

**INSTRUCTION MANUAL**

**For  
RF Preamplifier**

**Model PAM-103**

***1 MHz to 1000 MHz, 33 dB Gain (typical)***



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## **1.0 Introduction**

This manual includes product specifications, safety precautions, product maintenance and warranty information.

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## 2.0 Product Specifications

<b>Model:</b>	<b>PAM-103</b>
<b>Electrical</b>	
Frequency Range	1 MHz to 1 GHz
Preamplifier Gain	33 dB ( $\pm 3$ dB)
Linear RF Input Range	< -30 dB $\mu$ V to 89 dB $\mu$ V
POUT @ 1 dB Compression	18.3 dBm
POUT @ 3 dB Intercept (IP <sub>3</sub> )	32 dBm
Noise Figure	< 3.3 dB
Input Sensitivity	< -30 dB $\mu$ V (< 31.6 nV)
VSWR (RF Input/Output Ports)	1.69:1 (maximum), 1.25:1 (average)
Return Loss (RF Input/Output Ports)	29.5 dB (minimum), 44 dB (average)
RF Connectors (Input/Output Ports)	50 $\Omega$ N-Type (female)
Reverse Isolation	>40 dB (output port to input port)
Absolute Max. RF Input Ratings	107 dB $\mu$ V (225 mV), 0 dBm (1 mW), 2 VDC
Battery Runtime	>13 Hours (with new, fully-charged batteries)
Power Input	15 VDC, 500 mA (unregulated)
Operating Temperature Range	0° to 40° C (32° to 104° F)
<b>Mechanical</b>	
Dimensions (Height x Width x Depth)	2.3" x 6.6" x 8.3" (6 cm x 16.7 cm x 21 cm)
Weight	3.2 lbs (1.45 kg)

*This equipment is designed for indoor use only.*

### 2.1 Other related equipment available from Com-Power.

- PS-400 or PS-500 Near Field Probe Kits
- AL-100 / ALP-100 / ALC-100 Log Periodic antennas
- AB-900 / ABF-900 Biconical Antennas
- AC-220 Combilog Antenna

### 2.2 Other RF and Microwave preamplifier models available from Com-Power

Model	Specifications
<b>PAL-010</b>	100 Hz to 30 MHz, 28 dB
<b>PAM-6000</b>	1 to 6 GHz, 30 dB
<b>PAM-118</b>	1 to 18 GHz, 25 dB
<b>PAM-118A</b>	1 to 18 GHz, 40 dB
<b>PAM-840</b>	18 GHz to 40 GHz, 25 dB

### **3.0 Important Precautions**

Observe the following safety precautions to ensure user safety and maximizing the operating life of the preamplifier.

- Remove the batteries from the preamplifier when it is not used for an extended period.
- Use only the battery charger adapter supplied with the preamplifier.
- Replace fuse with same type and size.
- Replace only with batteries supplied by Com-Power.
- Exercise caution when handling the preamplifier because it is sensitive electrostatic discharge.
- Avoid using the preamplifier in environments with excessive heat or moisture.

The only user replaceable part in the preamplifier is the battery pack. It can be accessed from the bottom of the unit. There are no other user serviceable parts inside the unit. Do not remove the main instrument cover. If the preamplifier needs repair please contact authorized Com-Power service center.

#### **3.1 Excessive RF input**

Do not exceed RF input level indicated on front panel. Excessive RF input may damage the preamplifier's sensitive input and will not be covered under warranty.

#### **3.2 Saturation**

In addition possible damage to the preamplifier input, excessive RF signals may cause the preamplifier to saturate. When a preamplifier reaches saturation point the gain will reduce and cause a nonlinear increase in output power resulting inaccurate measurements. Please check product specification for saturation level.

#### **3.3 Calibration**

The factory recommended calibration period for the Preamplifier is 12 months. However, its performance should be checked periodically to ensure the preamplifier is operating within the rated specification given in section 2.0 of this manual.

## 4.0 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 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 knowledge 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, calibration or repair services, it is recommended that the original packaging material be used for shipping. Damage due to improper packaging will void warranty.

In the case of repair or complaint, a label should be attached to the housing of the instrument which describes briefly the faults observed. Please include the name, telephone number and email address of the contact person. Please visit our website [www.com-power.com](http://www.com-power.com) and obtain an RMA number by selecting service and completing the online form.

## 4.1 Maintenance

This product contains no user replaceable parts other than the battery. If the unit does not operate or needs calibration, please contact Com-Power Corporation. Do not remove the instrument cover. The batteries can be accessed from the the bottom of the unit if needs replacement. Any modifications or repairs performed on the unit by anyone other than an authorized factory trained technician will void warranty.

The exterior surface may be cleaned with mild detergent and then be wiped with a dry, clean, lint-free cloth. Use care to avoid any liquids or foreign objects entering the chassis.

## **5.0 Application and product operation**

### **5.1 Application**

Com-Power PAM-103 Preamplifier are designed specifically for EMI radiated emissions testing up to 1 GHz.

The PAM-103 high gain of the preamplifier

- Amplifies signals within its operational frequency band to improve the overall signal noise ratio of the measurement system.
- Compensates for signal losses associated with the use of cables and antennas operating within its frequency range.
- Increases sensitivity of near field probes.

### **5.2 Items included with the preamplifier**

The following accessories and documents are supplied with the Model PAM-840A Preamplifier:

- Battery Charger / Power Adapter
- Instruction Manual
- Calibration data with certificate traceable to NIST
- Two (Pre-installed) rechargeable battery packs

#### **Optional items**

- ISO-17025 calibration data and certificate
- Spare battery packs
- Spare fuses

## 5.3 Front and rear panel layout description

### 5.3.1 Front Panel

The simple panel shown in the photo below consists of BNC or N type connector for RF input and output, power switch with LED indicator and battery low indicator. Please observe the maximum input rating printed on front panel. When the battery low indicator turns on, the preamplifier needs charging. For faster charging, turn off preamplifier and plug in the supplied charging adapter. You can continue using the preamplifier powered by battery charger adapter. If the low battery indicator will remain lit, it can be turned off by flipping the power switch off and then on.



### 5.3.2 Rear Panel

The back panel shown below consists of fuse holder and charging adapter input socket. Make sure to use only the charger adapter supplied by Com-Power to power and charge the preamplifier. Please note input rating and polarity noted above the power socket. Replace fuse with similar size, type and rating. Please heed the warning on the back panel. Damage caused to the preamplifier by using an alternate adapter or wrong fuse will void warranty.





## 5.4 Battery Replacement and troubleshooting tips

The replaceable battery pack can be accessed from the bottom of the preamplifier. Four screws secure the cover to the battery compartment. Please charge the new batteries overnight initially to maximize operating time of the preamplifier.



## 5.5 Troubleshooting Common problems

**Problem: Gain is low or no gain.**

**A: Make sure the power switch is on and the green LED is lit.**

Check if the input and output cables are connected securely. Wiggle both cables and verify if the signal level changes on the receiver. If the signal changes replace the defective cable and check again. Make sure the cable from the signal source is connected to the input not the output.

Verify if the signal source connected. If it is a signal generator make sure the RF is turned on.

Inject a known signal level into the preamplifier and check the gain. For example if you inject 50 dBμV, you should read ~ 81 to 83 dBμV on the receiver. Please be cautious not to exceed the input limits given in specification table of this manual.

Make sure the battery is fully charged or the adapter is plugged into a AC power source.

**Problem: Battery low indicator remains lit even after charging overnight.**

**A:** The battery may need to be replaced. However, before you replace the battery perform the following steps

- Make sure the battery terminals are connected to the preamplifier
- Check the fuse on the back panel. If the fuse is blown, replace it. Please heed the warning label on the bottom of the fuse holder and rear panel.
- Check the charging adapter to make sure it is supplying the rated voltage on the adapter. If the charging adapter is producing the proper voltage, the batteries may have to be replaced. Otherwise replace the charger adapter.

## 6.0 Typical Preamplifier Gain

