ANYWAVE

PA-U2D-C-FA

User Manual

Version 2.2 – September 25, 2019

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.net

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 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 are 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 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 Product Appearance

1.1 Front Panel

- 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 stay on or flash when internal communication is normal.
  - The green light will stay constantly off when internal communication is abnormal.
- LED_FWD
  - The blue light will be on when RF_OUT has power output.
  - The blue light will be off when the RF button is turned off, or the PA enters the auto-protection mode and therefore shuts down its RF output. 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.
- LED_ALARM
  - The red light will be off if there is no alarm.
  - The red light will be on if there is an alarm.
- LAN
  - Connector:10M/100M Ethernet
  - Note: Ethernet port for web-based remote control (IP address: 192.168.1.210, username/password: anywavecom/anywavecom)
- RESET
  - Press for up to 8 seconds to reset the IP of the amplifier to default (192.168.1.210).

1.2 Back Panel

- RF IN-A/RF IN-B
  - Connector: N
  - Impedance: 50 Ω
  - Note: If input power from RF_IN is lower than the rated input value, the output power will be lower than the rated output power accordingly. This is because the PA has a fixed gain. If the input level from RF_IN is higher than the rated value, it will result in RF output distortion and performance deterioration. If the output power is higher than the preset FWD threshold, it may trigger the current-limiting function. The PA will enter the auto-protection mode, and there will be reduced RF output or even no RF output.
- RF_OUT
  - Connector: N
  - Impedance: 50 Ω
  - Note: RF_OUT must be connected with a load with proper impedance, otherwise the PA will enter the auto-protection mode and there will be in no or reduced RF output.
- RFMON (reserved)
- ERS485-A
  - Connector: DB9-M
  - Note: Connected to the REMOTE (RS232) port of exciter A (with an RS232-to-485 adapter), which is used for control and communication between the PA and the exciter A.
- ERS485-B
  - Connector: DB9-M
  - Note: Connected to REMOTE (RS232) port of exciter B (with an RS232-to-485 adapter), which is used for control and communication between the PA and the exciter B.
- AC INPUT: 90~264VAC, 47~63Hz
- POWER SWITCH: ON/OFF

2 Specifications

- Environment
  - Operation Temperature: -10 ºC ~ +60 ºC (+14 ºF ~ +140 ºF)
  - Operation Humidity: 20 % ~ 90 % (non-condensing)
  - Atmospheric Pressure: 86 kPa ~ 106 kPa
- Power Supply
  - Voltage: 90 ~ 264 VAC
  - Frequency: 47 ~ 63 Hz
- Others
  - Frequency: 470 MHz ~ 610 MHz
  - Rated Power (before BPF): 320 W (OFDM) / 400 W (ATSC)
  - MER: 32 dB
  - VSWR: ≤ 1.5
  - Shoulder Level: ≥ 36dBc (with pre-correction ON)
  - Size: 480mm(W)*89mm(H)*587mm(L)

Note

1) The electrical interface characteristics are measured at the rated power. Values may change.
2) Operating in abnormal conditions may result in damage to the equipment. Long operating hours in severe environments may reduce the reliability of the entire system, which may cause permanent damage to the equipment. Make sure all electrical interface characteristics and environmental parameters are within the defined range listed above before operating this equipment.

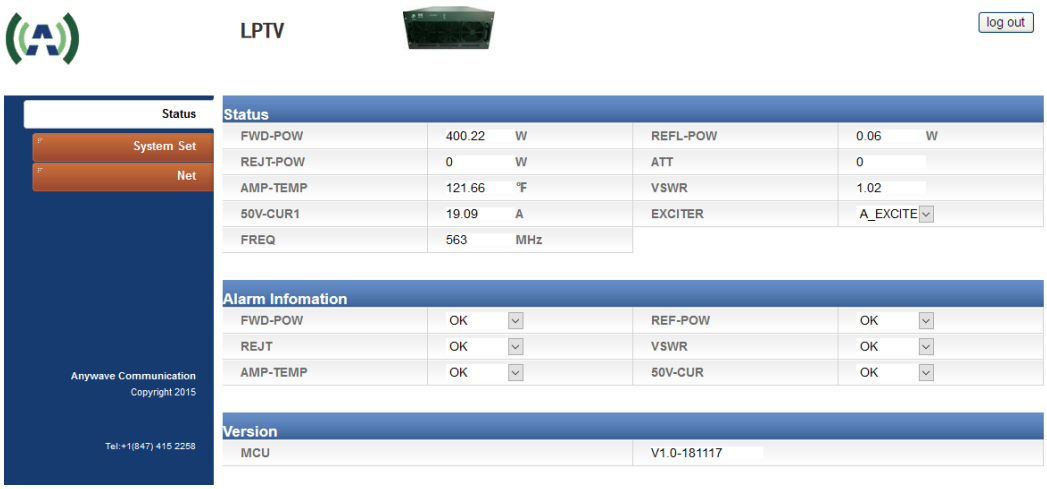
3 Control Interface

3.1 Web Interface

Enter the IP address of the PA (the default value is 192.168.1.210) in a web browser's address bar to cause a login window to pop up.

The “admin” tier provides full status and control of the PA and is accessed with a username and password of "anywavecom" and "anywavecom" (case sensitive).

Admin Web Page



Note:

1) FWD_POW/REFL-POW/REJT-POW are respectively the forward power, reflected power and rejected power meters of the amplifier. VSWR value is calculated accordingly based on these power meters. If any of these meters has exceeded the pre-set thresholds which can be set in the System Set Tap->ALARM-PARA section, then it triggers an alarm accordingly, and the amplifier

will enter into the auto-protection mode and run at reduced power levels, or even no TX output.

2) ATT stands for the internal attenuator setting. It is normal to see ATT decrease from its maximum value (127) to its pre-set value (set in System Set Tap) slowly during a reboot. ATT is also used in AGC mode when the AGC target value is away from the free-run level.

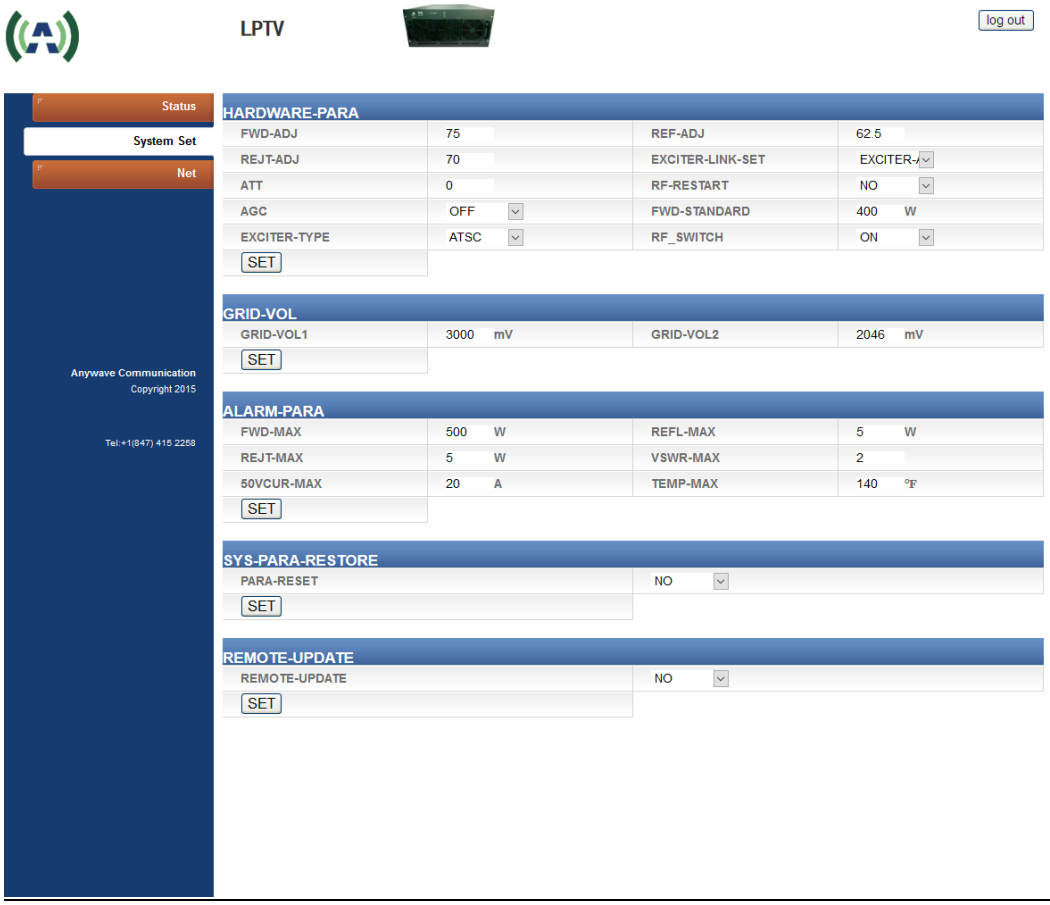
   Important: If there is an alarm that triggers the amplifier to go into the auto-protection mode, then the ATT's value will increase and the amplifier will run at reduced power to protect it from potential damage. This kind of power drop is by designed for protection purpose. So, if you notice the output power drops, please first to check if there is an alarm in the system and if the current ATT value (in the Status Tap) matches what is set in the System Set Tap. Don't increase the input of the PA (or the output of the exciter) without checking alarm(s) and ATT value/setting first. Otherwise, once the alarm has been cleared, you may have a much higher input level than needed, and it may damage the amplifier and may void the warranty.

3) AMP-TEMP is the internal temperature readings measured by an onboard temperature sensor. If this value is higher than the pre-set threshold (TEMP-MAX in the System Set tap->ALARM-PARA section), then it triggers an AMP-TEMP alarm, and the amplifier will enter into the auto-protection mode and run at reduced power levels, or even no TX output.

4) 50V-CUR1 is the main transistor current readings. If this value is higher than the pre-set threshold (50VCUR-MAX in the System Set tap->ALARM-PARA section), then it triggers a 50V-CUR alarm, and the amplifier will enter into the auto-protection mode and run at reduced power levels, or even no TX output.

5) EXCITER shows which exciter is currently selected and on air. Each PA can connect with up to two exciters (Exciter A and/or Exciter B) as needed.

6) FREQ is the current channel frequency read from the exciter. If the internal communication between the exciter and the PA is lost (via RS485), or the PA is not connected with an Anywave exciter, then this parameter may not reflect the actual channel information.



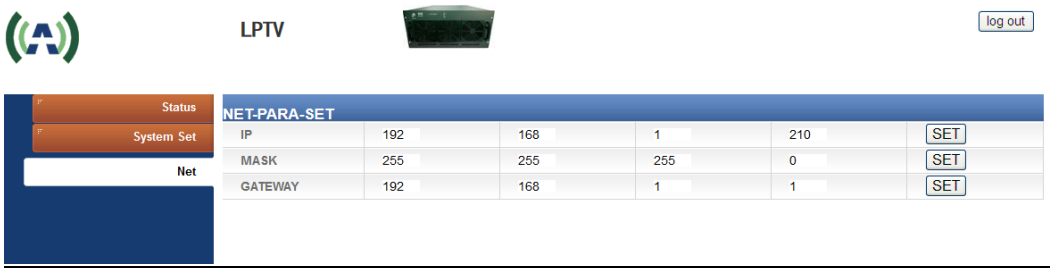
Note:

1) FWD-ADJ/REF-ADJ/REJT-ADJ: These are used to calibrate the forward power, reflected power and rejected power meters. Calibration values may vary by channels. Every amplifier is calibrated at the channel specified by order in the factory before shipment. If you would like to run the amplifier at a different channel (within the allowed range of the amplifier) or to calibrate the readings again for any reason, please contact the manufacturer for technical support. Otherwise, inaccurate readings caused by the wrong calibration may cause false alarms (if readings are higher than the actual power level), or lose the ability to protect the amplifier (if readings are lower than the actual power level) and may cause damage to the amplifier and void the warranty.
2) ATT: This is to set the value of the internal attenuator in the amplifier. The higher the value, the more it attenuates the input level and therefore the output level. If the default "0" stands for no attenuation at all, "4" stands for 1dB in attenuation, "8" stands for 2dB in attenuation, and so on. We recommend keeping the value as default (0). Usually, the ATT value in the Status should match the ATT setting in System Set Tap when the amplifier is running normally. If not, it is possible that the amplifier has triggered some alarm and entered the auto-protection mode.
3) RF-RESTART: if an amplifier is in the auto-protection mode, you can set RF-RESTART to ON to clear all the alarm(s) and restart the amplifier. After RF-RESTART, please check again to see if the alarm is gone and ATT is back to pre-set value. Sometimes you may need to clear more than once to bring the amplifier back.

   Important: To be safe, before you run RF-RESTART to clear the alarm, please first lower the

exciter's output 10dB down than its original settings, or set the exciter's output to -20dBm, or set the ATT to 60, to avoid over-drive the amplifier after it recovers from the auto-protection mode. Once alarms are cleared, you can slowly increase the exciter's drive or lower the ATT value to bring the amplifier back to the original level.

4) RF-SWITCH: It is to turn the TX of the amplifier ON or OFF.
5) AGC: This is the switch to turn ON/OFF AGC function and FWD-STARDARD is to set the target AGC value.
6) GRID-VOLT: It is highly NOT recommended to change any setting in GRID-VOLT without the permission of the manufacturer. Unauthorized changes in GRID-VLOT may cause damage to the amplifier and void the warranty.
7) ALARM-PARA: This section is to set the threshold for all alarms including forward power alarm, reflected power alarm, rejected power alarm, VSWR alarm, high current alarm, and high-temperature alarm. We recommend keeping those settings unchanged because they are pre-set and optimized for the application before leaving the factory. If they are changed without the permission of the manufacturer, it may leave the amplifier in insufficient protection and may cause damage to the amplifier and void the warranty.
8) PARA-RESET: This is to restore all parameters back to default/uncalibrated settings. Every amplifier's parameters have been calibrated and optimized for its application. Please do not run PARA-RESET unless it is suggested by the manufacturer.
9) REMOTE-UPDATE: This is to upgrade the firmware of the amplifier. Please only upgrade the amplifier with the permission or guidance from the manufacturer. Turning the amplifier into upgrade mode will make it stop working immediately, and it loses its web pages access too. If the amplifier is turned into the upgrade mode by mistake, the only way to bring it back is to power cycle the amplifier.



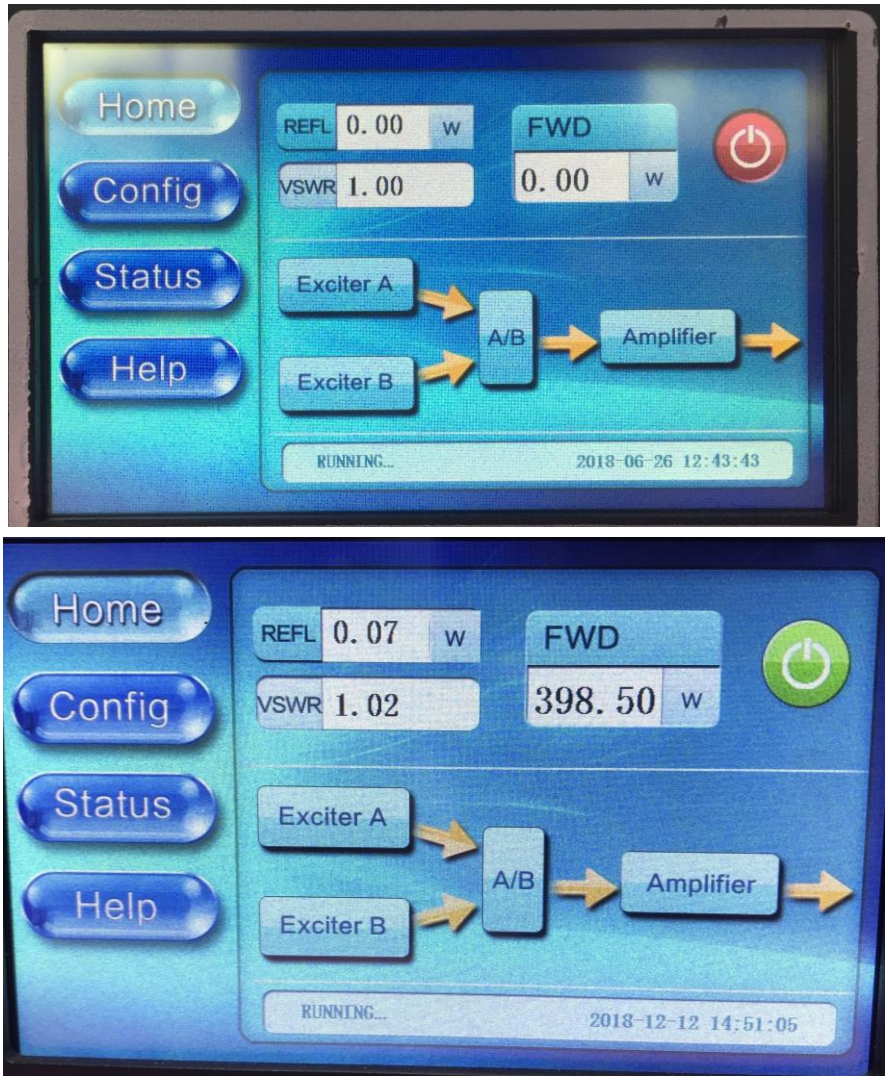
Note:

1) This section is to set the network configuration of the amplifiers. It allows users to set the IP, mask, and gateway of the amplifier.
2) If a user cannot recall the IP and therefore cannot log in remotely after making a change, he can either reset the IP back to default (192.168.1.210) from its front panel RESET button by pressing it for 8 seconds or longer, or he can check the IP from the front panel touch screen. Please note: both recover methods have to be done locally.

3.2 Local (Touch Screen) User Interface

3.2.1. Home Screen

Turn on the power supply and the PA enters the initialization process, and after 5 seconds, the PA enters the Home screen (as shown below).



The home screen is divided into 4 parts: Title Bar (left column), Power Metering (upper right), Block Diagram (middle right) and Status Bar (lower right), as shown below.

- **Title Bar**: Shown in the picture above, the "Home" button is highlighted, indicating the Home screen is now being displayed. This screen is a touch screen. You may navigate to the other screens (Config, Status, Help) by simply touching the corresponding button in the Title Bar.

- **Power Metering**
  - ON/OFF (Green) Button: Provides TX ON/OFF control. When it is GREEN (as shown above), it

indicates the TX is ON. When it is RED, it indicates the TX is OFF.

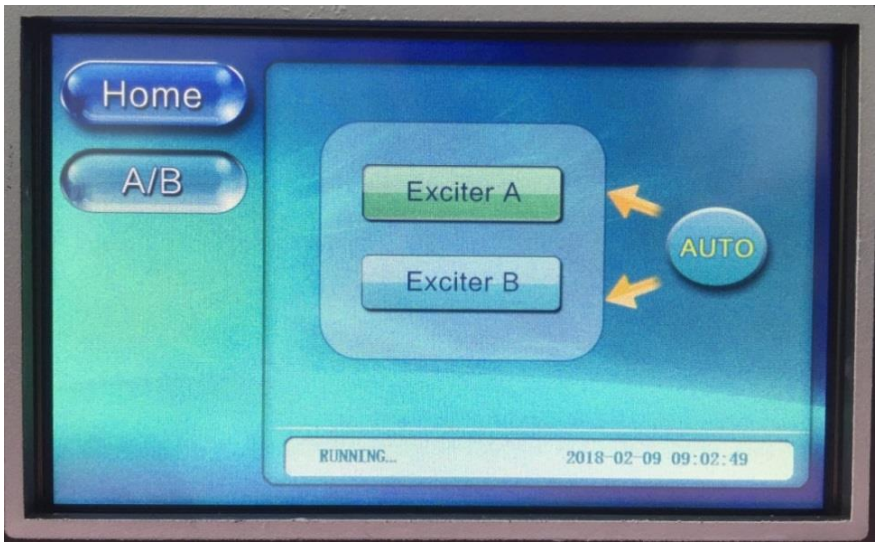
- FWD: the Forward Power Meter. Touching the white display box of FWD will toggle its display units between "dBm" and "W".
- REFL: the Reflected Power Meter. Touching the white display box of REFL will toggle its display units between "dBm" and "W".
- VSWR: the Voltage Standing Wave Ratio.

- **Status Bar**: During normal operation, the default status is "RUNNING OK". If there is an alarm, the alarm will show up in the Status Bar of each screen.

- **Block Diagram**: Press the "Exc A/B" graphic to navigate to the Dual Exciters Switching screen (shown below). This screen shows which exciter is currently on-air (highlighted in GREEN) and allows the user to manually change the on-air exciter.

3.2.2. A/B Exciter Icon Screen

Dual Exciters - Switching Screen: Pressing the "Exc A/B" icon will bring you to the Dual Exciters Switching Screen, a shown below.



Manual Exciter Switchover: As shown above, Exciter A's status is in "GREEN", indicating that Exciter A is the current on-air exciter, while Exciter B is standby. Pressing the "Exciter A" or "Exciter B" button on this screen will cause a manual switchover between exciters if the PA is "linked" to both exciters. (Note: In a dual exciter configuration, both exciters are on at the same time, producing an RF output signal a the same time, and the PA is considered "linked" with an exciter when the PA detects an RF output present from the exciter as monitored).

Auto Exciter Switchover: In a Dual Drive configuration, the PA is set to automatically switch to the standby exciter in the event a problem occurs with the on-air exciter. The PA will not automatically switch back to the original Exciter as long as the standby Exciter is operating properly. However, the PA will

automatically switch back to the original Exciter in the event of a problem with the on-air (standby) exciter. So the PA will continue to automatically switch to the standby exciter in the event of a problem with the on-air exciter.

If neither of the exciters can be linked successfully (i.e. the PA does not detect a valid RF output present from either exciter), a window will pop up, indicating “No Exciter Linked”, as shown below.

If the manual switching is successful, a window will pop up indicating “Change succeed!”, as shown below.

If the manual switching is not successful, a window will pop up indicating “Change failed!”, as shown below.

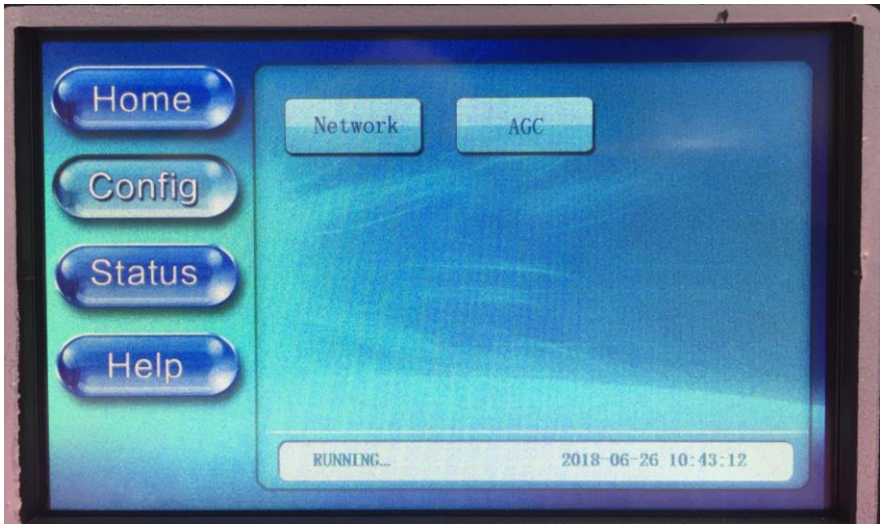
Please note that the Exciter(s) communicates via an RS-485 bus to the PA. In a single drive TX, the Exciter will be configured with an RS-485 address ID of 80H (as found under the Exciter CONFIG submenu) corresponding with Exciter A. In a dual-drive TX, Exciter B will be configured with an RS-485 ID of 81H.

Pressing the Exciter A or Exciter B button will bring up a window displaying the Exciter Channel Frequency and well as the TX System SNR and Upper and Lower Shoulder metrics. Please note: only the on-air exciter has valid readings.

3.2.3. Config Screen

Touching the Config button on the Title Bar of the Home Screen will navigate to the Config Screen, as shown below. The Config Screen has two functional sections on the right. Press any of these buttons to navigate to that config screen. The Network screen is used to configure all the TX networking parameters

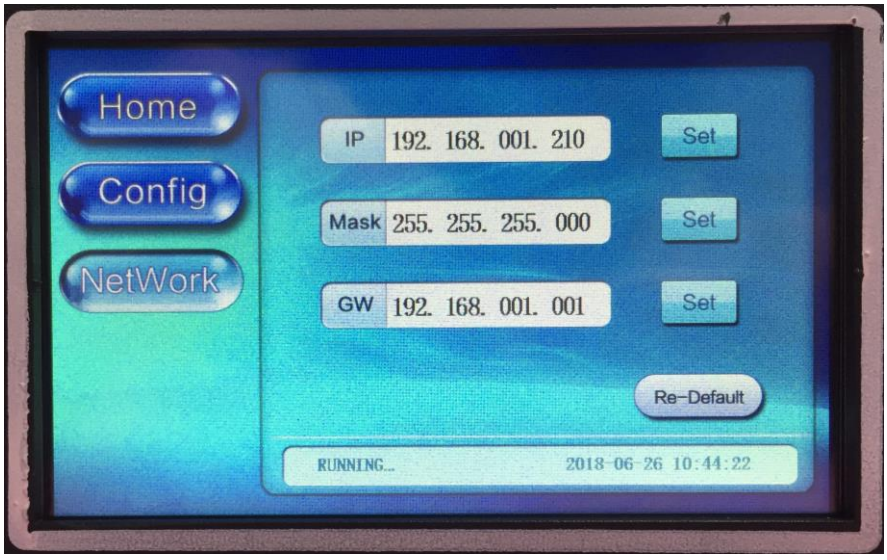
including IP, Mask, and Gateway. The AGC screen is used to turn the PA AGC On/Off and to change the target AGC output power level.



Network Screen: The User can check and set all the Controller network information in this screen.

- Re-Default: Reset Default settings - This button is used to set all the network settings to the default values, as shown below:

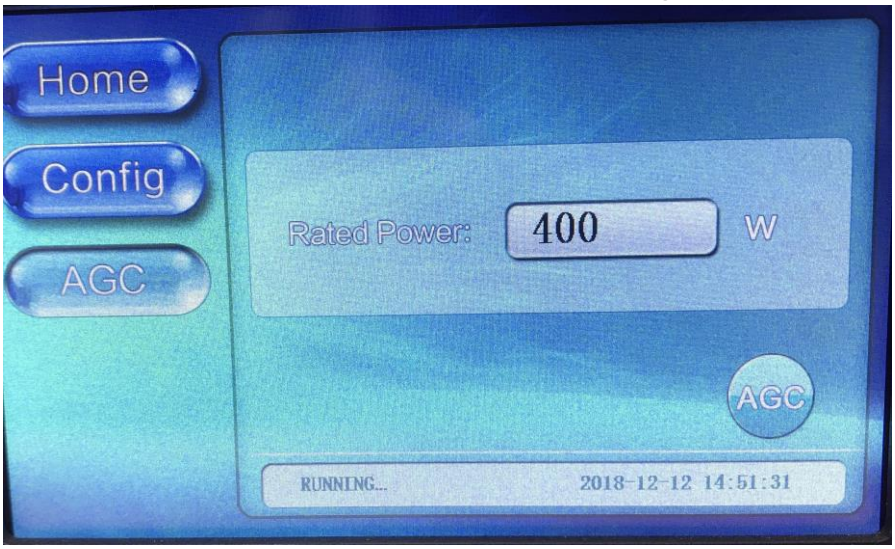
  IP: 192.168.1.210
  MASK: 255.255.255.0
  GateWay: 192.168.1.1



- Set: There is a Set button for each bar on this screen. Pressing the Set button will lead to the corresponding configuration screen of IP or Mask or GateWay accordingly. Using the IP setting as an example, Press any part of the white bar on the IP Setting Screen and the keyboard (shown below) will be enabled, turning from grey to yellow. The user can only set 3-digits of one bar at a time. When the configuration is finished, press OK to confirm. If the keyboard is enabled by

mistake, press Cancel to exit the setting mode. Don't press Ok without entering a valid number, otherwise, the system will fill it with all zeros instead.

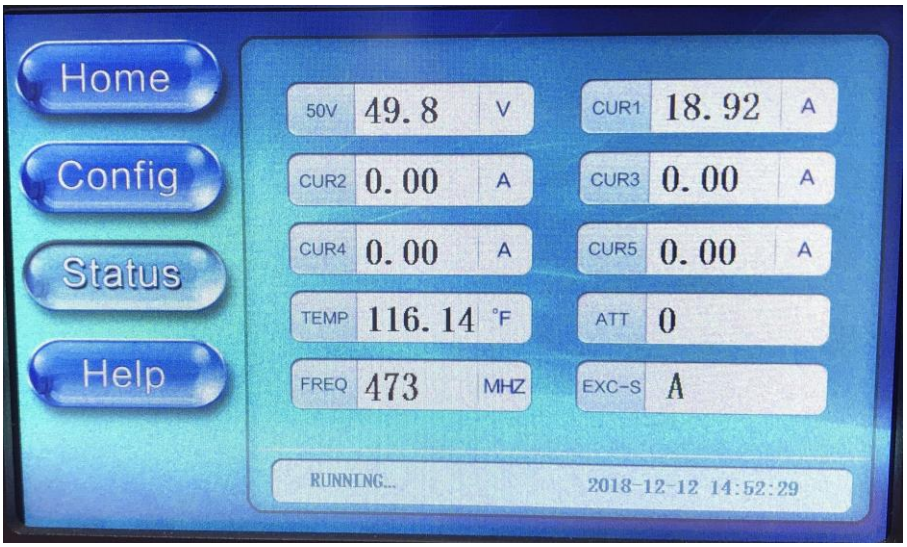
AGC Screen: This screen is used to set the AGC Reference output power of the PA and to turn the PA AGC ON/OFF. Press the AGC button to turn AGC ON (button will turn green).



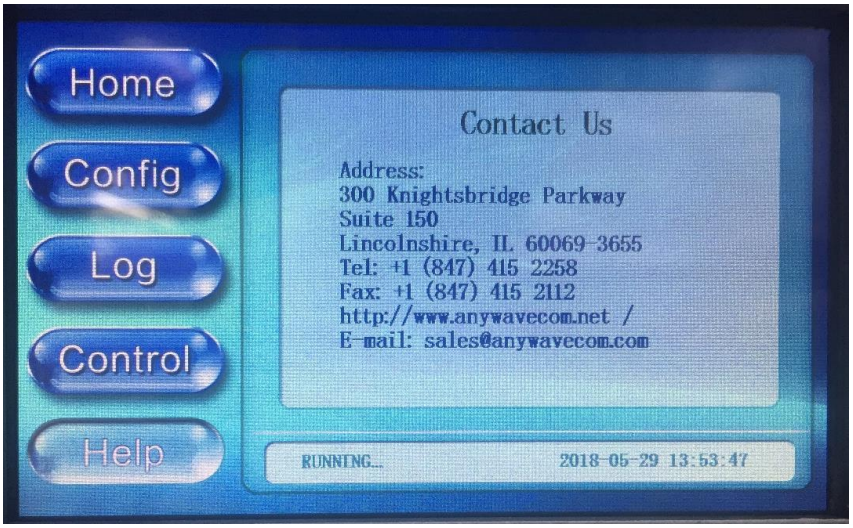
3.2.4. Status Screen

Status Screens: As mentioned above, pressing the "Amplifier" icon on the Home page, will navigate to the Amplifier Status Screens.

- Temp: Temperature of the amplifier
- V50: Reading of 50 V power supply of the amplifier
- Cur1: Device current.
- Cur2~5: N/A for this amplifier.
- ATT: The internal attenuation value of the amplifier (every 4 stands for 1dB in attenuation).
- FREQ: Current frequency of the amplifier.
- EXC-S: The selected on-air exciter of the amplifier.



3.2.5. Help Screen



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