### 4•8•0•2 Output PID Logger

Select Menu > Output > PID > Logger to access the PID Logger Screen

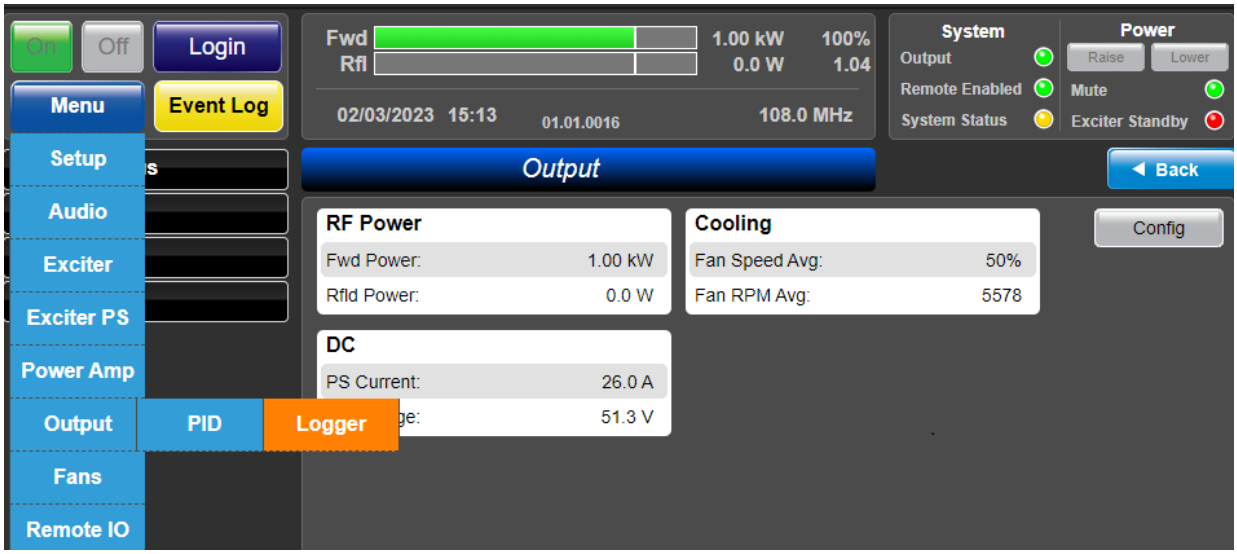


**Figure 4-83 PID Logger Button**

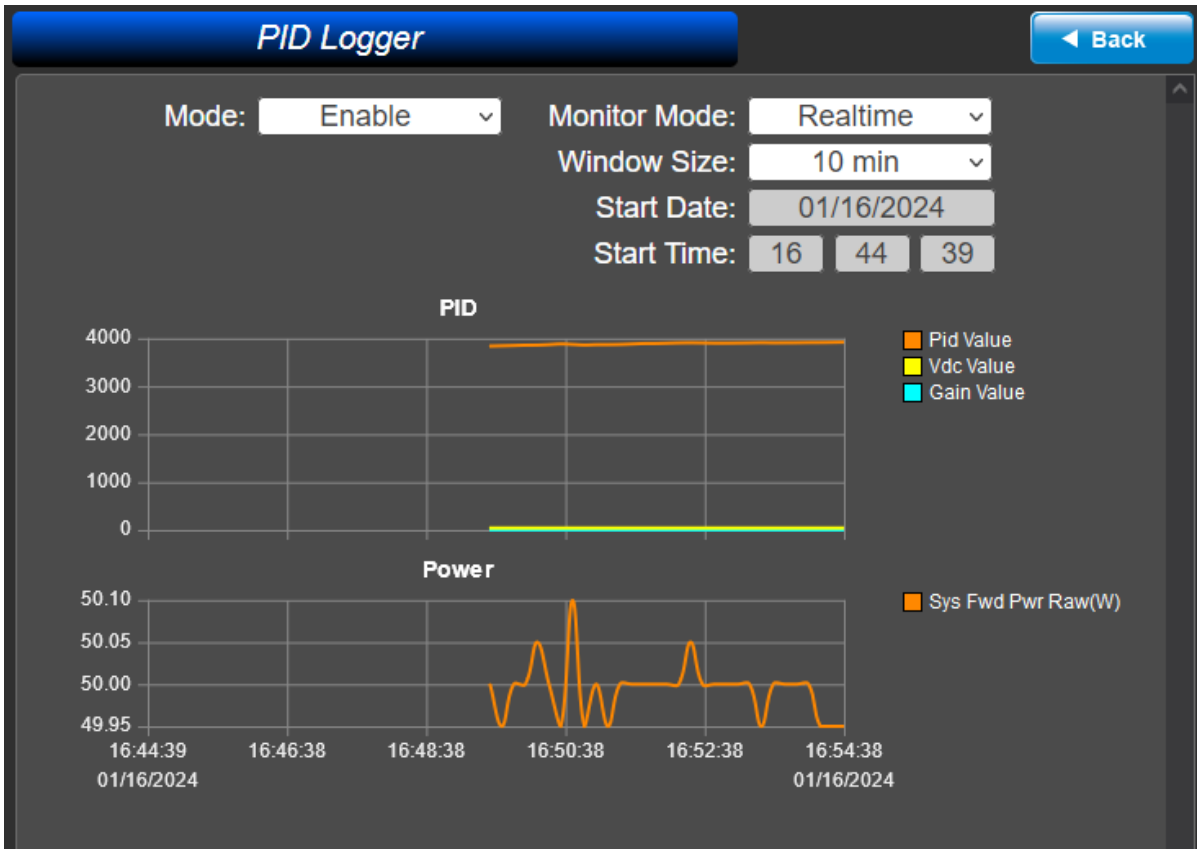


**Figure 4-84 Output PID Logger Screen**

The PID Logger is primarily used by GatesAir for debugging purposes. Basically, a low PID number produces low amounts of output power and a high PID number creates a large amount of RF output power. In a stable system, the PID might change value some to counter temperature changes and such but for the most part you expect it to remain fairly stable. This screen allows for setting the monitoring mode, time window display, start date and start time of charting these levels for debugging

## 4.9 Fans Button

The Fans Status/Setup screen shows the fan RPM and the percent of maximum. The Minimum speed in percent can be programmed down to 30%.


**Figure 4-85 Fans Screen**


**WARNING: Disconnect primary power prior to servicing.**

## 4.10 Remote I/O Button

Clicking on the Remote I/O button from the pull down menu, opens the Remote Interface screen to provide the pinout settings for 25 pin connector on the rear of the transmitter.

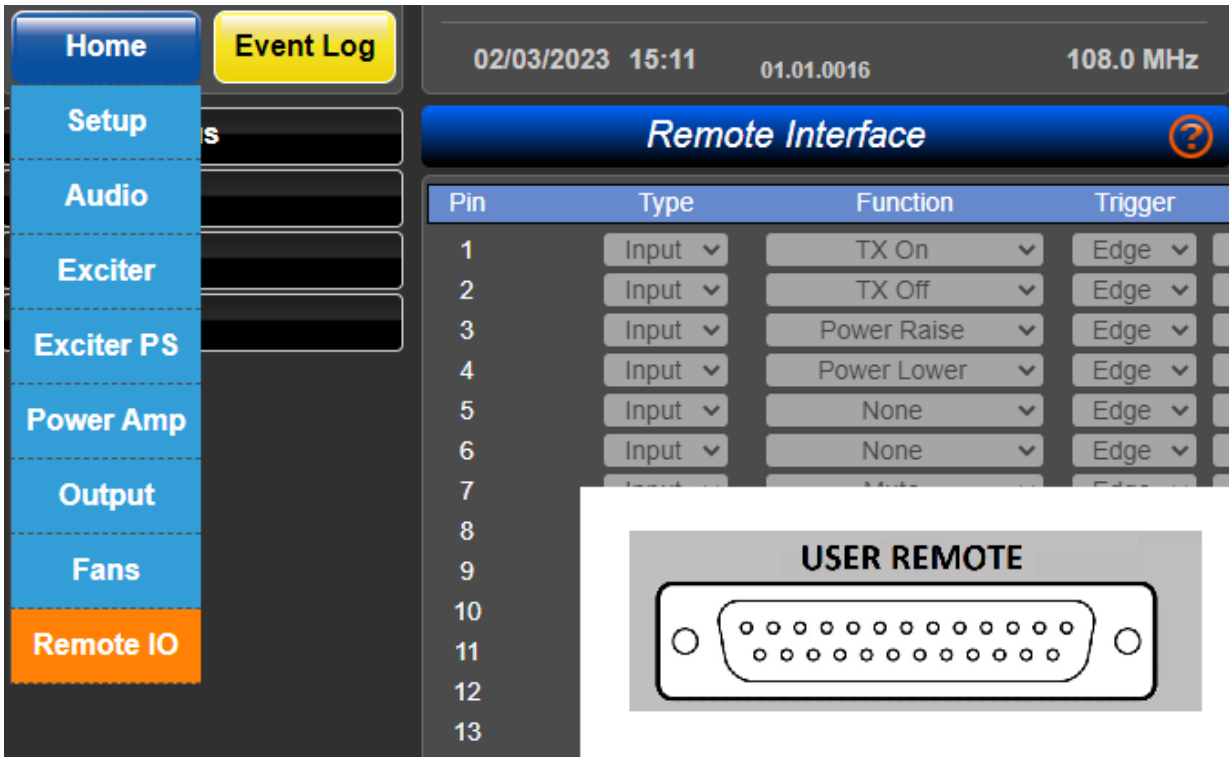


**Figure 4-86 Remote I/O Button**

## 4.10.1 USER REMOTE Screen - 25 Pin


| Pin | Type | Function | Trigger | Active | State |
|---|---|---|---|---|---|
| 1 | Input | TX On | Edge | Low | High |
| 2 | Input | TX Off | Edge | Low | High |
| 3 | Input | Power Raise | Edge | Low | High |
| 4 | Input | Power Lower | Edge | Low | High |
| 5 | Input | Equipment Interlock | Edge | Low | High |
| 6 | Input | Mute | Edge | Low | High |
| 7 | Input | Input Primary Sel | Edge | Low | High |
| 8 | Input | Input Backup Sel | Edge | Low | High |
| 9 | Input | TX On | Edge | Low | High |
| 10 | Input | TX Off | Edge | Low | High |
| 11 | --- | Reset | --- | Low | |
| 12 | --- | N/C | --- | --- | |
| 13 | Output | On/Off Status | Level | High | Low |
| 14 | Output | On/Off Status | Level | High | Low |
| 15 | Output | On/Off Status | Level | High | Low |
| 16 | Output | On/Off Status | Level | High | Low |
| 17 | Output | On/Off Status | Level | High | Low |
| 18 | Output | On/Off Status | Level | High | Low |
| 19 | Analog Out | Fwd Pwr | Level | --- | 0.00 V |
| 20 | Analog Out | Rfld Pwr | Level | --- | 0.00 V |
| 21 | Analog Out | PA PS Volts | Level | --- | 2.97 V |
| 22 | Analog Out | PA PS Current | Level | --- | 0.00 V |
| 23 | --- | GND | --- | --- | |
| 24 | --- | GND | --- | --- | |
| 25 | --- | Safety Interlock | --- | High | High |

**Figure 4-87 Remote I/O Screen**

- NOTE: Some selections will be grayed out/disabled when the transmitter is in Local control

**Table 4-42 Remote I/O Fields Pins 1 - 25**

| Item / Field | Explanation |
|---|---|
| Pin | Pin number to be programmed. Note: Some pins are fixed with pre-assigned function. |
| Type | Digital Input, Digital Output and Analog Output; the type of connection on that pin of the remote Connector. |
| Function | A list of Remote Status Outputs or Remote Control Inputs to choose from for the desired type. |
| Trigger | The Remote Control Inputs are ONLY triggered on the edge of the input signal. Meaning even thou the input is held low as an example it only triggers the command once i.e. on the edge. |
| Active | Active High or Low. |
| State | Current State of the pin; high, low or a variable DC voltage for analog outputs. |

## 4.10.2 XMTR IO Screen - 15 Pin

To access the 15 pin, TX I/O connector, click on the XMTR IO pull down button or the sub screen button in the upper right corner.

This connector is typically used when a GX50 or other LP model is used as an exciter for a larger transmitter or RF System control such as Main / Alternate Exciters.

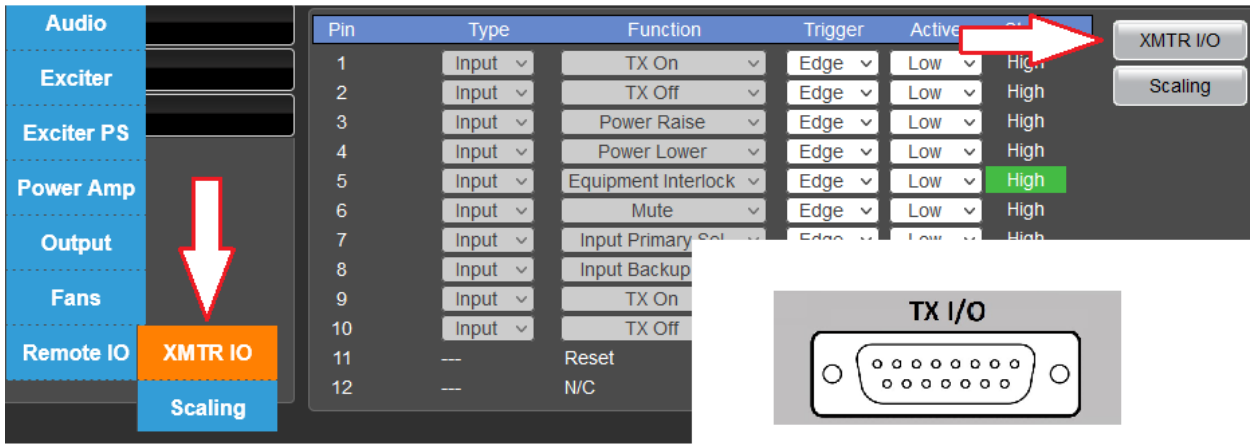


**Figure 4-88 TX I/O Button**

Most pins on this connector are user programmable. For those pins that are programmable, select the Type and Function for corresponding pin number. Then set the Trigger to be on the leading Edge or Level and then it's active state. Some pins are not programmable such as Ground, Mute and Interlock

- Some selections will be grayed out/disabled when the transmitter is in Local control.


**Figure 4-89 XMTR I/O Screen**

## Table 4-43 XMTR I/O Transmitter Interface Screen

| Item / Field | Explanation |
|---|---|
| Pin | Pin number to be programmed. Note: Some pins are fixed with pre-assigned function. |
| Type | Digital Input, Digital Output and Analog Output; the type of connection on that pin of the remote Connector. |
| Function | A list of Remote Status Outputs or Remote Control Inputs to choose from for the desired type. |
| Trigger | The Remote Control Inputs are ONLY triggered on the edge of the input signal. Meaning even thou the input is held low as an example it only triggers the command once i.e. on the edge. |
| Active | Active High or Low. |
| State | Current State of the pin; high, low or a variable DC voltage for analog outputs. |
| | **Upper Right Corner Navigation BUTTONS** |
| Remote I/O | Button to navigate to the User Remote screen |
| Scaling | Button to navigate to Scaling screen |

## Table 4-44 Pin Function Selections

| Functions (Selectable) | Remarks |
|---|---|
| Exciter Active | Used by main/alt exciter switcher to determine what unit is Exc A or Exc B.<br>Level Setting: Low=Exciter B High=Exciter A |
| Exciter Ready | Used by main/alt exciter switcher to determine if exciter is Ready to be put On-Air |
| Sum Flt Status | Summary Fault Status condition of the exciter. |
| None | Makes pin inactive and non-functioning as well as it's other fields.<br>Any unused pins that are programmable should be set to None |
| FM On | Not used in GXLP. Pin function should be set to None |
| HD On | Not used in GX LP. Pin function should be set to None |
| **Functions (Fixed)** | **Remarks** |
| Fwd Pwr | Exciter Forward Power. Analog voltage output.<br>(0-4 VDC linear scale); Scaling available via Remote GUI |
| Rfld Pwr | Exciter Reflected Power. Analog voltage output.<br>(0-4 VDC linear scale); Scaling available via Remote GUI |
| Ext APC | Analog Power Control voltage input to control RF Output power.<br>0-5 VDC |
| TX Mute | Input signal to mute RF output.<br>The Level is selectable, High or Low, via Remote GUI |
| Fast Mute | Input signal to mute RF output. Provides faster ramp times than TX Mute<br>The Level is selectable, High or Low, via Remote GUI |
| RS485+ | Not used in GX LP. Pin function is inactive. |
| RS485- | Not used in GX LP. Pin function is inactive. |

## 4.10.3 Scaling - Analog Outputs

Although the Analog Outputs are fixed to their pin assignments, the Scaling button on the main Remote I/O screen allows the user to adjust the analog DC outputs for the 4 samples for monitoring.

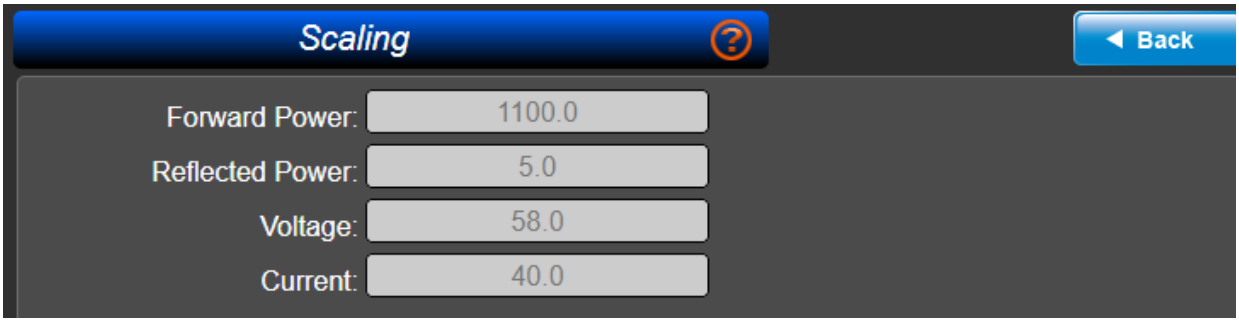


**Figure 4-90 Analog Output Scaling**

### Table 4-45 Scaling Definitions

| Item / Field | Explanation |
|---|---|
| Forward Power: | Sets the analog voltage out to track the forward power of the transmitter. This setting is for both the User Remote and TX I/O pin out. Typically 4VDC for TPO in Watts |
| Reflected Power: | Sets the analog voltage out to track the reflected power of the transmitter. This setting is for both the User Remote and TX I/O pin out. Typically 4VDC for 1.5:1 VSWR |
| Voltage: | Sets the analog voltage out to track the power main DC supply voltage of the transmitter. |
| Current: | Sets the analog voltage out to track the total supply current of the transmitter. |

**Note**

*The fields, Voltage and Current are assigned to the Remote User connector only*

**Note**

*Clicking the " ?" in the Title Banner opens help glossary information for the Scaling screen.*

## 4.11 Navigation Menu Tree

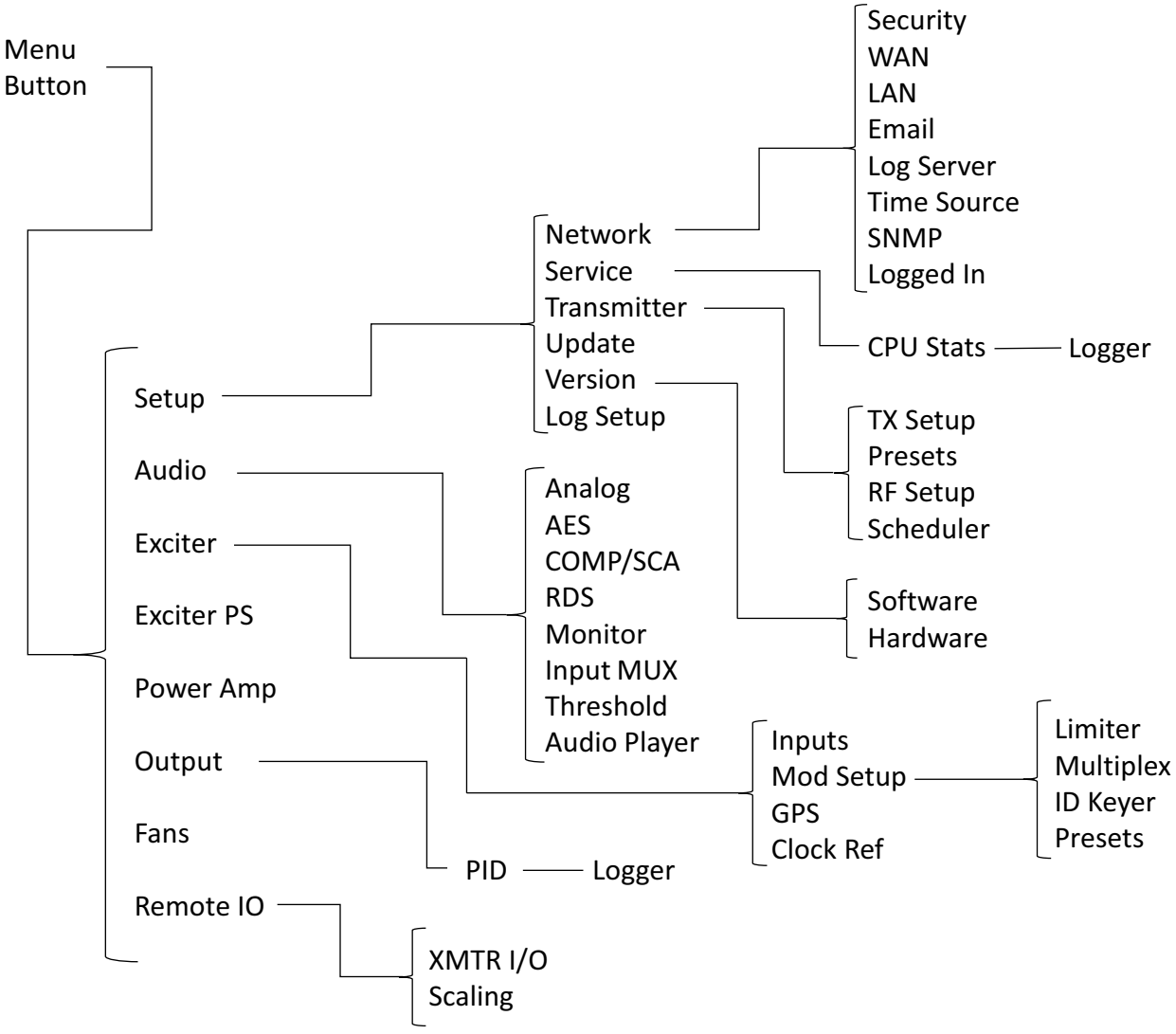


**Figure 4-91 GUI Menu Tree**


**WARNING: Disconnect primary power prior to servicing.**

# 5 Section-5 Theory

## 5.1 Introduction

This section contains detailed descriptions of the GXLP Series transmitter.

The following descriptions and series of drawings are intended to provide general overall knowledge on how the GXLP transmitter works. This series of transmitter operates in FM analog mode.

The GXLP Series Transmitters include a common built-in Modulator and a common front panel LCD display with front panel controls plus a remote GUI Interface. All of the interfaces to the transmitter and the GUI are identical for all GXLP models

## 5.2 Modulator/Control Board Description

Refer to Figure 1 as needed for the Modulator and Control circuit descriptions.

### 5.2.1 Modulator Circuits

The Modulator Board is a full-scale high quality Digital FM Exciter which includes transmitter monitoring/control circuitry plus the back panel input connector assembly. Refer to Figure 4-1 Modulator Board Block Diagram.

The heart of the Modulator Board is the fully programmable multi-tasking FPGA. It has 2 primary functions: take the audio inputs and generate the modulated Stereo/Mono FM signal, and to monitor/control the key operating functions of the transmitter. The Front Panel LCD Display Assembly interfaces directly with the FPGA to facilitate user interaction with the transmitter.

The Modulator and the Front Panel Display gets it’s DC voltage from the 12 volt power supply.

All of the analog audio signals, L&R, SCA’s and MPX, that come into the Modulator are filtered, go through a balancing amp and sent to a A/D converter. The output of the A/D converter is sent to the FPGA. The AES audio is sample rate converted prior to the input of the FPGA.

The main reference clock for the Modulator board is a 40 MHz OCXO with a stability of ± 200 ppb from -20 to +70° C. The 40 MHz can be locked to GPS, external 10 MHz or an external 1 PPS signal. The 40 MHz is buffered and sent to the FPGA. The frequency is voltage controlled from the FPGA and a D/A converter. The 40 MHz clock is also the reference for the 720 MHz PLL clock for the D/A converter for the generation of the FM signal from the I and Q signal at the output of the FPGA.

The FPGA generates the FM signal and modulates it with the incoming audio, SCA’s and RDS (if used), this signal leaves the FPGA as I/Q. The I and Q signal is then converted to an analog signal in the 88-108 MHz range on the specified frequency. The D/A converted is filtered, goes through an RF relay that selects either internal modulator or external RF source. The selected RF signal passes to a variable attenuator that controls the level of RF amplifier circuitry on the Modulator board which can produce up to 8 watts output, but typically operates 1 watt or less.

### 5.2.2 Control Circuits

The control circuits of the FPGA on the Modulator/Control Board receives transmitter interface I/O via two other PCB assemblies. These assemblies are the Front Panel Display and the Final RF Amplifier.

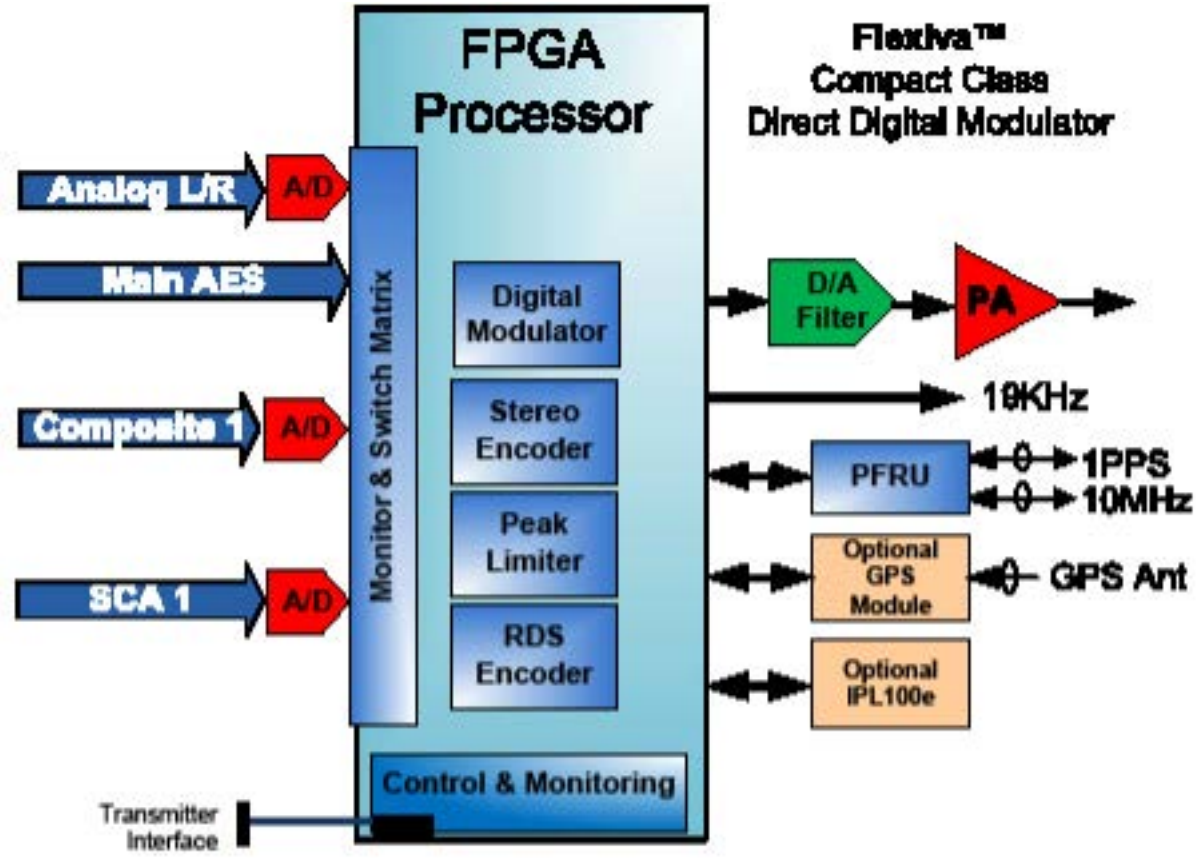


**Figure 5-1 Modulator Block Diagram**

## 5.3 Front Panel Display

The front panel Display assembly consists of an LCD touch screen display, pushbutton switches to provide on/off, and local/remote control and four status LEDs.

The front panel cover can be removed to gain access to the Display and on larger GX models, the PA power supply and Fan can be accessed.

## 5.4 RF Final Amplifier & Power Supplies

On the GX50, the required power supplies for the modulator, control and RF circuits are mounted on the RF Final Amplifier Assembly. On larger GXLP models such as the GX1K, the power supplies are mounted separately and wired to the RF Amp assembly. Supply voltages for modulator, display and cooling fans and routed to provide their power requirements.

The Final Amplifier RF output is routed to low pass circuitry for any additional spurious attenuation required and then to it's output connector mounted on the rear of the chassis.

# 6 Section-6 Maintenance & Diagnostics

## 6.1 Introduction

This section contains diagnostic and servicing information for the Flexiva GX Compact Series of Transmitters.

Most equipment care is general maintenance such as air filter cleaning and replacement of fan(s). A higher level skill set of basic IT knowledge is needed for Software Management in the Flexiva products.

In the event that a component or circuit failure occurs, most repairs are confined to replacement of the cards or major PWB assemblies. This is due to very small size of surface mount components and the need for specialized tools and procedures required. This requires a much higher level of skill to repair these PWB's and the soldering these components.

For Diagnostics, make use of the Front Panel Display and Status LEDs in Section 3 and the GUI in Section 4. All screens use the same status indicator color coding:

- **GREEN**: System is normal, does not need any attention
- **AMBER**: System WARNING. Transmitter is operating but there's a problem. Warning should be investigated and resolved ASAP.
- **RED**: System FAULT. Something in the transmitter system has faulted and is not operating properly and possibly off-air. Should be investigated and fixed immediately.

Use this information with the details provided in various Table created to explain the various fields and buttons used in the display screens.

## 6.2 Software Management

Once your transmitter has been installed and configured properly it is a good idea to save the configuration file in case the Modulator board needs to be replaced in the future. The information is stored on the Modulator board with the software using an SD card for the backup. This file should be saved each time there is a change made in the configuration of the transmitter system. Use a file naming scheme that allows for easy access to the correct file and date it.

### 6.2.1 Configuration File Saving and Software Updates

**Note**

*Power Calibration is not stored in the configuration file. Power calibration is stored in PA and is set at the factory if this board needs to be replaced..*

#### 6•2•1•1 Save Config File Procedure

*STEP 1* Connect the PC to the transmitter using an Ethernet cable to the rear Ethernet WAN port to start a GUI connection. Refer to Section 4 for Network setup and login information.

*STEP 2* Open a web browser and establish a connection, once there is a connection, navigate from the HOME page select the *Menu button* and then to the *Setup >> Update* button to open the Software Management main screen shown in Figure 6-1.


**WARNING: Disconnect primary power prior to servicing.**

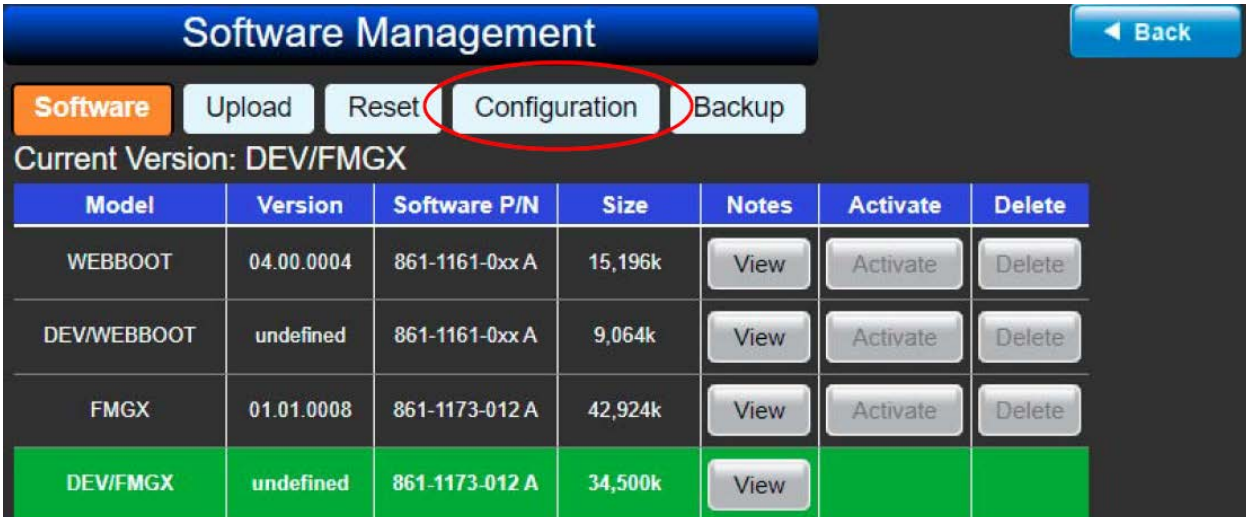


**Figure 6-1 GX GUI ISP Screen**

*STEP 3* Click on the **Configuration** button circled in Figure 6-1 to open the it's sub-menu screen, *Export/Import* in Figure 6-2.

*STEP 4* Check the box: **Export** ***+Net Routes*** circled in Figure 6-2 and then click the *Download System Configuration* button. The file will be downloaded and in your download folder on the computer. Move it in a special folder for future retrieval.

.

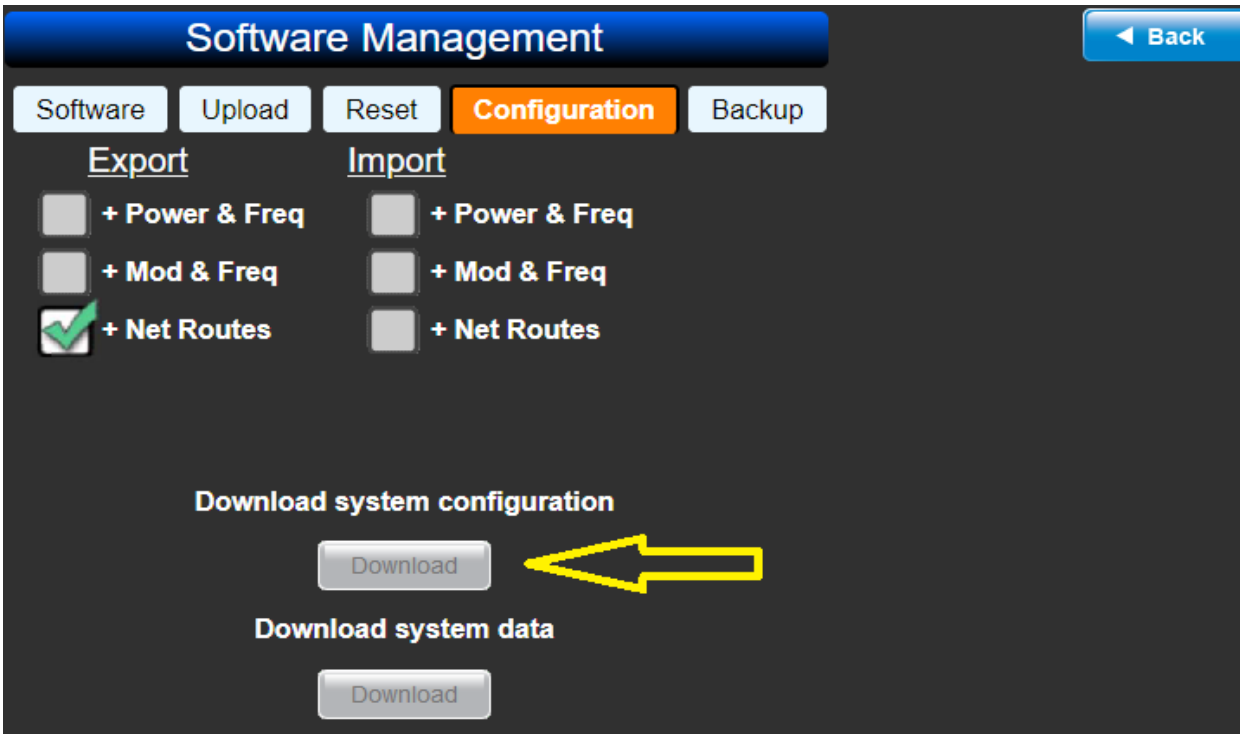


**Figure 6-2 Export/Import Screen**

### 6•2•1•2 Software Update Procedure

Updating the transmitter software and reloading a previously saved Configuration file follows the same steps listed here. Software files can be obtained on the GatesAir Customer Portal. All customers should register at the website to obtain any updated software, manual and documentation packages.

*STEP 1* Connect the PC to the transmitter using a Ethernet cable to either the front or rear Ethernet WAN port. See Section 3 for Network setup and login information.

*STEP 2* Open a web browser and establish a connection, once there is a connection from the HOME page navigate to the Setup>> Update main screen menu and click on the Upload tab. See the figure 6-3 below.

*STEP 3* Click Browse and locate the correct file for the upload from the PC. The default name is eeprom.s19. This name may vary if the name was changed when saved from transmitter. Also note that it is best to have this file located on your hard disk drive not on a removable stick.

*STEP 4* Click on the file, then Open and the box should populate with the file location and name.

*STEP 5* Click Upload button and there will be a progress bar while the file uploads.

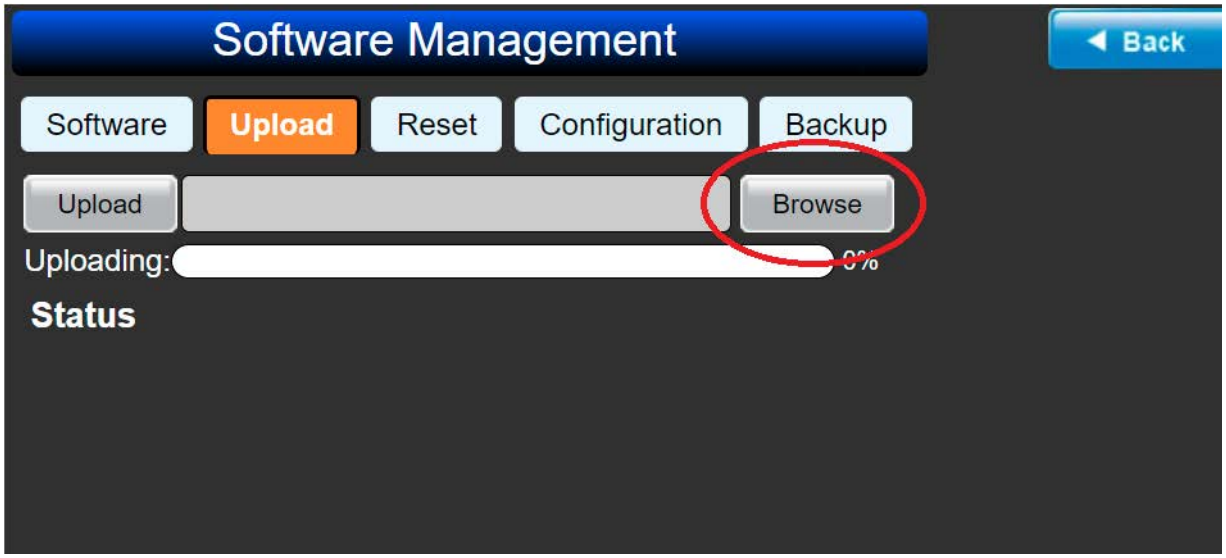


**Figure 6-3 Software Update**

*STEP 6* Once the file upload is complete click on the PROGRAM button, it will take 15 - 20 seconds for the config file to be programmed into memory. Once programming is complete the transmitter will automatically reboot.

*STEP 7* Go back to the IP address of the transmitter and Login, verify the code took by navigating to the Setup > Version Software screen. Verify the software revisions.

# 6.3 Basic Maintenance Procedures

The maintenance procedures provided in this section may be routinely performed by operators with basic technical skills. No special equipment or training is required.

## 6.3.1 Periodic Cleaning and Inspection

The GX transmitter, should be periodically opened, inspected for dust buildup, and cleaned. This inspection should also check for signs of progressive damage, such as cracking cables or evidence of heat stress/burning. A full inspection will require the GX to be taken out of service, (Off Air). However if just the air filter is be serviced, this may done without removing the GX from the rack or taking it out of service.

- Check equipment external to the transmitter such as the transmission line(s)

While transmitter is still operating at full power, inspect all external transmission line sections for localized discolorations or “hot spots” that are warm/hot to the touch. Areas to look for are the Type N or 7/16 connectors that may not be screwed in fully.. If localized heating is found, switch off transmitter, resolve transmission line issue. Inspect for loose bullets (anchor connectors), split bullets, contaminations, or other irregularities on the 1-5/8" and larger line.

*STEP 1* Turn GX LP off and remove from rack or transmitter.

*STEP 2* If GX is located in a transmitter, take steps to ensure AC Mains connection is securely locked out and inadvertent Mains re-application is not possible while maintenance is being performed. ( Use Lockout Tagout procedures).

**Warning**

*ALWAYS DISCONNECT POWER BEFORE OPENING COVERS, DOORS, ENCLOSURES, GATES, PANELS, OR SHIELDS. ALWAYS USE GROUNDING STICKS AND SHORT OUT HIGH VOLTAGE POINTS BEFORE SERVICING. NEVER MAKE INTERNAL ADJUSTMENTS, PERFORM MAINTENANCE, OR SERVICE WHEN ALONE OR WHEN FATIGUED.*

*STEP 3* With GX on work bench, remove top cover and the front panel.

*STEP 4* Verify no loose hardware is in the chassis.

*STEP 5* Vacuum any dust accumulations.

*STEP 6* Vacuum any dust accumulations on the fan blades and PS module fan blades.

*STEP 7* Inspect all exposed PC boards for signs of heat discoloration or rings of dried solder flux, an indication of partial solder melting.

*STEP 8* Verify all push-on DC connections are fully seated on the PA modules and Left and Right Splitters.

*STEP 9* Install top and front covers.

*STEP 10* Reinstall GX back in rack or transmitter.

*STEP 11* Press front panel ON button to turn transmitter on.

*STEP 12* Verify transmitter returns to full power and no alarms are reported.

*STEP 13* As desired, use off-air opportunity to verify integrity of all safety interlock circuits such as station load temp sensor, patch panel position switches, coaxial switch position switches, etc.

*STEP 14* As desired, use off-air opportunity to operate transmitter into station test load and verify test load integrity.

*STEP 15* As desired, use off-air opportunity to verify reserve exciter and exciter switchover functionality (where applicable).

*STEP 16* Note any findings and resolutions in station maintenance log.

## 6.3.2 Air Filter Replacement

The front panel air filter require periodic replacement. How often depends on the air quality at the site. When the filter is filled with dust/dirt, it will reduce the air flow to the point where the modules will overheat, then shut down.

- Follow the steps in **6.3.3. Fan Replacement** to change the filter.

**Warning**

*DO NOT UNDER ANY CIRCUMSTANCE INSTALL A WET OR MOIST FILTER IN THE TRANSMITTER.. CONTACT GATESAIR SERVICE TO PURCHASE ADDITIONAL FILTER MEDIA, AS NECESSARY.*

A spare filter media can be purchased, so that a new one may be rotated into service while the original filter is being washed and allowed to dry.

## 6.3.3 Fan Replacement

In most models of GXLP, their is a PA fan and a fan for the modulator section and these fans can be replaced while the transmitter is on the air, with the exception of the GX50. The GX50 only has the single modulator fan and it location requires removal of the top cover panel.

The modulator fan runs at a constant. In the higher power models such as the GX1K, GX2K and GX3K, the PA power supply will always spin at some low level with AC on and its speed is scaled up depending on the PA temperature.

- Refer to **Figure 6-4** on the next page.

*STEP 1* Loosen the two thumbscrews and remove the front filter cover.

*STEP 2* The front LCD Display assembly will need to be removed to gain access to the Modulator Fan.

*STEP 3* Disconnect the wire connector from the bulkhead and replace fan.

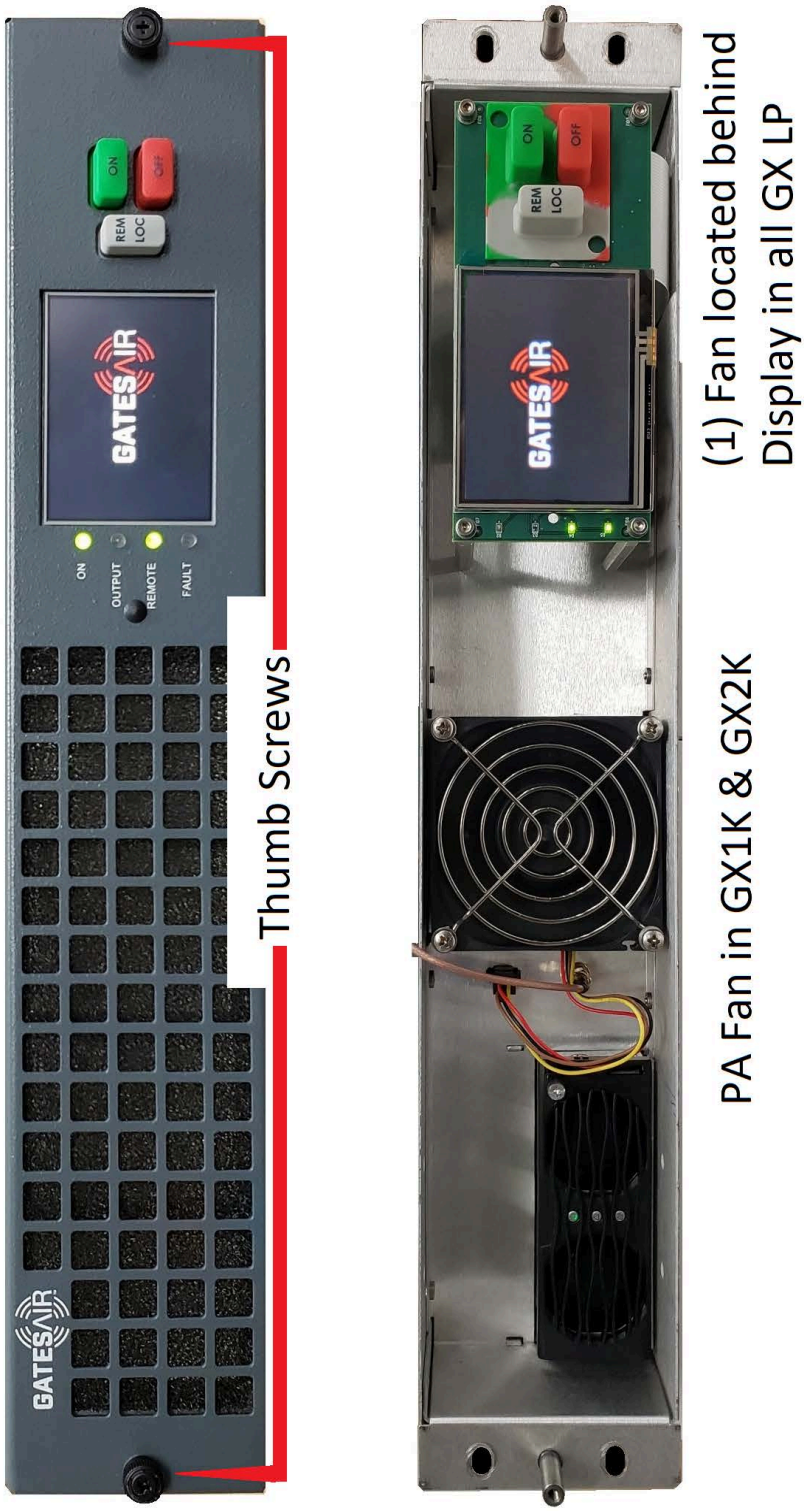


**Figure 6-4 GX with Front Cover Removed**

# 6.4 Power Calibration

The GX RF power metering is set to an accurate calibrated standard prior to shipment from GatesAir and under normal conditions, calibration should not be required.

In the event the Modulator Tray or a PA assembly is replaced or repaired, the following calibration procedure is required for setting up and calibrating the GXLP power metering.

## 6.4.1 Required Equipment for the Power Cal Procedure

- External RF Power Meter and Sensor (Keysight N1911A & N1921A or equivalent).
- SMA Male to N Female adapter. (If Sensor is not Type N, adapt to connector type on Sensor being used.)
- Telnet software such as PuTTY.
- PC or Laptop for the Telnet software and connection to the GX GUI.
- Factory Test Data with Coupler Offsets.
- Dummy Load.

**Note**

*If the power cal is being done on GX with it's original PA assembly, use the test data that shipped with the GX. If the RF assembly has been replaced, use the test data that came with the replacement PA assembly.*

## 6.4.2 Power Calibration Procedure Using Telnet

The calibration procedure is a wide band cal and the frequencies 88, 98 and 108 MHz are used in this procedure.

*STEP 1* With GX RF Output connected to the dummy load, turn the GX on to warm up for 30 minutes. Connect the SMA adapter and Sensor to the Rear RF sample port and then turn on and calibrate the RF Power Meter.

*STEP 2* Obtain the offset information from the test data to use in the RF Power Meter setup.

| Coupler Info | |
|---|---|
| **Rear Port Coupling Offsets** | |
| Coupling @ 88MHz: | 39.38 |
| Coupling @ 98MHz: | 38.45 |
| Coupling @ 108MHz: | 37.61 |
| Coupling @ 97.4 MHz: | 38.53 |

**Figure 6-5 Table of Offsets vs Frequency on Factory Test Data**

**Note**

*If the power cal is being done on a GX with it's original PA assembly, use the test data that shipped with the GX. If the RF assembly has been replaced, use the test data that came with the replacement PA.*

*STEP 3* From the GX front panel display, select Network and note the GatesAir IP Address for the next step.

*STEP 4* Connect the PC or Laptop to the GX and open PuTTY. Enter an IP address in the Host Name field. Verify that Telnet is selected and then click Open.

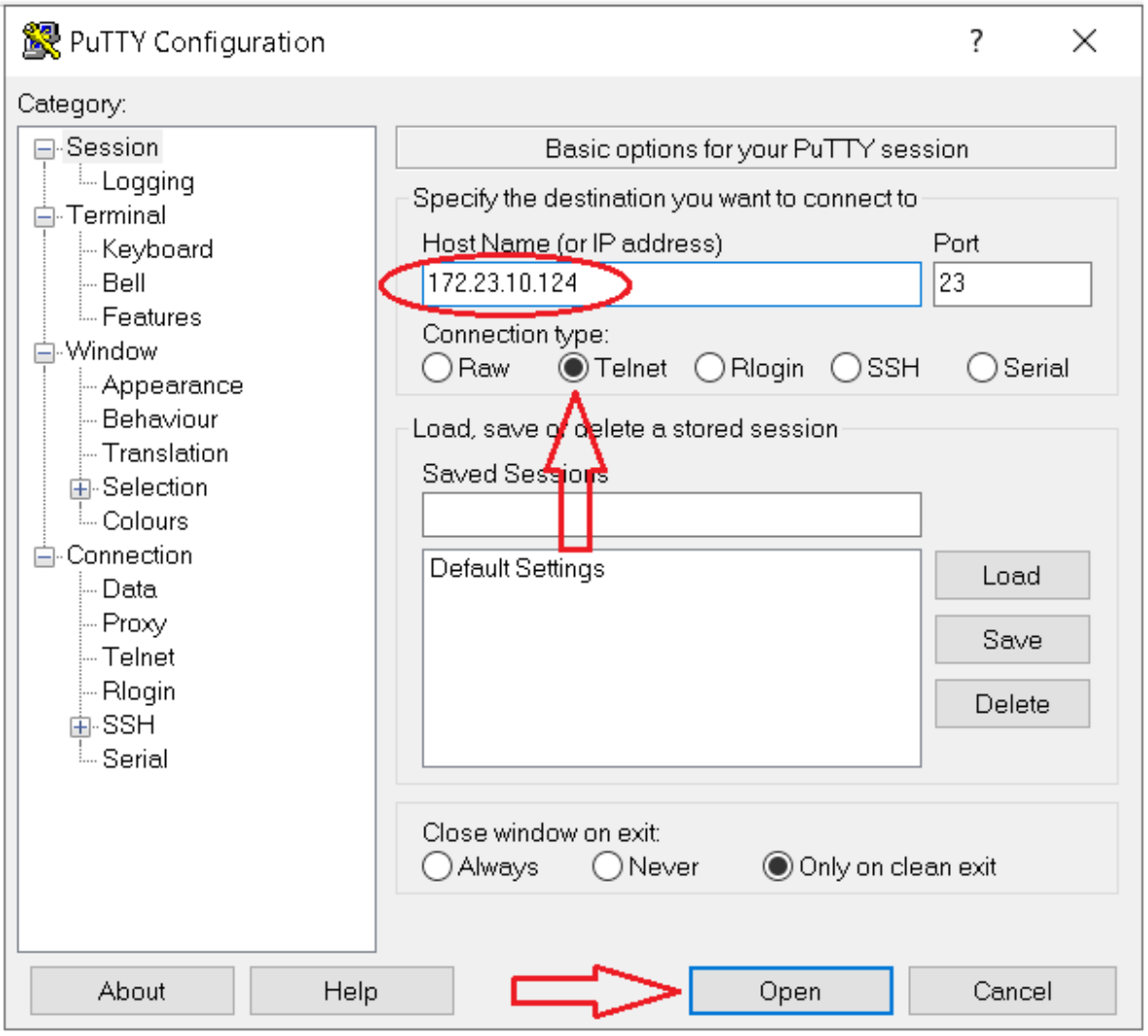


**Figure 6-6 Starting Telnet Session using PuTTY**

*STEP 5* The screen will change and prompt for a Password. Enter: gates at the prompt, all lower case.


**Figure 6-7 Password gates**

*STEP 6* The screen now changes as shown in Figure 6-8. Note the PAGE 1 circled and using your keypad's right arrow key, advance to page 13.

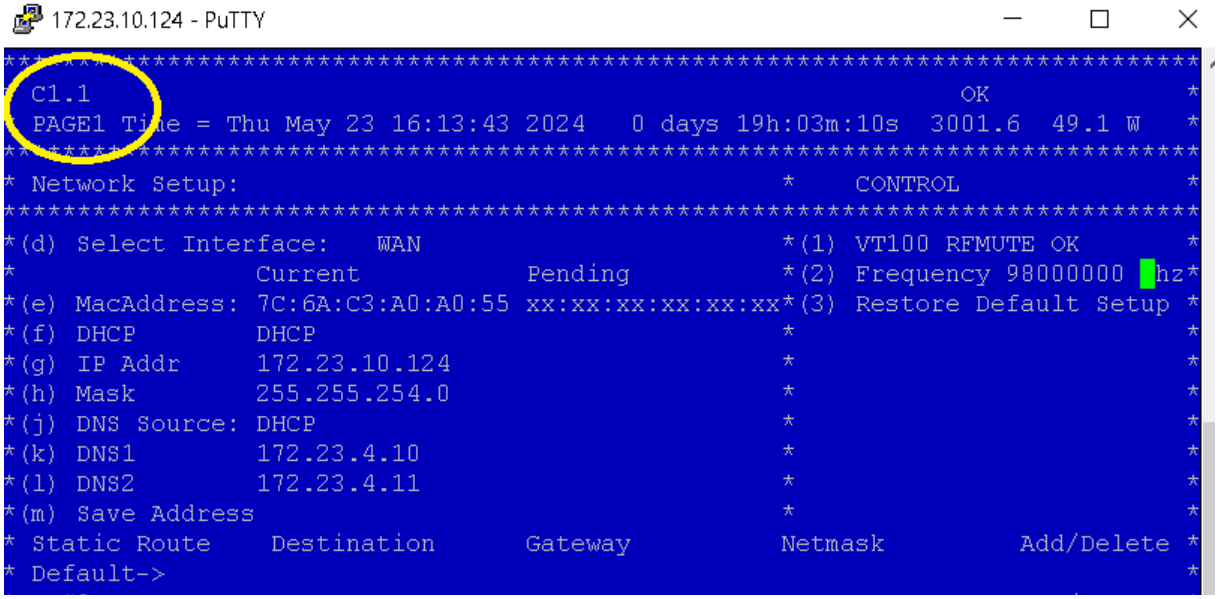


**Figure 6-8 PAGE 1**

*STEP 7* in Figure 6-9, note the column of letters, a thru i, on the right side of the page and the numbers, 1 thru 6, on the lower left side of page.

On your PC keyboard, press the letter "a" key for (a) Start Cal.

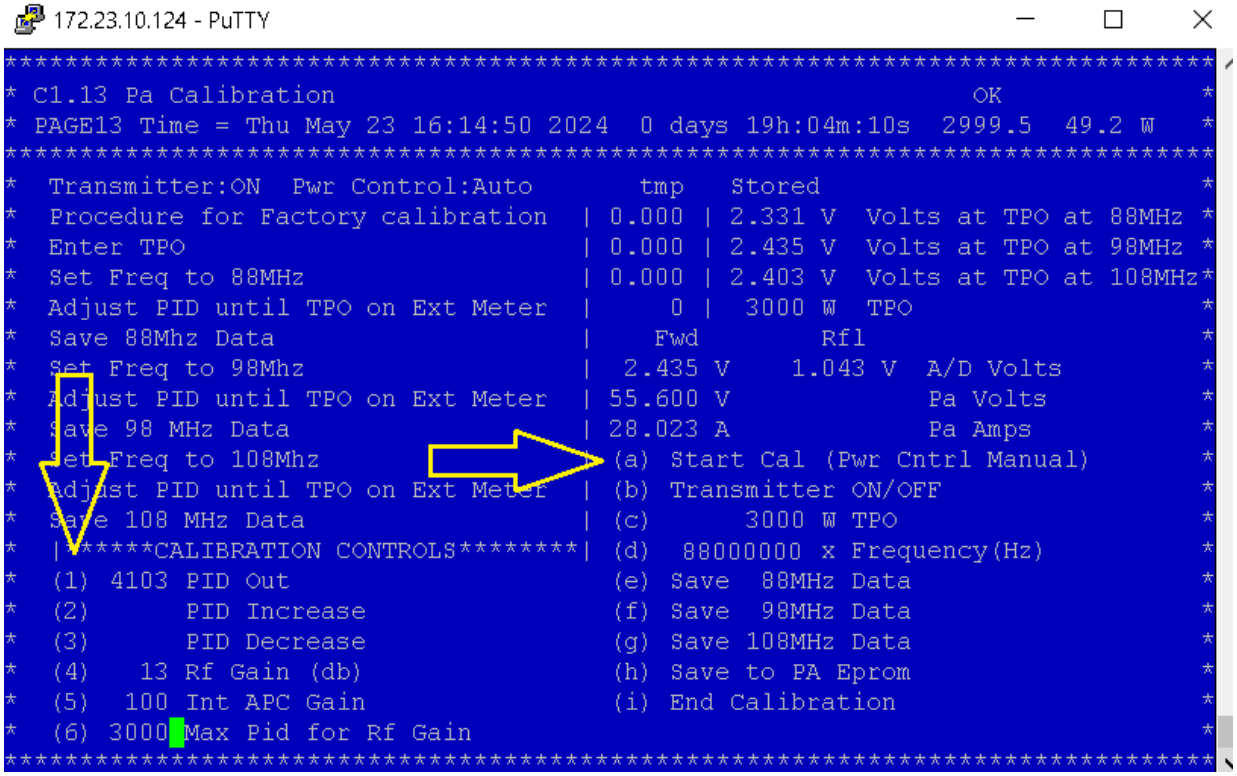


**Figure 6-9 PA Calibration PAGE 13**


**WARNING: Disconnect primary power prior to servicing.**

**Note**

*Ensure the equipment has warmed up for 30 minutes. You can press (b) to turn the GX on or off.*

*STEP 8* Press (c) and enter the TPO you want to preform the calibrate at.

Normally this power level will be the nameplate power such as 500W for GX500, 1000W for GX1K, 2000W for GX2K and so on. In the steps and figures that follow, a GX3K at 3000W was used for the calibration examples.

The calibration remains valid when operating at lower power levels, such as a GX1K operating at 500W.

*STEP 9* Press (d) and enter the frequency to calibrate at. Enter 88000000Hz.

Steps 9 thru 13 will be repeated for 98MHz and 108MHz after completing the 88MHz Cal. *Remember to put the appropriate offset into the external power meter for the frequency being calibrated.*

*STEP 10* Press (4) and enter "13" (this is the RF gain and is a good all-around number for all models)

In the following steps, use the PID controls, numbers 1, 2 & 3, to adjust the GX output power level until it meets the targeted power that was entered for (c) in Step 8, as measured on the external power meter.

*STEP 11* Pressing (1) and entering numbers between 1 and 4000 will step up the power. Begin by entering 2000 and then increase in 500 increments to provide gross steps in power. When you get close, 10% - 20% of the target power level, reduce the increment size until you get to 98% of target with a PID Out in the range 3500 - 3800.

If you reach the 4000 limit without reaching target power. Double-check that RF Gain was set to 13. If so, proceed to the next step which will allow higher PID Out levels to be attained.

*STEP 12* Now use (2) PID Increase and (3) PID Decrease to fine tune the external power level to the target. Get it as close as you can for best accuracy.

*STEP 13* At this point, the 88000000Hz calibration is done and ready to store. Press (e) to store the data for 88MHz calibration.

*STEP 14* Repeat Steps 9 thru 13 on frequency 98000000Hz and it's offset for the power meter. When target is reached press ( f ) to store the data for the 98MHz calibration.

*STEP 15* Repeat Steps 9 thru 13 on frequency 108000000Hz and it's offset for the power meter. When target is reached press ( g ) to store the data for the 108MHz calibration.

*STEP 16* Now, the calibration data is stored for 88/98/108MHz, so we press ( h ) to save this data into the GX EPROM memory.

*STEP 17* Press ( i ) to end calibration.

### 6.4.3 Cross-check Your Power & Frequency Settings

The GX system may be in **Manual** Power Control Mode from the calibration process and will need to be set back to **Auto**.

*STEP 1* Setup the GX LP GUI with you browser.

*STEP 2* Login to the GUI as User = ENG.

*STEP 3* Using the Home/Menu button, navigate to the Power Control Setup/Status screen as shown in Figure 6-10. Select the "Auto" button circled below.

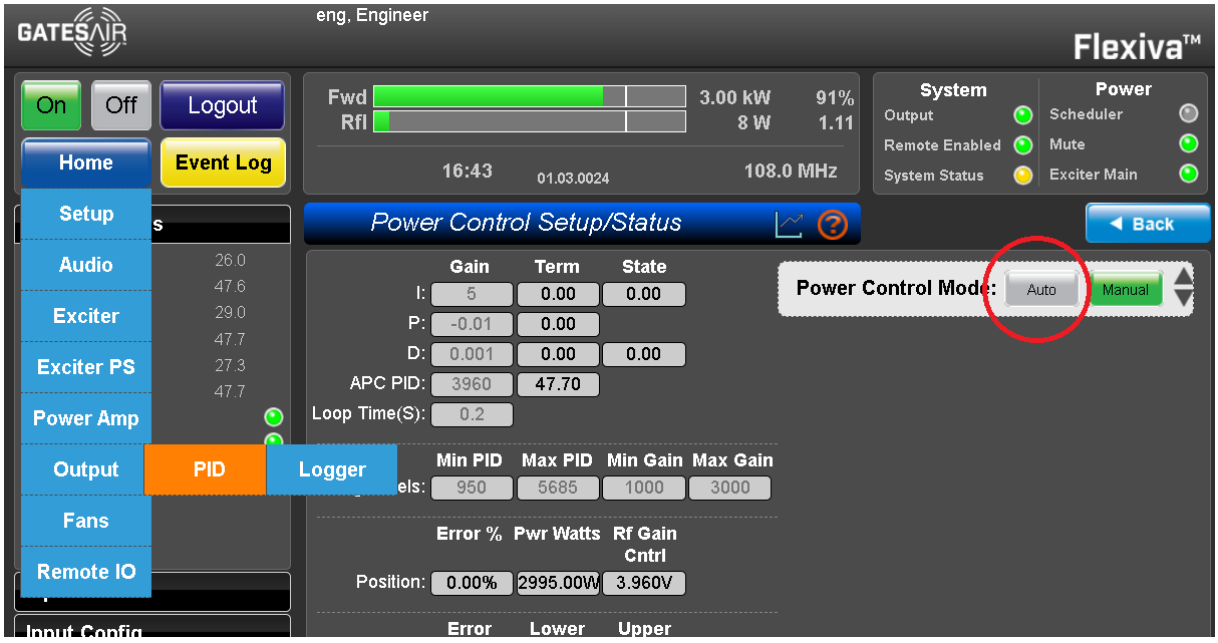


**Figure 6-10 Power Control Setup/Status Screen**

*STEP 4* Return the GX LP to your operating frequency. Navigate to the Modulator Setup screen and click in the Frequency field window and enter your operating frequency.

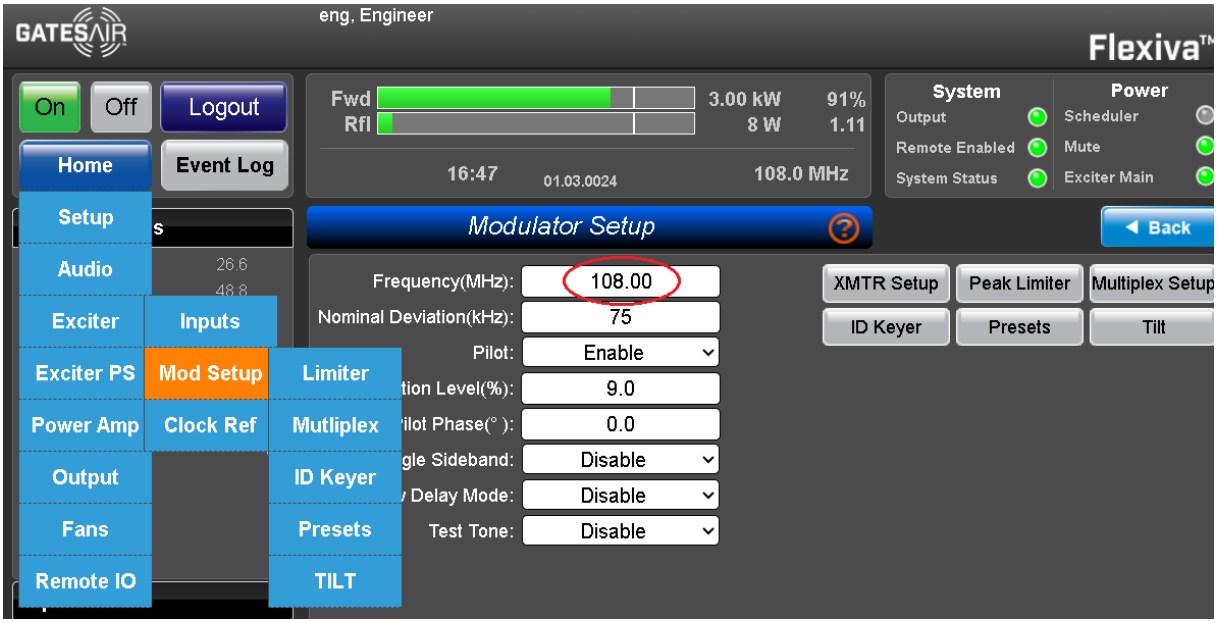


**Figure 6-11 Set Frequency**


**WARNING: Disconnect primary power prior to servicing.**

*STEP 5* Cross-check your normal operating power settings by navigating to Output as shown in Figure 6-12 and click the Config button circled on the right of the screen.

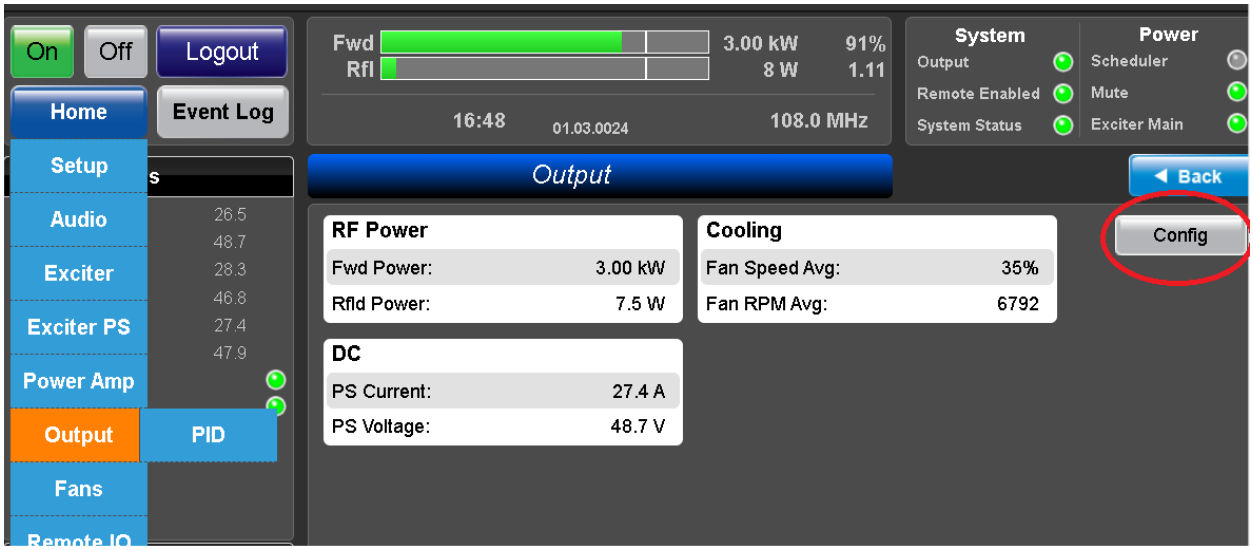


**Figure 6-12 Output Screen**

*STEP 6* Check and reset your power by clicking in the Normal Power Mode field as shown in arrow in Figure 6-13.

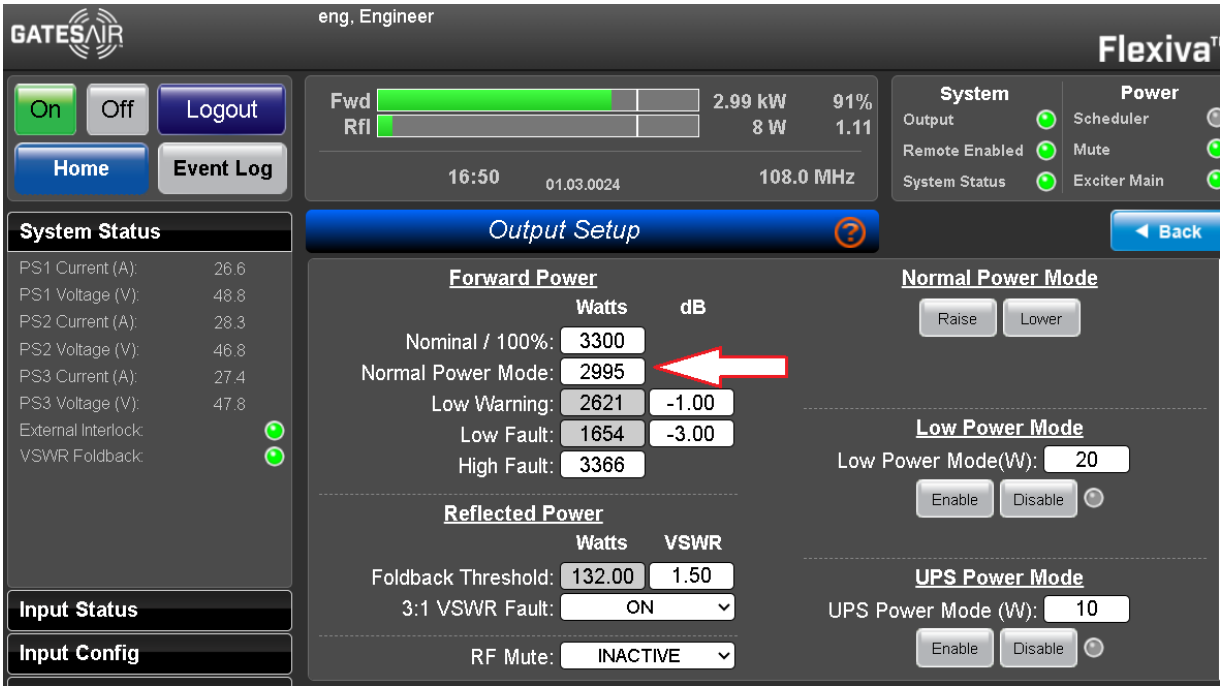


**Figure 6-13 Output Setup Screen**

# 7 Section-7 Parts List

## 7.1 Part Lists

### 7.1.1 GX50 Parts List

| Product ID | Description GX50 | Qty |
|---|---|---|
| 3980605000 | FUSE, CART 5X30MM 3.15A SLOW | 1 |
| 4760455000 | AC LINE FILTER, 3A 250V 1PH | 1 |
| 6600054000 | BATTERY, COIN CELL, 3V CR2032 | 1 |
| 9430252007 | FILTER, FRONT PANEL | 1 |
| 9520252009 | ASSY, FAN + CABLE (50/150 MODULATOR) | 1 |
| 9710252005T | ASSY, GXLP, PA 50W | 1 |
| SKU0010373 | ASSY, GXLP, MODULATOR TRAY | 1 |
| SKU0010374 | ASSY, FRONT DISPLAY BOARD GXLP | 1 |
| | | |
| | | |

### 7.1.2 GX150 Parts List

| Product ID | Description GX150 | Qty |
|---|---|---|
| 6090023000 | AC INLET/FILTER, C14, 10AMP | 1 |
| 6600054000 | BATTERY, COIN CELL, 3V CR2032 | 1 |
| 7360565002 | PSU, 48VDC 320W 240AC | 1 |
| 7360639000 | PSU, 12VDC 100W UNIV AC | 1 |
| 9430252007 | FILTER, FRONT PANEL | 1 |
| 9520252009 | ASSY, FAN + CABLE (50/150 MODULATOR) | 1 |
| 9520252019 | ASSY, FAN + CABLE (150W PA) | 1 |
| 9710252011T | ASSY, GXLP, PA 150W | 1 |
| SKU0010373 | ASSY, GXLP, MODULATOR TRAY | 1 |
| SKU0010374 | ASSY, FRONT DISPLAY BOARD GXLP | 1 |


**WARNING: Disconnect primary power prior to servicing.**

## 7.1.3 GX300 Parts List

| Product ID | Description GX300 | Qty |
|---|---|---|
| 6090125000 | AC INLET/FILTER, C20, 20AMP | 1 |
| 6600054000 | BATTERY, COIN CELL, 3V CR2032 | 1 |
| 7360390003 | PSU, 48VDC 3000W UNIV AC | 1 |
| 7360639000 | PSU, 12VDC 100W UNIV AC | 1 |
| 9430252007 | FILTER, FRONT PANEL | 1 |
| 9520252001 | ASSY, FAN + CABLE (MODULATOR) | 1 |
| 9529272433 | ASSY, CONNECTORIZED FAN (300/500/1K) | 1 |
| 9710252004T | ASSY, GXLP, PA 300W | 1 |
| SKU0010373 | ASSY, GXLP, MODULATOR TRAY | 1 |
| SKU0010374 | ASSY, FRONT DISPLAY BOARD GXLP | 1 |
| | | |
| | | |
| | | |

## 7.1.4 GX500 Parts List

| Product ID | Description GX500 | Qty |
|---|---|---|
| 6090125000 | AC INLET/FILTER, C20, 20AMP | 1 |
| 6600054000 | BATTERY, COIN CELL, 3V CR2032 | 1 |
| 7360390003 | PSU, 48VDC 3000W UNIV AC | 1 |
| 7360639000 | PSU, 12VDC 100W UNIV AC | 1 |
| 9430252007 | FILTER, FRONT PANEL | 1 |
| 9520252001 | ASSY, FAN + CABLE (MODULATOR) | 1 |
| 9529272433 | ASSY, CONNECTORIZED FAN (300/500/1K) | 1 |
| 9710252012T | ASSY, GXLP, PA 500W | 1 |
| SKU0010373 | ASSY, GXLP, MODULATOR TRAY | 1 |
| SKU0010374 | ASSY, FRONT DISPLAY BOARD GXLP | 1 |
| | | |
| | | |
| | | |

## 7.1.5 GX1K Parts List

| Product ID | Description GX1K | Qty |
|---|---|---|
| 6090125000 | AC INLET/FILTER, C20, 20AMP | 1 |
| 6600054000 | BATTERY, COIN CELL, 3V CR2032 | 1 |
| 7360390003 | PSU, 48VDC 3000W UNIV AC | 1 |
| 7360639000 | PSU, 12VDC 100W UNIV AC | 1 |
| 9430252007 | FILTER, FRONT PANEL | 1 |
| 9520252001 | ASSY, FAN + CABLE (MODULATOR) | 1 |
| 9529272433 | ASSY, CONNECTORIZED FAN (300/500/1K) | 1 |
| 9710093001 | ASSY, PA PALLET, GX ANALOG | 1 |
| 9710252101T | ASSY, GXLP, PA 1KW | 1 |
| SKU0010373 | ASSY, GXLP, MODULATOR TRAY | 1 |
| SKU0010374 | ASSY, FRONT DISPLAY BOARD GXLP | 1 |
| | | |
| | | |

## 7.1.6 GX2K Parts List

| Product ID | Description GX2K | Qty |
|---|---|---|
| 4760530000 | AC LINE FILTER, 20A, 250V 1PH | 1 |
| 6600054000 | BATTERY, COIN CELL, 3V CR2032 | 1 |
| 7360390004 | PSU, 48VDC 4000W UNIV AC | 1 |
| 7360642000 | PSU, 12VDC 150W UNIV AC | 1 |
| 9430252007 | FILTER, FRONT PANEL | 1 |
| 9520252001 | ASSY, FAN + CABLE (MODULATOR) | 1 |
| 9520252008 | FAN, 12VDC 80MM W/CONN | 1 |
| 9710093001 | ASSY, PA PALLET, GX ANALOG | 2 |
| 9710252006T | ASSY, GXLP, PA 2KW | 1 |
| SKU0010373 | ASSY, GXLP, MODULATOR TRAY | 1 |
| SKU0010374 | ASSY, FRONT DISPLAY BOARD GXLP | 1 |
| | | |
| | | |

## 7.1.7 GX3K Parts List

| Product ID | Description GX3K | Qty |
|---|---|---|
| 4760456000 | AC LINE FILTER, 40A, 250V 1PH | 1 |
| 6600054000 | BATTERY, COIN CELL, 3V CR2032 | 1 |
| 7360390004 | PSU, 48VDC 4000W UNIV AC | 3 |
| 7360643000 | PSU, 12VDC 200W UNIV AC | 1 |
| 9430252078 | FILTER, FRONT PANEL | 1 |
| 9520252001 | ASSY, FAN + CABLE (MODULATOR) | 1 |
| 9520252008 | ASSY, CONNECTORIZED FAN (2K/3K) | 2 |
| 9710093001 | ASSY, PA PALLET, GX ANALOG | 3 |
| 9710252007 | ASSY, GXLP, PA 3KW | 1 |
| SKU0010373 | ASSY, GXLP, MODULATOR TRAY | 1 |
| SKU0010374 | ASSY, FRONT DISPLAY BOARD GXLP | 1 |
| | | |
| | | |

## 7.2 Exploded Diagrams

## 7.2.1 GX50 Exploded Diagram

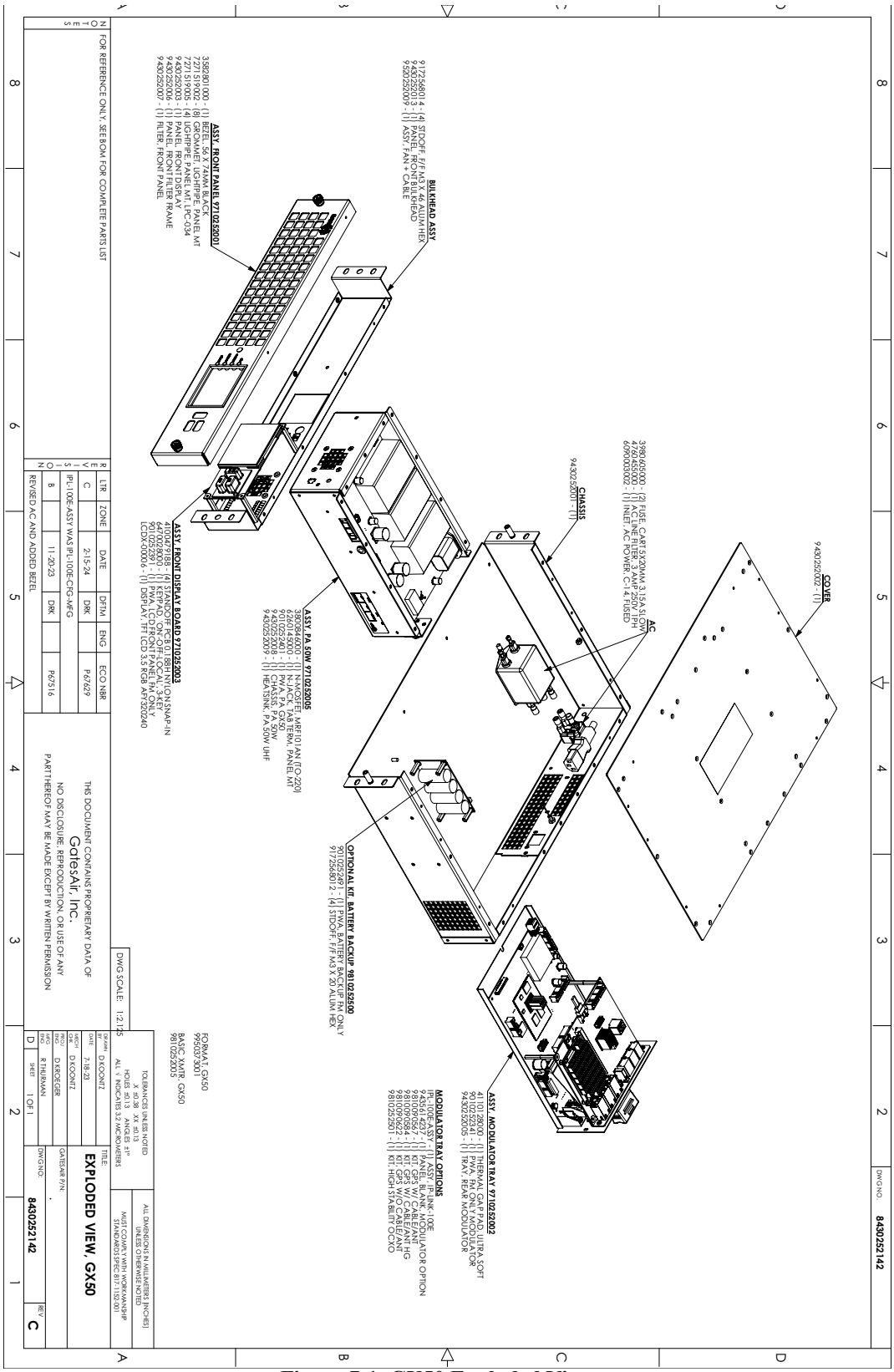


**Figure 7-1 GX50 Exploded View**

## 7.2.2 GX150 Exploded Diagram

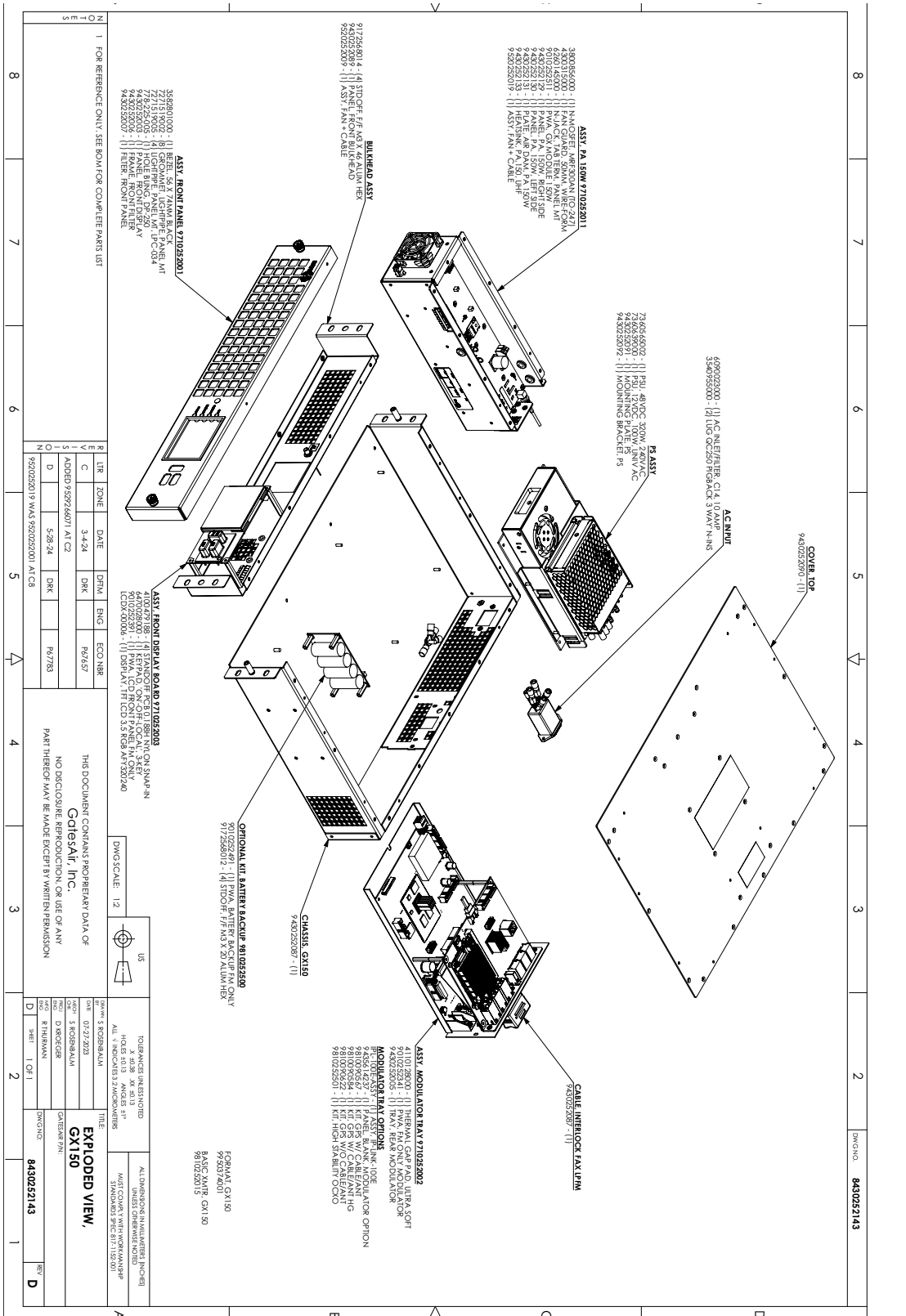


**Figure 7-2 GX150 Exploded View**



**WARNING: Disconnect primary power prior to servicing.**

## 7.2.3 GX300 Exploded Diagram

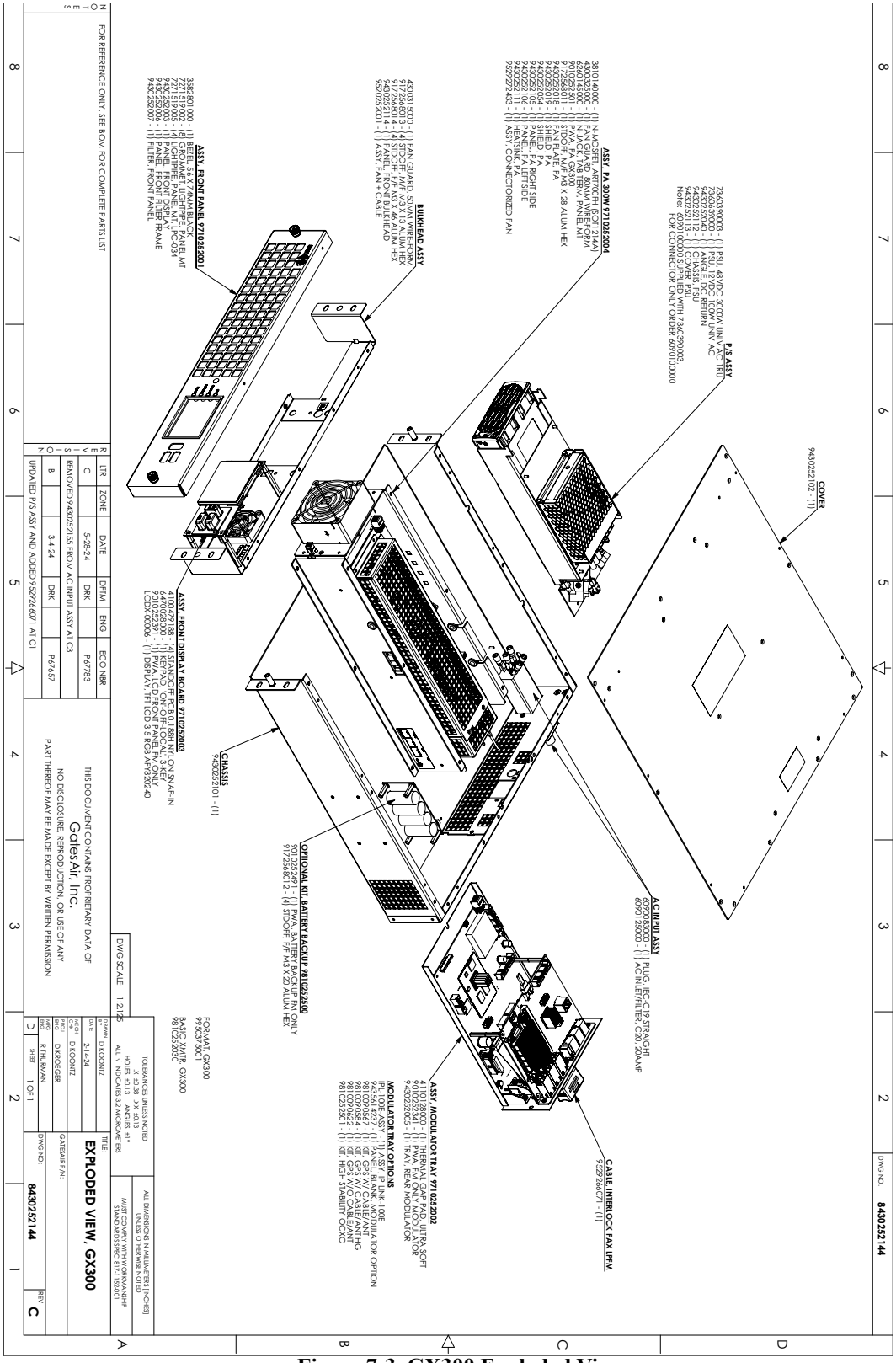


**Figure 7-3 GX300 Exploded View**

## 7.2.4 GX500 Exploded Diagram

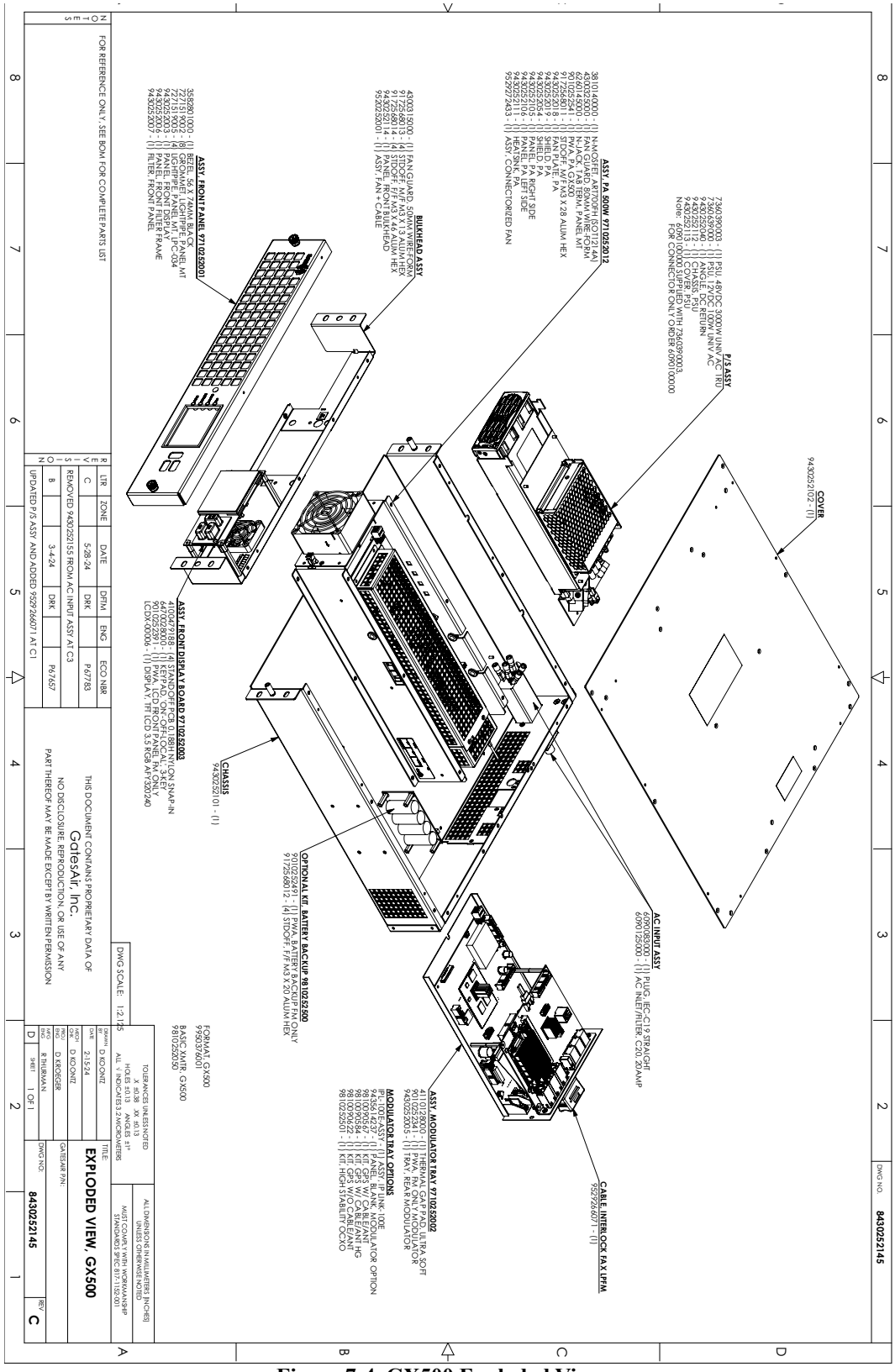


**Figure 7-4 GX500 Exploded View**



**WARNING: Disconnect primary power prior to servicing.**

## 7.2.5 GX1K Exploded Diagram

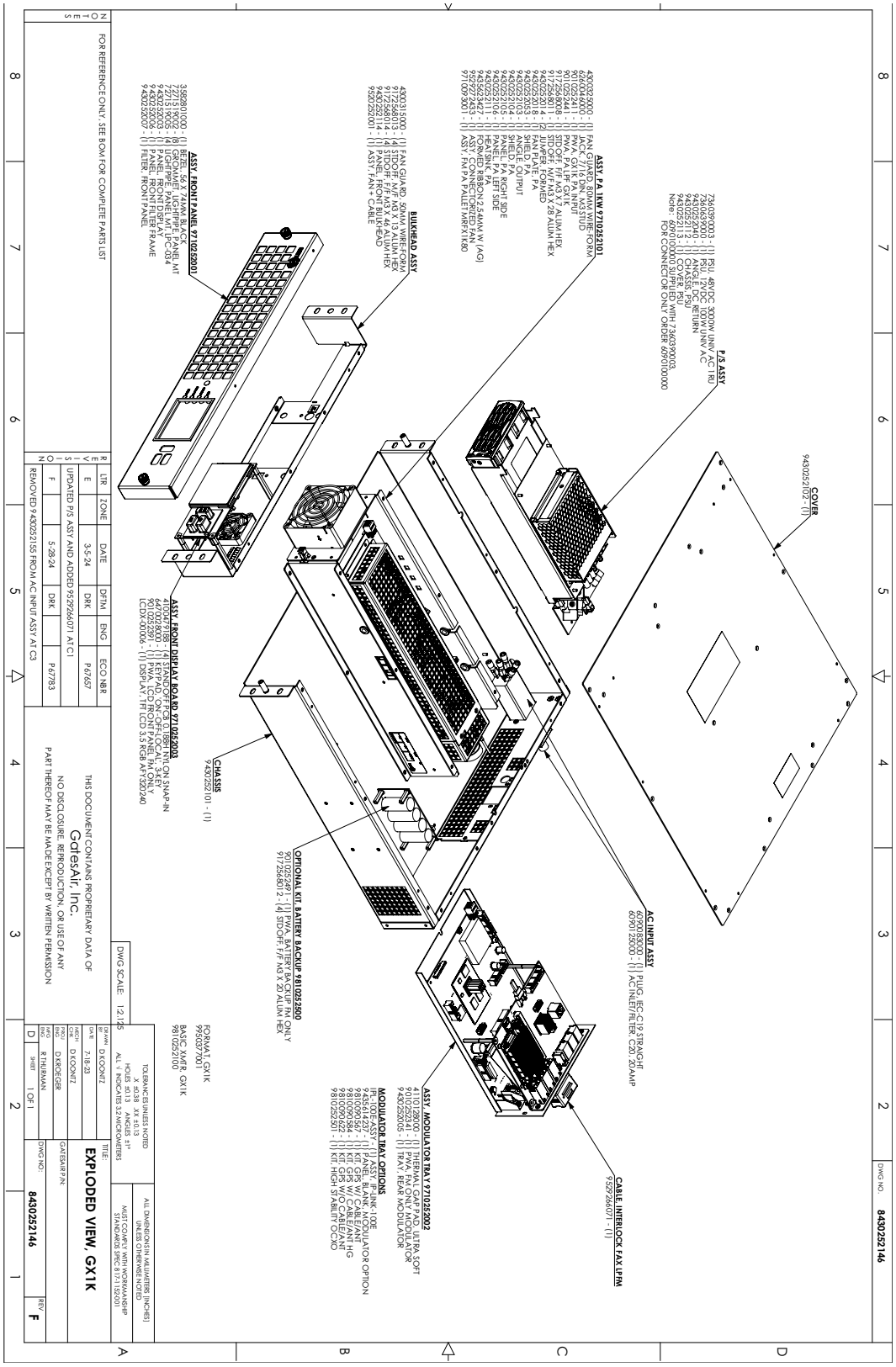


**Figure 7-5 GX1K Exploded View**

## 7.2.6 GX2K Exploded Diagram

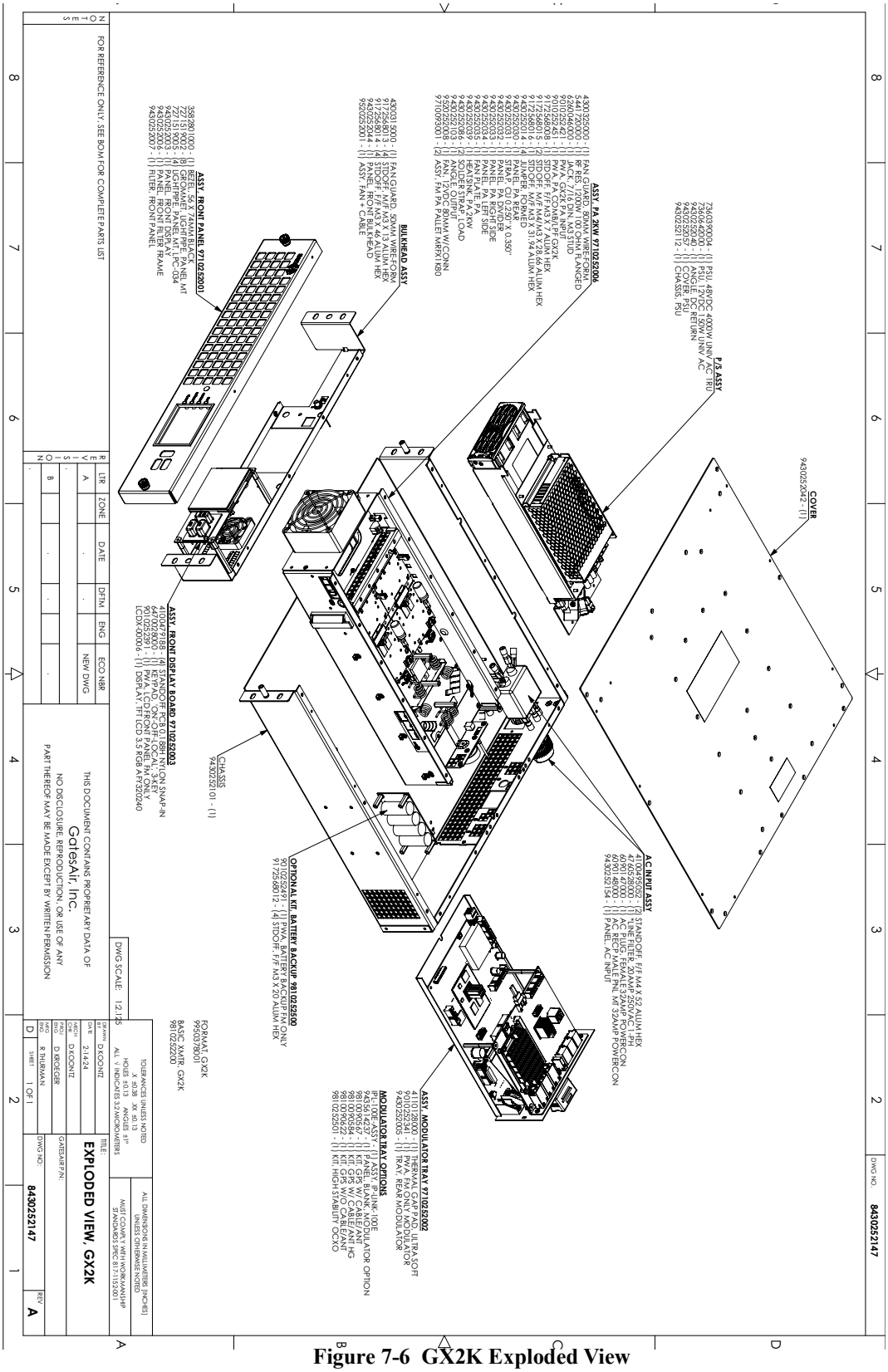


**Figure 7-6 GX2K Exploded View**



**WARNING: Disconnect primary power prior to servicing.**

## 7.2.7 GX3K Exploded Diagram

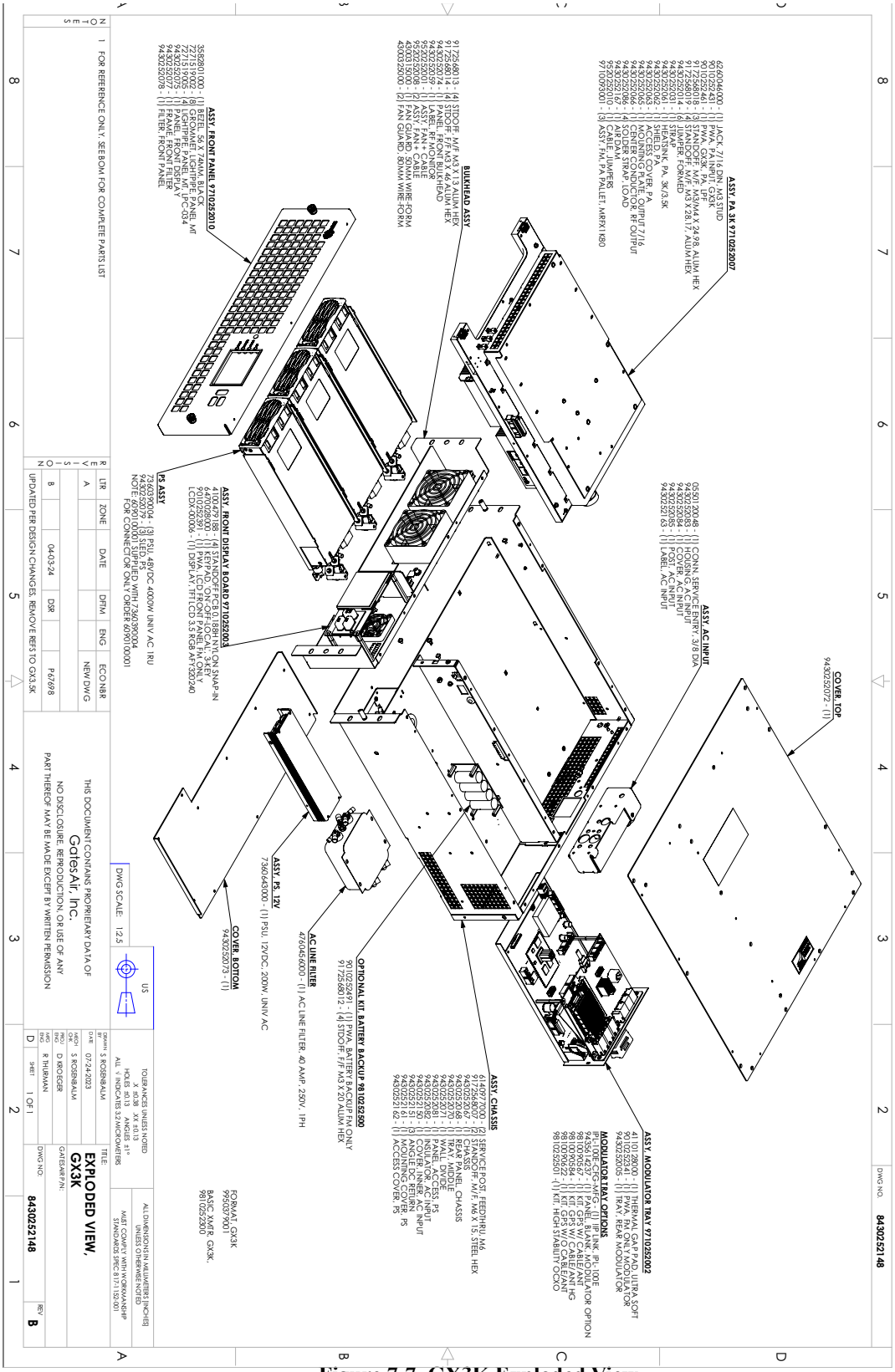


**Figure 7-7 GX3K Exploded View**

# 8 Glossary

## 8.1 Glossary of Terms used in the Manual & Servicing

***ADC -*** Analog to Digital Converter

***AES-EBU -*** is a standard for the exchange of digital audio signals between professional audio devices. AES3 was jointly developed by the Audio Engineering Society (AES) and the European Broadcasting Union (EBU).

***AES192 -*** This term is an indication of the audio content and its intended use. This type of connection uses the standard AES-EBU interface. It is a quantized rendition of Composite audio, often referred to as MPX (term for: multiplex). Typically sourced from an FM audio broadcast processor. The sample rate is 192 kHz. Often only the L or R audio stream carries the audio.

***AMSL -*** Above Mean Sea Level

***APC -*** Automatic Power Control refers to the ability of a transmitter to maintain a constant power output in a dynamic environment.

***ASI*** - Asynchronous Serial Interface, A streaming format used to carry the MPEG transport stream from the network origination point to the transmitter for modulation onto the RF carrier(s).

***AUX -*** Shortened from the word Auxiliary. Typically refers to a backup or a redundant option.

***BER -*** Bit Error Rate.

***BPF*** - Band Pass Filter. May also be called a mask filter or critical mask filer. A high power filter centered about the desired channel bandwidth and located at the transmitter output port to eliminate out-of-band intermodulation products arising from the power amplification process.

***CCIR -*** Consultative Committee on International Radio

***COFDM -*** Coded Orthogonal Frequency Division Multiplex. A transmission technique in which the information content of a complete ensemble (multiplex) is divided and modulated onto a multitude of closely neighboring RF carriers within a channel bandwidth (frequency block). The division of the information payload among a large number of RF carriers ensures that each individual RF carrier has a very low data rate (symbol rate). The long symbol period of the individual RF carriers allows the receiver to wait until all delayed signal reflections have arrived and been added to the direct signal (...during a guard interval to be discarded). This permits recovery a stable signal in difficult reception conditions, especially during mobile reception.

***Content Stream -*** A continuous flow of data that represents the program material being broadcast by the transmitter. An exciter converts content stream to modulated RF for amplification in the transmitter.

***CPLD -*** Complex programmable logic device.

***CRC*** **-** Cyclic Redundancy Checksum is a procedure for error detection in digital signals. Before distribution to the transmitter, a CRC is computed for the transport stream signal. This CRC is sent in the transport stream. Upon reception at the transmitter site, another CRC is computed from the received transport stream and compared to the transmitted value. If the CRCs are identical, no error has occurred during the distribution to the transmitter site.

***DAC*** - Digital Analog Converter refers to a circuit that converts digital values inside the processing stages of the LPU modulator into analog RF waveforms for amplification and transmission by the transmitter.

**dBm -** Decibels above a milliwatt refers to a logarithmic signal power measurement scale referenced to 1 mW. 0 dBm is equivalent to 1 mW. 10dBm = 10mW, 20dBm = 100mW, 30dBm = 1000mW.

***DHCP*** **-** Dynamic Host Configuration Protocol (DHCP) is a client/server protocol that automatically provides an Internet Protocol (IP) host with its IP address and other related configuration information such as the subnet mask and default gateway.

***DMB*** - Digital Multimedia Broadcasting is a modification of the basic DAB system according to ETSI standard (TS 102 427 and TS 102 428) using MPEG-4 (H.264) and BSAC/HE-AAC V2 compression to permit sending of multimedia information (radio, TV, and data casting) to mobile devices such as mobile phones. Originally developed in South Korea.

***DNS*** - The Domain Name System (DNS) is a naming system for computers connected to the Internet or a network. It translates user domain names to the assigned numerical IP addresses.

***DSB-SC*** - Double-Sideband Suppressed-Carrier.

***Dynamic Delay*** **-** Refers to a processing function provided in the modulator section to compensate for different delays of the program data stream in the data distribution network between the network origination point and various transmitter sites. A time-stamp contained in the transport stream serves as a reference. The present time is delivered by a GPS receiver at the transmitter (1pps signal, rising slope). Comparing these two sources, the dynamic delay function is able to synchronize the program input to all transmitters over a one-second correction range.

***ECM*** **-** Electrical, Cooling, Mechanical.

***Ethernet*** **-** Physical interface by which a device may be connected to a LAN and/or the Internet to provide web-based supervision. It generally employs an RJ45 connector.

***E2X*** **-** Exporter to Exciter see Content Stream.

***FAX*** **-** Flexiva Air-Cooled Transmitter.

***FEC*** **-** Forward Error Correction.

***FFT***- Fast Fourier Transform.

***FPGA*** - Field Programmable Gate Array, is an integrated circuit designed to be configured by the customer or designer after manufacturing. FPGAs perform many of the intensive digital processing steps used to synthesize the transmitted RF signal in the LPU modulator section.

***FSK*** **-** Frequency Shift Keying is a frequency modulation scheme in which digital information is transmitted through discrete frequency changes of a carrier signal.

***GPS*** - Global Positioning System is satellite-based navigation system commonly used for determining position and navigating. In a single frequency network context, it delivers an extremely precise time reference (UTC... universal time coordinated) that is used to synchronize all transmitters.

***GUI*** - Graphical User Interface is a type of user interface that allows users to interact with electronic devices via images rather than text commands. In this application, the user interface provided by a touch screen in dual drive systems or the web-based remote interface served over the Ethernet interface.

***Hot-pluggable*** - Term to denote that the device in question can be removed and replaced while transmitter is operating without suffering damage or causing damage to other devices.

***HTML*** - HyperText Markup Language is the predominant markup language for web pages. HTML is the basic building block of web pages.

***I2E -*** Importer to Exporter see Content Stream.

***IEC- 215*** - International Electronics Commission regulation 215 refers to safety standard requirements for radio transmitting equipment.

***IP*** - Internet Protocol.

***IP Address -*** Internet Protocol Address is a numerical label assigned to each device (e.g., computer, printer) participating in a computer network that uses the Internet Protocol (IP) for communication. An IP address serves two principal functions: host or network interface identification and location addressing.

***ISP*** - In-System Programming refers to a GatesAir utility used to update transmitter software.

***LAN*** -Local Area Network. Typically, a LAN encompasses computers and peripherals connected to a server within a distinct geographic area such as an office or a commercial establishment.

**LBFM -** Low Band FM. A transmitter operating at a frequency between 76 and 88MHz.

***LCD*** - Liquid Crystal Display is a thin, flat electronic visual display that uses the light modulating properties of liquid crystals to display text and images. Often used to refer to the blue display screen on the front panel of LPU (low power unit).

***LED*** - Light-Emitting Diode is a two-lead semiconductor light source. It is a p–n junction diode, which emits light when activated

***LP*** - Low Power

***LPFM*** - Lowe Power Frequency Modulation. In the FAX transmitter family this refers to any transmitter model under 3.5kW.

***LPF*** - Low Pass Filter. Typically installed withing the transmitter or close to the transmitter output port. It is used to attenuate out of band emissions at the signal harmonic frequencies arising from the high power amplification process. It may also be referred to as a harmonic filter.

***MAC -*** Media Access Control. Typically usage is “MAC address”. This is a 12 digit hexadecimal number that is meant to be both permanent and unique. It is used in networking to keep track of what IP address a piece of equipment has. This is typically done automatically inside Ethernet switches, routers and computers. Example: 00:01:29:02:E1:43. There are networking situations where the MAC address is used as part of a configuration to facilitate a path for special network traffic.

***MER*** - Modulation Error Ratio is a measure used to quantify the quality of the digital being transmitted. A signal sent by an ideal transmitter would have all constellation points precisely at the ideal locations. However various imperfections in the signal path cause the actual constellation points to deviate from the ideal locations by finite

error vectors. The modulation error ratio quantifies the ratio of the desired signal to the undesired error vectors. MER is typically associated with COFDM modulation formats such as HD Radio, DRM, DVB or DAB.

***MIB*** - Management Information Base is a database used for managing the entities in a communication network. Most often associated with the Simple Network Management Protocol

***MOV*** - Metal Oxide Varistor, an electrical component that varies resistance depending on the voltage applied.

***MPX*** **-** Multiplex, referring to composite audio which incorporates several signals such as; L + R audio, 19 kHz pilot, L- R 38 kHz DSB (double sideband) Suppressed Carrier, RDS, SCA.

***NIST*** **-** The National Institute of Standards and Technology is a measurement standards laboratory, and a non-regulatory agency of the United States Department of Commerce. Calibration of test equipment is linked to the standards defined and maintained by NIST.

***NIT*** **-** Network Information Table.

**NTP -** Network Time Protocol is a networking protocol for clock synchronization between computer systems over packet-switched, variable-latency data networks. In operation since before 1985, NTP is one of the oldest Internet protocols in current use.

***PA*** - Power Amplifier is an electronic circuit that accepts a low level RF signal and outputs an amplified output. FAX amplifiers work in either class C or class AB amplification modes depending on the mode of operation.

***PAI*** **-** Power Amplifier Current.

***PAV*** **-** Power Amplifier Voltage.

***PAB*** - Power Amplifier Block refers to a high power amplifier stage. May refer to the LPU power amplifier section or one or more high power amplification stages external to the LPU. PABs are typically numbered from 1…n with PAB 1 being the highest in the rack.

***PAC*** - Power Amplifier Controller. PAC Reboot

***PAN*** - Personnel Area Network.

***PBC*** - Power Block Controller

***PAPR*** **-** Peak-to-Average Power Ratio.

***PC*** - Personal Computer.

***PCB*** **-** Printed Circuit Board in the transmitter. Synonymous with PWA.

***PFRU*** **-** Precise Frequency Reference Unit is a circuit sub-assembly inside the LPU modulator section responsible for supplying the various high-stability oscillator signals required to synthesize the RF waveform that will be transmitted.

***PLL*** - Phase Locked Loop.

***PPB*** - Parts per Billion

***PPS*** **-** Pulse(s) Per Second.

***PS*** - Power Supply is a device that supplies DC electrical energy to one or more electric loads, typically via the rectification of an AC mains electrical input.

***PSU*** **-** Power Supply Unit.

***PWA*** **-** Printed Wiring Assembly.

***PWB*** **-** Printed Wiring Board. Typically refers to the circuit card without components installed.

***RBDS*** - Radio Broadcast Data System is the US version of RDS (see below). The primary difference between RBDS and RDS is a different list of program format names for Program Type (PTY) code number.

***RBW*** **-** Resolution Bandwidth. A term for a setting in a spectrum analyzer referring to the fineness of the measurement of the signals under test. The unit is in Hertz. The smaller the value the more detailed the results. However, if the SPAN divided by the RBW is greater than the number of sweep points in a digital analyzer display you risk missing key details. Also, noise like signals often need a calculated correction value to determine the total level (power) when the RBW is narrower than the signal of interest.

***RDS*** - Radio Data System is a communications protocol standard for embedding small amounts of digital information in conventional FM radio broadcasts. This relatively low data rate traffic is carried on a 57 kHz subcarrier with a data rate of approximately 300 bps. Peak control of the total FM modulation can be improved when the RDS subcarrier is synchronized with the FM pilot.

***RF*** - Radio Frequency refers to an electrical oscillation at the frequency of radio waves in the range of 3 kHz to 300 GHz. In this application, typically a signal in the 168 MHz to 242 MHz frequency range of the VAX transmitter.

***RoHS*** - also known as Lead-Free, stands for Restriction of Hazardous Substances. RoHS, also known as Directive 2002/95/EC, originated in the European Union and restricts the use of six hazardous materials found in electrical and electronic products.

***RS-485*** - TIA/EIA standard for serial multipoint communications lines, also known as EIA-485 and TIA/EIA-485, is a standard defining the electrical characteristics of drivers and receivers for use in balanced digital multipoint systems. The standard is published by the Telecommunications Industry Association/Electronic Industries Alliance (TIA/EIA).

***RTAC****TM* - Real Time Adaptive Correction is a signal processing technique applied in the modulator signal generation stage which seeks to correct distortions produced in the high power amplification and filtering stages by means of pre-distortion.

***RU*** **-** Is an abbreviation for rack unit. One rack unit equals 1.75" (44.45mm). The rack unit is used to describe the height of components that will be placed in racks.

**SCA -** Subsidiary Communications Authorization is an auxiliary multiplexed channel or channels in a broadcast FM signal, located higher in frequency that the stereo sub-channel.

***SFN*** - Single Frequency Network is a type of transmission network in which all transmitters are synchronized in frequency and phase (symbol). This transmission technique offers high frequency economy, as a single frequency can be used in a large geographic area.

***SMA*** - SMA connector - consists of a 0.250x36 thread. The male is equipped with a .312 inch (7.925mm) hex nut.

***SMT*** **-** Surface Mount Technology.

***SNMP -*** Simple Network Management Protocol is a popular protocol for network management. It is used for collecting information from various devices on a network.

***Span -*** A spectrum analyzer setting for the display width of the plotted measurement. The unit is in Hz.

***SSB-SC -*** Single-Sideband Suppressed-Carrier.

***Static Delay -*** A delay function provided by the exciter over a manually settable range of 0 to 1000 ms to compensate for differences in signal processing delays or local propagation conditions for individual transmitters in a single frequency network.

***System Reference -*** A reference the clock and frequency of the transmitter will be locked to.

***TPO -*** Transmitter Power Output refers to the transmitter forward output power level.

***UPS*** - Uninterruptable Power Supply is a battery-based system designed to provide power during an AC mains failure event.

***VGA*** - Video Graphics Array is a video display standard used by the personal computer industry based on a 640 x 480 pixel resolution. The standard used by the TCU touchscreen in dual drive systems.

**VSWR** - Voltage Standing Wave Ratio is a measurement term used to express the reflected power in reference to the transmitted power.

***WAN -*** Wide Area Network. A wide area network is a telecommunications network or computer network that extends over a large geographical distance.

***WEB -*** A system of Internet servers that support HTML formatted documents. A device or interface that uses HTML formatted documents transmitted according to the IP protocol, typically over LAN/WAN/Internet servers, but also locally via 1:1 communications.

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