ANYWAVE
COMMUNICATION TECHNOLOGIES

MHPTV Quick Start Guide

June 25, 2019 - Version 2.0

MHPTV (Granite)
TV TRANSMITTERS

Copyright Notice

FCC Compliance

This equipment complies with relevant portions of Parts 2, 73, & 74 of the FCC rules governing LPTV operation.

Disclaimer

Information provided by Anywave Communication Technologies is believed to be accurate and complete; however, no liability can be assumed for its use.

The manufacturer makes no representations or warranties, either expressed or implied, by or with respect to anything in this manual, and shall not be liable for any implied warranties of fitness for a particular purpose or for any indirect, special, or consequential damages. Information in this document is subject to change without notice and does not represent a commitment on the part of the manufacturer.

USE OF THIS PRODUCT IN A MANNER OTHER THAN DESCRIBED IN THIS MANUAL MAY RESULT IN DAMAGE TO THE EQUIPMENT AND/OR PERSONAL INJURY.

PLEASE READ THIS MANUAL IN ITS ENTIRETY BEFORE ATTEMPTING TO OPERATE THE EQUIPMENT. CONTACT ANYWAVE WITH ANY QUESTIONS OR CONCERNS YOU MAY HAVE.

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300 Knightsbridge Parkway, Suite 150, Lincolnshire, IL 60069
Tel: (847) 415-2258
Fax: (847) 415-2112
http://www.anywavecom.com/en/

Unpacking

Carefully unpack the equipment and perform a visual inspection to determine if any apparent damage has occurred during shipment. Please notify the delivery carrier and Anywave immediately if shipment damage has occurred. Retain all original shipping materials.

Please locate and reference the Packing Check List to verify you have received all components of your system. Retain the Packing Check List for future reference.

Also, please identify and remove all packing materials and supports (foam pads, etc.) prior to the initial turn-on of the equipment.

Returns and Exchanges

Written approval and a Return Material Authorization number (RMA) are required from Anywave for all equipment returns. Please direct all return inquiries to the Anywave Service Department at support_us@anywavecom.com, providing the Sales Order number and Serial Number(s) of the equipment. Complete details regarding the nature and circumstances of your return must be included in your RMA request. Proper handling and return shipping instructions will be provided with an approved RMA number.

Technical Support

Technical support and troubleshooting assistance for Anywave Transmitters are available through the Anywave Technical Support Department during normal business hours (9:00 AM - 5:00 PM Eastern Time) at (847) 415-2258 (option 2). After hour Emergency Support is available at (847) 415-2258 (option 3). Email questions anytime to support_us@anywavecom.com and a Technical Support Engineer will respond as soon as possible.

Note: For all service and support requests, you will need to provide the Serial Number of the equipment with your Sales Order number. For future reference, please record that information here:

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WARNING

THE VOLTAGES, CURRENTS, AND RF ENERGY IN THIS EQUIPMENT ARE DANGEROUS. PERSONNEL MUST AT ALL TIMES OBSERVE ALL SAFETY WARNINGS, INSTRUCTIONS, AND REGULATIONS.

IN THE CASE OF EMERGENCY, ENSURE THAT ALL POWER HAS BEEN DISCONNECTED.

ALWAYS DISCONNECT POWER BEFORE REMOVING COVERS, ENCLOSURES, OR SHIELDS. DO NOT PERFORM SERVICE ON THE EQUIPMENT WHEN ALONE OR FATIGUED. KNOW YOUR EQUIPMENT AND DO NOT TAKE RISKS.

This manual is provided as a general guide for trained and qualified personnel well aware of the dangers inherent in handling potentially hazardous electrical transmission equipment.

The installation, operation, maintenance, and service of this equipment involves risks both to personnel and equipment, and must ONLY be performed by qualified personnel exercising due care. Anywave Communication Technologies, Inc. shall not be responsible for injury or damage resulting from improper handling or from the use of improperly trained or inexperienced personnel performing such tasks.

All local building and electrical codes, as well as fire protection standards, must be observed in the installation and operation of the equipment.

Contents

1 Introduction

This Quick Start Guide contains instructions to safely set up and turn on the Anywave MHPTV Transmitter. Please note that trained and qualified personnel are required to install, maintain, and service this transmission equipment.

2 Organization of Manual

This Manual is broken up into several sections.

- Section 3 - TX system Overview: Provides a general overview of the MHPTV Transmitter System
- Section 4 & 5 – TX System Description: Reviews the physical layout and interconnections of the major subassemblies contained in the Transmitter
- Section 6 - RF System Connections: How to Install the RF System components and connections
- Section 7 – TS Input Connection: How to install the TS Input Stream connection
- Section 8 – AC Mains Connections: How to install the AC Mains electrical connections
- Section 9 – Initial Turn On: How to safely turn on your Transmitter

3 TX System Overview

Final assembly and test of each transmitter are performed at the Anywave factory. The Exciter is set up on the desired channel frequency and the TX is tested with the complete RF system (if purchased) at full power into a load. All TX operating parameters are optimized and the Transmitter Forward, Reflected, and Reject load power meters are properly calibrated. Linear and Nonlinear pre-correction is performed and automatically stored in non-volatile memory inside the Exciter. A Factory Test Report is completed for each system, providing a record of full power operating parameters and performance. The TX then goes through a final 24-hour burn-in period and check out before being shut done and packed up for shipment.

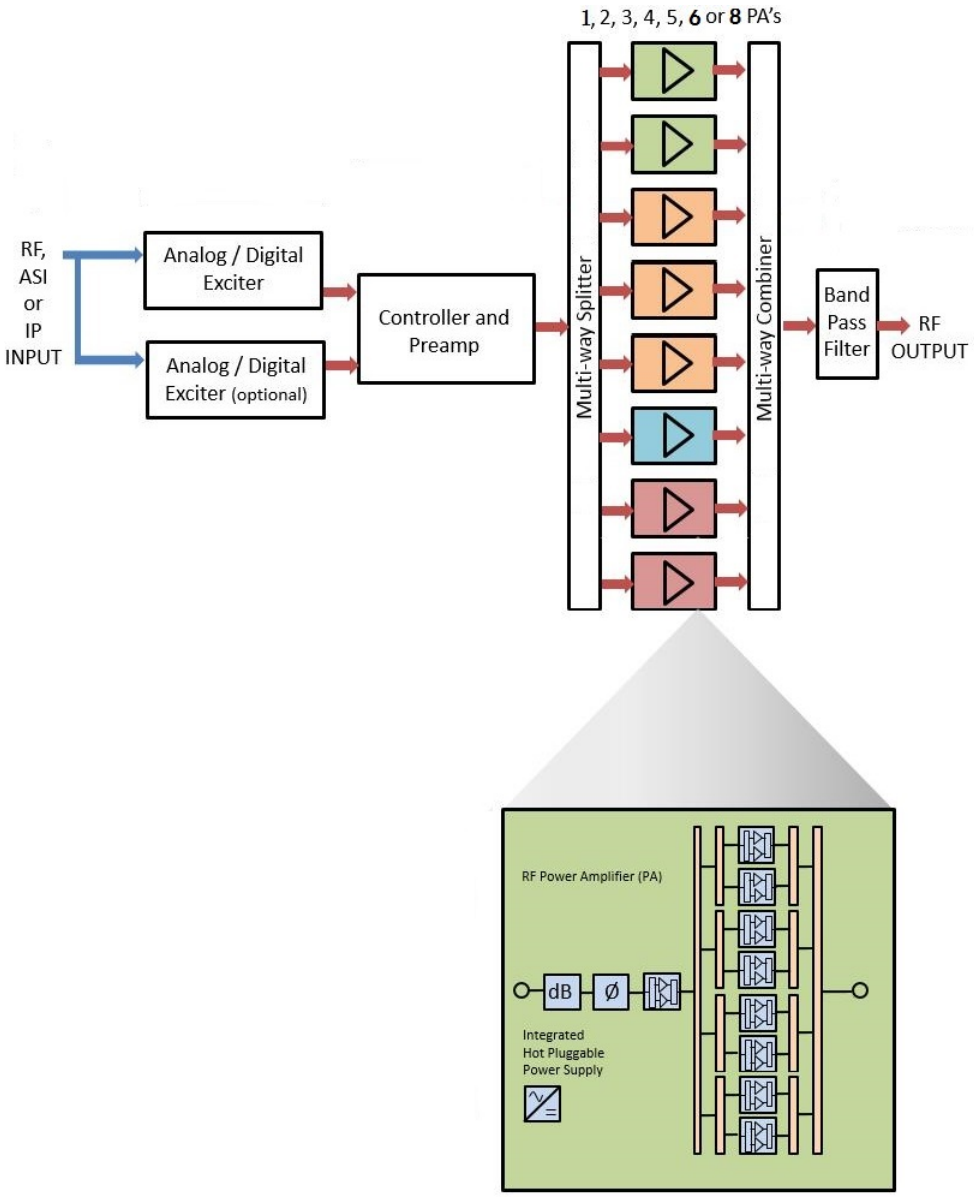
In your shipment, you should receive a copy of the following documentation.

- Packing Checklist
- Transmitter Factory Test Report
- MHPTV TX Quick Start Guide
- MHPTV TX and Exciter User Manuals

Carefully unpack and inspect all your equipment and please review the Packing Checklist when you receive your system to be certain you have received all your system components. Also, please be sure to identify and remove all packing materials and supports (foam pads, etc.) inside the Transmitter prior to initial turn-on of the equipment.

4 TX System Description

A hi-level System Block Diagram of the MHPTV TX is shown below. The MHPTV system essentially consists of an Exciter, a Controller (with built-in preamp), 1,2,3,4,5,6, or 8 Power Amplifiers with corresponding input Splitter and output Combiner, and a Band Pass (mask) Filter.



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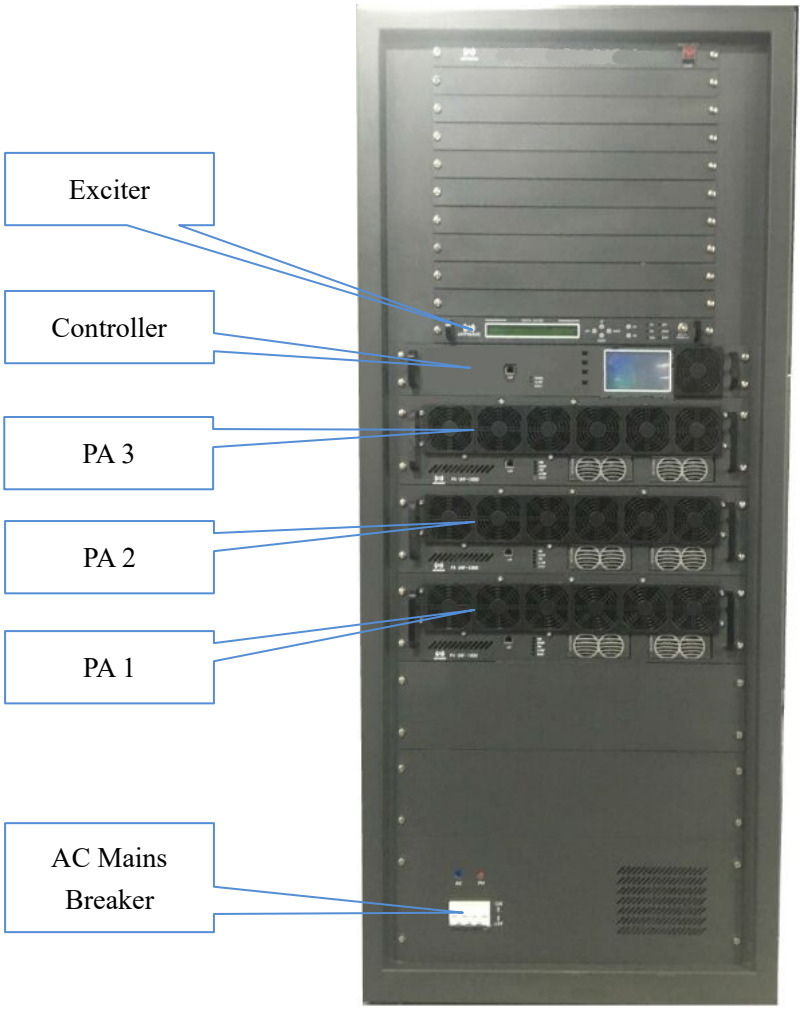
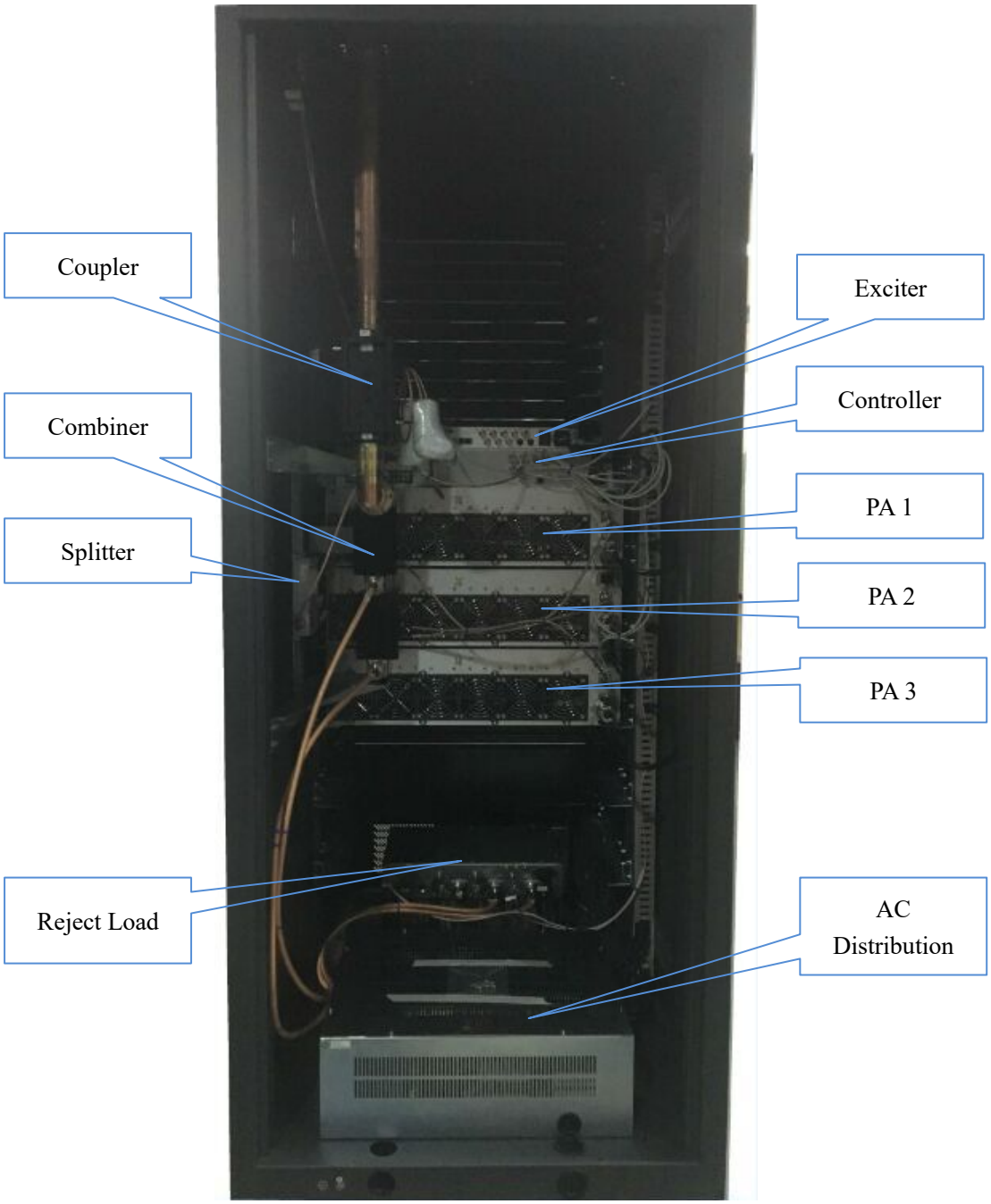
5 TX Interconnect Diagram

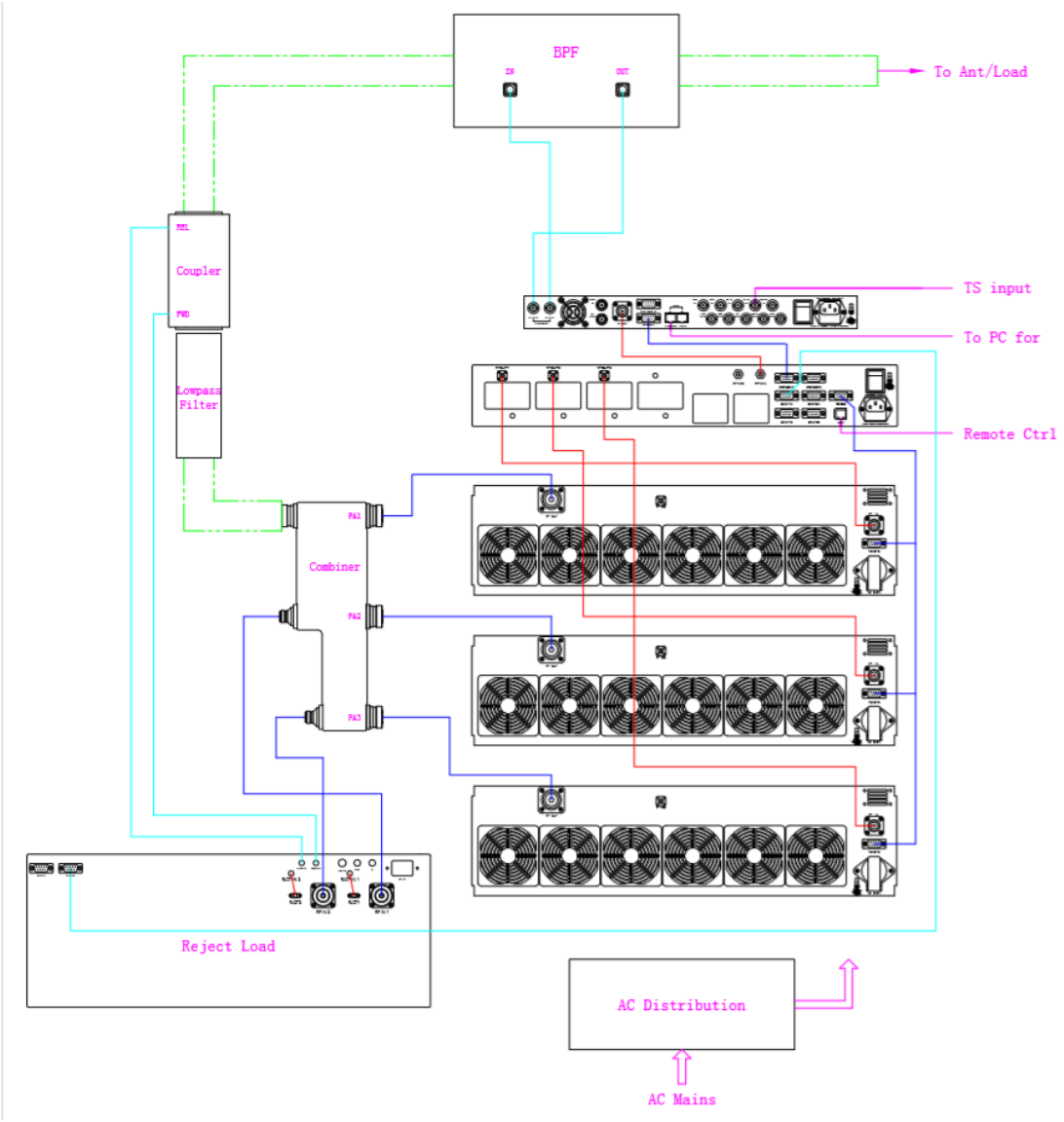
Below is the front view of the Anywave 3-PA MHPTV Transmitter - which comes in single and dual exciter configurations. Photos of a single exciter system are shown below. The main subsystems (as seen from the front) include Exciter(s), one Controller (with a touchscreen LCD, and built-in preamp), three power amplifiers (8 x BLF 888E power transistors per PA), one AC Mains Breaker, and one channel mask Band Pass Filter (BPF) – optional – installed on top or on the side of the cabinet rack.



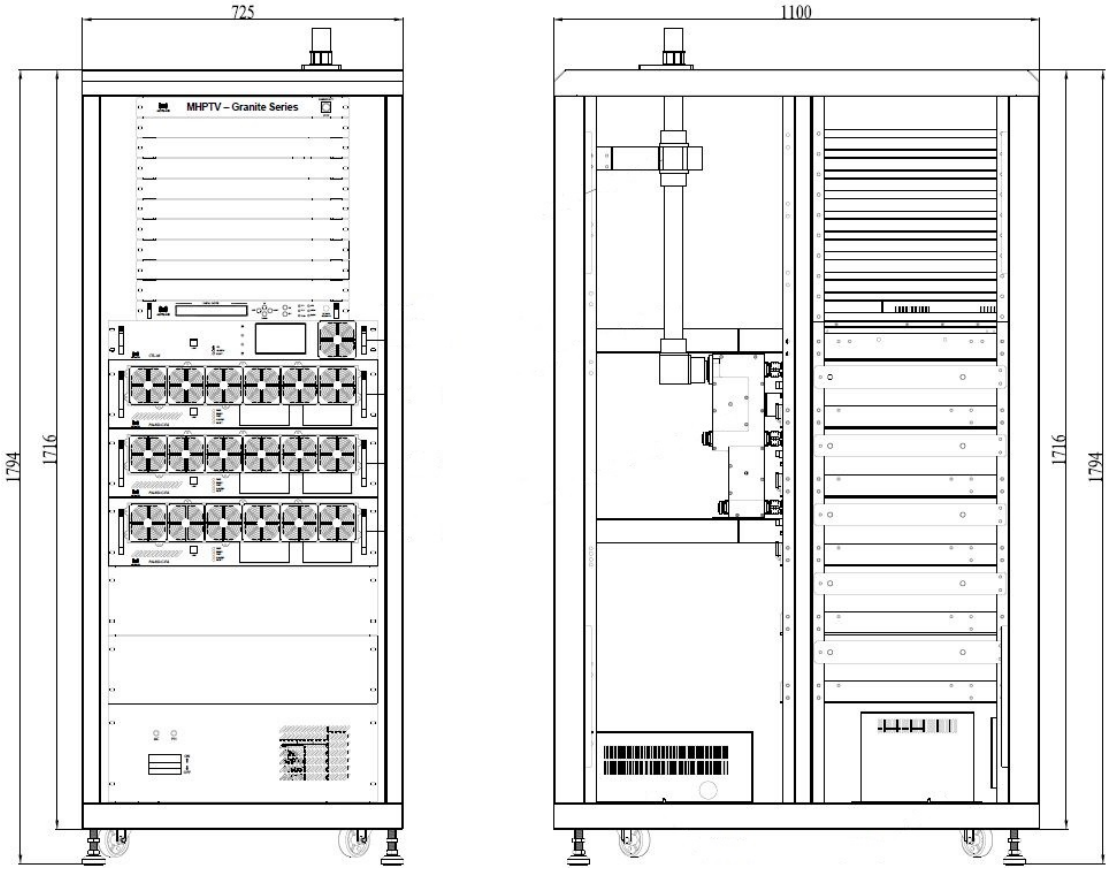
From the rear view of the TX cabinet, several other main components can be seen which include an AC Distribution System, 3-way Splitter and Combiner, 2-port Directional coupler and Reject Load.



The diagram below shows the overall system interconnect between the various modules in the 3-PA MHPTV system.



The 3-PA MHPTV system Cabinet dimensions are shown below. Please note: the BPF (not shown) may be mounted on top or on the side of the TX cabinet.

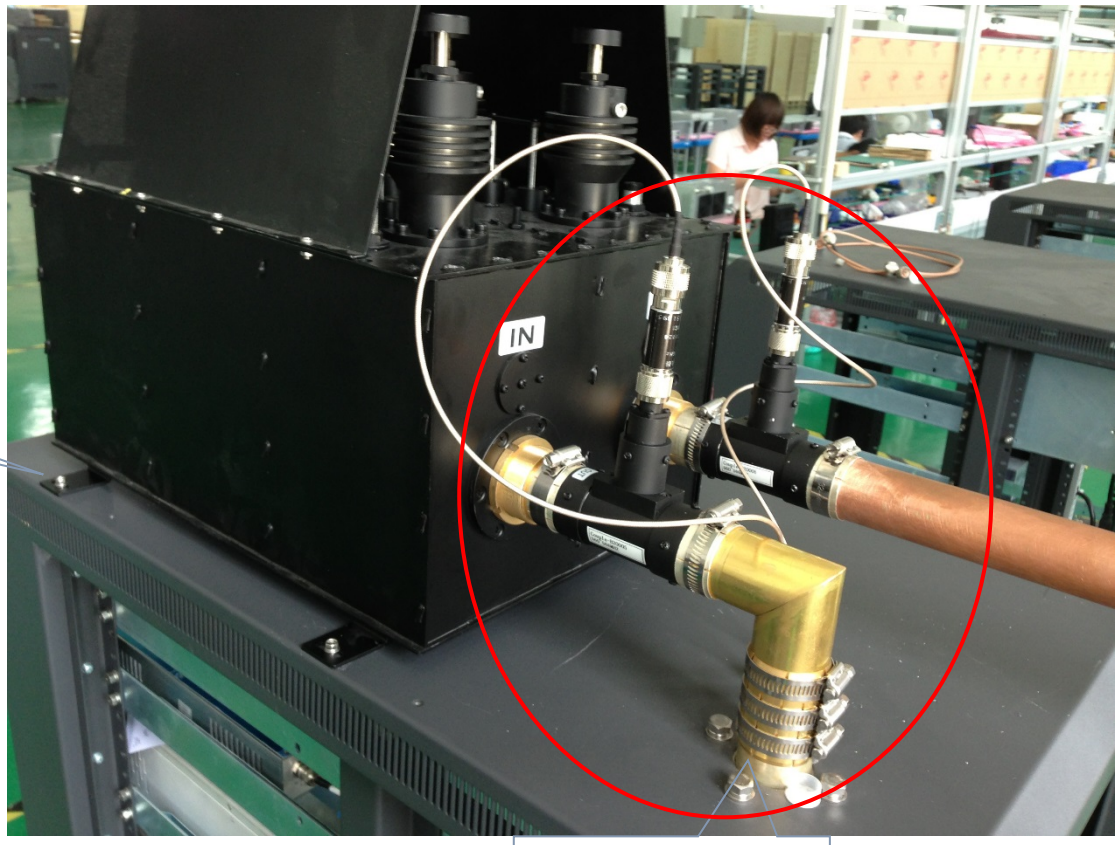


6 RF System Connections

Once the TX cabinet is in position, the next step is to install the RF system and connect the TX to the Antenna feed or a suitable station load before proceeding further.

1. Mechanically mount BPF

If you purchased an Anywave BPF, Anywave will design to install the BPF either on top of the TX cabinet or standing on the floor, according to the transmitter and the BPF's dimensions, unless it is specified with order.
If it is mounted on top of the MPTV cabinet (as shown below), four metal stand-offs "feet" with mounting hardware are supplied with the BPF to allow it to be fastened and secured to four holes located in the top panel of the cabinet. Before securing the BPF with the screws provided, please execute step 2 below, as you will need to be able to move (slide) the BPF into place, and then apply the mounting screws.



1 – Mount BPF

2 – Connect Elbow and Directional Couplers

If the BPF is installed on the floor next to the TX cabinet, then put the BPF in standing position, and connect it with the transmitter with coax. Please note, if the LPF included in the system is not installed inside the cabinet, then it should be put between the transmitter and the BPF, as shown below.

2. Connect Elbow and Directional Couplers

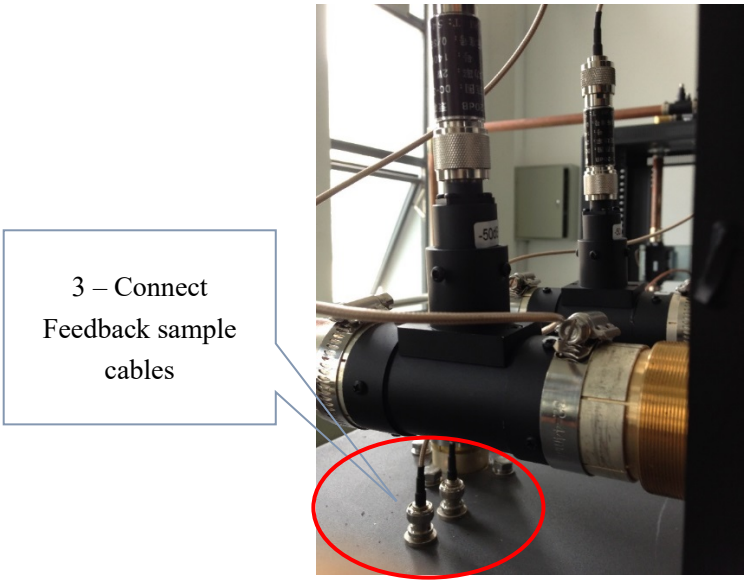
With the BPF set on top of the cabinet, connect the 90º Elbow between the TX output stack and the BPF Input (Before filter) Directional Coupler (if the LPF is installed in the TX cabinet), or between the TX output stack and the LPF Input (if the LPF is installed external to the TX cabinet). Be sure that these connections are made properly and the RF bullets are fully seated inside.

Connect the After-filter Directional Coupler to the output of the BPF on one side and then to the 1 5/8 or 3 1/8 slip-on flange adapter on the other side (not shown in the photo above). This standard 1 5/8 or 3 1/8 EIA flanged output will then need to be connected to your Antenna transmission line (please note: If your Antenna feed is other than 1 5/8 EIA or 3 1/8 flanged, then you will need to provide whatever adapter hardware necessary to facilitate this connection to your Antenna line).

Please be sure to install the Before and After BPF Directional Couplers in the correct positions and orientation. Incorrect operation of the TX system may result if these directional couplers are not installed in the proper locations with the proper orientation as labeled.

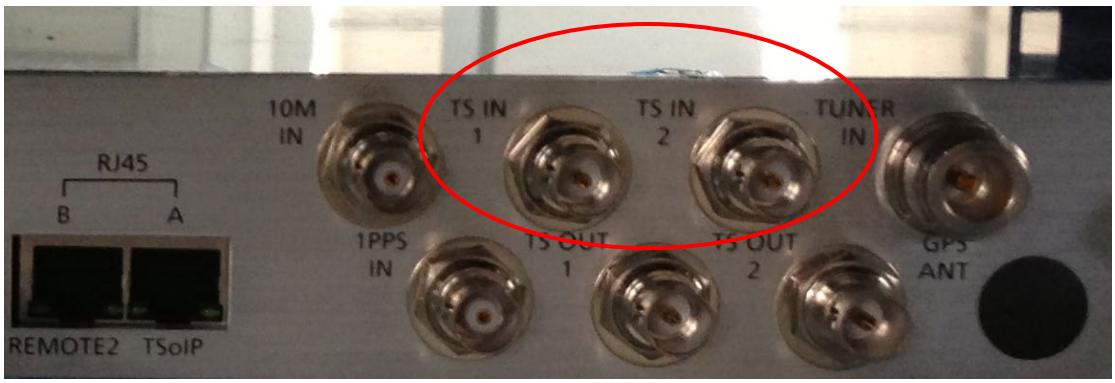
3. Connect Feedback sample cables

Connect the 2 x 20dB attenuators to the Before and After 50dB Directional Couplers and then connect these attenuators to the Before and After filter feedback BNC connectors located on the top of the cabinet with the cables provided (as shown below). As a check, verify the Before and After samples are properly connected to the respective inputs on the Exciter inside the cabinet.



7 TS Input Stream Connection

With the RF output connections properly made, the next step is to connect your 19.39 MBPS TS input stream to the Exciter inside the TX cabinet. Using a 75ohm cable, connect your ASI input stream to the TS IN 1 BNC connector on the rear panel of the Exciter (as shown below). If you have more than one TS (multiple STLs, etc.) connect your redundant TS input to the TS IN 2 BNC connector.



Please note: The above instructions apply to the 5X Exciter (which requires an ASI input signal) and is most likely the Exciter installed in your system. However, if you ordered the 9X Exciter (that can accept an ASI, SMPTE301M, or TSoIP (optional) TS input, the rear panel connections on your Exciter will look slightly different. Please consult your Exciter User Manual for details.

With a valid ASI TS stream connected to the TS IN 1 and/or TS IN 2 on the Exciter, verify that the corresponding TS1 and/or TS2 Led is illuminated on the front panel of the Exciter as shown below.

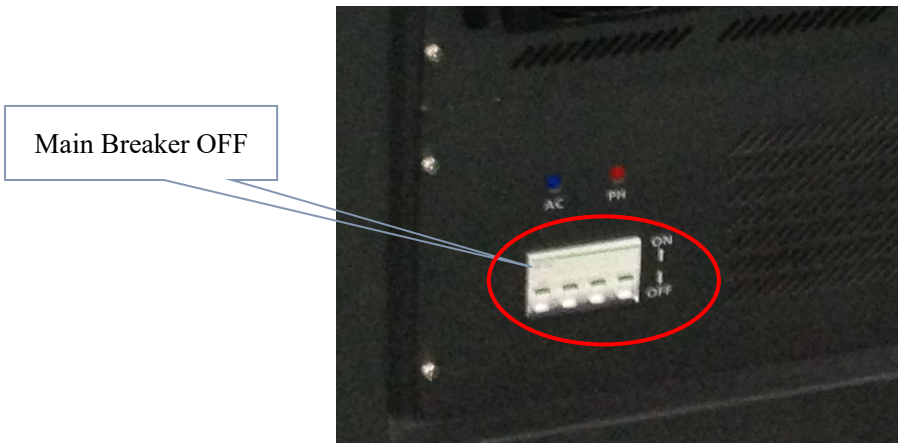
Please note: The Exciter SysErr LED illuminates solid RED when the Exciter is in Local mode and is OFF when the Exciter is in Remote mode. This LED only indicates a SysErr when flashing.

8 AC Mains Connections

Please review the safety WARNINGS on page 4 of this manual before proceeding with any electrical work.

A licensed Electrician is required to properly and safely connect the AC mains power cable from your station's electrical panel to the terminal block located inside the TX AC Mains Distribution compartment in compliance with local electrical and building codes. Please note: a power cable is not provided with the Transmitter system and should be obtained via your local Electrician.

Be sure the Main Breaker on the lower left front of the TX is turned OFF before performing any electrical work on the TX (as shown below).



The MHPTV TX AC distribution compartment may be wired for 240VAC single-phase (3-wire, L1, L2, GND – for 1, 2, and 3-PA systems) or 208VAC three-phase (4-wire, L1, L2, L3, GND – for 1~8 Pa systems) power to be sourced from a proper breaker sized according to the charts below. Also, please note the recommended cable gauge to make the connection between the TX AC Mains Distribution terminal block and the circuit breaker installed in the facility electrical panel. Please note: This cable is not provided with your Transmitter equipment and should be obtained from your local Electrician.

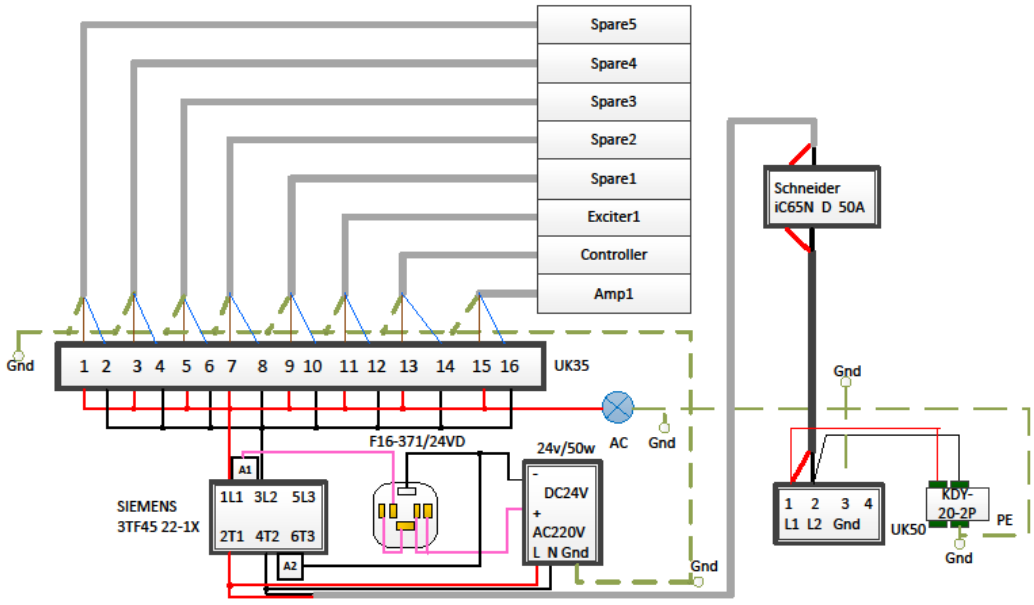
Important: The transmitter cabinet MUST be properly bonded to the building lightning protective ground and have a good RF ground. This is typically done with a 2" to 4" copper strap that is connected to the cabinet ground, found at the bottom rear of the TX cabinet, making sure all equipment inside the rack is tied to this ground. Any damage caused by not having proper grounding may void your warranty.

MHPTV – (Granite) Doherty AC Power Requirements

MHPTV- (Granite) Doherty (888E) -AC Power Requirements, Dimensions, and Weights			
After BPF(W)	**240VAC** **Single-phase (L1, L2, GND)**	**208VAC** **Three-phase (L1, L2, L3, GND)** **Delta**	Net Weight (lbs.) Dimensions (mm)
1100(ATSC), 1PA	3110W consumption	3110W consumption	Weight: 400 lbs.
	20A, 2pole breaker, gauge 12 wire	15A, 3pole breaker, gauge 14 wire	1358H x 850D x 725W (mm)
	13.0A/phase-current draw	8.7A/phase-current draw	
2200(ATSC), 2PA	6220W consumption	6220W consumption	Weight: 520 lbs.
	40A, 2pole breaker, gauge 8 wire	30A, 3pole breaker, gauge 10 wire	1358H x 850D x 725W (mm)
	25.9A/phase-current draw	17.3A/phase-current draw	
3300(ATSC), 3PA	9330W consumption	9330W consumption	Weight: 700 lbs.
	50A, 2pole breaker, gauge 6 wire	40A, 3pole breaker, gauge 8 wire	1794H x 1100D x 725W (mm)
	38.9A/phase-current draw	26.0A/phase-current draw	
4400(ATSC), 4PA	N/A	12440W consumption	Weight: 810 lbs.
	N/A	50A, 3pole breaker, gauge 6 wire	1794H x 1100D x 725W (mm)
	N/A	34.6A/phase-current draw	

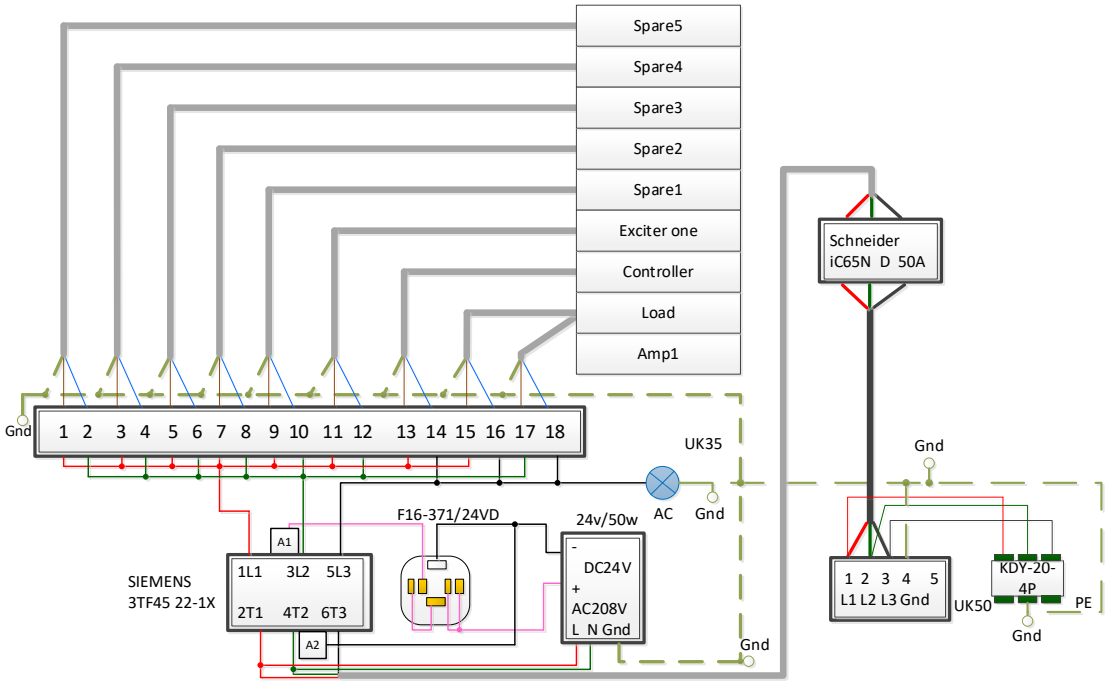
5500(ATSC), 5PA	N/A	15560W consumption	Weight: 920 lbs.
	N/A	60A, 3pole breaker, gauge 6 wire	1794H x 1100D x 725W (mm)
	N/A	43.2A/phase-current draw	
6600(ATSC), 6PA	N/A	18670W consumption	Weight: 1060 lbs.
	N/A	70A, 3pole breaker, gauge 4 wire	2063H x 1100D x 725W (mm)
	N/A	51.9A/phase-current draw	
8800(ATSC), 8PA	N/A	24890W consumption	Weight: 1280 lbs.
	N/A	100A, 3pole breaker, gauge 2 wire	2063H x 1100D x 725W (mm)
	N/A	69.2A/phase-current draw	

1-PA 240VAC, Single-Phase AC Distribution Wiring



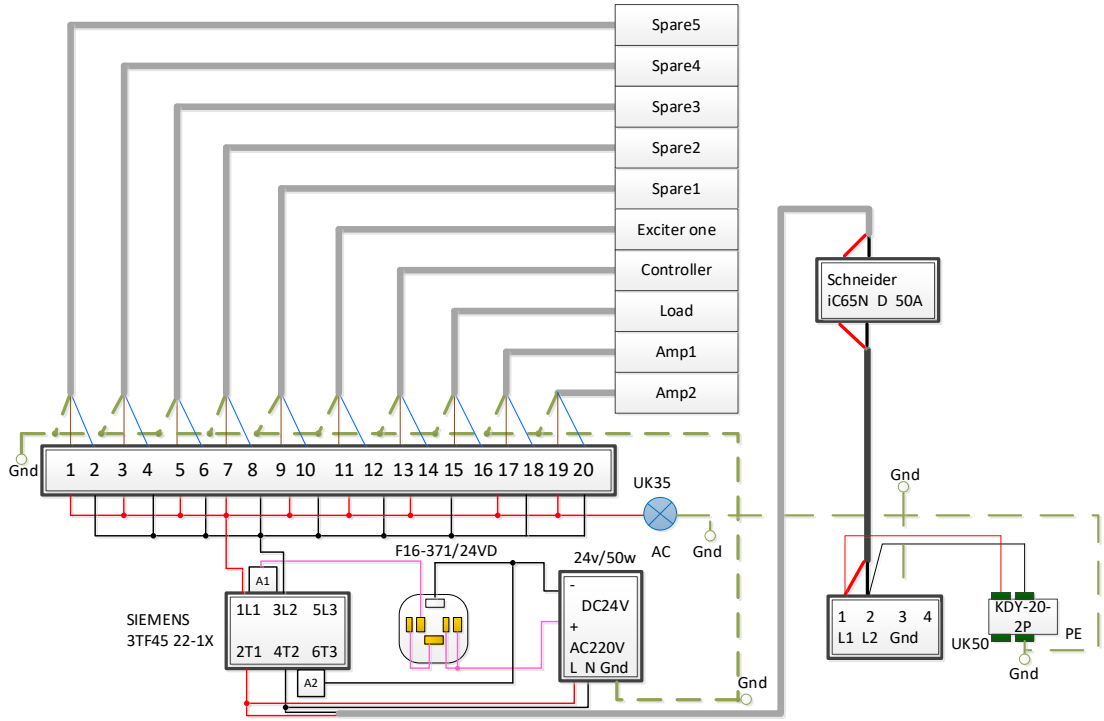
Properly connect the three wires to the terminal block as shown in the above diagram, taking care to notice which terminal is connected to the chassis Ground in your system. Be sure to connect the GND terminal properly and other two connections as L1 and L2.

1-PA 208VAC, Three-Phase AC Distribution Wiring



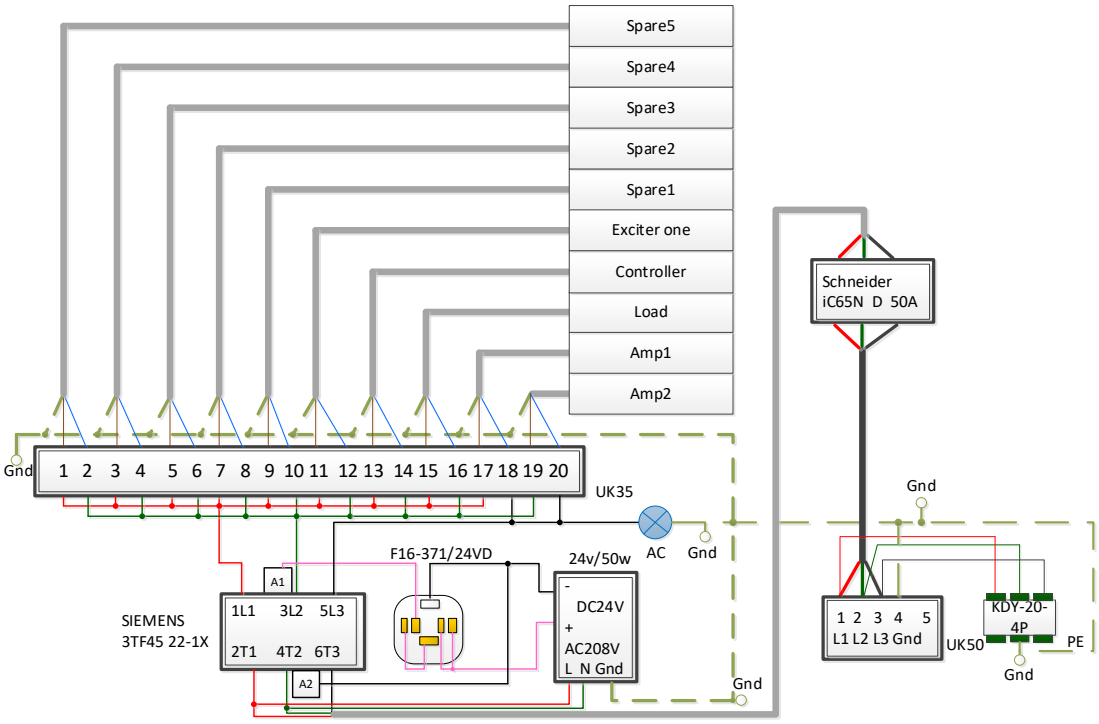
Properly connect the four wires to the terminal block as shown in the above diagram, taking care to notice which terminal is connected to the chassis Ground in your system. Be sure to connect the GND terminal properly and other three connections as L1, L2, and L3.

2-PA 240VAC, Single-Phase AC Distribution Wiring



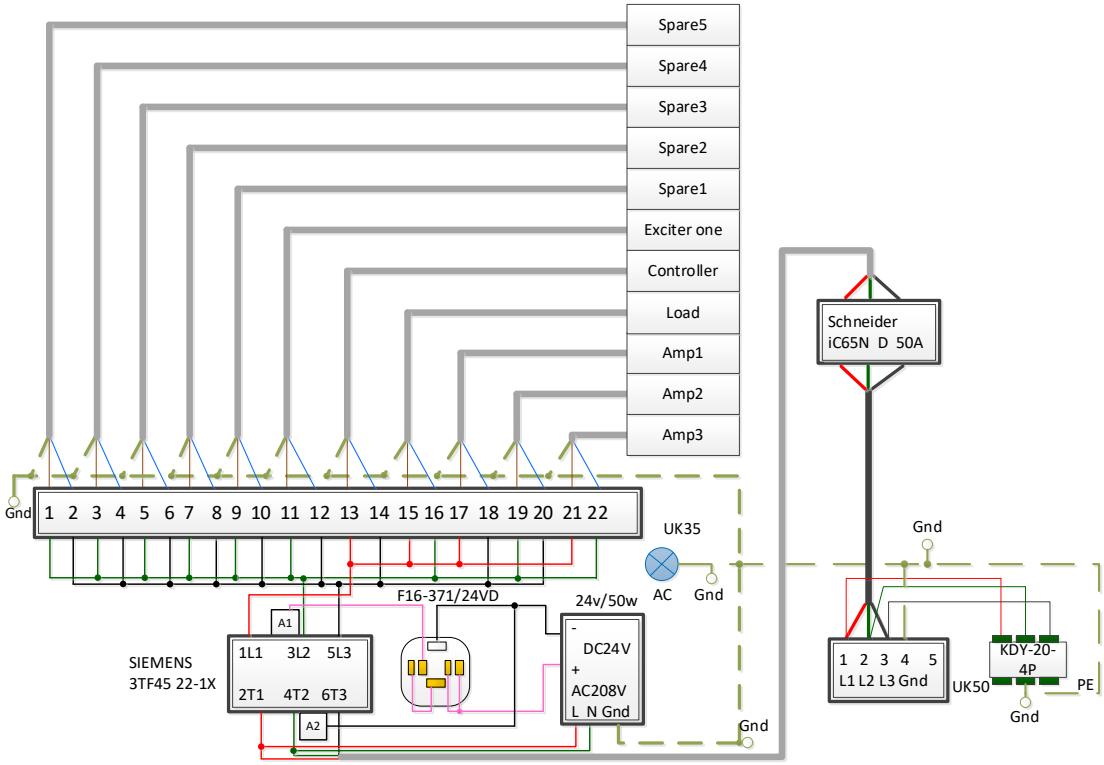
Properly connect the three wires to the terminal block as shown in the above diagram, taking care to notice which terminal is connected to the chassis Ground in your system. Be sure to connect the GND terminal properly and other two connections as L1 and L2.

2-PA 208VAC, Three-Phase AC Distribution Wiring



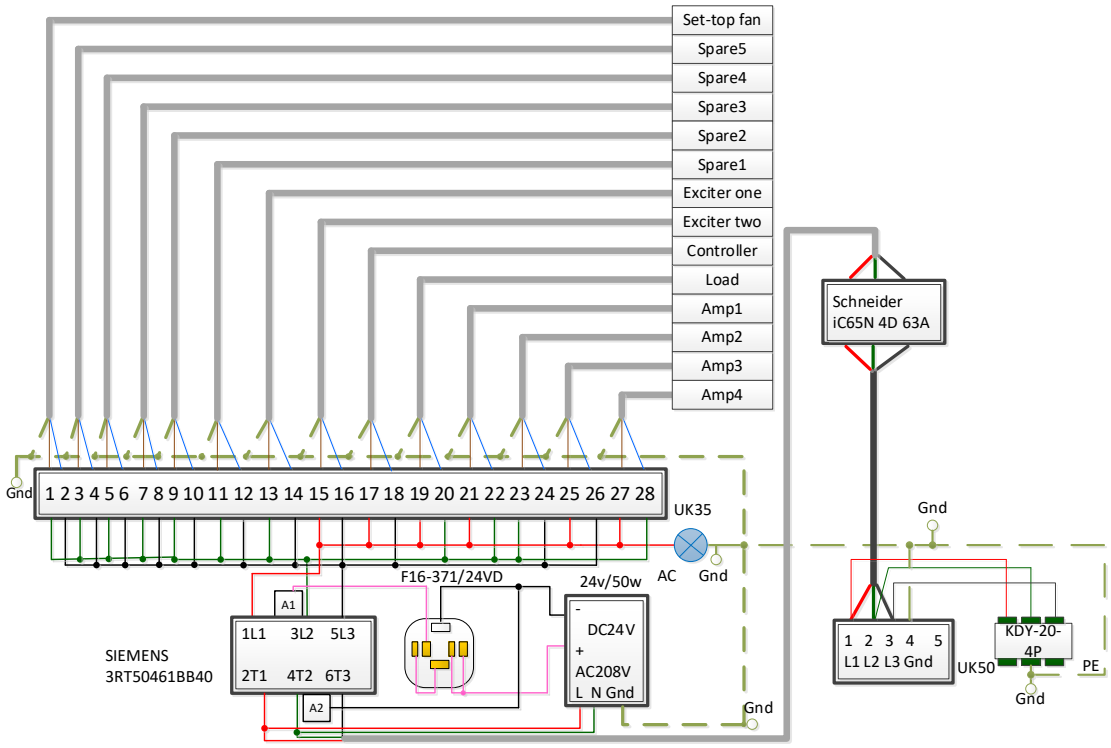
Properly connect the four wires to the terminal block as shown in the above diagram, taking care to notice which terminal is connected to the chassis Ground in your system. Be sure to connect the GND terminal properly and other three connections as L1, L2, and L3.

3-PA 208VAC, Three-Phase AC Distribution Wiring



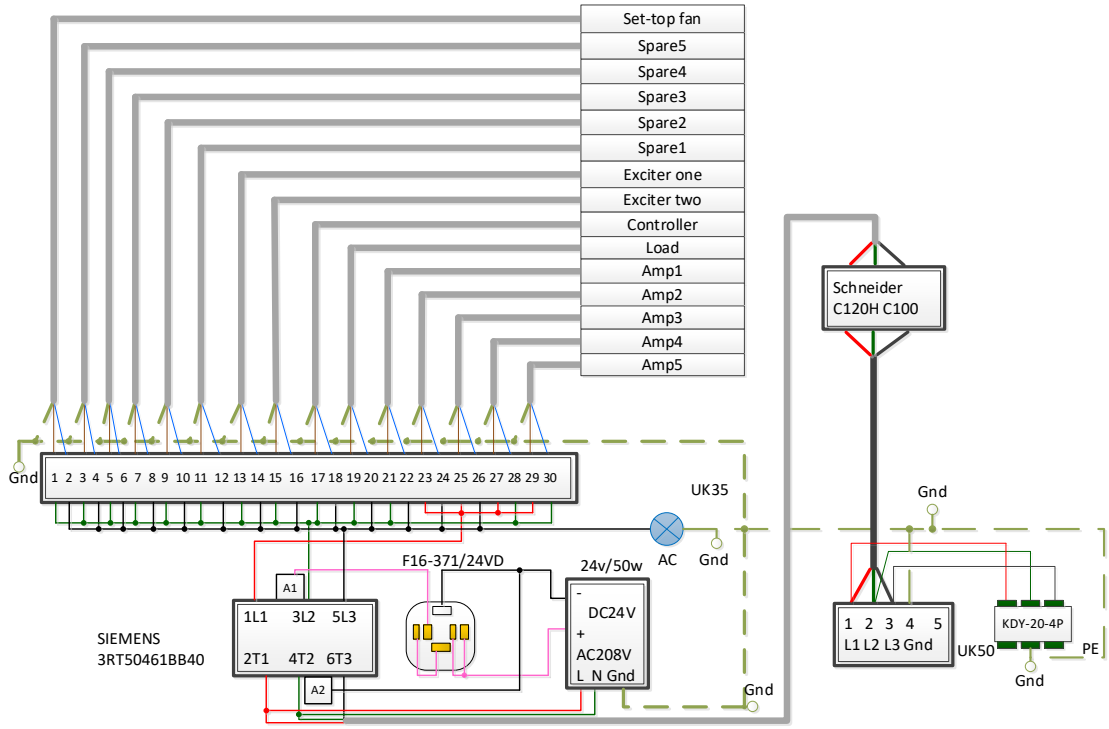
Properly connect the four wires to the terminal block as shown in the above diagram, taking care to notice which terminal is connected to the chassis Ground in your system. Be sure to connect the GND terminal properly and other three connections as L1, L2, and L3.

4-PA 208VAC, Three-Phase AC Distribution Wiring



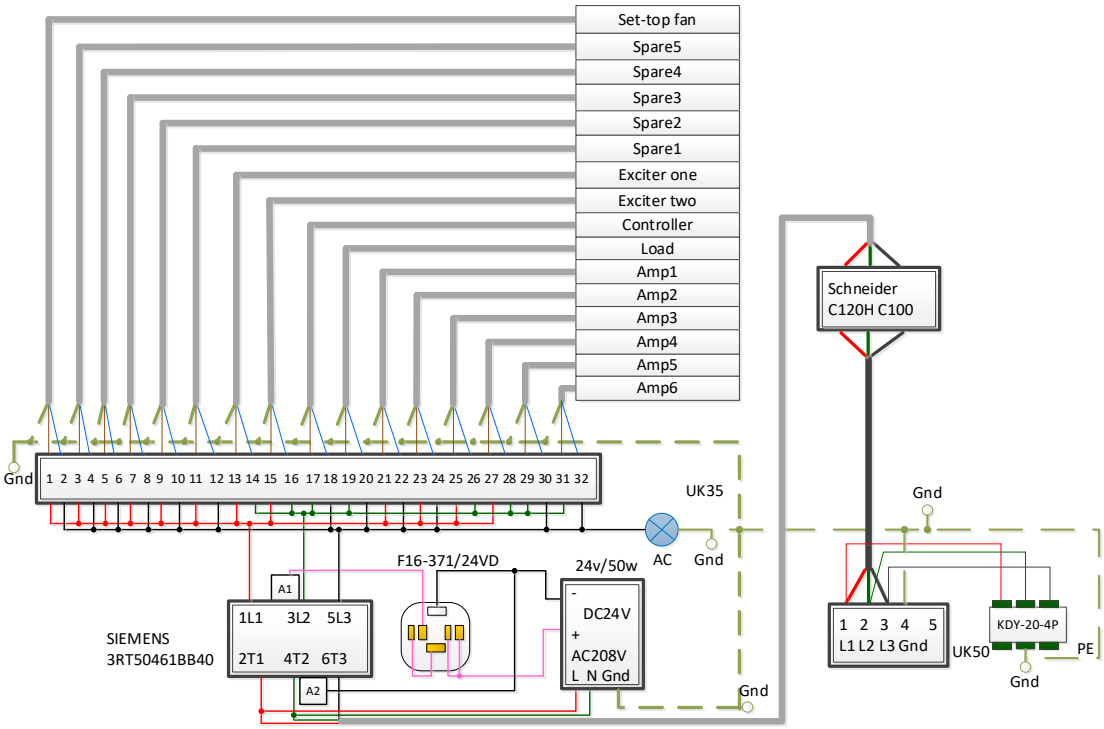
Properly connect the four wires to the terminal block as shown in the above diagram, taking care to notice which terminal is connected to the chassis Ground in your system. Be sure to connect the GND terminal properly and other three connections as L1, L2, and L3.

5-PA 208VAC, Three-Phase AC Distribution Wiring



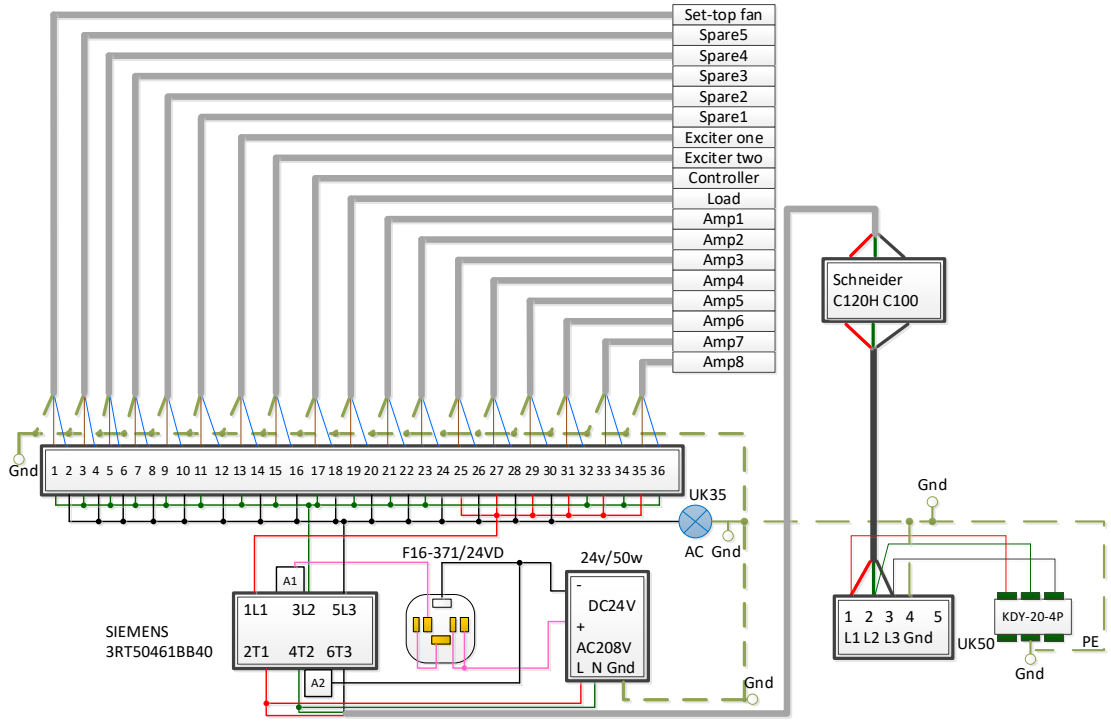
Properly connect the four wires to the terminal block as shown in the above diagram, taking care to notice which terminal is connected to the chassis Ground in your system. Be sure to connect the GND terminal properly and other three connections as L1, L2, and L3.

6-PA 208VAC, Three-Phase AC Distribution Wiring



Properly connect the four wires to the terminal block as shown in the above diagram, taking care to notice which terminal is connected to the chassis Ground in your system. Be sure to connect the GND terminal properly and other three connections as L1, L2, and L3.

8-PA 208VAC, Three-Phase AC Distribution Wiring



Properly connect the four wires to the terminal block as shown in the above diagram, taking care to notice which terminal is connected to the chassis Ground in your system. Be sure to connect the GND terminal properly and other three connections as L1, L2, and L3.

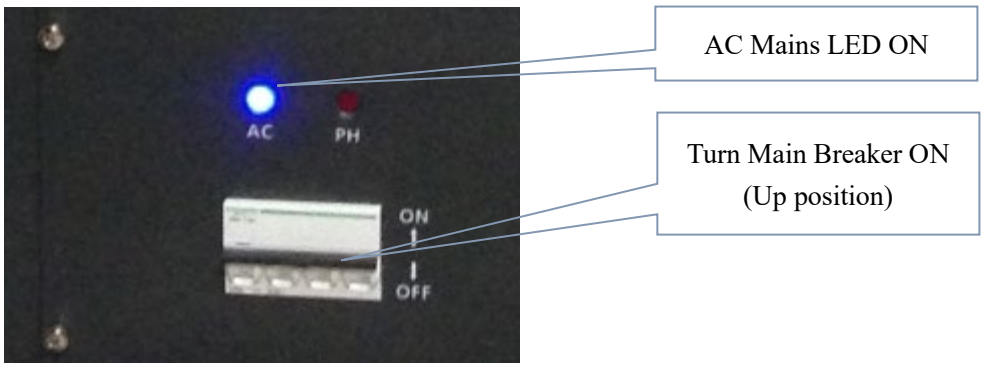
9 Initial Turn On

Once the RF connections have been properly made into your antenna feed or suitable station load, and the Transmitter has been properly wired to the station electrical panel (as outlined in sections 6 & 8) you are now ready to turn on the system.

Please locate and have handy for reference a copy of your MPTV TX Factory Test Report as well as this MHPTV TX User Manual and Quick Start Guide, and Exciter User Manuals.

Please follow the steps outlined below to safely turn on and bring your TX system up to power.

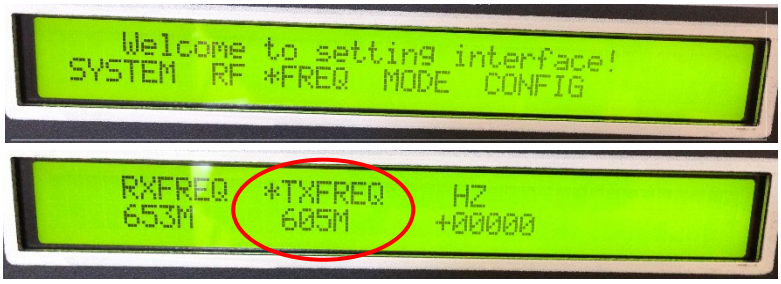
1. Apply power to the Transmitter by turning ON the AC Main Breaker located in the lower left front of the TX and ensure that the AC Mains indication is illuminated. You will hear the PA fans rev up to full speed for a few seconds and then ramp down.



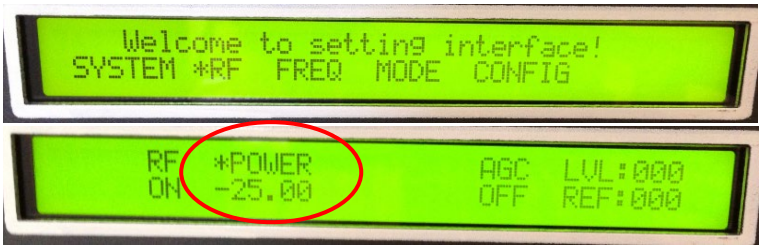
It takes a few seconds for the Controller to power up and display the HOME screen (shown below). Please note that the values will be different as the TX initially turns ON at a reduced power level.

The Controller HOME touchscreen display will indicate System Forward (FWD), Reflected (REFL), and Reject Load (REJT) output power in Watts in real-time.

2. Check Exciter settings. Check the operating Frequency of the Exciter by navigating to the Exciter FREQ submenu (simultaneously press Left and Right buttons)

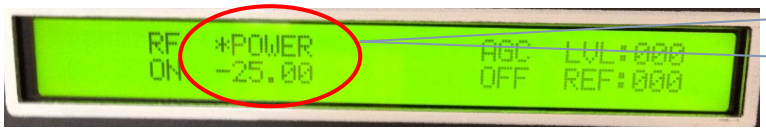


Check the Exciter drive level is set to -25dBm by navigating to the Exciter RF submenu (from above, press ESC button then enter the RF submenu).

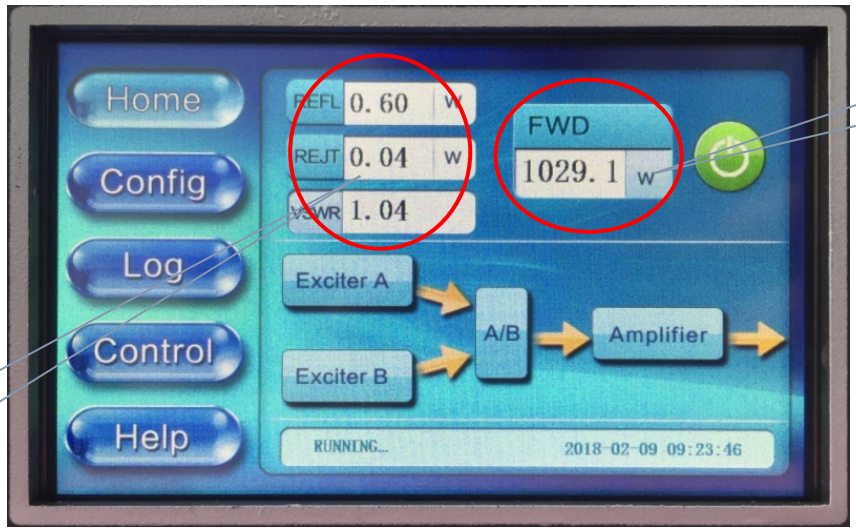


3. You are now ready to bring the TX up to power. To accomplish this, slowly increase the drive level out of the Exciter by increasing the POWER setting in the Exciter RF submenu while watching the Sys FWD power increase accordingly on the Controller touchscreen.

   Begin to slowly raise the FWD System power by using the UP button on the Exciter, while monitoring the FWD system power meter on the Controller HOME screen as shown below.



Slowly increase to raise FWD SYS POWER



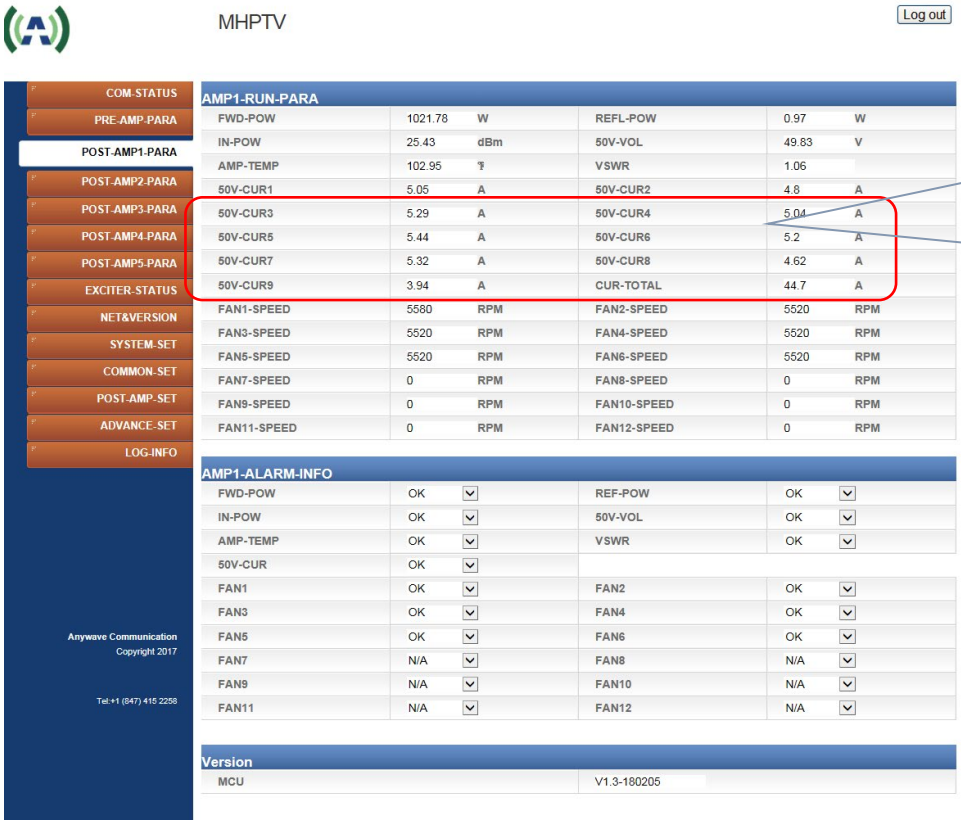
Monitor FWD SYS POWER

Monitor REFL, REJT, and VSWR

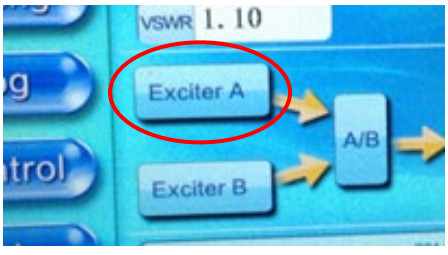
4. Slowly bring the FWD power to ~ half-power and notice the power meter values of REFL, REJCT, and VSWR to be sure these look reasonable (less than the values of the TX operating at full rated power (please reference your Factory Test Report for these values).

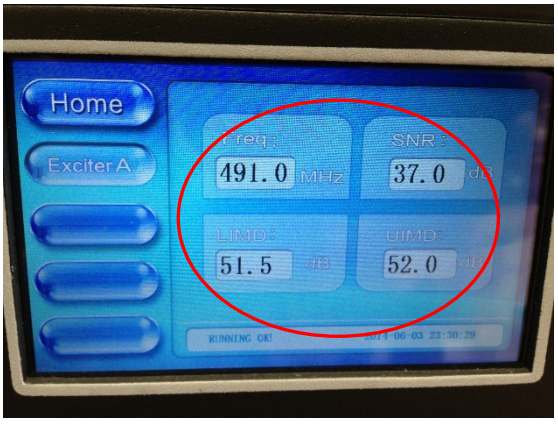
   Check to be sure that the lower-left corner of the HOME screen shows the status as “RUNNING OK!” and there are no alarm messages. If you do see an alarm message, please reference the Troubleshooting section of your transmitter User Manual to understand what the error means and suggested steps to correct it. (For example, when initially turning on a system, the error message AMP_VSWR_ERR (accompanied by high REFL power readings) may be witnessed - indicating a connection problem somewhere in the external RF System – a mismatch sending hi reflected energy back to the REFL sample on the output directional coupler inside the TX cabinet.)

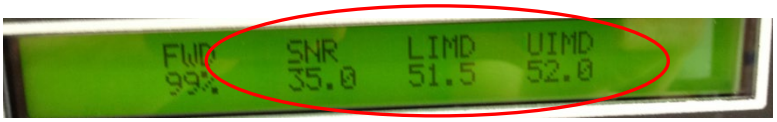
5. Continue to slowly raise the FWD power until you reach the max power rating of the TX or your lower desired TPO. Check to be sure that the PA device currents do not exceed the full power operating currents as shown in your Factory Test Report. Also, be careful to make small increases in the value of Exciter POWER as you approach the desired TPO.



6. Check the SNR and Shoulder (LIMD and UIMD) RF performance of your system by pressing the Exciter A icon on the Controller HOME screen or by checking the Exciter hi-level LCD or web interface as shown below.







Linear and Non-Linear corrections were performed and optimized at the TX rated TPO in the factory and so the stored correction coefficients should produce good results if you are operating at or close to the TX max output power.

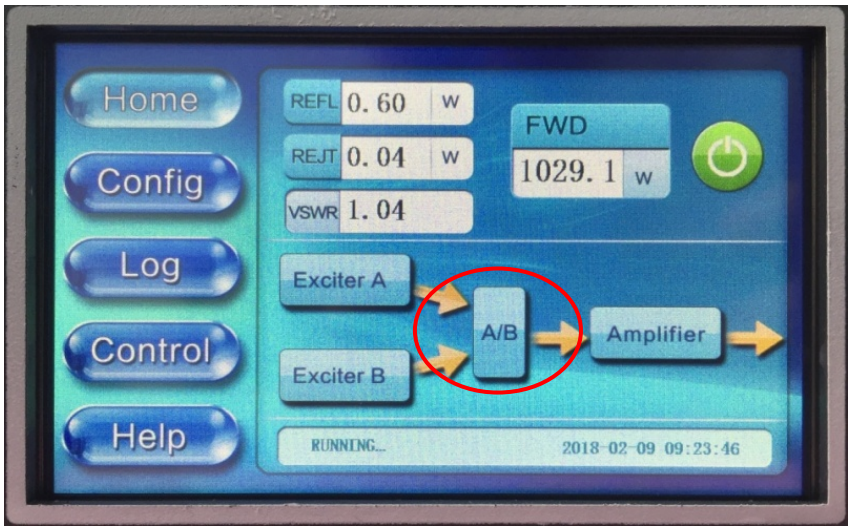
If you are operating at a TPO less than the max rated TX power or wish to rerun corrections, please reference the “Running Corrections” section of your transmitter User Manual.

7. With your TX operating at your desired output power and with good RF performance, the next step is to engage the TX AGC.

   Navigate to the AGC screen on the Controller (by pressing the CONFIG button and then the AGC button). Be sure the AGC Target FWD power is set your desired TPO but no higher than the TX max rated output power, and then press the unlit AGC button to engage the TX AGC and turn this button Green.

8. Press the HOME button to return to the HOME screen to monitor FWD power With the AGC engaged, the FWD power metering may vary up to +/- 5%, so for a 1500W TPO, meter variations from 1425W to 1575W may be experienced.

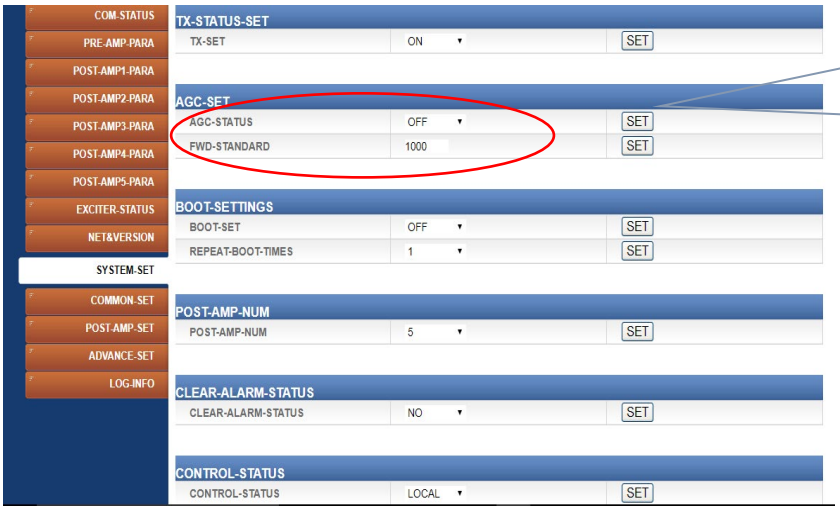
9. For Dual Exciter TX configurations, test the Exciter switchover behavior by pressing the A/B icon on the Controller touchscreen and initiating an Exciter Changeover by selecting EXCITER B, and confirming the changeover when asked. The power will drop and the exciter changeover will initiate. Once again, allow 45 to 60 seconds for the transmitter to reach operating power. Make the same performance checks as just outlined for Exciter A.



10. Your TX should now be up and running properly into your load or on-air antenna. Continue to monitor system parameters as you allow the transmitter to warm up to temperature and stabilize at full output power for another 30 minutes.

11. To turn the TX On/Off, please use the TX On/Off button located on the HOME screen of the Control module or via the TX built-in web interface. When turning the TX OFF and ON again, monitor the FWD power wattage on the HOME screen as FWD power ramps up to the AGC target level (45-60 seconds).

12. To Raise or Lower the TX output power level, please adjust the AGC target power setting under the Controller Config →AGC button. An alternative to this would be to disable the Controller AGC (set AGC-Status = Off) and raise/lower the Exciter output drive.



13. You may network your Transmitter Control Module (rear LAN connector, default IP address 192.168.1.210) and your Exciter (REMOTE RJ-45 rear panel connection at 192.168.1.143), and your PA drawers (rear Lan port 192.168.1.200 – note – you will need to change some of the PA IP address (via the PA built-in web interface) to avoid network conflicts if putting all PAs on your network for remote monitor/control. All equipment IP addresses are user-configurable via their respective user interfaces, so they may be configured to match the TX sites specific IP addressing scheme.

    If you desire to have remote monitoring and control, before leaving the station, please be sure to set the Transmitter to REMOTE mode via the Controller CONTROL button setting and set the Exciter to REMOTE mode under the SYSTEM submenu by setting CTL=RMT. This will enable remote monitoring and control of the TX via its built-in web interfaces (refer to the MHPTV TX and Exciter user manuals for details).

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