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4MX 25



4MX 50

4MX 25 / 4MX 50

25kW / 50kW AM Transmitter Manual

597-4050, Revision G
10/21/09

4MX 25 / 4MX 50

25kW / 50kW AM Transmitter Manual

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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 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 25/50 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 2.4 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) 224-6258





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.

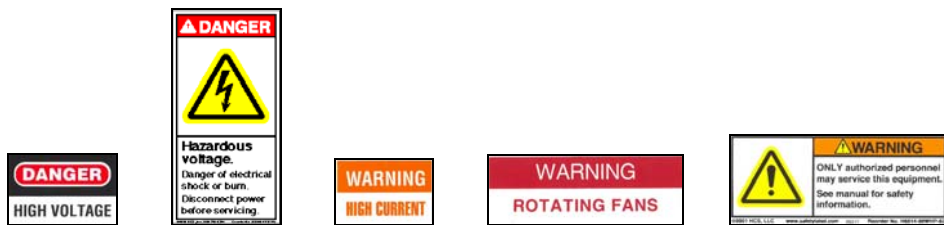




SAFETY PRECAUTIONS

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. 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.
- D. 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.

HOT SURFACES -

The power components in the 4MX are cooled by forced-air and natural convection. When handling any components of the transmitter after it has been in operation, caution must always be taken to ensure that the component is cool enough to handle without injury.



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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 25/50 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 25/50 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 .

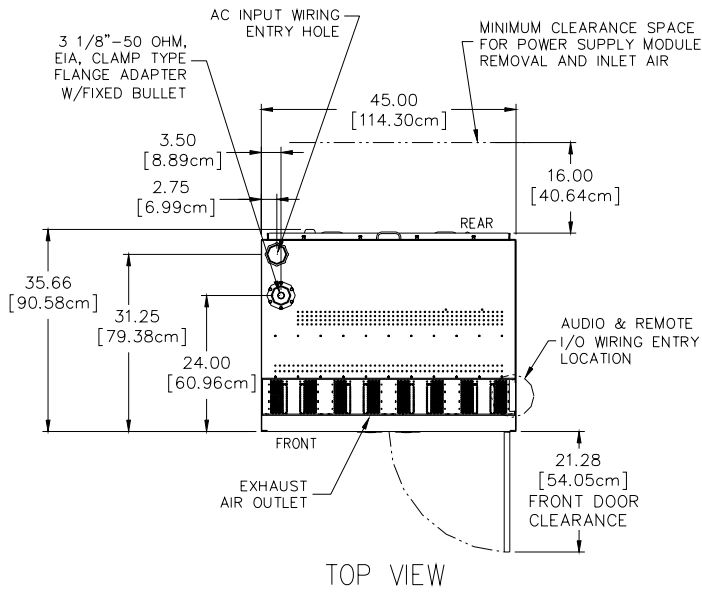
1.5 Cooling Air Requirements

The 4MX 25/50 requires a source of cooling air to maintain an acceptable operating temperature. The transmitter requires a cooling air flow of 3000 cubic feet per minute (85.0 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 25/50 Physical Information

Prior to installation, there are several items in the transmitter room that must be considered. The following 4MX 25 and 4MX 50 Installation Drawings provide the necessary dimensional data and information for planning of the AC Power, RF Output, Interlock, Failsafe, Ground Strap, and Remote Control connections.



NOTES:

- AIR INLET AT REAR OF CABINET; 3000 CFM (85.0 M³/MIN). REUSABLE FILTERS ARE PROVIDED.
- GROUND STRAP CONNECTION TOP OF CABINET AT RF OUTPUT CONNECTOR FLANGE.
- RF OUTPUT CONNECTION: 3-1/8 INCH, EIA, 50 OHM, CLAMP TYPE FLANGE ADAPTER WITH FIXED BULLET, FOR RIGID COAXIAL TRANSMISSION LINE.
- EXHAUST AIR OUTLET AT TOP OF CABINET.
- ACCESS FOR AC POWER THROUGH TOP OF CABINET.
- ACCESS FOR REMOTE CONTROL AND AUDIO CONNECTIONS THROUGH TOP OF CABINET.
- WEIGHT: 825 LBS (375 Kg) UNPACKED.
- AC POWER CONSUMPTION:
 - ⊗ 25 KW, 0% MODULATION: 29.8 KW
 - ⊗ 37.5 KW, 100% TONE MODULATION: 44.6 KW
- POWER DISSIPATED:
 - ⊗ 25KW, 0% MODULATION: 4.8 KW (16,382 BTU/HR)
 - ⊗ 25KW, 100% TONE MODULATION: 7.1 KW (24,232 BTU/HR)
- AC INPUT:
 - 192-265 VAC: 50/60 Hz, 3 PHASE WYE OR DELTA
 - 332-460 VAC: 50/60 Hz, 3 PHASE 4-WIRE WYE
- AC INPUT WIRE SIZE: SEE 4MX 25 WIRE SIZE CHART IN THE MANUAL.
- POWER FACTOR: 0.99 OR BETTER

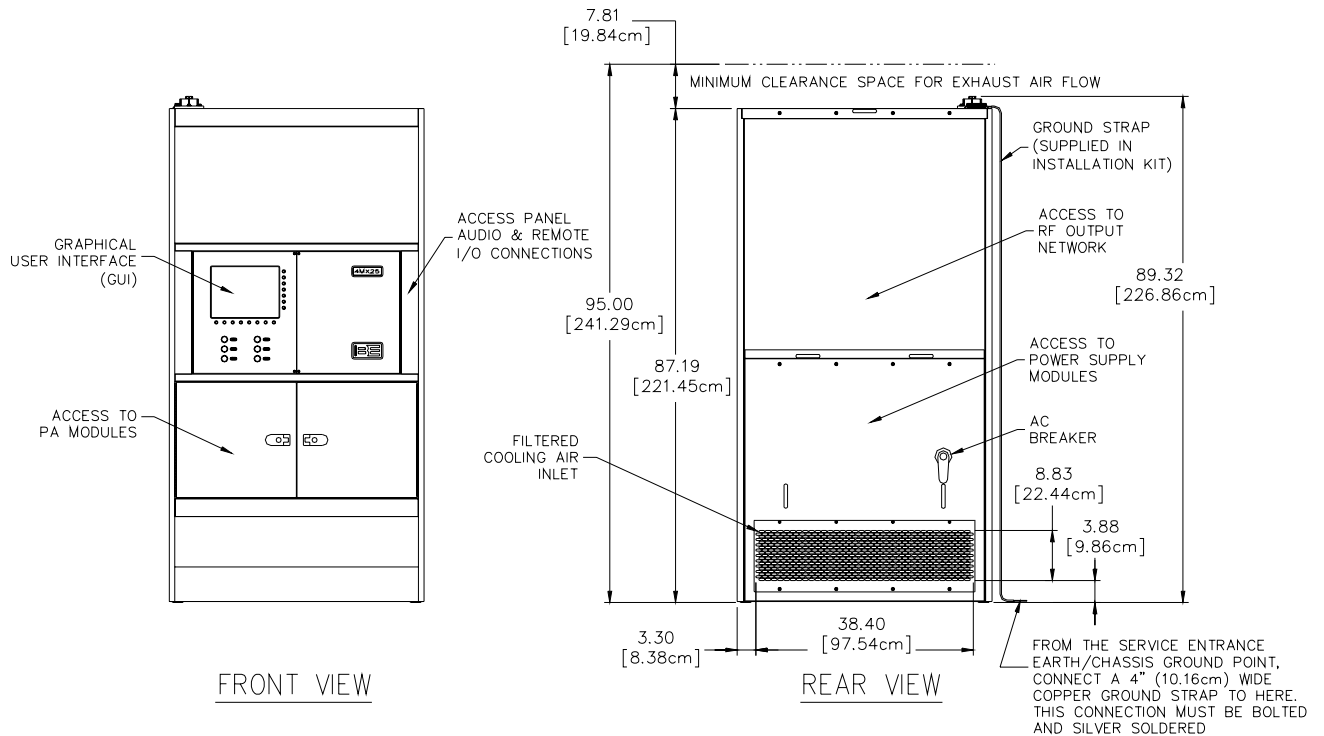
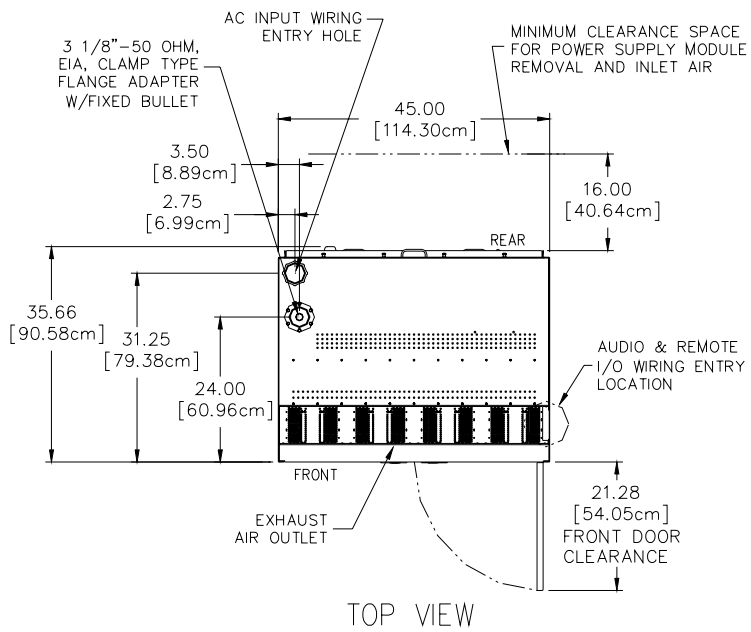


Figure 1 – 4MX 25 Installation Drawing





NOTES:

- AIR INLET AT REAR OF CABINET; 3000 CFM (85.0 M³/MIN). REUSABLE FILTERS ARE PROVIDED.
- GROUND STRAP CONNECTION TOP OF CABINET AT RF OUTPUT CONNECTOR FLANGE.
- RF OUTPUT CONNECTION: 3-1/8 INCH, EIA, 50 OHM, CLAMP TYPE FLANGE ADAPTER WITH FIXED BULLET, FOR RIGID COAXIAL TRANSMISSION LINE.
- EXHAUST AIR OUTLET AT TOP OF CABINET.
- ACCESS FOR AC POWER THROUGH TOP OF CABINET.
- ACCESS FOR REMOTE CONTROL AND AUDIO CONNECTIONS THROUGH TOP OF CABINET.
- WEIGHT: 1115 LBS (506 Kg) UNPACKED.
- AC POWER CONSUMPTION:
 - 0% MODULATION: 56.8 KW @ 50 KW POWER OUT
 - 100% TONE MODULATION: 85.2 KW @ 75 KW POWER OUT
- POWER DISSIPATED:
 - 0% MODULATION: 6.8 KW (23,208 BTU/HR)
 - 100% TONE MODULATION: 10.2 KW (34,813 BTU/HR)
- AC INPUT:
 - 192-265 VAC: 50/60 Hz, 3 PHASE WYE OR DELTA
 - 332-460 VAC: 50/60 Hz, 3 PHASE 4-WIRE WYE
- AC INPUT WIRE SIZE: SEE 4MX 50 WIRE SIZE CHART IN THE MANUAL.
- POWER FACTOR: 0.99 OR BETTER

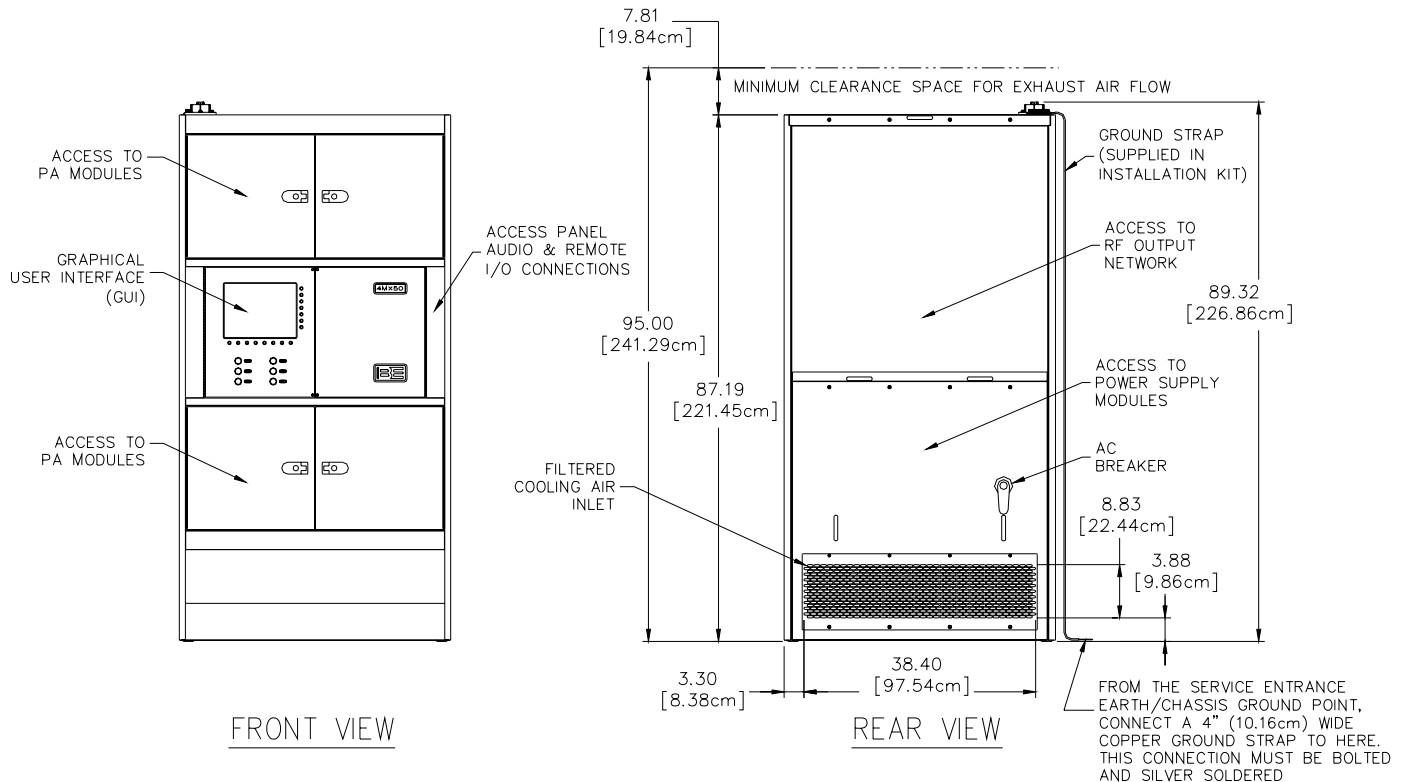


Figure 2 – 4MX 50 Installation Drawing

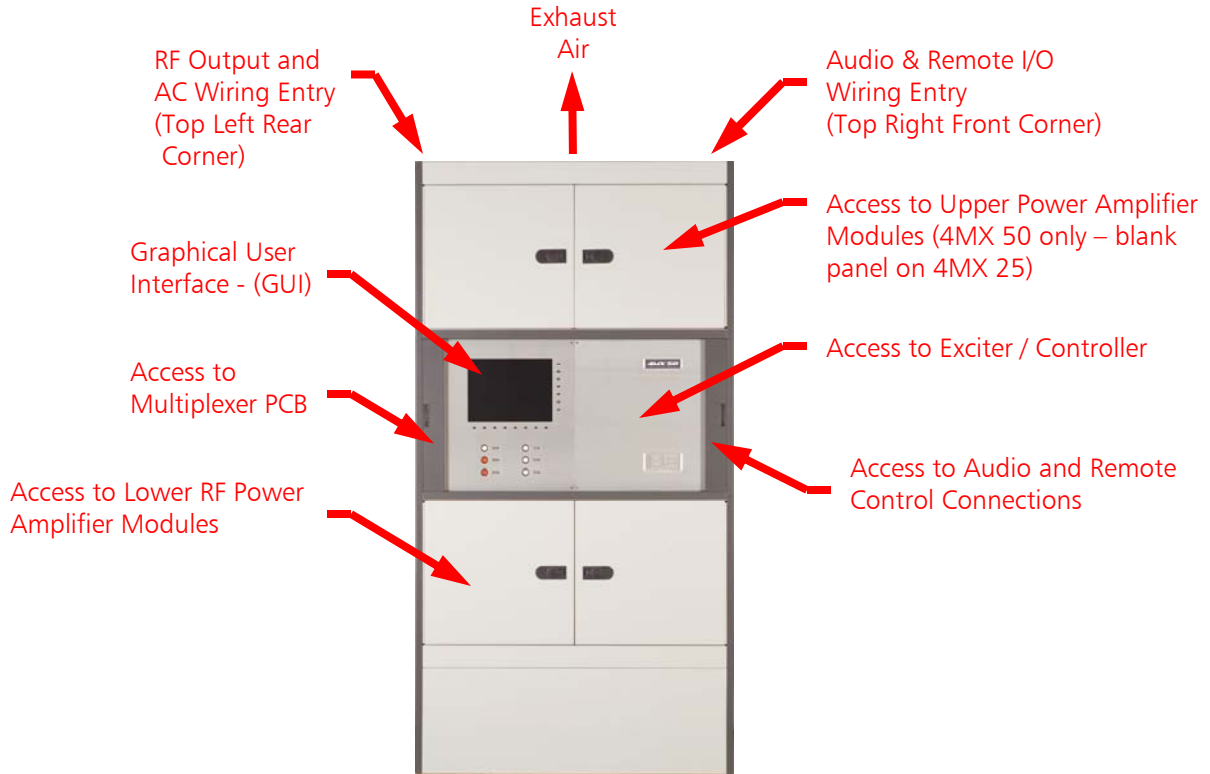


Figure 3 – 4MX 25/50 Front View

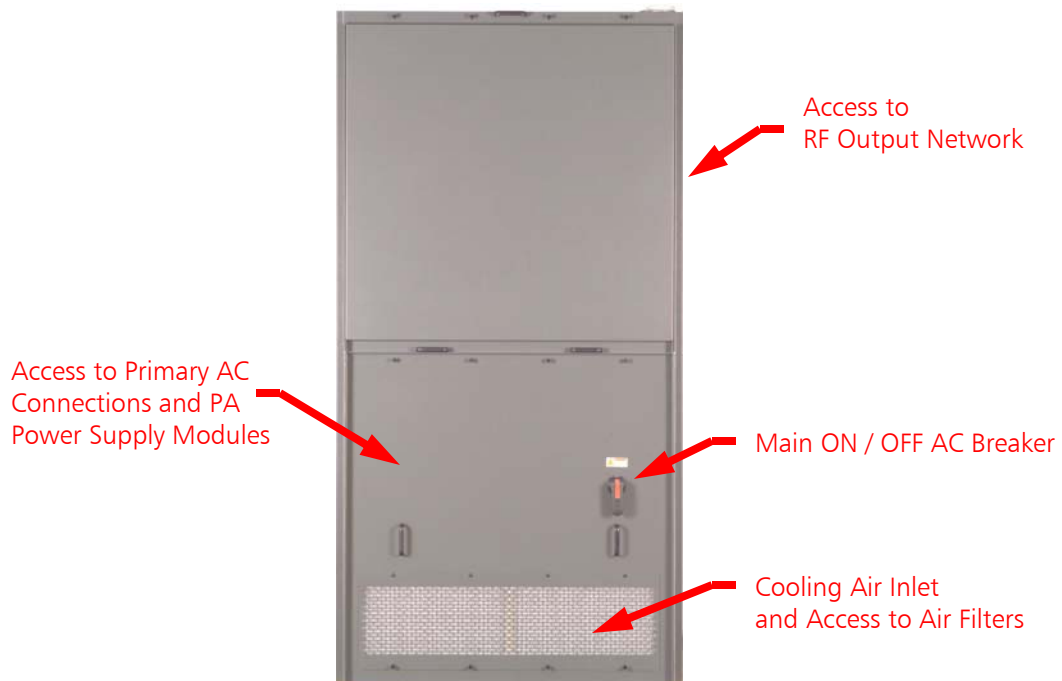


Figure 4 – 4MX 25/50 Rear View

1.7 4MX 25 PA and PS Module Locations

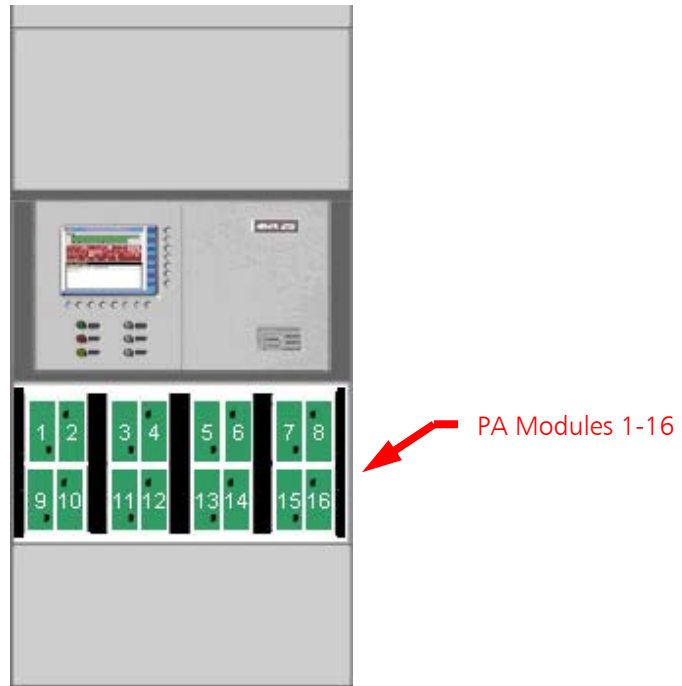


Figure 5 – 4MX 25 Front View (PA Module Locations)

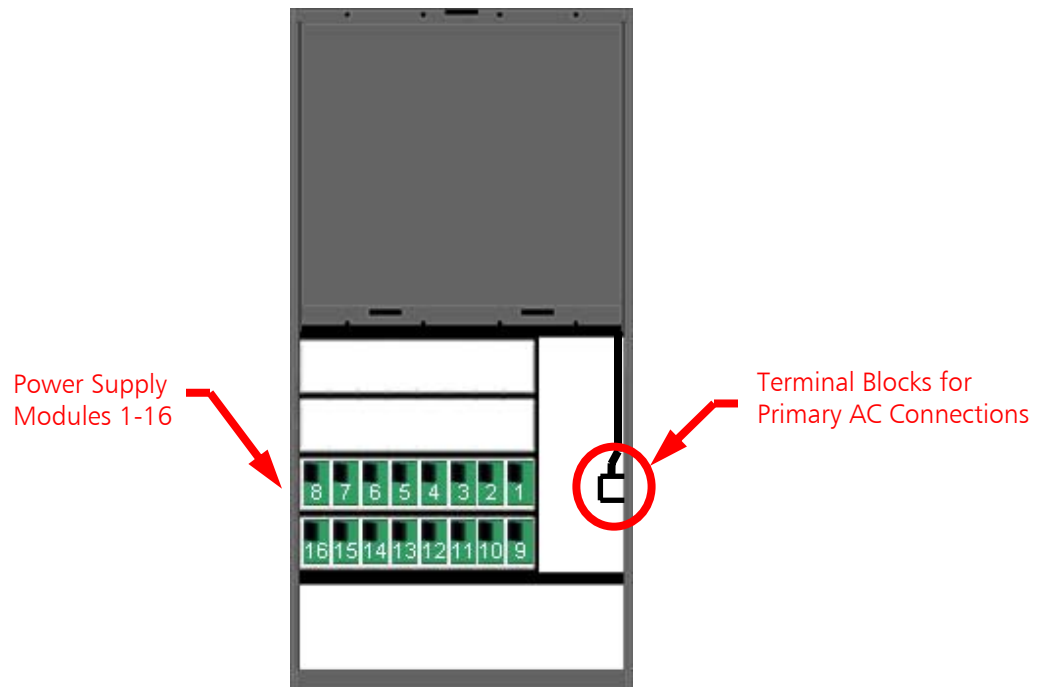


Figure 6 – 4MX 25 Rear View (Power Supply Module Locations)

1.8 4MX 50 PA and PS Module Locations

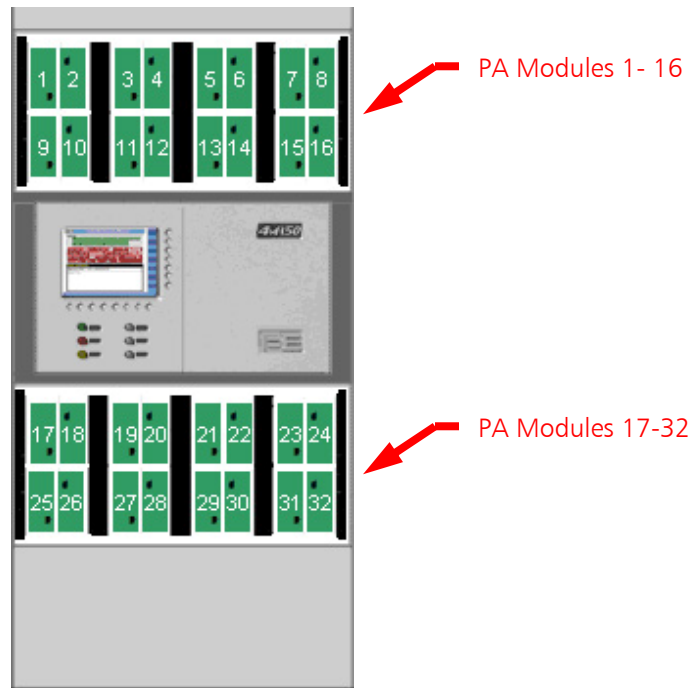


Figure 7 – 4MX 50 Front View (PA Module Locations)

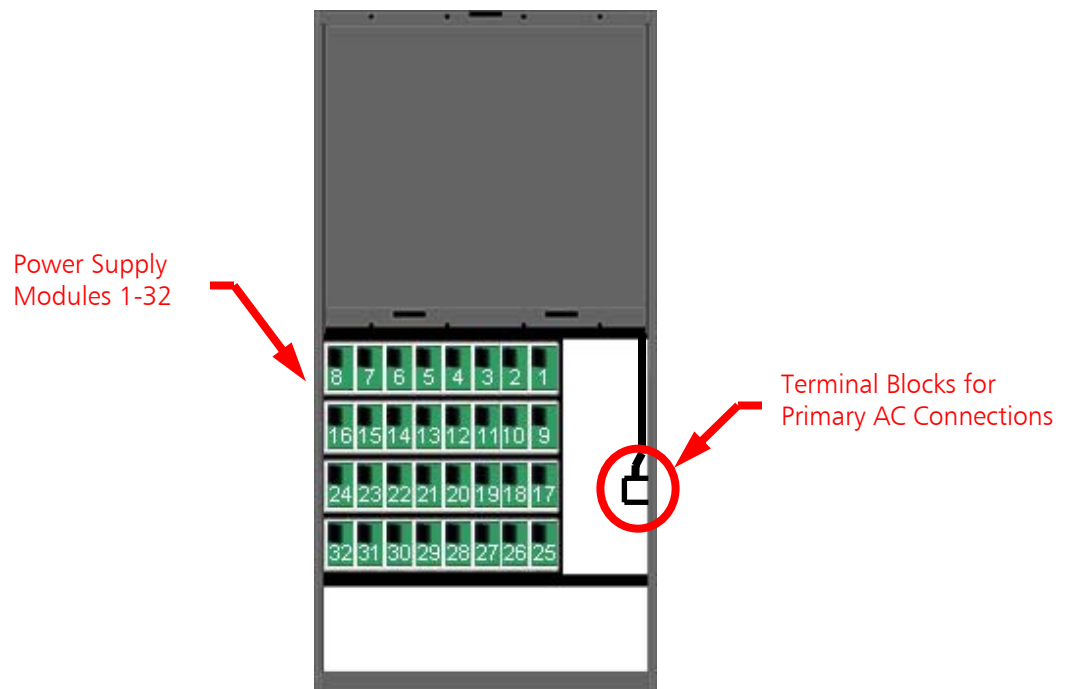


Figure 8 – 4MX 50 Rear View (Power Supply Module Locations)

1.9 Items Required for Installation

1.9.1 Tools / Items Required for Installation (not supplied with 4MX 25/50)

- ☐ 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 RF connection).
- ☐ 1/2" Wrench or Socket (for Earth Ground connection).
- ☐ 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

1.9.2 Installation Kit Items (977-4051 – supplied with 4MX 25/50)

- ☐ 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).
- ☐ 463-5500-001, Earth Ground Strap

1.9.3 Surge Suppressor (supplied with 4MX 25/50)

4MX 25/50 AM Transmitters come with an AC Surge Protector. Depending upon your site's requirements, one of the following will arrive with your shipment.

- ☐ 959-2062-001, AC Surge Protector, 240V, CL Delta or WYE, 3 Wire + Ground
- ☐ 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 Locating the Transmitter

The 4MX 25/50 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 transmitter from the shipping skid, remove the transmitter from the skid and slide the transmitter into its exact location.

Note: Ensure that adequate clearance is maintained for proper air flow and general maintenance (see **Figures 1 and 2** for dimensions).

2.2 Earth Ground to 4MX 25/50 Chassis Connection

The 4MX 25/50 ground system requires the connection of an earth ground to the 4MX 25/50 chassis. Refer to **Figure 9** and connect an earth ground from the AC Service Entrance to the RF Output flange using the supplied Earth Ground Strap (463-5500-001) and customer supplied grounding strap as shown.

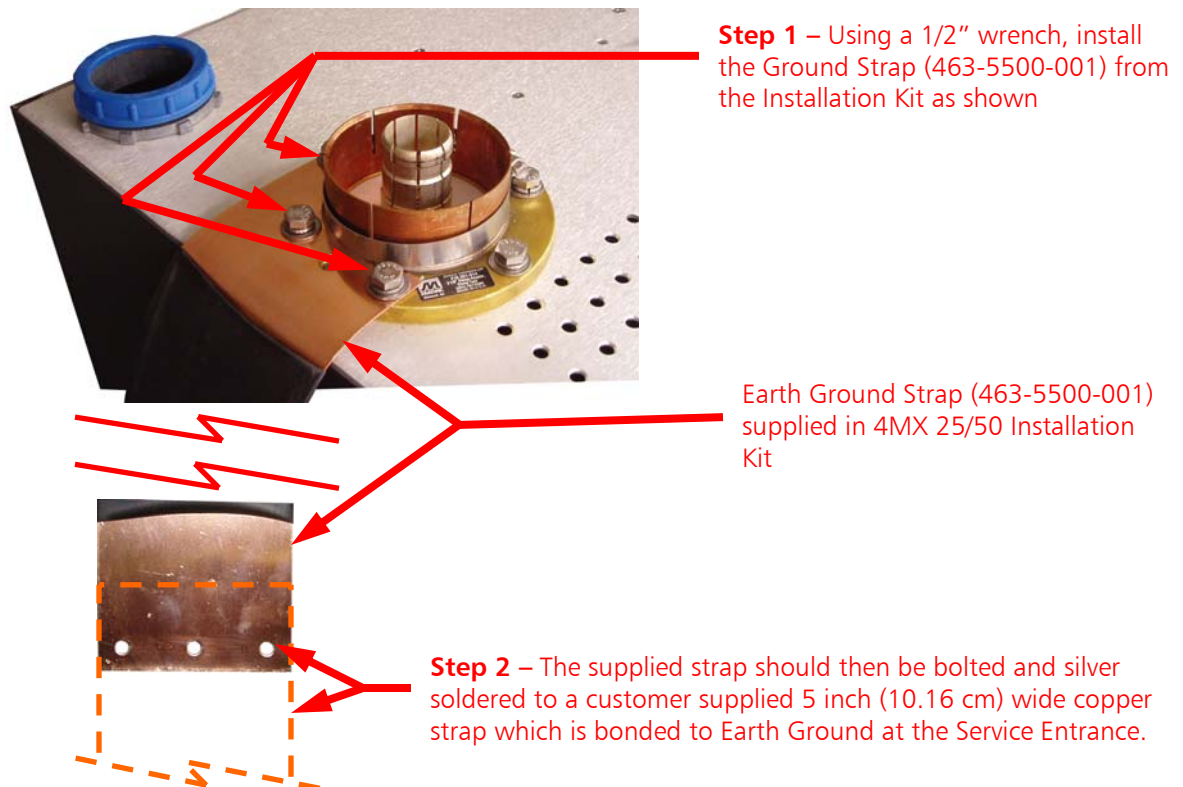


Figure 9 – Earth Ground to 4MX 25/50 Chassis Connection

2.3 RF Output Transmission Line Connection

The 4MX 25/50 transmitter RF output connection is 3-1/8 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 10**.

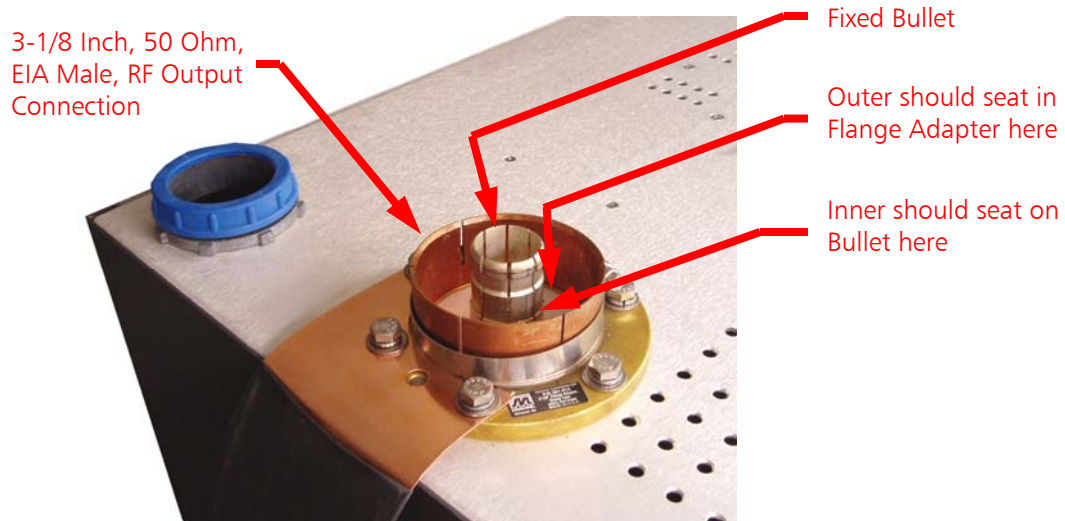
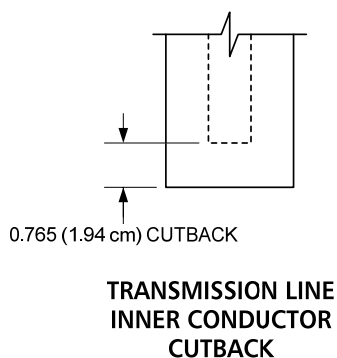


Figure 10 – 3-1/8 Inch, 50 Ohm, RF Output Connector (Left Rear of Cabinet Top)

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 10**.

Step 3 – Position the clamp as shown and tighten using a flat blade screwdriver, 5/16" nut driver or socket.



Install and position clamp as shown. Tighten using a flat blade screwdriver, 5/16" nut driver or socket

Figure 11 – 3-1/8 Inch, 50 Ohm, RF Output Connection

2.4 Primary AC Power Source Voltage and Configurations

The 4MX 25/50 was designed to operate from the AC Power Sources listed below

- 230VAC (192-265VAC), 50 / 60 Hz, 3-Phase, Closed Delta
- 230VAC (192-265VAC), 50 / 60 Hz, 3-Phase, WYE, 3 Wire
- 400VAC (332-460VAC), 50 / 60 Hz, 3-Phase, WYE, 4 Wire

However, please note that each AC Power Source does require a specific configuration of the power supply components in the 4MX 25/50.

When placing the order for the transmitter, the customer must determine which of the three AC Power Sources that they intend to operate the 4MX 25/50 from.

The customer sales order for the transmitter determines what AC Supply Voltage and Configuration that the transmitter was built and tested for.

The following figures represent acceptable AC Power Source transformer topologies.

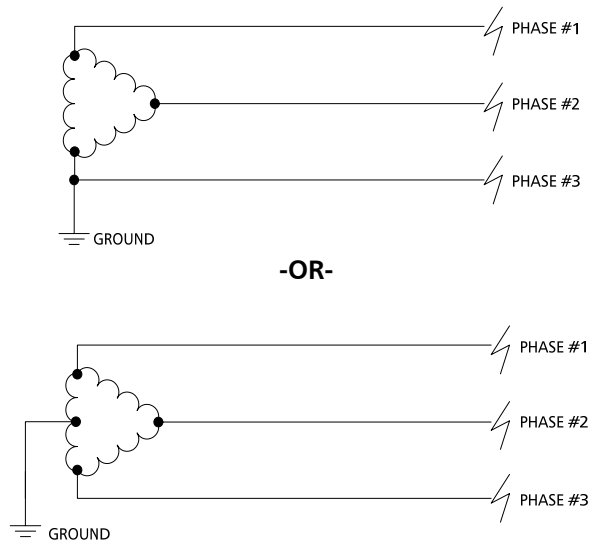


Figure 12 – 230VAC , 3-Phase, Closed Delta Supply to Main Breaker Box

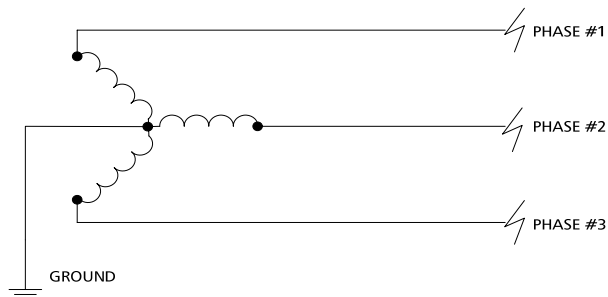


Figure 13 – 230VAC , 3-Phase, WYE, 3 Wire Supply to Main Breaker Box

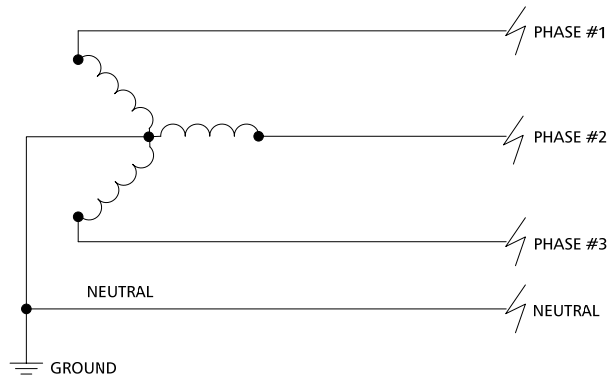


Figure 14 – 400VAC , 3-Phase, WYE, 4 Wire Supply to Main Breaker Box



CAUTION!!

- 1) *DO NOT attempt to connect the 4MX 25/50 to a different AC Power Source than it was configured and tested for at the factory!*
- 2) *Before installing the 4MX 25/50 Transmitter, make certain that the AC Input Voltage and configuration does in fact match the transmitter sales order information!*
- 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!*

2.5 4MX 25 AC Input Recommended Disconnect Fuse and Wire Sizes

- NOTES:** 1) Amperage Draw Per Phase calculated @ 27.5kW, 100% Tone Modulation.
2) Wire to be Type THHN or equivalent.

230VAC (192-265VAC) 3 Phase, Closed Delta or WYE, 3 Wire, 120A 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
208	133A	150A	1/0 AWG	2/0 AWG	2/0 AWG	2/0 AWG	2/0 AWG
220	126A	150A	1/0 AWG	2/0 AWG	2/0 AWG	2/0 AWG	2/0 AWG
230	120A	125A	1 AWG	1/0 AWG	1/0 AWG	1/0 AWG	1/0 AWG
240	115A	125A	1 AWG	1/0 AWG	1/0 AWG	1/0 AWG	1/0 AWG
260	107A	125A	1 AWG	1/0 AWG	1/0 AWG	1/0 AWG	1/0 AWG

400VAC (330-460VAC) 3 Phase, WYE, 4 Wire, 69A 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	82A	90A	3 AWG	3 AWG	3 AWG	2 AWG	2 AWG
400	69A	75A	4 AWG	4 AWG	4 AWG	3 AWG	3 AWG
440	63A	70A	4 AWG	4 AWG	4 AWG	4 AWG	4 AWG
460	60A	70A	4 AWG	4 AWG	4 AWG	4 AWG	4 AWG

AWG To Metric Conversion

AWG	Metric Cond Cross-Sect mm ²	Comparable Cond Cross-Sect mm ²	AWG	Metric Cond Cross-Sect mm ²	Comparable Cond Cross-Sect mm ²
4	21.2	----	1	42.4	----
3	26.7	25	1/0	53.4	50
2	33.6	35	2/0	67.5	70

Primary Circuit Breaker Candidates – ABB Circuit Breakers

SIZE	ABB P/N	SIZE	ABB P/N
70A	S3N070TW	125A	S3N125TW
75A	None	150A	S3N150TW
90A	S3N090TW		

Figure 15 – 4MX 25 AC Primary AC Input Disconnect Fuse and Wire Size Charts



2.6 4MX 50 AC Input Recommended Disconnect Fuse and Wire Sizes

NOTES: 1) Amperage Draw Per Phase calculated @ 55kW, 100% Tone Modulation.
2) Wire to be Type THHN or equivalent.

230VAC (192-265VAC) 3 Phase, Closed Delta or WYE, 3 Wire, 240A 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
208	266A	300A	350 KCMIL	400 KCMIL	400 KCMIL	500 KCMIL	500 KCMIL
220	251A	300A	350 KCMIL	400 KCMIL	400 KCMIL	500 KCMIL	500 KCMIL
230	240A	250A	250 KCMIL	300 KCMIL	300 KCMIL	350 KCMIL	350 KCMIL
240	230A	250A	250 KCMIL	300 KCMIL	300 KCMIL	350 KCMIL	350 KCMIL
260	213A	225A	4/0 AWG	250 KCMIL	250 KCMIL	300 KCMIL	300 KCMIL

400VAC (330-460VAC) 3 Phase, WYE, 4 Wire, 138A 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	163A	175A	2/0 AWG	3/0 AWG	3/0 AWG	4/0 AWG	4/0 AWG
400	138A	150A	2/0 AWG	2/0 AWG	2/0 AWG	3/0 AWG	3/0 AWG
440	126A	150A	2/0 AWG	2/0 AWG	2/0 AWG	3/0 AWG	3/0 AWG
460	120A	125A	1 AWG	1/0 AWG	1/0 AWG	2/0 AWG	2/0 AWG

AWG To Metric Conversion

AWG	Metric Cond Cross-Sect mm ²	Comparable Cond Cross-Sect mm ²	AWG	Metric Cond Cross-Sect mm ²	Comparable Cond Cross-Sect mm ²
1	42.4	----	250 KCMIL	127	120
1/0	53.4	50	300 KCMIL	152	150
2/0	67.5	70	350 KCMIL	177	185
3/0	85	95	400 KCMIL	203	----
4/0	107.2	120	500 KCMIL	253	240

Primary Circuit Breaker Candidates – ABB Circuit Breakers

SIZE	ABB P/N	SIZE	ABB P/N
125A	S3N125TW	225A	S3N225TW
150A	S3N150TW	250A	T4N250TW
175A	S3N175TW	300A	T5N300TW

Figure 16 – 4MX 50 AC Primary AC Input Disconnect Fuse and Wire Size Charts

2.7 Installing the AC Surge Suppressor

Included in the 4MX 25/50 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 schematics in **Figures 17 and 18** for the Surge Suppressor Device wiring for your specific AC Voltage and Configuration.



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

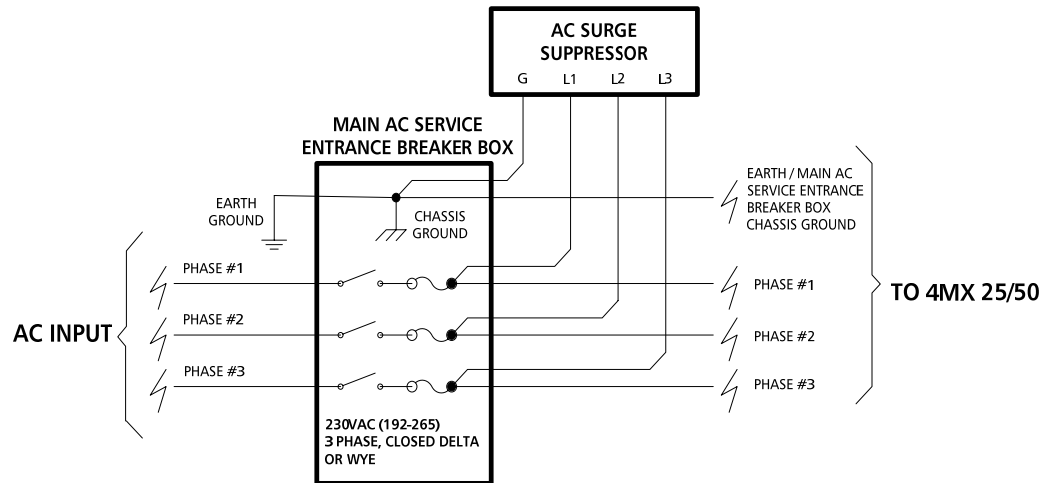


Figure 17 – 230VAC, 3 Phase, Closed Delta or WYE Input, AC Surge Suppressor Device Wiring

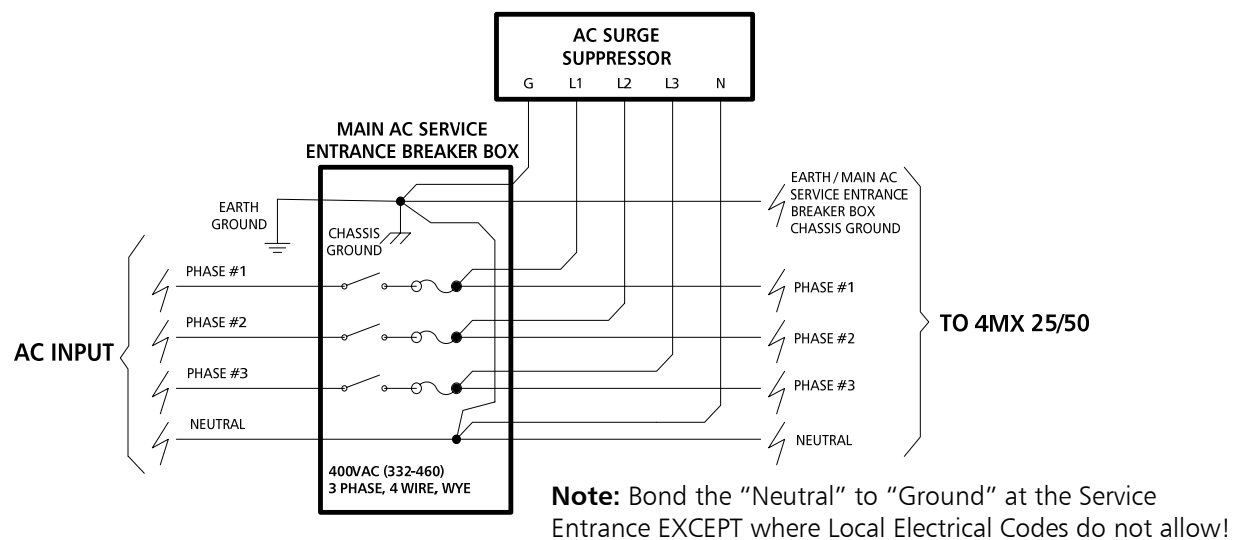


Figure 18 – 400VAC, 3 PHASE, 4 Wire WYE Input, AC Surge Suppressor Device Wiring



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" (**Note: Neutral connection only used on 400V WYE**); 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.

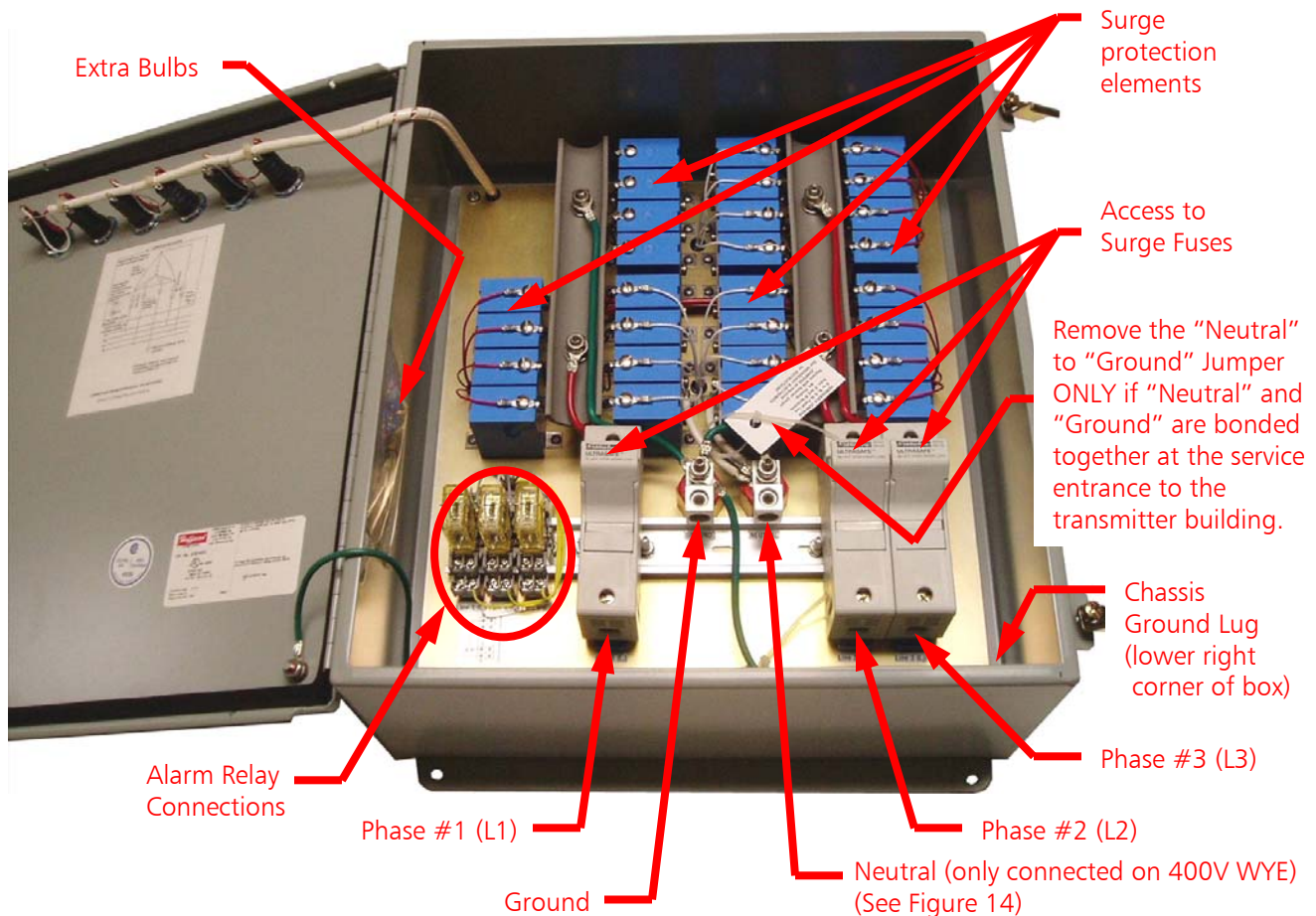


Figure 19 – Typical AC Surge Suppressor Device Connections

2.8 Connecting AC Power To The 4MX 25/50 Transmitter

The primary AC Power Source wiring enters the 4MX 25/50 cabinet through the top and runs down through an internal conduit to the main AC terminal blocks.

Step 1 – Remove the lower rear door of the 4MX 25/50.

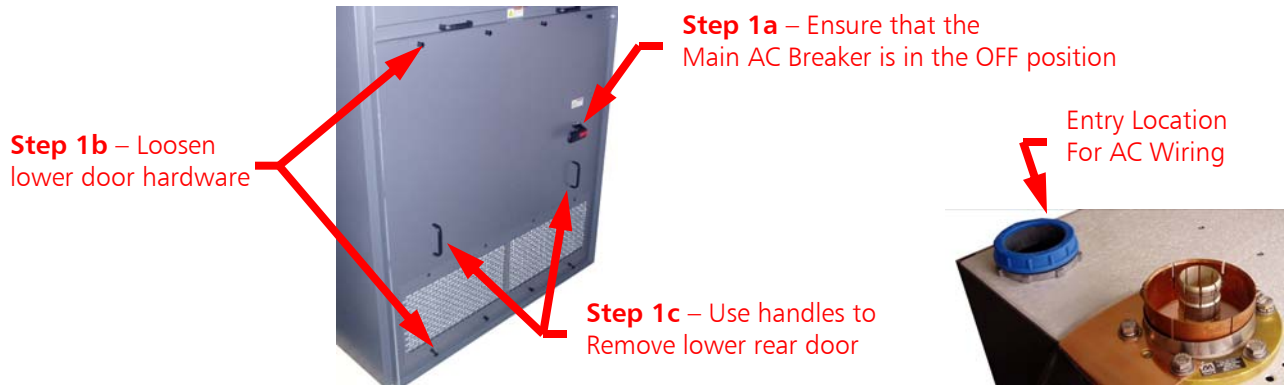


Figure 20 – Lower Rear Door Removal and AC Wiring Entry (Top Left Rear Corner)

Step 2 – Insert the AC Power cable into the provided entry location in the top of the cabinet.

Step 3 – Route the AC Power cable down through the conduit to the AC Connection blocks.

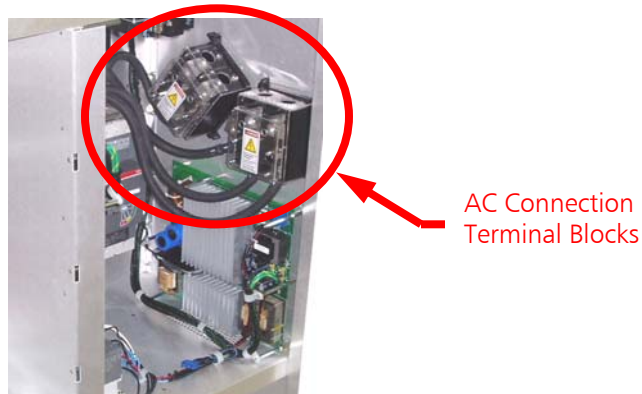


Figure 21 – AC Terminal Block Location (Lower Right Rear of Cabinet)

Step 4 – Prepare the conductors with the suggested strip length and apply conductive grease supplied in the Installation kit.



Figure 22 – Suggested Strip Length and Grease for AC Supply Wiring

Step 5 – See the following sections 2.8.1, 2.8.2, or 2.8.3 for the AC Input Terminal Block Connections for your specific configuration.

2.8.1 230VAC (192-265VAC), 50/60 Hz, 3 Phase, Closed Delta Input

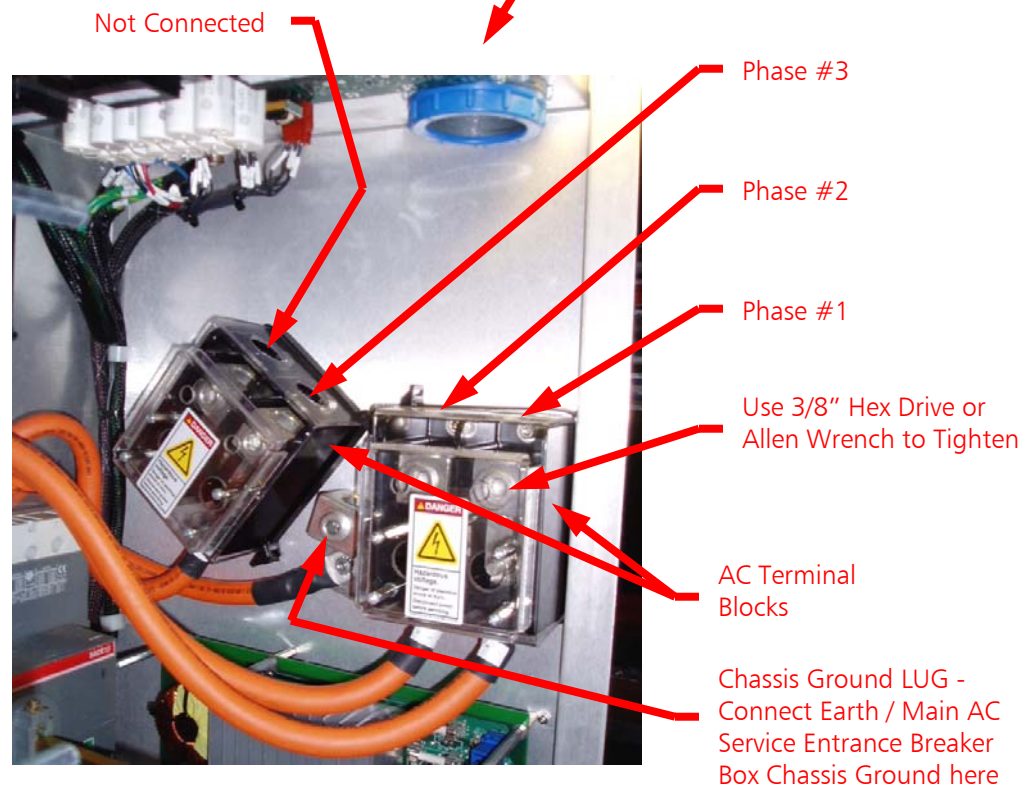
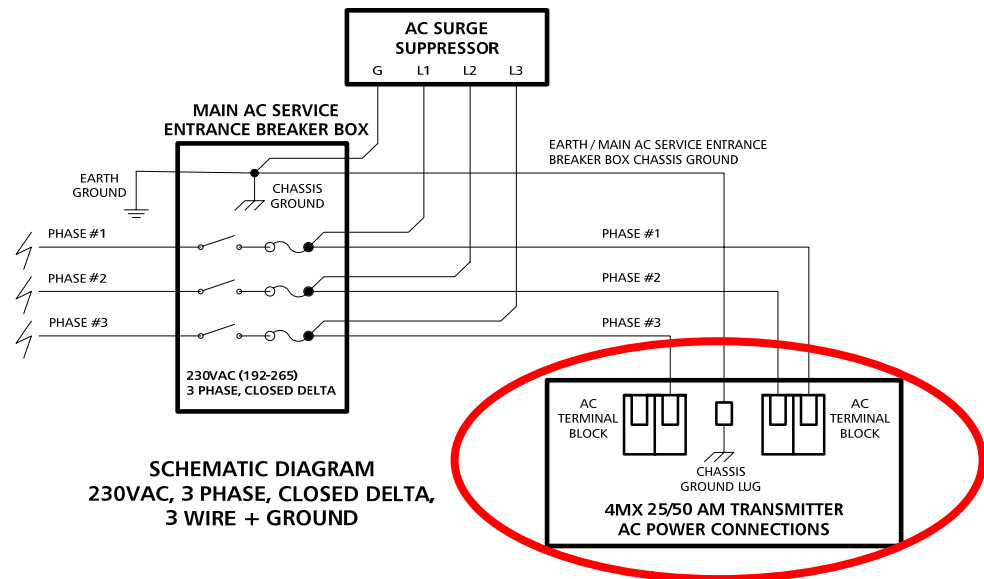


Figure 23 – 230VAC, 3 Phase, Closed Delta

2.8.2 230VAC (192-265VAC), 50/60 Hz, 3 Phase, WYE, 3 Wire Input

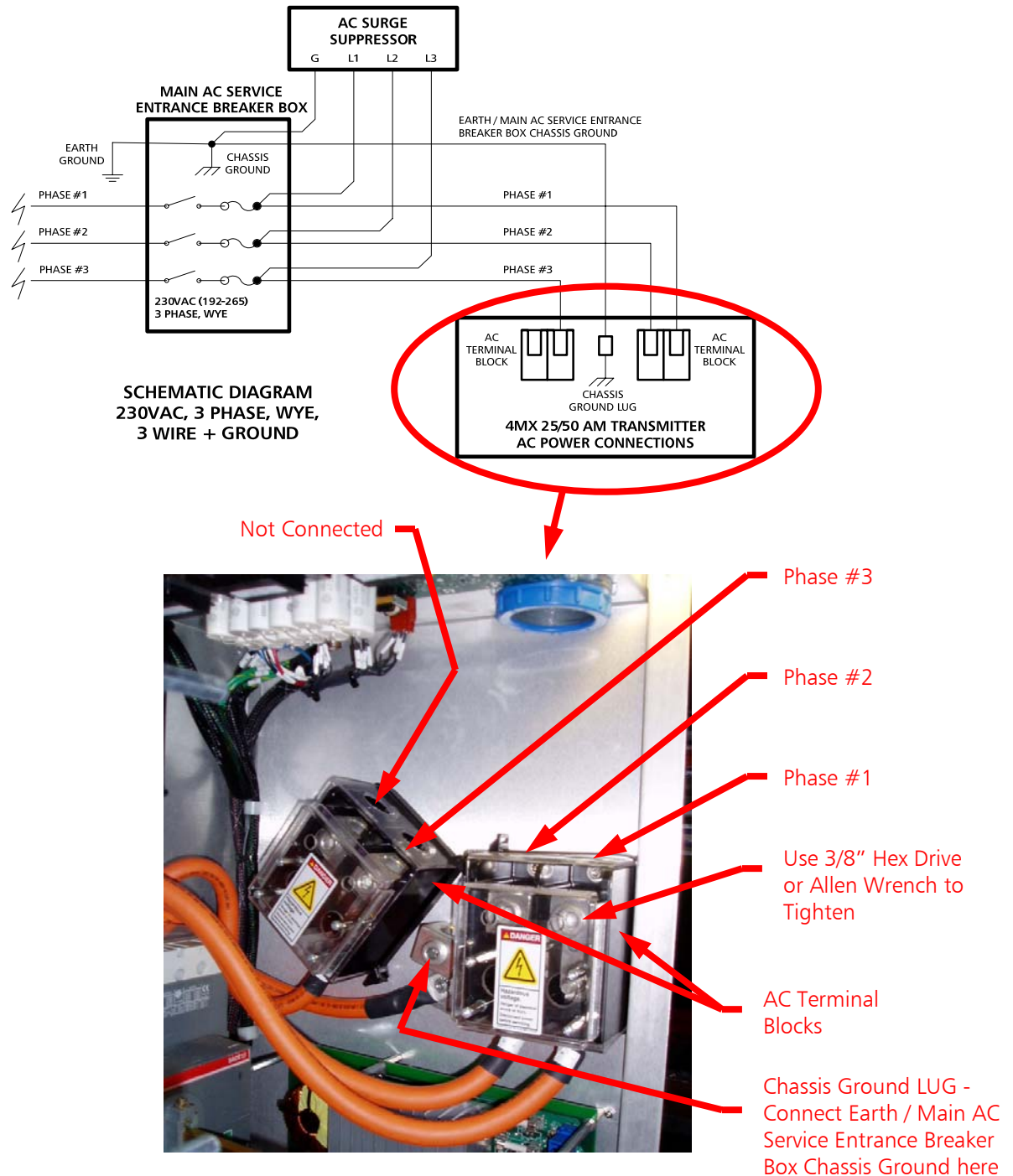
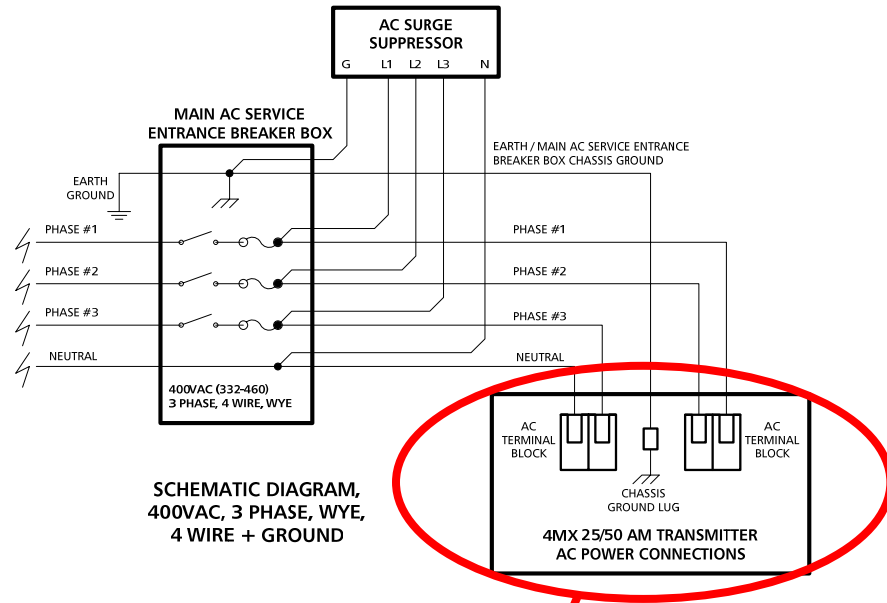


Figure 24 – 230VAC, 3 Phase, WYE, 3 Wire

2.8.3 400VAC (332-460VAC), 50/60 Hz, 3 Phase, WYE, 4 Wire Input



**SCHEMATIC DIAGRAM,
400VAC, 3 PHASE, WYE,
4 WIRE + GROUND**

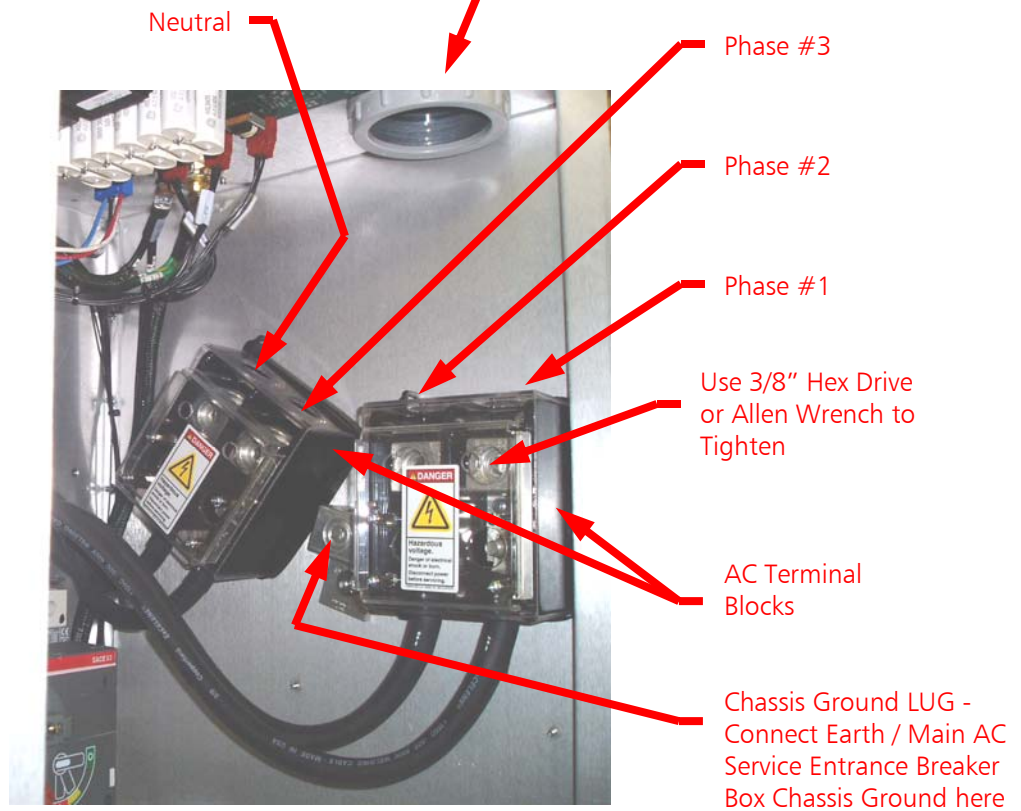


Figure 25 – 400VAC, 3 Phase, WYE, 4 Wire

2.8.4 Install Lower Rear Door

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

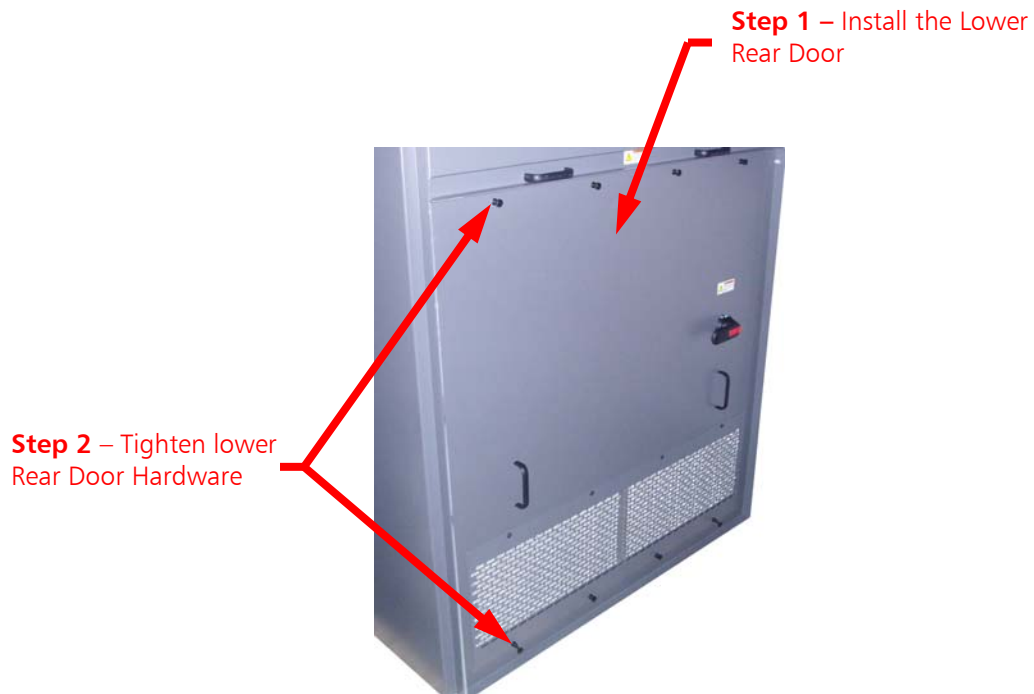


Figure 26 – Install Lower Rear Door

2.9 Remote INTERLOCK and FAILSAFE I/O Connections

The 4MX 25/50 Transmitter is 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 **Figures 1 and 2** for the cabinet entry location provided for remote device wiring and the front panel access location to the I/O Connection Board. See **Figures 27 and 28** for instructions to gain access to the Remote Control I/O connections. For the pin out of the I/O Connection Board, see **Figure 29**.



Figure 27 – Remote Control I/O and Audio Input Access Panel Hardware



Figure 28 – Remote Control I/O and Audio Input Access Panel

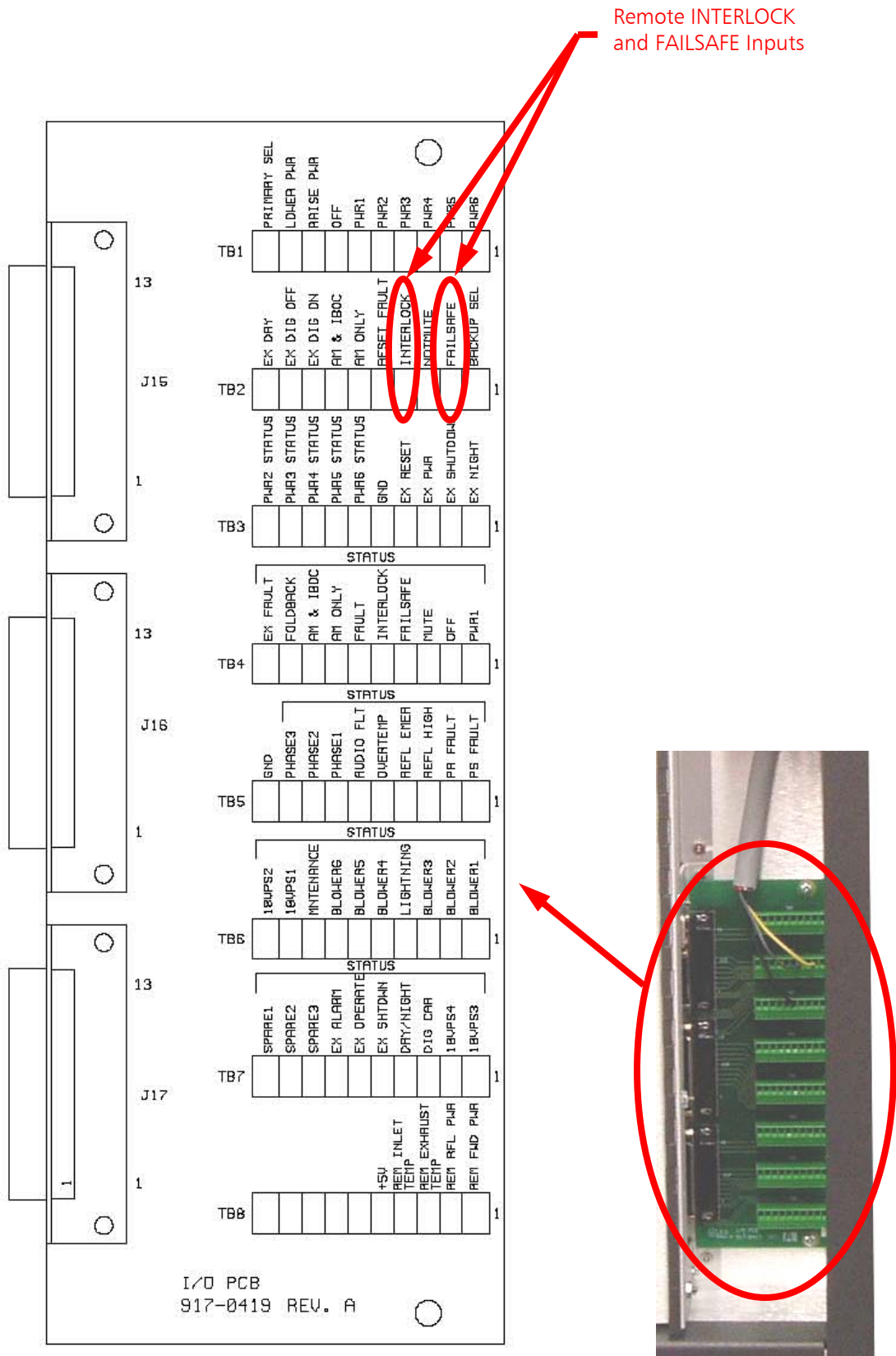


Figure 29 – Remote I/O Terminal Block Pin Outs

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 30** for the location of jumper plug P4 on the Controller Board.



Figure 30 – 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 25/50 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.*

2.9.1 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!

2.9.2 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!



2.10 Turning on AC Power

2.10.1 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 **Figures 1 and 2**).
- ☐ Ensure that the transmitter has a cooling air supply source that will provide 3000 cubic feet per minute (85.0 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.

2.10.2 Turn ON the Main AC Service Entrance Breaker

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

2.10.3 Turn ON the 4MX 25/50 Transmitter AC Breaker

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

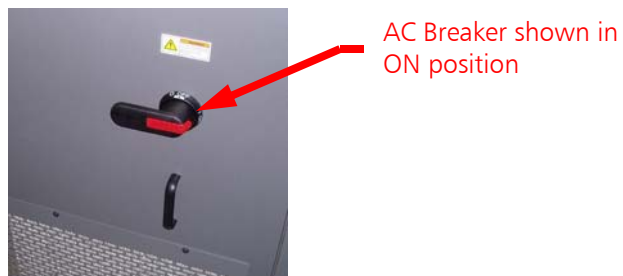


Figure 31 – 4MX 25/50 Rear Panel AC Breaker

2.11 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.

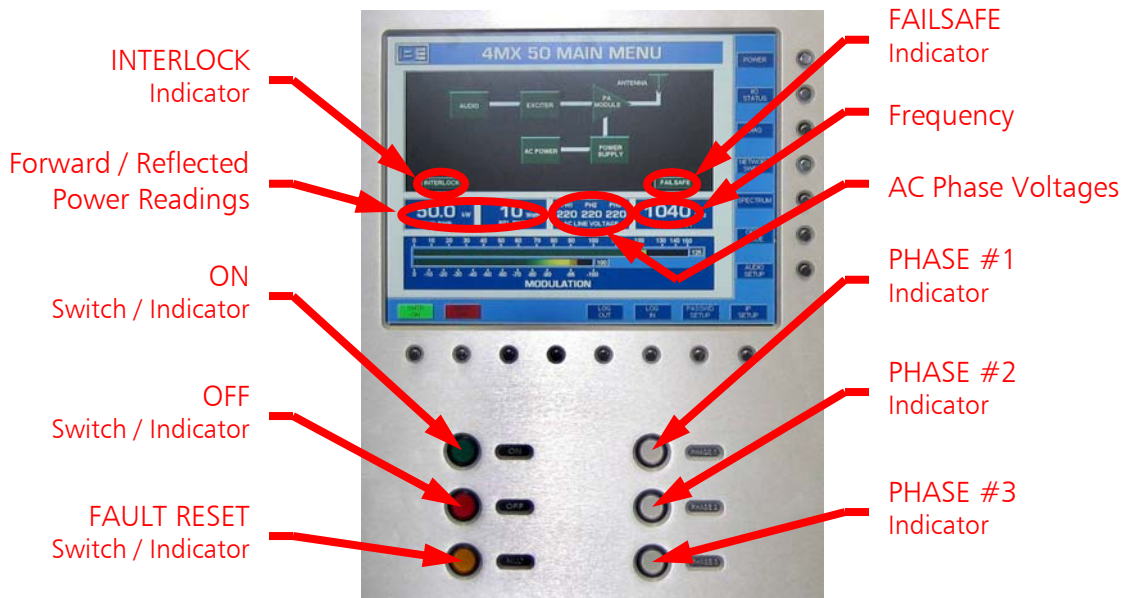


Figure 32 – Front Panel GUI, Switches, and Indicators

2.9.1 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.

2.9.2 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.

2.9.3 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.

2.9.4 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.

2.12 Initial RF Output and Connection of the Audio Source

2.12.1 Log into the GUI

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

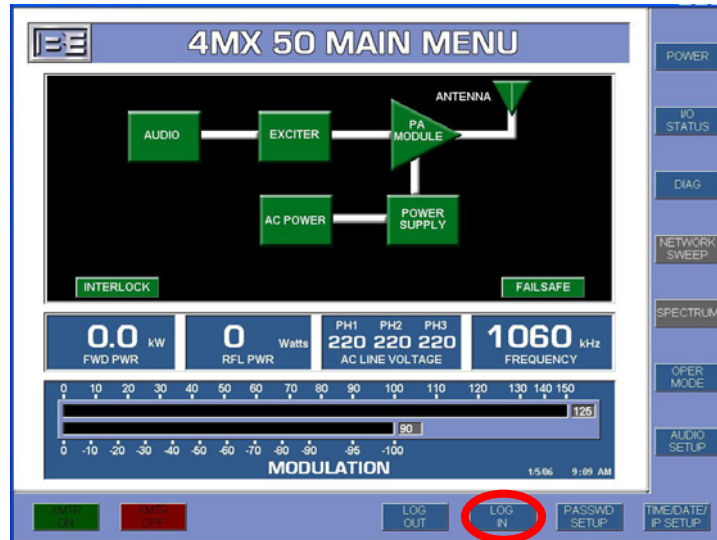


Figure 33 – Main GUI Menu

2.12.2 Enter the Chief Engineer's Password

Next, enter the Chief Engineer's default password, 123456, and press ENTER



Figure 34 – Log In Menu

2.12.3 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.

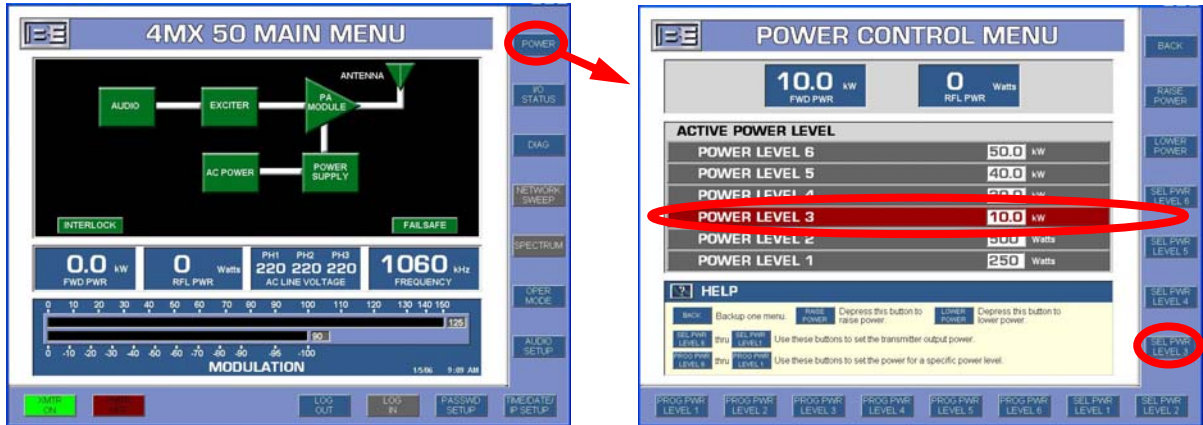


Figure 35 – RF Output Power Control Menu

2.12.4 Turn the 4MX 25/50'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.

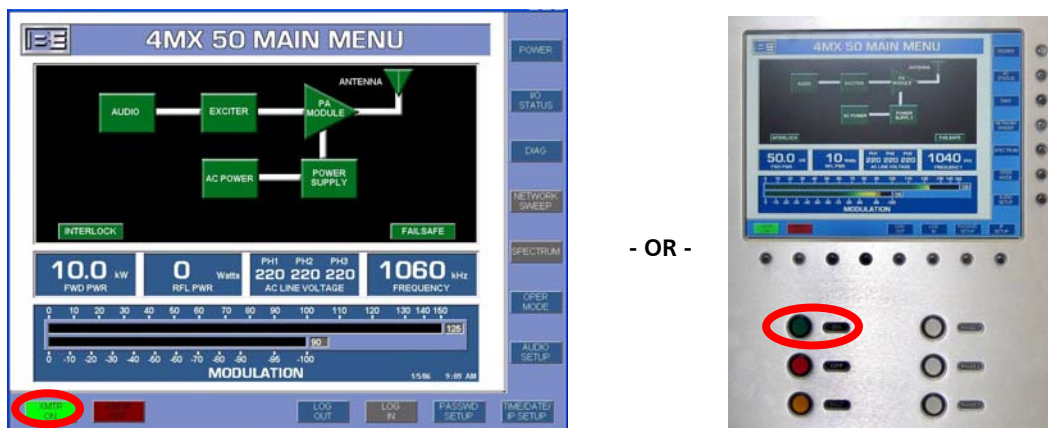


Figure 36 – Turning RF Output Power ON

- ☐ 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.

2.12.5 PA Diagnostics

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

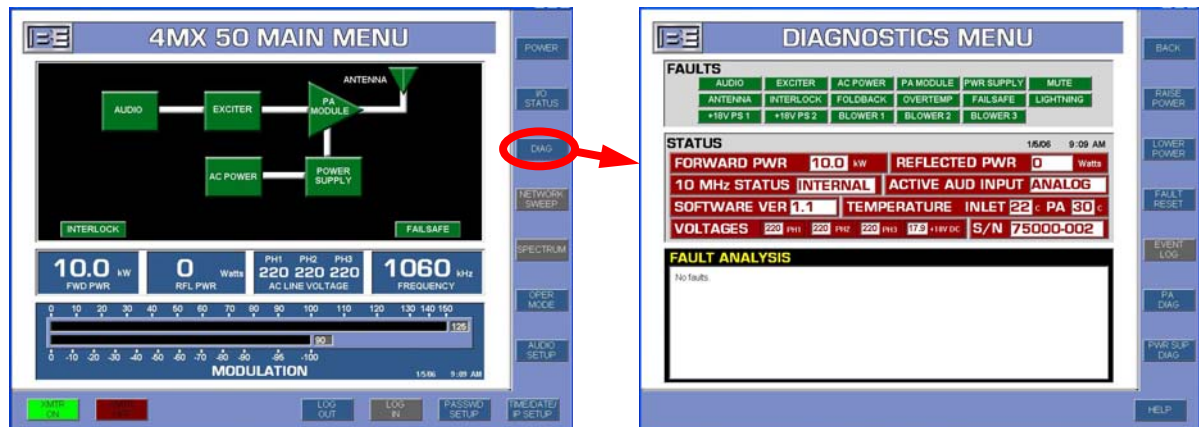


Figure 37 – Diagnostics Menu

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

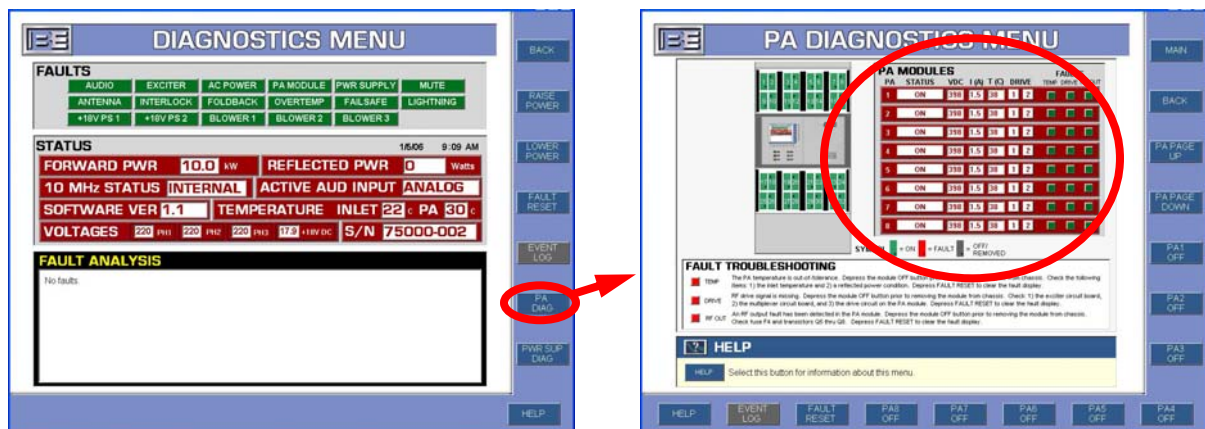


Figure 38 – PA Diagnostics Menu

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

NOTE: In a 4MX 25, all 16 PA Modules will not be ON unless the RF Output Power Level is set for $\geq 5\text{kW}$; @ 1.25kW – 4.99kW 8 PA Modules will be ON (1-8); @ 250W – 1.24kW 4 PA Modules will be ON (1-4).

NOTE: In a 4MX 50, all 32 PA Modules will not be ON unless the RF Output Power Level is set for $\geq 10\text{kW}$; @ 2.5kW – 9.99kW 16 PA Modules will be ON (9-24); @ 250W – 2.49kW 8 PA Modules will be ON (13-20).

2.12.6 Power Supply Diagnostics

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

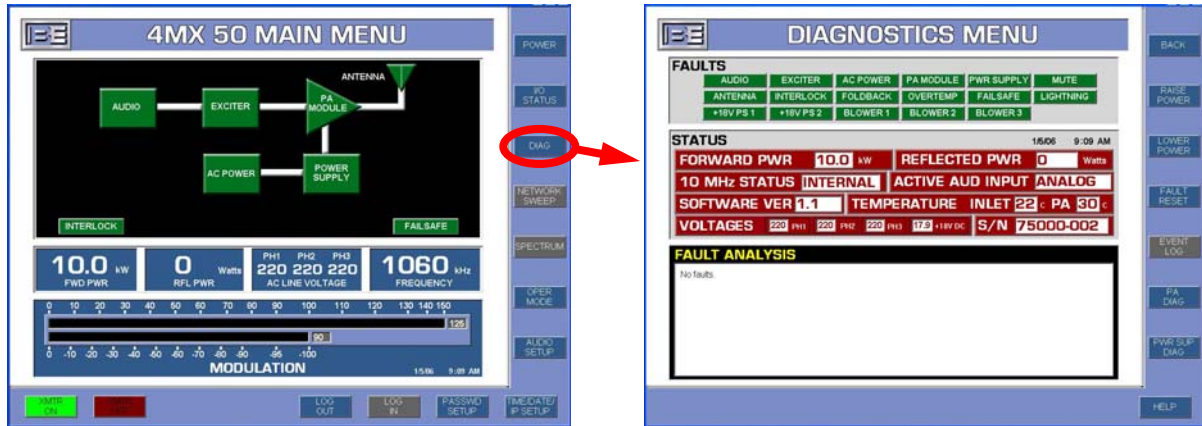


Figure 39 – Diagnostics Menu

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

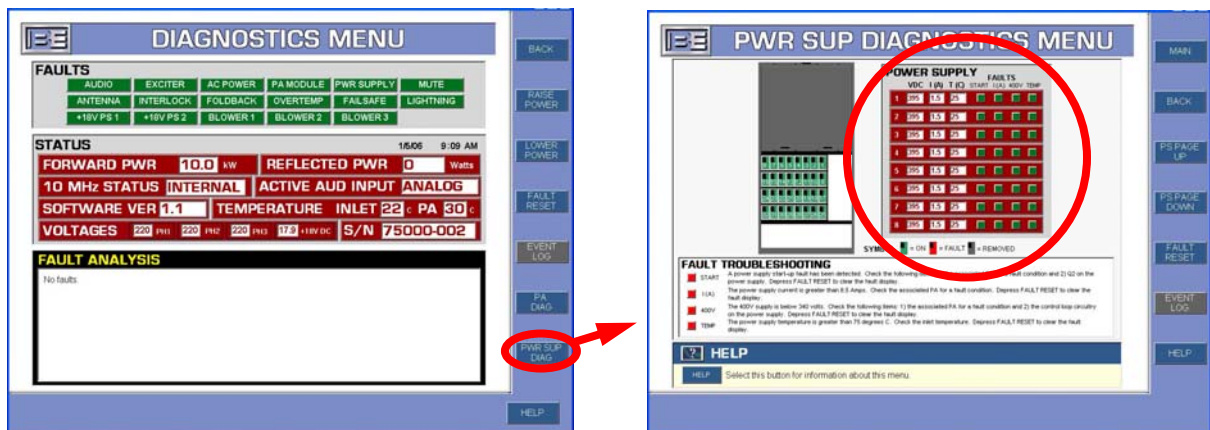


Figure 40 – Power Supply Diagnostics Menu

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

NOTE: In a 4MX 25, all 16 Power Supply Modules will not be ON unless the RF Output Power Level is set for $\geq 5\text{kW}$; @ 2.5kW – 9.99kW 8 PS Modules will be ON (1-8); @ 250W – 2.49kW 4 PS Modules will be ON (1-4).

NOTE: In a 4MX 50, all 32 Power Supply Modules will not be ON unless the RF Output Power Level is set for $\geq 10\text{kW}$; @ 2.5kW – 9.99kW 16 PS Modules will be ON (9-24); @ 250W – 2.49kW 8 PS Modules will be ON (13-20).

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



2.12.7 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.

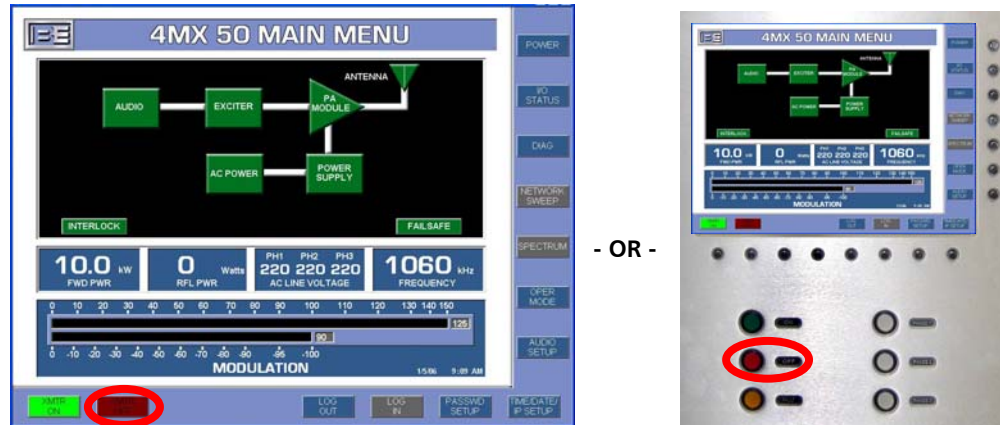


Figure 41 – Turning RF Output Power OFF

2.12.8 Audio Setup

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

Please note that if you are planning to run in HD mode (with an ASI) and are using Analog 1 and/or Analog 2 for back up, you must go through the Audio Setup procedure for each of the Analog Audio sources. If there is an ASI-10 HD failure, the 4MX will automatically switch to the primary audio input.

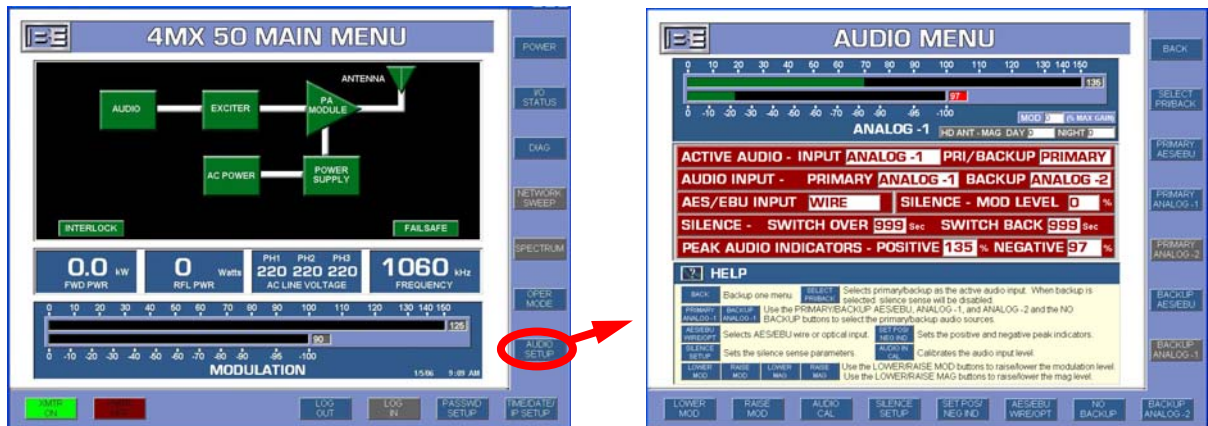


Figure 42 – Audio Setup Menu

2.12.8.1 Set the Active Audio Input

The 4MX 25/50 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**.

2.12.8.2 Assign the Audio Input Type

Next, you must assign the Audio Input signal type. If you chose **PRIMARY** in step 2.12.8.1, 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**. If an input is selected as Primary it is not available as a choice for secondary input and vice versa.

2.12.8.3 No Backup Audio

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

2.12.8.4 AES/EBU Input

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



2.12.8.5 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.

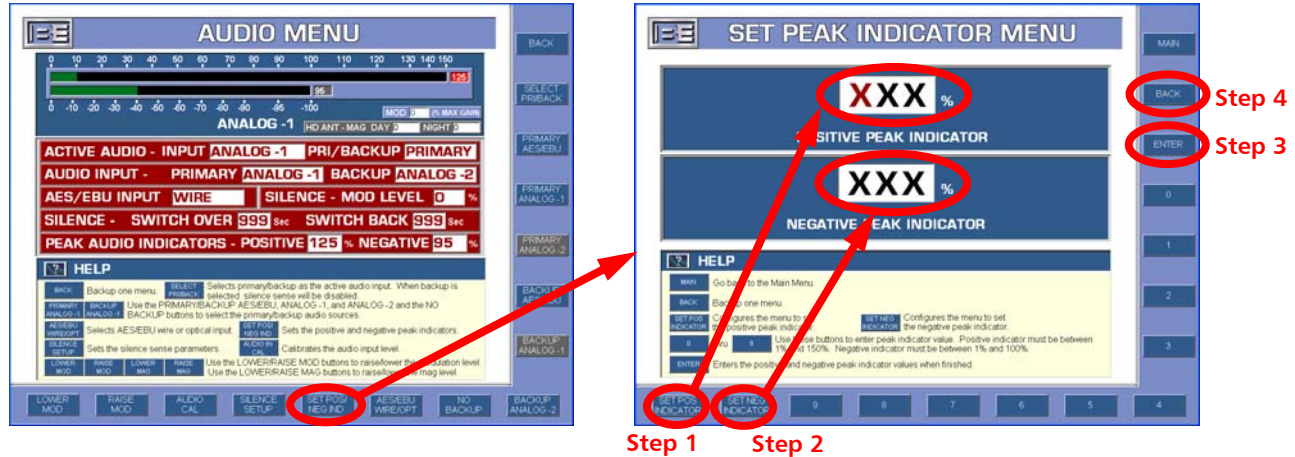


Figure 43 – Set Peak Indicator Menu

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 **97%** (typical value) for an initial starting point. The range for this setting is **1 – 100%**.

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

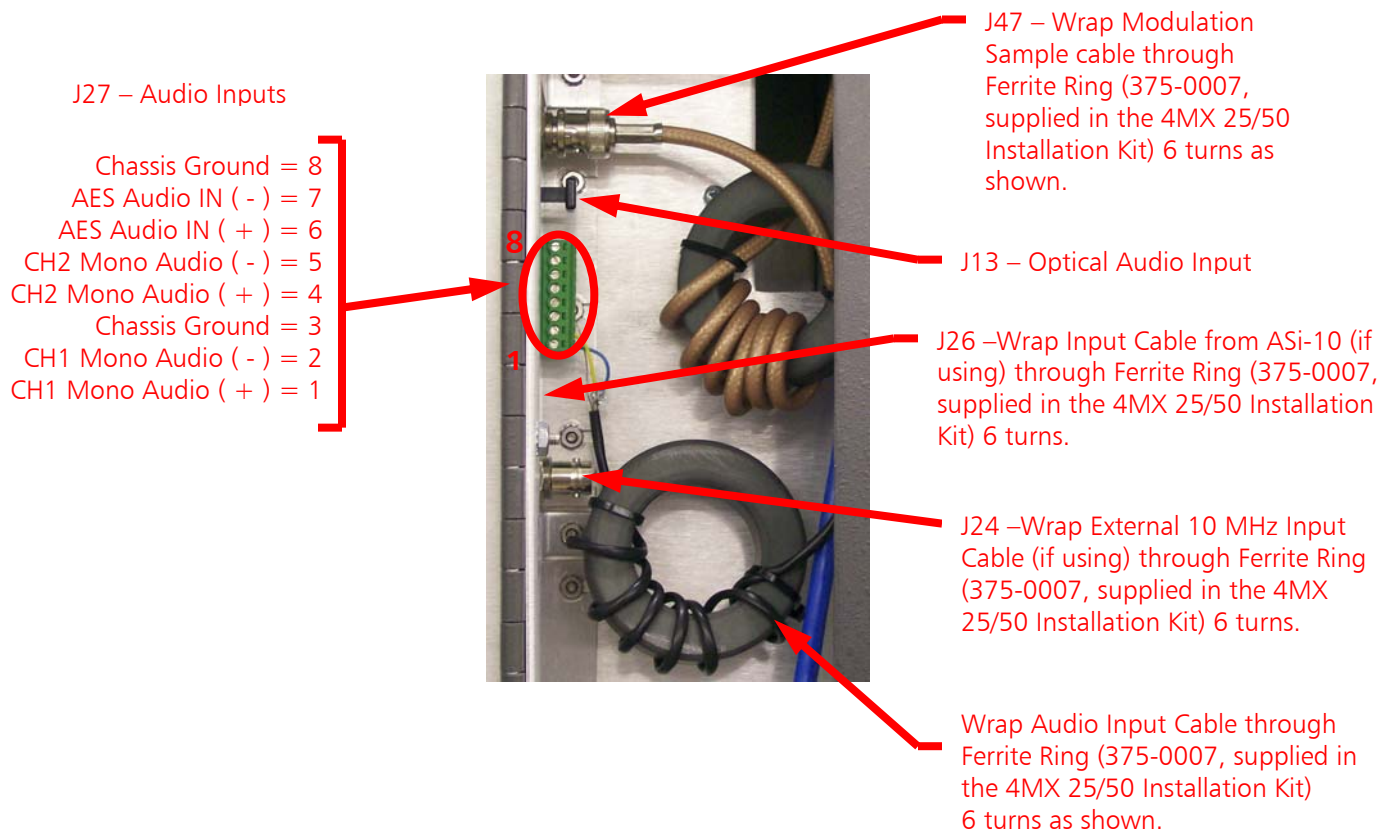
Step 4 - Select **BACK** to return to the Audio Menu.

2.12.9 Audio Input Connections

Before connecting the Audio source to the 4MX 25/50, make sure of the following.

- ☐ Ensure that the Audio Source is turned OFF.
- ☐ Ensure that the 4MX 25/50's RF Output Power is now OFF.

Proceed with connecting the Audio source to the 4MX 25/50. The Audio Inputs enter the 4MX 25/50 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.**



NOTE: ALL CONNECTIONS TO / FROM THE 4MX (AUDIO INPUTS, MODULATION SAMPLE, ASi-10 INPUT, EXTERNAL 10MHz, AND ALL CONNECTIONS TO THE REMOTE I/O BOARD) MUST BE ROUTED THROUGH FERRITE RINGS (375-0007, SUPPLIED IN THE 4MX 25/50 INSTALLATION KIT) AND WRAPPED 6 TURNS. IF THE FERRITE RINGS ARE NOT INSTALLED, DAMAGE TO THE TRANSMITTER MAY RESULT!

FAILURE TO PROPERLY INSTALL THE FERRITE RINGS WILL VOID THE WARRANTY OF THE TRANSMITTER!!!

Figure 44 – Audio Input Connections



2.12.10 Adjust R120 and R133

On the 4MX Exciter Board, remove P63 from Pins 2 and 3 of J63. Measure the resistance from J63 Pin 3 to R130 Pin 2, if not 1K then adjust potentiometer R133 until a resistance reading of 1K is achieved. Place P63 back onto Pins 2 and 3 of J63.

Next, remove P64 from Pins 2 and 3 of J64. Measure the resistance from J64 Pin 3 to R123 Pin 2, if not 1K then adjust potentiometer R120 until a resistance reading of 1K is achieved. Place P64 back onto Pins 2 and 3 of J64.

These pots should not need to be adjusted after ensuring they are set to 1K. This requires using an external processor's audio level adjustments to provide the correct audio level into the 4MX and using the audio gain adjustments found in 2.12.12.

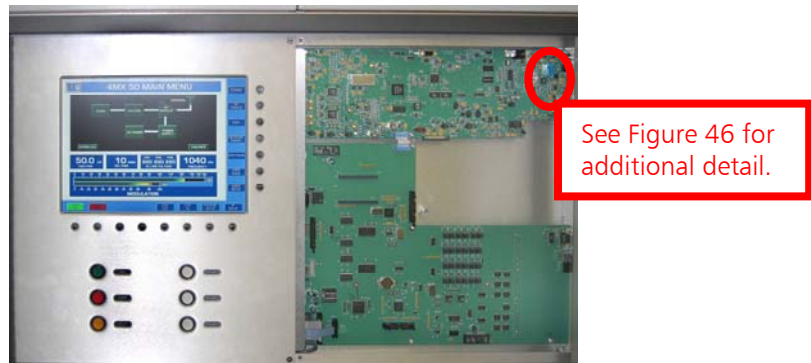


Figure 45 – Audio Calibration

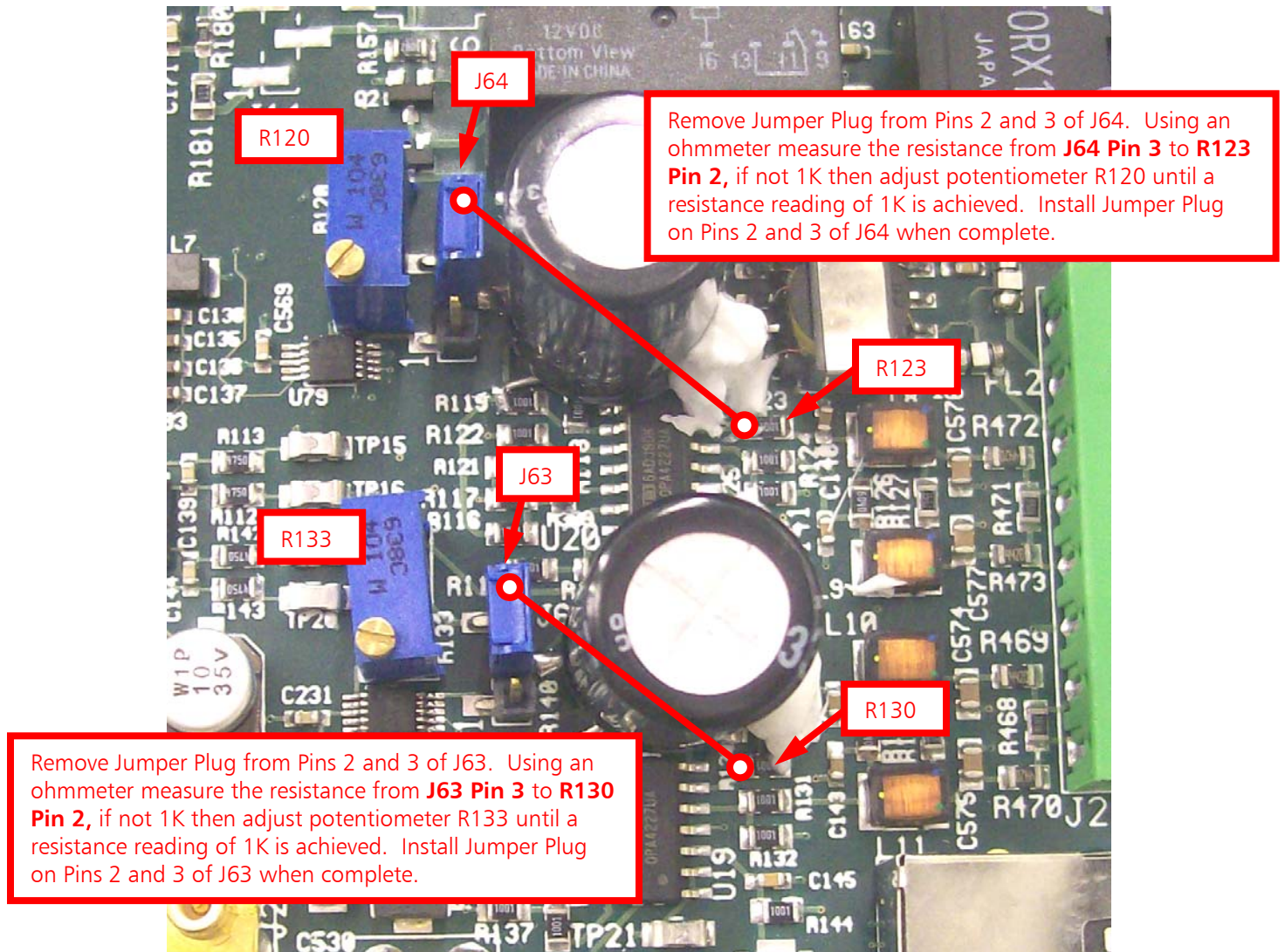


Figure 46 – Audio Calibration Detail

2.12.11 Setup Audio Processor Asymmetry

Find a song with content as high as you would ever expect to operate the system at and adjust the Audio Processor's asymmetry for that song. You should see the asymmetry on the main screen meter or on the audio menu meter.

2.12.12 Setup the Incoming Audio Gain in the 4MX

Step 1 – From the 4MX's MAIN Gui menu, select **AUDIO SETUP** then **AUDIO CAL**.

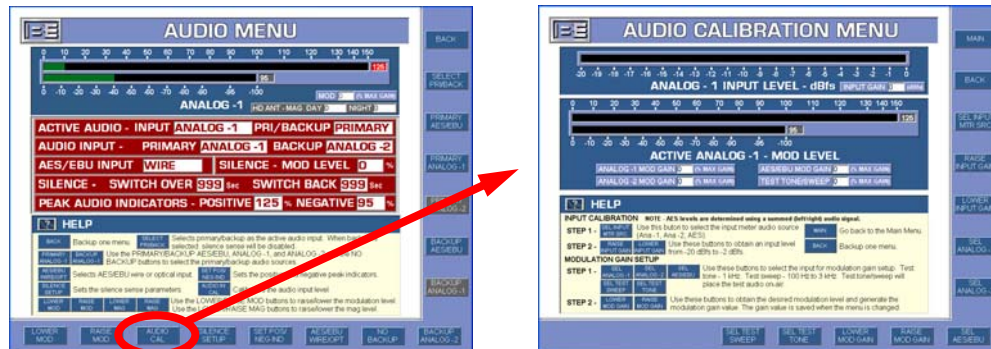


Figure 47 – Audio Calibration Menu

Step 2 – Next, use the **SEL INPUT MTR SRC** button to toggle to the audio source that you are setting up.

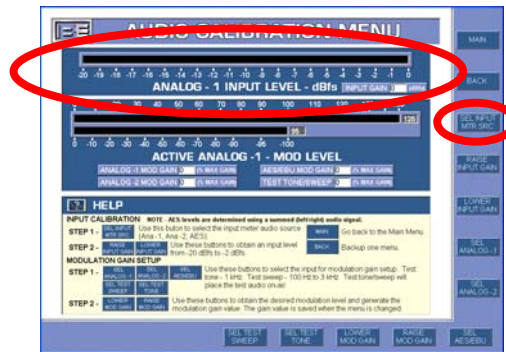


Figure 48 – Audio Calibration Menu

Step 3 – Set the output of the Audio Processor to provide to the Audio Input of the 4MX -5dBfs. Use the **RAISE INPUT GAIN** and **LOWER INPUT GAIN** buttons in the Audio Calibration Menu to set the audio input nominal gain in the 4MX to 0.

If the audio processor cannot output enough level then adjust the input gain in the Audio Calibration Menu of the 4MX to provide enough gain so that the input level will increase to -5dBfs on the meter.

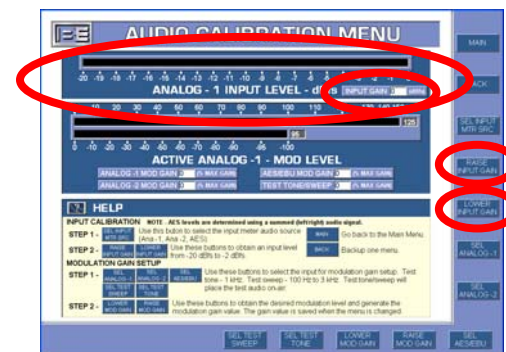


Figure 49 – Audio Calibration Menu

Step 4 – Repeat Steps 1 thru 3 for backup audio sources.

2.12.13 Set the Modulation Level

Step 1 – From the 4MX's MAIN Gui menu, select **AUDIO SETUP** then **AUDIO CAL.**

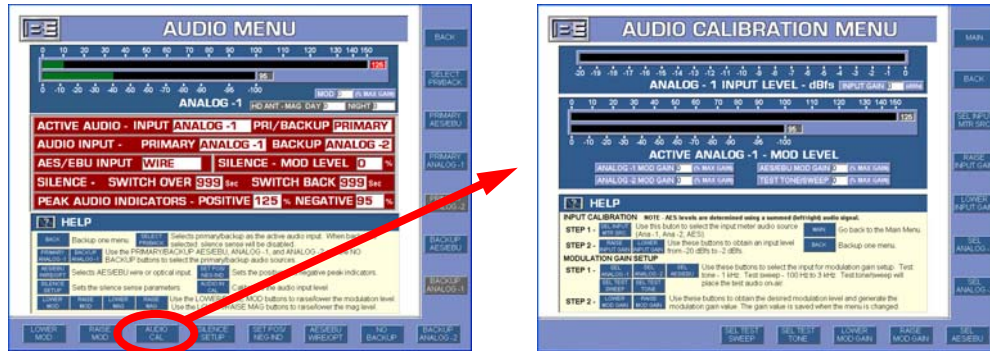


Figure 50 – Audio Calibration Menu

Step 2 – Turn the Transmitter's RF Output to ON. The Transmitter's RF Output must be ON to set the modulation gain.

Step 3 – Next, use the **LOWER MOD GAIN** and **RAISE MOD GAIN** buttons to set the Modulation Level for the active audio. Use the **SEL ANALOG-1**, **SEL ANALOG-2**, and **SEL AES/EBU** buttons to change the active audio.

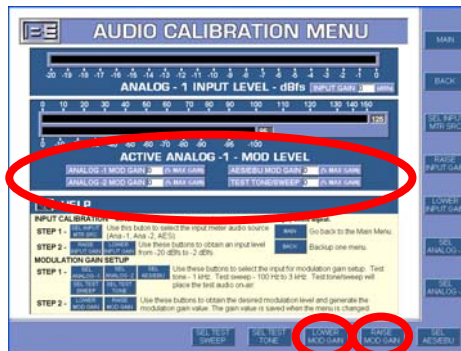


Figure 51 – Audio Calibration Menu

2.12.14 Silence Sense

To setup Silence Sense select **SILENCE SETUP** from the **AUDIO MENU**, then **OPTION SETUP** from the **SILENCE SENSE MENU**.

Use the **SELECT OPTION** button from the **SET SILENCE SENSE MENU** to toggle between **SWITCH OVER TIME**, **SWITCH BACK TIME**, and **LEVEL THRESHOLD** settings.

Next, use the numeric buttons to enter the desired values. Press the **ENTER** button to save all changes. Press **BACK** to return to the **SILENCE SENSE MENU**. Use the **SILENCE ENABLED** / **SILENCE DISABLED** buttons from the **SILENCE SENSE MENU** to enable / disable the option.

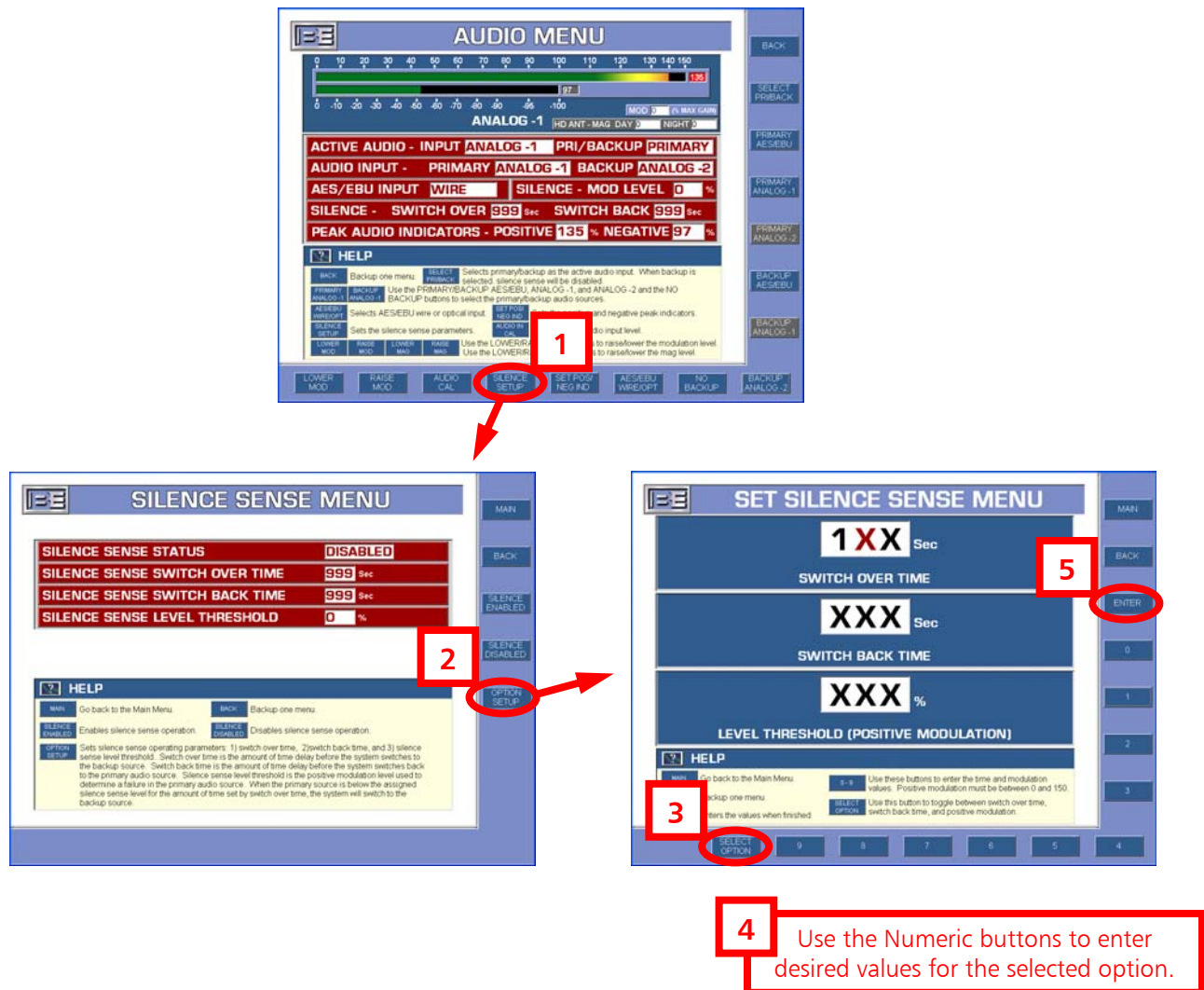


Figure 52 – Silence Sense Menu

3 Operation

3.1 Overview

The 4MX 25 consists of 16 Power Amplifier (PA) and 16 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.

The 4MX 50 consists of 32 Power Amplifier (PA) and 32 Power Supply (PS) modules in a one to one relationship. The PA's are located in four 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 cabinet where the contactor and circuit breaker is 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.

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

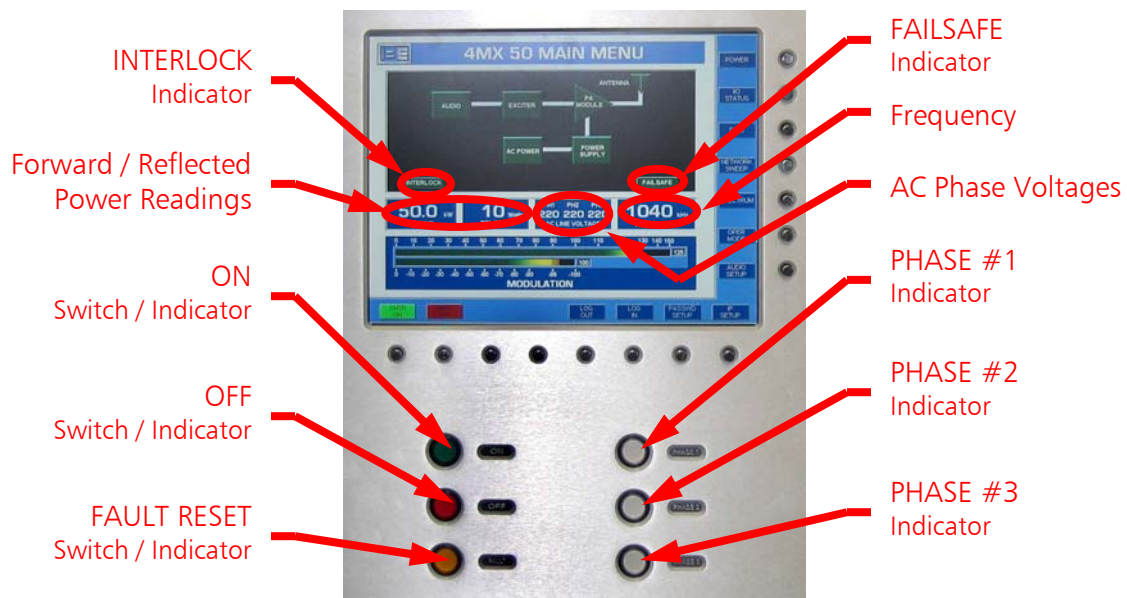


Figure 53 – 4MX 25/50 Front Panel GUI, Switches, and Indicators

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 25/50 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.

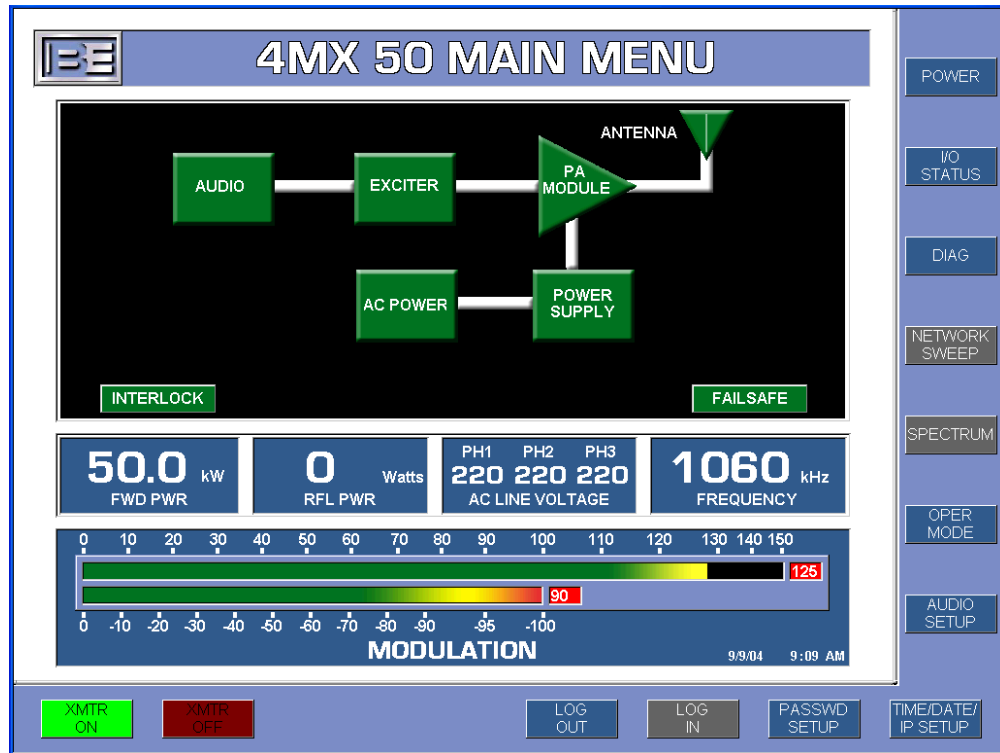


Figure 54 – Main GUI Menu



3.4 Graphical User Interface Sub-Menus

3.4.1 Default User Classification and Password

For security purposes the 4MX 25/50 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 55 – Log In Menu

3.4.3 Log Out

In the Log Out Menu only the Chief Engineer login has permission to make 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 56 – 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 57, 58, and 59** for the password setup menus. Passwords must be either 4, 5, or 6 digits in length.

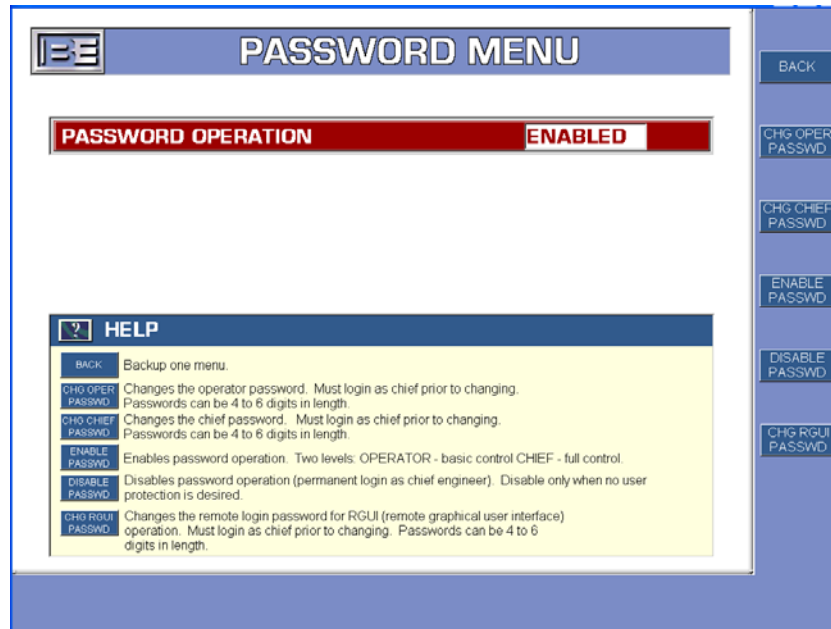


Figure 57 – Password Menu

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 Remote GUI Password

CHG RGUI PASSWD changes the remote login password for RGUI (remote graphical user interface) operation. To change the Remote GUI Password the user **MUST** be logged in as the Chief Engineer prior to changing.

3.4.4.3 Change Chief Engineer's Password

To change the Chief Engineer's Password, select the **CHG CHIEF PASSWD** button and the screen shown in **Figure 58** will appear. Enter the new password (must be 4, 5, or 6 digits) and press **ENTER**.

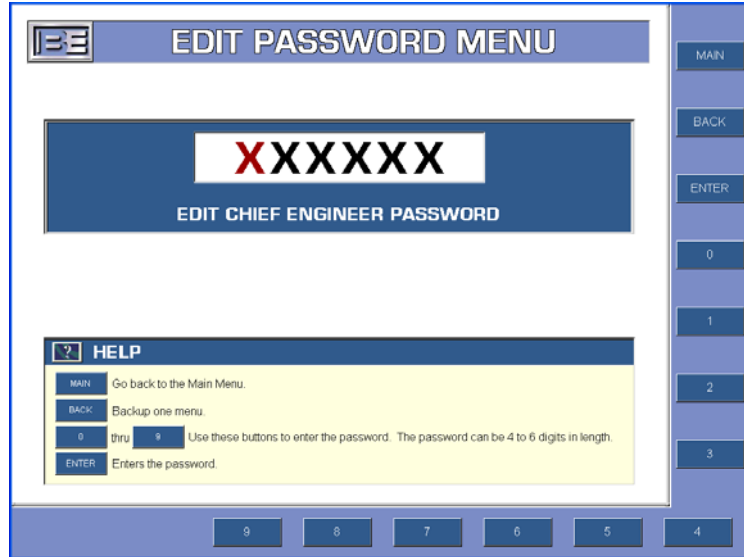


Figure 58 – Edit Chief Engineer Password Menu

3.4.4.4 Change Operator's Password

To change the Operator's Password, select the **CHG OPER PASSWD** button and the screen shown in **Figure 59** will appear. Enter the new password (must be 4, 5, or 6 digits) and press **ENTER**.

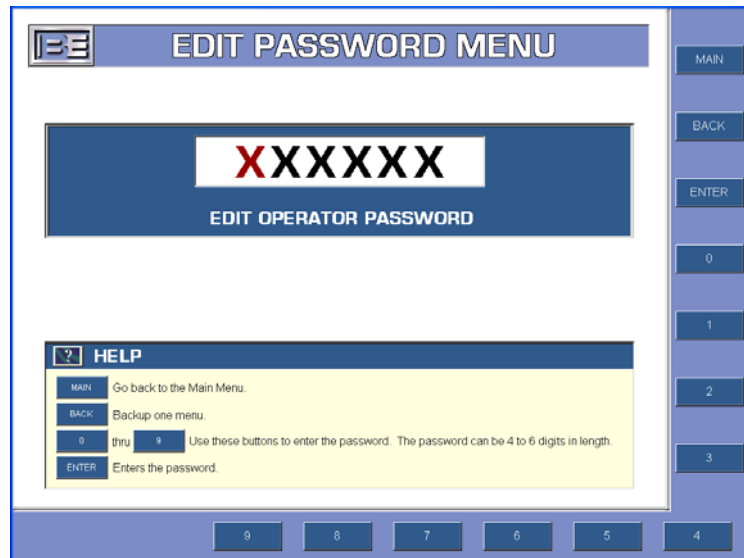


Figure 59 – Edit Operator Password Menu



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.

TIME/DATE/IP SETUP MENU

IP ADDRESS	10.2.4.102
SUBNET MASK	255.255.255.255
GATEWAY ADDRESS	
TIME	2:43 PM
DATE	7/24/06

HELP

- BACK: Backup one menu.
- ENTER IP ADDRESS: Select this button to enter the IP address. Example - 10.1.8.10.
- ENTER SUB MASK: Select this button to enter the subnet mask. Example - 255.0.0.0.
- ENTER GATEWAY: Select this button to enter the gateway address. Example - 10.4.4.10.
- SET TIME: Select this button to enter the current time. Example - 12:00 AM.
- SET DATE: Select this button to enter the current date. Example - 04/11/05.

Navigation buttons on the right: BACK, ENTER IP ADDRESS, ENTER SUB MASK, ENTER GATEWAY, SET TIME, SET DATE.

Figure 60 – 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 25/50 Transmitter.

IP ADDRESS ENTRY MENU

XXX.XXX.XXX.XXX

IP ADDRESS

HELP

- MAIN: Go back to the Main Menu.
- BACK: Backup one menu.
- 0 thru 9: Use these buttons to enter an IP address. The first field must be between 1 - 233. The remaining fields must be between 0 - 255.
- .: Use this button to move to the next data field.
- ENTER: This button can be used to move to the next data field. When finished, depress the button to enter the IP address.

Navigation buttons on the right: MAIN, BACK, ENTER, 0, 1, 2, 3.

Numeric keypad at the bottom: ., 9, 8, 7, 6, 5, 4.

Figure 61 – 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 25/50 Transmitter.

SUBNET MASK ENTRY MENU

XXX.XXX.XXX.XXX
SUBNET MASK

HELP

- MAIN**: Go back to the Main Menu.
- BACK**: Backup one menu.
- 0 thru 9**: Use these buttons to enter the subnet mask. The fields must be between 0 - 255.
- .**: Use this button to move to the next data field.
- ENTER**: This button can be used to move to the next data field. When finished, depress the button to enter the subnet mask.

MAIN, BACK, ENTER, 0, 1, 2, 3, ., 9, 8, 7, 6, 5, 4

Figure 62 – 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 25/50 Transmitter.

GATEWAY ENTRY MENU

XXX.XXX.XXX.XXX
GATEWAY ADDRESS

HELP

- MAIN**: Go back to the Main Menu.
- BACK**: Backup one menu.
- 0 thru 9**: Use these buttons to enter a gateway address. The first field must be between 1 - 233. The remaining fields must be between 0 - 255.
- .**: Use this button to move to the next data field.
- ENTER**: This button can be used to move to the next data field. When finished, depress the button to enter the gateway address.

MAIN, BACK, ENTER, 0, 1, 2, 3, ., 9, 8, 7, 6, 5, 4

Figure 63 – 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.

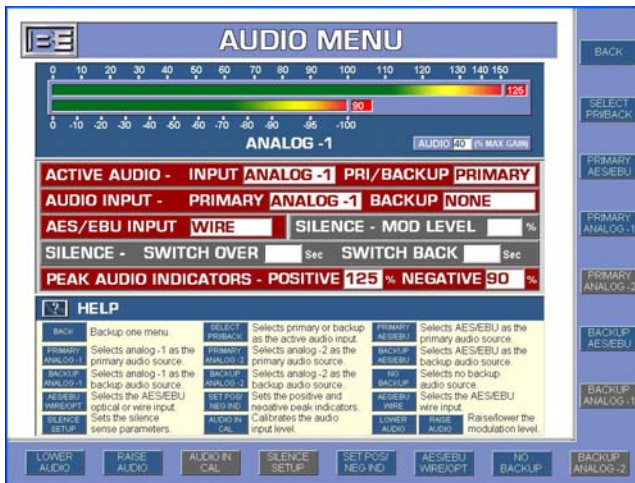


Figure 64 – Audio Setup Menu

3.4.6.1 Set the Active Audio Input

The 4MX 25/50 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.

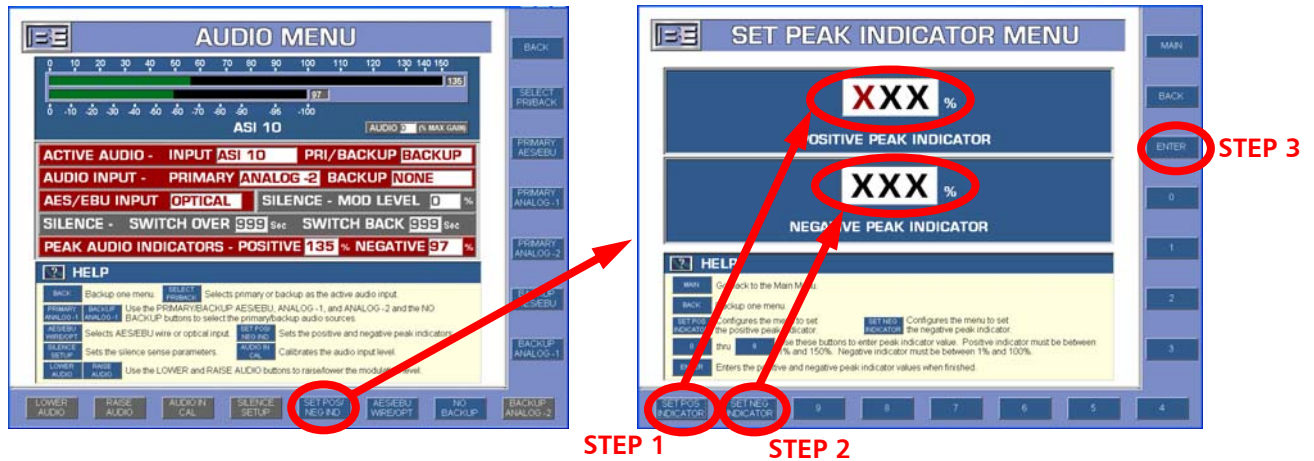


Figure 65 – Set Peak Indicator Menu

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 Headphone Source, 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.

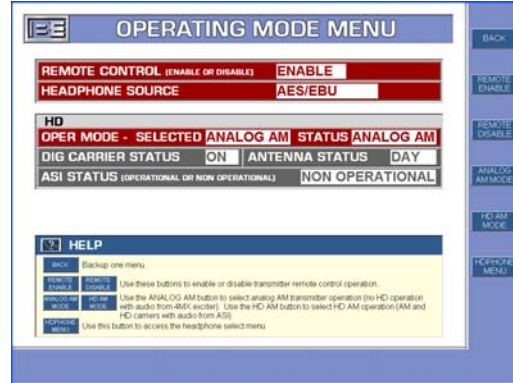


Figure 66 – Operation Mode Menu

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 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.

3.4.7.3 Headphone Setup

Select the **HDPHONE MENU** button to setup the Audio Source and Level for the Headphone output.



Figure 67 – Headphone Menu

3.4.8 Spectrum

The Spectrum menu will allow the user to view the RF Spectrum. Center Frequency, Span, Scale, Reference, and Resolution Bandwidth settings are displayed.

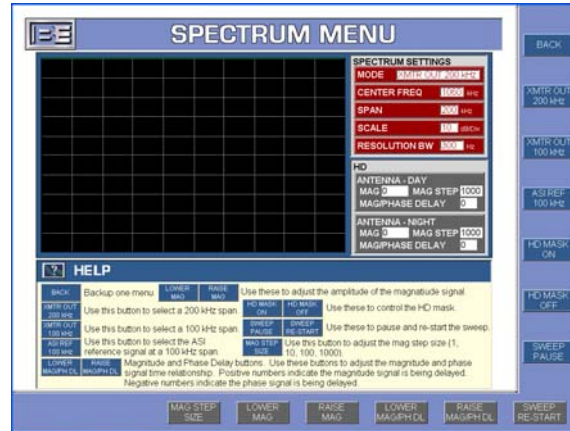


Figure 68 – Spectrum Menu

3.4.8.1 Xmtr Out 200 kHz

Use this button to select a 200 kHz span.

3.4.8.2 Xmtr Out 100 kHz

Use this button to select a 100 kHz span.

3.4.8.3 ASi Ref 100 kHz

Use this button to select the ASi Reference signal at a 100 kHz span.

3.4.8.4 HD Mask ON / OFF

Use these buttons to turn the HD Mask ON and OFF.

3.4.8.5 Sweep Pause / Restart

Use these buttons to Pause and Restart the Sweep.

3.4.8.6 Lower / Raise Magnitude / Phase Delay

Use these buttons to adjust the Magnitude and Phase Delay relationship. Positive numbers indicate the magnitude signal is being delayed. Negative numbers indicate that the Phase signal is being delayed.

3.4.8.7 Lower / Raise Magnitude

Use these buttons to adjust the Amplitude of the Magnitude signal.

3.4.8.8 Magnitude Step Size

Use this button to adjust the Magnitude step size (1, 10, 100, or 1000).



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.

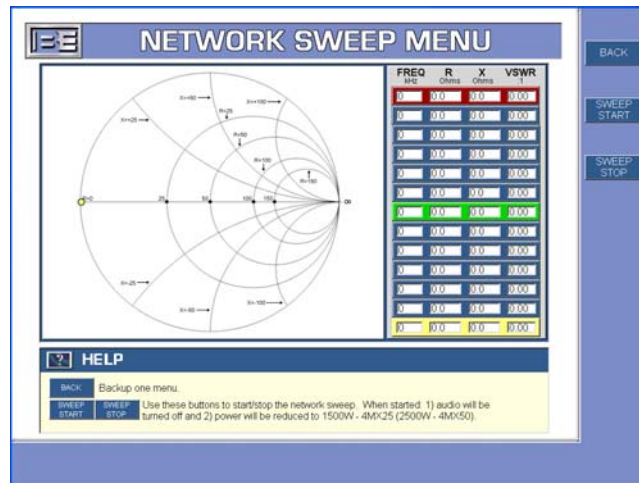


Figure 69 – Network Sweep Menu

3.4.9.1 Sweep Start / Stop

Use the **SWEEP START** and **SWEEP STOP** buttons to start/stop the network sweep. When started audio will be turned off and power will be reduced to 1500W (4MX25) or 2500W (4MX50).

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.

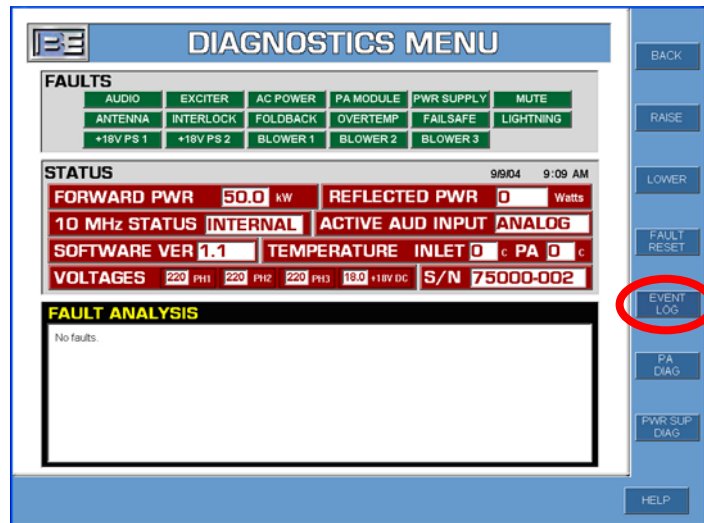


Figure 70 – Diagnostics Menu

3.4.11 Event Log

Built into the Diagnostics System of the 4MX 25/50 is an Event Log. The Event Log stores the operating history of the 4MX 25/50. 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.

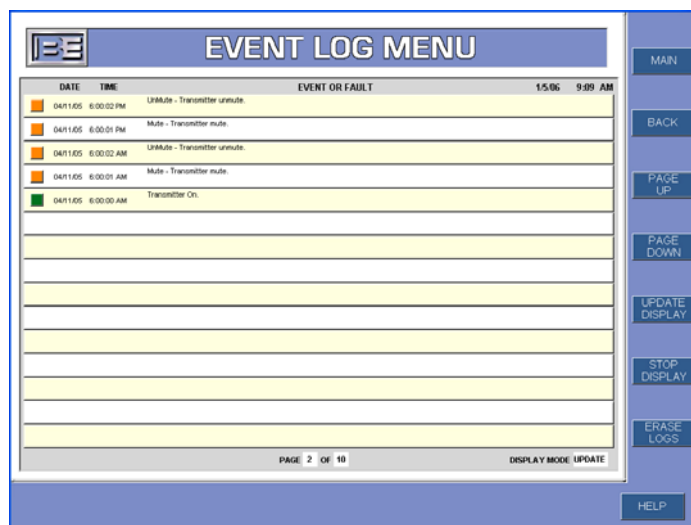


Figure 71 – Event Log



3.4.11.1 Page Up / Down

Use these buttons to Page Up and Page Down through the Event Log history.

3.4.11.2 Update Display

Use this button to Update the Event Log display.

3.4.11.3 Stop Display

Use this button to Stop the Event Log display.

3.4.11.4 Erase Logs

Use this button to Erase the Event Log history.



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.

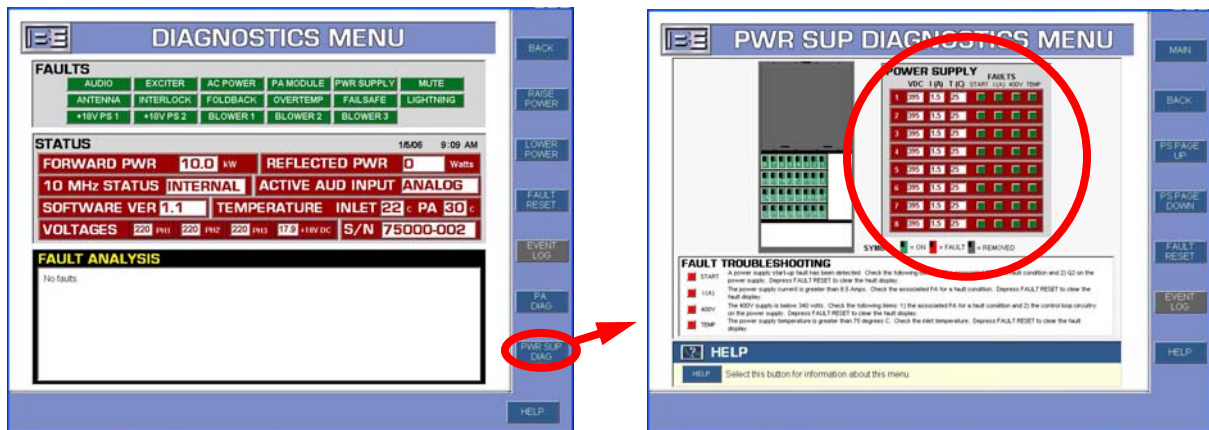


Figure 72 – Power Supply Diagnostics Menu

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

NOTE: In a 4MX 25, all 16 Power Supply Modules will not be ON unless the RF Output Power Level is set for $\geq 5\text{kW}$; @ 2.5kW – 9.99kW 8 PS Modules will be ON (1-8); @ 250W – 2.49kW 4 PS Modules will be ON (1-4).

NOTE: In a 4MX 50, all 32 Power Supply Modules will not be ON unless the RF Output Power Level is set for $\geq 10\text{kW}$; @ 2.5kW – 9.99kW 16 PS Modules will be ON (9-24); @ 250W – 2.49kW 4 PS Modules will be ON (13-20).

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**.

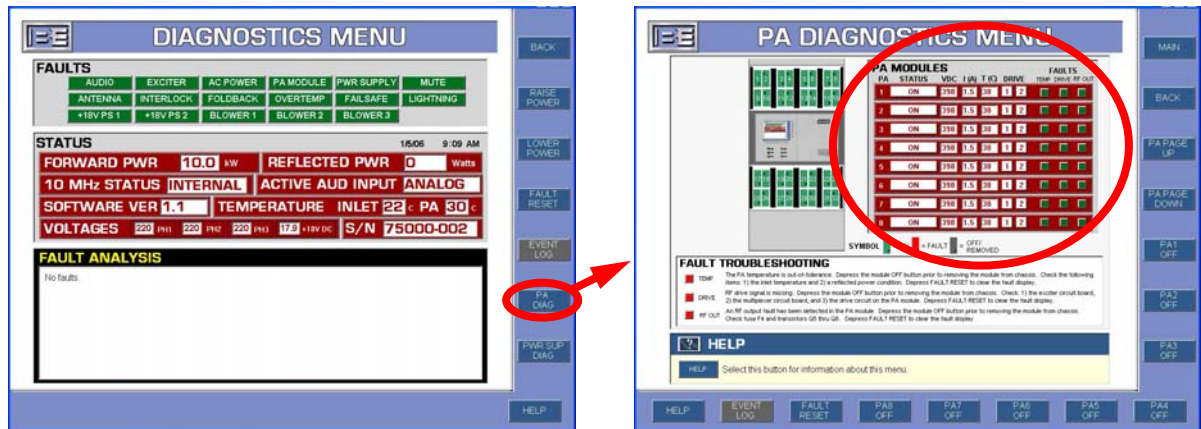


Figure 73 – PA RF Module Diagnostics Menu

NOTE: In a 4MX 25, all 16 Power Amplifier Modules (1-8) will not be ON unless the RF Output Power Level is set for $\geq 5\text{kW}$; @ 2.5kW – 9.99kW 8 PA Modules will be ON (17-24); @ 250W – 2.49kW 4 PA Modules will be ON (1-4).

NOTE: In a 4MX 50, all 32 Power Amplifier Modules will not be ON unless the RF Output Power Level is set for $\geq 10\text{kW}$; @ 2.5kW – 9.99kW 16 PA Modules will be ON (9-24); @ 250W – 2.49kW 8 PA Modules will be ON (13-20).

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.

I/O STATUS MENU									
TRANSMITTER INPUTS									
PWR RAISE	PWR 6 SELECT	PWR 2 SELECT	PRI AUDIO SEL	FAULT RESET					
PWR LOWER	PWR 4 SELECT	PWR 1 SELECT	BACKUP AUD	RMT FAILSAFE					
PWR 6 SELECT	PWR 3 SELECT	XMTR OFF	MUTE	EXT INTERLK					
HD INPUTS									
ANALOG AM	DIG CARR ON	ANT DAY							
HD AM	OPERATIONAL	ANT NIGHT							
TRANSMITTER STATUS OUTPUTS									
PWR 6	RMT FAILSAFE	MUTE	MAINTENANCE	BLOWER 2 FLT					
PWR 5	EXT INTERLK	FOLDBACK	OVERTMP FLT	BLOWER 3 FLT					
PWR 4	FWD PWR 50.0	EX FAULT	ASI 10	18V PS 1 FLT					
PWR 3	RFL PWR 0	PS FAULT	PH1 FAULT	18V PS 2 FLT					
PWR 2	INLET TEMP 0	PA FAULT	PH2 FAULT	LIGHTNING					
PWR 1	PA TEMP 0	RFL PWR HIGH	PH3 FAULT						
XMTR OFF	FAULT	RFL PWR EMG	BLOWER 1 FLT						
HD STATUS OUTPUTS									
ANALOG AM	DIG CARR	ANT DAY/NIGHT							
HD AM	OPERATIONAL								
REMOTE CONTROL AUTOMATIC TRANSMITTER ON DISABLE									
HELP									
BACK	Backup one menu.	RMT OUT HIGH	RMT OUT LOW	Selects active high (+3.3V) or low (0V) status outputs.			AUTO XMTR ENABLE	AUTO XMTR DISABLE	Enables/disables automatic xmtr on.

Figure 74 – 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, such as 10kW, when turning on the RF Output Power for the first time, and then step up the RF output power once the entire transmission system has been proven out.

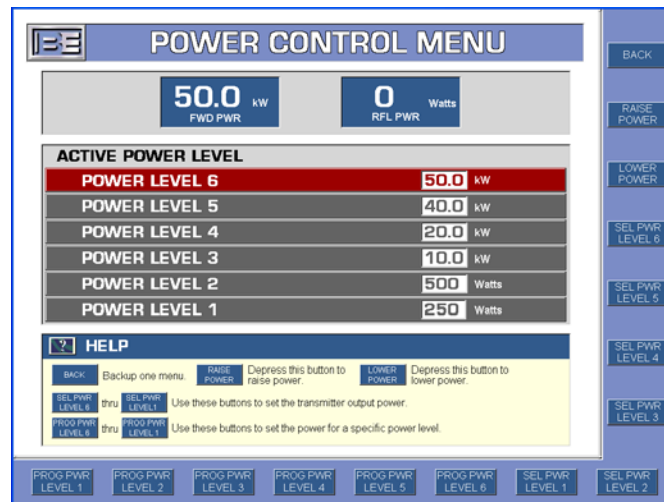


Figure 75 – Power Menu with Default Settings

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**.

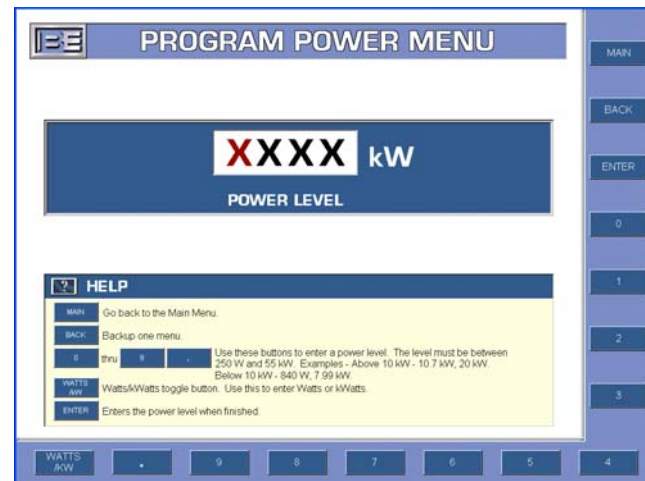


Figure 76 – Program Power Menu

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

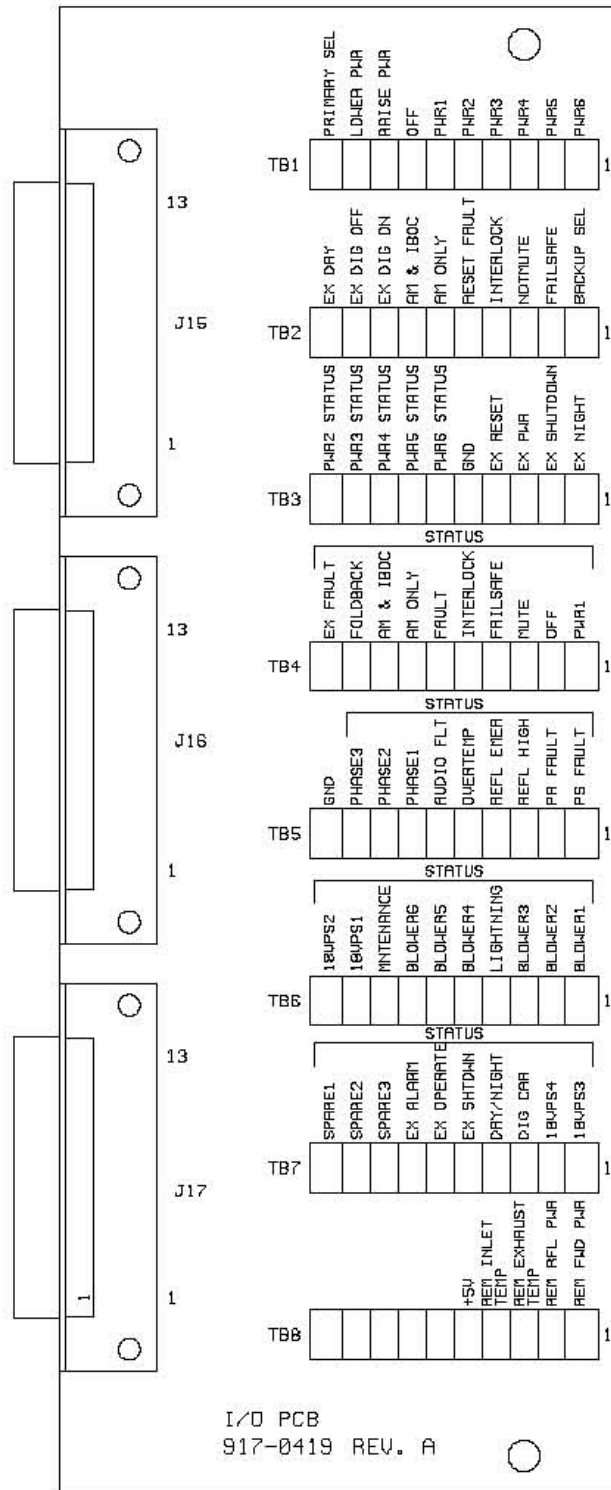
The 4MX 25/50 Transmitter is equipped with a remote device I/O Connection Board (PCB Assy 917-0419) and will interface with almost any remote control or diagnostic device. Remote device wiring enters through the top of the cabinet and routes down to the I/O Connection Board which is accessible from the front of the transmitter. See **Figures 1 and 2** for the cabinet entry location provided for remote device wiring and the front panel access location to the I/O Connection Board. See **Figures 77 and 78** for instructions to gain access to the Remote Control I/O connections. For the pin out of the I/O Connection Board, see **Figure 79**.



Figure 77 – Remote Control I/O and Audio Input Access Panel Hardware



Figure 78 – Remote Control I/O and Audio Input Access Panel



NOTE: Wrap Remote Control Cable through Ferrite Ring (375-0007, supplied in the Installation Kit) 6 turns.

See Figure 44 for additional details).

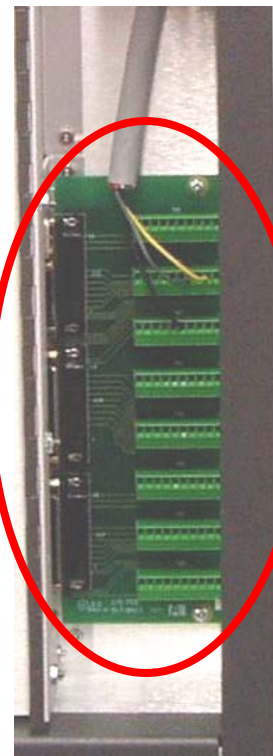


Figure 79 – Remote I/O Terminal Block Pin Outs

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 80** for the location of jumper plug P4 on the Controller Board.

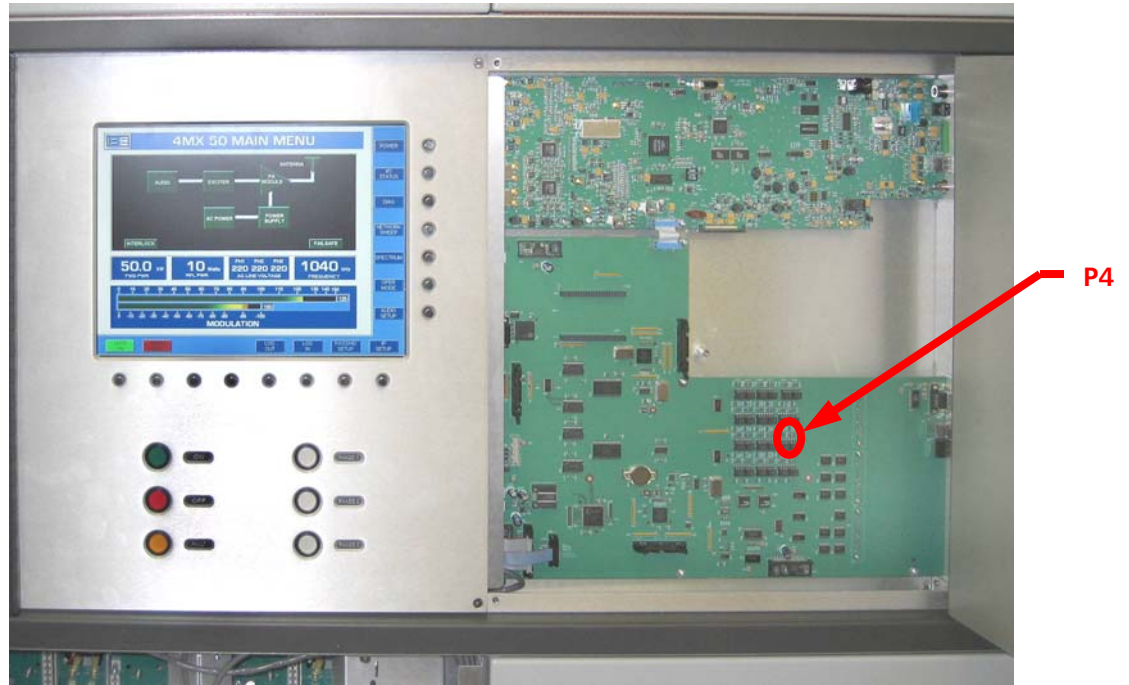


Figure 80 – Controller Board I/O Signal Configuration Jumper

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 25/50 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 $\geq 50\text{msec.}$ 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 $\geq 50\text{msec.}$ 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 $\geq 50\text{msec.}$ 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 $\geq 50\text{msec.}$ 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 $\geq 50\text{msec.}$ 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 $\geq 50\text{msec.}$ 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 $\geq 50\text{msec.}$ 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 PWR (TB1-8)

This input requires only a momentary pulse width that is $\geq 50\text{msec.}$ 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 $\geq 50\text{msec}$. 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 $\geq 50\text{msec}$. 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 $\geq 50\text{msec}$. 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 $\geq 50\text{msec.}$ 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 50 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 (192-265VAC for 230V Nominal operation; 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 (192-265VAC for 230V Nominal operation; 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 (192-265VAC for 230V Nominal operation; 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 25/50 RF Output.

3.5.3.53 BLOWER 4 STATUS (TB6-5)

Not used in a 4MX 25 or 4MX 50 transmitter.

3.5.3.54 BLOWER 5 STATUS (TB6-6)

Not used in a 4MX 25 or 4MX 50 transmitter.

3.5.3.55 BLOWER 6 STATUS (TB6-7)

Not used in a 4MX 25 or 4MX 50 transmitter.

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)

Not used in a 4MX 25 or 4MX 50 transmitter.

3.5.3.60 18VPS4 STATUS (TB7-2)

Not used in a 4MX 25 or 4MX 50 transmitter.



3.5.3.61 DIG CAR STATUS (TB7-3)

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

3.5.3.62 DAY/NIGHT STATUS (TB7-4)

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

3.5.3.63 EX SHUTDOWN STATUS (TB7-5)

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

3.5.3.64 EX OPERATE STATUS (TB7-6)

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

3.5.3.65 EX ALARM STATUS (TB7-7)

Exhine 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.

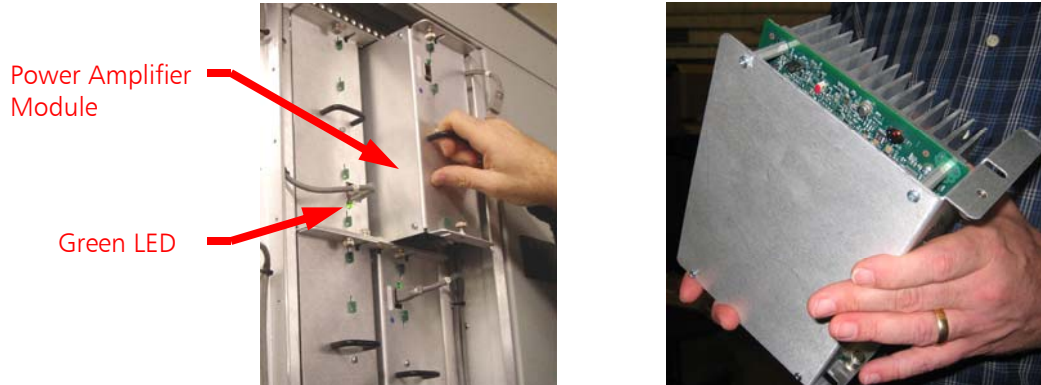


Figure 81 – 4MX 25/50 1700W Power Amplifier Module

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, 16 of each in the 4MX25 and 32 of each in the 4MX50. 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.

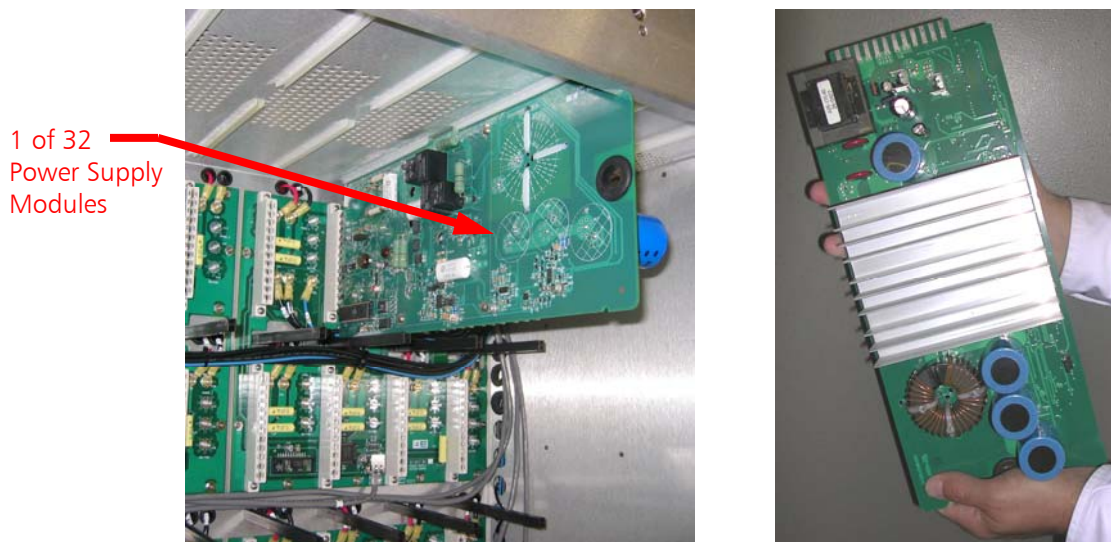


Figure 82 – 4MX 25/50 400V Power Supply Module

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 4MX25/50 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.

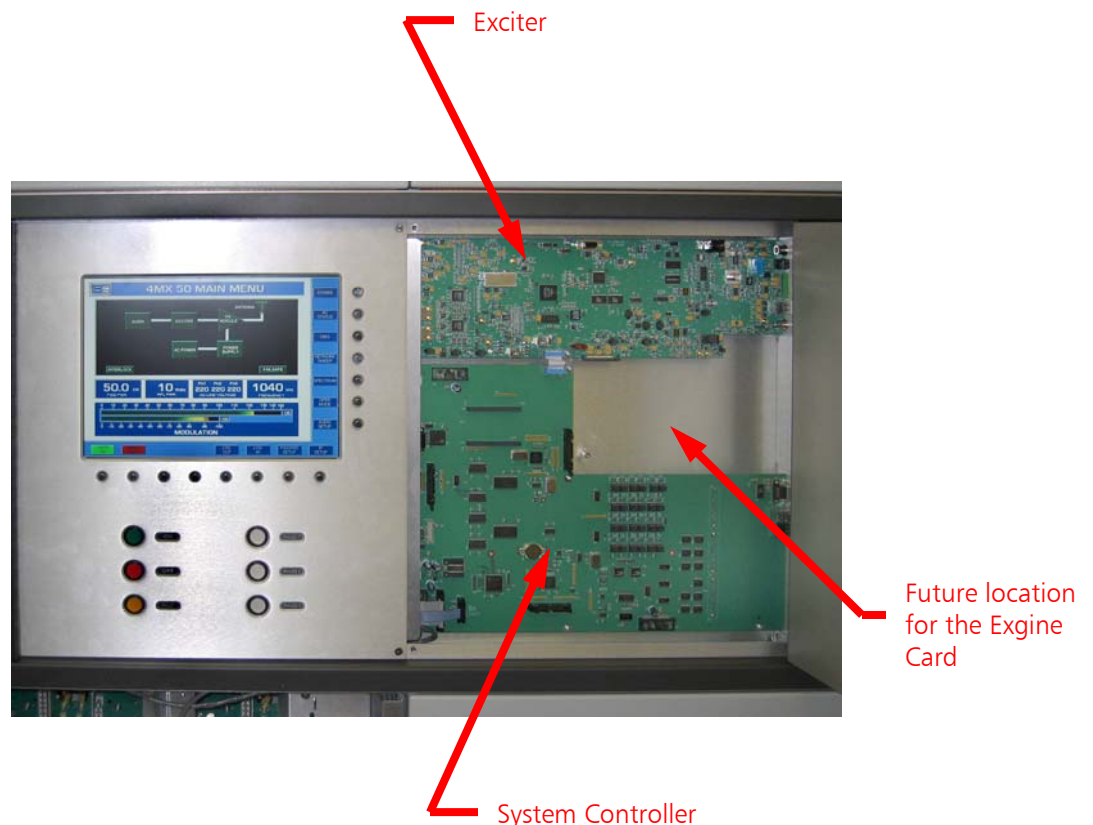


Figure 83 – 4MX 25/50 Exciter and Controller

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 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.

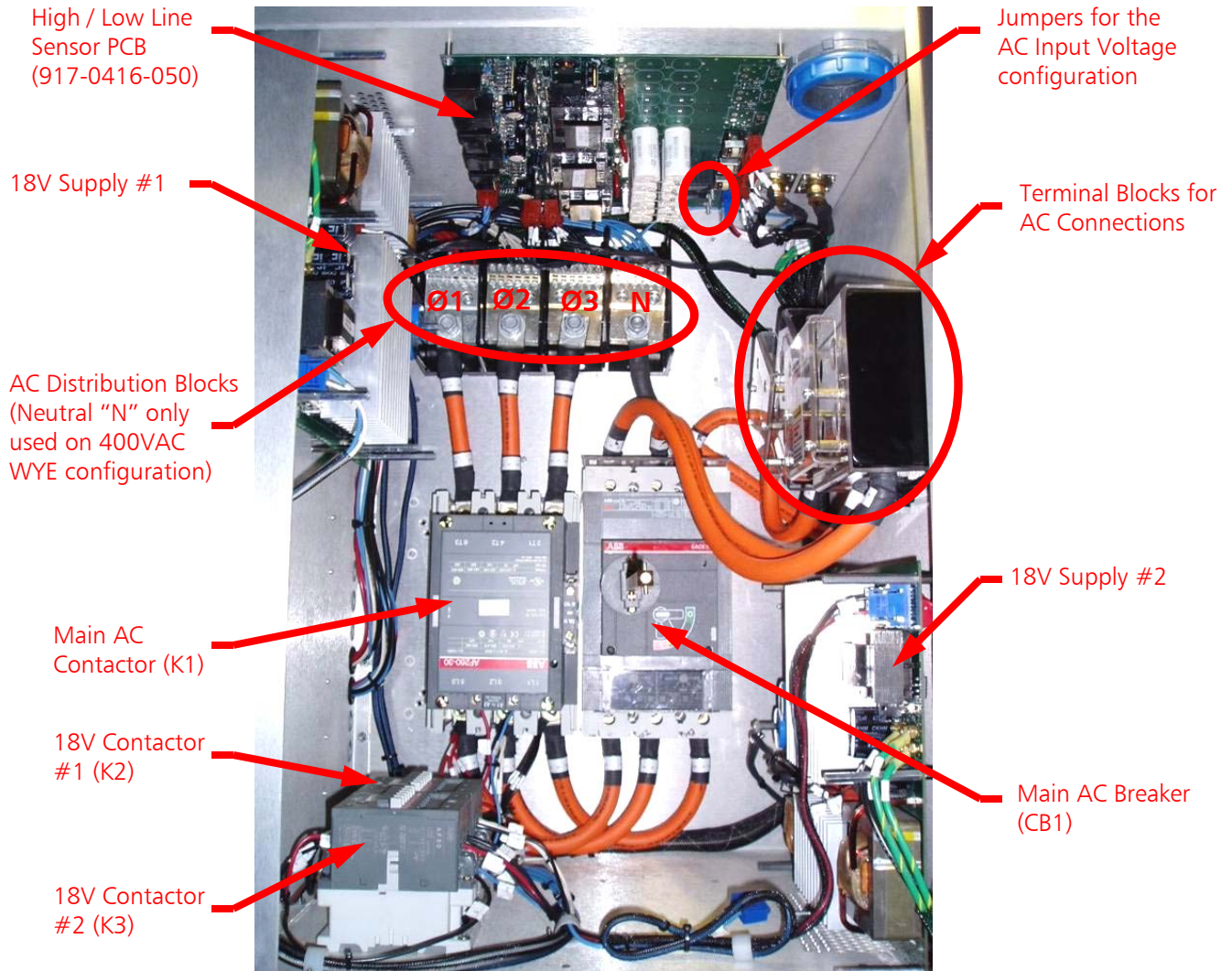


Figure 84 – 4MX 25/50 AC Supply

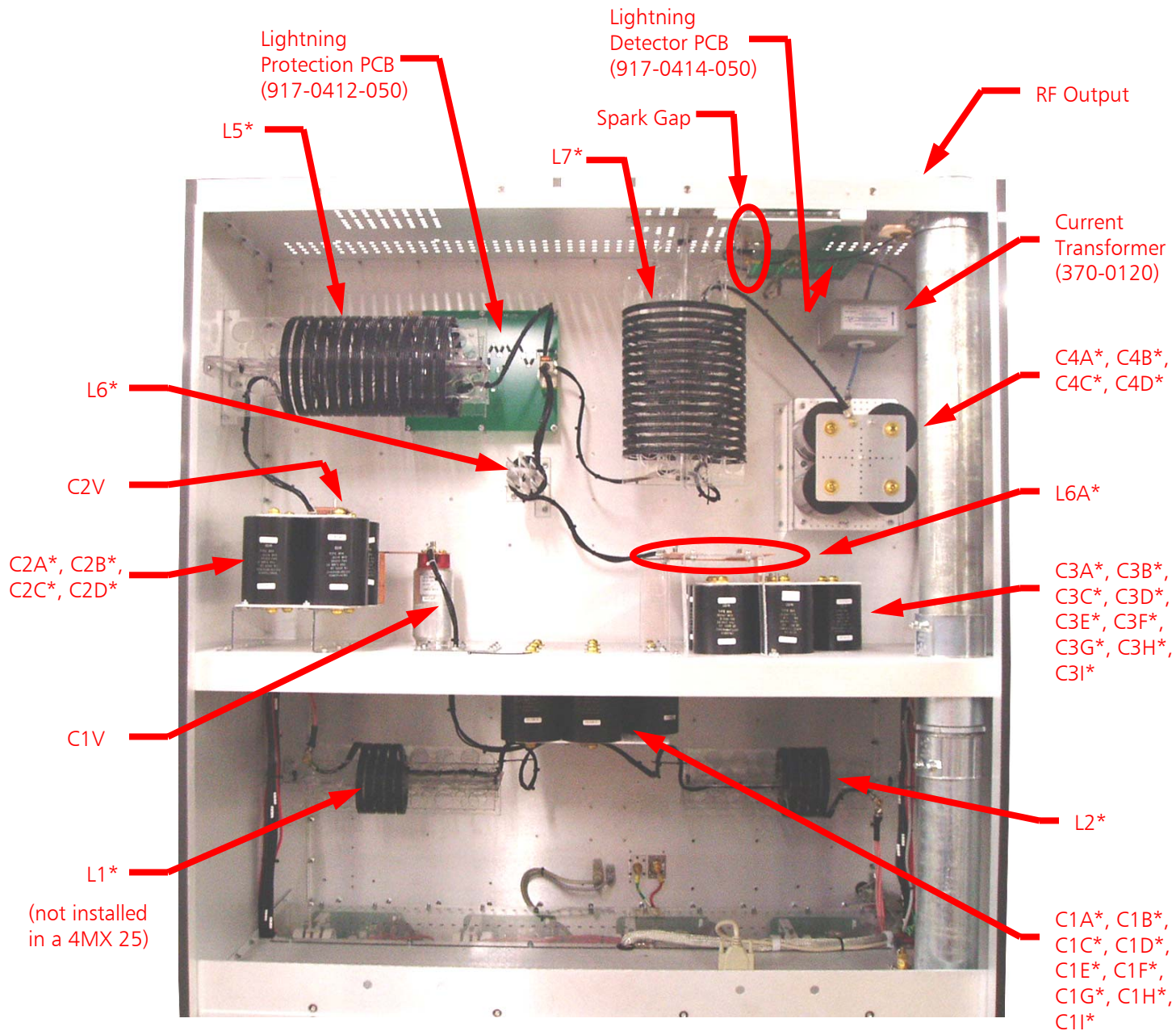
3.11 18V Power Supplies

For redundancy, there are (2) 18V Power Supplies located in the AC Entry area of the cabinet as shown above. 18V is supplied to the Multiplexer PCB for distribution to the PAs.

3.12 RF Output Network

The RF Output Network is located behind the upper rear door of the 4MX 25/50. The use of Litz Wire increases the performance of the RF Output Network and also allows for packaging into a smaller space than other traditional methods.

See Sheet 4 of the 4MX 25 and 4MX 50 Wiring Diagrams (907-4025-230/400 and 907-4050-230/400) located in the "Schematics" section of this manual.



Note: Components marked with an "*" are Frequency Dependent.

**Figure 85 – 4MX 25/50 RF Output Network Components
(Upper Rear Door Removed)**

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

3.13.1 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 instructions to download the files from the B.E. Website.

3.13.2 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)

3.13.3 4MX Software Version Labeling

Note 1: PA and PS Module Micro code is downloaded to the 4MX transmitter as part of the "Controller Control Micro" target. A secondary process is then used to update the PA and PS Modules.

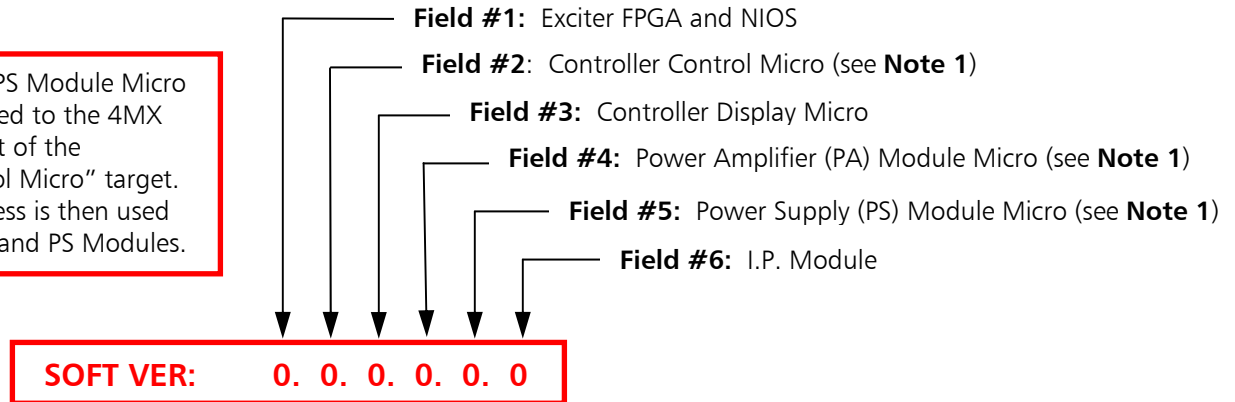


Figure 86 – Software Version Labeling

3.13.4 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.

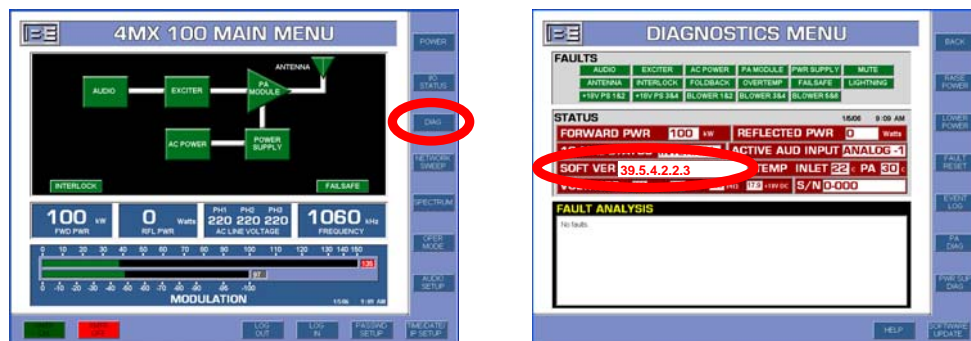


Figure 87 – Determine Current 4MX Software Version



3.13.5 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 15 and 16 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.

3.13.6 DSP Exciter S4 Settings

If the DSP Exciter target is to be updated to version 46.X.X.X.X or greater, dip switch S4 must be changed or it will result in a DSP Exciter Board fault. S4 on the DSP Exciter needs to be set to 1=OFF, 2=OFF, 3=OFF, and 4=ON as shown below.

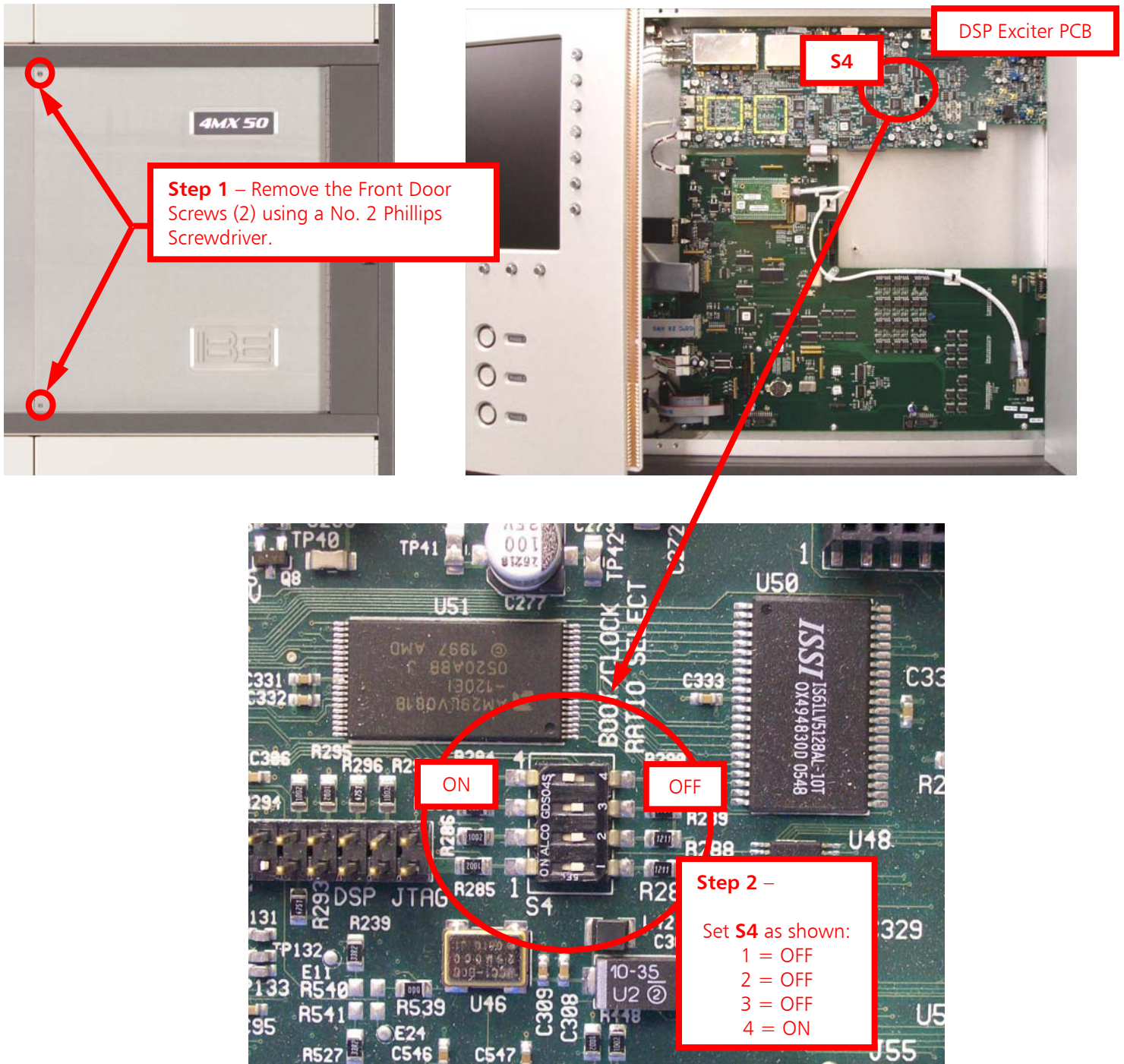


Figure 88 – DSP Exciter S4 Settings

3.13.7 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.

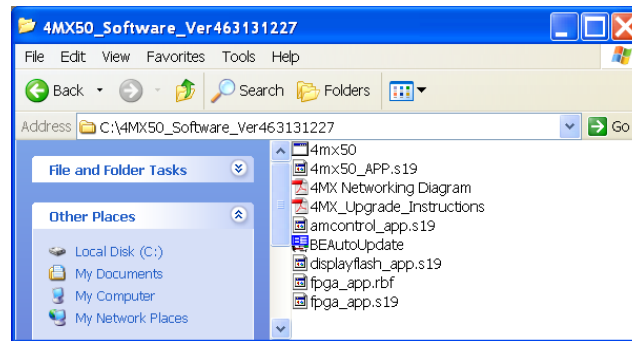


Figure 89 – 4MX Software Upgrade Files

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

- Step 2** – 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**.

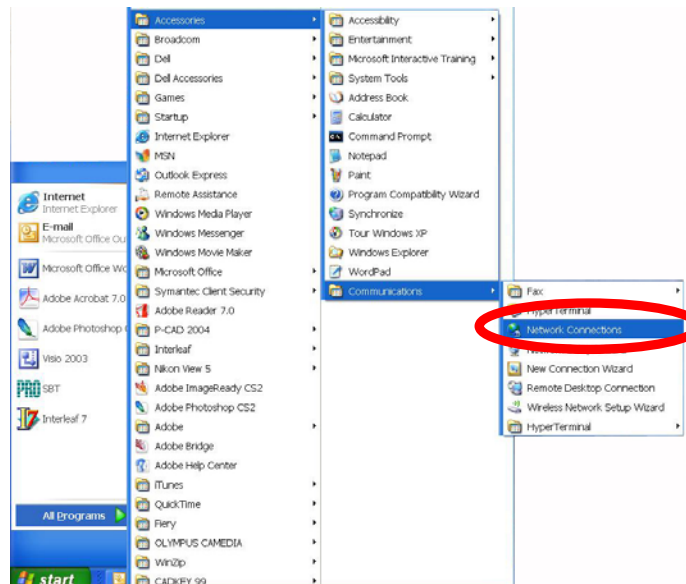


Figure 90 – PC Network Connection Menu

Step 3 – Right click on **Local Area Connection** and select **Properties**.

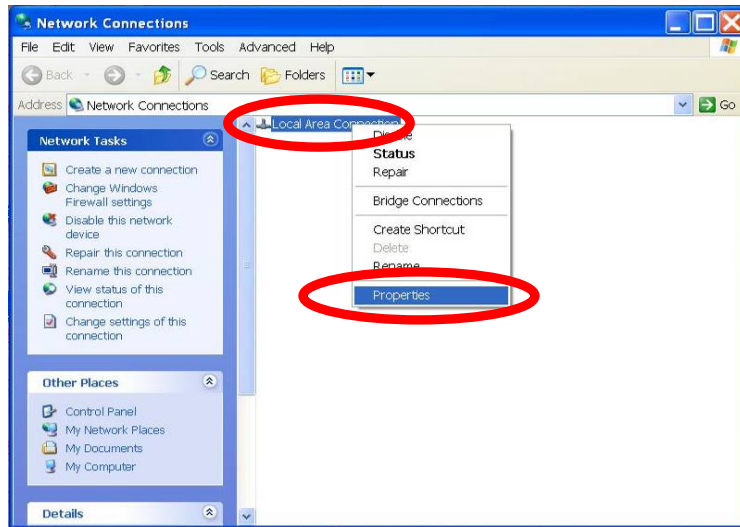


Figure 91 – Local Area Connection Properties

Step 4 – 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.

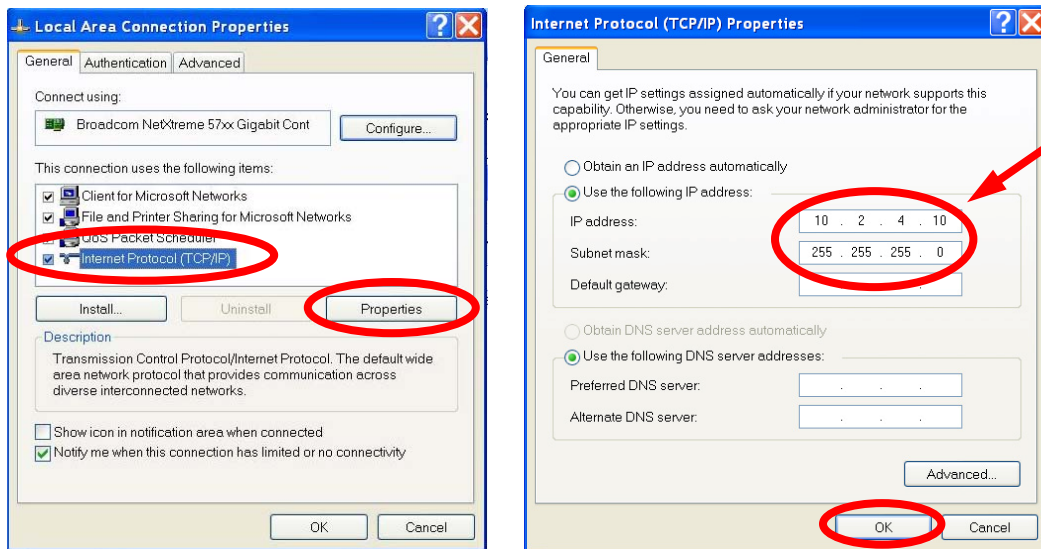
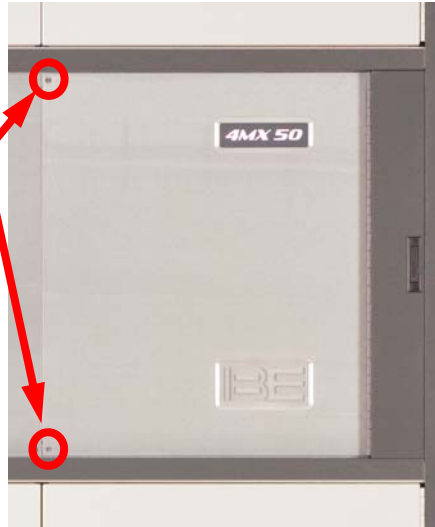


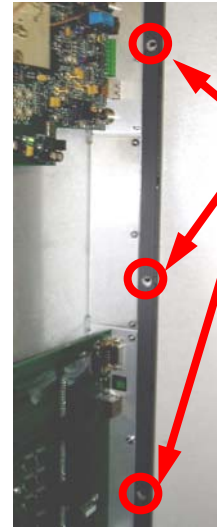
Figure 92 – Configure the I.P. Address of the Personal Computer

Step 5 – Remove the 4MX 's remote control access panel to gain access to the transmitter's Ethernet Port.

Step 5a – Using a No. 2 Phillips Screw Driver remove the (2) screws from the right door as shown.



Step 5b – Using a No. 2 Phillips Screw Driver remove the (3) screws from the hinge area as shown



Step 5c – Use the fold-out handle to remove the Remote Control I/O and Audio Input Access Panel



Ethernet Port



Figure 93 – Remote Control I/O Access Panel Removal

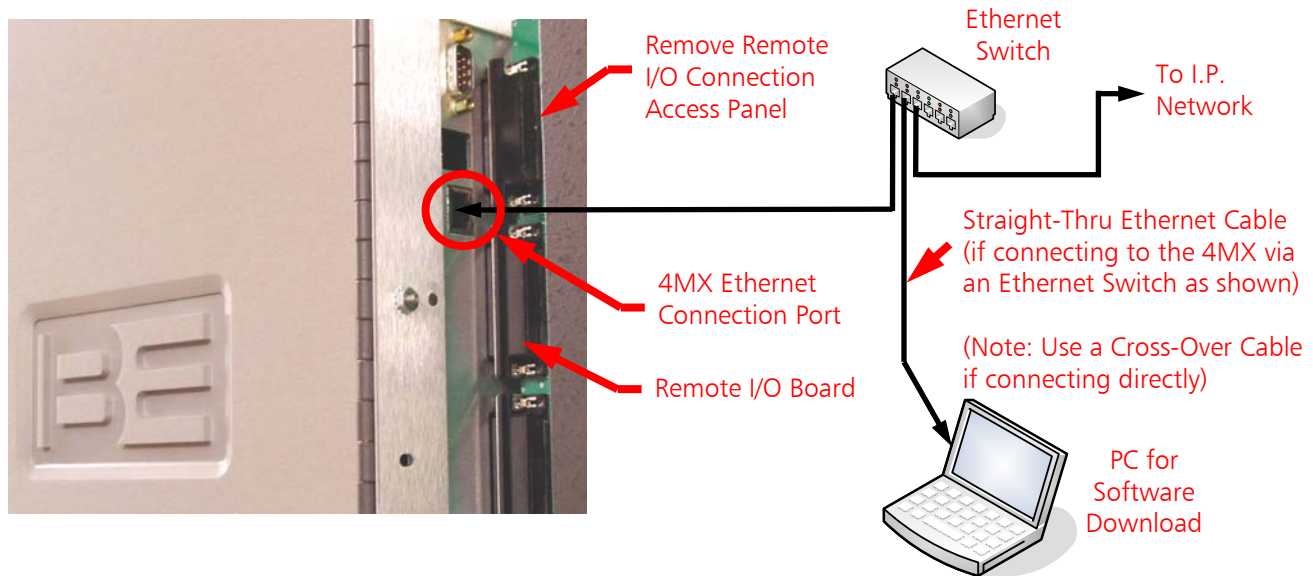


Figure 94 – 4MX Ethernet Connection Location

Step 6 – 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 7 – 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.



Figure 95 – 4MX Webpage

Step 8 – Close web browser.



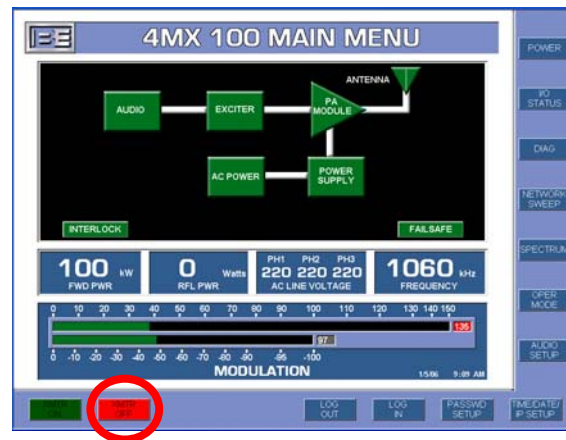
Step 9 – Turn the transmitter's **RF Output Power OFF** either from the Main Menu or by depressing the front panel button.



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.



- OR -



Figure 96 – 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 97 – 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) Exciter
- 3) Controller PCB – Control Micro (includes PA & PS Modules update code)
- 4) IP Module

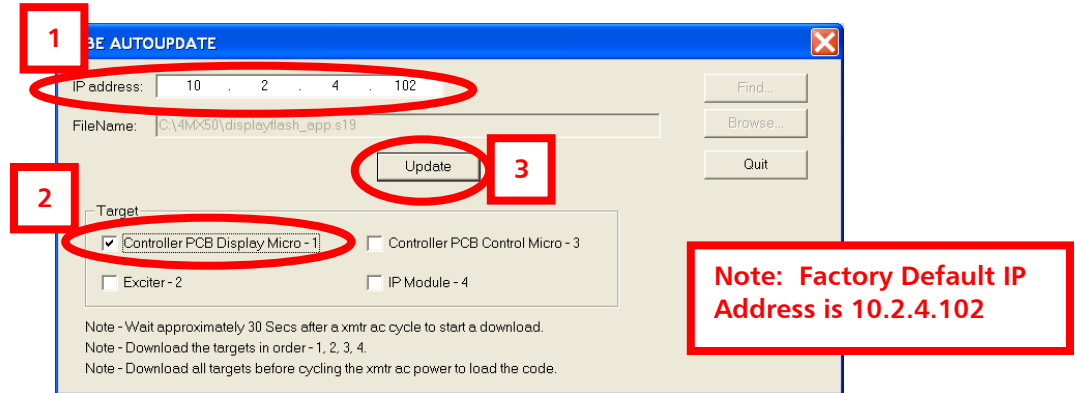


Figure 98 – Software Update Application

NOTE: Should the I.P. connection be lost during the Software Upgrade Process, see section 3.13.9 for instructions on how to proceed.

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

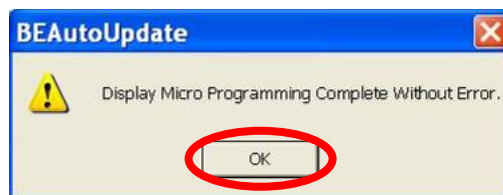


Figure 99 – Software Update Complete

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

Step 14 – Close the **BEAutoUpdate** application by selecting “**Quit**”.

Step 15 – 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 100 – Turn the 4MX AC Breaker OFF then back ON after ALL Targets Have Been Updated

Step 16 – If the 4MX Software Upgrade included new versions of PA Module Micro and/or PS Module Micro Software proceed to **Step 17** (determined by comparing the current version number **Fields #4 and #5** to the upgrade version number) if not, proceed to **Step 16a**.

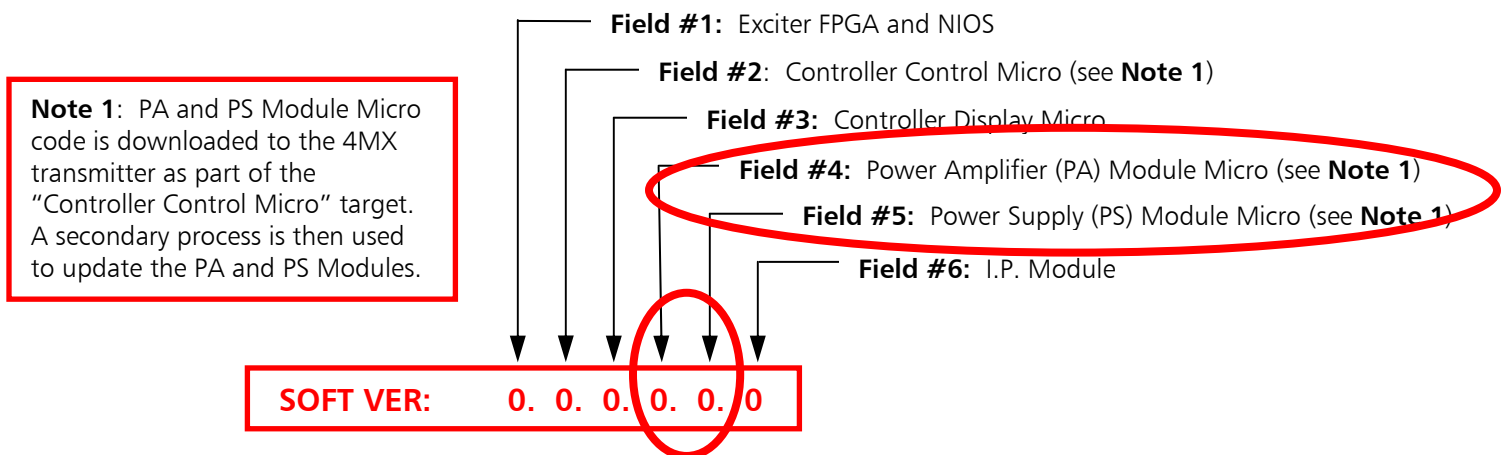


Figure 101 – Software Version Labeling

Step 16a – 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.

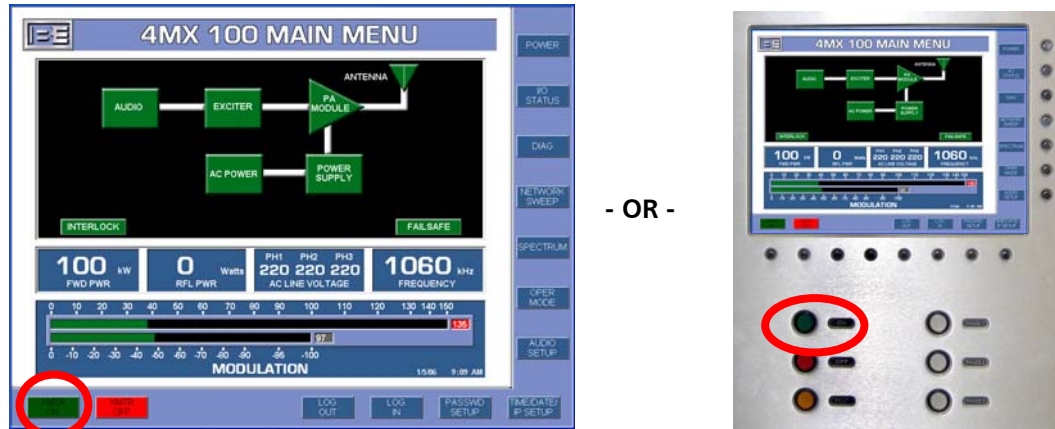


Figure 102 – Turn the RF Output Power ON

Step 17 – 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**.

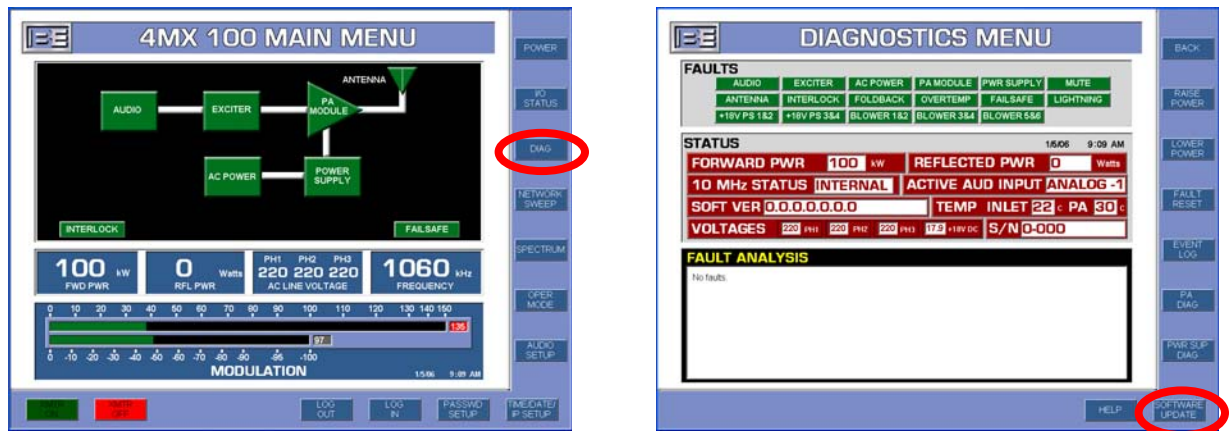


Figure 103 – Diagnostics Menu

Step 18 – After selecting **SOFTWARE UPDATE**, the login screen will appear. Only the “Chief Engineer” login (factory default is **123456**) 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 104 – Software Update Menu

NOTE: See section 3.13.8 for PA and PS Software Update problem resolution.

Step 19 – 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.

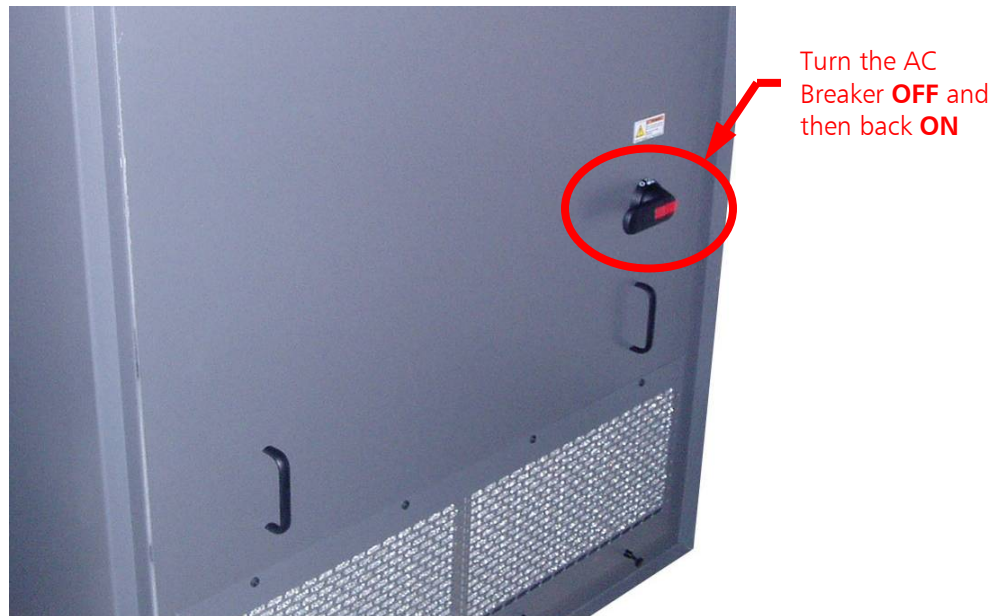


Figure 105 – Turn the 4MX AC Breaker OFF then back ON

Step 20 – Verify that the Software Version has changed.

From the Main Menu select **DIAG** and the Diagnostics menu will appear. Compare the Software version to what was previously recorded in Section 3.13.4.

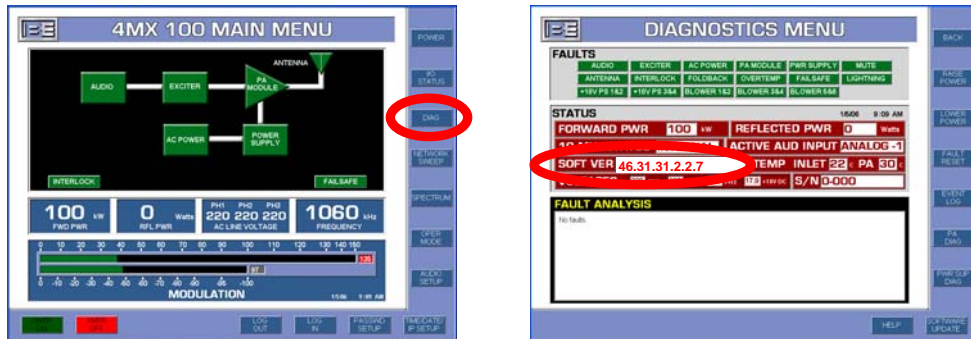


Figure 106 – Determine Current 4MX Software Version

Step 21 – Turn the transmitter's RF Output to ON.

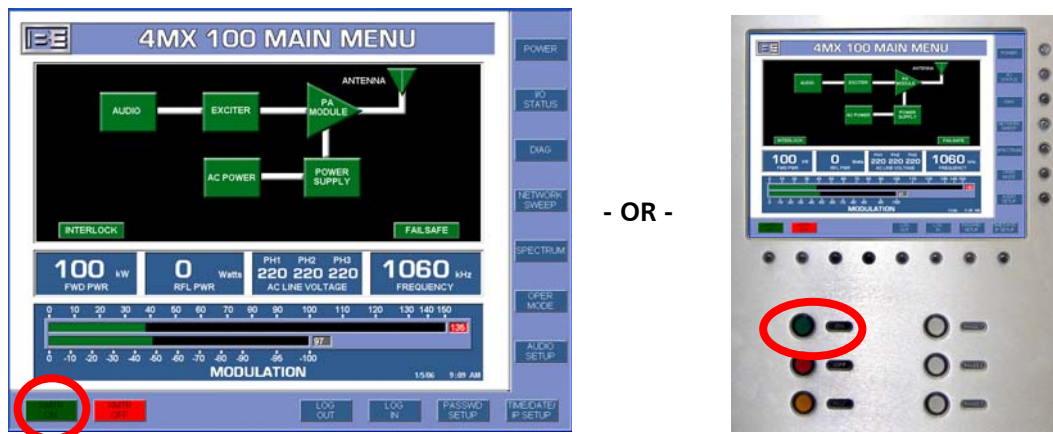


Figure 107 – Turn the RF Output Power ON

3.13.8 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.

3.13.9 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.

3.13.10 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.

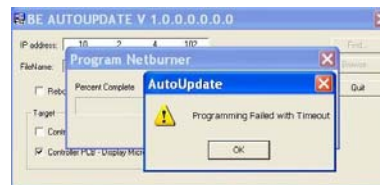


Figure 108 – Programming failed with Timeout Screen

3.13.11 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 109 – Downloading Code to "Target" Screen

3.14 4MX Remote GUI

3.14.1 Overview

4MX Series transmitters have Remote GUI Capability.

3.14.2 4MX Remote GUI Network Requirements

If you are using a “high speed connection” to communicate with the transmitter you must have a static I.P. address assigned to the transmitter.

If you are using a “dial-up connection” you must build a dial-up server. Use a PC with Windows XP, and Remote Desktop to build the dial-up server.

Consult your Network Administrator for I.P. Address assignment for proper setup.

3.14.3 Download the Remote GUI Application

Download the 4MX remote GUI application (4MX25.exe, 4MX50.exe, or 4MX 100.exe) and place on the desktop of the PC that will be used for communication with the transmitter.

3.14.4 Changing 4MX's I.P. Address and Subnet Mask

The 4MX comes from the factory with a default I.P. Address of **10.2.4.102** and Subnet Mask of **255.255.255.255**. If you wish to change use the steps shown below (Please note that only the Chief Engineer login has permission to change the I.P. and Subnet of the 4MX).

From the Main GUI on the front panel of the transmitter select **TIME/DATE/IP SETUP** and enter the new I.P. and Subnet settings.



Figure 110 – 4MX I.P. Address

3.14.5 Changing the Remote GUI Password

Step 1 – Select the **PASSWD SETUP** menu.

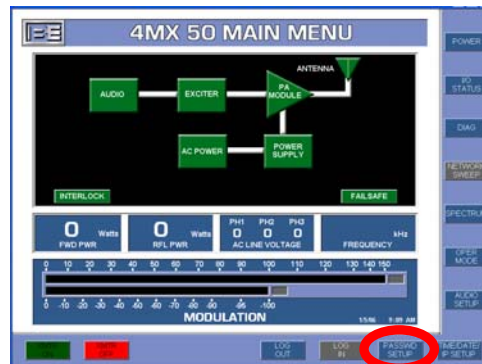


Figure 111 – Main GUI

Step 2 – Select the **CHG RGUI PASSWD**.



Figure 112 – Remote GUI Password Setup

Step 3 – Next, enter a password for the Remote GUI Log In such as **222222**, then select **Enter**.



Figure 113 – Enter Remote GUI Password

Step 4 – Next, re-enter the password (**222222** for this example) then select **Enter**.



Figure 114 – Confirm Remote GUI Password

3.14.6 Cycle AC Power to the Transmitter

After changing the I.P. address of the transmitter and entering the remote GUI Password, turn the transmitter's AC Breaker OFF then back ON.



Figure 115 – Cycle AC Power to the 4MX

3.14.7 Remote I/O Panel Removal

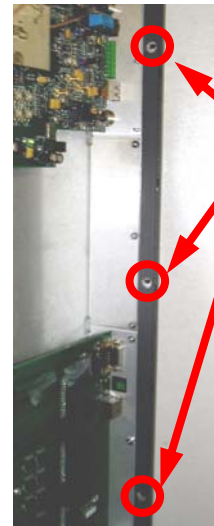
Before Remote GUI communication may be established with the 4MX, ensure that the PC is setup in the same I.P. family as the transmitter.

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

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 116 – Remote Control I/O Access Panel Removal

3.14.8 PC to 4MX Connection

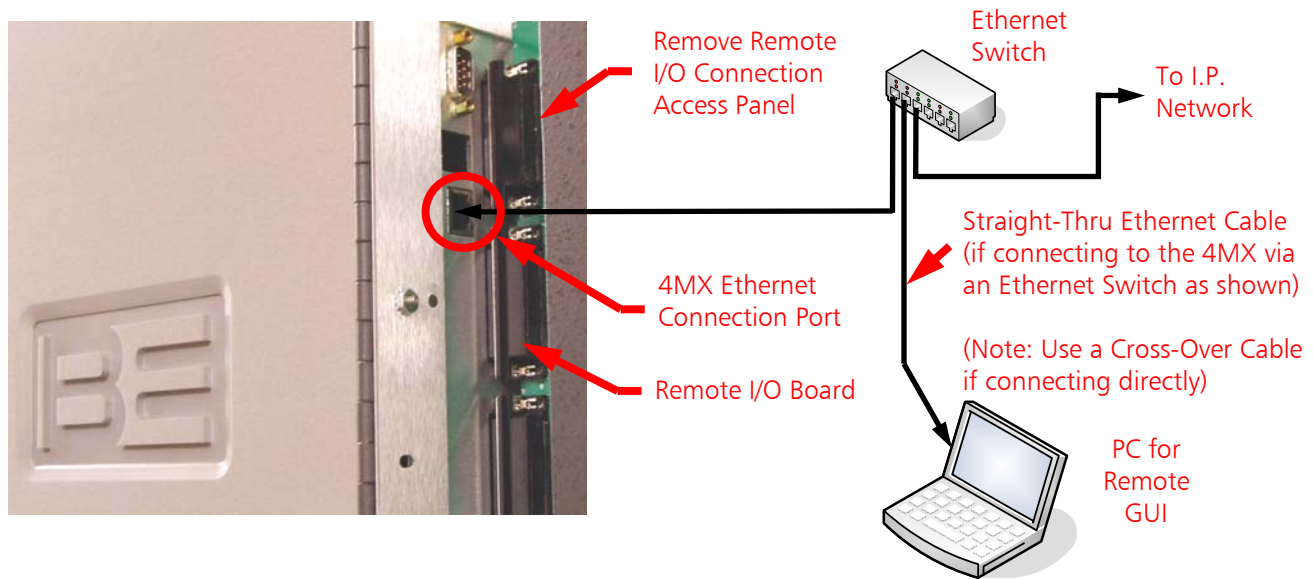


Figure 117 – PC to 4MX Connection

3.14.9 Setup PC for Remote Communication with the 4MX

Before Remote GUI communication may be established with the 4MX, ensure that the PC is setup in the same I.P. family as the transmitter.

Step 1 – 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**.

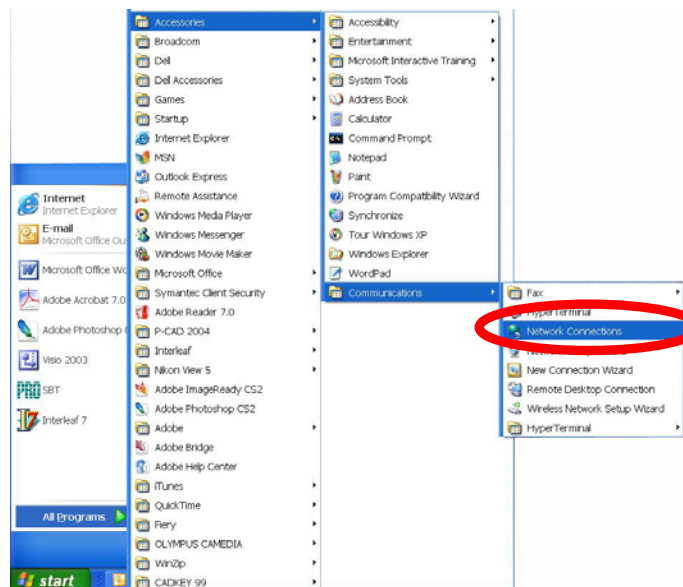


Figure 118 – PC Network Connection Menu

Step 2 – Right click on **Local Area Connection** and select **Properties**.

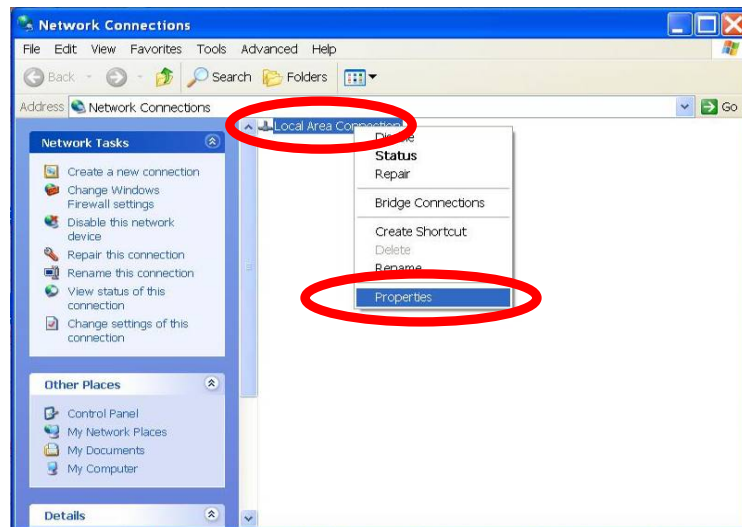


Figure 119 – Local Area Connection Properties

Step 3 – 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.

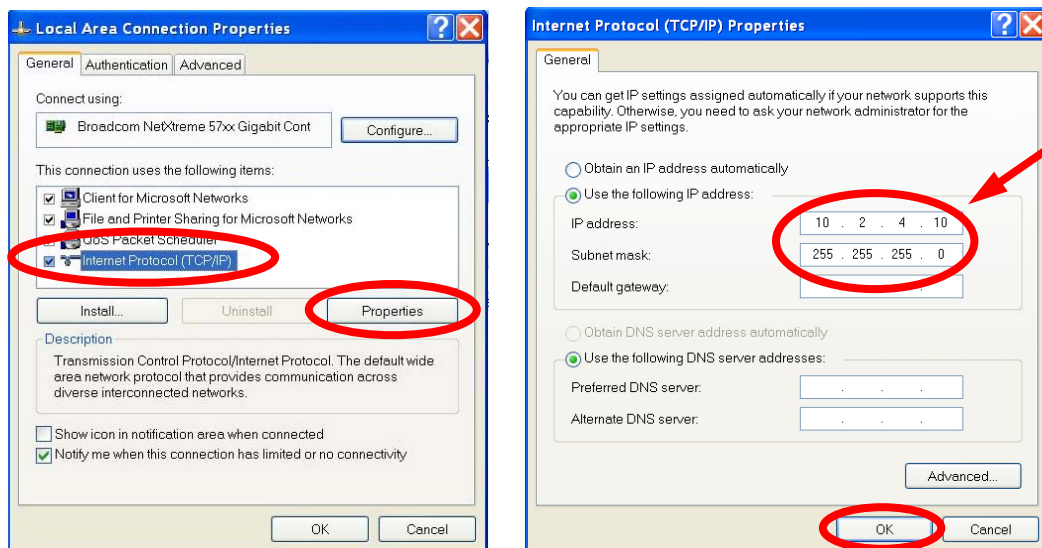


Figure 120 – Configure the I.P. Address of the Personal Computer

3.14.10 Check PC to Transmitter Connection

On the PC open a web-browser and type in **10.2.4.102** in the address bar. If communication can be established with the 4MX the following screen will appear.

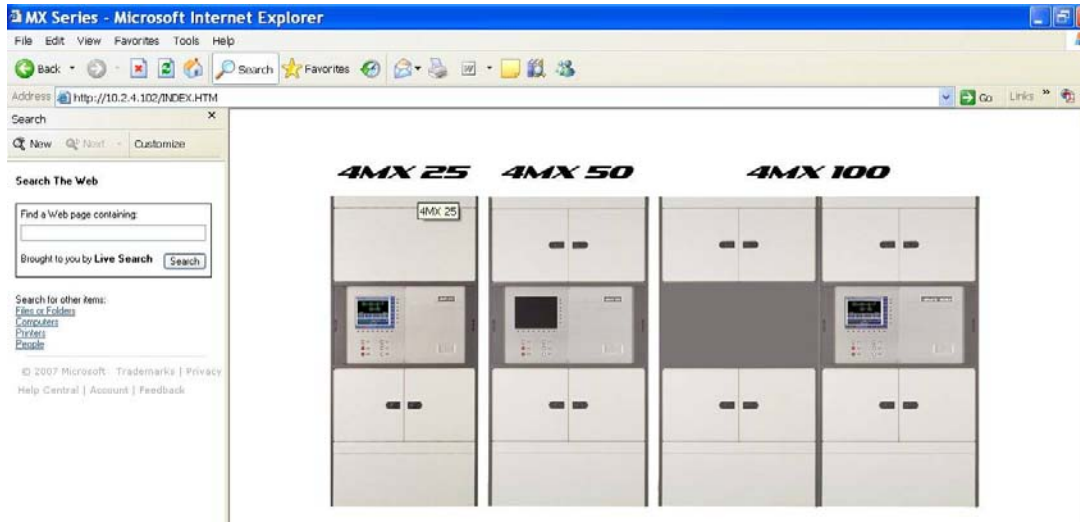


Figure 121 – 4MX Web Page

3.14.11 Launch Remote GUI Application

Launch the Remote GUI Application that you placed on the desktop of your PC (4MX25.exe, 4MX50.exe, or 4MX100.exe). Once the application launches select **RMT 4MX LOG IN**.

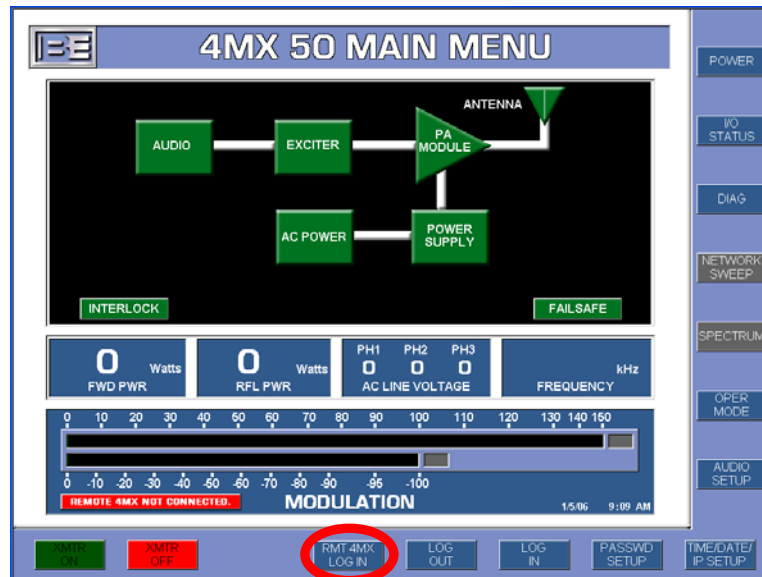


Figure 122 – Remote GUI



3.14.12 Remote GUI Login

Enter the I.P. Address of the transmitter and remote GUI password that you previously assigned (**222222** for this example).

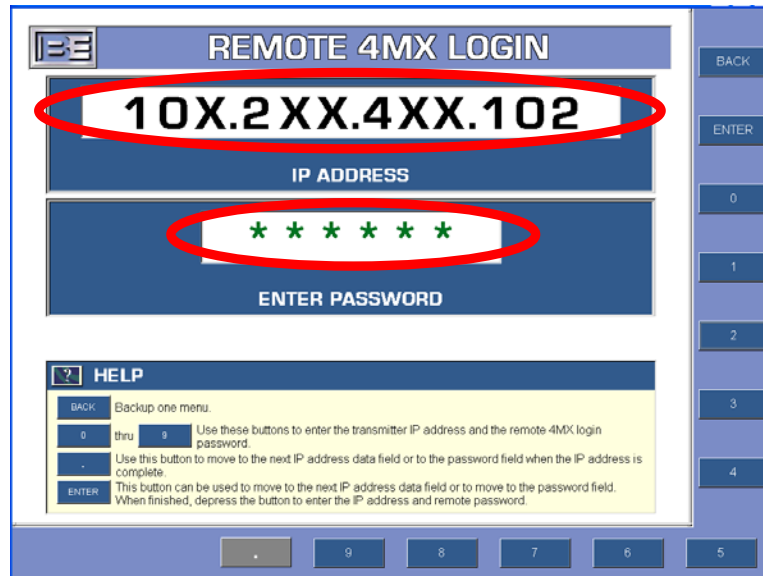


Figure 123 – Remote GUI

3.14.13 Windows Security Alert

If this screen appears, select **Unblock**.



Figure 124 – Windows Security Alert

Note: Sometimes the connection will fail after this screen. If this should happen close and try logging in again.

3.14.14 Remote GUI

The Remote GUI will now appear. Next, select **LOG IN**.

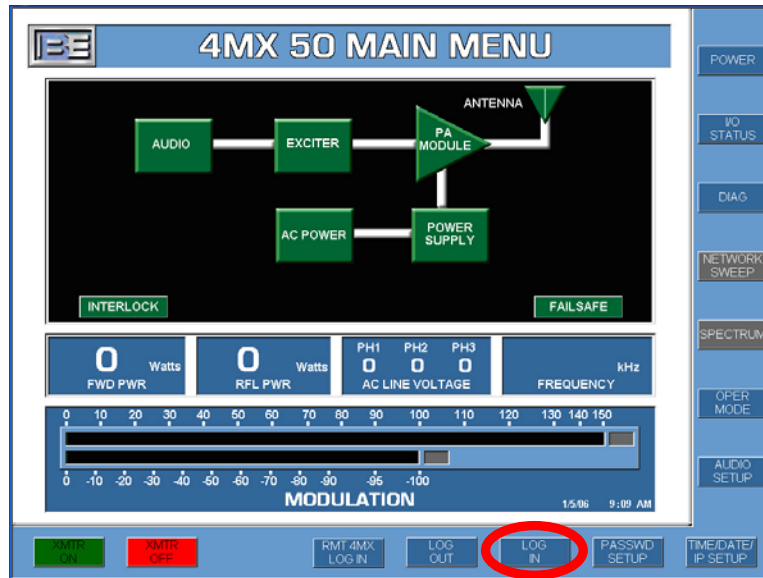


Figure 125 – Remote GUI

3.14.15 Transmitter Login

When the transmitter **LOG IN MENU** appears, log in as you normally would if you were at the transmitter.

The default Chief Engineer Password is **123456**

The default Operator Password is **111111**



Figure 126 – Transmitter Log In



3.15 4MX Remote GUI General Notes

3.15.1 PC Requirements

- 500 MHz or faster running MS Windows XP

3.15.2 Connection Types

- Performance is slow on Dial-up connections.
- Performance is very fast on Broadband connections.
- Performance is very fast if connecting directly to the transmitter.

3.15.3 Remote Enable / Disable

Remote GUI functionality may be Enabled / Disabled from the **OPER MODE** menu. Please note that this selection may only be made locally to the transmitter.

3.15.4 “Grayed Out” Features

Please note that certain features are NOT available via the Remote GUI and are “grayed out”.

3.15.5 Sessions

Please note that you may only have one session of the Remote GUI running on a PC at any given time.

3.15.6 4MX Remote GUI is a Two User System

The 4MX Remote GUI login is a two user system. Any combination of view, operate, or chief login is allowed.

3.15.7 Downloading Code

If you are planning to download software to the transmitter, ensure that there are no Remote GUI sessions open.



3.15.8 Typical Networking Configurations

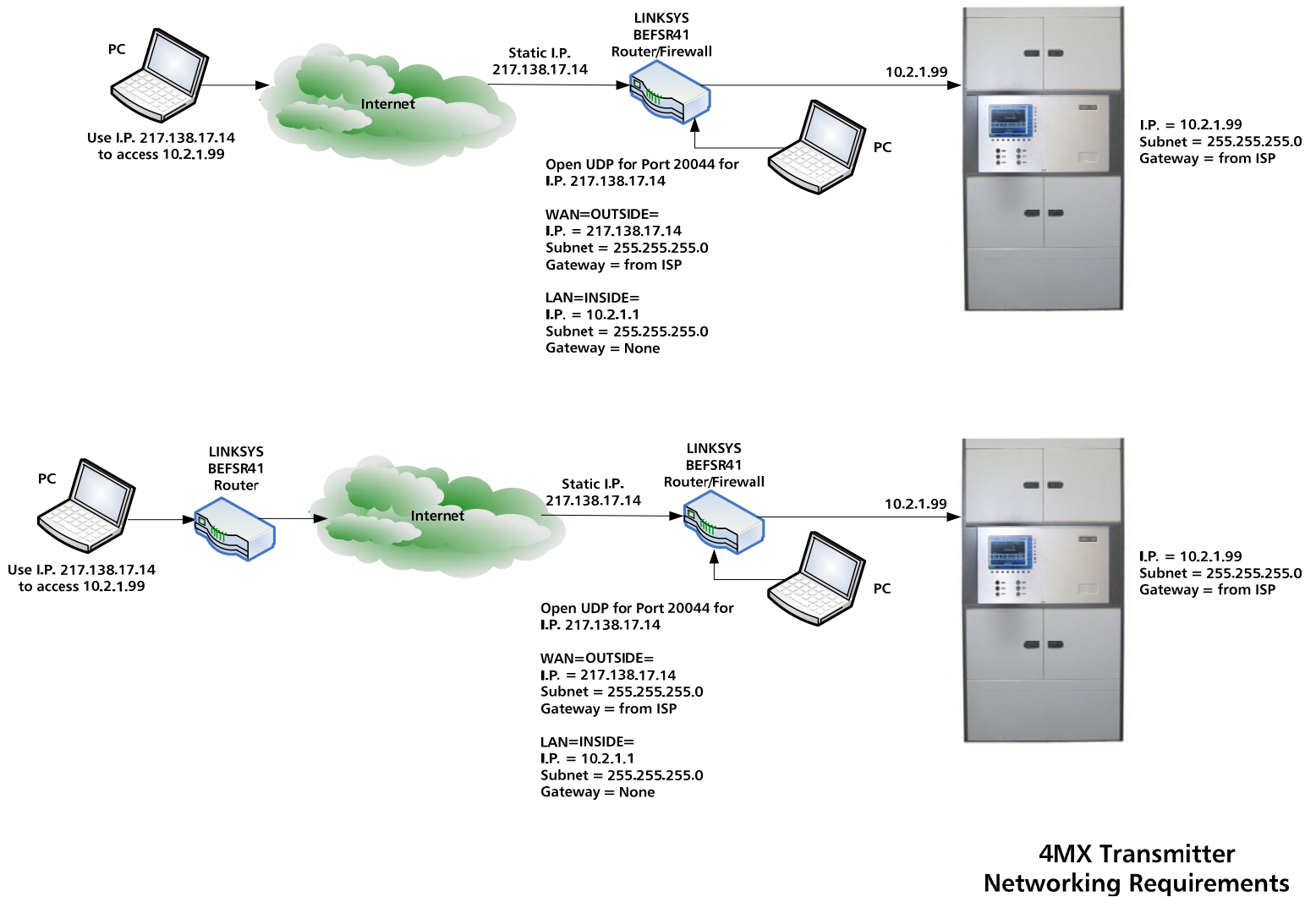


Figure 127 – Typical Networking Configurations

4 General Maintenance

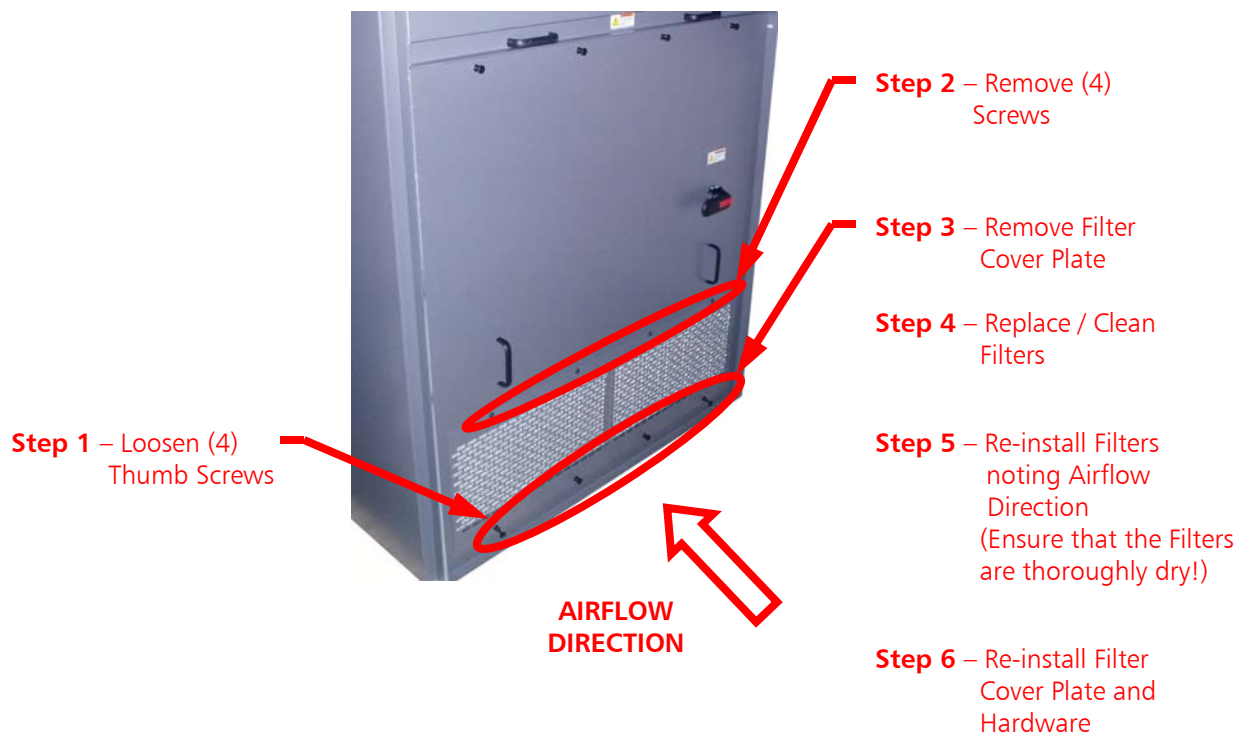
4.1 Air Filter Replacement

The 4MX 25/50 has (2) reusable inlet Air Filters located on the lower rear door of the cabinet. These filters provide protection to the 4MX 25/50 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 door of the 4MX 25/50 is designed such that the air filters may be removed and re-installed while the transmitter is running.



**Figure 128 – Removal / Installation of Inlet Air Filters
(Lower Rear of Cabinet)**

4.2 GUI Menu Screen Care

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

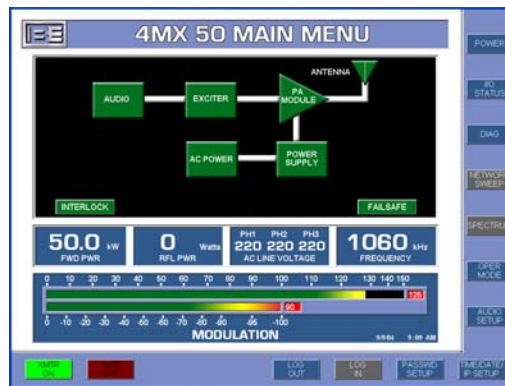


Figure 129 – GUI Menu Screen

- 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 130 – AC Terminal Block Connections

5 Power Amplifier Module Replacement

There are 16 Power Amplifier Modules in the 4MX 25 Transmitter. There are 32 Power Amplifier Modules in the 4MX 50 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 25, all 16 PA Modules (1-16) will not be ON unless the RF Output Power Level is set for $\geq 5\text{kW}$; @ $1.25\text{kW} - 4.99\text{kW}$ 8 PA Modules will be ON (1-8); @ $250\text{W} - 1.24\text{kW}$ 4 PA Modules will be ON (1-4).

In a 4MX 50, all 32 PA Modules will not be ON unless the RF Output Power Level is set for $\geq 10\text{kW}$; @ $2.5\text{kW} - 9.99\text{kW}$ 16 PA Modules will be ON (9-24); @ $250\text{W} - 2.49\text{kW}$ 8 PA Modules will be ON (13-20).



**Figure 131 – 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 132**.

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

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

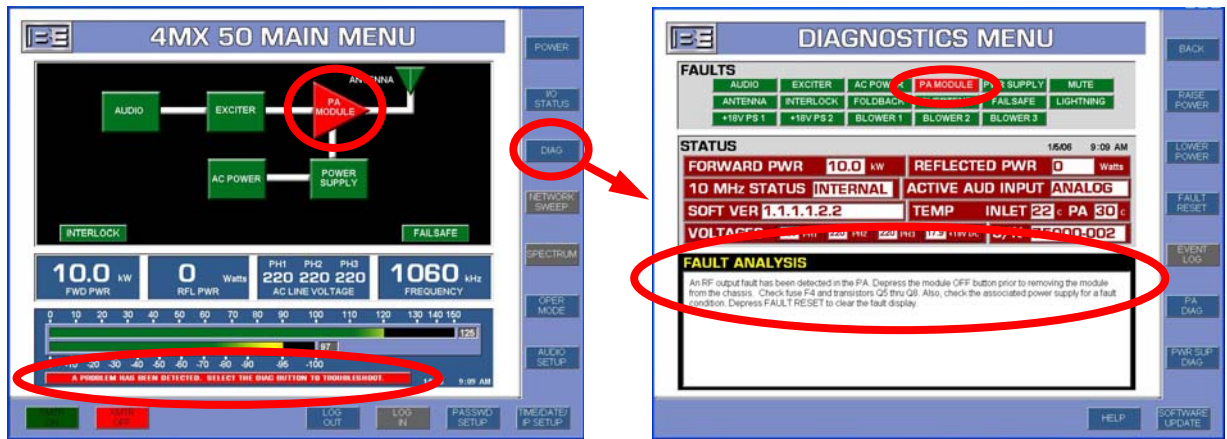


Figure 132 – Diagnostics Menu

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

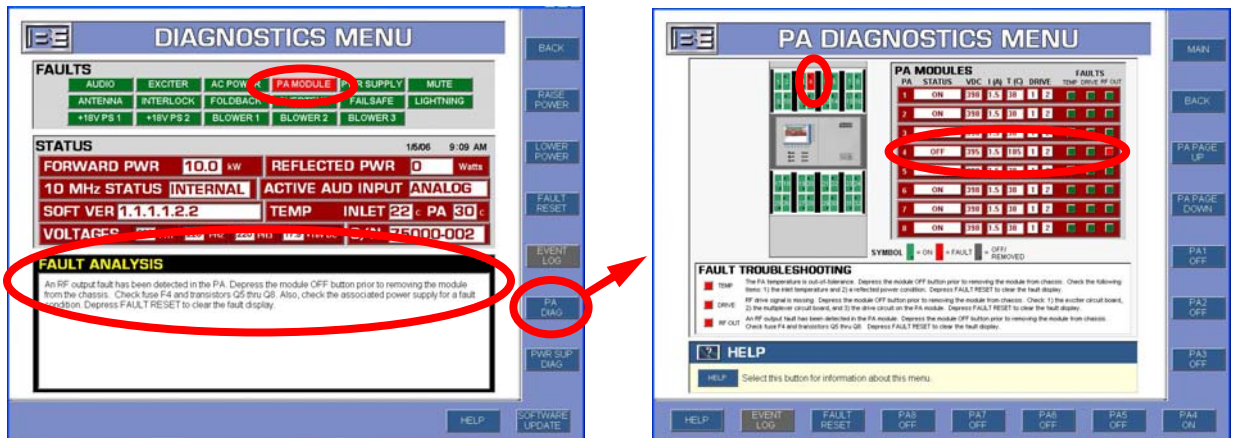


Figure 133 – PA Diagnostics Menu

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 **"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 134 – PA Module Locations (Front of Transmitter)

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

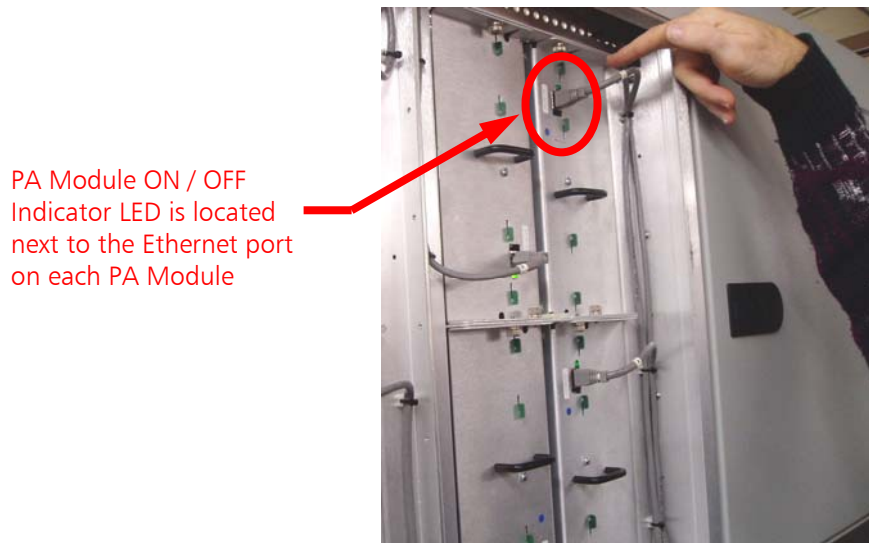


Figure 135 – Ensure That the PA Indicator is Extinguished

Step 6 – Disconnect the Ethernet connection.

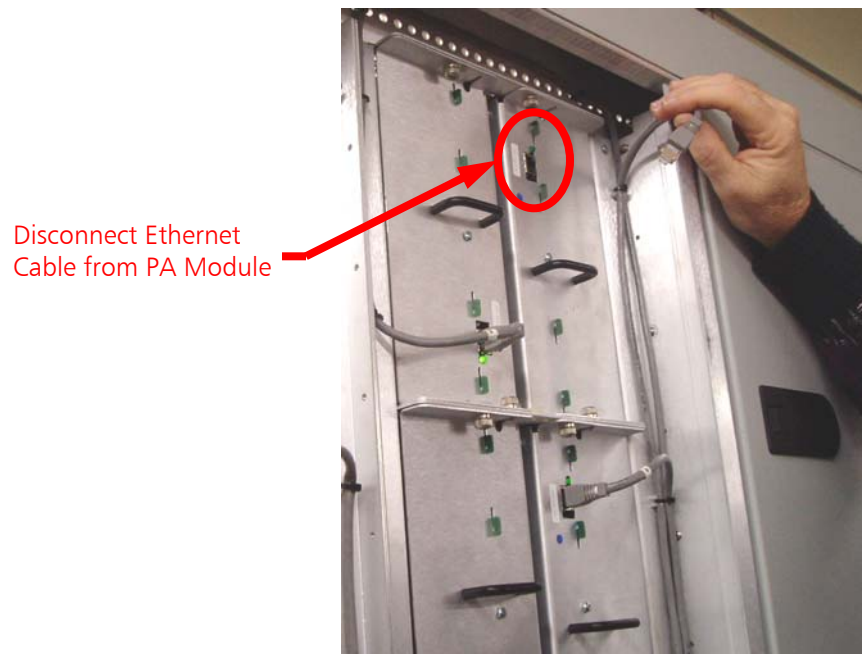


Figure 136 – Disconnect Ethernet Cable

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

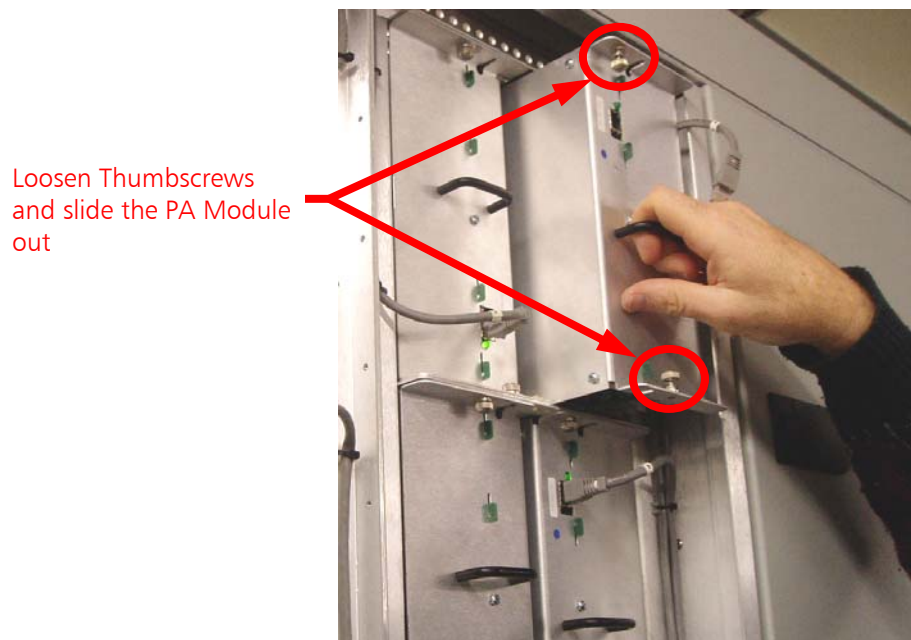


Figure 137 – Loosen Thumb screws and Slide the PA Module Out

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



Figure 138 – Install New PA Module and Tighten Thumbscrews

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

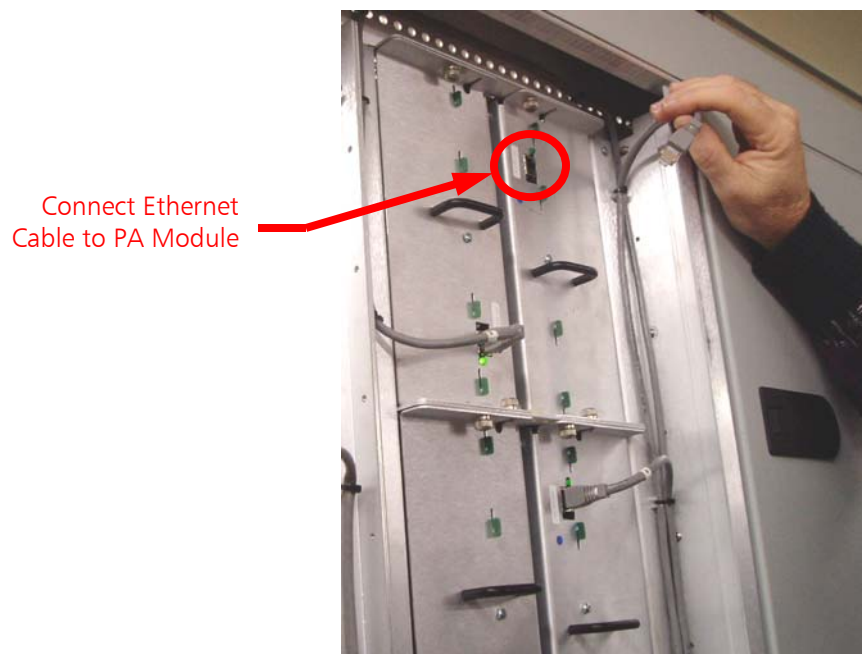


Figure 139 – Connect the Ethernet Cable To PA Module

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.

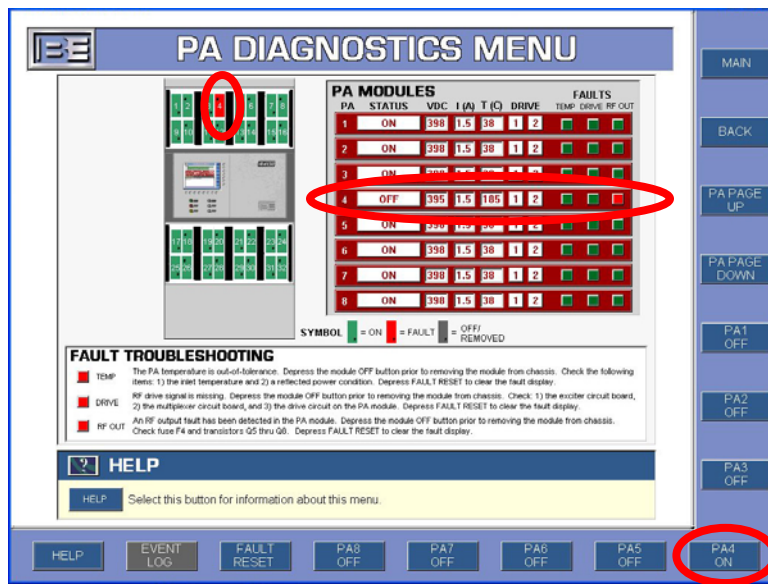


Figure 140 – Turning the PA Module ON

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

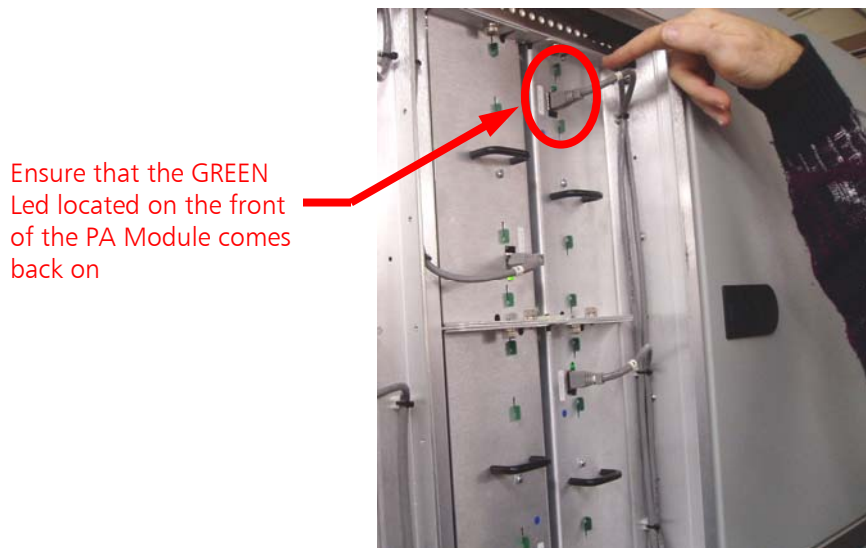


Figure 141 – PA Module LED

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.

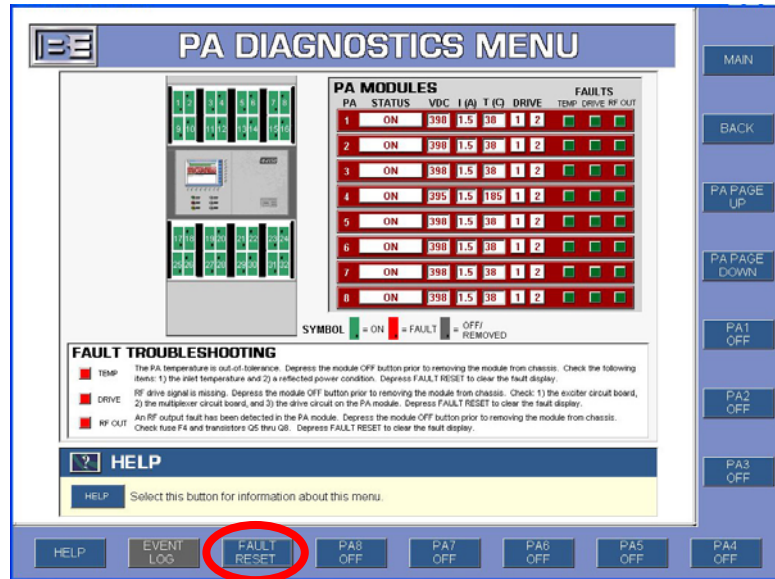


Figure 142 – Turning the PA Module ON

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

6 Replacing a 4MX 25/50 PA Motherboard

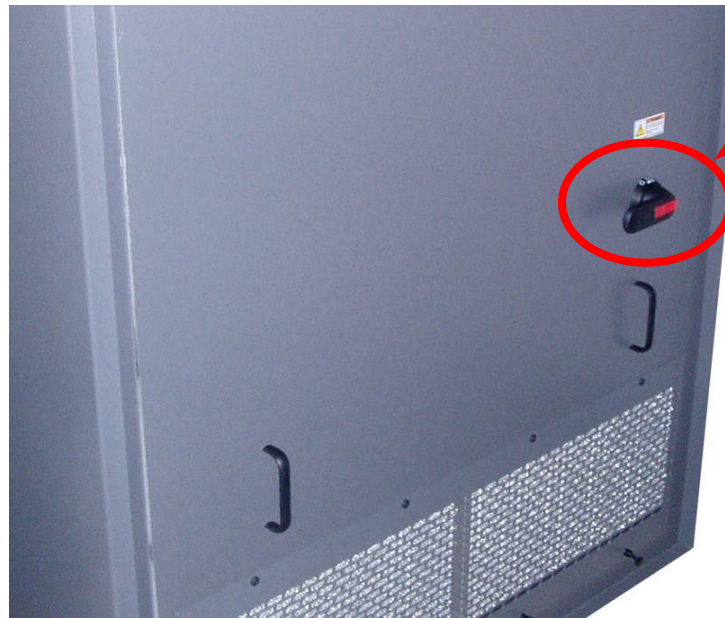
6.1 Tools / Items Needed

- ☐ 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.

6.3 Turn the 4MX 25/50 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 143 – Turn 4MX 25/50 AC Breaker to OFF

6.4 4MX 25 PA Module / Motherboard Locations

The 4MX 25 has 16 PA Modules (2 per PA Motherboard). **Figure 144** illustrates how the PA Modules are numbered. **Figure 145** 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.

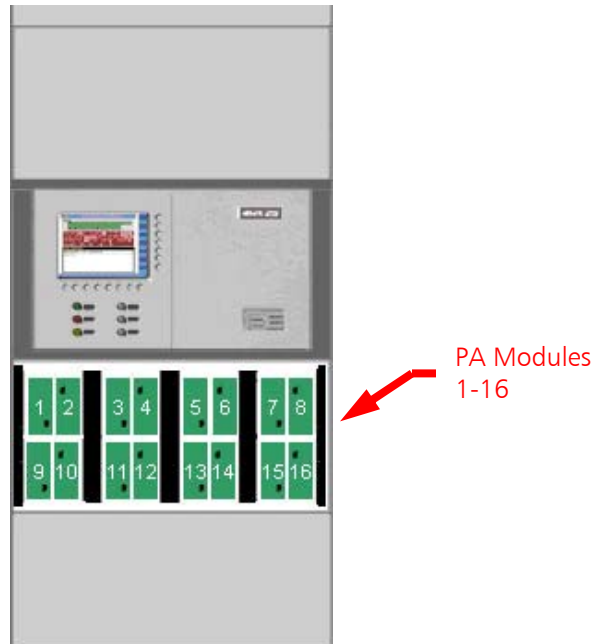


Figure 144 – 4MX 25 PA Module Locations

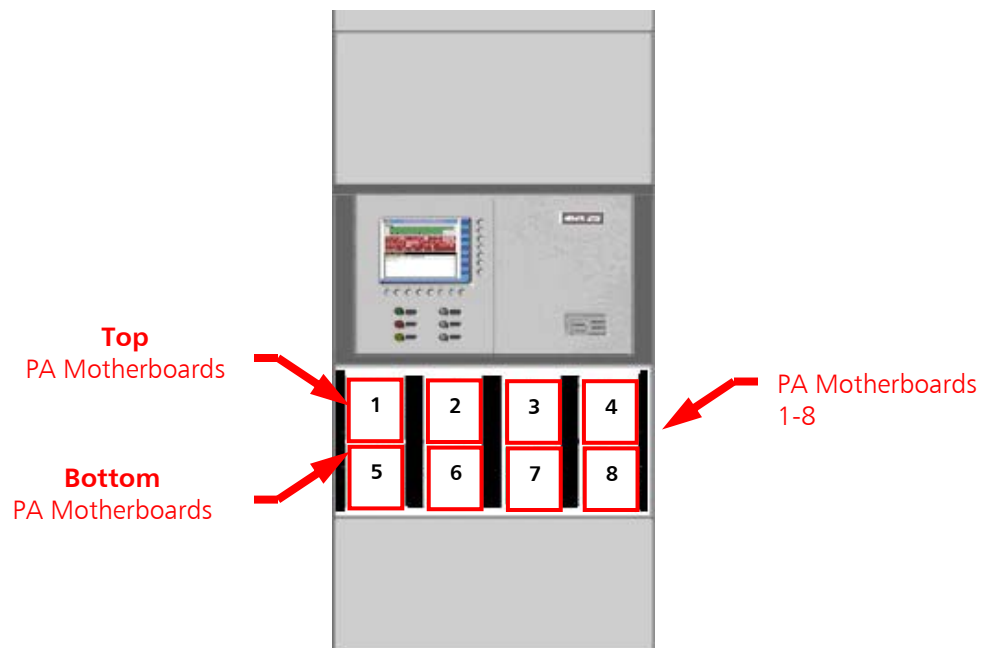


Figure 145 – 4MX 25 PA Motherboard Locations

6.5 4MX 50 PA Module / Motherboard Locations

The 4MX 50 has 32 PA Modules (2 per PA Motherboard). **Figure 146** illustrates how the PA Modules are numbered. **Figure 147** 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.

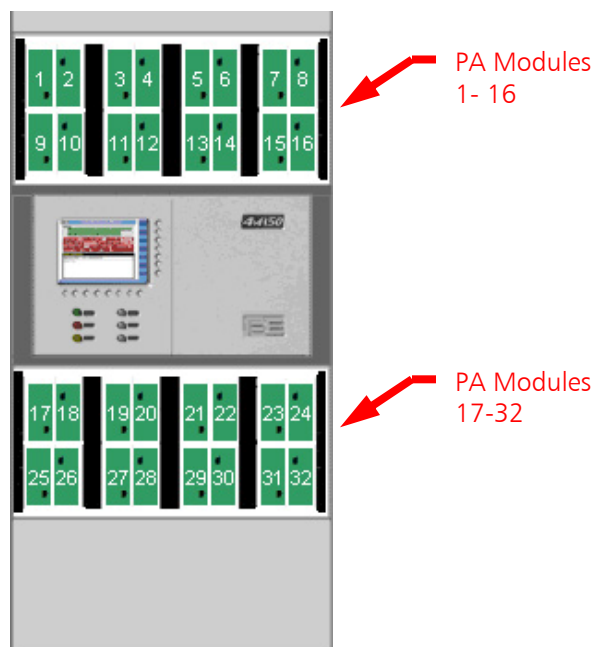


Figure 146 – 4MX 50 PA Module Locations

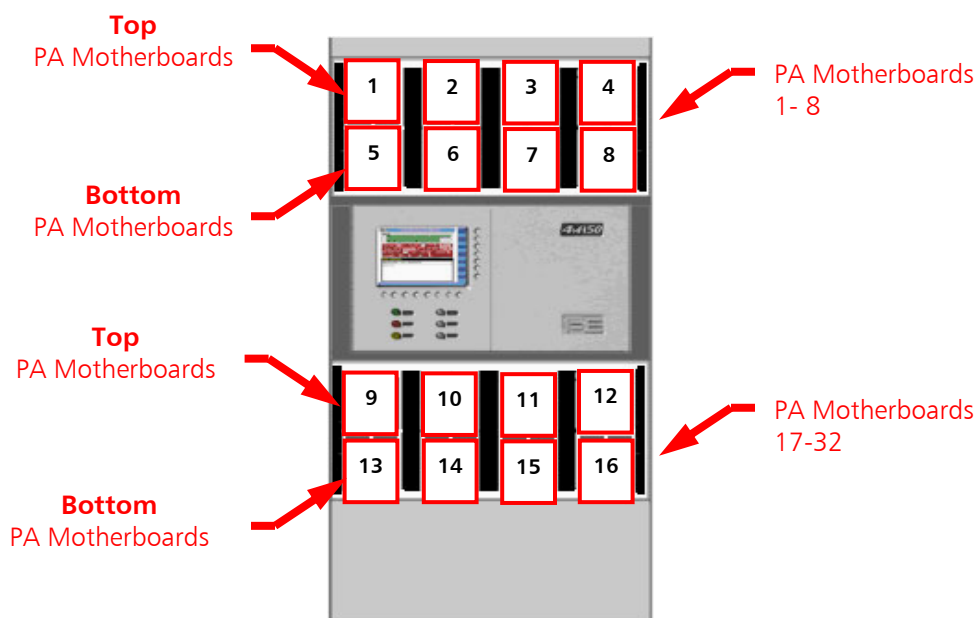


Figure 147 – 4MX 50 PA Motherboard Locations

6.6 PA Module Removal

In the following instructions we will be replacing Motherboard No. 10 in a 4MX 50. 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)

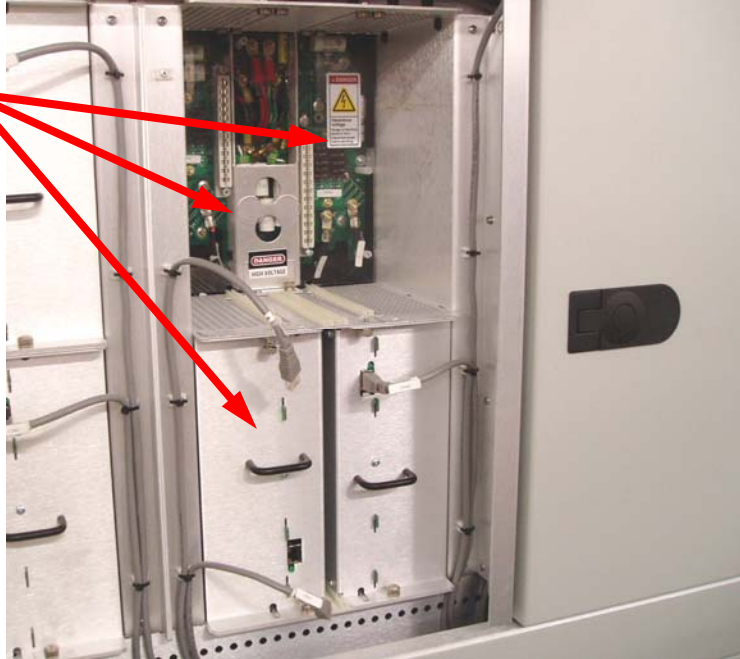
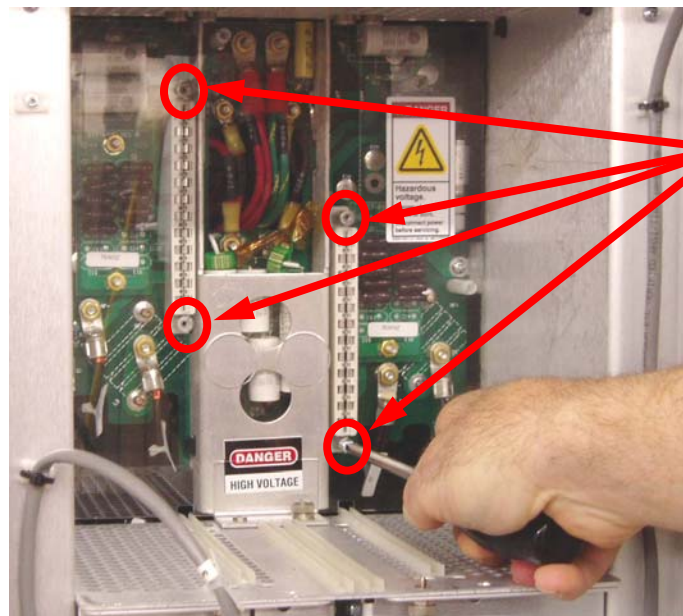


Figure 148 – Remove Appropriate PA Modules

6.7 Remove Motherboard Cover



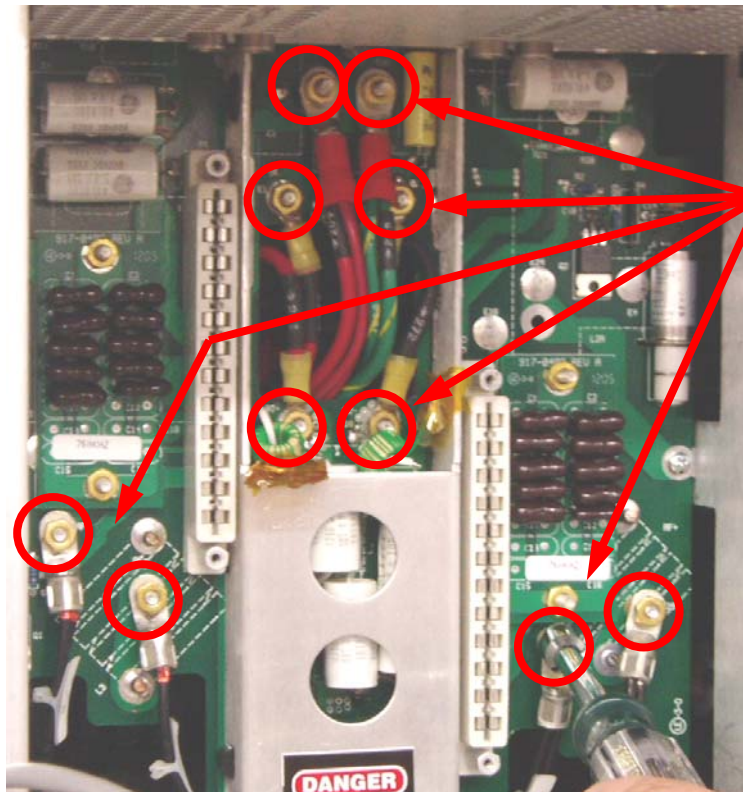
STEP 1 - Using a No. 2 Phillips Screw Driver remove the (4) screws with captive star washers

STEP 2 – Remove the Motherboard Cover

Figure 149 – Remove Motherboard Cover

6.8 Remove Wiring Connection Hardware

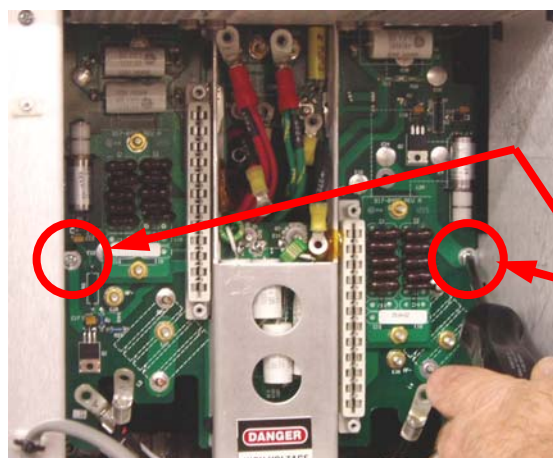
PLEASE NOTE: It is a good idea to label the wires to ensure that they are connected properly later. If possible, take some close up digital photos for reference as well.



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 150 – Remove Wiring Connection Hardware

6.9 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 with captive star washers

Figure 151 – Remove Wiring From Studs / Remove Mounting Screws

6.10 Loosen PA Motherboard Bracket Thumbscrews

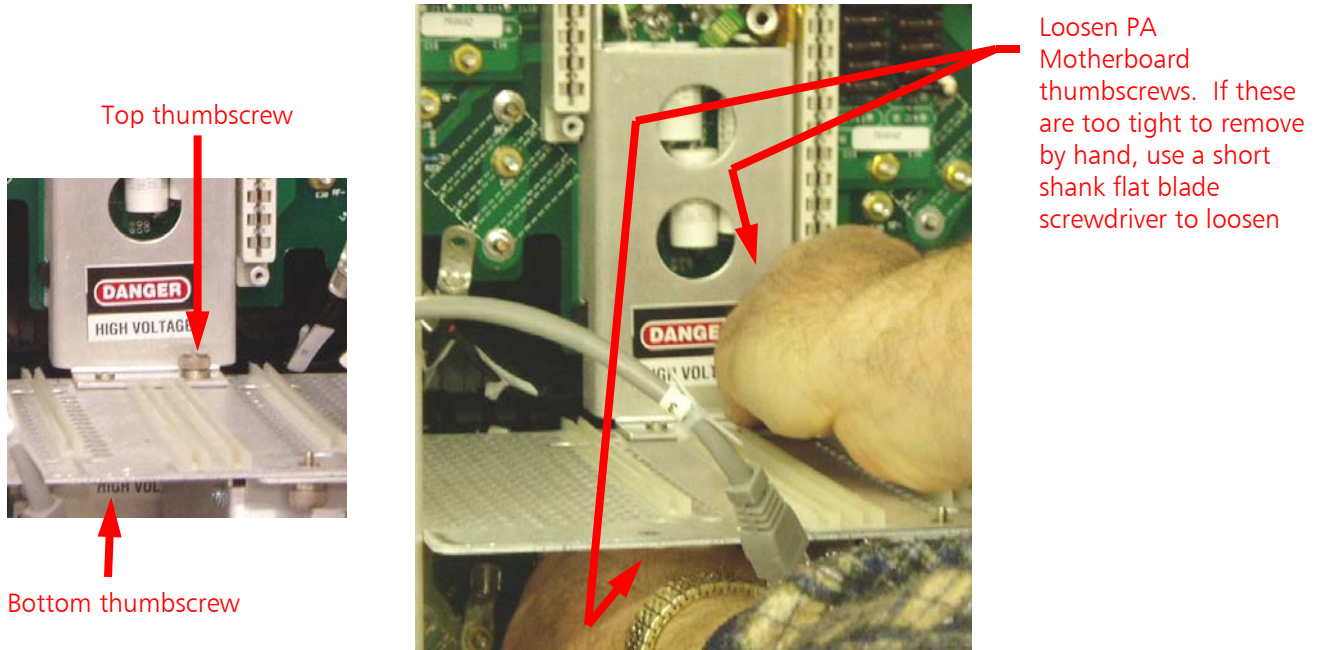


Figure 152 – Loosen PA Motherboard Bracket Thumbscrews

6.11 Remove the PA Motherboard from the Transmitter

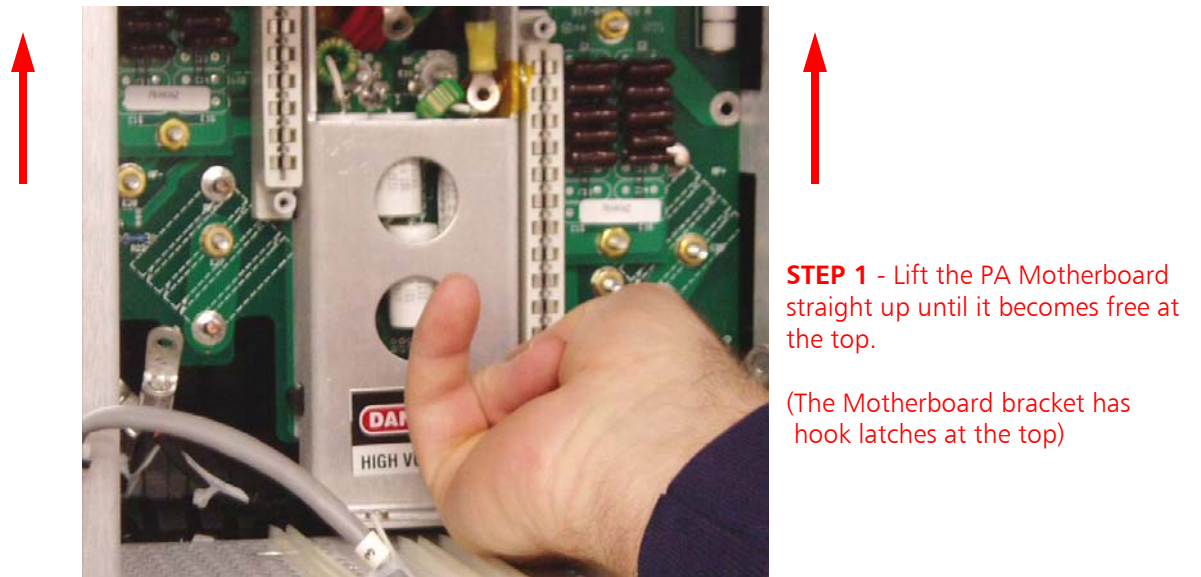
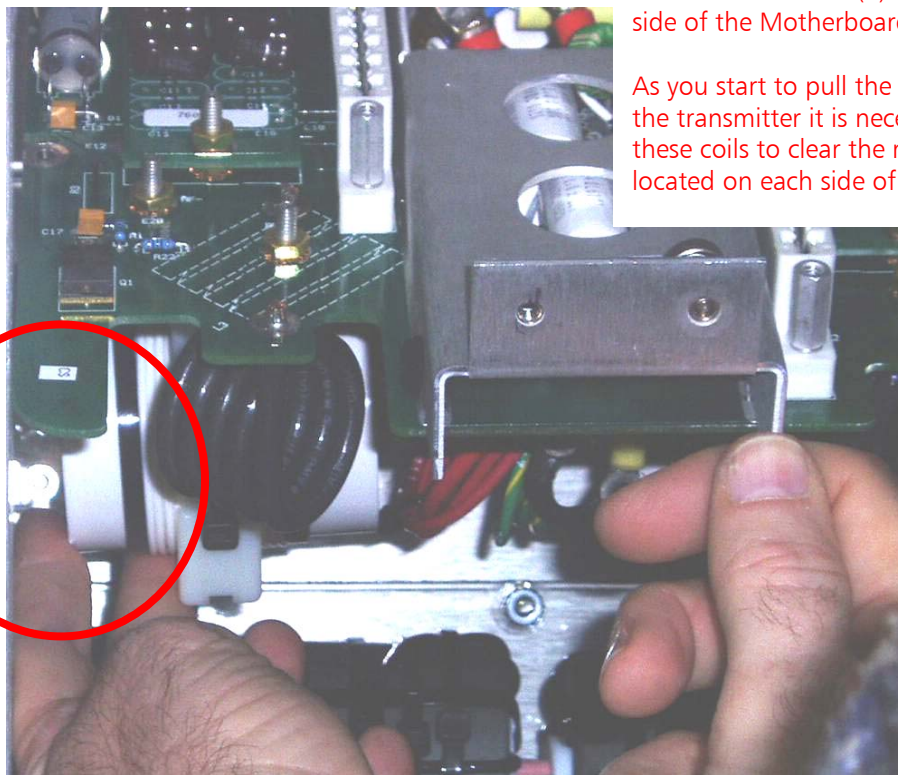


Figure 153 – Lift the Motherboard Straight Up



STEP 2 – Tilt the Motherboard to horizontal position

Figure 154 – Tilt Motherboard



STEP 3 – There are (4) large coils on the back side of the Motherboard (see Figure 113).

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

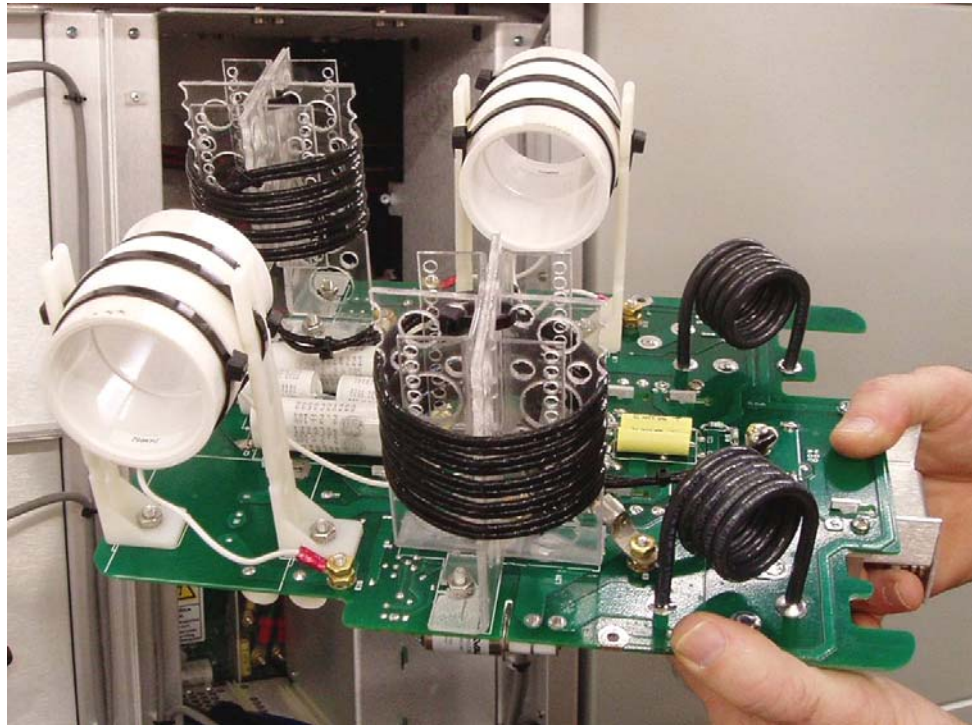


Figure 156 – PA Motherboard Removed

6.12 Ty-rap Center Wire Bundle

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

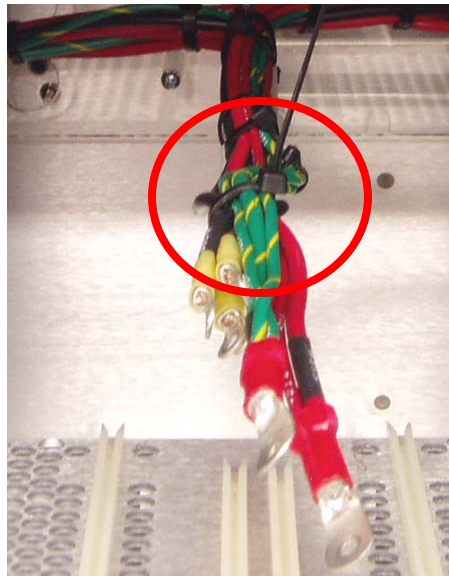
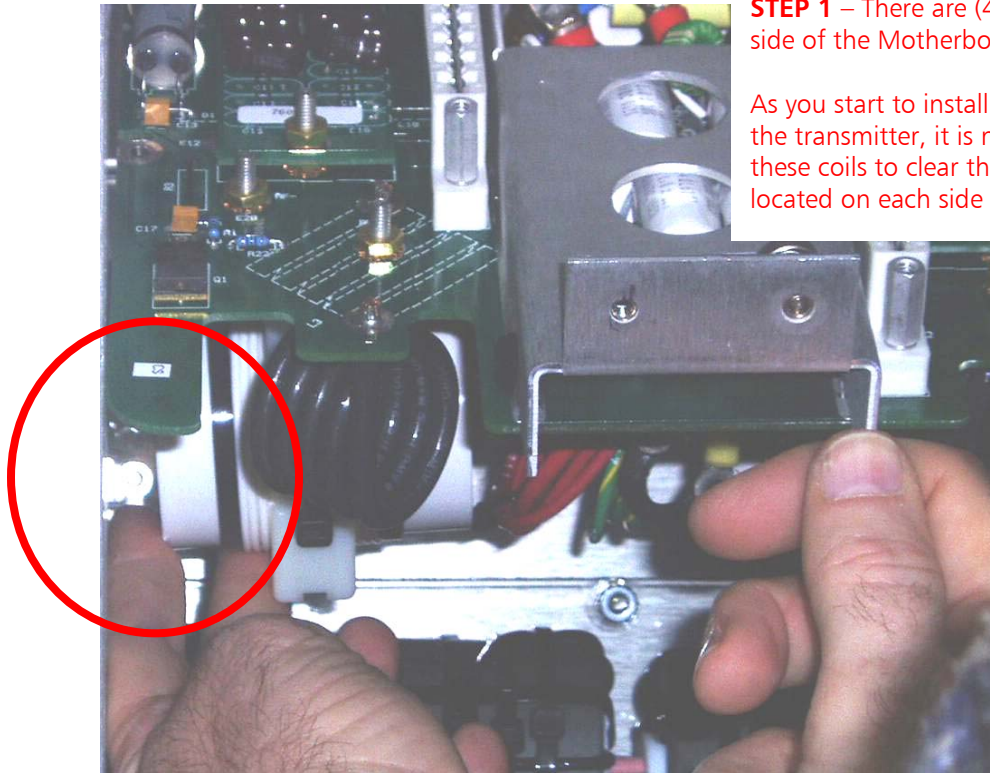


Figure 157 – Ty-rap Wire Bundle

6.13 Install New PA Motherboard



STEP 1 – There are (4) large coils on the back side of the Motherboard (see Figure 113).

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 158 – 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 159 – Tilt Motherboard into Vertical Position

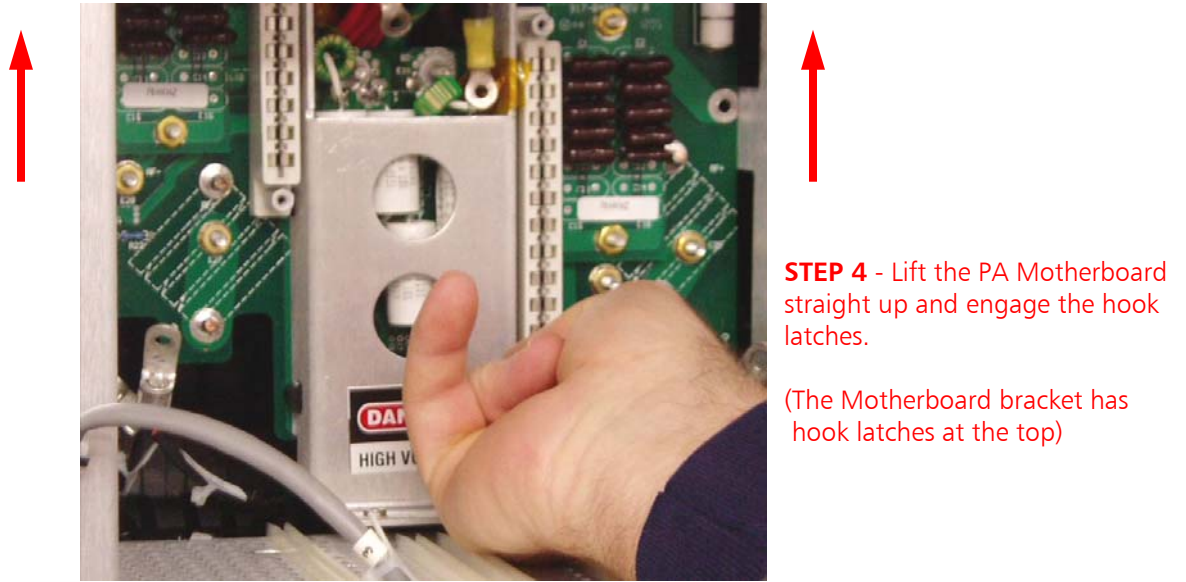


Figure 160 – Lift the Motherboard Straight Up

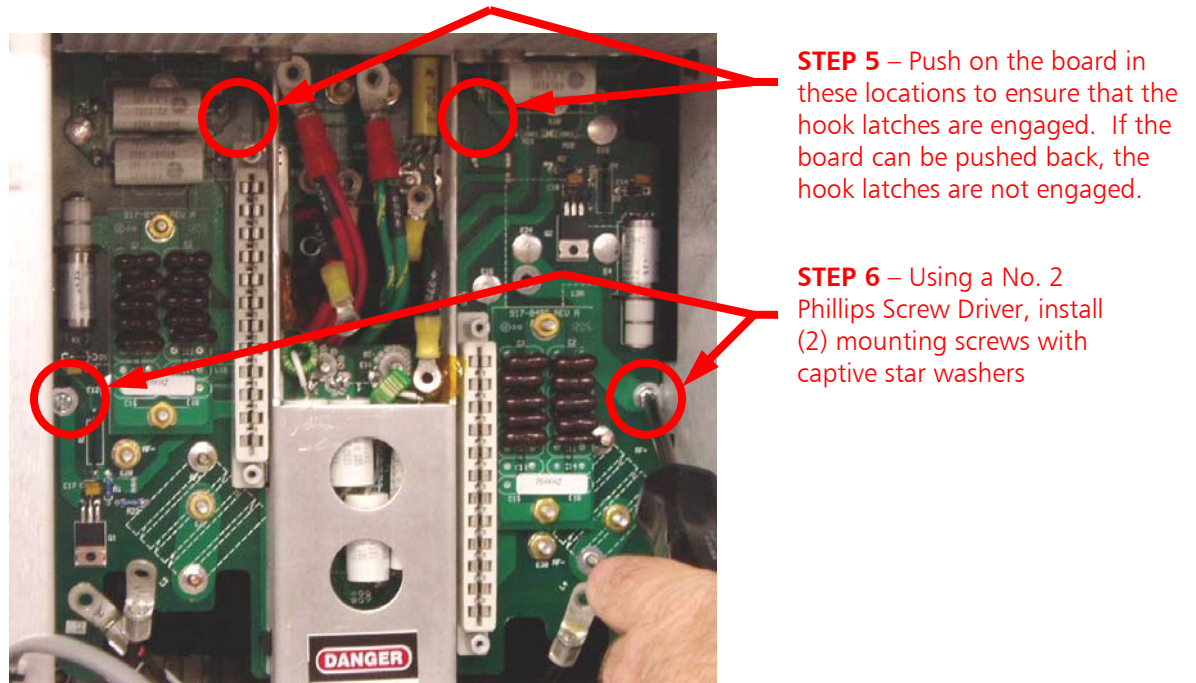


Figure 161 – Install Mounting Screws

6.14 Tighten PA Motherboard Bracket Thumbscrews

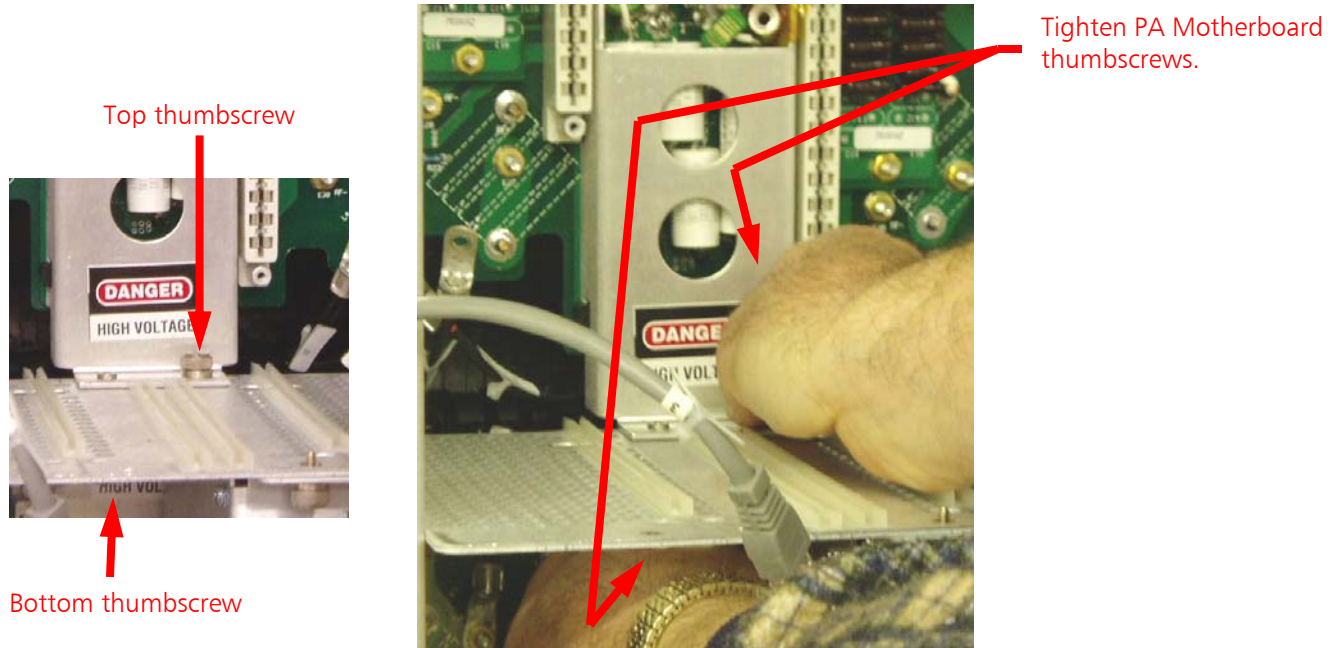


Figure 162 – Tighten PA Motherboard Bracket Thumbscrews

6.15 "TOP" PA Motherboard Wiring Connections

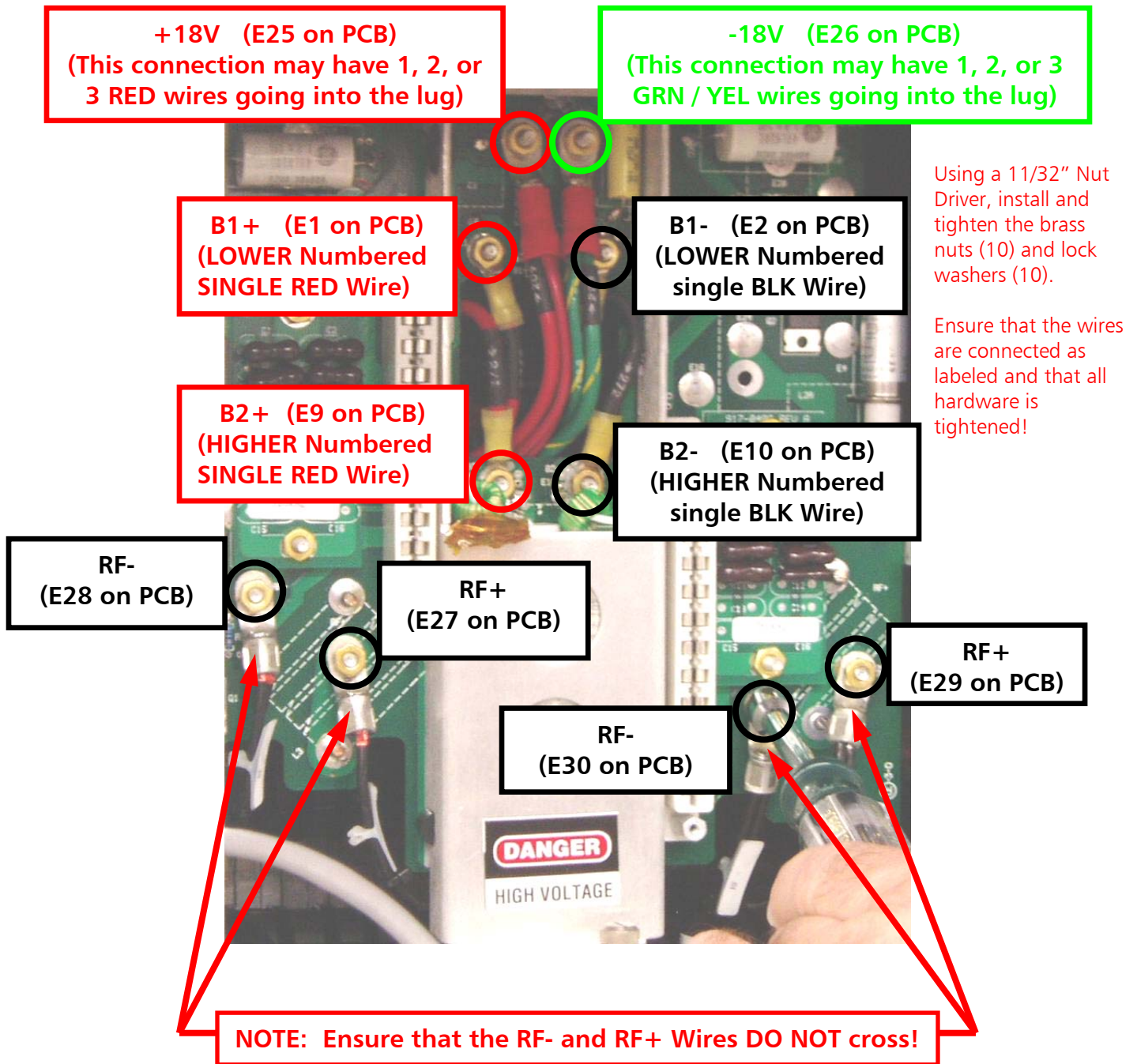


Figure 163 – "TOP" PA Motherboard Wiring Connections

6.16 "BOTTOM" PA Motherboard Wiring Connections

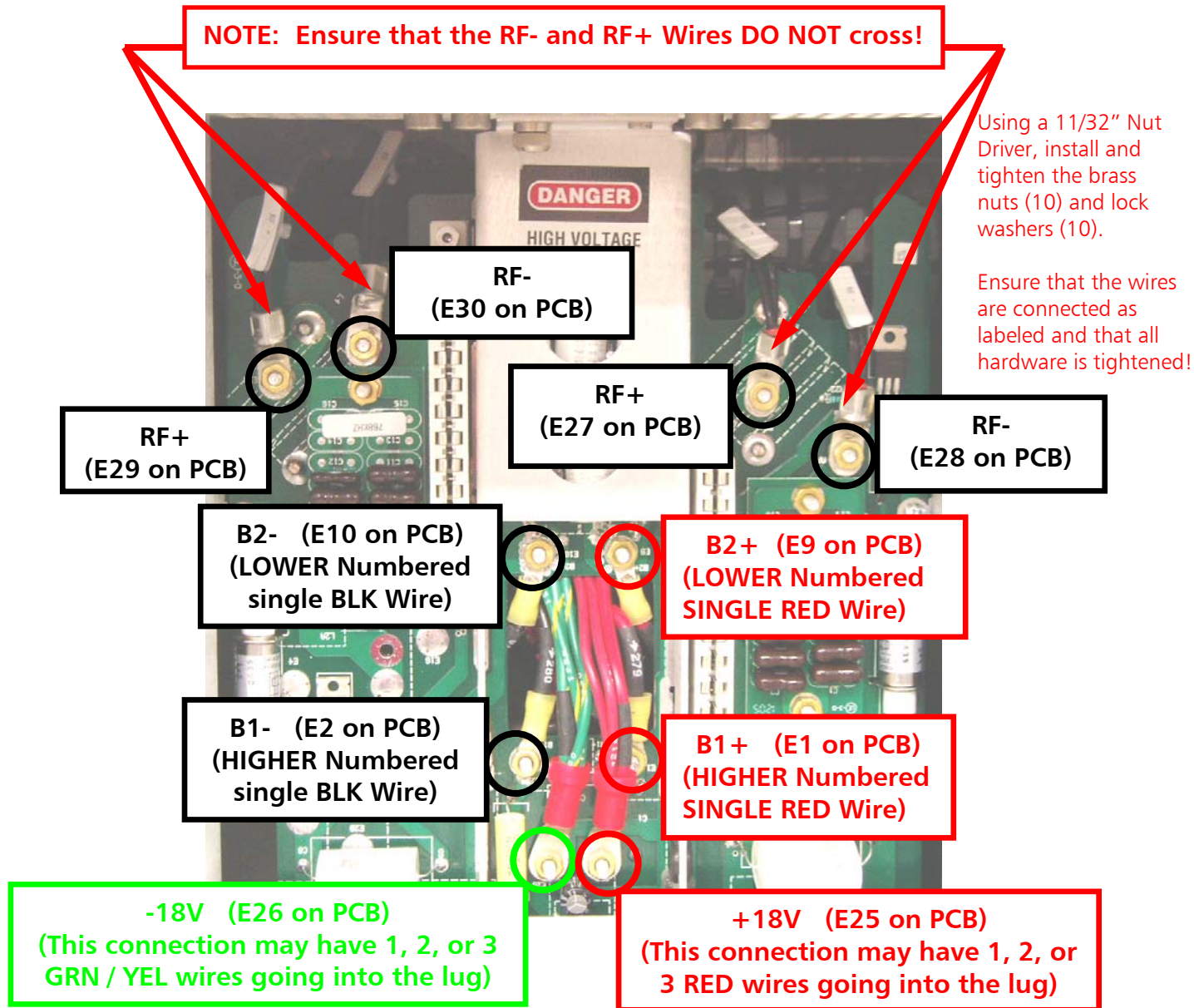
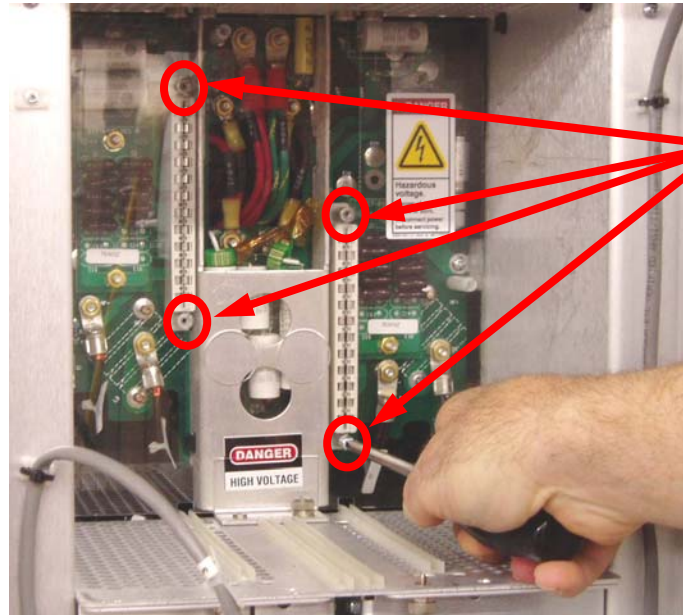


Figure 164 – "BOTTOM" PA Motherboard Wiring Connections

6.17 Install PA Motherboard Cover



STEP 1 – Install the Motherboard Cover

STEP 2 - Using a No. 2 Phillips Screw Driver install the (4) screws with captive star washers

Figure 165 – Install Motherboard Cover

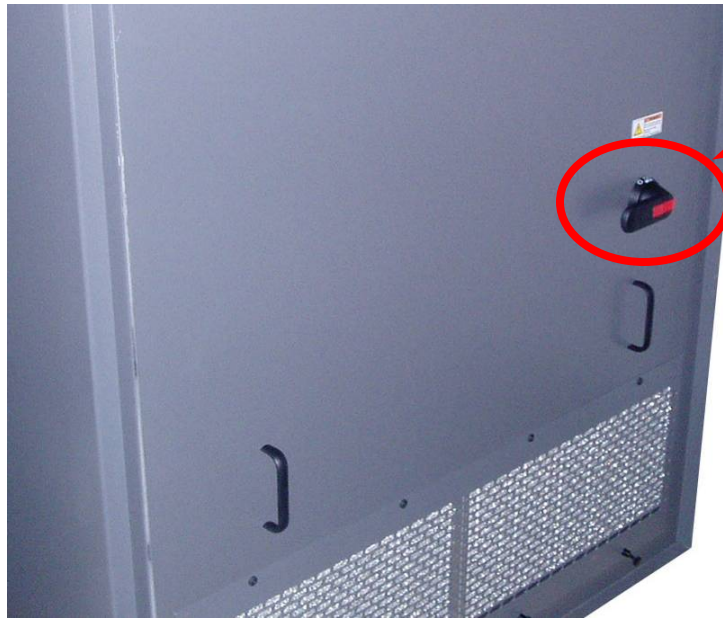
6.18 Install and Connect PA Modules

Install and connect all PA Modules that were previously removed.



Figure 166 – Install PA Modules

6.19 Turn the 4MX 25/50 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 167 – Turn 4MX 25/50 AC Breaker to ON

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

6.20 PA Power Supply Module Replacement

There are 16 Power Supply Modules in the 4MX 25 Transmitter. There are 32 Power Supply Modules in the 4MX 50 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 25, all 16 PS Modules (1-16) will not be ON unless the RF Output Power Level is set for $\geq 5\text{kW}$; @ $1.25\text{kW} - 4.99\text{kW}$ 8 PS Modules will be ON (1-8); @ $250\text{W} - 1.24\text{kW}$ 4 PS Modules will be ON (1-4).

In a 4MX 50, all 32 PS Modules will not be ON unless the RF Output Power Level is set for $\geq 10\text{kW}$; @ $2.5\text{kW} - 9.99\text{kW}$ 16 PS Modules will be ON (9-24); @ $250\text{W} - 2.49\text{kW}$ 8 PS Modules will be ON (13-20).



Figure 168 – Power Supply Module Location (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 126**.

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

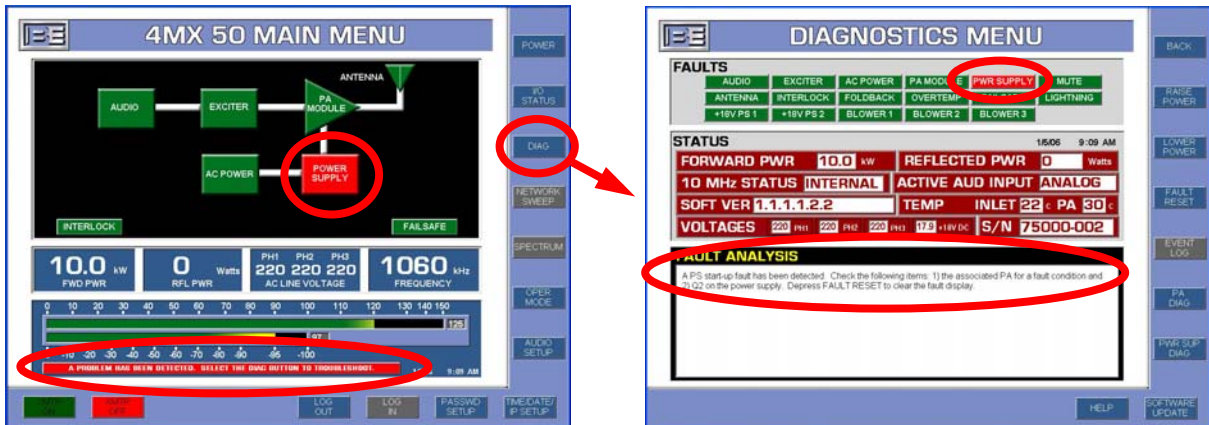


Figure 169 – Main GUI Power Supply Fault

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.

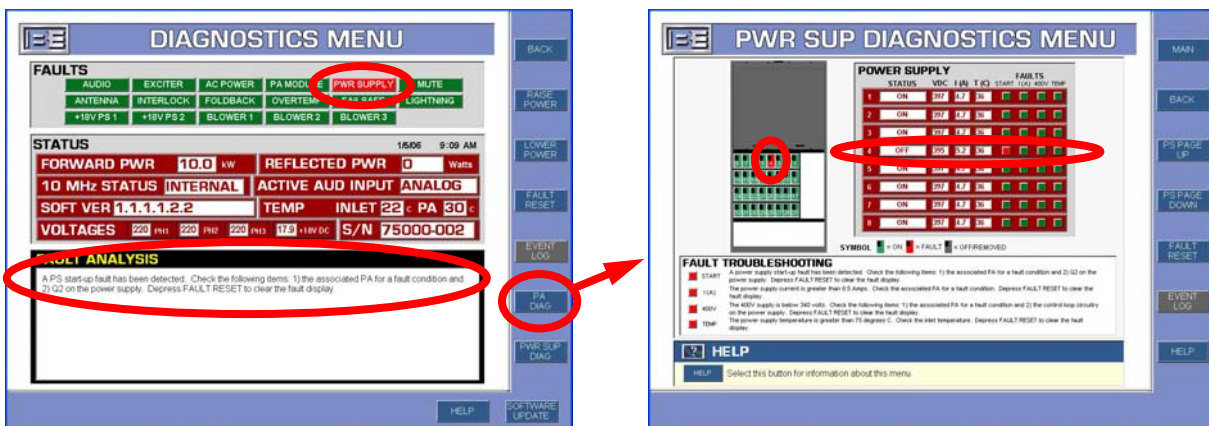


Figure 170 – Power Diagnostics Menu (Failed Power Supply Fault)

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 AC Breaker OFF and remove the lower rear door.



Figure 171 – Turn the Transmitter's AC Breaker OFF and Remove Door

Step 4 – Locate the failed power supply module. **Figure 124** shows the Power Supply Module locations.



Figure 172 – 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 kepinut that secures that row's retaining bracket in place.

**Figure 173 – 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.

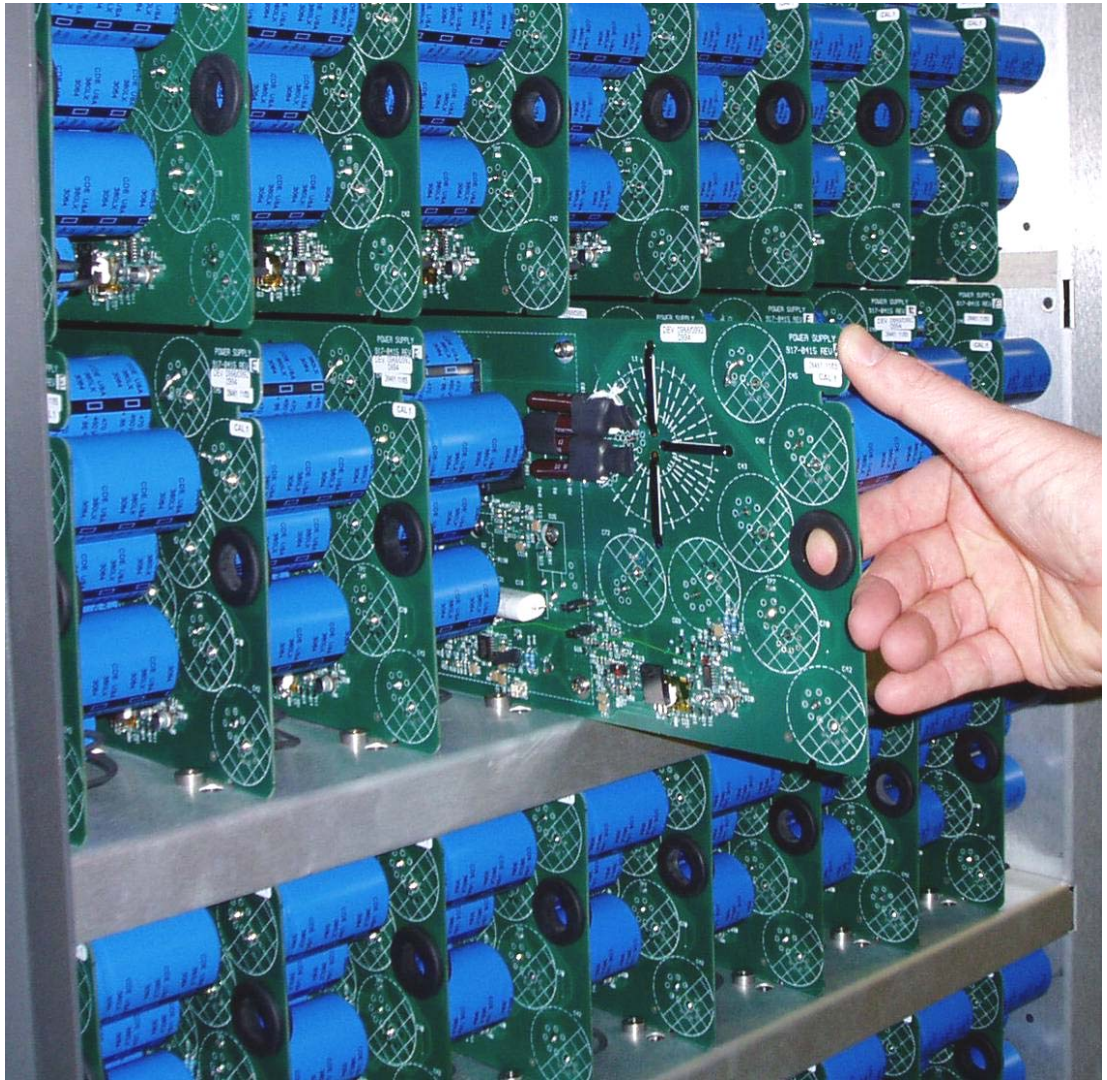


Figure 174 – Power Supply Module Removal

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.

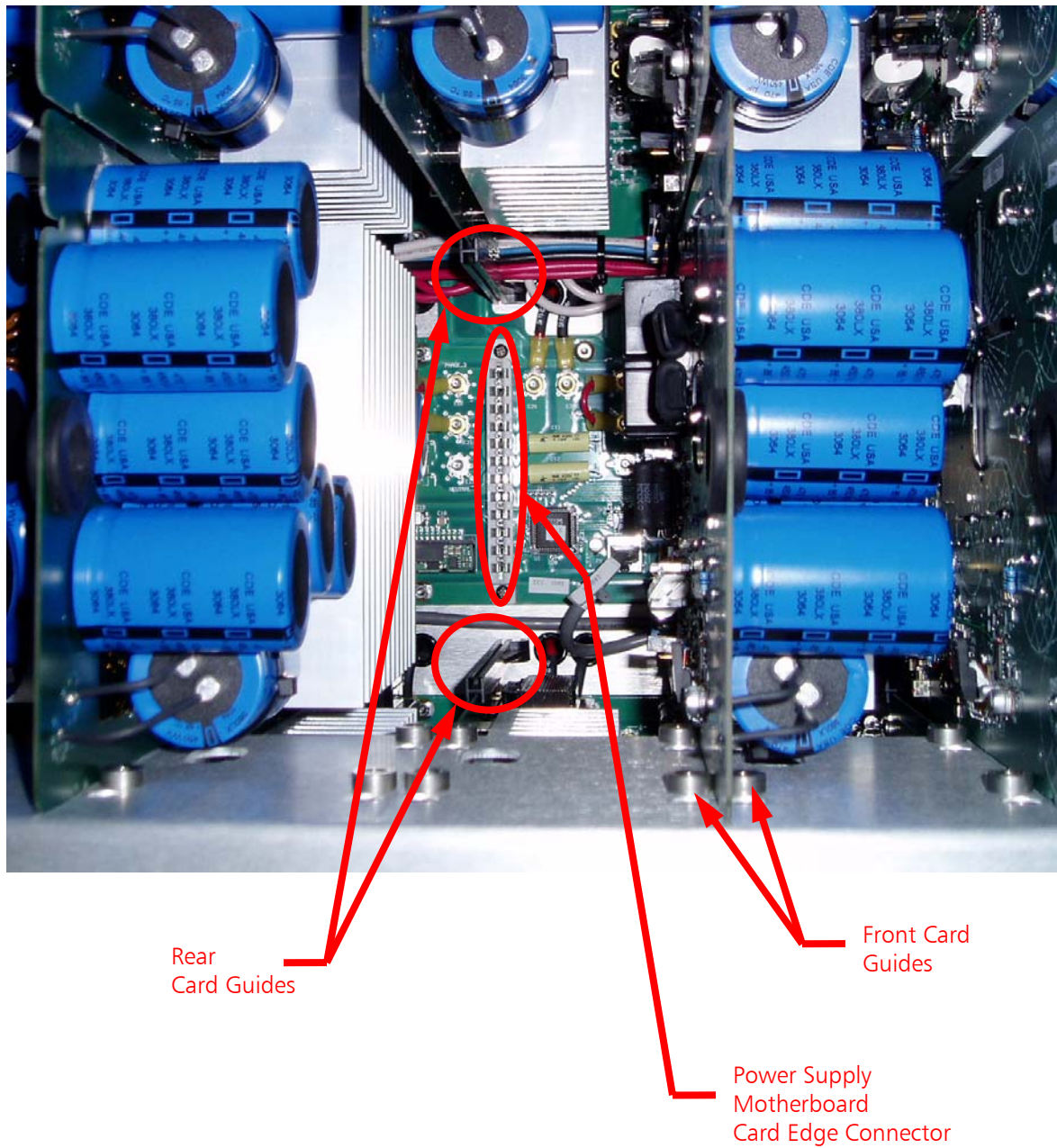


Figure 175 – View of Power Supply Motherboard (PS Module Removed)

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.

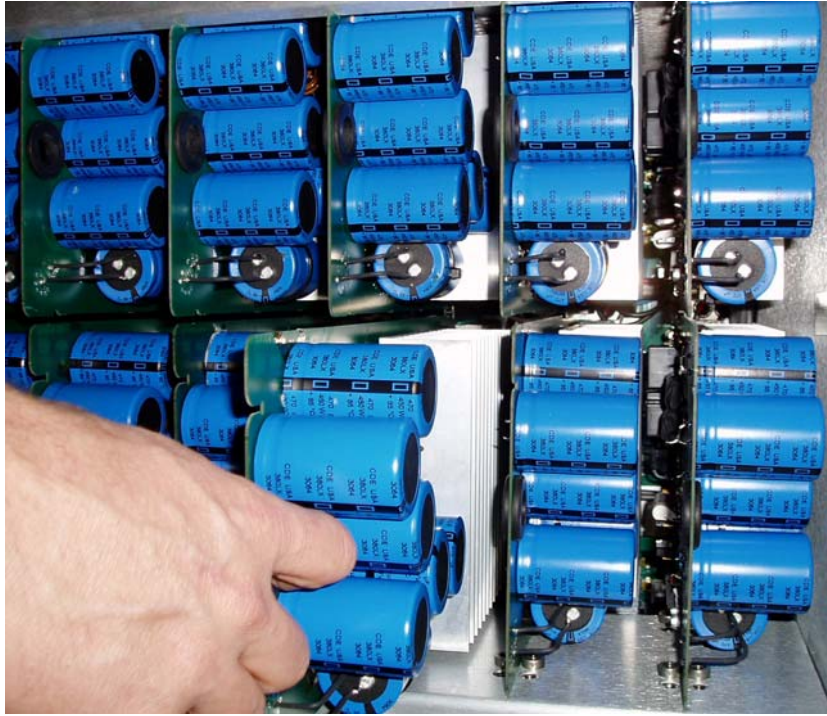
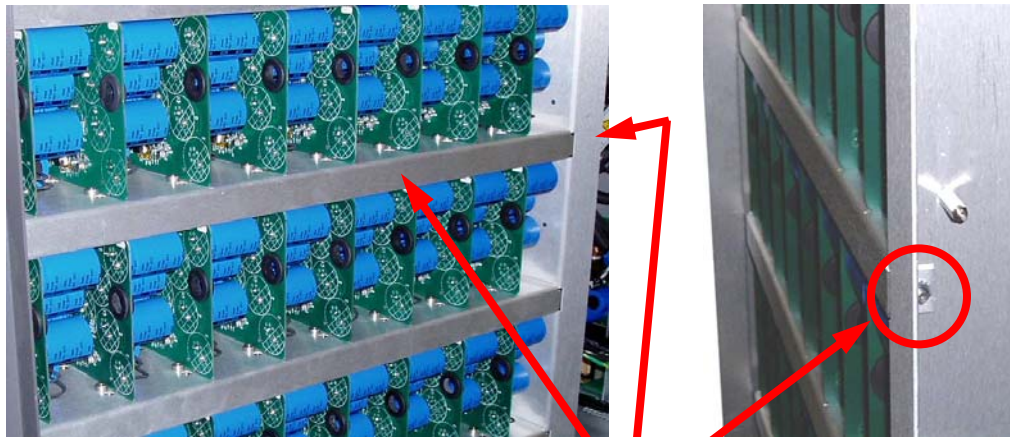


Figure 176 – Installing a New Power Supply Module

Step 8 – Install the Power Supply retaining bracket.



Re-install the Power Supply
Retaining Bracket and hardware

Figure 177 – Install Power Supply Retaining Bracket

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

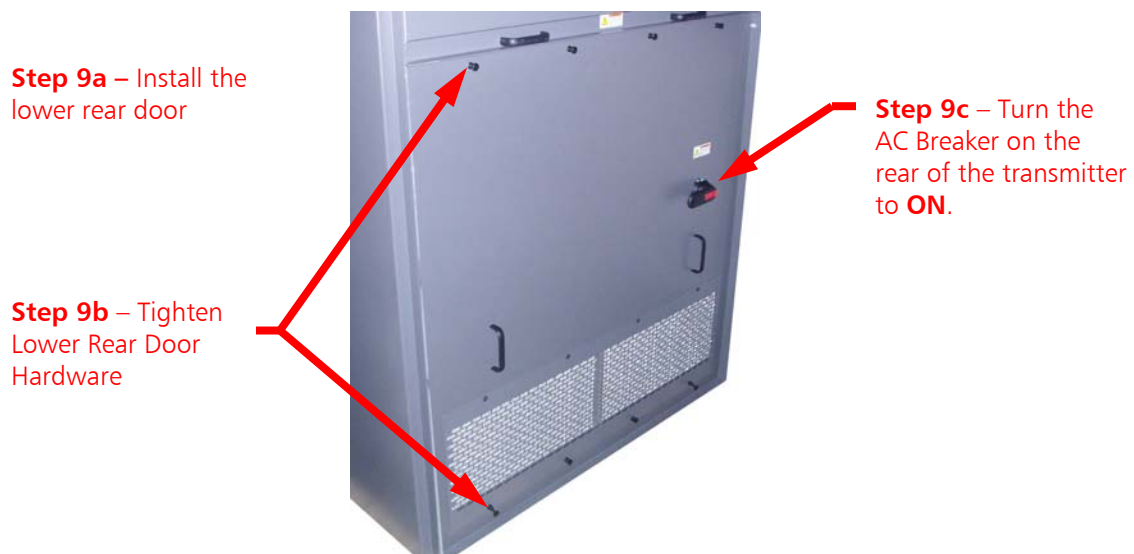


Figure 178 – Install Lower Rear Door and Turn AC Breaker ON

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.

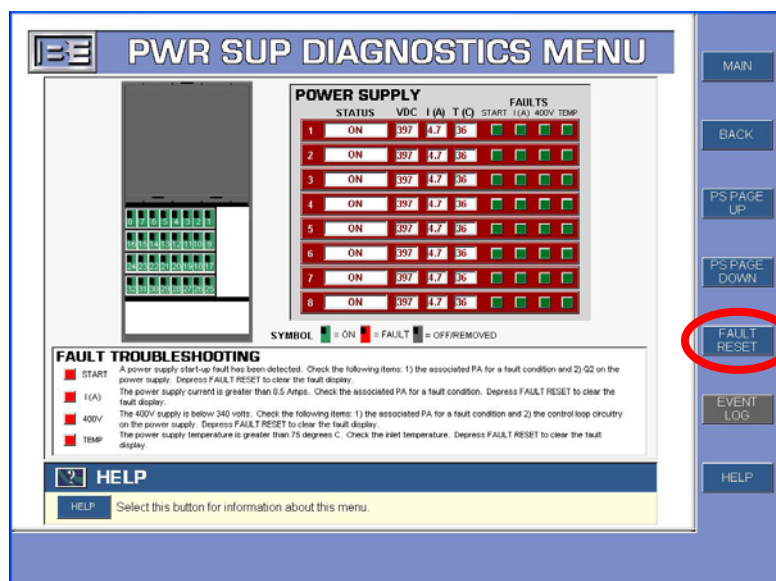


Figure 179 – Reset Faults

7 Replacing a 4MX 25/50 Power Supply Motherboard

7.1 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

7.2 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.

7.3 Turn the 4MX AC Breaker OFF



Figure 180 – Turn the Transmitter's AC Breaker OFF and Remove Door

7.4 Power Supply Module / Motherboard Locations

The 4MX 25 has 16 Power Supply Modules and the 4MX 50 has 32 Power Supply Modules. **Figure 181** illustrates how the Power Supply Modules are numbered.



Figure 181 – Power Supply Module Locations (Rear of Transmitter)

Figure 182 illustrates how the Power Supply Motherboards are numbered.



Figure 182 – Power Supply Motherboard Locations (Rear of Transmitter)

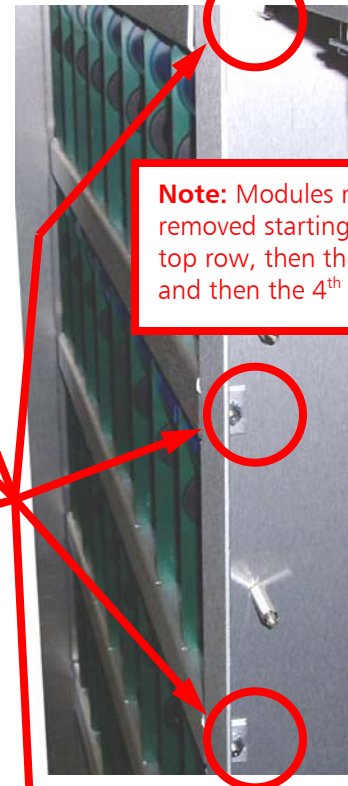
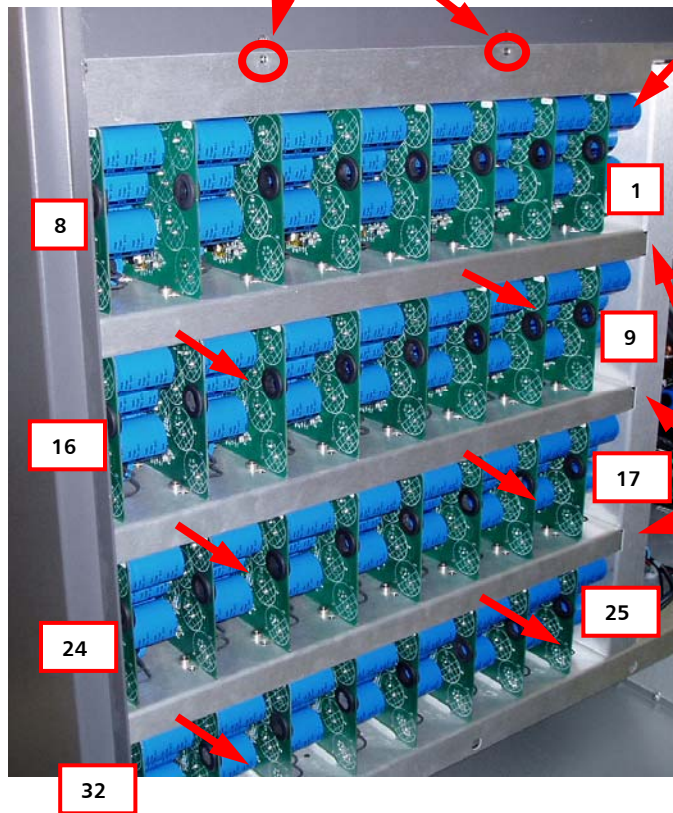
7.5 Removal of Power Supply Modules

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



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

Figure 183 – Power Supply Module Retaining Brackets (4MX 50 shown in illustration)

Step 4 – Use a 3/8" Nut Driver and remove the kepnuts that secure the retaining brackets in place.

Step 5 – Pull to slide the Retaining Brackets out as indicated by the arrows above.

Step 6 – Remove all of the Power Supply Modules.

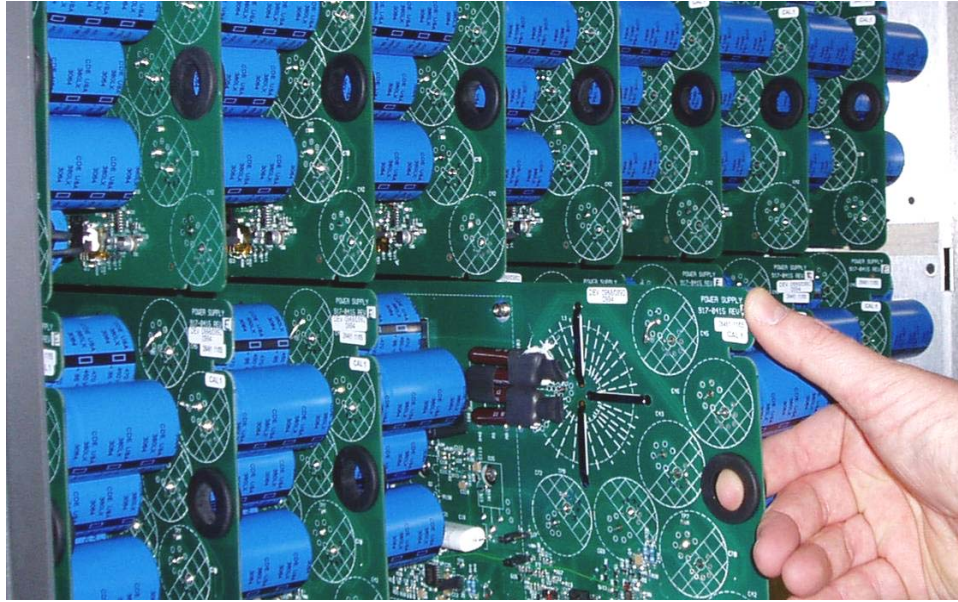


Figure 184 – Removal of Power Supply Modules (4MX 50 shown in illustration)

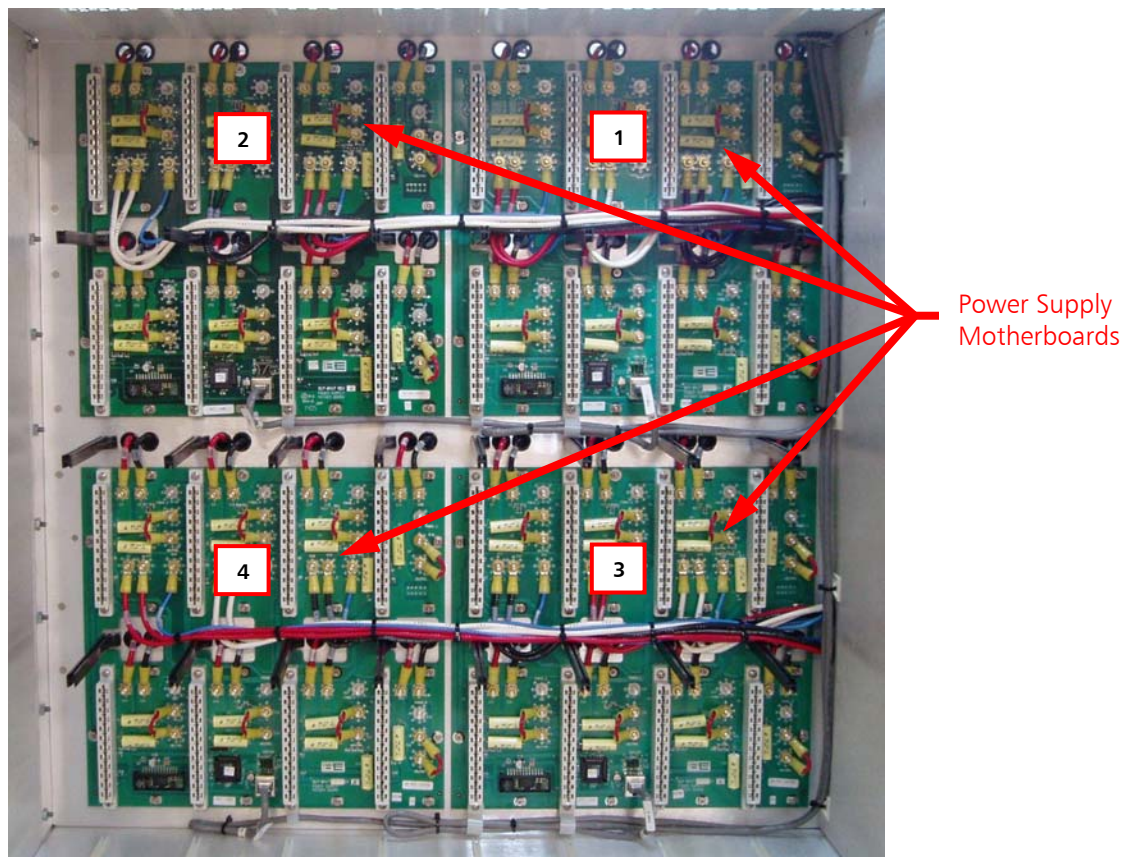
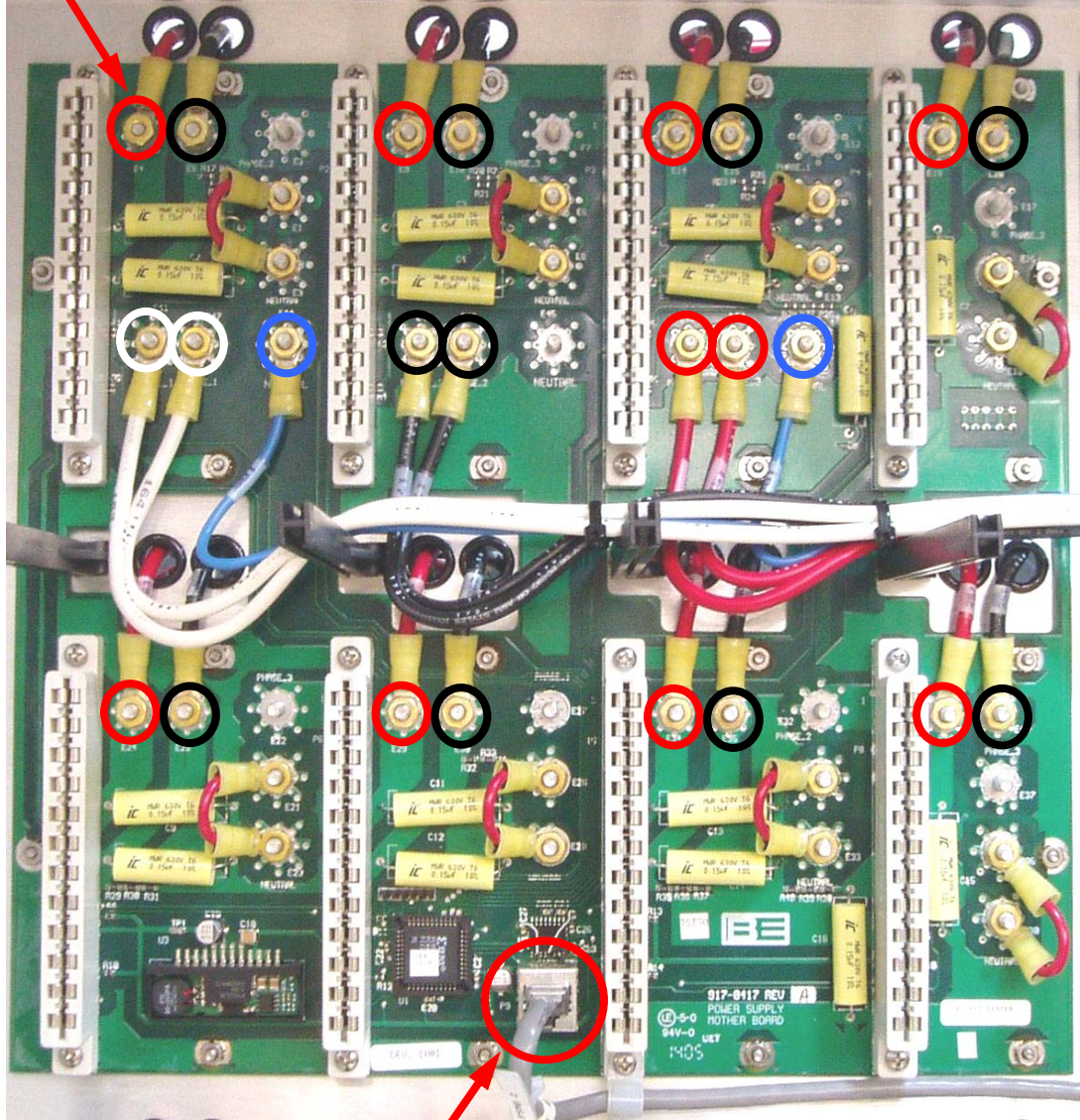


Figure 185 – Power Supply Modules Removed (4MX 50 shown in illustration)

7.6 Disconnect Power Supply Motherboard Connections

Step 1 - Using an 11/32" 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 186 – Disconnect Power Supply Motherboard Connections

7.7 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).

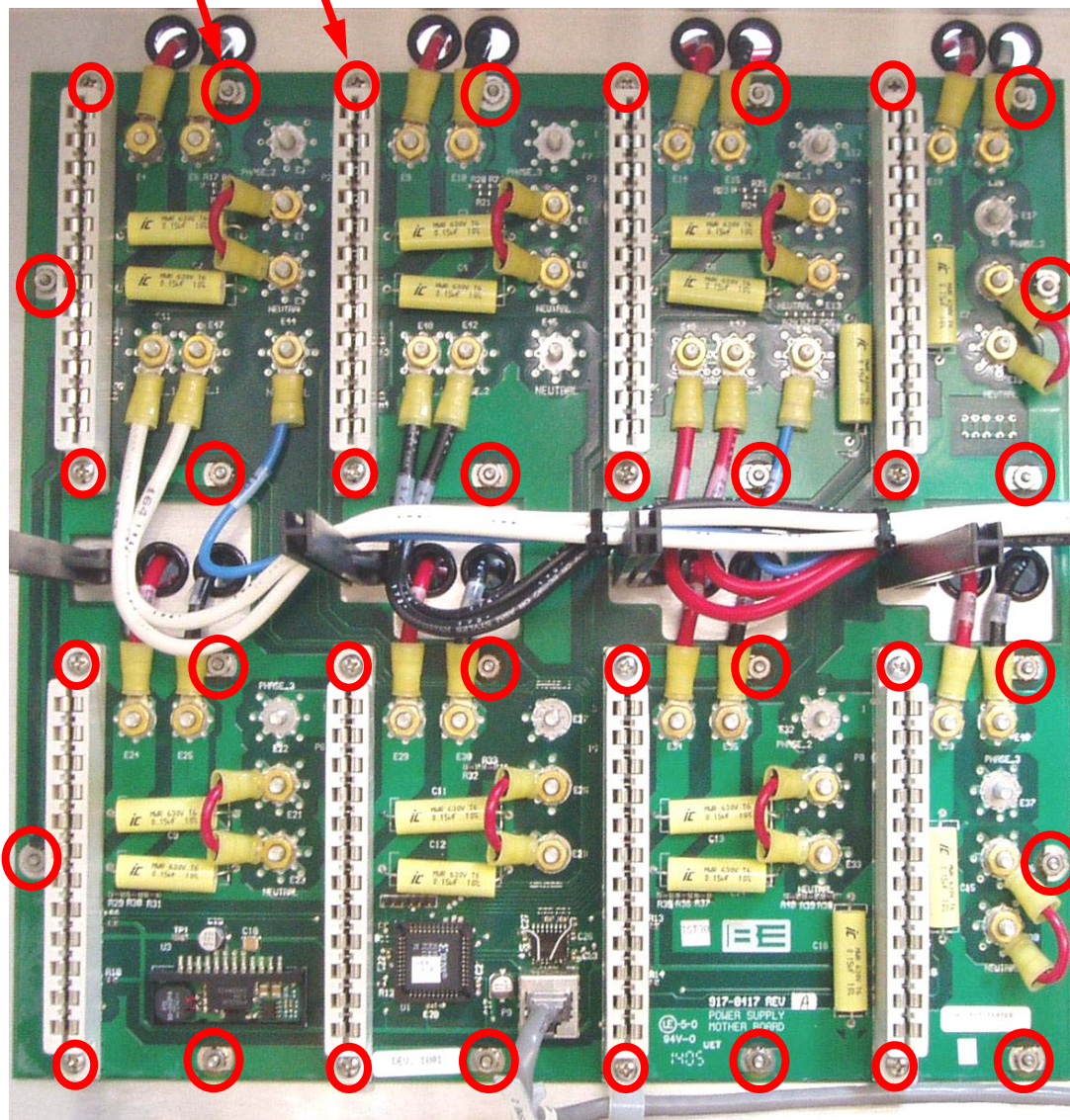


Figure 187 – Removal of Power Supply Motherboard Hardware

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

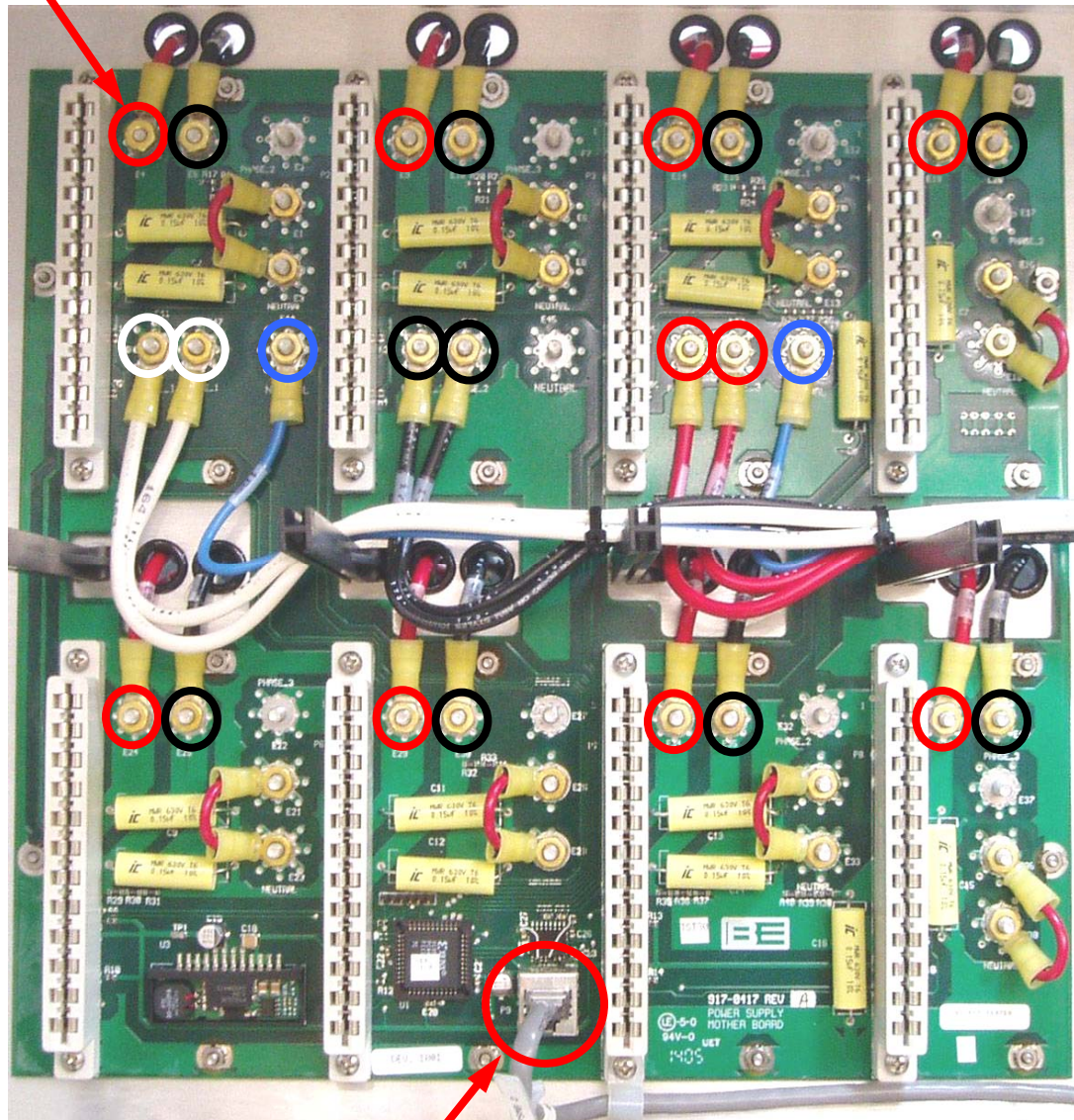
7.8 Install New Power Supply Motherboard

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

7.9 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 188 – Power Supply Motherboard Hardware Cable Connections

7.10 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.

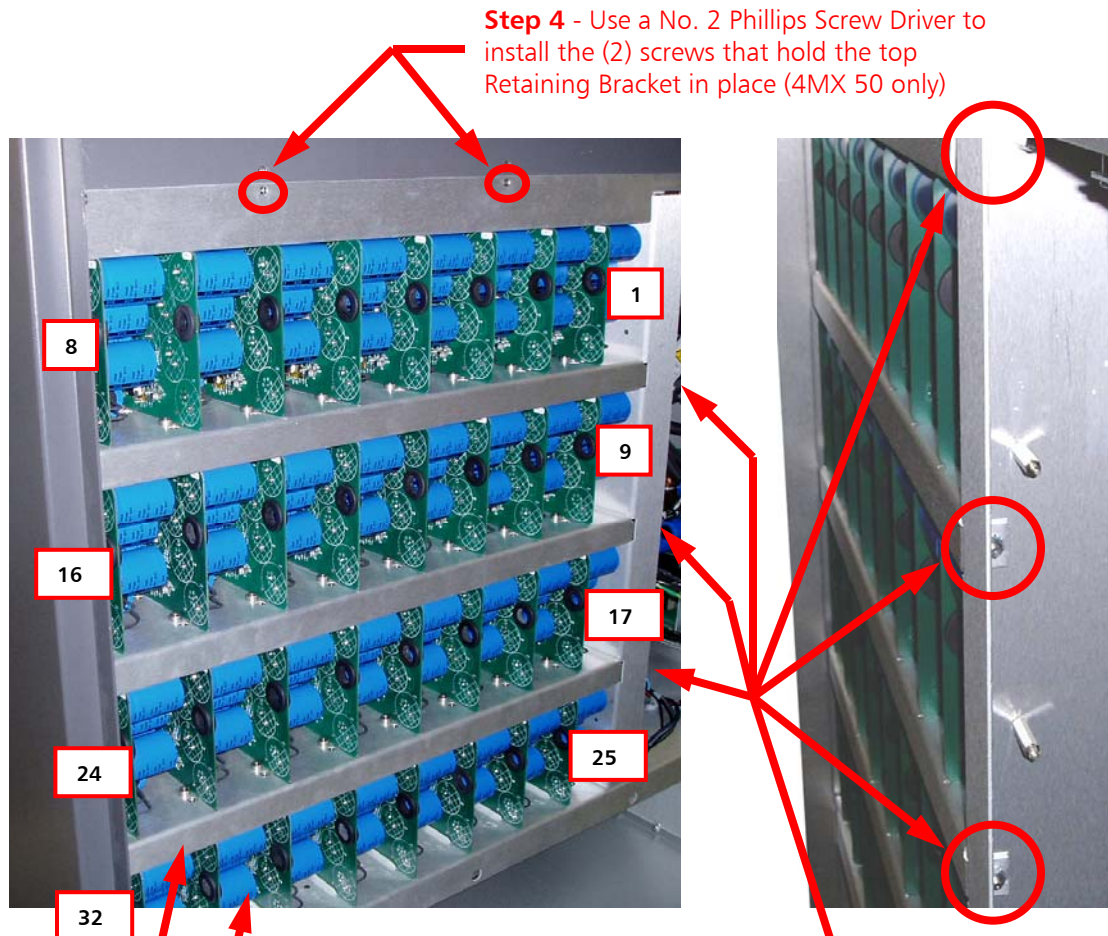


Figure 189 – Install Power Supply Modules (4MX 50 shown in illustration)

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.

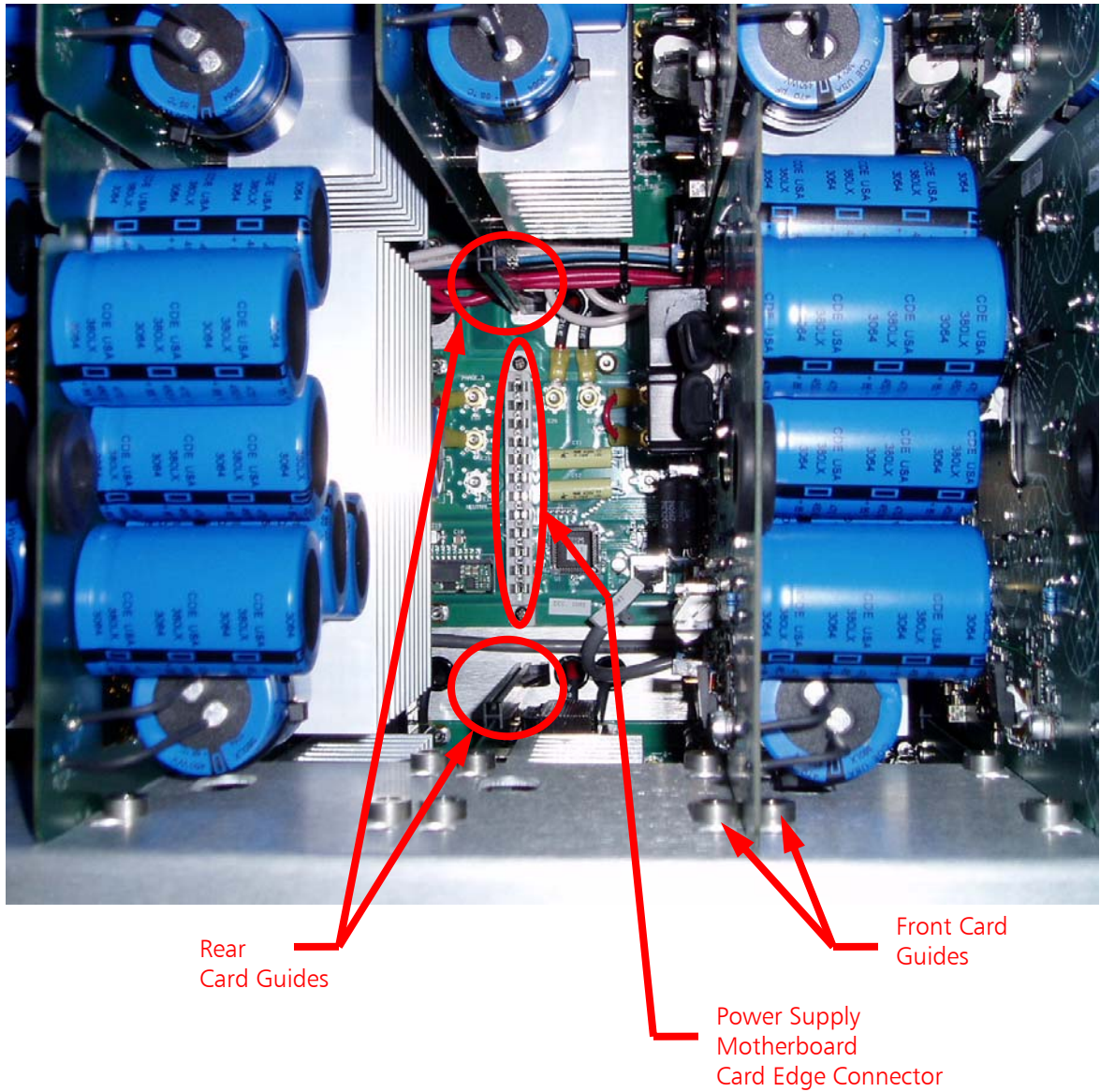


Figure 190 – View of Power Supply Motherboard (Power Supply Module Removed)

7.11 Install the Lower Rear Door of the Transmitter and Turn AC Breaker ON



Figure 191 – 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.

8 Replacing the 4MX 25/50 System Controller

8.1 Tools Needed

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

8.2 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.

8.3 ESD Awareness



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

8.4 Turn the 4MX 25/50 AC Breaker OFF

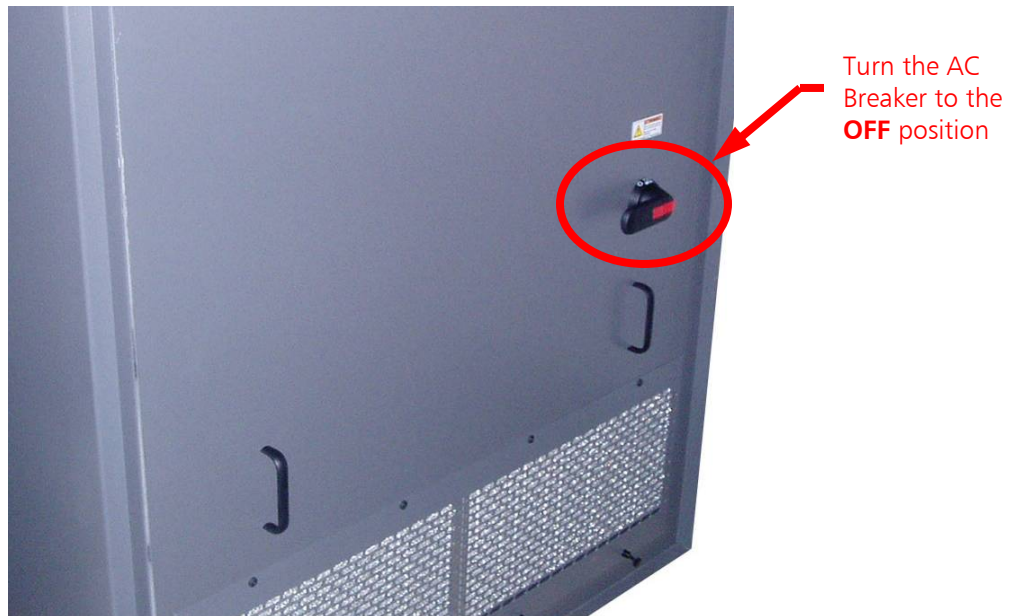
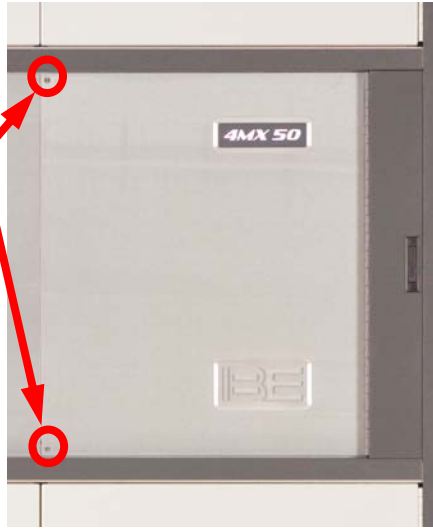


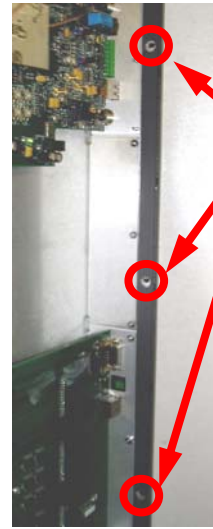
Figure 192 – Turn 4MX 25/50 AC Breaker to OFF

8.5 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 193 – Remote Control I/O Access Panel Removal



8.6 Remove the Remote I/O PCB Assembly

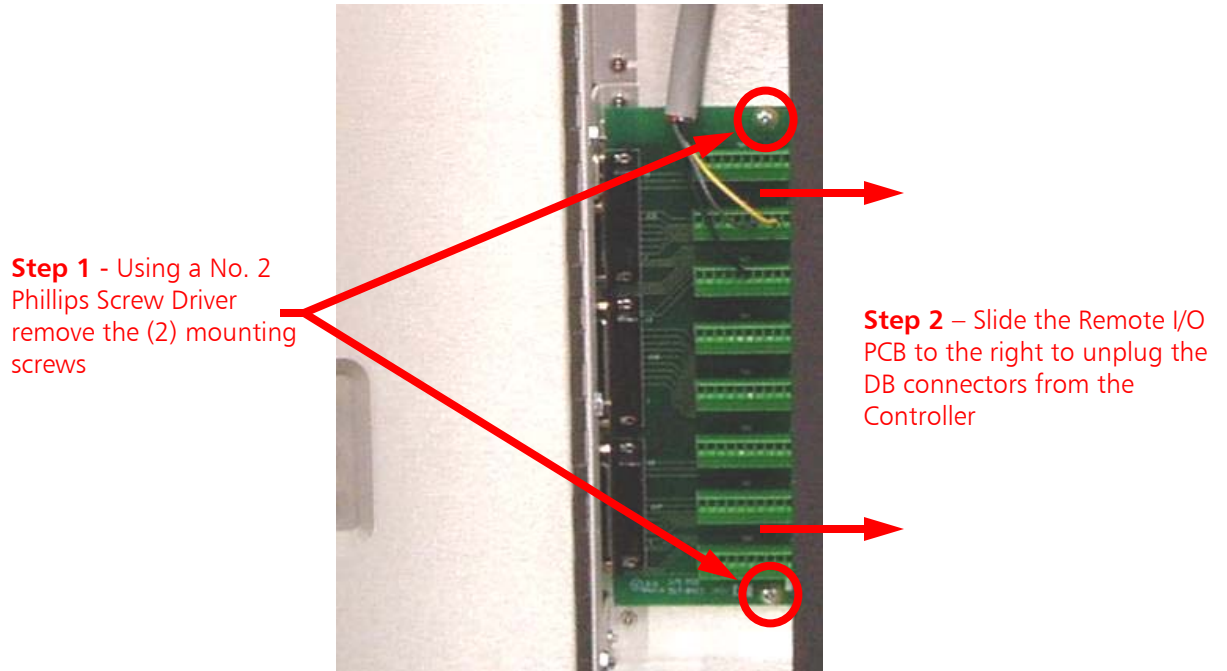


Figure 194 – Remove Remote I/O PCB

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

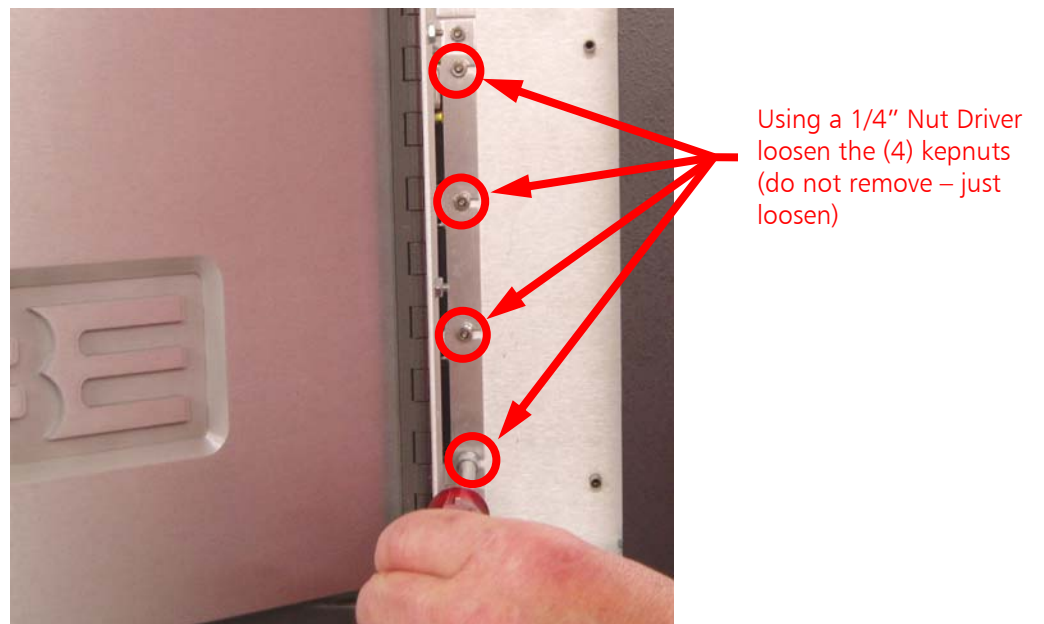


Figure 195 – Loosen System Controller PCB Bracket Kepnuts

8.8 Disconnect Cabling from the Controller PCB

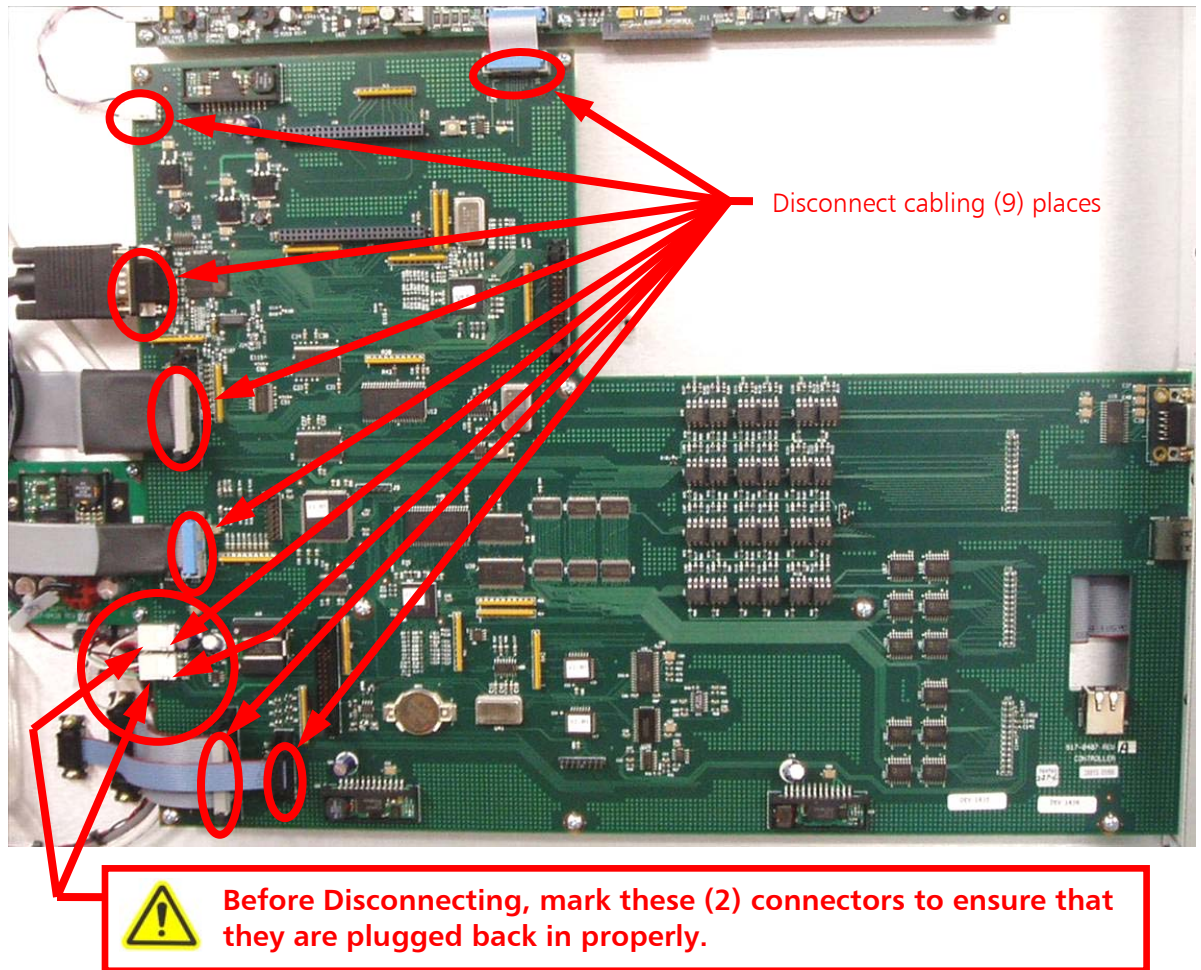


Figure 196 – Disconnect Cabling

8.9 Remove the Controller PCB Mounting Hardware

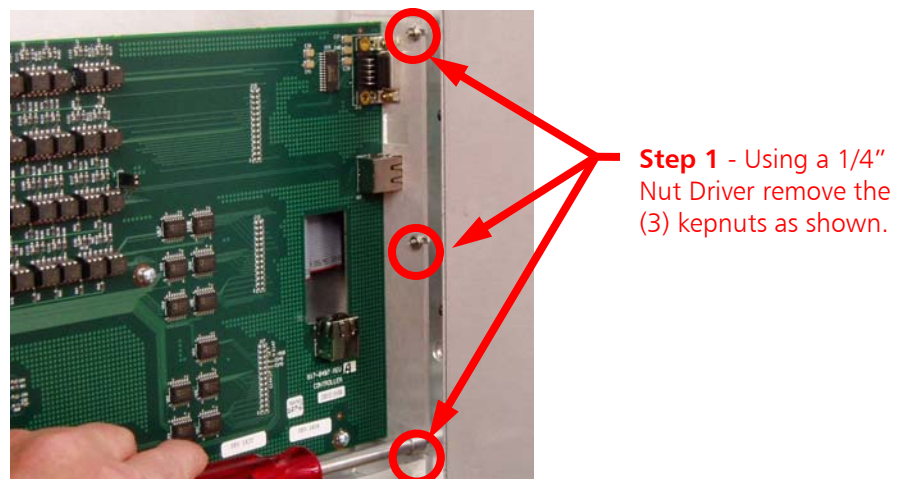


Figure 197 – Remove Kepnuts

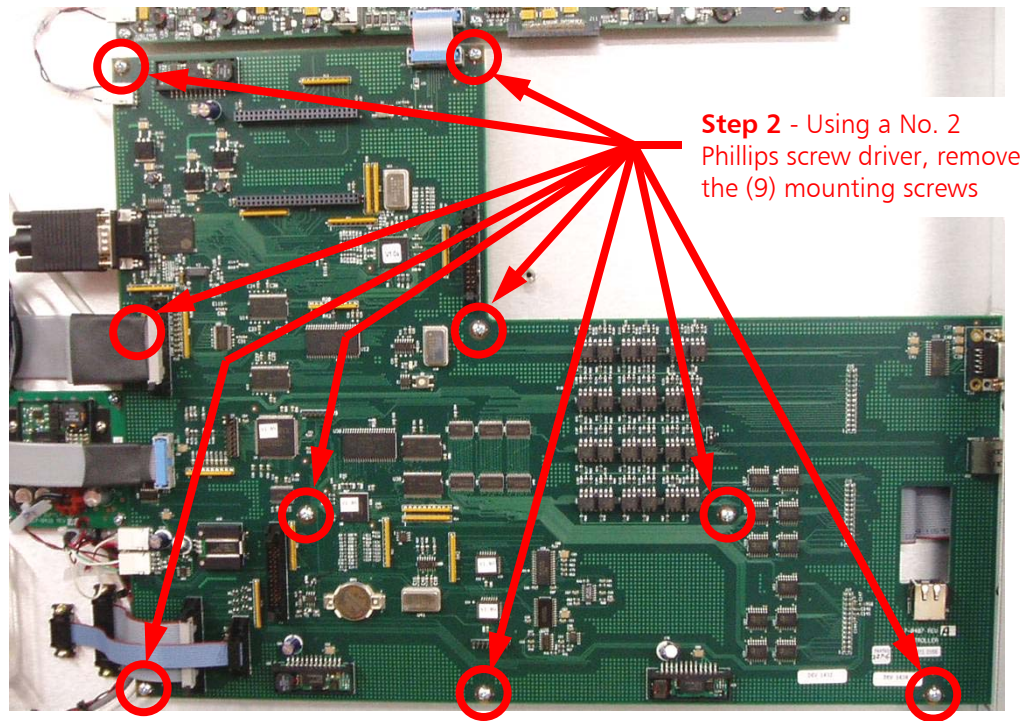


Figure 198 – Remove Mounting Screws

8.10 Remove the System Controller PCB Assembly from the 4MX 25/50

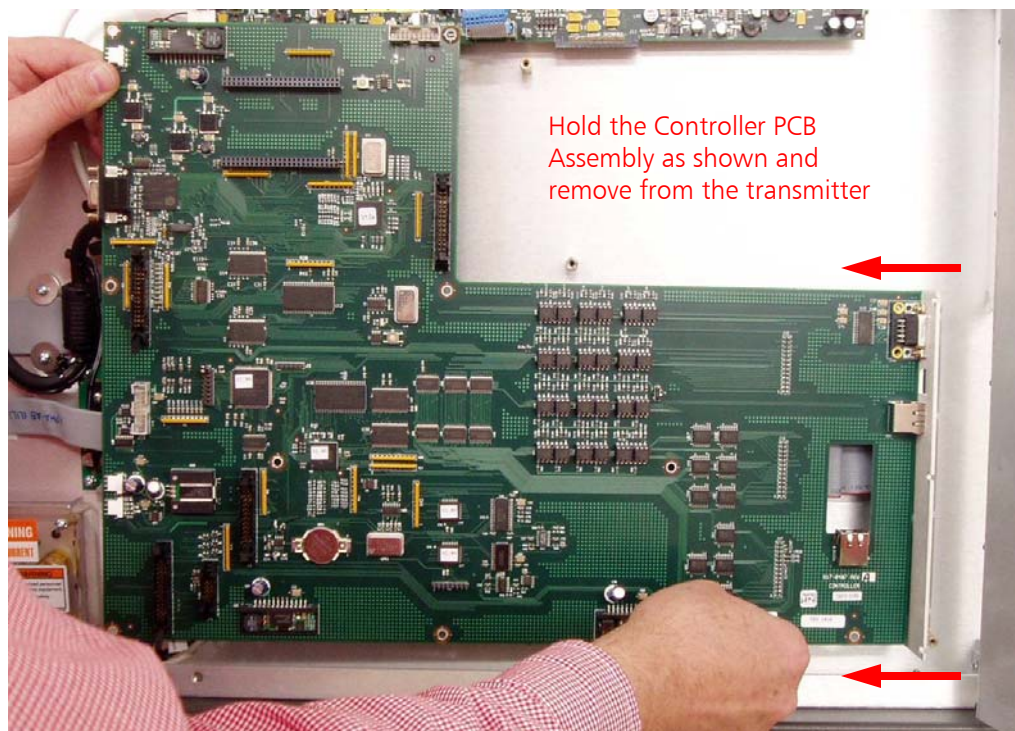


Figure 199 – Remove the Controller PCB from the 4MX 25/50

8.11 Install the new Controller PCB Assembly into the 4MX 25/50

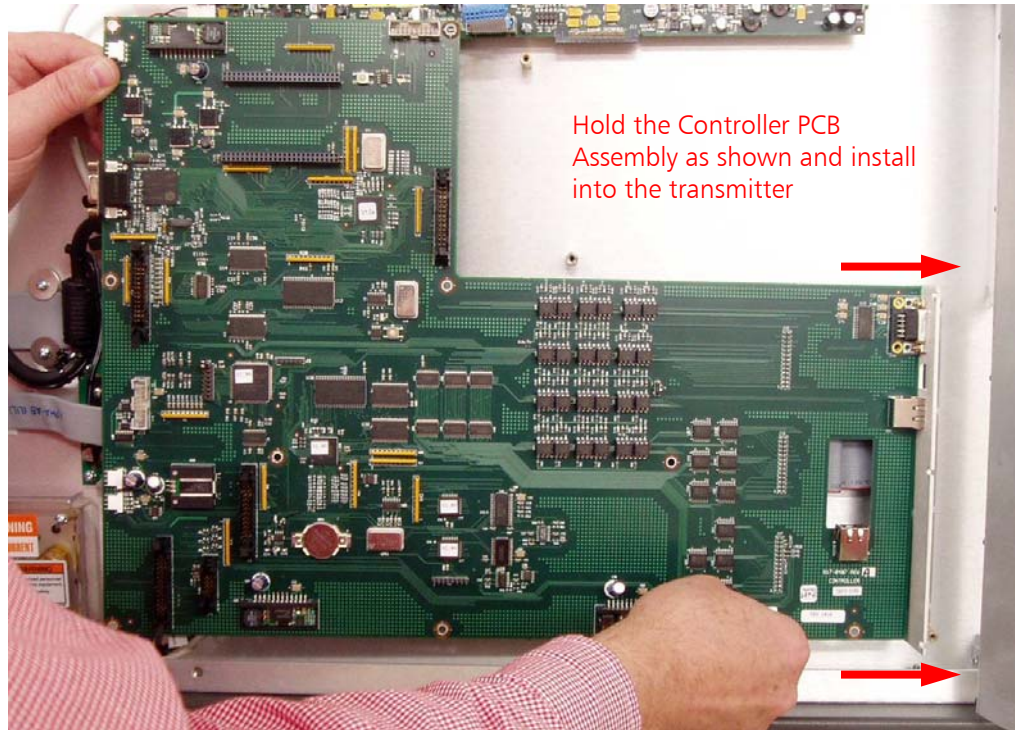


Figure 200 – Install the Controller PCB from the 4MX 50

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

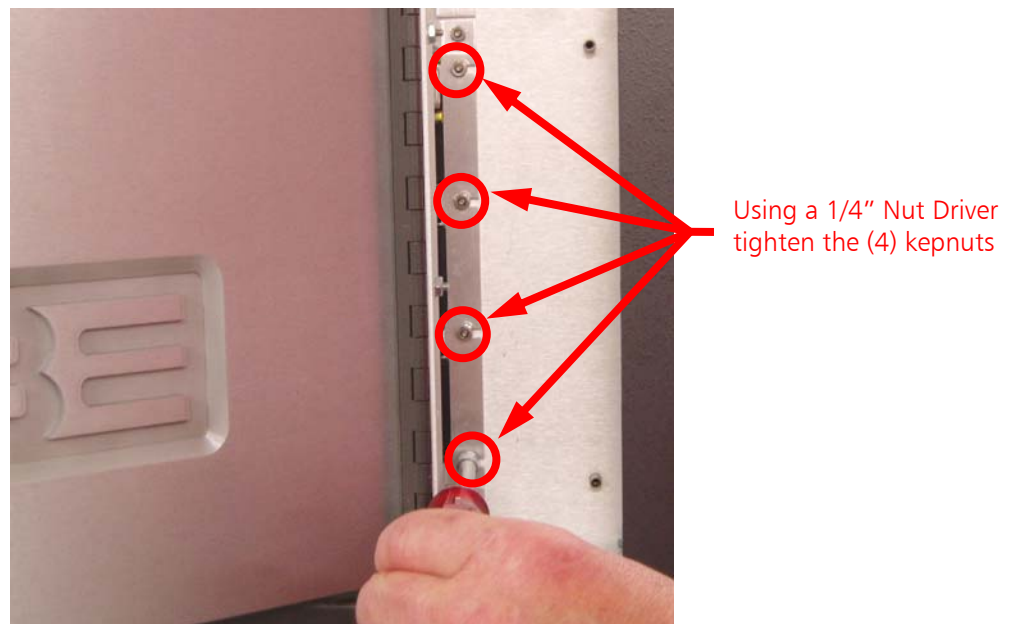


Figure 201 – Tighten System Controller PCB Bracket Kepnuts

8.13 Install Controller PCB Mounting Hardware

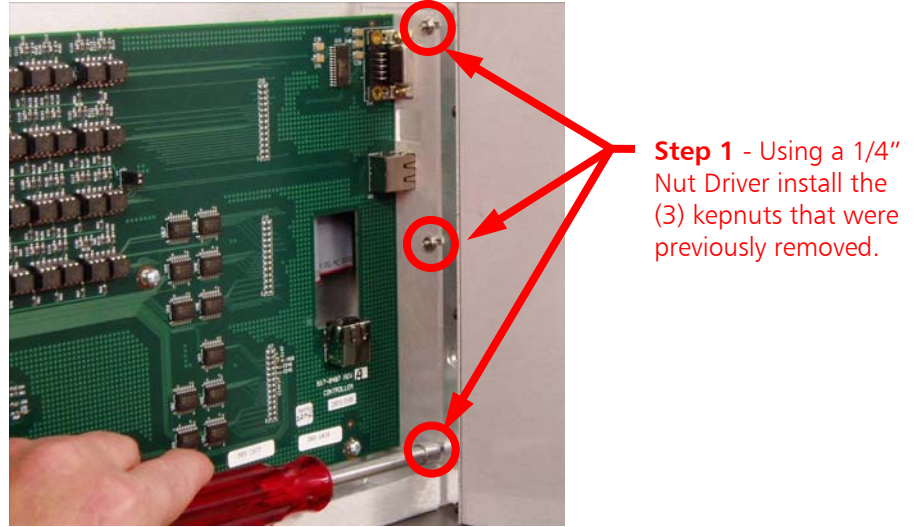


Figure 202 – Install Kepnuts

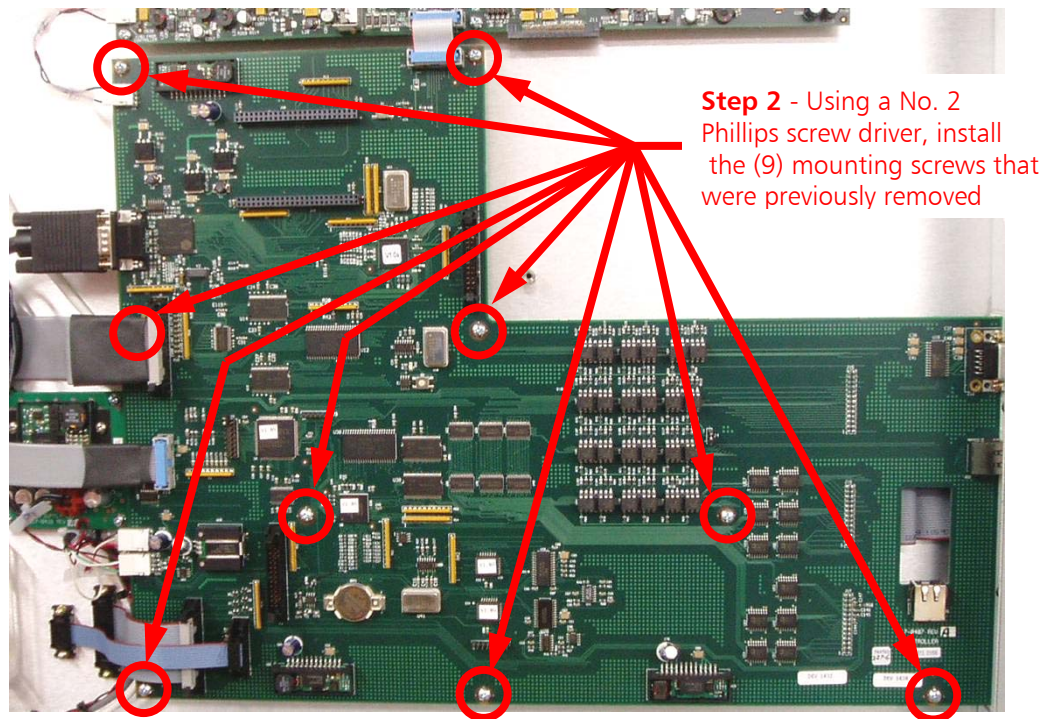
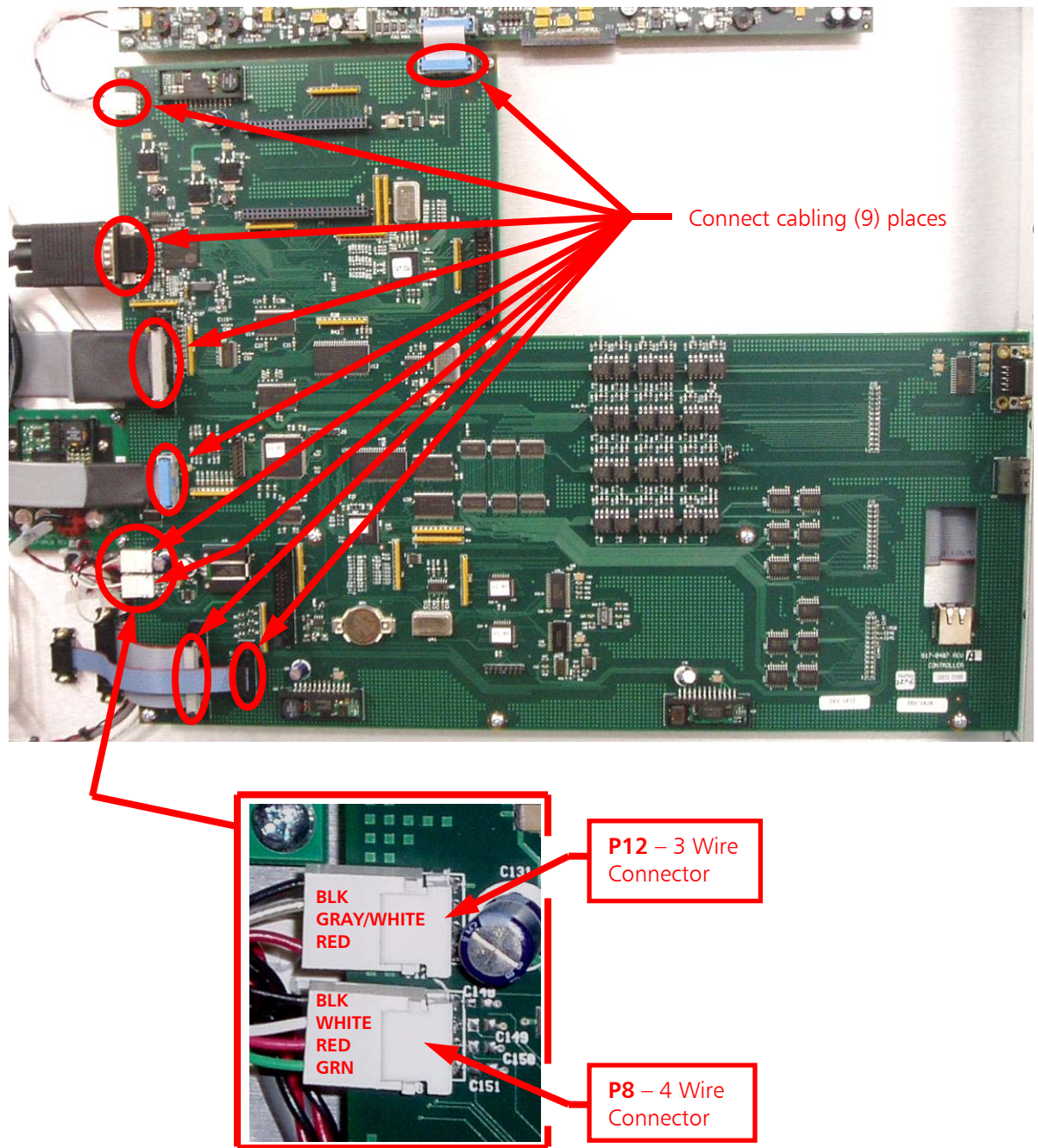


Figure 203 – Install Mounting Screws

8.14 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 204 – Connect Cabling

8.15 Install the Remote I/O PCB Assembly

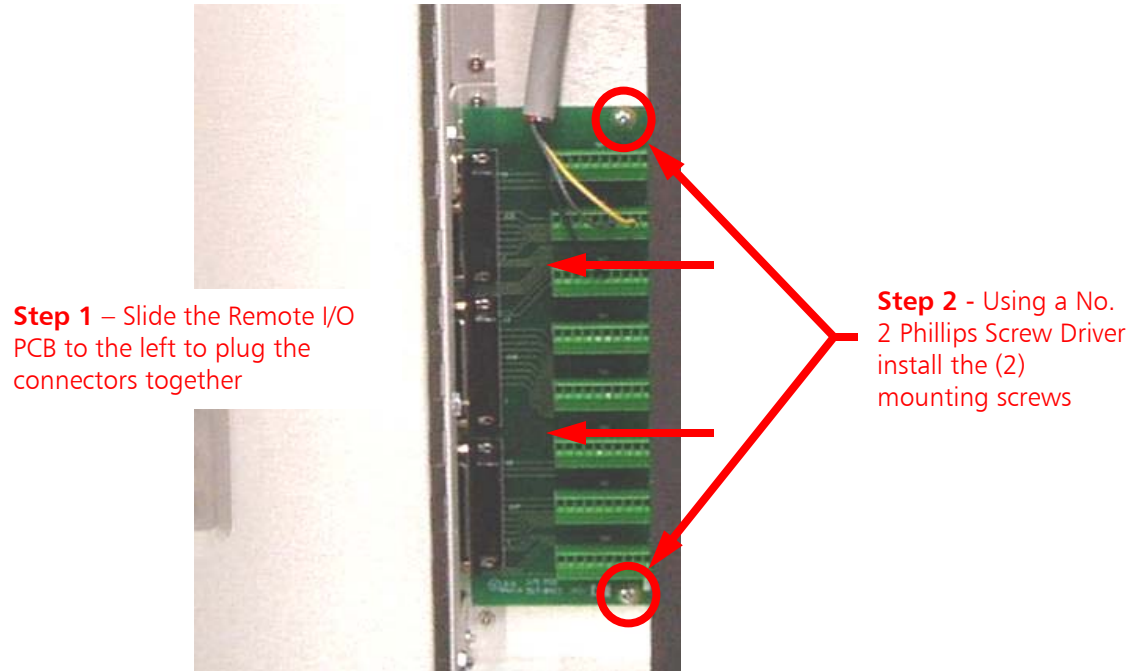


Figure 205 – Install Remote I/O PCB

8.16 Install the Remote I/O Access Panel

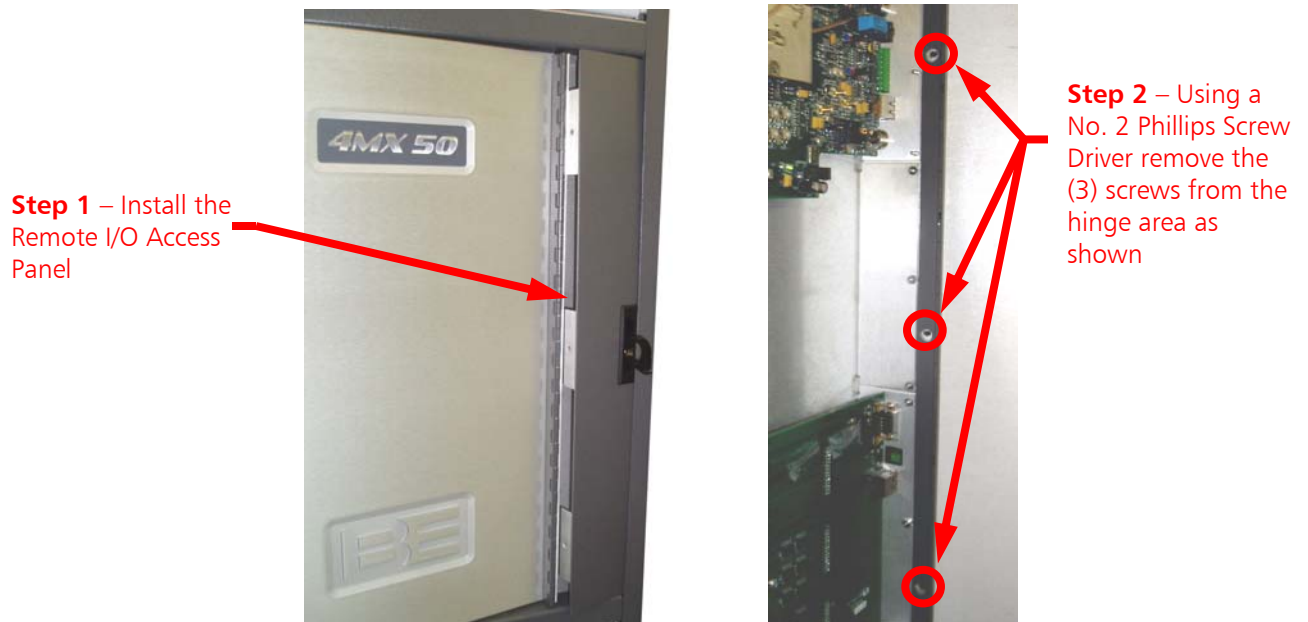


Figure 206 – Install the Remote I/O Access Panel

8.17 Install Front Door Hardware

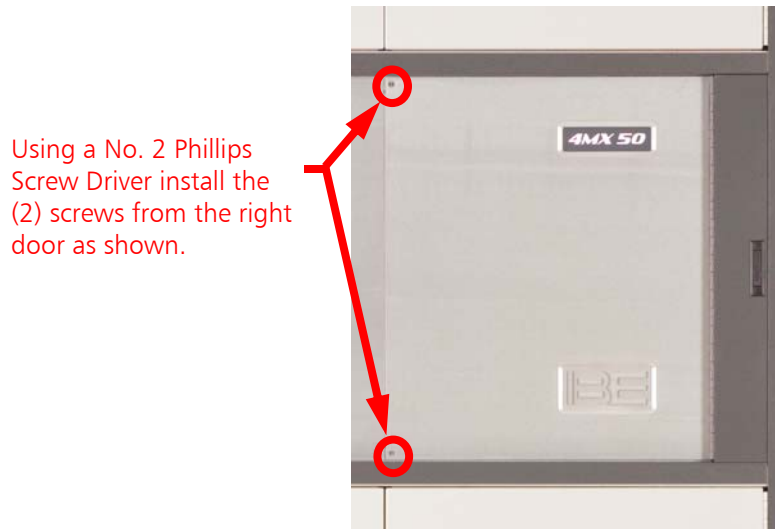


Figure 207 – Install the Front Door Hardware

8.18 Turn the 4MX 25/50 AC Breaker ON

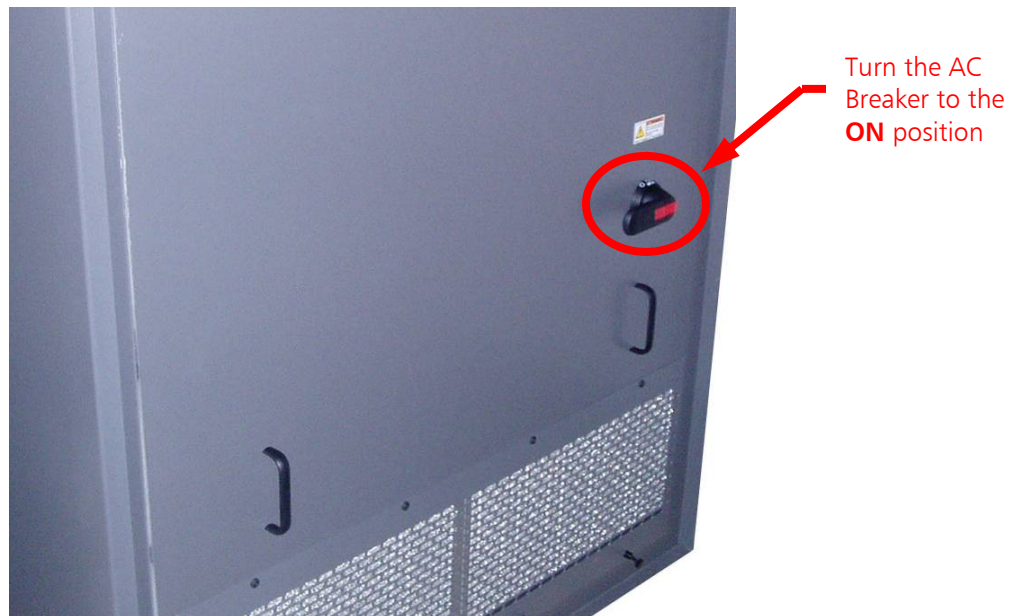


Figure 208 – Turn the 4MX 25/50 AC Breaker to ON

8.19 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 25/50 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

8.20 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.

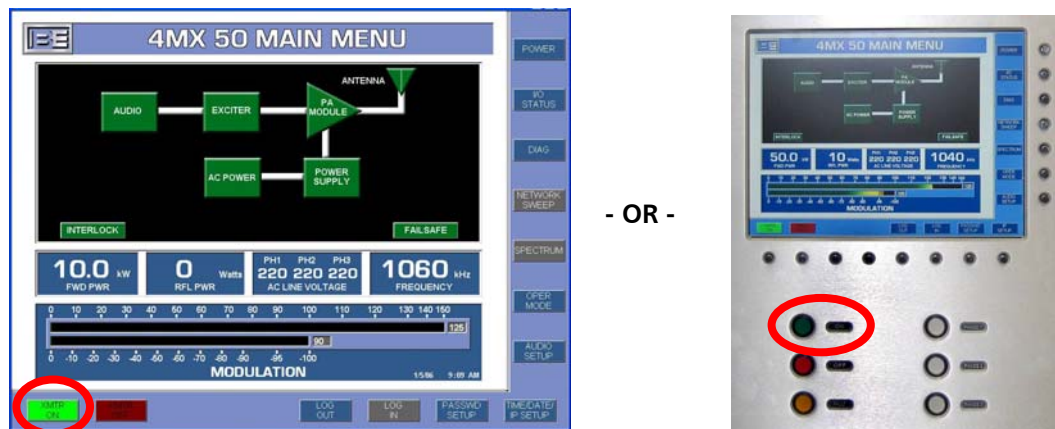


Figure 209 – Turn the RF Output Power ON

9 Replacing/Calibrating the 4MX DSP Exciter PCB

9.1 Overview

This document describes the necessary steps to replace and calibrate the DSP Exciter PCB in a 4MX Series Transmitter.

WARNING: This application guide is strictly intended to assist field personnel while replacing a DSP Exciter Board in a 4MX transmitter and it should **ONLY** be used in conjunction with support from the BE RF Customer Service Organization. Resultant damage to the transmitter or transmitter site may occur if this application guide is not followed correctly. Contact the BE RF Customer Service Organization before beginning this procedure.

9.2 Items/Tools Required

Supplied by Customer:

- ☐ No. 2 Phillips Screwdriver
- ☐ 1/4" Nutdriver
- ☐ 9/16" Open End Wrench
- ☐ RF Ammeter (Delta TCA-40/80-EXR or equivalent)
- ☐ 2 Channel Oscilloscope (Agilent Infinium or equivalent as described in Figures 30 and 32)

Supplied by B.E.

- ☐ 4MX DSP Exciter PCB (P/N 917-0400) (Only if deemed necessary by Customer Service)

977-4001 Kit, 4MX Calibration

- ☐ Cable, RF, BNC to SMA for Connection to Scope (P/N 947-4052, Qty 2)
- ☐ L1 Adjustment Tool (P/N 930-104)
- ☐ Potentiometer Adjustment Tool (P/N 930-100A)

9.3 ESD Awareness



During the upgrade process be sure to exercise ESD precautions.



10 Replacing the DSP Exciter PCB

10.1 Ensure that the Transmitter's AC Power Breaker is turned to OFF



Figure 210 – Turn 4MX AC Breaker to OFF

<continue to next page>

10.2 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 211 – Remote Control I/O Access Panel Removal



10.3 Disconnect Cables from the DSP Exciter PCB

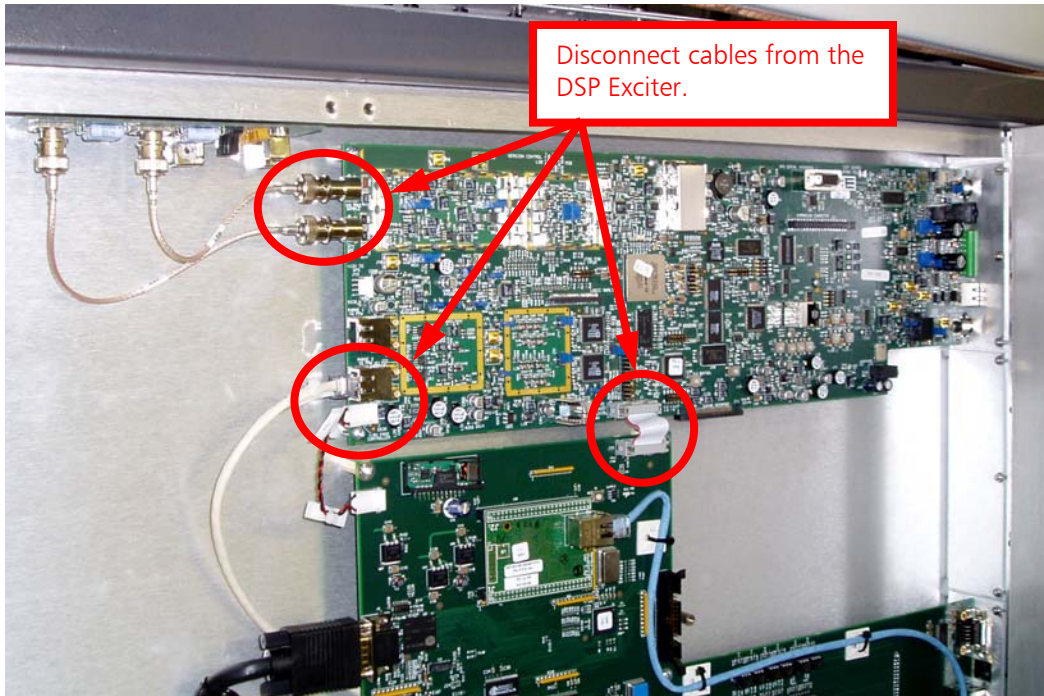


Figure 212 – Disconnect Cables from the DSP Exciter PCB

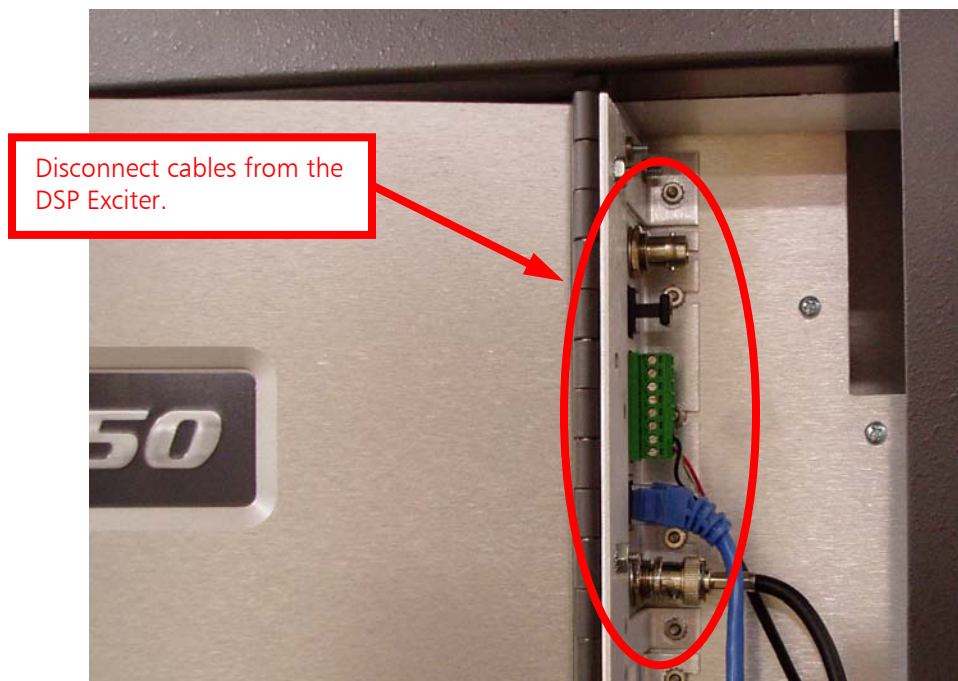


Figure 213 – Disconnect Cables from the DSP Exciter PCB

10.4 Remove DSP PCB Mounting Hardware

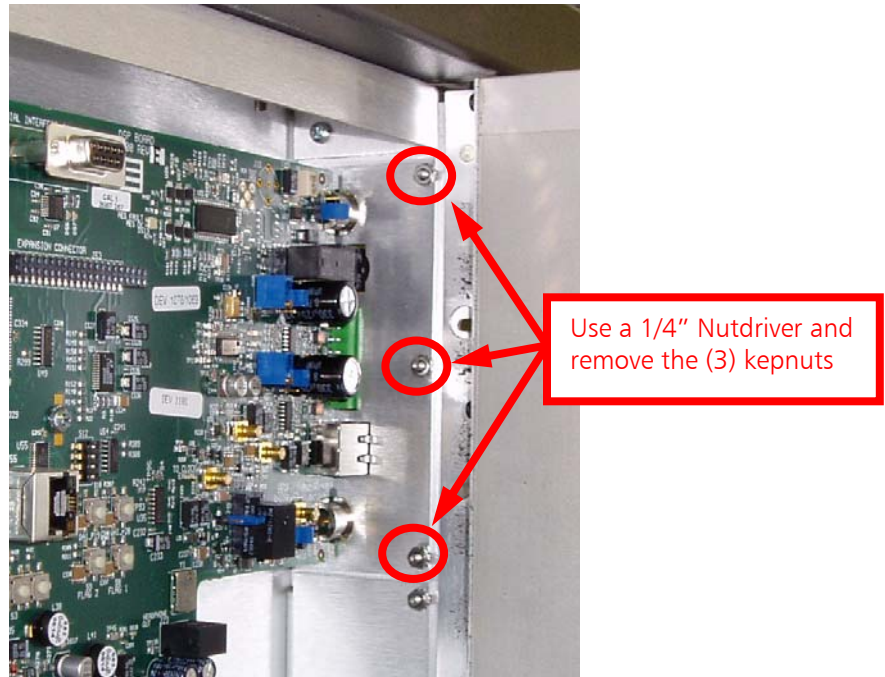


Figure 214 – Hardware Removal

10.5 Loosen DSP Exciter PCB Mounting Bracket Hardware

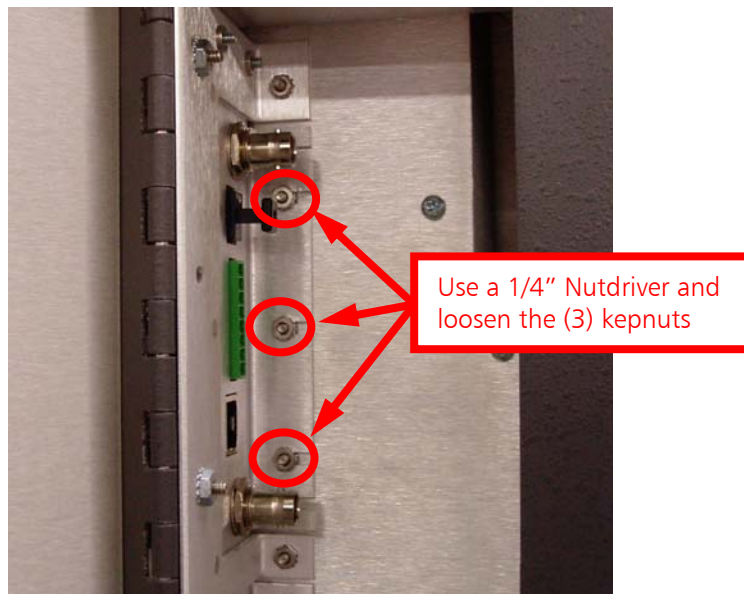


Figure 215 – Loosen DSP Exciter Mounting Bracket Hardware

10.6 Remove DSP Exciter Mounting Screws

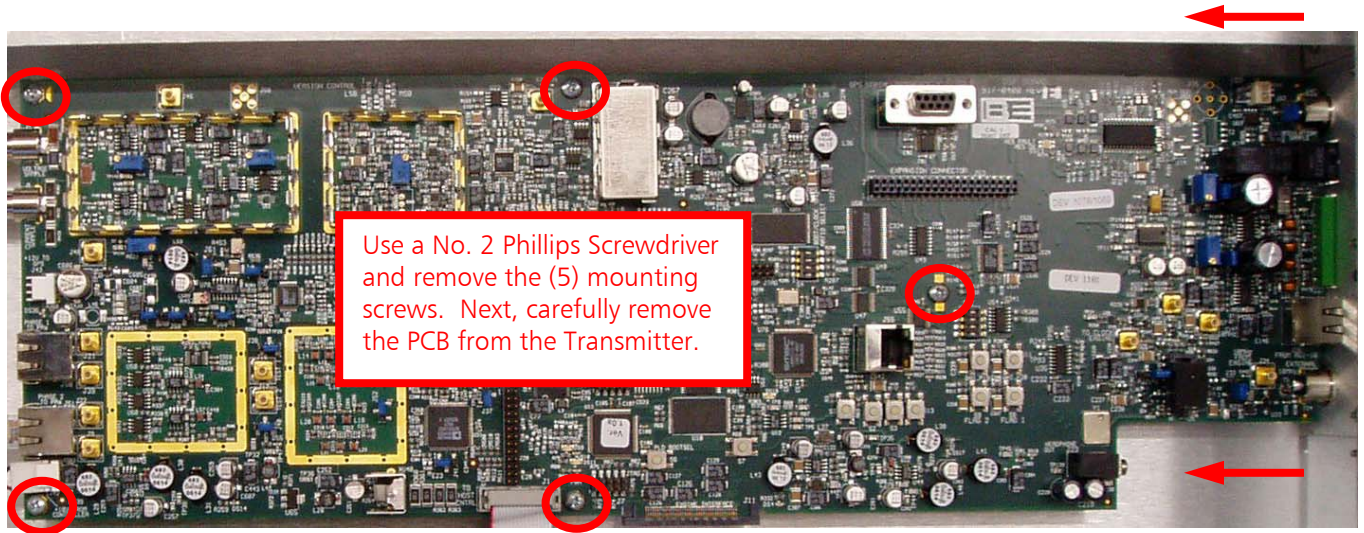


Figure 216 – Mounting Screw Removal

10.7 Remove Mounting Bracket from DSP Exciter PCB

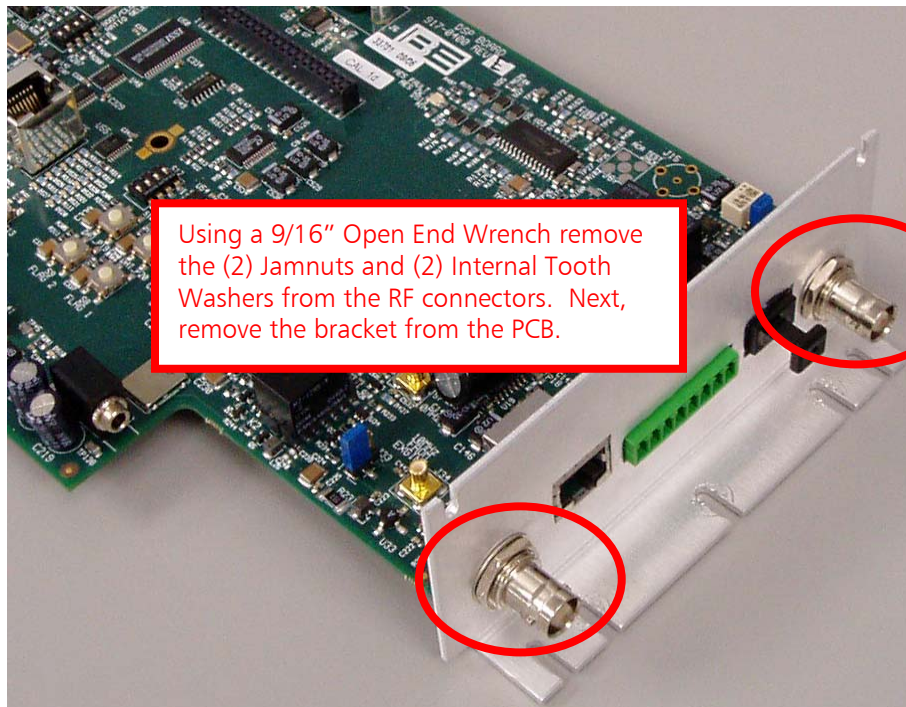


Figure 217 – Mounting Bracket Removal

10.8 Install Mounting Bracket on Replacement DSP PCB

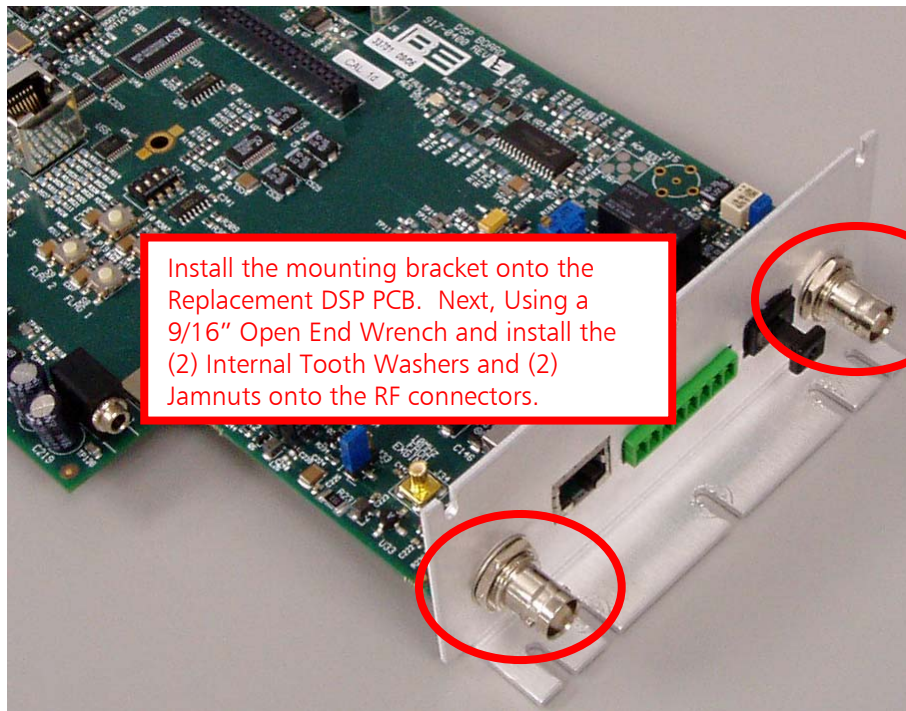


Figure 218 – Mounting Bracket Installation

10.9 Install DSP Exciter Mounting Screws

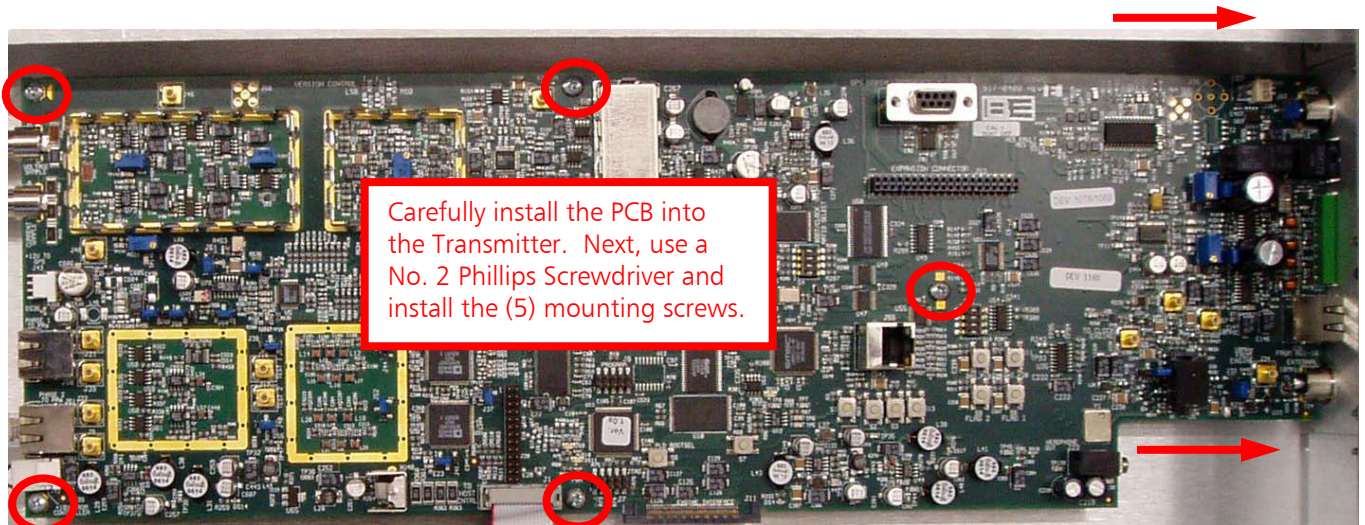


Figure 219 – Mounting Screw Installation

10.10 Tighten DSP Exciter PCB Mounting Bracket Hardware

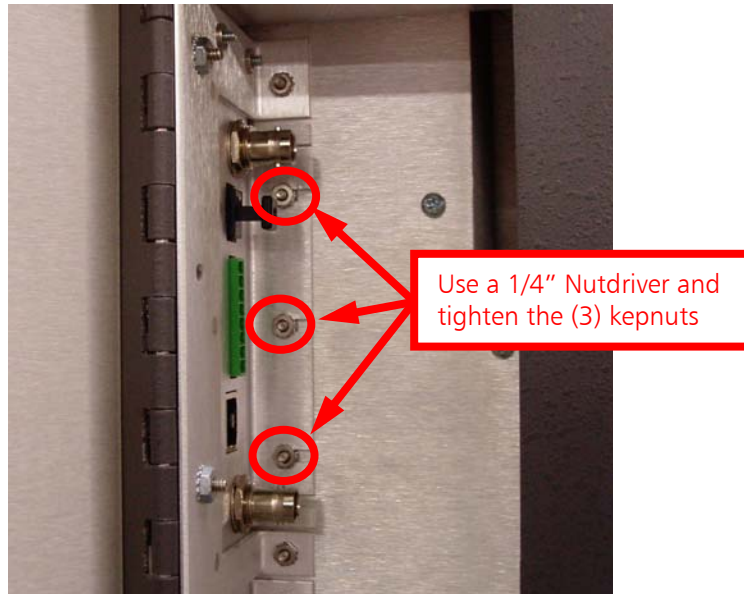


Figure 220 – Tighten DSP Exciter Mounting Bracket Hardware

10.11 Install DSP PCB Mounting Hardware

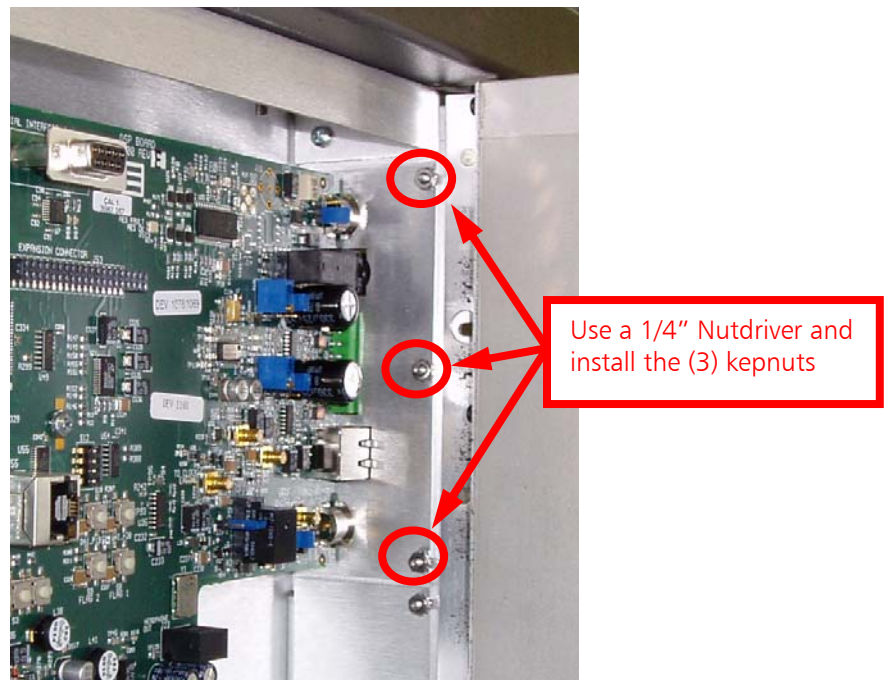


Figure 221 – Hardware Installation

10.12 Connect Cables to the DSP Exciter PCB

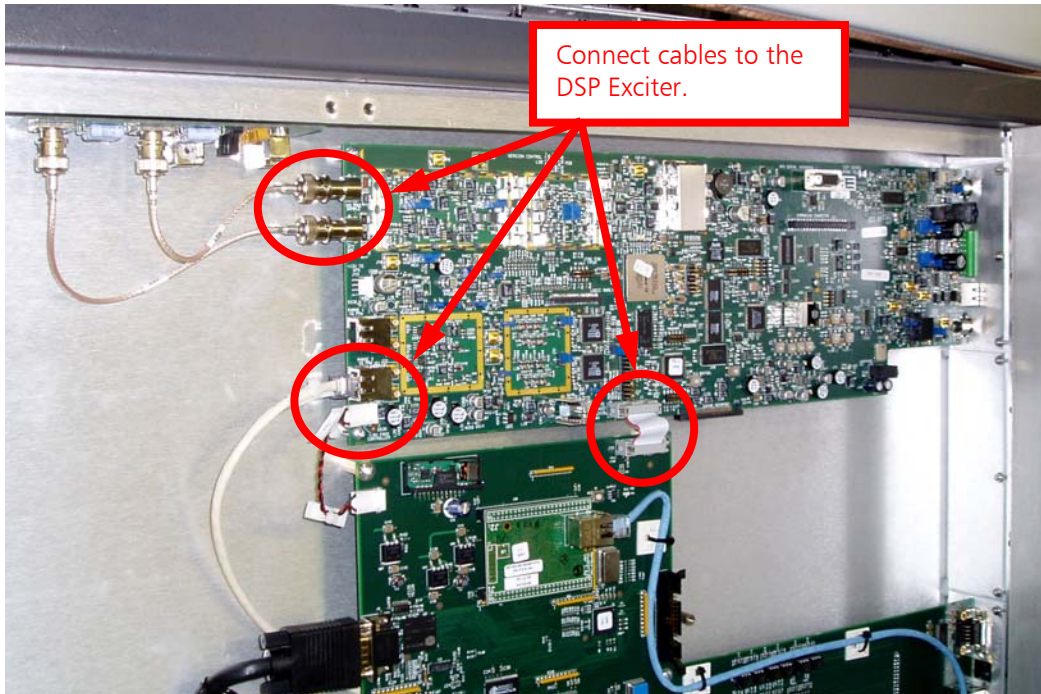


Figure 222 – Connect Cables to the DSP Exciter PCB

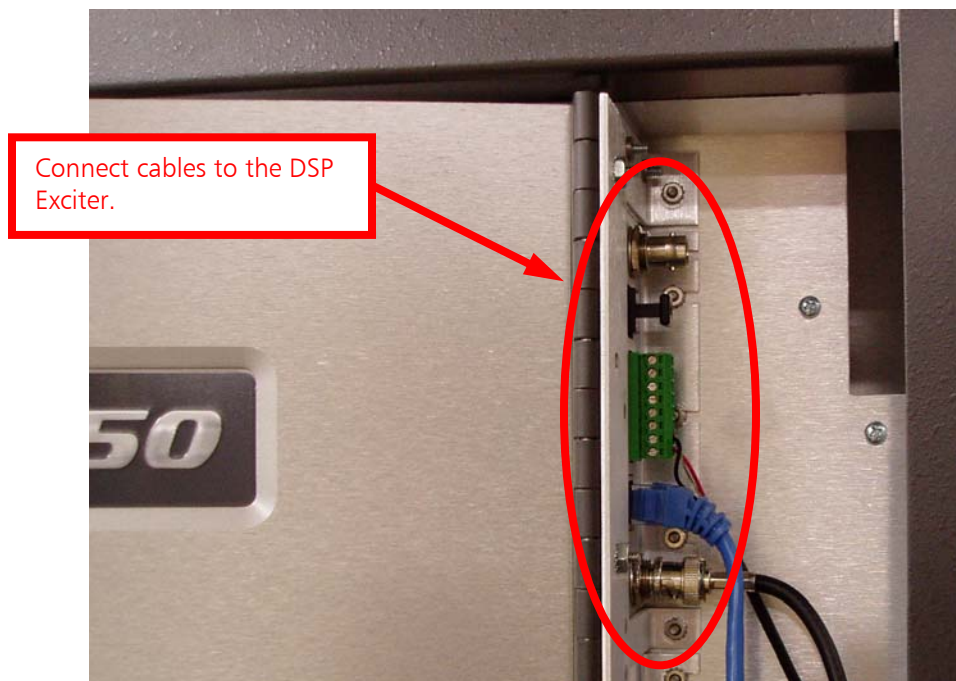


Figure 223 – Connect Cables to the DSP Exciter PCB

11 4MX Fwd Pwr Calibration (SW Ver 45.X.X.X.X or Newer)

11.1 Ensure the Transmitter's RF Output is Connected to a 50-J0 Ohm Load

Ensure the Transmitter's RF Output is connected to a 50-J0 Ohm Load capable of handling 50kW un-modulated power (for a 4MX 50) or 25kW un-modulated power (for a 4MX 25).

NOTE: If the transmitter is connected to a load that is not 50-J0 Ohms, the system will be improperly calibrated!

11.2 Connect RF Ammeter to Transmitter's RF Output



Figure 224 – RF Ammeter Connection

11.3 Transmitter Forward Power Calibration

Step 1 – Ensure that the forward power selected is 50 kW for 4MX50 and 25 kW for 4MX25.

Step 2 – Enter the calibration mode by selecting the factory setup menu screen.

MAIN MENU -> DIAG -> HELP (then press 4 buttons simultaneously as shown).



Figure 225 – Factory Setup Menu Access

Step 3 – The login menu will appear. Press the buttons “469687” and hit **ENTER**.

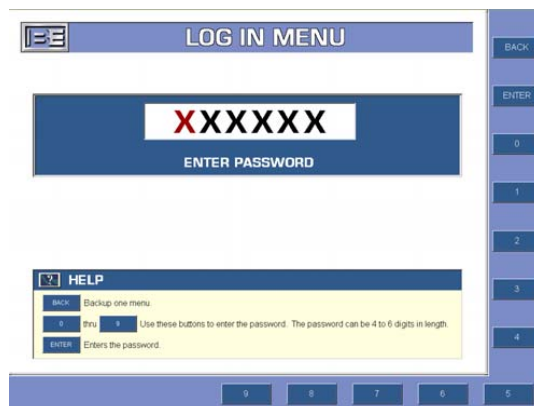


Figure 226 – Login Menu

Step 4 – The Factory Setup Menu will appear. Select “**CALIBRATE EXCITER**”.

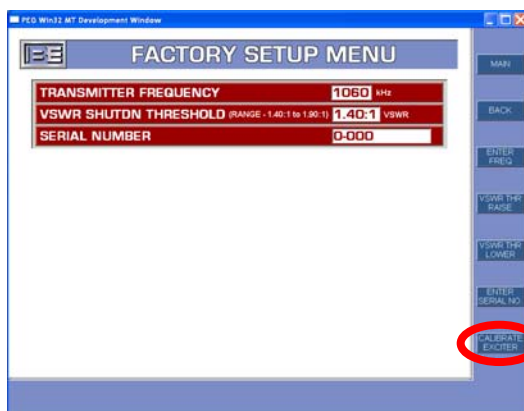


Figure 227 – Factory Setup Menu

Step 5 – Turn the Transmitter’s RF output to OFF.

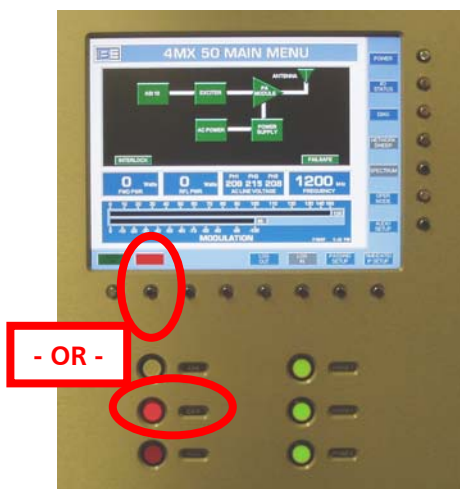


Figure 228 – Turn the Transmitter’s RF Output to OFF

Step 6 – The Exciter Calibration Menu will appear. Select “**START CAL**”.

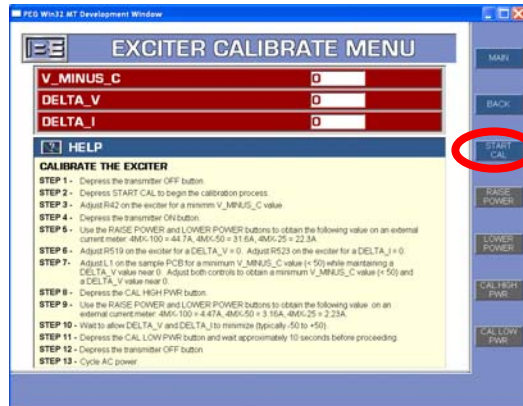


Figure 229 – Exciter Calibration Menu

Step 7 – Adjust R42 on the DSP Exciter for a minimum **V_MINUS_C** value.

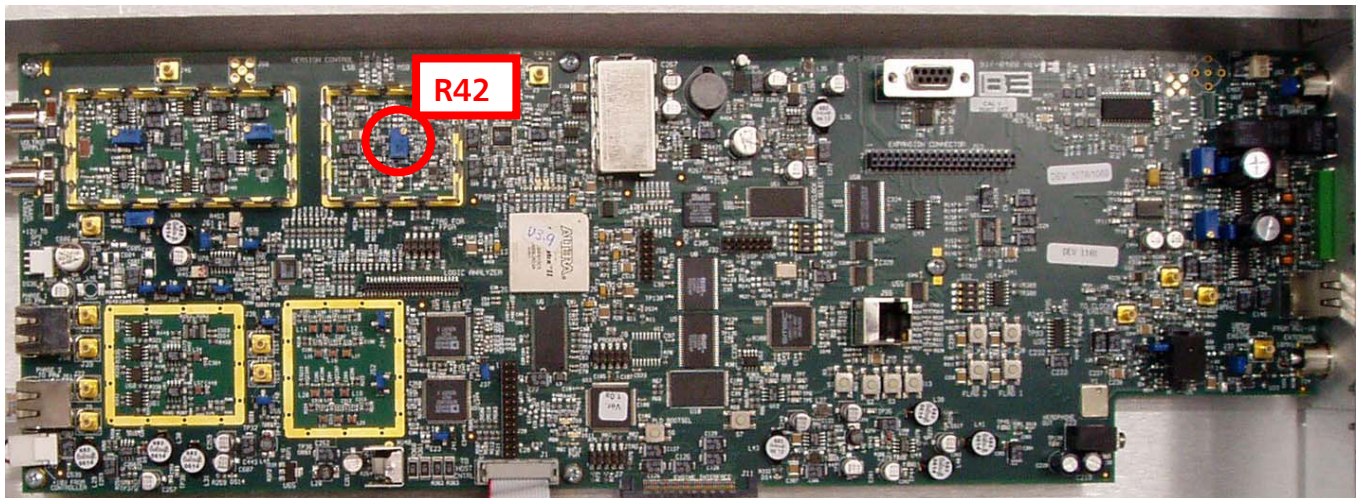


Figure 230 – R42

<continue to next page>

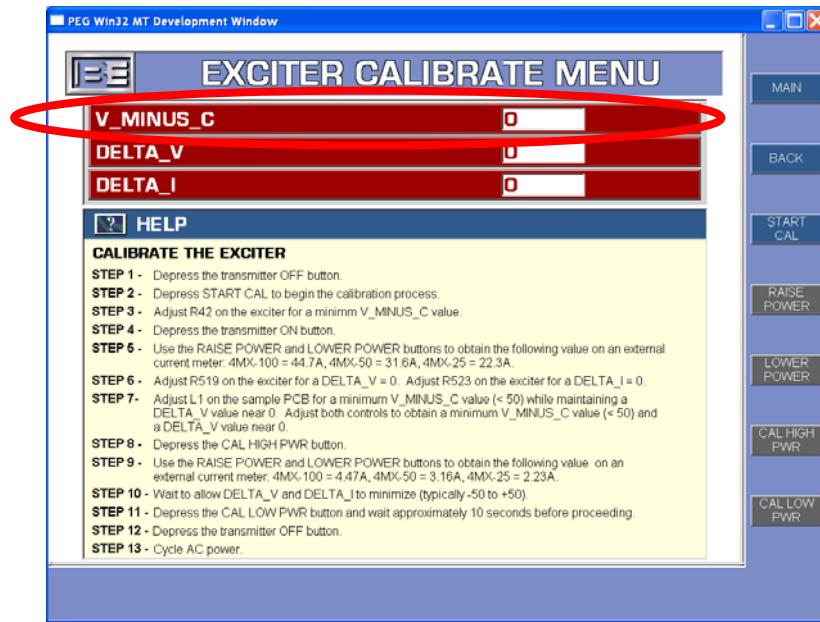


Figure 231 – Exciter Calibrate Menu

Step 8 – Turn the Transmitter’s RF output to ON.

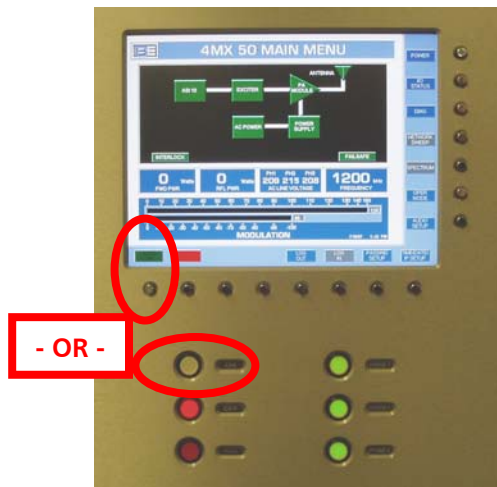


Figure 232 – Turn the Transmitter’s RF Output to ON

<continue to next page>

Step 9 – Use the **RAISE POWER** and **LOWER POWER** buttons to obtain the following value on an external RF current meter: 4MX100 = 44.7A, 4MX50 = 31.6A, 4MX25 = 22.3A

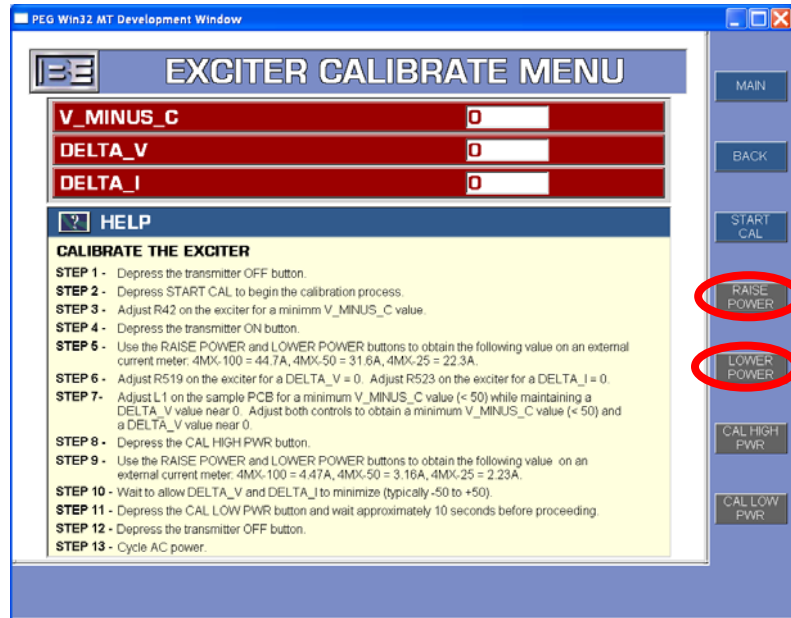


Figure 233 – Exciter Calibrate Menu

<continue to next page>

Step 10 – On the DSP Exciter adjust **R519** for a **DELTA_V=0** and **R523** for a **DELTA_I=0**.

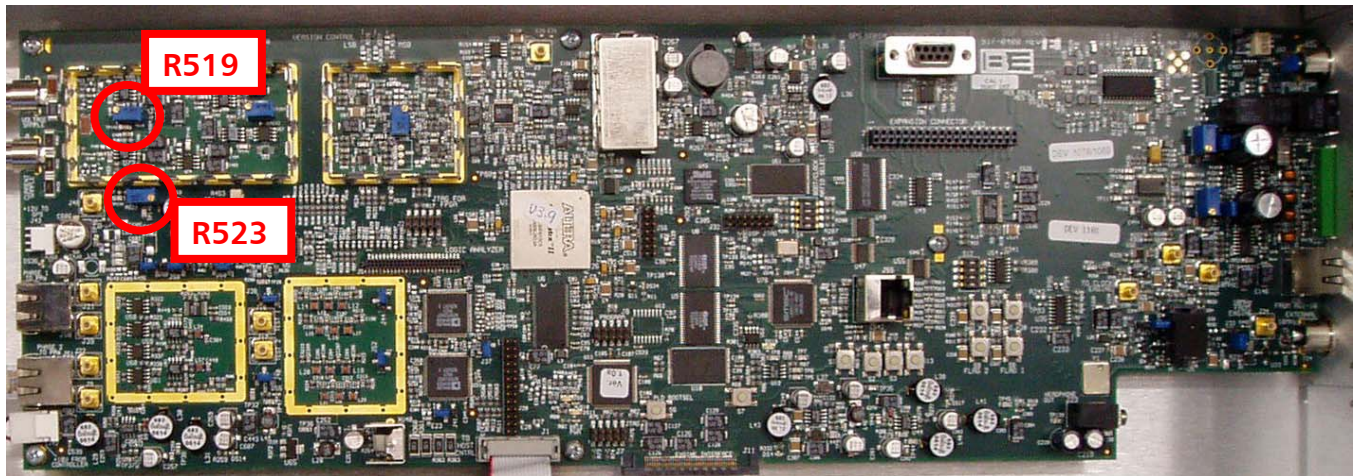


Figure 234 – R519 and R523 Locations

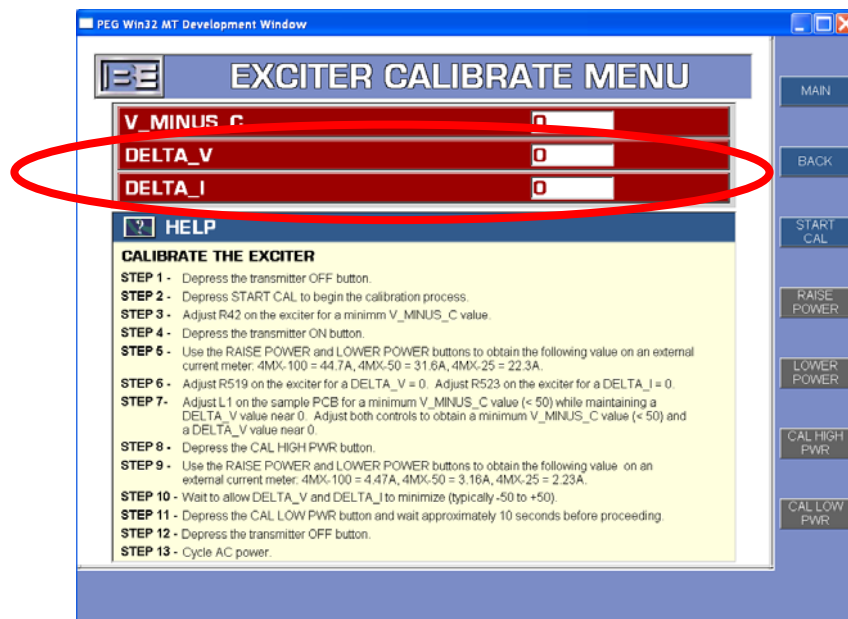


Figure 235 – Exciter Calibrate Menu

<continue to next page>

Step 11 – Adjust **L1** on the **Sample PCB** for a minimum **V_MINUS_C** value (<50) while maintaining a **DELTA_V** value near 0. Adjust **L1** on the **Sample PCB** and **R519**, **R523** on the **DSP Exciter** (if necessary) to obtain a minimum **V_MINUS_C** value (<50), a **DELTA_V** value near 0, and **DELTA_I** value near 0.

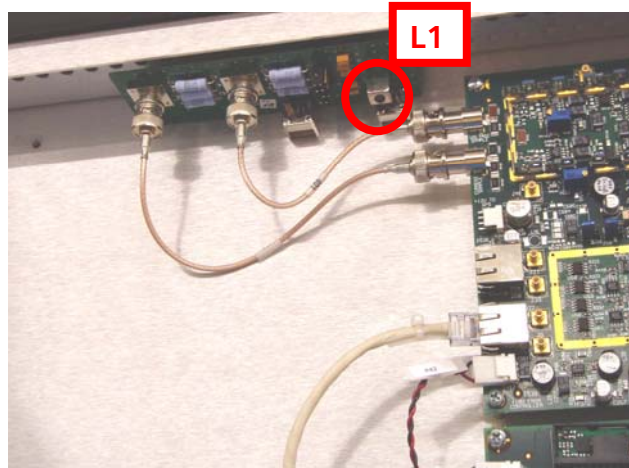


Figure 236 – L1 Location

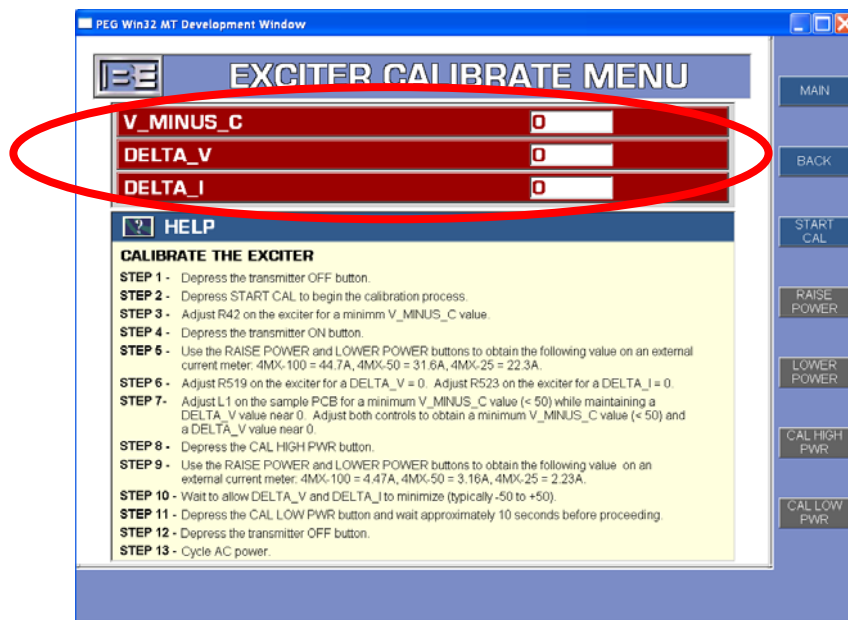


Figure 237 – Exciter Calibrate Menu

<continue to next page>

Step 12 – Depress the **CAL HIGH PWR** button.

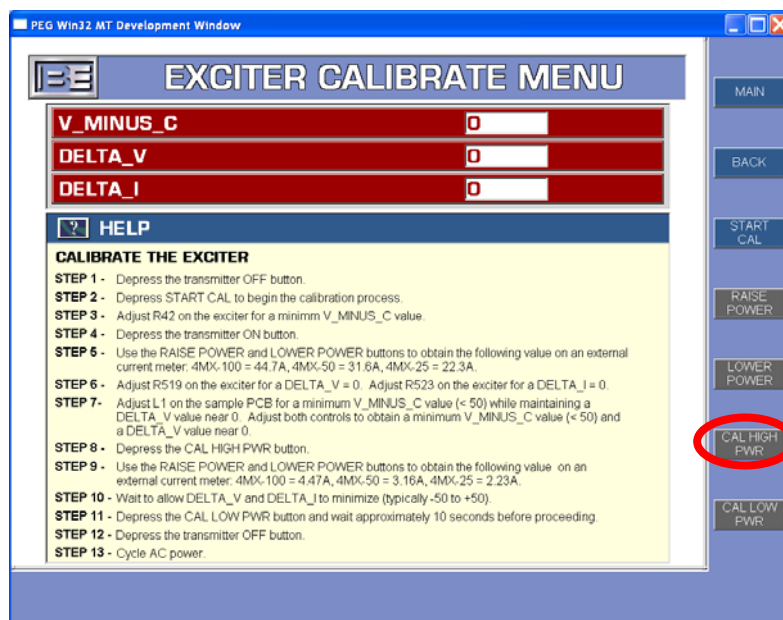


Figure 238 – Exciter Calibrate Menu

Step 13 – Use the **RAISE POWER** and **LOWER POWER** buttons to obtain the following value on an external current meter: 4MX100 = 4.47A, 4MX50 = 3.16A, 4MX25 = 2.23A

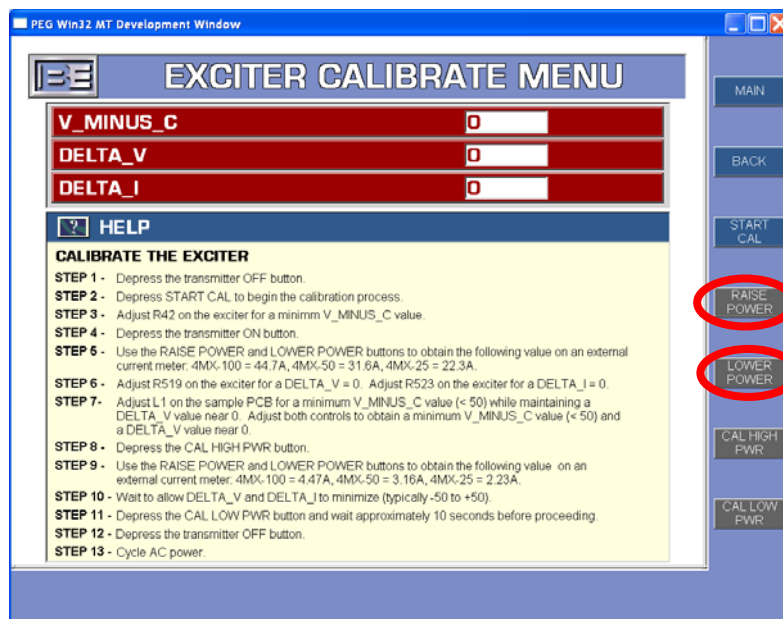


Figure 239 – Exciter Calibrate Menu



Step 14 – Wait to allow **DELTA_V** and **DELTA_I** to minimize (typically -50 to +50).

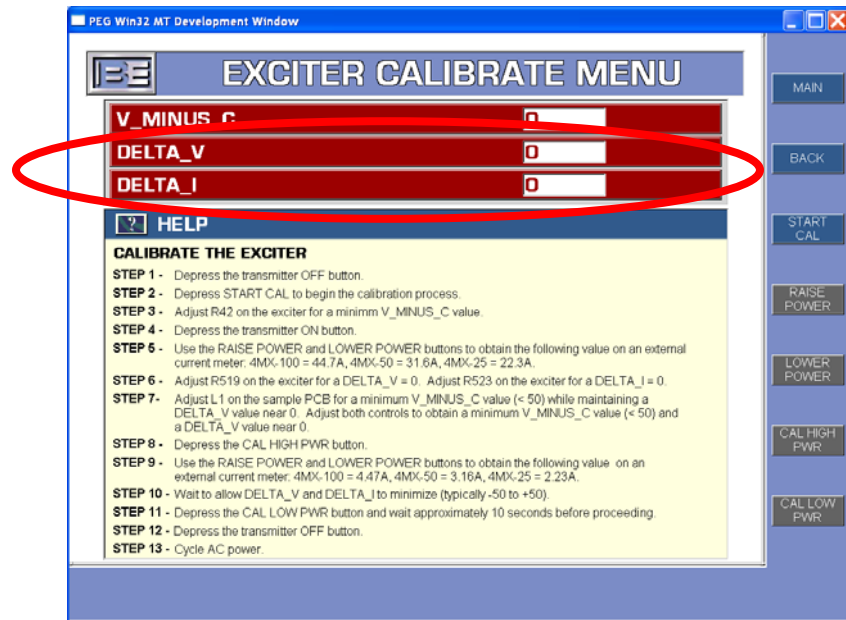


Figure 240 – Exciter Calibrate Menu

Step 15 – Depress the **CAL LOW PWR** button and wait approximately 10 seconds before proceeding.

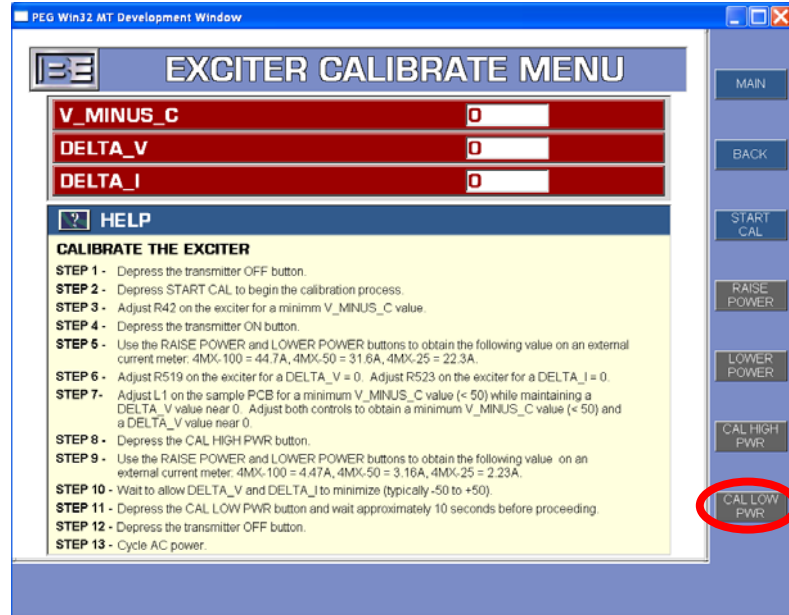


Figure 241 – Exciter Calibrate Menu

Step 16 – Depress the transmitter's RF Output OFF button.

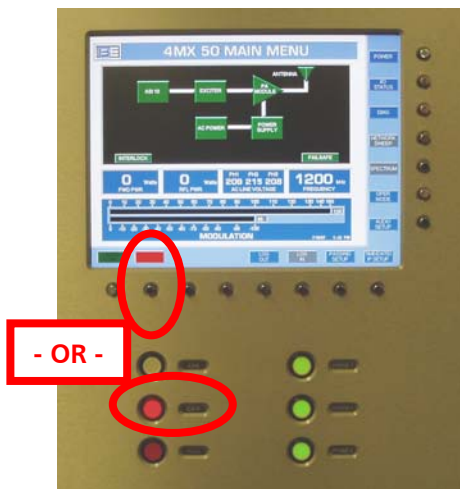


Figure 242 – Turn the Transmitter's RF Output to OFF

Step 17 – Cycle AC power.



Figure 243 – Cycle the Transmitter's AC Power Breaker

12 4MX Negative Overlap Calibration (SW Ver 45.X.X.X.X or Newer)

12.1 Background

A negative overlap adjustment is necessary to optimize the negative peak modulation to approximately -97% in analog mode. Observation has concluded that negative overlap adjustments are necessary over the am frequency band as well as on a board to board basis.

Note: Transmitter forward power **MUST** have been already been calibrated to use this procedure.

12.2 Connect Scope CH1 to J22 and CH2 to J9

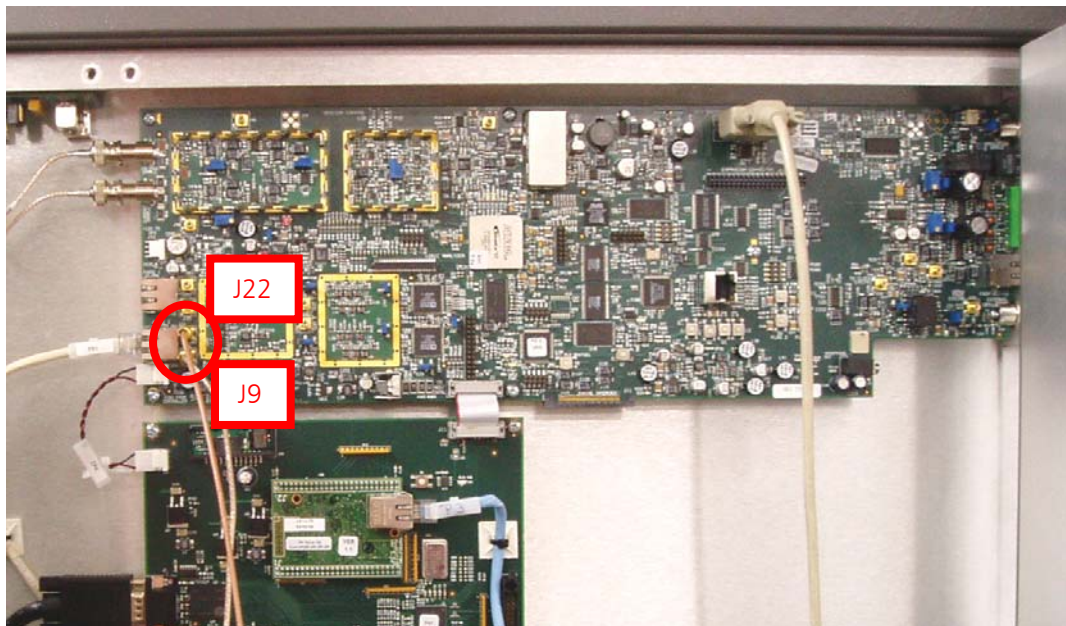


Figure 244 – Connect Scope to DSP PCB J22 and J9

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12.3 Negative Overlap Calibration

Step 1 – Ensure that the forward power selected is 50 kW for 4MX50 and 25 kW for 4MX25.

Step 2 – Enter the calibration mode by selecting the factory setup menu screen.

MAIN MENU -> DIAG -> HELP (then press 4 buttons simultaneously as shown).

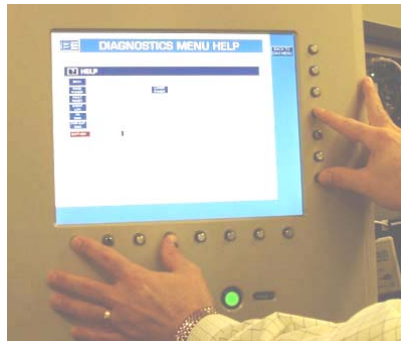


Figure 245 – Factory Setup Menu Access

Step 3 – The login menu will appear. Press the buttons “469687” and hit **ENTER**.

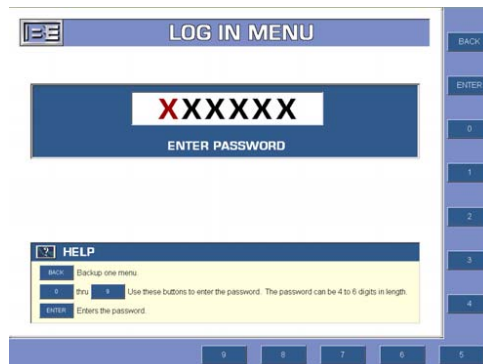


Figure 246 – Login Menu

Step 4 – The Factory Setup Menu will appear. Verify that the Frequency is correct and the VSWR Shutdown Threshold has been set to 1.80:1 then select “**CALIBRATE EXCITER**”.

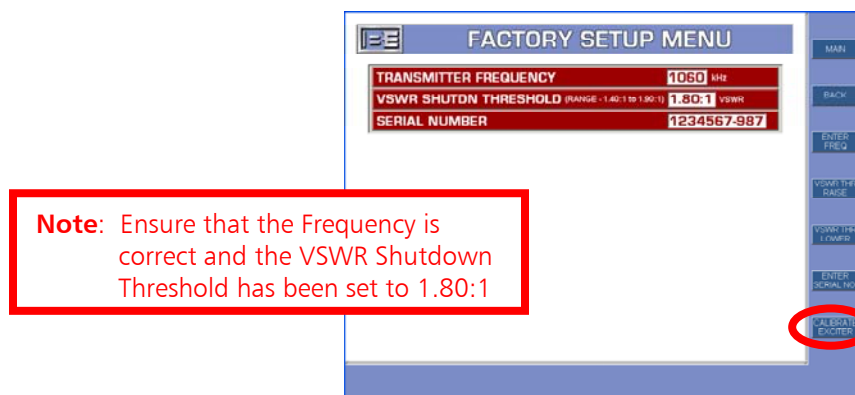


Figure 247 – Factory Setup Menu



Step 5 – The Exciter Calibration Menu will appear. Select **“START CAL”**.

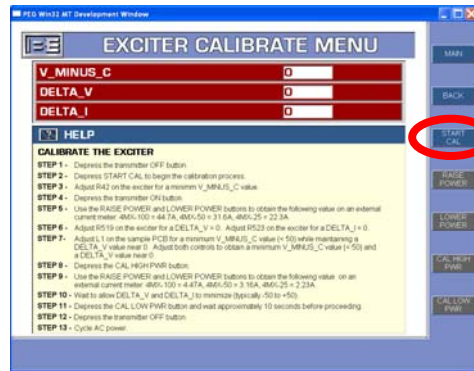


Figure 248 – Exciter Calibration Menu

Step 6 – Turn the Transmitter’s RF output to ON.



Figure 249 – Turn the Transmitter’s RF Output to ON

Step 7 – Use the “**RAISE POWER**” and “**LOWER POWER**” buttons to achieve the **MINIMUM** RF current on the external RF Ammeter attached to the transmitter’s RF output.

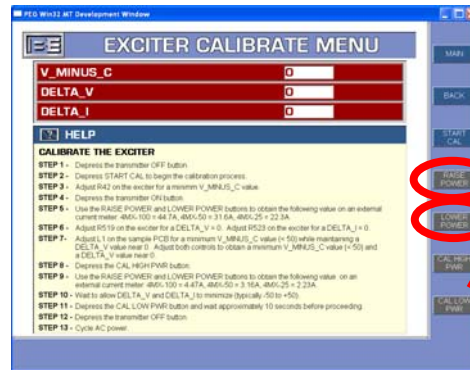


Figure 250 – Exciter Calibrate Menu

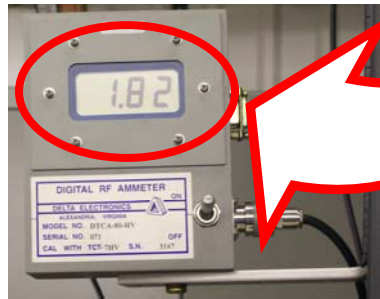


Figure 251 – External RF Ammeter attached to Transmitter’s RF Output

Step 8 – Once the minimum current has been achieved on the external RF Ammeter, measure and record the time differential from the knee of each waveform as shown.

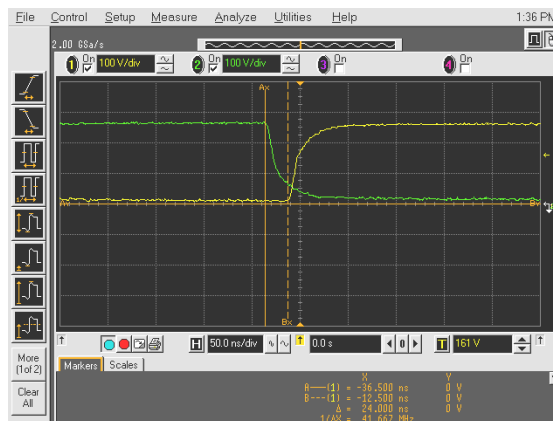


Figure 252 – Measure Waveform Time Differential

Step 9 – Turn the transmitter's RF Output to OFF.



Figure 253 – Turn the Transmitter's RF Output to OFF

Step 10 – Cycle AC Power to the transmitter.



Turn the AC Breaker to the **OFF** position then back to the **ON** position

Figure 254 – Cycle the Transmitter's AC Power Breaker

Step 11 – Next, put the transmitter into "negative" calibrate mode by pressing (S1) on the DSP Exciter until both mode LED's (DS1 and DS29) are solid.

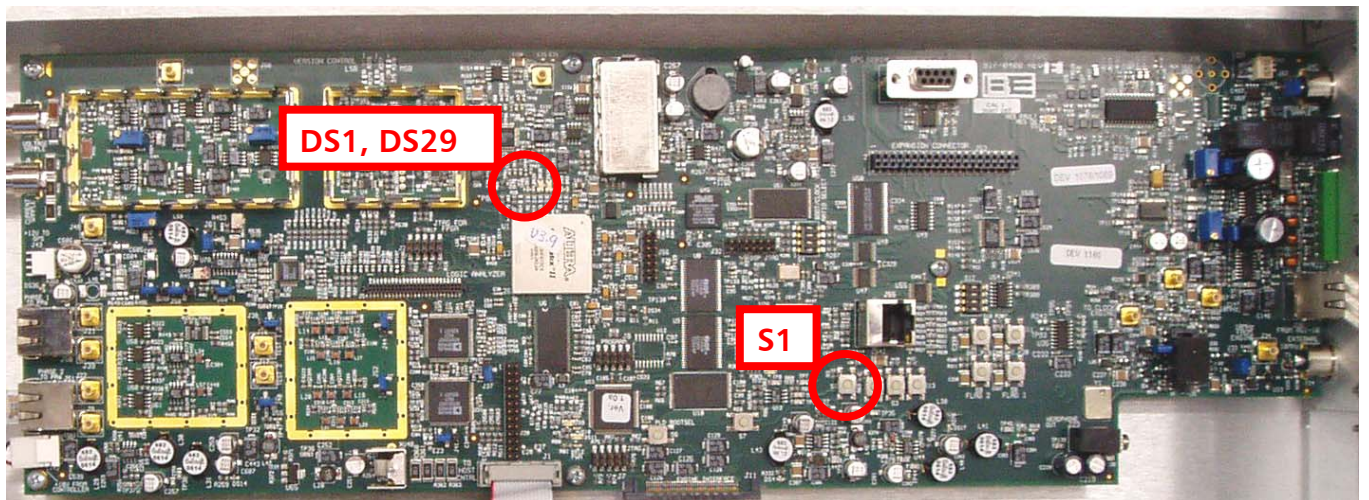


Figure 255 – S1, DS1, and DS29 Locations

Step 12 – Adjust overlap up or down with the right most push button (**S13**). Use the “Invert” button (**S2**) to switch overlap direction. The invert led may be stuck, therefore you may have to hold down the invert push button (**S2**) while adjusting overlap with (**S13**) to the value recorded in **STEP 8**.

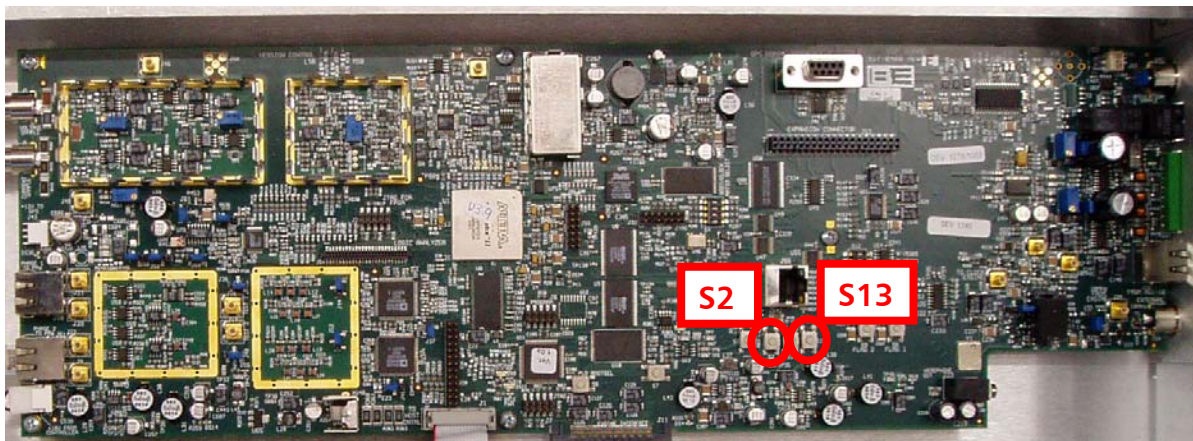


Figure 256 – S2 and S13 Locations

Step 13 – When the overlap is set to the desired level on the scope press the “second-from the right” (**S3**) push button on the DSP Exciter to save the calibration.

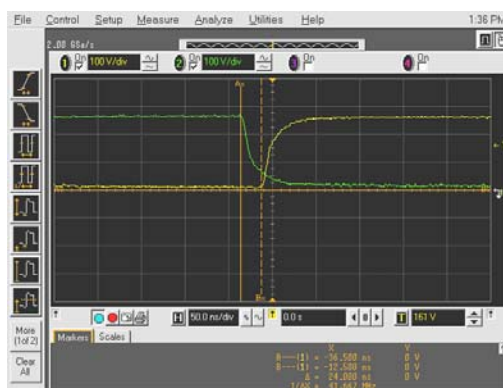


Figure 257 – Measure Waveform Time Differential

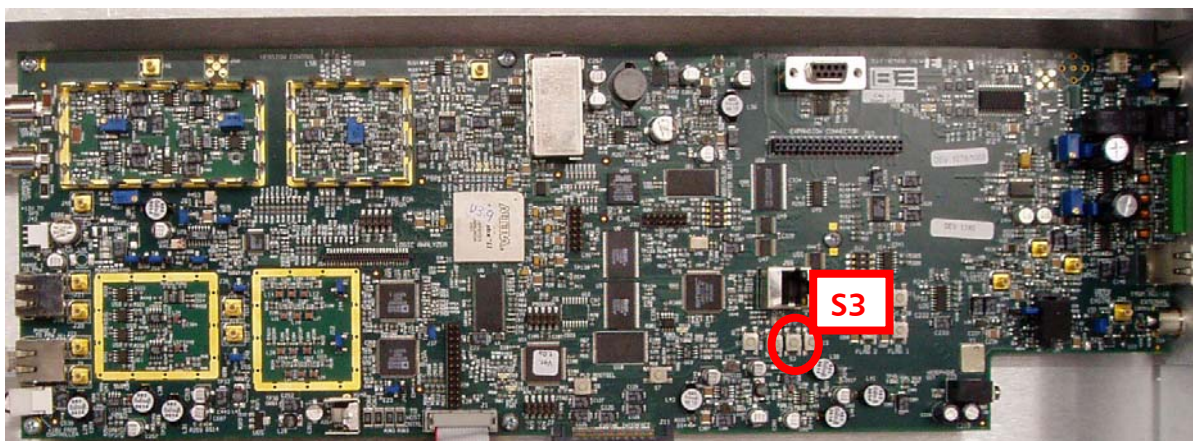


Figure 258 – S3 Location

Step 14 – Cycle AC Power to the transmitter.



Turn the AC Breaker to the **OFF** position then back to the **ON** position

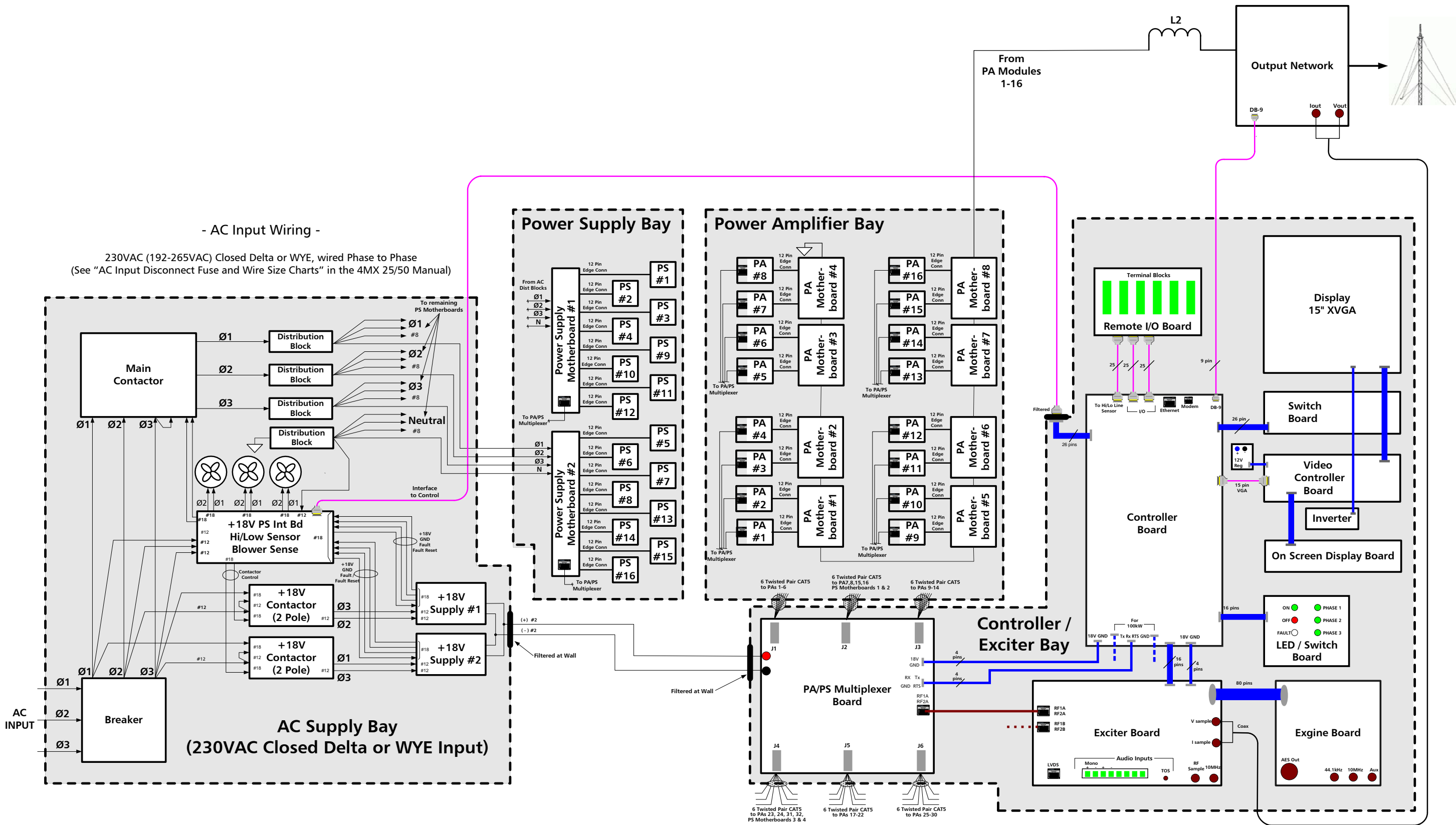
Figure 259 – Cycle the Transmitter's AC Power Breaker

Step 15 – Verification: With analog audio applied, turn the transmitter's RF Output to ON and verify 97% peaks are observed. Repeat procedure if necessary.

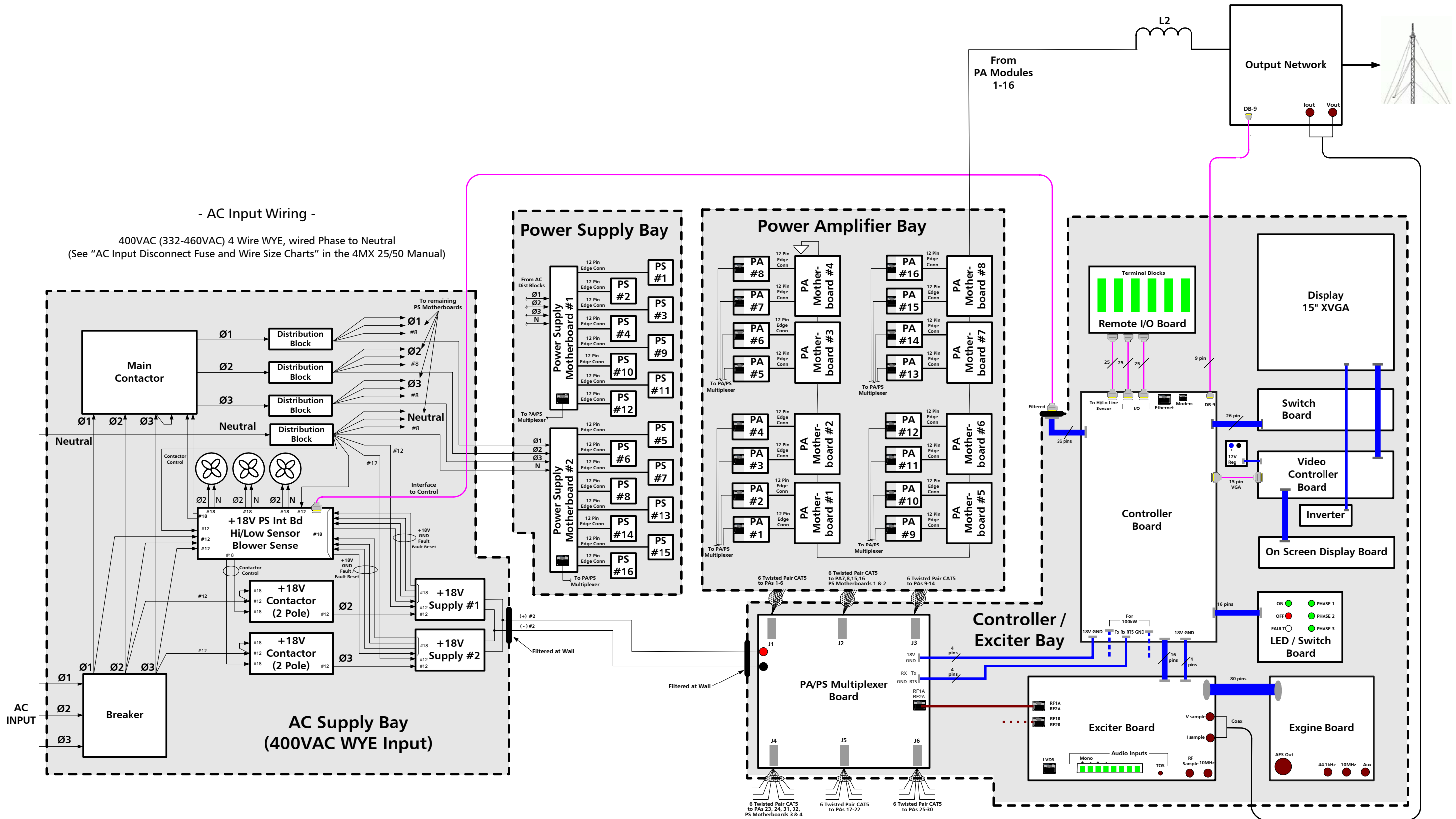
13 Diagrams and Schematics

- 13.1 4MX 25 System Block Diagram 230VAC (597-4025-001)**
- 13.2 4MX 25 System Block Diagram 400VAC (597-4025-002)**
- 13.3 4MX 50 System Block Diagram 230VAC (597-4050-001)**
- 13.4 4MX 50 System Block Diagram 400VAC (597-4050-002)**
- 13.5 PCB, ASSY, DSP Exciter (917-0400)**
- 13.6 PCB, ASSY, PA Motherboard / Combiner (917-0403)**
- 13.7 PCB, ASSY, High Power AM PA (917-0404)**
- 13.8 PCB, ASSY, Soft-key Switch (917-0406)**
- 13.9 PCB, ASSY, Controller (917-0407)**
- 13.10 PCB, ASSY, Switch / LED (917-0409)**
- 13.11 PCB, ASSY, Lightning Protection (917-0412-050)**
- 13.12 PCB, ASSY, Multiplexer (917-0413)**
- 13.13 PCB, ASSY, Lightning Detector (917-0414-050)**
- 13.14 PCB, ASSY, 400V PA Power Supply Module (917-0415)**
- 13.15 PCB, ASSY, Low Voltage Supply (917-0415-100)**
- 13.16 PCB, ASSY, High / Low Line Sensor (917-0416-050)**
- 13.17 PCB, ASSY, PS Motherboard (917-0417-001)**
- 13.18 PCB, ASSY, 12V Power Supply (917-0418)**
- 13.19 PCB, ASSY, Remote I/O (917-0419)**
- 13.20 PCB, ASSY, DC Filter (919-0519-001)**
- 13.21 4MX 25 Wiring Diagram (907-4025-230/400)**
- 13.22 4MX 50 Wiring Diagram (907-4050-230/400)**

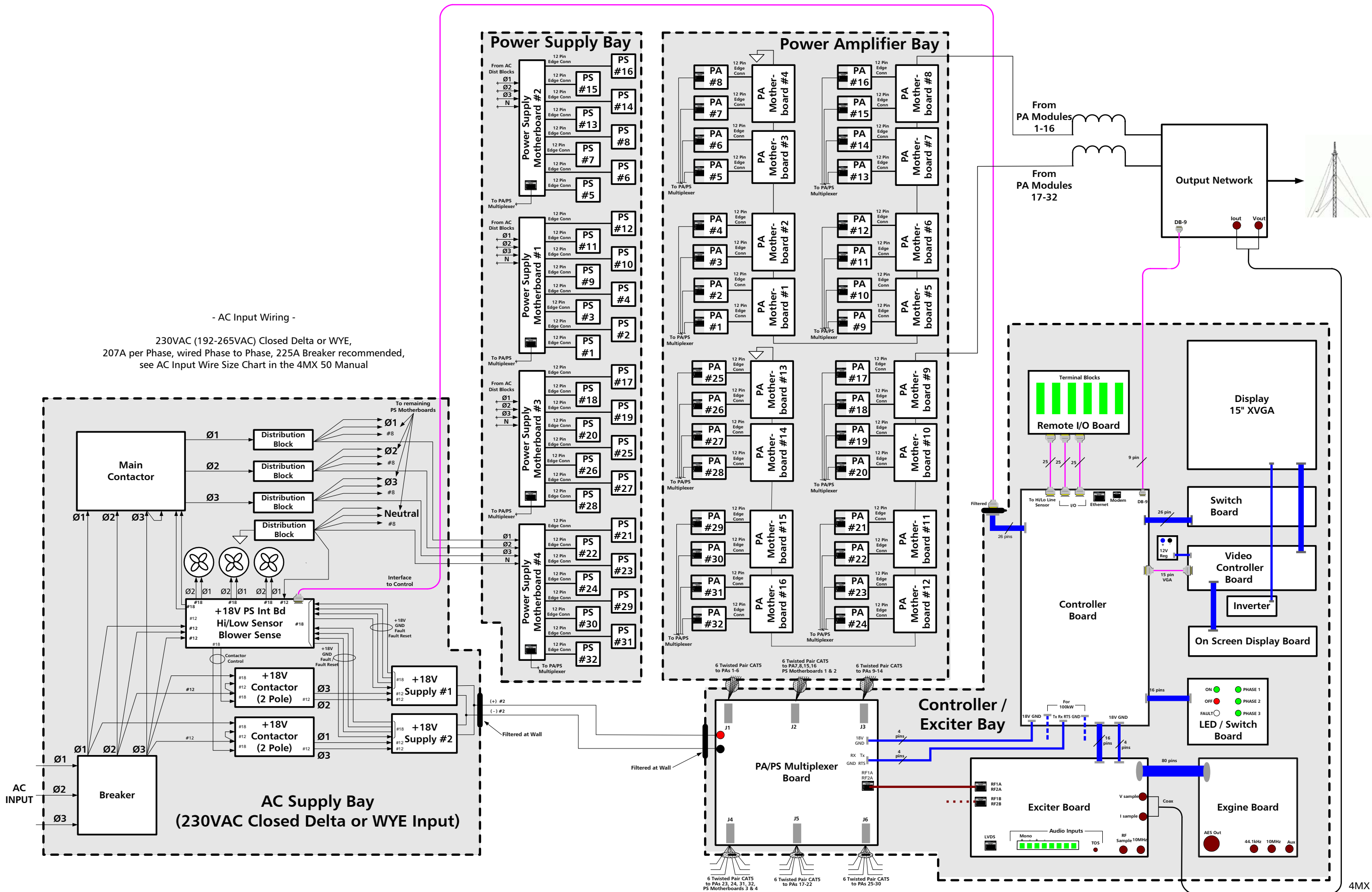




4MX 25 AM Transmitter
System Block Diagram
(230VAC Closed Delta or WYE Input)
597-4025-001 Rev A



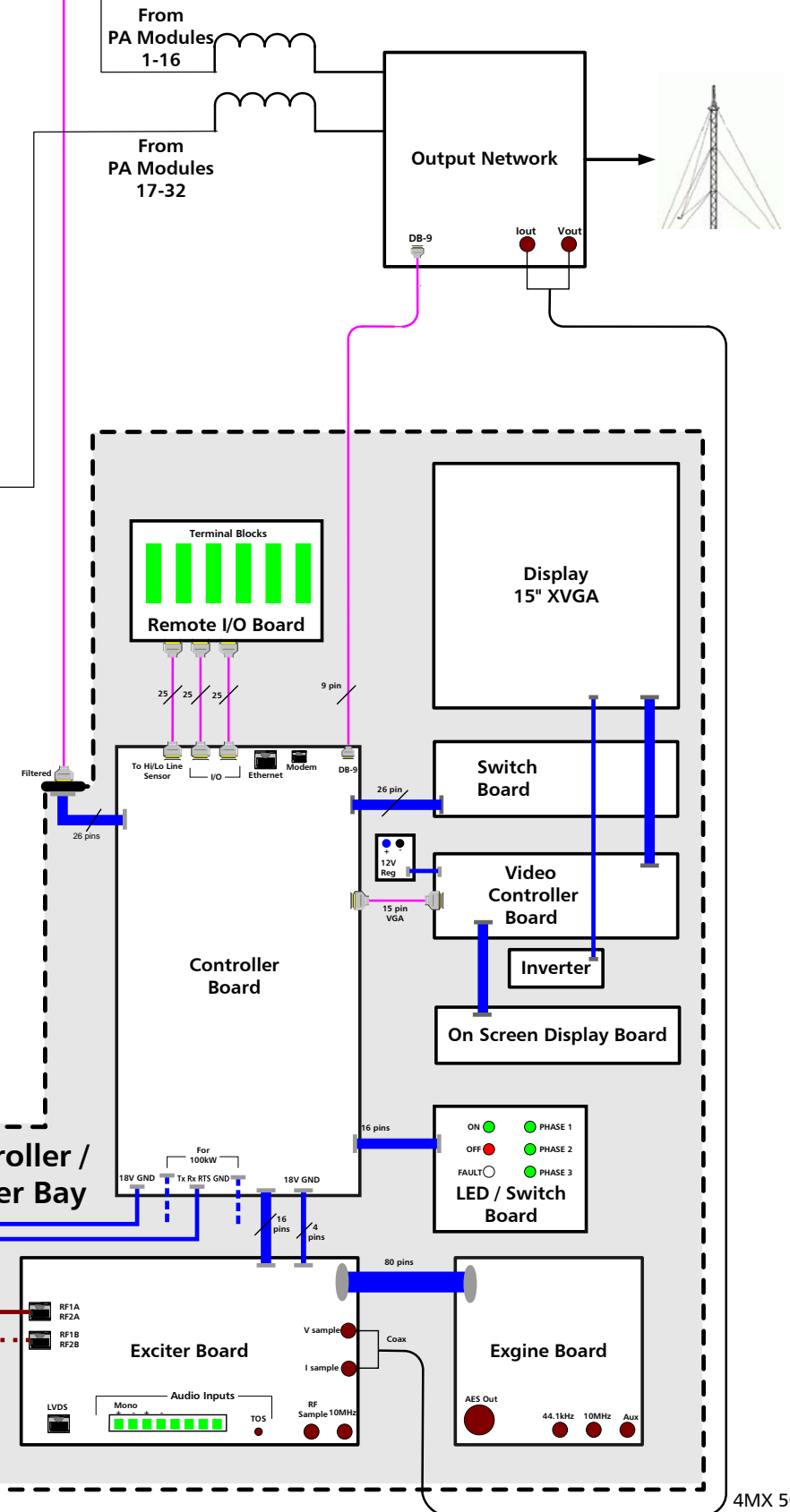
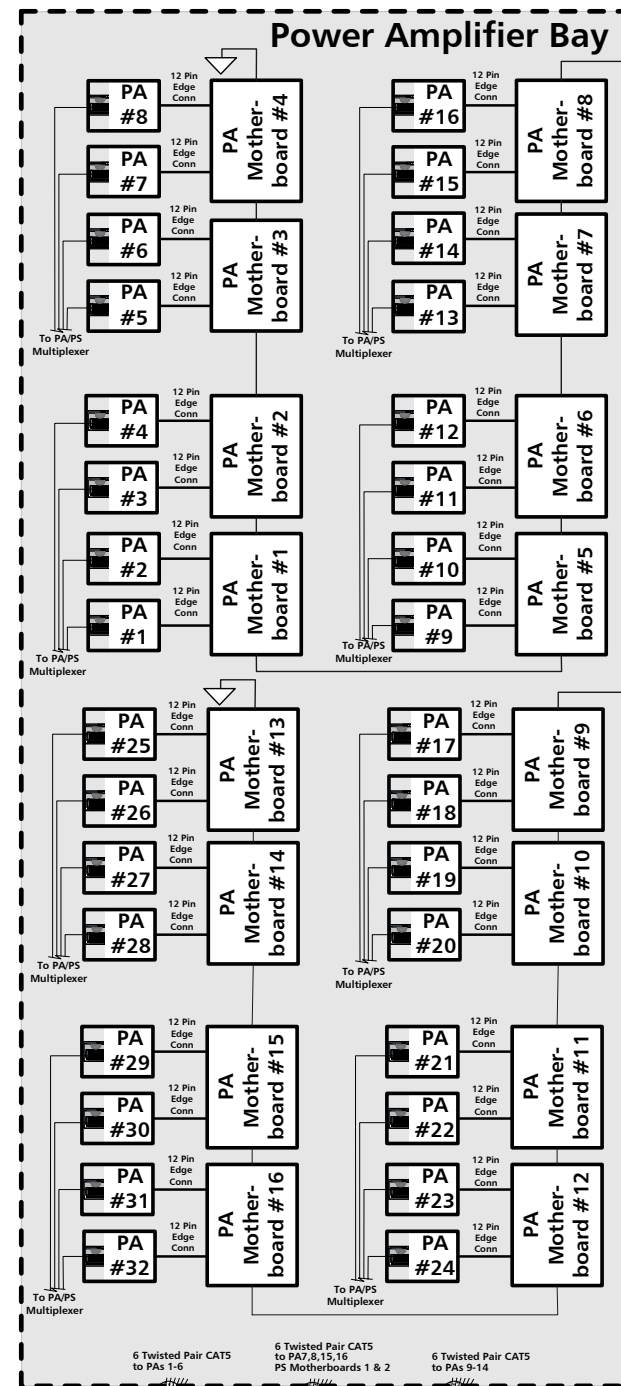
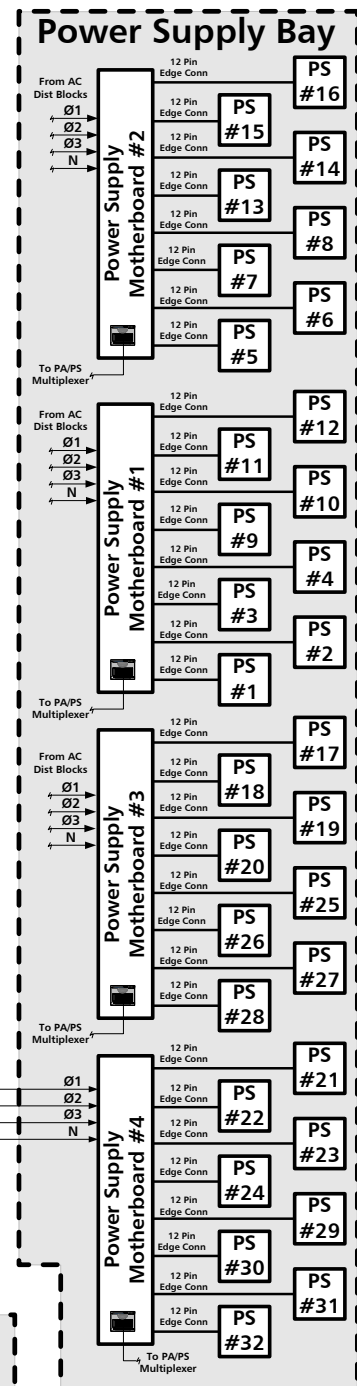
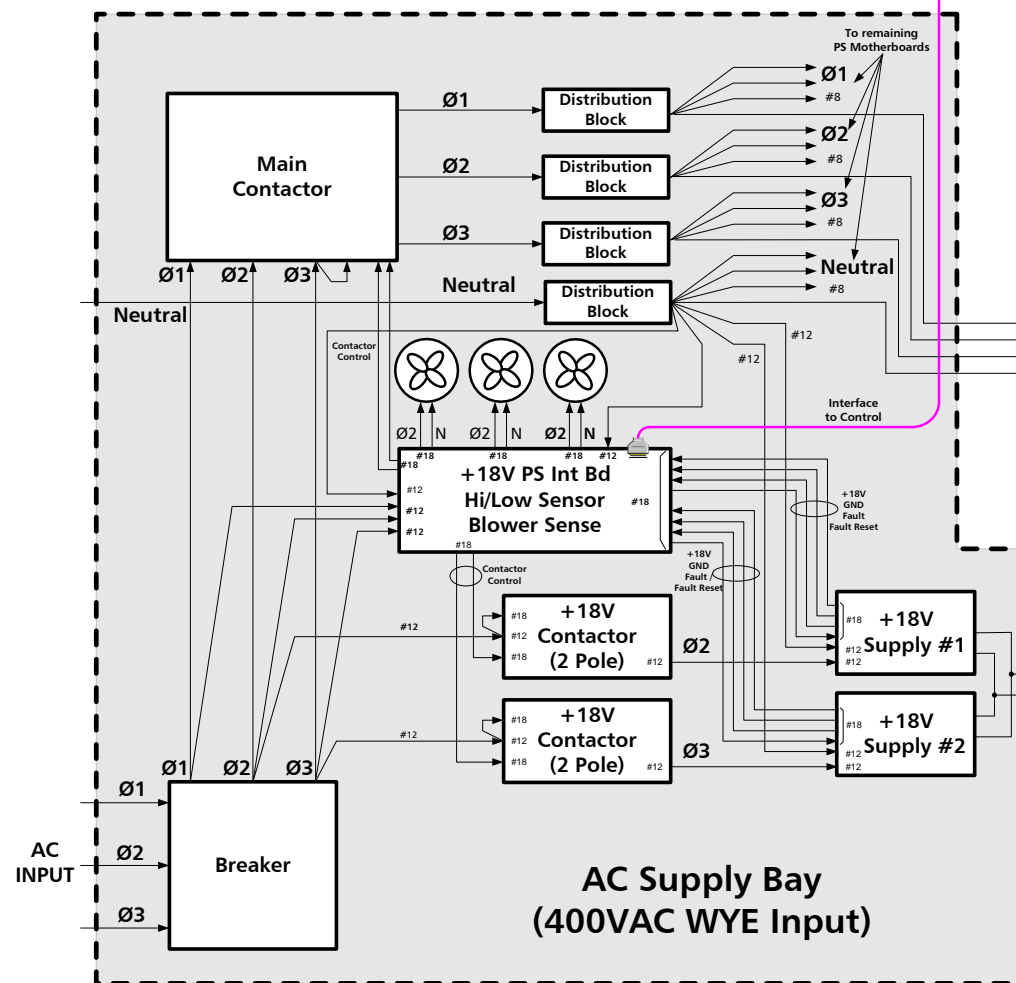
4MX 25 AM Transmitter
System Block Diagram
(400VAC WYE Input)
597-4025-002 Rev A



4MX 50 AM Transmitter
System Block Diagram
(230VAC Closed Delta or WYE Input)
597-4050-001

- AC Input Wiring -

400VAC (332-460VAC) 4 Wire WYE,
117A per Phase, wired Phase to Neutral, 125A Breaker recommended,
see AC Input Wire Size Chart in the 4MX 50 Manual



4MX 50 AM Transmitter
System Block Diagram
(400VAC WYE Input)
597-4050-002