ANYWAVE

ATSC 1.5KW DTV Transmitter

Quick Start Guide

Version 1.0 – September 10, 2014

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 INSTALL THE EQUIPMENT. CONTACT ANYWAVE WITH ANY QUESTIONS OR CONCERNS YOU MAY HAVE.

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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 initial turn on of the equipment.

Returns and Exchanges

Written approval and a Return Authorization Number (RAN) 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 RAN request. Proper handling and return shipping instructions will be provided with an approved RAN number.

Technical Support

Technical support and troubleshooting assistance for Anywave Transmitters is available through the Anywave Service Department during normal business hours (8:00 AM - 5:00 PM CST) at (847) 415-2258. Email questions to support_us@anywavecom.com.

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:_____

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 PERFROM 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 setup and turn on the Anywave 1.5KW DTV 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 1.5KW 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 is performed at the Anywave factory. The Exciter is setup 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 precorrection 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.

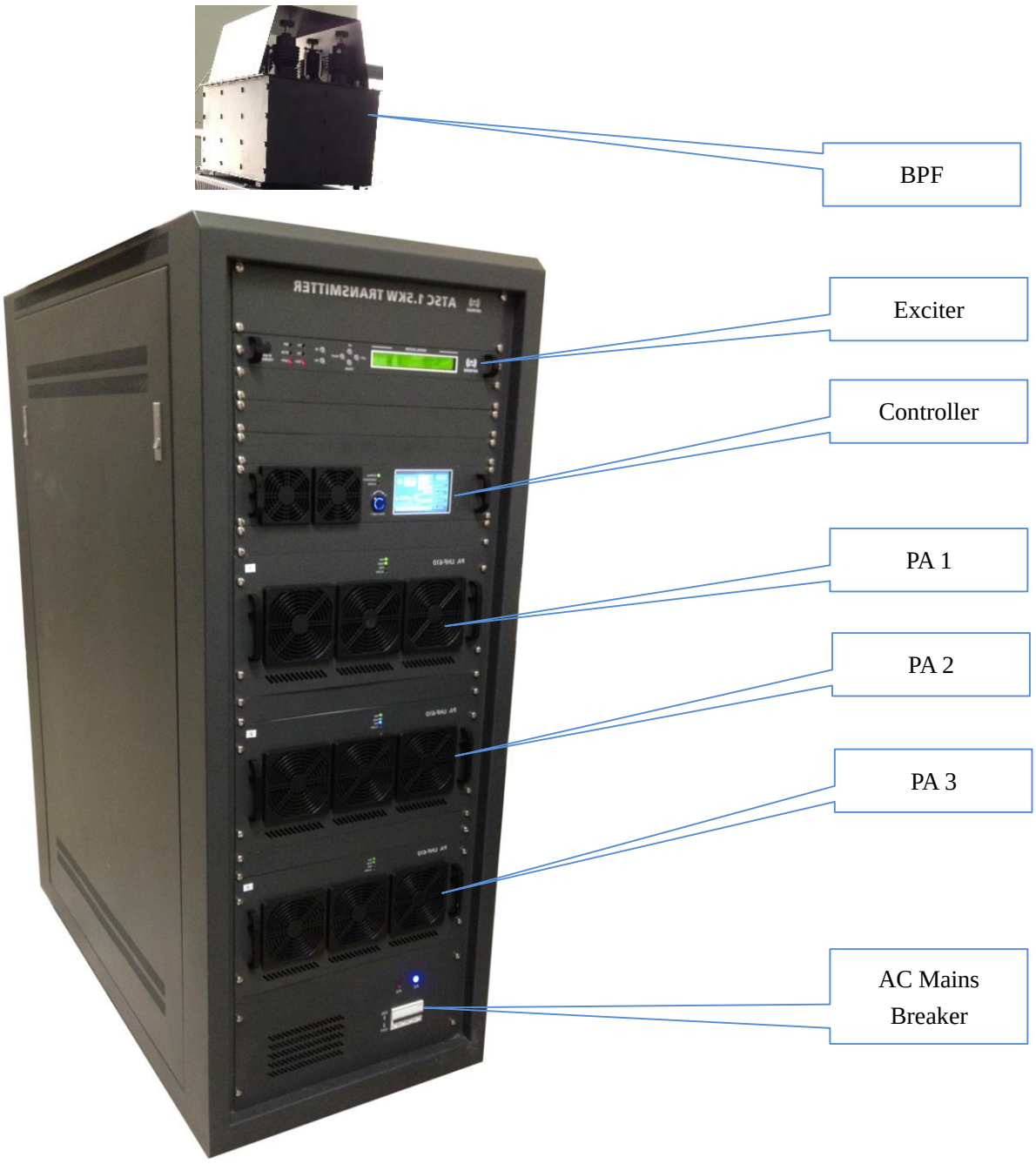
In your shipment, you should receive a copy of the following documentation.

- Packing Checklist
- Transmitter Factory Test Report
- 1.5KW TX Quick Start Guide
- 1.5KW 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.

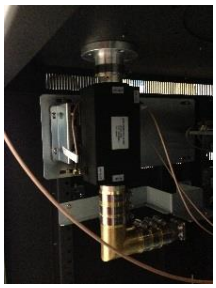
4 TX System Description

The Anywave ATSC 1.5KW DTV Transmitter 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 the Exciter, Controller unit (with a touchscreen LCD, and built-in preamp), three 600W power amplifiers, an AC Mains Breaker, and a channel mask Band Pass Filter (BPF) - optional.

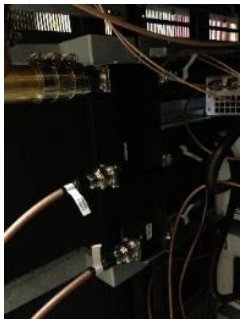


From the rear view of the TX cabinet, several other main components can be seen which include a 3-way Splitter, 2-port Directional Coupler, 3-Way Combiner, Reject Loads, and AC Distribution System.

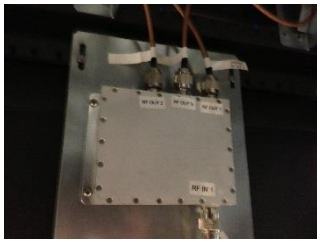
2-port Coupler

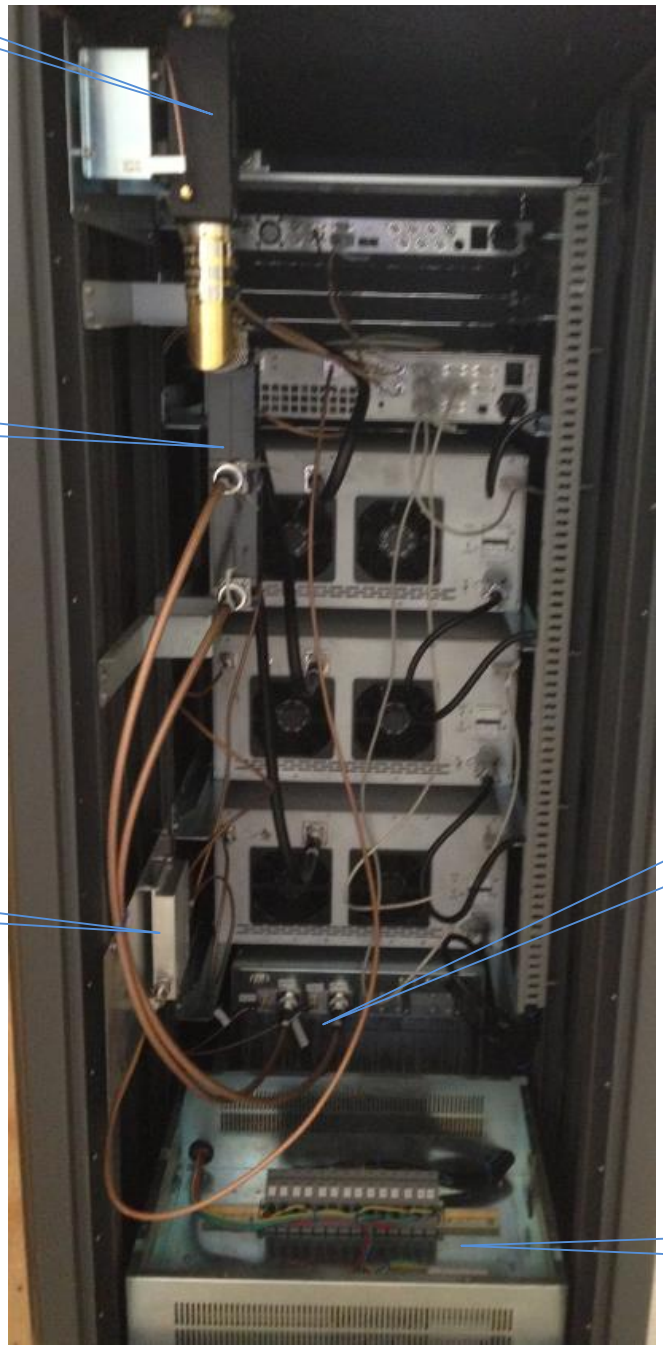


3-Way Combiner



3-Way Splitter



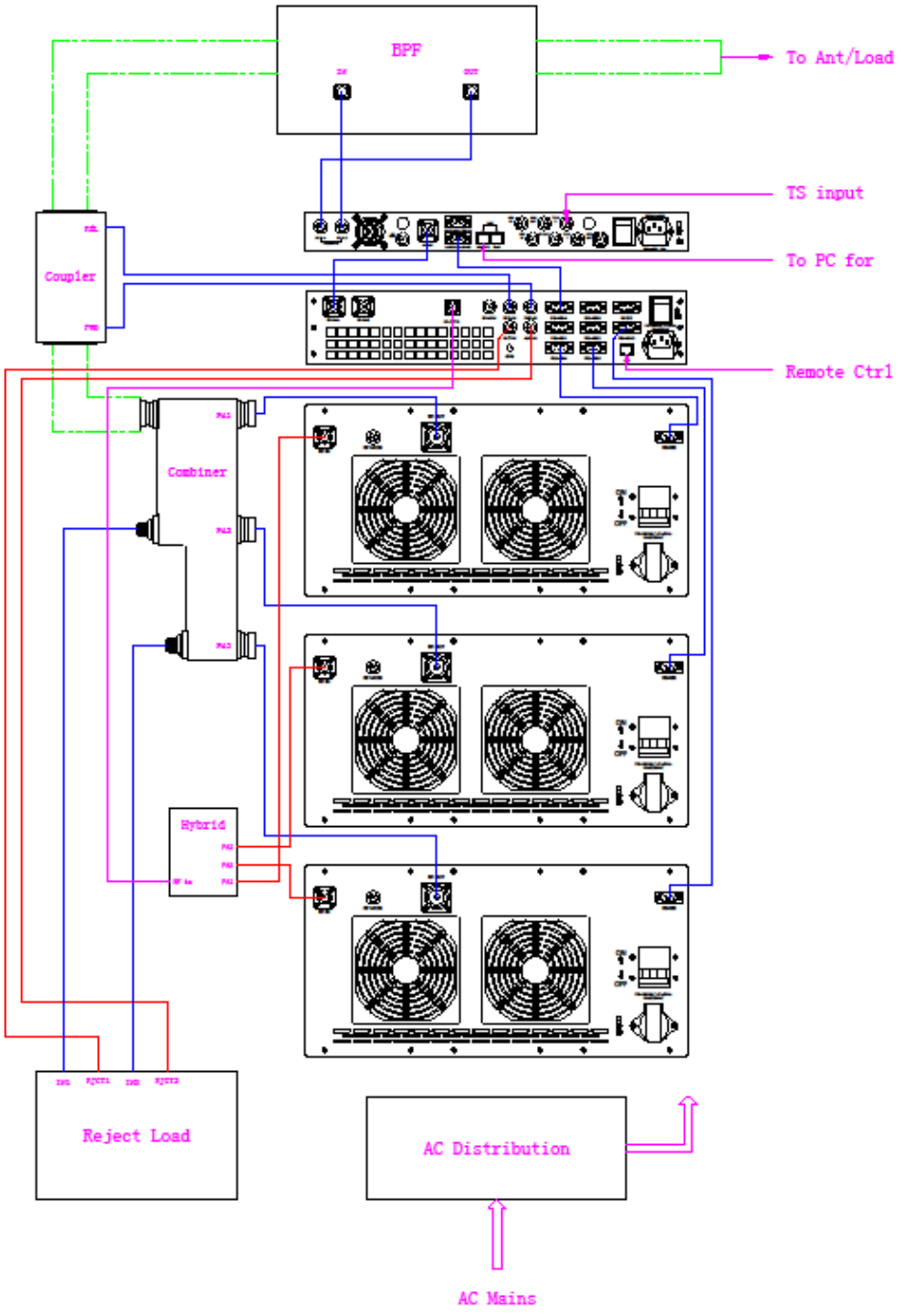


Sys Reject Loads w/fan

AC Distribution

5 TX System Interconnect

The diagram below shows the overall system interconnect between the various modules.

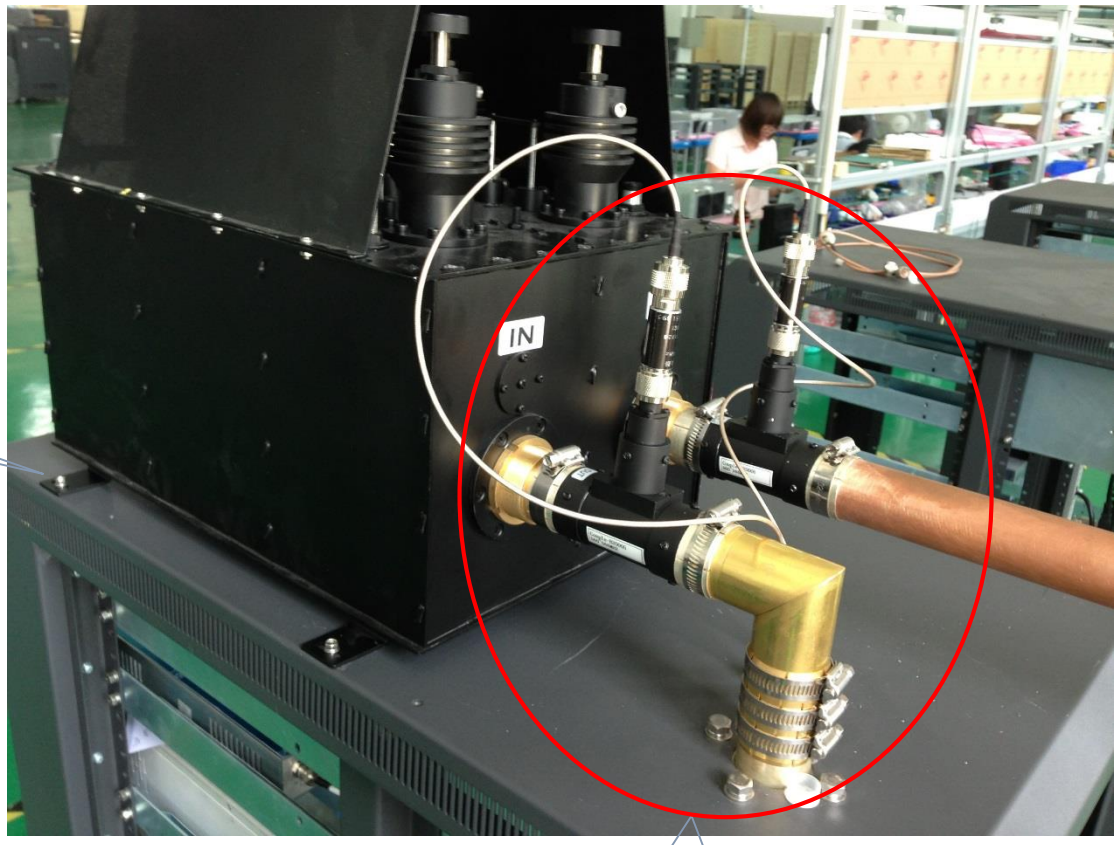


6 RF System Connections

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 on top of TX cabinet

If you purchased an Anywave BPF, it is designed to be installed and mounted on top of the 1.5KW TX 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

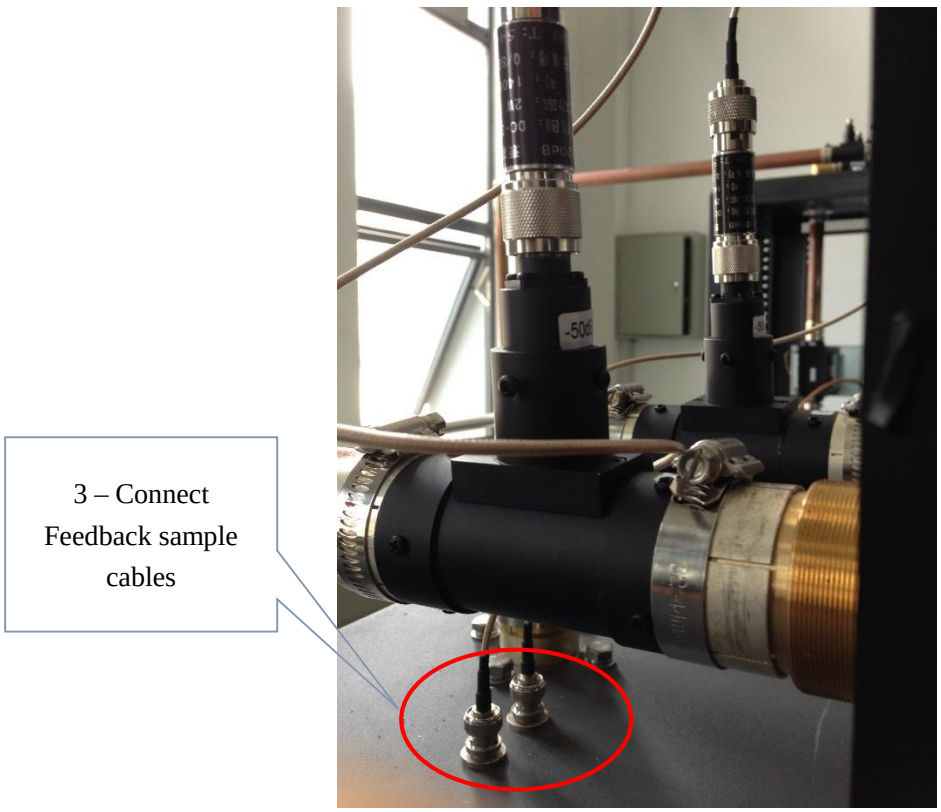
2. Connect Elbow and Directional Couplers

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 (as shown above). Be sure that these connections are made properly and the RF bullets are fully seated inside.

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

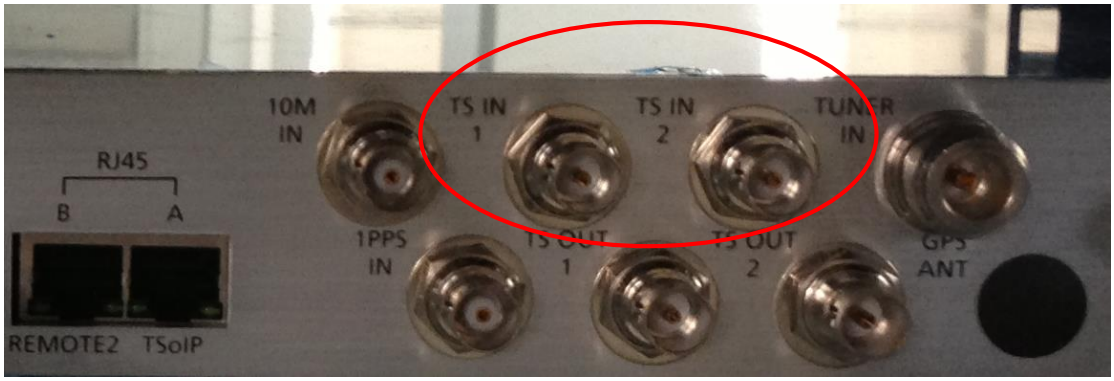
3. Connect Feedback sample cables

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 9X 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.

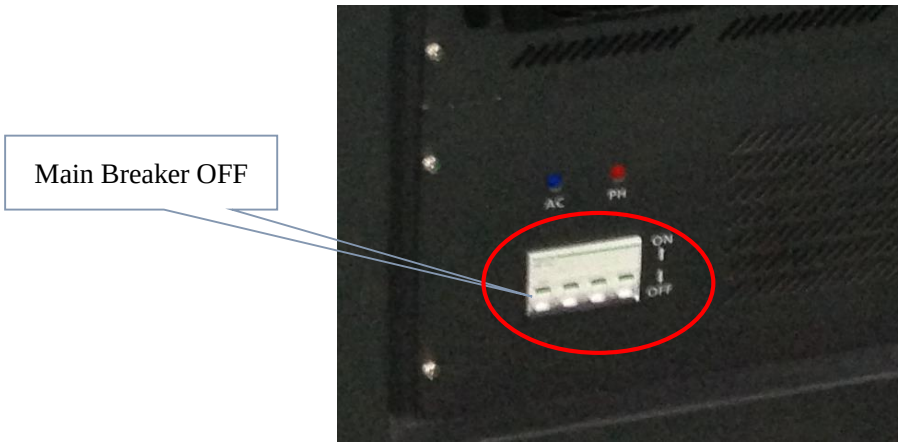
Please note: The Exciter SysErr LED illuminates solid RED when the Exciter is in Local mode and is OFF when the Exciter is in Remote mode. This LED only indicates a SysErr when flashing.

8 AC Mains Connections

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

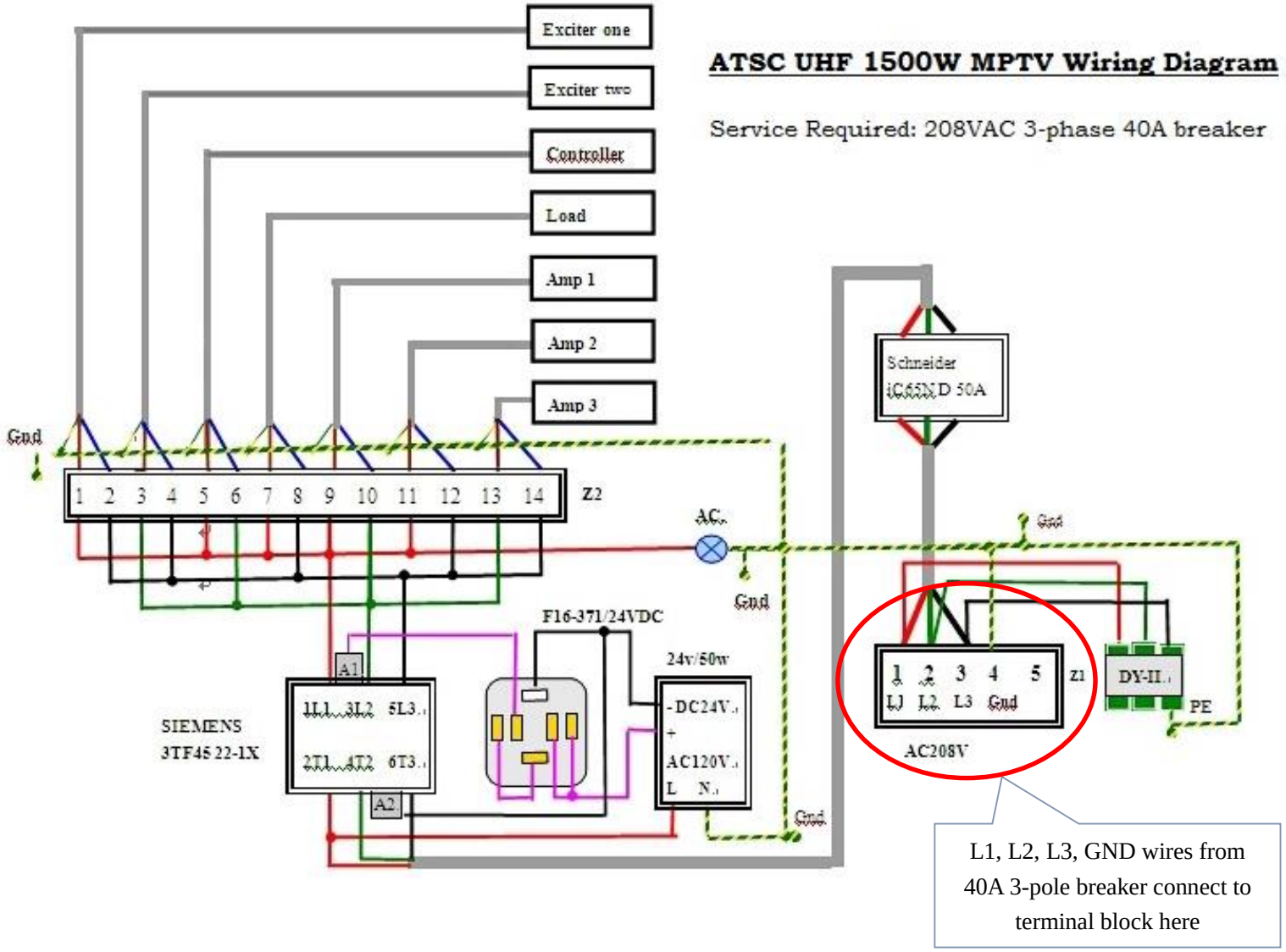
A licensed Electrician is required to properly and safely connect the 208V or 220V power cable from your stations electrical panel to the terminal block located inside the TX AC Mains Distribution compartment in compliance with local electrical and building codes. Please note: a power cable is not provided 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). Also, please be sure to reference the correct wiring diagram below for your particular system, 208VAC 3-phase or 220VAC Single-phase.



208VAC 3-phase Electrical Requirements

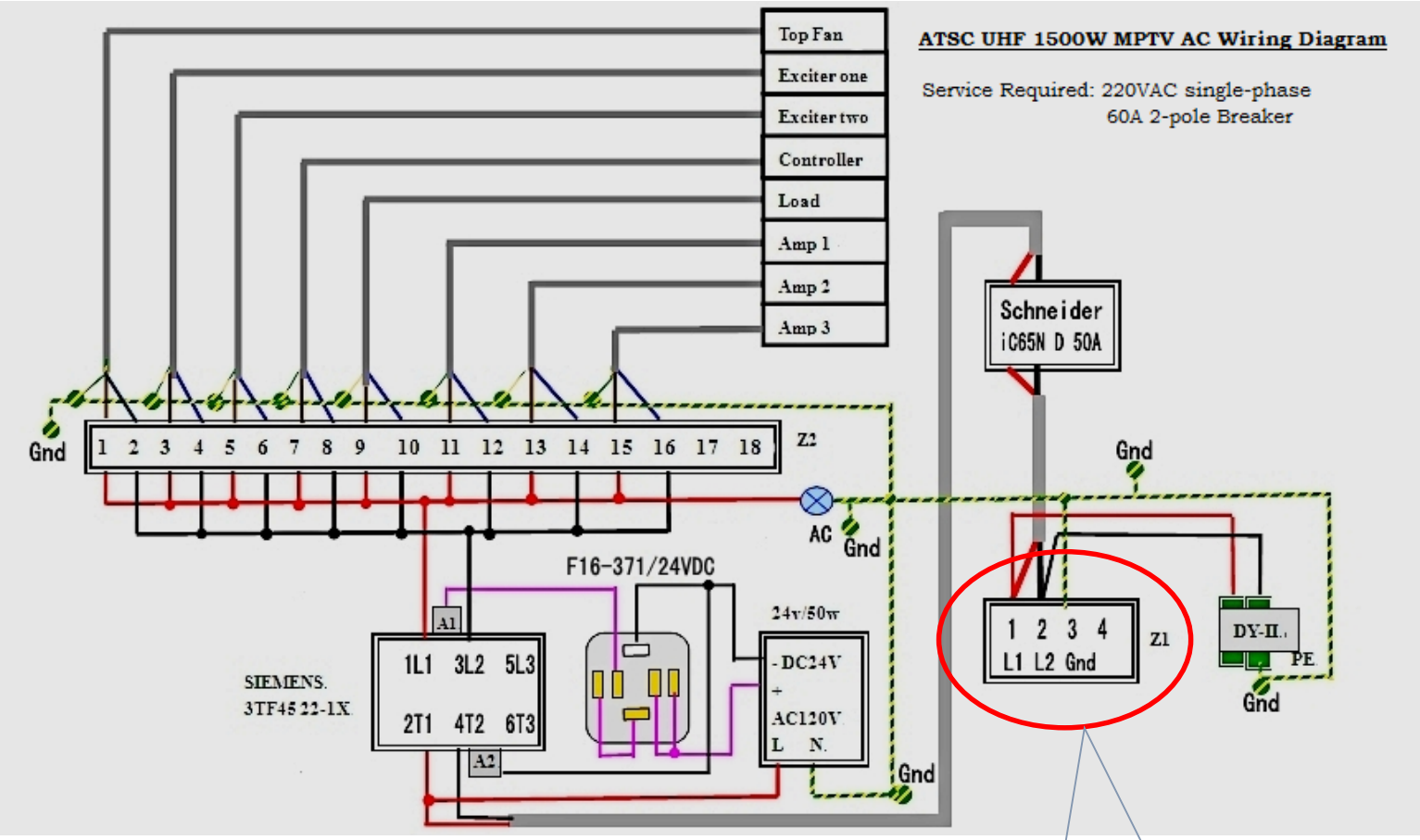
The 1.5KW ATSC Transmitter cabinet may be wired for 208VAC three-phase power to be sourced from a 40A 3-pole breaker. A 4-wire gauge 8 cable is recommended to make the connection between the TX AC Mains Distribution terminal block and the 3-pole 40A breaker in the facility electrical panel. Please note: this cable is not provided with your Transmitter equipment and should be obtained from your local Electrician.



Properly connect the four wires to the terminal block as outlined in the above diagram, taking care to identify which terminal is connected to the chassis Ground in your system.

220VAC Single-phase Electrical Requirements

The 1.5KW ATSC Transmitter cabinet may be wired for 220VAC single-phase power to be sourced from a 60A 2-pole breaker. A 3-wire gauge 4 cable is recommended to make the connection between the TX AC Mains Distribution terminal block and the 2-pole 60A breaker in the facility electrical panel. Please note: this cable is not provided with your Transmitter equipment and should be obtained from your local Electrician.



L1, L2, GND wires from 60A 2-pole breaker connect to terminal block here

Properly connect the three wires to the terminal block as outlined in the above diagram, taking care to identify which terminal is connected to the chassis Ground in your system.

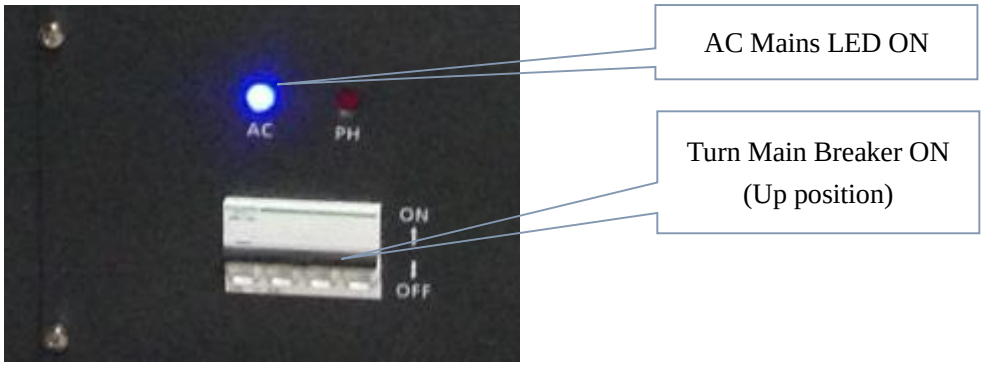
9 Initial Turn On

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.

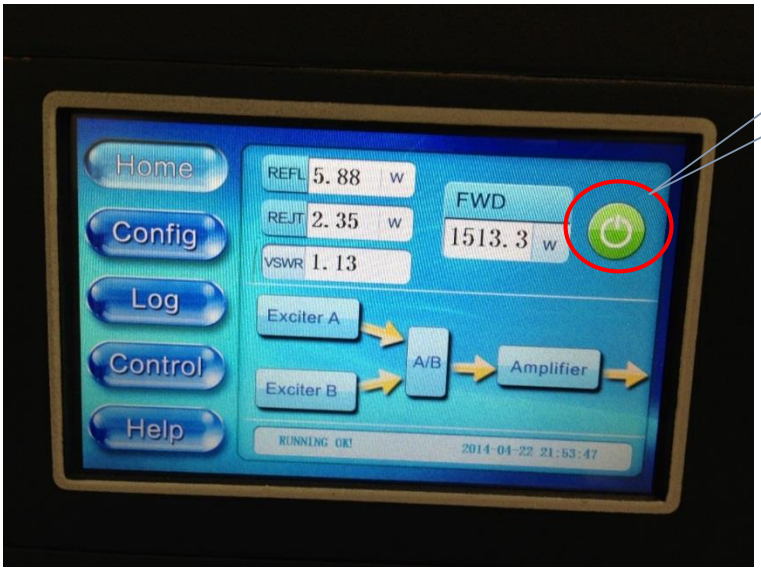
Please locate and have handy for reference a copy of your **1.5KW TX Factory Test Report** as well as the **1.5KW TX Quick Start Guide**, and **TX and Exciter User Manuals.**

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.

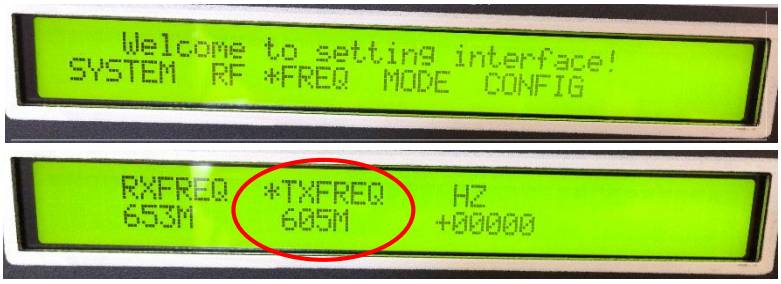


It takes about 5 seconds for the Controller to power up and display the HOME screen (shown below). Please note that the values will be different as the TX initially turns ON at a reduced power level.



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

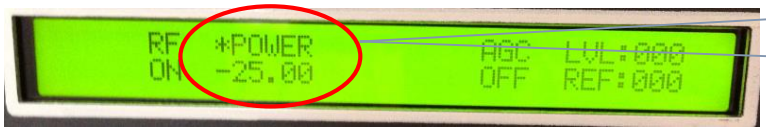
2. Check Exciter settings. Check the operating Frequency of the Exciter by navigating to the Exciter FREQ submenu (simultaneously press Left and Right buttons)



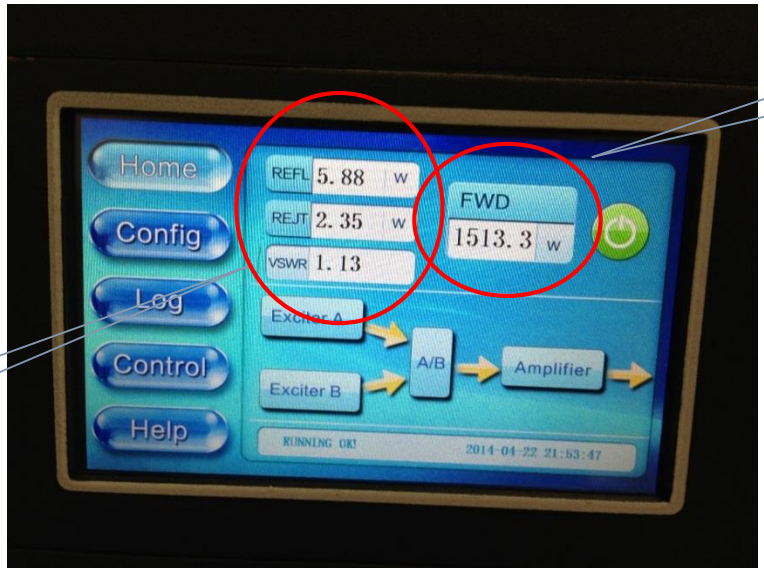
Check the Exciter drive level is set to -25dBm by navigating to the Exciter RF submenu (from above, press ESC button then enter the RF submenu).

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

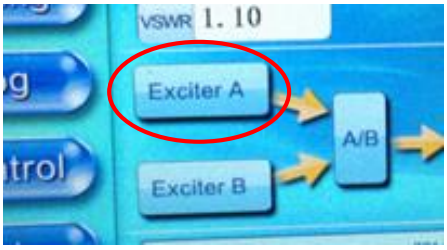
4. Slowly bring the FWD power to ~750W (half-power) and notice the power meter values of REFL, REJCT, and VSWR to be sure these look reasonable (less than a 1.5KW TX operating at a full 1500W FWD that has typical REFL, REJT, and VSWR as shown above).

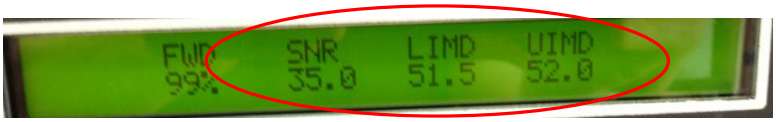
   Check to be sure that the lower left corner of the HOME screen shows the status as “RUNNING OK!” and there are no error messages. If you do see an error message, please reference the Troubleshooting section of your transmitter User Manual to understand what the error means and suggested steps to correct it. (For example, when initially turning on a system, on occasion the error message AMP_VSWR_ERR (accompanied by high REFL power readings) has been 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 full 1500W, or your desired TPO. Be careful to make small increases in the value of POWER as you approach the desired output level.

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 on the Exciter hi level status screen) as shown below.





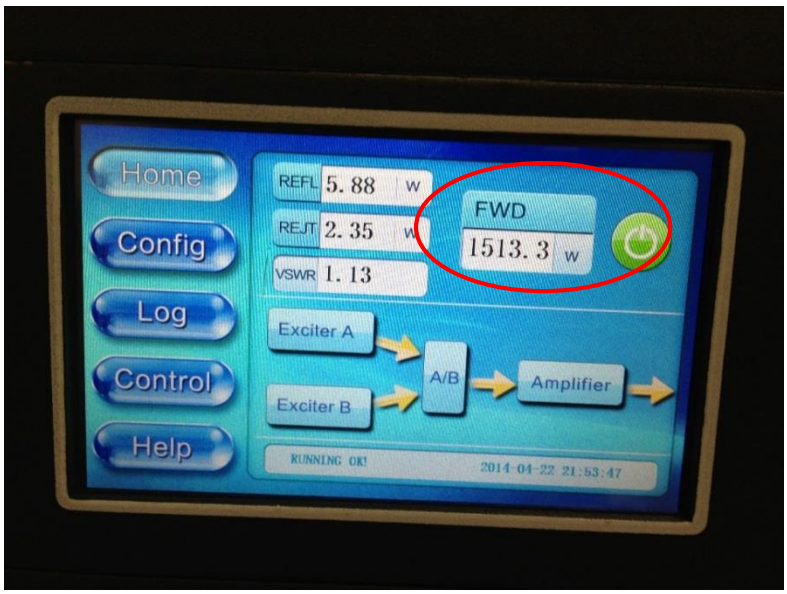
Linear and Non-Linear corrections were already performed and optimized at a TPO of 1500W in the factory and so the stored correction coefficients should produce good results.

If you are operating at a TPO less than 1.5KW or wish to rerun corrections, please reference the "Running Corrections" section of your transmitter User Manual.

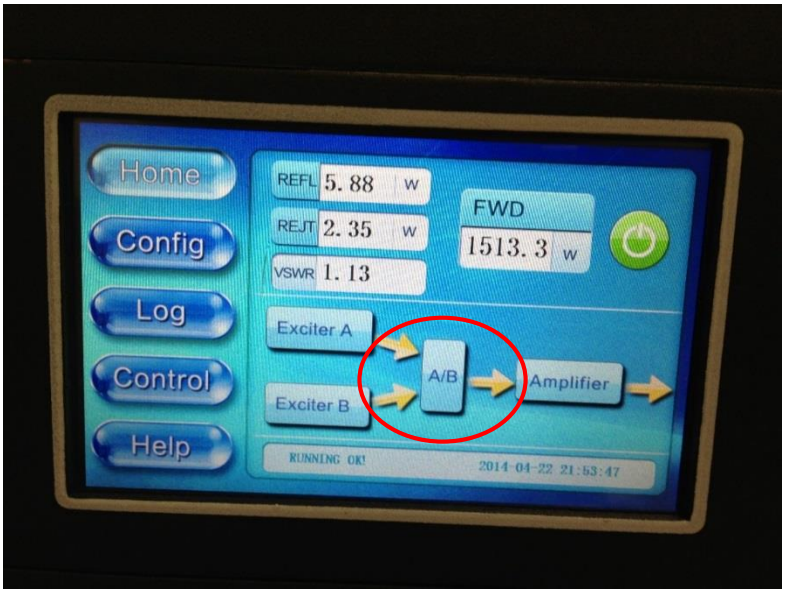
7. With your TX operating at your desired output power and with good RF performance, the next step is to setup and engage the TX AGC. Continue to slowly raise the output power of the system to 1.1 x desired TPO (for example 1650W if a 1500W TPO level is desired). (Note: You are bringing up the TX to 1.1 x desired TPO to provide 10% headroom for AGC operation).

8. 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 to 1500W, or whatever TPO level is desired for operation, and then press the unlit AGC button to engage the TX AGC and turn this button Green.

9. Press the HOME button to return to the HOME screen to monitor FWD power as it slowly reduces from 1.1 x TPO to the AGC target power (desired TPO) level over the next minute or so. With the AGC engaged, the FWD power metering may vary up to +/- 5%, so for a 1500W TX, meter variations from 1425W to 1575W may be experienced.



10. 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.



11. 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 operate and stabilize at full output power for another 30 minutes.

12. 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).

13. To Raise or Lower the TX output power level, please adjust the AGC target power setting under the Controller Config →AGC button.

14. You may network your Transmitter Control Module (rear LAN connector, default ipaddress 192.168.1.210) and your Exciter (REMOTE RJ-45 rear panel connection at 192.168.1.143). Both the Exciter and Control Module

ipaddresses are user configurable via their respective user interfaces (please refer to the Exciter and 1KW TX User Manuals for details).

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 1KW TX and Exciter user manuals for details).

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