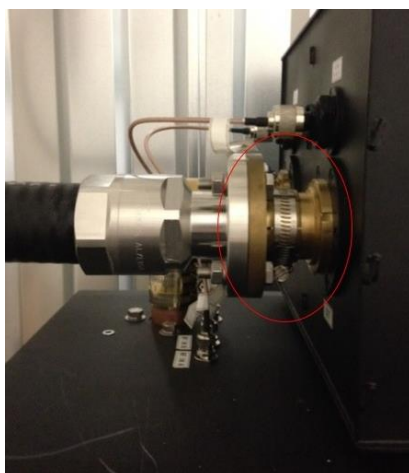




BPF standing on the floor next to the TX cabinet:



Please note: The 1.1kw~5.5kw MHPTV comes standard with a 1 5/8 EIA Flanged output connector, and the 6.6kw~8.8kw MHPTV comes standard with a 3 1/8 EIA Flanged output connector. If your Antenna feed is other than the standard connector (as shown on left), you will need to provide whatever adapter hardware is necessary to facilitate this connection to your Antenna feed).



Before and After BPF Directional Coupler installation

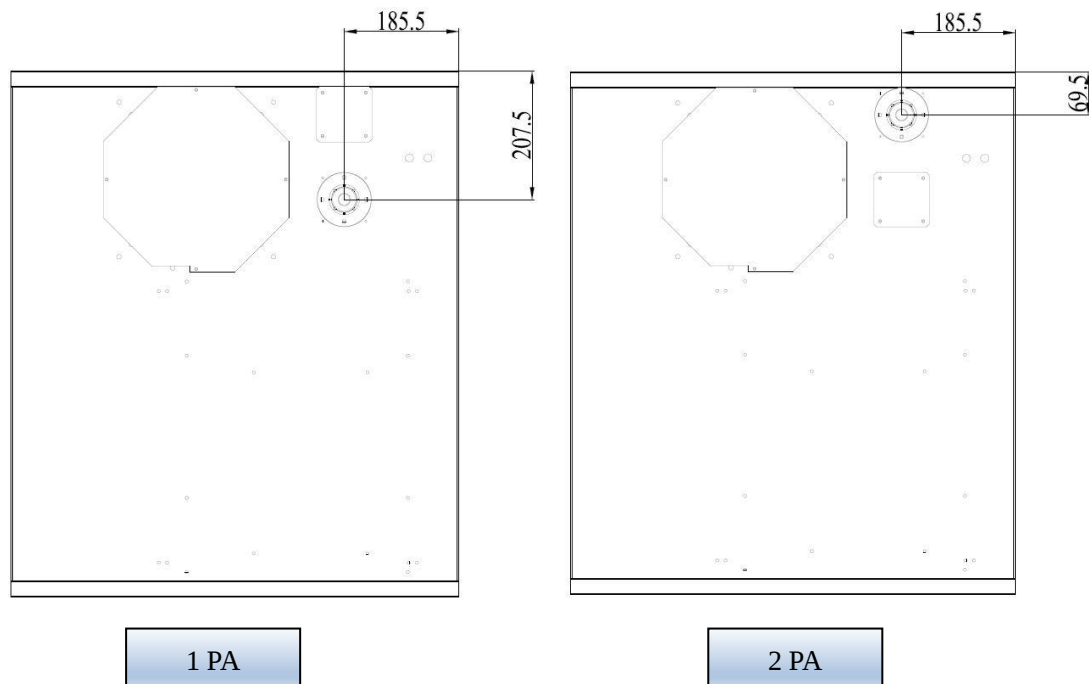
Please be sure to install the Before and After BPF Directional Couplers in the correct positions and orientation. Incorrect operation of the TX system may result if these directional couplers are not installed in the proper locations with the proper orientation as labeled.

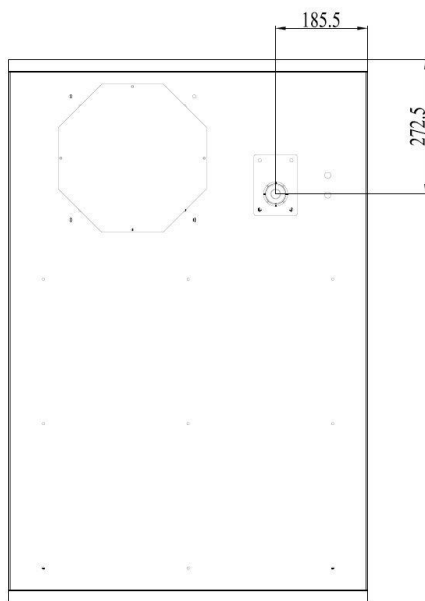


1.6 TX Ventilation

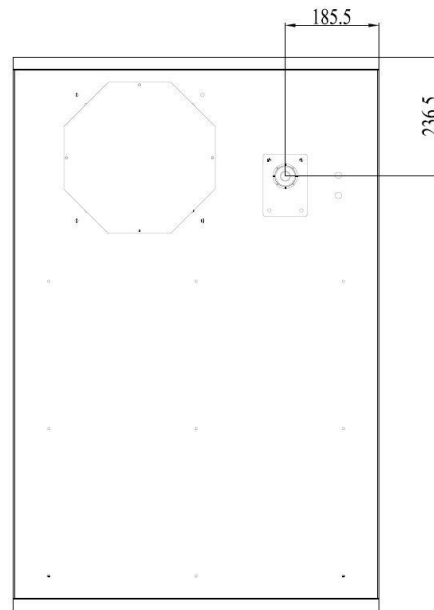
MHPTV PA cooling is from front to rear. In a standard installation, warm air is vented out perforations in the cabinet rear door and into the room. A proper air-conditioned, dust-free environment is required to operate the TX equipment.

There is an option to exhaust heat out the top of the cabinet. The top-down cabinet drawings below show the provision for the top panel ventilation hole (11 inches). Please specify cabinet ventilation when ordering. If you specify top ventilation, the TX will be delivered with a solid rear panel door (instead of the standard perforated rear door). All TXs are provisioned with a single ventilation hole at the top of the cabinet.

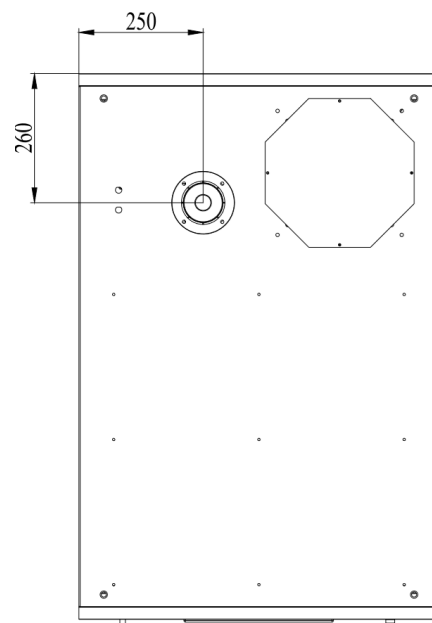




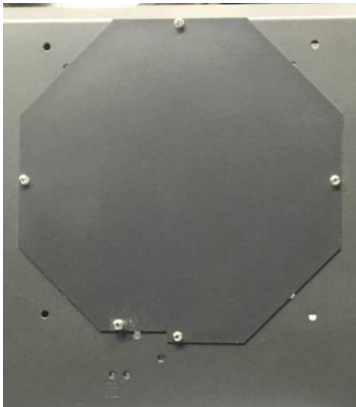
3 & 4 PA



5 PA



6 & 8 PA





2. Theory of Operation

The MHPTV transmitter is conceptually simple to understand and easy to operate.

The Transmitter operates on either 240VAC single-phase (3-wire) or 208VAC three-phase (4-wire) AC Mains service. An AC Mains Distribution compartment is located on the back-rear floor of the TX. This compartment is shielded for personnel safety and provides the distribution of appropriate AC power to the various modules inside the TX cabinet.

A standard ASI input stream is provided to one of the BNC connectors located on the rear panel of the Exciter. The Exciter (different platforms) supports options for DVB-ASI and SMPTE310M (ATSC 9x exciter only) stream formats as well as an RF off-air input via a built-in tuner and TSoIP support via an RJ-45 input. The Exciter performs the appropriate modulation to produce an RF output at the desired channel frequency. Exciter configurations may vary – for DTV (ATSC, ATSC 3.0, DVBT/T2, ISDBT, DTMB, etc.).

The TX supports both Single and Dual Drive (DD) Exciter configurations and manages the automatic and manual switchover between Exciters in a DD configuration. The modulated RF output signal from the Exciter(s) is (are) fed into the Control module which contains a preamp driver stage and built-in N-ways splitter (for multiple PA configurations). The N-ways outputs of the Controller preamp are then to feed the RF inputs of each of the PA modules.

The PA modules contain 8 x BLF888E Doherty devices that amplify the RF signal to produce 1300W of output power per PA. The amplified output signals are fed into an N-way Hybrid Combiner (for 2/3/4/5/6/8 PAs configuration) and then into a Directional Coupler (for 2/3/4/5/6/8 PAs configuration) and finally out the top of the cabinet via a section of 1 5/8 or 3 1/8 transmission line.

The 1 5/8 or 3 1/8 output stack of the Transmitter is then fed into an inline 1 5/8 or 3 1/8 Harmonic Filter (if required) before entering a Before-Filter directional coupler and the input to the channel mask BPF mounted on top of the cabinet. The output of the BPF connects through an After-Filter directional coupler into the Antenna feed to radiate the DTV signal on-air.

The Exciter receives the two feedback signals from the Before-Filter and After-Filter directional couplers located at the input and output of the BPF. These before and



after BPF feedback signals are used by the Exciter to provide automatic Linear and Non-Linear pre-correction of the forward path signal.

Additional feedback signals are provided to the Control module, which monitors these samples to implement protective protocols including forward power reduction and shutting down the TX in the event of high reflected power or other unsafe operating conditions. System FWD and REV power samples are provided to the Control module from the Directional Coupler located directly after the N-way power combiner (for 2/3/4/5/6/8 PAs configuration). The Control module also receives feedback samples from the System Reject Load(s) (for 2/3/4/5/6/8 PAs configuration), enabling it to control the variable fan speed of the reject load(s).

The Control module is in constant communication with the Exciter and PA modules via an RS-485 serial bus. Each module has a unique ID on the bus, and the Control module is continually talking with the Exciter and PA modules to provide monitoring and control capabilities via its front panel touchscreen and built-in web user interfaces. Both the Control module and the Exciter provide RJ-45 Ethernet connections through which the user may remotely monitor and control the TX via their respective built-in web interfaces.



2.1 Control Unit

2.1.1 Control Unit (CTL-S)

For 1, 2 and 3 PA configurations, the TX Control Unit CTL-S consists of a pre-amp and a powerful control system. It receives the RF input(s) from the exciter(s), performs the pre-amplification, and sends RF output to a PA or an external N-way splitter to feed up to 3 PAs. The CTL-S communicates over an RS-485 serial bus to the PAs and Exciter(s) installed in the system and monitors system Forward, Reflected, and Reject load power.

Front panel

The front panel of the Control Unit is shown below.



- Color touch screen
- LED_OK
 - If the green light is ON, then the transmitter is working in OK mode.
- LED_ALARM
 - If there is an alarm, the red light is ON, and the transmitter will shut down its output. The most common alarms include Over-drive/over-current of PA modules or Preamp, high reflected power of PA modules or Preamp, high absorbed power, over temperature of PA modules or Preamp, etc. Please refer to Status Bar and LOG from the touch screen of Control Unit for details.
- RESET (reserved)



Rear Panel

The rear panel of the Control Unit is shown below:



- RF_OUT
 - Connector: N
 - Impedance: 50 Ω
 - Note: Sends pre-amplified RF signal to the inputs of PA modules
- RF_IN_A/RF_IN_B
 - Connector: N
 - Impedance: 50 Ω
 - Note: To receive the RF_OUT signal from Exciter_A / Exciter_B
- REFL_IN (TX Reflected Power)
 - Connector: BNC
 - Impedance: 50 Ω
 - Note: To receive feedback signal from Directional Coupler for Reflected Power detection and monitoring.
- FWD_IN (TX Forward Power)
 - Connector: BNC
 - Impedance: 50 Ω
 - Note: To receive feedback signal from Directional Coupler for Forward Power detection and monitoring.
- AUX_IN (TX Load Reject Power)
 - Connector: BNC
 - Impedance: 50 Ω
 - Note: To receive a feedback signal from RJCT1 of reject Load for Absorbed Power detection and monitoring
- GPRS (reserved)
- ERS485-A/ERS485-B: To be connected to REMOTE of Exciter_A/Exciter_B for internal communication between exciters and Control Unit.
- PRS485: To be connected to the RS485 of PA#1 for internal communication between the PA module and Control Unit.
- CAN: To be connected to the RS485 of PA#2 for internal communication between the PA module and Control Unit.
- RS-232: Reserved.
- LAN: 10M/100M Ethernet port for web-based remote control (IP address: 192.168.1.210)
- AC INPUT/FUSE: 100-240 VAC
- Power Switch: ON/OFF



2.1.2 Control Unit (CTL-M)

For 4 to 8 PA configurations, the TX Control Unit CTL-M consists of a pre-amp, an N-way splitter with “Optitune” (phase/gain adjustment) circuit, and a powerful control system. It receives the RF input(s) from the exciter(s), performs the pre-amplification, and sends RF output to an N-way splitter with phase/gain adjustment circuit, finally to feed 4, 5, 6 or 8 PAs. The CTL-M communicates over an RS-485 serial bus to the PAs and Exciter(s) installed in the system and monitors system Forward, Reflected, and Reject load power.

Front panel

The front panel of the Control Unit is shown below.



- Color touch screen
- LED_OK
 - If the green light is ON, then the transmitter is working in OK mode.
- LED_ALARM
 - If there is an alarm, the red light is ON, and the transmitter will shut down its output. The most common alarms include Over-drive/over-current of PA modules or Preamp, high reflected power of PA modules or Preamp, high absorbed power, over temperature of PA modules or Preamp, etc. Please refer to Status Bar and LOG from the touch screen of Control Unit for details.
- RESET (reserved)



Rear Panel

The rear panel of Control Unit is shown below:



- RF_OUT-1/.../RF_OUT-8
 - Connector: SMA
 - Impedance: 50 Ω
 - Note: Sends pre-amplified RF signal to the inputs of PA modules
- RF_IN_A/RF_IN_B
 - Connector: SMA
 - Impedance: 50 Ω
 - Note: To receive the RF_OUT signal from Exciter_A / Exciter_B
- ERS485-A/ERS485-B: To be connected to REMOTE of Exciter_A/Exciter_B for internal communication between excitors and Control Unit.
- CAN-1A: To be connected to CAN port of the power detection board.
- CAN-1B/2A/2B: Reserved.
- RS-485: To be connected in series with RS485 ports of all PA modules.
- LAN: 10M/100M Ethernet port for web-based remote control (IP address: 192.168.1.210)
- AC INPUT/FUSE: 90-240 VAC
- Power Switch: ON/OFF



2.2 Digital Exciter

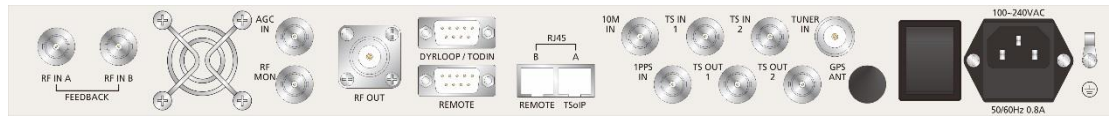
Front Panel



- LCD:
 - 40×2 LCD with power-saving backlight
- 6 Buttons:
 - Left, Right, Up, Down, OK, ESC
- 6 LEDs:
 - When in Exciter mode:
 - LED_TS1: Green light on indicates TS1 is selected and the input TS signal is OK
 - LED_TS2: Green light on indicates TS2 is selected and the input TS signal is OK
 - LED_TSErr: Red light on indicates the selected input signal has an error
 - When in Translator mode:
 - LED_TS1: Green light on indicates the synchronization of the input RF signal is OK
 - LED_TS2: Green light on indicates the equalization of the input RF signal is OK
 - LED_TSErr: Red light on indicates there is synchronization error or equalization error
 - In both Exciter and Translator mode:
 - LED_GPS: Green light on indicates GPS connected and locked
 - LED_RFON: Green light on indicates system ready and RF on
 - LED_SysErr: A flashing red LED indicates the presence of a system error. A solid red LED indicates the unit is in "Local (LCL)" control mode, and when this LED is off, this indicates that the unit is in "Remote (RMT)" control mode
- 1 BNC connector:
 - RFMON: Reserved



Rear Panel



- RF_IN_A: Feedback signal, sampled after the band-pass filter (-5 to -15dBm)
- RF_IN_B: Feedback signal, sampled before the band-pass filter (-5 to -15dBm)
- AGC_IN: Feedback DC voltage for AGC control (0-5VDC)
- RF_MON: Loop out of RF_OUT for monitoring (-25 dB below RF_OUT)
- RF_OUT: Main RF signal output of exciter, to be connected to RF_IN_A/RF_IN_B of Control Unit (nominal 0 dBm output)
- DRY LOOP: Dry loop for remote control
- REMOTE: To be connected to ERS485-A/ERS485-B of Control Unit for internal communication between excitors and Control Unit
- REMOTE (RJ45-B): 10M/100M Ethernet for remote control (IP address: 192.168.1.143)
- TSoIP (RJ45-A): Input for IP based streams.
- 10M_IN: 10 MHz input from external GPS receiver
- 1PPS_IN: 1 PPS input from external GPS receiver
- TS_IN_1: The first port of TS inputs, DVB-ASI only
- TS_OUT_1: Loop out of [TS_IN_1] for monitoring
- TS_IN_2: The second port of TS inputs, DVB-ASI only
- TS_OUT_2: Loop out of [TS_IN_2] for monitoring
- TUNER_IN: Received RF signal input

Note: Please refer to the ACT-5X+/ACT9x Exciter User Manual for more details.



2.3 ANY1022 (option)

ANY1022's Front Panel



- PWR: The green light ON indicates ANY1022 is powered ON.
- STATUS: The red light ON indicates ANY1022 has detected an internal hardware error.
- ALARM: The red light on indicates ANY1022 has at least one active alarm.

ANY1022's Rear Panel



- REMOTE: To be connected to the 10" touch screen (industrial PC)'s LAN1.
- 10M IN: To be connected to exciter's 10M OUT
- 1PPS IN: To be connected to exciter's 1PPS OUT
- RF IN: To be connected to the transmitter's feedback samples.
- RELAY PORT: See the manual for more details.
- 12V DC: Reserved.
- Power Switch: ON/OFF
- AC INPUT/FUSE: 88-264VAC

10" Touchscreen (Industrial PC) Rear panel (option)



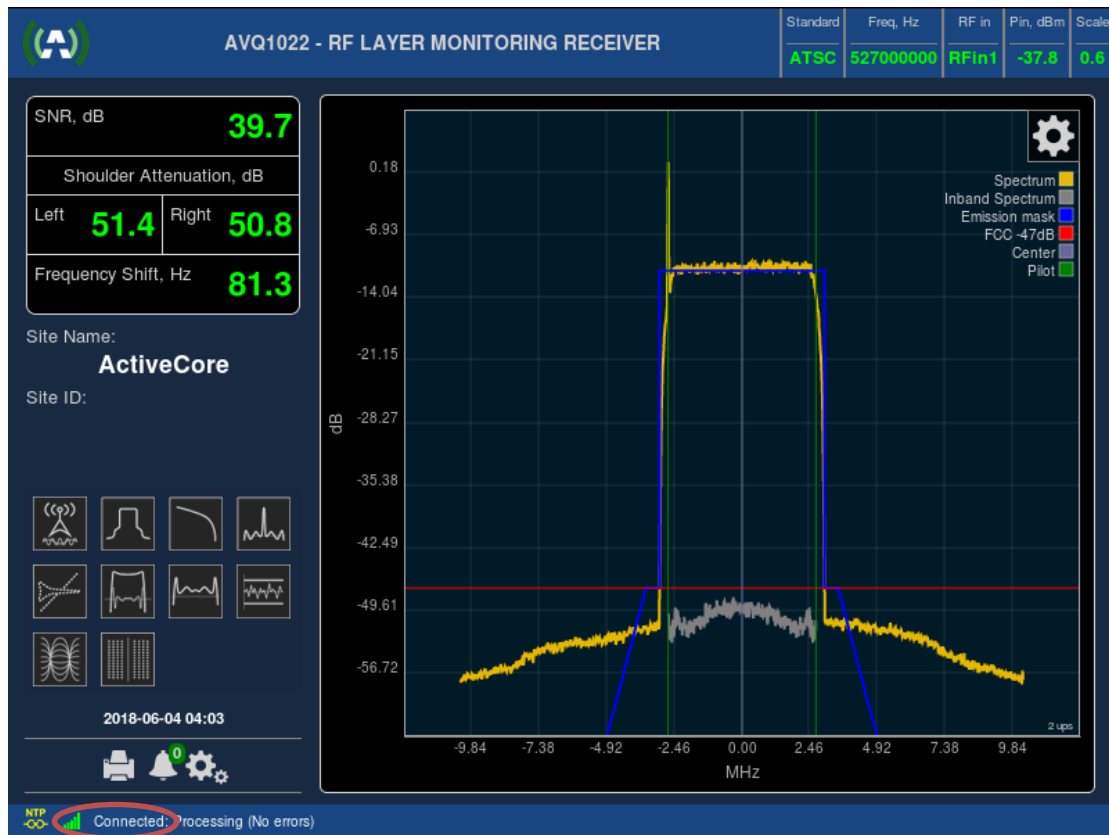


- WIFI: Reserved.
- POWER: Power switch on/off.
- COM2/3/4: Serial port
- COM1: Serial port
- LAN2: To access to Ethernet.
- LAN1: To be connected to ANY1022 REMOTE(RJ-45).
- USB: two USB ports
- VGA
- HDMI
- DC9-24V: 24VDC voltage input.

The default IP Address of the ANY1022 is 192.168.254.254. In order to communicate with the device through a web browser, configure the industrial PC (with 10" touchscreen) to be on the same subnet as ANY1022. This will allow you to have access to the ANY1022 Control Panel to tune network settings according to the required by your network parameters.

After setting network parameters of the computer/device running a WEB browser (Host) the following steps are recommended:

- Verify basic communication between the PC and ANY1022; you should be able to connect to the ANY1022 using the WEB browser by entering the ANY1022's IP address and see its WEB UI main page. Please refer to Figure below;
- Make sure that the "Connection" bar is green and "Connected" status is present;



- By pressing “Control Panel” switch to the Receiver Control Panel Log-in page and enter a password for Administrator level of access. The default password is “admin”;

Control Panel RF Layer Monitoring Receiver

Please Login

Password

[Log In](#)

Connected

Powered By **ACTIVECORE**

- Once logged in, navigate to Control Panel->System->Network and adjust the Receiver Network interface settings.



Control Panel RF Layer Monitoring Receiver

Status

Configuration

Alarms

NMS

System

Site

Access Settings

Network

SNMP

Time

Licensed Standards

Reset parameters to default

Restart System

Downloads

Settings Backup & Restore

Stored Files & Uploads

Network

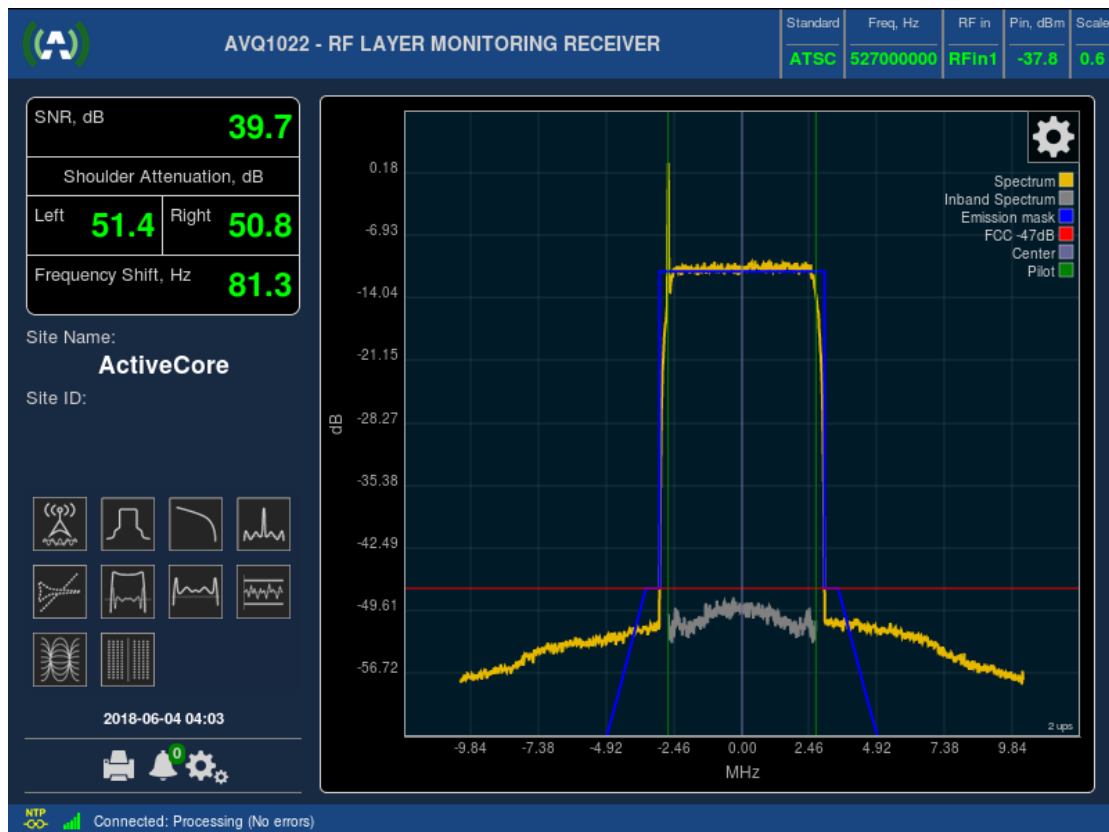
Eth0 IP Address	192.168.254.254	0.0.0.0 .. 255.255.255.255
Eth0 Netmask	255.255.255.0	0.0.0.0 .. 255.255.255.255
Eth0 Gateway	192.168.254.1	0.0.0.0 .. 255.255.255.255
DNS Server	8.8.8.8	0.0.0.0 .. 255.255.255.255

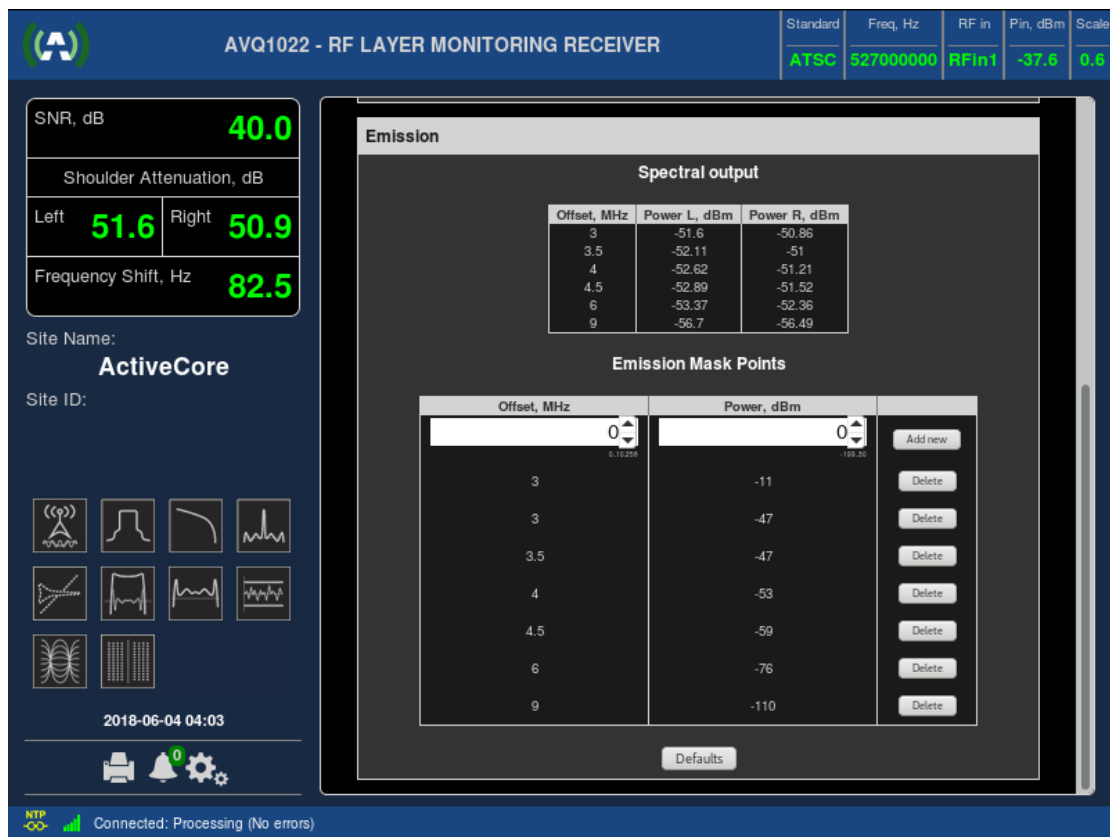
Update

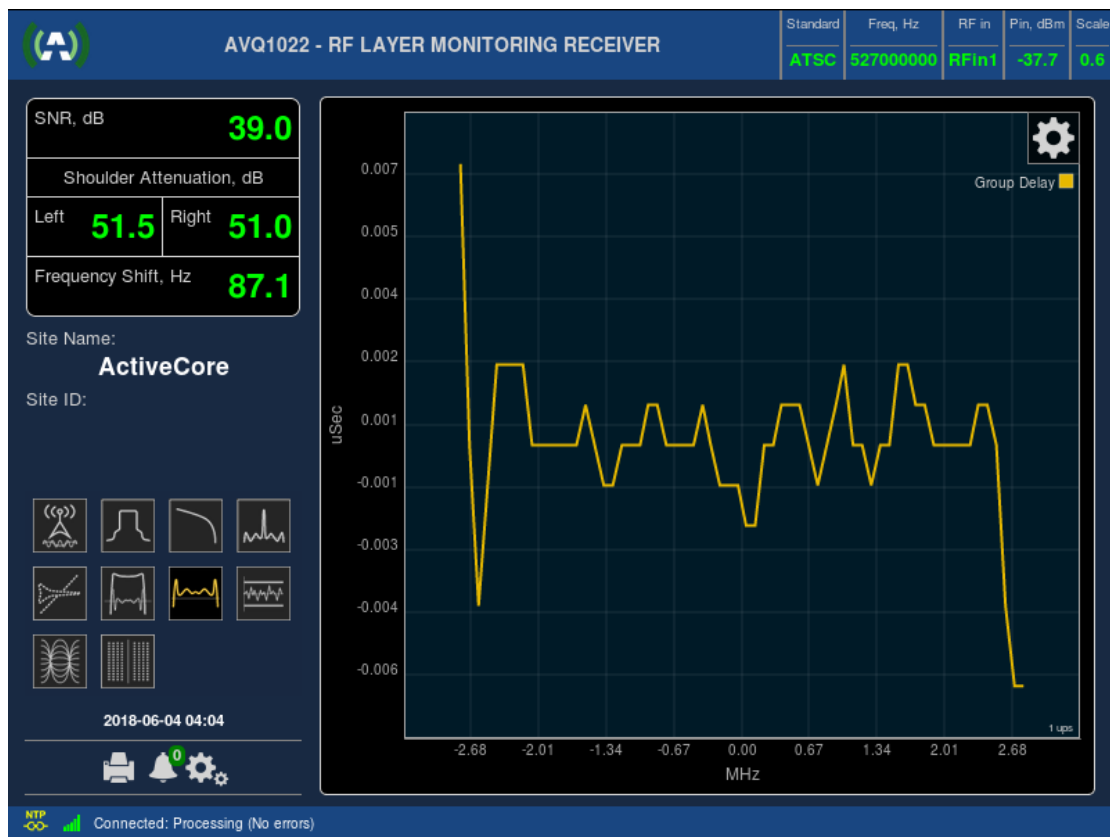
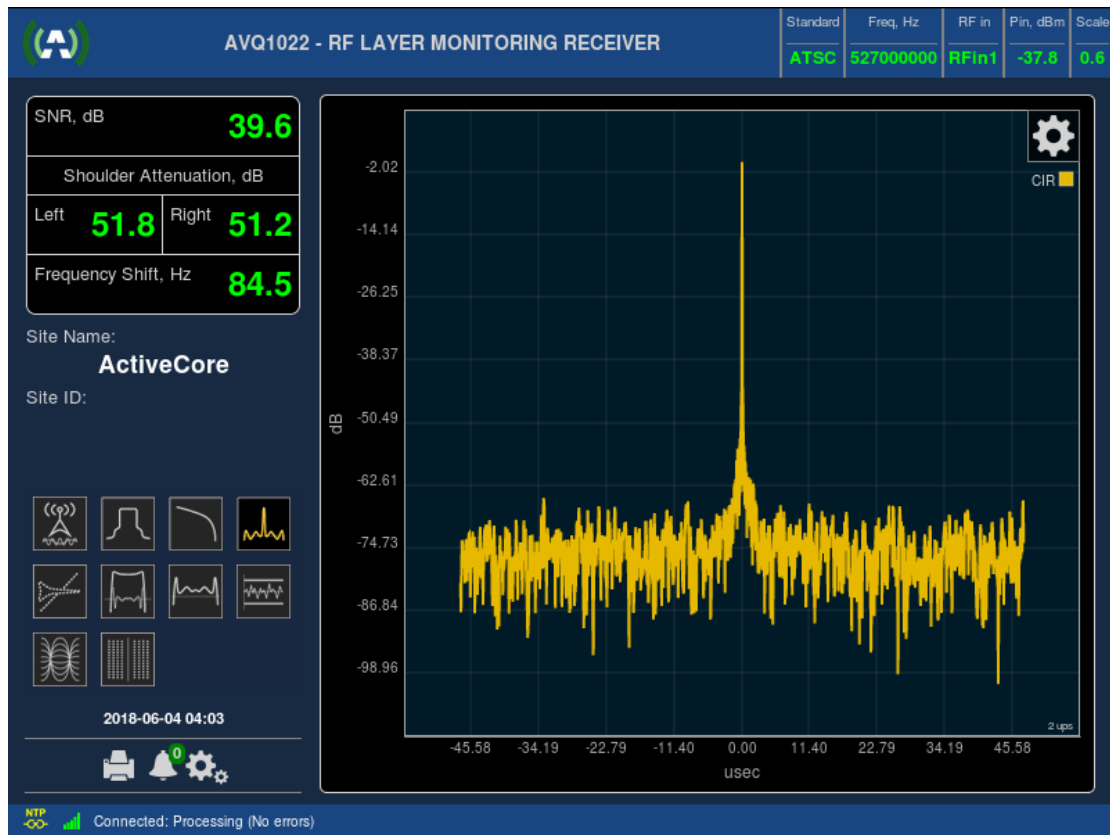
Connected: Processing (No errors)

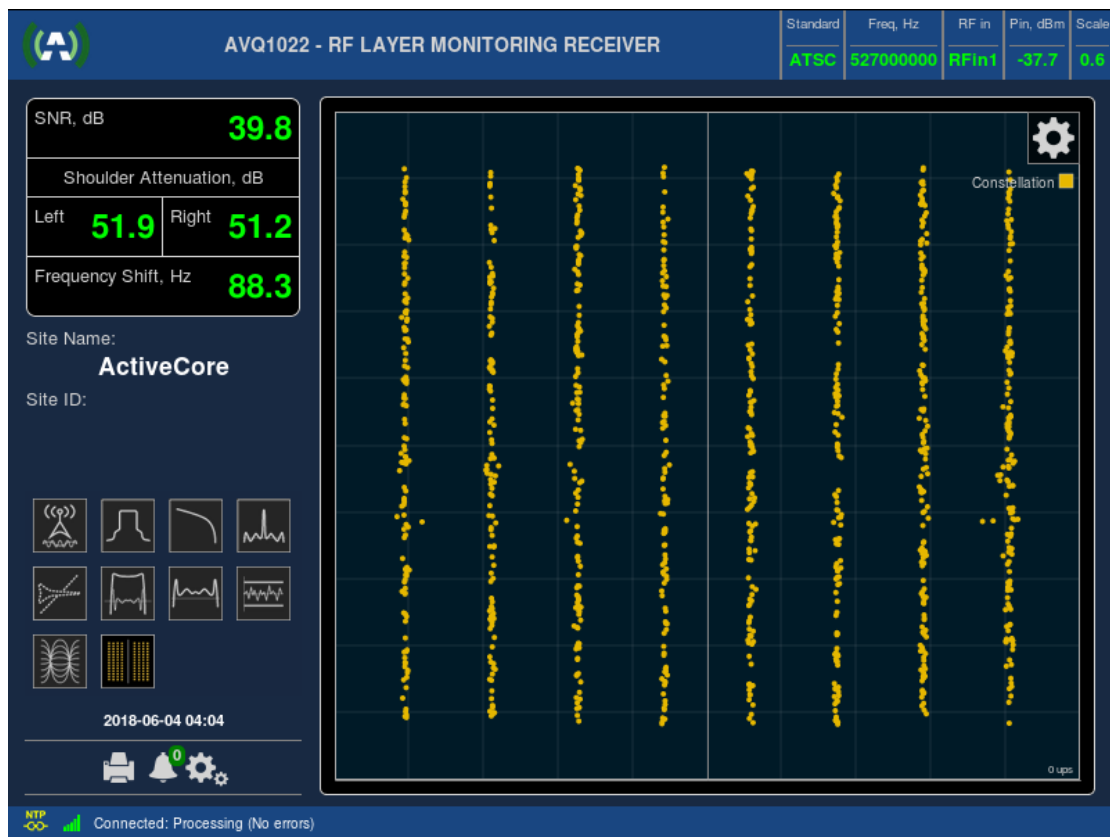
Powered By
ACTIVECORE

Below are a few screenshots of ANY1022 displayed on the 10" touchscreen.











Note: Please refer to the ANY1022 User Manual for more details.

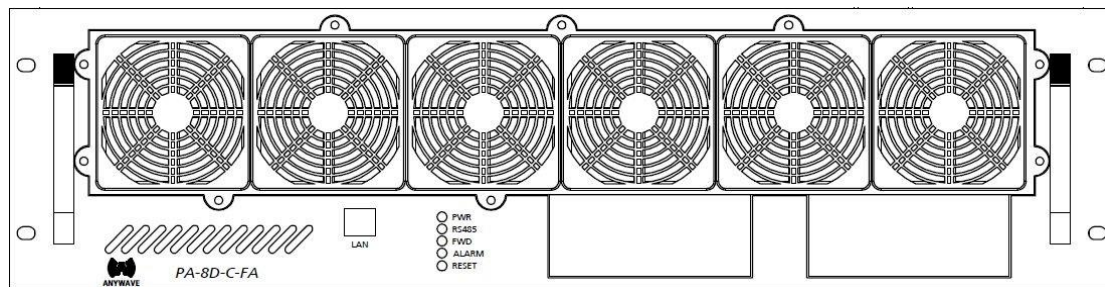


2.4 Power Amplifier – PA-8D-C-FA

The MHPTV TX may be fitted with 1, 2, 3, 4, 5, 6, or 8 PA-8D-C-FA PA modules. Each module consists of a total of 8 BLF888E (Doherty) devices per PA drawer. Each PA is also fitted with two pluggable 50V power supplies.

Front Panel

The front panel of PA is shown as below. The LED indicators and ports are listed below.



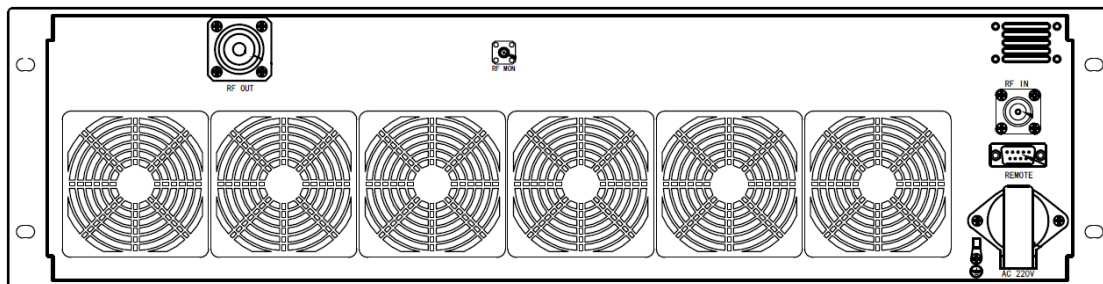
- LAN: 10M/100M Ethernet port for web-based remote control (IP address: 192.168.1.200)
- LED_PWR
 - The green light will be on when the DC voltage of the internal power supply is within the normal range (48 VDC ~ 52 VDC).
 - The green light will flash when the DC voltage of the internal power supply is out of the normal range (48 VDC ~ 52 VDC).
 - The green light will be off when the external power supply is turned off, or the internal power supply module does not work.
- LED_RS485
 - The green light will flash once per second when internal communication is normal.
 - The green light will stay constantly on or off when internal communication is abnormal.
- LED_FWD
 - The blue light will be on when the TX power level is stable and higher than 10 W.
 - The blue light will flash once per second during the ramp-up process and the TX power level is higher than 10 W.
 - The blue light will be off when the TX power level is less than 10 W, or it's turned off by configuration or for protection. There are several situations which will result in auto-protection mode, such as the input power is too high, the reflected power is too high, or the temperature is too high. When the transmitter reboots, the default setting of TX status is OFF.



- LED_ALARM
 - The red light will be on if there is any alarm
 - The red light will be off if there is no alarm
- RESET: To reset the IP to default (192.168.1.200).

Rear Panel

The rear panel of PA is shown below with ports described as follows.



- RF_OUT
 - Connector: 7/16 DIN
 - Impedance: 50 Ω
 - Note: To send out RF signal to the input of Power Combiner (attached to the cabinet). It must always be connected to a load.
- RFMON
 - Connector: SMA
 - Impedance: 50 Ω
 - Note: Loop out of RF_OUT for monitoring.
- RF_IN
 - Connector: N
 - Impedance: 50 Ω
 - Note: To receive RF signal from RFOUT1/RFOUT2 of Control Unit.
- REMOTE
 - Connector: DB9-M
 - Note: To be connected to PRS485-1/ PRS485-2 of Control Unit for internal communication between PA and Control Unit.
- AC220V input: To be connected with Power Supply System.



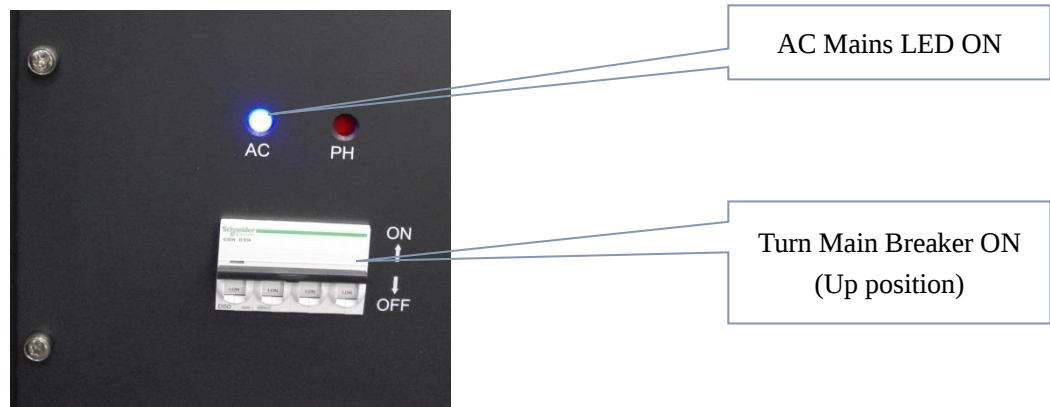
3. Installation/Initial Turn-On

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 Chapter 1) you are now ready to turn on the system.

Please locate and have handy for reference a copy of your MHPTV TX Factory Test Report, 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.





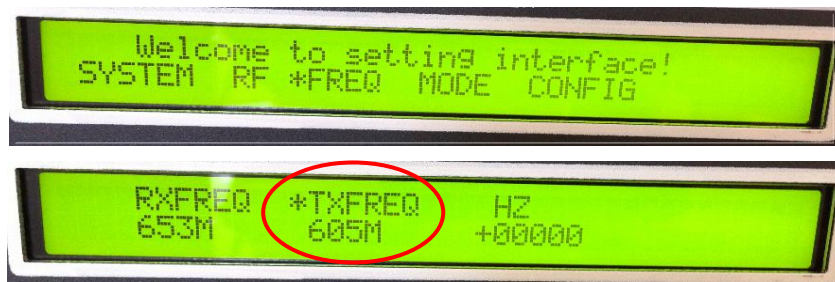
It takes a few seconds for the Controller to power up and to display the HOME screen (shown below). Please note that the values will be different as the TX initially turns ON at a reduced power level.



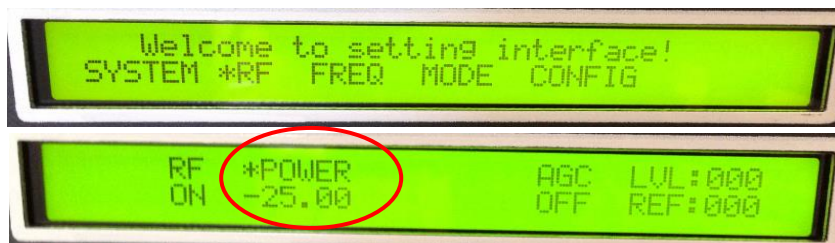
TX On/Off
(Green = ON,
Red = OFF)

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)



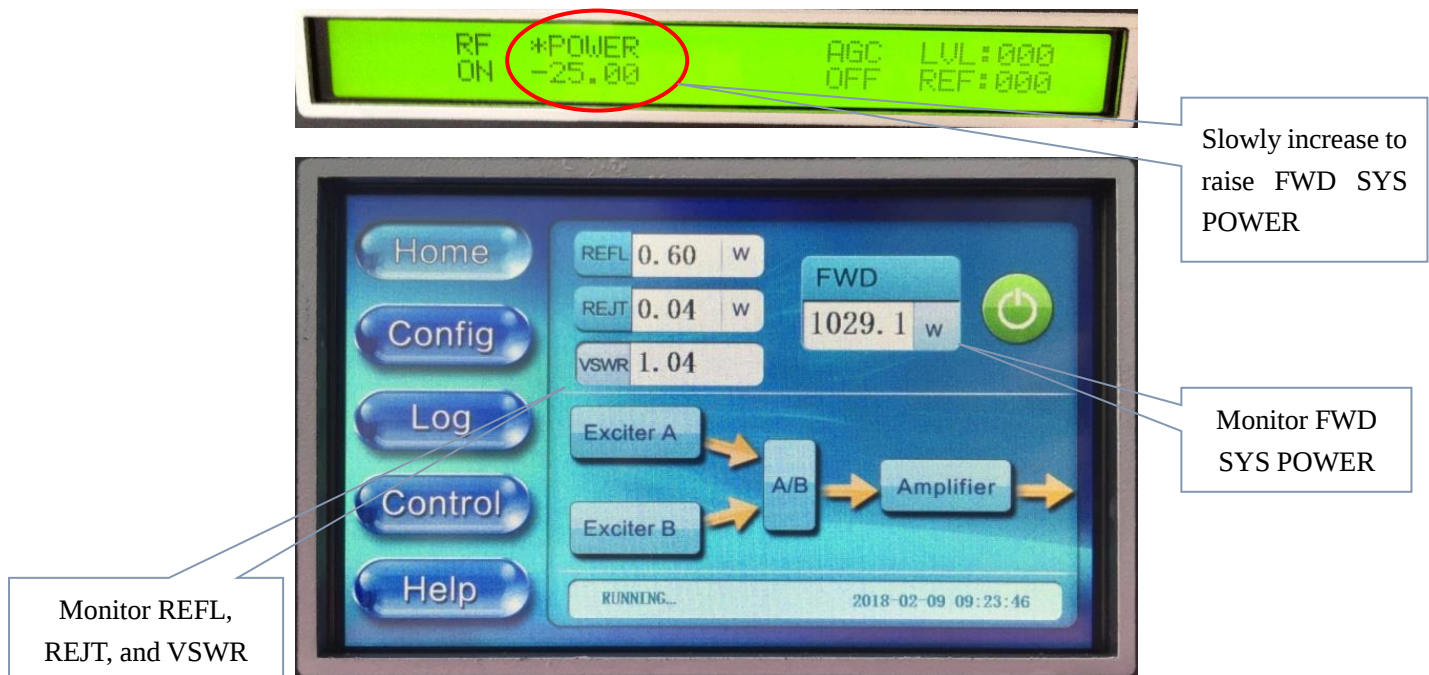
Check the Exciter drive level is set to -25dBm by navigating to the Exciter RF submenu (from above, press ESC button then enter the RF submenu).





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.



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.)



- 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.

MHPTV
Log out

COM-STATUS

PRE-AMP-PARA

POST-AMP1-PARA

POST-AMP2-PARA

POST-AMP3-PARA

POST-AMP4-PARA

POST-AMP5-PARA

EXCITER-STATUS

NET&VERSION

SYSTEM-SET

COMMON-SET

POST-AMP-SET

ADVANCE-SET

LOG-INFO

AMP1-RUN-PARA					
FWD-POW	1021.78	W	REFL-POW	0.97	W
IN-POW	25.43	dBm	50V-VOL	49.83	V
AMP-TEMP	102.95	°F	VSWR	1.06	
50V-CUR1	5.05	A	50V-CUR2	4.8	A
50V-CUR3	5.29	A	50V-CUR4	5.04	A
50V-CUR5	5.44	A	50V-CUR6	5.2	A
50V-CUR7	5.32	A	50V-CUR8	4.62	A
50V-CUR9	3.94	A	CUR-TOTAL	44.7	A
FAN1-SPEED	5580	RPM	FAN2-SPEED	5520	RPM
FAN3-SPEED	5520	RPM	FAN4-SPEED	5520	RPM
FAN5-SPEED	5520	RPM	FAN6-SPEED	5520	RPM
FAN7-SPEED	0	RPM	FAN8-SPEED	0	RPM
FAN9-SPEED	0	RPM	FAN10-SPEED	0	RPM
FAN11-SPEED	0	RPM	FAN12-SPEED	0	RPM

AMP1-ALARM-INFO					
FWD-POW	OK	▼	REF-POW	OK	▼
IN-POW	OK	▼	50V-VOL	OK	▼
AMP-TEMP	OK	▼	VSWR	OK	▼
50V-CUR	OK	▼			
FAN1	OK	▼	FAN2	OK	▼
FAN3	OK	▼	FAN4	OK	▼
FAN5	OK	▼	FAN6	OK	▼
FAN7	N/A	▼	FAN8	N/A	▼
FAN9	N/A	▼	FAN10	N/A	▼
FAN11	N/A	▼	FAN12	N/A	▼

Version

MCU V1.3-180205

Monitor device currents on all PA drawers – be sure to not exceed Factory Test data values

- 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.

MHPTV-USR-DOC-V3.0, 10/18/2019

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Digital Exciter

log out

Status

Setting

RF Control

TSID&PSIP

TSolP

SYS LOG

Status			
INPUT	TS1	STATUS	OK
AGC	OFF	TS_RATE	19.389568
TEMP	125.60°F	SYSERR	OK
TX FREQ	659	HZ(+/-50000HZ)	+0
FWD	76 %	SNR	34.0
LIMD	52.5	UIMD	53.0
CONTROL	REMOTE		

TUNER STATUS

RX FREQ	653	RSSI	-87
RSNR	0	LOCK	UnLock ▼

PAC STATUS

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 $\pm 5\%$, 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.

COM-STATUS	TX-STATUS-SET		
PRE-AMP-PARA	TX-SET	ON	SET
POST-AMP1-PARA	AGC-SET		
POST-AMP2-PARA	AGC-STATUS	OFF	SET
POST-AMP3-PARA	FWD-STANDARD	1000	SET
POST-AMP4-PARA	BOOT-SETTINGS		
POST-AMP5-PARA	BOOT-SET	OFF	SET
EXCITER-STATUS	REPEAT-BOOT-TIMES	1	SET
NET&VERSION	SYSTEM-SET		
COMMON-SET	POST-AMP-NUM		
POST-AMP-SET	POST-AMP-NUM	5	SET
ADVANCE-SET	CLEAR-ALARM-STATUS		
LOG-INFO	CLEAR-ALARM-STATUS	NO	SET
CONTROL-STATUS			
CONTROL-STATUS		LOCAL	SET

Set Target AGC to desired System Forward Power, Turn AGC ON/OFF



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 (front 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 1KW TX and Exciter user manuals for details).



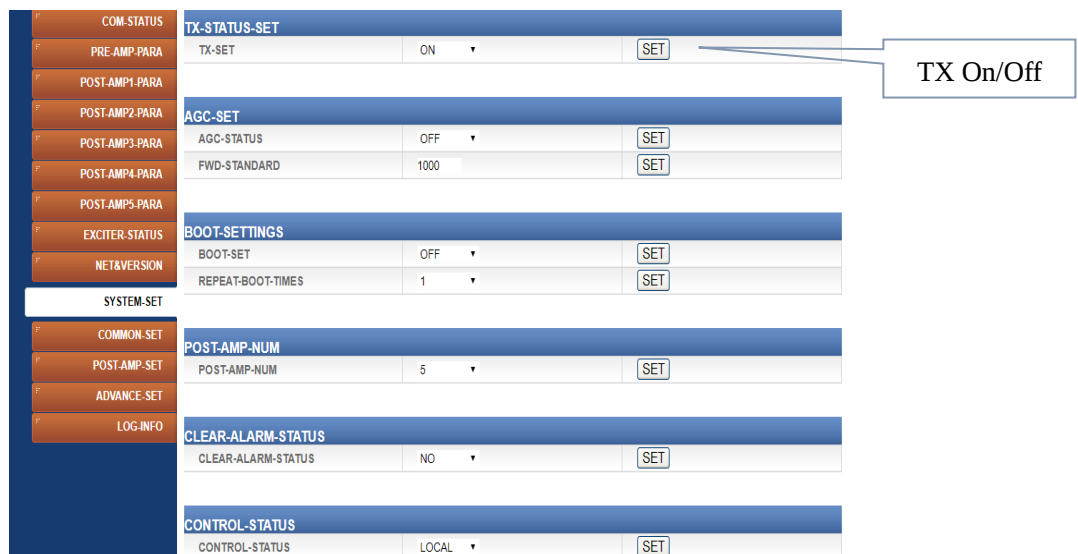
4. Operational Basics

4.1 TX ON/OFF

Local Control: To turn the TX On/Off, please use the TX On/Off button located on the HOME screen of the Control module. The Button will light Green when the TX is ON and RED when the TX is off. When turning the TX ON, please monitor the FWD power wattage on the HOME screen as FWD power ramps up to the AGC target level (which takes roughly 45-60 seconds).



Remote Control: To Turn the TX On/Off from the Controller Web Interface, please select ON or OFF for TX_SET on the SYSTEM-SET tab and press the SET button to the right (network to the Controller module via rear panel RJ-45 LAN connection, default IP address 192.168.1.210).





4.2 RAISE/LOWER POWER

Local Control: To raise or lower the TX system forward power, please adjust the target AGC power setting on the Controller AGC screen. Monitor the change in power via the Home screen FWD Power meter (which may take up to 60 seconds). Please note, as an alternative, you could disable the Controller AGC (Turn AGC Off) and raise/lower the Exciter output drive.



Remote Control: To raise or lower the TX system forward power from the Controller Web Interface, please adjust the target AGC power setting and press the SET button to the right (network to the Controller module via rear panel RJ-45 LAN connection, default IP address 192.168.1.210). Please note, as an alternative, you could disable the Controller AGC (AGC-Status = Off) and raise/lower the Exciter output drive.

COM-STATUS	TX-STATUS-SET		
PRE-AMP-PARA	TX-SET	ON	SET
POST-AMP1-PARA			
POST-AMP2-PARA	AGC-SET		
POST-AMP3-PARA	AGC-STATUS	OFF	SET
POST-AMP4-PARA	FWD-STANDARD	1000	SET
POST-AMP5-PARA			
EXCITER-STATUS	BOOT-SETTINGS		
NET&VERSION	BOOT-SET	OFF	SET
	REPEAT-BOOT-TIMES	1	SET
SYSTEM-SET			
COMMON-SET	POST-AMP-NUM		
POST-AMP-SET	POST-AMP-NUM	5	SET
ADVANCE-SET			
LOG-INFO	CLEAR-ALARM-STATUS		
	CLEAR-ALARM-STATUS	NO	SET
CONTROL-STATUS			
	CONTROL-STATUS	LOCAL	SET

Set Target AGC to desired System Forward Power



4.3 RUNNING CORRECTIONS

Local Control:

This section guides you through the process of running Linear and Nonlinear Precorrection (You may also reference the Exciter User Manual for additional details and instructions on running corrections). If you are operating at reduced power you may wish to rerun corrections to achieve better RF performance.

Normal operation for the MHPTV TX is to run with the Transmitter AGC enabled to compensate for slight variations in output power due to changes in temperature, AC mains, etc. It is not recommended to run corrections with AGC enabled, as the correction process can at times produce slight changes in output power.

1. Please navigate to the Controller AGC screen (by pressing the CONFIG button and then AGC button) and disable AGC by pressing the Green button (as shown below), so that the button then becomes transparent (blue). This indicates that AGC is OFF.



2. Adjust the Exciter POWER setting under the RF submenu to achieve the desired Forward System Power (1000W for example) as monitored on the Controller Home screen.





3. Before running corrections, it is important to verify proper feedback signal levels. There are two feedback signal samples used to compute corrections. “RF IN A” (After BPF) is used to calculate Linear correction coefficients while “RF IN B” (Before BPF) is used to compute the Non-Linear correction coefficients.
4. Navigate to the Exciter “DPD” submenu in the Advanced User menu (simultaneously press Left and Right buttons, then simultaneously press Up and Down buttons). Be sure the value of the Feedback Sample Signal Input (FSSI) for both A (after) and B (before) reads somewhere between 35% and 75% - which roughly corresponds to a value of -15 to -5 dBm as measured on a power meter (note: the FSSI indicator toggles between A and B and will “flash” when the signal level is out of range, too high or too low). Optimal FSSI level is typical ~ 50%. Add or remove the appropriate attenuator padding to achieve feedback signal levels in the desired range.

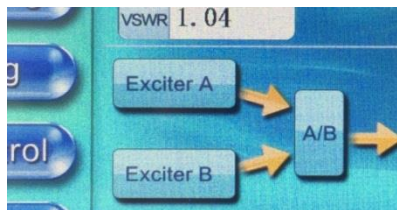


5. Check and set the value of PDT (correct time) (set to 5) and CFR (Crest Factor Reduction) (set to F) in the DPD Advanced Menu (above) (Note: CFR=F means NO CFR, CFR=0, means maximum CFR)
6. Navigate to the Exciter “SYSTEM” submenu and select UPDATE under ADPC then press the OK button to run corrections. The exciter will then proceed through 4 stages of correction, automatically computing Linear and Non-Linear corrections, and saving the coefficients into non-volatile memory upon completion. The correction process typically takes from 8-10 minutes to complete while real-time performance metrics of SNR and Shoulder performance are displayed on the Exciter LCD.





7. Check the SNR and Shoulder (LIMD and UIMD) RF performance on the front panel screen of the exciter or by pressing the Exciter Icon on the Controller HOME screen. (Change the value of CFR or rerun correction if necessary, to obtain optimal performance).



8. With your TX operating at your desired output power and with good RF performance, the next step is to set up and re-engage the TX AGC. To accomplish this, be sure the TX system forward power is at, or just slightly higher than, the desired system TPO.
9. 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 desired TPO and then press the unlit AGC button to engage the TX AGC and turn this button Green.

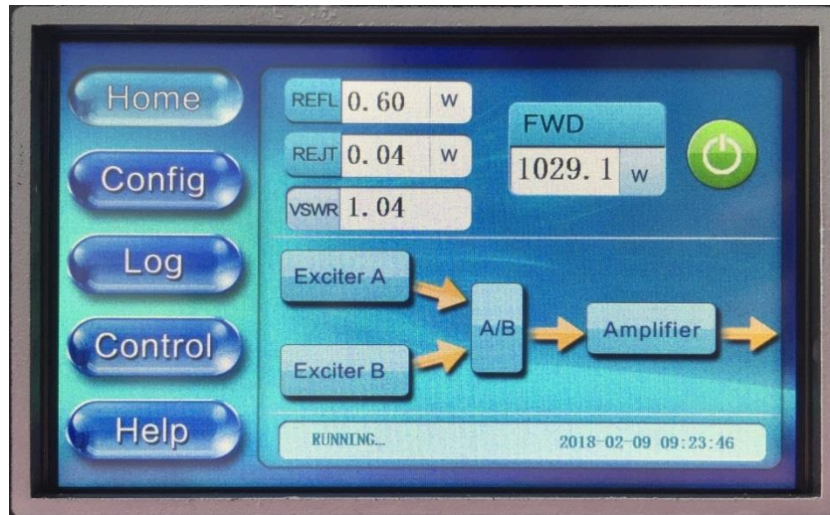


Set Target AGC Power to desired TPO

Press AGC button to turn AGC ON (will illuminate Green)



10. 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 1000W TPO, meter variations from 950W to 1050W may be experienced.



11. On the Exciter, navigate to the CAL setting under the AD3 Advanced submenu and select CAL then press OK to calibrate the FWD PWR meter on the Exciter front panel to ~ 100%.



Please note that the Exciter FWD PWR meter reading is based on the RF_IN_A BNC feedback sample on the rear panel of the Exciter and is only available when this sample is connected and in the proper signal level range ($35\% < \text{FSSI A} < 75\%$).

12. You have completed running Linear and Non-Linear corrections on your TX.

4.4 CALIBRATE EXCITER FWD POWER METER

On the Exciter, navigate to the CAL setting under the AD3 Advanced submenu and select CAL then press OK to calibrate the FWD PWR meter on the Exciter front panel to ~ 100%.



Please note that the Exciter FWD PWR meter reading is based on the RF_IN_A BNC feedback sample on the rear panel of the Exciter and is only available when this sample is connected and in the proper signal level range ($35\% < \text{FSSI A} < 75\%$).



4.5 CALIBRATE TX SYSTEM POWER METERS

Local Control: There are three TX system power meters located on the Controller HOME screen, Forward (FWD), Reflected (REFL), and Reject Load (REJT). These power meters were calibrated at the factory to provide accurate power readings when testing the TX at its full rated output power. These meters may be recalibrated if desired via the Controller calibration screens as outlined below.



You will require a power meter to independently measure power at the Controller input samples in order to properly calibrate the built-in system FWD, REFL, and REJT power meters. Please reference the TX System Interconnect Diagrams in section 3 of this manual for connection details.

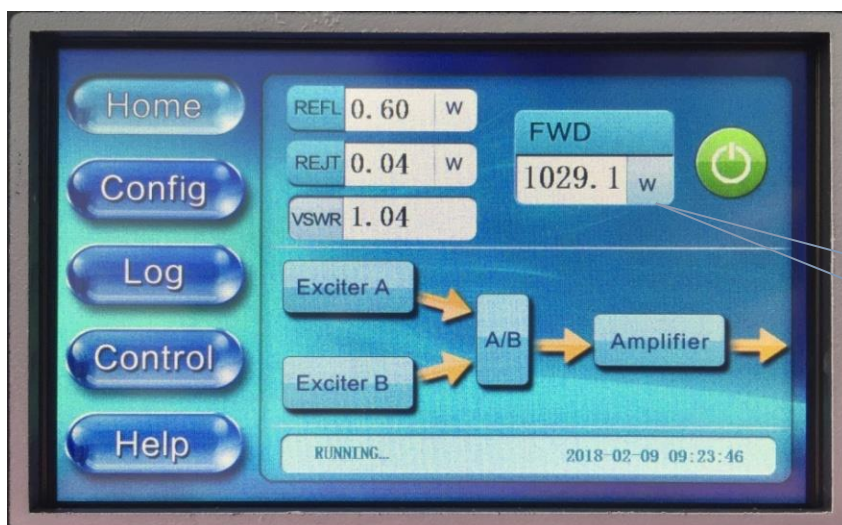


Normal operation for the MHPTV TX is to run with the Transmitter AGC enabled to compensate for slight variations in output power due to changes in temperature, AC mains, etc. It is not recommended to perform power meter calibration with AGC enabled.

1. Please navigate to the Controller AGC screen (by pressing the CONFIG button and then AGC button) and disable AGC by pressing the Green button (as shown below), so that the button then becomes transparent (blue). This indicates that AGC is OFF.

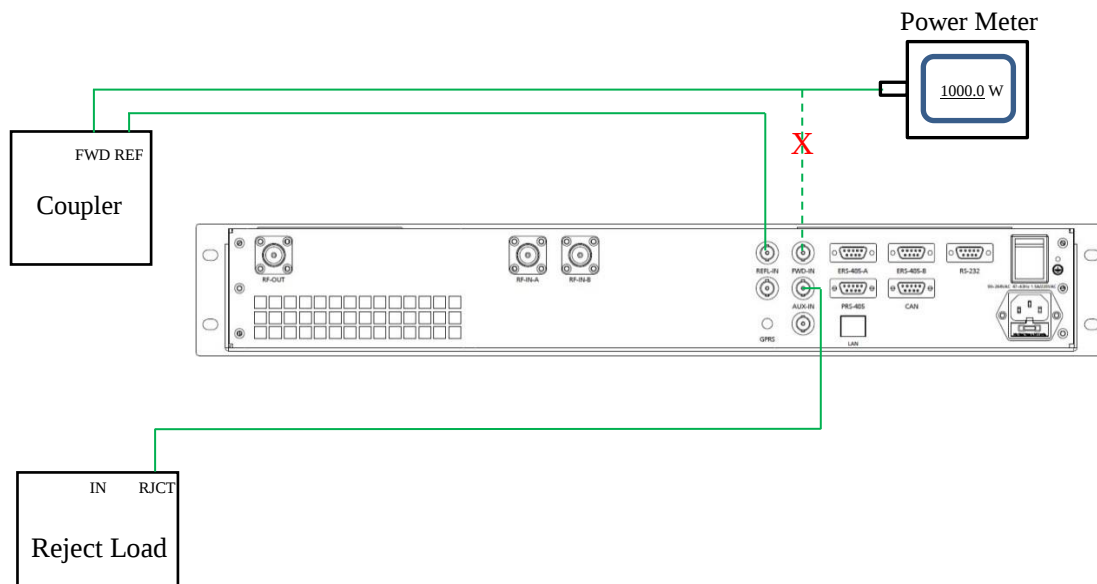


2. Adjust the Exciter POWER setting under the RF submenu to achieve the desired Forward System Power (1000W for example) as monitored on the Controller Home screen.

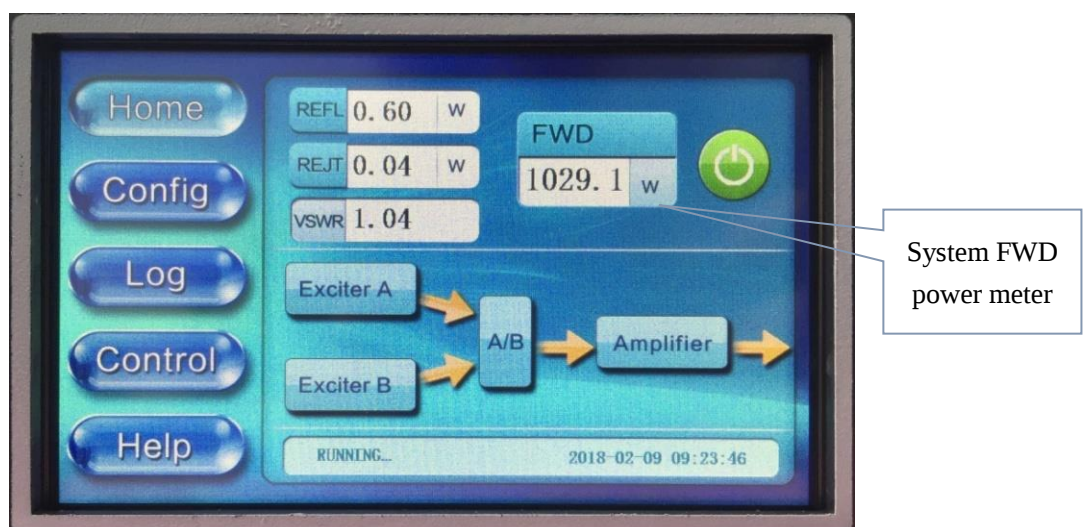




3. Disconnect the FWD IN sample from the rear panel of the Controller and connect this to your power meter. This sample comes from the TX output directional coupler and has a coupling value of 50dB (offset for your power meter). Measure and record the real Forward system power.

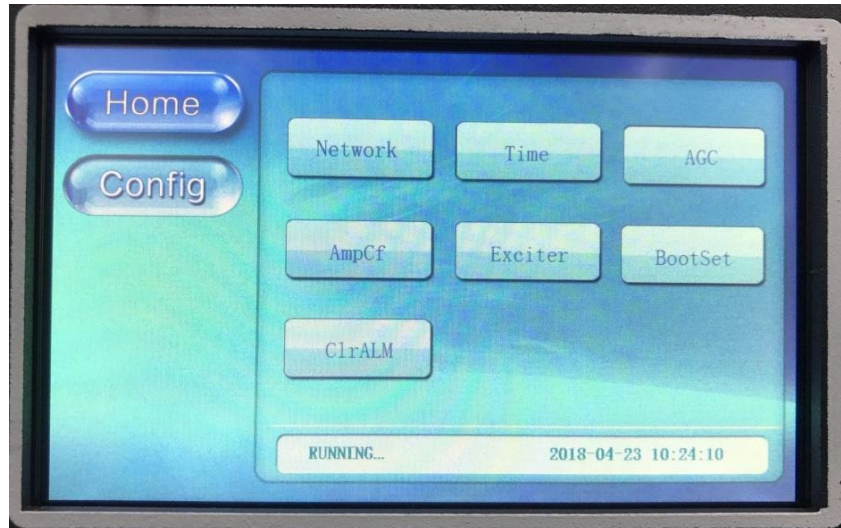


4. Disconnect the FWD sample from your power meter and reconnect it to the FWD IN port on the rear panel of the Controller.
5. Monitor the FWD power meter on the Controller HOME screen and notice if it reads higher or lower than your recorded power meter reading.





6. Navigate to the TX meter Calibration screen on the Controller by pressing the CONFIG button and then selecting AmpCF (Amplifier Configuration)



The AmpCF screen is used to configure advanced settings of the TX System and PAs and is locked with a password. When pressing the “AmpCf” button in the Config Menu, a pop-up window requiring a password will appear. Please enter the “AmpCf” password “27654” and then press “OK”.



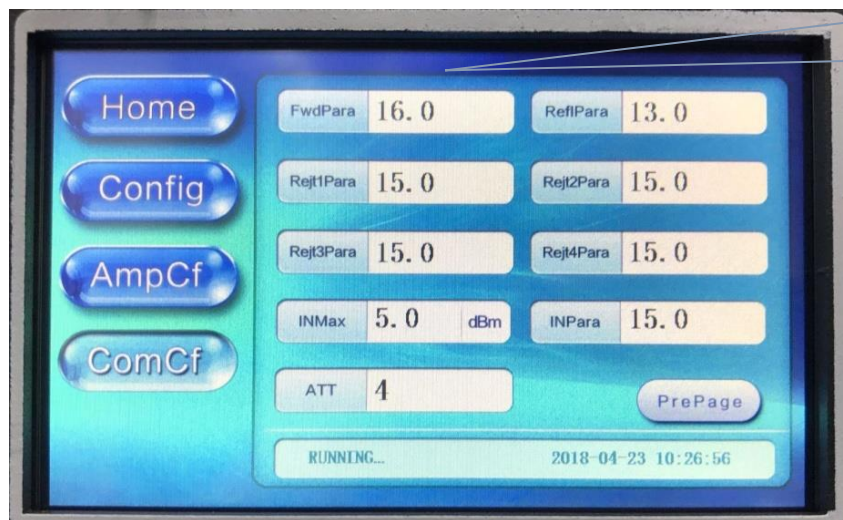
With the password properly entered, the AmpCf configuration screen will appear, as shown below. Press the ComCF button.



The ComCF screen is used to configure the TX maximum operating thresholds to engage safety and protective power reduction and shutdown mechanisms. Press the NextPage button to reach the FWD, REFL, and REJT power calibration screen below.



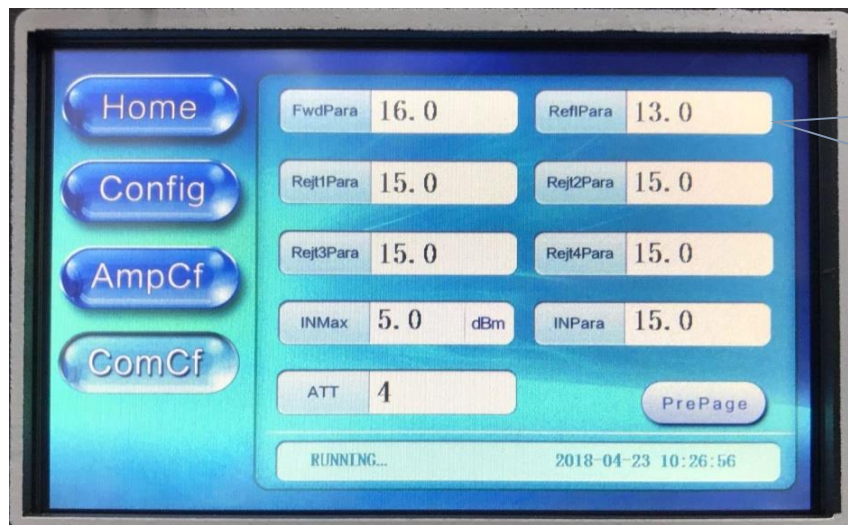
7. Press the word FwdPara to slightly adjust this value up or down (in small increments 0.1, 0.2, etc.) until the FWD power meter reading on the Controller HOME screen (also available via the Controller Web interface: RJ-45 LAN default IPaddress 192.168.1.210) agrees with the value of forward power you recorded from your power meter measurement.



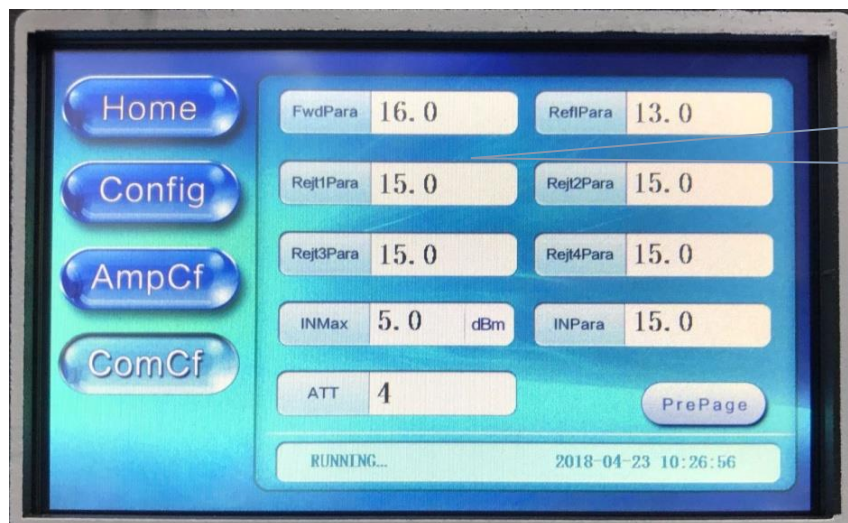
8. Please note: the above FWD power meter calibration (and below Reflected and Reject meter readings) may alternatively be adjusted and calibrated via the Controller Web interface (192.168.1.210) Common-Set Tab instead of the Controller front panel touchscreen – as shown below.

COM STATUS		COM-AMP-PARA-SET									
PRE-AMP-PARA	F	FWD-MAX	1500	W	SET	FWD-PARA	12.9		SET		
POST-AMP1-PARA	F	REFL-MAX	100	W	SET	REFL-PARA	16		SET		
POST-AMP2-PARA	F	IN-MAX	5	dBm	SET	IN-PARA	16.3		SET		
POST-AMP3-PARA	F	REJT1-MAX	100	W	SET	REJT1-PARA	15		SET		
POST-AMP4-PARA	F	REJT2-MAX	100	W	SET	REJT2-PARA	15		SET		
POST-AMP5-PARA	F	REJT3-MAX	100	W	SET	REJT3-PARA	15		SET		
EXCITER-STATUS	F	REJT4-MAX	100	W	SET	REJT4-PARA	15		SET		
NET&VERSION	F	VSWR-MAX	2		SET	ATT	4		SET		
SYSTEM-SET	F										
COMMON-SET	F										
POST-AMP-SET	F										
ADVANCE-SET	F										
LOG-INFO	F										

9. Repeat steps 3 through 7 above, this time removing, measuring, and returning the REFL IN sample to calibrate the Reflected system power meter by adjusting the value of RefPara below.



10. Repeat steps 3 through 7 above, this time removing, measuring, and returning the RJCT IN sample to calibrate the Reject Load system power meter by adjusting the value of Rejt1 below.



11. With your TX operating at your desired output power and with accurately calibrated system power metering, the next step is to set up and re-engage the TX AGC. To accomplish this, slightly adjust (if necessary) the value of POWER in the Exciter RF submenu to desired TPO.



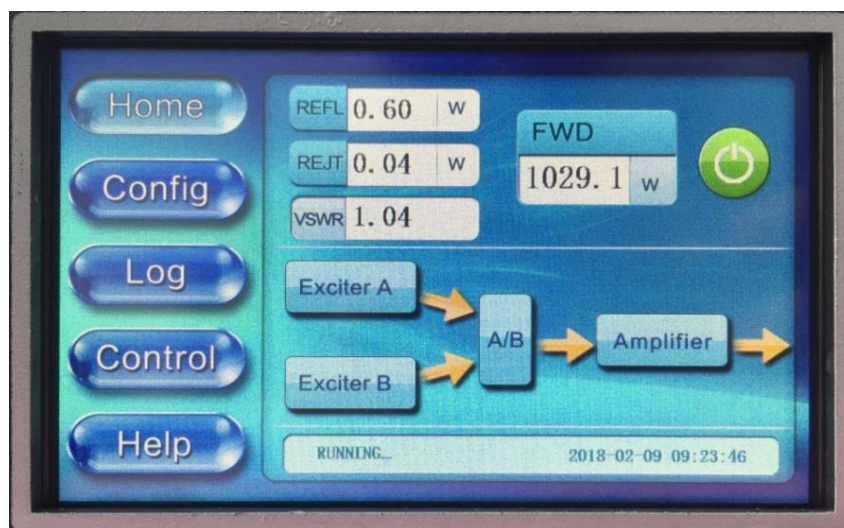
12. Navigate to the AGC screen on the Controller (by pressing the CONFIG button and then the AGC button). Be sure the AGC Target FWD power is set to desired



TPO level and then press the unlit AGC button to engage the TX AGC and turn this button Green.



13. 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 1000W TX, meter variations from 950W to 1050W may be experienced.



4.6 OPTITUNE (Available in CTL-M)

Optitune is Anywave's unique feature, which can do self-calibrating, automatic, adaptive phase and gain matching of all PA modules. It automatically balances the entire system in gain and phase within 10 minutes to achieve maximum output power (minimizes combiner losses) and optimal operating efficiency (minimizes operating costs). Optitune is only available in the model of CTL-M controller.

You can run Optitune locally via the touch screen or remotely from the web

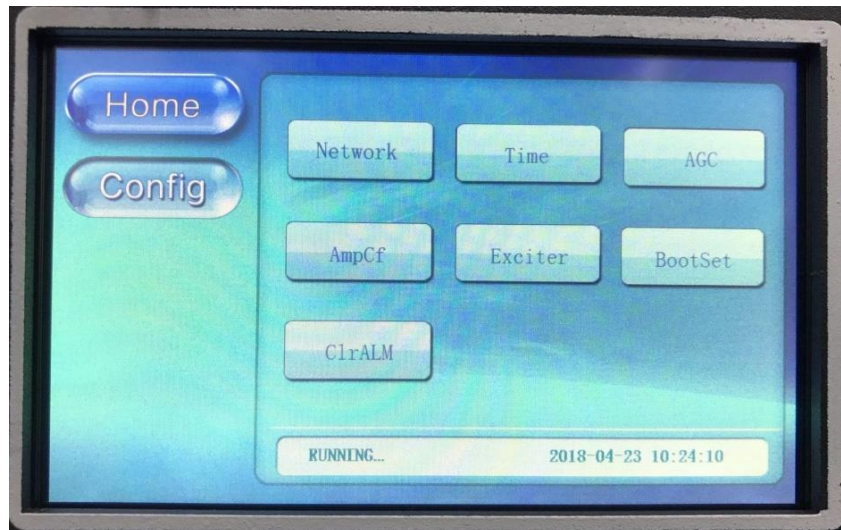


interface.

Important: Never run Optitune at full power, otherwise it may cause damage to the transmitter and void the warranty. It is required only running Optitune with the guidance from the manufacturer.

Local Control:

1. Make sure AGC is turned OFF, then lower the overall transmitter forward power level to 1kw.
2. Navigate to the System screen on the Controller by pressing the CONFIG button and then selecting AmpCF (Amplifier Configuration)



The AmpCF screen is used to configure advanced settings of the TX System and PAs and is locked with a password. When pressing the “AmpCf” button in the Config Menu, a pop-up window requiring a password will appear. Please enter the “AmpCf” password “27654” and then press “OK”.



3. With the password properly entered, the AmpCf configuration screen will appear, as shown below. Press the System button.



The System screen is used to run Optitune (AUTO_G_P) and One-Button Adjusting PSU output voltage (see section 4.7).