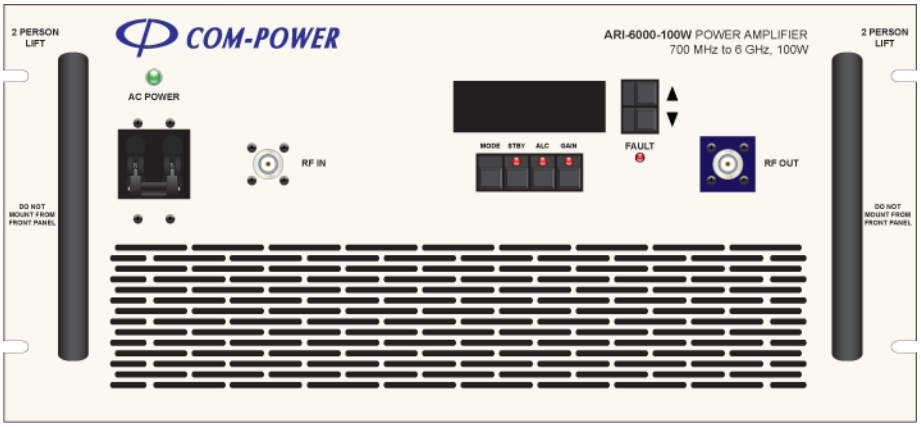
INSTRUCTION MANUAL
for
RF POWER AMPLIFIER

Model:
ARI-6000-100W



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19121 El Toro Rd • Silverado, California 92676 • (949) 459-9600 • com-power.com

List of Figures

1.0 Introduction

This owner's manual contains operating instructions for the ARI-6000-100W Power Amplifier.

2.0 Products Available from Com-Power


Antennas


Antenna Kits


Absorbing Clamps


Coupling/Decoupling Networks (CDN)


Comb Generators


Current Probes & Bulk Current Injection Probes


Emissions Test Systems

Conducted Immunity Test Systems


Impedance Stabilization Networks (ISN)

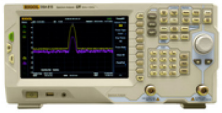

Line Impedance Stabilization Networks (LISN)


Antenna Masts


Near-Field Probe Sets


Preamplifiers


Power Amplifiers


Spectrum Analyzers


Surge Generators


Transient Limiters

Turntables


Antenna Tripods


Telecom Test Systems

www.com-power.com

3.0 Product Information

3.1 Product Description

The power amplifier operates in the RF frequency range. The input to the power amplifier is rated at 0 dBm nominal CW signal input for the 0.7 to 6.0 GHz frequency range. The output of the power amplifier is specified at 60 Watts CW (non-saturated); and 100W (saturated). Detailed specifications for the power amplifier are given in Section 3.5.

3.2 Incoming Inspection

WARNING!

The power amplifier has been mechanically and electrically inspected prior to shipment. If the equipment has been damaged or if electrical performance is not within specification, notify Com-Power immediately.

3.3 Safety Information

3.3.1 Definitions of Safety Notes and Symbols

The following safety notes and symbol are used in this manual and on the equipment. Familiarize yourself with each and its meaning before operating this equipment.

Caution *Caution* denotes a hazard. It calls attention to a procedure that, if not correctly performed or adhered to, would result in damage to, or destruction of, the equipment. Do not proceed beyond a caution note until the indicated conditions are fully understood and met

Warning Warning denotes a hazard. It calls attention to a procedure which, if not correctly performed or adhered to, could result in injury or loss of life. Do not proceed beyond a warning note until the indicated conditions are fully understood and met.

The instruction documentation symbol. The product is marked with this symbol when it is necessary for the user to refer to the instructions in the documentation.

3.3.2 General Safety Considerations

The following safety instructions have been included in compliance with safety standard regulations. Please read them carefully.

Warning This is a safety Class I product provided with a protective earthing ground incorporated in the AC power cord. The AC power cord shall only be inserted in a socket outlet provided with a protective earth contact. Any interruption of the protective conductor, inside or outside of the equipment, is likely to make the equipment dangerous. Intentional interruption is prohibited.

Warning No operator serviceable parts inside. Refer servicing to qualified personnel. To prevent electrical shock, do not remove covers.

Warning If this equipment is used in a manner not specified by Com-Power Corporation, the protection provided by the equipment may be impaired.

Caution Before switching on this equipment, make sure that the line voltage is correct and that an External Load has been applied. (refer to Section 4.3)

3.3.3 General Safety Instructions/Precautions

- **READ AND RETAIN INSTRUCTIONS** - Read all safety and operating instructions before operating the instrument. Retain all instructions for future reference.
- **HEED WARNINGS** - Adhere to all warnings on the instrument and operating instructions.
- **FOLLOW INSTRUCTIONS** - Follow all operating and use instructions.
- **WATER AND MOISTURE** - Do not use the instrument near water.

- **VENTILATION** - The instrument should be used/installed only in locations where the flow of air through the ventilation openings is not impeded.
- **MOUNTING –** The instrument can be used in Horizontal or vertical orientation as long as the ventilation holes are not obstructed and the protective grounding is not defeated.
- **HEAT** - The instrument should be situated away from heat sources such as heat registers or other instruments which produce heat.
- **POWER SOURCES** - Connect the instrument only to the type of power source described in the operating instructions or as marked on the instrument.

- **POWER CORD PROTECTION** - Place power supply cords so that they are not likely to be walked on or pinched by items placed on them or against them.
- **CLEANING** – Clean the instrument outside surfaces of the device with a soft, lint-free cloth. If necessary, a mild detergent may be used.
- **NON-USE PERIODS** - Unplug the power cords of the instrument when it will be left unused for a long period of time.
- **OBJECT AND LIQUID ENTRY** - Take care that objects do not fall into the instruments and that liquids are not spilled into the enclosure through openings.
- **DEFECTS AND ABNORMAL STRESS** - Whenever it is likely that the normal operation has been impaired, make the equipment inoperable and secure it against further operation.
- **SITTING OR CLIMBING** - Do not sit or climb upon the instrument or use it as a step or ladder.
- **ENVIRONMENTAL CONDITIONS** - This equipment is designed for indoor use. Ambient temperature range during operation should be between 5° C to 40° C.
- **STORAGE AND PACKAGING** - The device should only be stored at a temperature between –25 and +70 °C. During extended periods of storage, protect the device from dust accumulation. The original packaging should be used if the device is transported or shipped again. If the original packaging is no longer available, the device should be packed carefully to prevent mechanical damage.

3.4 Product Features

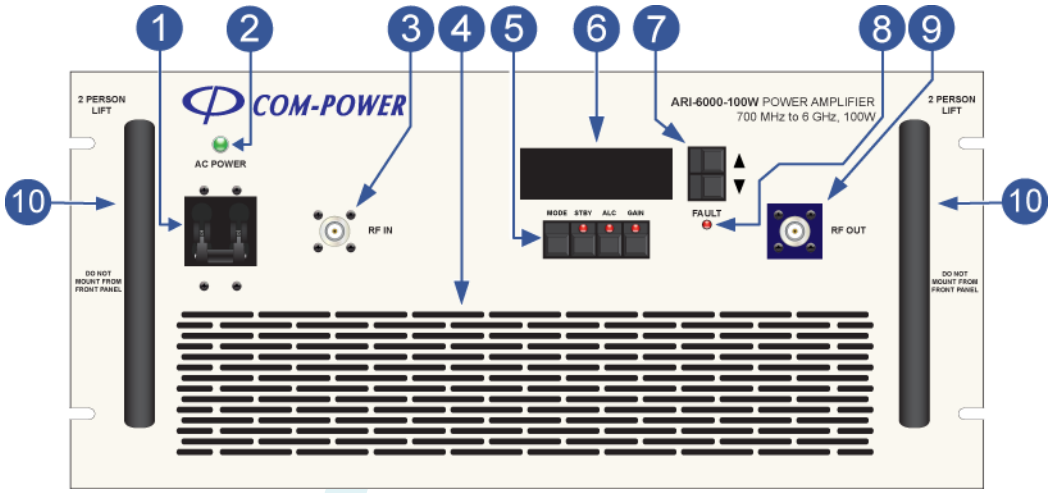


FIGURE 1 - *Product Features – Front Panel*

1. **Main Power Switch**
   Turns on/off amplifier system power.
2. **AC Power Indicator Lamp**
   When lit, Indicates that the system power is ON, and power is distributed throughout the amplifier properly.
3. **RF Input Port Connector**
   Coaxial N-Type (female) Connector for Amplifier RF Input Port.
4. **Air Intake Vents**
   Air intake slots for system cooling.
5. **Amplifier Mode Control Buttons**
   These four buttons are used for selecting the amplifier's operating mode.
6. **Front Panel Digital Display**
   Displays the selected operating parameters during amplifier operation.
7. **Up/Down Buttons**
   These two buttons are used for incrementing the displayed value up and down, respectively.
8. **Fault Indicator Lamp**
   When lit, indicates that the internal temperature of the amplifier has exceeded 80° C, and that the DC bias voltage to the main amplifier modules has been turned off.
9. **RF Output Port Connector**
   Coaxial N-Type (female) Connector for Amplifier RF Output Port.
10. **Handles**
    Handles attached to either side of the front panel.

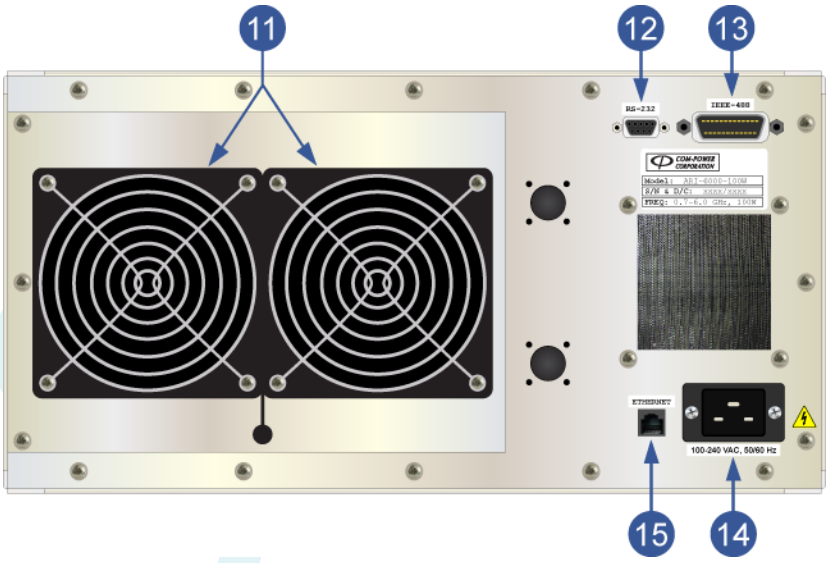


FIGURE 2 - ***Product Features – Rear Panel***

11 **Exhaust Fans**
Exhaust fans for cooling mounted onto exterior of amplifier rear panel.

12 **RS232 (Serial) Communications Port**
DB9 pin (female) connector for remote control of amplifier through RS232 or RS422 serial communications.

13 **IEEE-488 Communications Port**
GPIB connector for remote control of amplifier through GPIB interface.

14 **System Power Input Port**
IEC C20 Inlet Connector for system power.

15 **Ethernet Communications Port**
RJ45 ethernet receptacle for factory maintenance purposes only.

3.5 Product Specifications

GENERAL	
Frequency Range	**700 MHz to 6 GHz**
Class of Operation	**A/AB**
Output Power (saturated)	**100 Watts** *(typical)*
P1dB Output Power	**60 Watts** *(minimum)*
Small Signal Gain	**53 dB** *(minimum)*
Power Gain Flatness	**±5 dB @ 0 dBm input** *(maximum)*
Input/Output Impedance	**50 ohms** *(nominal)*
Input VSWR	**2:1** *(maximum)*
Output VSWR	**2:1** *operating into****
RF Input	**0 dBm** *(nominal)* ***+3 dBm with no damage***
ELECTRICAL	
AC Input Power	**100 to 240 VAC, 50/60 Hz, 1-Phase** **3000 Watts** *(maximum)*
INPUT/OUTPUT CONNECTORS	
Input Connector	**N-type** *(female)*
Output Connectors	**N-type** *(female)*
AC Input Connector	**IEC C20 Receptacle**
RS232/RS-422 Serial Interface	**DB9 pin *(female)* Connector**
GPIB Interface	**GPIB Connector**
ENVIRONMENTAL	
Operating Temperature	**32° F to 122° F** *(0° C to 50° C)*
Operating Humidity Range	**95%** *(non-condensing)*
Temperature Protection	**Shut-down @ 80° C** *(minimum)*
Cooling System	**Internal Forced Air**
MECHANICAL	
Dimensions (H)x(W)x(D)	**(5U) 8.75"** x **19"** x **24.5"** *(**22 cm** x **48.3 cm** x **62.2** cm)*
Weight	**95 lbs.** *(43.1 kg)*

* Any output VSWR match >2.5:1 may result in reduced power and/or activate amplifier's "Reverse Power" protection.

Specifications given at 25° C.

Specifications subject to change without notice.

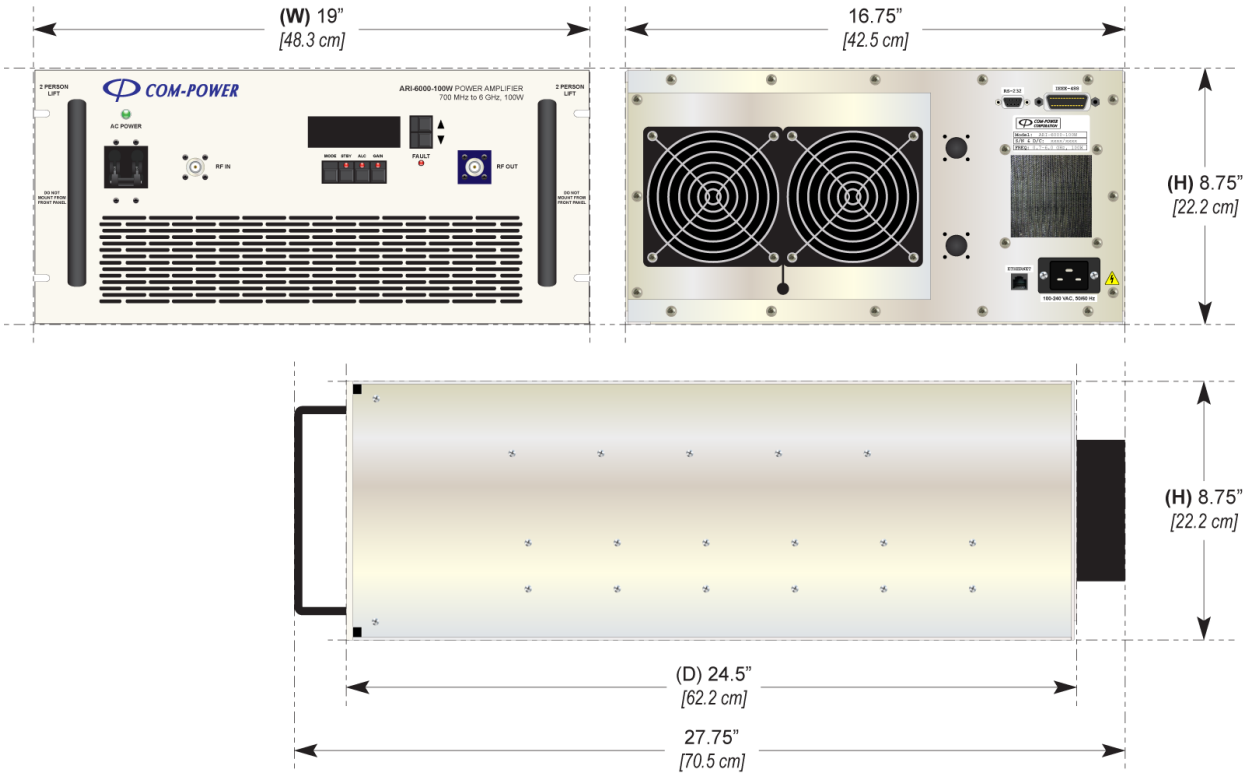


FIGURE 3 - *Product Dimensions*

4.0 Installation

4.1 Power Requirements

The power amplifier requires a power source of 100 to 240 VAC, 50/60 Hz capable of delivering 3000 Watts. Turn off the front panel 'ON/OFF' switch ***before*** connecting the AC power source.

4.2 Earthing

Earthing is achieved simultaneously with connection of the AC power cord to a properly grounded power source.

4.3 Load Requirements

The power amplifier requires an output load, antenna, or dummy load with a 50-Ohm nominal impedance.

CAUTION Make this external load connection before applying power to the equipment.

4.4 Cable Connections

The AC power cable connection is made at the rear of the power amplifier via the receptacle connector. RF connections for Input and Output are made at via the front Type-N connectors.

4.5 Statement Against Unspecified Use

This amplifier must be used as specified by the manufacturer. Use of this equipment in any way not specified by the manufacturer may result in bodily injury and/or damage to the equipment.

4.6 Controls, Indicators, and Connectors

When set to 'ON', the AC power indicator lamp will light, indicating that AC power is present. The RF INPUT and OUTPUT connections are located on the front of the power amplifier. Refer to the following discussion and Section 3.1 for the location and functional description of all controls, indicators, and connectors.

IMPORTANT NOTE! - User Selectable Control

There are three control options available for operation of this system:

1) Manual control via the front panel controls.
2) Optional Remote control via the IEEE-488 bus.
3) Optional Remote control via RS-232/422.

4.7 Before Turn On

CAUTION! Do not obstruct the airflow at the front and rear of the power amplifier. If you do not verify that this equipment has an unobstructed airflow, you may cause this equipment to overheat or otherwise impair its operation.

Perform the following preliminary procedures before energizing the equipment:

Check that the ON/OFF switch is set to the 'OFF' position.

At the rear of the RF power amplifier, verify that the AC cord is properly inserted into the AC system power input receptacle.

Verify that the RF Input Port is properly connected to the RF source, having a nominal output impedance of 50 ohms. ***ENSURE THAT THE RF OUTPUT OF THE RF SOURCE EQUIPMENT IS TURNED OFF OR OTHERWISE DISABLED.***

Verify that the RF Output Port is properly connected to its intended load, antenna or other device, having an appropriate RF power rating and a nominal input impedance of 50 ohms.

4.8 Turn On

Perform the following procedure to energize the equipment:

a) Set the ON/OFF switch on the front panel to the 'ON' position. Verify that the AC power indicator lamp is lit;

b) Enable the RF output of the source equipment.

CAUTION! To maintain specified performance and retain certain operating characteristics, RF input power shall not exceed +3 dBm.

4.9 Basic Operation

4.9.1 ON/OFF Switch

In the 'ON' position, AC power is supplied to the power amplifier.

4.9.2 AC Power Indicator Lamp

Illumination of the green AC power indicator lamp indicates proper distribution of AC power throughout the power amplifier.

4.9.3 Fault Indicator Lamp

Illumination of the red FAULT lamp indicates that the internal temperature exceeded 80° C, which automatically disables the DC bias voltage to the main amplifier modules. In addition, a message indicating high temperature will appear on the digital display on the front panel. The DC bias voltage will automatically be restored once the temperature is less than 75° C.

4.10 Turn Off

Turn off the RF power amplifier by first lowering or removing the RF Input drive level and then placing the ON/OFF switch in the 'OFF' position.

WARNING In the event of ANY power failure; whenever possible and practical, it is advisable to reset the ON/OFF switch on the front panel to the "OFF" position *before* you reconnect AC power to the power amplifier. This is to prevent any possible electrical damage to the amplifier, due to the initial power surge, once power is restored.

5.0 Operation

5.1 Front Panel Controller

5.1.1 Introduction

The front panel display operates in three distinct modes. The first mode is called the Run Mode. This is the normal operation mode, where the amplifier is controlled either by the front panel or via the GPIB/IEEE-488, the RS-232 or RS-442 interfaces. The second mode is User Configuration. In this mode, the end user can configure the system to more closely support their needs. The final mode is the System Calibration mode. *This mode that is designed to be used only by an authorized technician.* Within the System Calibration mode, all aspects of the amplifier configuration and calibration can be adjusted.

5.1.2 Controls and Display

The layout of the controls and display on the front panel is depicted in Figure 4. A description of each of the controls and the display is contained in Table 1 (page 19). General comments on the operation of the controller are contained in Table 2 (page 20).

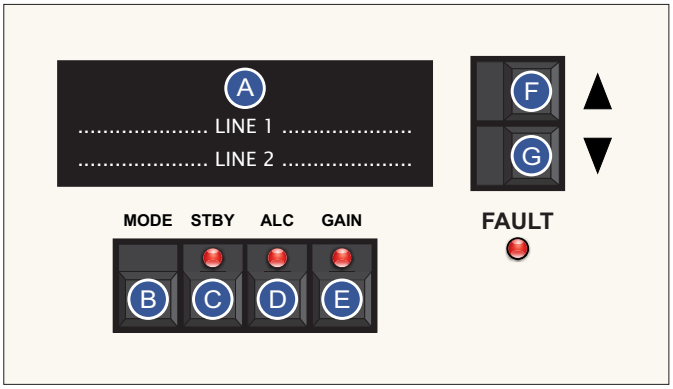


FIGURE 4 - *Front Panel Display and Controls*

5.1.3 Run Mode

When the unit first powers up, a self-test operation is conducted. If any portion of the system is un-calibrated, or an error in the calibration data or settings is encountered, an appropriate message will appear on the display, and the unit will not power up. If the unit passes self-test, it will place itself in the power up mode specified by the user in the User Configuration; or. if no mode has been specified, in STANDBY with 0% Gain (Voltage Variable Amplifier, or VVA) amplification.

5.1.4 User Interface

There are six buttons used to control the amplifier. The first two buttons are the UP and DOWN buttons, which are used to set values used by the amplifier. The values that can be changed include the amplifier output level (either specified in Gain % or dBm), and the VSWR alarm point.

The functions associated with each button are described in Table 1 in the following section.

5.1.5 Display

The display is used in conjunction with the mode button to display the current amplifier status. Pressing the MODE button cycles through all of the status displays. See the tables later in this document for summaries of the displays in the different operational modes.

Table 1 - Run-Mode Controls and Display Descriptions

Item	Description	Comments
A	Display	Displays information on command from the microprocessor based on queries from the front panel control switches, IEEE interface, or from fault detection circuitry.
B	Mode Button	Allows toggling thorough the following modes: • Gain Control (Adjustable Output power) • Forward and Reflected power • Max Power (FWD, REV) • VSWR Cut off (Fwd - Rev in dB) • Gain (VVA) Voltage in % • Monitors (8 inputs, If Applicable), • IEEE-488 (GPIB) interface address • Firmware revision
C	Standby Button	Places the amplifier in minimum gain mode (Gain/VVA @ 0% voltage). The standby condition is indicated via the LED on Standby button.
D	ALC Button	Turns ALC (Automatic Level Control) mode ON and VVA (Variable Voltage Attenuator) control mode (also known as the GAIN mode) OFF. The ALC mode is on when the LED on ALC button is illuminated. This button is used in conjunction with the UP/DOWN buttons to change the ALC setting in 0.1 dB steps.
E	Gain Button	Turns VVA control mode ON and ALC mode OFF. ON is indicated when the LED on GAIN button is illuminated. This button is used in conjunction with the UP/DOWN buttons to change the Gain of the amplifier through 0.1% steps. Note that the percentage of gain is a relative function and is not linear.
F & G	Up and Down Buttons	Controls gain of the amplifier when in the Gain mode and the output level when in the ALC mode. These buttons manipulate various parameters depending on the operating mode of the amplifier.

Table 2 - General Notes on Operation

Item	Description	Comments
1	Default Power-Up Setting	Standby ON (VVA @ 0% voltage), ALC OFF and GAIN ON. UP/DOWN arrow keys adjust Gain of the amplifier in 0.1% steps. After adjusting to desired power output, press Standby key once. Amplifier will display actual power output and relative VVA voltage in percentage. Press Standby key again and amplifier will again be in Standby mode.
2	Fault Conditions	If fault occurs during normal operation, the information is shown on the display and the red fault LED on the front panel illuminates. It also reports the fault information via the IEEE-488 bus, RS-232 port and RS-422 ports, if queried. To clear a fault, after fault condition is repaired, push the STBY button. • **High Temperature** – Turns OFF bias voltage, illuminates red fault LED and sends fault status condition to IEEE-488 bus, RS-232 port , RS-422 port, and Ethernet Port if queried. A normal operating condition will be only restored once the fault has been removed and Standby has been pressed (to acknowledge fault). MESSAGE: "Temp". • **High power** – The amplifiers are programmed to automatically reduce the drive level if the forward, reverse or input power levels exceed factory-set values. Message: "Fwd Pwr", "Rev Pwr", or "Input Pwr". • **High VSWR** – The amplifiers are programmed to reduce output power to a factory-set maximum reverse-power level under high load VSWR conditions. As with all other faults, the controller will illuminate the fault LED Message: "VSWR". • **Monitors** – Occurs when DC input(s) exceeds or falls below configured levels. If configured for amplifier shutdown, the controller turns OFF the bias voltage and illuminates the fault LED. A normal operating condition will be only restored once the fault has been removed and Standby has been pressed (to acknowledge fault). If configured for Notification Fault, the controller will only display the fault without affecting the current control status of the amplifier. Message: "Mon X", where "X" is the number of the monitor that tripped. • **Uncalibrated** - If EEPROM is damaged or has lost its' stored data, front panel will indicate "Error – Calibrate" and the controller will not be useable. Complete re-calibration will be required Message: "Error – Calibrate"
3	Basic Operating Instructions	Drive the amplifier with a nominal level indicated by the specifications included with the specific model of amplifier. Adjust the desired output level or the gain using the Set ALC or Set VVA level function, respectively.

5.1.6 Faults

There are two levels of faults in the system. The first and more severe fault level is a *shutdown fault*. Shutdown faults are VSWR faults (when the forward power minus the reverse power is greater than the VSWR Alarm Set point), over-temperature faults, and some voltage or current monitor faults. The second and more minor fault is a *notification fault*. Notification faults can include voltage or current faults as configured via the calibration menu.

When a temperature fault occurs, the unit will go into the protective mode, completely shutting-down the amplifier.

When a shutdown fault occurs, the unit shutdowns immediately, and the fault LED illuminates. The nature of the fault is shown on the display. If applicable, multiple faults will be displayed, in-line. If more faults exist than can be displayed in 16 characters, the up and down buttons can be used to horizontally scroll the display. To change the display mode from the fault screen to other screens to help determine the nature of the fault, press the MODE button to cycle through screen. When the fault condition has been removed (i.e. the temperature has returned to a safe operating range) and the STANDBY button is pressed, the system will restart. If the fault has not been removed, the system will not respond to the STANDBY button.

When a notification fault occurs, the unit continues to operate as before the fault occurred, and the fault LED illuminates. The nature of the fault is still displayed, as described above for shutdown faults. To acknowledge the fault, press the STANDBY button once. This places the display into normal operation. The fault LED will remain illuminated until the fault condition goes away, but the unit will operate normally. To see what faults are still occurring, use the MODE button to step through the displays to the Fault Display. This will display any notification faults the system may have tripped.

5.1.7 Run Mode Status Displays

Table 3 explains the operation of the run-mode menus. The following general considerations apply:

- These display items are available following successful power-up of the amplifier.
- If any portion of the system requires calibration, the unit will not power up, and the front panel will display an error message and automatically go to the calibration menu.
- Many specific aspects of the display in Run Mode are dictated by settings made in the configuration menu.
- Cycle through the front panel menu items by pressing the MODE key.

Table 3 - Run Mode Status Displays

Item	Description	Comments
Output Level Set	Fwd Pwr: XX.X dBm Set VVA: XXX.X % or Fwd Pwr: XXX.X W Set VVA: XXX.X % (if amplifier is in VVA mode, i.e. 'GAIN' LED is illuminated).	Change Output Level using the ↑ and ↓ keys on the front panel.
	Fwd Pwr: XX.X dBm Set ALC: XX.X dBm or Fwd Pwr: XXXX.X W Set ALC: XXXX.X W (if amplifier is in ALC mode, i.e. 'ALC' LED is illuminated). Units are in dBm or Watts depending on Startup Options setting selected in User Configuration Mode (see next section).	Change Output Level using the ↑and ↓ keys on the front panel.
Output Power (Read Only in Run Mode)	Fwd Pwr: XX.X dBm Rev Pwr: XX.X dBm or Fwd Pwr: XXXX.X W Rev Pwr: XXXX.X W Units are in dBm or Watts depending on Startup Options setting selected in User Configuration Mode (see next section).	The forward and reverse power levels are displayed.
Input Power (if option installed and configured)	In Pwr: XX.X dBm Max Pwr: XX.X dBm	
Maximum Forward and Reverse Power Settings	Max Fwd: XX.X dBm Max Rev: XX.X dBm or Max Fwd: XXXX.X W Max Rev: XXXX.X W	These values are set at the Factory and cannot be changed without the Factory Jumper. These values are set by Com-Power Technician for safety purposes to protect the amplifier. If either setting is exceeded, a fault is generated.
VSWR Alarm (Read Only in Run Mode)	VSWR Alarm: XX.X dB	The VSWR Alarm Threshold represents the difference between the **forward power** and the **reflected power** (in dBm). A higher value here represents a configuration that is more sensitive to VSWR.

Item	Description	Comments
Gain (VVA) Level (Read Only in Run Mode)	Gain: XXX.X%	When the unit is in ALC mode this value will change dynamically as the input signal changes. When the unit is in VVA mode this value should mirror the value set in the Output Level Set display. User can change either VVA or ALC level by using the ↑and ↓ keys on the panel after first pushing the 'ALC' or 'GAIN' buttons.
Monitors (Read Only in Run Mode)	I1: X.X I2: X.X I3: X.X I4: X.X or V1: X.X V2: X.X V3: X.X V4: X.X Any combination of V and I monitors are possible.	Displays the voltage and/or current monitors. They are displayed four at a time; pressing the mode button advances to the next set of four. After all of the monitors are displayed, pressing the mode button advances it to the next display. If no monitors are configured, this mode is skipped.
GPIB Address (Read Only in Run Mode)	Address = XX Where XX = 1 to 31 Default is 5	Displays the GPIB / IEEE-488 device address of the Amplifier. Valid address values are from 1 to 31. This menu item will not appear if the GPIB Interface has been disabled in the System Calibration Options.
Version	X.YY Where X = Revision number, and YY = Version number	Displays the Revision and Version number of the Front Panel Controller firmware.
Fault Display	Temp and/or Fwd Pwr and/or Rev Pwr and/or In Pwr and/or VSWR and/or Mon x and/or ALC Range and/or EXT. VSWR	Displays any acknowledged notification faults. If no minor faults have occurred, these items will not displayed and this menu item is skipped.

5.1.8 User Configuration Options

Table 4 explains the operation of the run-mode menus. The following general considerations apply:

- These menu options are available to the user to select the default system settings.
- Enter the User Configuration Menu by pressing and holding down then 'GAIN' and 'ALC' buttons on the front panel simultaneously *during power-up*. Release when top display line reads Configuration.
- Cycle through menu items using the ↑ and ↓ keys on the front panel. Make selection by pressing the 'MODE' key. Selections result in context-sensitive prompts for sub-items.

Table 4 - User Configuration Mode and Status Displays

Item	Description	Comments
GPIB Address	Address = XX Where XX = 1 to 31	Allows user to change the GPIB / IEEE-488 device address of the Amplifier. Valid address values are from 1 to 31. This item will not appear if GPIB Interface has been disabled in the System Calibration Options.
Startup Option: Power display	Display dBm or Display Watts	Sets default units used in displaying power.
Startup Option: Online/Standby	Standby or Gain	Selects the default power-up mode for the amplifier.
Startup Option: Gain /ALC	Gain or ALC	ALC: X.X (in units of dBm or Watts) or Gain: XX% (in units of percent)
Startup Option: ALC Response	Filtering: x Where x = 0 - 9	Allows choosing between fast and slow response for the Automatic Level Control (ALC) function. 0= Minimal filtering, 9= Maximum filtering.

Item	Description	Comments
Startup Option: Initial Gain	Gain: XX.X% Where x = 00.0 to 100.0	Allows choosing between 0% attenuation to 100% attenuation at startup. Where 0% is maximum, and 100% is minimum.
Startup Option: RS-232	On or Off	Enables or disables the Front Panel Controller's onboard RS-232 serial port.
Startup Option: *RS-422	On or Off	Enables or disables the Front Panel Controller's onboard RS-422 serial port.
Startup Option: GPIB Port	On or Off	Enables or disable the Front Panel Controller's onboard GPIB port.
Startup Option: Ethernet Port	On or Off	Enables or disable the Front Panel Controller's onboard Ethernet port.
VSWR Alarm:	VSWR Alarm: X Where X = 0 to 20	The VSWR Alarm Threshold represents the difference between the forward power and the reflected power (in dB). A higher value here represents a configuration that is more sensitive to VSWR.
Restore Defaults	Yes/No	This allows the user to restore ALL settings and calibration parameters to those set at the factory.
Display Brightness	25%, 50%, 75%, 100%	Allows for setting of the brightness of the vacuum-fluorescent display.
GPIB Termination	LF Term. On/Off	Adds an extra Line Feed (If On) to the GPIB.
Telnet Timeout	Time: X Min	Telnet idle-period timeout. X = 0 to 100 minutes, where 0 = infinite (no timeout)
Exit	Save? (Y/N)	Exits User Configuration mode and returns the display to Run Mode. The user is given the choice to save options. Other than as mentioned above, choosing "No" will result in all changes being lost, and the previous settings will remain in EEPROM.

***= May not be displayed if Option was not purchased.**

5.1.8.1 Example: Setting the VSWR Monitor

This item is used to select the difference between the forward and reverse power levels (loosely defined herein as VSWR; however, the literal term for this parameter is 'RETURN LOSS') that will result in the amplifier automatically setting the gain to zero, then ramping back up toward the previous gain or ALC setting. If the fault condition persists, the output power will continue to cycle until the condition is rectified.

Example:

In this example, the "Max VSWR" setting is changed from 2.0 dB to 5.0 dB.

User: Select "VSWR" from the main System Configuration menu.

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, set the minimum value for the VSWR alarm, and press the MODE button."

Second line displays: "Max VSWR: 2.0 dB"

User: Use the ↑ and ↓ buttons to change the VSWR Alarm level until it reads "Max VSWR: 5.0 dB", then press the MODE button.

Unit: Stores the information and returns to the main System Configuration menu.

NOTE: A "Max VSWR" setting of **2 dB** on the amplifier actually represents 2 dB *Return Loss*, which correlates to a VSWR of approximately **8.7:1**. With this setting, the fault indicator light will turn on if the return loss is *less than or equal to* 2 dB; which corresponds to the VSWR being equal to or greater than 8.7:1.

A "Max VSWR" setting of **5 dB** on the amplifier actually represents 5 dB *Return Loss*, which correlates to a VSWR of approximately **3.6:1.** With this setting, the fault indicator light will turn on if the return loss is less than or equal to 5 dB; which corresponds to the VSWR being *equal to or greater than* 3.6:1.

See Table 5 for a complete cross-reference of Max VSWR Settings [Return Loss values] vs the respective VSWR values.

The relationship between VSWR and Return Loss is as follows:

$$\rho = \text{Reflection Coefficient}$$
$$= \text{Power}(10,([\textit{Return Loss}]/20))$$

$$\text{VSWR} = \frac{1+\rho}{1-\rho}$$

Table 5 – VSWR Cross Reference Table

Max. VSWR Setting **[RETURN LOSS]**	Corres-ponding **VSWR Value**	*Max. VSWR* Setting **[RETURN LOSS]**	Corres-ponding **VSWR Value**	*Max. VSWR* Setting **[RETURN LOSS]**	Corres-ponding **VSWR Value**	*Max. VSWR* Setting **[RETURN LOSS]**	Corres-ponding **VSWR Value**
0.1 dB	**173.72:1**	5.1 dB	**3.50:1**	10.1 dB	**1.91:1**	15.1 dB	**1.427:1**
0.2 dB	**86.86:1**	5.2 dB	**3.44:1**	10.2 dB	**1.89:1**	15.2 dB	**1.421:1**
0.3 dB	**57.91:1**	5.3 dB	**3.38:1**	10.3 dB	**1.88:1**	15.3 dB	**1.415:1**
0.4 dB	**43.44:1**	5.4 dB	**3.32:1**	10.4 dB	**1.87:1**	15.4 dB	**1.409:1**
0.5 dB	**34.75:1**	5.5 dB	**3.26:1**	10.5 dB	**1.85:1**	15.5 dB	**1.404:1**
0.6 dB	**28.96:1**	5.6 dB	**3.21:1**	10.6 dB	**1.84:1**	15.6 dB	**1.398:1**
0.7 dB	**24.83:1**	5.7 dB	**3.16:1**	10.7 dB	**1.82:1**	15.7 dB	**1.393:1**
0.8 dB	**21.73:1**	5.8 dB	**3.11:1**	10.8 dB	**1.81:1**	15.8 dB	**1.387:1**
0.9 dB	**19.32:1**	5.9 dB	**3.06:1**	10.9 dB	**1.80:1**	15.9 dB	**1.382:1**
1.0 dB	**17.39:1**	6.0 dB	**3.01:1**	11.0 dB	**1.78:1**	16.0 dB	**1.377:1**
1.1 dB	**15.81:1**	6.1 dB	**2.96:1**	11.1 dB	**1.77:1**	16.1 dB	**1.372:1**
1.2 dB	**14.50:1**	6.2 dB	**2.92:1**	11.2 dB	**1.76:1**	16.2 dB	**1.367:1**
1.3 dB	**13.39:1**	6.3 dB	**2.88:1**	11.3 dB	**1.75:1**	16.3 dB	**1.362:1**
1.4 dB	**12.44:1**	6.4 dB	**2.84:1**	11.4 dB	**1.74:1**	16.4 dB	**1.357:1**
1.5 dB	**11.61:1**	6.5 dB	**2.80:1**	11.5 dB	**1.73:1**	16.5 dB	**1.352:1**
1.6 dB	**10.89:1**	6.6 dB	**2.76:1**	11.6 dB	**1.71:1**	16.6 dB	**1.347:1**
1.7 dB	**10.25:1**	6.7 dB	**2.72:1**	11.7 dB	**1.70:1**	16.7 dB	**1.343:1**
1.8 dB	**9.69:1**	6.8 dB	**2.68:1**	11.8 dB	**1.69:1**	16.8 dB	**1.338:1**
1.9 dB	**9.18:1**	6.9 dB	**2.65:1**	11.9 dB	**1.68:1**	16.9 dB	**1.333:1**
2.0 dB	**8.72:1**	7.0 dB	**2.61:1**	12.0 dB	**1.67:1**	17.0 dB	**1.329:1**
2.1 dB	**8.31:1**	7.1 dB	**2.58:1**	12.1 dB	**1.66:1**	17.1 dB	**1.325:1**
2.2 dB	**7.94:1**	7.2 dB	**2.55:1**	12.2 dB	**1.65:1**	17.2 dB	**1.320:1**
2.3 dB	**7.60:1**	7.3 dB	**2.52:1**	12.3 dB	**1.64:1**	17.3 dB	**1.316:1**
2.4 dB	**7.28:1**	7.4 dB	**2.49:1**	12.4 dB	**1.63:1**	17.4 dB	**1.312:1**
2.5 dB	**7.00:1**	7.5 dB	**2.46:1**	12.5 dB	**1.62:1**	17.5 dB	**1.308:1**
2.6 dB	**6.73:1**	7.6 dB	**2.43:1**	12.6 dB	**1.61:1**	17.6 dB	**1.304:1**
2.7 dB	**6.49:1**	7.7 dB	**2.40:1**	12.7 dB	**1.60:1**	17.7 dB	**1.300:1**
2.8 dB	**6.26:1**	7.8 dB	**2.37:1**	12.8 dB	**1.594:1**	17.8 dB	**1.296:1**
2.9 dB	**6.05:1**	7.9 dB	**2.35:1**	12.9 dB	**1.586:1**	17.9 dB	**1.292:1**
3.0 dB	**5.85:1**	8.0 dB	**2.32:1**	13.0 dB	**1.577:1**	18.0 dB	**1.288:1**
3.1 dB	**5.66:1**	8.1 dB	**2.30:1**	13.1 dB	**1.568:1**	18.1 dB	**1.284:1**
3.2 dB	**5.49:1**	8.2 dB	**2.27:1**	13.2 dB	**1.560:1**	18.2 dB	**1.281:1**
3.3 dB	**5.33:1**	8.3 dB	**2.25:1**	13.3 dB	**1.552:1**	18.3 dB	**1.277:1**
3.4 dB	**5.17:1**	8.4 dB	**2.23:1**	13.4 dB	**1.544:1**	18.4 dB	**1.273:1**
3.5 dB	**5.03:1**	8.5 dB	**2.20:1**	13.5 dB	**1.536:1**	18.5 dB	**1.270:1**
3.6 dB	**4.89:1**	8.6 dB	**2.18:1**	13.6 dB	**1.528:1**	18.6 dB	**1.266:1**
3.7 dB	**4.77:1**	8.7 dB	**2.16:1**	13.7 dB	**1.521:1**	18.7 dB	**1.263:1**
3.8 dB	**4.64:1**	8.8 dB	**2.14:1**	13.8 dB	**1.513:1**	18.8 dB	**1.259:1**
3.9 dB	**4.53:1**	8.9 dB	**2.12:1**	13.9 dB	**1.506:1**	18.9 dB	**1.256:1**
4.0 dB	**4.42:1**	9.0 dB	**2.10:1**	14.0 dB	**1.499:1**	19.0 dB	**1.253:1**
4.1 dB	**4.32:1**	9.1 dB	**2.08:1**	14.1 dB	**1.491:1**	19.1 dB	**1.250:1**
4.2 dB	**4.22:1**	9.2 dB	**2.06:1**	14.2 dB	**1.484:1**	19.2 dB	**1.246:1**
4.3 dB	**4.12:1**	9.3 dB	**2.04:1**	14.3 dB	**1.478:1**	19.3 dB	**1.243:1**
4.4 dB	**4.03:1**	9.4 dB	**2.03:1**	14.4 dB	**1.471:1**	19.4 dB	**1.240:1**
4.5 dB	**3.95:1**	9.5 dB	**2.01:1**	14.5 dB	**1.464:1**	19.5 dB	**1.237:1**
4.6 dB	**3.86:1**	9.6 dB	**1.99:1**	14.6 dB	**1.458:1**	19.6 dB	**1.234:1**
4.7 dB	**3.79:1**	9.7 dB	**1.97:1**	14.7 dB	**1.451:1**	19.7 dB	**1.231:1**
4.8 dB	**3.71:1**	9.8 dB	**1.96:1**	14.8 dB	**1.445:1**	19.8 dB	**1.228:1**
4.9 dB	**3.64:1**	9.9 dB	**1.94:1**	14.9 dB	**1.439:1**	19.9 dB	**1.225:1**
5.0 dB	**3.57:1**	10.0 dB	**1.92:1**	15.0 dB	**1.433:1**		

5.2 GPIB, RS-232 and RS-422 Command Summary

Table 6 lists the commands and responses available via the GPIB (IEEE-488), RS-232 and RS-422 interfaces.

Table 6 - Amplifier Control Commands

COMMAND	OPERATION/RESPONSE
*IDN?	Identification query. Response is "OPHIRAMP".
MODE?	Requests the current mode of the unit; returns one of the following values: STANDBY, ALC STANDBY, VVA ONLINE, ALC ONLINE, VVA
MODE xxx	Sets the mode of the unit; the only valid values for xxx are ALC and VVA.
STANDBY	Places the unit into STANDBY mode.
ONLINE	Removes the unit from STANDBY mode.
FWD_PWR?	Returns the forward power in the form 'xx.x dBm' where xx.x is a floating point number
REV_PWR?	Returns the reverse power in the form 'xx.x dBm' where xx.x is a floating point number
INPUT_PWR?	Returns the input power in the form 'xx.x dBm' where xx.x is a floating-point number. If the input power detector option is not installed, the response is "Not Available".
ALC_LEVEL?	Returns the current ALC set point in the form 'xx.x dBm' where xx.x is a floating-point number.
ALC_LEVEL xx.x	Sets the current ALC set point. Xx.x is a floating-point value, conforming to standard IEEE nomenclature. If the value given is invalid or out of range, no change is made.
VVA_LEVEL?	Returns the current VVA level in the form 'xx.x %' where xx.x is a floating-point number.
VVA_LEVEL xx.x	Sets the current VVA level. Xx.x is a floating-point value, conforming to standard IEEE nomenclature. If the value given is invalid, out of range, or the unit is in ALC mode, no change is made.
ACK_FAULTS	Acknowledge all faults. Note that the faults might immediately occur again.
FAULTS?	Returns any current faults in the system. The reply will consist of a string that contains a single space (if no faults have occurred) or one or more of the following items, concatenated together and separated by commas: VSWR, Fwd Pwr, Rev Pwr, Input Pwr, Temp, Mon 1, 2…
VSWR_ALARM?	Returns the current set point for the VSWR alarm in the form 'xx.x dB', where xx.x is a floating-point number.
VSWR_ALARM xx.x	Sets the set point for the VSWR alarm. Xx.x is a floating-point value, conforming to standard IEEE nomenclature. If the value given is invalid, out of range, no change is made
MONITORS?	Returns the current levels of all current and voltage monitors in the system. The reply will consist of a string that contains a single space (if no monitors have been defined), or all of the monitors, concatenated together and separated by commas.

COMMAND	OPERATION/RESPONSE
REV?	Returns the current Revision in the form X.XX.
NAME?	Returns Name of the Amplifier (Needs to be set first for a return response).
NAME xxxxxxx	Sets the Name of the Amplifier (Up to 31 Characters).
*MODEL?	Returns the Model Number of the Amplifier (Needs to be set first for a return response).
*SERIAL?	Returns the Serial Number of the Amplifier (Needs to be set first for a return response).

***= May not be displayed if Option was not purchased.**

Note that the above commands are only available during normal operation (i.e., they are not available when either the Configuration or Calibration menus are active).

5.2.1 Serial Communication Parameters

For both the RS-232 and RS-422 ports, the following settings must be used:

- Data Rate: 9600 Baud
- Data Bits: 8
- Start bits: 0
- Stop Bits: 1
- Parity: None
- Flow control/handshaking: None

5.2.2 GPIB Parameters

5.2.2.1 Message Terminator

For both incoming and outgoing messages, EOI is the used/required terminator.

5.2.2.2 Commands

Table 7 lists the supported GPIB commands. These GPIB-specific commands are in addition to those listed in Table 6. For more information on the status registers, refer to Figure 5.

Table 7 - GPIB Commands

COMMAND	OPERATION/RESPONSE
*IDN?	Identification query. Response is "OPHIRAMP".
*CLS	Clears all status bits and all faults.
*ESE	Sets bits in the Event Status Enable register. Valid parameters are 0-255 (e.g., *ESE 255).
*ESE?	Reads the contents of the Event Status Enable register.
*ESR?	Reads the contents of the Event Status Register.
*IDN?	Identification query. Response is always OPHIRAMP. This command is also available via the serial interfaces.
*OPC	Operation Complete. This command is accepted, but is not processed.
*OPC?	Operation Complete query. The response is always the character "1".
*RST	Reset Command. Clears the Event Status Register only.
*SRE	Sets bits in the Service Request Enable register. Valid parameters are 0-255 (e.g., *SRE 255).
*SRE?	Reads the contents of the Service Request Enable register.
*STB?	Reads the Status Byte.
*TST?	Reads self-test results. The response is always the character "1".
*WAI	Wait to Continue. This command is accepted, but is not processed.

Note that the above commands are only available during normal operation (i.e., they are not available when either the Configuration or Calibration menus are active).

5.2.2.3 Status Reporting

Status reporting, i.e., the setting of the Service Request (SRQ) line and status bits in the Event Status Register and Status Byte register (STB), are handled per tailored requirements of IEEE-488.2. The reporting structure is presented in Figure 5. This figure shows which status bits are used and which are always a logic zero.

Important Considerations:

1. The ESE and SRE registers have default values of all zeros. If status reporting is desired, these registers must be initialized whenever power to the amplifier is cycled.
2. Once the SRQ is asserted, then a serial poll command will un-assert the SRQ. However, the STB and ESR registers will not clear until an *CLS command is received.

The recommended/expected response to a service request is as follows:

1. The GPIB controller conducts a serial poll to determine which instrument made the request (asserted the SRQ flag). If serial polling is not used, then the controller could read the Status Byte, via the *STB? query to determine if a specific instrument made the request.
2. Issue the standard clear serial poll command if serial polling is used.
3. Read the Event Status Register, via the *ESR? Query to determine the reason for the service request.
4. If the User Request bit in the ESR is set, a fault condition occurred in the amplifier. Read the status of the amplifier's monitors via the Monitors? query.
5. Clear the ESR and monitor status registers via the *CLS command. Note that the *CLS clears both the GPIB registers (ESR and STB) and acknowledges faults (i.e., has the effect of issuing the ACK faults command). If a serial poll command was not used, the SRQ line is un-asserted via the *CLS command.

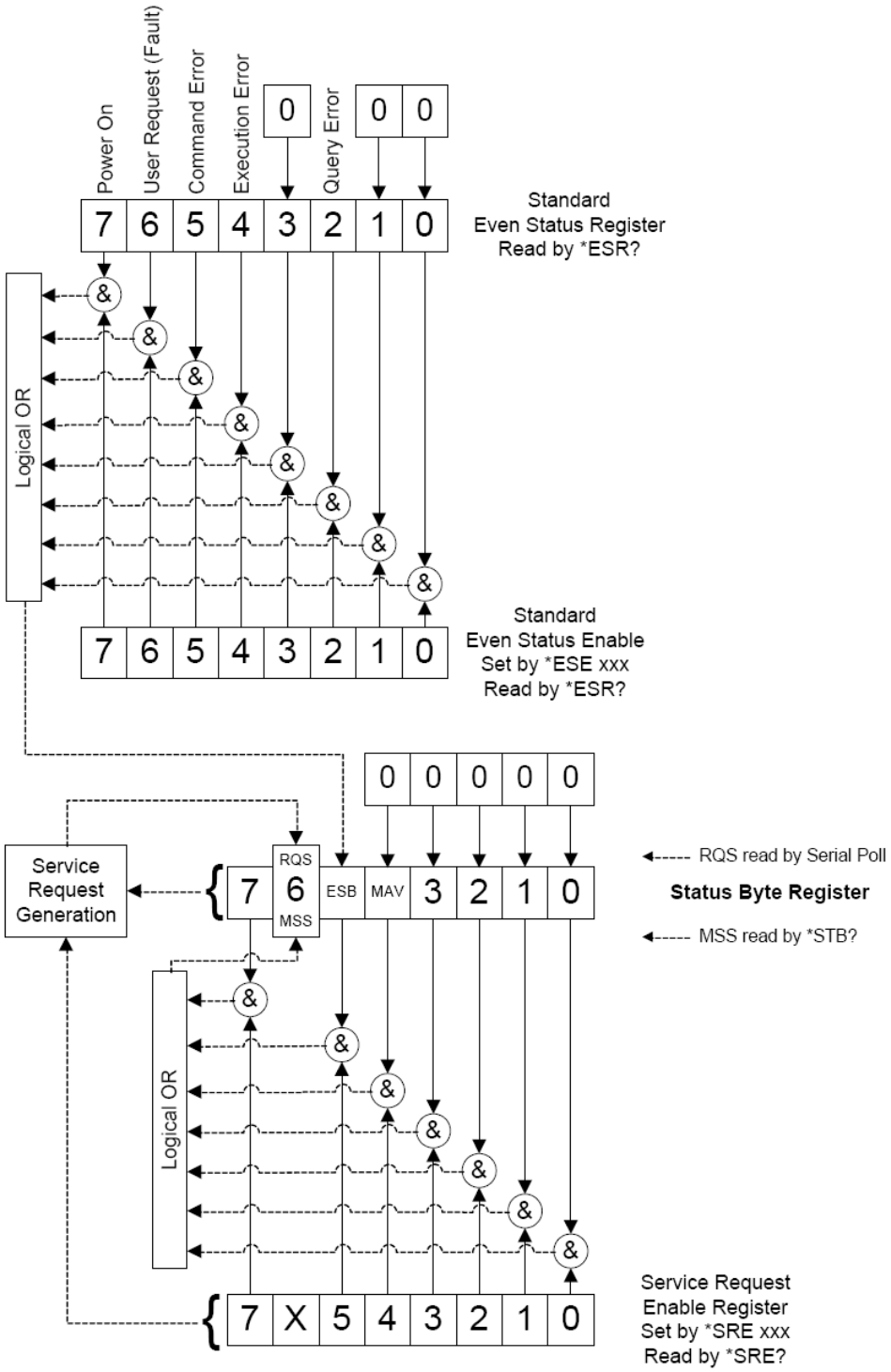


FIGURE 5 - *GPIB Status Reporting Structure*

5.3 Calibration

The information in the following section relates to specific technical aspects of the Front Panel Controller and its integration into the RF Power Amplifier that is beyond the scope of normal end-user operation. The information is provided for the purpose of completeness of documentation and is for reference only. Refer to Table 8 during the discussions contained in this section.

All necessary system configuration and calibration is performed at the factory prior to shipment. Specialized skills and equipment are required to perform System Configuration and Calibration, and Com-Power recommends returning the unit to their facility for the performance of any such functions.

Table 8 - Calibration Mode Displays

Item	Description	Comments
Forward Power	None	Calibrate forward power detector as described in the section below.
Reverse Power	None	Calibrate reverse power detector as described in the section below.
Gain (VVA)	None	Calibrate Gain adjustment as described in the section below.
View Peak Values	Forward Power Reverse Power Input Power Temperature Monitors	Allows the maximum and minimum (if applicable) values reached to be viewed.
Monitors	Multiple as described in the section below.	
System Info.	None	Displays system information entered by the factory.
Exit	Save or not save settings.	

5.3.1 System Calibration and Configuration Menu

The Calibration Menu also allow for various features to be enabled or disabled on the system. To enter the system configuration mode press and hold down both the □ and □□ buttons while the unit is powered up. When the display reads "Calibration", release the two buttons. The unit now displays the main system configuration menu. Using the ↑ and ↓ buttons, select the option to configure, and press the 'MODE' button to configure that option. A detailed explanation of all of the options is described below (and on Table 8, page 34).

5.3.1.1 Forward Power

This option calibrates the dBm scale used by the display. Before this step can be completed, the VVA levels must be calibrated. To perform the Forward Power calibration, the amplifier must be attached to an external RF power meter via a load, with a continuous wave input source to the amplifier. Also, the directional coupler must be configured for forward power calibration.

Example:

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, adjust the output power to match the level below, and press the 'MODE' button."

Second line displays: "Fwd Pwr=27.0 dBm"

User: Use the ↑ and ↓ buttons to adjust the output power so that the power level read on the RF power meter is 27.0 dBm. Then press the 'MODE' button.

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, adjust the output power to match the level below, and press the 'MODE' button."

Second line displays: "Fwd Pwr=28.0 dBm"

User: Use the ↑ and ↓ buttons to adjust the output power so that the power level read on the RF power meter is 28.0 dBm. Then press the 'MODE' button.

The user can back up (e.g., go from 32.0 dBm to 31.0 dBm) by pressing the ALC button.

This process continues until all of the calibration points have been taken. After all of the forward power levels have been calibrated, press the GAIN button, then the unit returns to the main System Configuration menu.

5.3.1.2 Reverse Power

This option calibrates the dBm scale used by the display. Before this step can be completed, the VVA levels must be calibrated. To perform the Reverse Power calibration, the amplifier must be attached to an external RF power meter via a load, with a continuous wave input source to the amplifier. Also, the directional coupler must be configured for reverse power calibration.

Example:

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, adjust the output power to match the level below, and press the 'MODE' button."

Second line displays: "Rev Pwr=27.0 dBm"

User: Use the ↑ and ↓ buttons to adjust the output power so that the power level read on the RF power meter is 27.0 dBm. Then press the 'MODE' button.

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, adjust the output power to match the level below, and press the 'MODE' button."

Second line displays: "Rev Pwr=28.0 dBm"

User: Use the ↑ and ↓ buttons to adjust the output power so that the power level read on the RF power meter is 28.0 dBm. Then press the 'MODE' button.

The user can back up (e.g., go from 32.0 dBm to 31.0 dBm) by pressing the ALC button.

This process continues until all of the calibration points have been taken. After all of the reverse power levels have been calibrated, press the GAIN button, then the unit returns to the main System Configuration menu.

5.3.1.3 Gain/VVA Levels

This should be the first item configured on any system. This option configures the VVA control voltage.

Example:

In the following example, the unit will be calibrated so that the VVA control voltage will be 0 volts when the input is to undergo maximum attenuation, and the VVA control voltage will be 3.75 to 5.00 volts when the input is to undergo minimum attenuation (actual voltage varies by amplifier model).

User: Selects 'Gain' from the main System Configuration menu.

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, adjust the VVA control voltage to the level specified below, and press the 'MODE' button."

Second line displays: "VVA Level: 100.0%"

User: Connect a voltmeter to Pin 3 of J3, and use the ↑ and ↓ buttons to adjust the voltage to the specified value (typically 3.75 to 5.0 volts, depending on amplifier model). Then press the 'MODE' button.

Unit: Stores the information and returns to the main System Configuration menu.

5.3.1.4 Monitor Options

This is a series of menus to configure all of the voltage and current monitors, as well as cutoff points for voltage and current faults.

Example:

In this example, physical monitor 2 will be configured as a current monitor that has a display range of 0.00 to 9.99 amps, with a shutdown fault if the monitor ever exceeds 8 amps.

User: Select 'Monitors' from the main System Configuration menu.

Top line displays: "Using the 'UP' and 'DOWN' buttons, select which monitor port you wish to configure, then press the MODE button."

Second line displays: "Monitor 1".

Unit: Use the ↑ and ↓ buttons to select the monitor to edit until the lower line of the display reads "Monitor 2", then press the MODE button.

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, select what type of monitor this port is, then press the MODE button."

Second line displays: "Monitor OFF".

User: Use the ↑ and ↓ buttons to change the monitor mode until the lower line of the display reads "Current", then press the MODE button.

Unit: Top line displays "Monitor Label:" and the second line displays "I2". In this example, I2 is the next available current monitor (i.e., I1 is already in use, and the label I2 is not in use).

Unit: Top line displays: "Using the ↑ and ↓ buttons, select the display format, then press the MODE button."

Second line displays: "Format: 123"

User: Use the ↑ and ↓ buttons to change the display format until the lower line of the display reads "Format: 1.23", then press the MODE button.

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, select the reading that corresponds to 0 volts on the input, and press the 'MODE' button."

Second line displays: "I2: 0V –> 0.00"

User: Press the 'MODE' button (no adjustment is required).

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, select the reading that corresponds to 5 volts on the input, and press the 'MODE' button."

Second line displays: "I2: 5V –> 0.00"

User: Use the ↑ and ↓ buttons to change the upper voltage range until the lower line of the display reads "5V –> 10.00", then press the 'MODE' button.

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, select the fault mode, and press the MODE button."

Second line displays: "No Fault Check"

User: Use the ↑ and ↓ buttons to change the monitor fault mode until the lower line of the display reads "Shutdown Fault", then press the MODE button.

If "No Fault Check" was selected, then the configuration of this monitor is completed. If either "Shutdown Fault" or "Notify Fault", then the following choices relating to monitor limits are displayed.

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, select the upper fault value for the input, and press the 'MODE' button."

Second line displays: "Upper I2= 0.00"

User: Use the ↑ and ↓ buttons to change the upper fault point until the lower line of the display reads "Upper I2= 8.00", then press the 'MODE' button.

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons, select the lower fault value for the input, and press the MODE button."

Second line displays: "Lower I2= 0.00"

User: Press the 'MODE' button (no adjustment is required).

Configuration for Monitor 2 has been completed at this time. If the other monitors were to be configured, they could be selected at this time. For this example, the user is going to just exit after editing Monitor 2.

Unit: Top line displays: "Using the 'UP' and 'DOWN' buttons to scroll through options, then press the MODE button."

Second line displays: "Monitors".

User: Press MODE to configure another monitor, or edit an existing monitor or use the ↑ and ↓ buttons to scroll to "Exit ", then press the MODE button.

Unit: Top line displays "Save Changes?" and the bottom line displays "Yes= ↑ No= ↓".

User: Press ↑ , thus saving the changes.

5.4 Interface Pin Assignments

All connectors are dual row headers, unless otherwise noted and are numbered as follows:

5.4.1 Connector: GPIB (IEEE-488) Connector

The GPIB connector is located on the rear panel of the amplifier. This should work directly with an IDC GPIB-4882 connector. The pin assignments are:

PIN	ASSIGNMENT
1	DIO1
2	DIO5
3	DIO2
4	DIO6
5	DIO3
6	DIO7
7	DIO4
8	DIO8
9	EO1
10	REN
11	DAV
12	GND

PIN	ASSIGNMENT
13	RFD
14	GND
15	DAC
16	GND
17	IFC
18	GND
19	SRQ
20	GND
21	ATN
22	GND
23	GND
24	GND

5.4.2 Connector: RS-232 Serial I/O

The RS-232 connector is a 9-Pin D-sub connector located on the rear panel of the amplifier. This should work directly with a standard PC serial port for communication. The pin assignments are:

PIN	ASSIGNMENT
1	N/C
2	TX
3	TX
4	RX
5	GND

PIN	ASSIGNMENT
6	N/C
7	N/C
8	N/C
9	N/C

6.0 Maintenance and Troubleshooting

6.1 Performance Test

The performance test is identical to the operating procedure described in Section 5 of this manual.

6.2 Adjustment Procedure

There are no operator adjustments applicable for the power amplifier.

6.3 Troubleshooting Procedures

The following troubleshooting procedures may be used as a guide to help ascertain whether the equipment is malfunctioning.

NOTE Troubleshooting beyond the level described below must be performed at by an authorized Com-Power representative, or the warranty may be voided.

6.3.1 Improper Power Distribution

If the amplifier does not function, perform the following steps:

a) Verify the AC POWER lamp is illuminated on the front panel;

b) Verify that the internal fans are operating;

c) If the AC POWER lamp is not illuminated and the internal fans are not operating, verify the presence AC power at the source and also at rear panel connection.

6.3.2 Low or No RF Output Power

Whenever the RF output power of the amplifier and/or the current drawn from the power supply is low, or the operating temperature has exceeded 80°C, the system may have triggered the thermal protection function. Perform the following procedure:

a) Verify that the drive level is correct;

b) Check that the 'FAULT' indicator is not illuminated.

If the above conditions are verified and there is still low or no RF output power, then contact your Com-Power or an authorized representative.

6.4 Cleaning

Use a clean cloth and isopropyl alcohol to clean exterior surfaces. Use a vacuum to remove dust from the screens on the front and rear of the equipment.

7.0 Warranty

Com-Power warrants to its Customers that the products it manufactures will be free from defects in materials and workmanship for a period of three (3) years. This warranty shall not apply to:

- Transport damages during shipment from your plant.
- Damages due to poor packaging.
- Products operated outside their specifications.
- Products Improperly maintained or modified.
- Consumable items such as fuses, power cords, cables, etc.
- Normal wear
- Calibration
- Products shipped outside the United States without the prior knowlege of Com-Power.

In addition, Com-Power shall not be obliged to provide service under this warranty to repair damage resulting from attempts to install, repair, service or modify the instrument by personnel other than Com-Power service representatives.

Under no circumstances does Com-Power recognize or assume liability for any loss, damage or expense arising, either directly or indirectly, from the use or handling of this product, or any inability to use this product separately or in combination with any other equipment.

When requesting warranty services, it is recommended that the original packaging material be used for shipping. Damage due to improper packaging will void warranty.

If you feel that the product is not working as intended, or is malfunctioning, please contact Com-Power for assistance. In the case of repair or complaint, Please visit our website at www.com-power.com and fill out a Service Request (http://com-power.com/repairservicereq.asp). The RMA number should be displayed in a prominent location on the packaging and on the product, along with a description of the problem, and your contact information.