SkyFire™ Remote Modem (RM) Installation

RAZE 12-10-EN-0304-01, rev B

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SkyFire Remote Modem (RM) Installation

1.0 General

1.1 Purpose

This method will step through the power verification and power-up procedures of the Raze Technologies SkyFire™ Remote Modem (RM). In addition this method will outline the power verification of the Argus Technologies RSM 48/10 Modular Switched Mode Rectifier.

1.2 Scope

The scope of this document is to outline the procedures for the proper installation of the Remote Modem (RM) and associated equipment ensuring a level of consistency thereby minimizing any discrepancies upon power-up and operation.

1.3 Applications

This method applies to initial installations and extensions for the following models:

1. RZ-BASECH

2.0 Reference Documentation

12-10-EN-0301-01, “SkyFire™, Power, Ground and System Cabling”

12-10-EN-0101-01, “SkyFire™ System General Description”

010-528-B2, “Argus Technologies, Universal Instruction Manual, RSM 48/10 Modular Switched Mode Rectifier”

2.1 Sequence

The following method(s) must be completed before this method is utilized.

- 12-10-EN-0301-01, “SkyFire™, Power, Ground and System Cabling”

3.0 Preparations

3.1 Safety Conventions and Precautions

The following symbols appear within this document:

 When this symbol appears on the equipment, it means that you should read the manual for additional safety information before taking further action. When it appears in the documentation, it highlights important safety-related information.

 Performing the indicated procedure can expose you to hazardous voltages or hazardous electrical currents. To avoid personal injury, disconnect power as indicated in the text.

 To avoid damaging this equipment with electrostatic discharge (ESD), place a static-control strap on your wrist and attach the ground clip as indicated in the text before handling the equipment.

 Interruption of the safety earth ground system could create an electrical-shock hazard. To avoid personal injury, all electrical connections marked with this symbol must be properly connected.

Observe all the general safety precautions against personal and equipment damage outlined in the ISM at all times. ISM located at URL…..

Prior to starting the operations presented in this method, arrange all materials, tools, and test equipment at the work location to minimize fatigue and inconvenience.

Inspect equipment for damage upon receipt. If damage is detected, call the Return Materials Authorization (RMA) office for replacement. (972) xxx-xxxx

Equipment will be placed per engineering specifications outlined in the engineering package.

Read this method in its entirety prior to performing any procedures.

3.2 FCC Precautions

Caution changes or modifications not expressly approved by Raze Technologies that pertain to compliance could void the user's authority to operate the basestation equipment.

- Only professional installers that have taken the Raze Technologies training class and are certified will be able to install this equipment including the antenna.

- This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC rules. These limits are designed to provide reasonable protection against harmful interference in a 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 the equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

    - Reorient or relocate the receiving antenna.
    - Increase the separation between the equipment and receiver
    - Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
    - Consult the dealer or an experienced radio/TV technician for help.

- Radio frequency radiation exposure requirements:

  This equipment is intended to be mounted on a fixed outdoor structure. A distance of 2 meters should be maintained between the radiating element and any nearby person. The antenna should not be co-located with other antennas. Failure to observe these restrictions may cause the equipment to operate with RF power density levels greater than those allowed by FCC regulations.

3.3 ACTA Precautions

- This equipment complies with Part 68 of the Federal Communications Commission Rules and the requirements adopted by the ACTA. On the outside surface of this equipment is a label that contains, among other information, a product identifier in the format US:RZ1DENANRZBASECH. If requested, this number must be provided to the telephone company.
- Raze Technologies, Inc. supplies an FCC compliant plug (RG48M for T1 interface). This equipment is designed to be connected to the telephone network using a Part 68 compliant plug. See installation instructions for proper wiring connections.
- If this product causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.
- The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.
- If trouble is experienced with this product, for repair or warranty information, please contact Raze Technologies (972) 516-1240. If the equipment is causing harm to the telephone network, the telephone company may request that the equipment be disconnected until the problem is resolved. Note that this equipment is not intended to be repaired by the customer (user).

3.4 Required Materials

- General Telecommunications Installation Tools
- Engineering Package or equivalent
- Digital Multi-meter

- Anti-oxidant (No-Ox) Grease

4.0 Procedures

Procedure 1. Argus RSM 48/10 Modular Switched Mode Rectifier Power Output Adjustments

The following procedure covers the process of verifying and adjusting the output voltages of the Power Module and Analog Supervisory Module within the Argus RSM 48/10 Modular Switched Mode Rectifier.

Step	Action	Observation
1.	Locate 110-120VAC power source and check for required voltage using a digital multi-meter.	Power range should be between 110-120 VAC.
2.	The RSM 48/10 is equipped with separate Power Modules, which fit into a common cabinet enclosure. In addition the RSM 48/10 includes a Analog Supervisory Module and a Circuit Breaker Distribution Module.	Verify the required amount of Power Modules against the engineering package.
3.	Turn **ON** the main 50 Amp circuit breaker, CB1 on the front of the cabinet's main distribution panel.	Refer to figure 4.
4.	Turn **ON** the circuit breaker(s) for the –48VDC rectifier, CB2 and CB3.	Refer to figure 4.
5.	Turn **ON** the circuit breaker(s) for the Fan Tray, CB4 and CB5.	The fan units will now be active. Refer to figure 4.

Step	Action	Observation
6.	On the Argus RSM 48/10 turn **ON** CB1 and CB2.	A soft start feature is used upon application of AC power; the output of the module(s) is gradually ramped up from 0 amps to the load requirement. A Bargraph Ammeter is located on the front panel of each Power Module. Each green LED segment represents a 2.5A increase in output current. The total output current will vary depending on chassis layout. The Ammeter operates on "DOT MODE", which means that no two segments will light simultaneously. If an LED is flashing, this indicates a Current or Power Limit Condition.
7.	The operational thresholds are to be verified initially upon startup, utilizing the module's output voltage test ports on the faceplate of each module. Using the digital multi-meter, measure the output voltage for each Power Module installed. Connect the multi-meter's ***Red*** lead to the (-) negative output voltage test port and the meter's ***Black*** lead to the (+) Positive output voltage test port on the Power Module.	The multi-meter's impedance level should be at least 10 mega ohms. Refer to figure 3.
8.	Adjust voltage accordingly by using a 1/16" slotted screwdriver on the Voltage Adjust Potentiometer on the Power Module.	The measurement should read a nominal voltage of –54 VDC
9.	Remove the multi-meter leads from the Power Module.	
10.	Using the digital multi-meter, measure the output voltage for the Analog Supervisory. Connect the multi-meter's ***Red*** lead to the (-) negative output voltage test port and the meter's ***Black*** lead to the (+) positive output voltage test port on the Analog Supervisory.	Refer to figure 3.
11.	Depress the Test Mode Activated switch, located to the right of the output voltage test ports on the Analog Supervisory, to the **ON** position.	The Test Mode Activated LED, to the left of the switch will illuminate *Red* indicating the Test Mode is Activated.

Step	Action	Observation
12.	With the multi-meter's leads connected and the Test Mode Activated, use a 1/16" slotted screwdriver to adjust the Voltage Adjust Potentiometer located above the Test Mode Activated switch, to run through the range of voltages between –40 VDC and –64 VDC, stopping on each recommended output voltage listed in the table in the observation. Refer to figure 3.	While running through the range of voltages, stop at the recommended voltage output listed below for each indicator. Once the voltage level is met on the multi-meter, the indicator should light up *Red*. If the LED for that particular indictor doesn't illuminate at the correct voltage, use a 1/16" slotted screwdriver to adjust the individual Voltage Adjust Potentiometer until the LED is illuminated. Continuing on until all (OVP, HVA, LVA and LVD) indicators are correctly set at the recommended voltages. Recommended Output Voltages: **OUTPUT VOLTAGE** -54VDC **OVP** -56VDC **HVA** -56VDC **LVD** -42VDC **LVA** -44VDC Caution is advised when tweaking the potentiometers. Be careful not to over-torque. It is recommended that a 1/16" slotted screwdriver be used. The indicators and associated colors are: **AC FAIL** No AC Input Voltage (red) **FUSE/CB** Output Fuse Blown/Circuit Breaker Trip (red) **OVP** Over Voltage Protection (red) **HVA** High Voltage Alarm (red) **LVA** Low Voltage Alarm (red) **LVD** Low Voltage Disconnect (red) **TEST** Test Mode Activated (red) **TEMP COMP** Temperature Compensation Active (green) **TEMP COMP FAULT** (flashing green)
13.	Once all voltages are set, depress the Test Mode Activated switch to **OFF** and remove the multi-meter leads.	

Step	Action	Observation
14.	Turn **OFF** the circuit breakers located on the front of the Argus RSM 48/10 Modular Switched Rectifier.	
15.	Turn **OFF** the Fan Tray circuit breaker(s) CB4 and CB5 at the front of the distribution panel.	Refer to figure 4.
16.	Turn **OFF** the 48 Volt Rectifier circuit breaker(s) CB2 and CB3 at the front of the distribution panel.	Refer to figure 4.
17.	Turn **OFF** the Main circuit breaker CB1 at the front of the distribution panel.	Refer to figure 4.
18.	End of procedure.	

Procedure 2. Remote Modem Cabinet Power Verification and Power Up

The Remote Modem (RM) is situated in an outdoor Cabinet enclosure and is powered by 120 VAC and –48 VDC. SkyFire™ cabinet configurations will vary from site to site. There may be multiple chassis installed, and depending on the configuration of the cabinet this will affect the utilized circuit breakers within the cabinet. The circuit breaker assignment will vary with site configuration specifications.

☞ **Note:** Before turning on any power to the cabinet, carefully inspect all pins on each back plane connector of each chassis. If any pins are bent or broken, notify the next level of support and utilize the RMA process. **Do not attempt to repair the pins. Do not proceed.**

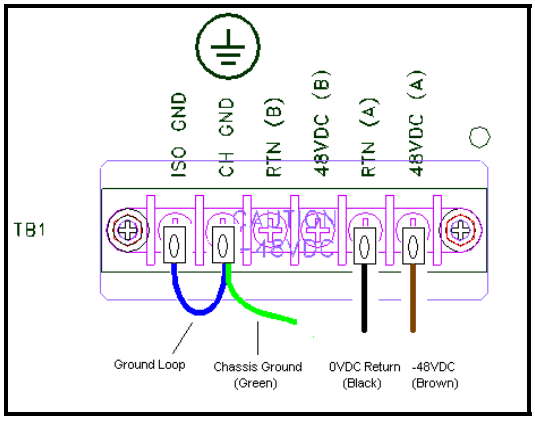
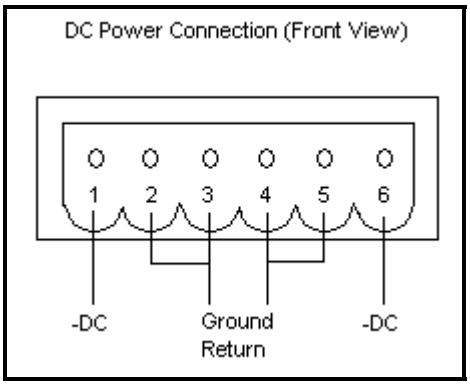
☞ **Note:** Label and mark all cabinet circuit breakers.

⚠ The SkyFire™ shelves are powered by –42 VDC to – 58 VDC. Take caution when working around power connections.

Step	Action	Observation
1.	Verify the location of the AC power cutoff for the SkyFire™ Remote Modem (RM) Cabinet.	

Step	Action	Observation
2.	Ensure that all personnel on site know where the power cutoff/breaker is located. There is one AC cutoff; it is a dual pole ganged 50 Amp circuit breaker (**CB1**) located on the distribution panel, inside the cabinet.	
3.	Ensure that the AC cutoff (CB1) is **OFF**.	Refer to figure 4.
4.	On the front of the Argus RSM 48/10 Modular Switched Mode Rectifier, verify all circuit breakers are in the **OFF** position.	
5.	Verify that there is no remaining power to the cabinet by checking the output voltage on the Power Module(s). Using the digital multi-meter, measure the output voltage for each Power Module installed. Connect the multi-meter's ***Red*** lead to the (-) negative output voltage test port and the meter's ***Black*** lead to the (+) Positive output voltage test port on the Power Module.	The measurement should read 0 VDC.
6.	If the site uses DC backup batteries, the following steps will cover the connection and verification of those batteries. If the site **does not** use backup batteries or a secondary power source, (i.e. CO installations may provide primary and/or secondary power via their own –48 VDC power plant) then go to step 13.	
7.	Ensure that all battery cables and/or jumper plates are present prior to proceeding with the battery cable connections.	⚠ Do not allow the battery terminals or wires to make contact with each other unless specifically stated in the following procedure. Personnel and/or equipment damage may result if care is not taken!
8.	Upon unpacking the batteries, wipe the grease from the terminal posts that is applied at the factory.	
9.	Apply a very thin coat of "NO-OX" antioxidant grease to the connecting surfaces of all battery terminals, battery terminal bolts, washers, battery jumper plates and battery lugs.	

Step	Action	Observation
10.	Use a battery cable or jumper plate to connect two battery terminals together. ☞ **Note:** The batteries within the rack will be connected in series by terminating the positive to the negative (terminals) of the batteries. ⚠ Do not allow any metal-to-metal contact with the battery terminals or cables at any time.	Ensure the polarity of the connections to the terminal posts are positive (+) to negative (–)
11.	Tighten all the battery terminal bolts over the jumper cables/plates and terminal washer.	
12.	Use a multi-meter to verify the voltage across the battery rack or secondary power source. Connect the multi-meter's **Red** lead to the (-) negative quick disconnect and the meter's **Black** lead to the (+) positive quick disconnect for the voltage measurement.	The measurement should read between -48 VDC and –54 VDC, depending on the charge state of the batteries. ☞ **Note:** If the results do not match the expected measurements, do not proceed. Troubleshooting may be required to resolve. Contact the next level of support for assistance.
13.	Turn **ON** the Main circuit breaker (CB1) at the front of the cabinet's main distribution panel.	Refer to figure 4.
14.	Turn **ON** the –48VDC Rectifier circuit breaker(s) CB2 and CB3 at the front of the distribution panel.	Refer to figure 4.
15.	Turn **ON** the Fan Tray circuit breaker(s) CB4 and CB5 at the front of the distribution panel.	Refer to figure 4.
16.	Turn **ON** the circuit breakers located on the Argus RSM 48/10 Modular Switched Rectifier.	⚠ Be aware that turning on the circuit breakers on the Argus RSM 48/10 will supply Power Insertion (-48Vdc) from the Argus to the chassis.

Step	Action	Observation
17.	Use a multi-meter to verify the voltage across the DC power connections at the back of the chassis. At TB1, connect the **Black** lead to the RTN (A) positive ground and connect the **Red** lead to the 48VDC (A) Terminal.	☞ Note: Use caution when working at the back of the chassis; the work area is confined. The multi-meter should read between –48VDC and –52VDC. 
18.	Use a multi-meter to verify the voltage and polarity across the DC power connections at the back of the Western Multiplex Backhaul Radio within the RM cabinet.	Cabinet configuration may not include the backhaul radio. If so, skip to step 20.
19.	Connect the Black lead to pin 3 on the DC power plug and connect the Red lead to pin 1 of the DC power plug.	The multi meter should read between –48Vdc and –52Vdc. 
20.	Turn **OFF** all circuit breakers located on the front of the Argus RSM 48/10 Modular Switched Rectifier.	
21.	Turn **OFF** the Fan Tray circuit breaker(s) CB4 and CB5 at the front of the distribution panel.	Refer to figure 4.

Step	Action	Observation
22.	Turn **OFF** the –48VDC Rectifier circuit breaker(s) CB2 and CB3 at the front of the distribution panel.	Refer to figure 4.
23.	Turn **OFF** the Main circuit breaker CB1 at the front of the distribution panel.	Refer to figure 4.
24.	End of procedure.	

Procedure 3. Installation of the Chassis Circuit Cards for the SkyFire™ Cabinet

The following procedure covers the installation of the Interface Control Processor (ICP), Radio Frequency Modem (RFM) and DC Power Conversion (Power Supply) circuit cards into the RM chassis and the power-up of the RM cabinet and chassis.

⚠ To ensure all module cards operate properly, install the number of power modules specified in the engineering package.

⚠ The pins on the back plane are fragile and easily damaged. Do not force the circuit boards into the chassis back plane.

⚠ Be aware of Electrostatic Discharge Devices (ESD) requirements when handling SkyFire™ equipment. Grounding straps must be worn at all times when handling circuit cards and working inside of equipment.

☞ **Note:** The DC Conversion and RF Modem circuit cards utilize two card slots. Depending on chassis configuration, the remainder of the circuit card installation will be unique. Verify chassis configuration with the engineering package prior to proceeding.

Step	Action	Observation
1.	The circuit cards for installation are to include the RFM**,** ICP, and the DC Power Conversion (Power Supply) cards.	Refer to Figure 1.

Step	Action	Observation
2.	Insert the Primary DC Power Conversion card into card slot 1/2.	Refer to figure 5.
3.	Insert the Secondary DC Power Conversion card into card slot 20/21.	Refer to figure 5.
4.	Insert the ICP into card slot 3.	Refer to figure 5.
5.	Insert the Primary RFM card into card slot 8/9.	☞ **Note:** The redundant RFM circuit card will typically be assigned to slot 6/7 due to operational requirements. Refer to figure 5.
6.	Insert the Redundant RFM card into card slot 6/7.	Refer to Figure 5.
7.	Continue installation of ICP, and RFM circuit card(s) per chassis layout outlined in the engineering package.	
8.	Fastened all circuit cards to the chassis by firmly securing the faceplate screws using a ⅛ slotted screwdriver.	
9.	Power up the cabinet and chassis at this time. Turn **ON** the Main circuit breaker CB1 at the front of the Distribution panel.	Refer to figure 4.
10.	Turn **ON** the –48VDC Rectifier circuit breaker(s) CB2 and CB3 at the front of the distribution panel.	Refer to figure 4.
11.	Turn **ON** the Fan Tray circuit breaker(s) CB4 and CB5 at the front of the distribution panel.	Refer to figure 4.
12.	Turn **ON** the Cabinet 1 Battery Heater circuit breaker CB6 at the front of the distribution panel.	Refer to figure 4.
13.	Turn **ON** the Cabinet 1 Heater circuit breaker CB9at the front of the distribution panel.	Refer to figure 4.
14.	Turn **ON** the GFI (Ground Fault Indicator) circuit breaker CB10 at the front of the distribution panel.	Refer to figure 4.
15.	Turn **ON** all circuit breakers located on the front of the Argus RSM 48/10 Modular Switched Rectifier.	

Step	Action	Observation
16.	Turn **ON** the Test Comp switch located on the Analog Supervisory Module.	☞ **Note:** The Test Comp switch must always be **ON** to enable the Temperature Compensation Sensor for the cabinet.
17.	Verify that all circuit card lights and LEDS are not indicating any faults or alarms. If so, begin troubleshooting or call the next level of support.	
18.	End of procedure.	

Procedure 4. RF Power Output Setup:

The following procedure covers the RF channel and power output setup for the, Radio Frequency Modem (RFM).

Note: All configuration parameters will be set-up before this operation is started (refer to XXX document for this procedure).

Step	Action	Observation
1.	Make sure power to the RM is on and connection from the craft port on the selected RFM is working.	LED lights will be on each card to show power up and a prompt will appear on the computer screen.
2.	Input the RF channel .	A response will come back saying input was accepted and completed.
3.	Input the cable loss for that RFM (this will set the RF power so the FCC Maximum RF power output will not be exceeded).	A response will come back saying input was accepted and completed.
4.	Repeat steps 1 thru 3 for every RFM that is installed.	
5.	End of procedure.	

Figure 1 - Front View for Power Supply, ICP and RFM

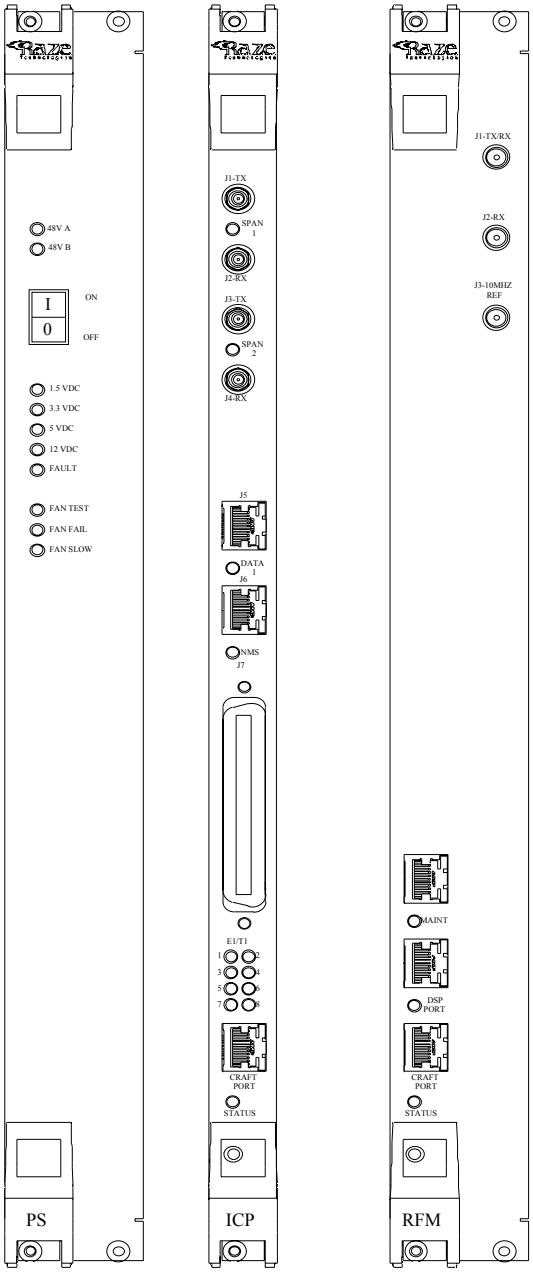


Figure 2 - Front View of Remote Modem Chassis

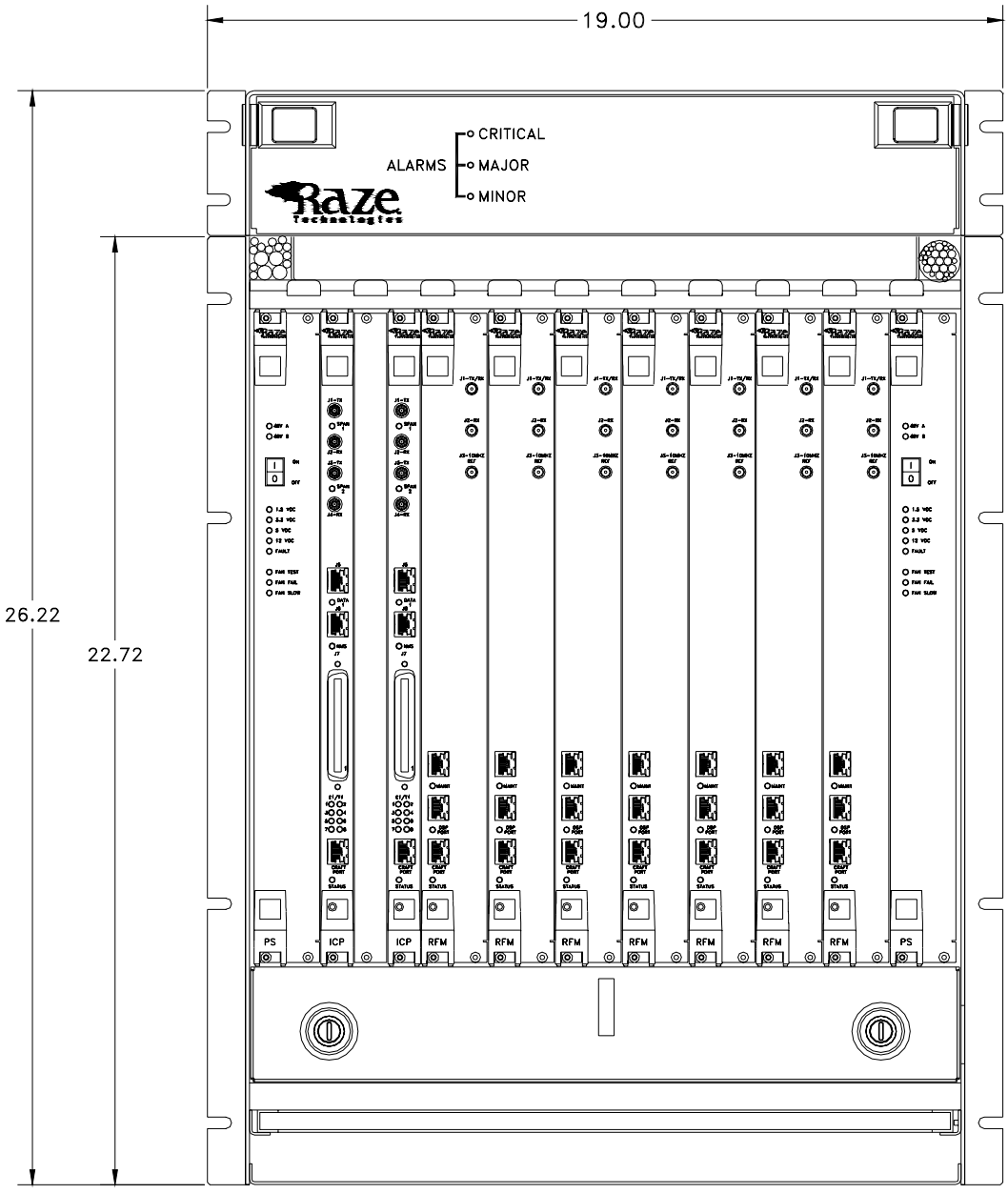


Figure 3 - Front View of Argus RSM 48/10 Modular Switched Mode Rectifier

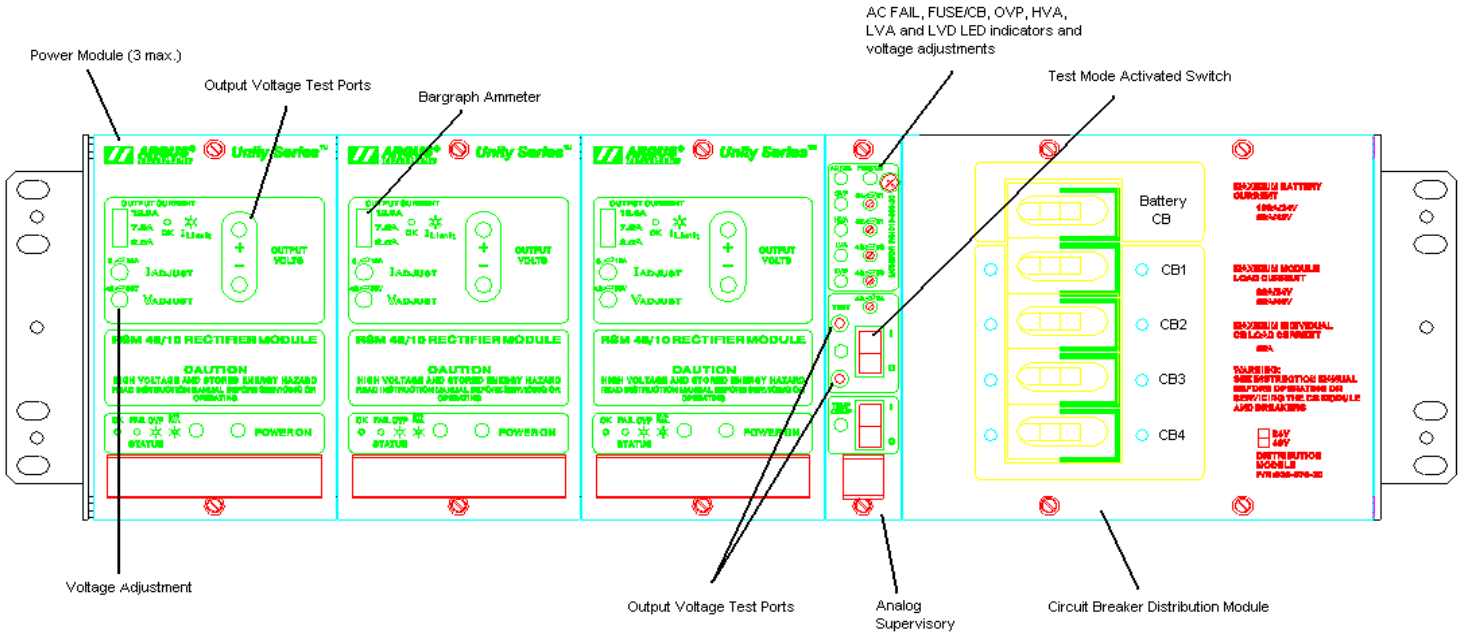


Figure 4 - RM Cabinet Main Power Distribution Panel

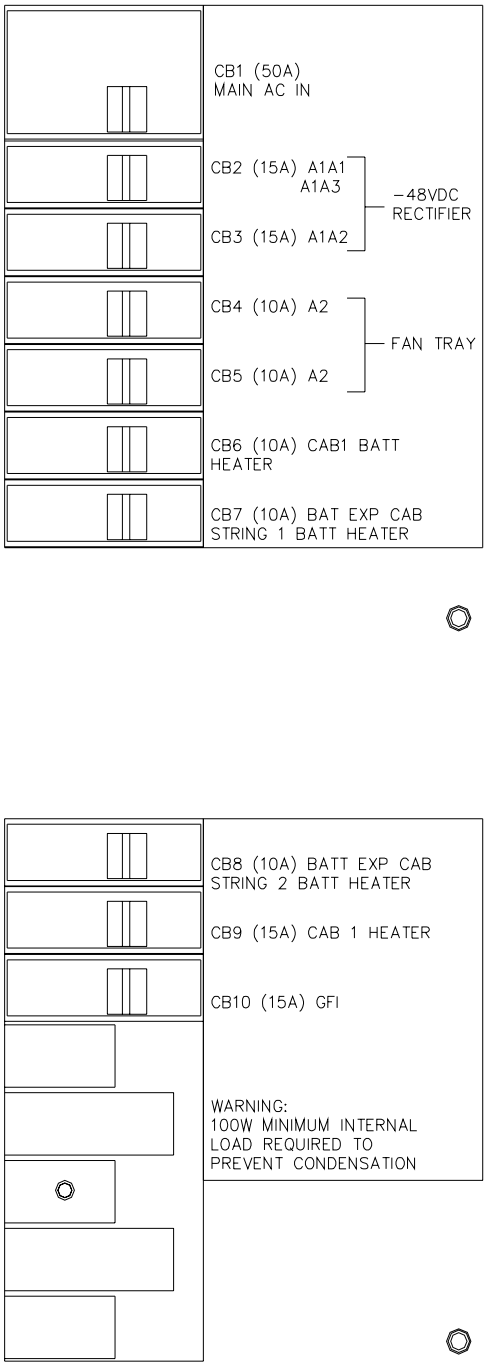
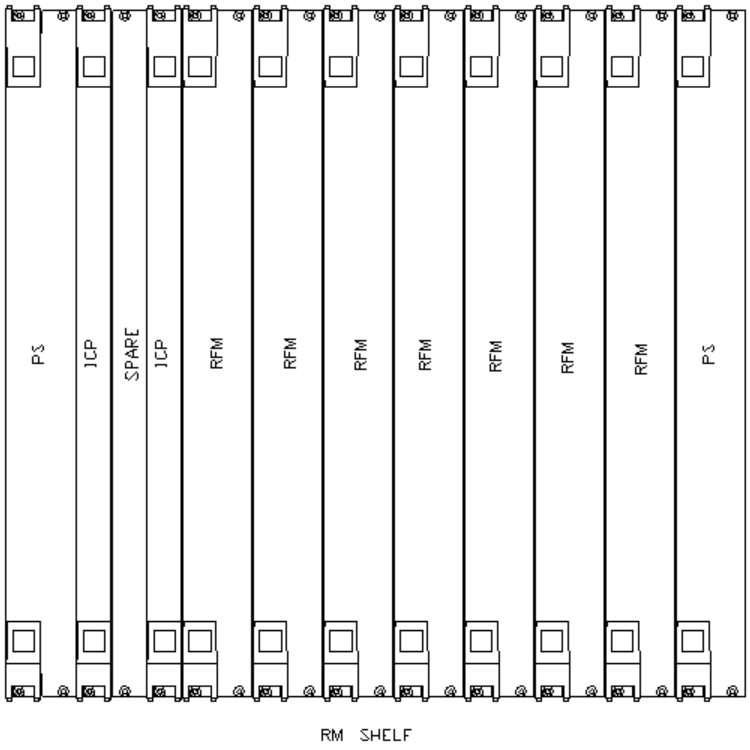


Figure 5 - RM Chassis Circuit Card Layout



5.0 Acronyms

ESD	Electrostatic Discharge Devices
HVA	High Voltage Alarm
ICP	Interface Control Processor
ISM	Installation Safety Manual
LVA	Low Voltage Alarm
LVD	Low Voltage Disconnect
OVP	Over Voltage Protection
RFM	Radio Frequency Modem
RM	Remote Modem
RMA	Return Materials Authorization
VDC	Volts Direct Current
VAC	Volts Alternating Current