M110/M800

Installation Manual

Welcome,

Thank you for choosing Mission Communications for your monitoring and alarm needs! Mission is committed to providing the highest quality in SCADA solutions. All of our products go through a strict testing regimen before leaving our facility to ensure a seamless "out of the box" installation experience.

The first chapters of this manual focus on pre-installation and are intended to identify issues and recommend solutions to optimize your installation. Appendix A houses descriptions of terminology that is used throughout the manual. Please consider the steps in these sections and confirm that you have received all the necessary parts for a successful installation.

Each RTU is packaged with an RTU Setup Form along with a User Guide, Terms & Guarantees, and an Emergency notice label. New customers will also be given a New Customer Packet which includes Account and Notification Setup Forms, along with electronic (Dallas) Key instructions. Prior to installation, please complete and send in all forms to Mission technical support in order to access your web portal with the login credentials you have provided.

Mission provides customers with 24-hour access to our technical support team. Additionally, we provide a wide range of information that can be remotely accessed through the web portal. Here at Mission, it is our goal to provide customers with the latest technology and designs while ensuring great value.

Weekly training webinars are available most Wednesdays at 2:00 P.M., Eastern. We also provide quarterly newsletters and training videos on our website. We encourage you and your staff to take advantage of these resources. Visit www.123mc.com to sign up for the webinar, to find our training videos, and newsletter archives. Our technical support staff is available at (877) 993-1911, option 2 for further assistance.

Thank you,
The Mission Team

> **WARNING:** This symbol indicates there is caution or warning to avoid damage to your property or product.
>
> **WARNING:** Follow requirements for field wiring installation and grounding as described in NEC and your local/state electrical codes.
>
> **NOTE:** This symbol indicates that there is something that requires your special attention.
>
> This device complies with part 15 of the FFC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Contents

Mission offers a variety of related documents. Scan the QR code with your smartphone or visit www.123mc.com/literature.asp to view.

Chapter 1: Overview

M110/M800 at a Glance

Each RTU is packaged with everything needed for a standard installation.

Enclosures

NEMA 1 - indoor mounting
NEMA 4 - outdoor mounting
Flatpak - control panel or cabinet mounting

NEMA 4

NEMA 1

Flatpak

Included Hardware with a Standard RTU:

- ☐ RTU (NEMA 1, NEMA 4, or Flatpak enclosure)
- ☐ RTU Installation Packet (RTU Form, User Guide, and Emergency notice label)
- ☐ Battery - 12 V, 5 Ah
- ☐ Flying Lead Transformer (120 VAC to 12 VAC, 1.2 amp)
- ☐ Universal Mount Antenna Kit (11' RG58 cable with SMA-M connector, pole, or wall mount bracket, dual band antenna whip, (2) pole clamps, and (2) Metal oxide varistors (MOVs) rated for 120 V control circuits)
- ☐ Accessory Bag ((4)1K ohm long yellow EOL resistors, (8) 1K ohm EOL resistors, (4) wire nuts, (8) screws, and an interchangeable Phillips/flathead screwdriver)
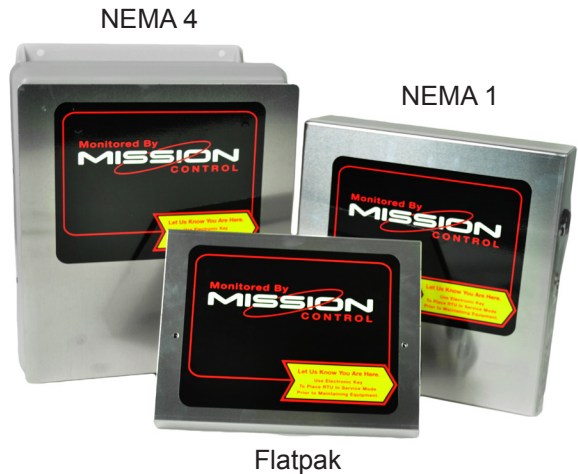
New customers will also be given a New Customer Packet which includes Account and Notification Setup Forms, along with (5) electronic (Dallas) keys plus instructions and Manage SCADA document.

Note: If there are any missing parts, please contact us.

Recommended Tools (not included)

Mechanical

- ☐ Drill motor
- ☐ Step drill or hole saw
- ☐ Hack/reciprocating saw
- ☐ Metal cutting blades
- ☐ Pliers
- ☐ 5/16" nut driver or tip
- ☐ Screwdriver phillips head
- ☐ Ladder (for antenna mounting if necessary)

Electrical

- ☐ Voltmeter/multimeter
- ☐ Wire cutters
- ☐ Wire strippers

Materials

- ☐ 18 or 22 gauge wire, 2, 4 or 8 conductor stranded and shielded
- ☐ 10-14 gauge green wire (follow NEC standards) for grounding the RTU
- ☐ ¾" Flex conduit with straight and elbow fittings
- ☐ Uni-strut rail and hardware for mounting
- ☐ Interposing relays and bases (if no dry contacts are available)
- ☐ 12 VDC coil interposing relay (if output relays will be used)
- ☐ Sealant

Mission offers a variety of optional accessories. Scan the QR code with your smartphone or visit www.123mc.com/accessories to view our accessories catalog.

Chapter 2: Site Survey & Connectivity Test

Prior to installation, please complete and submit the RTU Installation Form via fax (770-685-7913) or email (setupforms@123mc.com) so Mission can set up the new unit(s) on your web portal. New customers must also complete and submit both forms within the New Customer Packet. The web portal can be accessed with the login credentials you provided within the Account Setup Form. Once completed and entered by technical support, alarms can be enabled for your RTU(s) immediately after installation so you can perform end-to-end testing.

By powering the RTU and testing connectivity before mounting the hardware, you can optimize the signal strength for years of trouble-free communication. The test only takes a few minutes since the included battery can provide temporary power. Refer to the antenna best practices section (chapter 3) when positioning the antenna.

1. Remove the RTU from the box and place it on or near the control panel it will be monitoring. Remove the antenna cable and antenna whip from the package and hand-tighten the SMA-M connector to the radio SMA-F connection on the RTU (see Figure 1).

2. Screw the whip antenna onto the molded antenna base and place it outside as high as possible. ⚠ Hand-tighten plus ¼ turn with a wrench. Do not over tighten.

3. Power the RTU with the 12 VDC battery (see Figure 1). Connect the negative (black) lead to the battery and then connect the positive (red) lead. LEDs will illuminate in a sequence (see Figure 1 for LEDs). Once the sequence is completed, you will hear 3 beeps from the buzzer. This indicates the unit has connected to Mission servers. If the RTU does not connect after two attempts, refer to Appendix D: RTU Boot-up Sequence, Appendix E: Troubleshooting or call technical support.

4. The signal strength push button is located to the left of the vertical stack, below the radio (see Figure 1). Press the button once to see the vertical LED stack display signal strength with the corresponding dBm readings to the right of the LED's. Once the button is pressed it will turn off for ~6 seconds then it will show the signal strength of area. The LED's will give live reading for two minutes then go back to operational mode. Press button again to repeat test. You can also check signal strength by logging into your web portal by visiting www.123mc.mobi on your smart device. Select "status" page and pick the RTU you are installing then page for signal strength. A -75dBm signal is better than a -100dBm signal, although it is acceptable.

Main Printed Circuit Board Wired for Site Survey
Figure 1
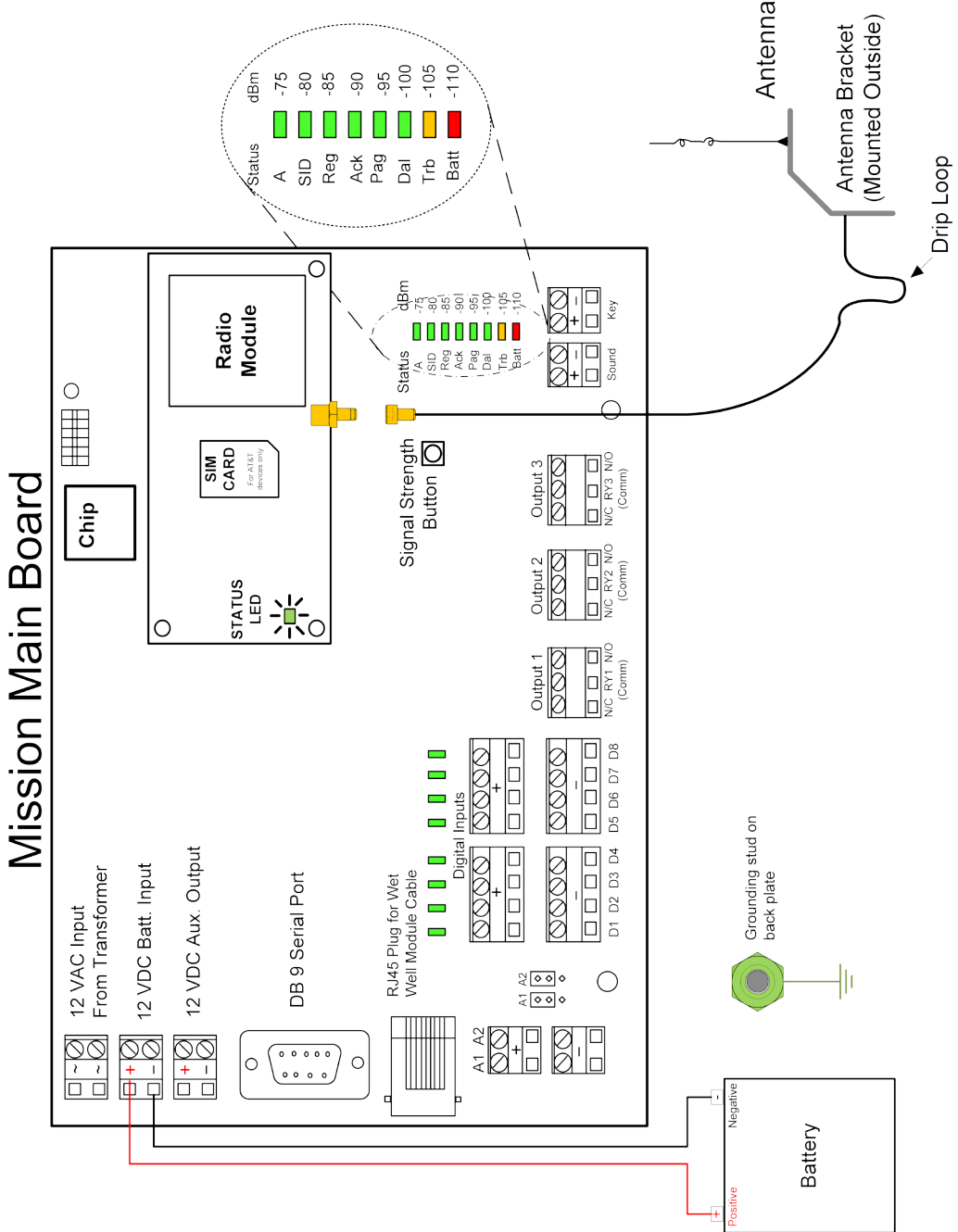
Chapter 3: Antenna Installation

Overview

The antenna should be mounted outdoors and above other objects. By optimizing the placement of the antenna, you increase the chances that the radio can communicate with more than one cell tower. The coaxial cable should reach the Mission RTU radio connection with no severe routing of the coax. Consider where the RTU will be mounted in relation to the location of the antenna.

1. Install the antenna cable and antenna whip. Connect the SMA-M cable connector to the SMA-F connector on the main board (see Figure 1). Unscrew the nut from the molded antenna base. Feed the molded antenna base through the square cut out on the bracket. Place the molded antenna base in the circle cutout.

⚠️ Secure the molded antenna base to the bracket with the nut. Hand-tighten the nut, plus ¼ turn with a wrench. Do not overtighten.

2. Install the mounting bracket. Mount the Universal Antenna Mount directly on the face of a flat surface or a metal pipe using the included pipe clamps (placing above any obstructions).

Antenna Best Practices

Do	Don't
Mount the antenna outside as high as possible, preferably above the roof or other objects.	Mount the antenna underground, in a dry well, or inside a "canned" lift station.
Mount the antenna above all metal surfaces close to the installation.	Mount the antenna horizontally or bend the antenna whip.
Coil excess coax in circles of 5 to 7 inches in diameter. Pinching or tight bends in the coax can restrict the high frequency/low power radio signal path in much the same way water flow is restricted through a tight bend in a hose.	Mount the antenna inside a metal control cabinet. Even fiberglass cabinets degrade the signal.
Ensure that the weight of the cable does not damage the antenna base. There should be enough slack in the cable so it does not rest or touch the top surface of the mounting bracket.	Mount the antenna on the side of a metal cabinet or adjacent to a tank. Metal surfaces will reflect the radio signal, preventing it from traveling in all directions.
Incorporate a drip loop when installing the cable to prevent water from penetrating into the building or enclosure.	Cut, lengthen, or shorten the coaxial cable. Mission can supply antenna extension cables and connectors up to 50 feet. For lengths above this limit, another RTU mounting location should be considered.

Wiring Best Practices

- Signal cables should NOT run parallel with high voltage AC wires (load conductors).
- Where signal wires and load conductors must cross, do so at right angles.
- High voltage should not enter the Mission RTU. Mount the supplied transformer outside the Mission enclosure.
- Lay wires in wire trays with the excess near terminations. Replace wire race covers (follow NEC and your local/state electrical codes requirements).
- Cables used for digital and analog inputs should be 18 to 22 gauge, shielded, twisted pair wire with the shield connected to ground at the RTU and NOT on the other end of the cable (to prevent ground loop current).
- MOVs can be installed across AC contactor coil terminals to shunt voltage away from the RTU inputs. Voltage spikes can be caused by coils de-energizing. The included MOVs are rated for 120 V circuits and will suppress excess voltage above 150 V. These parts are application dependent. They have a finite lifespan and will need to be replaced over time.

Chapter 4: RTU Installation and Wiring

Locate the RTU as close as possible to the control cabinet while considering the antenna cable length.

⚠️ Turn off station power.

1. **Mount the enclosure.**

2. **Cut the conduit and wiring holes.** Drill and attach the conduit in the control cabinet and Mission RTU. Use sealant where appropriate.

3. **Pull the wires and cables.** Pull the wet well cable (if used), then the AC and 18 to 22 gauge input wires.

4. **Ground the RTU.** Use 10 to 14 gauge green wire to connect the grounding lug on the backplate in the RTU to the stations Earth ground (refer to Figure 1).

5. **Install the Wet Well Module (optional).** Locate and mount the Wet Well Module, according to the supplied installation manual. Run the included RJ45 cable to the RTU.

Enclosure Options

Nema 4

Mount outdoors on unistrut or a wall. Allow clearance for hinge (left) and key reader (right).

Consider the Nema 4 for indoor application where wash-downs occur.

Conduit connections can enter from bottom, but leave space for the included battery.

Mission RTU and Antenna

Battery

Nema 1

Use indoors where no wash-downs occur.

Allow for space on bottom of the enclosure for the battery.

Key Reader
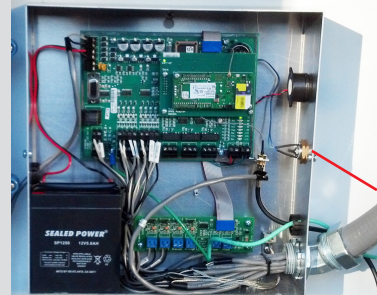
Flatpak

Mount inside the control cabinet.

Two large holes are provided for through-wires.

Place battery inside the control cabinet.

6. **Terminate digital inputs.** Refer to the wiring diagram on the M110/M800 cover/door and RTU Installation Form in the packing box. Record input names on the setup form and the diagram.

The default digital input (DX) connections are as follows:
D1 - pump 1 runtime accumulator
D2 - pump 2 runtime accumulator
D3 - pump 3 runtime or simultaneous pump (1 & 2) runtime accumulator*(M110)
D4 - high level float
D5 - pump 1 fail
D6 - pump 2 fail
D7 - phase fail
D8 - unassigned or multiple pump runtime accumulator*(M800)

Input labels can be modified on your web portal. Begin with D5 if you install a Wet Well Module.

⚠️ Digital inputs require dry contacts. This means that wires running to these inputs must not supply any voltage. Use an interposing relay if there are no dry contacts available. If you must use a common input wire refer to Appendix E.

The digital inputs are set as normally open by default. You must use normally open contacts on pump runtime inputs. You may use normally closed contacts on digital inputs 4 through 8. Notify Mission technical support via the RTU Setup Form to change the default settings (refer to Figure 2).

Connect the shields of digital input wires to the grounding lug located inside the RTU.

Pump Runtime Inputs: On M110 RTUs, only inputs D1-D3 can be configured for pump runtimes. However, they can also be set as alarm inputs. D4-D8 on an M110 can only be configured as alarm inputs. D3* can be used for simultaneous runtimes by leaving the resistor out, then contact tech support.

On M800 RTUs, D1-D8 (on the main board) can be configured as pump runtime, pump runtime with alarm, or alarm inputs. As an option, the system can report multiple pump runtimes on M800 RTUs for D1-7 by installing the resistor on D8*, and Mission technical support must configure it as an alarm.

Wire Supervision
Figure 2

Wire supervision: Sensors associated with the digital inputs rely on a 1000 ohm end-of-line resistor for wire supervision. These resistors are wired in parallel with the monitored switch contacts and allow the main board circuitry to monitor the integrity of the connections (refer to Figure 2A, and 2B). If you cannot easily install the resistors at the sensor or relay, you can install them across the digital input itself (refer to Figure 2C). By doing this, you will not have line supervision.

DB 9 Serial

RJ45 Plug for Wet Well Module Cable

Digital Inputs

A1 A2

A1 A2

D1 D2 D3 D4 D5 D6 D7 D8

Output 1

N/C RY1 N/O
(Comm)

N/C RY2
(Comm)

1000 ohm resistor

2C

Grounding stud on back plate

2B

EOL – End of Line Resistor

N / O

N / C

COIL

COMM

COIL

Panel Relay (example)
Mission can monitor the dry contacts of relays located inside the control panel. (N/O or N/C) I.E. pump run, seal fail, over temp, phase fail, high level, low level, generator run, etc...

2A

Any switch type instrument
(Float, phase fault, etc.)

EOL

⚠ No EOL resistors are required on D1, 2 and 4 when using Wet Well Module.

7. **Terminate analog inputs.** Two analog inputs are available on the main board (refer to figure 3). These inputs can accept a 4-20 mA (milliamps) or 0-5 V signal. Place the analog jumper* on the top 2 pins for a 4-20 mA signal and on the bottom 2 pins for a 0-5 V signal.

> ⚠️ Take precautions when wiring the analog inputs. Reverse polarity may damage the main board or the sensor.

The 12 VDC auxiliary output on the main board can be used to power the transducer as seen in Case 1 (100 mA maximum). When using the Aux. output, be aware of the voltage drop in the 4-20mA loop when wiring to the analog inputs. The Aux. output supplies a maximum of 12V. If voltage consumed in the 4-20mA loop exceeds the 12V supplied by the Aux. output, the analog reading will be in error. Case 2 or 3 may be appropriate in this situation.

8. **Wire the output relays.** The output relays are single pole, double throw and rated up to 24 VDC at 250 mA maximum. They are used for remote control applications such as Tank and Well, and digital intertie. You can wire the relay normally open (default) or normally closed (refer to Appendix B).

Analog Input Wiring
Figure 3

Case 1:
Power to Analog transfucer is supplied by Mission 12v Aux. Out
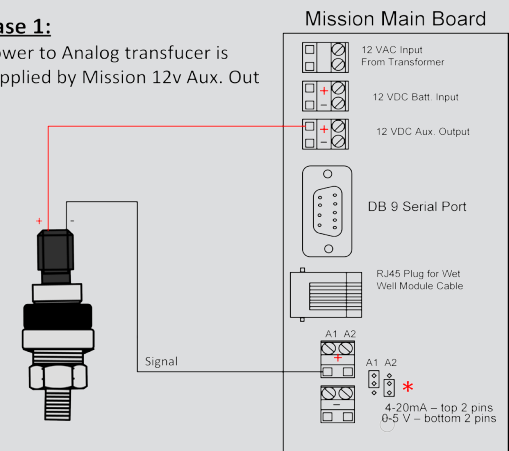
Case 2:
Power to Analog transducer comes from external power source

Case 3:
Voltage booster used to power analog device
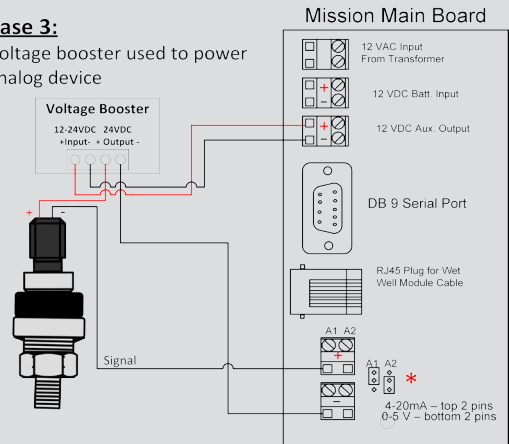
Many items should be considered with remote control applications. Refer to the *Best Practices for Remote Control Applications* document.

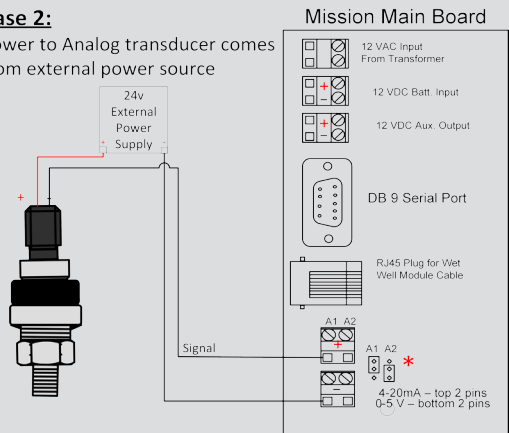Generally, 12 VDC coil interposing relay is used in conjunction with the Mission main board reed relays to prevent overload damage to the main board. Make sure the load side of the relay can handle the rated AC voltage of the load you are switching on or off. The maximum interposing relay coil rating is 200 milliamps.

Wire the 12 VDC auxiliary output to common on the output relay. Wire the coil on the interposing relay to normally open or normally closed on the output relay.

9. **Install the 120 VAC transformer and wire AC power.** Mount the transformer in the control panel (not the mission RTU).

It is very important to ONLY provide 12-16 VAC to the Mission main board AC input. Hooking up the transformer backwards will apply 1200 VAC to the main board and cause permanent change. Do not install transformer in the RTU, rather, install it in the control cabinet.

Transformer Wiring
Figure 4

Connect AC power to the primary input (black wires). Connect the secondary output (red wires) to the main board input. The transformer steps the power down from 120 VAC to 12 VAC. DO NOT turn on station AC power yet.

Mission Main Board

12 VAC
12 VAC Input
From Transformer
12 VDC Batt. Input
12 VDC Aux. Output
DB 9 Serial Port

From 120 VAC
In Panel
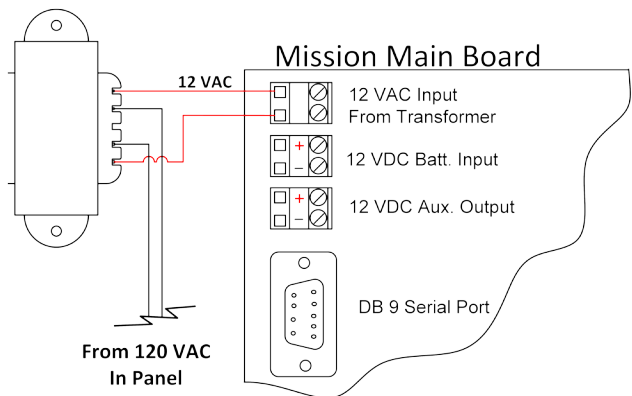
Chapter 5: RTU Startup

1. Power the Mission RTU with the 12 VDC battery only. Connect the black lead first, then the red lead. The LEDs will illuminate in sequence (see Figure 6 for LEDs). Once the sequence is complete, you will hear 3 beeps from the buzzer. This indicates the unit has connected to Mission servers. Allow the unit five to ten minutes to perform its power-up sequence and synchronization to the network. If the RTU does not connect after two attempts, refer to Appendix D: RTU Boot-up Sequence, Appendix E: Troubleshooting or call technical support.

2. Check the wiring connections before powering the pump station. If the wiring is correct, power the pump station, and immediately focus on the main board. Check to ensure the Mission RTU is still operating. If somehow a wiring mistake has been made, it will be evident. If there appears to be a mistake, immediately remove power. If power is OK, proceed to testing the RTU.

Battery Wiring
Figure 5

Mission Main Board

12 VAC Input
From Transformer

12 VDC Batt. Input

12 VDC Aux. Output

DB 9 Serial Port

Positive   Negative

Battery
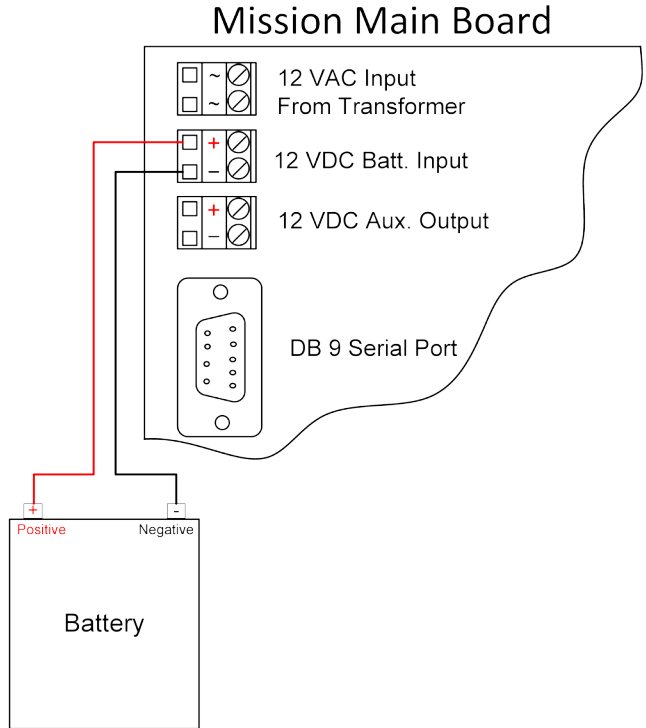
Main Board Connections
Figure 6

Option Board Connection Socket

Chip

Radio Module

SIM CARD For AT&T devices only

STATUS LED

Vertical Status LEDs
(Letters indicate status, Numbers indicate signal strength)

Status dBm
A -75
SID -80
Reg -85
Ack -90
Pag -95
Dai -100
Trb -105
Batt -110

Key

Sound

Antenna Connection

Signal Strength Button

Digital Status LEDs
LED Off – Open
LED On – Closed
LED blinking – wire fault

Digital Inputs
D1 D2 D3 D4
D5 D6 D7 D8

Digital Inputs
Dry Contacts Only.
(See manual for details)

Output 1 N/C RY1 N/O (Comm)
Output 2 N/C RY2 N/O (Comm)
Output 3 N/C RY3 N/O (Comm)

Output relays
24 VDC.
250 mA Max.
(Non-inductive Load)

12 VAC Input
(From Transformer)

12 VDC Battery Input

12 VDC Auxillary Output

DB 9 Serial Port
(For diagnostics and programming)

For Wet Well Module Cable (Accessory)

A1 A2

A1 A2
POS
NEG

Analog scaling jumpers
4-20mA – top 2 pins
0-5 V – bottom 2 pins

Analog Inputs
(See manual for details)

17

Chapter 6: Test the Installation

It is imperative that alarm points are tested and that alarm notifications are received so they can be acknowledged by the customer or end-user once the unit is put into production. This includes phone numbers, text messages, e-mail addresses, fax numbers, and pager numbers.

Additionally, it is recommended that the customer or end-user test all alarm points, at least, every six months to ensure all electrical components and alarm parameters are still functioning as desired and that alarms are being received and acknowledged by recipients. Refer to our *Spring Cleaning/Fall Fix-It document* for testing procedures.

Complete the following tests prior to leaving the job site:

1. **Confirm AC power.** Use a voltmeter across the AC terminal to verify ~12-14 VAC is present.

2. **Test the battery.** If the red BAT LED is on, remove AC power, and use a voltmeter to read the battery voltage. If it measures below 11.5 VDC, then the battery may require time to charge or is bad. If the BAT LED blinks steadily, it is charging. If it is on solid, the battery is not connected.

3. **Test the radio connection.** Check the radio status LED. It should blink slowly. If not, call technical support at 877-993-1911 option 2.

4. **Inspect the vertical status LEDs.** Normally the A and SID LEDs are on, while the green DAL LED blinks steadily. The REG, ACK, and PAG LEDs should remain off. The REG LED will illuminate during data transmission.

5. **Inspect the digital input LEDs.** Check the horizontal input LEDs on the Mission main board. If any LEDs are blinking, the input does not sense a 1000-Ohm EOL resistor. Check the wiring/connections of the resistors.

6. **Test the digital alarm inputs.** Put each digital input into an alarm state. If this is not possible, short out the 1000-Ohm resistor at the relay/terminal connections. The corresponding input LED will turn on and an alarm

call-out will be initiated (if call-outs are enabled at the web portal and the input is a NO input). If not, check wiring/connections. Ensure that all alarm inputs when closed cause the corresponding Mission RTU input LED to illuminate. Mission technical support is available to confirm that data is being properly transmitted and received on your web portal. A smartphone can be used otherwise.

7. **Test the pump runtime inputs.** Turn on pump 1. Mission D1 LED should illuminate. If not, check the wiring and/or end-of-line resistors (no Wet Well Module). Repeat step for pump 2 and 3 if used.

8. **Test the high level alarm.** Open the wet well. Pull the high-level float up and put it into alarm condition by tipping it. Ensure that the digital input LED turns on. If not, check the wiring (wet well module if used). Also check the high level float itself.

   Wet Well Module: By performing the above pump run and high level alarm tests you will have tested the wet well module if installed. The green power LED should always be on. The blue pump run LEDs come on when pumps are running. The red high level alarm LED should turn on when the high float is closed. No EOL resistors are required on D1, 2 and 4 when using Wet Well Module.

Verify alarm notifications are received from the tests. Log on to your web portal with the credentials specified on the Notification Setup form. Go to the Alarms page. You should see a list of alarm events with event time and the result.

Call Mission technical support after testing the installation to enable the device for alarm call-outs. A technician will verify proper operation of equipment.

Chapter 7: Site Commissioning

Enable the RTU for alarm call-outs by calling technical support.

Setup Forms
Ensure setup forms have been submitted to Mission technical support. Verify proper labeling on your web portal and the wiring diagram on the Mission RTU. Users with administrator credentials have the ability to make changes to the web portal, if necessary.

Documentation and Help Guides
It is recommended that you review the online manuals for detailed operation of your RTU and web portals. This can be found on your menu selection in the DOWNLOAD folder under DOCUMENTS.

The *Operators Guide* that came with the RTU should be distributed to your operators as a how-to document to get operators started with the Mission system. It covers the basics of the system capabilities, monitoring and alarming, and helpful resources.

Training Resources
Mission hosts weekly webinars nearly every Wednesday at 2:00 P.M. Eastern. The revolving series covers the basics, advanced web portal options, and everything in between. We want to help you get the most out of your system, so please join us and feel free to ask questions.

We also offer short video tutorials and quarterly newsletters with timeless information. Registration and archives can be found on our website.

Your unit is now ready for use. Visit www.123mc.com or www.123mc.mobi and log in with your credentials to view your web portal.

Appendix A: Terminology

Alarm Inputs
A digital or analog input that is configured to dispatch a notification when the alarm state or threshold is reached.

Analog Inputs
Two analog inputs on M110 and M800 series RTUs can be used to report pressure, level, chlorine pH, or any other dynamic readings by way of a 4-20mA or 0-5V transducer. Analog inputs support 4 threshold alarm settings that can be remotely configured. Both models can be expanded to 6 analog inputs. Model 110 alarm thresholds are not supported by the Analog Option Board but are supported on the two analog inputs on the main board.

Digital Inputs
Eight dry contact inputs on M110 and M800 series can be used for sensing alarms, pump status, as well as accumulating pump runtimes and pump starts. Both models can be equipped for an additional 8 digital inputs with the Digital Option Board to give you a total of 16 digital inputs (on M800 D1-8 can only be configured for runtimes).

Digital Outputs
Three relay outputs can be remotely controlled to turn on pumps, wells, or security lights. Multiple M800s can be linked so an event at one station causes a relay change at another. Mission's Tank and Well Control option and Intertie rely on this feature. Consult *Best Practices for Remote Control* document for more information (www.123mc.com/literature.asp).

Electronic Key Reader
The included key reader allows on-site personnel to log a site visit, acknowledge, and suspend alarms while service is performed at the station. Management can track the key entries for productivity and regulatory reporting purposes. The functionality of the key can be configured at the web portal.

End-of-Line Resistor
A resistor of known value (1000-Ohm) that is used to terminate protective loops, and provides wire supervision. Wired in parallel to a switch instrument.

M110 vs. M800

Generally, the M800 is more appropriate for remote control applications, where analog sensors are present, and at master lift stations. Both RTUs provide real-time alarms. The M110 accumulates pump starts each hour whereas the M800 reports real-time pump state changes. Hourly pump runtimes are reported for both. The M800 reports analog values every 2 minutes or sooner (>5% change) for trending purposes. The M110 supports up to 3 pump runtime inputs whereas the M800 supports up to 8.

Metal Oxide Varistor (MOV)

The included MOVs are used to protect circuits against high transient voltage spikes, often caused when relay coils de-energize. They are rated for 150V. Voltage above 150 V will be dissipated. The MOVs are non-conductive during normal operation. Consult your electrician before installing the MOVs.

Power and Backup Power

The M110 and M800 RTUs operate on 12 VAC via the supplied transformer. The 120 to 12 VAC transformer mounts outside the RTU to minimize the chances of induced voltages. A 5 amp hour battery with a charging circuit powers the units for 1-3 days (M800 and M110) during a power failure. AC power fail alarm will be dispatched after 5 minutes. A low battery alarm will be dispatched in the morning if the battery voltage fell below 11.5 volts anytime the previous day.

Pulse Inputs Options

Two pulse inputs can be used to report data such as flow, water meter, or rainfall totals. If no rainfall data is monitored at the site, Mission's web site presents data from the closest National Weather Service reporting station. Pulse inputs are available with either the Pulse Option Board or the Analog Option Board.
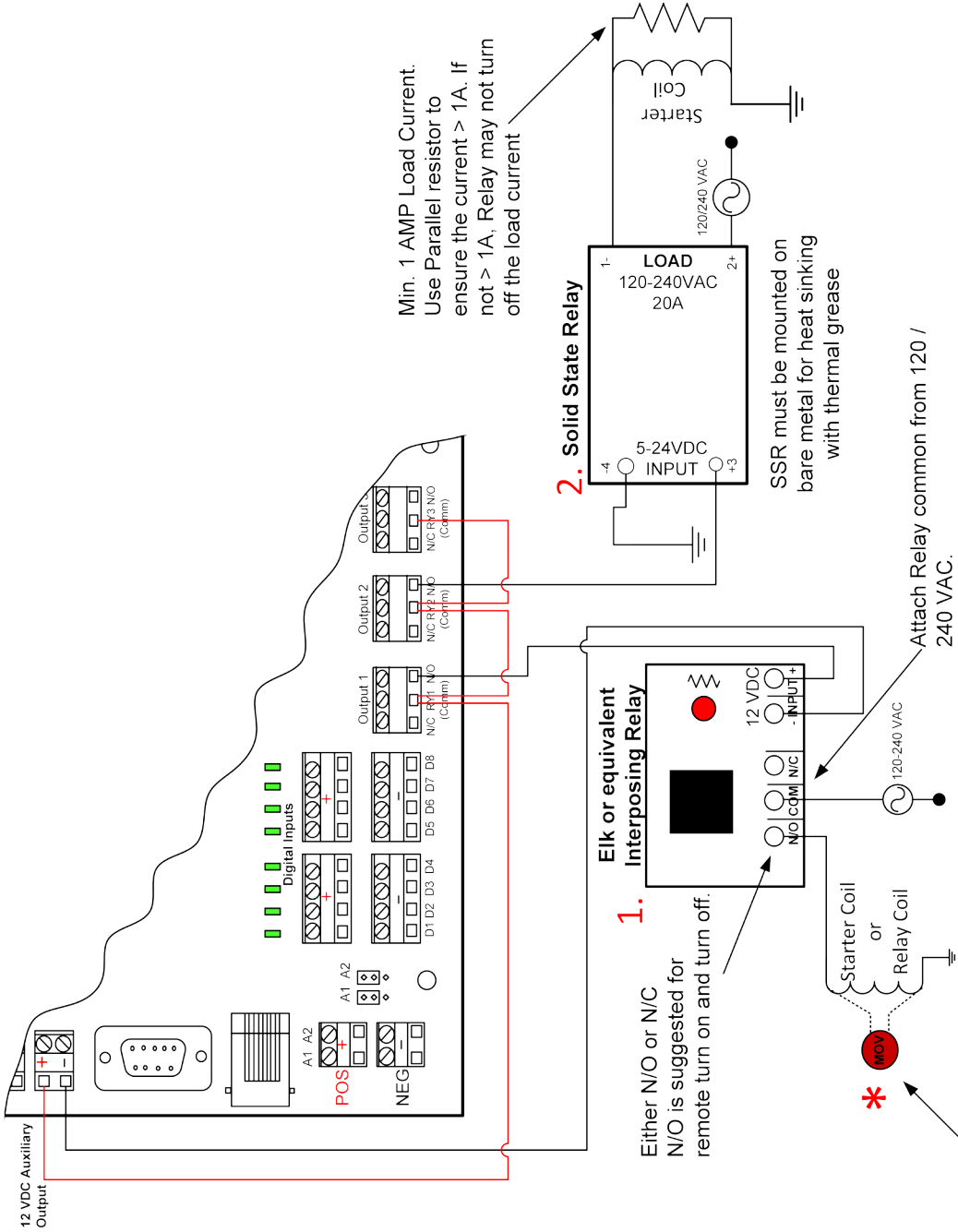
Runtime Inputs

A digital input that is configured to calculate for runtime minutes. Alarm notifications are generally not enabled.

SIM (Subscriber Identity Module)

This card carries an identification number that contains the billing credentials for certain cellular radio. Not required for Verizon (CDMA) services. Removal of card will disable operation.

Appendix B: Output Relay Diagram

Mission Main Board

12 VDC Auxiliary Output

POS

NEG

A1 A2

A1 A2

Digital Inputs

D1 D2 D3 D4   D5 D6 D7 D8

Output 1   Output 2   Output 3

N/C RY1 N/O (Comm)   N/C RY2 N/O (Comm)   N/C RY3 N/O (Comm)

2. Solid State Relay

LOAD
120-240VAC
20A

1-   2+

5-24VDC
INPUT

-4   +3

120/240 VAC

Starter Coil

Min. 1 AMP Load Current. Use Parallel resistor to ensure the current > 1A. If not > 1A, Relay may not turn off the load current

SSR must be mounted on bare metal for heat sinking with thermal grease

Elk or equivalent Interposing Relay

12 VDC

INPUT +   -

N/O COM N/C

120-240 VAC

Attach Relay common from 120 / 240 VAC.

1. Either N/O or N/C N/O is suggested for remote turn on and turn off.

Starter Coil or Relay Coil

MOV

* To suppress spikes during turn-off of Inductive loads, use a properly sized MOV across starter coil or relay coil. If this load is DC-driven, use a IN4004 diode across the load, cathode tied to the positive terminal.

23

Appendix C: Wiring Relays to Digital Inputs Using a Common Wire

To Mission Digital
Inputs – Upper
Terminals
(No connection to
lower terminals)

Output
Relay
Contacts

Common
Wire

1.8K
1K

1.8K
1K

1.8K
1K

1.8K
1K

1.8K
1K

1.8K
1K

1.8K
1K

1.8K
1K

Ground on
Mission
Main Board
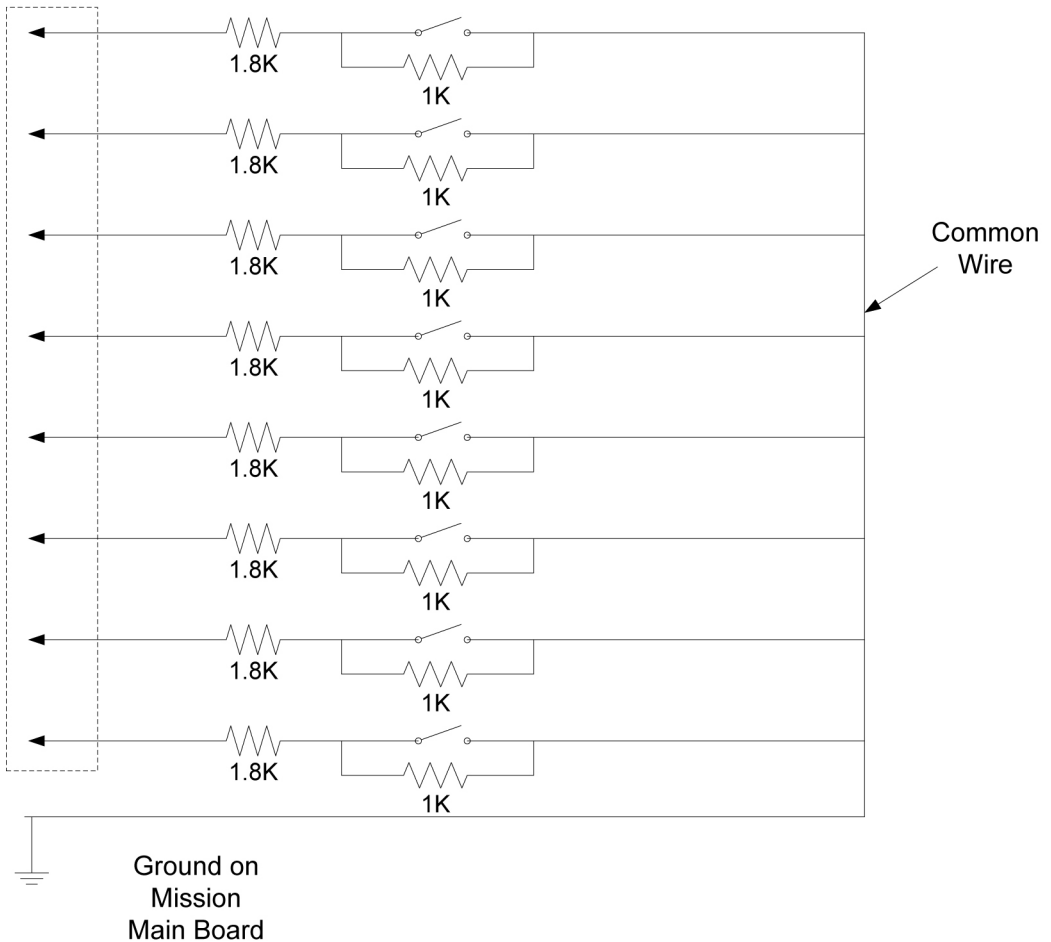
Appendix D: RTU Boot-up Sequence

✓ If sequence of an event fails, refer to right hand side for possible explanation. Call Mission technical support if further assistance is required.
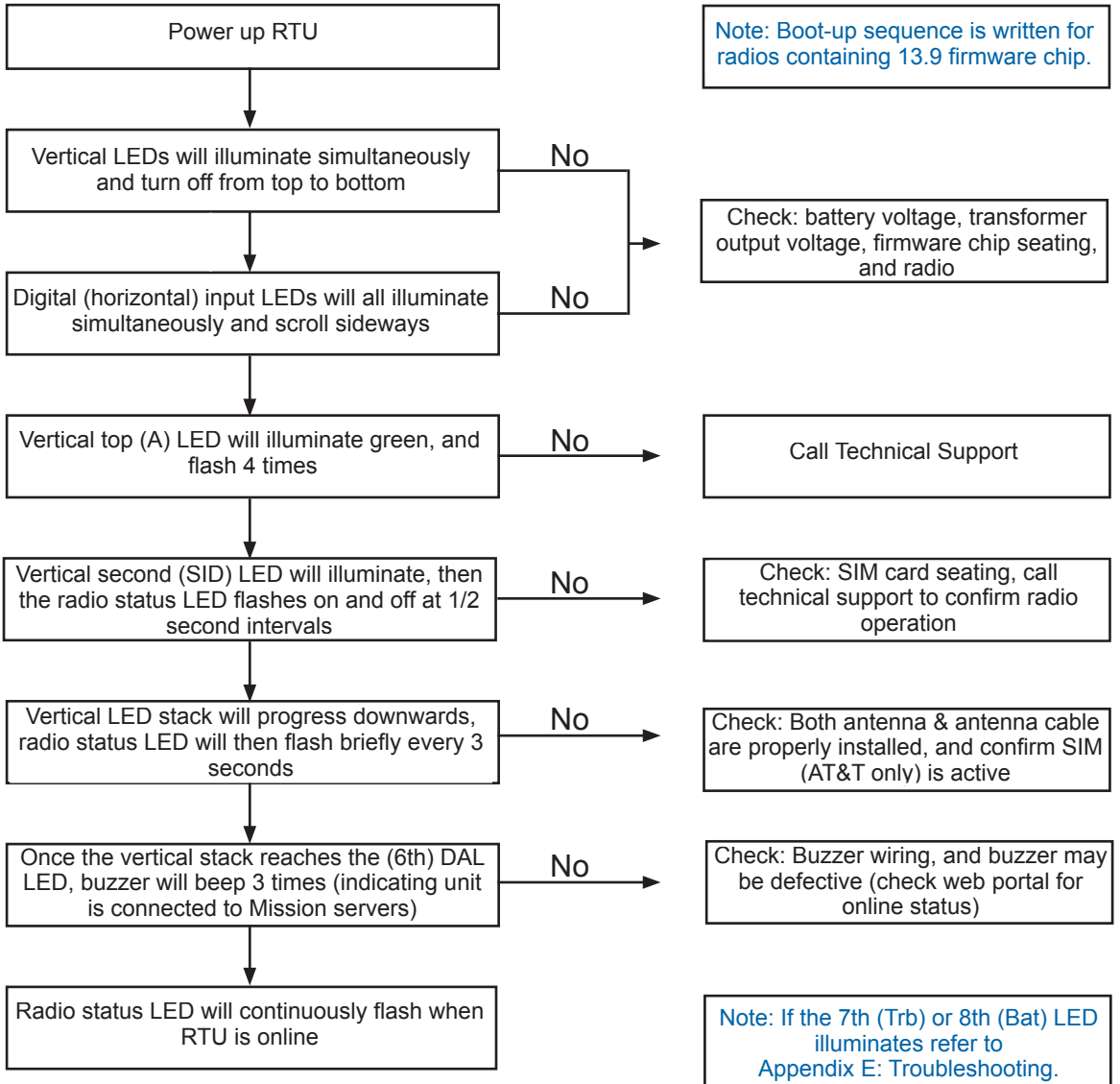
Power up RTU

Vertical LEDs will illuminate simultaneously and turn off from top to bottom	**No** →

Digital (horizontal) input LEDs will all illuminate simultaneously and scroll sideways	**No** →

→ Check: battery voltage, transformer output voltage, firmware chip seating, and radio

Vertical top (A) LED will illuminate green, and flash 4 times	**No** →

→ Call Technical Support

Vertical second (SID) LED will illuminate, then the radio status LED flashes on and off at 1/2 second intervals	**No** →

→ Check: SIM card seating, call technical support to confirm radio operation

Vertical LED stack will progress downwards, radio status LED will then flash briefly every 3 seconds	**No** →

→ Check: Both antenna & antenna cable are properly installed, and confirm SIM (AT&T only) is active

Once the vertical stack reaches the (6th) DAL LED, buzzer will beep 3 times (indicating unit is connected to Mission servers)	**No** →

→ Check: Buzzer wiring, and buzzer may be defective (check web portal for online status)

Radio status LED will continuously flash when RTU is online

Appendix E: Troubleshooting

Below is a chart of possible problems and solutions:

Problem	Possible Solution
No LEDs come on with power.	Make sure transformer power (12-16 VAC) is getting to the RTU. Check battery voltage. (>11.5 VDC).
Vertical status yellow TRB LED stays on solid.	Make sure you have proper AC (12-16 VAC) power to the RTU. Check for bad AC, battery or faulty input.
Vertical status red BAT LED is the only LED on when the RTU is powered up.	Remove, inspect, and re-seat processor chip. Cycle RTU power.*
Vertical status LED stops at ACK and green radio LED is on solid.	Check antenna connections and cycle RTU power. Verify SIM is active and installed correctly (contact tech. support).
RTU cycles itself every 20-30 seconds.	Remove power, then re-seat SIM card and cycle RTU power. Replace radio or SIM (contact tech. support).
Vertical status LED moves down the entire vertical stack, DAL is flashing but you do not hear 3 beeps.	The buzzer may be bad or improperly wired. Reseat the buzzer wires. Let the RTU cycle itself as it may be a connection issue.
No digital LED lights when in alarm.	Check wired connections and relays to ensure proper operation. Digital status LEDs are only active when unit is online.
Digital LED and/or vertical status "TRB" LED continuously blinks (solid on pump input).	Make sure the 1000 ohm resistor is installed at the relay or input, AC and battery are properly wired. Check connections for tightness.
Questionable Analog input.	Test by using a 1 K resistor to wire from the positive Auxiliary to positive Analog input. Measure voltage = ((AuxVoltage)/5) Refer to the Analog Input Field Testing document (www.123mc.com/literature.asp)

*Cycle power means removing the AC power and unplugging the battery to the Mission RTU for 15 seconds and then powering back up.

Contact Mission Technical Support at (877) 993-1911 for assistance.

Installation Notes

MISSION

COMMUNICATIONS

Web
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