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CHAPTER 1

Introduction

The ADS® RainAlert II™ monitor measures and records rainfall to assist municipalities and other industry in monitoring rainfall amounts and initiating emergency notification during significant rain events. These capabilities are essential to providing ongoing oversight and ensuring timely notification and rapid response in critical situations.

The battery-powered, microprocessor-based RainAlert II monitor displays exceptional accuracy and reliability in measuring rainfall, even under the most inclement weather conditions.

This manual offers detailed instructions on installing the RainAlert II monitor and the associated tipping bucket, providing (wireless, land-line, and direct, on-site) communication with the monitor, and performing routine maintenance and troubleshooting on the system.
Warnings and FCC Compliance

Personnel installing and maintaining this equipment should follow all guidelines presented in this manual concerning monitor installation and maintenance. Installers and technicians should also comply with all federal, state, and municipal regulations. Failure to strictly adhere to these guidelines can result in personal injury and/or damage to the monitor.

Communications Disclaimer

ADS monitoring and alarming products use publicly available landline telephone or third-party GSM/GPRS wireless communication services and, therefore, cannot control the availability of these services. For applications where ADS systems provide alarms, problems at the carrier level can delay or totally prevent the delivery of alarm messages. If the user has questions regarding the availability of services in an area or outages/interruptions that may have affected service, the user should contact the telephone company or wireless provider directly.

FCC Part 68 Compliance (applies only to Landline Units)

To comply with the Federal Communications Commission (FCC), ADS Environmental Services® provides the following information concerning RainAlert II monitor installation and operation.

This equipment complies with FCC Rules, Part 68. It bears a label displaying the FCC Registration Number. The user must provide this information to the telephone company if requested.

The telephone company may make changes in its facilities, equipment, operations, or procedures that could affect the operation
of this equipment. If this occurs, the telephone company will provide advance notice so the user can make necessary modifications to maintain uninterrupted service.

In the unlikely event that this equipment harms the telephone network, the telephone company will notify the user that temporarily discontinuing telephone service may be required. Notification will occur in advance of discontinuation, or as soon as practically possible. They will also inform the user of the right to file a complaint with the FCC if necessary.

This equipment may not be used on public coin phone service provided by the telephone company. Connection to party line service is subject to state tariffs.

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**FCC Part 15 Compliance**

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 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 should try to correct the interference by one or more of the following measures:

- Reorient or relocate the radio or television antenna.
- Move and/or increase the distance between the monitor and the radio or television.

If these suggestions do not help, the user should contact the ADS Client Services Department at adssupportcenter@idexc.com or 877-237-9585 or an experienced radio/television technician.
**GSM/GPRS Modem Information**

The wireless version of the ADS RainAlert II contains a third party GSM/GPRS modem manufactured by Enfora, Incorporated. The modem model number is GSM0108IG001, description “Enabler II-G Quad-Band GSM/GPRS Radio Modem”, FCC ID MIVGSM0108. Users of products containing the GSM0108 modem must be aware of the following:

Contains FCC ID: MIVGSM0108

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

Following is the general procedure for installing and configuring a RainAlert II monitor. Refer to Chapters 3 through 7 for more details.

- Investigate the Site Characteristics
- Install the Tipping Bucket and the Monitor
- Establish Wireless, Telephone, or On-Site Communication with the Monitor
- Configure the Monitor *(using Profile Software)*
  * Create the Monitor Location
  * Select and Edit the Devices
- Set the Communication Parameters *(Profile)*
- Activate the Monitor *(Profile)*
- Run Diagnostics and Perform Confirmations *(Profile)*
Product Warranty

This section includes the warranty information for the ADS RainAlert II.

New Product Warranty

All new products manufactured by ADS will be free from defects in material and workmanship for up to one (1) year following the date of shipment from ADS. During this warranty period, upon satisfactory proof of a defect, the product may be returned for repair or replacement, at ADS’s sole option. No returns will be accepted unless the Owner has prepaid shipping and has received a prior authorization return number from ADS. Please contact ADS to obtain an authorization return number. Warranty repairs and replacements will be performed only by ADS. Any unauthorized repair or replacement will void this product warranty. Any repair or replacement will be covered by this new product warranty for ninety (90) days from the date that such repaired or replaced product is shipped from ADS. This warranty is available only if the product has been installed and operated in accordance with the procedures outlined in the ADS Operations and Maintenance Manual. This warranty does not apply to damage by catastrophes of nature, fire, explosion, acts of God (including, but not limited to, lightning damage and power surges), accidents, improper use or service, damage during transportation, or other similar causes beyond ADS’s control.
Out-of-Warranty Product Repairs
After the new product warranty expires, a product may be returned, at the owner’s prepaid expense, to ADS for repair. The owner will pay for all parts and labor associated with the repair. Any repair part will be covered by the new product warranty for 90 days from the date of shipment from ADS.

Troubleshooting Fee
ADS will charge a troubleshooting fee if the reported product defect cannot be found and/or the reported defect is not due to a defect in materials or workmanship.

Shipping
All repaired products will be returned via surface transportation prepaid by ADS. Import duties, fees, taxes, and other related charges are the responsibility of the owner.

**THIS IS THE ONLY WARRANTY FOR ADS PRODUCTS. NO OTHER WARRANTY IS EXPRESSED OR IMPLIED, INCLUDING FITNESS FOR A PARTICULAR PURPOSE OR MERCHANTABILITY. PRODUCT REPAIR OR REPLACEMENT IS THE ONLY REMEDY. IN NO EVENT WILL ADS BE RESPONSIBLE FOR ANY DIRECT, INDIRECT, CONSEQUENTIAL, OR SPECIAL DAMAGES.**
CHAPTER 2

System Overview

The ADS® RainAlert II™ monitor measures rainfall using a tipping bucket containing a funnel and a small tipping mechanism that can collect a specific amount of rainfall. Once the tipping mechanism is full, it empties and records that a tip has occurred. Typically, each tip is equivalent to 0.01 inches of rainfall. The monitor records the number of tips that occur over a specified period of time to calculate rainfall amounts and to determine whether to initiate an alarm during a rain event.

The monitor records rain data based on a defined time interval. The monitor can store this data in memory and/or use the data to generate an alarm. The monitor memory can store over 2 years of data logged at a 15-minute sample rate. This data is available to the user for collection, further processing, analysis, and reporting.

The RainAlert II monitor is designed for use in indoor or outdoor environments. The monitor can be mounted to the wall of a building indoors or outdoors. The monitor also can be mounted onto a square, steel base plate and covered with a sun shield for protection against the sun and inclement weather. The tipping bucket can be mounted on a rooftop or other structure and secured to either a base plate or directly to the top of the sun shield protecting the monitor. Both the monitor and tipping bucket display exceptional durability and accuracy, even under harsh and extreme weather conditions.

Communication between the monitor and the user’s office or field computer can occur over GPRS (remote, wireless communication),
a telephone line (remote, land-line communication), or a direct
connection cable (on-site communication).

Special software called Profile® enables the user to configure and
communicate with the monitor for activation, data collection, and
diagnostic purposes. Configuration involves defining the location
information file (LIF) for storage in the user's local directory and
building the code and variables for the site. The LIF contains
information such as monitor identification, selected devices,
alarm/event notification settings, data log rate, and other parameters
necessary for measuring rain both accurately and efficiently.

Activation involves downloading the firmware (embedded software)
code and site-specific information from the LIF (stored in the user's
local directory or network drive) to the monitor. It also includes
initiating monitor activities such as logging rain data and managing
event notification and alarming.

Profile also enables the user to process the rain data, generate
graphical and tabular reports, organize data in the user's local
directory, and maintain logs of communication between the monitor
and the user's PC.

**Note:** Refer to the *Profile User's Guide (#950015**) for
more information.
ADS RainAlert II Monitor

The ADS RainAlert II monitor is a weather-resistant, rectangular, composite enclosure housing a printed circuit board, an alkaline battery pack, and an internal antenna for wireless communication.

Typical RainAlert II monitor with printed circuit board, battery pack, and internal wireless communication antenna

The following table contains the available RainAlert II Monitors:

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000-RAW</td>
<td>Internal Battery, Wireless Modem</td>
</tr>
<tr>
<td>6000-RAL</td>
<td>Internal Battery, Landline Modem</td>
</tr>
</tbody>
</table>
Printed Circuit Board

The circuit board, secured inside the monitor enclosure, supports the following:

- Digital Signal Processing
- Digital Counter
- Communications (GPRS wireless or land-line modem)
- Voltage Regulation

Digital Signal Processor

The Digital Signal Processor (DSP) contains the central processing unit (CPU). As the source of all monitor activity, the processor is responsible for all of the monitor's high-level functions, including the following:

- Scanning the tipping bucket counter to retrieve and store data
- Maintaining the monitor time and date
- Measuring the wireless signal strength (*applicable only to wireless monitors*)
- Performing power management
System Overview

- Transmitting the stored and current data to the user's PC
- Initiating event and alarm notification

The DSP allocates portions of memory to firmware (permanently stored software) and data storage. A seven-segment (SS) light-emitting diode (LED) located on the board indicates the current monitor communication and operational activity. The DSP also includes the monitor clock, random access memory (RAM), and Flash. The monitor uses RAM while taking readings and processing the rain data. The RAM then downloads the data to Flash, or non-volatile memory, which also stores the monitor firmware and configuration information. Flash ensures the monitor maintains the data during battery pack replacement or a power failure.

Digital Counter

The digital counter on the board records the number of tips processed through contact closures from the tipping bucket. The DSP requests the cumulative number of tips from the counter, calculates the number of tips that have occurred since the last reading, and stores the data in the monitor memory.

Communications

The communications element of the board provides multi-tasking/handling of all communications processes. It interfaces with a wireless or a land-line modem (based on the model of RainAlert II), as well as manages local serial communication requests. The communications component is also responsible for gathering real-time information from the other components on the board.

Voltage Regulator

The voltage regulator regulates and distributes power from the battery pack to the analog, communications, and DSP components on the board.
Communications

ADS offers two remote communication options for the RainAlert II monitor. The first option involves wireless communication over the cellular network using GPRS (General Packet Radio Service) through the modem in the monitor. GPRS facilitates high-speed, low-cost, efficient TCP/IP communication in areas with AT&T wireless coverage. The second option involves telephone communication over land lines through the modem in the monitor.

Local communication with all RainAlert II monitors is available through a direct serial cable connected to the SERIAL COMM port.

Connectors

Connectors located on the monitor receive the following cabling and components:

- Tipping bucket (ADS p/n 103202A/B/C/D)
- Direct (on-site) communication
- External AC/DC and solar power (not available at this time)
- Telephone/external antenna (wireless) communication

Note: Connectors available depend on the RainAlert II model. Refer to Appendix B, RainAlert II Models and Capabilities for specifics on different model types and functionality.
**Power**

The ADS RainAlert II monitor is powered by an internal 7.5-volt alkaline battery pack (ADS p/n 6000-0004) mounted inside the enclosure. This battery pack provides the power for operating the monitor, handling communication, and sustaining the monitor wake-up circuitry. The monitor measures the battery voltages, and **Profile** provides a user-defined setting to ensure the monitor signals a warning when the available power is low.

Battery voltage is logged during most communication sessions and available also on demand when performing diagnostics.

The RainAlert II also can be equipped to receive power from an external source using a simple conversion kit available through ADS (p/n 6000-0052). The kit includes instructions for completing the conversion.
RainAlert II 7.5-volt battery pack
Tipping Bucket

The RainAlert II monitor uses a tipping bucket (ADS p/n 103202A/B/C/D) containing a funnel and tipping mechanism to collect rainfall. When the tipping mechanism becomes full, it empties and closes a contact to register a tip on the digital counter located in the RainAlert II monitor.

The tipping bucket mounts to a sun shield covering the monitor (when applicable) or to a base plate when the monitor is installed in another location.

The RainAlert II also can support any other brand of tipping bucket that issues a contact closure to indicate rain tips. ADS offers an intermediate pigtail cable (ADS p/n 5000-0721) to allow connection of other tipping buckets to the monitor for these applications.
CHAPTER 3

Hardware Installation

The ADS® RainAlert II™ monitor and tipping bucket can be installed together or separately based on the location and project requirements. The monitor can mount independently to a wall or with the tipping bucket using the available base plate and sun shield. For an outdoor installation, the sun shield provides added protection to the monitor against the sun and inclement weather conditions.

The tipping bucket can mount independently to the available base plate or to the top of the sun shield when installed with the monitor. It is designed to be installed on a rooftop, an open field, or any other unobstructed surface.

Following is the basic procedure for installing the RainAlert II monitor and a tipping bucket at a location. The order of these steps may vary based on the location and application.

- **Investigate the Site Characteristics** This involves investigating and selecting the appropriate location to install the tipping bucket and monitor.
- **Gather the Parts and Supplies**
- **Gather the Tools and Equipment**
- **Install the Tipping Bucket** This step involves securing the tipping bucket to the base plate or sun shield at the designated rainfall collection location.
● **Calibrate the Tipping Bucket** This process involves testing and adjusting the tipping bucket and internal tipping mechanism to ensure it accurately measures rainfall amounts.

● **Install the Monitor** This step involves securing the monitor to a wall independent from the tipping bucket or locating it on the base plate at the rainfall collection location.

● **Connect the Tipping Bucket to the Monitor** This process involves running and connecting the cable between the tipping bucket and the monitor.

This chapter contains instructions for properly installing a RainAlert II monitor and tipping bucket.

**Note:** Installation may require using ladders to access rooftops and other elevated areas. Therefore, installers and technicians must comply with all federal, state, municipal, and building owner safety regulations when installing this equipment. ADS is not responsible for any injuries, damages, claims, or liability resulting directly or indirectly from the use of this installation guide or the installation of any ADS equipment.
Investigating Site Characteristics

Before beginning installation activities, conduct a thorough investigation of site conditions to determine the appropriate location to place the tipping bucket and mount the monitor.

Several factors contribute to determining the most practical and appropriate location to mount the equipment. Therefore, consider the following when selecting the most suitable site:

**Note:** When site investigations require accessing rooftops, always consult with the property owner before accessing the rooftop. You must obtain written permission from the owner or be accompanied by an owner’s representative before accessing a rooftop.

- **Communications**  Make sure that wireless or telephone communication is available or accessible at the site. For wireless communication, verify the signal strength to ensure a strong, consistent signal.

- **Security**  Try to locate the equipment in a location that will prevent or limit easy public access. Consider fenced/secured areas, public buildings, or rooftops. Examples of these may include pump station facilities, wastewater treatment plants, fire/police stations, libraries, or municipal complexes.

- **Accessibility**  While some locations, such as rooftops, may be good for security, they may not provide adequate accessibility for installation, calibration, and maintenance activities. Therefore, select a location offering a reasonable level of accessibility.

- **Weather Patterns and Obstructions**  Select a location for the tipping bucket that will ensure it can receive rainfall unobstructed, away from any structures or trees that may cause interference. When investigating locations on the ground or open fields, consider the effects of air turbulence on rainfall patterns and any security concerns. For rooftop applications,
choose a flat roof, the highest level of a structure, and an
elevation that will not be influenced by other nearby structures.
Gathering the Parts and Supplies

Obtain the following supplies before calibrating and installing the Rain Alert II and tipping bucket to prevent any costly delays. When ordering, specify the tipping bucket supporting the RainAlert II monitor.

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Description</th>
<th>ADS Part Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RainAlert II monitor</td>
<td>6000-RAW (wireless, battery-powered)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6000-RAL (landline, battery-powered)</td>
</tr>
<tr>
<td>1</td>
<td>tipping bucket with cable</td>
<td>103202A (8-inch)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>103202B (12-inch)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>103202C (12-inch, heated)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>103202D (8-inch, heated)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Customer-supplied</td>
</tr>
<tr>
<td>1</td>
<td>base plate (when applicable)</td>
<td>6000-0045</td>
</tr>
<tr>
<td>1</td>
<td>sun shield – base plate mount (when applicable)</td>
<td>6000-0046</td>
</tr>
<tr>
<td>1</td>
<td>sun shield – wall mount (when applicable)</td>
<td>6000-0047</td>
</tr>
<tr>
<td>1</td>
<td>direct connection cable</td>
<td>5000-0601</td>
</tr>
<tr>
<td>1</td>
<td>tipping bucket pigtail cable (when using customer-supplied tipping buckets)</td>
<td>5000-0721</td>
</tr>
</tbody>
</table>
Gathering the Tools and Equipment

Gather the following tools and equipment required to install and calibrate the RainAlert II and an associated tipping bucket:

- 24-inch carpenter’s level
- Open-end wrench set (including a 5/16-inch open end wrench)
- Small adjustable crescent wrench
- Screwdrivers (flathead and Phillips head of assorted sizes)
- 30 cubic centimeter (milliliter) syringe
- Diagonal wire cutters and strippers
- Folding carpenter’s rule with a brass slide
- Rubber stretch tape
- Ladder
Installing the Tipping Bucket

Install the tipping bucket in the following way:

**Note:** Although ADS offers a heavyweight base plate or a sun shield with mounting holes to secure the tipping bucket, you also can implement your own tipping bucket mounting scheme. Tipping bucket vendors offer several different options for securing their buckets to walls, poles, and other surfaces. Please consult ADS if other mounting options are required.

**Note:** The base plate used when installing the tipping bucket, monitor, and sun shield is not designed to be attached or secured to the surface on which it is set. Therefore, select a suitable location to place the plate and the corresponding hardware so they will not be adversely affected by existing or potential conditions inherent to the location. ADS is not responsible for any injuries, damages, claims, or liability resulting directly or indirectly from the use of this installation guide or the installation of any ADS equipment.

1. Attach the tipping bucket to the base plate or the sun shield based on the installation scenario:

   - **Tipping Bucket Alone** If the tipping bucket is installed in a separate location from the monitor, attach the tipping bucket to the base plate using the screws provided.
Securing the tipping bucket to the base plate

- **Tipping Bucket with Monitor** If the tipping bucket and monitor are installed together at the same location, attach the tipping bucket to the sun shield using the screws provided.
Securing the tipping bucket to the sun shield covering the monitor

Then, secure the sun shield to the base plate using the screws provided.
2. Place the entire assembly in the rainfall collection location.

3. Verify the tipping bucket is level in the following way:
   - Remove the funnel from the bucket.
   - Check the level according to both the X-axis and the Y-axis using the integrated levels located inside the tipping bucket or by placing a carpenter’s level over the top of the bucket.
   - Adjust the three mounting feet on the base plate as necessary to ensure the tipping bucket is level.

4. Replace the funnel and pre-wet it.

5. Calibrate the tipping bucket to verify the tipping mechanism is in adjustment. Refer to Calibrating the Tipping Bucket on page 3-11 for more information.
Calibrating the Tipping Bucket

After installing and securing the tipping bucket at the location, calibrate the tipping mechanism in the following way. This calibration procedure is based on a tipping bucket designed to tip every 0.01 inches of rainfall.

**Note:** The following instructions primarily address tipping buckets supplied by ADS. For the best results, ADS recommends following the calibration specifications and procedures provided with the tipping bucket from manufacturer.

1. Remove the funnel from the tipping bucket.
2. Place the tipping bucket on top of the base plate. Make sure the base plate includes the three leveling feet.
3. Confirm the tipping bucket is level in the following way:
   - Check the level according to both the X-axis and the Y-axis using the integrated levels located inside the tipping bucket or by placing a carpenter’s level over the top of the bucket. Another option is to place the level across the base plate of the tipping bucket assembly.
   - Adjust the three leveling feet on the base plate as necessary to ensure the tipping bucket is level, and secure the lock nuts to prevent the feet from turning.
4. Fill a graduated syringe or cylinder with between 50 and 100 milliliters of water.
5. Gently drip 8.25 cubic centimeters (8.25 milliliters) of water into one side of the tipping mechanism as close as possible to the center. This quantity of water is equal to 0.01 inches (0.25 millimeters) of rainfall and the amount of rainfall required to tip and pour out the contents of the tipping mechanism. Once connected to the tipping bucket, the RainAlert II will register a tip each time this occurs.
Using a syringe to calibrate the tipping mechanism

**Note:** The quantity required to tip the tipping mechanism is based on a 8-inch (20-centimeter) tipping bucket. If the project involves another size or type of tipping bucket, refer to the manufacturer for the proper specifications for performing calibrations.

6. Repeat step 4 at least 5 times for each side of the tipping mechanism, or until you are sure the mechanism tips only when filled with the correct amount of water.

7. If the tipping mechanism requires adjustment, calibrate it in the following way and retest until properly calibrated:

   - **Tips with less than designated amount** If the tipping mechanism requires less than the designated amount to tip, adjust the screw on the opposite side of the mechanism down.

   - **Tips with more than designated amount** If the tipping mechanism requires more than the designated amount to tip, adjust the screw on the opposite side of the mechanism up.
8. Place the funnel back into the bucket.

9. Slowly pour 82.5 cubic centimeters (82.5 milliliters) of water into the pre-wetted funnel. This amount should cause the tipping mechanism to tip 9 to 10 times.

**Note:** Keep in mind that the quantity required to accomplish 9 to 10 tips may vary based on the tipping bucket. If the project involves another size or type of tipping bucket, refer to the manufacturer for the proper specifications to determine the proper amount.
Installing the RainAlert II

The RainAlert II monitor is designed for indoor or outdoor installation and can mount directly to a wall or sit on an optional base plate. A sun shield also is available for limited protection from the elements and/or when installing the monitor and tipping bucket together.

The following procedures for monitor installation apply to most sites. However, some sites may require the installer to implement slight modifications to the standard installation technique.

Before installing the monitor at the site, activate the monitor to verify that the monitor is configured correctly for the application and that the battery pack (or external power) is operating at an adequate voltage. Refer to Chapter 5, Configuration and Activation, for more information. ADS recommends making any necessary changes to the configuration before installing the unit. Refer to Chapter 6, Maintenance and Troubleshooting, for information on replacing the battery pack, if necessary.

**Warning:** Using a battery-powered, wireless monitor without connecting an antenna will significantly decrease the life of the battery pack.

**Note:** The base plate used when installing the tipping bucket, monitor, and sun shield is not designed to be attached or secured to the surface on which it is set. Therefore, select a suitable location to place the plate and the corresponding hardware so they will not be adversely affected by existing or potential conditions inherent to the location. In addition, installers and technicians must comply with all federal, state, and municipal safety regulations. ADS is not responsible for any injuries, damages, claims, or liability resulting directly or indirectly from the use of this installation guide or the installation of any ADS equipment.
Mounting the Monitor to a Wall

Mount the monitor directly to a wall or other flat surface, independent of the tipping bucket, in the following way:

1. Select the appropriate mounting hardware/fasteners to secure the monitor to the surface. For wall mounting, consider using ¼-inch fasteners.

2. Place the monitor against the surface at the exact location at which you want to mount the monitor and mark the wall through each of the pre-drilled holes on the monitor enclosure, or mark the wall at the desired location for the pre-drilled holes according to the following mounting dimensions:
   - Top-to-bottom: 12.75 inches
   - Left-to-right: 8.00 inches
   - Mounting hole diameter: 0.31 inches

3. Pre-drill the holes to prepare the surface to receive the mounting hardware/fasteners for mounting the monitor.

4. Mount and secure the monitor to the wall using the four fasteners.

**Note:** Avoid over-tightening the fasteners to prevent damage to the enclosure.
5. *(optional wall-mount sun shield)* Secure a sun shield (ADS p/n 6000-0047) to the wall directly above the monitor using the appropriate mounting hardware/fasteners. This shield serves as a visor to provide outdoor protection for the monitor.

![WALL MOUNT SHIELD](image)

**RAINALERT II MONITOR**

RainAlert II installed with the optional wall-mount sun shield

---

**Mounting the Monitor on the Base Plate**

Locating the monitor and tipping bucket in the same location does not require securing the monitor to the base plate. The monitor merely sits on top of the base plate for easy removal during maintenance or service activities.

First, make sure the sun shield has been secured to the base plate using the screws provided. Then, simply slide the monitor onto the base plate, from the open side of the sun shield, until it is resting completely under the sun shield.
Securing the sun shield (with tipping bucket) to the base plate

Sliding the monitor onto the base plate
Monitor seated on the base plate under sun the shield
Connecting the Tipping Bucket to the Monitor

Connecting the tipping bucket to the monitor primarily involves running the cable from the tipping bucket to the monitor and connecting the cable to the tipping bucket port on the monitor. Applications involving a customer-supplied tipping bucket also require an intermediate pigtail cable (ADS p/n 5000-0721) that runs between the tipping bucket cable and the monitor.

Connect the tipping bucket to the monitor in the following way:

1. Run the cable from the tipping bucket to the monitor location. When the tipping bucket and monitor are in different locations, consider the following when running the cable:
   - Always obtain permission for the cable route from the property owner, when applicable.
   - Prepare the route and run the cable according to the property owner’s specifications.

2. Locate the **TIPPING BUCKET** port on the bottom of the monitor.

3. Visually inspect the connector on the cable (and adapter, when applicable) and the **TIPPING BUCKET** connector port on the monitor for debris or moisture. Clean off any debris, and dry
any surface moisture. Compressed air is useful for removing moisture from the inside of the connectors or ports (pin and socket surfaces).

4. Verify that the interfacial seal is present inside the monitor port connector with the pins. The bright orange, rubber seal should sit at the bottom of the connector with the pins protruding through the seal.

5. *(applies only when using ADS-supplied tipping buckets)*
   Connect the tipping bucket cable to the **TIPPING BUCKET** port on the monitor. Tighten the connector in a clockwise direction until it clicks, and verify that it is seated correctly.

6. *(applies only when using customer-supplied tipping buckets)*
   Prepare and connect the customer-supplied tipping bucket to the monitor in the following way:
   
   − Connect the wires from the cable of the customer-supplied tipping bucket to the wires on the pigtail cable (ADS p/n 5000-0721). Polarity is not an issue.

   − Thoroughly wrap the completed connection with rubber tape. Extend the tape up the cables beyond the connection to ensure a good moisture seal and to reinforce the connection.

   − Connect the pigtail connector to the **TIPPING BUCKET** port on the monitor. Tighten the connector in a clockwise direction until it clicks, and verify that it is seated correctly.
CHAPTER 4

Communication

After performing the initial installation, it is necessary to establish communication with the ADS® RainAlert II™ monitor and activate the monitor. Communication can occur through wireless communication, telephone communication, or a direct serial connection. This chapter contains instructions on establishing wireless communication or telephone service at the monitor location for communicating with the monitor remotely and using the direct serial cable to communicate with the monitor on-site.

**Note:** Installers and technicians must comply with all federal, state, and municipal regulations to ensure all safety precautions are in place and exercised. ADS is not responsible for any injuries, damages, claims, or liability resulting directly or indirectly from the use of this installation guide or the installation of any ADS equipment.
Setting Up Wireless Communication

**Note:** ADS wireless communication products use static IP address network services provided by AT&T. Therefore, any installation location designated for wireless communication must have access to AT&T 850 or 1900 MHz service. Each wireless device must be fitted with a SIM (Subscriber Identity Module) card that is provisioned by AT&T with specific account and network information for use with ADS software. Refer to *Installing the SIM Card* on page 4-9 for more information.

The RainAlert II monitor equipped for wireless communication (ADS p/n 6000-RAW) includes an integrated, internal antenna. This configuration should function well under most circumstances and requires no additional setup. However, if the internal antenna does not provide an adequate signal strength or consistency, ADS offers two additional options for implementing wireless communication using external antennas:

- **Miniwing or Slim Antenna** These antennas mount to poles or other structures.
- **Magnetic Whip Antenna**  This antenna mounts to a roof or other protected, steel structure.

Note: The antenna displayed above is representative of the type of quad-band magnetic whip antenna provided by ADS. The actual antenna delivered may vary based on availability.

Setting up an external antenna for wireless communication involves installing the antenna and connecting the antenna to the monitor. The first two sections describe how to install the external antennas, and the last section describes how to prepare the monitor to receive an external antenna and connect either antenna to the monitor.

Note: The following sections provide general installation guidance or instructions for each external antenna option. Detailed installation instructions accompany all wireless antennas provided by ADS.
Installing a Mini-wing or Slim Antenna

Secure the ruggedized mini-wing or slim antenna (ADS p/n 3800-0162/0163 with SMA connector) to a wall, pole, or other structure using cable ties, non-metallic clamps, or weather-resistant tape. Extension cables (ADS p/n 507165 (15-foot) and other lengths) are available when necessary. ADS also offers longer extension cables; however, ADS recommends keeping cable length to a minimum to prevent signal loss. Securely tape all connections to prevent moisture access.

Once the antenna is installed, run the antenna cable to the monitor location and connect it to the monitor. Refer to Modifying the RainAlert II Monitor to Support an External Antenna on page 4-5 for detailed instructions.

Installing a Magnetic Whip Antenna

This installation involves securing a wireless whip antenna with a magnetic base (ADS p/n 3800-0128) to a roof or other protected magnetic structure. Roof or outdoor cabinet applications also require a lightning protection device (ADS p/n 507180).

Mount the whip antenna in the following way:

**Warning:** Never place a magnetic mount antenna on top of or near an office or field (laptop) computer. The strong magnet in the antenna base will immediately corrupt the computer’s hard drive.

1. Identify an anchored or heavy steel surface at least 4 inches by 4 inches to serve as the grounding plate.
2. If the whip antenna is not attached to the magnetic base, screw the antenna onto the base using any sealing washers or o-rings included in the packaging.
3. Seat the antenna base on the steel grounding plate surface selected.
4. *(applies only to applications requiring lightning protection)*
   Install lightning protection according to the instructions included with the lightning protection module.

5. Run the antenna cable to the monitor location, and attach the connector to the monitor.

---

**Modifying the RainAlert II Monitor to Support an External Antenna**

Modifying the monitor to support an external antenna involves disconnecting the internal antenna and rerouting the internal antenna connector to the **TELCO/EXT ANTENNA** port. Perform these modifications and connect the external antenna to the monitor in the following way:

- **Note:** Disconnect power to the monitor before performing any modifications. In addition, to prevent damage to the cable, do not kink or bend the antenna cable when coiling.

1. Undo the latches to the door on the monitor enclosure, and open the door.
   
   **Note:** Opening the door to the monitor enclosure to connect the external antenna increases the risk of damaging or introducing debris or moisture to the circuit board. Make every effort to prevent water, dirt, and debris from contacting the monitor's circuit board when opening or working within the enclosure.

2. Disconnect the battery pack’s cable from the printed circuit board’s power cable.

3. Disconnect the internal antenna’s cable connector from the printed circuit board’s cable connector. This connection exists to the right of the printed circuit board.
4. Use a 5/16-inch open end wrench to remove the top nut and washer securing the board’s antenna connector to the metal tab.

5. Remove the connector from the tab and the sealing plug from the TELCO/EXT ANTENNA port on the outside of the enclosure.

6. Insert the connector through the hole in the TELCO/EXT ANTENNA port from the inside out.

7. Replace the nut and washer onto the connector from the outside and secure.
8. Restore power to the monitor by reconnecting the battery pack cable to the board’s power cable.

9. Attach the SMA connector from the external antenna to the connector on the **TELCO/EXT ANTENNA** port.
10. Wrap rubber stretch tape around the entire cable connection, extending onto the cable approximately 2 inches beyond the connection.

11. Carefully close the door to the enclosure (without pinching the wire), and secure the latches.
Installing the SIM Card

RainAlert II monitors require a standard SIM card for wireless communication. This card must be installed in the monitor before communication can occur. The monitor uses SIM cards provisioned by AT&T (ADS p/n 507181) for public static IP address operation. Please contact ADS for specific information on procuring SIM cards for use in the specific geographic area.

Install the SIM card in the monitor in the following way:

1. Record the number from the SIM card (i.e., the IP address) on the site report. This address is required for reconciling billing and setting up the LIF in the Profile software. This IP address is printed directly on the SIM card or on a label affixed to the card.

2. Undo the latches to the door of the monitor enclosure, and open the door.

   **Note:** Opening the door to the enclosure and accessing the printed circuit board increases the risk of damaging or introducing debris or moisture to the board. Make every effort to prevent water, dirt, and debris from contacting the monitor's printed circuit board when opening or working within the enclosure.

3. Disconnect the battery pack cable from the circuit board power cable.
4. Remove the four screws securing the plastic dust cover (protecting the printed circuit board) to the chassis, and remove the cover.
5. Slide back the clip to the SIM card carrier on the circuit board to unlock the carrier.

6. Swing up the hinged clip to the carrier.

7. Gently insert the SIM card into the slot on the clip. Orient the card so that the beveled corner of the card will align with the beveled corner of the carrier when in place.
8. Close the clip to the carrier, and slide the clip forward to lock the SIM card into place.

9. Replace the protective dust cover over the board, and replace and tighten the screws securing the cover to the chassis.

10. Reconnect the battery pack cable to the circuit board power cable.

11. Close the door to the enclosure, and redo the latches to the door.
12. Verify wireless communication with monitor after setting up the location through **Profile** and configuring the monitor using the proper serial number and IP address. Refer to *Chapter 5, Configuration and Activation*.
Providing Telephone Service

Providing telephone service to the RainAlert II monitor equipped for landline communication (ADS p/n 6000-RAL) involves the following steps:

- Running the telephone cable between the monitor and service locations
- Mounting the lightning protection module
- Preparing the telephone cable
- Wiring the telephone cable to the monitor
- Wiring the telephone cable to the lightning protection module
- Wiring the lightning protection module to the network interface box

**Warning:** To avoid possible shock, make all connections to the monitor before wiring to the lightning protection module and the telephone company’s network interface box.

Running the Telephone Cable Between the Monitor and Service Locations

**Safety Note:** Always disconnect the telephone line at the ONI/Network Interface while performing field wiring. Dangerous voltages (100 VAC) are present when the line is ringing. Connect to the telephone company line only after all other wiring is complete.
The first step in establishing telephone service involves running the telephone cable between the monitor and service locations. However, before this can occur, the installer must determine or designate the most suitable service location and the most appropriate route for running the cable. The service location and cable route evaluation criteria may include the following:

- Availability or accessibility to the service location, pole, or pedestal
- Existing structures, landscape, or utilities
- Monitor location (indoor/outdoor, rooftop, etc.)
- Regulatory compliance and property owner requirements
- Routing and/or excavation options and costs

**Note:** For more information on determining the most suitable service location and cable route, consult your ADS representative.

After finalizing the service location and cable route, run the telephone cable between the monitor location and the designated service location. Consider the following parameters and recommendations when running the cable:

- Route all cables in accordance with all local regulations and building owner requirements.
- Use four-conductor Belden® telephone cable.
- When running the telephone cable through conduit, use ¾-inch electrical conduit.
- Provide enough excess cabling at the monitor and service ends to allow maintenance during service activities.
- For outdoor service connections, create a drip loop for any wires or cables that may be subject to condensation to prevent moisture from entering the electrical or telephone boxes.
- Make sure the building owner or telephone company installs a network interface box at the service location.
Verify that adequate grounding is available at the service location. This is critical to ensuring proper lightning protection. Refer to the National Fire Protection Association (NFPA) Standard 70 National Electrical Code (NEC) Article 250 for detailed instructions on proper grounding.

Mounting the Lightning Protection Module

The next step in establishing telephone service is mounting the lightning protection module at the service location. Using the screws included with the lightning protection module, mount the module next to or 6 to 8 inches below the network interface box.

![Diagram showing the positioning of the lightning protection module and network interface box.](image-url)
Preparing the Telephone Cable

The next step in establishing telephone service is preparing the telephone cable for connection to the lightning protection module. Prepare the cable in the following way:

1. Carefully strip about 3 inches of the external insulation from each end of the telephone cable.

   ![Stripping the external insulation from the telephone cable](image)

2. Remove the internal braiding, and separate the four insulated wires.
3. Cut off both the orange and the orange/white-striped wires down to the level of the external insulation. These wires will not be used in this application.

**Note:** The wire colors referenced in this manual are based on the telephone cable recommended for use in these applications. However, the wires inside some telephone cables may vary in color and number. Therefore, when the actual wire colors and number differ from those designated in this manual, connect the available wiring in reference to ground, ring, and tip.

4. Strip ½ inch of insulation from the remaining blue and blue/white-striped wires.
5. At the service end of the cable, fold over both exposed wires (doubling the thickness). Insert each wire into a non-insulated #10 ring terminal lug (22-18 gauge), and crimp the wires to the lugs.

---

**Wiring the Telephone Cable to the Monitor**

After preparing the telephone cable, wire the telephone cable to the monitor in the following way:

- **Note:** Wiring the telephone cable to the monitor requires an intermediate cable (External Power/Phone Cable - ADS p/n 5000-0697) supplied by ADS when ordering a RainAlert II monitor equipped for landline communication.

1. Unpack the RainAlert II phone cable (ADS p/n 5000-0697; same cable as the FlowAlert phone cable and the FlowShark External Power cable). The pigtail consists of two bundled pairs; green/white and red/black. If these soldered junctions are modified or stripped to make the phone junction easier, be sure to keep these pairs together. It is not necessary to solder
them, just be sure they are securely connected together when the phone wire is spliced to the green/white and red/black pairs.

2. Connect the green/white and red/black pairs to the phone wires. Use crimp type or other outdoor rated connection methods to splice the monitor cable to the phone cable.

3. Thoroughly wrap the completed junction with rubber tape. Be sure to extend the tape up the cables beyond the junction to ensure a good moisture seal and to reinforce the connection.

4. Identify the **TELCO/EXT ANTENNA** port on the bottom of the monitor.

5. Seat, fasten, and secure the completed telephone cable onto the **TELCO/EXT ANTENNA** port on the monitor. Tighten the connector in a clockwise direction until it clicks. Verify that it is seated correctly.
Wiring the Telephone Cable to the Lightning Protection Module

Next, wire the telephone cable to the lightning protection module (ADS p/n 103313A) in the following way:

1. Open the front cover of the lighting protection module, and remove the nuts, washers, and card from the posts inside the module. Leave only the bottom-most nut on each post.

2. Slice a hole in the grommet in the bottom of the module, and run the telephone cable up through the grommet into the module.

3. Place the lugs for the following wires onto the designated posts, and then replace a washer and nut onto each post:
   - Red wire to Telco network interface — Top left post (tip)
   - Green wire to Telco network interface — Bottom left post (ring)
Blue wire from monitor — Top right post (tip)

Blue/white-striped wire from monitor — Bottom right post (ring)

4. Run the two wires (secured to the posts on the left) down and out through the grommet in the bottom of the module.

5. Place a washer onto each post, and replace the card.

6. Securely tighten a washer and nut onto each post over the card.

7. Make sure the ground wire (included with the lightning protection module) is secured at the designated location on the front left side of the card, and run the wire down through the bottom grommet of the module.
8. Close and secure the front cover of the module.
9. Cut ½ inch of insulation from the loose end of the black ground wire running from the lightning protection module.
10. Clamp the exposed ground wire to the telephone company’s ground source.

Wiring the Lightning Protection Module to the Network Interface Box

The final step in establishing telephone service is wiring the lightning protection module to the telephone company’s network interface box. Accomplish this task in the following way:

1. Open the front cover of the telephone company's network interface box, and temporarily disconnect the test plug. Opening some network interface boxes may require a special tool available only through the telephone company.
2. Remove 3 inches of insulation from the lightning protection module service cable to expose the four insulated wires.
3. Cut off the black and yellow wires (running from the lightning protection module) down to the level of the external insulation.
4. Strip ½ inch of insulation from the green and red wires.
5. Slice a hole in the rubber grommet in the bottom of the network interface box (when necessary), and run the wires up through the grommet into the box.
6. Loosen the screws for tip and ring in the network interface box. Wrap the following wires around the designated posts and then re-tighten the screws until snug:
   - Red wire — tip
   - Green wire — ring
Wiring diagram of a typical telephone company network interface box

**Note:** Since the colors inside some boxes vary, this manual does not reference colored posts for connection. The installer should connect the wires to the posts in reference to ring and tip.

7. Re-connect the test plug.

8. Close and secure the cover of the network interface box.
Complete wiring diagram
Connecting to the Monitor in the Field

Communicating with the monitor on-site requires a direct serial cable (ADS p/n 5000-0664) and a field computer running the Profile® software. The direct serial cable provides communication between the user’s computer and the monitor without requiring an antenna or telemetry.

To use the cable for performing on-site communication, connect the cable's 9-pin connector to the field computer's serial communication port and the 5-pin connector to the monitor's SERIAL COMM port. Refer to the Profile User’s Guide (#950015**) for using the Profile software to designate the appropriate local port for serial communication.

**Note:** If your computer only has a USB port and no serial port, use a USB to Serial adapter cable (and driver software) to perform serial communications. Ensure that the appropriate port for the USB adapter has been designated in Profile (it will be different than the serial port) before attempting communications. ADS recommends the following USB adapters: Dynex – model DX-UBDB9, and Keyspan – model USA-19S.
CHAPTER 5

Configuration and Activation

After installing the ADS® RainAlert II™ monitor and tipping bucket and setting up communication, it is necessary to configure and activate the monitor to begin recording rain data. This chapter contains general instructions on the following activities concerning monitor configuration and activation:

- Creating a monitor location
- Selecting and editing devices
- Setting the communication parameters
- Activating the monitor
- Configuring power savings (optional)

This chapter also includes the procedure for running diagnostics on the rain device, collecting data from the monitor, and upgrading the firmware (embedded software) in the monitor.

Refer to the Profile User's Guide (#950015**) for more detailed instructions on installing the software, collecting monitor data, and configuring, activating, and confirming the monitor.
Configuring the Monitor Location

To ensure the most accurate results for each monitor location, the user must activate the RainAlert II monitor with the proper configuration information to satisfy the specific monitoring needs of the project and to record the desired data. The configuration information includes critical details such as location description, device assignment and parameters, log rates, and other items relevant to the site and project requirements.

The configuration information is stored in a Location Information File (LIF) in the user’s local directory or network drive. Certain elements of the LIF are saved to the monitor memory during monitor activation.

This section includes instructions on performing the following activities required for monitor configuration:

- Creating a Monitor Location in the Profile database
- Selecting and Editing Devices

**Note:** If remote (wireless or landline) communications already have been established for the location, these activities can be performed in cooperation between field and office personnel. If remote communication is not available, perform configuration and activation on-site through direct communication with the monitor.

Launching the Profile Software

Before traveling to the field for installation, configuration, and activation activities, install the Profile software on the field computer.

Once installed, launch the Profile software from an office or field computer by selecting **Start > Programs > ADS Corporation >**
Profile from the Microsoft® Windows® start menu or double-clicking on the Profile icon on the Windows desktop.

The Profile main screen displays.

The left pane provides the capability to display all the levels and current details for the selected database on a tree. These levels and details are accessible by expanding and collapsing the entries on the tree. Click the plus symbol (+) next to an entry to display the items contained under that level of the tree; click on the minus symbol (-) next to an entry to collapse the items under that entry level.

Select an entry or level name in the left pane to display the details of that entry in the right pane of Profile.

The toolbar provides access to various functions and tools in Profile based on the item selected in the left or right pane.
Creating a Monitor Location

Creating a new location includes entering and setting up the location information as follows:

1. Select the <All Locations> group located under the database level.

2. Select the Edit > New > Location option or the New Location toolbar button. 
   A new location named New Location #1 is added to the <All Locations> group and displays the Properties dialog.

3. Enter the new Location Name. Do not duplicate more than the first 7 characters for multiple monitors names.

4. Enter the new location Description.

5. Select RainAlert II from the Series drop-down list.
6. Select the appropriate method of communication from the **Connect Using** drop-down list.

7. Enter the monitor location **Telephone Number** or the **IP Address** for the wireless connection.

   **Note:** When entering an IP Address, do not include leading zeroes in the address. For example, an IP Address of 166.219.008.063 should be entered as 166.219.8.63. If leading zeroes are included in the address, monitor communications will not be successful.

   **Note:** To support emailing and text messaging for alarm notification, the address of the monitor’s SIM card must begin with 166.219.XXX.XXX. If the address begins with other numbers, please contact ADS Client Services to arrange for a replacement SIM card for the monitor.

8. Enter the monitor **Serial Number**.

9. Enter the number of hours difference between your location (or the location of the computer on which the database resides) and the location of the monitor in the **Time Zone** field. For a monitor in a time zone earlier than the time zone in which you are located, enter a minus sign before the number of hours difference. For example, if you are in the **Central** time zone and the monitor is located in the **Mountain** time zone, select -1 from this field.

10. Select the rate at which you want the monitor to log data from the **Normal** drop-down list.
11. Select **OK** to create a LIF for the location in the database and exit the dialog.

_The new monitor location with a single monitoring point is now created and configured in the database._

### Selecting and Editing Devices

Select and edit the devices corresponding to the new monitor location to log the desired data. Editing the devices involves setting specific parameters to ensure the monitor and **Profile** properly obtain and process the data. Perform the following steps to properly select and edit devices:

1. Select the location for selecting/editing devices from the database.
2. Expand the location contents (monitoring point and devices) by selecting the expansion symbol corresponding to the location, and then select **Devices**.

![Devices selected for ADSTown_001](image)

3. Select the **Edit > Properties** option or the **Properties** toolbar button.

![Properties toolbar button](image)

*The Edit Devices dialog displays the available devices and devices selected by default for Monitoring Point 1.*

![Edit Devices dialog](image)
4. Select the checkboxes corresponding to the devices you want to assign to the designated monitoring point from the Available Devices selection box. A checkmark must display beside a device in the Monitoring Point Devices section to ensure Profile includes the device in the LIF. Deselect the checkboxes corresponding to the devices you want to remove from association with the selected monitoring point from the Available Devices section.

**Note:** Profile selects the Rain device for the RainAlert II monitor by default.

The selected devices display in the Monitoring Point Devices section.

5. As necessary, edit the parameters specific to each device as follows:

- Access the device parameters by selecting (highlighting) the device you want to edit in the Monitoring Point Devices section and then selecting the Edit button.
- Refer to the following sections for details concerning the specific device parameters.

6. Once you have edited the devices as necessary, select the OK button to save the devices to the LIF.

**Editing the Rain Device**

Edit the parameters for rain device in the following way, and select OK when complete:

![Edit Rain Parameters dialog](image)
• **Rain Per Tip** Enter the amount of rain that must accumulate in the tipping bucket to initiate one tip of the tipping mechanism.

• **Rain Intensity Interval** Enter the amount of time within which a specified amount of rain must fall to initiate a rain alarm.

• **Enable** Select this checkbox to activate the options to edit parameters and to ensure Profile configures the monitor to initiate and terminate an alarm under the rain conditions designated in the Rain Alarm section.

• **Threshold** Enter the rain amount over a designated interval at which you want the monitor to initiate an alarm and contact an ADS IntelliServe® system, an email recipient, and/or a cellular telephone that receives text messages.

• **Return to Normal** Enter the rain amount that cannot be exceeded over a designated interval to ensure the monitor discontinues an existing rain alarm. Under this scenario, the monitor also contacts an ADS IntelliServe system, an email recipient, and/or a cellular telephone that receives text messages that conditions have *returned to normal*.

**Editing the Notification Device**

The RainAlert II monitor can provide rain alarm notification through IntelliServe systems, email, and cellular phones with text messaging (SMS) capability. The RainAlert II also can check in daily and provide event notification to an email address and cellular phone. Events concern low battery voltage, power failure, and time errors.
Edit the notification device to setup alarm and/or event notification the following way, and select OK when complete:

- **Alarm Enable**  Select this checkbox to activate the options for configuring alarm notification to an IntelliServe system, cellular phone, and/or email address.

- **IntelliServe Recipient**  Enter the IP address for the IntelliServe system you want the RainAlert II monitor to notify under alarm conditions.

- **Port**  This non-editable field represents the number of the port through which wireless communication will occur (when applicable). The current default and only applicable port is 2100.

- **Max Retries**  Enter the number of times within a sample interval you would like the RainAlert II monitor to attempt to establish communication following an event.

- **Diagnostics Enable**  Select this checkbox to enable the RainAlert II monitor to send out event notification to a cellular phone or email address.

- **Check In Enable**  Select this checkbox to ensure the RainAlert II monitor checks in daily through an email or text message. The daily check-in provides the monitor name, date and time, and battery voltage.

- **Check In Hour**  Select the time at which you want the monitor to check in from the drop-down list.

- **Message**  Select this button to display the **Edit Alarm Recipients** dialog for entering alarm/event recipient email addresses and cellular phone numbers.

- **Edit Alarm Recipients**  Enter the email address or cellular phone number and select the corresponding communication method for up to three recipients. To receive text messages, enter both the area code and the phone number for the cellular phone. Following is an example of the format to use for an SMS number: 2561234567.

**Note:** Text messages cannot be sent to land-line numbers.
To receive email, enter the wireless provider’s SMS/mail Gateway number and the recipient’s email address separated by a colon. ADS only uses AT&T wireless service; therefore, all emails should read in the following format: 
+121:john.doe@adserv.com.

Editing the RSSI Device

The RSSI (Received Signal Strength Indication) device does not require editing. This device corresponds to the signal strength for wireless communication.
Setting the Communication Parameters

Setting the communication parameters involves designating the modem, communication ports, and temperature, battery, and signal thresholds to ensure proper communication, measurement, and maintenance of the RainAlert II monitor. Modify the communication parameters as necessary.

**Note:** Typically, the default settings should not require modification.

1. Select a monitor location from the Profile main screen, and then select Tools > Diagnostics from the main menu or click on the Diagnostics toolbar button.

   *Diagnostics toolbar button*

   *The Monitor Diagnostics dialog displays.*
2. Select Communication Parameters from the Functions drop-down list, and click on the Perform button.

The Select Communication Parameters dialog displays.
3. Select or enter the communication parameters as necessary:

- **Modem Name** Select the modem you want to use during modem communication from the drop-down list. This list should include all available modems on your computer.

- **Modem Port** Select the proper port for modem communication from this drop-down list. This list should include all available ports on your computer.

- **Serial Port** Select the proper port for serial communication from this drop-down list. This list should include all available ports on your computer.

- **DMI Port** *(This parameter does not apply to the RainAlert II monitor)*

- **Timeout** Enter the number of seconds you want your local computer to wait for a response from the monitor once communication has been initiated.

- **Retries** Enter the number of times you want your local PC to request data from the monitor following failed attempts while the monitor is still on line.

- **Low Temperature** *(This parameter does not apply to the RainAlert II monitor)*

- **High Temperature** *(This parameter does not apply to the RainAlert II monitor)*

- **Log Communications** Select this checkbox to record all communication activities with the monitor.

- **Status On Connect** Select this checkbox to view details of the current state of the monitor when monitor communications are established.

- **Low Battery 1502, 1506, 3500, 4000** *(These parameters do not apply to the RainAlert II monitor)*

- **Low Modem Battery TCP/IP** *(This parameter does not apply to the RainAlert II monitor)*

- **Low Signal Strength TCP/IP** Enter the signal strength (in dBm) below which you want Profile to provide
notification for the wireless communication unit, when applicable. *ADS recommends using -95 dBm for the low signal strength.*

- **Low Battery FlowShark, FlowShark IS, and IS External** (These parameters do not apply to the RainAlert II monitor)

- **Low Battery FlowAlert/RainAlert II** Enter the voltage below which you want Profile to provide notification for FlowAlert and RainAlert II monitors. *ADS recommends leaving the default battery voltage unchanged.*

**Note:** Notification of low battery voltage or signal strength occurs during the data collection process, during monitor activation, and when receiving TCP/IP communication status. View the associated logs through the Diagnostics tool and Log Viewer in the Profile software.

4. Select the OK button.
Activating the Monitor

After configuring the monitor, activate the monitor to initiate the rainfall measurement process based on the monitor configuration. Monitor activation involves generating the activation data using the Profile software, downloading this data to the monitor, and initiating rain data measurement and logging. The activation data includes the current monitor firmware (embedded software) and relevant portions of the LIF and other configuration parameters necessary to ensure monitoring activities reflect the specific site conditions and project requirements. The monitor requires these files and information to properly measure and record rainfall.

Activating the monitor also tests communication between the user's computer and the monitor. To test communication, connect to the monitor on-site (using the Direct Connection cable) or have an analyst call the monitor from any telephone or computer at a remote location while a technician is on-site to verify that the monitor modem responds. This also will verify the monitor telephone number entered in Profile.

Monitor activation occurs through the Diagnostics tool in Profile. Activate the monitor in the following way:

1. Select the monitor location for activation from the Profile main screen, and then click on the Diagnostics toolbar button.

The Diagnostics dialog displays.
2. Select the **Connect** button to establish communication with the monitor.

   **Profile** initiates communication with the monitor and establishes a connection.

3. Select **Activate** from the **Functions** drop-down list, and then select the **Perform** button.

   **Profile** displays the **Activate Monitor** dialog.
4. *(optional)* Select the **Clear data** checkbox to ensure that all data is removed from the monitor memory when activation occurs. If you choose to implement this option ADS recommends collecting all data from the monitor before reactivating the monitor.

5. Select the **OK** button to activate the monitor.

*Profile* downloads the configuration and installation information, activates the monitor, and begins logging data based on the selected configuration.

6. Click on the **Disconnect** button once activation is successful (designated in the **Results** section) and complete.

*The local computer disconnects from the monitor.*

7. Click on the **Close** button to exit the **Monitor Diagnostics** dialog.
Configuring the Power Savings Parameters

Use the **Power Saving** function when you want to configure the monitor to conserve battery power. Battery power is conserved by powering down the wireless modem during specific hours of the day. The monitor automatically powers up the wireless modem each day between 11AM and 12PM to receive incoming calls. However, you also can configure the modem for specific on/off times for each day of the week.

**Note:** Alarms will be sent out even when the modem is in Power Savings mode.

Complete the parameters of the **Power Saving Configuration** window through the **Diagnostics** tool in **Profile** according to the schedule best suited to your project. Configure the power saving parameters for the monitor as follows:

1. Select the monitor location for activation from the **Profile** main screen, and then click on the **Diagnostics** toolbar button.

   ![Diagnostics toolbar button]

   *The Monitor Diagnostics dialog displays.*
2. Select the Connect button to establish communication with the monitor. 

Profile initiates communication with the monitor and establishes a connection. Choose the Abort button prior to establishing a connection to abort the communication attempt.

3. Select Power Saving from the Functions drop-down list and then select the Perform button to display the Power Saving Configuration window.
4. Choose a *Global* setting when you want all 7 days of the week to be set to the same on or off mode.

   - **Set All On**  Choose this *Global* settings button to configure all 7 days of the week to *Always On* or no power saving periods. The wireless modem will be set for uninterrupted power.

   - **Set All Off**  Choose this *Global* setting to configure all 7 days of the week to *Always Off* to facilitate maximum battery savings. Wireless modem communications can be performed only during the hour of 11 AM to 12 PM and will be turned off all other hours of the day.
5. Use the Mode, Start, and End fields to program each day of the week uniquely for power savings. Repeat the instructions for each day of the week you want to program and select OK to save and exit the Power Saving Configuration window.

- **Always On** Choose this setting for uninterrupted wireless modem communications and no power savings for the selected day of the week.

- **Always Off** Choose this setting to allow wireless service only during the hour of 11AM to 12 PM. This setting is the maximum battery conservation mode for the selected day of the week.

- **Span On** Choose this option to specify the span of time you want the wireless modem to be available (powered) during the selected day. If you choose this mode, specify values in the Start and End fields for the beginning and ending time for the span you want the wireless modem to be active.

- **Span Off** Choose this option to specify the span of time you want the wireless modem to be unavailable (powered down) during the selected day. If you choose this mode, specify values in the Start and End fields for the
beginning and ending time for the wireless modem to be powered down.

- **Start**  This field is enabled when you choose **Span On** or **Span Off** mode selections and allows you to specify the beginning time for the selected span.

- **End**   This field is enabled for **Span On** or **Span Off** mode selections and allows you to specify the ending time for the selected span.

6. Click on the **Disconnect** button to discontinue communication with the monitor, and then click on the **Close** button to exit the **Monitor Diagnostics** dialog.
Running Diagnostics on the Rain Device

Profile’s diagnostics tool enables the user to verify the proper operation of the tipping bucket, obtain current readings, adjust settings, and identify, diagnose, and troubleshoot potential problems with the tipping bucket. Run diagnostics for the rain device in the following way:

1. Select the monitor location for which you want to run diagnostics on a device from the Profile main screen, and then select Tools > Diagnostics or click on the Diagnostics toolbar button.

The Monitor Diagnostics dialog displays.
Monitor Diagnostics dialog

2. Select the **Connect** button to establish communication with the monitor.

*Profile* initiates communication with the monitor and establishes a connection.
3. Select the **Rain Gauge 1** device from the **Diagnose Device** drop-down list, and then select the **Diagnose** button.

*The Diagnostics dialog displays the current configuration parameters stored in the LIF for the rain device.*
4. Click on the Fire button.

The Results section displays the rainfall information. **Rain While Online** represents the amount of rainfall that has occurred (based on the value designated for **Rain Per Tip**) during the time period between initially entering the current Diagnostics dialog and requesting rainfall data from the monitor (i.e., clicking the Fire button). Any additional rain data obtained through subsequent requests made without exiting the dialog is added to the existing amount, and included in the updated total displayed in the Rain While Online field. **Rain Intensity** represents the amount of rainfall that has occurred up to the time at which the request for data was made based on the amount of time designated in the Rainfall Intensity Interval field. For example, designating a 60-minute interval and clicking on the Fire button would display the amount of rainfall that occurred over the previous 60 minutes.
5. View the results, and edit the configuration settings in the **Parameters** section as necessary. Refer to *Editing the Rain Device* on page 5-8 for descriptions of the individual configuration parameters. Save any modifications to the LIF in the monitor as follows:

- Select the **Store** button to save any changes made in the device parameters to the LIF in the database.

- Select the **Close** button to exit the **Diagnostics** dialog for the rain device and return to the **Monitor Diagnostics** dialog.

- Select **Activate** from the **Functions** drop-down list, and then select the **Perform** button. For more information on activating a monitor, refer to *Activating the Monitor* on page 5-16.
6. Select the **Disconnect** button to discontinue communication with monitor when finished running diagnostics on the rain device.
Collecting Data from the Monitor

Collect data using the data collection function available through **Diagnostics** in the following way:

**Note:** You can perform group and scheduled collects using the **Communications** tool.

1. Select the monitor location from which you want to collect data, and then select **Tools > Diagnostics** from the main menu or click on the **Diagnostics** toolbar button.

*The Monitor Diagnostics dialog displays.*
2. Select the **Connect** button to establish communication with the monitor.

   *Profile* initiates communication with the monitor and establishes a connection.

3. Select **Collect** from the **Functions** drop-down list, and then select the **Perform** button.

   *Profile displays the Collect the Specified Data dialog.*

4. Designate the range of data you want to collect from the monitor by editing the **Start** and **End Time** fields in the **Collect Information** in the section. Edit these fields directly by selecting the portion of the date or time stamp you want to change and then entering the appropriate designation or using the arrows to scroll up and down in the range. *If you do not edit the range, the start date and time automatically default to the Auto Collect Start Date in the LIF.*
5. Select the Collect button.

The Results section displays the status of the collect. Profile collects all entity data from the monitor for the selected date/time range and stores it in the currently selected database.

6. Click on the Next button.

The Site DR Analysis – [location name] dialog displays the results of the site data review analysis of the collected data and any recommendations for resolving identified issues.
Site DR Analysis – [location name] dialog

7. Review any issues identified and the suggested actions, and then click on the Finish button.

The Monitor Diagnostics dialog displays. The Results section displays the recommendations from Site DR Analysis when applicable.
Monitor Diagnostics dialog
Upgrading the Monitor Firmware

Profile enables you to download updated firmware to a RainAlert II monitor that may include new features and capabilities or performance improvements and enhancements in functions such as data processing, analysis, or communications.

ADS recommends collecting data from the monitor before updating the firmware in the monitor to ensure that you do not lose any data during the firmware upgrade process. Refer to the Profile User’s Guide (#950015**) for information on collecting data from the monitor. ADS also requires that you reactivate the monitor after updating the firmware.

Upgrade the firmware in the RainAlert II monitor memory as follows:

1. Select the monitor location for which you want to upgrade the firmware, and select Tools > Diagnostics from the main menu or click on the Diagnostics toolbar button.

The Monitor Diagnostics dialog displays.
2. Select the **Connect** button to establish communication with the monitor.

*Profile* initiates communication with the monitor and establishes a connection.

3. Select **Update Firmware** from the **Functions** drop-down list, and then select the **Perform** button.

*The Form Firmware Download dialog displays.*
4. Select the **Browse** button corresponding to **DSP file** to locate and designate the DSP file applicable to the firmware download. This program file represents the firmware containing the updated code for data processing activities. An example filename for this kind of file could be FAdsp600.biw.

5. Select the **OK** button.

**Profile** downloads the new firmware to the monitor.

6. Select **Activate** from the **Functions** drop-down list, and then select the **Perform** button.

**Profile** activates the monitor with the updated firmware.
Viewing Diagnostic and Data Logs

Profile generates detailed logs for many activities performed through Diagnostics, such as monitor activation, data collection, and firmware downloading. These logs are available immediately following the activity and for future access to historical information.

1. Select the monitor location for which you want to run diagnostics on a device from the Profile main screen, and then click on the Diagnostics toolbar button.

   Diagnostics toolbar button

   The Monitor Diagnostics dialog displays.

   Monitor Diagnostics dialog

2. Select Logs from the Functions drop-down list.

3. Click on the Perform button.
The *View Logs* dialog displays.

4. Select the type of log you want to view from the **Log Type** drop-down list.

   The *Logs* section displays **all logs available for the selected location and log type.**

5. Select the specific log you want to view, and select the **View** button.

   The *View Logs* dialog displays the logs available for viewing corresponding to the selected log type.

6. (optional) Select the **Print** button to print the log file contents.
While the ADS® RainAlert II™ monitor and tipping bucket are designed for dependability and durability, all electronic devices are vulnerable to wear, malfunction, or failure, particularly when certain components remain in an outdoor environment. However, many system problems can be avoided altogether by performing routine maintenance and inspections. The design of the monitor enables the user to perform general diagnostics and troubleshooting to prevent, isolate, and correct many problems easily. These serve to minimize unnecessary monitor downtime and data loss.

This chapter provides routine maintenance instructions as well as general diagnostic and troubleshooting guidelines for isolating and correcting monitoring system problems.

**Warning:** Disconnect telephone service, when applicable, at the network interface box before disconnecting cables from the monitor lid. These activities help prevent possible shock or injury to personnel as well as damage to the equipment during service visits at the monitor location.
Maintaining the System Components

The RainAlert II monitor and the tipping bucket should receive routine on-site inspections and remote confidence checks to maintain the equipment in optimal working condition, minimize monitor downtime, and prevent possible data loss.

ADS recommends performing these inspections following initial system installation, during site visits, and on a scheduled interval (i.e., quarterly or during battery pack replacement).

**Note:** The only service or maintenance activity ADS permits within the monitor chassis is battery pack replacement. Therefore, please do not handle, alter, modify, remove, or replace any other components inside the monitor. This may void the monitor warranty agreement.

Gathering Replacement Parts and Supplies

Gather the following replacement parts and supplies for performing routine maintenance:

- Battery pack
- Paper towels
- Compressed air
- Flat head screwdriver
- Assorted wrenches
Inspecting the Monitor

Perform the following inspections during site visits or from a remote location (when applicable):

- Inspect the monitor mounting hardware to verify that it is free of heavy corrosion (when outdoors) and is tightened and secure.

- Inspect the monitor for general integrity. Verify that the door to the enclosure is tightly closed, latched, and sealed and that the monitor has no obvious mechanical defects.

- Perform monitor data confirmations to test the tipping bucket. These should occur from a remote location when telephone or wireless communication is available. However, they also can accomplished locally through a serial connection.

- Review the applicable logs in Profile® to verify the status of the monitor clock, communications, firmware, and battery pack.

- Clean the monitor with paper towels, as necessary. However, do not use detergent!

- If the monitor is located outdoors, make sure all connector ports on the monitor are dry. Use compressed air or paper towels to dry out wet or damp connectors.

Confirming the Monitor

When performing a site visit, ADS recommends manually tipping the tipping mechanism and using the diagnostic functions in Profile to confirm the RainAlert II records the number of tips accurately. ADS also recommends confirming the calibration of the tipping. Refer to Calibrating the Tipping Bucket in Chapter 3, Hardware Installation, for more information.

Checking the Monitor Battery Pack Voltage

Check the battery voltage using Profile before installing the monitor. ADS also recommends verifying the battery voltage after
collecting data. Replace the battery pack (ADS p/n 6000-0004) as soon as possible whenever the voltage reads below 4.5 volts or **Profile** provides a **Low** battery status.

**Warning:** Batteries reading below 4.5 volts may prevent communication with and data collection from the monitor.

Check the current battery voltage in the monitor using the **Diagnostics** tool in **Profile** in the following way:

1. From the **Profile** software main screen, select the monitor and then select the **Diagnostics** toolbar button (or select **Tools > Diagnostics** from the main menu).

2. On the **Diagnostics** dialog, select the **Connect** button to establish communication with the monitor.

3. Once communication is established, select **Monitor Status** from the **Functions** drop-down list and then select the **Perform** button.

*The Print Preview dialog displays the current system information, including the monitor battery voltage, in printable format. Select the Print button to print the report contents.*

![Print preview dialog (battery pack voltage displays under Voltage)](image-url)
Replacing the Monitor Battery Pack

When necessary, replace the battery pack in the monitor as follows:

**Warning:** Before changing a battery pack in a monitor located outdoors during rainy or snowy conditions, disconnect the cables from the monitor and move to a dry area. The circuit board is not completely sealed and must be kept dry. If the monitor is moved indoors from a cold, outdoor environment, wait for the entire chassis (inside and out) to acclimate to the inside temperature before changing the battery. Failure to do so will result in condensation damage to the board.

**Note:** Be careful to avoid damaging or pinching the battery cable between the monitor door and the enclosure when replacing the battery pack.

**Note:** The only service or maintenance activity ADS permits within the monitor enclosure is battery pack replacement. Therefore, please do not handle, alter, modify, remove, or replace any other components inside the monitor. This may void the monitor warranty agreement.

1. Collect the data from the monitor.
2. Remove any locks securing the latches of the monitor enclosure (when applicable), undo the latches, and open the door.
Battery pack seated in cradle in monitor (without transparent cover over printed circuit board)

**Note:** Opening the door to the monitor enclosure during battery pack replacement increases the risk of damaging or introducing debris or moisture to the circuit board. Make every effort to prevent water, dirt, and debris from contacting the monitor's circuit board during routine maintenance.

3. Disconnect the battery pack from the circuit board power cable at the cable connector.

4. Carefully remove the battery pack from the cradle in the enclosure by rotating the top of the battery pack outward and then sliding it slightly up and out of the cradle.
5. Place the new battery pack into the cradle with the cables to the right and the red cable facing the back panel of the enclosure, and then rotate the battery pack backward until it locks into place.

6. Connect the new battery pack to the board’s power cable. Carefully push the excess cabling between the battery pack and the enclosure without pinching the cables.

7. Call the monitor or connect to the monitor on site using a serial communication cable to verify communication.

8. Carefully close the door to the enclosure (without pinching the battery cables), and secure the latches.
Checking the Tipping Bucket

Perform the following tipping bucket inspections and service during regular site visits:

- Inspect the tipping bucket to ensure it is still tightly secured to the base plate or sun shield and free from damage.
- Remove and clean out the screen and funnel. Verify that the opening to the funnel is clear and that the tipping mechanism is operational.
- Clean the tipping bucket regularly with a soft bristle brush and paper towels. *However, do not use detergent!*
- Calibrate the tipping bucket to ensure the accuracy of the tipping mechanism. Refer to *Calibrating the Tipping Bucket in Chapter 3, Hardware Installation*, for detailed instructions on performing calibrations.
- Confirm that the cable connecting the tipping bucket to the monitor is securely fastened and free of debris, cuts, and breaks that may affect performance. Replace a damaged cable, when necessary.

Checking Communication Devices

Inspect the following communication devices during site visits:

- **Antenna Cable** Check the internal or external antenna cable for damage, kinks, or breaks. Make sure the connector between the (external) antenna cable and the monitor is dry and sealed with rubber stretch tape.
- **Lightning Protection Module** Check the lightning protection module for lightning strikes (visible arcing), damaged or poor connections, or corrosion. Replace a burned out module, and repair any bad or corroded connections in the wiring.
- **Network Interface Box** If any problems exist with the network interface box, check the connectors to ensure that the cable entries are tight and waterproof. If this does not resolve the problem, contact the telephone company.

  **Note:** Make sure both the lightning protection module and network interface box are still waterproof.
Troubleshooting

The RainAlert II system contains several different components that perform many different functions. Since a malfunctioning component increases the risk of losing data, isolating the part containing the problem quickly is essential to performing troubleshooting activities efficiently. Minimizing monitor downtime is critical.

Consider the following when trying to isolate the component exhibiting the problem:

- Problems affecting only one of the components are usually caused by one component alone. The problem may exist in the board, communications, tipping bucket, or cabling.
- Problems affecting more than one component usually can be traced to a problem with the processor, power source, or communication lines. Problems in one component can create problems in other components when the power source or communication lines are faulty.
- Problems with communication lines, clock readings, time stamps, and data storage intervals usually arise from faulty processors, incorrect information entered on the user's PC, or low batteries.
- Failures occurring outside a connector (i.e., between a connector and the field input or output device) may arise from problems with the field unit or component cabling. Failures occurring on the inside (i.e., between a connector and the printed circuit board) may arise from problems with the board or its cabling.

**Note:** If possible, collect all monitor data prior to swapping a tipping bucket or troubleshooting a monitor to prevent possible data loss. Swapping a tipping bucket or battery pack does not result in stored data loss.
Some problems that occur will not require a site visit, such as incorrect equipment identification numbers or other system parameters the user can re-enter on the local PC. However, some problems will require a site visit. When this is necessary, inform the analyst any time a field crew is enroute to a monitor site to troubleshoot problems so that the analyst can attempt to collect the monitor data before they arrive. If the problem is a faulty monitor and the analyst cannot collect the data remotely, replace the monitor and deliver the faulty monitor to the office so the analyst can attempt to collect the data directly. If the analyst is still unable to collect the data from the monitor, send it to ADS for repair.

This chapter provides general guidelines for troubleshooting and correcting problems with the RainAlert II monitor and the tipping bucket.
## General Monitor Problems

The following tables contain general techniques for troubleshooting the ADS RainAlert II monitor.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Time stamp on the collected data is incorrect.</th>
</tr>
</thead>
</table>
| Possible Causes | PC clock may read incorrect time.  
Monitor clock may be faulty. |
| Possible Solutions | Verify the time on the PC clock and correct if necessary.  
Reactivate the monitor to enable the clock.  
Collect the data from the monitor and replace monitor if defective. |

<table>
<thead>
<tr>
<th>Problem</th>
<th>Time on the monitor clock is incorrect.</th>
</tr>
</thead>
</table>
| Possible Causes | Monitor clock may be faulty.  
PC clock may read incorrect time. |
| Possible Solutions | Verify the time on the PC clock and correct if necessary.  
Reactivate the monitor to enable the clock.  
Collect the data from the monitor and replace monitor if defective. |

<table>
<thead>
<tr>
<th>Problem</th>
<th>You receive a Device Time Out message in Profile.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible Cause</td>
<td>Circuit board may be faulty.</td>
</tr>
</tbody>
</table>
| Possible Solutions | Re-attempt communication with monitor.  
Replace the monitor if defective.  
Contact your regional ADS representative. |
<table>
<thead>
<tr>
<th>Problem</th>
<th>Gap exists within the collected data.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible Cause</td>
<td>Monitor time may be incorrect.</td>
</tr>
<tr>
<td></td>
<td>Monitor firmware or variable file may be corrupt.</td>
</tr>
<tr>
<td>Possible Solutions</td>
<td>Check monitor time, and reset clock if necessary.</td>
</tr>
<tr>
<td></td>
<td>Attempt to collect data within the gap.</td>
</tr>
<tr>
<td></td>
<td>Contact your regional ADS representative.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem</th>
<th>Data is missing at the beginning or end of the date range following data collection.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible Causes</td>
<td>Monitor activation may have failed.</td>
</tr>
<tr>
<td></td>
<td>Monitor time may be incorrect.</td>
</tr>
<tr>
<td></td>
<td>Monitor's firmware or variable file may be corrupt.</td>
</tr>
<tr>
<td>Possible Solutions</td>
<td>Verify whether the monitor has been activated, and activate if necessary.</td>
</tr>
<tr>
<td></td>
<td>Check monitor time, and reset clock if necessary.</td>
</tr>
<tr>
<td></td>
<td>Contact your regional ADS representative.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Problem</th>
<th>An I/O error message displays when communicating with the monitor.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Possible Cause</td>
<td>Circuit board may be faulty.</td>
</tr>
<tr>
<td>Possible Solutions</td>
<td>Re-attempt communication with the monitor.</td>
</tr>
<tr>
<td></td>
<td>Replace the monitor if defective.</td>
</tr>
<tr>
<td></td>
<td>Contact your regional ADS representative.</td>
</tr>
</tbody>
</table>
## General Communication Problems

The following tables contain general techniques for troubleshooting communication problems.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Possible Causes</th>
<th>Possible Solutions</th>
</tr>
</thead>
</table>
| Monitor does not answer a telephone call. | Telephone connection at monitor may be damaged, loose, or leaking.  
Telephone cable may be noisy, damaged, or dead.  
Lightning protection module may be damaged.  
Battery pack may be dead or below minimum voltage requirement (4.5 volts).  
Monitor may be defective.  
Modem in monitor may be defective.  
Modem in office or field computer may be defective.  
Telephone service may not be working. | Make sure phone cable connection at monitor base is secure and dry.  
Check telephone cable for damage.  
Use voltmeter to check voltage on telephone cable and at lightning protection module. Voltage should be approximately 48 Vdc on hook.  
Replace battery pack if below 4.5 volts.  
Attempt to direct connect to monitor.  
Contact telephone company for repair if noise, no tone, or constant busy signal occurs at network interface box or if service does not seem to be working.  
Replace the monitor. |
<table>
<thead>
<tr>
<th>Problem</th>
<th>Monitor does not answer through wireless communication.</th>
</tr>
</thead>
</table>
| **Possible Causes** | Signal strength to the modem may be insufficient.  
Battery pack may be dead or below minimum voltage requirement (4.5 volts).  
Monitor may be defective.  
Modem in monitor may be defective.  
Antenna or cable may be damaged.  
Internet connection in office or field computer may be down.  
Wireless carrier may be experiencing problems.  
Port 2100 may be blocked by IT department. |
| **Possible Solutions** | Direct connect to monitor on site, and request the signal strength. If the signal strength falls between -51 and -95, communication should be available. If it reads below -95, relocate the antenna. If relocation is not an option, install a land line or perform all communications on-site.  
Replace the battery pack if below 4.5 volts.  
Replace the monitor.  
Replace antenna/cable (*applies only to external antenna*).  
Restore Internet connection.  
Check for AT&T outage.  
Restore/establish permission to pass TCP/IP traffic via Port 2100. |
<table>
<thead>
<tr>
<th>Problem</th>
<th>Busy signal occurs when calling the monitor using a land-line.</th>
</tr>
</thead>
</table>
| **Possible Causes** | Someone else may be communicating with monitor.  
Monitor may be calling out an alarm.  
Telephone cable may be damaged.  
Lightning protection module may be damaged.  
Telephone cable may have shorted.  
Modem in monitor may be damaged.  
Telephone service may not be working. |
| **Possible Solutions** | Wait a few minutes, and attempt to communicate with monitor again.  
Connect at the site using the serial cable, and try to communicate with monitor.  
Use voltmeter to check voltage on telephone cable. Voltage should be approximately 48 Vdc on hook. If it is not, disconnect phone line at the lightning protection module and check the voltage at the network interface box.  
Make sure telephone cable is not damaged or severed, and repair or replace cable if necessary.  
Check telephone connector for moisture.  
Contact the telephone company to report service is not working.  
Replace the monitor. |
### Problem 1
Monitor establishes a connection, but does not respond to any message.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Possible Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cabling may be loose.</td>
<td>Listen for noise at the site using a field phone. If noise is present, inspect the wirings and replace wiring if necessary.</td>
</tr>
<tr>
<td>Lightning protection module may be damaged.</td>
<td>Replace the lightning protection module.</td>
</tr>
<tr>
<td>Modem in monitor may be faulty.</td>
<td>Contact telephone company.</td>
</tr>
<tr>
<td></td>
<td>Collect the data from the monitor on site using the serial cable, and replace monitor if defective.</td>
</tr>
<tr>
<td></td>
<td>Contact your regional ADS representative.</td>
</tr>
</tbody>
</table>

### Problem 2
Monitor does not deliver alarms through emails or text messages.

<table>
<thead>
<tr>
<th>Possible Causes</th>
<th>Possible Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>SIM card is missing or improperly installed.</td>
<td>Verify the presence and proper installation of the SIM card.</td>
</tr>
<tr>
<td>Text message or email address entered for alarm delivery is incorrect.</td>
<td>Verify the correct cryout address for alarm notification through emailing or text messaging.</td>
</tr>
<tr>
<td>SIM card address address is not valid.</td>
<td>Verify the SIM card address begins with 166.219.XXX.XXX and does not include leading zeroes.</td>
</tr>
<tr>
<td>AT&amp;T account has not been activated or set up correctly.</td>
<td>Verify that AT&amp;T activated and correctly set up account.</td>
</tr>
<tr>
<td></td>
<td>Contact your regional ADS representative.</td>
</tr>
</tbody>
</table>
## General Tipping Bucket Problems

The following table contains general techniques for troubleshooting the tipping bucket.

<table>
<thead>
<tr>
<th>Problem</th>
<th>Monitor is not registering or recording tips.</th>
</tr>
</thead>
</table>
| Possible Causes | Debris may be present in the funnel.  
| | Cable connecting the tipping bucket to the monitor may be loose or broken.  
| | Tipping bucket may not be level.  
| | Tipping bucket and/or tipping mechanism may be faulty.  
| | Circuit board is not responding or may be faulty.  |
| Possible Solutions | Clean out the funnel in the tipping bucket.  
| | Secure tipping bucket connection to monitor (if necessary).  
| | Check and adjust the level, and then secure the base plate or tipping bucket screws.  
| | Replace the tipping bucket.  
| | Replace the monitor if defective.  |

**Warning:** Contact your regional ADS representative for further diagnosis before replacing a tipping bucket.
This appendix contains specifications for the ADS® RainAlert II™ monitor, printed circuit board, tipping buckets, and lightning protection module.

**ADS RainAlert II Monitor (p/n 6000-RAW/RAL)**

The following table contains the specifications for the RainAlert II monitor.

<table>
<thead>
<tr>
<th><strong>Enclosure</strong></th>
<th>Stahlin &quot;J&quot; series HPL (hinged, padlock latch) enclosure; NEMA Type 4X 6P hot compression molded fiberglass reinforced polyester (thermoset) with stainless steel hardware</th>
</tr>
</thead>
</table>
| **Dimensions** | External: 13.56 inches high x 11.43 inches wide x 5.21 inches deep  
                             Internal: 11.79 inches high x 9.80 inches wide x 4.94 inches deep  
                             Mounting: 12.75 top-to-bottom x 8.00 right-to-left  
                             Mounting hole diameter: 0.31 inches |
| **Weight** | 22 pounds (monitor with battery) |

**Note:** RainAlert II monitors are not intrinsically safe.
### Operating Temperature

Without optional heater: 32° to 140° F (0° to 60° C)
With optional heater: 0° to 140° F (-18° to 60° C)

### Internal Power

- **Landline:** One ADS 130AH 7.5-volt alkaline battery pack (not rechargeable)
- **Wireless:** One ADS 130AH 7.5-volt alkaline battery pack powering both the monitor and the wireless modem; power to modem can be continuous or managed via duty cycles for power saving

### Waterproof

NEMA 6P

### Battery Life

- 5-minute sample rate: 12 months
- 15-minute sample rate: 24 months

**Note:** Estimate based on performing weekly data collects. Actual battery life may vary depending on operating temperature and frequency of communications, particularly when using wireless communication.

### Connectors

U.S. MIL-C-26482 Series 1 Type hard anodized aluminum with interfacial seals (for environmental sealing) and gold-plated contacts

### Inputs

- Tipping bucket
- Serial communication
- External AC/DC power
- Telco/ext antenna (external wireless antenna or telephone connection)

### Internal Antenna

Quad-band slot-type
Printed Circuit Board (ADS p/n 6000-0001)

The following table contains the specifications for the printed circuit board.

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Processor</strong></td>
<td>Texas Instruments VC33 DSP (Digital Signal Processor)</td>
</tr>
<tr>
<td><strong>Functions</strong></td>
<td>Performs and processes all requests for rain data, executes all math calculations, performs MLI-related functions based on user configuration, performs alarm handling, and performs multi-tasking monitor operations</td>
</tr>
<tr>
<td><strong>Memory</strong></td>
<td>1 megabyte non-volatile (program, configuration, and data storage) and 512 kilobytes static RAM</td>
</tr>
<tr>
<td><strong>Data Storage</strong></td>
<td>365 days at a 15-minute sample rate</td>
</tr>
<tr>
<td><strong>Sample Rates</strong></td>
<td>Minutes: 1, 2, 5, 15, 30</td>
</tr>
<tr>
<td></td>
<td>Hours: 1, 2, 12, 24</td>
</tr>
<tr>
<td><strong>Clock</strong></td>
<td>Battery-backed real-time clock (RTC) module</td>
</tr>
<tr>
<td><strong>Communications</strong></td>
<td>Wireless modem: Enfora™ Dual band 850/1900 MHZ GSM/GPRS; FCC ID MIVGSM0108; fixed address via AT&amp;T custom APN; refreshed every 4 hours via hard-attach</td>
</tr>
<tr>
<td></td>
<td>Landline modem: Multitech Model MT5600SMI; FCC ID 6KDMD06AH1; 19.2K baud with fallback to 9600 and 1200 as required for reliable communication; regular 2-wire voice grade POTS service line</td>
</tr>
<tr>
<td></td>
<td>Serial/Direct Connect: RS-232</td>
</tr>
<tr>
<td><strong>Comm Protocol</strong></td>
<td>AccuYapp for configuration and diagnostics</td>
</tr>
<tr>
<td></td>
<td>Yapp for data collects and cryouts</td>
</tr>
<tr>
<td><strong>LED Diagnostic Readings</strong></td>
<td>Wireless signal strength</td>
</tr>
<tr>
<td></td>
<td>Battery voltage</td>
</tr>
<tr>
<td></td>
<td>Monitor IP address</td>
</tr>
</tbody>
</table>
Tipping Buckets (ADS p/n 103202A/B/C/D)

The following table contains the specifications for the 8-inch tipping bucket (without a heater).

**Note:** Some specifications may vary for ADS-supplied tipping buckets of other sizes.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Industrial grade PVC</td>
</tr>
<tr>
<td>Funnel/Legs</td>
<td>Anodized aluminum</td>
</tr>
<tr>
<td>Dimensions</td>
<td>12 inches high x 8 inches in diameter</td>
</tr>
<tr>
<td>Weight</td>
<td>8 pounds</td>
</tr>
<tr>
<td>Switch</td>
<td>Magnetic proximity reed; encapsulated in hermetically-sealed glass tube; 10 watts, 200 VDC</td>
</tr>
<tr>
<td>Minimum Resolution</td>
<td>0.01 inches (.25 mm) per tip</td>
</tr>
<tr>
<td>Maximum Tips Per Second</td>
<td>10</td>
</tr>
<tr>
<td>Accuracy</td>
<td>+/- 2% at 1 inch per hour</td>
</tr>
<tr>
<td>Minimum Alarm Threshold</td>
<td>0.01 inches (.25 mm) per 5 minutes</td>
</tr>
<tr>
<td>Cable</td>
<td>Standard size: 20 feet long x 0.29 inches diameter OD polyurethane jacket</td>
</tr>
</tbody>
</table>
Lightning Protection Module (ADS p/n 103313)

The following table contains the specifications for the lightning protection module at the service location.

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Housing</td>
<td>Gray PVC</td>
</tr>
<tr>
<td>Dimensions</td>
<td>4.13 inches high x 3.25 inches wide x 1.88 inches deep</td>
</tr>
<tr>
<td>Polyswitch</td>
<td>600-volt 150-milliamps over-current protector</td>
</tr>
<tr>
<td>Varistor</td>
<td>240-volt over-voltage protector</td>
</tr>
<tr>
<td>Sidactor</td>
<td>280-volt over-voltage protector</td>
</tr>
<tr>
<td>Ground Wire</td>
<td>12 AWG black stranded</td>
</tr>
<tr>
<td>Service Wire</td>
<td>22 AWG 4-conductor gray unshielded</td>
</tr>
</tbody>
</table>
This appendix lists the part numbers for the most commonly ordered and used ADS® RainAlert II™ system parts.

<table>
<thead>
<tr>
<th>Monitor and Mounting Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000-RAW  MONITOR, RAINALERT II, WIRELESS (WITH ANTENNA)</td>
</tr>
<tr>
<td>6000-RAL  MONITOR, RAINALERT II, LAND-LINE</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Monitor Mounting Hardware</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000-0045  KIT, BASE PLATE, RAINALERT II</td>
</tr>
<tr>
<td>6000-0046  KIT, SUN SHIELD, RAINALERT II</td>
</tr>
<tr>
<td>6000-0047  KIT, SUN SHIELD, WALL MOUNT, RAINALERT II</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tipping Buckets</th>
</tr>
</thead>
<tbody>
<tr>
<td>103202A  TIPPING BUCKET, 8-INCH</td>
</tr>
<tr>
<td>103202B  TIPPING BUCKET, 12-INCH</td>
</tr>
<tr>
<td>103202C  TIPPING BUCKET, 12-INCH, HEATED</td>
</tr>
<tr>
<td>103202D  TIPPING BUCKET, 8-INCH, HEATED</td>
</tr>
<tr>
<td>5000-0724-xxx  CABLE, TIPPING BUCKET, EXTENSION (xxx represents cable length; options include 25-, 50-, 75, and 100-foot lengths)</td>
</tr>
<tr>
<td>5000-0721  CABLE, TIPPING BUCKET PIGTAIL, 25 FEET</td>
</tr>
</tbody>
</table>
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<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
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<td>5000-0664</td>
<td>CABLE, RS232, WITHOUT PHONE LINE</td>
</tr>
<tr>
<td>5000-0601</td>
<td>CABLE, RS232, WITH PHONE LINE</td>
</tr>
<tr>
<td>5000-0697</td>
<td>CABLE, PHONE</td>
</tr>
<tr>
<td>103313A</td>
<td>LIGHTNING PROTECTION MODULE</td>
</tr>
</tbody>
</table>

### Wireless Communication and Antennas

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>3800-0128</td>
<td>ANTENNA, WHIP, 850/1900 MHz, SMA</td>
</tr>
<tr>
<td>3800-0162</td>
<td>ANTENNA KIT, SLIM, SMA/TNC, HIRSCHMANN</td>
</tr>
<tr>
<td>3800-0163</td>
<td>ANTENNA KIT, MINI-WING, SMA/TNC, SMARTEQ</td>
</tr>
<tr>
<td>507181</td>
<td>SIM CARD, WIRELESS GSM</td>
</tr>
<tr>
<td>507180</td>
<td>LIGHTNING PROTECTION DEVICE</td>
</tr>
<tr>
<td>507165</td>
<td>CABLE, ANTENNA, EXTENSION, 15-FOOT SMA</td>
</tr>
</tbody>
</table>

### Monitor Replacement PCBs

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000-0001</td>
<td>PCBA, PROCESSOR, WIRELESS, RAINALERT II</td>
</tr>
<tr>
<td>6000-0001-01</td>
<td>PCBA, PROCESSOR, LANDLINE, RAINALERT II</td>
</tr>
<tr>
<td>3506-0078</td>
<td>PCBA, MODEM, LANDLINE, RAINALERT II</td>
</tr>
</tbody>
</table>

### Monitor Replacement Battery Pack

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000-0004</td>
<td>BATTERY PACK, 7.5 V, RAINALERT II</td>
</tr>
</tbody>
</table>

### External Power Kit

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>6000-0052</td>
<td>KIT, EXTERNAL POWER</td>
</tr>
</tbody>
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