



Broadcast Electronics Inc.

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4MX 100

100kW AM Transmitter Manual

597-4100, Revision B
3/13/07

4MX 100

100kW AM Transmitter Manual

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Further, after receiving the equipment, unpack it and inspect thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage WITHIN 15 DAYS after receipt. Claims for loss or damage will not be honored without proper notification of inspection by the carrier.

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RF CUSTOMER SERVICE -

Telephone: (217) 224-9617
E-Mail: rfservice@bdcast.com
Fax: (217) 224-9607

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MODIFICATIONS -

Broadcast Electronics, Inc. reserves the right to modify the design and specifications of the equipment in this manual without notice. Any modifications shall not adversely affect performance of the equipment so modified.

FCC NOTICE TO THE EQUIPMENT USER -

FCC Rule 73.1590 mandates that the licensee of each AM station be responsible to make measurements for spurious and harmonic emissions to show compliance with the transmission system requirements of Section 73.44 of the Commission's Rules. It is the broadcast station's responsibility to ensure that the audio signal input to the Broadcast Electronics, Inc.'s 4MX 100 AM Transmitter conform to the audio standard NRSC-1 (published as ANSI / EIA-549-1988). This is a mandatory requirement to ensure that the equipment complies to Section 73.44 and Section 73.128(C) of the Commission's Rules.



TRANSMITTER WARRANTY VOID NOTICE -

THIS PRODUCT WARRANTY WILL BE VOID IF THE TRANSMITTER IS INSTALLED AT A SITE WITH INADEQUATE LIGHTNING / AC SURGE PROTECTION, DEFECTIVE TRANSMISSION LINE SYSTEM, OR CONNECTION TO AN IMPROPER AC INPUT.

The transmitter is covered by a two year limited product warranty from Broadcast Electronics, Inc. However, the transmitter must be properly installed at a site with adequate Lightning / AC Surge protection, transmission line system or load capable of handling the Transmitter's RF Output power, and also be connected to a proper AC Input.

To ensure that the 4MX 100 Transmitter's Warranty does remain valid:

- The transmitter must be installed and setup as described by the installation procedures presented throughout this manual.
- The Lightning / AC Surge Suppressor (supplied with transmitter) must be installed at the AC Service entrance as described in this manual.
- The transmitter's RF Output must be connected to an adequate transmission line system or load capable of handling the transmitter's RF Output power.
- The transmitter must be connected to the AC Power Source, with the transformer topology and voltage, that it was configured for and tested with at the factory. See Section 2.9 regarding "Primary AC Power Source Voltage and Configuration."

FAILURE TO PROPERLY INSTALL THE AC SURGE SUPPRESSOR WILL VOID THE TRANSMITTER'S WARRANTY.

If you have any questions regarding the installation of the transmitter or the warranty, please contact the RF Customer Service Department at Broadcast Electronics, Inc.

Telephone: (217) 224-9617
E-Mail: rfservice@bdcast.com
Fax: (217) 224-9607





OPERATING HAZARD

THE TRANSMITTER CONTAINS MULTIPLE CIRCUIT GROUNDS WITH HIGH AC AND DC POTENTIALS WITH RESPECT TO THE CABINET WHICH IS AT EARTH POTENTIAL. DO NOT ENERGIZE THE TRANSMITTER WITH TEST EQUIPMENT CONNECTED TO THE TRANSMITTER'S OUTPUT NETWORK, RF POWER MODULE, RF COMBINER, OR POWER SUPPLY COMPONENTS.

Broadcast Electronics, Inc.'s AM transmitters contain high voltages and currents. If safety precautions are not practiced, contact with high voltages and currents could cause serious injury or death. The transmitter is equipped with many built-in safety features, however good judgment, care, and common sense must be practiced to prevent accidents.

In addition to high voltages and currents, AM transmitters contain multiple circuit grounds with high ac and dc potentials with respect to the cabinet which is at earth potential. The potentials could cause serious injury or death if maintenance personnel simultaneously touch a circuit ground and the cabinet. As a result, operation of the transmitter with test equipment connected to the transmitter's output network, RF power module, RF combiner, or power supply components is extremely dangerous and must not be attempted. Therefore, never energize the transmitter with test equipment connected to the output network, RF power module, RF combiner, or power supply components.

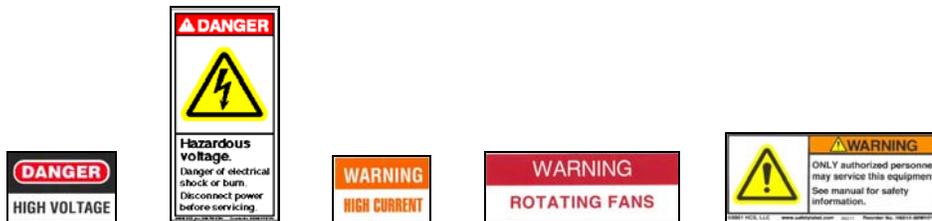




SAFETY PRECAUTIONS

PLEASE READ AND OBSERVE ALL SAFETY PRECAUTIONS!!

ALL PERSONS WHO WORK WITH OR ARE EXPOSED TO POWER TUBES, POWER TRANSISTORS, OR EQUIPMENT WHICH UTILIZES SUCH DEVICES MUST TAKE PRECAUTIONS TO PROTECT THEMSELVES AGAINST POSSIBLE SERIOUS BODILY INJURY. EXERCISE EXTREME CARE AROUND SUCH PRODUCTS. UNINFORMED OR CARELESS OPERATION OF THESE DEVICES CAN RESULT IN POOR PERFORMANCE, DAMAGE TO THE DEVICE OR PROPERTY, SERIOUS BODILY INJURY, AND POSSIBLY DEATH.



DANGEROUS HAZARDS EXIST IN THE OPERATION OF POWER TUBES AND POWER TRANSISTORS -

The operation of power tubes and power transistors involves one or more of the following hazards, any one of which, in the absence of safe operating practices and precautions, could result in serious harm to personnel.

- A. HIGH VOLTAGE** - Normal operating voltages can be deadly. Additional information follows.
- B. RF RADIATION** - Exposure to RF radiation may cause serious bodily injury possibly resulting in Blindness or death. Cardiac pacemakers may be affected. Additional information follows.
- C. BERYLLIUM - OXIDE POISONING** - Dust or fumes from BeO ceramics used as thermal links with conduction cooled power tubes and power transistors are highly toxic and can cause serious injury or death. Additional information follows.
- D. HOT SURFACES** - Surfaces of air-cooled radiators and other parts of tubes can reach temperatures of several hundred degrees centigrade and cause serious burns if touched. Additional information follows.
- E. RF BURNS** - Circuit boards with RF power transistors contain high RF potentials. Do not operate an RF power module with the cover removed.

HIGH VOLTAGE -

Many power circuits operate at voltages high enough to kill through electrocution. Personnel should always break the primary AC Power when accessing the inside of the transmitter.

RADIO FREQUENCY RADIATION -

Exposure of personnel to RF radiation should be minimized, personnel should not be permitted in the vicinity of open energized RF generating circuits, or RF transmission systems (waveguides, cables, connectors, etc.), or energized antennas. It is generally accepted that exposure to "high levels" of radiation can result in severe bodily injury including blindness. Cardiac pacemakers may be affected.

The effect of prolonged exposure to "low level" RF radiation continues to be a subject of investigation and controversy. It is generally agreed that prolonged exposure of personnel to RF radiation should be limited to an absolute minimum. It is also generally agreed that exposure should be reduced in working areas where personnel heat load is above normal. A 10 mW/cm² per one tenth hour average level has been adopted by several U.S. Government agencies including the Occupational Safety and Health Administration (OSHA) as the standard protection guide for employee work environments. An even stricter standard is recommended by the American National Standards Institute which recommends a 1.0 mW/cm² per one tenth hour average level exposure between 30 Hz and 300 MHz as the standard employee protection guide (ANSI C95.1-1982).

RF energy must be contained properly by shielding and transmission lines. All input and output RF connections, such as cables, flanges and gaskets must be RF leak proof. Never operate a power tube without a properly matched RF energy absorbing load attached. Never look into or expose any part of the body to an antenna or open RF generating tube or circuit or RF transmission system while energized. Monitor the tube and RF system for RF radiation leakage at regular intervals and after servicing.

DANGER - BERYLLIUM OXIDE CERAMICS - AVOID BREATHING DUST OR FUMES -

BeO ceramic material is used as a thermal link to carry heat from a tube or power transistor to the heat sink. Do not perform any operation on any BeO ceramic which might produce dust or fumes, such as grinding, grit blasting, or acid cleaning. Beryllium oxide dust or fumes are highly toxic and breathing them can result in serious personal injury or death. BeO ceramics must be disposed of only in a manner prescribed by the device manufacturer.

HOT SURFACES -

The anode portion of power tubes is often air-cooled or conduction-cooled. The air-cooled external surface normally operates at a high temperature (up to 200° to 300°C). Other portions of the tube may also reach high temperatures, especially the cathode insulator and the cathode/heater surfaces. All hot surfaces may remain hot for an extended time after the tube is shut off. To prevent serious burns, take care to prevent and avoid any bodily contact with these surfaces both during and for a reasonable cooling down period after tube operation.



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1 Preparing for Installation

1.1 Shipment Inspection

When delivering the equipment to you, the truck driver or carrier's agent will present a receipt for your signature. Do not sign the receipt until you have:

- Inspected the containers and / or Transmitter for visible signs of damage.
- Counted the containers and compared with the amount shown on the shipping papers. If a shortage or evidence of damage is noted, insist that notation to that effect be made on the shipping papers before you sign them.

1.2 Unpacking the Transmitter

After receiving the 4MX 100 transmitter/equipment, unpack and inspect it thoroughly for concealed damage. If concealed damage is discovered, immediately notify the carrier, confirming the notification in writing, and secure an inspection report. This item should be unpacked and inspected for damage WITHIN 15 DAYS after receipt. Claims for loss or damage will not be honored without proper notification of inspection by the carrier.

1.3 Documentation Review

Every transmitter is wired, operated, tested, and inspected prior to shipment and is ready for installation when received. Prior to installation, this Transmitter Manual should be studied to obtain an understanding of the operation, circuitry, nomenclature, and installation requirements.

1.4 Environmental Requirements

The 4MX 100 is designed to operate in an ambient air temperature range of 0° - 122° Fahrenheit (0° to +50° Celsius) with 0 - 95% non-condensing humidity at 0 - 10,000 feet (0 - 3,048 meters) above sea level. The floor on which the transmitter is to be installed must be level and capable of supporting the transmitter's weight .

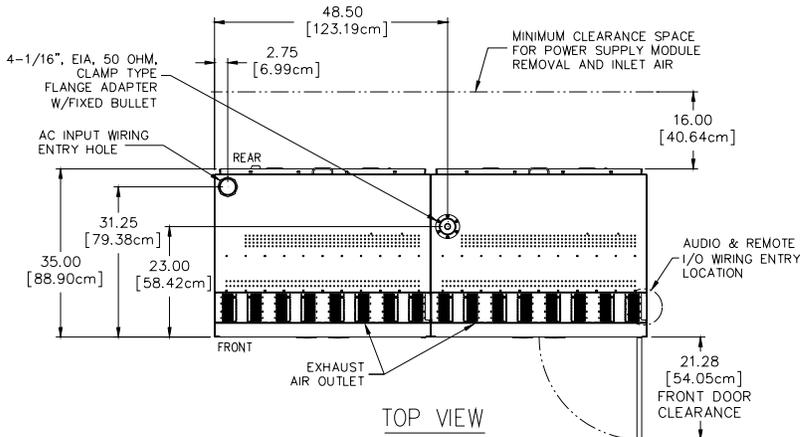
1.5 Cooling Air Requirements

The 4MX 100 requires a source of cooling air to maintain an acceptable operating temperature. The transmitter requires a cooling air flow of 6000 cubic feet per minute (170.0 cubic meters per minute). To ensure that airflow is not restricted, there should be a minimum clearance from the top of the cabinet to any obstructions of 7.81 inches (19.84 cm) and 16.0 inches (40.64 cm) from the rear of the cabinet.

1.6 4MX 100 Physical Information

Prior to installation, there are several items in the transmitter room that must be considered. The following 4MX 100 Installation Drawing provides the necessary dimensional data and information for planning of the AC Power, RF Output, Interlock, Failsafe, Ground Strap, and Remote Control connections.





NOTES:

1. AIR INLET AT REAR OF CABINET: 6000 CFM (170.0 M³/MIN). REUSABLE FILTERS ARE PROVIDED.
2. GROUND STRAP CONNECTION TOP OF CABINET AT RF OUTPUT CONNECTOR FLANGE.
3. RF OUTPUT CONNECTION: 4-1/16 INCH, EIA, 50 OHM, CLAMP TYPE FLANGE ADAPTER WITH FIXED BULLET, FOR RIGID COAXIAL TRANSMISSION LINE.
4. EXHAUST AIR OUTLET AT TOP OF CABINET.
5. ACCESS FOR AC POWER THROUGH TOP OF CABINET.
6. ACCESS FOR REMOTE CONTROL AND AUDIO CONNECTIONS THROUGH TOP OF CABINET.
7. WEIGHT: 2230 LBS (1012 Kg) UNPACKED.
8. AC POWER CONSUMPTION:
 - ⊗ 0% MODULATION: 114 KW @ 100 KW POWER OUT
 - ⊗ 100% TONE MODULATION: 171 KW @ 150 KW POWER OUT
9. POWER DISSIPATED:
 - ⊗ 0% MODULATION: 13.6 KW (46,416 BTU/HR) @ 100 KW POWER OUT
 - ⊗ 100% TONE MODULATION: 20.4 KW (69,626 BTU/HR) @ 100 KW POWER OUT
10. AC INPUT: 332-460 VAC: 50/60 Hz, 3 PHASE 4-WIRE WYE
11. AC INPUT WIRE SIZE: SEE 4MX 100 WIRE SIZE CHART IN THE MANUAL.
12. POWER FACTOR: 0.99 OR BETTER

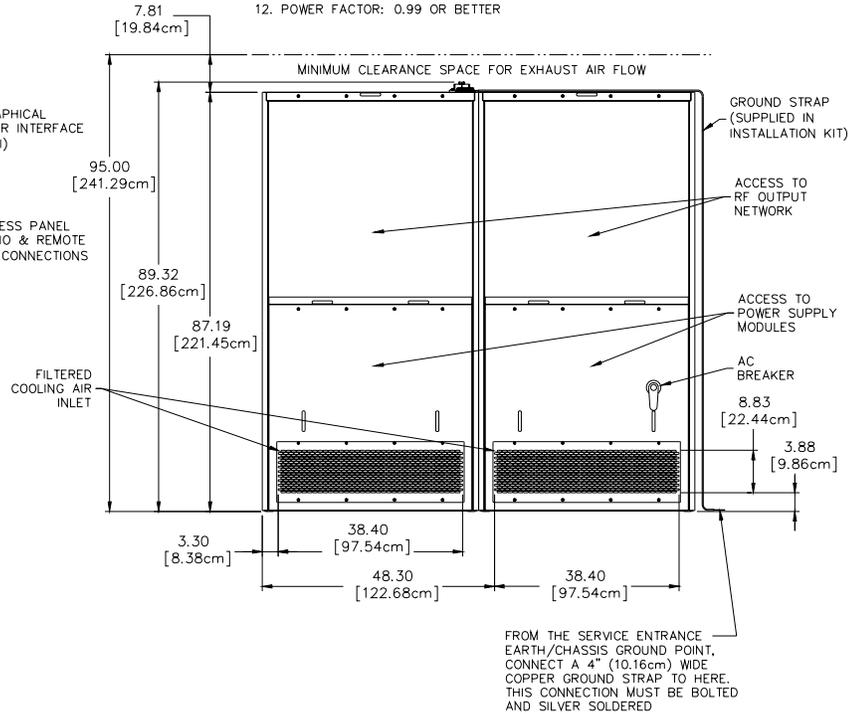
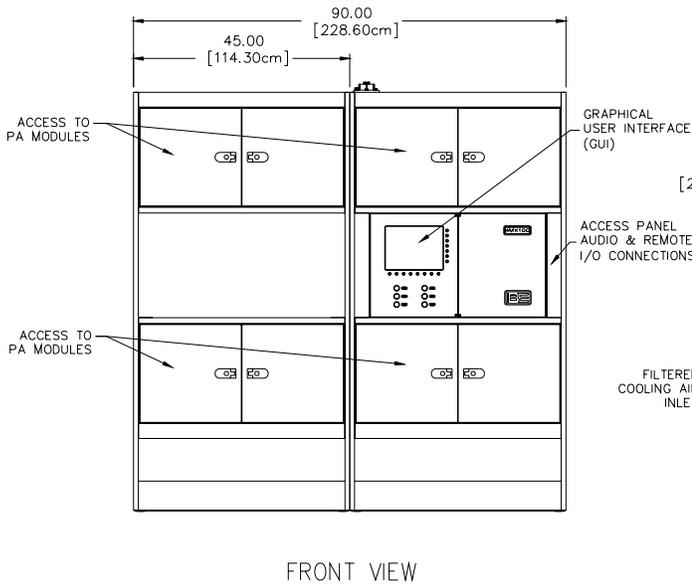


Figure 1 – 4MX 100 Installation Drawing



1.7 4MX 100 PA and PS Module Locations



Figure 2 – 4MX 100 Front View (PA Module Locations)

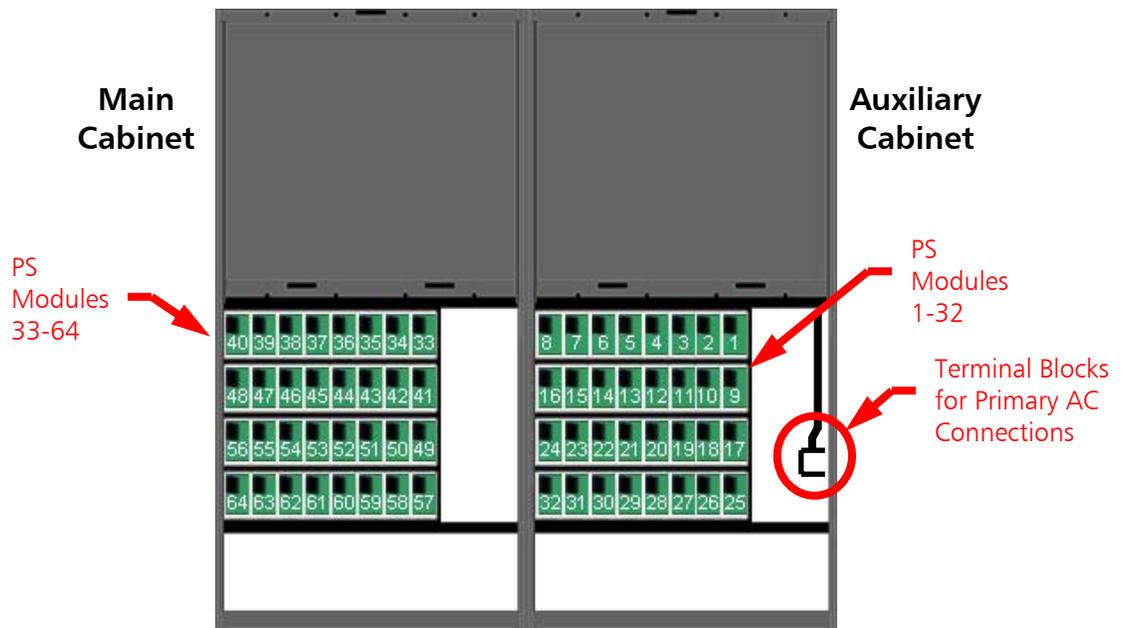


Figure 3 – 4MX 100 Rear View (Power Supply Module Locations)



1.8 Items Required for Installation

1.8.1 Tools / Items Required for Installation (not supplied with 4MX 100)

- AC Voltage Meter (to confirm AC Supply Voltage).
- 3/8" Allen Wrench or Hex Drive (for AC Power terminal blocks).
- No. 2 Phillips Screwdriver (for Front Doors and Remote I/O Access Panel).
- Small Flat Blade Screwdriver (for Remote I/O connections).
- Wire Strippers (for Remote I/O connections).
- Large Flat Blade Screwdriver (for RF connection).
- 5/16" Socket or Nut Driver (for Cap Bank installation and RF connections).
- 7/16" Socket, Nut Driver, or Wrench (for Cap Bank installation).
- 1/2" Socket, Nut Driver, or Wrench (for Earth Ground and Cap Bank connections).
- 9/16" Socket, Nut Driver, or Wrench (for Cap Bank installation).
- Hydraulic Punch Set (for punching holes in Surge Suppressor Box).
- Watertight Connectors (for Surge Suppressor Box).
- 4 inch (10.16 cm) wide copper ground strap

1.8.2 Installation Kit Items (977-4101 – supplied with 4MX 100)

- 700-0155, Conductive Grease (for AC Terminal Block Connections).
- 407-0186, Potentiometer Tuning Tool (for Audio Setup Procedure).
- 375-0007-001, Ferrite Ring, 2.4 O.D. X 1.4 I.D. (for Remote I/O Connections).
- 375-0009, Ferrite Ring, 1.2 O.D. X 0.75 I.D. (for Audio Connections).
- 463-5600, Earth Ground Strap

1.8.3 Surge Suppressor (supplied with 4MX 100)

4MX 100 AM Transmitters come with an AC Surge Protector. Depending upon your site's requirements, one of the following will arrive with your shipment.

- 959-4031-001, AC Surge Protector, 380V, WYE, 4 Wire + Ground
- 959-2020-001, AC Surge Protector, 480V, WYE, 4 Wire + Ground



2 Installation and Setup

2.1 Locate the Transmitter

The 4MX 100 transmitter is designed with access holes in the top of the cabinet to allow for overhead routing of AC Power, RF Output line, and control wiring. The transmitter room floor must be level and capable of supporting the total transmitter weight.

Once the location of the transmitter has been determined, use a fork lift to move it to the desired location. Unbolt the (2) transmitter cabinets (Main and Auxiliary) from the shipping skids, remove the cabinets from the skids and then slide them into their exact location.

Note: Ensure that adequate clearance is maintained for proper air flow and general maintenance (see **Figure 1** for dimensions).

2.2 Remove the 4MX 100 Rear Cabinet Doors

For safety, the 4MX 100 Transmitter is equipped with locking rear doors. To access the "Key," the user must first turn the AC Breaker to the OFF position. The Lower Auxiliary Cabinet door may then be removed where a "Bolt Lock" contains the "Key" required for removal of the keyed doors.

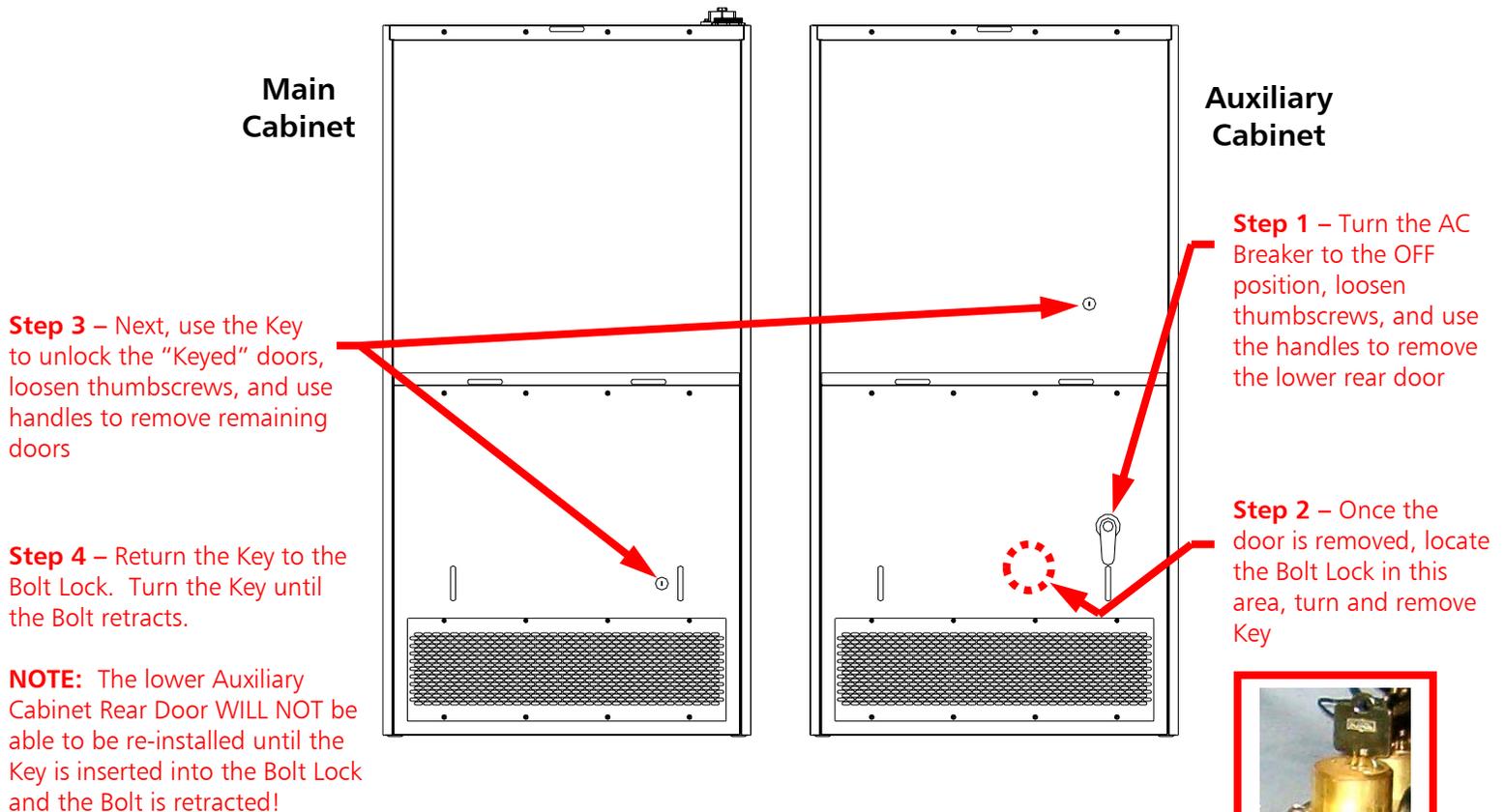


Figure 4 – Removal of the 4MX 100 Rear Doors

2.3 Bolt the Main and Auxiliary Cabinets Together

The 4MX 100 Transmitter is shipped in (2) cabinets (Main and Auxiliary). The cabinets must be bolted together as shown below using the supplied hardware.

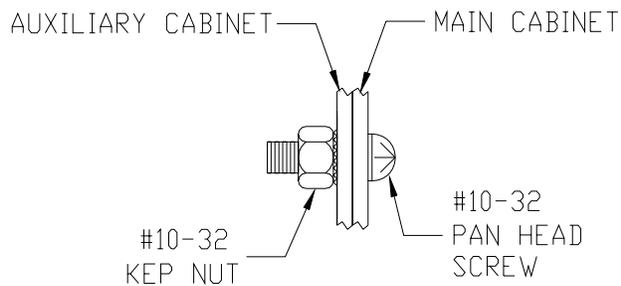
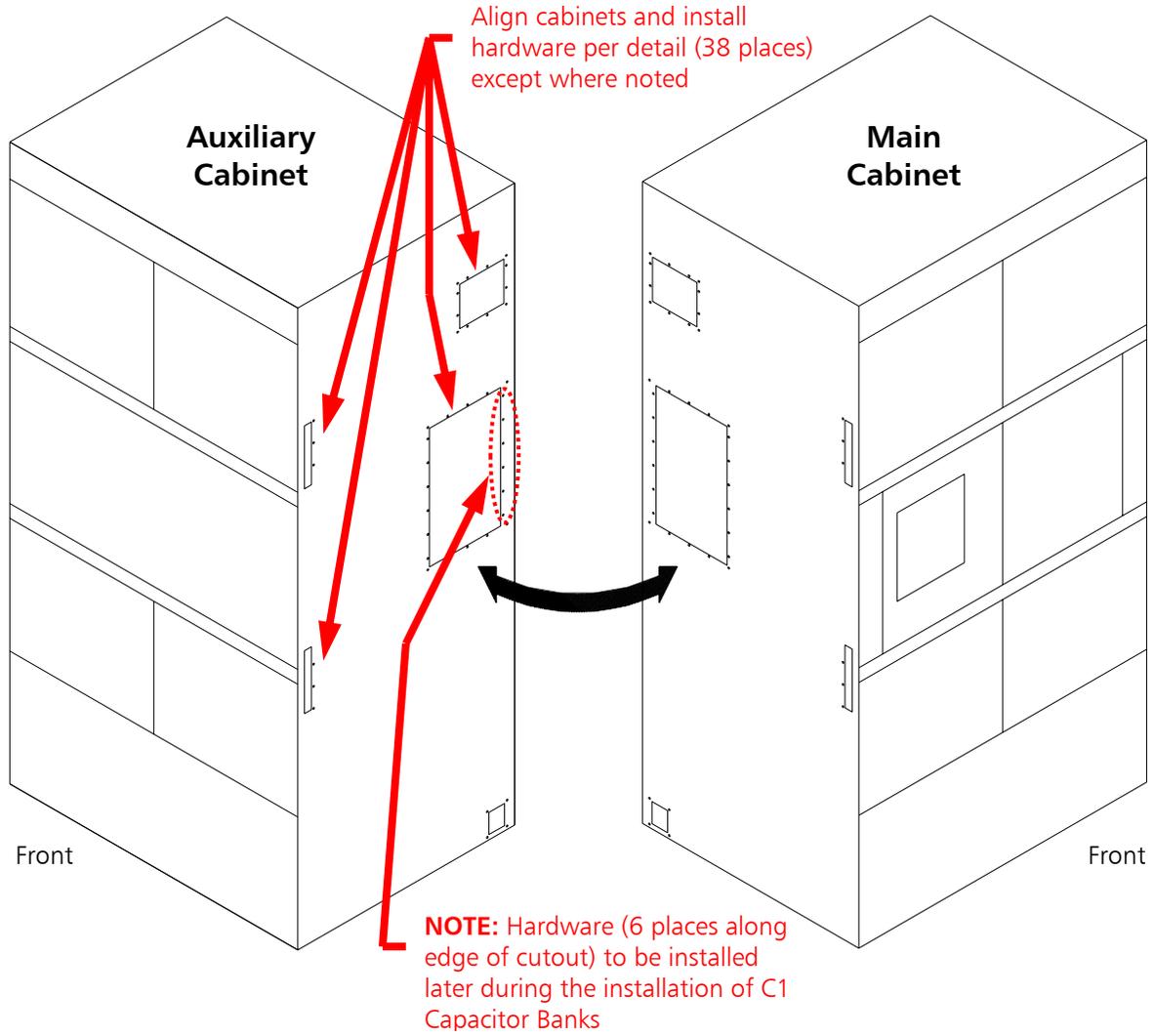


Figure 5 – Bolt 4MX 100 Main and Auxiliary Cabinets Together



2.4 4MX 100 Output Network Capacitor Banks

Capacitors banks are removed from the 4MX 100's Output Network in each of the cabinets prior to shipment and must be reinstalled.

NOTE: All Capacitor Banks are heavy and (2) people are required to install them into the 4MX 100 Transmitter!

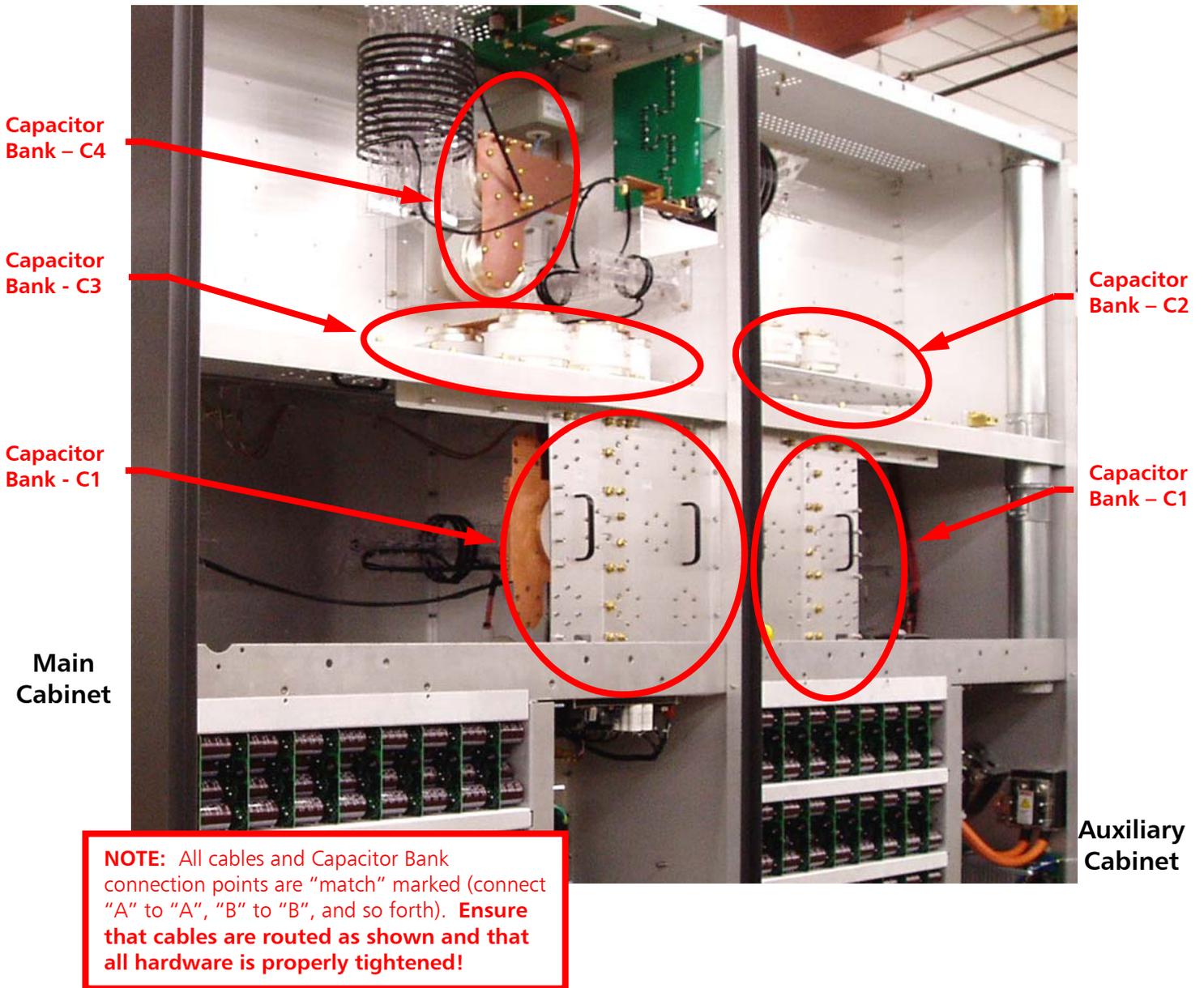
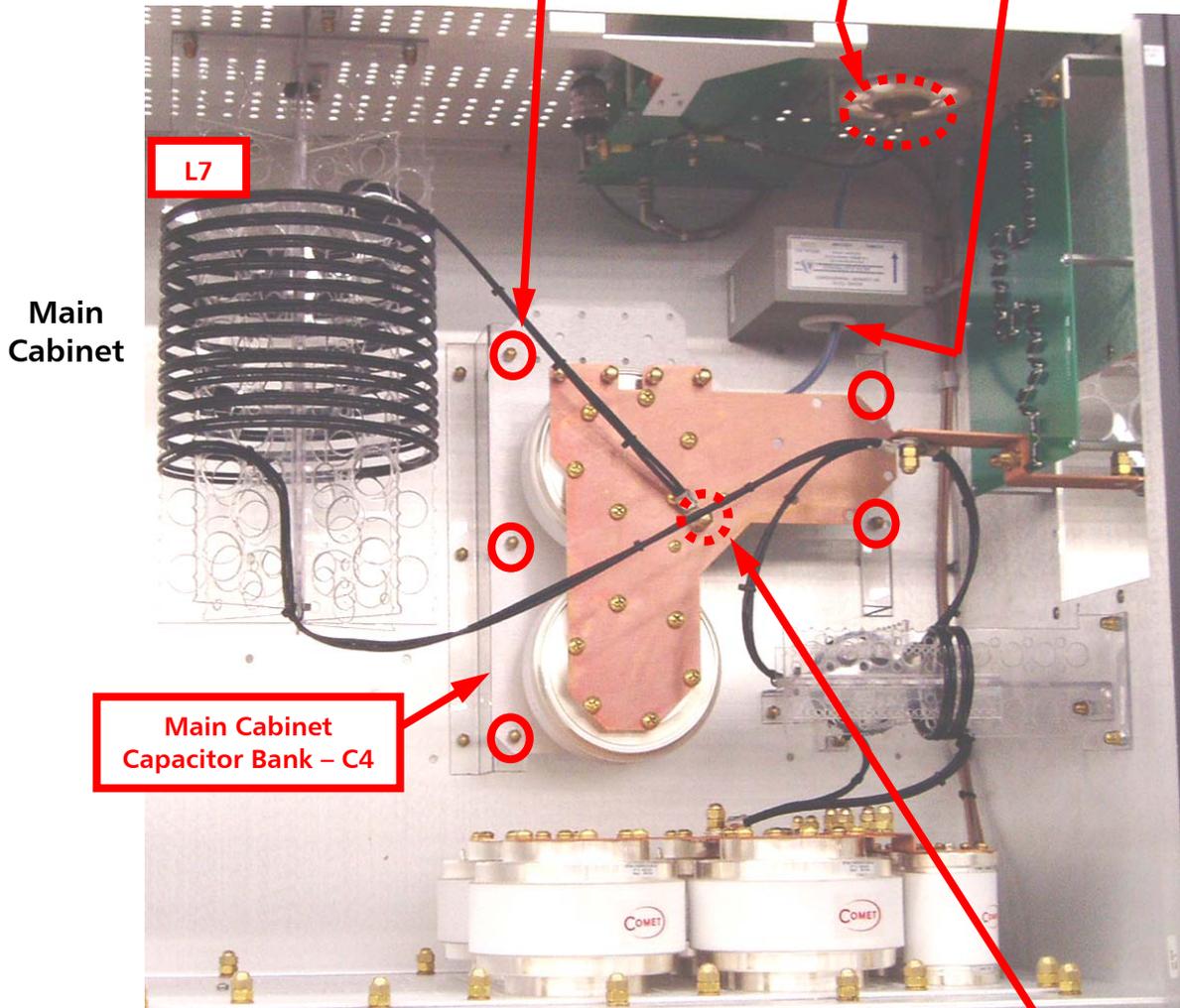


Figure 6 – 4MX 100 Output Network Capacitor Bank Locations (Rear of 4MX 100)

2.4.1 Install the Main Cabinet Capacitor Bank C4

Step 1 – Using 5/16" Nut Driver or Wrench, remove the Mounting Hardware from the (5) places marked, carefully install C4 and re-install the mounting hardware. Ensure that all hardware is properly tightened!

Step 2 – Route the cable from the under side of C4 up through the Current Transformer. Use a 9/16" Wrench to attach the cable to the RF Output Connector. Ensure that all hardware is properly tightened!



Step 3 – Using a 7/16" Nut Driver or Wrench remove the connection hardware from C4. Make the connection from L7 and re-install the hardware as shown. Ensure that all hardware is properly tightened!

Figure 7 – Main Cabinet Capacitor Bank C4 Installation (Rear of 4MX 100)

2.4.2 Install the Main Cabinet Capacitor Bank C3

Step 1 – Using a 1/2" Nut Driver or Wrench remove the 5/16-18 mounting hardware from the 14 places marked. Install C3 and re-install all hardware. Ensure that the hardware is properly tightened!

Step 2 – Using a 7/16" Nut Driver or Wrench remove the connection hardware from the C3 Capacitor Bank. Make the (2) connections from L6A and L6B, then re-install the hardware. Ensure that the hardware is properly tightened!

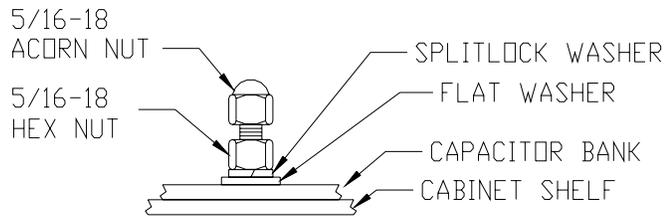
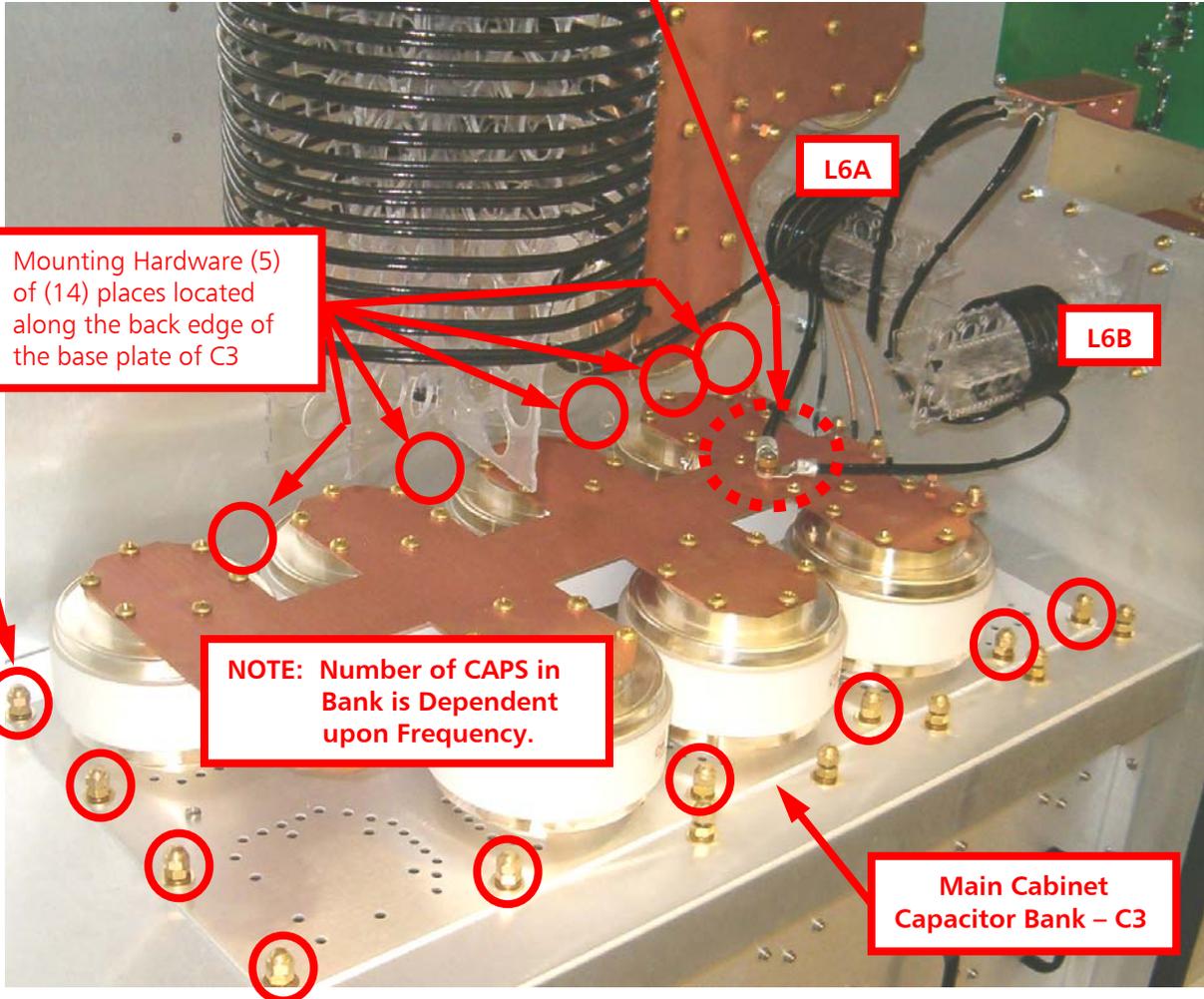


Figure 8 – Main Cabinet Capacitor Bank C3 Installation

2.4.3 Install the Auxiliary Cabinet Capacitor Bank C2

Step 1 – Use a 5/16" Nut Driver or Wrench and remove the Mounting Hardware from (6) places marked. Next, carefully install Capacitor Bank C2 routing the cable attached to the bottom side of C2 down through the shelf of the cabinet as shown. Re-install the mounting hardware ensuring that it is properly tightened!

Step 2 – Using a 7/16" Nut Driver or Wrench remove the connection hardware from the C2. Make the connection from L5 and re-install the hardware. Ensure that the hardware is properly tightened!

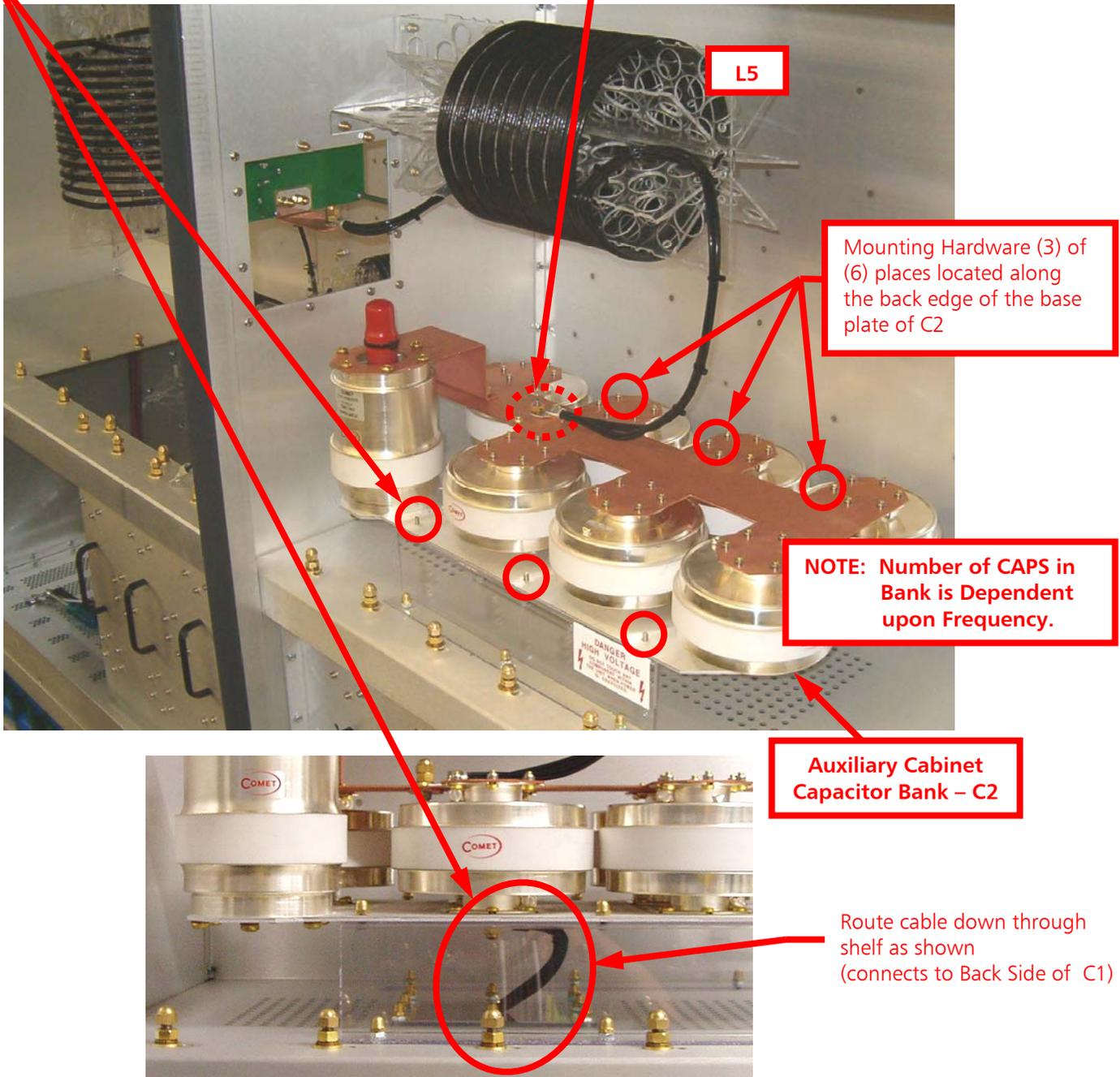


Figure 9 – Auxiliary Cabinet Capacitor Bank C2 Installation

2.4.4 Capacitor Bank C1, L1, L2, L3 & L4 Locations

Capacitor Bank C1 is mounted across the middle rear of both the Main and Auxiliary Cabinets of the 4MX 100. C1 is installed in sections and then tied together with hardware and a "Joiner Plate" on the back side. After Installing C1 into each of the cabinets, connections will be made from L1, L2, L3, L4, and C2. The illustrations and photos in **Figures 10 & 11** primarily show the locations of L1 – L4 and are intended to give an overview of the assembly of C1 and necessary electrical connections. Detailed instruction regarding the installation of C1 and connections will begin in Section 2.4.5.

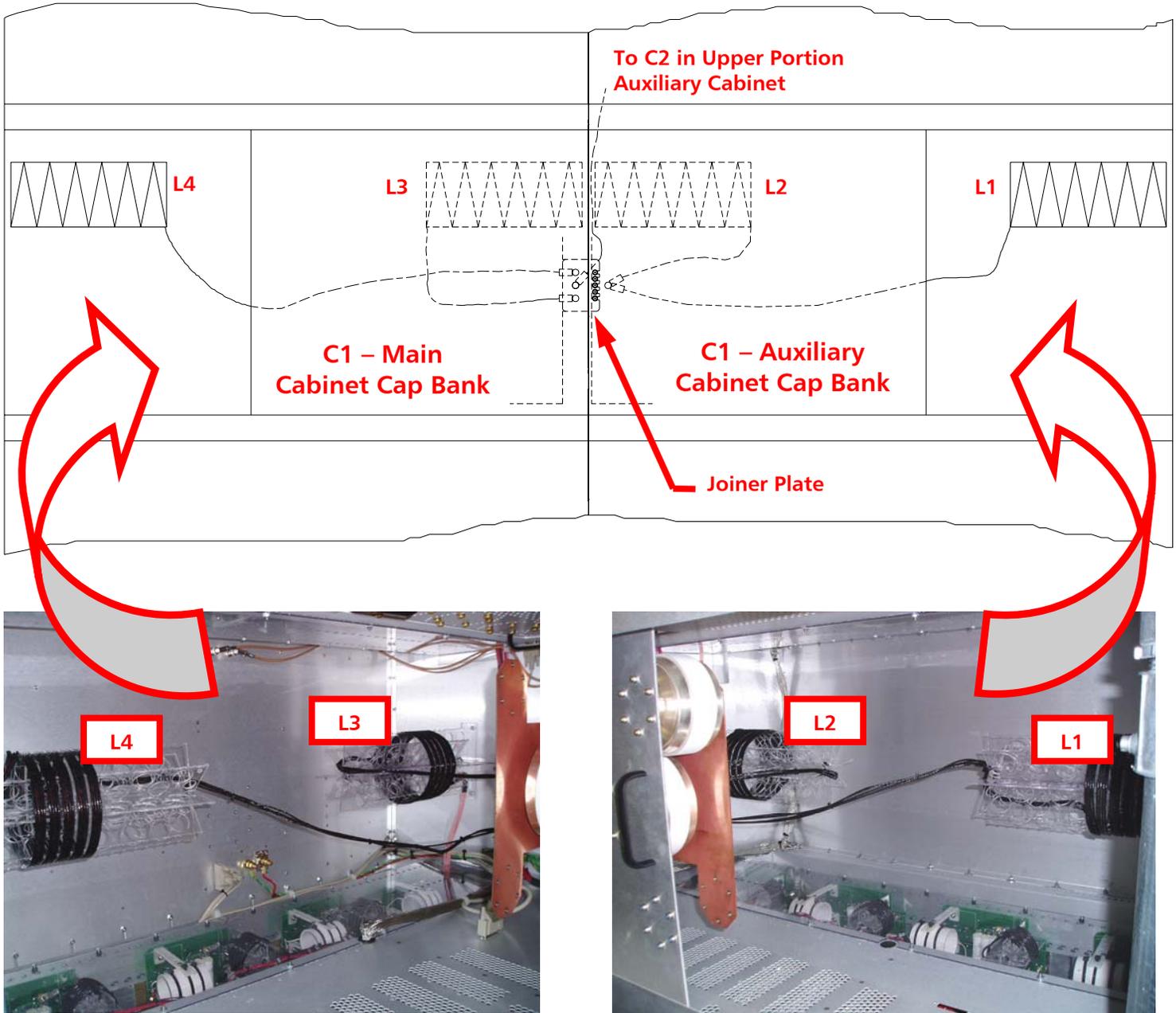


Figure 10 – L1, L2, L3, & L4 Locations
(All Views looking at the Rear of the Transmitter!)

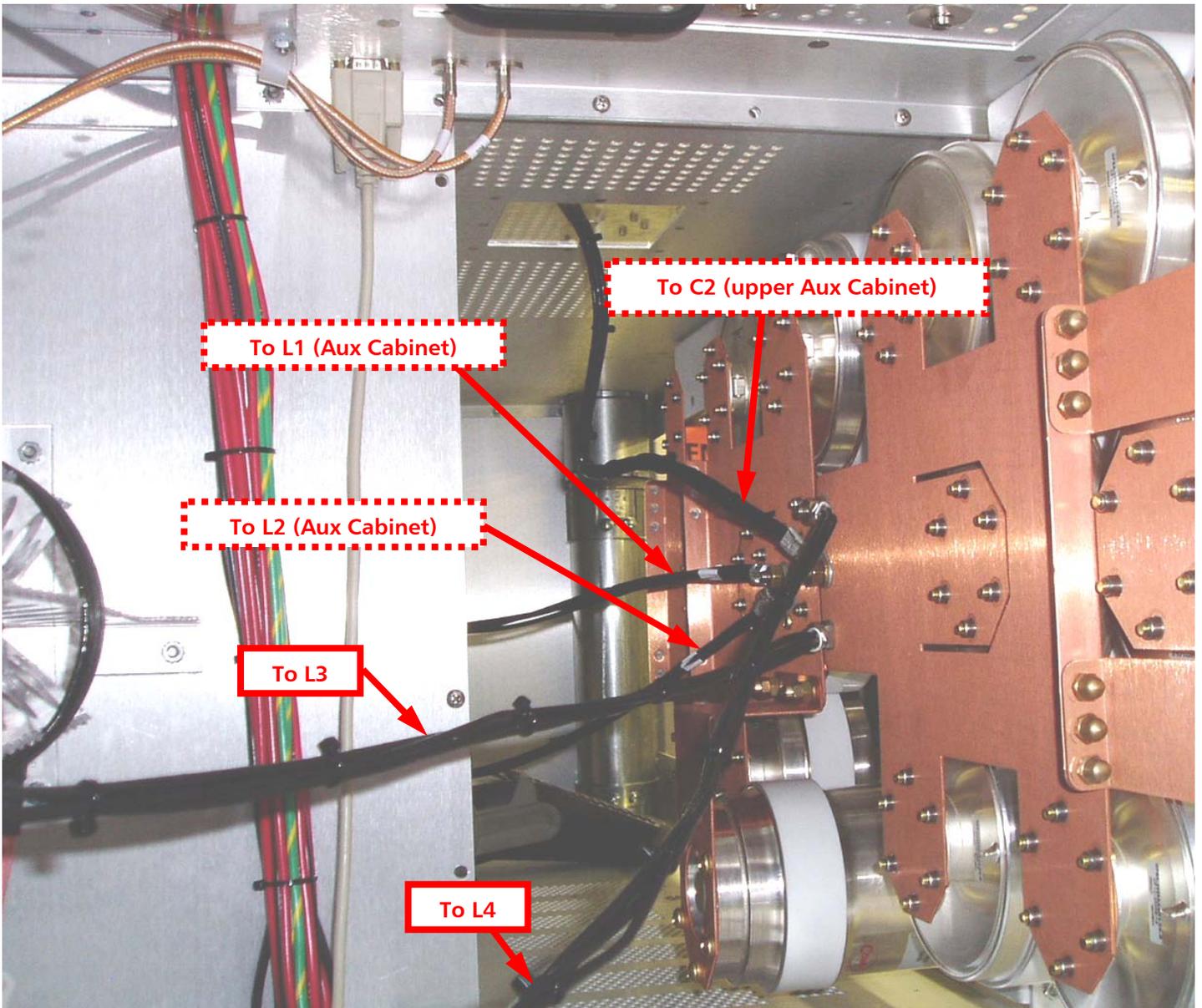


Figure 11 – C1 Electrical Connections

**(View After Assembly inside of Cabinet behind C1 -
looking from the Main Cabinet though to the Auxiliary Cabinet)**



2.4.5 Install Main and Auxiliary Cabinet Capacitor Bank C1

NOTE: All Capacitor Banks are heavy and (2) people are required to install them into the 4MX 100 Transmitter!

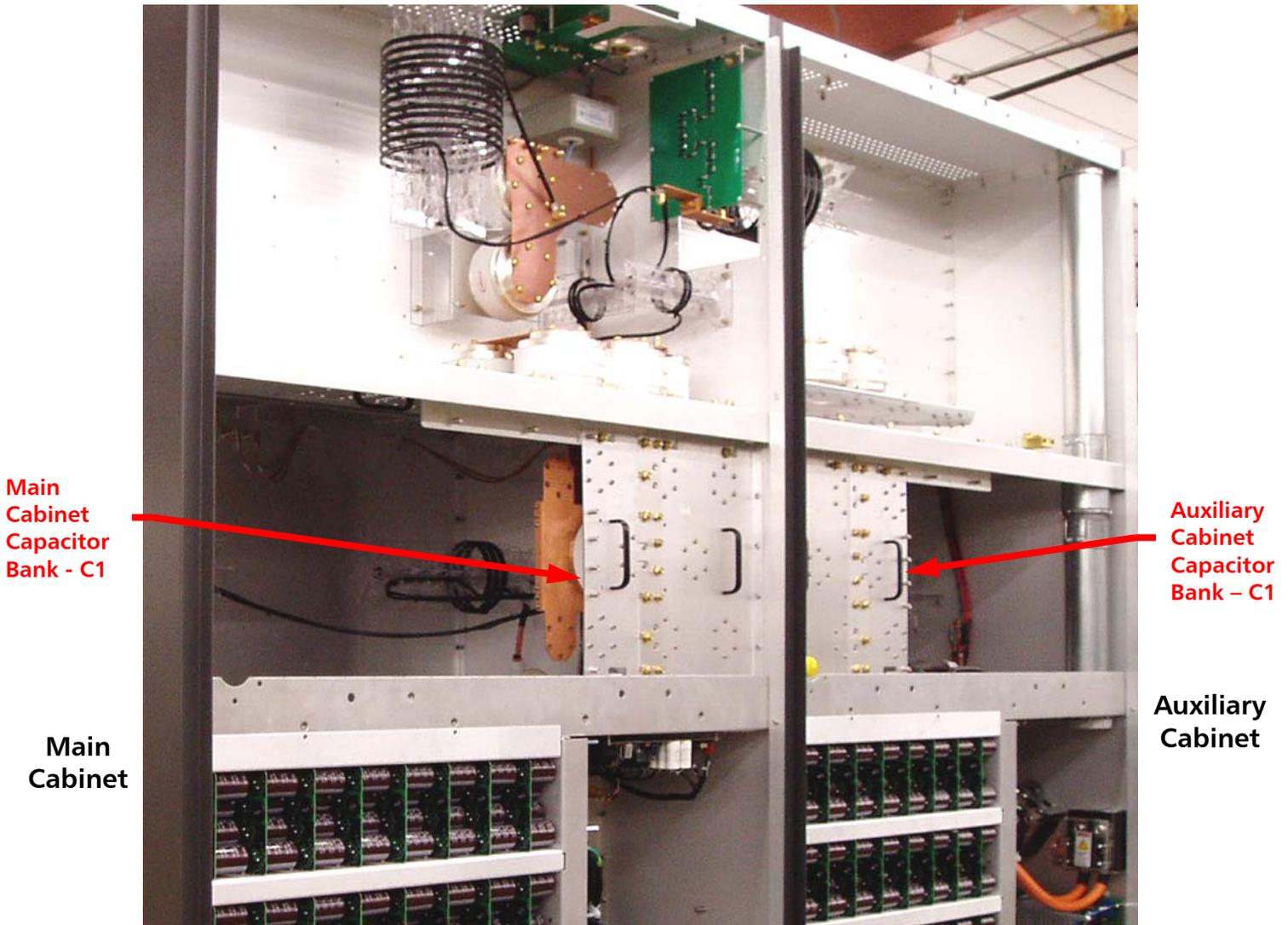


Figure 12 – Main and Auxiliary Cabinet Capacitor Bank C1 Installation

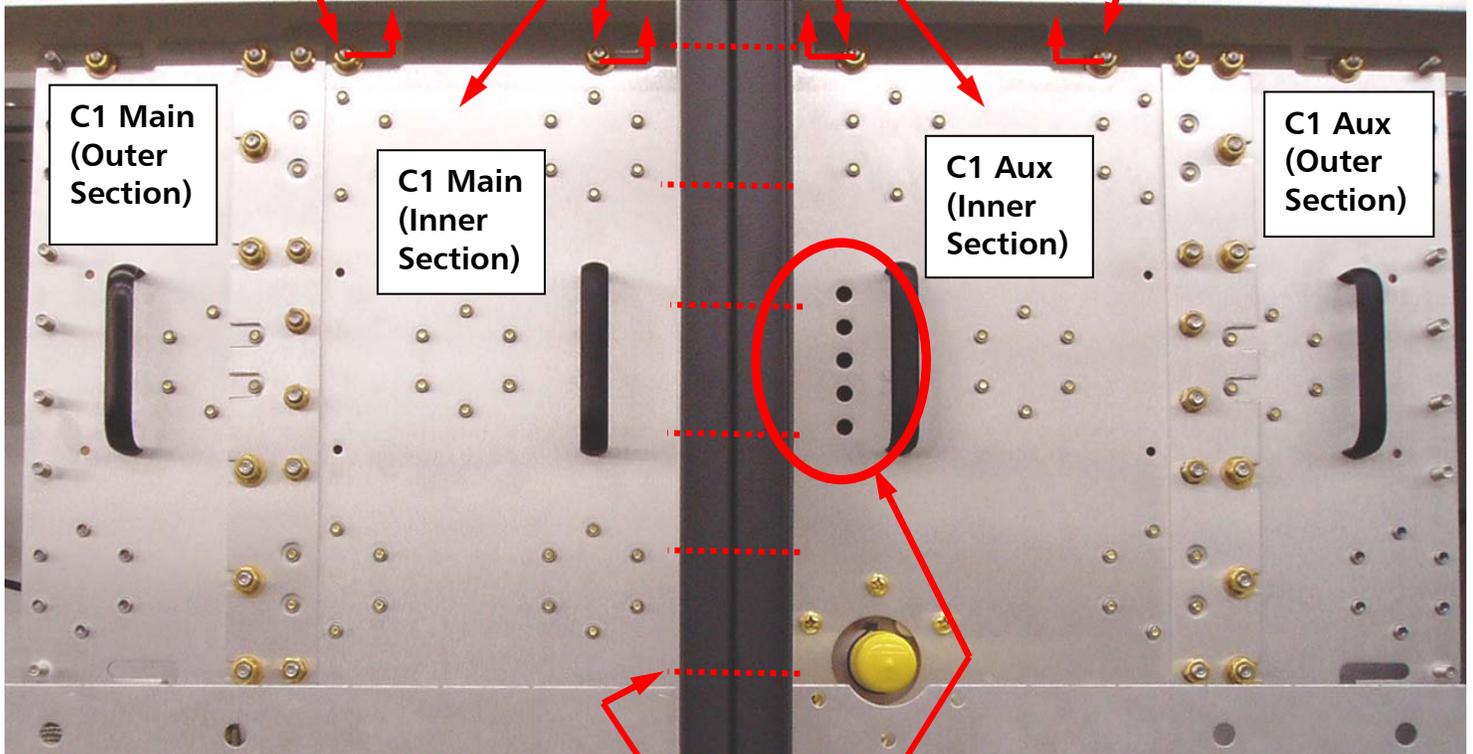
Install the C1 cap bank sections as shown below into the 4MX transmitter. The number of sections is dependent upon the transmitter's frequency (4 sections for this example). The C1 cap bank sections were labeled as shown in **Figure 13** prior to shipment. The inner most banks are installed first, then the outer most.

NOTE: The picture below shows what the C1 banks will look like after they are completely assembled.

2.4.6 Install Inner C1 Cap Bank Sections

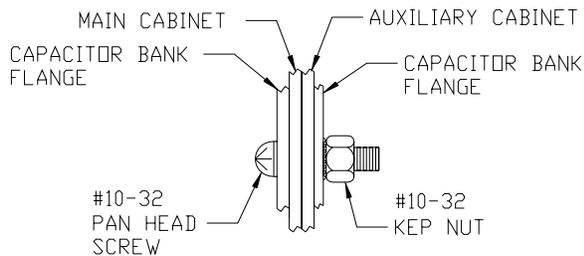
Step 1 – Install C1 Main “Inner Section” into the transmitter first as shown. Each section has (2) “L” shaped slots in the top. Slide over the studs and install the 5/16 hardware (2 places - flat, lock washer, and nut). Use a 1/2” wrench to tighten.

Step 2 – Next, install C1 Aux “Inner Section” into the transmitter and install the 5/16 hardware (2 places - flat, lock washer, and nut). Use a 1/2” Wrench to tighten.



Step 3 – Install 10-32 Pan Head screws and kepnuts (6 Places) through each of the cap banks and cabinets (see Detail A). Use a No. 2 Phillips screwdriver to tighten.

Step 4 – Use a No. 2 Phillips Screwdriver and tighten the “Joiner Plate” hardware. (See Figure 14 for additional detail regarding the joiner plate).



Detail A

Figure 13 – Main and Auxiliary Cabinet Capacitor Bank C1 Installation



2.4.7 C1 "Joiner Plate" Detail

Install the Joiner Plate (P/N 471-5361) as shown. It is critical that the Joiner Plate be installed exactly as shown (*the Joiner Plate should already be attached to the Main Cabinet Inner Cap bank*).

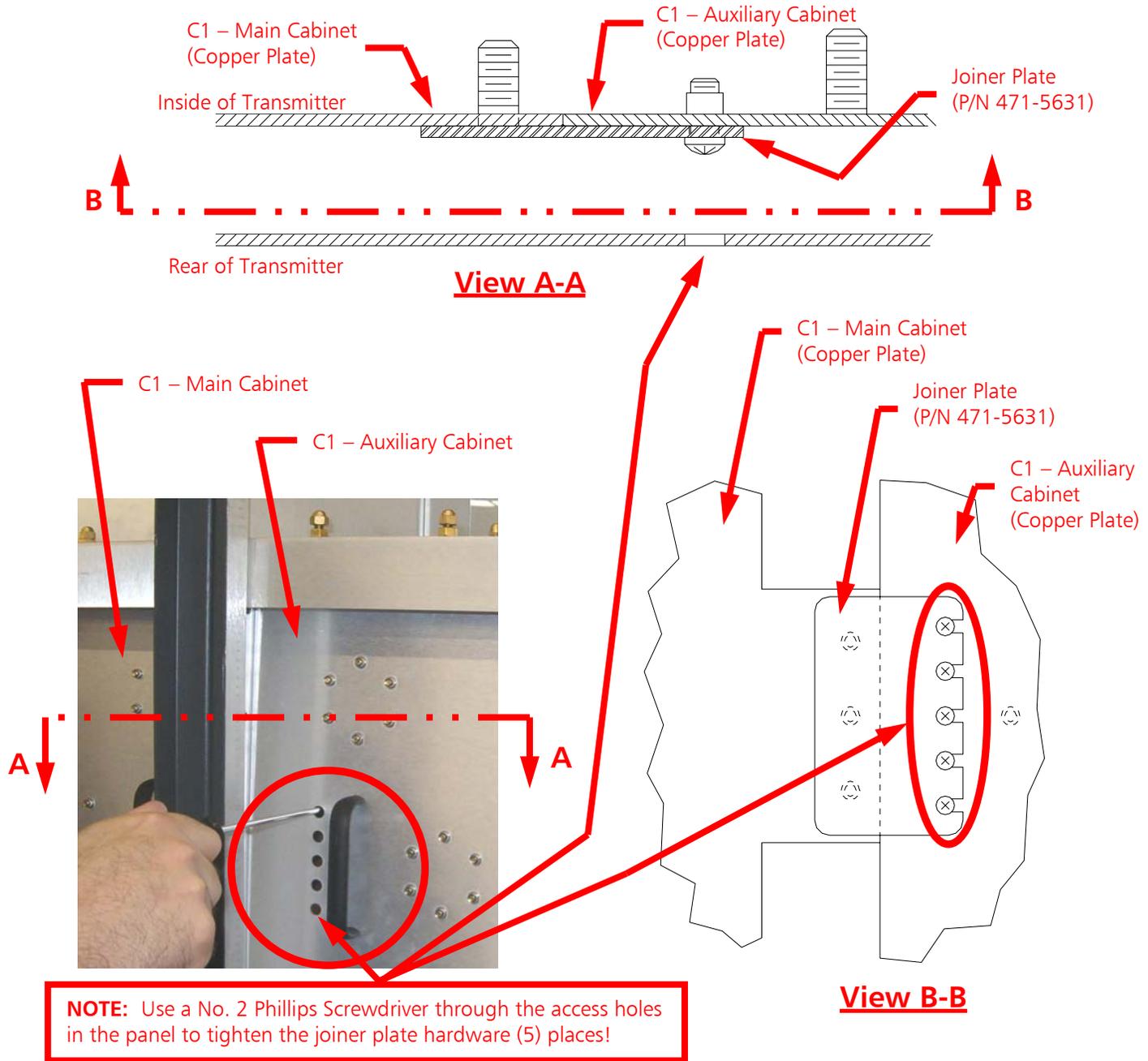


Figure 14 – Joiner Plate Installation



2.4.8 Install Outer C1 Cap Bank Sections

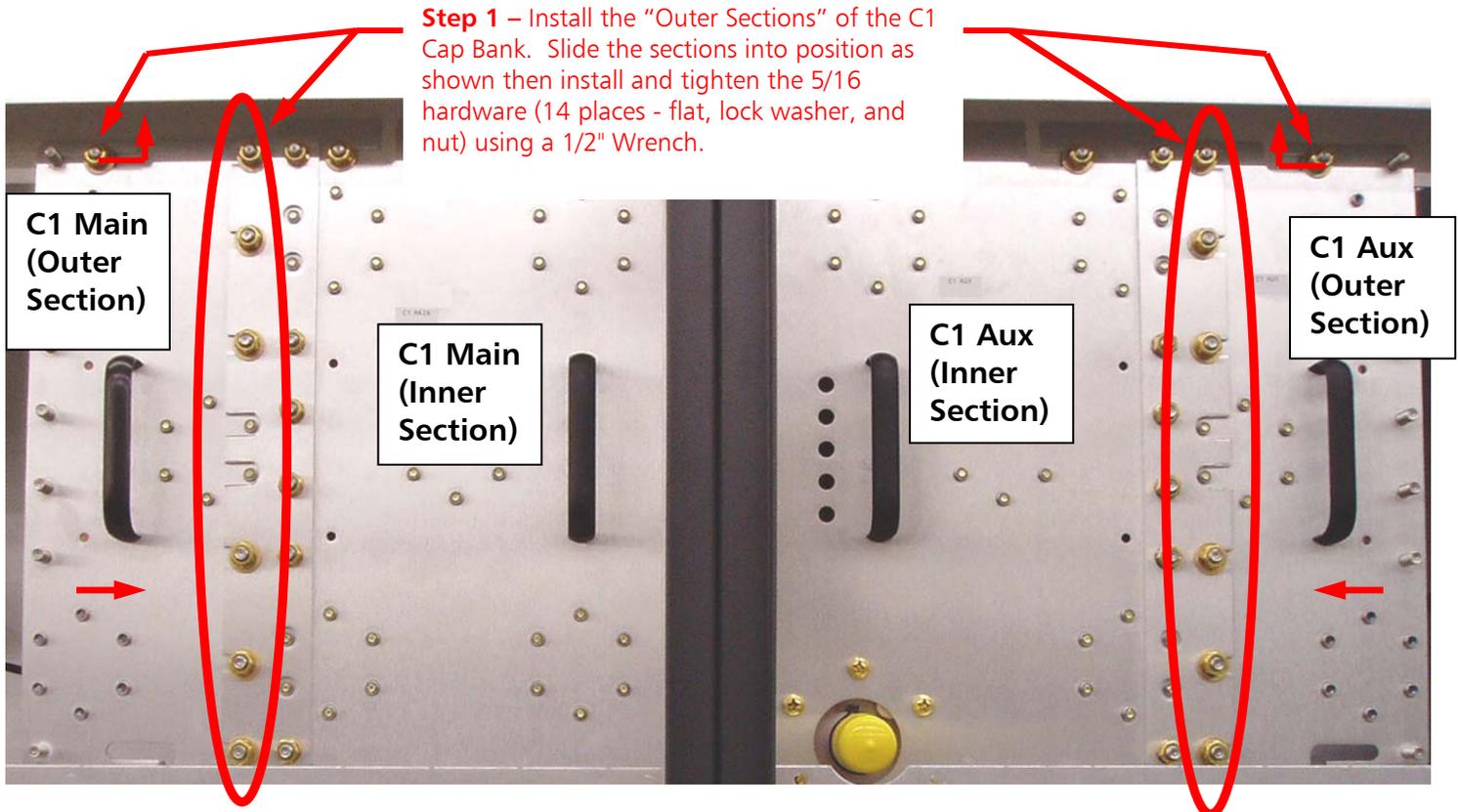


Figure 15 – Main and Auxiliary Cabinet Capacitor Bank C1 Installation

The C1 cap bank sections also require installation of hardware on the back side of the copper plates.

Step 2 – Next, be sure to install the No. 10 hardware as shown (6 places – lock washer, hex nut, and acorn nut). This hardware ties the copper sections together on the back side of the C1 Cap Bank sections. Use a 5/16" Wrench or Nut driver to tighten.

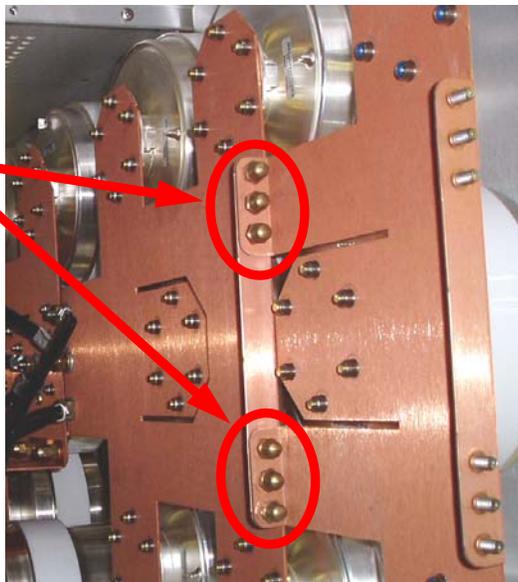


Figure 16 – Back Side of C1 Cap Bank(s) Copper Plate Hardware Connections

2.4.9 Capacitor Bank C1 to L1, L2, L3, & L4 Connections

Figures 17A and 17B show details regarding the electrical connections to C1. Ensure that the hardware is installed exactly as shown and is properly tightened.

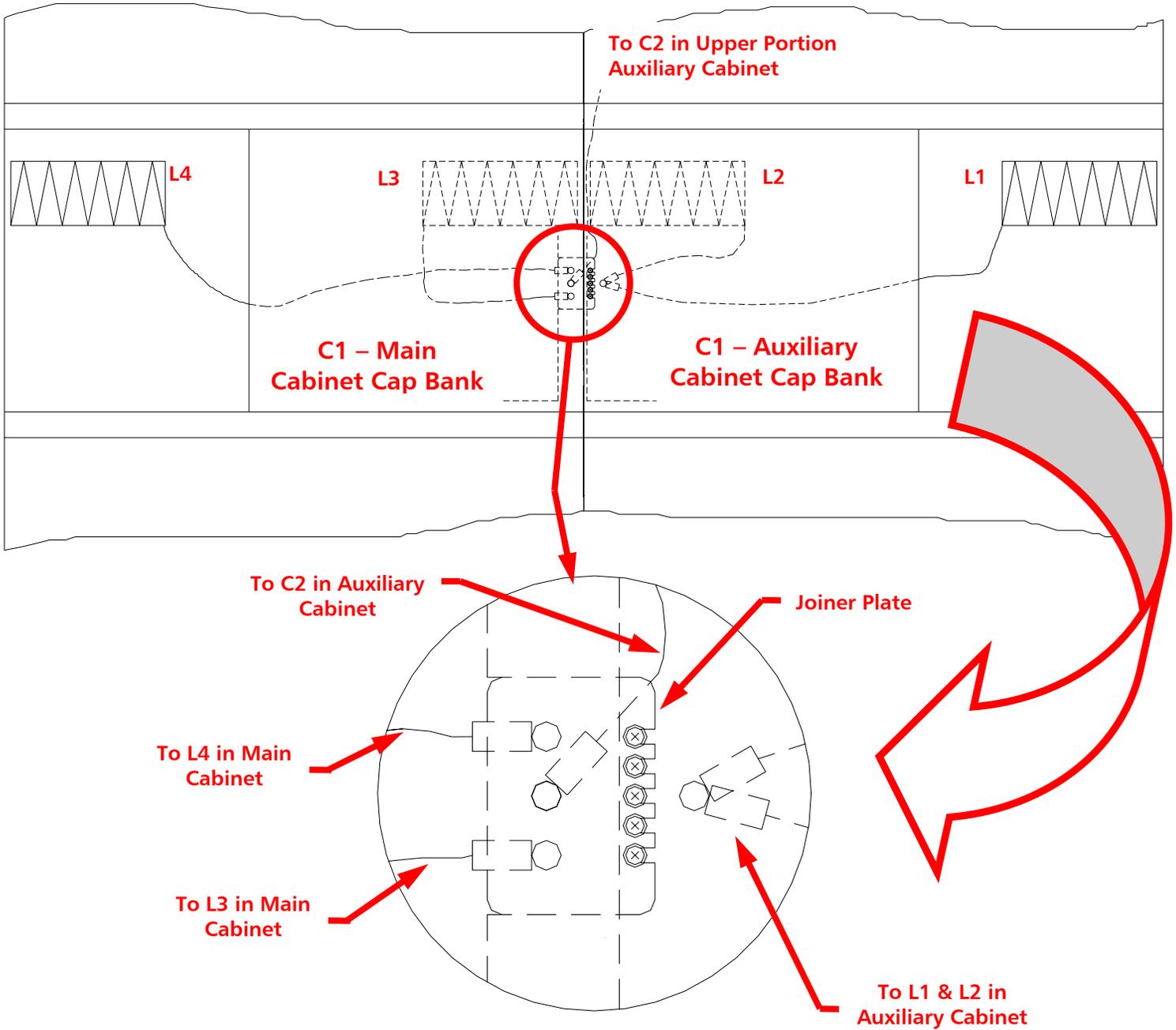


Figure 17A – C1 Joiner Plate and Electrical Connections
(View looking at the Rear of the transmitter through C1!)



Step 1 – Install the lugs and hardware for the (5) connections to C1 as shown below. Use a 1/2" wrench to tighten hardware. All cables and Capacitor Bank connection points were "match" marked prior to shipment (connect "A" to "A", "B" to "B", and so forth).

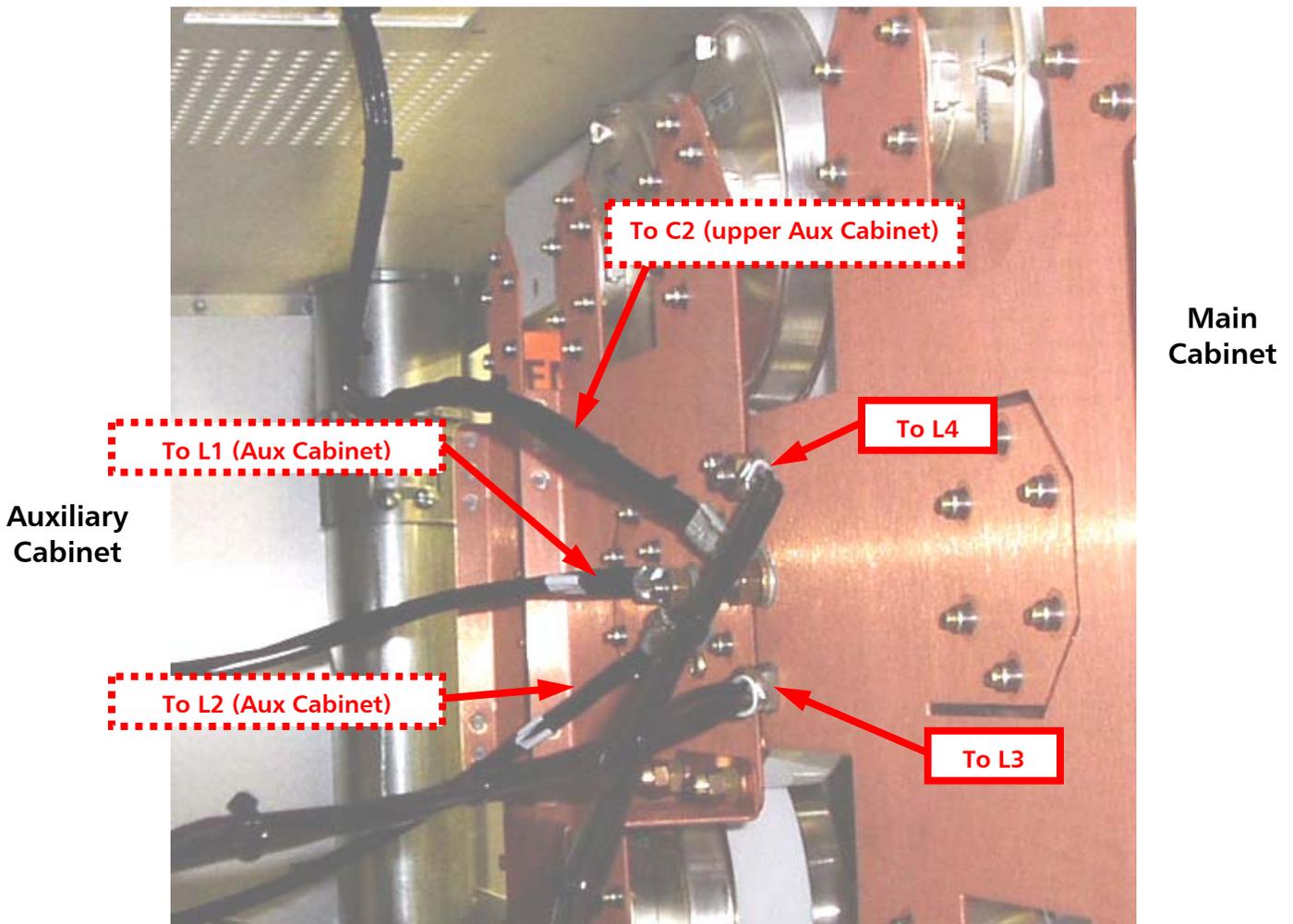
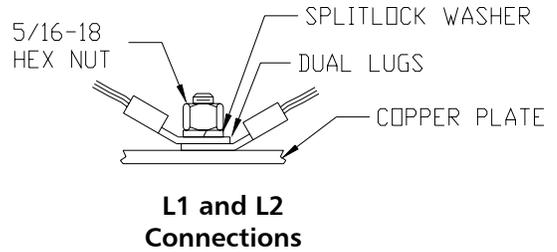
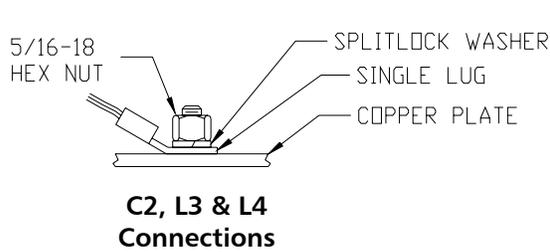


Figure 17B – C1 Electrical Connections
(View looking at back side of C1 inside the transmitter!)

Step 2 – Double check all of the C1 Capacitor Bank's installation and connection hardware to ensure that it has been properly tightened before proceeding.



2.5 Route / Connect Power and Fan Interconnect Cabling

Before shipment of the 4MX 100, Main to Auxiliary Cabinet interconnect cabling for AC Power, 18VDC, and the cooling Blowers were disconnected. After disconnection, these cables were then bundled for shipment in the bottom of each of the cabinets. This section provides instruction on the routing and reconnection of these cables.

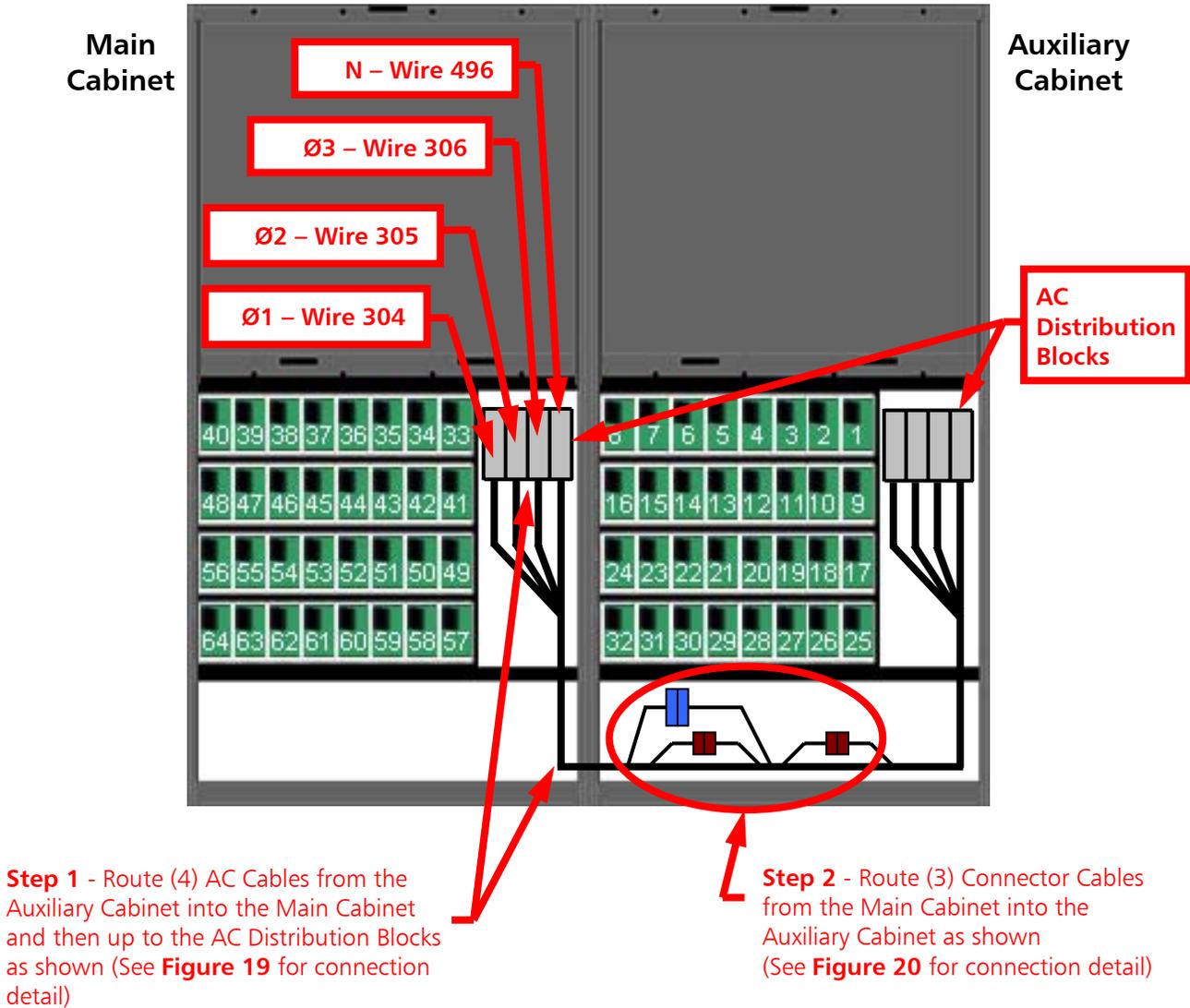


Figure 18 – 4MX 100 400VAC, 18VDC, and Fan Interconnect Cabling (Rear View of Main and Auxiliary Cabinets)

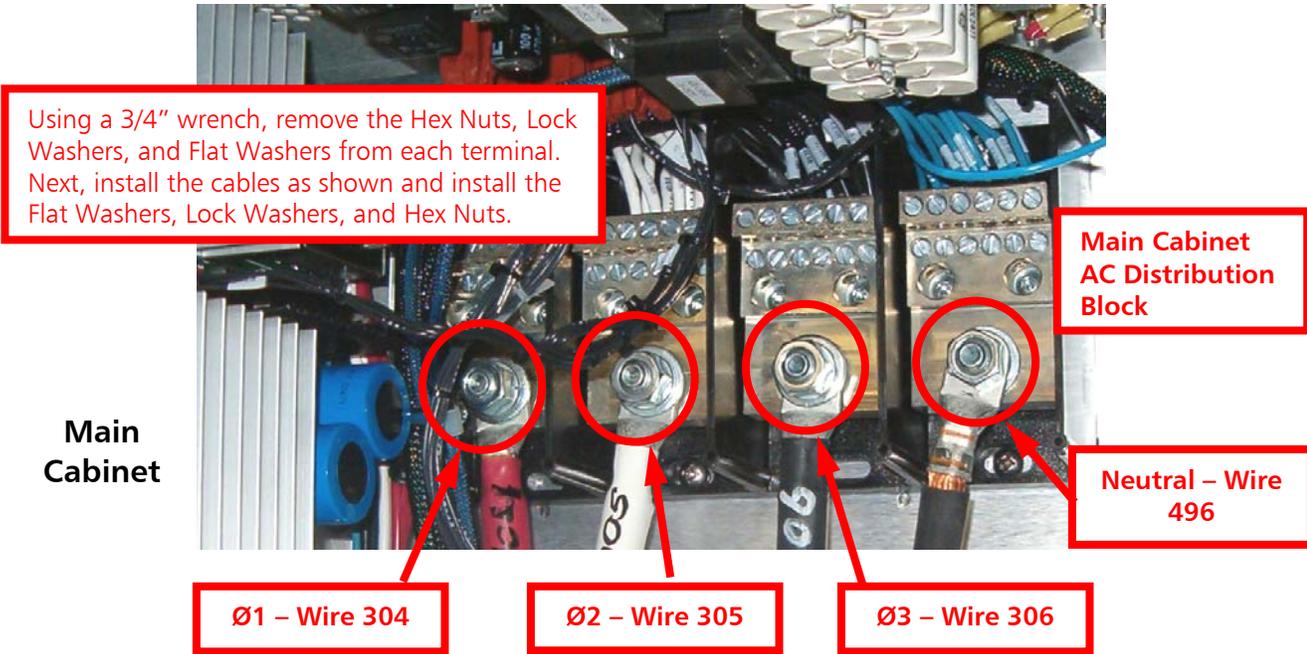


Figure 19 – 4MX 100 400VAC Interconnect Cable Connections (Rear View of Main Cabinet)

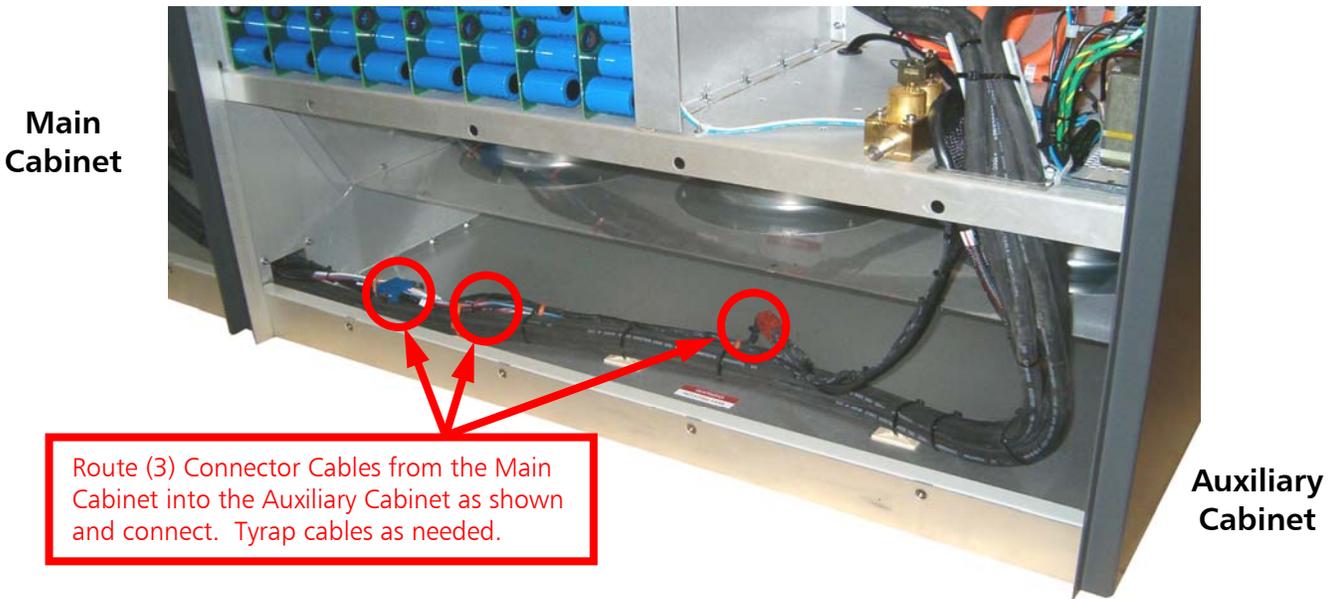


Figure 20 – 4MX 100, 18V, and Fan Interconnect Cable Routing and Connections (Rear View of Auxiliary Cabinet)

2.6 Route / Connect the Multiplexer Interconnect Cabling

Auxiliary Cabinet Multiplexer cabling must be routed to and connected in the Main Cabinet. Route the cabling as illustrated and connect the cable connectors to the Multiplexer Board.

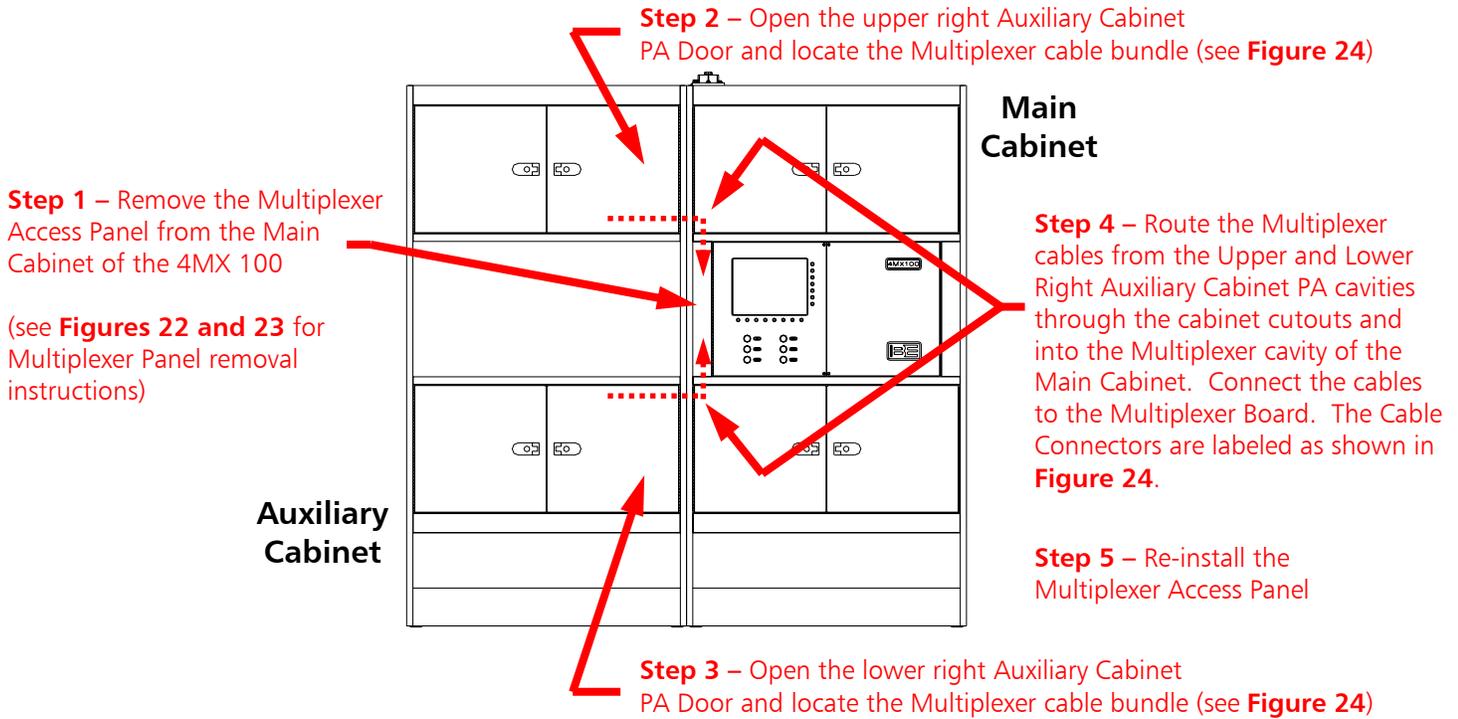


Figure 21 – Auxiliary Cabinet Multiplexer Cable Routing

Step 1a – Use a No. 2 Phillips screwdriver and remove the (4) door screws



Step 1b – Use a No. 2 Phillips screwdriver and remove the (3) screws from the hinge area as shown

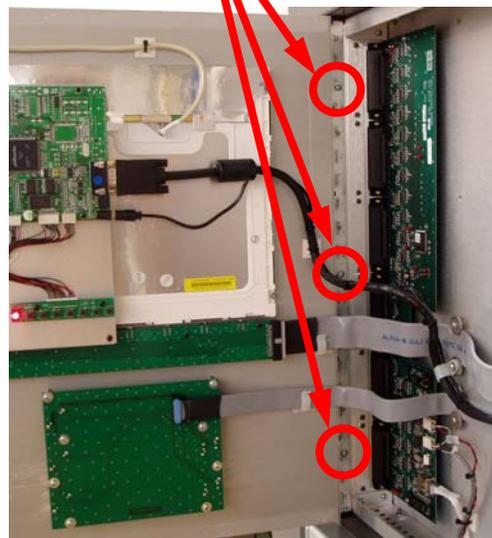


Figure 22 – Multiplexer Access Panel Removal



Step 1c – Use the flip out handle and remove the Multiplexer Access Panel



Figure 23 – Multiplexer Access Panel Removal

Multiplexer Cables are bundled prior to cabinet separation at the factory for shipment (Typical Top and Bottom PA Cavities in Auxiliary Cabinet)

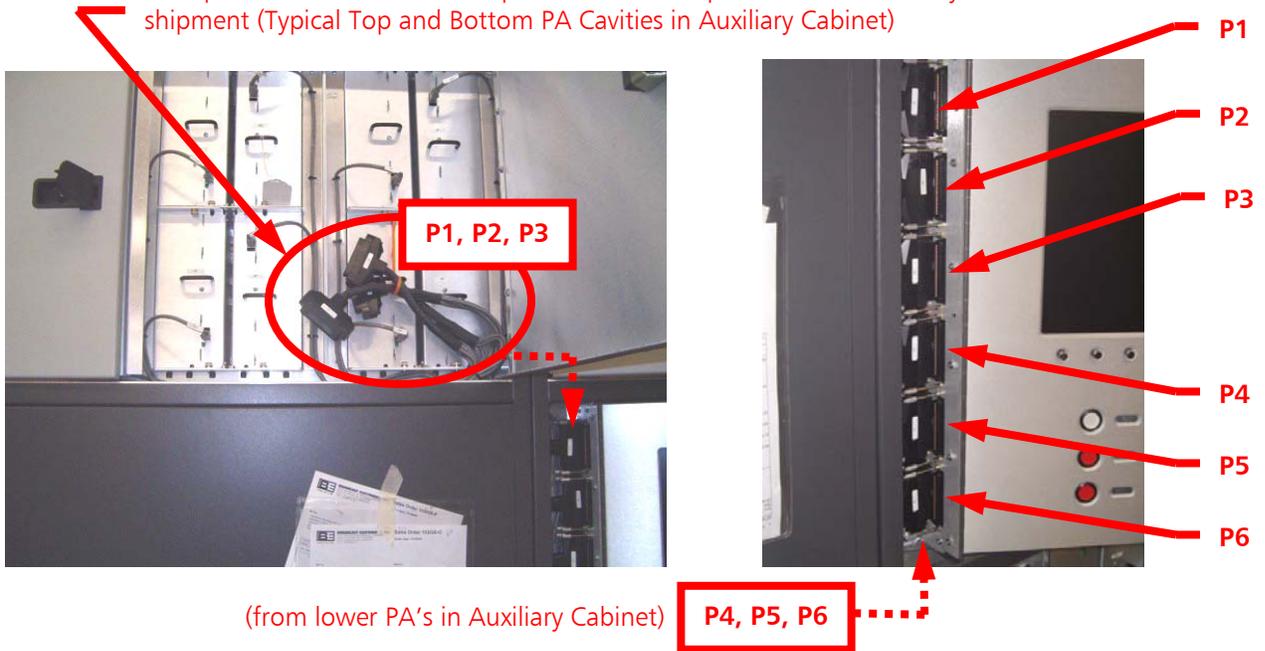


Figure 24 – Multiplexer Cable Routing From Auxiliary Cabinet / Connections in Main Cabinet



2.7 Earth Ground to 4MX 100 Chassis Connection

The 4MX 100 ground system requires the connection of an earth ground to the 4MX 100 chassis. Refer to **Figure 25** and connect an earth ground from the AC Service Entrance to the RF Output flange using the supplied Earth Ground Strap (463-5600) and customer supplied grounding strap as shown.

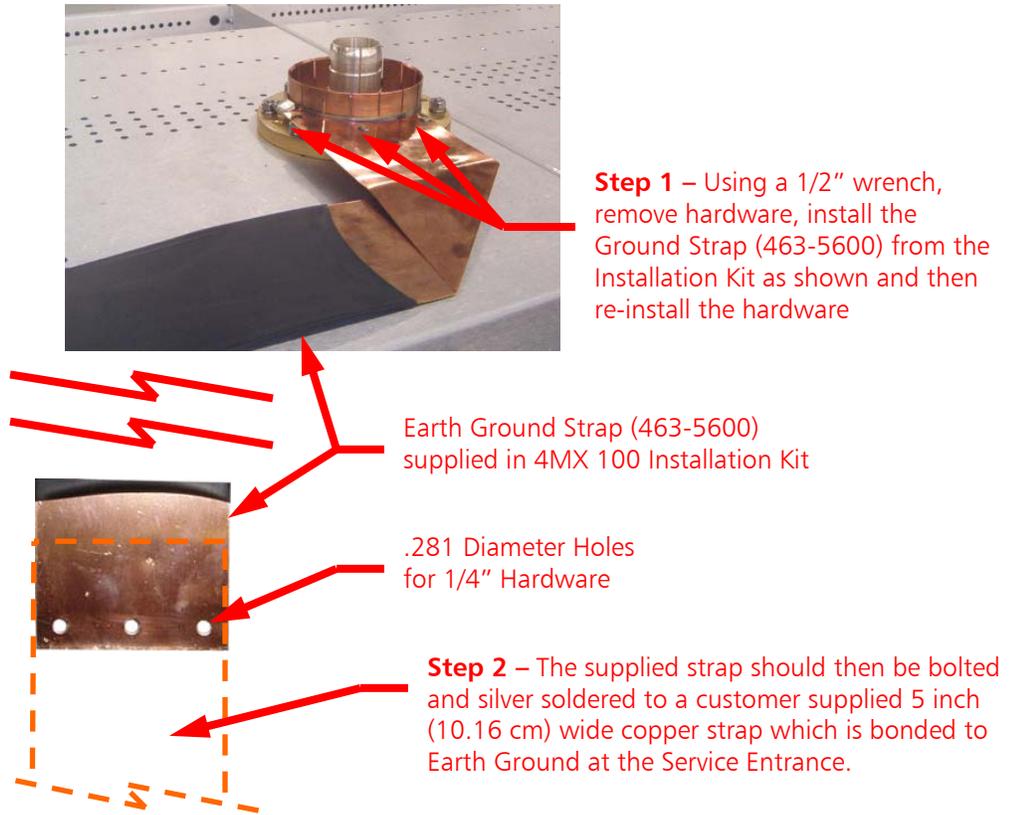


Figure 25 – Earth Ground to 4MX 100 Chassis Connection

2.8 RF Output Transmission Line Connection

The 4MX 100 transmitter RF output connection is 4-1/16 inch, 50 Ohm, EIA, Male, and is located in the top of the cabinet. This connection is a Clamp Type Flange Adapter with a fixed bullet as shown in **Figure 26**.

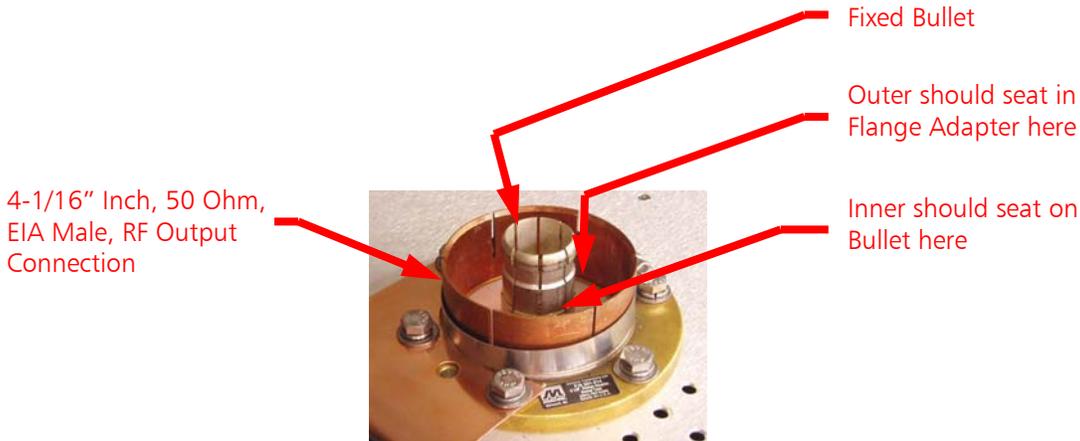


Figure 26 – 4-1/16 Inch, 50 Ohm, RF Output Connector (Left Rear of the Main Cabinet Top)

- Step 1** – Prepare the transmission line inner conductor with the proper cutback.
- Step 2** – Install the transmission line ensuring that the inner conductor goes over the bullet. Also, ensure that the inner and outer are seated as noted in **Figure 26**.
- Step 3** – Position the clamp as shown and tighten using a flat blade screwdriver, 5/16" nut driver or socket.

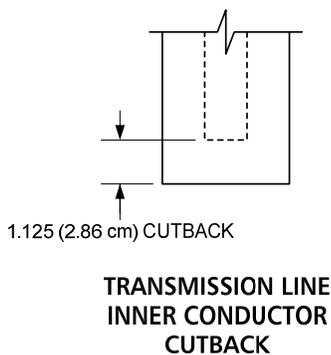


Figure 27 – 4-1/16 Inch, 50 Ohm, RF Output Connection

2.9 Primary AC Power Source Voltage and Configurations

The 4MX 100 was designed to operate specifically from the AC Power Source listed below.

400VAC (332-460VAC), 50 / 60 Hz, 3-Phase, WYE, 4 Wire

The following figure represents an acceptable AC Power Source transformer topology.

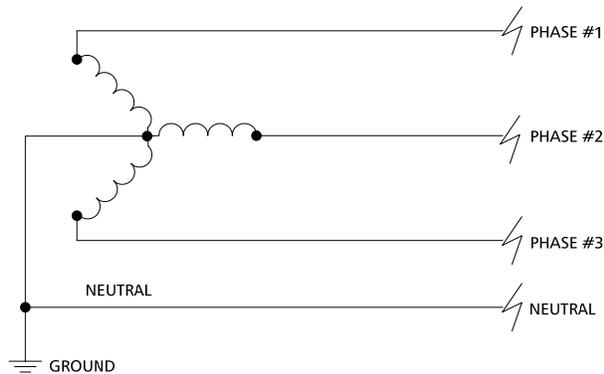


Figure 28 – 400VAC , 3-Phase, WYE, 4 Wire Supply to Main Breaker Box



CAUTION!!

- 1) **DO NOT attempt to connect the 4MX 100 to a different AC Power Source than 400VAC (332-460VAC), 50 / 60 Hz, 3-Phase, WYE, 4 Wire!!**
- 2) **Before installing the 4MX 100 Transmitter, make certain that the AC Input Voltage and configuration is 400VAC (332-460VAC), 50 / 60 Hz, 3-Phase, WYE.**
- 3) **If you have not done so, consult with the local electric utility to ensure that the correct AC service is provided before connecting the primary power source to the transmitter!**
- 4) **Operation from an unsatisfactory power source will void the warranty on the transmitter as any resulting damage is beyond the control of the manufacturer!**

2.10 4MX 100 AC Input Recommended Disconnect Fuse and Wire Sizes

- NOTES:** 1) Amperage Draw Per Phase calculated @ 100kW, 100% Tone Modulation.
2) Wire to be Type THHN or equivalent.

400VAC (330-460VAC) 3 Phase, WYE, 4 Wire, 276A per phase

Voltage +/- 10%	Amperage Draw Per Phase	Primary AC Fused Disconnect Fuse Size	Wire Size at 26-30 degrees C	Wire Size at 31-35 degrees C	Wire Size at 36-40 degrees C	Wire Size at 41-45 degrees C	Wire Size at 46-50 degrees C
340	325A	350A	400 KCMIL	500 KCMIL	500 KCMIL	500 KCMIL	500 KCMIL
400	276A	300A	300 KCMIL	350 KCMIL	350 KCMIL	400 KCMIL	400 KCMIL
440	251A	300A	300 KCMIL	350 KCMIL	350 KCMIL	400 KCMIL	400 KCMIL
460	240A	250A	250 KCMIL	300 KCMIL	300 KCMIL	300 KCMIL	300 KCMIL

Figure 29 – 4MX 100 AC Primary AC Input Disconnect Fuse and Wire Size Charts

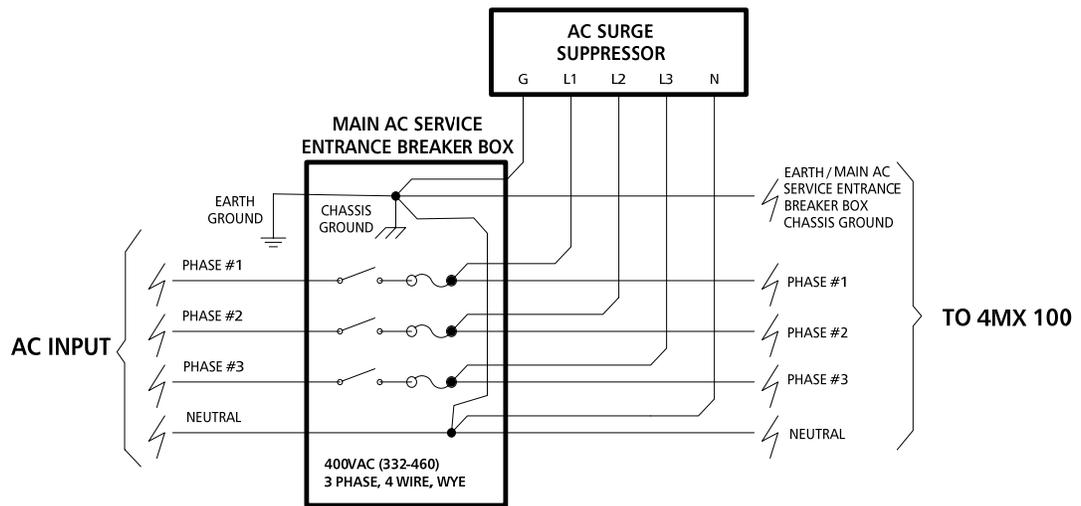


2.11 Installing the AC Surge Suppressor

Included in the 4MX 100 shipment from Broadcast Electronics, Inc. is an **AC Surge Suppressor** device. This device **MUST** be installed for over voltage protection at the AC service entrance of the transmitter building before AC Power is applied to the transmitter. Please adhere to the installation instructions included with the Surge Suppressor device. The Surge Suppressor should be installed immediately after the Main Breaker Box to ensure its effectiveness. The wires from the Main Breaker Box to the Surge Suppressor must be as short as possible. See the schematic in **Figure 30** for the Surge Suppressor Device wiring.



CAUTION - Failure to install the AC Surge Suppressor will void the warranty of the transmitter!



Note: Bond the "Neutral" to "Ground" at the Service Entrance EXCEPT where Local Electrical Codes do not allow!

Figure 30 – 400VAC, 3 PHASE, 4 Wire WYE Input, AC Surge Suppressor Device Wiring



Step 1 – Mount the AC Surge Protector as close to the Main AC Service Entrance Breaker Box as possible using the 5/16" diameter holes that are provided.

Step 2 – Determine the desired main cable entry location. Using hydraulic punch set, punch the appropriate hole and install a watertight connector (not supplied).

Step 3 – Punch another hole near the relays for Remote Alarm Wiring and install an appropriate sized watertight connector.

Step 4 – Connect the Surge Suppressor to the power bus using No. 8 stranded copper building wire. Connect (short as possible) the phase wires to "L1", "L2", and "L3" terminals; connect the neutral wire to "N"; connect the earth ground wire to "G"; connect the earth ground the Chassis Ground Lug.



Step 5 – If using an alarm (customer supplied), connect to the dry contacts (NO or NC) on alarms relays.

Note: For additional information reference the instructions included with the Surge Suppressor Device.

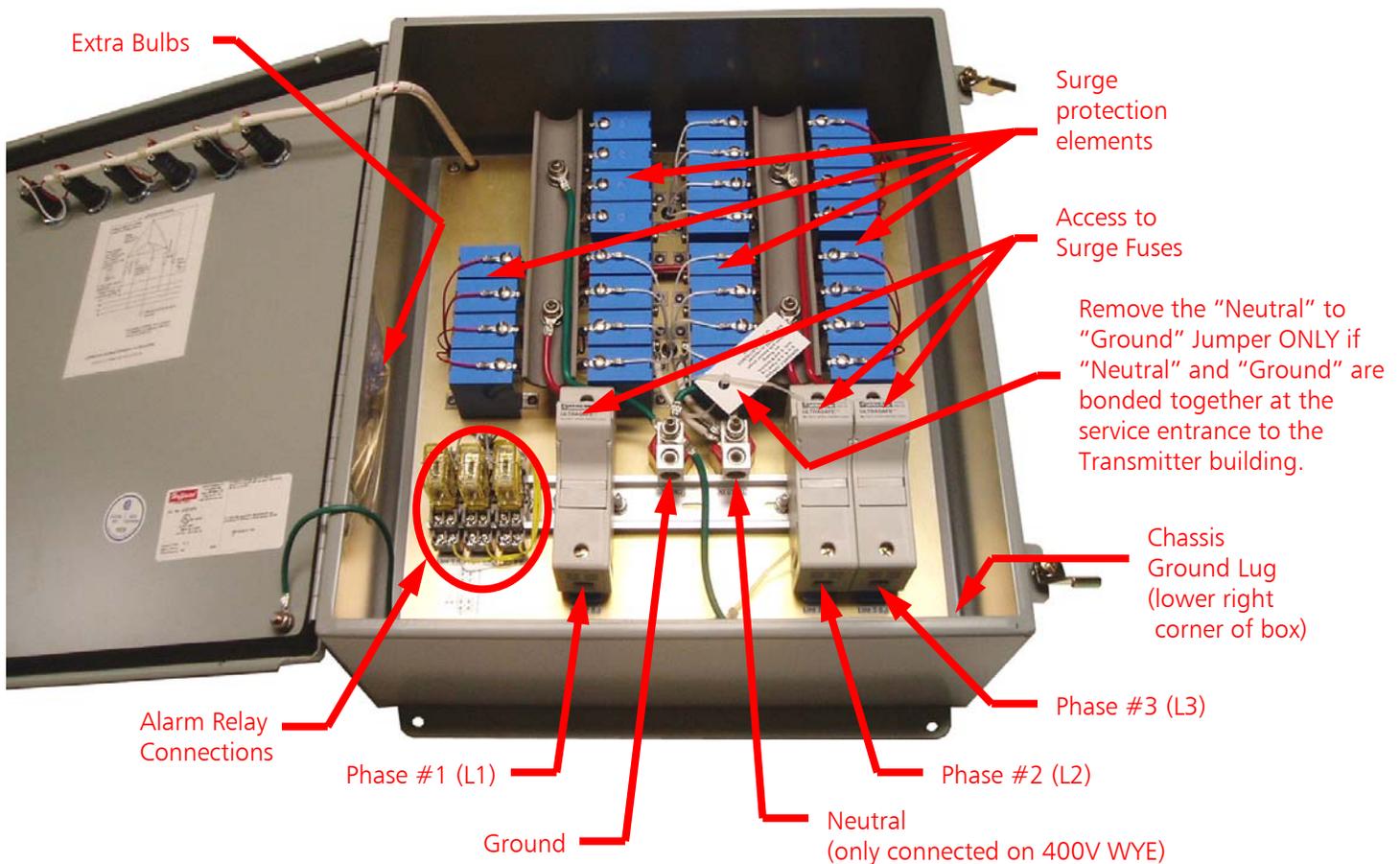


Figure 31 – Typical AC Surge Suppressor Device Connections



2.12 Connecting AC Power To The 4MX 100 Transmitter

The primary AC Power Source wiring enters the 4MX 100 cabinet through the top and runs down through an internal conduit to the main AC terminal blocks.

Step 1 – Insert the AC Power cables into the provided entry location in the top of the cabinet.

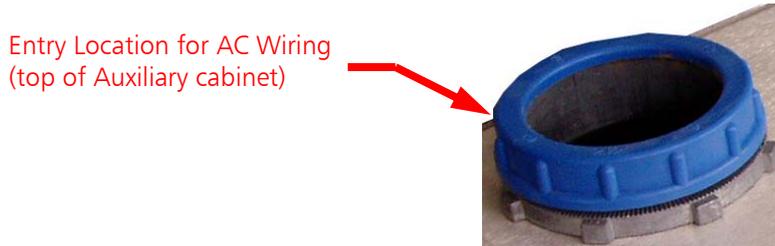


Figure 32 – Entry Location for AC Wiring

Step 2 – Route the AC Power cables down through the conduit to the AC Connection blocks.

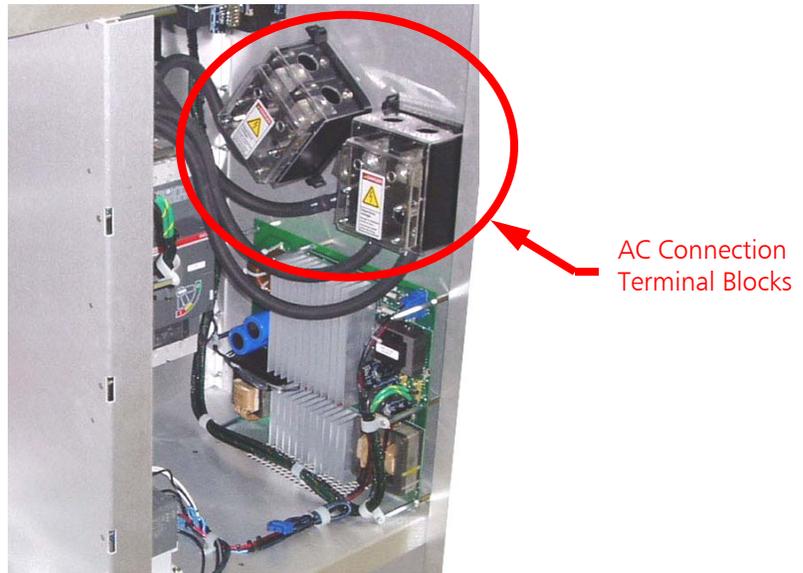


Figure 33 – AC Terminal Block Location (Lower Right Rear of Cabinet)

Step 3 – Prepare the conductors with the suggested strip length and apply conductive grease supplied in the Installation kit.



Figure 34 – Suggested Strip Length and Grease for AC Supply Wiring

Step 4 – Connect the Primary AC Wiring to the transmitter as shown below.

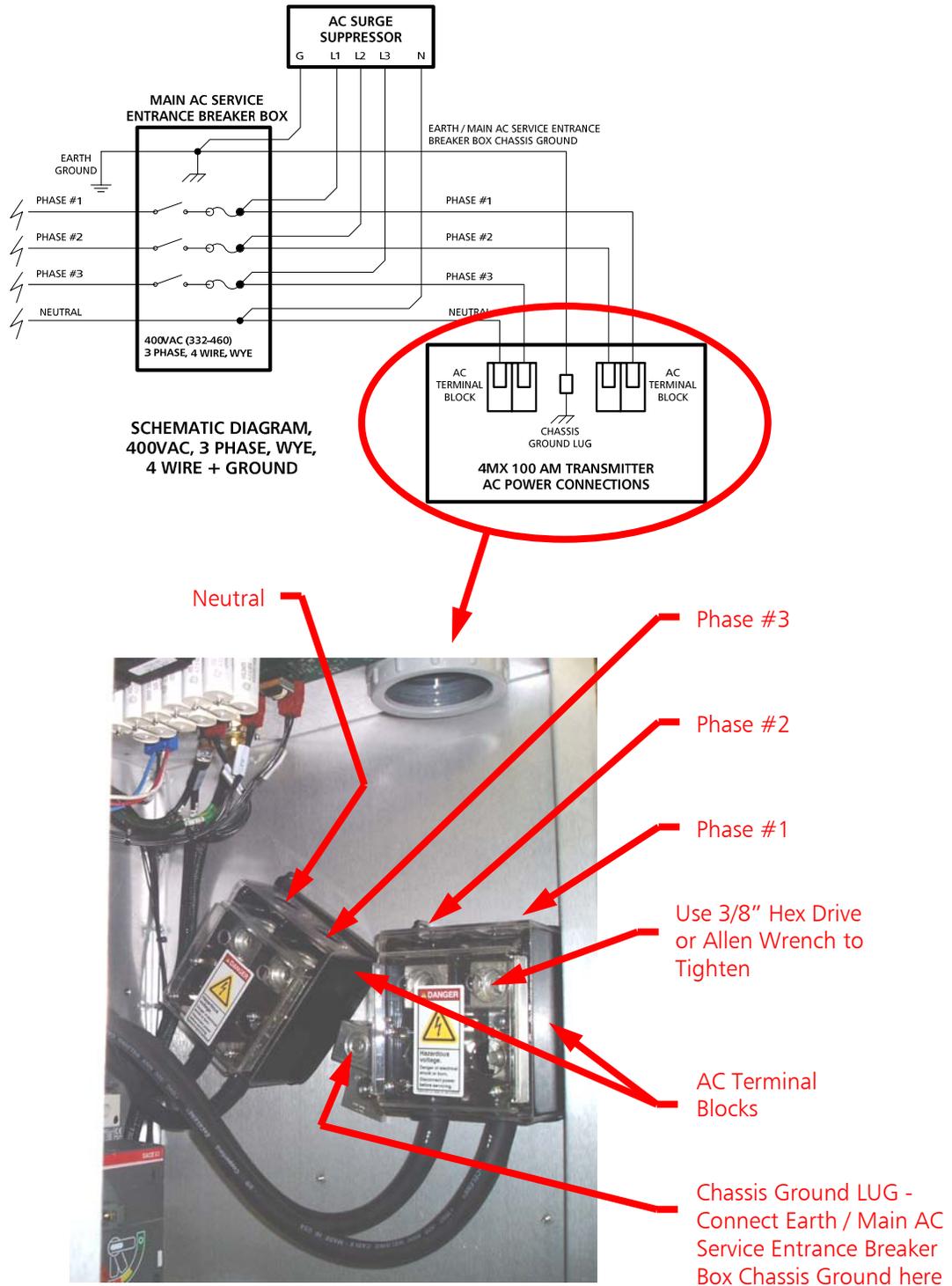


Figure 35 – 400VAC, 3 Phase, WYE, 4 Wire



2.12.1 Install Rear Doors

Once the AC Connections have been made, install the rear doors.

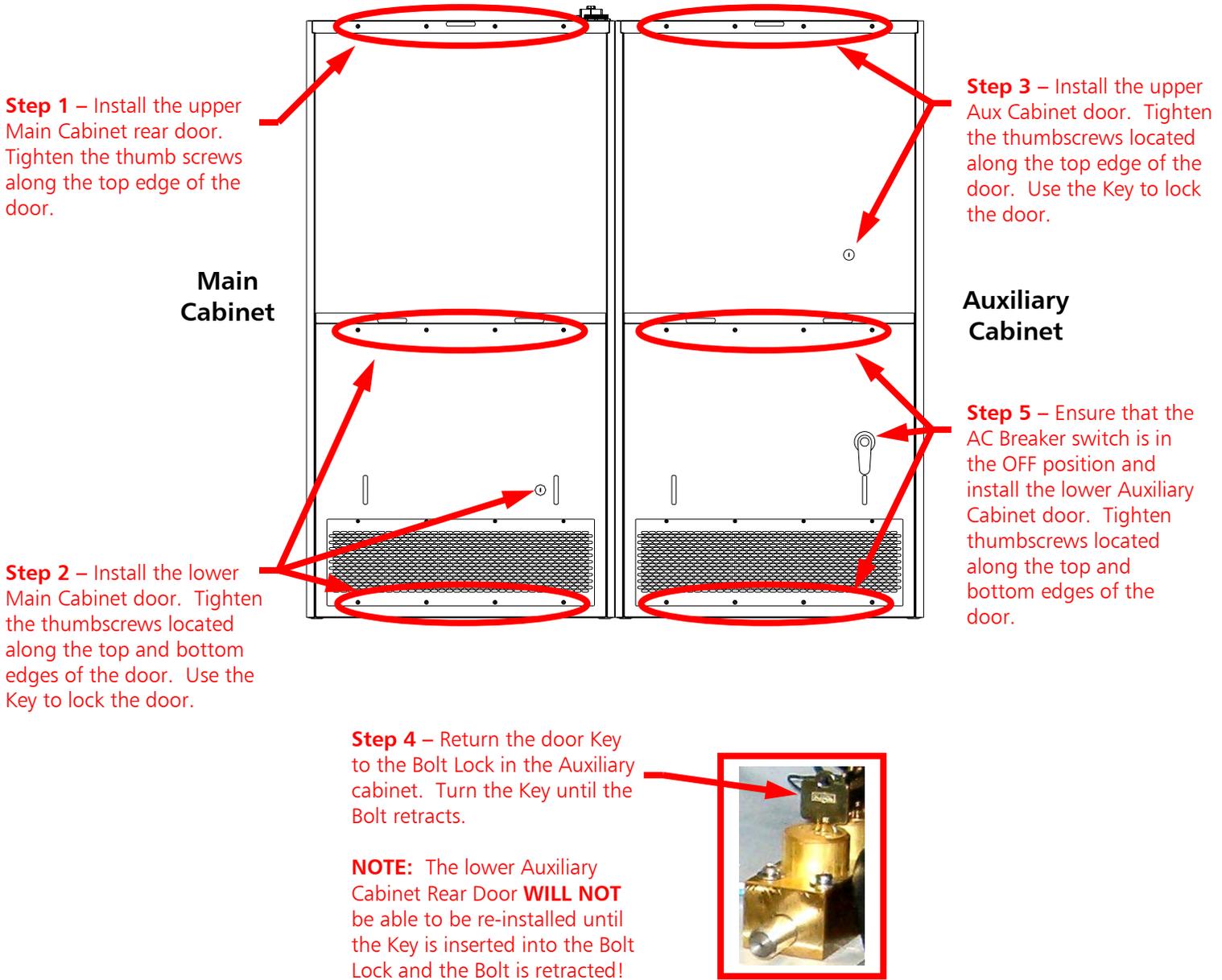


Figure 36 – Rear Door Installation



2.13 Remote INTERLOCK and FAILSAFE I/O Connections

4MX Series Transmitters are equipped with a remote device I/O Connection Board (PCB Assy 917-0419) and will interface with almost any remote control or diagnostic device. Remote device wiring enters through the top of the cabinet and routes down to the I/O Connection Board which is accessible from the front of the transmitter. See **Figure 1** for the cabinet entry location provided for remote device wiring and the front panel access location to the I/O Connection Board. See **Figures 37** and **38** for instructions to gain access to the Remote Control I/O connections. For the pin out of the I/O Connection Board, see **Figure 39**.



Figure 37 – Remote Control I/O and Audio Input Access Panel Hardware



Figure 38 – Remote Control I/O and Audio Input Access Panel

(see **Figure 33** for pin outs)



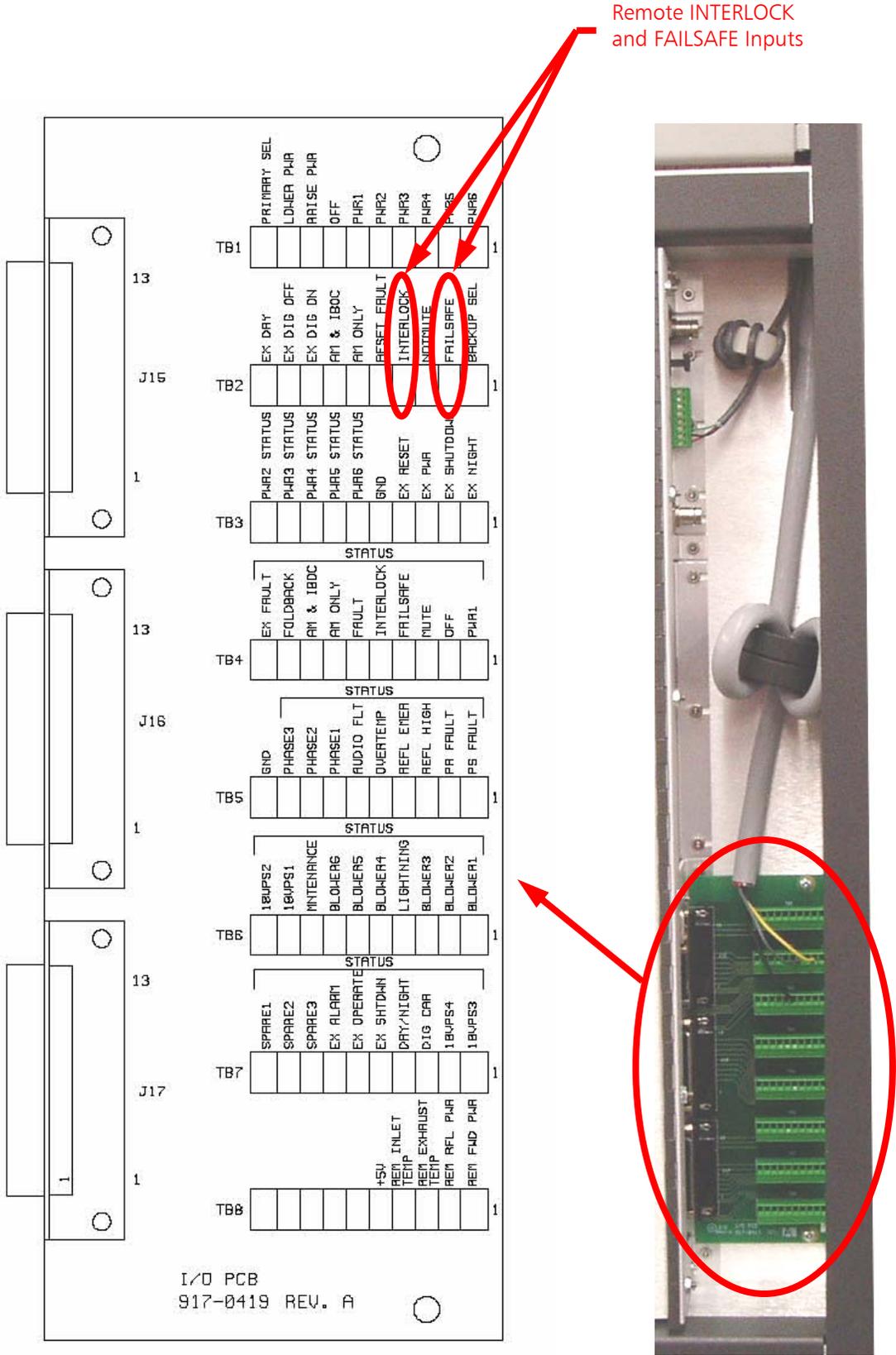


Figure 39 – Remote I/O Terminal Block Pin Outs



On the Controller Board (PCB Assy 917-0407), jumper plug P4 will come from the factory installed on pins 1 and 2 of J4. This position of P4 will require a GND connection from a remote device to the I/O Connection Board to activate its input. If desired, P4 may be positioned on pins 2 and 3 of J4 which will then require a voltage of 3.5V or greater to activate the input. See **Figure 40** for the location of jumper plug P4 on the Controller Board.



Figure 40 – Controller Board I/O Signal Configuration Jumper

Included in the remote device I/O connections, is an **INTERLOCK** and a **FAILSAFE** connection. These connections are provided for safety to protect not only the 4MX 100 transmitter but service personnel as well who may be working on the transmitter or the transmission system.

*REMOTE CONTROL **DOES NOT** need to be **ENABLED** from the **OPERATING** menu in the GUI for **INTERLOCK** and **FAILSAFE** inputs to function.*

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

2.13.1 INTERLOCK (TB2-4)

If the INTERLOCK circuit is interrupted when the transmitter's RF Output is ON, the following will occur:

- 1) The transmitter will completely shutdown.
- 2) The transmitter's front panel green ON indicator will go off.
- 3) The INTERLOCK indicator on the GUI will turn RED.
- 4) The front panel FAULT indicator located below the GUI will also turn RED.

Once the INTERLOCK circuit is closed, the transmitter **WILL NOT** automatically return to its original state. **The transmitter must be restarted!**

If the INTERLOCK circuit is interrupted when the transmitter's RF Output is OFF, the following will occur:

- 1) The transmitter's front panel ON indicator will remain off.
- 2) The INTERLOCK indicator on the GUI will turn RED.
- 3) The front panel FAULT indicator located below the GUI will also turn RED.

Once the INTERLOCK circuit is closed, the transmitter may then be restarted.

IMPORTANT - The remote INTERLOCK circuit MUST be closed or the transmitter will not operate!

2.13.2 FAILSAFE (TB2-2)

If the FAILSAFE circuit is interrupted when the transmitter's RF Output is ON, the following will occur:

- 1) The FAILSAFE indicator on the GUI will turn RED.
- 2) The transmitter's RF Output Power will go to 0.0 kW on the GUI
(Note: The Power Supply and PA modules are still turned ON).
- 3) The front panel FAULT indicator below the GUI will light.

Once the FAILSAFE circuit is closed, the transmitter **WILL** automatically return to the RF Output power level it was set at before the FAULT occurred.

If the FAILSAFE circuit is interrupted when the transmitter's RF Output is OFF, the following will occur:

- 1) The FAILSAFE indicator will turn RED on the GUI.
- 2) The front panel FAULT indicator below the GUI will also turn RED.

Once the FAILSAFE circuit is closed the transmitter RF Output will remain OFF, but may now be turned ON.

IMPORTANT - The remote FAILSAFE circuit MUST be closed or the transmitter will not operate!



2.14 Turning on AC Power

2.14.1 Installation Checklist

Before turning on the AC Power, please use the following checklist to ensure that the proper installation steps have been taken.

- Ensure that the transmitter is installed on a level surface that is capable of supporting the transmitter's weight (see **Figure 1**).
- Ensure that the transmitter has a cooling air supply source that will provide 6000 cubic feet per minute (170.0 cubic meters).
- Ensure that an Earth Ground strap has been properly connected to the cabinet.
- Ensure that the RF Output has been properly connected to an adequate load or antenna system.
- Ensure that the transmitter site's AC Supply Voltage and configuration matches the transmitter sales order.
- Ensure that an adequate AC Surge Protector is properly installed.
- Ensure that the AC Connections to the 4MX terminal blocks match the configuration stated on the sales order.
- Ensure that the remote INTERLOCK and FAILSAFE connections have been made. If the Remote INTERLOCK and FAILSAFE circuits are not closed, the transmitter will NOT operate.

2.14.2 Turn ON the Main AC Service Entrance Breaker

After ensuring that the installation is correct, turn the Main AC Service Entrance Breaker ON.

2.14.3 Turn ON the 4MX 100 Transmitter AC Breaker

Next, turn the 4MX AC Breaker to its ON position.



Figure 41 – 4MX 100 Rear Panel AC Breaker

2.15 Initial System Checkout

After AC Power has been applied to the 4MX, the following should all occur:

- The front panel GUI will come up.
- The 3 AC Phase indicators will light Green.
- The Front Panel OFF indicator should be RED.
- The FAILSAFE and INTERLOCK indicators should be GREEN on the GUI.

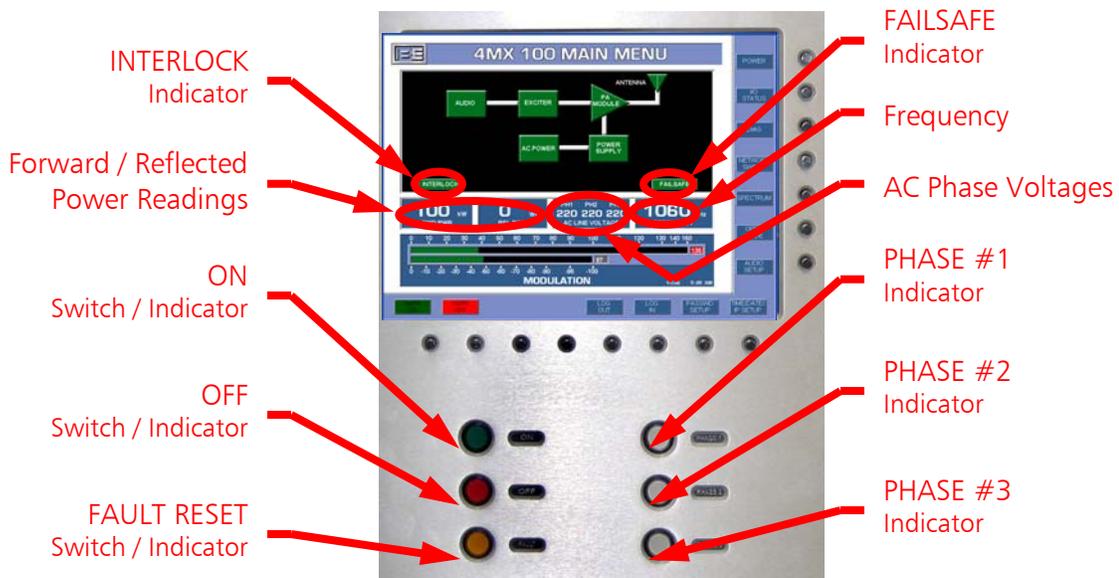


Figure 42 – Front Panel GUI, Switches, and Indicators

2.15.1 ON

This Switch / Indicator is used to turn the RF Output Power ON. Upon initial AC power up it will be off until pressed to turn the RF Output power ON, then it will illuminate GREEN.

2.15.2 OFF

This Switch / Indicator is used to turn the RF Output Power OFF and will illuminate RED upon initial AC power up. When the RF Output power is ON, this Switch / Indicator will be off.

2.15.3 FAULT RESET

This Switch / Indicator is used to reset a Fault. This Switch / Indicator will be off when there are no faults and RED when a fault occurs.

2.15.4 PHASE 1, PHASE 2, and PHASE 3

These indicators are used to monitor the three AC Phases and will illuminate GREEN. If a Phase is lost, the indicator for that Phase will extinguish.

2.16 Initial RF Output and Connection of the Audio Source

2.16.1 Log into the GUI

Click the **LOG IN** button and the Log In Menu will appear.

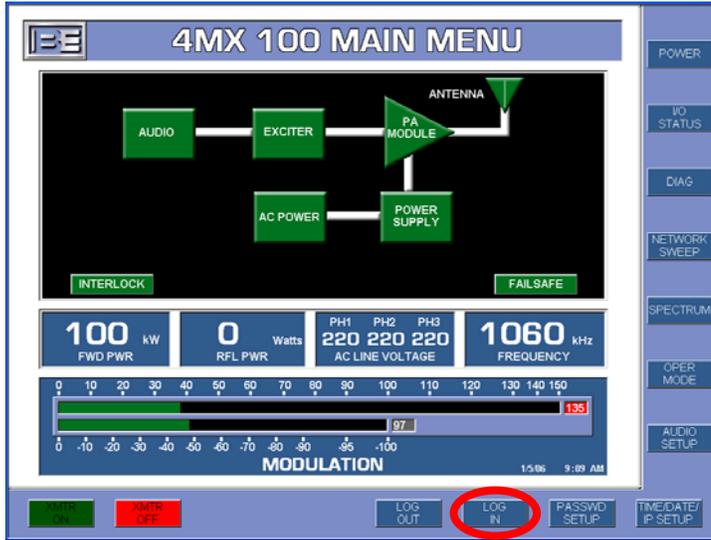


Figure 43 – Main GUI Menu

2.16.2 Enter the Chief Engineer’s Password

Next, enter the Chief Engineer’s default password, **123456**, and press **ENTER**.



Figure 44 – Log In Menu



2.16.3 Set the Initial RF Output Power Level

From the Main Menu select **POWER** and the RF output Power Control Menu will appear. Next, select a preset Power Level that is ≤ 10.0 kW.

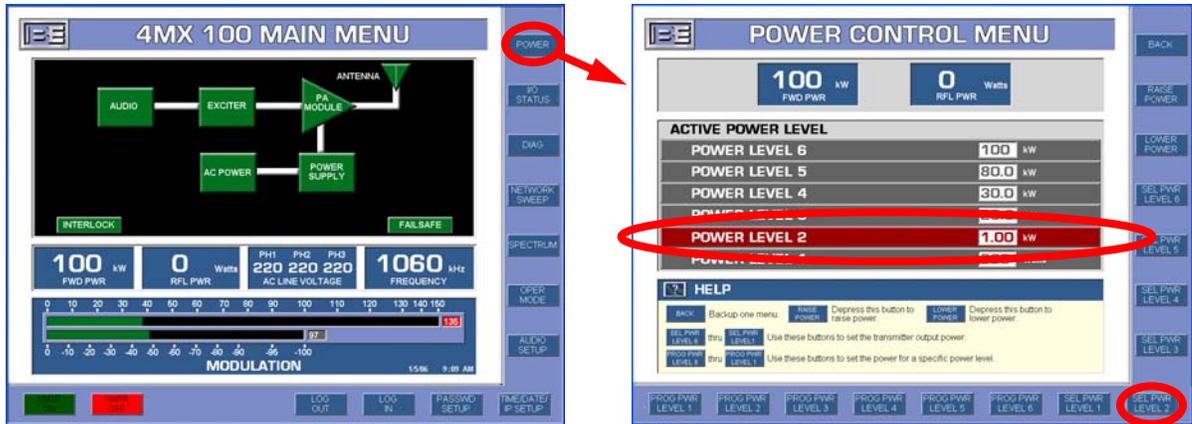


Figure 45 – RF Output Power Control Menu

2.16.4 Turn the 4MX 100's RF Output Power ON (without Modulation)

- Ensure that the Audio Source is **NOT** yet connected.
- Ensure that the RF Output is connected to an adequate load or antenna system capable handling the RF Output Power.

To turn the transmitter's RF Output Power **ON**, select either the **XMTR ON** from the Main GUI Menu, or depress the **ON** button on the front of the transmitter.

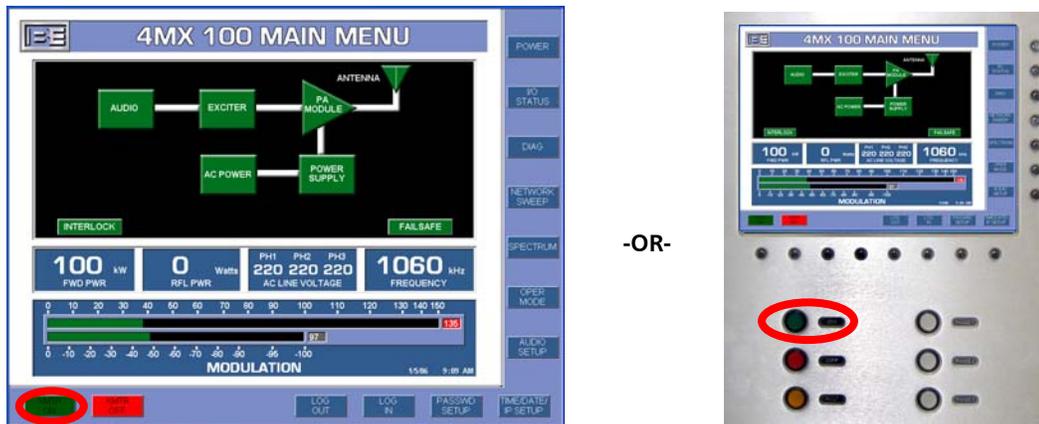


Figure 46 – Turning RF Output Power ON

- Ensure that the Transmitter goes to the Power Level that was selected and does so with no alarms and/or faults displayed on the GUI.

2.16.5 PA Diagnostics

From the Main Menu select **DIAG** and the following menu will appear.

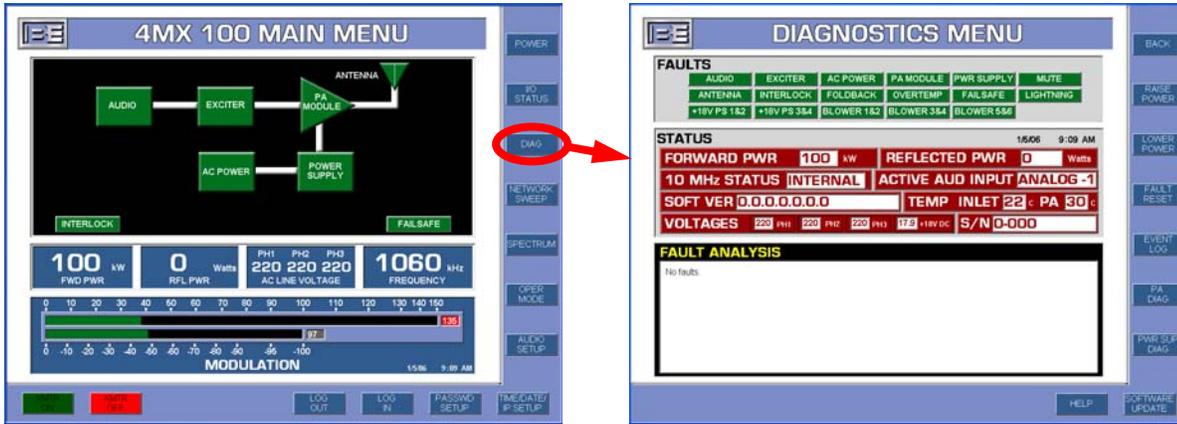


Figure 47 – Diagnostics Menu

From the Diagnostics Menu select **PA DIAG**.

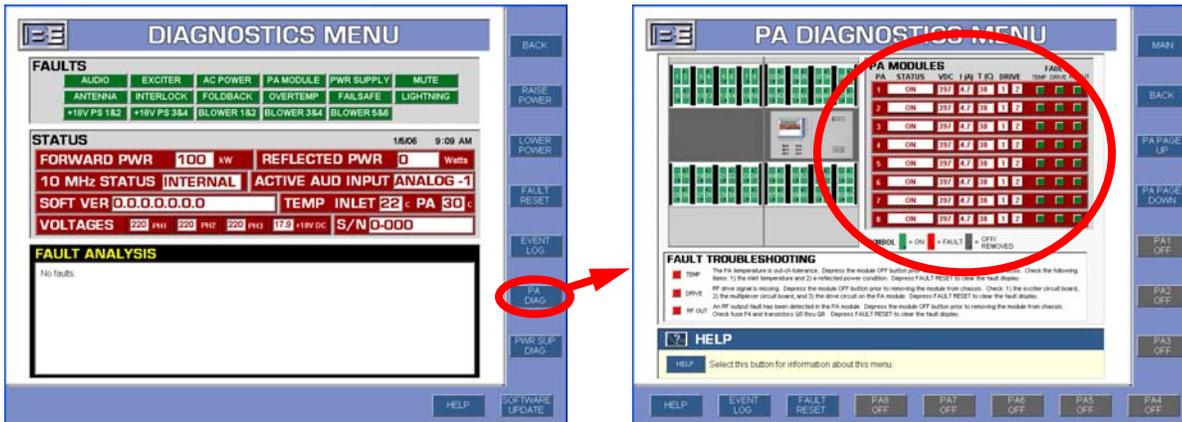


Figure 48 – PA Diagnostics Menu

Ensure that all of the PA Modules that are ON are GREEN with No Faults.

NOTE: In a 4MX 100, all 64 PA Modules will not be ON unless the RF Output Power Level is set for $\geq 20\text{kW}$; @ $5\text{kW} - 19.99\text{kW}$ 32 PA Modules will be ON (9-24 & 41-56); @ $500\text{W} - 4.99\text{kW}$ 16 PA Modules will be ON (13-20 & 45-52).



2.16.6 Power Supply Diagnostics

From the Main Menu select **DIAG** and the following menu will appear.

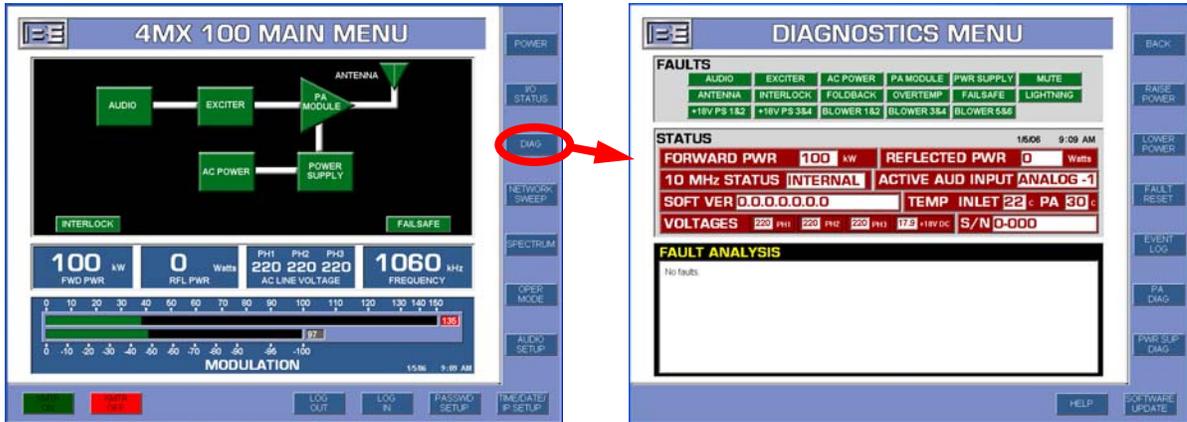


Figure 49 – Diagnostics Menu

From the Diagnostics Menu select **PWR SUP DIAG**.

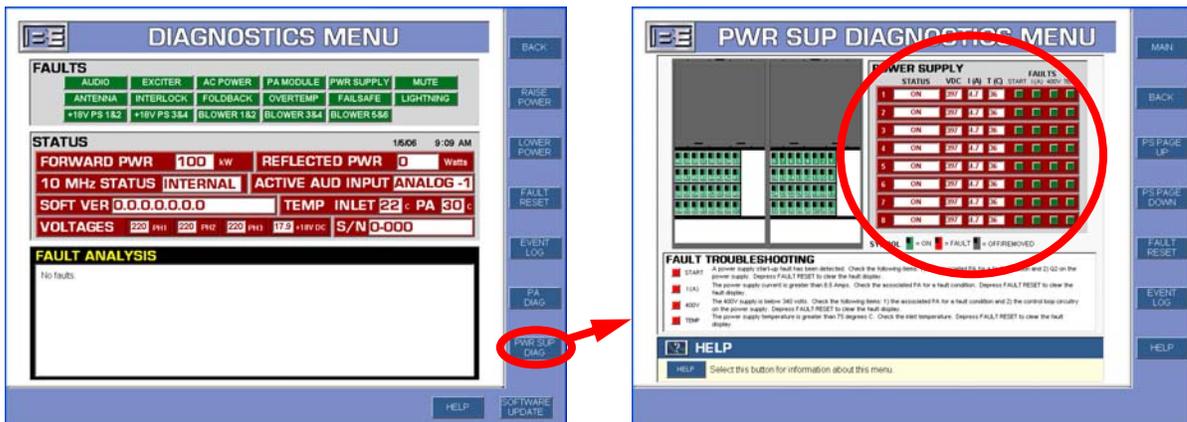


Figure 50 – Power Supply Diagnostics Menu

- Ensure that all of the Power Supply Modules are ON (GREEN) with No Faults.

NOTE: In a 4MX 100, all 64 Power Supply Modules will not be ON unless the RF Output Power Level is set for $\geq 20\text{kW}$; @ $5\text{kW} - 19.99\text{kW}$ 32 PS Modules will be ON (9-24 & 41-56); @ $500\text{W} - 4.99\text{kW}$ 16 PS Modules will be ON (13-20 & 45-52).

If there are any Faults and/or Alarms present, they must be resolved prior to applying Audio to the Transmitter!



2.16.7 Turn the Transmitter's RF Output Power OFF

To turn the transmitter's RF Output Power **OFF**, select either the **XMTR OFF** from the Main GUI Menu, or depress the **OFF** button on the front of the transmitter.

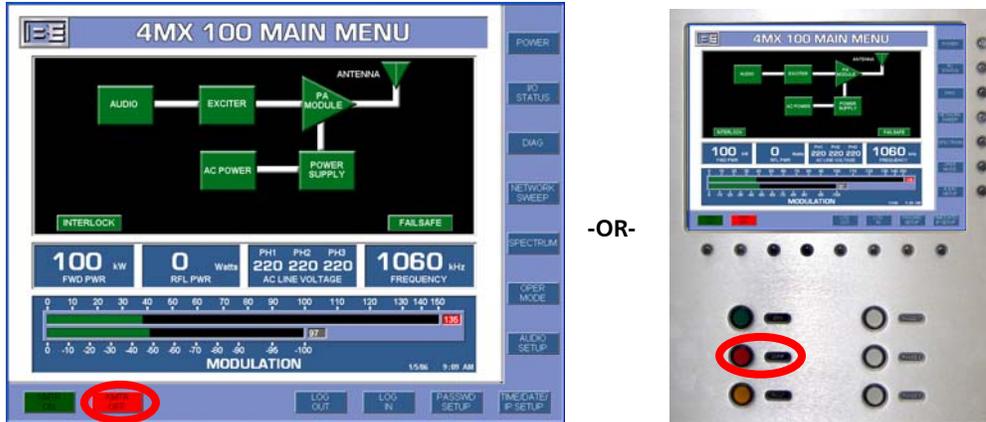


Figure 51 – Turning RF Output Power OFF

2.16.8 Audio Input Connections

Before connecting the Audio source to the 4MX 100, make sure of the following.

- Ensure that the Audio Source is turned OFF.
- Ensure that the 4MX 100's RF Output Power is now OFF.

Proceed with connecting the Audio source to the 4MX 100. The Audio Inputs enter the 4MX 100 through the top of the cabinet in the same location as the remote control connections. The Audio Inputs then route down through the cabinet to the Audio Input terminal block. **CH1 is the default Audio Input factory setting.**

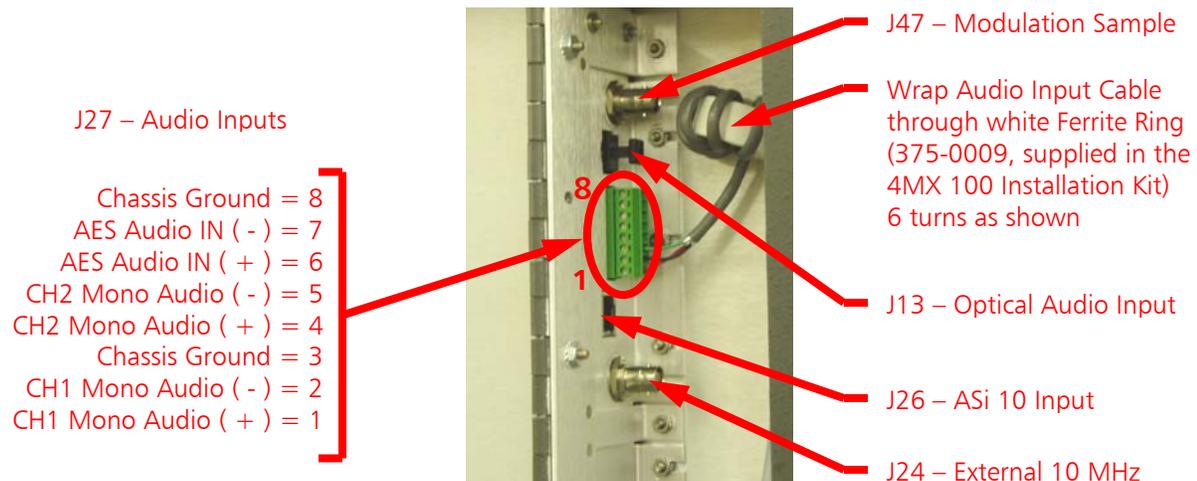


Figure 52 – Audio Input Connections

2.16.9 AUDIO SETUP Menu

From the Main GUI Menu, select **AUDIO SETUP**.

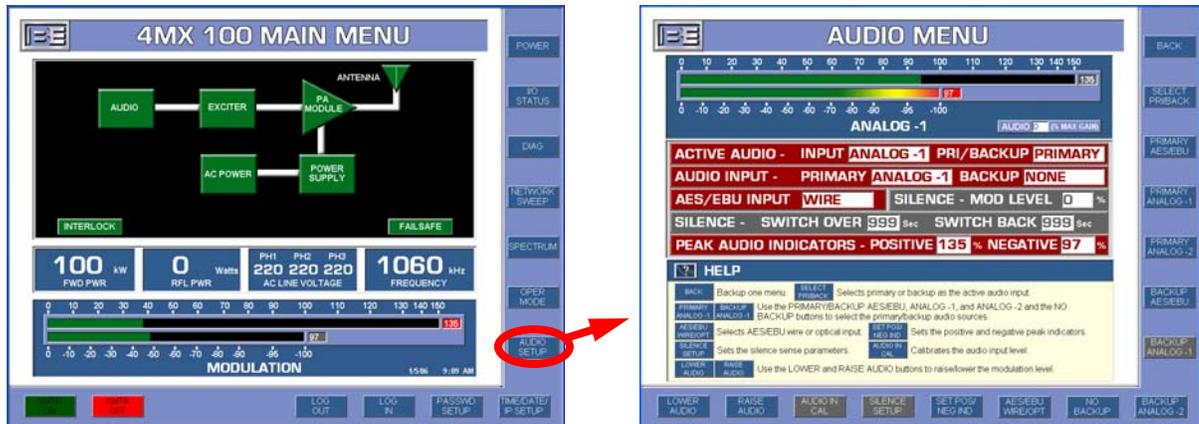


Figure 53 – Audio Setup Menu

2.16.9.1 Set the active Audio Input

The 4MX 100 audio input type can be set for either a **PRIMARY** or a **BACKUP** audio input source. This selection may be made on the right side of the Audio Menu by depressing either the **SELECT PRIMARY** or **SELECT BACKUP** buttons. The factory default for the Active Audio **PRIMARY**.

2.16.9.2 Assign the Audio Input Signal Type

Next, you must assign the Audio Input signal type. If you chose **PRIMARY** in step 2.16.9.1, then you must select either **PRIMARY ANALOG-1**, **PRIMARY ANALOG-2**, or **PRIMARY AES/EBU**. If you chose **BACKUP**, then you must select either **BACKUP ANALOG-1**, **BACKUP ANALOG-2**, or **BACKUP AES/EBU**.

2.16.9.3 No Backup Audio

If no Backup Audio source is being used, select **NO BACKUP**.

2.16.9.4 AES/EBU Input

If an AES/EBU input is being used, you must select either **AES/EBU OPTICAL** or **AES/EBU WIRE**.

2.16.9.5 Set Audio Positive / Negative Indicator Peak Levels

To set the positive and negative audio indicator peak levels, select **SET POS/NEG IND** from the Audio Menu and the Set Peak Indicator Menu will appear.

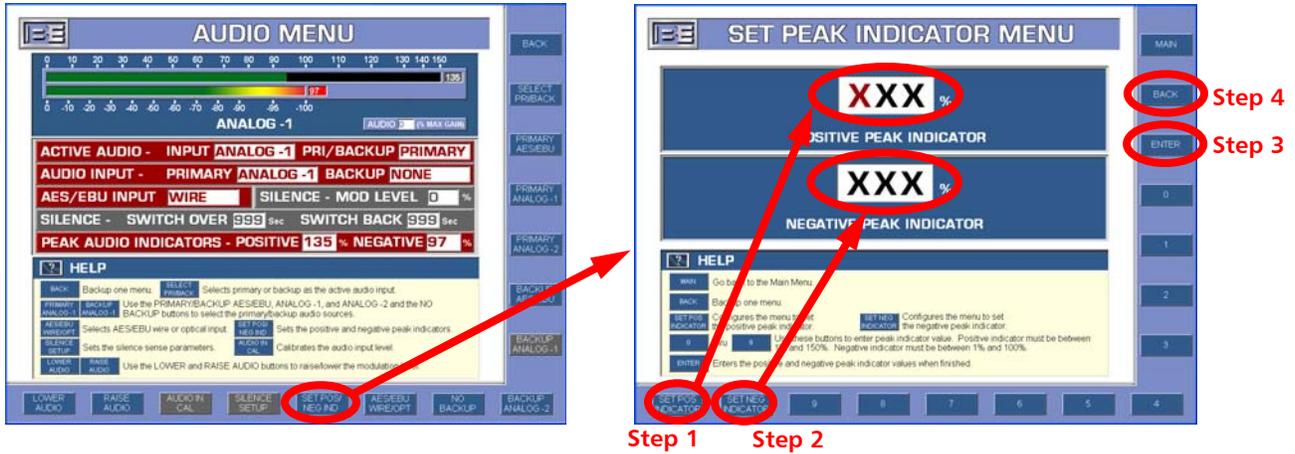


Figure 54 – Set Peak Indicator Menu

- Step 1** - Select the **SET POS INDICATOR** button and then enter **125%** (typical value) for an initial starting point. The range for this setting is **1 – 150%**.
- Step 2** - Select the **SET NEG INDICATOR** button and then enter **95%** (typical value) for an initial starting point. The range for this setting is **1 – 100%**.
- Step 3** - Select the **ENTER** button.
- Step 4** - Select **BACK** to return to the Audio Menu.

2.16.9.6 Set the Audio Gain

From the **AUDIO SETUP** menu select **LOWER AUDIO** or **RAISE AUDIO** and set the Audio Gain to **40%**. Next, select **BACK** to return to the Main Menu.



Figure 55 – Audio Setup Menu



2.16.10 Turn the Audio Source ON

When applying the Audio Source, the content should be as high as you would ever expect to operate the system at.

2.16.11 Audio Tuning Procedure

Step 1 - Locate the CH1 Audio Tuning Potentiometer **R133** (R129 if tuning CH 2) and Led **DS31** on the DSP Exciter Board.

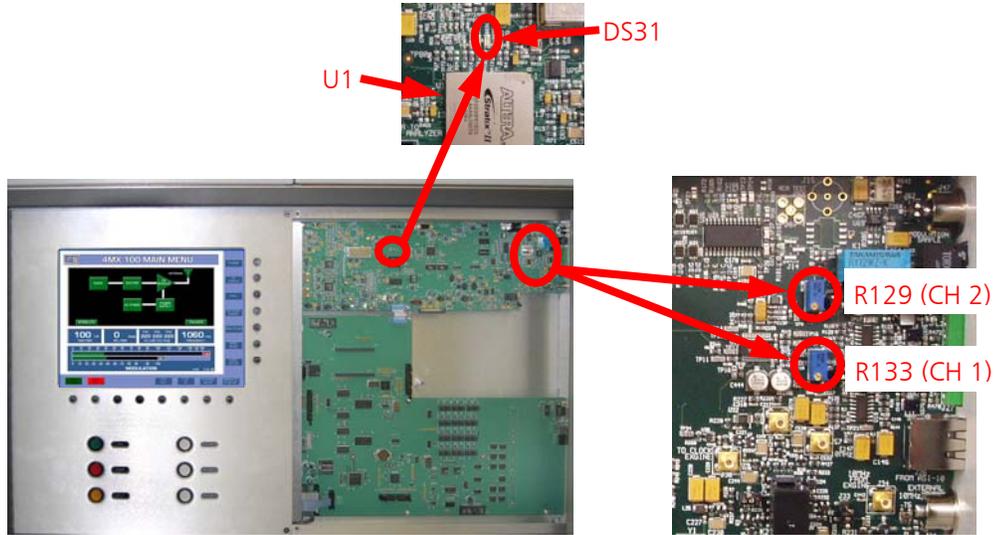


Figure 56 – DSP Exciter Board Audio level Tuning Pots and indicator

Step 2 - Turn the CH1 Audio Tuning Potentiometer **R133** (R129 if tuning CH 2) on the DSP Exciter Board **Clockwise (SLOWLY)** until Led **DS31** starts to come on and an Audio Fault occurs. Led DS31 will blink on/off as the audio level starts hitting the A/D upper limit. The Main Menu should appear as shown below with the AUDIO Block and a Warning Note highlighted in red.

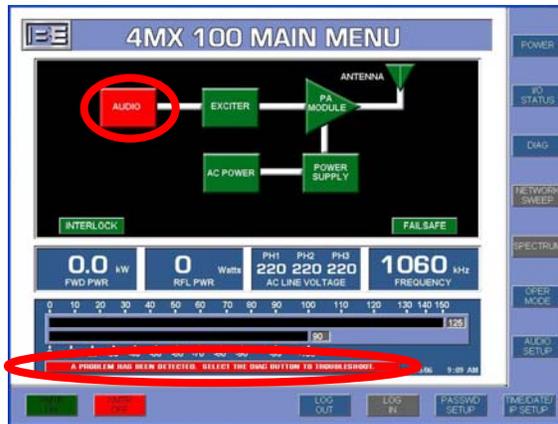


Figure 57 – Audio Fault



Step 3 - Next, it is necessary to confirm that the Audio fault is an A/D fault. From the Main Menu select **DIAG** and the Diagnostic Menu will appear. It should appear as shown below with the Audio Fault block in red and a note in the Fault Analysis window stating **“The audio input level is too high, lower the level by adjusting R133 (or R129) on the Exciter circuit board.”**

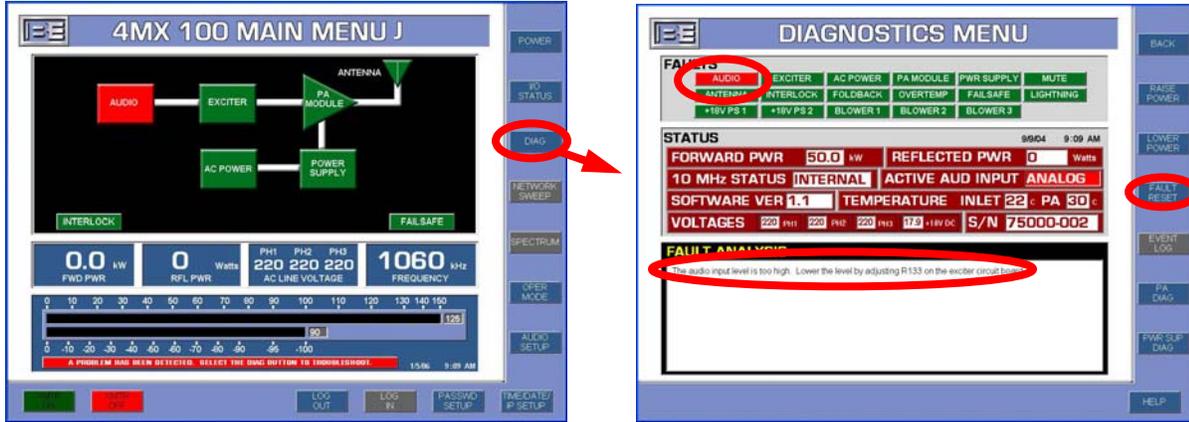


Figure 58 – Audio Input Level Too High

Step 4 - Next, turn R133 (R129 if tuning CH 2) on the Exciter Board **Counter Clockwise (SLOWLY)** 1/2 of a turn, or until Led DS31 is extinguished.

Step 5 - Press the **FAULT RESET** button from the Diagnostics Menu then return to the Main Menu.

- Ensure that the Audio Fault is now cleared.
- Ensure that Led DS31 remains extinguished.

Step 6 - Turn the Transmitter’s RF Output ON

To turn the transmitter’s RF Output Power **ON**, select either the **XMTR ON** from the Main GUI Menu, or depress the **ON** button on the front of the transmitter.

- Ensure that the Transmitter has no Faults and/or Alarms.

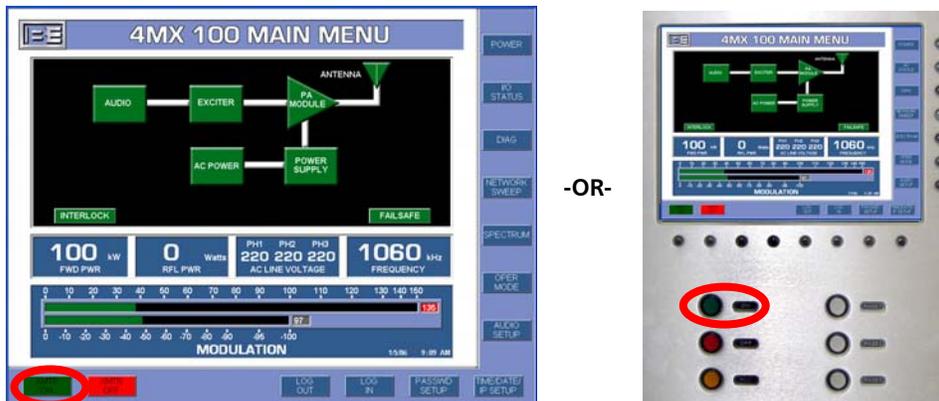


Figure 59 – Turning RF Output Power ON



Step 7 - Go to the **AUDIO SETUP** Menu. Next, select **RAISE AUDIO** to raise the Audio Gain to the desired Modulation level.

Please note that the maximum modulation level is 135% and that the Transmitter's RF Output Power will fault off if exceeded!!

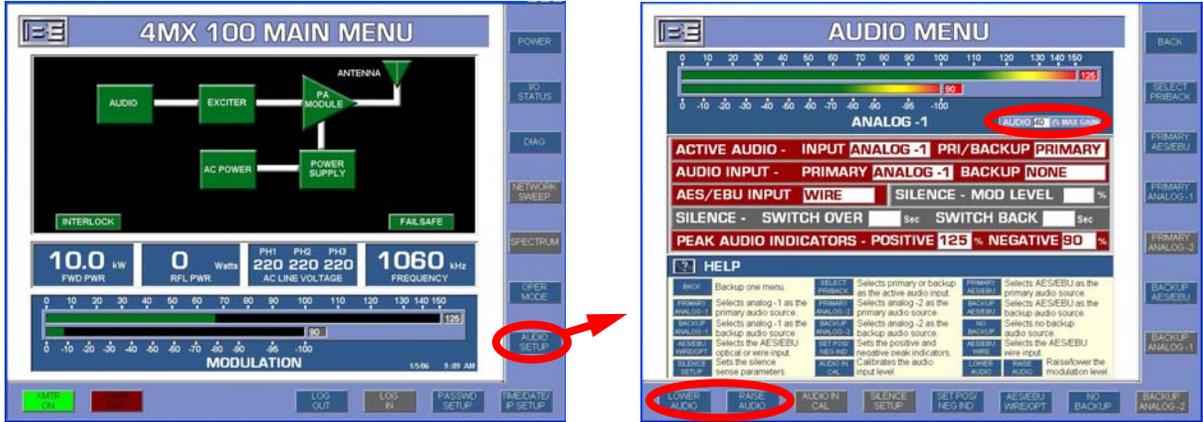


Figure 60 – Audio Setup Menu

There should not be any Faults or Alarms relating to Audio now. If there are, see the following Audio Troubleshooting section. If the transmitter is running properly, go to the **POWER** menu and raise the RF Output Power to the desired level.



2.17 Audio Troubleshooting

This section discusses the most common Audio Setup related Faults/Alarms and how to resolve them.

2.17.1 Audio Fault (A/D Overdrive) - If this fault occurs, use the following procedure to resolve.

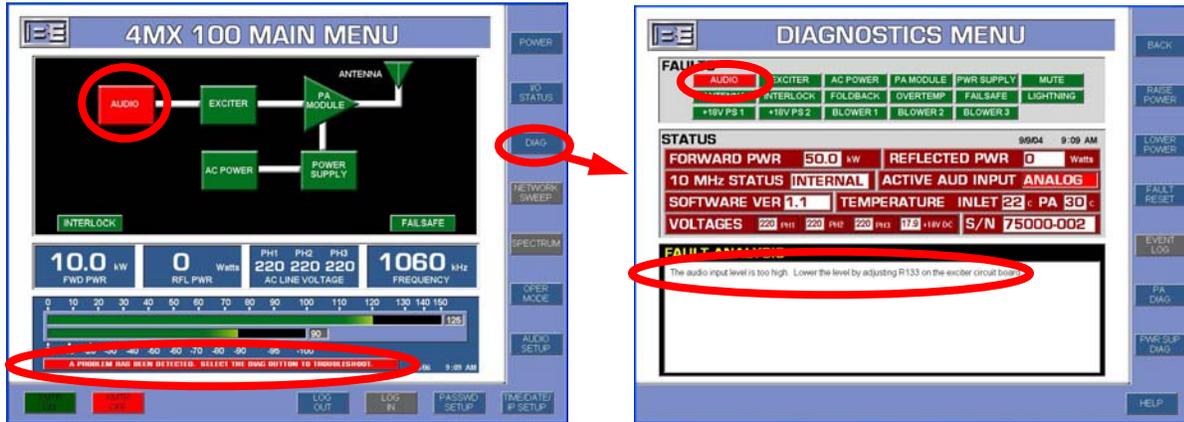


Figure 61 – Audio Fault (A/D Overdrive)

Step 1 - Locate the Audio Tuning Potentiometer, R133, on the DSP Control Board.

Step 2 - Turn R133 on the DSP Controller Board **Counter Clockwise (SLOWLY)** 1/8 of a turn.

Step 3 - Press the **FAULT RESET** button on the front of the transmitter to clear the fault.

Step 4 - If the fault still exists, repeat the process until the Fault clears.



2.17.2 Audio Fault (too much gain or over modulation...) - If this fault occurs, use the following procedure to resolve.

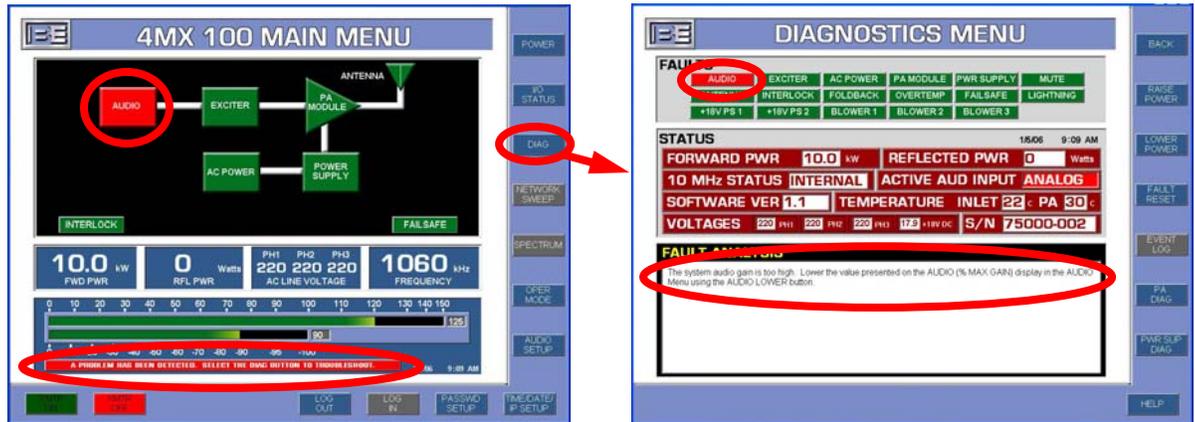


Figure 62 – Audio Fault (Audio Gain Too High)

Step 1 - Go to the Audio Menu.

Step 2 - Lower the Audio Level.

Step 3 - Press the **FAULT RESET** button on the front of the transmitter to clear the fault.

Step 4 - If the fault still exists, repeat the process until the Fault clears.

2.17.3 Low Modulation Level - If you have this condition, use the following procedure to resolve.

Step 1 - Go to the Audio Menu.

Step 2 - Raise the Audio Level (if already at 90% or greater proceed to Step 3, if not proceed to Step 4).

Step 3 - Adjust R133 on the DSP Controller Board **Clockwise (SLOWLY)** to obtain the desired modulation level.

Step 4 - Raise the Audio level from the Audio Menu to the desired level.

3 Operation

3.1 Overview

The 4MX 100 consists of 64 Power Amplifier (PA) and 64 Power Supply (PS) modules in a one to one relationship. The PA's are located in two bays across the front of the transmitter and the power supplies are accessible from the back. The power supplies provide a 400V bulk voltage to the PA's.

RF Drive is generated in the Exciter and distributed to the PA bays through cat-5 cables. AC entry is from the top rear of the transmitter and extends down into the bottom rear of the Auxiliary Cabinet where the contactor and circuit breaker are located. Also in this area are redundant 18V power supplies and an AC Line Sensor Board. The Exciter, System Controller, Multiplexer, and GUI circuitry are contained in the central section at the front of the transmitter in the Main Cabinet.

Using a Fourier modulation method, the amplitude information is encoded on the drive waveforms supplied to the PA's by the Exciter. There are two such drive waveforms supplies to each PA.

The Controller takes user input from the GUI, assures a safe turn on/off transition of the transmitter, monitors system parameters during operation, and sends pertinent operational data back through the GUI to the user.

The GUI allows the user complete control of transmitter operation. Access to vital system information is provided on screen through an intuitive menu structure.



3.2 Switches and Indicators

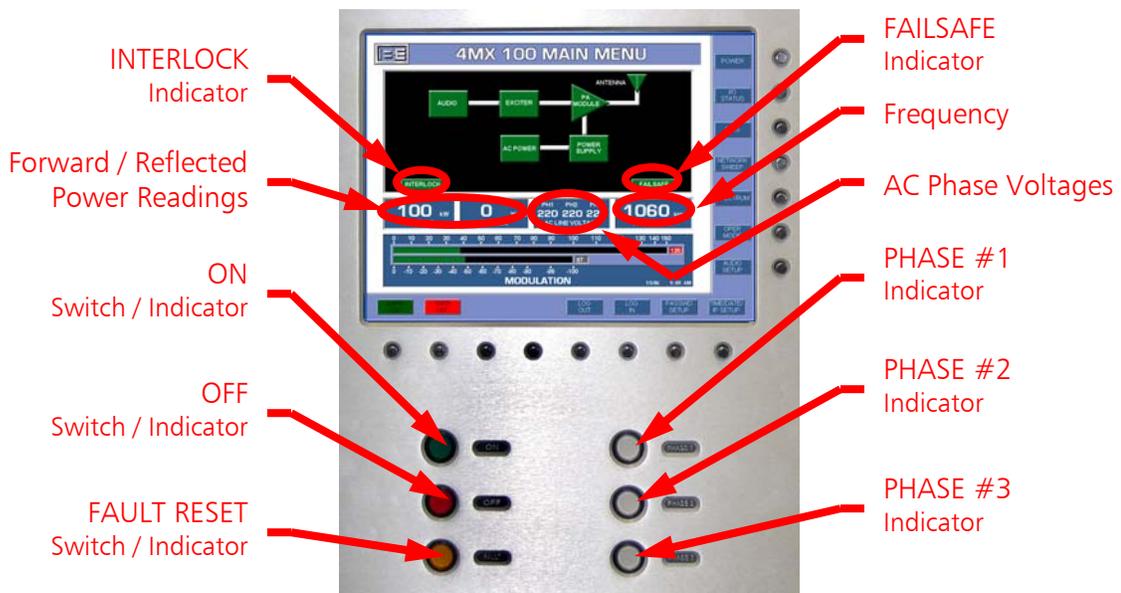


Figure 63 – 4MX 100 Front Panel GUI, Switches, and Indicators

3.2.1 ON

This Switch / Indicator is used to turn the RF Output Power ON. Upon initial AC power up it will be off until pressed to turn the RF Output power ON, then it will illuminate GREEN.

3.2.2 OFF

This Switch / Indicator is used to turn the RF Output Power OFF and will illuminate RED upon initial AC power up. When the RF Output power is ON, this Switch / Indicator will be off.

3.2.3 FAULT RESET

This Switch / Indicator is used to reset a Fault. This Switch / Indicator will be off when there are no faults and RED when a fault occurs.

3.2.4 PHASE 1, PHASE 2, and PHASE 3

These indicators are used to monitor the three AC Phases and will illuminate GREEN. If a Phase is lost, the indicator for that Phase will extinguish.

3.3 Graphical User Interface

The GUI allows complete control of the transmitter from the front panel. It also provides a comprehensive view of internal parameters important to its operation. It is an intuitive menu driven interface with a 15inch xvga lcd display. Softkeys around the display direct the user to the desired menu. The GUI is security protected to prevent unauthorized use.

Please Note that some options in the GUI menus are “grayed” out. These options are not activated at this time but are planned for future software releases.

Upon AC power up of the transmitter, the main GUI menu displays a rudimentary block diagram of the 4MX 100 and key transmitter parameters such as modulation and frequency. There are also indicators that will appear on this menu for important alarms or faults.

To activate any GUI menu option, simply depress its silver button located just outside the GUI screen.

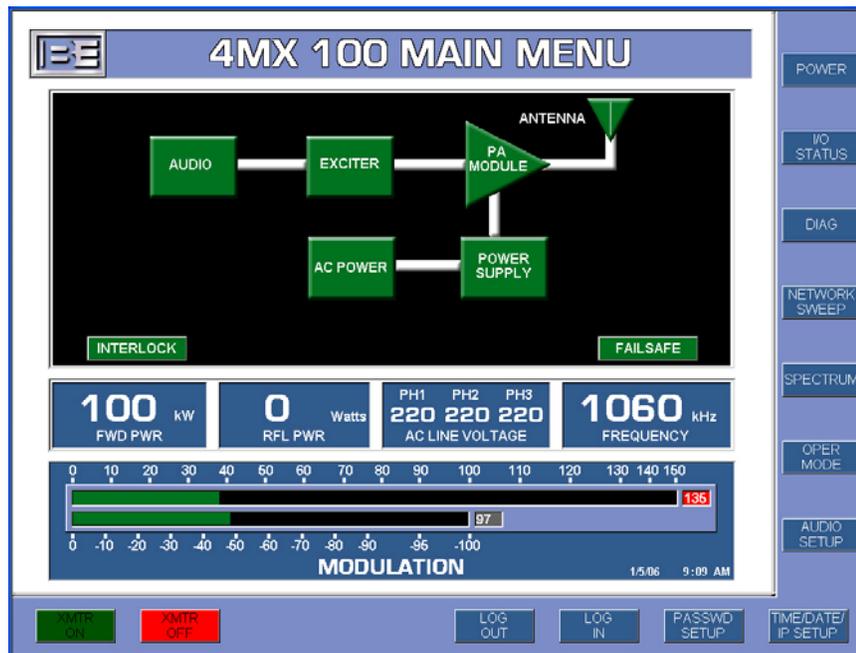


Figure 64 – Main GUI Menu



3.4 Graphical User Interface Sub-Menus

3.4.1 Default User Classification and Password

For security purposes the 4MX 100 has two classifications of users by default, **Chief Engineer** and **Operator**. Users who login as **Chief Engineer** have total control over critical transmitter parameters. The Operator login, however, has limited access to make system changes. The **Operator** can not make changes in the Audio and Password Setup Menus.

The default Chief Engineer password is **123456**

The default Operator login password is **111111**

3.4.2 Log In

Once the AC Power has been turned on, the Main menu screen will appear on the GUI. Depress the button just below the **LOG IN** box to activate its menu, and then enter the appropriate password.

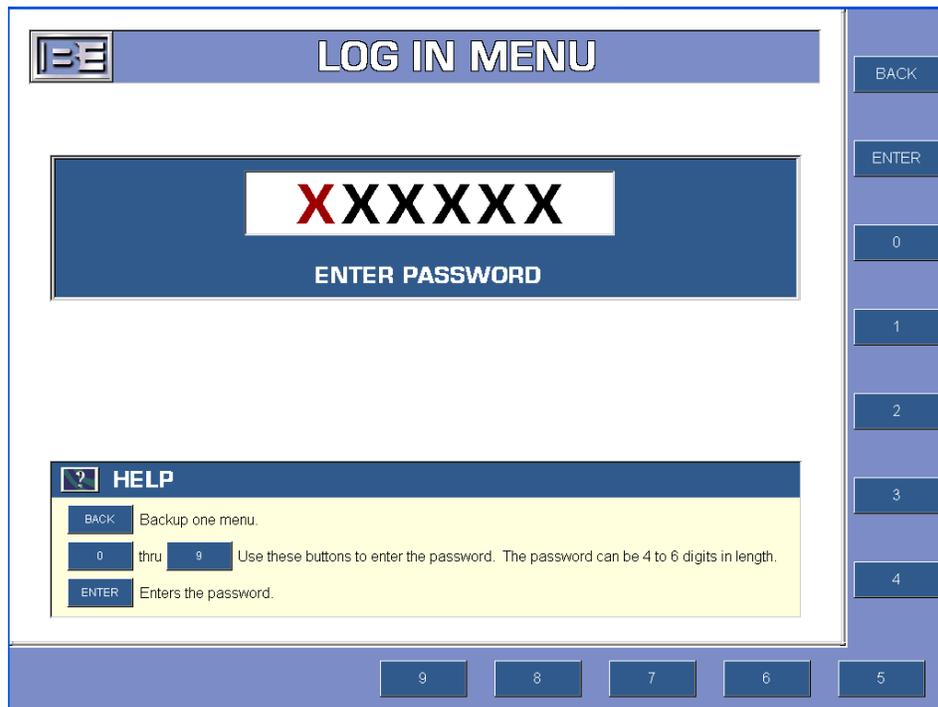


Figure 65 – Log In Menu

3.4.3 Log Out

In the Log Out Menu only the Chief Engineer login has permission to make Logout Operation changes.

3.4.3.1 Manual Logout

When the **MANUAL LOGOUT** option is enabled, to logout of the transmitter, the user must select **LOGOUT** from the Main Screen and then **LOGOUT** from the screen shown below. If the GUI is not used for 15 minutes the GUI will go into screen save mode. The user will remain logged in.

Note: When the GUI goes into screen save mode it returns to the Main GUI Menu.

3.4.3.2 Auto Logout

When the **AUTO LOGOUT** option is enabled, if the GUI is not used for 15 minutes, the GUI will go into screen save mode and the user will be automatically logged out.

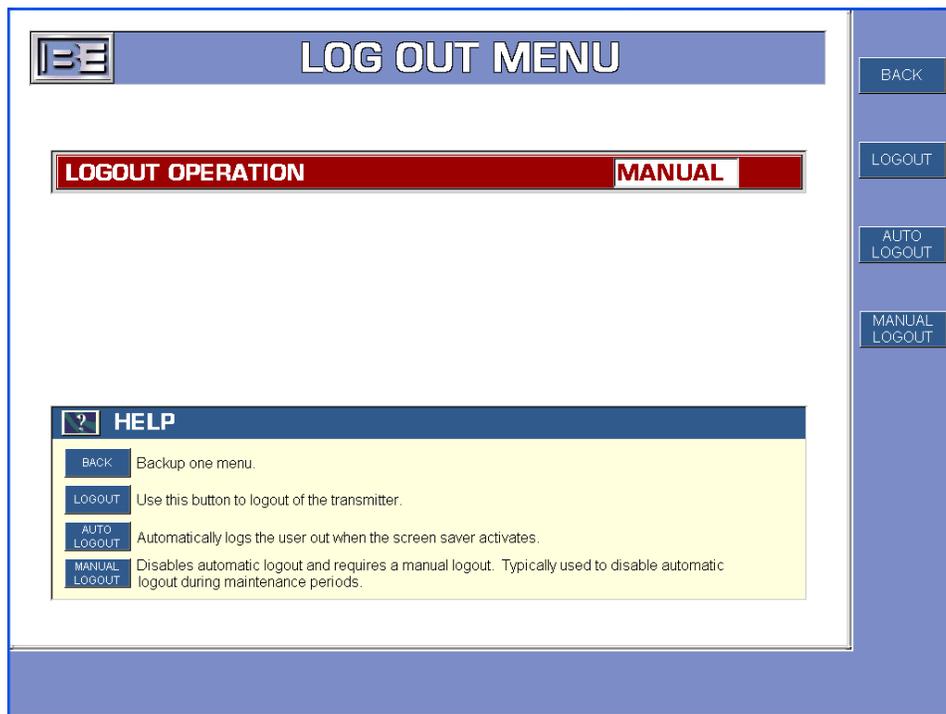


Figure 66 – Logout Menu

3.4.4 Password Protection

From the Main menu screen select **PASSWORD SETUP** and the Password Menu will appear. Only the Chief Engineer login has permission to make changes in this menu. From this menu the Chief Engineer may change their password as well as the Operator password. Additionally, the password protection may be disabled if desired.

See **Figures 67, 68, and 69** for the password setup menus. Passwords must be either 4, 5, or 6 digits in length.

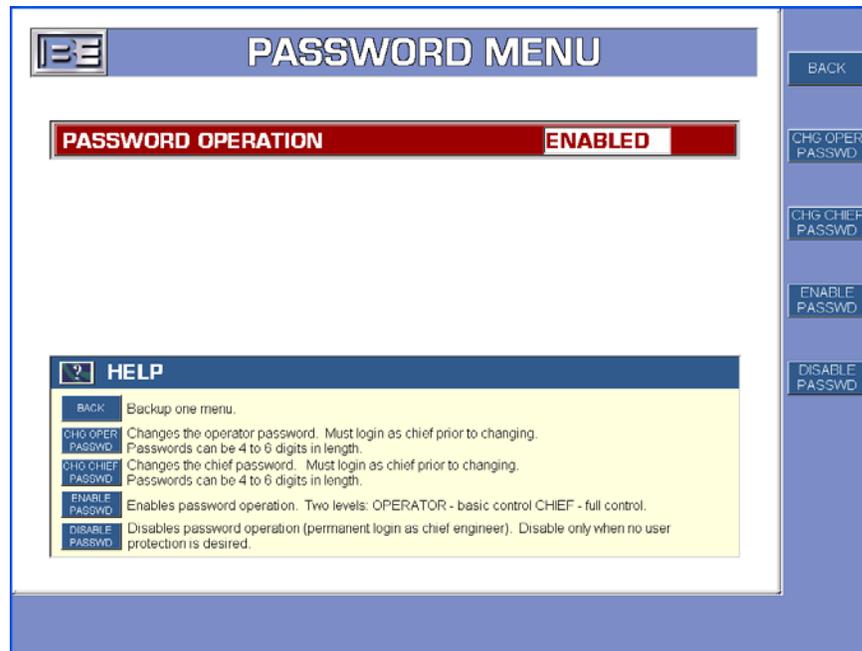


Figure 67 – Password Menu

3.4.4.1 Disable / Enable Password Protection

To Disable password protection select the **DISABLE PASSWD** button. When password protection is Disabled, the system will be as if the Chief Engineer is logged in permanently. **DISABLE PASSWD** should only be used when no user protection is desired.

To Enable password protection simply select the **ENABLE PASSWD** button.

3.4.4.2 Change the Chief Engineer's Password

To change the Chief Engineer's Password, select the **CHG CHIEF PASSWD** button and the screen shown in **Figure 68** will appear. Enter the new password (must be 4, 5, or 6 digits) and press **ENTER**.



Figure 68 – Edit Chief Engineer Password Menu

3.4.4.3 Change the Operator's Password

To change the Operator's Password, select the **CHG OPER PASSWD** button and the screen shown in **Figure 69** will appear. Enter the new password (must be 4, 5, or 6 digits) and press **ENTER**.

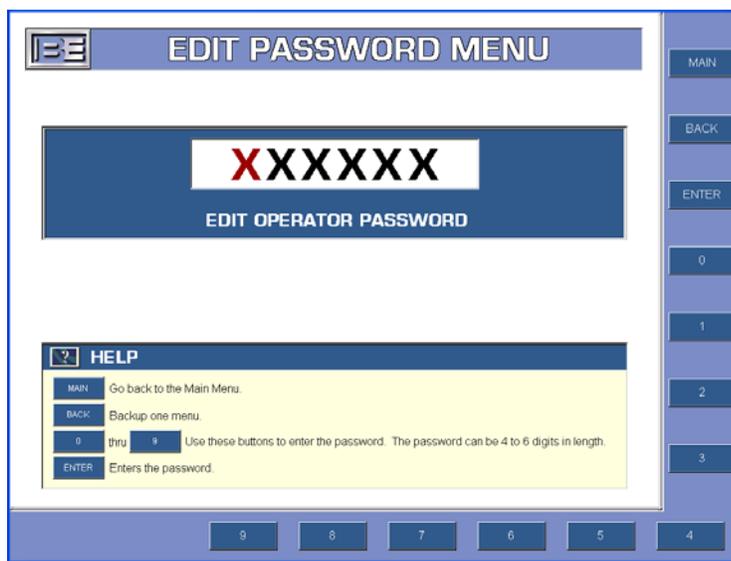


Figure 69 – Edit Operator Password Menu



3.4.5 Time / Date / IP Setup

The Time, Date, IP Address, and Subnet mask are all set from this menu. If password protection is enabled, only the Chief Engineer may make changes in this menu set. The factory default settings for the IP Address and Subnet Mask are shown below.

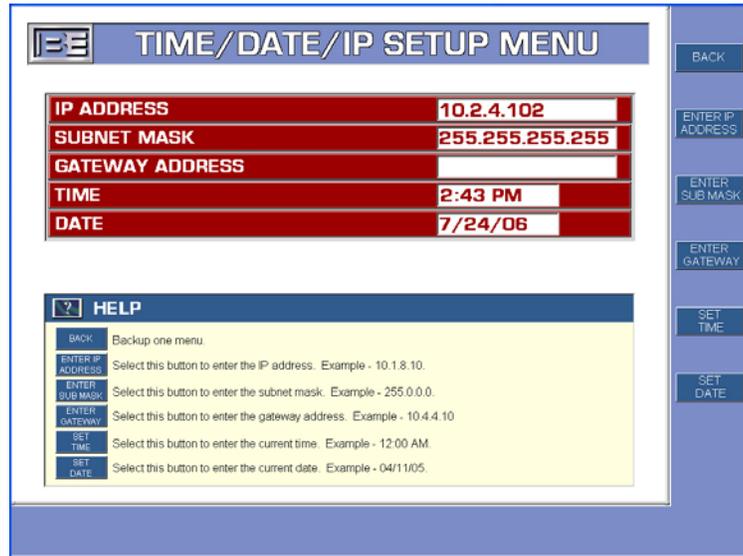


Figure 70 – Time / Date / IP Setup Menu

3.4.5.1 IP Address Entry Menu

Use the numeric keypad to enter the IP Address that you want to assign to the 4MX 100 Transmitter.



Figure 71 – IP Address Entry Menu



3.4.5.2 Subnet Mask Entry Menu

Use the numeric keypad to enter the Subnet Mask that you want to assign to the 4MX 100 Transmitter.

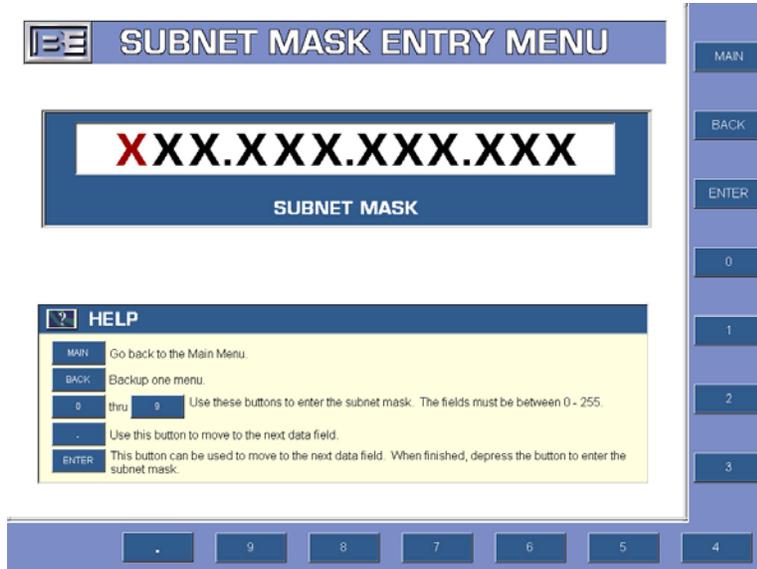


Figure 72 – Subnet Mask Entry Menu

3.4.5.3 Gateway Address Entry Menu

Use the numeric keypad to enter the Gateway Address that you want to assign to the 4MX 100 Transmitter.



Figure 73 – Gateway Address Entry Menu



3.4.6 Audio Setup

The Audio Setup menu is used for defining the Active Audio, Primary Audio, Backup Audio, AES/EBU Audio input, and the positive / negative audio indicator levels. The Analog and AES/EBU Audio levels may be adjusted here as well. If password protection is enabled, only the Chief Engineer can make changes in this menu.



Figure 74 – Audio Setup Menu

3.4.6.1 Set the active Audio Input

The 4MX 100 audio input type can be set for either a **PRIMARY** or a **BACKUP** audio input source. This selection may be made on the right side of the Audio Menu by depressing either the **SELECT PRIMARY** or **SELECT BACKUP** buttons. The factory default for the Active Audio is **PRIMARY**.

3.4.6.2 Assign the Audio Input Signal Type

Next, you must assign the Audio Input signal type. If you chose **PRIMARY** in Step 3.4.6.1, then you must select either **PRIMARY ANALOG-1**, **PRIMARY ANALOG-2**, or **PRIMARY AES/EBU**. If you chose **BACKUP**, then you must select either **BACKUP ANALOG-1**, **BACKUP ANALOG-2**, or **BACKUP AES/EBU**.

3.4.6.3 No Backup Audio

If no Backup Audio source is being used, select **NO BACKUP**.

3.4.6.4 AES/EBU Input

If an AES/EBU input is being used, you must select either **AES/EBU OPTICAL** or **AES/EBU WIRE**.

3.4.6.5 Set Audio Positive / Negative Indicator Peak Levels

To set the positive and negative audio indicator peak levels, select **SET POS/NEG IND.**

Step 1 - Select the **SET POS INDICATOR** button and then enter **40%** for an initial starting point. The range for this setting is **1 – 150%**.

Step 2 - Select the **SET NEG INDICATOR** button and then enter **40%** for an initial starting point. The range for this setting is **1 – 100%**.

Step 3 - Select the **ENTER** button.

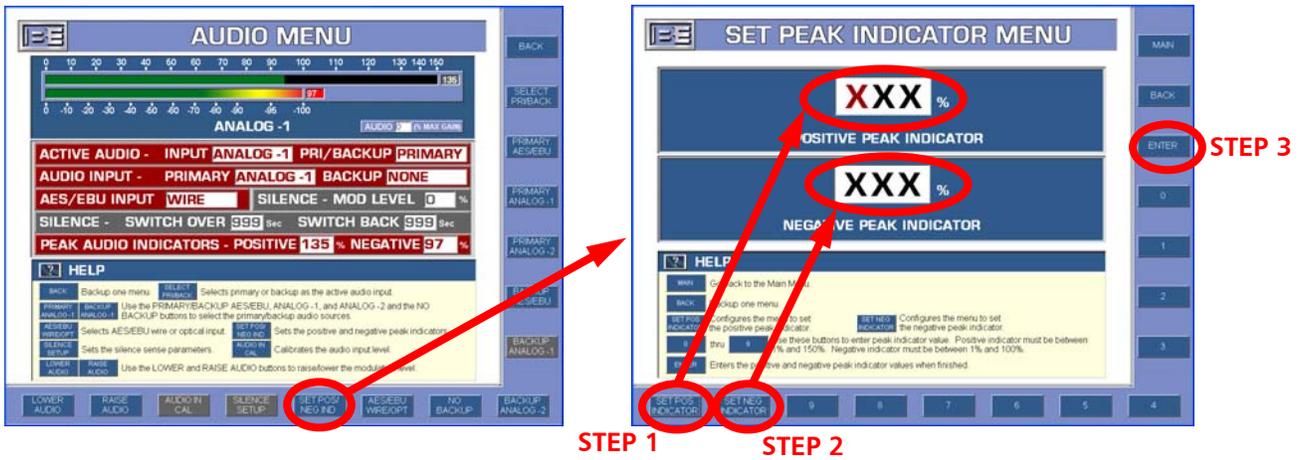


Figure 75 – Set Peak Indicator Menu

3.4.6.6 Audio Levels

Analog and AES/EBU Audio levels may be adjusted using the **LOWER ANALOG**, **RAISE ANALOG**, **LOWER AES/EBU**, and **RAISE AES/EBU** selections.



3.4.7 Operating Modes (Analog AM or HD AM)

The Operating Mode Menu allows the user to enable / disable Remote Control, configure the 10 MHz reference, and set the transmitter's operating mode (either Analog AM or HD AM). If password protection is enabled, only the Chief Engineer can make changes in the Operating Mode Menu.

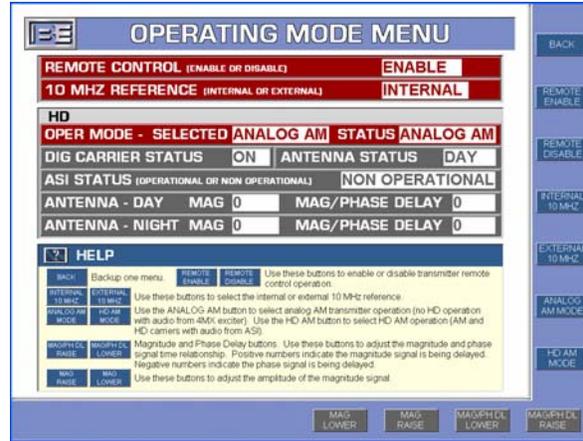


Figure 76 – Operation Mode Menu

3.4.7.1 Remote Control

The Remote Control functions may be enabled and disabled using **REMOTE ENABLE** and **REMOTE DISABLE**.

3.4.7.2 10 MHz Reference

The 10 MHz Reference may be set to either an internal or external source by selecting either the **INTERNAL 10 MHz** or **EXTERNAL 10 MHz** buttons. The factory default setting is **INTERNAL**.

3.4.7.3 Operating Mode

The Operating Mode may be set to either **ANALOG AM MODE** or **HD AM MODE**. Please note that AM HD Operation requires an ASi 10 HD AM Signal Generator. Refer to B.E. document "597-4050-004, 4MX Series AM Transmitter HD Operation Application Guide" for detailed instructions for the connection and setup of an ASi 10 to the 4MX transmitter.

3.4.7.4 Antenna Day / Night Operation

Antenna Day / Night Operation is displayed on this menu but is actually controlled via remote control connections to the transmitter. See the "Remote Control" section of this Manual for additional details.

3.4.7.5 Magnitude / Phase Delay

Use **MAG/PH DL RAISE** and **MAG/PH DL LOWER** to adjust the magnitude and phase signal time relationship. Positive numbers indicate the magnitude signal is being delayed. Negative numbers indicate the phase signal is being delayed. Use **MAG RAISE** and **MAG LOWER** to adjust the amplitude of the magnitude signal.

3.4.8 Spectrum

The Spectrum menu will allow the user to view the RF Spectrum. Center Frequency, Span, Scale Reference, and Resolution settings are displayed. This feature was not active at the time of printing this manual.

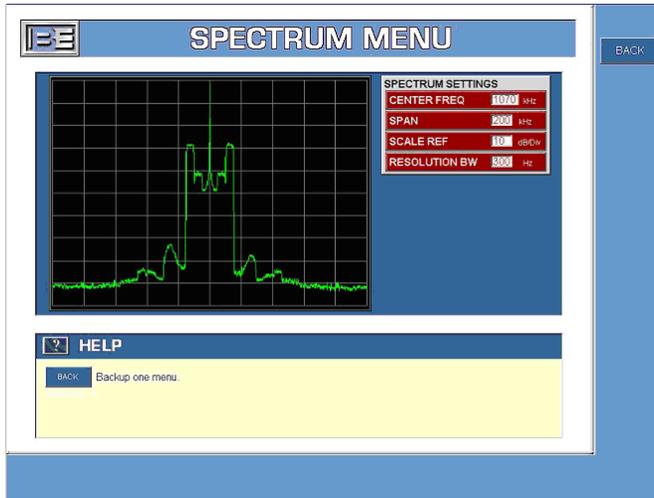


Figure 77 – Spectrum Menu

3.4.9 Network Sweep

The Network Sweep menu allows the user to view a system load impedance plot. The plot displays color coded points matching the values for Frequency, Resistance (R and X), and VSWR. This feature was not active at the time of printing this manual.

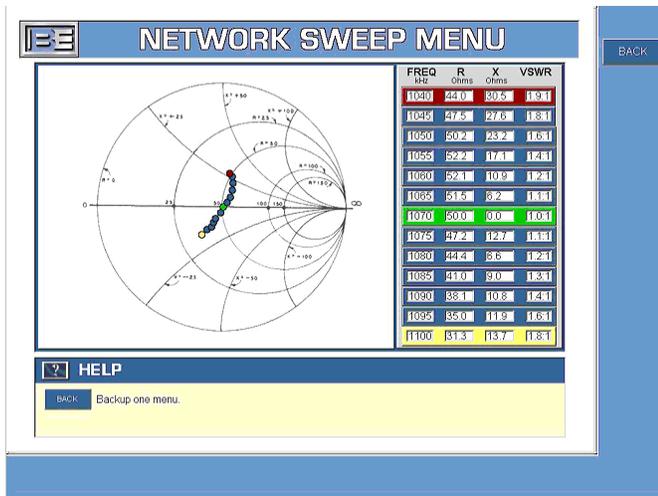


Figure 78 – Network Sweep Menu

3.4.10 Diagnostics

The Diagnostics menu set allows users to monitor critical parameters of the PA Power Supplies and PA Modules, Reset Faults, and Raise / Lower Forward Power. Both the Chief Engineer and Operator logins have full permissions in all Diagnostics menus.

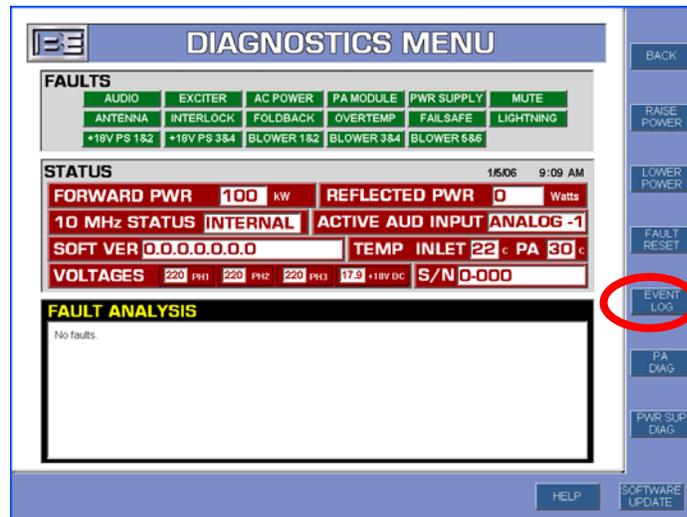


Figure 79 – Main Diagnostics Menu

3.4.11 Event Log

Built into the Diagnostics System of the 4MX 100 is an Event Log. The Event Log stores the operating history of the 4MX 100. Virtually, every event (a change in an operating parameter) that the transmitter sees is recorded.

To access the Event Log from the Diagnostics Menu, select the **EVENT LOG** button.

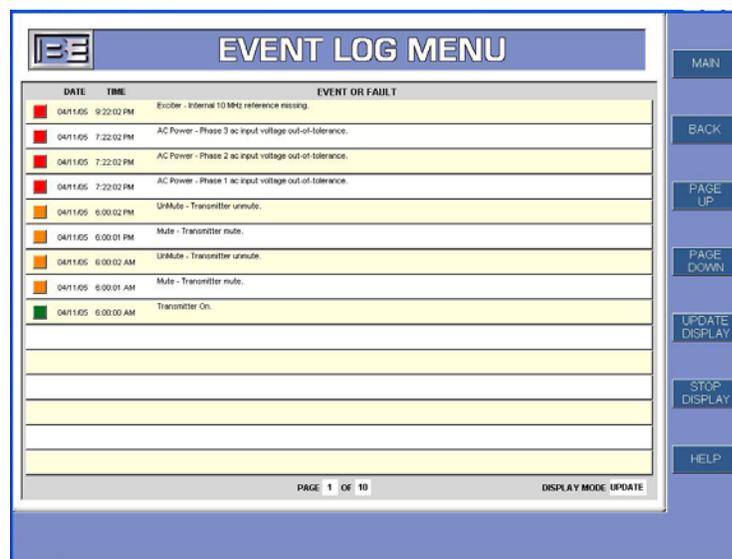


Figure 80 – Event Log

3.4.12 PA Power Supply Diagnostics

The Power Supply Diagnostics menu provides the user with individual PA Power Supply Module DC Voltage, Current, and Temperature (in degrees Celsius). There are also (4) fault indicators for Start, Current, 400V, and Temperature. Color coded symbols indicate if a module is ON (GRN), has a FAULT (RED), or has been REMOVED or is OFF (GRAY).

Only data for (8) of the power supply modules is displayed at a given time on this menu. To scroll to other modules use the **PS PAGE UP** and **PS PAGE DOWN** menu buttons.

Fault indicators and their definitions are shown at the bottom of the Power Supply Diagnostics Menu. Faults may be reset from this menu by selecting the **FAULT RESET** button.

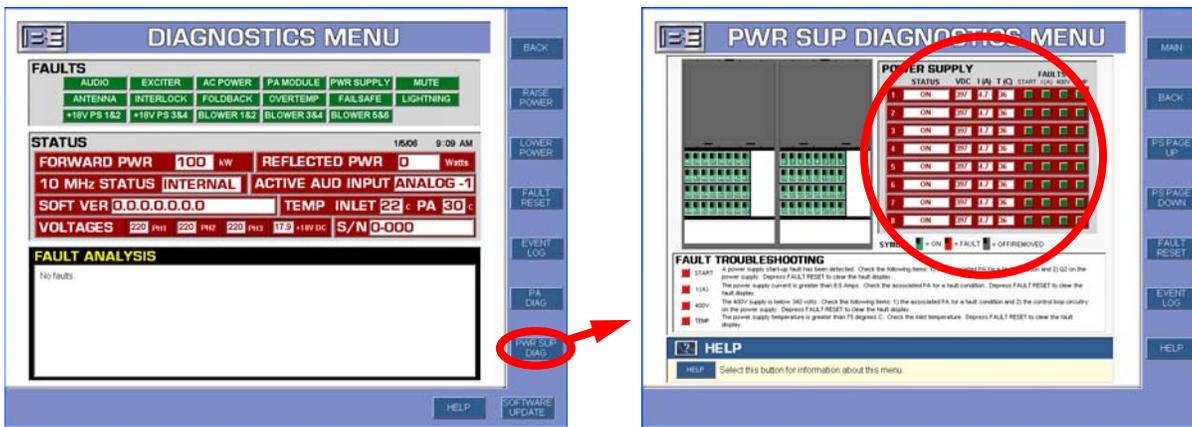


Figure 81 – Power Supply Diagnostics Menu

- Ensure that all of the Power Supply Modules are ON (GREEN) with No Faults.

NOTE: In a 4MX 100, all 64 Power Supply Modules will not be ON unless the RF Output Power Level is set for $\geq 20\text{kW}$; @ $5\text{kW} - 19.99\text{kW}$ 32 Ps Modules will be ON (9-24 & 41-56); @ $500\text{W} - 4.99\text{kW}$ 16 PS Modules will be ON (13-20 & 45-52).

If there are any Faults and/or Alarms present, they must be resolved prior to applying Audio to the Transmitter!



3.4.13 PA RF Module Diagnostics

The PA Diagnostics Menu provides the user with individual PA Module voltage, current, temperature (in degrees Celsius), and Drive indicators. There are also (3) fault indicators for Temp, Drive, and RF Out. Color coded symbols indicate if a module is ON (GRN), has a FAULT (RED), or has been REMOVED or is OFF (GRAY).

Only data for (8) of the power amplifier modules is displayed at a given time on this menu. To scroll to other modules use the **PA PAGE UP** and **PA PAGE DOWN** menu buttons.

Fault indicators and their definitions are shown at the bottom of the PA Diagnostics Menu. Faults may be reset from this menu by selecting the **FAULT RESET** button.

Individual PA Modules may be turned OFF and ON by selecting **PA(X) ON** or **PA(X) OFF**.

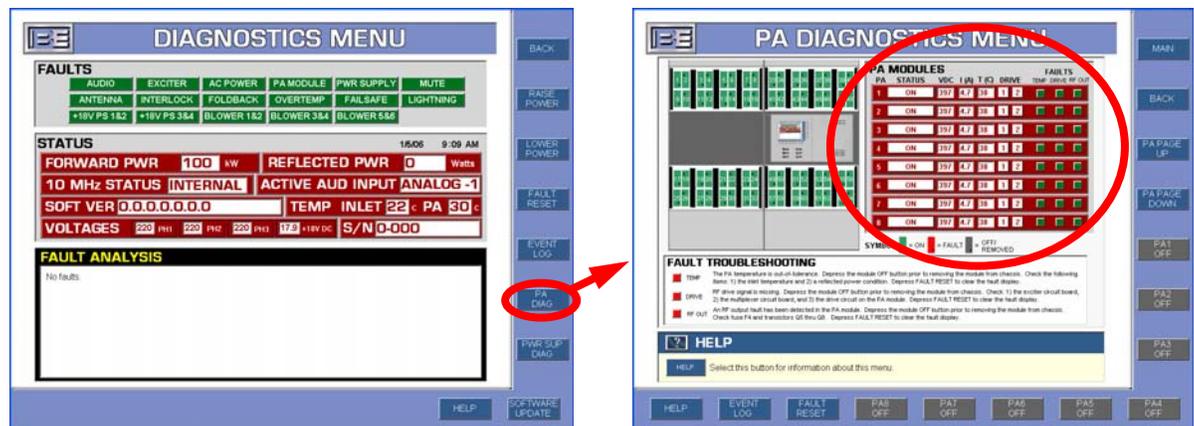


Figure 82 – PA RF Module Diagnostics Menu

NOTE: In a 4MX 100, all 64 PA Modules will not be ON unless the RF Output Power Level is set for $\geq 20\text{kW}$; @ $5\text{kW} - 19.99\text{kW}$ 32 PA Modules will be ON (9-24 & 41-56); @ $500\text{W} - 4.99\text{kW}$ 16 PA Modules will be ON (13-20 & 45-52).

If there are any Faults and/or Alarms present, they must be resolved prior to applying Audio to the Transmitter!

3.4.14 I/O Status

The I/O Status Menu shows which Remote I/O Connections are activated by highlighting them Green.

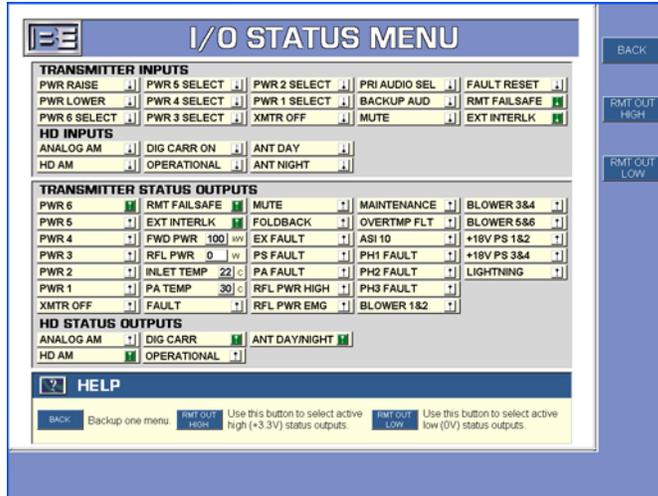


Figure 83 – I/O Status Menu

3.4.15 RF Output Power Control Menu

From the Main Menu select **POWER** and the RF output Power Control Menu will appear. Choose one of the 6 preset power levels by selecting one of the **SEL PWR LEVEL (X)** buttons on the right side of the menu.

It is recommended to start with a lower power level ≤ 10 kW, when turning the RF Output Power ON for the first time, and then step up the RF Output Power once the entire transmission system has been proven out.

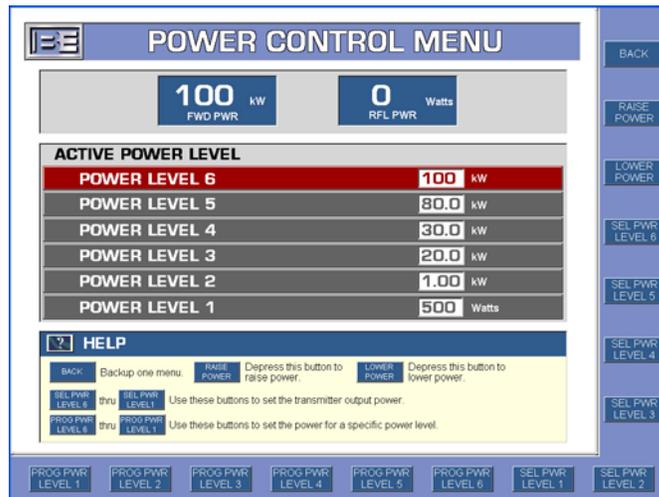


Figure 84 – Power Menu with Default Settings



3.4.16 Program Preset Power Level Menus

To re-program an individual preset power level, select the appropriate **PROG PWR LEVEL (X)** button from the Power Control Menu and the following screen will appear. Fill in the desired setting and then select **ENTER**.

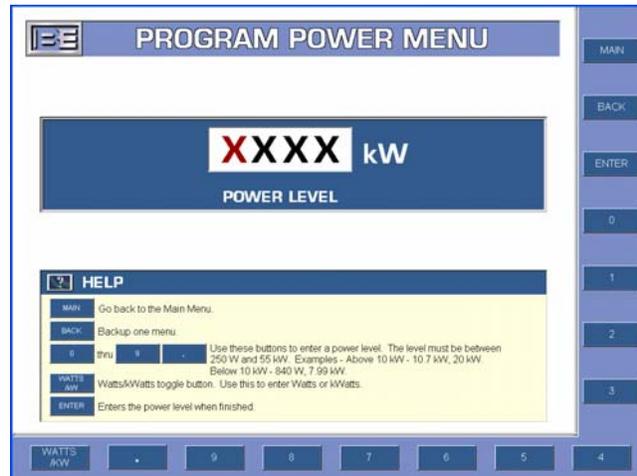


Figure 85 – Program Power Menu

3.4.17 Raise / Lower Power Level

Select the **RAISE POWER** and **LOWER POWER** buttons to change the RF Output power level momentarily from the selected preset setting.

3.5 Remote Control I/O Connections

4MX Series Transmitters are equipped with a remote device I/O Connection Board (PCB Assy 917-0419) and will interface with almost any remote control or diagnostic device. Remote device wiring enters through the top of the cabinet and routes down to the I/O Connection Board which is accessible from the front of the transmitter. See **Figure 1** for the cabinet entry location provided for remote device wiring and the front panel access location to the I/O Connection Board. See **Figures 86** and **87** for instructions to gain access to the Remote Control I/O connections. For the pin out of the I/O Connection Board, see **Figure 88**.



Figure 86 – Remote Control I/O and Audio Input Access Panel Hardware



Figure 87 – Remote Control I/O and Audio Input Access Panel



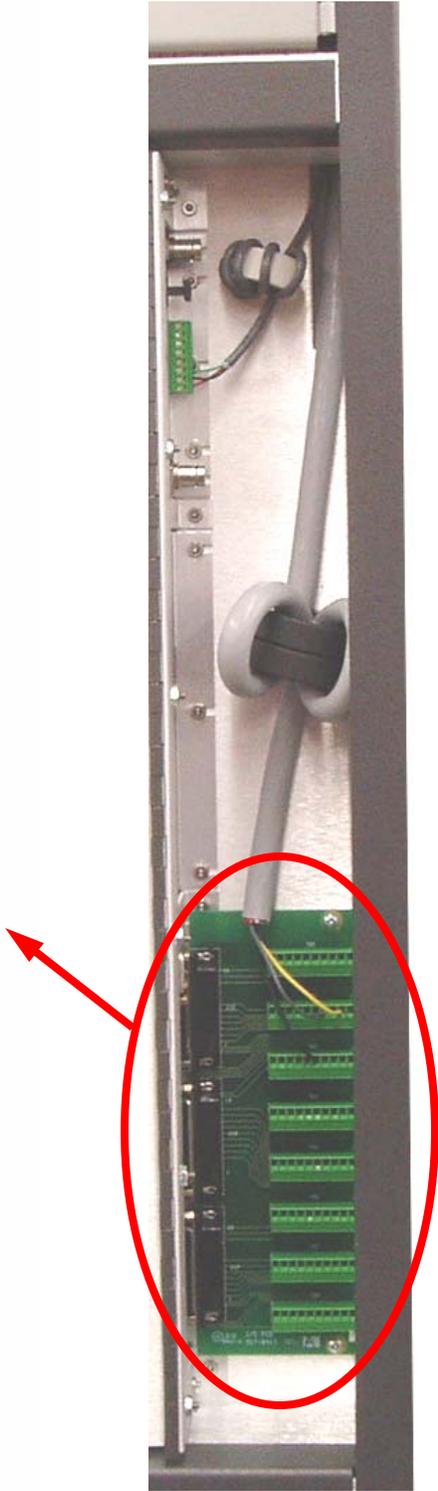
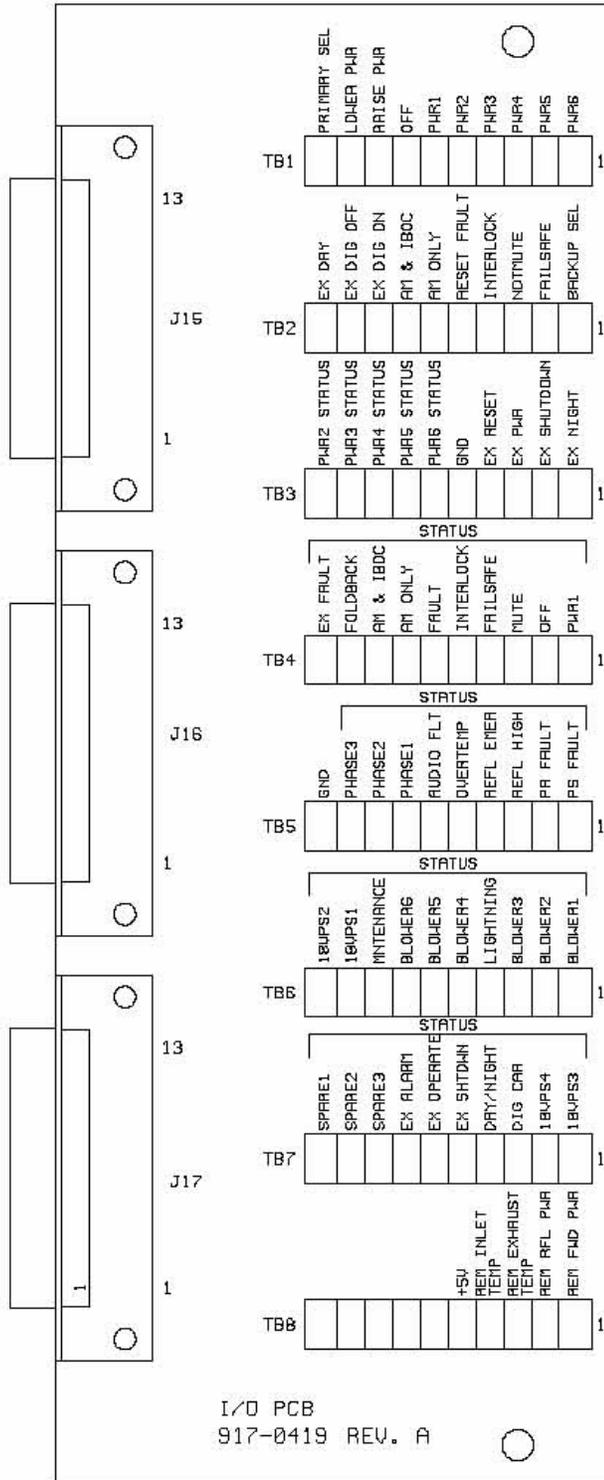


Figure 88 – Remote I/O Terminal Block Pin Outs



On the Controller Board (PCB Assy 917-0407), jumper plug P4 will come from the factory installed on pins 1 and 2 of J4. This position of P4 will require a GND connection from a remote device to the I/O Connection Board to activate its input. If desired, P4 may be positioned on pins 2 and 3 of J4 which will then require a voltage of 3.5V or greater to activate the input. See **Figure 89** for the location of jumper plug P4 on the Controller Board.



Figure 89 – Controller Board I/O Signal Configuration Jumper

Included in the remote device I/O connections, is an **INTERLOCK** and a **FAILSAFE** connection. These connections are provided for safety to protect not only the 4MX 100 transmitter but service personnel as well who may be working on the transmitter or the transmission system.

*REMOTE CONTROL **DOES NOT** need to be **ENABLED** from the **OPERATING** menu in the GUI for **INTERLOCK** and **FAILSAFE** inputs to function.*

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.1 INTERLOCK (TB2-4)

If the INTERLOCK circuit is interrupted when the transmitter's RF Output is ON, the following will occur:

- 1) The transmitter will completely shutdown.
- 2) The transmitter's front panel green ON indicator will go off.
- 3) The INTERLOCK indicator on the GUI will turn RED.
- 4) The front panel FAULT indicator located below the GUI will also turn RED.

Once the INTERLOCK circuit is closed, the transmitter **WILL NOT** automatically return to its original state. **The transmitter must be restarted!**

If the INTERLOCK circuit is interrupted when the transmitter's RF Output is OFF, the following will occur:

- 1) The transmitter's front panel ON indicator will remain off.
- 2) The INTERLOCK indicator on the GUI will turn RED.
- 3) The front panel FAULT indicator located below the GUI will also turn RED.

Once the INTERLOCK circuit is closed, the transmitter may then be restarted.

IMPORTANT - The remote INTERLOCK circuit MUST be closed or the transmitter will not operate!

3.5.2 FAILSAFE (TB2-2)

If the FAILSAFE circuit is interrupted when the transmitter's RF Output is ON, the following will occur:

- 1) The FAILSAFE indicator on the GUI will turn RED.
- 2) The transmitter's RF Output Power will go to 0.0 kW on the GUI (Note: The Power Supply and PA modules are still turned ON).
- 3) The front panel FAULT indicator below the GUI will light.

Once the FAILSAFE circuit is closed, the transmitter **WILL** automatically return to the RF Output power level it was set at before the FAULT occurred.

If the FAILSAFE circuit is interrupted when the transmitter's RF Output is OFF, the following will occur:

- 1) The FAILSAFE indicator will turn RED on the GUI.
- 2) The front panel FAULT indicator below the GUI will also turn RED.

Once the FAILSAFE circuit is closed the transmitter RF Output will remain OFF, but may now be turned ON.

IMPORTANT - The remote FAILSAFE circuit MUST be closed or the transmitter will not operate!



3.5.3 Other Remote Device I/O Connections

3.5.3.1 PWR6 (TB1-1)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter will ramp up or down to power level 6 as set in the Power menu on the front panel GUI.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.3.2 PWR5 (TB1-2)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter will ramp up or down to power level 5 as set in the Power menu on the front panel GUI.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.3.3 PWR4 (TB1-3)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter will ramp up or down to power level 4 as set in the Power menu on the front panel GUI.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.3.4 PWR3 (TB1-4)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter will ramp up or down to power level 3 as set in the Power menu on the front panel GUI.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*



3.5.3.5 PWR2 (TB1-5)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter will ramp up or down to power level 2 as set in the Power menu on the front panel GUI.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.3.6 PWR1 (TB1-6)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter will ramp up or down to power level 1 as set in the Power menu on the front panel GUI.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.3.7 OFF (TB1-7)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter will turn off and responds just as if the OFF button on the front panel of the transmitter was pushed.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.3.8 RAISE POWER (TB1-8)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter start to ramp power up and will continue to ramp up power until this input becomes inactive. This input acts just as if the user would press the raise power button from the power menu on the front panel GUI.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*



3.5.3.9 LOWER PWR (TB1-9)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter will start to ramp power down and will continue to ramp down power until this input becomes inactive. This input acts just as if the user would press the lower power button from the power menu on the front panel GUI.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.3.10 PRIMARY SEL (TB1-10)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter will use the primary audio input as it's active source. This input acts just as if the user would press the Select Primary button from the Audio menu on the front panel GUI.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.3.11 BACKUP SEL (TB2-1)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active the transmitter will use the backup audio input as it's active source. This input acts just as if the user would press the Select Backup button from the Audio menu on the front panel GUI.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.3.12 MUTE (TB2-3)

This input requires a constant active level in order to activate the input. Once this input becomes active the transmitter will "MUTE" and when this input becomes inactive the transmitter will "UN-MUTE".

*REMOTE CONTROL **DOES NOT** need to be ENABLED from the OPERATING menu in the GUI for the **MUTE** input to function.*

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*



3.5.3.13 FAULT RESET (TB2-5)

This input requires only a momentary pulse width that is ≥ 50 msec. in order to activate the input. Once this input becomes active it will reset any faults present. This input acts just as if the user would press the FAULT RESET button from the DIAGNOSTICS menu from the GUI or pressing the FAULT button on the front panel of the transmitter.

REMOTE CONTROL must be ENABLED from the OPERATING menu in the GUI.

NOTE: *If P4 on the controller pcb is positioned on pins 1 & 2 of J4, a GND connection is required to activate the remote input. If P4 is on pins 2 & 3 of J4, a voltage of 3.5-12V is required to activate the input.*

3.5.3.14 AM ONLY (TB2-6)

Exgine card input, option not available at this time.

3.5.3.15 AM & IBOC (TB2-7)

Exgine card input, option not available at this time.

3.5.3.16 EX DIG ON (TB2-8)

Exgine card input, option not available at this time.

3.5.3.17 EX DIG OFF (TB2-9)

Exgine card input, option not available at this time.

3.5.3.18 EX DAY (TB2-10)

Exgine card input, option not available at this time.

3.5.3.19 EX NIGHT (TB3-1)

Exgine card input, option not available at this time.

3.5.3.20 EX SHUTDOWN (TB3-2)

Exgine card input, option not available at this time.

3.5.3.21 EX PWR (TB3-3)

Exgine card input, option not available at this time.

3.5.3.22 EX RESET (TB3-4)

Exgine card input, option not available at this time.

3.5.3.23 GND (TB3-5)

This GND connection is the 4MX 100 transmitter chassis ground.

3.5.3.24 PWR6 STATUS (TB3-6)

This status output is active high and becomes active when the transmitter is operating at the pre-programmed RF Output Power Level #6.

3.5.3.25 PWR5 STATUS (TB3-7)

This status output is active high and becomes active when the transmitter is operating at the pre-programmed RF Output Power Level #5.

3.5.3.26 PWR4 STATUS (TB3-8)

This status output is active high and becomes active when the transmitter is operating at the pre-programmed RF Output Power Level #4.

3.5.3.27 PWR3 STATUS (TB3-9)

This status output is active high and becomes active when the transmitter is operating at the pre-programmed RF Output Power Level #3.

3.5.3.28 PWR2 STATUS (TB3-10)

This status output is active high and becomes active when the transmitter is operating at the pre-programmed RF Output Power Level #2.

3.5.3.29 PWR1 STATUS (TB4-1)

This status output is active high and becomes active when the transmitter is operating at the pre-programmed RF Output Power Level #1.

3.5.3.30 OFF STATUS (TB4-2)

This status output is active high and becomes active when the transmitter has been turned off.

3.5.3.31 MUTE STATUS (TB4-3)

This status output is active high and becomes active when the transmitter has been "MUTED" (RF Level to zero) and inactive when the transmitter is "UN-MUTED".

3.5.3.32 FAILSAFE STATUS (TB4-4)

This status output is active high and becomes active when the transmitter failsafe has been removed. The transmitter RF level will go to zero, much like the mute function. When the failsafe has been restored the transmitter will return to the set power level.

3.5.3.33 INTERLOCK STATUS (TB4-5)

This status output is active high and becomes active when the transmitter interlock has been removed. The transmitter will go "OFF", just as if the OFF button on the front panel was pushed. When the interlock status has been restored the transmitter will remain off until a remote power level has been selected or the ON button has been pushed on the front panel of the TX.



3.5.3.34 FAULT STATUS (TB4-6)

This status output is active high and becomes active when the transmitter has any type of fault active. If the fault reset button from the GUI or front panel is pushed this will output will go inactive (low). In addition, a transition of OFF and back ON will also clear this fault output. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.35 AM ONLY STATUS (TB4-7)

Exgine status output, this option is not available at this time.

3.5.3.36 AM & IBOC STATUS (TB4-8)

Exgine status output, this option is not available at this time.

3.5.3.37 FOLDBACK STATUS (TB4-9)

This status output is active high and becomes active when the transmitter has any type of power reduction. This output will usually go active in conjunction with some type of fault. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.38 EX FAULT STATUS (TB4-10)

This status output is active high and becomes active when the DSP exciter in the transmitter has any type of power reduction. This output will usually go active in conjunction with some type of fault. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.39 PS FAULT STATUS (TB5-1)

This status output is active high and becomes active when a fault has occurred on any of the power supply modules. This output will usually go active in conjunction with the Fault Status Output defined above. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.40 PA FAULT STATUS (TB5-2)

This status output is active high and becomes active when a fault has occurred on any of the power amplifier modules. This output will usually go active in conjunction with the Fault Status Output defined above. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.41 REFL HIGH STATUS (TB5-3)

This status output is active high and will indicate when the Transmitter has seen reflected power that occurred gradually such as antenna icing. When high reflected power occurs, the rf output power will be reduced to an appropriate level. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.42 REFL EMER STATUS (TB5-4)

This status output will indicate when the Transmitter has seen catastrophic open or short circuit on the RF output. If such an event occurs, the transmitter will shutdown to "0" rf output power. The transmitter will then attempt to come back on 2 times within 20 seconds. If the transmitter cannot come backup within this time frame it will remain off. This fault status output is latched when the event occurs and will remain latched, even if the transmitter is able to come back on, until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.43 OVERTEMP STATUS (TB5-5)

This status output is active high and will indicate if the heat sink temperature of a PA Module exceeds 85° C. This fault status output is latched when the event occurs and will remain latched, even if the transmitter is able to come back on, until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.44 AUDIO FLT STATUS (TB5-6)

This status output is active high and will indicate when the modulation level has exceeded 150% or the audio input to the exciter exceeded the A/D converter input maximum level. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.45 PHASE 1 STATUS (TB5-7)

This status output is active high and will indicate when Phase #1 of the transmitter's primary 3 phase ac supply service has gone out of its operating range (332-460VAC for 400V Nominal operation). This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.46 PHASE 2 STATUS (TB5-8)

This status output is active high and will indicate when Phase #2 of the transmitter's primary 3 phase ac supply service has gone out of its operating range (332-460VAC for 400V Nominal operation). This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.



3.5.3.47 PHASE 3 STATUS (TB5-9)

This status output is active high and will indicate when Phase #3 of the transmitter's primary 3 phase ac supply service has gone out of its operating range (332-460VAC for 400V Nominal operation). This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.48 GND (TB5-10)

This GND connection is the 4MX 50 transmitter chassis ground.

3.5.3.49 BLOWER 1 STATUS (TB6-1)

This status output is active high and will indicate when Blower 1 in the transmitter is not drawing any current. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.50 BLOWER 2 STATUS (TB6-2)

This status output is active high and will indicate when Blower 2 in the transmitter is not drawing any current. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.51 BLOWER 3 STATUS (TB6-3)

This status output is active high and will indicate when Blower 3 in the transmitter is not drawing any current. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.52 LIGHTNING STATUS (TB6-4)

This status output is active high and will indicate when a greater than 6.2kV potential is present on the 4MX 100 RF Output.

3.5.3.53 BLOWER 4 STATUS (TB6-5)

This status output is active high and will indicate when Blower 4 in the transmitter is not drawing any current. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.54 BLOWER 5 STATUS (TB6-6)

This status output is active high and will indicate when Blower 5 in the transmitter is not drawing any current. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.55 BLOWER 6 STATUS (TB6-7)

This status output is active high and will indicate when Blower 6 in the transmitter is not drawing any current. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.56 MNTENANCE STATUS (TB6-8)

This status output is active high and will indicate when a PA or PS Module has been manually turned off from the diagnostics menu for removal while the TX is operating.

3.5.3.57 18VPS1 STATUS (TB6-9)

This status output is active high and will indicate when +18V PS #1 in the transmitter has faulted. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.58 18VPS2 STATUS (TB6-10)

This status output is active high and will indicate when +18V PS #2 in the transmitter has faulted. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.59 18VPS3 STATUS (TB7-1)

This status output is active high and will indicate when +18V PS #3 in the transmitter has faulted. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.60 18VPS4 STATUS (TB7-2)

This status output is active high and will indicate when +18V PS #4 in the transmitter has faulted. This fault status output is latched when the event occurs and will remain latched until it is cleared by using the fault reset button, turning the transmitter off and back on, or turning the ac power off and then back on.

3.5.3.61 DIG CAR STATUS (TB7-3)

Exgine status output, this option is not available at this time.

3.5.3.62 DAY/NIGHT STATUS (TB7-4)

Exgine status output, this option is not available at this time.



3.5.3.63 EX SHTDWN STATUS (TB7-5)

Exgine status output, this option is not available at this time.

3.5.3.64 EX OPERATE STATUS (TB7-6)

Exgine status output, this option is not available at this time.

3.5.3.65 EX ALARM STATUS (TB7-7)

Exgine status output, this option is not available at this time.

3.5.3.66 SPARE 3 STATUS (TB7-8)

For future expansion.

3.5.3.67 SPARE 2 STATUS (TB7-9)

For future expansion.

3.5.3.68 SPARE 1 STATUS (TB7-10)

For future expansion.

3.5.3.69 REM FWD PWR (TB8-1)

This output is a dc voltage (0 – 5VDC) for Remote Forward Power meter indications.

3.5.3.70 REM RFL PWR (TB8-2)

This output is a dc voltage (0 – 5VDC) for Remote Reflected Power meter indications.

3.5.3.71 REM EXHAUST TEMP (TB8-3)

This status output allows the monitoring of the exhausted air temperature from the 4MX.

3.5.3.72 REM INLET TEMP (TB8-4)

This status output allows the monitoring of the ambient inlet air temperature to the 4MX.

3.5.3.73 +5V (TB8-5)

+5V supply connection.



3.6 PA Modules

Each PA Module consists of an H-Bridge configuration of high power mosfets and associated drive, control and fault circuitry. They are broadband units with frequency determining parts located external to the module. Two PA Modules plug into a single motherboard. The motherboards contain combining transformers and current sourcing inductors used to minimize device stress and improve efficiency. An onboard microprocessor communicates control and status with the main system controller. If a fault occurs on a PA Module, the green led on the module will be extinguished. In addition, a PA Fault will be indicated on the Transmitter's Front Panel GUI.

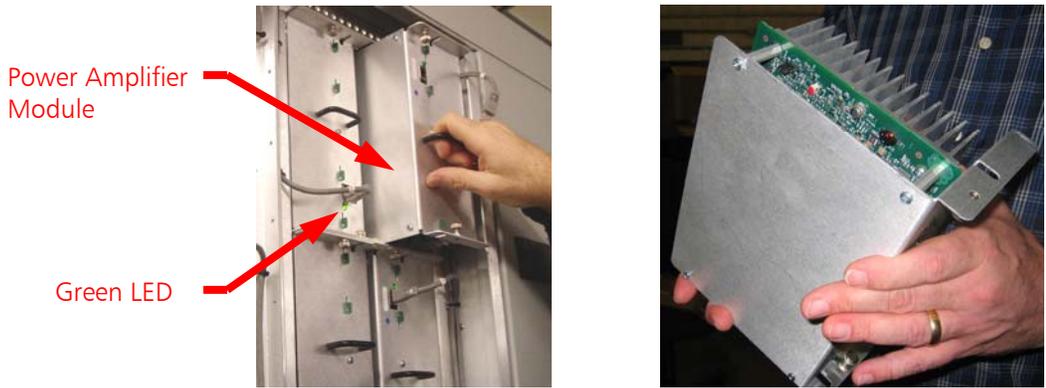


Figure 90 – 4MX 100 1700W Power Amplifier Module

3.7 Power Supply Modules

The Power Supply Modules provide 400V to the PA's. There is a one to one relationship between PA's and the Power Supplies, 64 of each in the 4MX 100. The supply is a power factor correcting boost circuit that operates directly from the ac line. Fault circuitry is included for protection against over current conditions and to ensure smooth startup. An onboard microprocessor communicates control and status with the main system controller.

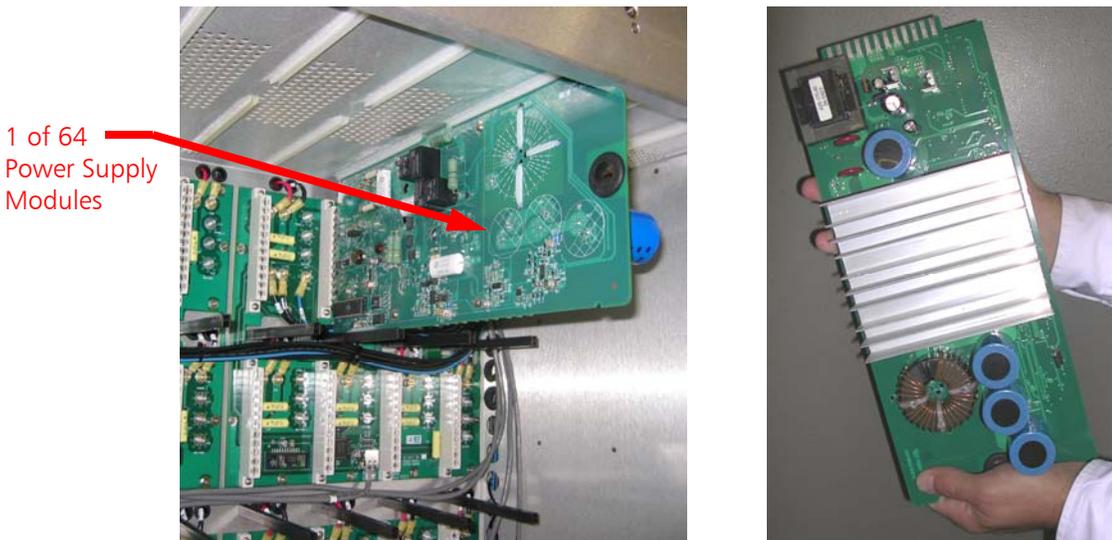


Figure 91 – 4MX 100 400V Power Supply Module

3.8 Exciter

The integrated exciter is a DSP and FPGA based signal generator that produces “on frequency” RF Drive Signals (two) that also contain the modulation information. Besides signal generation, this board corrects for modulation nonlinearities and provides noise reduction. An output sample is fed back to the exciter to measure and correct transmitter performance. Signal processing functions, such as network and spectrum analysis, occur on this board and the results are then sent to the GUI for display. Audio information can be supplied to the exciter in either analog or digital form. IBOC signals are accepted in I/Q form from the IBOC generator to minimize conversion steps.

3.9 System Controller

The 4MX 100 controller is a processor-based board that provides transmitter control and protection. It communicates with all of the other functional assemblies in the cabinet to respond to user input, control transmitter function, monitor operation and report the status back to the user.

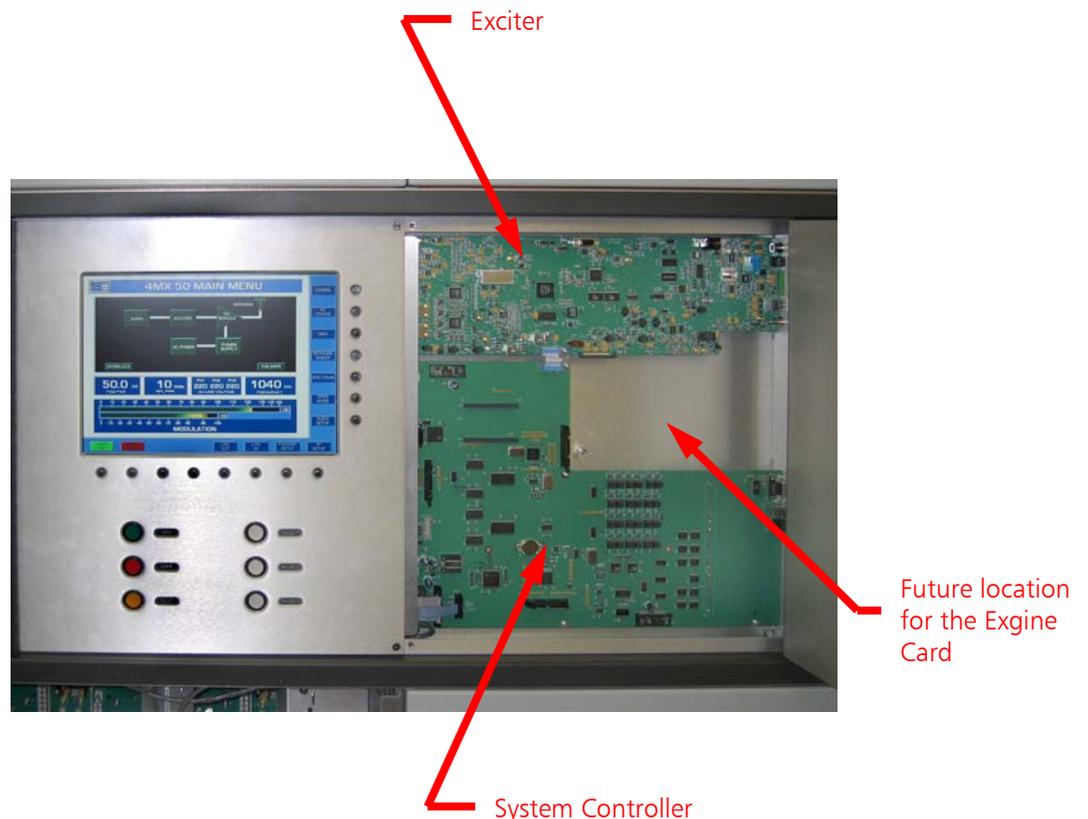


Figure 92 – 4MX 100 Exciter and Controller

3.10 High / Low Line Sensor

The High / Low Line Sensor board is located in the ac entry section at the lower rear portion of the Main cabinet. It monitors the condition of the ac input voltage and shuts down the transmitter if the voltage is out of tolerance. It also is the interface to the system controller that turns the motorized impellers on and off when necessary. There are also jumpers that select the proper ac configuration depending upon input ac voltage and transformer topology.

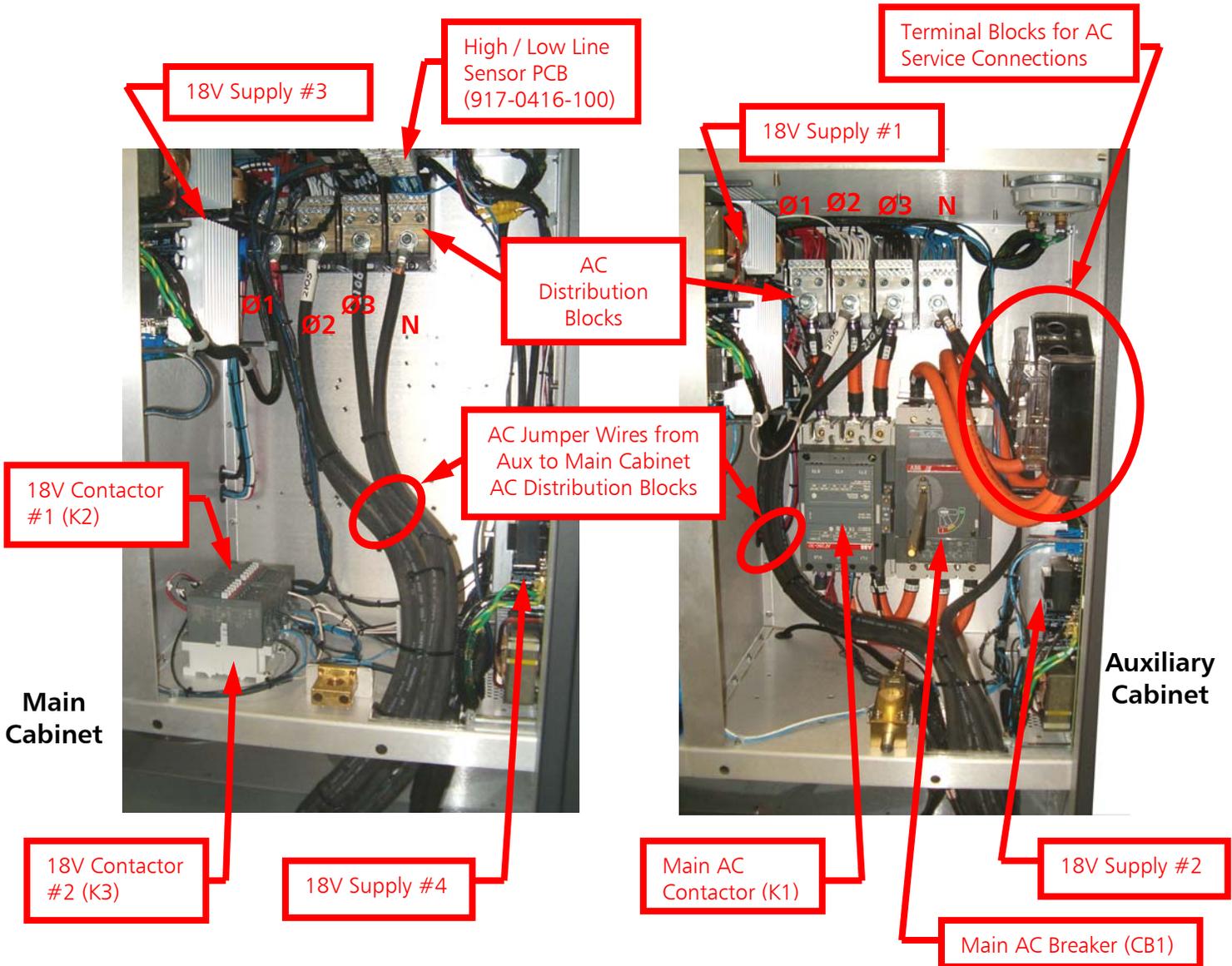


Figure 93 – 4MX 100 AC Supply (Main and Auxiliary Cabinets)

3.11 18V Power Supplies

For redundancy, there are (4) 18V Power Supplies located in the AC Entry areas of the Auxiliary and Main cabinets as shown above. 18V is supplied to the Multiplexer PCB for distribution to the PAs.



4 General Maintenance

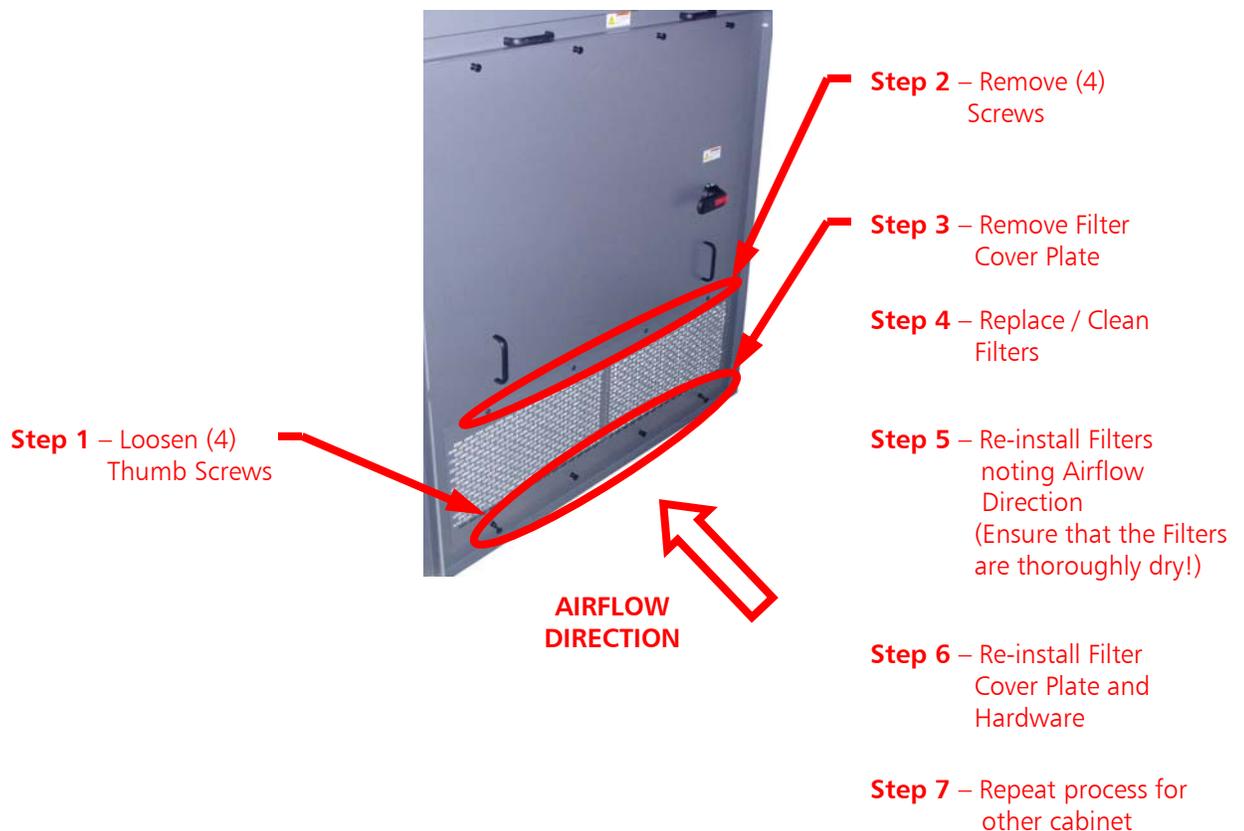
4.1 Air Filter Replacement

The 4MX 100 has (4) reusable inlet Air Filters located on the lower rear door of both the Main and Auxiliary cabinets. These filters provide protection to the 4MX 100 by removing dirt from the inlet cooling air. To maintain proper airflow these filters must be cleaned or replaced every 90-120 days.

To clean the air filters:

- 1) Remove them from the Transmitter (see instructions below).
- 2) Wash with water and detergent.
- 3) Allow to dry thoroughly!
- 4) Re-install into the transmitter.

The rear doors of the 4MX 100 are designed such that the air filters may be removed and re-installed while the transmitter is running.



**Figure 94 – Removal / Installation of Inlet Air Filters
(Lower Rear of 4MX 100 Cabinets)**

4.2 GUI Menu Screen Care

To ensure the life of the GUI Menu Screen, the following care must be taken.

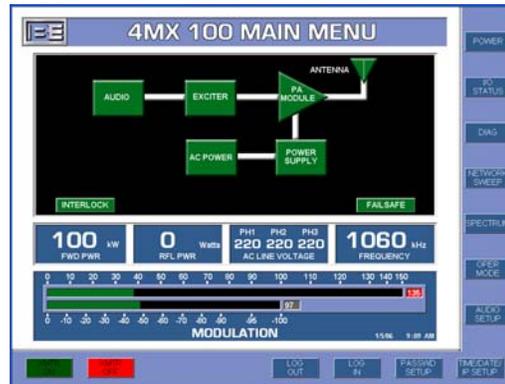


Figure 95 – GUI Menu Screen

- 1) **DO NOT** press on or scratch the surface of the screen!
- 2) Wipe off any water or oil droplets from the screen immediately with a clean absorbent cotton, or soft cloth. If droplets are left on the screen for a period of time discoloration may occur.
- 3) If the screen is dirty, clean it using a clean absorbent cotton, or soft cloth.
- 4) The desirable cleaners are Water, Isopropyl Alcohol, or Hexane.



DO NOT use cleaners containing Ketone type materials such as Acetone, Ethyl Alcohol, Toluene, Ethyl Acid or Methyl Chloride. Use of these chemicals may cause permanent damage to the GUI screen!

4.3 Check AC Terminal Block Connections

After a few weeks of operation, it is a good idea to check the main AC terminal blocks connections to ensure that they are still tight.



This does require turning **the Main AC Breaker OFF that is located on the rear of the Transmitter** as well as turning the **Primary AC Power Breaker Box OFF**.

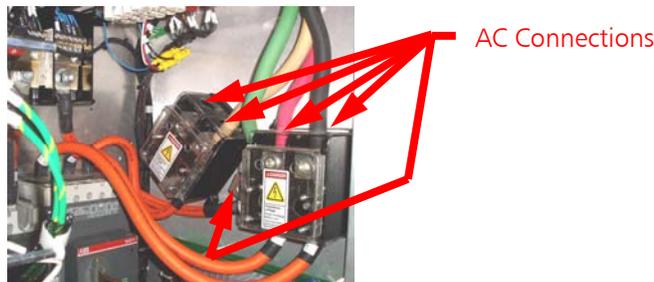


Figure 96 – AC Terminal Block Connections

5 Repair / Replacement

5.1 Power Amplifier Module Replacement

There are 64 Power Amplifier Modules in the 4MX 100 Transmitter. The PA Modules are "hot pluggable" (individual PA Modules may be replaced while the transmitter is operational).



Please note that it is recommended to turn the transmitter's RF Output OFF before replacing a PA Module. "Hot Plugging" should only be used when the Transmitter must remain on the air.

Please note the RF Output Power Level that the transmitter is set to operate at determines which PA Modules are ON at a given time.

In a 4MX 100, all 64 PA Modules will not be ON unless the RF Output Power Level is set for $\geq 20\text{kW}$; @ $5\text{kW} - 19.99\text{kW}$ 32 PA Modules will be ON (9-24 & 41-56); @ $500\text{W} - 4.99\text{kW}$ 16 PA Modules will be ON (13-20 & 45-52).



**Figure 97 – 4MX 100 PA Module Locations
(Front of Transmitter)**

In the event that a Power Amplifier Module should fail, it is necessary to replace it.



When replacing a PA Module the following steps must be followed to ensure the safety of the maintenance personnel as well as to protect against damage to the transmitter.

If a PA Module fails, the "PA Module" block on the Main GUI screen will highlight red and a note stating "A problem has been detected, select the DIAG button to troubleshoot" will appear as shown on the left view of Figure 98.

To replace a PA Module, adhere to the following steps.

Step 1 – From the Main Menu, select **DIAG** and the Diagnostics Menu will appear.

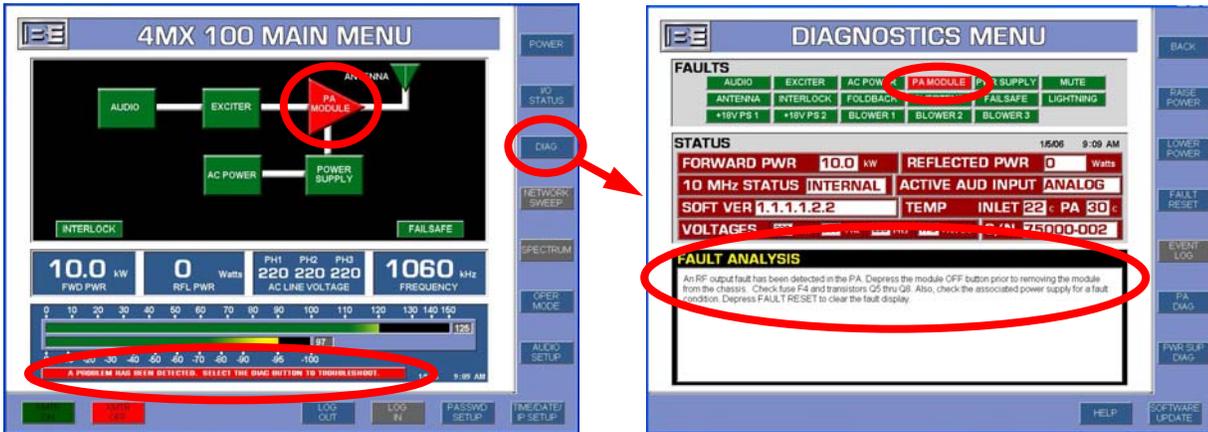


Figure 98 – Diagnostics Menu

Step 2 – From the Diagnostics Menu, select **PA DIAG** and the PA Diagnostics Menu will then appear.

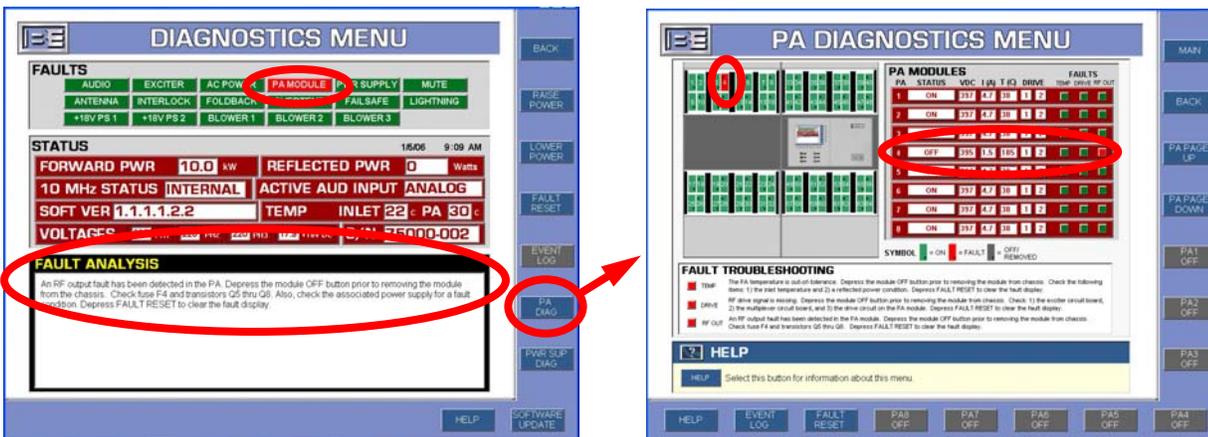


Figure 99 – PA Diagnostics Menu

Step 3 - In the PA Diagnostics Menu, the failed PA Module will be displayed as red in the PA location graphic (left side of the PA Diagnostics Menu) and the status column for the failed module should read "OFF."



If the "Status" of the "Faulted" PA Module is not "OFF", turn the PA Module "OFF" by selecting the appropriate "PA(X) OFF" button.



Before a given PA Module may be removed, its "Status" must be "OFF."

Step 4 – Open the appropriate PA Module access door, and locate the “Faulted” PA Module.



Figure 100 – 4MX 100 PA Module Locations (Front of Transmitter)

Step 5 – After locating the “Faulted” PA Module, ensure that the “GREEN” led is extinguished.

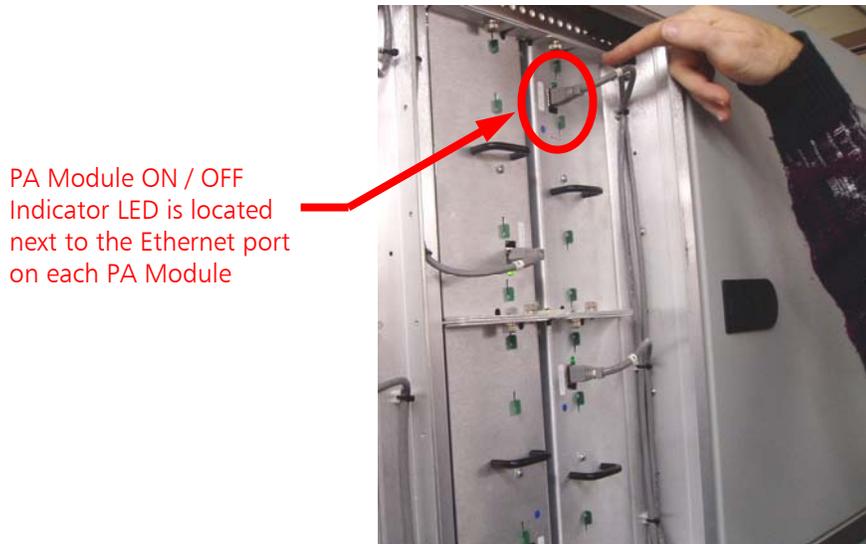


Figure 101 – Ensure That the PA Indicator is Extinguished

Step 6 – Disconnect the Ethernet connection.



Figure 102 – Disconnect Ethernet Cable

Step 7 – Loosen thumb screws and pull to slide the module out.

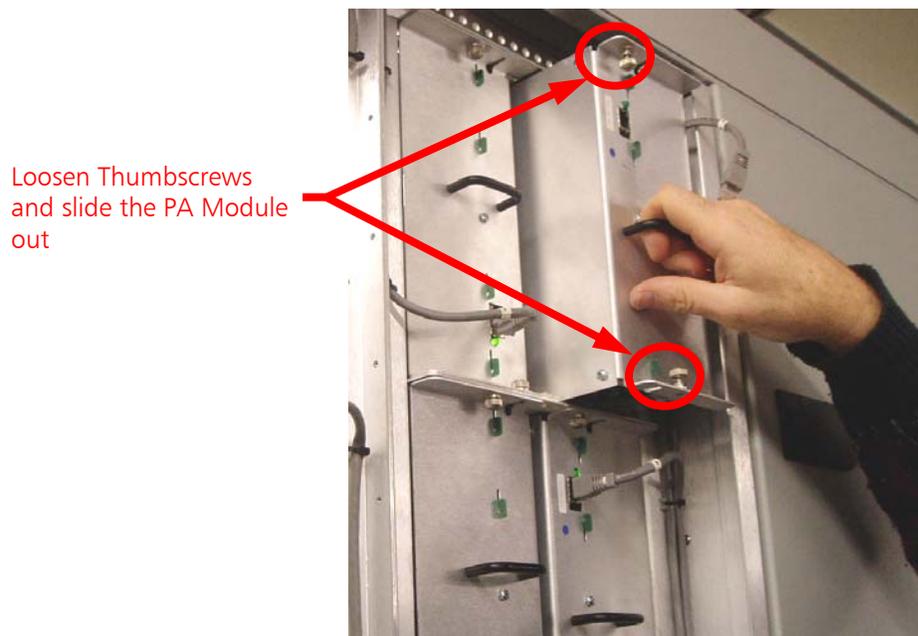


Figure 103 – Loosen Thumbscrews and Slide the PA Module Out

Step 8 – Install a new PA Module ensuring that it fully seats into the motherboard connectors then tighten the thumbscrews



Figure 104 – Install New PA Module and Tighten Thumbscrews

Step 9 – Connect the Ethernet Cable to the PA Module.



Figure 105 – Connect the Ethernet Cable To PA Module

Step 10 – From the PA Diagnostics Menu select the appropriate **PA(X) ON** button to turn the PA Module ON (use the **PA PAGE UP** and **PA PAGE DOWN** buttons if necessary).

Please note, that when a PA Module is turned ON in this manner the RF Output of the Transmitter will go to “0 watts” for several seconds before returning back to the RF Output power level it was previously set to operate at.

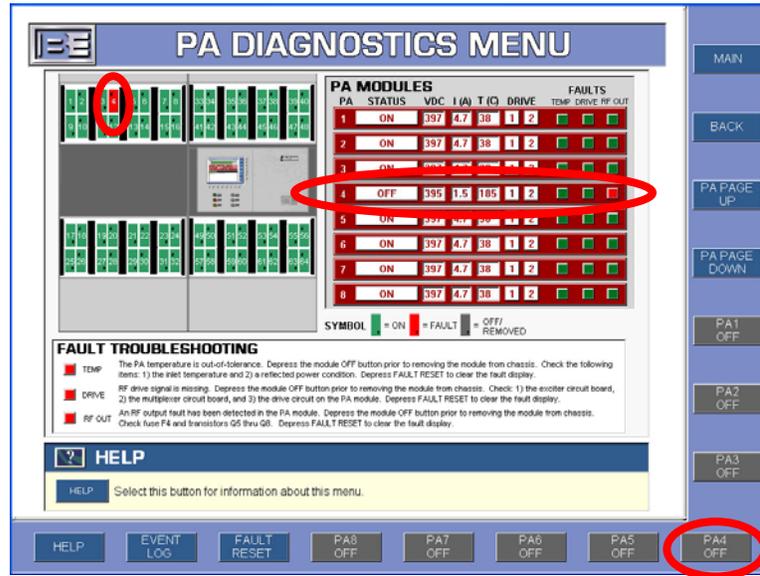


Figure 106 – Turning the PA Module ON

Step 11 – Ensure that the GREEN led on the front of the PA Module comes back on.

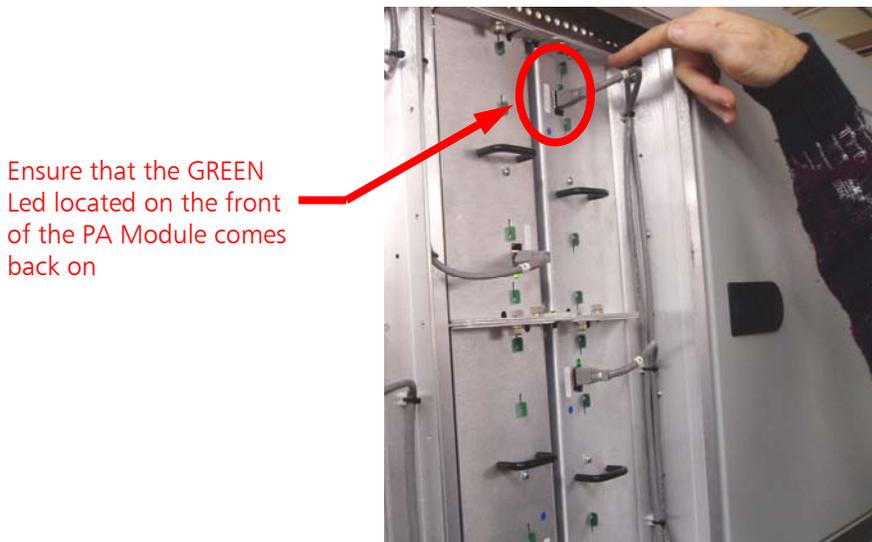


Figure 107 – PA Module LED



Step 12 – From the PA Diagnostics Menu select **FAULT RESET** or press the front panel Fault Reset button located below GUI to clear any faults.

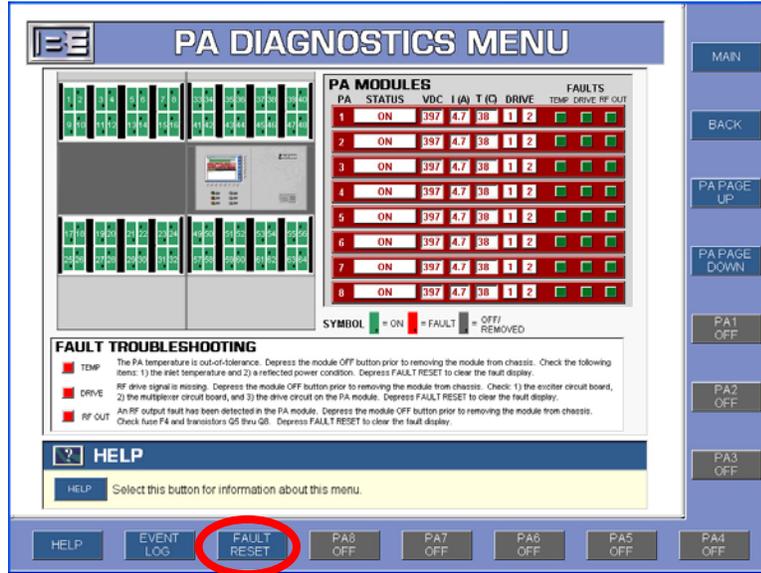


Figure 108 – Turning the PA Module ON

The transmitter should now return to the power level that it was operating at before the PA Fault occurred.



6 Prepare to Replace the 4MX 100 PA Motherboard

6.1 Tools / Items Needed

- No. 2 Phillips Screw Driver
- Flat Blade Screw Driver (short shank)
- 11/32" Nut Driver
- Small 6" Ty-wrap
- Side Cutters

6.2 Estimated Time for Replacement

Providing that you have the tools listed above, it will take approximately 30-45 minutes to complete the replacement of a Power Amplifier Motherboard.

7 Replacing a 4MX 100 PA Motherboard

7.1 Turn the 4MX 100 AC Breaker OFF



Step 1 - Turn the AC Breaker to the **OFF** position.

Step 2 - Turn the Main Service Entrance AC Breaker to the **OFF** position.

Figure 109 – Turn 4MX 100 AC Breaker to OFF

7.2 4MX 100 PA Module Locations

The 4MX 100 has 64 PA Modules (2 per PA Motherboard). **Figure 110** illustrates how the PA Modules are numbered. **Figure 111** illustrates how the PA Motherboards are numbered. PA Motherboards will be referred to in this section as either **Top** or **Bottom**. This section of the document focuses on the replacement of a **Top** PA Motherboard. The same steps are necessary to replace a **Bottom** PA Motherboard.



Figure 110 – 4MX 100 PA Module Locations

7.3 4MX 100 PA Motherboard Locations

The 4MX 100 has 64 PA Modules (2 per PA Motherboard). **Figure 110** illustrates how the PA Modules are numbered. **Figure 111** illustrates how the PA Motherboards are numbered. PA Motherboards will be referred to in this section as either **Top** or **Bottom**. This section of the document focuses on the replacement of a **Top** PA Motherboard. The same steps are necessary to replace a **Bottom** PA Motherboard.

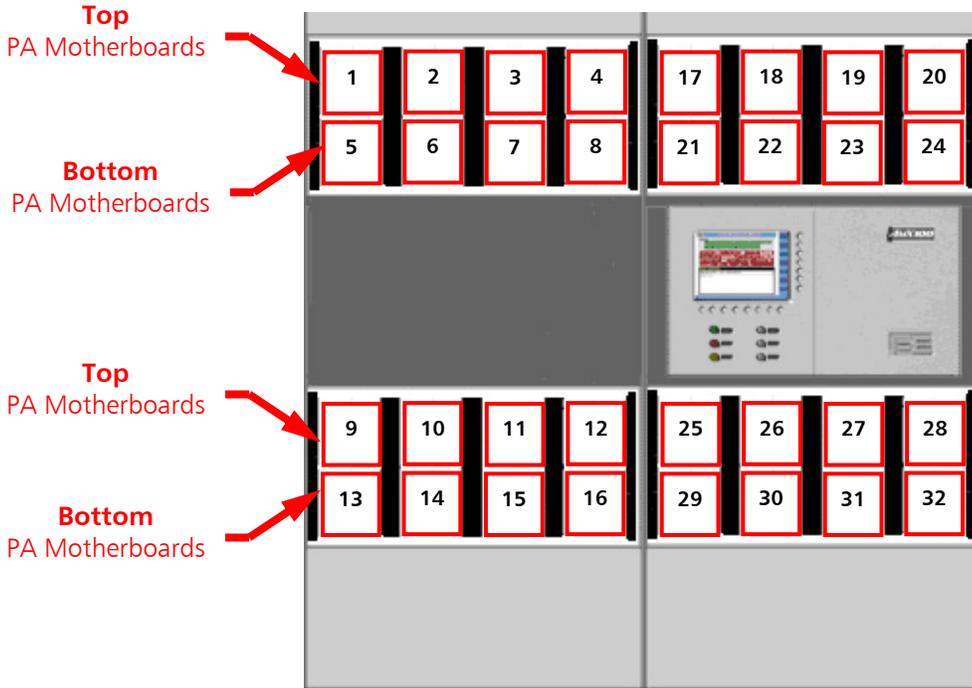


Figure 111 – 4MX 100 PA Motherboard Locations



7.4 PA Module Removal

In the following instructions we will be replacing Motherboard No. 10 in a 4MX 100. PA Modules 19, 20, and 27 must be removed first.

Disconnect and remove PA Modules 19, 20, and 27. (Module 27 not yet removed in photo)

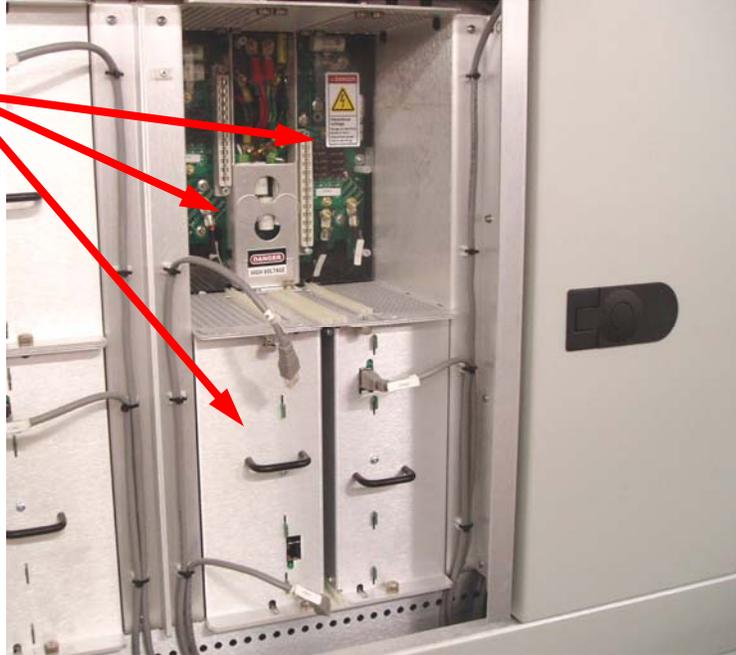
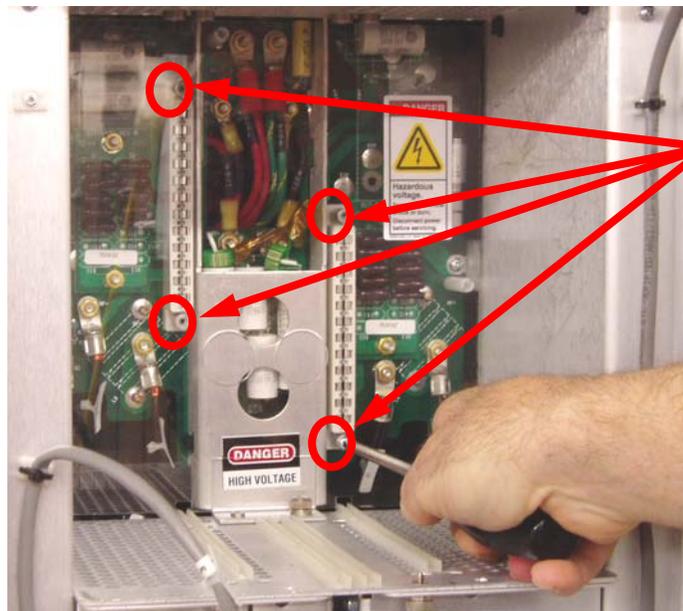


Figure 112 – Remove Appropriate PA Modules

7.5 Remove Motherboard Cover



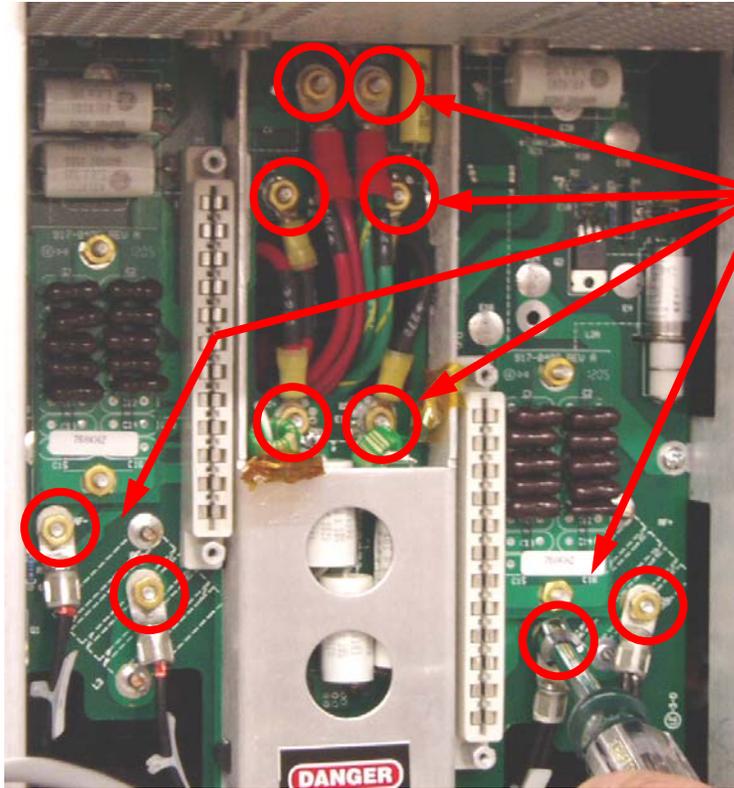
STEP 1 - Using a No. 2 Phillips Screw Driver remove the (4) screws and (4) lock washers

STEP 2 – Remove the Motherboard Cover

Figure 113 – Remove Motherboard Cover

7.6 Remove Wiring Connection Hardware

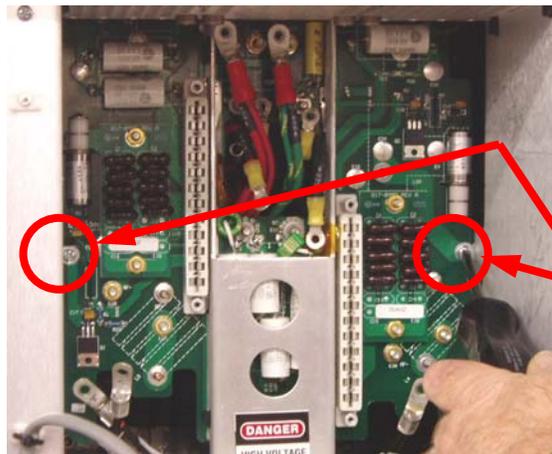
PLEASE NOTE: It is a good idea to label the wires to ensure that they are connected properly later. If possible, take some close up digital photos for reference as well.



Using a 11/32" Nut Driver, loosen the brass nuts (10). Once loosened, carefully remove the brass nuts (10) and lock washers (10) by hand.

Figure 114 – Remove Wiring Connection Hardware

7.7 Remove Wiring From Studs / Remove Mounting Screws



STEP 1 – Remove all wiring from studs (10 places)

STEP 2 – Using a No. 2 Phillips Screw Driver, remove (2) mounting screws and (2) lock washers

Figure 115 – Remove Wiring From Studs / Remove Mounting Screws

7.8 Loosen PA Motherboard Bracket Thumbscrews

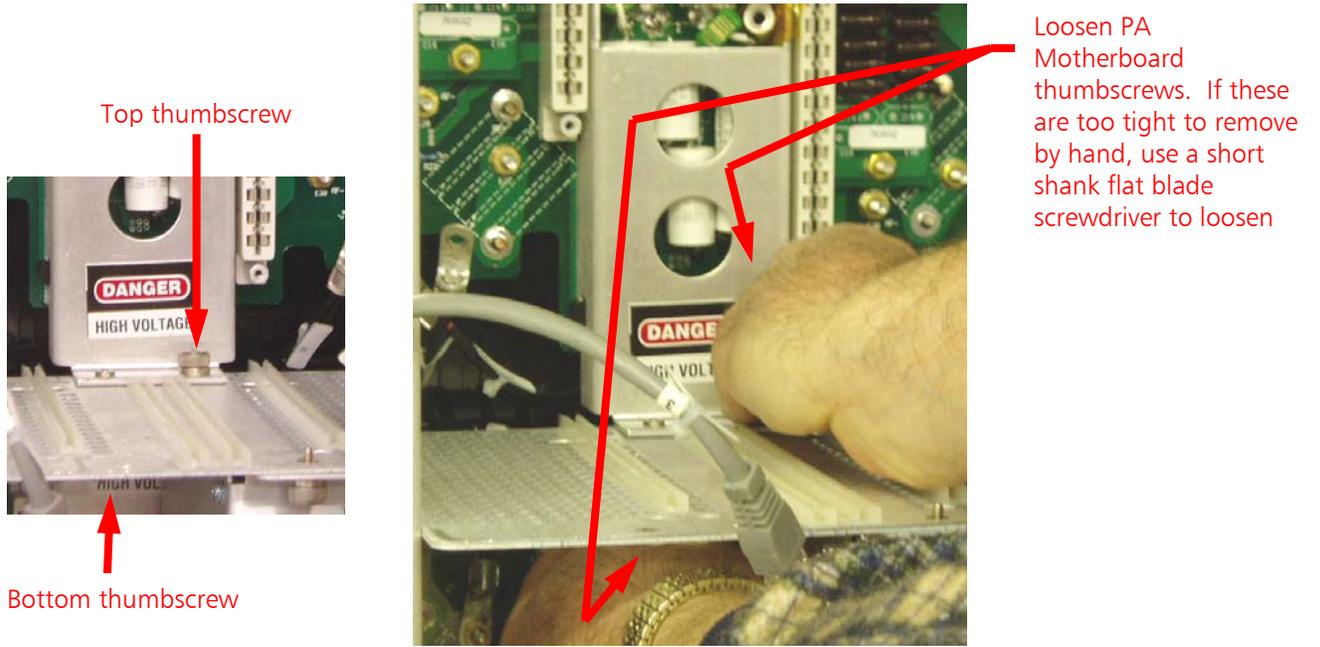


Figure 116 – Loosen PA Motherboard Bracket Thumbscrews

7.9 Remove the PA Motherboard from the Transmitter

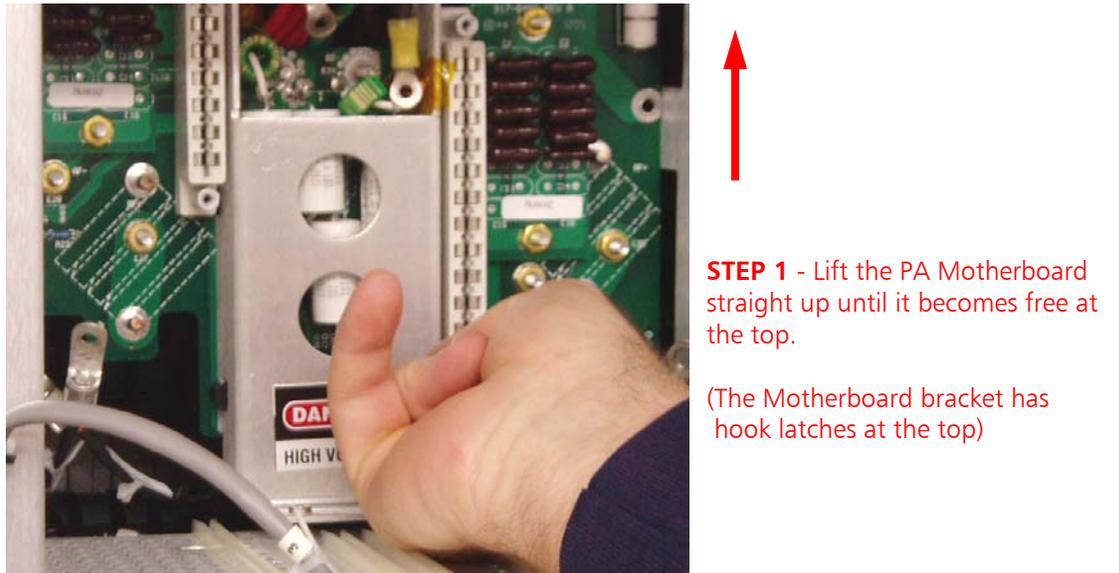
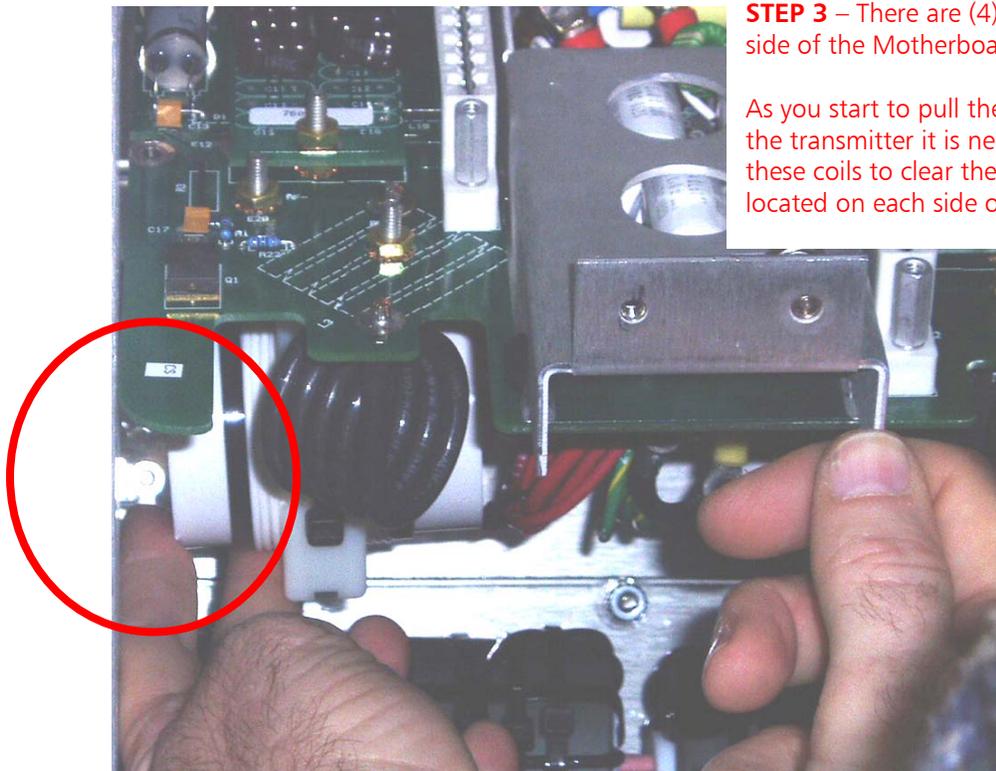


Figure 117 – Lift the Motherboard Straight Up



STEP 2 – Tilt the Motherboard to horizontal position

Figure 118 – Tilt Motherboard



STEP 3 – There are (4) large coils on the back side of the Motherboard (see Figure 115).

As you start to pull the Motherboard out of the transmitter it is necessary to “gently” flex these coils to clear the mounting screw bosses located on each side of the compartment.

Figure 119 – Gently Flex Coils (both sides) to Clear Mounting Screw Bosses

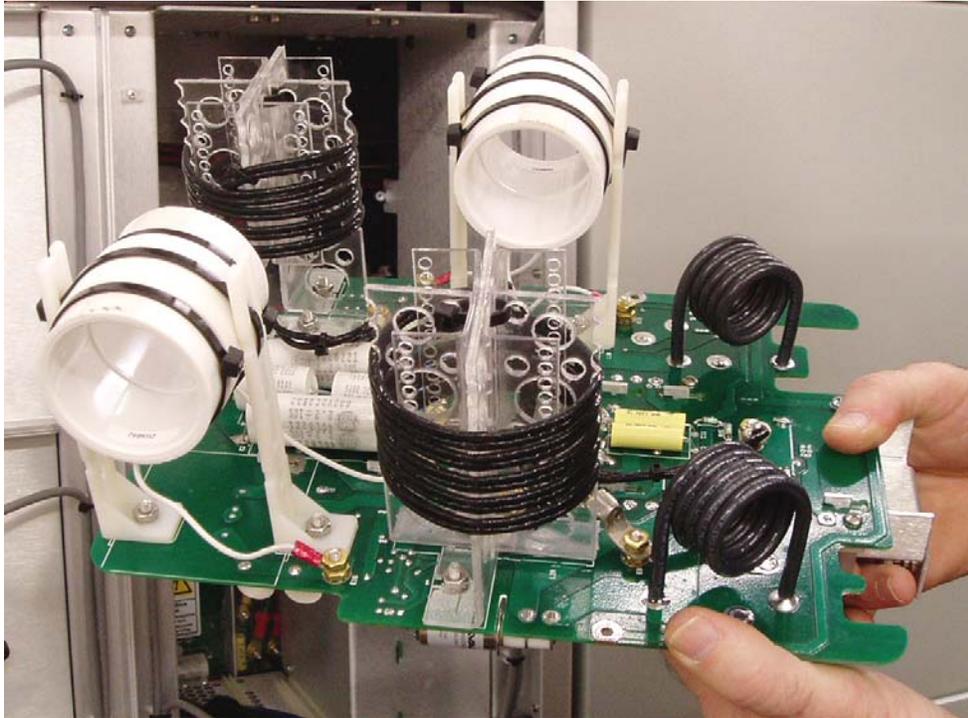


Figure 120 – PA Motherboard Removed

7.10 Ty-rap Center Wire Bundle

Before installing the new PA Motherboard, ty-rap the center wire bundle as shown to ease installation.

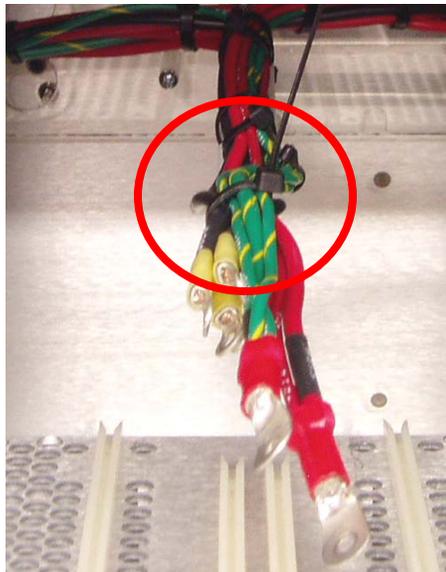


Figure 121 – Ty-rap Wire Bundle

7.11 Install New PA Motherboard

STEP 1 – There are (4) large coils on the back side of the Motherboard (see Figure 118).

As you start to install the Motherboard into the transmitter, it is necessary to “gently” flex these coils to clear the mounting screw bosses located on each side of the compartment.

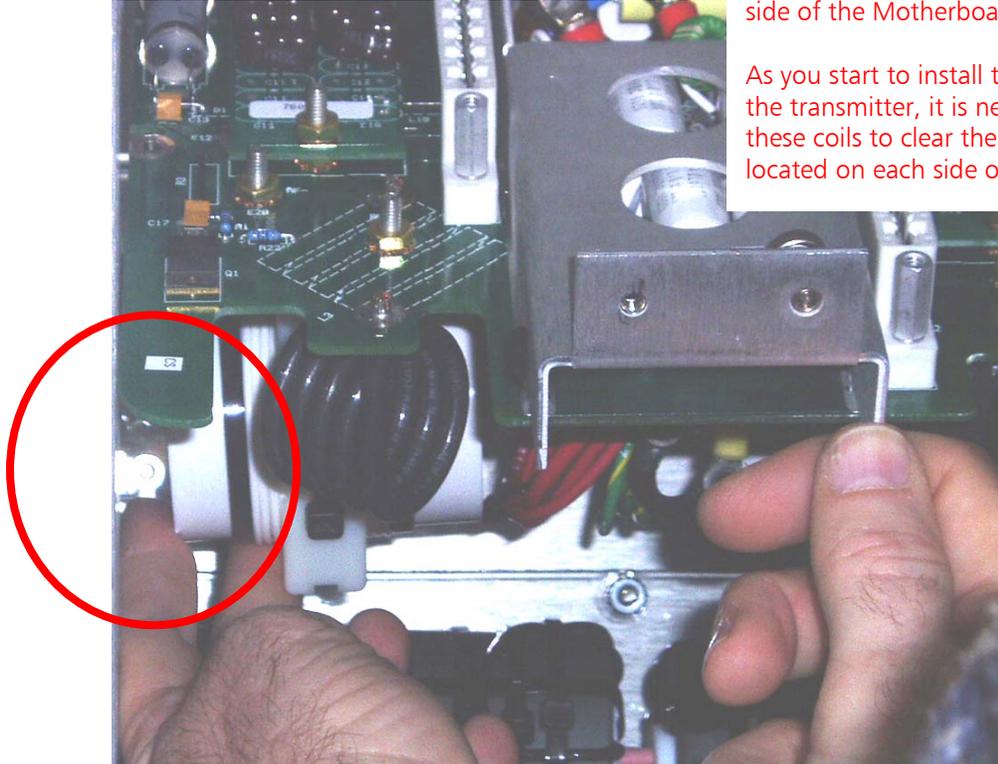


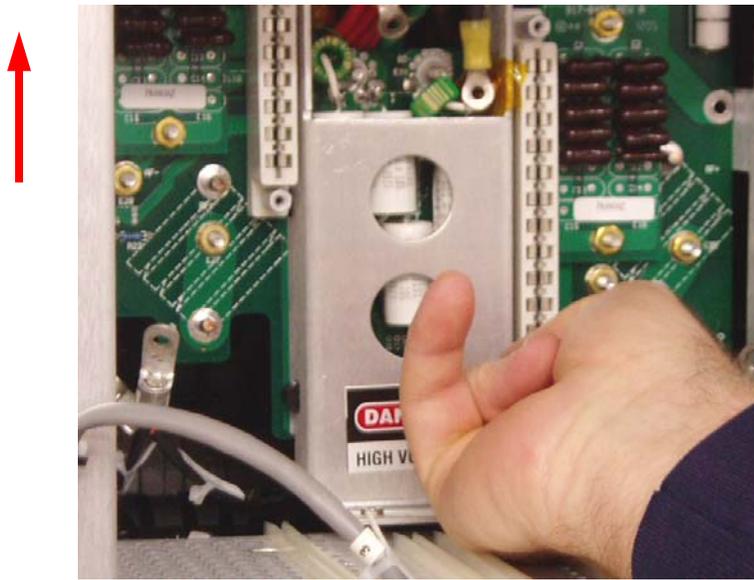
Figure 122 – Gently Flex Coils (both sides) to Clear Mounting Screw Bosses



STEP 2 – Once the coils clear the screw bosses, tilt the Motherboard to vertical position.

STEP 3 – Pull the wires through the board.

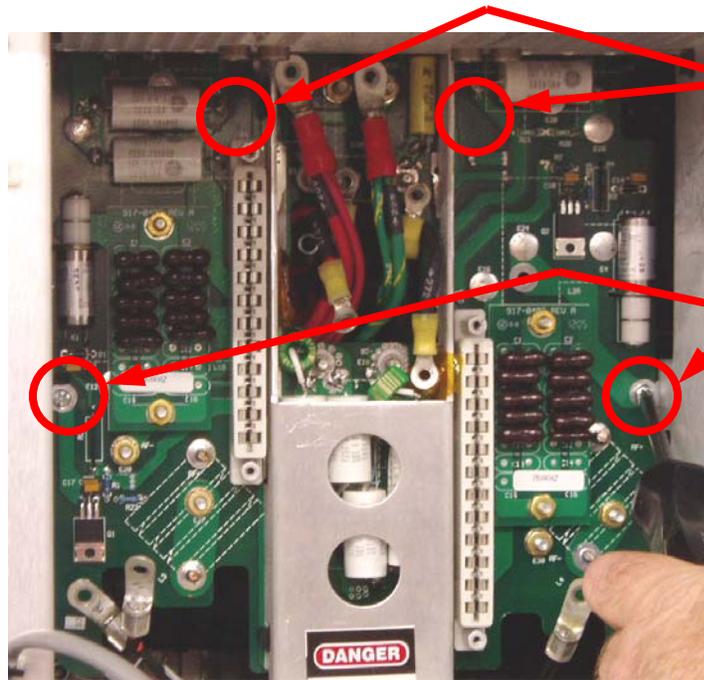
Figure 123 – Tilt Motherboard into Vertical Position



STEP 4 - Lift the PA Motherboard straight up and engage the hook latches.

(The Motherboard bracket has hook latches at the top)

Figure 124 – Lift the Motherboard Straight Up



STEP 5 – Push on the board in these locations to ensure that the hook latches are engaged. If the board can be pushed back, the hook latches are not engaged.

STEP 6 – Using a No. 2 Phillips Screw Driver, install (2) mounting screws and (2) lock washers

Figure 125 – Install Mounting Screws

7.12 Tighten PA Motherboard Bracket Thumbscrews

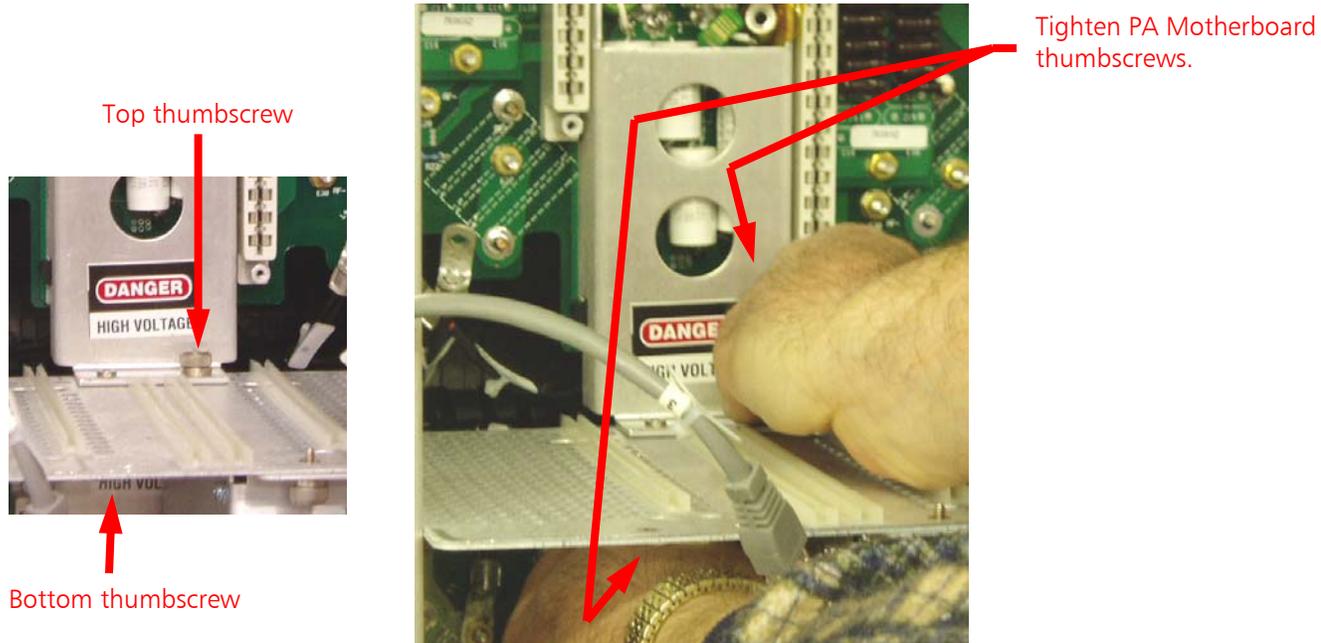


Figure 126 – Tighten PA Motherboard Bracket Thumbscrews

7.13 "TOP" PA Motherboard Wiring Connections

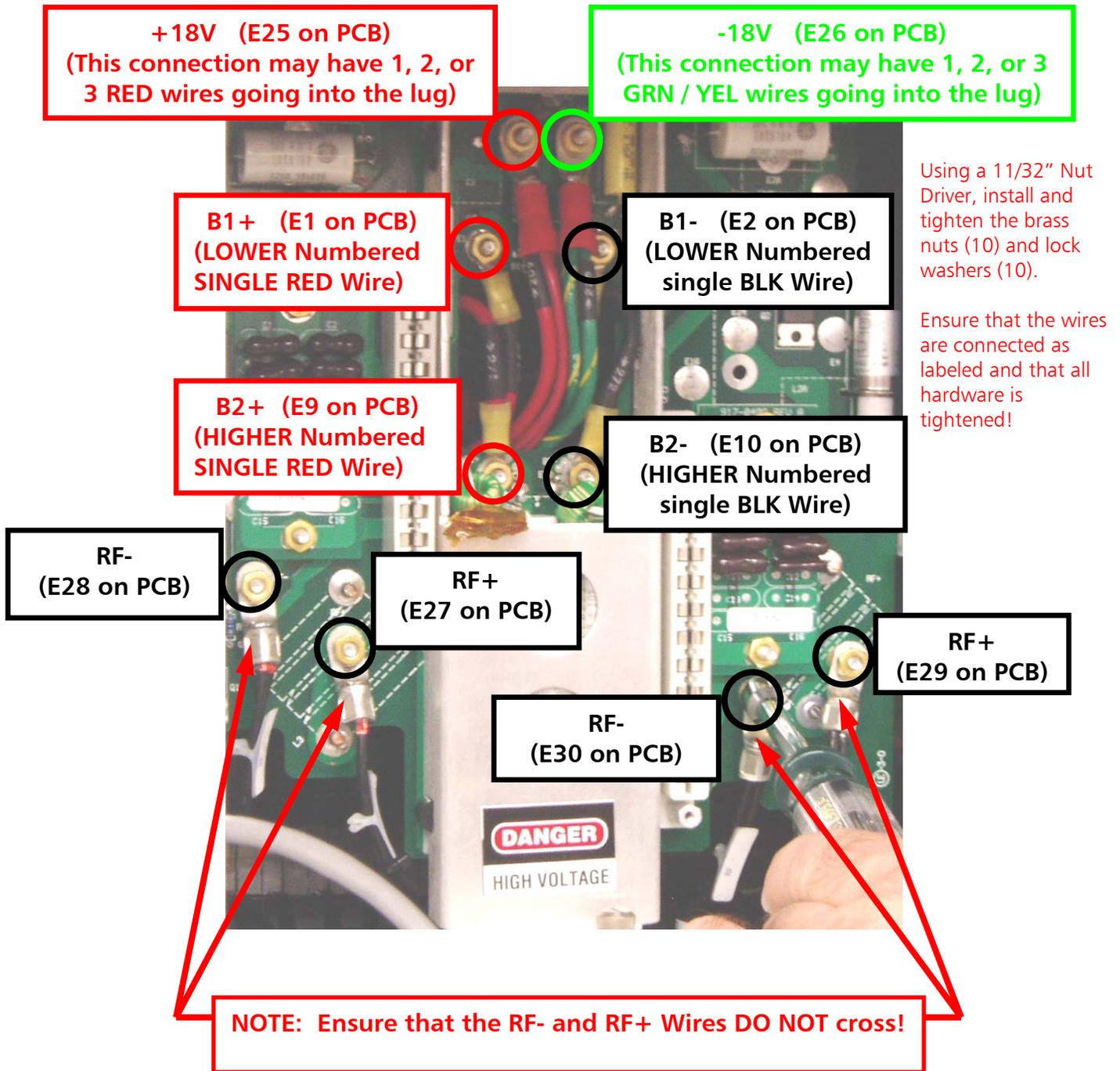


Figure 127 – "TOP" PA Motherboard Wiring Connections

7.14 "BOTTOM" PA Motherboard Wiring Connections

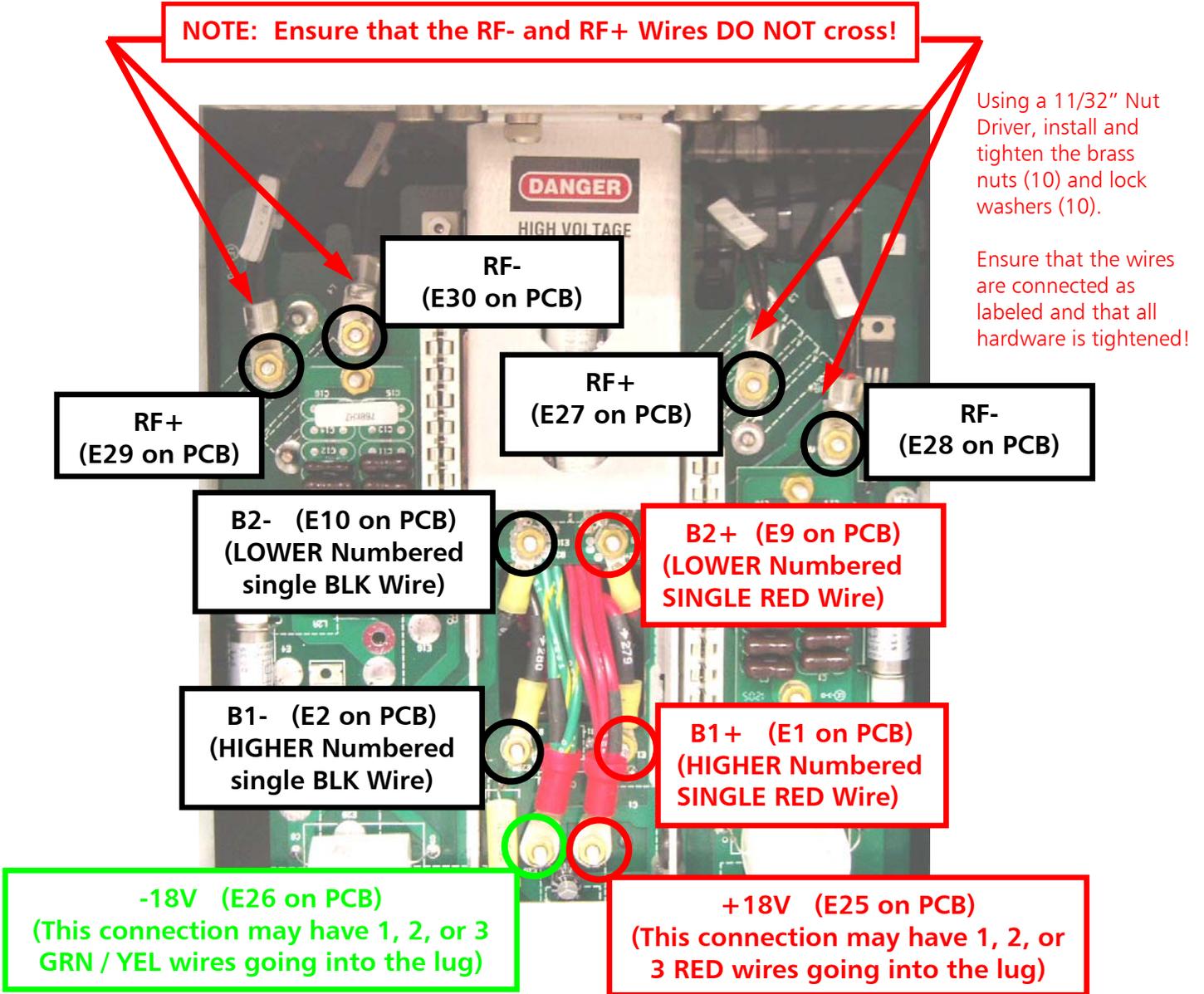
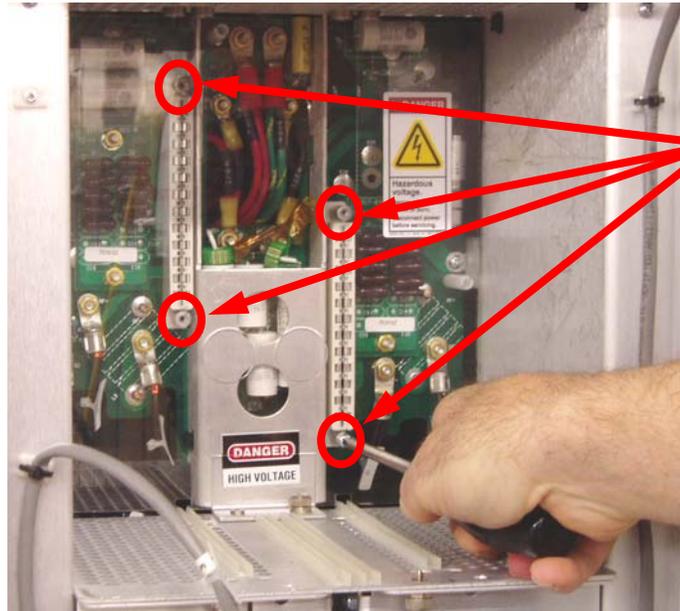


Figure 128 – "BOTTOM" PA Motherboard Wiring Connections



7.15 Install PA Motherboard Cover



STEP 1 – Install the Motherboard Cover

STEP 2 - Using a No. 2 Phillips Screw Driver install the (4) screws and (4) lock washers

Figure 129 – Install Motherboard Cover

7.16 Install and Connect PA Modules

Install and connect all PA Modules that were previously removed.



Figure 130 – Install PA Modules

7.17 Turn the 4MX 100 AC Breaker ON



Step 1 - Turn the Main Service Entrance AC Breaker to the **ON** position.

Step 2 - Turn the AC Breaker to the **ON** position.

Figure 131 – Turn 4MX 100 AC Breaker to ON

Once the transmitter comes up, there should not be any faults or alarms relating to Power Amplifiers.

7.18 PA Power Supply Module Replacement

There are 64 Power Supply Modules in the 4MX 100 Transmitter. The PS Modules are **NOT** "hot pluggable" (meaning individual PS Modules may NOT be replaced while the transmitter is operational).

Please note the RF Output Power Level that the transmitter is set to operate at determines which PS Modules are ON at a given time.

In a 4MX 100, all 64 Power Supply Modules will not be ON unless the RF Output Power Level is set for $\geq 20\text{kW}$; @ $5\text{kW} - 19.99\text{kW}$ 32 PS Modules will be ON (9-24 & 41-56); @ $500\text{W} - 4.99\text{kW}$ 16 PS Modules will be ON (13-20 & 45-52).

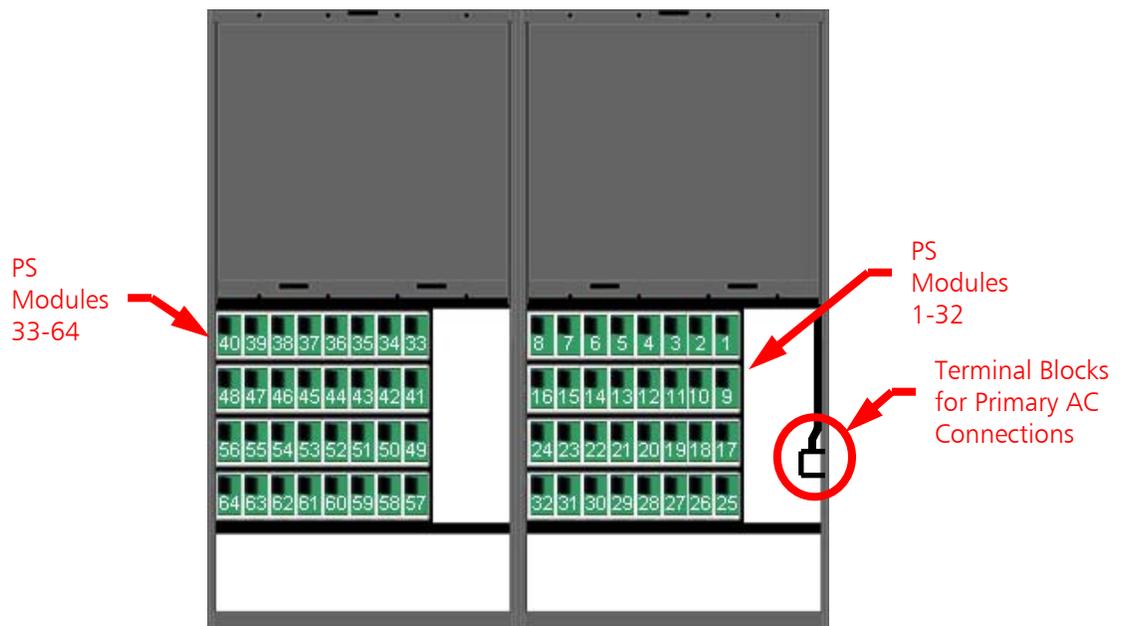


Figure 132 – 4MX 100 Power Supply Module Locations (Rear of Transmitter)

In the event that a Power Supply Module should fail, it is necessary to replace it.



When replacing a Power Supply Module the following steps must be followed to ensure the safety of the maintenance personnel as well as to protect against damage to the transmitter.

If a Power Supply Module fails, a "Power Supply Fault" will be displayed on the Main GUI.

If a PS Module fails, the **“Power Supply”** module block on the Main GUI screen will highlight red and a note stating **“A problem has been detected, select the DIAG button to troubleshoot”** will appear as shown on the left view of **Figure 133**.

Step 1 – From the Main GUI Menu, select **DIAG** and the Diagnostics Menu will then appear.

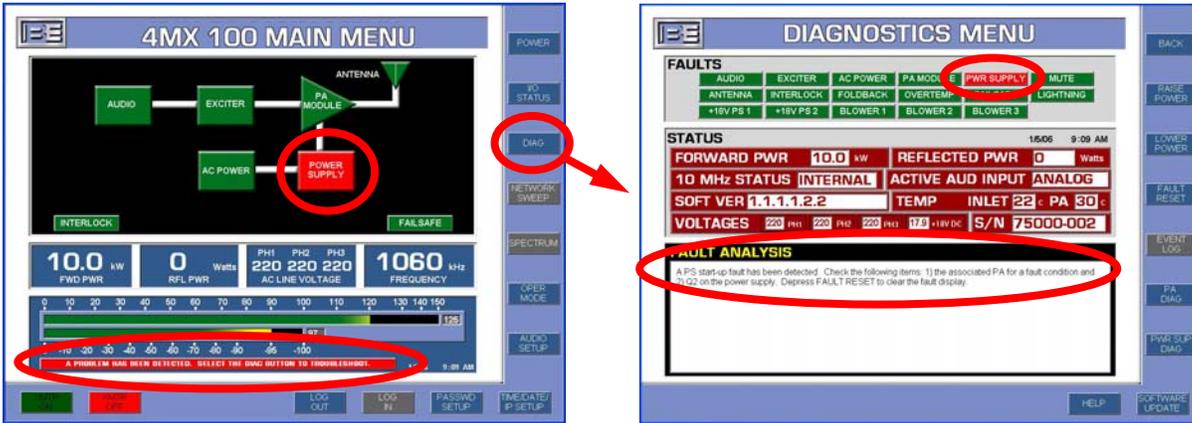


Figure 133 – Main GUI Power Supply Fault

Step 2 – From the Diagnostics Menu select **PWR SUP DIAG** and the Power Supply Diagnostics Menu will appear. If the fault is a failed Power Supply Module the Power Supply Diagnostics Menu will read as shown below. If the Fault does indicate a failed Power Supply Module, note which module has failed and proceed to **Step 3**.

If the Fault does **NOT** indicate a failed module, reset the Fault from the GUI or the front panel fault reset button.

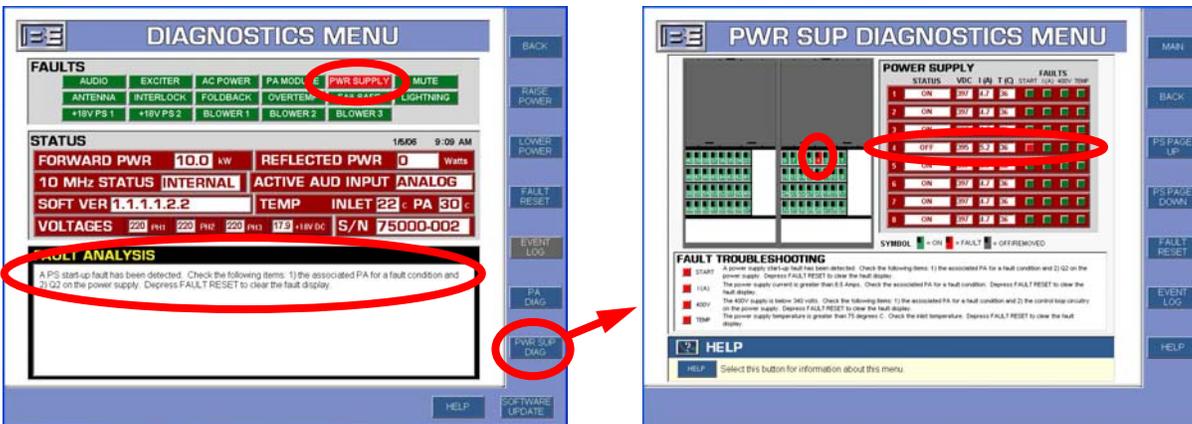


Figure 134 – Power Diagnostics Menu (Failed Power Supply Fault)

NOTE: Under certain conditions, a Power Supply Module fault may be indicated even though a PA Module has actually faulted. Please keep this in mind when troubleshooting. As a general rule, replace the corresponding PA module first.



Step 3 – Turn the Service Entrance Breaker OFF. Next, turn the 4MX’s AC Breaker OFF and remove the lower rear door.

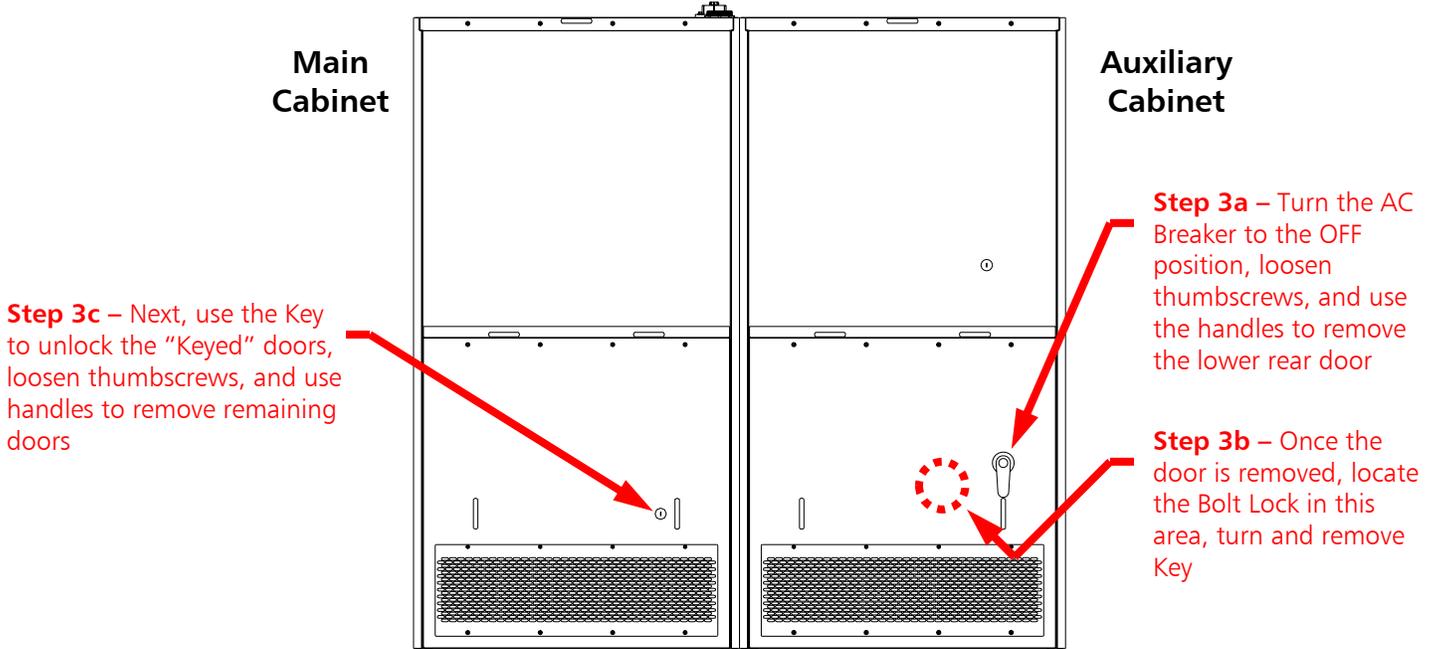


Figure 135 – Turn the Transmitter’s AC Breaker OFF and Remove Lower Rear Doors

Step 4 – Locate the failed power supply module. **Figure 136** shows the Power Supply Module locations.

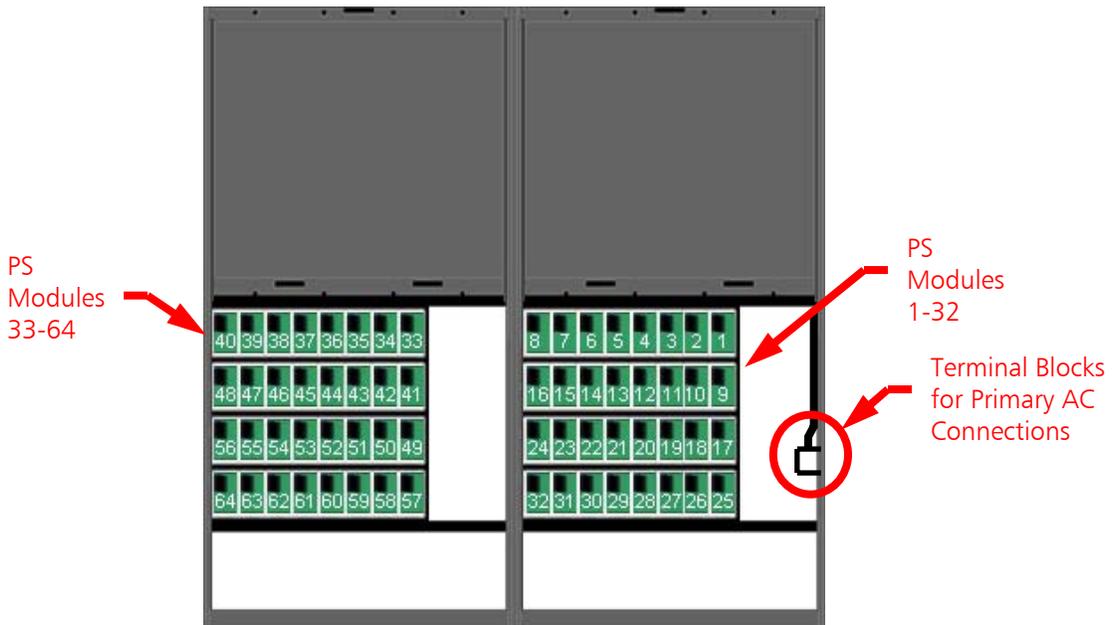
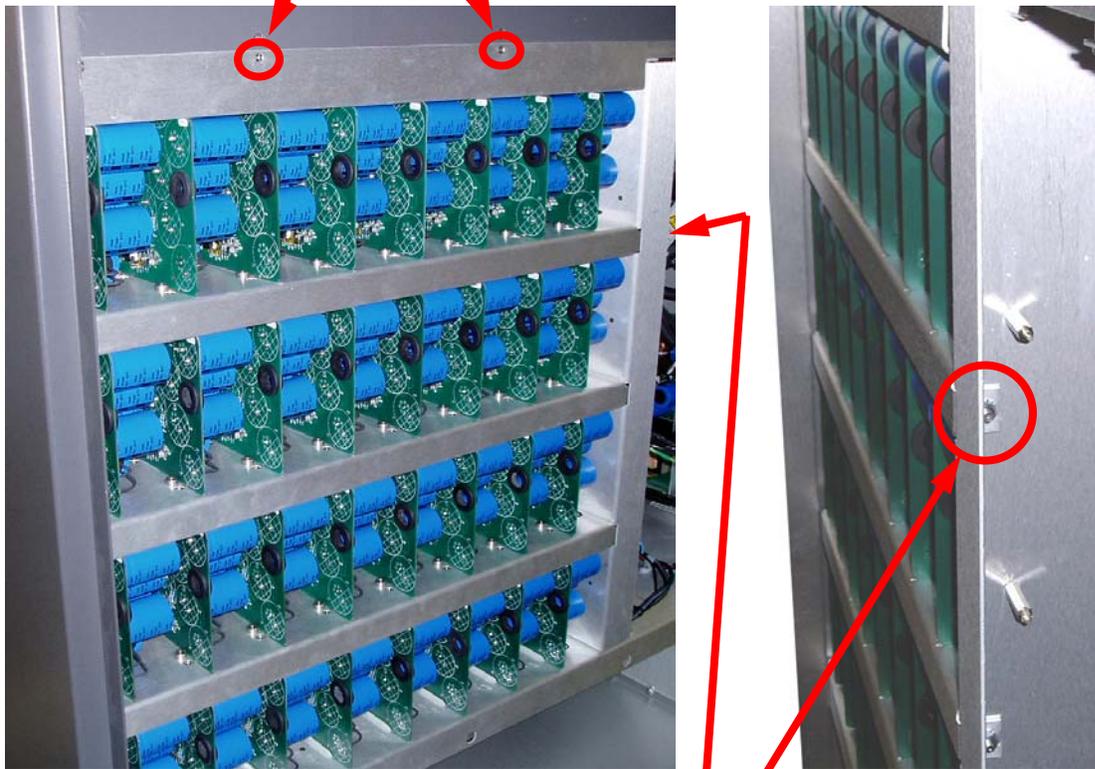


Figure 136 – Power Supply Module Locations (Rear of Transmitter)

Step 5 – Remove the appropriate Power Supply Module retaining bracket.

If removing a Power Supply Module from the top row, use a No. 2 Phillips Screw Driver and remove the (2) screws that hold the top Retaining Bracket in place.



If removing a Power Supply Module from the 2nd, 3rd, or 4th row, use a 3/8" Nut Driver and remove the kepnut that secures that row's retaining bracket in place.

**Figure 137 – Power Supply Module Retaining Brackets
(Rear of Transmitter – Lower Door Removed)**

Step 6 – After removing the retaining bracket, pull to remove the Power Supply Module. As the module starts to come out, be sure to use free hand to support the rear of the module.

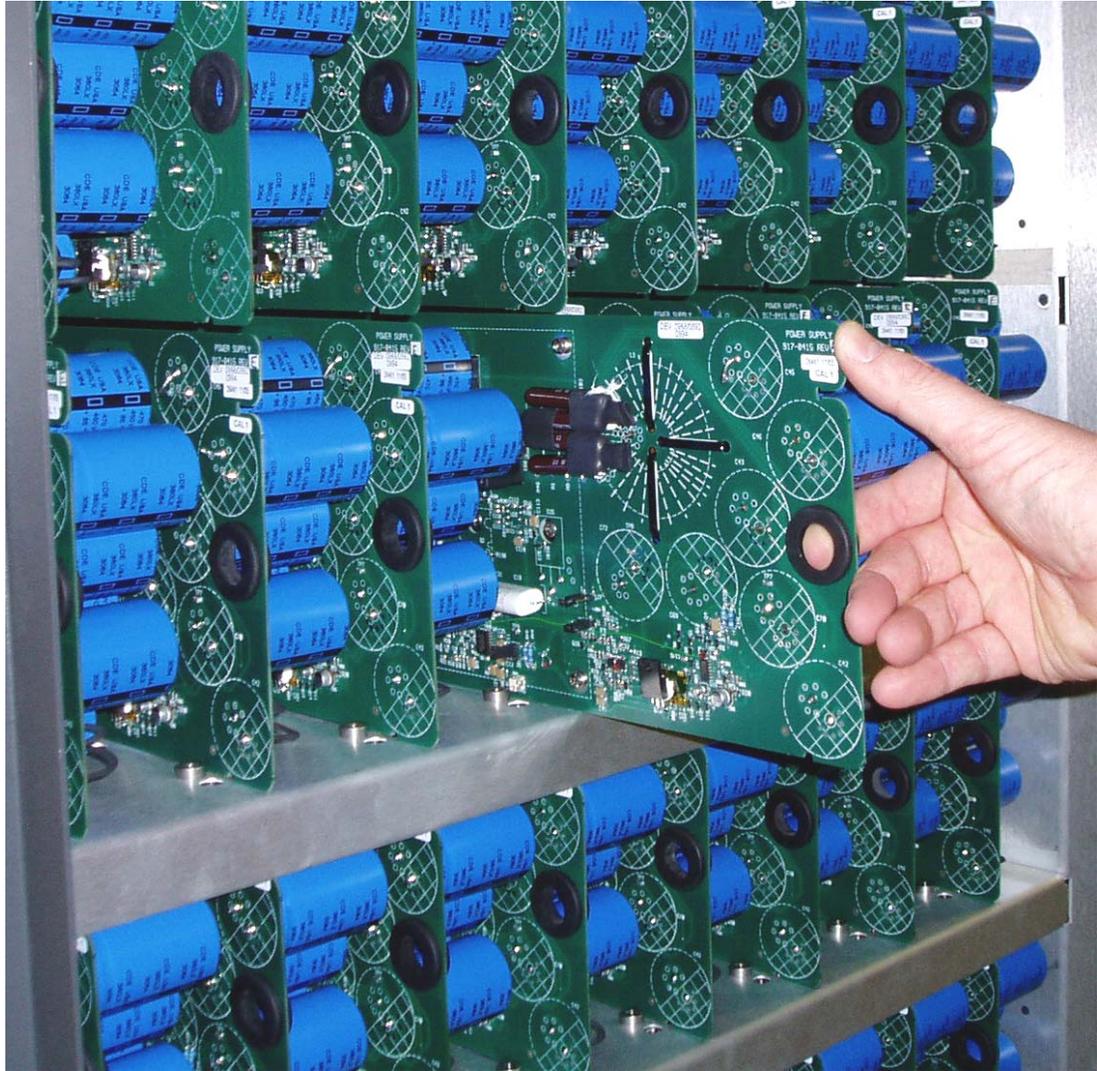


Figure 138 – Power Supply Module Removal

Note: When Installing a new Power Supply Module, ensure that the module enters the Rear Card Guides and then becomes fully seated into the power supply motherboard card edge connector.

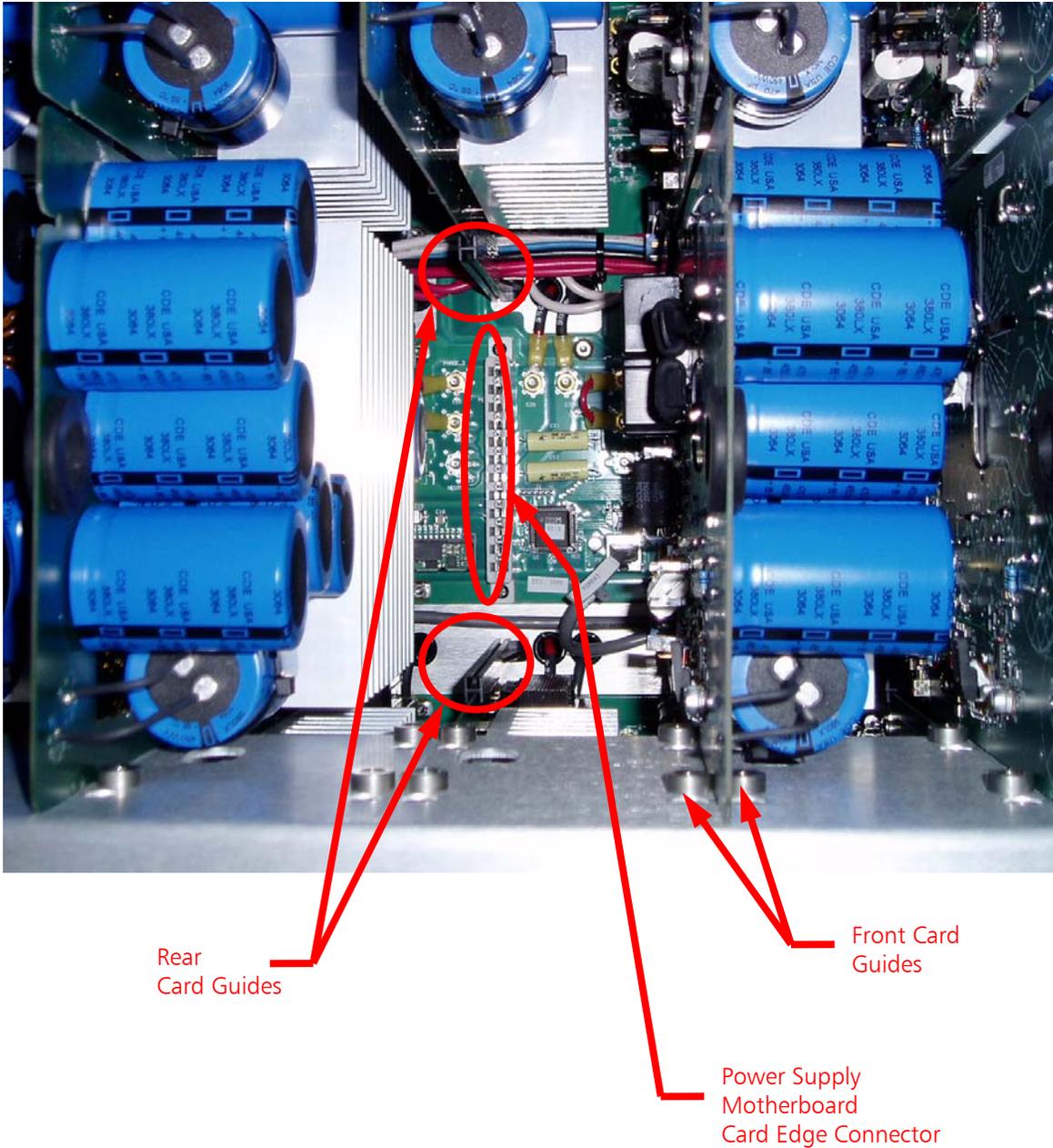


Figure 139 – View of Power Supply Motherboard (PS Module Removed)



Step 7 – Carefully install the new Power Supply Module ensuring that the module enters the rear card guides and then fully seats into the motherboard card edge connector.

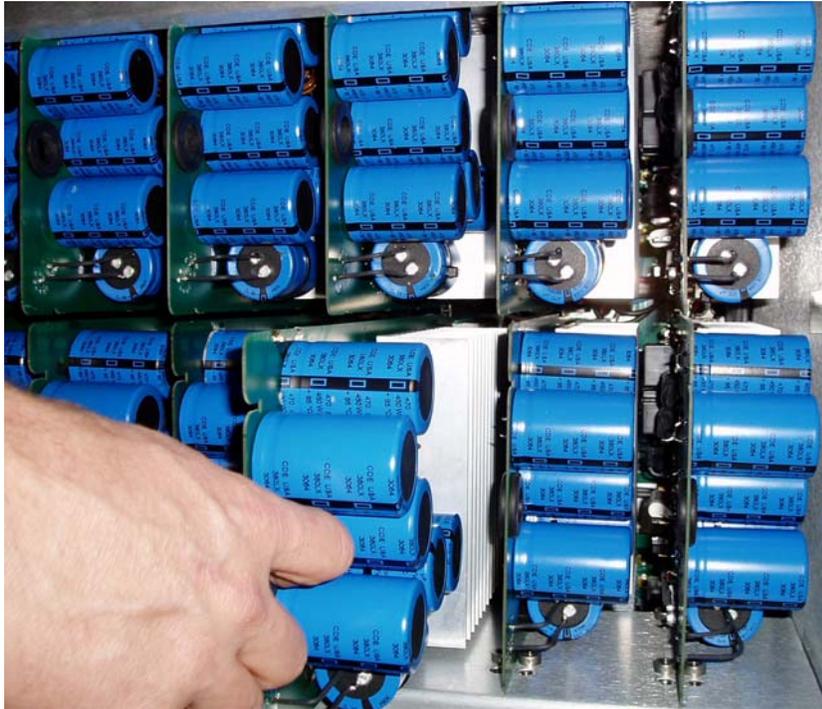
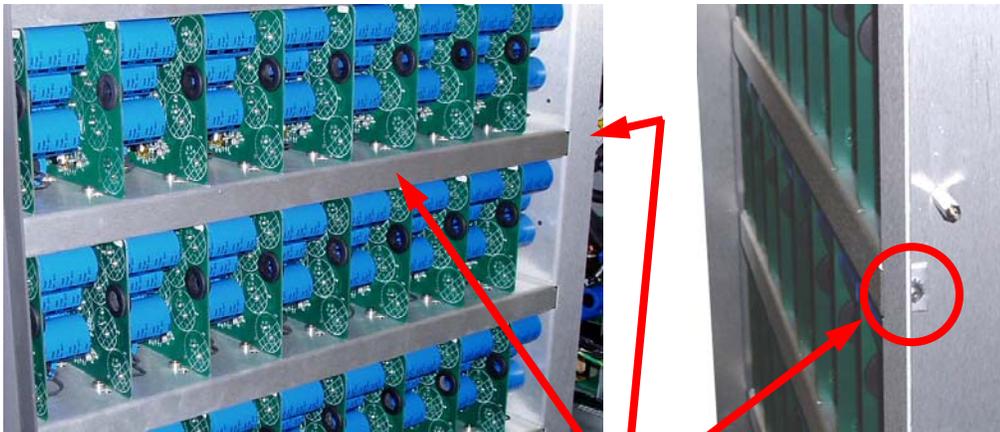


Figure 140 – Installing a New Power Supply Module

Step 8 – Install the Power Supply retaining bracket.



Re-install the Power Supply
Retaining Bracket and hardware

Figure 141 – Install Power Supply Retaining Bracket

Step 9 – Install the lower rear door and turn the AC Breaker ON.

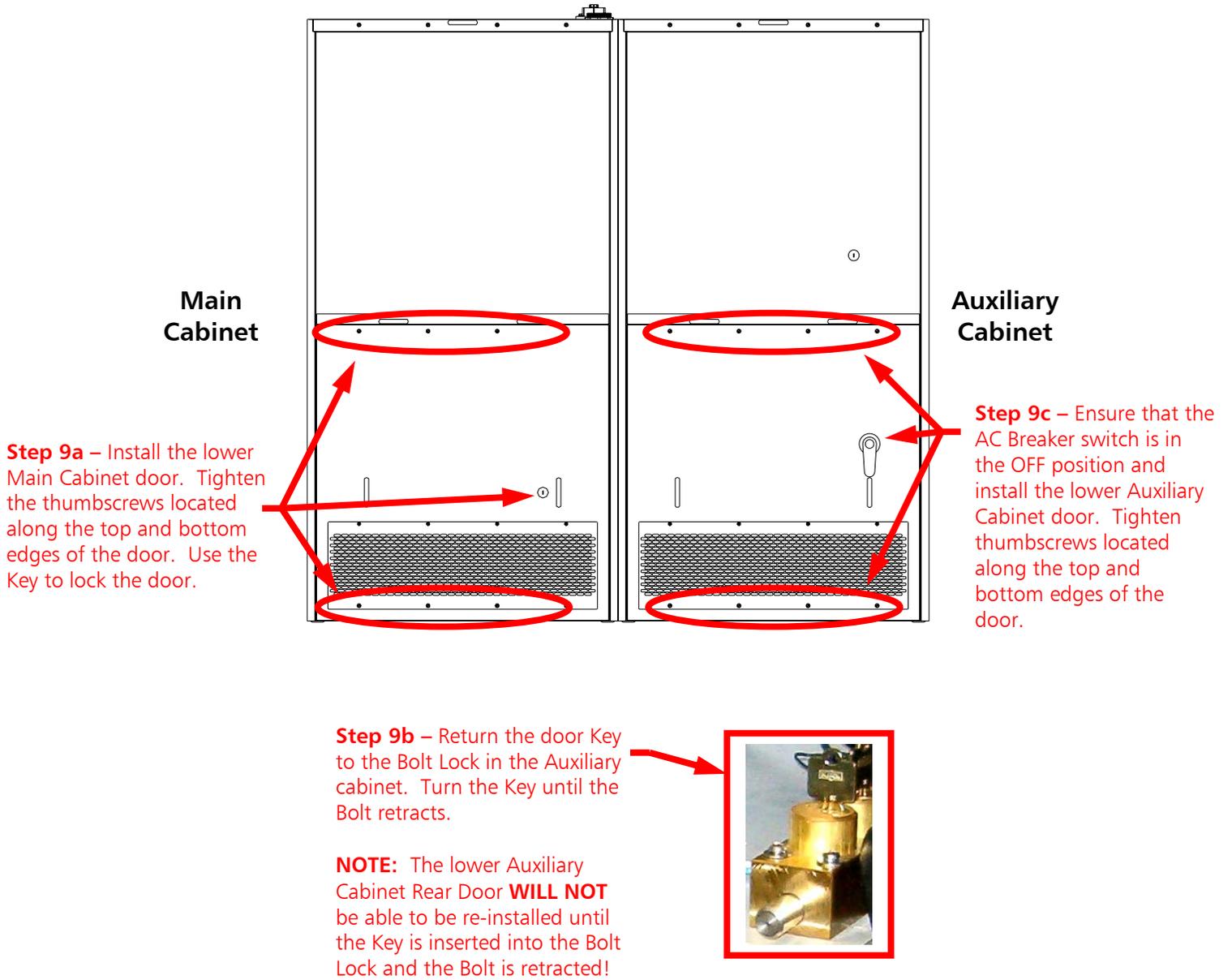


Figure 142 – Install Lower Rear Door and Turn AC Breaker ON



Step 10 – After turning on the Main AC Breaker, reset Faults from the Power Supply Diagnostics Menu. The transmitter should now return to the RF Output Power level that it was set at before the Power Supply Fault occurred.

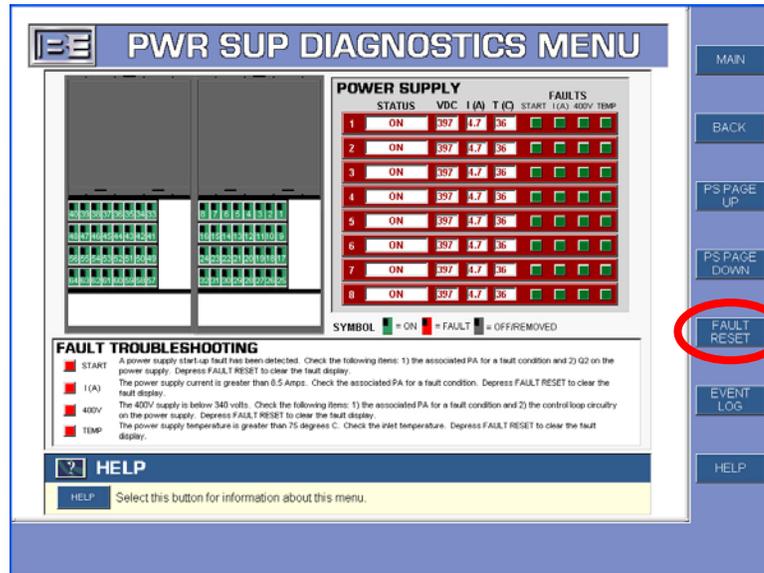


Figure 143 – Reset Faults

8 Prepare to Replace a 4MX 100 Power Supply Motherboard

8.1 Tools / Items Needed

- No. 2 Phillips Screw Driver
- Flat Blade Screw Driver (short shank)
- Identification Tags (tag Power Supply Modules prior to removal)
- 11/32" Nut Driver
- 1/4" Nut Driver
- Small 6" Ty-wraps
- Side Cutters

8.2 Estimated Time for Replacement

Providing that you have the tools listed above, it will take approximately 45 minutes – 1 hour to complete the replacement of a Power Supply Motherboard.

9 Replacing a 4MX 100 Power Supply Motherboard

9.1 Turn the 4MX AC Breaker OFF

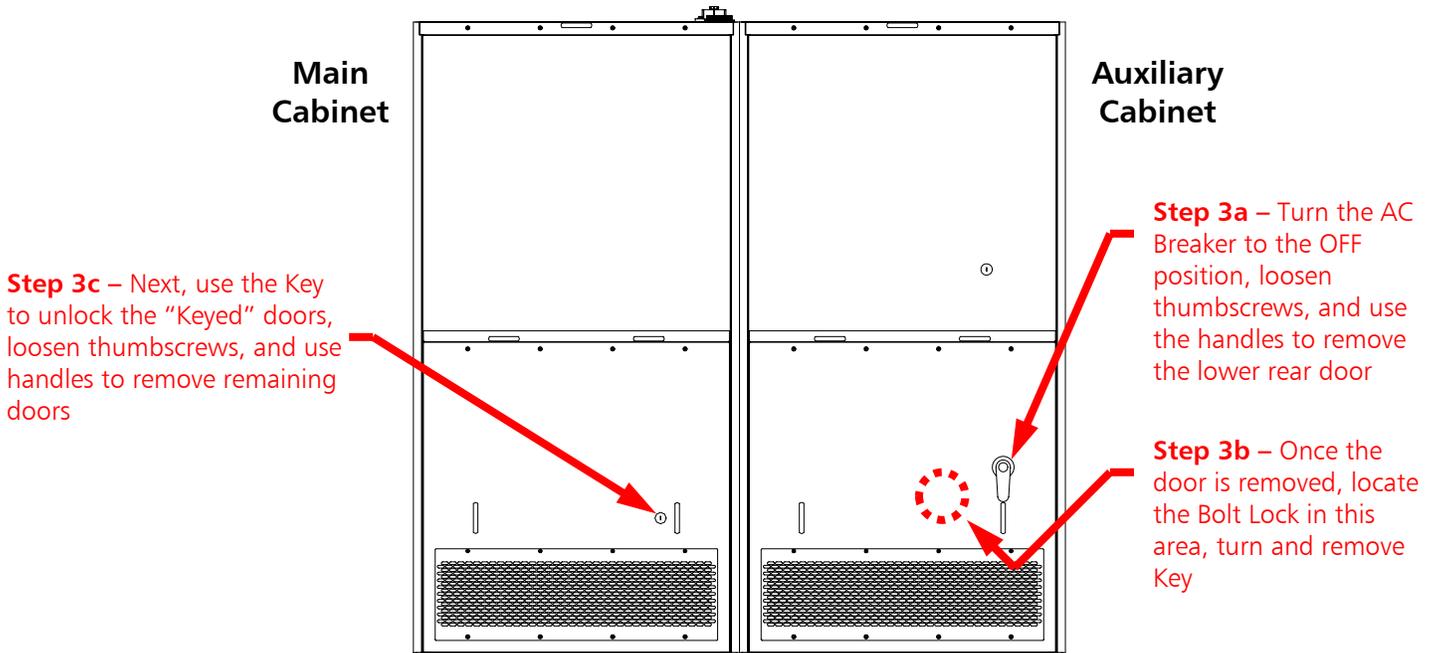


Figure 144 – Turn the Transmitter’s AC Breaker OFF and Remove Lower Rear Doors

9.2 Power Supply Module / Motherboard Locations

The 4MX 100 has 64 Power Supply Modules. **Figure 145** illustrates how the Power Supply Modules are numbered.



Figure 145 – 4MX 100 Power Supply Module Locations (Rear of Transmitter)

Figure 146 below illustrates how the Power Supply Motherboards are numbered.

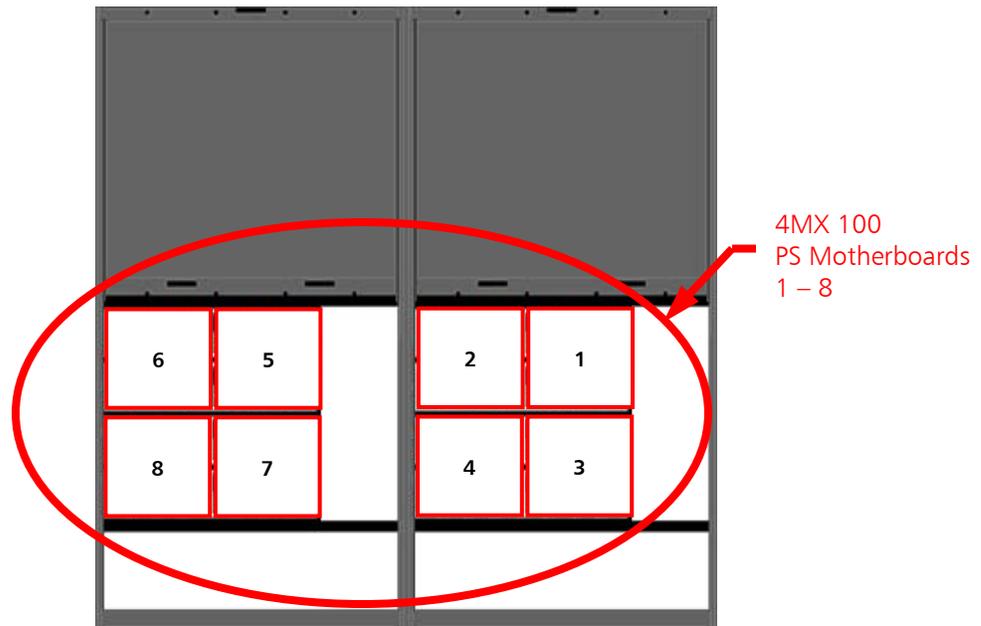


Figure 146 – 4MX 100 Power Supply Motherboard Locations (Rear of Transmitter)

9.3 Removal of Power Supply Modules

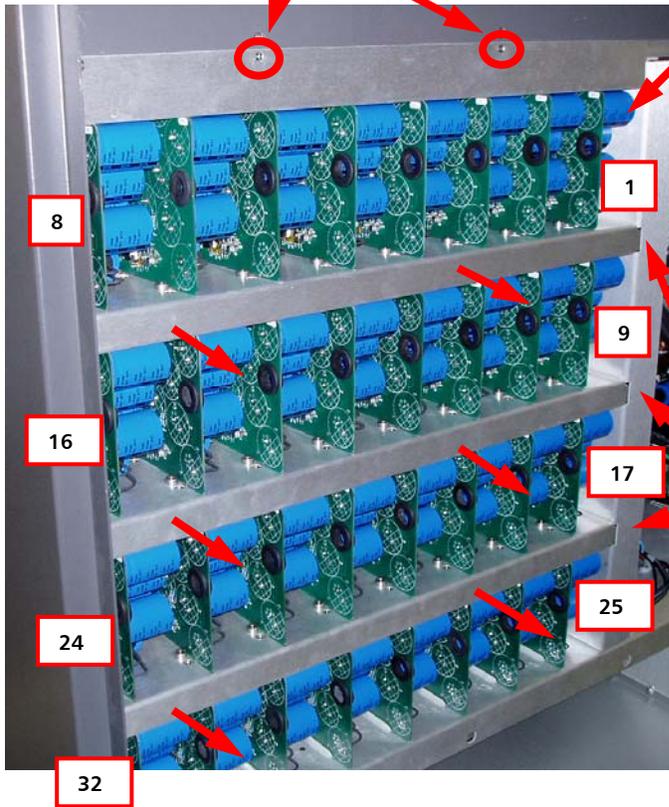
NOTE: Prior to removal of the Power Supply Modules, it is recommended that the modules be tagged to ensure that they are installed into their original locations to maintain integrity with the original factory test data.

Step 1 – Tag Power Supply Modules with their number as noted.

Step 2 – Use a No. 2 Phillips Screw Driver and remove the (2) screws that hold the top Retaining Bracket in place.

Step 3 – Remove the top row of PS Modules

Auxiliary Cabinet shown



Note: Modules must be removed starting with the top row, then the 2nd, 3rd, and then the 4th row.

Figure 147 – Power Supply Module Retaining Brackets

Step 4 – Use a 3/8" Nut Driver and remove the kepnuts that secures the retaining bracket of the next row of PS Modules.

Step 5 – Pull to slide the Retaining Bracket out as indicated by the arrows above, then remove the next row of PS Modules.

Step 6 – Remove all of the Power Supply Modules.



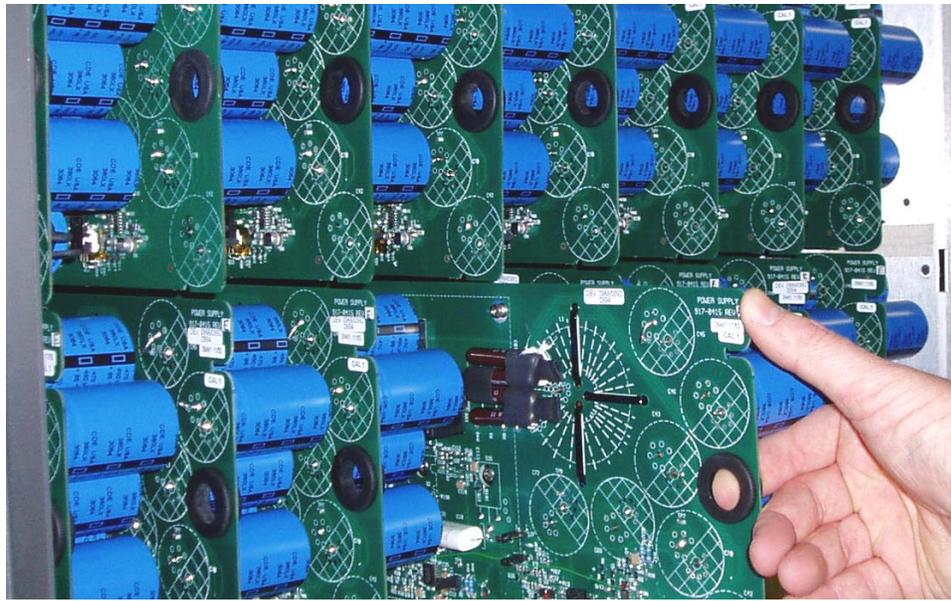


Figure 148 – Removal of Power Supply Modules

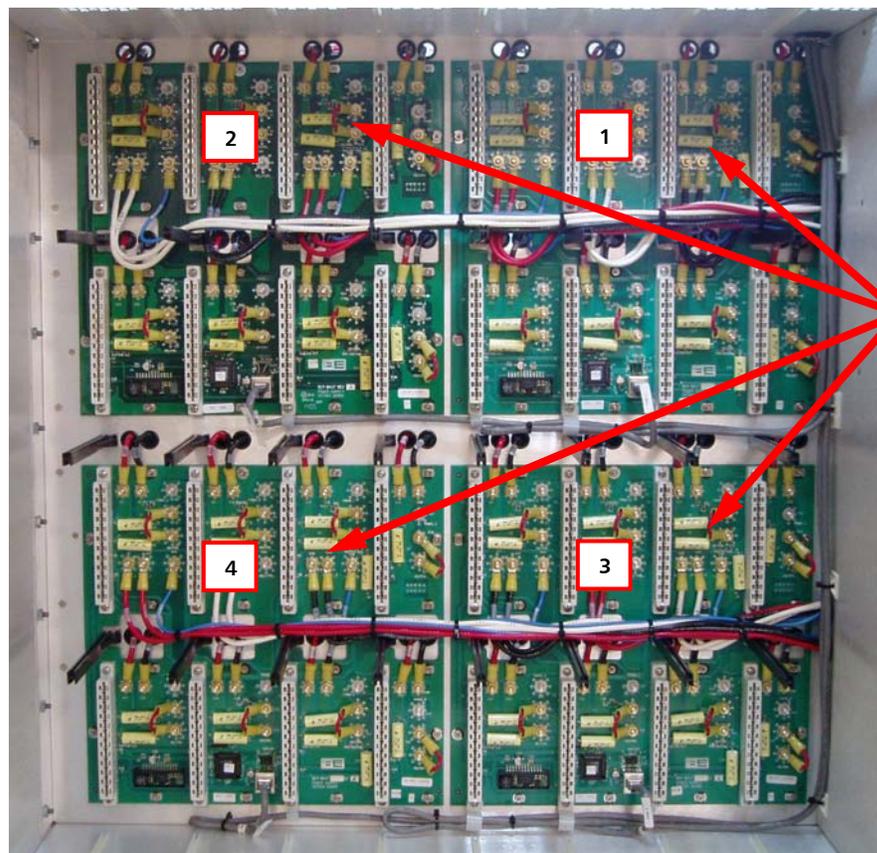
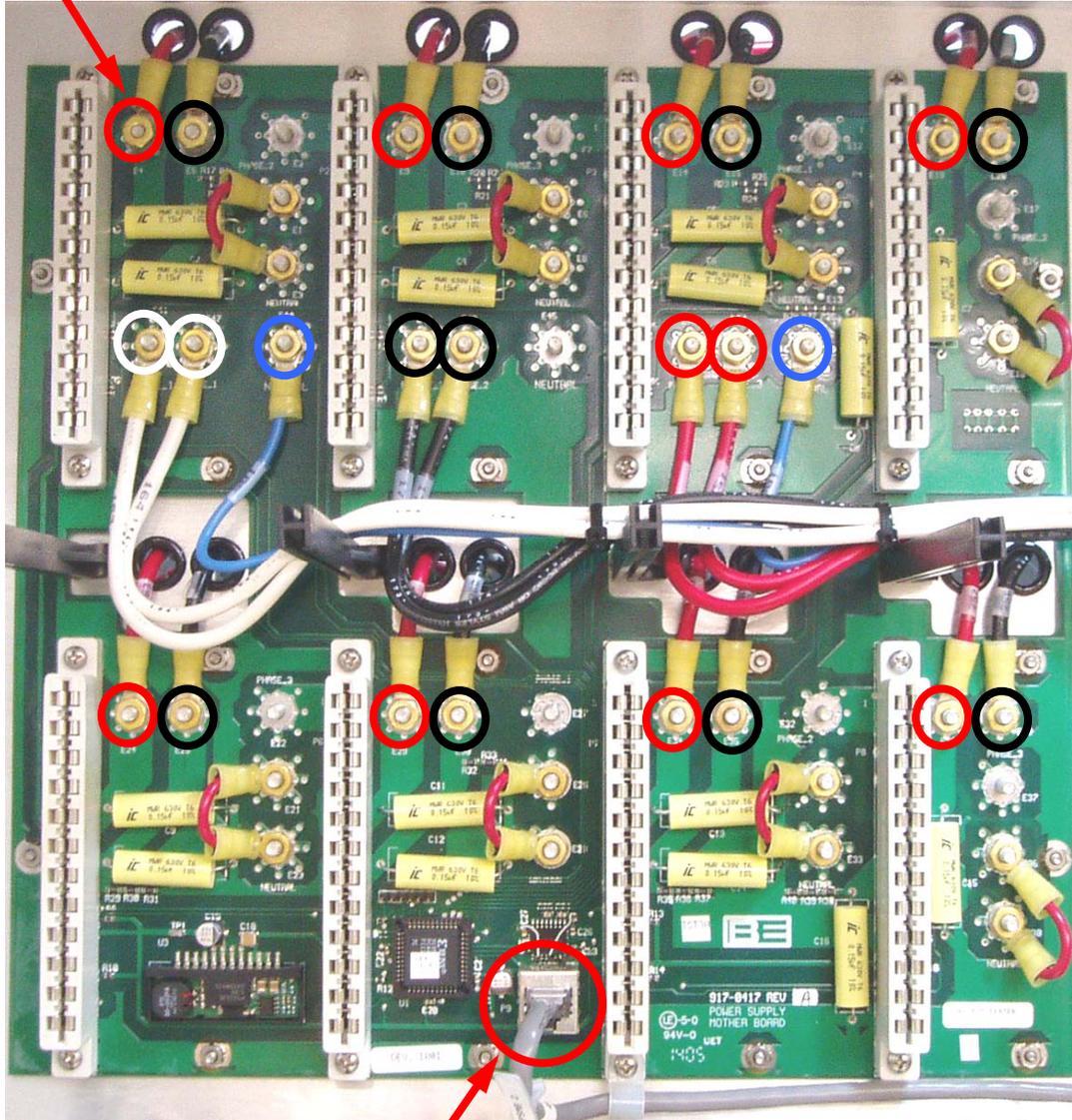


Figure 149 – Power Supply Modules Removed

9.4 Disconnect Power Supply Motherboard Connections

Step 1 - Using an 1 1/32" nut driver remove brass hex nuts (qty 24) and lock washers (qty 24). Next, remove the wire harness lug terminals from the studs in the Motherboard.



Step 2 - Disconnect the Ethernet connection.

Figure 150 – Disconnect Power Supply Motherboard Connections

9.5 Remove Power Supply Motherboard Hardware

Step 1 - Using a 1/4" Nut Driver, remove all kepnut mounting hardware (qty 20).

Step 2 - Using a No. 2 Phillips screw driver, remove all card edge mounting Screws and split lock washers (qty 16).

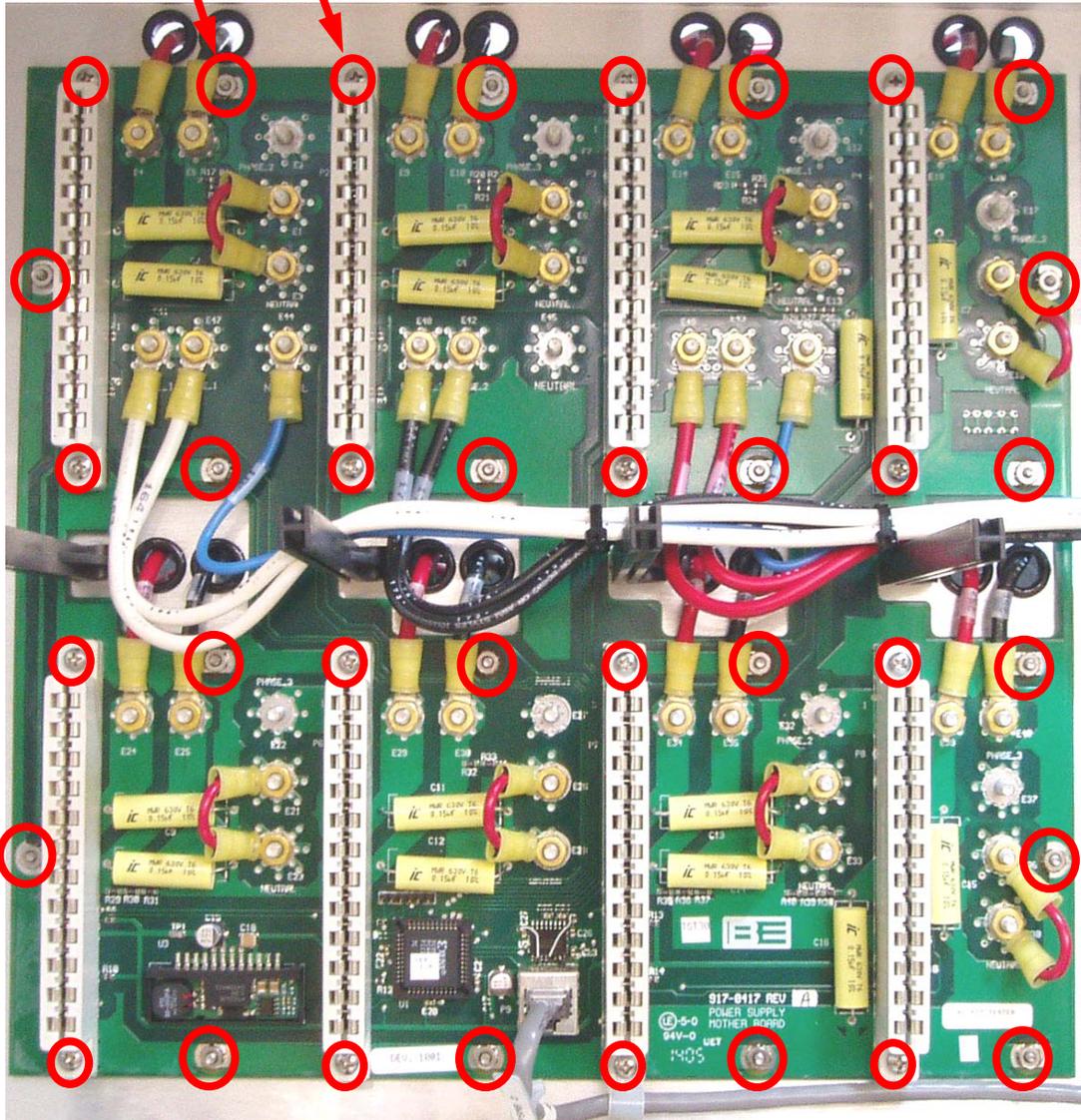


Figure 151 – Removal of Power Supply Motherboard Hardware

Step 3 – Remove the Power Supply Motherboard from the transmitter.

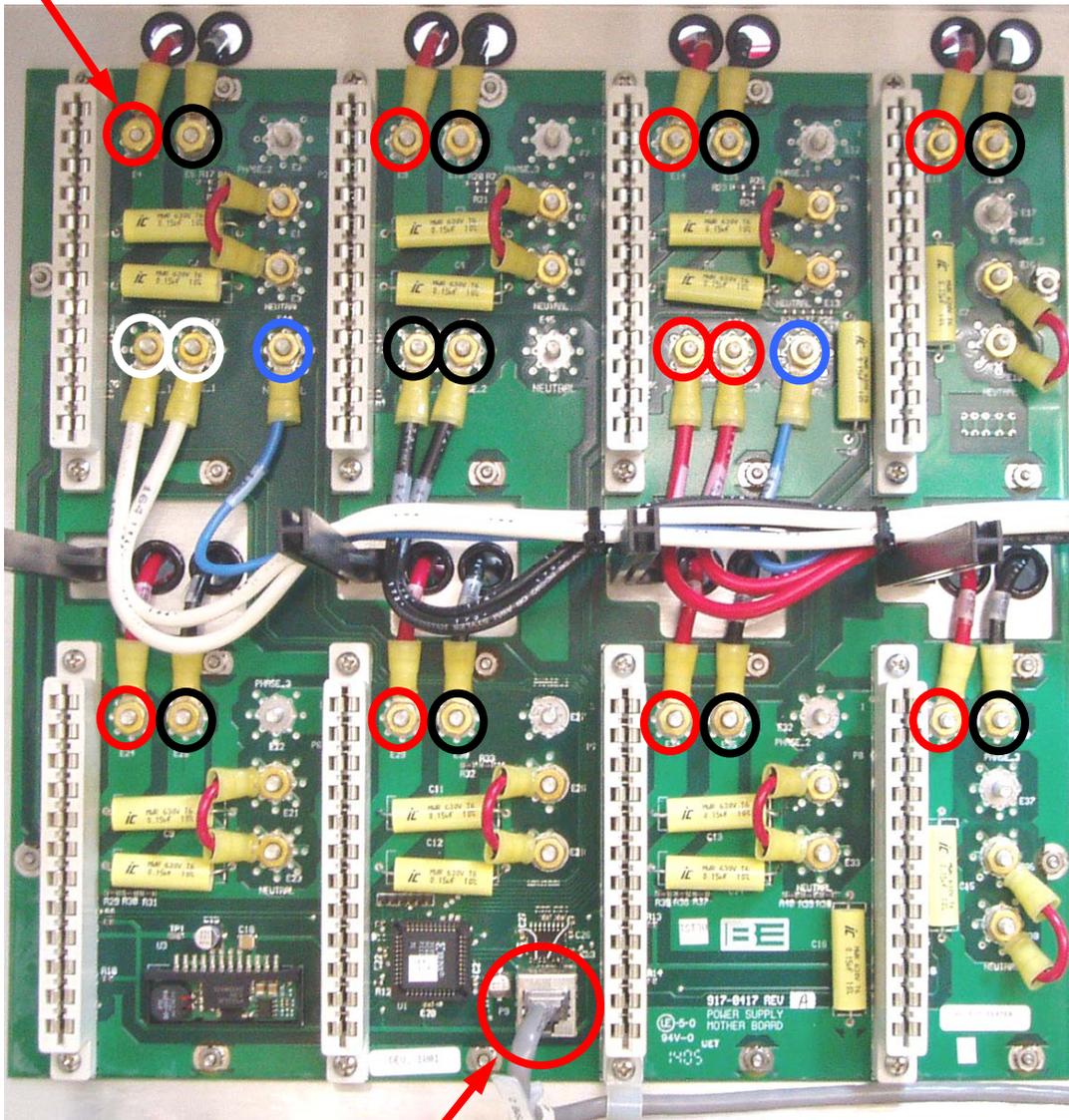
9.6 Install New Power Supply Motherboard

Install the new Power Supply Motherboard using the hardware that was previously removed.

9.7 Connect Wire Harness and Ethernet To Power Supply Motherboard

Connect the Wire Harness and Ethernet Cables to the Power Supply Motherboard.

Step 1 – Install the wire harness lug terminals onto the studs of the Power Supply Motherboard as shown. Use an 11/32" nut driver and install the Brass Nuts and Lock Washers that were previously removed when disconnecting the harness. Ensure that all connections are tightened down properly.



Step 2 – Connect the Ethernet connection.

Figure 152 – Power Supply Motherboard Hardware Cable Connections

9.8 Install the Power Supply Modules

Install the Power Supply Modules starting at the bottom row and work your way up. After installation of each row of Power Supply Modules, install the row's retaining bracket.

Step 4 - Use a No. 2 Phillips Screw Driver to install the (2) screws that hold the top Retaining Bracket in place

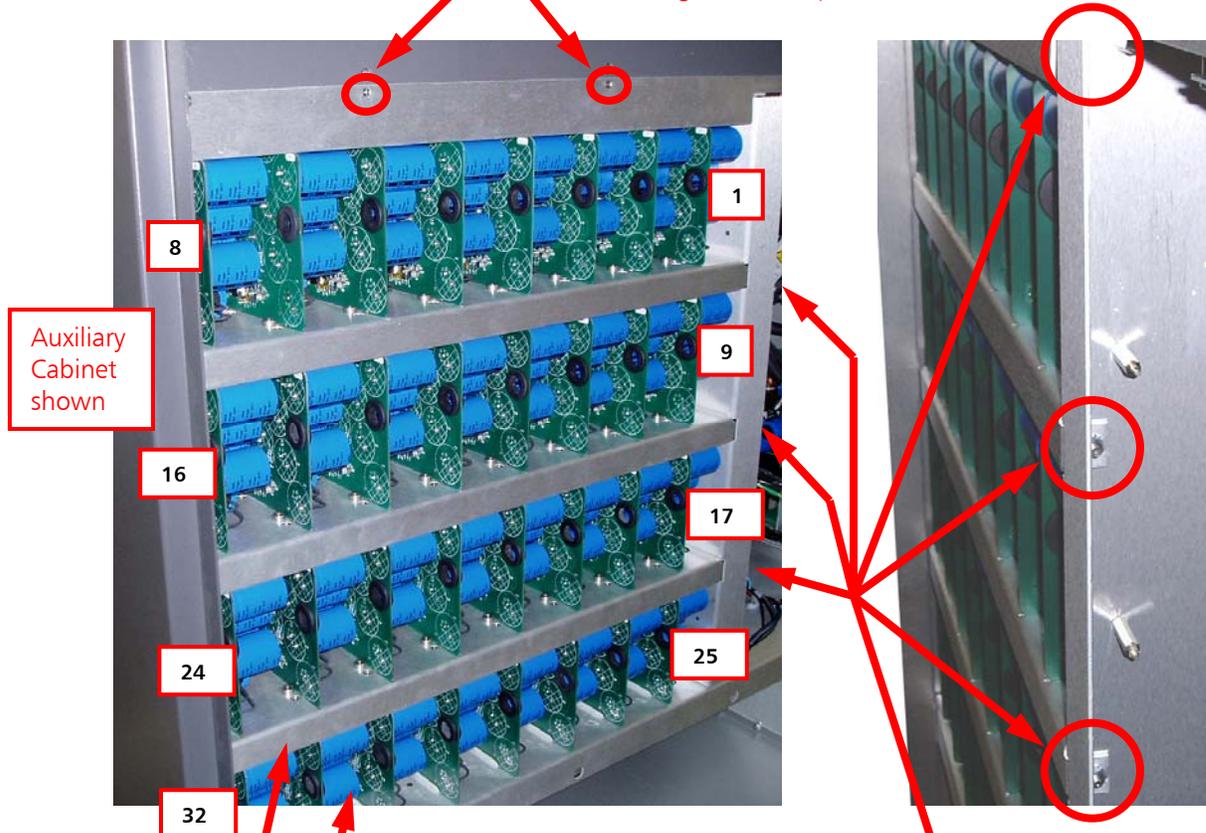


Figure 153 – Install Power Supply Modules

Step 1 – Install the bottom row of modules first (25 - 32 tagged prior to removal)

Step 2 – Install the Retaining Bracket. Use a 3/8" Nut Driver to tighten the kepnuts that secure the retaining brackets in place.

Step 3 – Repeat Steps 1 and 2 for the remaining rows of Power Supply Modules.

NOTE: When Installing a new Power Supply Module, ensure that the module enters the Rear Card Guides and then becomes fully seated into the power supply motherboard connector.

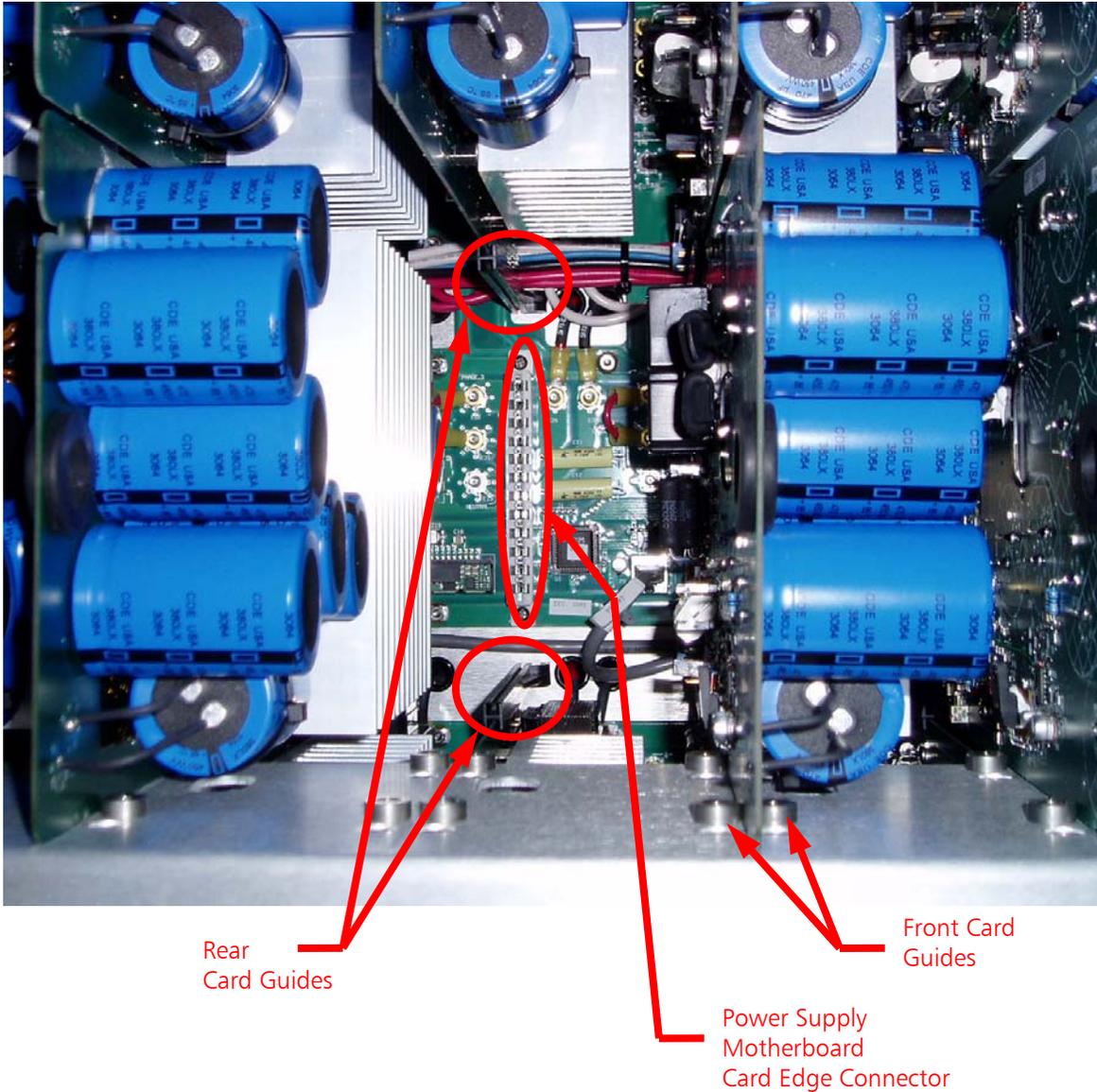


Figure 154 – View of Power Supply Motherboard (Power Supply Module Removed)



9.9 Install the Lower Rear Doors of the Transmitter and Turn AC Breaker ON

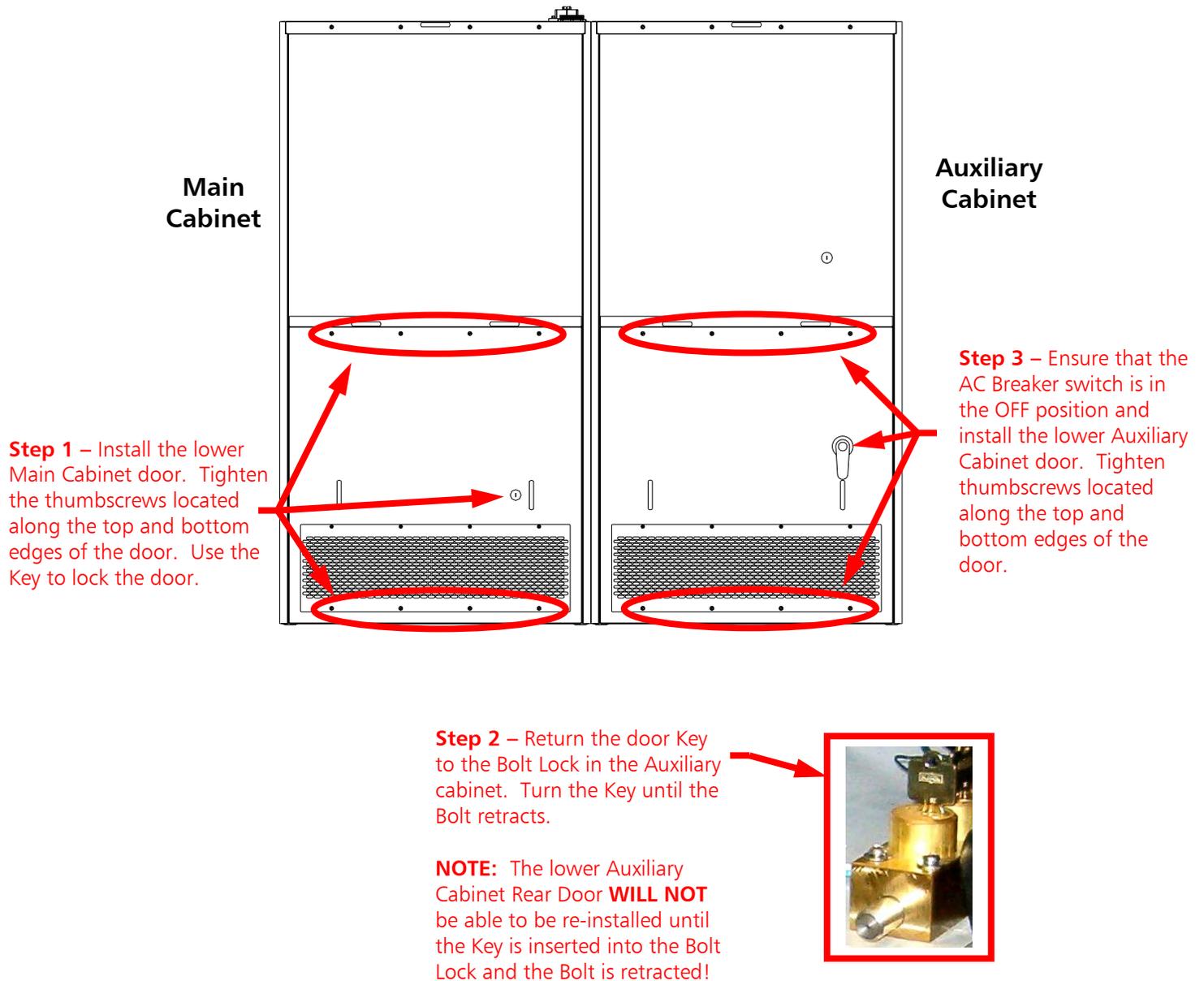


Figure 155 – Install Lower Rear Door and Turn AC Breaker ON

After AC Power has been applied, ensure that the transmitter comes up without any faults pertaining to the Power Supply.

10 Prepare to Replace the 4MX 100 System Controller

10.1 Tools Needed

- 1/4" Nut Driver
- No. 2 Phillips Screw Driver

10.2 Estimated Time for Replacement

Providing that you have the tools listed above, it will take approximately 30-45 minutes to complete the replacement of the System Controller.

10.3 ESD Awareness



When handling the Controller PCBs, be sure to exercise ESD precautions as the controller has ESD sensitive components.

11 Replacing the 4MX 100 System Controller

11.1 Turn the 4MX 100 AC Breaker OFF

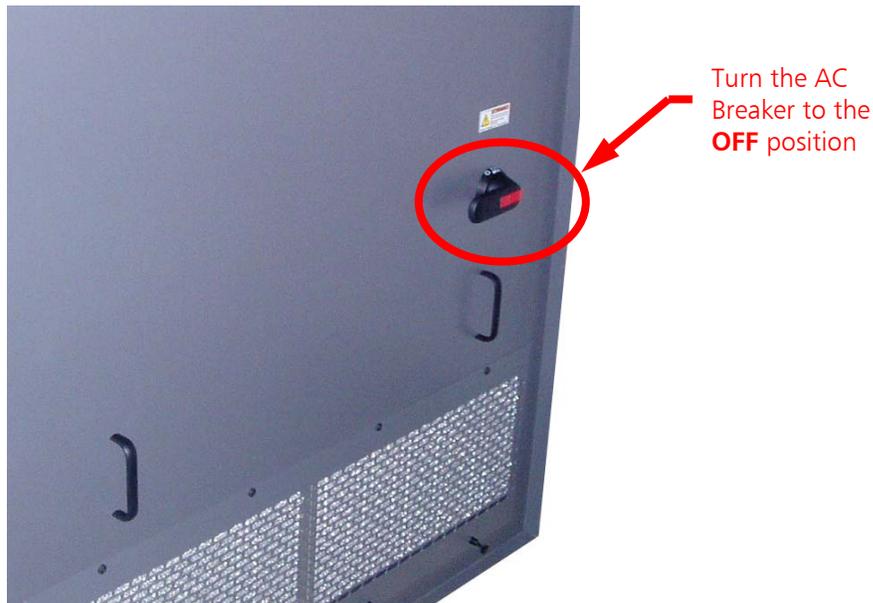


Figure 156 – Turn 4MX 100 AC Breaker to OFF

11.2 Remove the Remote I/O Access Panel

Step 1 – Using a No. 2 Phillips Screw Driver remove the (2) screws from the right door as shown.



Step 2 – Using a No. 2 Phillips Screw Driver remove the (3) screws from the hinge area as shown



Step 3 – Use the fold-out handle to remove the Remote Control I/O and Audio Input Access Panel



Figure 157 – Remote Control I/O Access Panel Removal

11.3 Remove the Remote I/O PCB Assembly

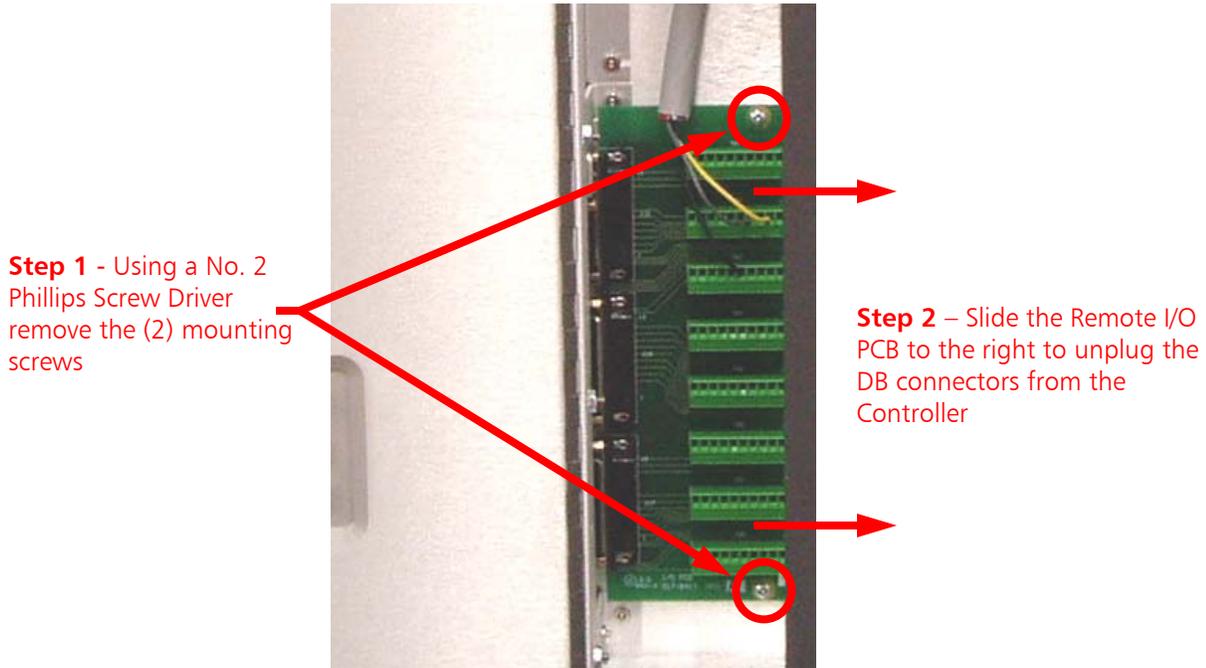


Figure 158 – Remove Remote I/O PCB

11.4 Loosen the Controller Bracket Kepnuts (in the Remote I/O Cavity)

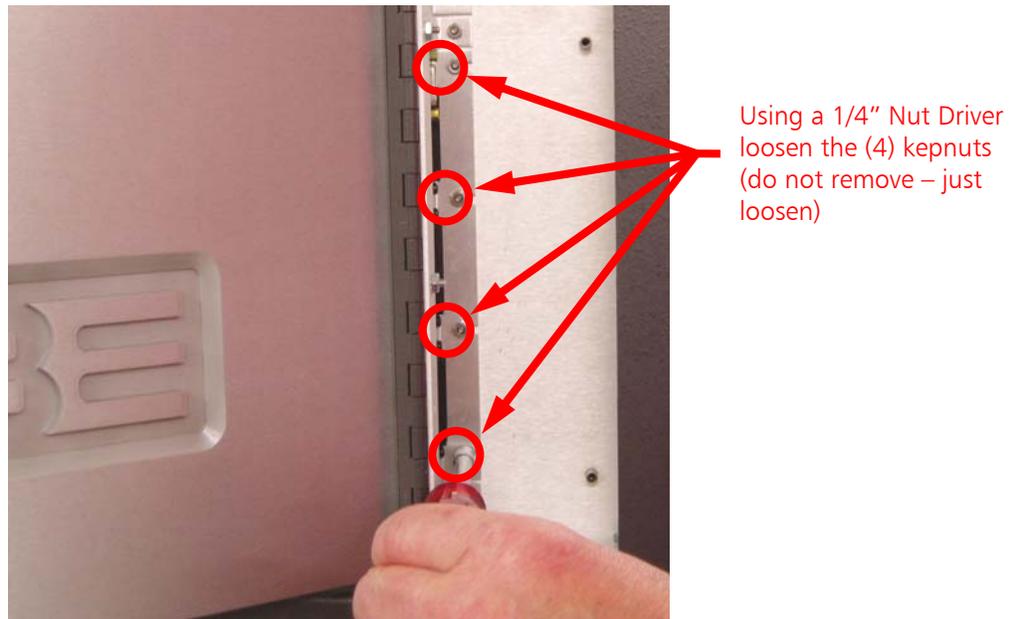


Figure 159 – Loosen System Controller PCB Bracket Kepnuts

11.5 Disconnect Cabling from the Controller PCB

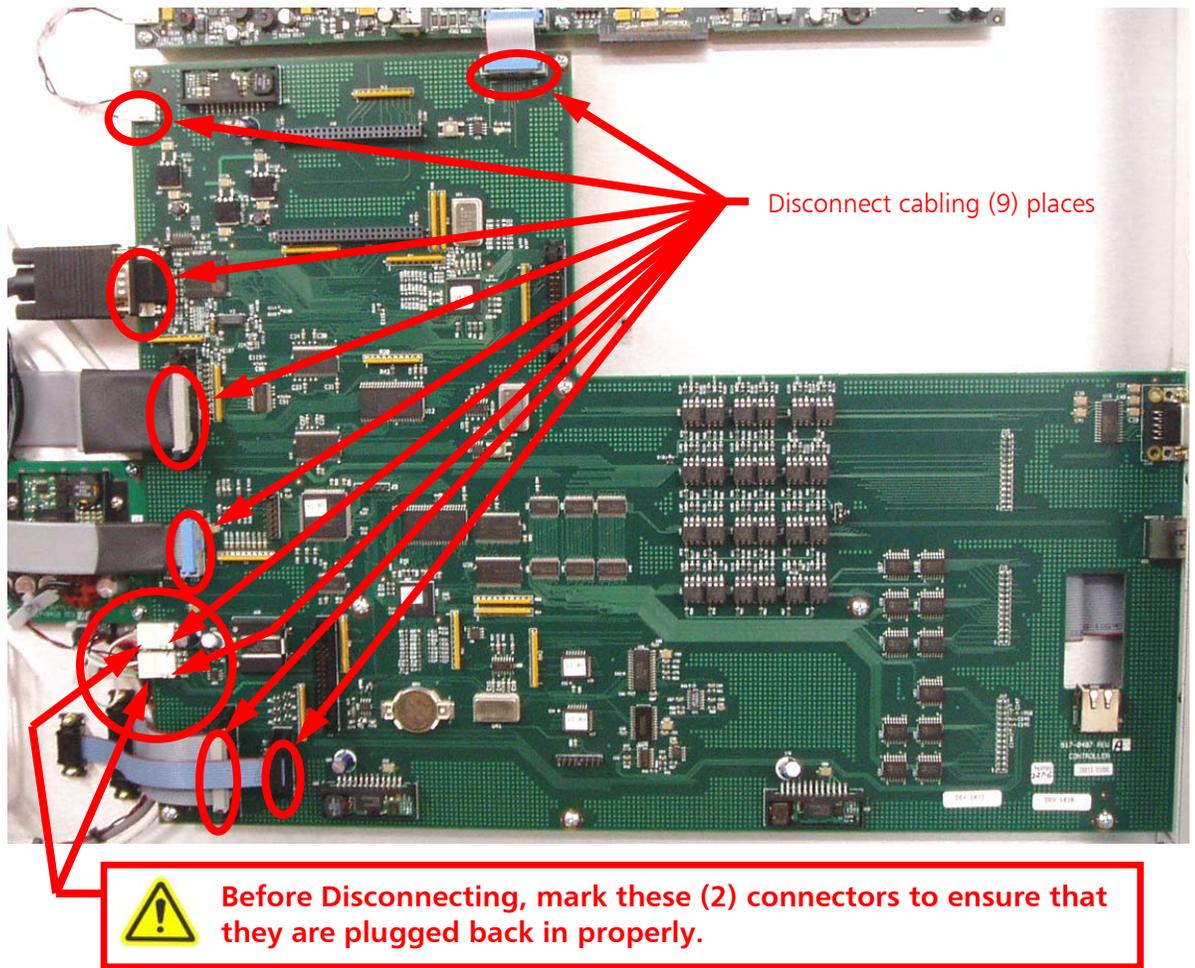


Figure 160 – Disconnect Cabling

11.6 Remove the Controller PCB Mounting Hardware

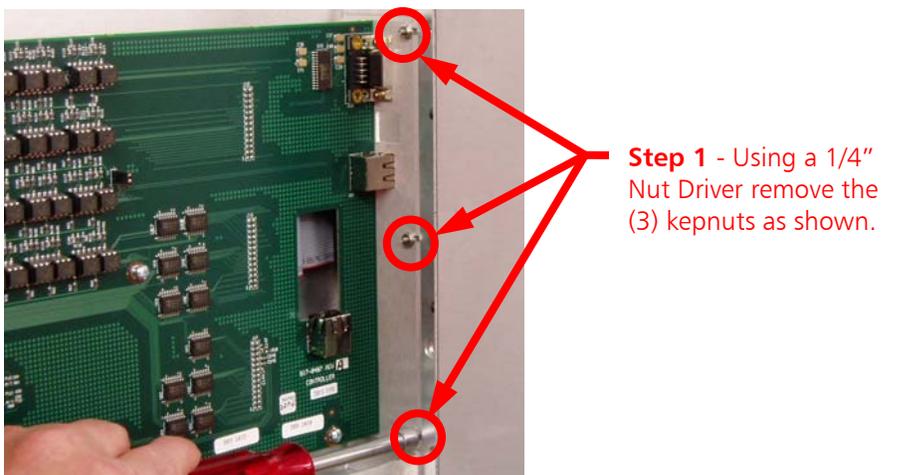


Figure 161 – Remove Kepnuts

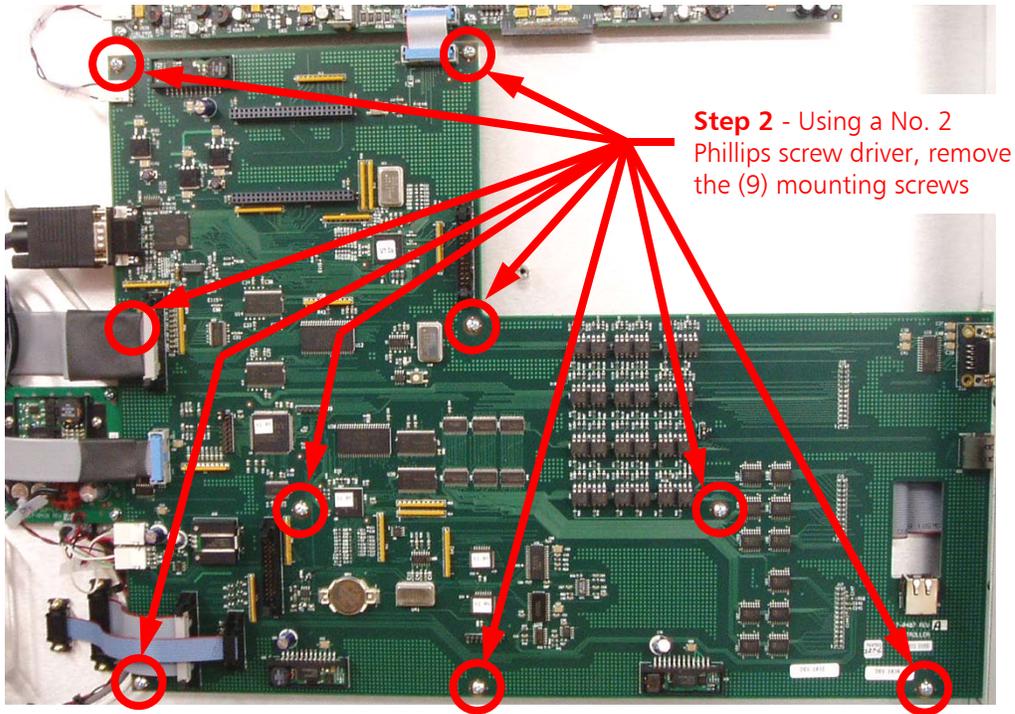


Figure 162 – Remove Mounting Screws

11.7 Remove the System Controller PCB Assembly from the 4MX 100

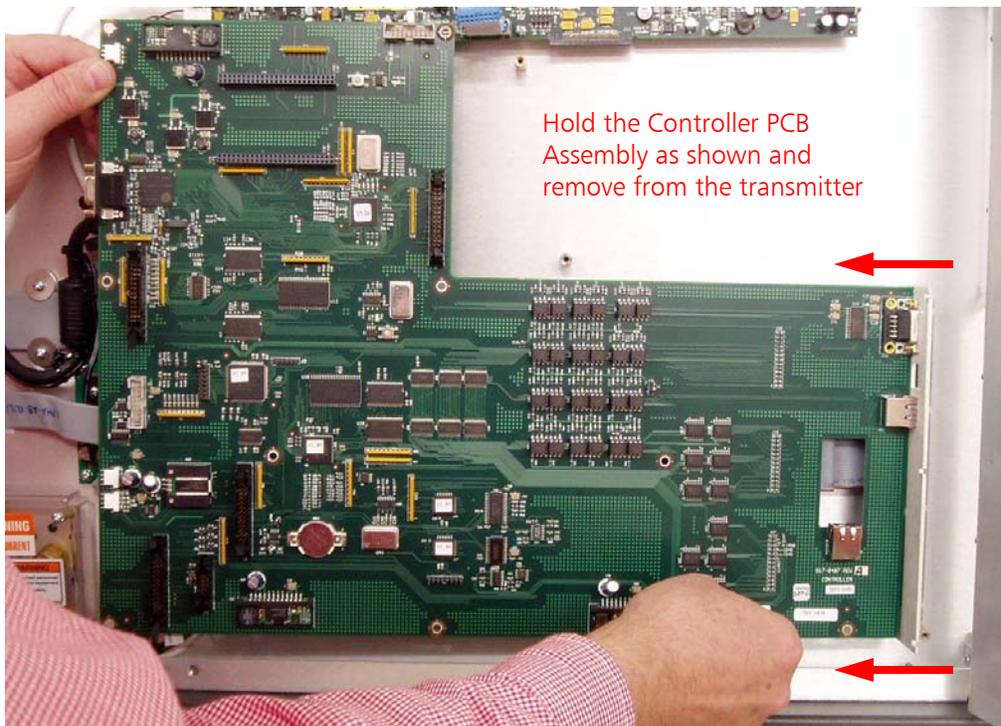


Figure 163 – Remove the Controller PCB from the 4MX 100

11.8 Send the old Controller PCB Assembly to Broadcast Electronics, Inc.

Carefully remove the new Controller PCB Assembly from the shipping packaging. Place the old Controller PCB Assembly into the packaging, and return to Broadcast Electronics, Inc.

Contact the RF Customer Service department for a Return Authorization.

RF Customer Service
Phone: (217) 224-9617
E-mail: rfservice@bdcast.com
Fax: (217) 224-9607

11.9 Install the new Controller PCB Assembly into the 4MX 100

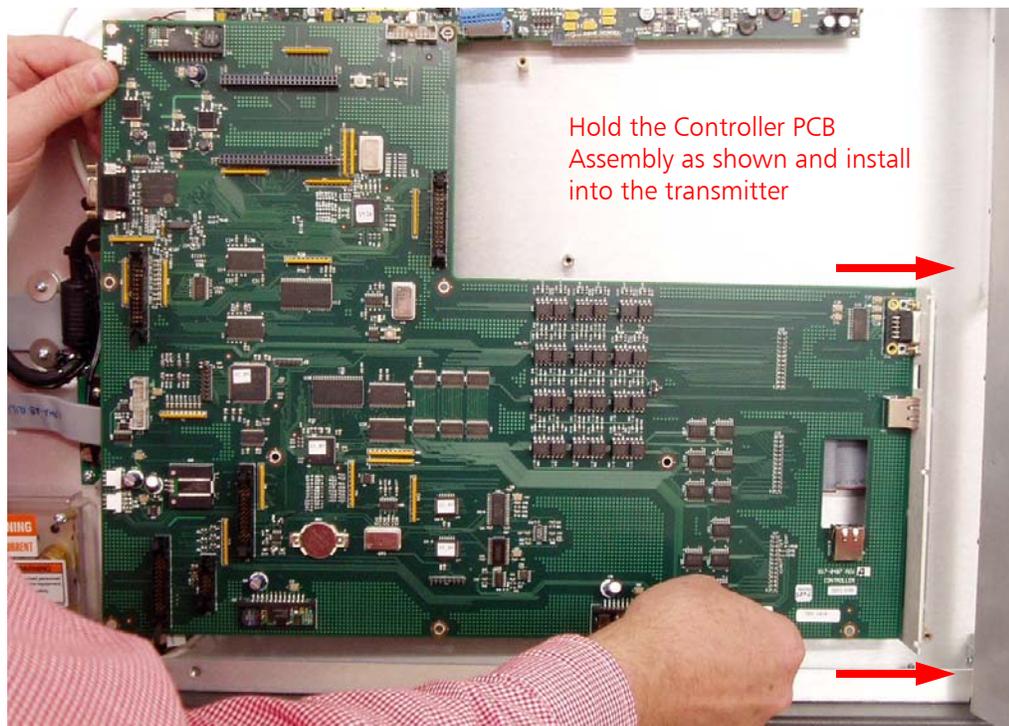


Figure 164 – Install the Controller PCB from the 4MX 100

11.10 Tighten the Controller Bracket Kepnuts (in the Remote I/O Cavity)

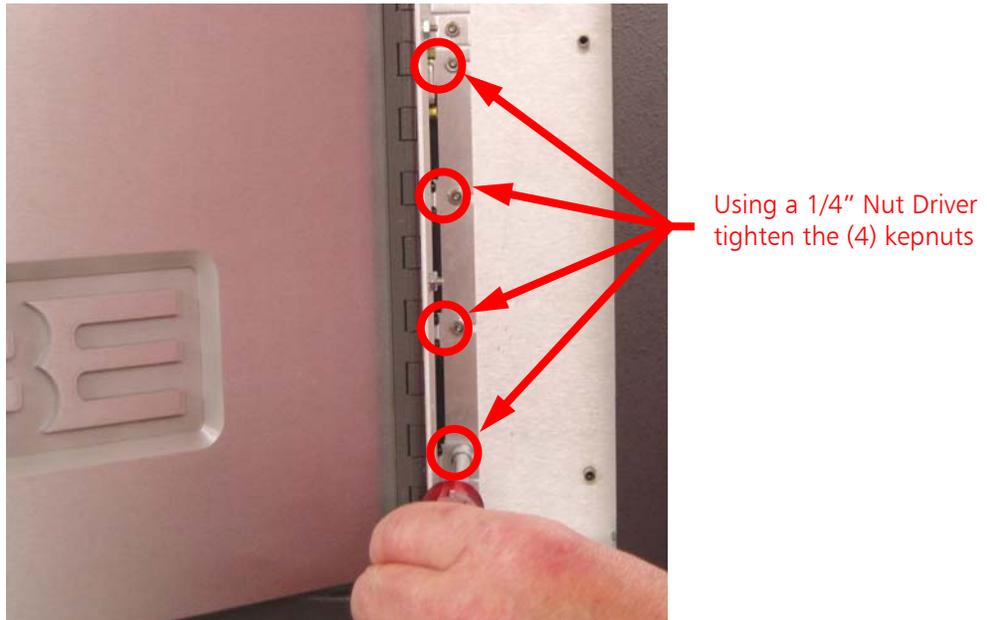


Figure 165 – Tighten System Controller PCB Bracket Kepnuts

11.11 Install Controller PCB Mounting Hardware

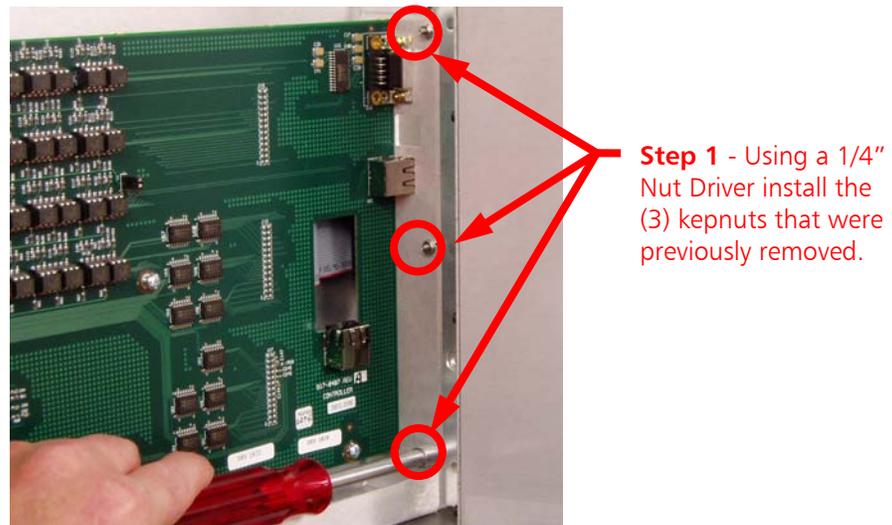


Figure 166 – Install Kepnuts

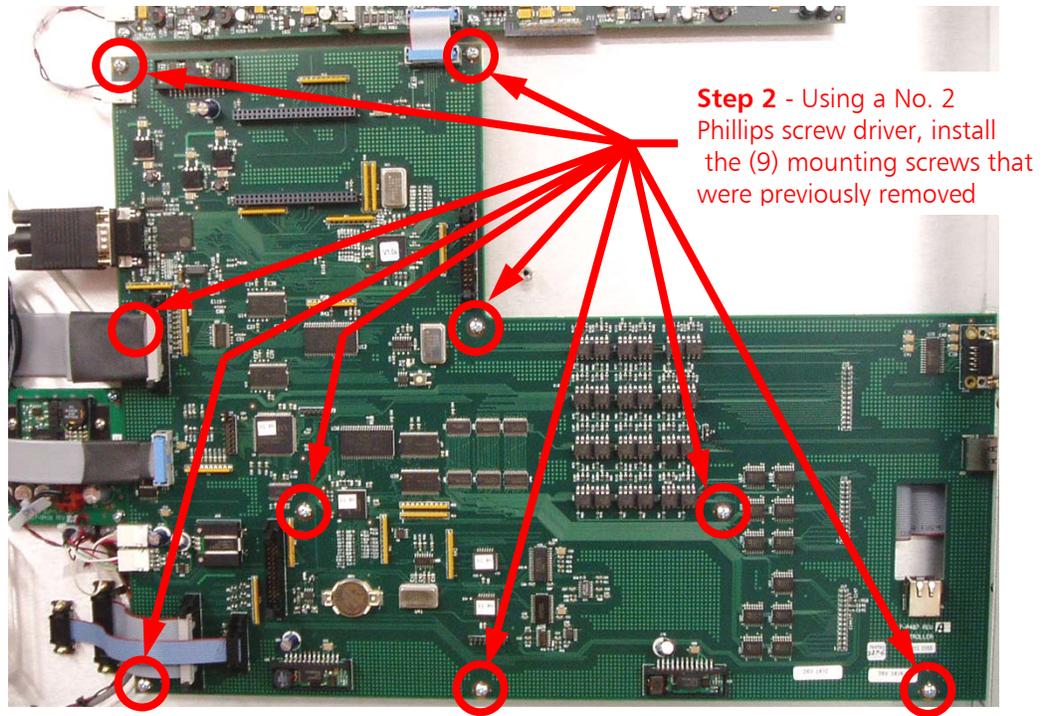
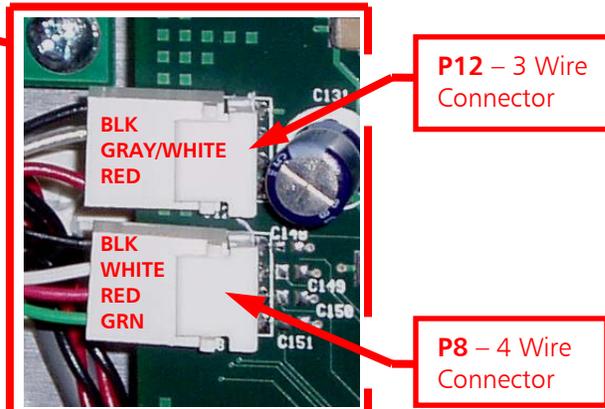
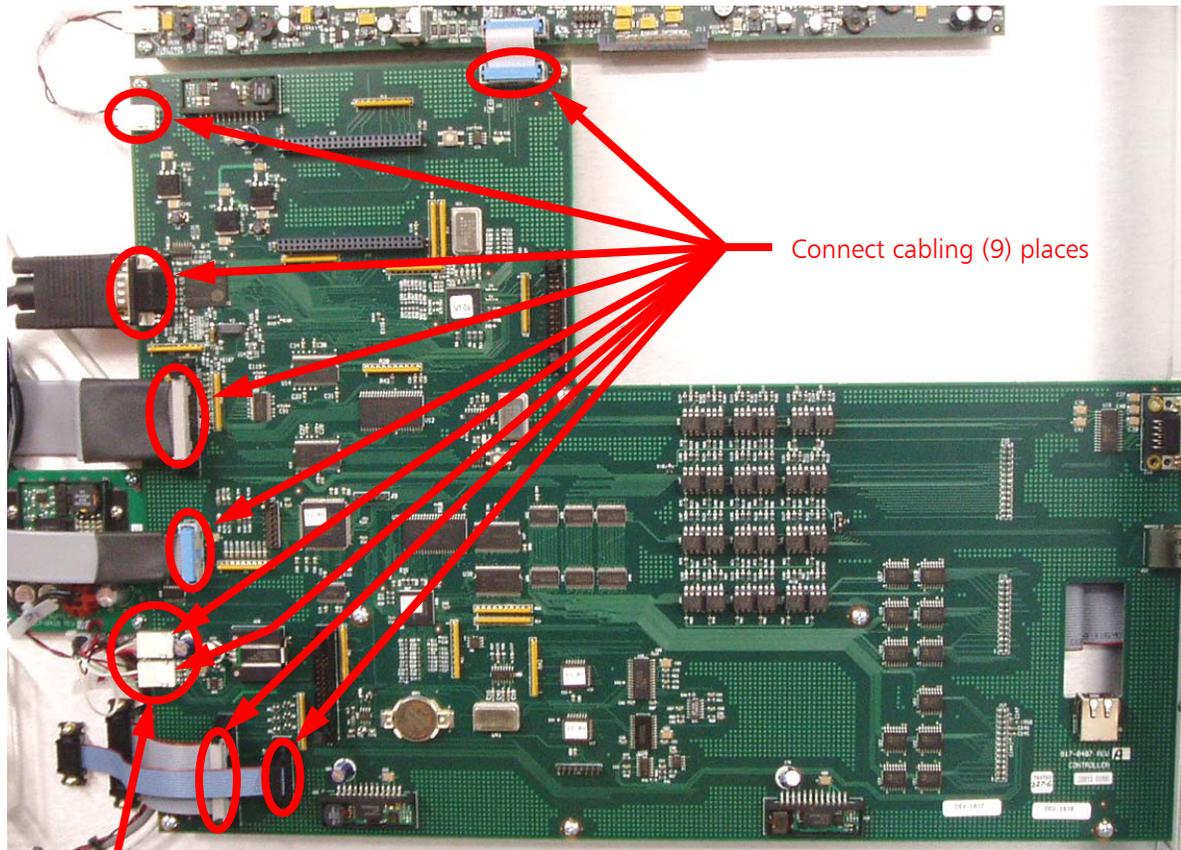


Figure 167 – Install Mounting Screws

11.12 Connect Cabling to the Controller PCB Assembly



CAUTION - Ensure that these (2) connectors are connected exactly as shown! If these (2) connectors are installed incorrectly, the Controller PCB may be permanently damaged along with other components of the transmitter!

Figure 168 – Connect Cabling

11.13 Install the Remote I/O PCB Assembly

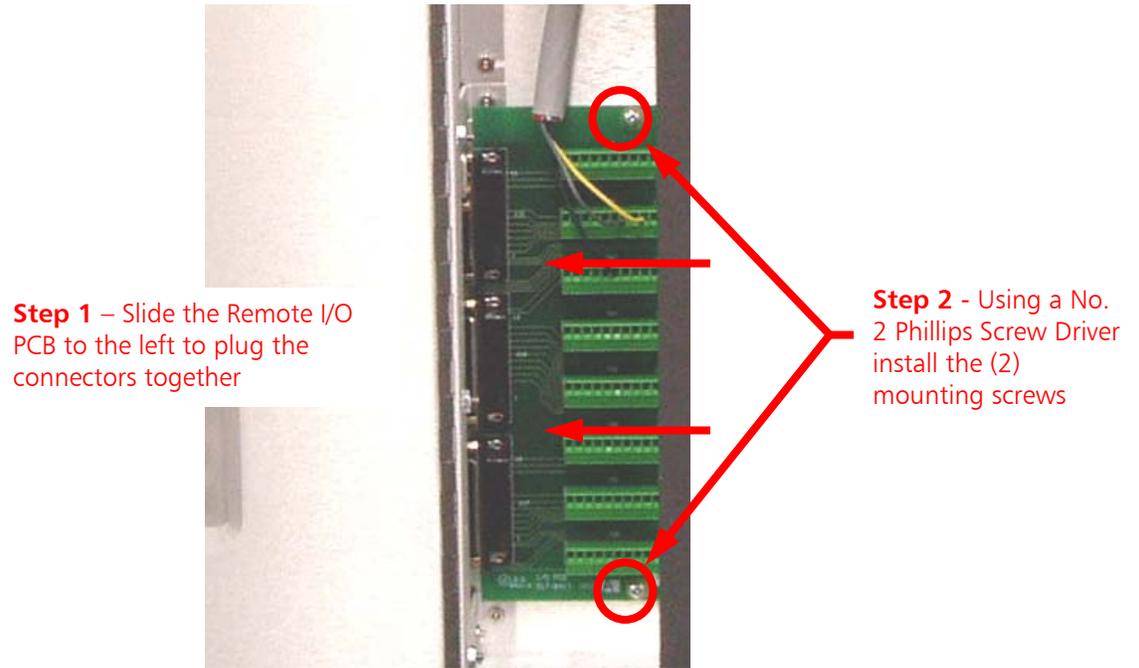


Figure 169 – Install Remote I/O PCB

11.14 Install the Remote I/O Access Panel

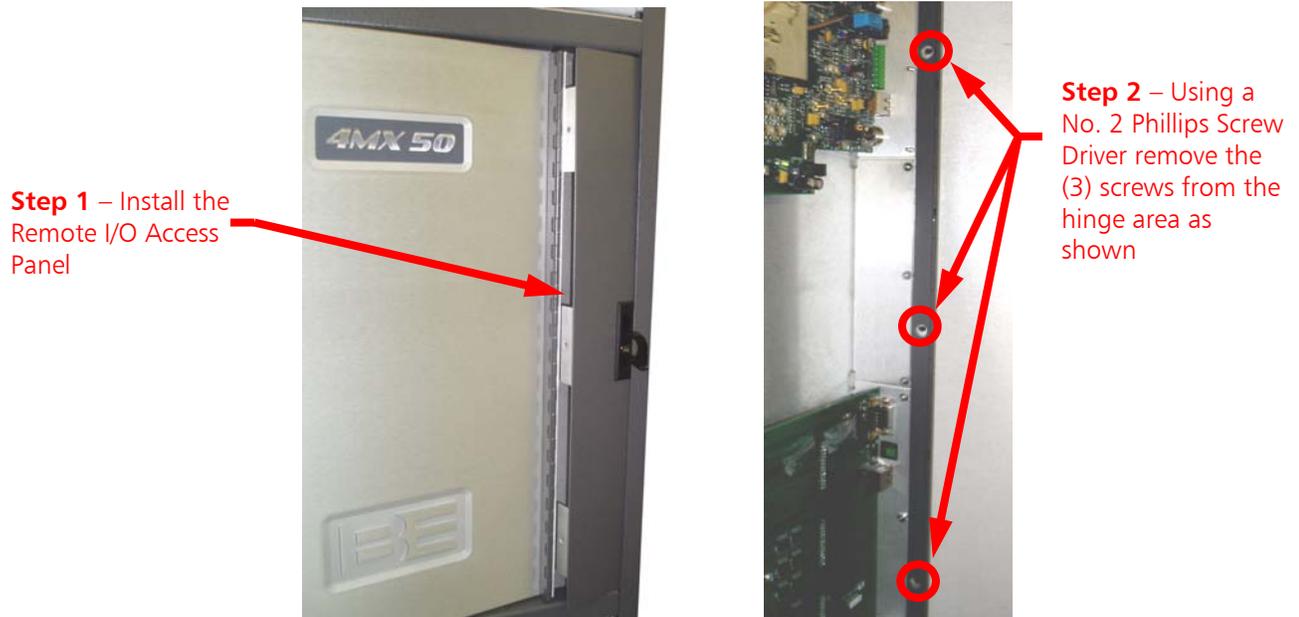


Figure 170 – Install the Remote I/O Access Panel

11.15 Install Front Door Hardware



Figure 171 – Install the Front Door Hardware

11.16 Turn the 4MX 100 AC Breaker ON

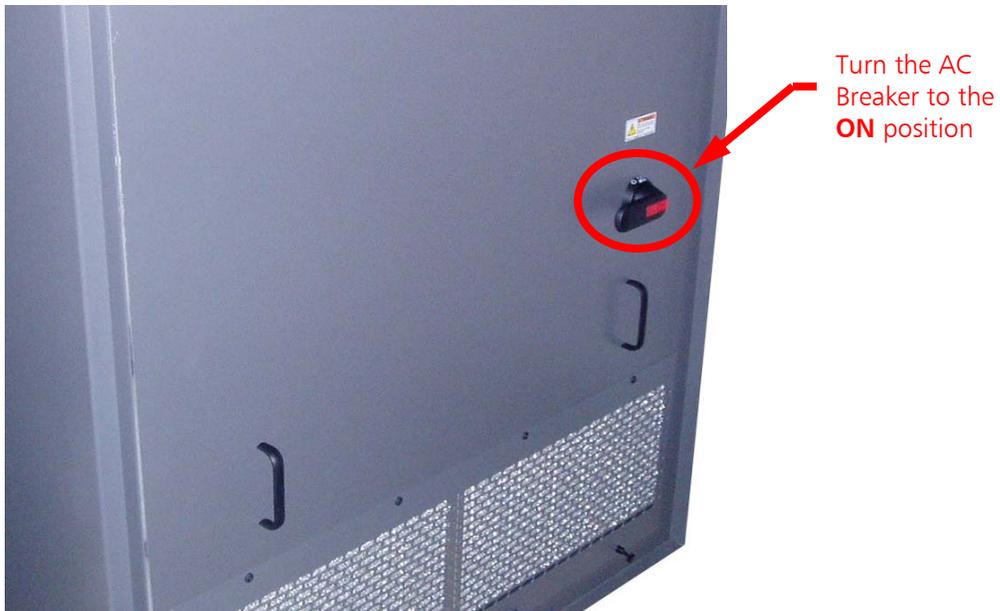


Figure 172 – Turn the 4MX 100 AC Breaker to ON



11.17 Reprogramming Controller PCB Settings

The Controller PCB Assembly stores the **Login and Password** information, **RF Output Power Level Settings**, and **Peak Indicator Levels**. Since the Controller PCB Assembly is being replaced, this information will need to be reprogrammed into the transmitter.

Please see your **4MX 100 AM Transmitter Manual** for programming these settings.

For programming the **Login and Password**, **RF Power Level Settings**, **Peak Indicator Levels**, see the appropriate sections of this manual

11.18 Turn the RF Output Power ON

Once all of the Controller PCB settings have been re-programmed, turn the RF Output Power ON from either the GUI or the front panel.

The transmitter should then go to the RF Output Power Level that it is set at with no faults or alarms.

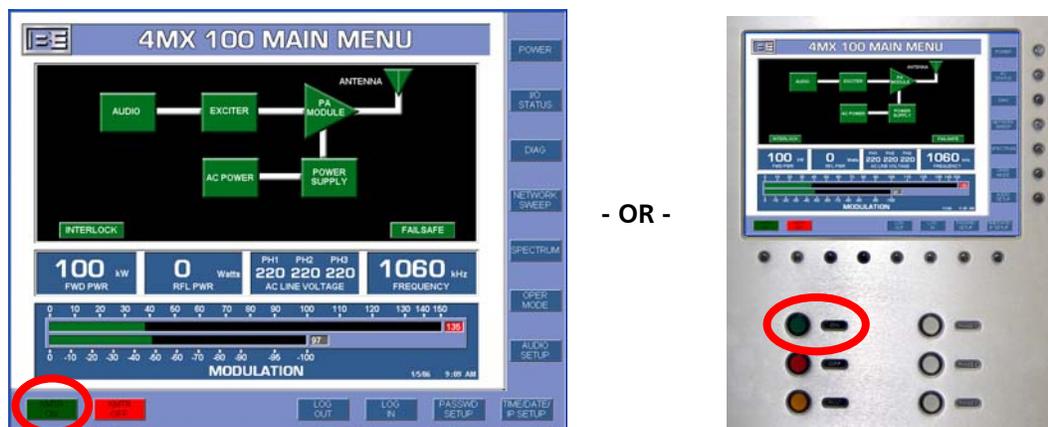


Figure 173 – Turn the RF Output Power ON

12 Upgrading 4MX Software via an I.P. Connection

12.1 Overview

4MX Series Transmitters have the capability to receive software upgrades via an I.P. connection. As software upgrades become available, customers will either receive the 4MX upgrade files via a CD or a notification with instruction to download files from the B.E. Website.

12.2 Items/Tools required for the Software Upgrade Process

- Personal Computer with CD ROM Drive running either Windows 2000 or XP Operating System
- 4MX Software Upgrade CD from B.E. (4MX 25, 4MX 50, or 4MX 100)
- Crossover Ethernet Cable (if connecting directly to the transmitter)
- Straight-Thru Ethernet Cable (if connecting through an Ethernet switch)

12.3 4MX Software Version Labeling

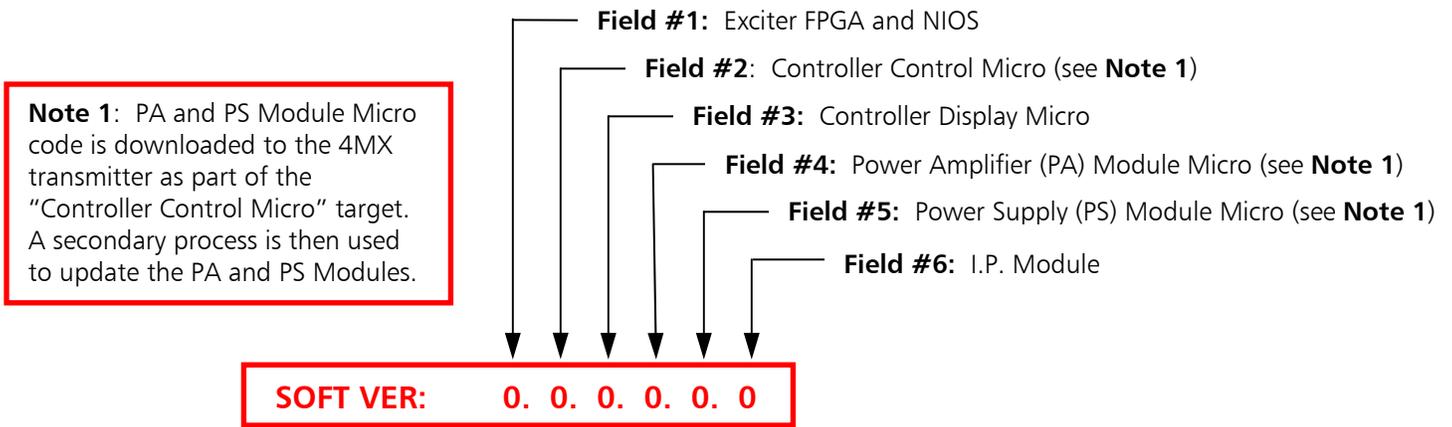


Figure 174 – Software Version Labeling

12.4 Determine the Current Software Version of the 4MX

From the Main Menu select **DIAG** and the Diagnostics menu will appear. Record the 4MX's current Software Version.

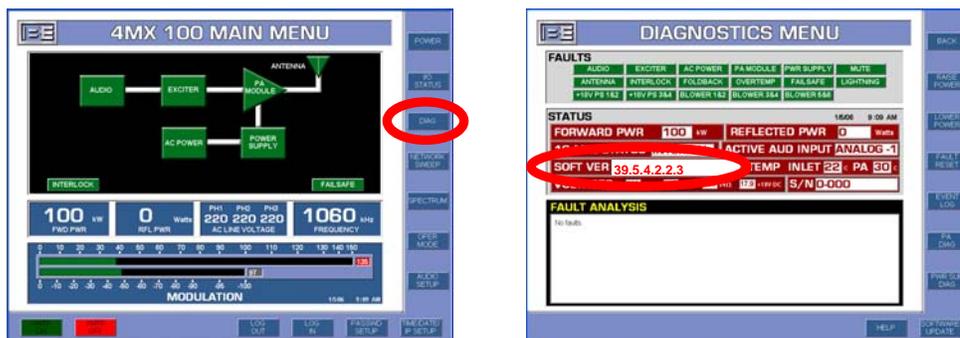


Figure 175 – Determine Current 4MX Software Version



12.5 4MX Software “Targets”

Compare the “Upgrade” Software Version Number with the “Current” Software Version Number of the 4MX (see sections 12.3 and 12.4) to determine exactly which components need to be updated.

If **Field #1** has incremented, you will need to upload to the “**Exciter**” target.

If **Field #2** has incremented, you will need to upload to the “**Controller Control Micro**” target.

Please note that if the **PA** and **PS Modules** (Fields #4 & #5) are to be updated, their update code will be included in the Controller Control Micro target’s download. A secondary step is then required to update PA and PS Module Software from the 4MX Software Update Menu as discussed in Steps 14 and 15 of Section 12.6.

If **Field #3** incremented, you will need to upload to the “**Controller Display Micro**” target.

If **Field #4** incremented, you will need to update PA Module Software from the 4MX GUI Software Update Menu. PA Module code is initially downloaded to the transmitter as part of the “Controller Control Micro.”

If **Field #5** incremented, you will need to update PS Module Software from the 4MX GUI Software Update Menu. PS Module code is initially downloaded to the transmitter as part of the “Controller Control Micro.”

If **Field #6** incremented, you will need to upload to the “**IP Module**” target.



12.6 Uploading Software to a 4MX Series Transmitter

Step 1 – Using Windows Explorer, copy all of the files from the 4MX Software Upgrade CD (or files downloaded from the B.E. Website) to a folder on the hard drive “C:\” of the personal computer that you are planning to use for the upgrade. Unzip the files (if they have been zipped) ensuring that all of the files remain in the “4MX Upgrade” directory.

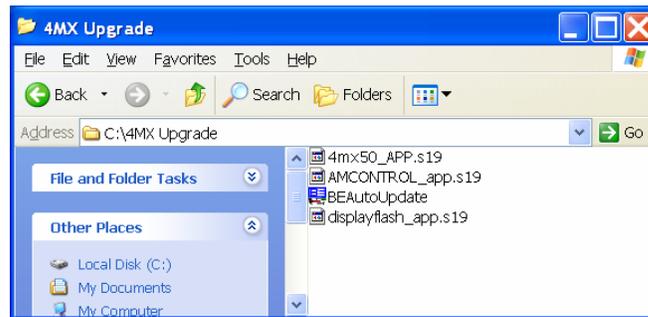


Figure 176 – 4MX Software Upgrade Files

NOTE: The factory default **I.P.** is **10.2.4.102** and the factory default **Subnet Mask** is **255.255.255.255**.

Step 3 – To establish communication via I.P. with the 4MX Transmitter, your PC must be setup in the same I.P. family. On your PC go to **Start -> All Programs -> Accessories -> Communications ->** and select **Network Connections**.

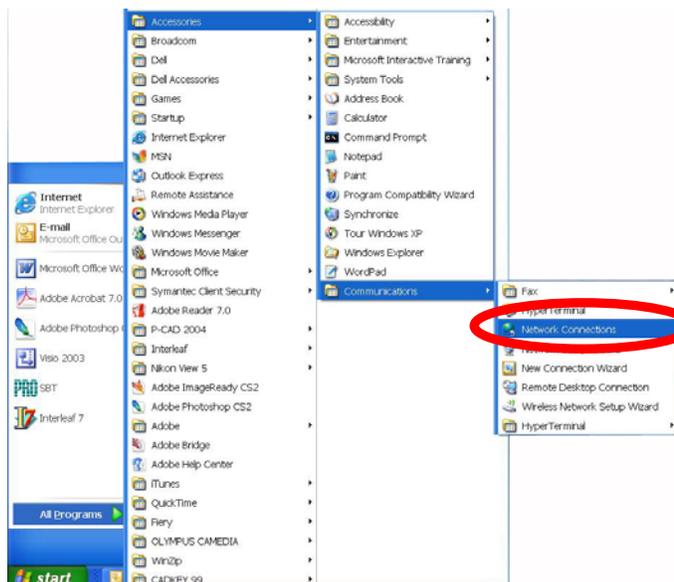


Figure 177 – PC Network Connection Menu

Step 4 – Right click on **Local Area Connection** and select **Properties**.

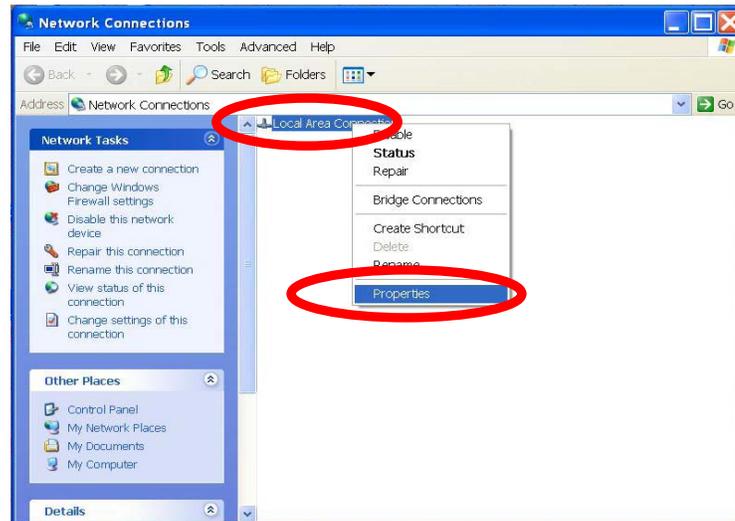


Figure 178 – Local Area Connection Properties

Step 5 – Since the I.P. Address of the 4MX in this example is 10.2.4.102 with a Subnet Mask of 255.255.255.255, we configure the PC with an I.P. of 10.2.4.10 and 255.255.255.0 for the Subnet Mask.

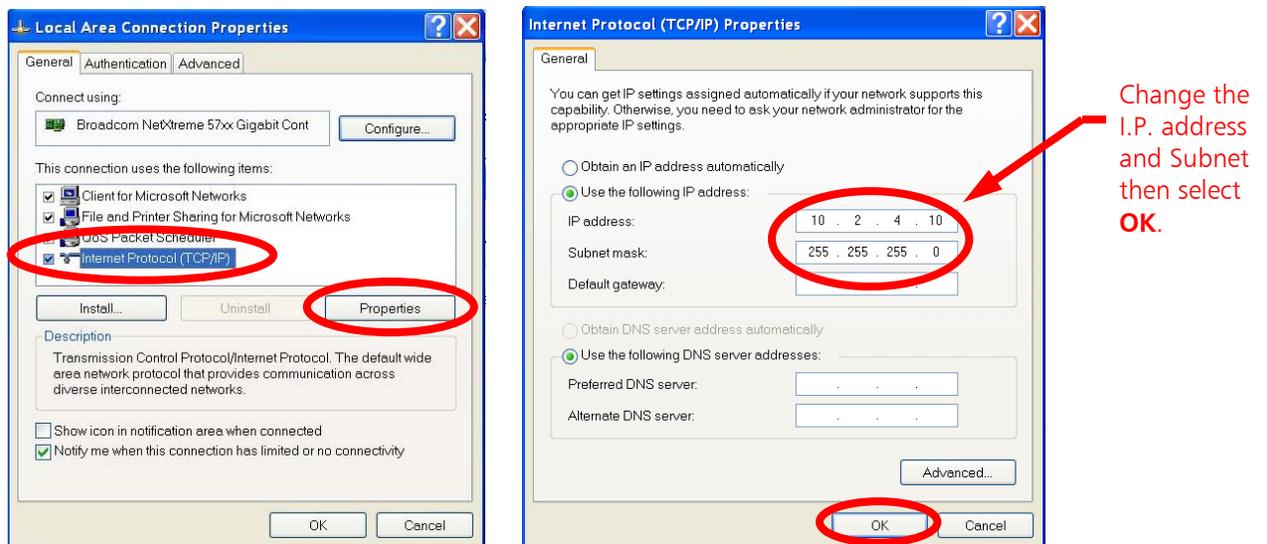


Figure 179 – Configure the I.P. Address of the Personal Computer

Step 6 – Remove the 4MX 's remote control access panel to gain access to the transmitter's Ethernet Port.

Step 6a – Using a No. 2 Phillips Screw Driver remove the (2) screws from the right door as shown.



Step 6b – Using a No. 2 Phillips Screw Driver remove the (3) screws from the hinge area as shown



Step 6c – Use the fold-out handle to remove the Remote Control I/O and Audio Input Access Panel



Ethernet Port



Figure 180 – Remote Control I/O Access Panel Removal



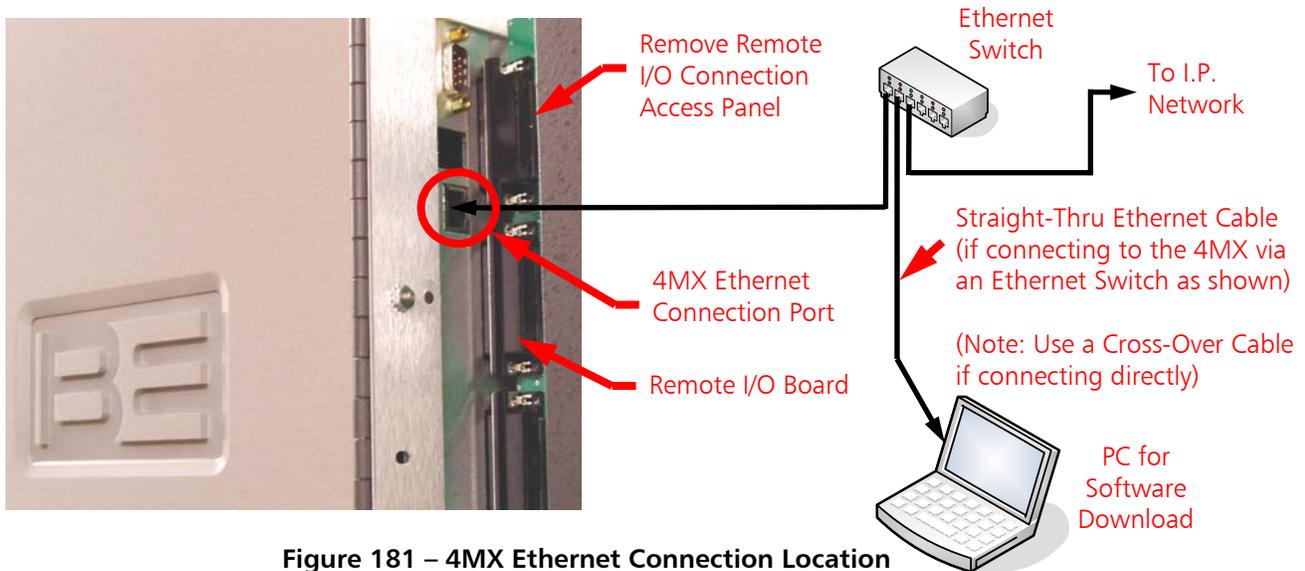


Figure 181 – 4MX Ethernet Connection Location

Step 7 – Next, connect an Ethernet cable from your PC to the 4MX. If connecting to the transmitter via a network switch or hub, use a Straight-Thru Ethernet cable as illustrated. If connecting directly from the PC to the 4MX, use a Cross-Over Ethernet cable (in high RF environments route and wrap the cable through a ferrite ring).

Step 8 – To verify communication, type the transmitter’s I.P. address into a web browser. If communication can be established a picture of the 4MX will appear.

Step 9 – Turn the transmitter’s **RF Output Power OFF** either from the Main Menu or by depressing the front panel button.

NOTE: The 4MX Transmitter’s RF Output **MUST** be OFF during the entire Software Upgrade Process!

NOTE: Ensure that AC Power does remain ON during the Software Upgrade Process! After downloading software to the transmitter, AC Power to the transmitter **MUST** then be cycled for the upgrades to take effect. Customers should plan for the transmitter to be off of the air for approximately 30 minutes for the entire process.

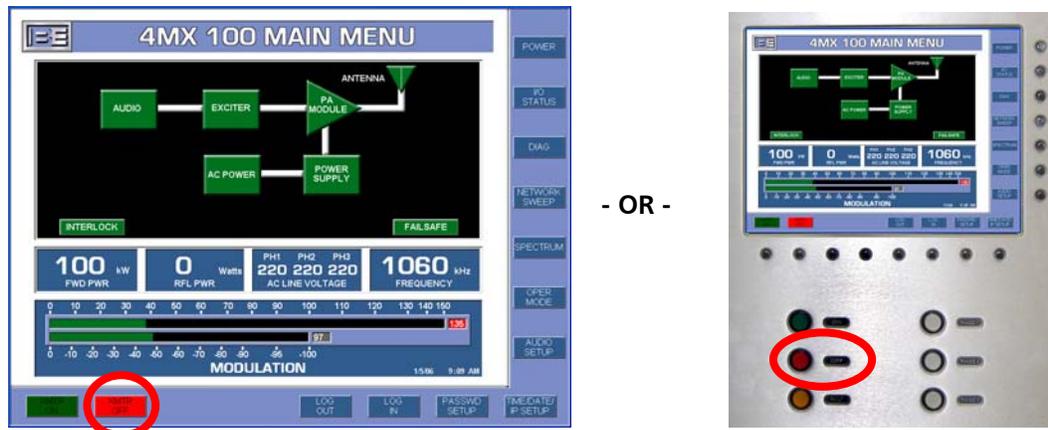


Figure 182 – Turn the RF Output Power OFF



Step 10 – On the PC, using Windows Explorer, navigate to the directory on the hard drive of the PC where you copied the upgrade files to and double click on the **BEAutoUpdate** application icon.



Figure 183 – Software Update Application Icon

Step 11 – Once the **BEAutoUpdate** application launches, enter the I.P. Address of the 4MX Transmitter, select the desired **“Target”**, and then select **Update**. Only one target may be selected at a time.

If more than one **“Target”** needs to be updated, ensure that they are loaded in the following order.

- 1) Controller PCB – Display Micro
- 2) Controller PCB – Control Micro (includes PA & PS Modules update code)
- 3) IP Module
- 4) Exciter

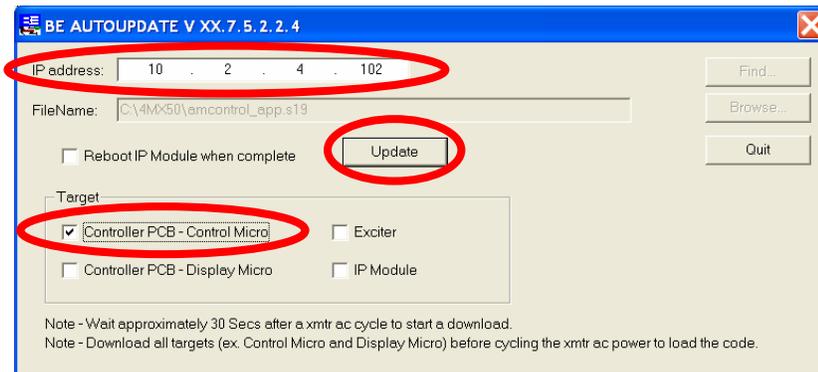


Figure 184 – Software Update Application

NOTE: Should the I.P. connection be lost during the Software Upgrade Process, see section 12.8 for instructions on how to proceed.



Step 12 – Once a “**Target**” has been updated, the following screen will appear. Click **OK** to dismiss.



Figure 185 – Software Update Complete

Step 13 – Repeat **Steps 10 thru 12** for each “**Target**” to be updated.

Step 14 – After **ALL** desired targets have been updated, you **MUST** then turn the Transmitter’s AC Power **OFF**, and then back **ON** for the software updates to take affect.

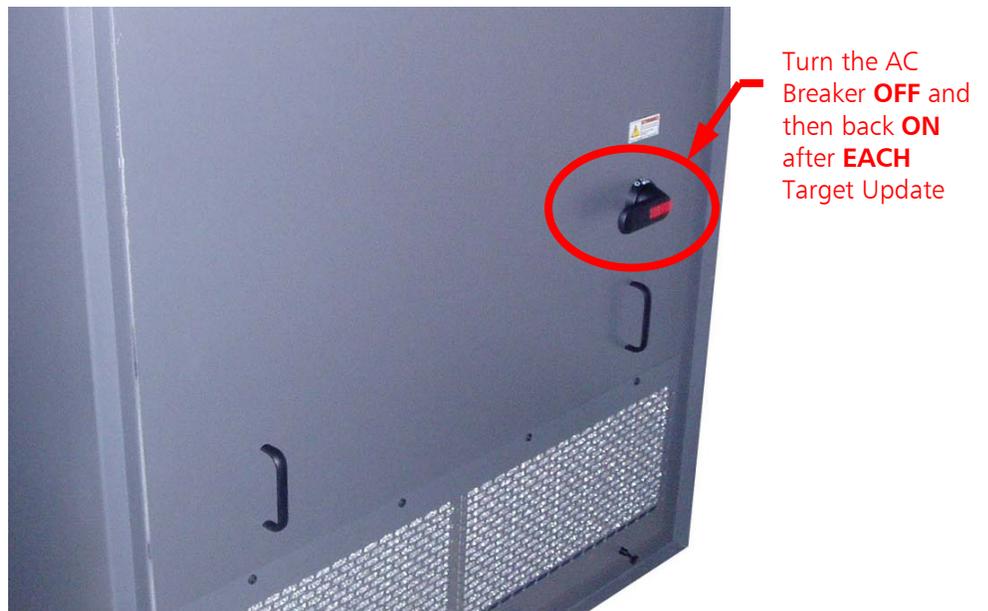


Figure 186 – Turn the 4MX AC Breaker OFF then back ON after ALL Targets Have Been Updated

Step 15 – If the 4MX Software Upgrade included new versions of PA Module Micro and/or PS Module Micro Software proceed to **Step 16** (determined by comparing the current version number to the upgrade version number – see Sections 12.3 and 12.4), if not, proceed to **Step 15a**.

Step 15a – If the Software Upgrade did **NOT** include new versions of PA Module Micro and/or PS Module Micro Software, turn the transmitter’s RF Output back ON from either Main Menu or Front Panel button. The transmitter will return to the RF Output Power level that the transmitter was set at prior to the Software Upgrade Process. This concludes the Software Upgrade Process and no further steps are needed.

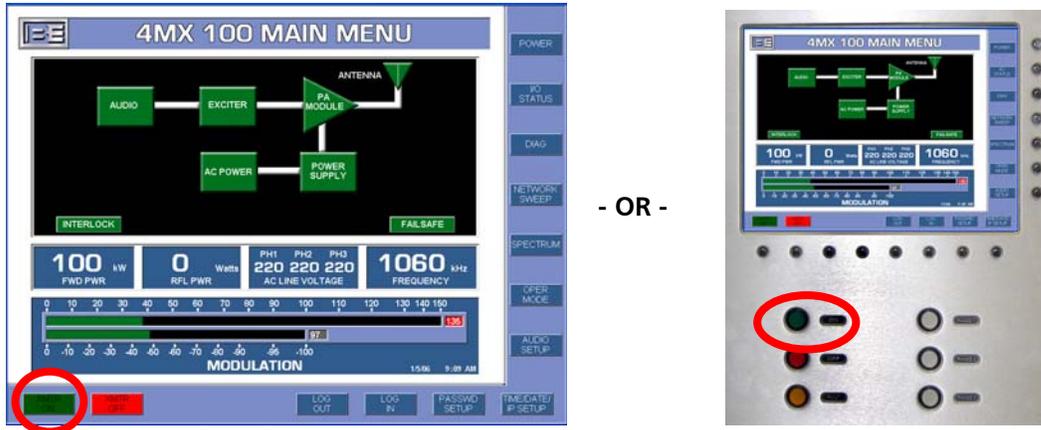


Figure 187 – Turn the RF Output Power ON

Step 16 – If the 4MX Software Upgrade included new versions of PA Module Micro and/or PS Module Micro Software, from the Main Menu Screen select **DIAG**. After the Diagnostics Menu Screen appears, select **SOFTWARE UPDATE**.

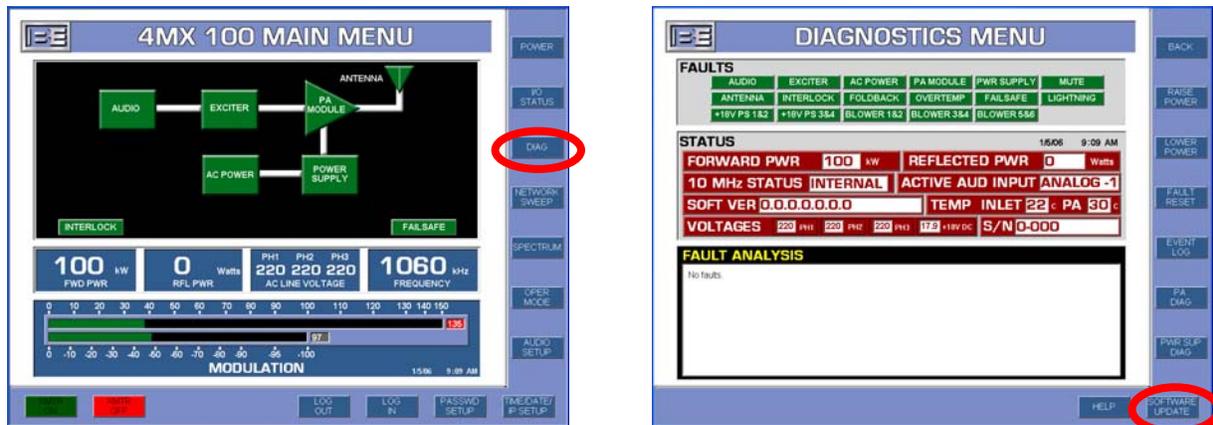


Figure 188 – Diagnostics Menu

Step 17 – After selecting **SOFTWARE UPDATE**, the login screen will appear. Only the “Chief Engineer” login (factory default is 1 2 3 4 5 6) has permission to the Software Update Menu.

Select **UPDATE PA** to update software in all of the 4MX PA Modules.

Select **UPDATE PS** to update software in all of the 4MX PS Modules.



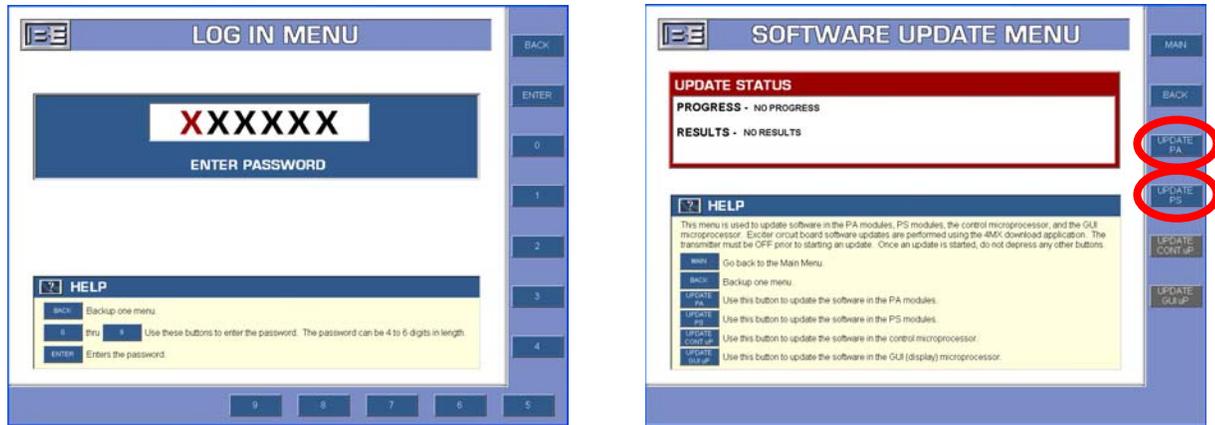


Figure 189 – Software Update Menu

NOTE: See section 12.7 for PA and PS Software Update problem resolution.

- Step 18** – Once all of the PA Modules and/or PS Modules have been updated, turn the Transmitter's AC Power OFF, and then back ON for the software updates to take affect.

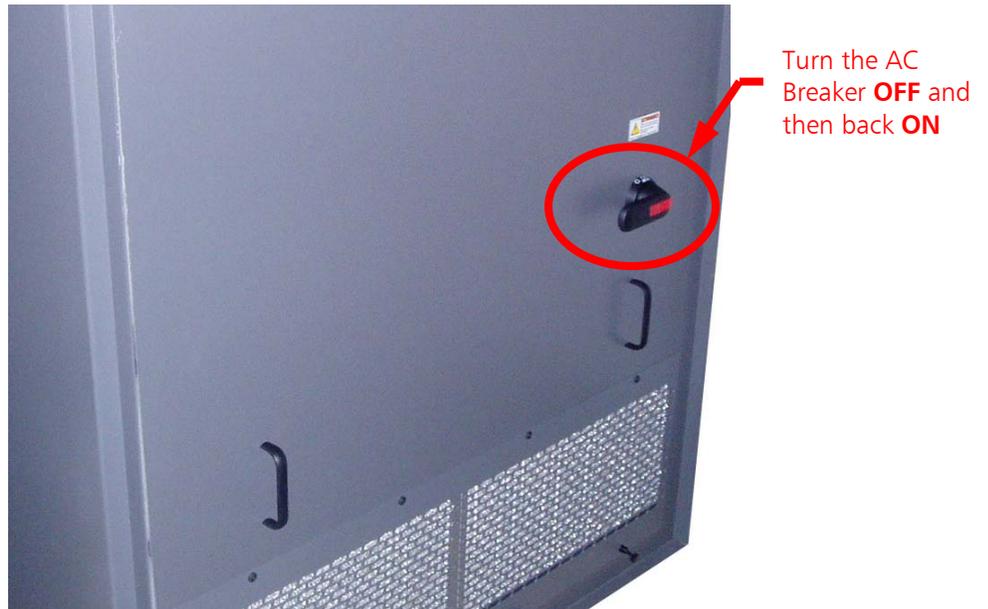


Figure 190 – Turn the 4MX AC Breaker OFF then back ON

- Step 19** – Turn the transmitter's RF Output to ON.

12.7 PA and PS Software Update Problem Resolution

If a failure is encountered during the update of **PA Software**, do the following:

- 1) Ensure that the problematic PA Module is installed in the transmitter.
- 2) Ensure that the Ethernet Cable to the problematic PA Module is secure.
- 3) Reselect "Update PA" from the Software Update GUI Menu.
- 4) Turn the Transmitter's AC Power OFF and then back ON.

If a failure is encountered during the update of **PS Software**, do the following:

- 1) Ensure that the problematic PS Module is installed in the transmitter.
- 2) Reselect "Update PS" from the Software Update GUI Menu.
- 3) Turn the Transmitter's AC Power OFF and then back ON.

12.8 Loss of I.P. Connection During Download

There are (2) loss of I.P. connection scenarios that must be considered and handled differently. It is very important to differentiate between these scenarios before deciding which course of action to take.

12.8.1 Loss of I.P. Connection BEFORE the Target receives the new code

If you should loose the I.P. connection and the following "Programming Failed ..." screen appears, start the process over.



Figure 191 – Programming failed with Timeout Screen

12.8.2 Loss of I.P. Connection AFTER the Target receives the new code

If you should loose the I.P. connection to the transmitter while the "Downloading Code To ..." target screen is present, do the following:

- 1) Wait approximately 5 minutes (this allows the code to finish the programming process).
- 2) Turn the transmitter's AC Power OFF then back ON.
- 3) Close the software download tool on the PC.
- 4) Proceed with PA and PS Updates (if required).



Figure 192 – Downloading Code to "Target" Screen



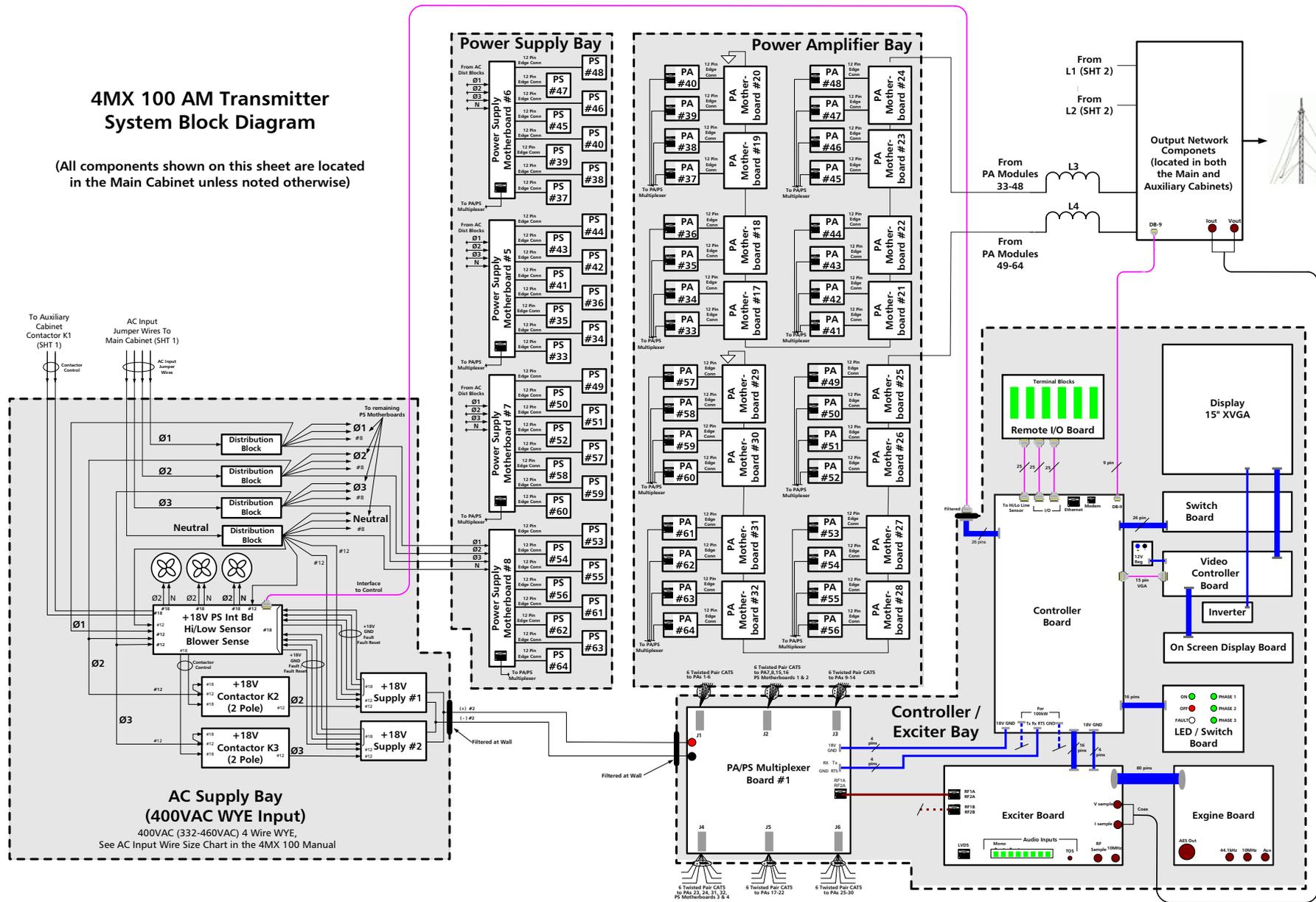
13 Diagrams and Schematics

- 13.1 4MX 100 System Block Diagram 400VAC (597-4100-001)
- 13.2 PCB, ASSY, DSP Exciter (917-0400)
- 13.3 PCB, ASSY, PA Motherboard / Combiner (917-0403)
- 13.4 PCB, ASSY, High Power AM PA (917-0404)
- 13.5 PCB, ASSY, Soft-key Switch (917-0406)
- 13.6 PCB, ASSY, Controller (917-0407)
- 13.7 PCB, ASSY, Switch / LED (917-0409)
- 13.8 PCB, ASSY, Lightning Protection (917-0412-050)
- 13.9 PCB, ASSY, Multiplexer (917-0413)
- 13.10 PCB, ASSY, Lightning Detector (917-0414-050)
- 13.11 PCB, ASSY, 400V PA Power Supply Module (917-0415)
- 13.12 PCB, ASSY, Low Voltage Supply (917-0415-100)
- 13.13 PCB, ASSY, High / Low Line Sensor (917-0416-050)
- 13.14 PCB, ASSY, PS Motherboard (917-0417-001)
- 13.15 PCB, ASSY, 12V Power Supply (917-0418)
- 13.16 PCB, ASSY, Remote I/O (917-0419)
- 13.17 PCB, ASSY, DC Filter (919-0519-001)
- 13.18 4MX 100 Wiring Diagram (907-4100-400)



4MX 100 AM Transmitter System Block Diagram

(All components shown on this sheet are located in the Main Cabinet unless noted otherwise)



4MX 100 AM Transmitter System Block Diagram

(All components shown on this sheet are located in the Auxiliary Cabinet unless noted otherwise)

