



# Gamma 2.0, 2.5, 3, & 3.5kW Operating Manual and User Guide



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# This manual is for the: 2kW PS, 2.5kW PS, and 3kW PS

## **Operating Voltage Requirements:**

\*\*\*The CW Broadcast 2, 2.5, 3kW PS are Dual Phase 110VAC devices, more commonly referred to as 220VAC\*\*\*

## **Warranty Service**

The Limited Warranty covers parts & labor to the original purchaser as outlined on purchase invoice for use in the United States of America. To return a product for service, you must contact customer service & get an RMA. Products returned without an RMA will be refused.

## **---These transmitters are not recommended for use as a replacement IPA---**

Damage caused by misuse or shipping is excluded from the warranty. CircuitWerkes, Inc. will not warranty the product due to misuse, accident, neglect, and improper installation or operation. Proper installation includes A/C line surge suppression, lightning protection and proper grounding of the entire transmitter, and any other recommendations designated in this Operating Manual.

CW Broadcast  
Customer Service Manager  
111 N Vista Rd, Ste 3E

## Safety Instructions

To maximize user safety and ensure correct device operation, all instructions contained in this section should be read carefully.



Caution: It is important that the user observe all warnings and instructions that are on the unit and contained in this manual.



Warning: DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Operation of the PS Series in the presence of flammable gases or fumes can endanger persons proximate to the site of operation.

Verify that the line voltage is 220VAC

## Ground the Transmitter or Amplifier

To minimize shock hazard, the exciter chassis must be connected to an electrical ground, the exciter must be connected to the AC power mains through a three-conductor power cable, with the third wire connected to an electrical ground (safety ground) at the power outlet. Any interruption of the protective (grounding) conductor or disconnection of the protective earth terminal will cause a potential shock hazard that could result in personal injury. If the exciter is to be energized by any other source be certain that the chassis is connected to a separate safety ground.



The inside of the product contains lethal voltages. **ALWAYS** disconnect the unit from the AC power before opening any covers. When operating, the transmitter can have high RF potential at various places, including, but not limited to, the RF amplifiers, combiners Power sample boards, and low pass filters. Touching these can result in serious RF burns or death. Never work on the transmitter when energized and always ground every part before touching.

## AC Line Fuses and Trips

The PS Series power amplifiers are provided with an 8 gauge 3 conductor “pig tail” AC Line cord. This should be wired into a breaker box and feed with a 2 pole 35A breaker.

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## Output Connector



Warning: The Flange output connector carries dangerously high RF voltages that present shock and burn hazards. Never operate the PS power amp without properly terminating the output connector in either an adequately rated load or antenna.

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## Electrostatic Discharge (ESD)

A sudden discharge of electrostatic electricity can destroy static-sensitive devices or micro-circuitry. Proper packaging and grounding techniques are necessary precautions to prevent damage. Always take industry-standard precautions.

## Grounding Methods

Guard against electrostatic damage at workstations by following these steps:

1. Cover workstations with approved anti-static material. Provide a wrist strap connected to a work surface and properly grounded tools and equipment.
2. Use anti-static mats, heel straps, or air ionizers to give added protection.
3. Handle electrostatic-sensitive components, boards, and assemblies by the case or the PCB edge.
4. Avoid contact with pins, leads, or circuitry.
5. Turn off power and input signals before inserting and removing connectors or test equipment.
6. Keep the work area free of non-conductive materials such as ordinary plastic assembly aids and Styrofoam.
7. Use field service tools, such as cutters, screwdrivers, and vacuums that are conductive.

## General Safety Rules

- The device must be used in accordance with the instructions for use.
- Electrical installations in the room must correspond to the requirements of respective regulations.
- Take care that there are no cables, particularly mains cables, in areas where persons can trip over them.
- Do not use a mains connection in sockets shared by a number of other power consumers. Do not use an extension cable.
- Only use the mains cable supplied.
- The unit is completely disconnected from the power source only when the power cord is disconnected from the power source. Therefore, the power cord and its connectors must always remain easily accessible.
- Do not set up the device in the proximity of heat sources or in a damp location. Make sure the device has adequate ventilation.
- All plugs on the connection cables must be screwed or locked to the chassis housing.
- The device is designed to be used in horizontal position only.
- The device is no longer safe to operate when the device has visible damage or the device no longer functions.
- In case of system malfunction or visible damage to the PS Series, the device must be shut down and secured against unintentional operation.
- Repairs may only be carried out by authorized CW Broadcast personnel.

## Preface

This document, entitled *Gamma Operating Manual and User Guide*, provides instructions on how to install, configure, power up, and perform diagnostics on the 2.0, 2.5 and 3kW Gamma FM Broadcast Transmitter. (see photo below). The information contained within is intended for an experienced system operator with a knowledge of high-performance broadcast transmission systems. The 4RU-high (7.0”) Gamma is designed to fit a standard 19” rack and is provided with rack-mount left and right brackets and handles. Rack-mount slides are also provided and must be used to mount the unit in a 19” rack cabinet



*PS Series “Gamma” Transmitter / Amplifier*

Key features of the PS Series CW Broadcast Transmitters include:

- Totally solid-state no-tune construction
- Wide input range from 210 to 264 VAC
- New comprehensive power and temperature monitoring system for improved reliability
- Remote-control interface (Webserver optional)
- Built-in stereo generator
- Meets or exceeds all FCC and CCIR standards
- 24 month warranty (parts and labor)
- Designed, manufactured & supported in the United States

The Gamma series are FCC-type verified for use on FM stations. Frequency stability for each unit is ensured by using DDS frequency synthesis from a highly stable crystal oscillator. All units incorporate over-temperature protection and VSWR foldback to automatically reduce power output to safe operating levels

Switch-mode power supplies provide consistent performance even when there are frequent power outages and voltage fluctuations that make stressful demands on power dependence. An overview and specifications of the Gamma series Broadcast Transmitters is given in Chapter 1, "Overview and Specifications", of this manual.

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## CW Broadcast Online

Product information, including this manual, can be found on our Webpage at [www.cwbroadcast.com](http://www.cwbroadcast.com). You may also reach us by email at: [support@cwbroadcast.com](mailto:support@cwbroadcast.com).

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## Your Feedback:

We are interested in improving our documentation and welcome your comments and suggestions. You can email your comments to us at [support@cwbroadcast.com](mailto:support@cwbroadcast.com). Please include the document part number in the subject line of your email.

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## Notes, Cautions, Warnings, and Sidebars

The following icons and formatted text are included in this document for the reasons described:



Note: A note provides additional information concerning the procedure or action being described.



Caution: A caution describes a procedure or action that may result in injury to the operator or equipment. This may involve—but is not restricted to—heavy equipment or sharp objects. To reduce the risk, follow the instructions accompanying this symbol.

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Warning: A warning describes a procedure or action that may cause injury to the operator or equipment as a result of hazardous voltages. To reduce the risk of electrical shock and danger, follow the instructions accompanying this symbol.

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Sidebar: A sidebar adds detail to the section with in which it is placed, but is not absolutely vital to the description of the procedure of that section.

## Overview and Specifications

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### 1.1 Overview

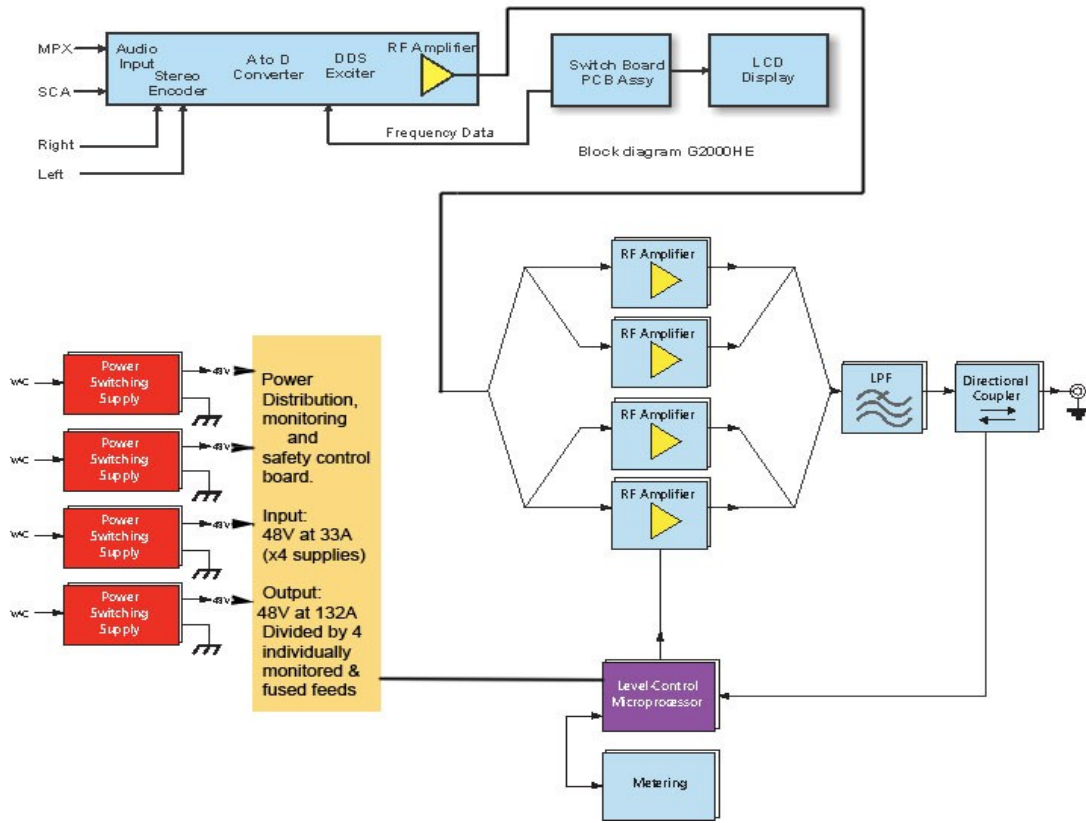
The Gamma series are FCC-type verified for use on FM stations. Frequency stability for each unit is ensured by using PLL (phase-locked loop) frequency synthesis from a highly stable crystal oscillator. All units incorporate over-temperature protection and VSWR foldback to automatically reduce power output to safe operating levels

Switch-mode power supplies provide consistent performance even when there are frequent power outages and voltage fluctuations that make stressful demands on power dependence.

The 4RU-high (7.0") Gamma is designed to fit a standard 19" rack and is provided with rack-mount left and right brackets and handles. Rack-mount slides optionally available and are very helpful when mounting the unit in a 19" rack cabinet.



A PS3000 Transmitter with rack slides attached.

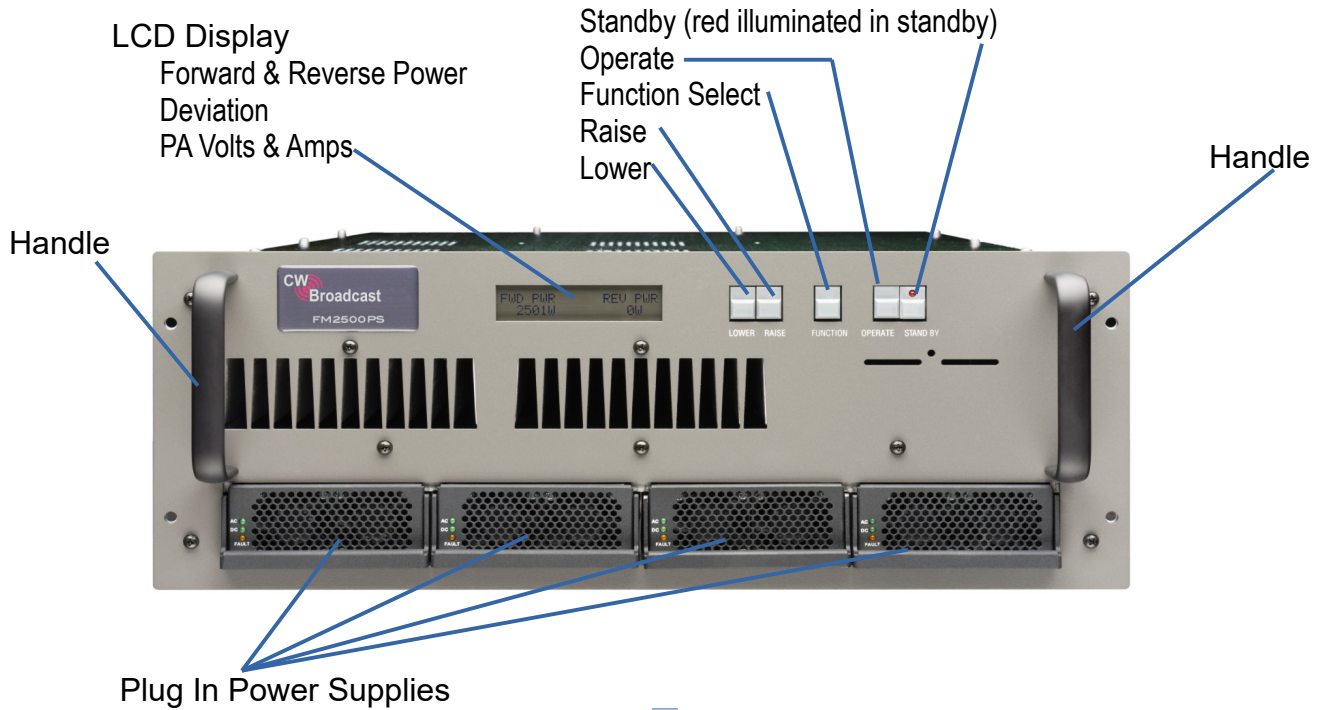


**Figure 1-1: PS Series Transmitter block diagram**

**Figure 1-2: PS Series Amplifier Block Diagram**

The Gamma series is designed within a 4RU-high (3.5”) form-factor that is 24” deep (including the front panel and rear protective flanges; the chassis body itself is 27” deep) and 17” (43.2 cm) wide (19” including the front panel to fit a standard sized rack).

Features on the Gamma front panel are shown in Figure 1-3.



**Figure 1-3: PS Series Front Panel**

Figure 1-4 PS Series AMPLIFIER Rear Panel

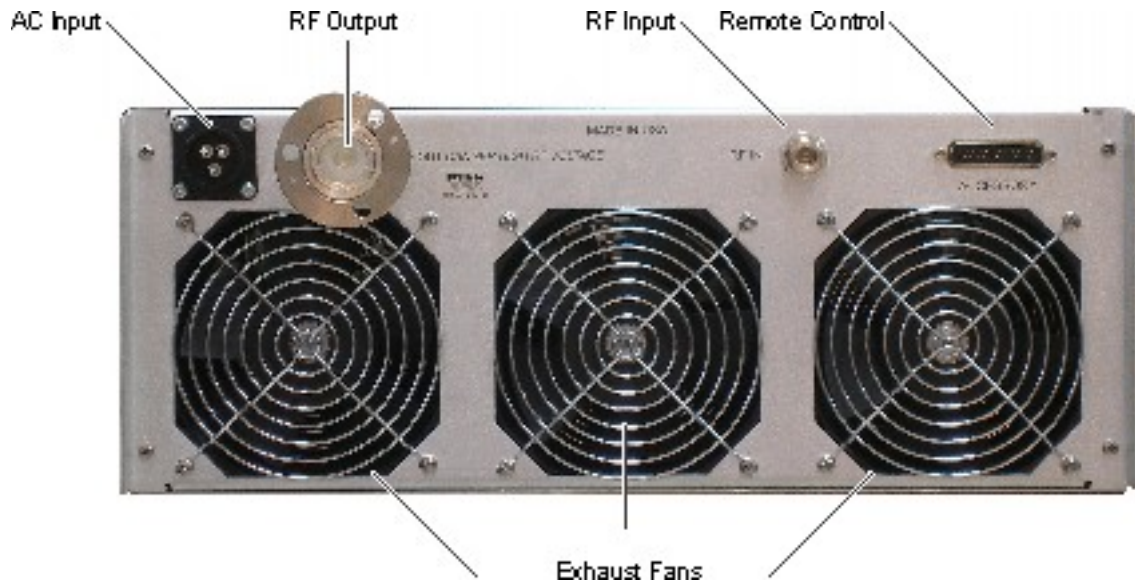
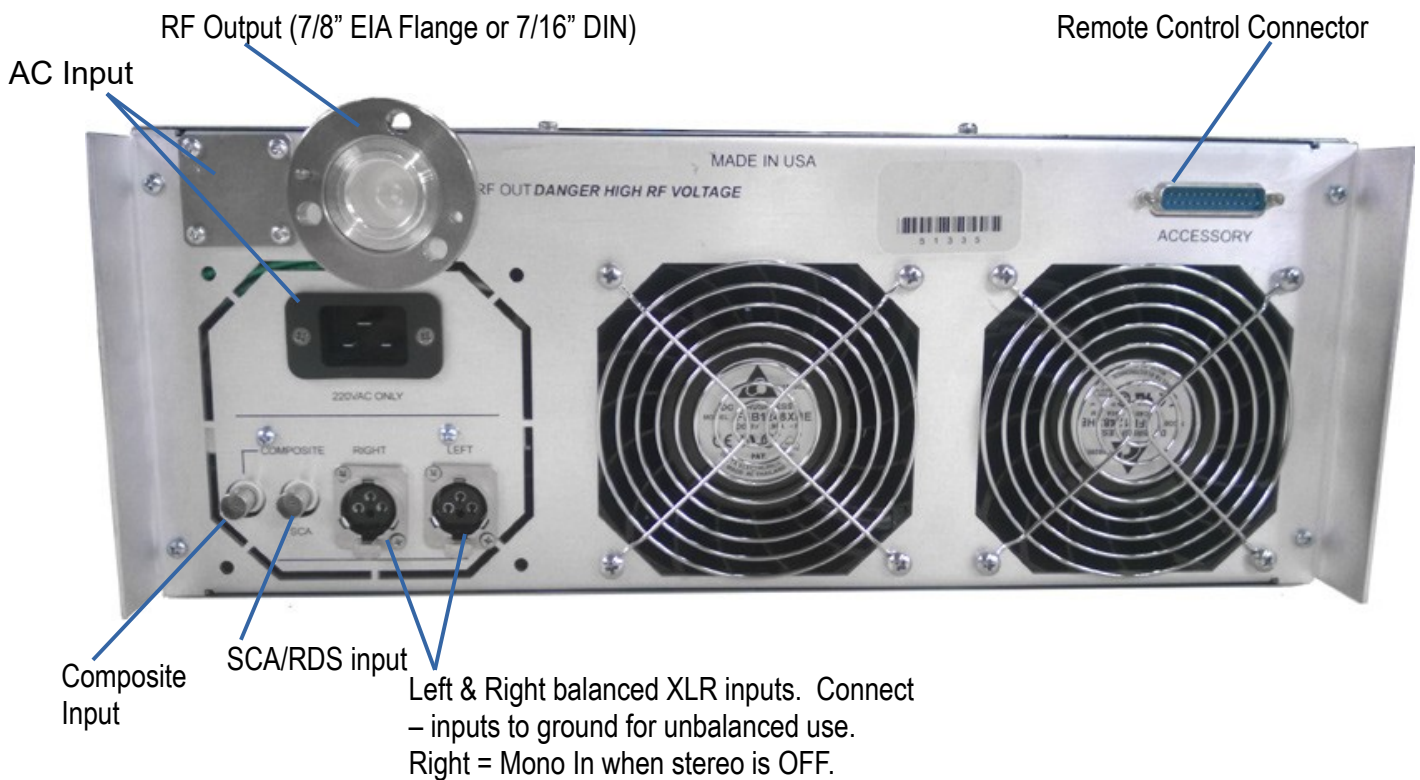


Figure 1-5 PS Series TRANSMITTER Rear Panel



# 1.2 Specifications

## 1.2.1 General

Table 1-1 lists the general specifications for the PS series

**Table 1-1: PS series General Specifications**

Parameter	Description
Dimensions	<ul style="list-style-type: none"><li>■ 7.0' (4RU) high</li><li>■ 19" wide including the front panel</li><li>■ 24" deep (including the front panel and rear protective flanges; the chassis body itself is 17" deep)</li></ul>
Weight	Total shipping weight is 90 pounds and includes the following: <ul style="list-style-type: none"><li>■ Chassis 70 pounds, including</li><li>■ Add 25 pounds for four AC power supplies packed separately.</li></ul>
19" Rack-Mountable with Slide capability	<ul style="list-style-type: none"><li>■ Left and right rack-mount tabs and handles are attached directly to the chassis. Rack-mount slides are provided</li></ul>
Temperature Operating: Non-Operating:	<ul style="list-style-type: none"><li>■ 0°C to +30°C</li><li>■ -40°C to +70°C</li></ul>
Relative Humidity Operating: Non-Operating:	<ul style="list-style-type: none"><li>■ 8% to 90% non-condensing</li><li>■ 5% to 95% non-condensing</li></ul>
Maximum Wet Bulb Operating: Non-Operating:	<ul style="list-style-type: none"><li>■ 27°C, non-condensing</li><li>■ 35°C, non-condensing</li></ul>
Altitude Operating: Non-Operating	<ul style="list-style-type: none"><li>■ 0 to 10,000 feet above sea level</li><li>■ 0 to 40,000 feet above sea level</li></ul>

## 1.2.2 Electrical

Table 1-2 lists the electrical specifications for the PS Series.

Table 1-2 PS Series Electrical Specifications

Parameter	Description
Frequency Range	■ 87.7 MHz to 108 MHz
Audio Input Impedance	■ 600 ohms
Audio Input Level (Composite)	■ -10 dBm
Audio Input Level R & L Stereo Encoder (optional)	■ -10 dBm
Frequency Response (Composite)	■ 20 Hz to 15(90) KHz
Pre-Emphasis	■ 50 or 75 uS
Harmonic Distortion	■ < 0.15% max
Signal-to-Noise Ratio	■ > 80 dB rms
RF Output Impedance	■ 50 ohms
Output Connector	■ 7/8 EIA Flange
RF Power Output	■ 2100 for 2kW : 2600 for 2.5kW ■ 3150 for 3kW
Harmonic Attenuation	■ < -70 dB
Power Requirements	■ 220-264 VAC, externally fused 35A

### 1.2.2.1 System Power

The PS Series is shipped with 2, 3 or 4 (dependent on model) “plug-in” AC power supplies packaged separately to avoid damage. Each AC power supply has a 1500-watt output capacity that auto-ranges single-phase input from a 220 to 264 VAC (47 to 63 Hertz) source. AC is supplied from a rear-mounted power connector

## 1.3 Packing & Shipping

The PS Series transmitter is packaged in a reusable shipping container. Approximate weight of an empty container and one (1) AC power cord is 9 pounds (4 kg). The approximate weight of a PS Series transmitter without power supplies is 70 pounds. The power supplies are packed separately and weigh up to 25 pounds, depending on the number supplied.

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## 2.1 Installation Procedures



Caution: Use industry-standard ESD grounding techniques when handling all components. Wear an antistatic wrist strap and use an ESD-protected mat. Store ESD-sensitive components in antistatic bags before placing them on any surface. Handle all IC cards by the front panel or edges only.

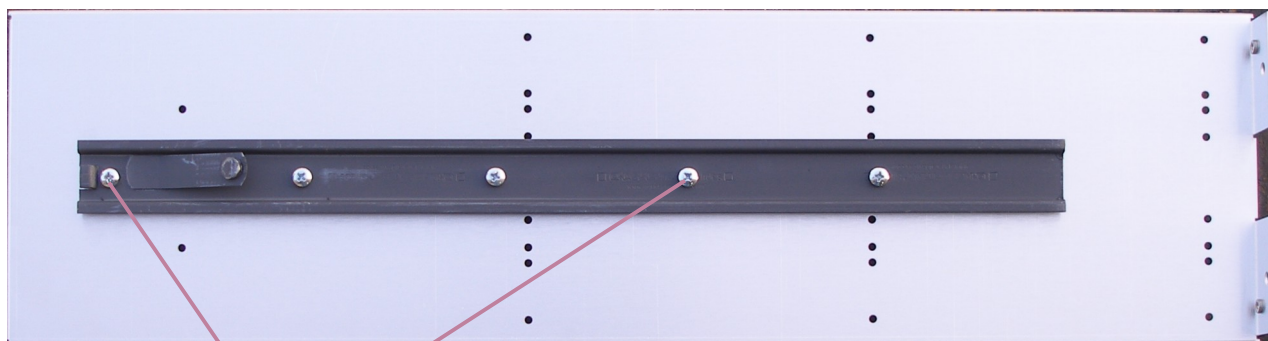
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## 2.2 Rack Mounting



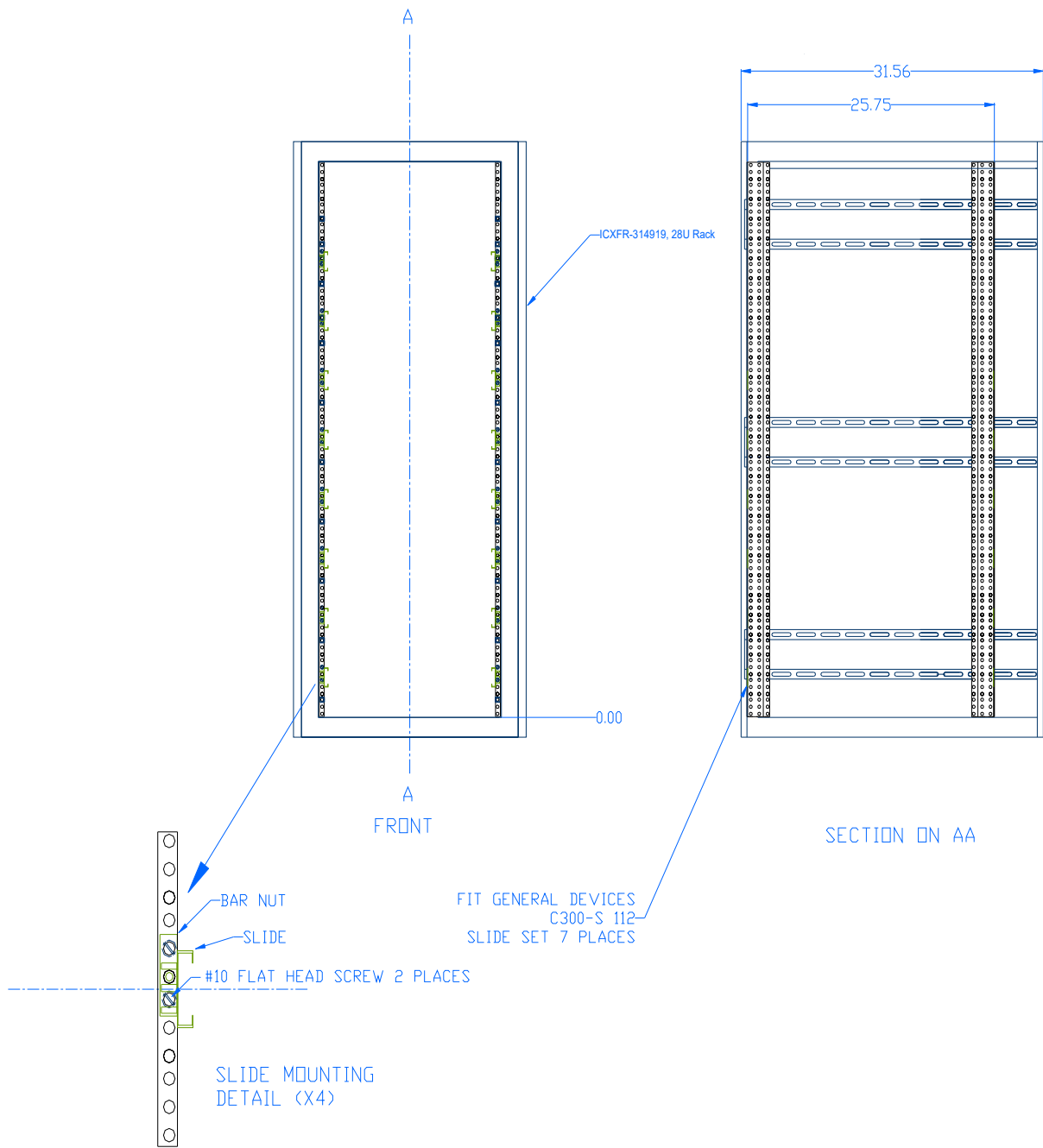
Warning: Make sure that the AC power cord is removed from the AC input connector on the rear of the PS Series before installing

---



**Figure 2-1:** PS Series Rack Slides

When installing the optional rack mounts (recommended), mount slide to side of the Gamma use 10-32 Screws provided (5 places)





**Figure 2-3:** Fitting PS Series into Rack



**Caution:** This is a 2 person lift

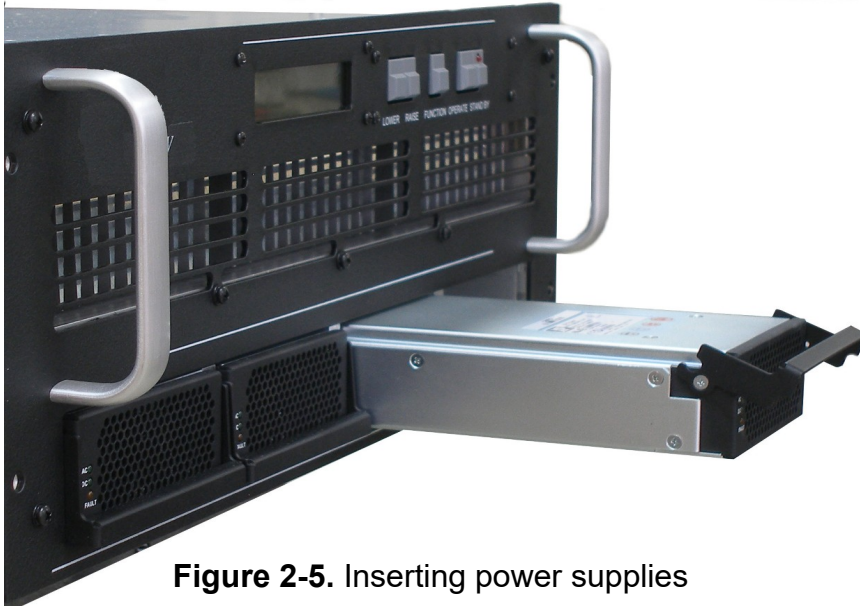


#10-32 screws (4 places)

**Figure 2-4:** Place the front panel screws

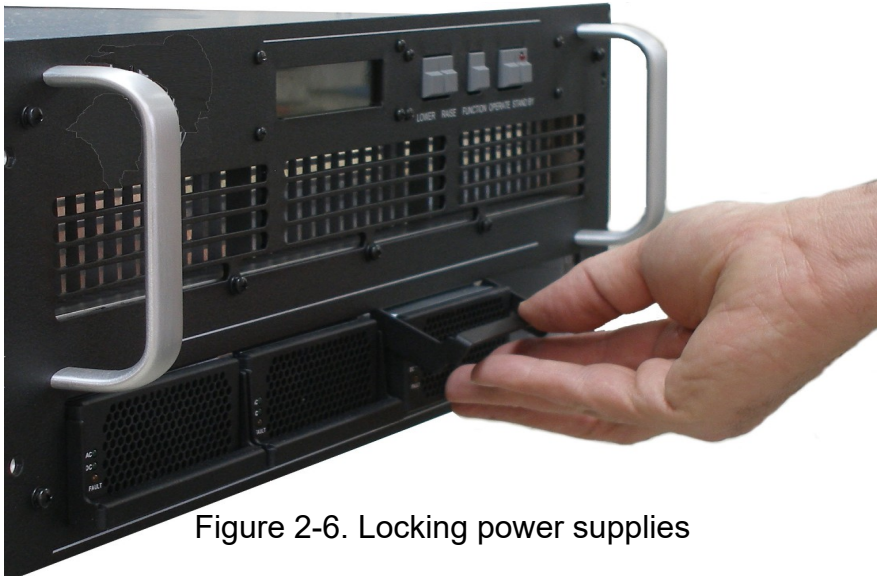
Using the supplied #10 screws with nylon washers, screw the front panel securely to the rack.

## 2.3 Installing the Power Supplies



**Figure 2-5.** Inserting power supplies

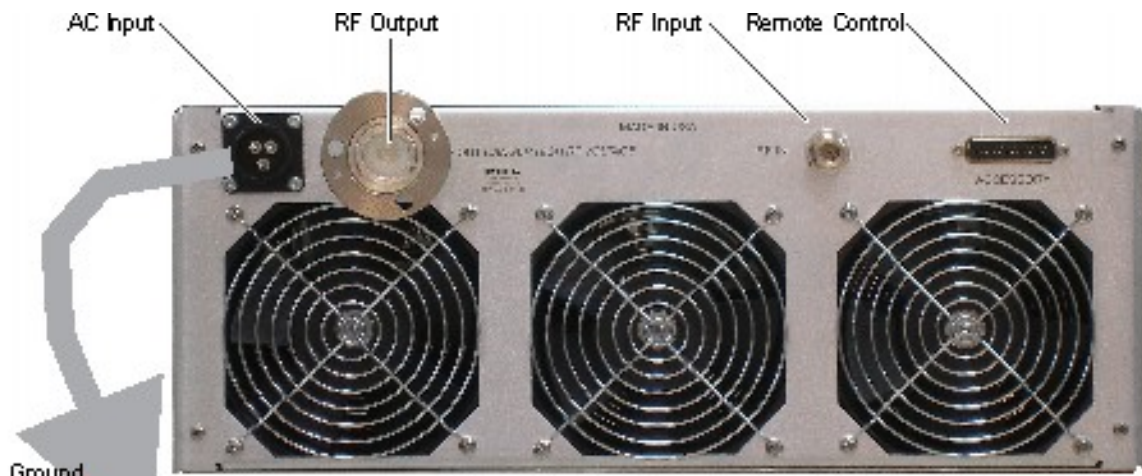
1. Place the power supply in the power supply slot.



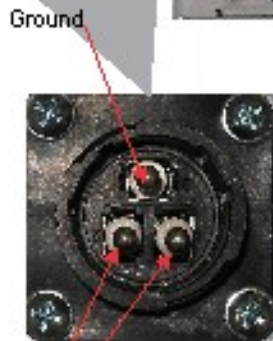
**Figure 2-6.** Locking power supplies

2. With the handle in the up position press the power supply fully into the slot.
3. Fully secure the power supply in place by pressing the handle down

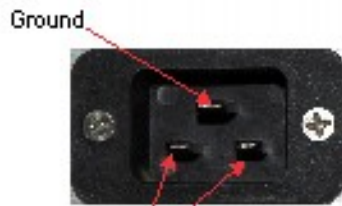
## 2.4 Electrical Mains Connections



**Figure 2-7.** Gamma Rear panel



3 & 3.5kW



1, 1.5, 2 & 2.5kW

220 VAC

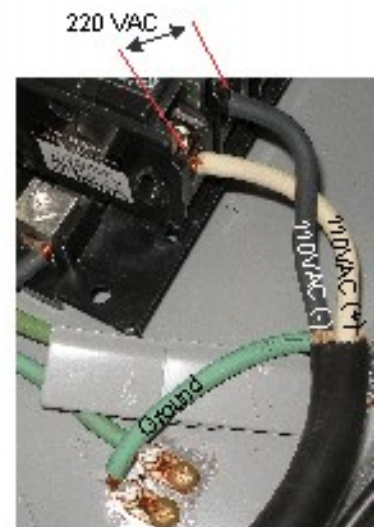
220 VAC

Connect the AC Line to a fused or tripped 220V single phase AC supply. the Trip/fuse rating should be 35A.

Connect the Power output to the antenna

Connect the Exciter output to the input connector

Optional Connect the 25 way D connector to the remote control



AC Cable connections to Breaker Box

This chapter describes:

- How to set up the PS Series system to begin operation
  - How to turn the system on and off
  - How to monitor and change the operational settings of the system
- 

## 3.1 Set Up the System

To successfully operate the PS Series Transmitter, it must be connected to a correctly matched antenna, an exciter and a 220V single phase supply.

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Warning: PREVENT FIRES!

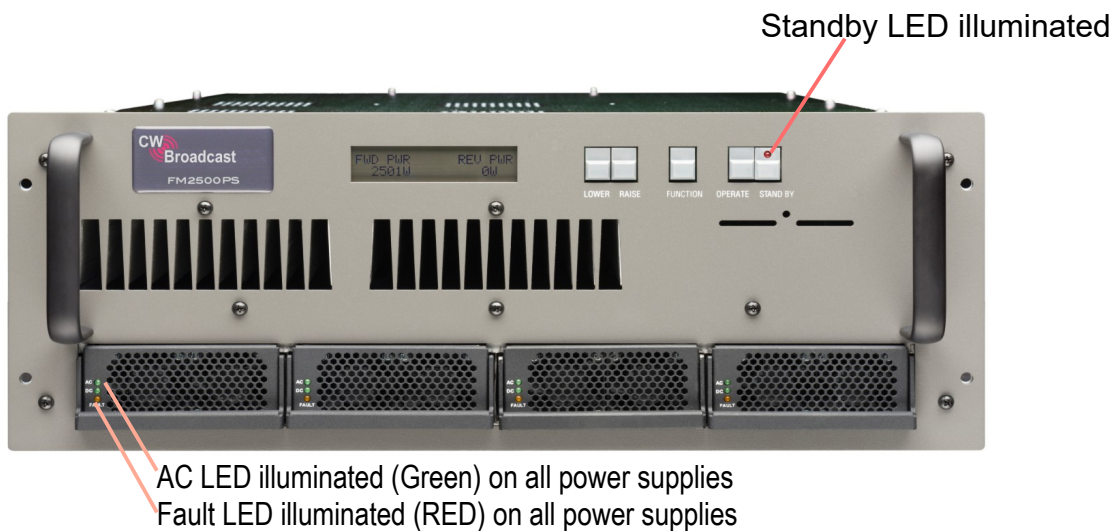
Ensure the 220V line is connected to a circuit breaker rated at 35A. Use the supplied 8 gauge 3 conductor cable.

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Refer to the section 4 of the manual for exciter set up

## 3.2 Power Up the System

1. For amplifiers, check that the exciter power is as above.
2. Switch the transmitter/amplifier to standby.
3. Operate the breaker to apply 220AC to the PS Series.
4. Check the following:



Press the OPERATE key on the front of the PS Series. Check that the fans are running and that the indications are as below:

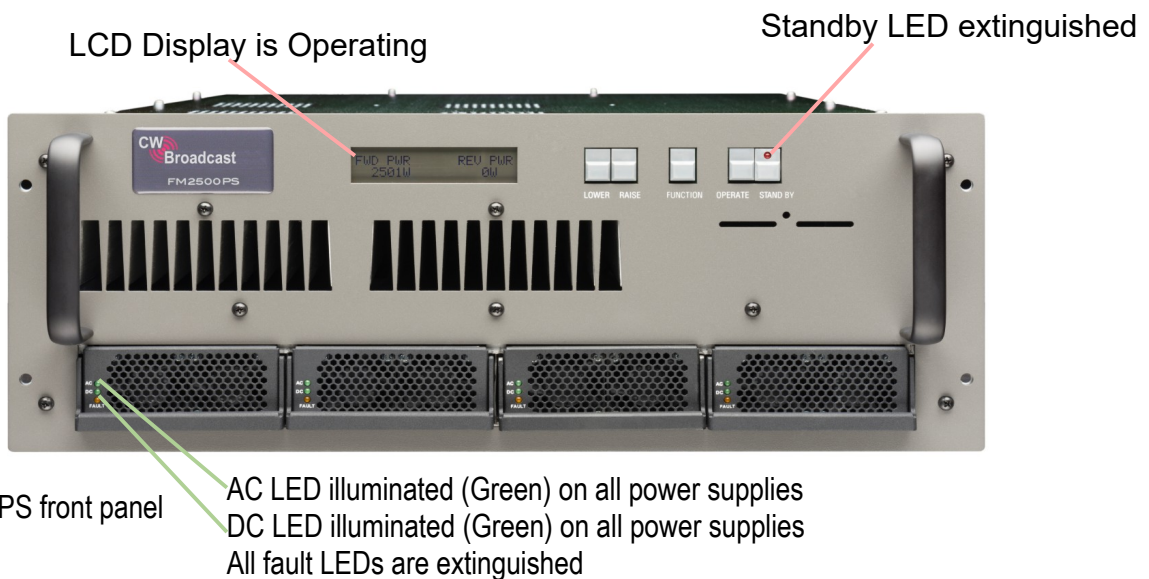


Figure 3-2: PS front panel

If using an amplifier, switch the exciter to operate. The PS amplifiers require an exciter of approximately 50W to produce full power. A low power exciter option is available that requires only 5-7W of drive. If you have the low power drive option, do not exceed 8W of drive.

After the startup sequence has completed and the exciter is generating power the PS Series will also produce power.

Typically the power is set at the factory to a mid value (i.e. 1500W for the 3000W PS Series). This should now be indicated on the LCD display similar to this:



**Figure 3-3a:** LCD Display Power

Pressing the function key will change the display to read Voltage and Current.



**Figure 3-3b:** LCD Display Current & Voltage

Pressing the function key again will revert the display to read Forward and Reverse power. At this point the power can be adjusted to the required output power using the raise and lower keys as appropriate.

Note all the readings for future reference.

Below is a table of expected power outputs, current and efficiency.

Power Output	Gamma 1.5kW		Gamma 2kW		Gamma 2.5kW		Gamma 3.0kW		Gamma 3.5kW	
	Current	Efficiency	Current	Efficiency	Current	Efficiency	Current	Efficiency	Current	Efficiency
500	26	40%	26	40%	31	34%	31	34%	41	26%
600	29	43%	29	43%	34	37%	34	37%	45	28%
700	31	47%	31	47%	37	40%	37	40%	48	30%
800	33	50%	33	50%	39	42%	39	42%	51	32%
900	35	53%	35	53%	42	45%	42	45%	55	34%
1000	37	56%	37	56%	44	47%	44	47%	57	36%
1100	39	59%	39	59%	46	50%	46	50%	60	38%
1200	41	61%	41	61%	48	52%	48	52%	63	40%
1300	42	64%	42	64%	50	54%	50	54%	66	41%
1400	44	66%	44	66%	52	56%	52	56%	68	43%
1500	46	69%	46	69%	54	58%	54	58%	70	44%
1600			47	71%	56	60%	56	60%	73	46%
1700			49	73%	57	62%	57	62%	75	47%
1800			50	75%	59	64%	59	64%	77	49%
1900			51	77%	61	66%	61	66%	79	50%
2000			53	79%	62	67%	62	67%	81	51%
2100					64	69%	64	69%	83	53%
2200					65	70%	65	70%	85	54%
2300					67	72%	67	72%	87	56%
2400					68	73%	68	73%	89	56%
2500					69	75%	69	75%	91	57%
2600							71	76%	93	58%
2700							72	78%	94	60%
2800							73	79%	96	61%
2900							75	81%	98	62%
3000							76	82%	100	63%

### 3.3.4 Final Check

Pressing the FUNCTION key rotates the LCD display through the following screens:



Note: At each screen, pressing the LOWER or RAISE key changes the output power only. PA VOLTS and PA AMPS is another way of indicating the power output, accomplished by multiplying the voltage by the amperage (current), then multiplying the result by the efficiency.

Readings should be recorded weekly to keep track of changes, which may indicate developing problems such as antenna or coax deterioration.

1. After pressing the FUNCTION key on the front of the unit, the Forward and Reverse power readings will appear on the LCD display (see Figure 3-4a).



**Figure 3-4a:** Press the FUNCTION key to read Powers



**Figure 3-4b:** Press the FUNCTION key to read Voltage and Current

## 3.4 Faults

CW Broadcast PS series transmitters include comprehensive temperature and power monitoring capabilities that include multiple temperature sensors, current sensors and RF samples. Various conditions are programmed into the main controller so that malfunctions can be handled in such a way as to minimize danger to surrounding devices while trying to keep the transmitters operating to their safe limit. This ensures that you stay on the air while avoiding collateral damage to expensive hardware. A free software tool, called Imperium, can be downloaded. Imperium can be used to set any of the various alarm condition trigger points. The software can also be used to monitor your transmitter's inner workings, but the software is not required for the transmitter to automatically handle out of tolerance conditions. The transmitter will autonomously protect itself without the software.

## 3.4.1 Over Temperature

All of the RF transistors are monitored for temperature. Additionally, in transmitters with 4 or fewer RF pallets, the load balancing resistors between the pallets are also monitored. Should the internal temperature exceed 80 degrees Centigrade the power will be reduced by 25%. The transmitter will periodically check the temperature and if the temperature remains high, the transmitter will continue to reduce the output power in 25% increments.

If the temperature of any sensor should exceed 100 degrees C, the transmitter will turn off the RF and cease broadcasting.

At this time all the controls will be locked out and the stand by LED will flash. You must clear this alarm before the transmitter will operate again.

## 3.4.2 Over Current, Under Current, Current Imbalance

The removable power supply outputs are summed together at the power distribution board. This board monitors the current feeding each individual amplifier pallet. If any pallet or group of pallets are using significantly more or less current than the others, this is an imbalance. If the imbalance exceeds safe levels, the transmitter will reduce power to 20% of it's nominal rated output. This is done to prevent damage to surrounding pallets and load balancing resistors.

If any pallet suddenly consumes more than 35amps, this could be an indication of a short circuit. In that case, the transmitter will shut off the 48VDC to the pallets.

At this time all the controls will be locked out and the stand by LED will flash. You must clear this alarm before the transmitter will operate again.

Fuses, in line with each RF pallet, are also on the power distribution board. If a short circuit occurs, this may blow the fuse. This is intended to prevent damage to the pallets and other related components in the case of shorts to ground.

## 3.4.2 High VSWR

If the load VSWR is high, indicated by a high reading on the reverse power meter (greater than 5% of the Forward Power reading). The power will be reduced progressively to limit the maximum reverse power. If the Load VSWR improves the power will be increased, ultimately to the previous set value.

## 3.4.3 Power Supplies

Each power supply has 3 LEDs: AC good, DC good, and Fault. In the standby mode the AC good and Fault will be illuminated. This is a normal condition. In operate mode both the AC good and DC good will be illuminated, and the Fault LED will be extinguished. Any other combination would indicate a fault with that power supply. Further confirmation of this would be that the other power supplies are operating as expected.



**Figure 3-5:** Power Supply LEDs

## 3.5 Power Down the System

To power down (turn off) the PS Series, press the STANDBY key, then disconnect the AC power chord from the AC power socket on the rear panel chassis.

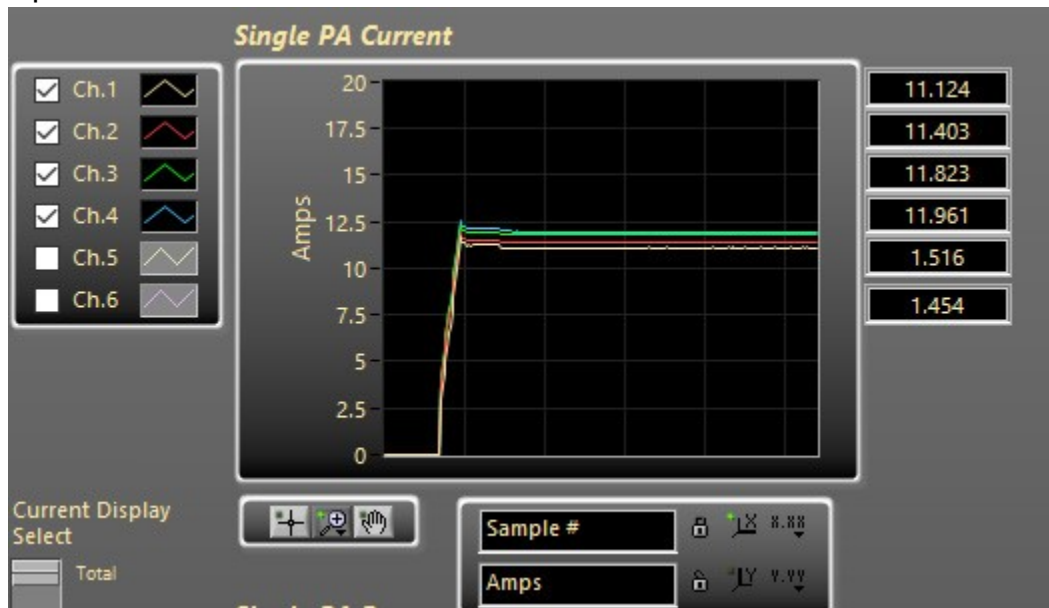
## 3.6 Imperium Power Management Software

The power distribution board sends data to the controller card. A limited sample of this data is also sent to the standard serial port from the controller. Generally, you can see enough information from the main controller output to get an overview of the internal operation of the transmitter. An even more detailed view is available when viewing the separate serial output data directly from the power distribution board. This data is available on the transmitter's D25 port. The free Imperium software lets you graphically see the performance of the transmitter's power systems and temperature systems. You can also set your own alarm limits.

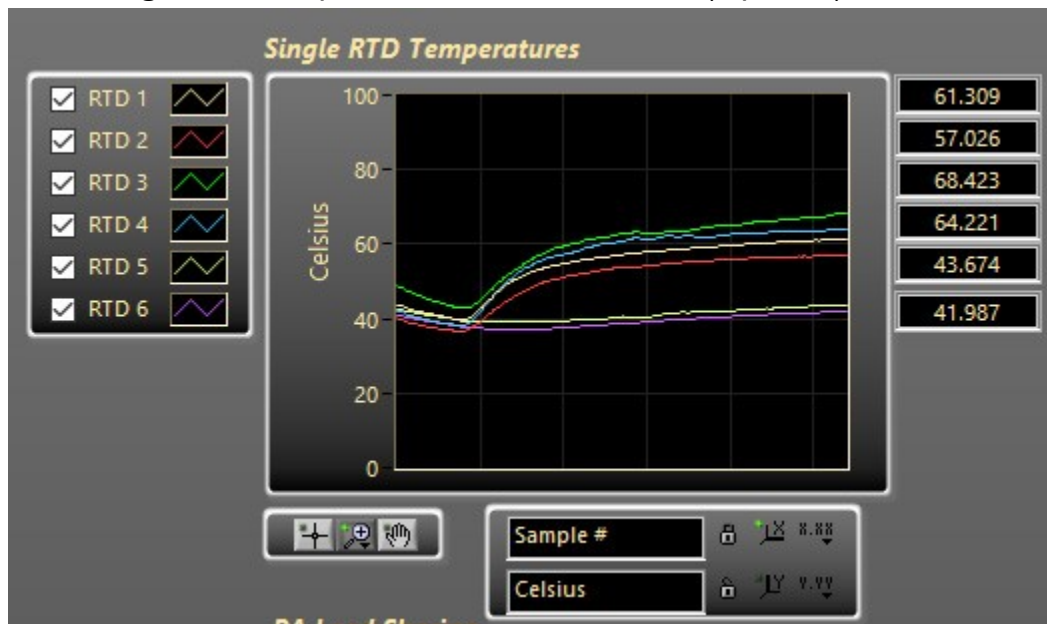


Figure 3-6: Imperium Main Screen

The Power distribution board keeps track of PA current and PA temperatures. Based on these measurements, a number of parameters can be calculated and displayed to make monitoring more effective. The two screens that give you the basic info are the “Single PA Current” and the “Single RTD Temperatures”. In a properly working transmitter at the nominal operating power level, these will be very close to each other. It’s normal for the values to be different at lower or higher output powers. Although the amplifiers can be balanced at any power level, they will almost always diverge at other power levels. This is why we align them at the power level that was specified with the order.



**Figure 3-7:** Imperium PA Current Monitor (4 pallets)



**Figure 3-8:** Imperium PA Temperature Monitor (4 pallets)

Temperature sensors are arranged differently between 4 and 6 pallet transmitters. In four pallet transmitters, four temperature sensors are dedicated to measuring the individual PA transistor temperatures. Two sensors are used to track the PA balancing resistor temperatures.

A normally operating transmitter should have temperatures between 50C and 70C. There should never be any device exceeding 70-80C.

If any sensor exceeds 90 degrees C, the transmitter will reduce its power by 25%. It will periodically check and continue to reduce power until the temperature drops below 90C.

If any sensor reaches or exceeds 100 degrees C, the transmitter will turn itself off.

All of the other values displayed in the Imperium software are derived from the basic current and temperature sensors. When operating correctly, you want the Overall PA imbalance to be less than 5% at nominal power. We also want the temperature spread to be within 5 degrees C, or less. This should be measured in groups, with the PA transistors grouped together and the load balancing resistors in another group. The two groups typically will be different.

Nominally we want all of the PA currents to be similar. Also expected to be similar to other grouped items are:

- Single PA Current
- Single PA Power,
- PA Load sharing
- Single RTD Temps for PA transistors
- Single RTD Temps for Load Balance Resistors

The transmitter compares actual RF power to DC input power. These values are shown on the left side. Note that system efficiencies of under 50% at low power (less than 50% of rated power) are normal. In some cases, due to lower efficiency at reduced power, it's possible to generate more raw heat than when running close to full power.

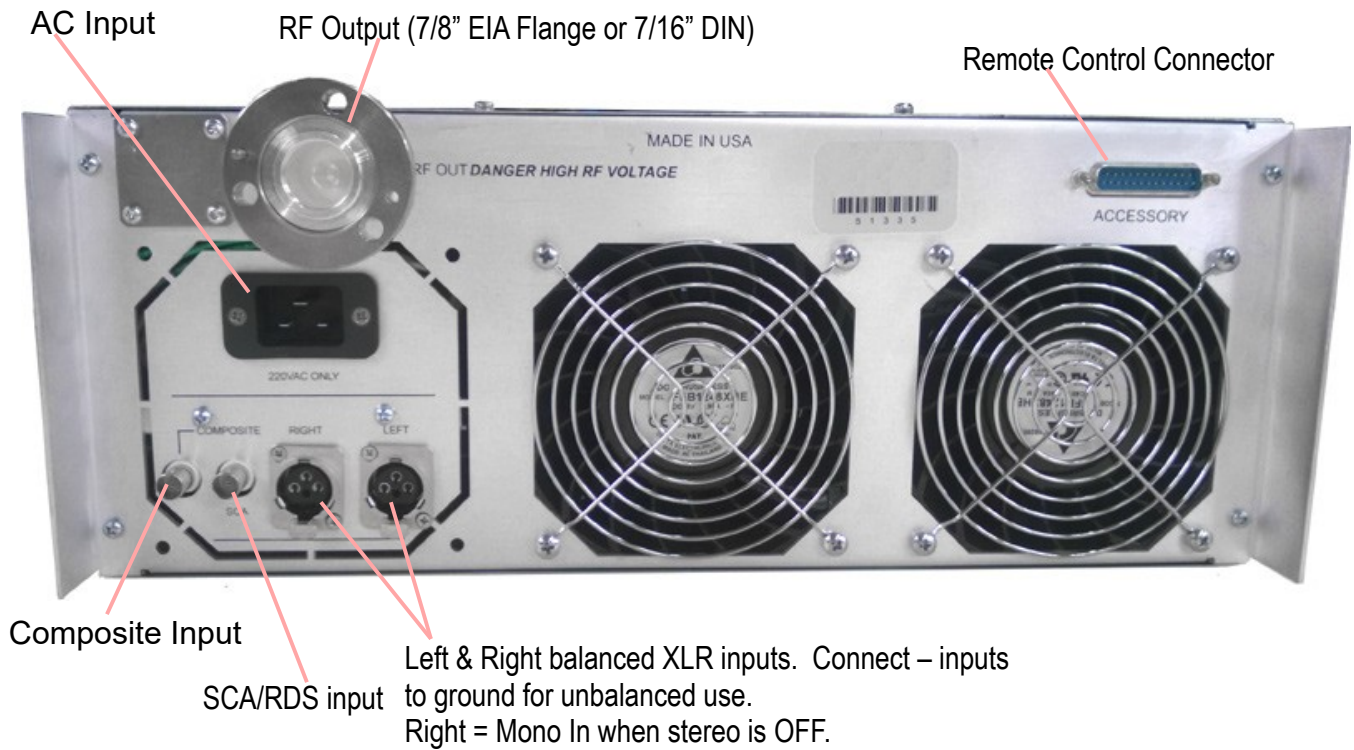
This chapter describes:

- How to set up the Exciter options to begin operation
  - How to monitor and change the operational settings of the Exciter
- 

## 4.1 Set Up the System

To successfully operate the PS Series CW Broadcast Transmitter, an antenna and an audio source must first be connected to the system, as outlined in the following steps:

1. Connect the antenna or power amplifier input to the RF output connector on the rear panel of the PS Series.
2. Connect the audio input to one of the following connectors on the rear panel:
  - Composite Input
  - Mono Input
  - Balanced Stereo Left and Right (if equipped with stereo encoder)



**Figure 4-1: Gamma Rear Panel**

## 4.2 Power Up the System

1. On the rear of the PS Series, plug an AC power cord (shipped with each unit) into the AC power socket (see Figure 4-1).
2. Plug the other end of the AC power cord into a “live” AC outlet.

**Note:**



There is no On/Off switch on the PS Series Transmitter. As soon as power is introduced to the system through an AC power chord attached to a live AC outlet, if the system was powered off while in Standby mode, the system will again enter Standby mode and the light on the STANDBY key on the front of the PS Series will turn red.

If the system was powered off while not in Standby mode, it will begin the startup sequence described in section 4.3.1 on page 31.

3. Make sure the STAND BY key on the front of the system has turned red (or the system has begun the startup sequence), thus assuring that the system has powered on (see Figure 4-2).



**A** Before power is applied to the system, the standby LED is OFF



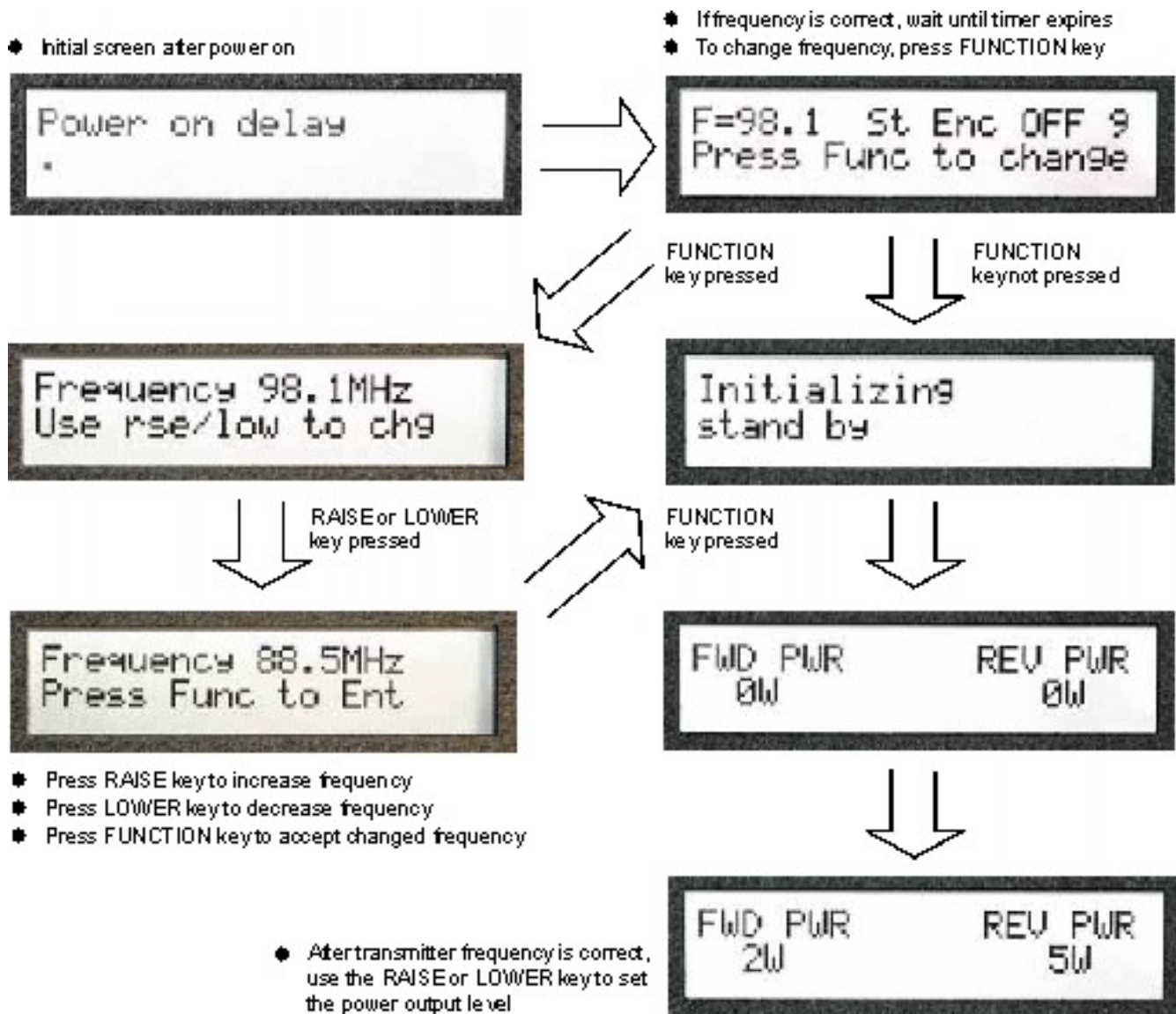
**B** After power is applied to the system, the standby LED is ON

**Figure 4-2:** After Power has been applied to the PS Series, it enters Standby mode

## 4.3 Getting Started

### 4.3.1 Startup Sequence

1. Press the OPERATE key on the front of the PS Series.
2. After the OPERATE key is enabled, the LED display will show the initialization sequence and display, in order, the screens shown in Figure 4-3.

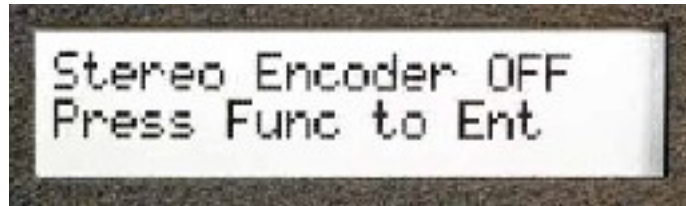


**Figure 4-3:** After the OPERATE key is pressed, the Startup Sequence begins

## 4.3.2 Changing the Stereo Encoder

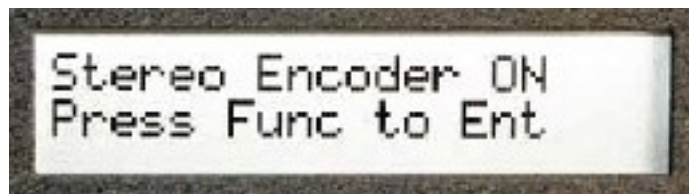
After changing the frequency in the startup sequence (see previous page), you have the option of changing the Stereo Encoder setting:

1. If the LCD screen displays the desired setting (Stereo Encoder OFF or ON), press the FUNCTION key to accept the setting (see Figure 3-5)



**Figure 4-4:** Stereo Encoder can be changed through the LCD display

2. To change the Stereo Encoder setting, press the RAISE or LOWER key, which will result in the alternate setting (see Figure 3-6).



**Figure 4-5:** Press the RAISE or LOWER key to change the LCD display

### 4.3.3 Audio

Audio levels for the PS Series have already been set and should not need to be changed. Deviation can be checked by pressing the FUNCTION key until the appropriate LCD screen is reached (see Figure 4-6).

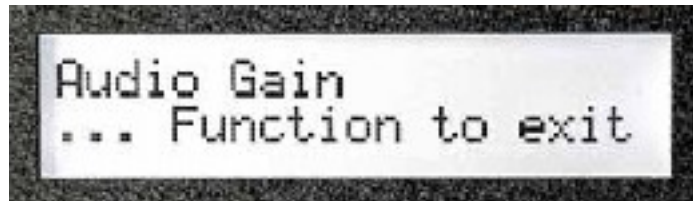


**Figure 4-6.**

When the LCD display is in DEVIATION mode, the maximum deviation should occasionally reach 100% (indicated by the thick bar). If the 100% level is never reached or exceeds 100%, the level needs to be adjusted.

The output level from the audio source should be adjusted to give a peak deviation of 75 kHz (as described above).

If the correct deviation cannot be obtained, the audio gain can be raised or lowered by pressing the FUNCTION key until the appropriate LCD screen is reached (see Figure 4-7).



**Figure 4-7:** Audio Gain can be adjusted through the LCD display

When the AUDIO GAIN screen appears, the value may be raised by pressing the RAISE key or lowered by pressing the LOWER key until the desired deviation is reached. The Deviation Screen is displayed through the FUNCTION key.

## 4.3.4 Final Check

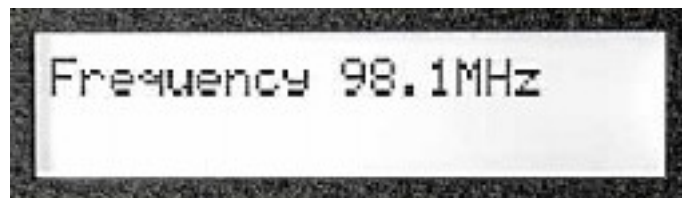
Pressing the FUNCTION key rotates the LCD display through the following screens:



Note: At each screen, pressing the LOWER or RAISE key changes the output power only. PA VOLTS and PA AMPS is another way of indicating the power output, accomplished by multiplying the voltage by the amperage (current), then multiplying the result by the efficiency.

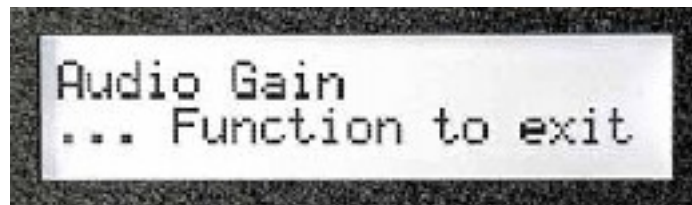
Readings should be recorded weekly to keep track of changes, which may indicate developing problems such as antenna or coax deterioration.

1. After pressing the FUNCTION key on the front of the unit, the operating frequency will appear on the LCD display (see Figure 4-8).



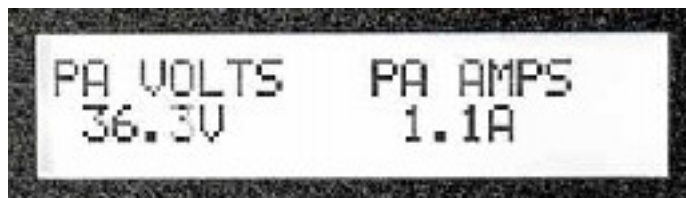
**Figure 4-8:** Press the FUNCTION key to read Frequency

2. Pressing the FUNCTION key again will display the audio gain (see Figure 4-9)



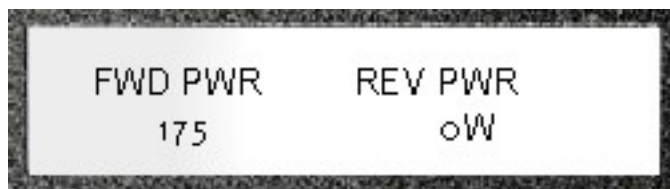
**Figure 4-9:** Press the FUNCTION key to read Audio Gain

- Pressing the FUNCTION key again will display the power output (volts multiplied by amps; see Figure 4-10).



**Figure 4-10:** Press the FUNCTION key to read Volts & Amps

- Pressing the FUNCTION key again results in a screen showing forward and reverse power (see Figure 4-11).



**Figure 4-11:** Press the FUNCTION key to read Forward & Reverse Power

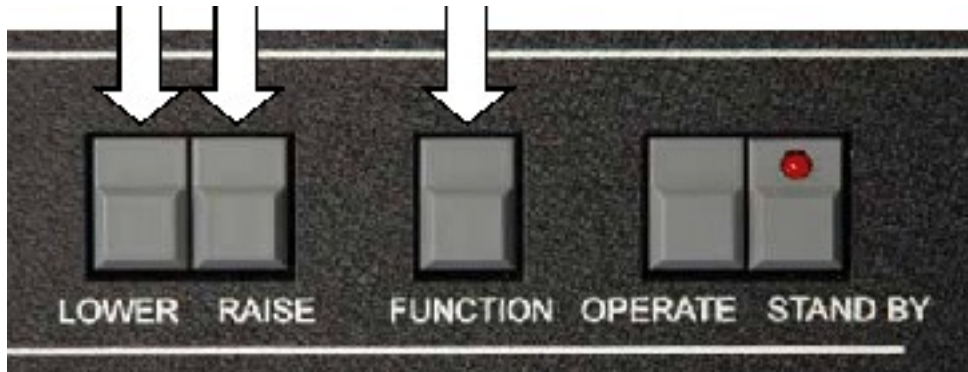
- A final pressing of the FUNCTION key will produce a screen showing deviation (see Figure 4-12). Figure 4-12. Press the FUNCTION key to read Deviation.

As already noted, further pressing of the FUNCTION key will rotate the LCD display through a queue of the same screens.



## 4.4 Additional Adjustments

The PS Series offers additional capabilities by pressing the LOWER, RAISE, and FUNCTION keys simultaneously (see Figure 4-13).



**Figure 4-13:** Press the LOWER/RAISE/FUNCTION keys simultaneously



Note: When pressing LOWER, RAISE, and FUNCTION, the transmitter cannot be in STANDBY mode.

The resulting LCD screens will appear as follows:



**Figure 4-14.**

After a few seconds, press the FUNCTION key to display the next LCD screen.

---

Caution: Do not change any of these settings unless you have the proper test equipment and are able to make the appropriate measurements

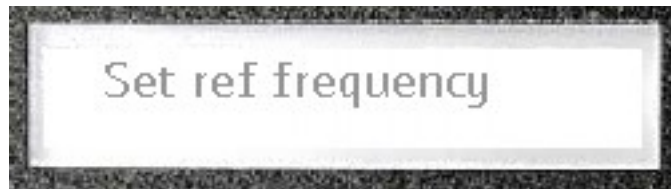
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2.



**Figure 4-15.**  
Use the RAISE/LOWER keys to adjust.

3.



**Figure 4-16.**

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## 4.5 Power Down the System

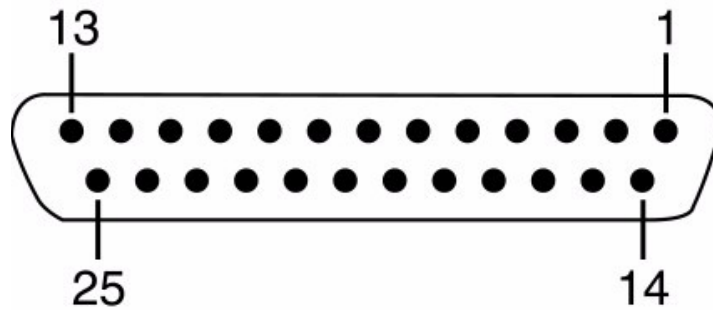
To power down (turn off) the transmitter, press the STANDBY key, then disconnect the AC power cord from the AC power socket on the rear panel of the chassis

# Appendix A

## Connector Pinouts

This appendix provides connector pinouts and signal descriptions for the user I/O connectors that are installed on the PS Series Transmitter rear I/O Panel (see Figure 1-4, on page 11).

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**Figure A-1:** Accessory Port Pinout

Older "PTEK" Branded Transmitters

<b>PIN</b>	<b>Signal Function</b>
1	Forward power DC indication; 2.4V = approx half power
2	Final voltage DC indication; $V = V/10$
3	Power Range (Some models)
4	Serial Data Out (9600b N81)
5,6,18,19	24V out when ON
7	
8	Raise; ground to raise the output power
9	
10	
11,12,23,24	Ground
13	Remote on (ground to turn the unit on momentarily only)
14	Reverse power DC indication; 2.4V = approx half power
15	Power Range (some models (10v = Low))
16	
17	Serial Data In (9600b N,8,1)
20	Lower; ground to lower the output power
21	Final current DC indication; Full scale = 2.5V
22	
25	Remote off (ground to turn the unit off momentarily only)

Newer “CW Broadcast” PS Series Transmitters

PIN	Signal Function
1	Forward power DC indication; 2.4V = approx half power
2	Final voltage DC indication; $V = V/10$
3	Imperium Power Board RX Data (serial In) (115,200b N81)
4	Main Controller Serial Data Out (115,200b N81)
5,6,19	24V out when ON
7	
8	Raise; ground to raise the output power
9	
10	
11,12,23,24	Ground
13	Remote on (ground to turn the unit on momentarily only)
14	Reverse power DC indication; 2.4V = approx half power
15	Imperium Power Board TX Data (serial Out) (115,200b N81)
16	
17	Main Controller Serial Data In (115,200b N,8,1)
18	RF Mute (Ground to suspend RF. Power supplies stay <b>ON</b> )
20	Lower; ground to lower the output power
21	Final current DC indication; Full scale = 2.5V
22	
25	Remote off (ground to turn the unit off momentarily only)

