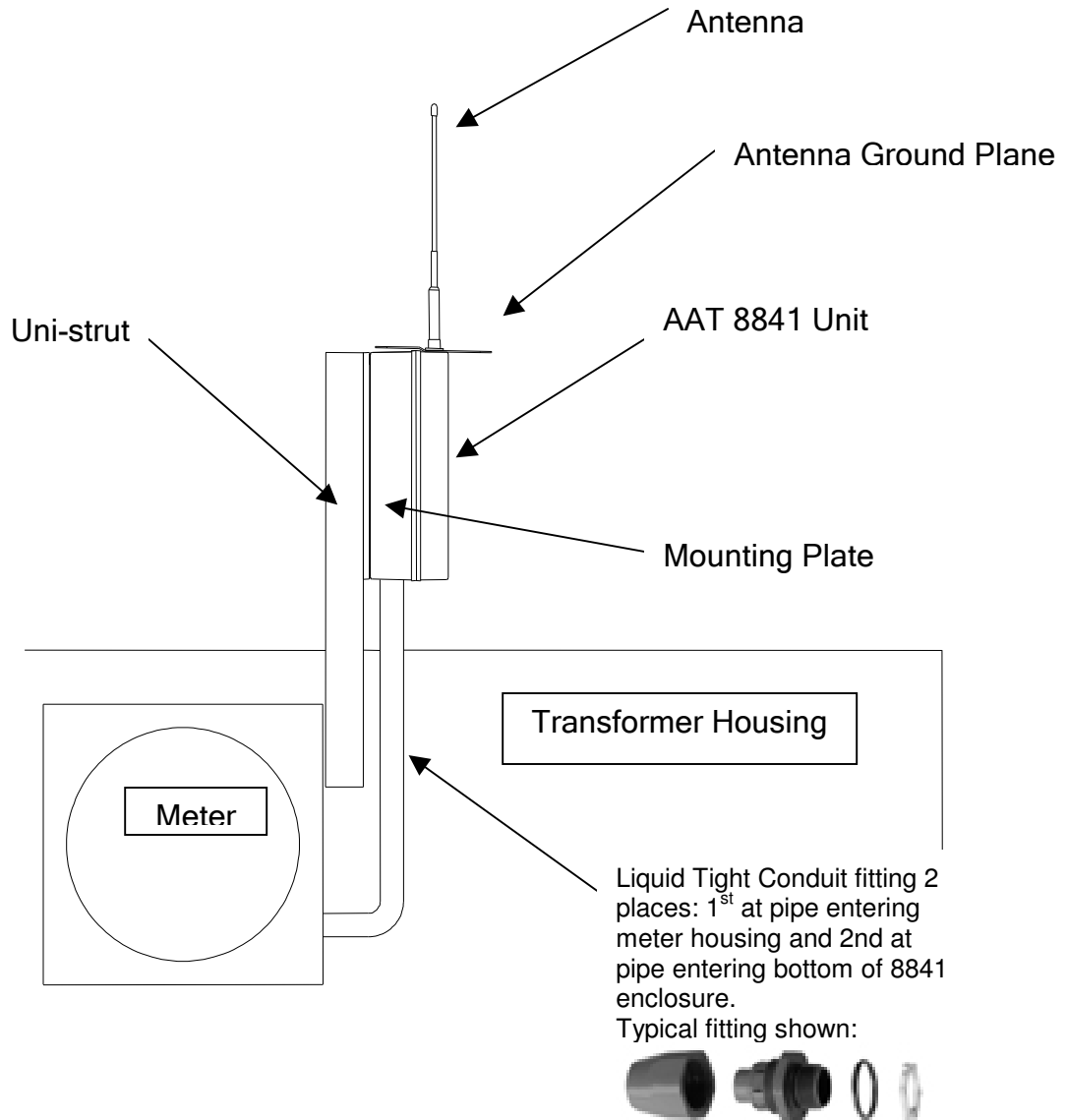


Side View – 8841, Ground Plane, Antenna

The ground plane is a piece of aluminum installed under the antenna. Both the antenna and ground plane are critical parts of the radio system. Both must be installed.

Note the position of the ground plane in the diagram. It is formed to fit the 8841 case, and extends over the front and sides after installation.

Correct Installation When Mounting To A Metal Transformer HOUSING

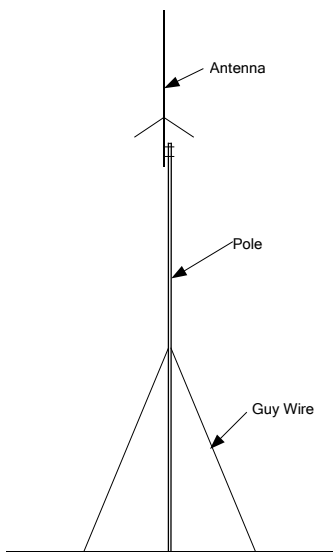


Remote Antenna Installation

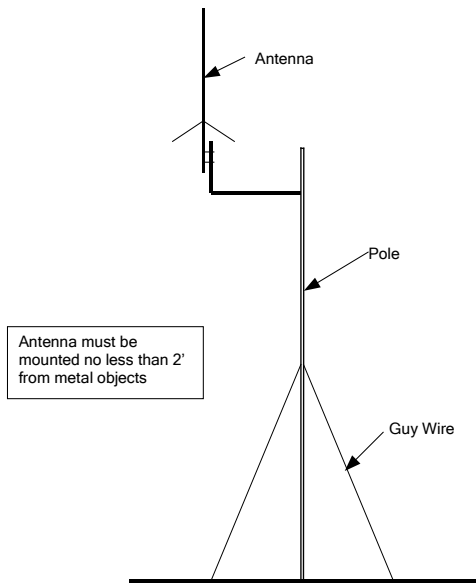
For locations where the case-top antenna is inadequate, a remote-mounted antenna should be used. A roof top, side of a building, pole or other high location is preferred. AAT offers several higher gain antennas for this application. Also, a BNC-to-N-bulk head patch cable (shown) is required inside the 8841 to connect the external RG-8 cable to the remote antenna.



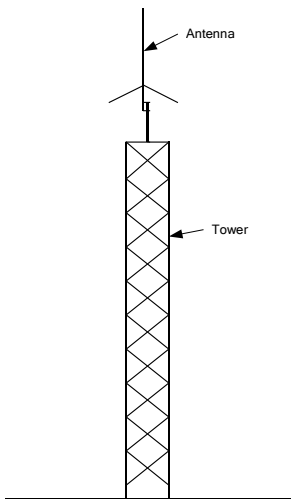
For the BNC to N-bulk head patch cable, order AAT part # 8841-N Male.



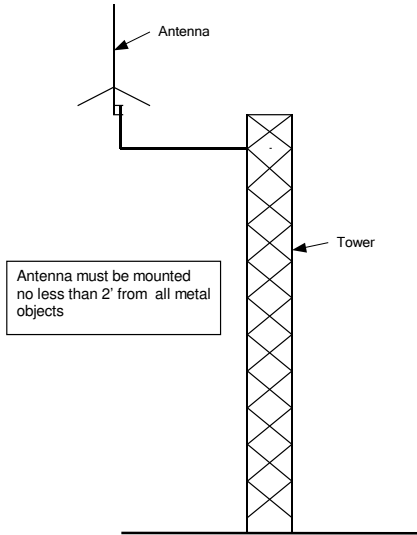
Antenna Mounted On Top Of A Pole – Correct Installation



Antenna Mounted On Top Of A Pole – Using Antenna Arm Correct Method



Antenna Mounted To A Tower – Correct Way

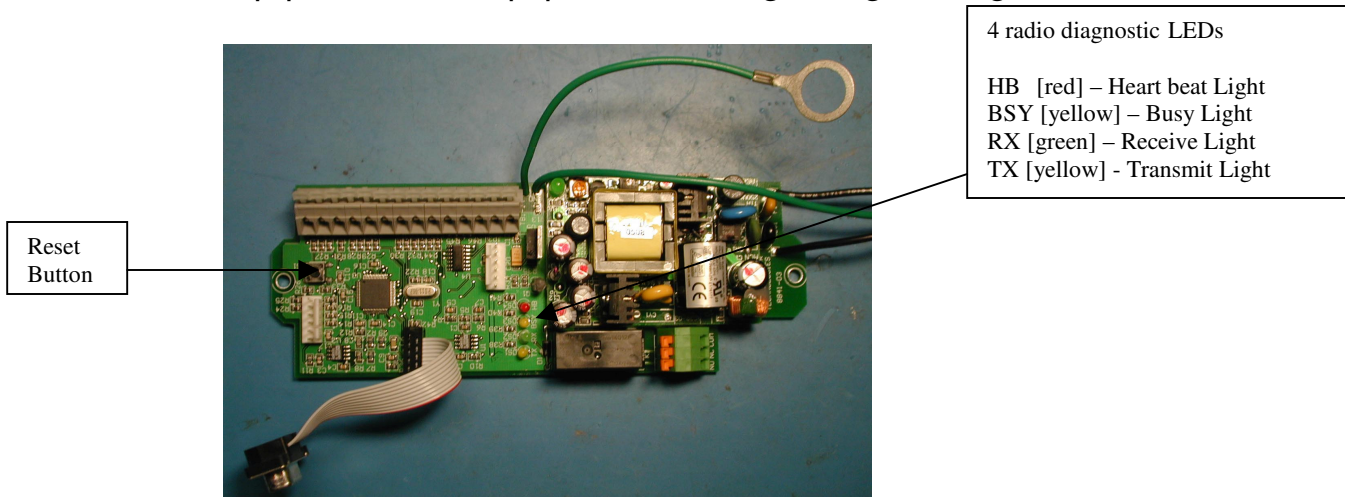


Antenna Mounted To A Tower – Using Antenna Arm Correct Installation

8.0 Electrical Inputs and Outputs

Important – Only use UL listed wire rated for at least 600 volt insulation.

Hot power lead should be fused at the meter socket power source to reduce the risk of electric shock. We recommend using waterproof in-line fuse holder Mouser Electronics Tel (800) 346-6873 part # 504-HFB. Some installers tie 5 knots in the AC line to help protect the equipment from lightning damage.



Location of Reset Button & 4 Radio Diagnostic LED's

9.0 Programming and Setup

The AAT 8841 is factory tuned for your application and requires no customer programming. Connect the power source to 120 VAC or 240 VAC with the cabling provided and observe the LED pattern. When power is applied to the 8841 the AC green LED is lit. After initializing, the AAT 8841 goes on the air to enroll in the radio network. Once it successfully enrolls, you will see a red blinking “HB” LED, or heartbeat.

The 8841 is a small computer. When powered for the 1st time the unit may need to run at least 1 minute for logic and memory files to be initialized. If enrollment has not occurred after 1 minute, press the black manual reset button. Verification of enrollment status can be completed through the Energy Information Control System software [EICS]. Contact AAT Technical support if enrollment status cannot be verified.

When the 8841 unit is powered the red LED HB i.e., heartbeat [one of the four radio diagnostic LED lights] should blink slowly (ON four seconds, OFF four seconds).

The red heartbeat light blinks continuously (ON one second OFF one second) indicating the unit is working OK, transmitting and receiving. Upon enrollment in the network the unit receives the correct time from the 8855/8856 Wireless Concentrator. A slow heartbeat i.e., ON four seconds OFF four seconds could mean the unit is still booting up, or the 8841 unit is not receiving RF communications from the 8855/8856 wireless concentrator(s). To determine if the 8841 unit is transmitting, try using a scanner set to the assigned frequency, listening for a one second “chirp” on the scanner, indicating that the 8841 unit has transmitted.

Note: there is a 15-minute delay until the first reports are displayed on the Internet for the online load profile reports. The system administrator must be informed of activity on this account, as some configuration at the server is necessary to set up an online energy profile.

10.0 LED Status Indicators

4 radio diagnostic LED indicators are located in the middle of the PCB board.

- HB light [red LED] – heart beat light blinks ON one second OFF one second indicating unit is working OK, is enrolled in the network, and has the correct time. If red heart beat light blinks very slowly ON four seconds OFF four seconds it indicates the unit is not receiving time from the server. Time is based on GMT [Greenwich Mean Time]. In normal operations, the 8841 heart beat should blink a steady one second rate within 60 seconds indicating the unit has enrolled and is in contact with the wireless concentrator. If the red heart beat light is not on at all, contact technical support.
- BSY light [yellow LED] – A solid Busy light i.e., WAIT light indicates the 8841 is waiting for acknowledgement of last transmission. Under “Normal Activity” the yellow light will be off except when it is has a message to send and stays on until the transmit is done.
- RX light [green LED] – Radio receive light. When there is any radio activity on the 8841 unit’s frequency, the receive light will flicker.
- TX light [yellow LED] – Transmission light. Occasionally the transmission light will flicker indicating radio transmission to the wireless concentrator device.
- AC Green LED Light (Located at right edge of board – See Figure 1) -Green light should stay on all the time, indicating unit is powered.

11.0 Testing

The testing of the 8841 is described in the previous section on status lights. In general: A steady blinking (one second on, one second off) of the red “HB” LED indicates the unit is enrolled.

12.0 Maintenance

Periodically check for dirt, corrosion or excessive moisture in or around the 8841, the antenna, mounts and cables. Clean or dry the device as necessary. Remove any debris that may accumulate in outdoor locations.

13.0 Troubleshooting

Green Light is Off: Check power connection to meter; Check power to meter.

Unit does not report data: Check unit:

- Red Light is Off or Blinking Slow: Check network status, check antenna, check cables and connectors.

Should there be any performance issues with your AAT 8841 monitor, contact AAT Technical support.

14.0 Repair & Warranty

Should your 8841 Remote monitor fail, repairs will be performed at our factory headquarters. See information on repair procedures in the next section.

Advanced AMR Technologies

LIMITED PRODUCT WARRANTY AND TECHNOLOGY LICENSE

LIMITED PRODUCT WARRANTY:

AAT warrants to the original purchaser that each AAT Subscriber Product will be free from defects in material and workmanship for one (1) year from date of purchase and all other products purchased from AAT including the 8855/8856 Wireless Concentrator and accessories will be warranted for one (1) year from the date of purchase. At no cost to the original purchaser for parts or labor, AAT will repair or replace any AAT Product or any, part or parts thereof which are judged defective under the terms of this Warranty.

Defective AAT Products must be returned to AAT directly, provided they are properly packed, postage prepaid. Or exchange may be made through any authorized direct factory representative for any AAT Products that are judged defective under the terms of this Warranty. Improper or incorrectly performed maintenance or repair voids this Warranty. This Warranty does not cover replacement parts that are not approved by AAT. This Warranty does not apply to any AAT Product or any part thereof that has been altered in any way to affect its stability or reliability, or that has been subjected to abuse, misuse, negligence, accident or act of God, or that has had the serial number effaced or removed.

Certain AAT Products are designed to operate and communicate with other specified AAT Products and certain other specified products, systems or networks authorized or approved by AAT, as identified in the applicable AAT Product instructions. This Warranty does not apply to any AAT Product that is used with any unauthorized or unapproved products, systems or networks, or that has been installed, applied or used in any manner, other than in strict accordance with AAT instructions.

AAT makes no warranty, express or implied, other than what is expressly stated in this Warranty. If the law of your state provides that an implied warranty of merchantability, or an implied warranty of fitness for particular purpose, or any other implied warranty, applies to AAT, then any such implied warranty is limited to the duration of this Warranty.

AAT cannot be aware of and is not responsible for the differing values of any property to be protected by its alarm reporting systems. This Warranty does not cover and AAT shall not be liable for any defect, incidental or consequential, loss or damage arising out of the failure of any AAT Product to operate.

Some states do not allow the exclusion or limitation of the durations of implied warranties or the limitation on incidental or consequential damages, so the above limitations or exclusions may not apply to you.

This Warranty gives you specific legal rights and you may also have other rights that vary from state to state.

TECHNOLOGY LICENSE:

Certain AAT Products include software, protocols and other proprietary and confidential technology and trade secrets of AAT, which are incorporated in or provided, with AAT Products solely for use in conjunction with and in order to operate AAT Products ("Licensed Technology"). AAT grants the original purchaser a non-exclusive license to use such Licensed Technology solely in connection with the use and operation of AAT Products and for no other purpose or use whatsoever. No title or ownership in or to any such Licensed Technology is conveyed by the sale or delivery of any AAT Products; all such rights are retained by AAT.

AAT SERVICE PROCEDURE: Contact AAT at (978) 826-7660, [fax (978) 535-7313] to receive a Return Authorization Number. Have the AAT part number and serial number ready. Repack equipment in original or equivalent packaging. Inside the box, please include a contact name, telephone number, address and a brief description of the reason for return.

Ship authorized RA items freight-prepaid to:

(call for Return Authorization number)

Repair Services, RA# _____
AAT Corporation
285 Newbury Street
Peabody, MA 01960 USA

