

# OPERATING AND SERVICE MANUAL

## Model GRF5016BF

RF POWER AMPLIFIER

1.4 – 2.4 GHz, 25 WATT



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SECTION I  
GENERAL INFORMATION

1.1 DECLARATION OF CONFORMITY

**DECLARATION OF CE CONFORMITY**

We, Ophir RF Inc., 5300 Beethoven Street, Los Angeles, CA 90066, declare under sole responsibility that the Power Amplifier Model GRF5016B, to which this declaration relates, meets the essential health and safety requirements, is in conformity with ISO 3864 and the CE marking has been applied according to relevant Safety and CE Directives listed below using the relevant section of the following EC standards and other normative documents:

**EU EMC DIRECTIVE 89/366/EEC**

Essential health and safety requirements relating to electromagnetic compatibility:

ENEN55022 Class B

EN50082-1 EC generic immunity requirements, Category A & B

IEC801-2

IEC801-3

IEC801-4

**EC Low Voltage Directive 72/23/EEC**

Essential health and safety requirements relating to electrical equipment designed for use within certain voltage limits.

**EN61010-1**

Safety requirements of Test Measurement and Laboratory Equipment.

## 1.2 SCOPE

This technical manual contains operating and servicing instructions for a 25 Watt RF power amplifier. The equipment is manufactured by OPHIR RF, Los Angeles, California, U.S.A.

## 1.3. DESCRIPTION.

The power amplifier operates in the Microwave frequency. The input to the power amplifier is rated at 0 dBm nominal CW signal between the 1.4 GHz and 2.4 GHz frequency range. The output of the power amplifier is specified at 25 Watt CW RF signal. Detailed specifications for the power amplifier are given in table 1-1.

Table 1-1. Specifications

Mode of Operation:	Class A Linear
Frequency Range:	1.4 – 2.4 GHz
Output Power @ Saturation:	25 Watt CW Typical
Output Power @ 1 dB Compression:	20 Watt CW minimum
Small Signal Gain:	45 dB minimum
Input Power:	1 mW CW nominal
Small Signal Gain Flatness:	± 1.5dB maximum
Small Signal Gain Variation:	1.5 dB maximum
Input/Output Impedance:	50 ohm nominal
Input/Output VSWR:	2:1 minimum
Operating Temperature Range:	0° C to 50° C
Operating Humidity Range:	95%, 0° C to 40° C
Temp. Protection:	Shut down @ 80° C minimum
Cooling system:	Forced Air
AC Power:	100 - 240 VAC, 50/60 Hz nominal
AC Power consumption:	220 Watt maximum
Dimensions:	19.0" W x 3.5" H x 18" D
Weight:	26 Pounds maximum

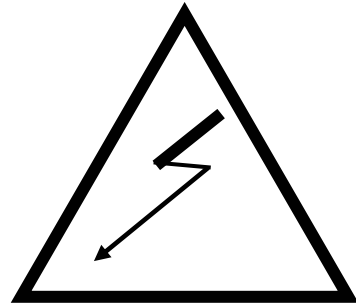
Option(s) included:

- Type-N Connectors on Front Panel.

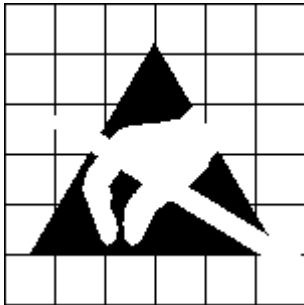
1.4 SYMBOLS AND MARKINGS



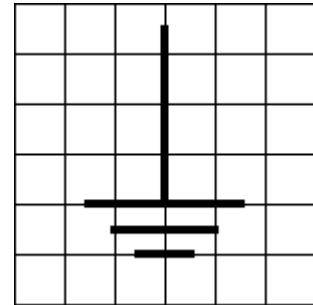
Caution! Refer to  
Accompanying Documents



Hazardous Line Voltages



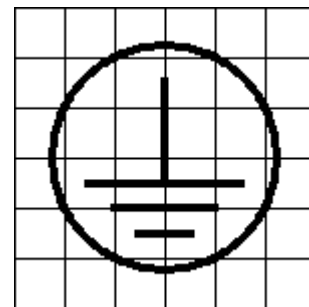
ESD Sensitive Devices



Earth Symbol (Ground)



Personal Hazard



Protective Earth

SECTION II  
INSTALLATION

2.1. INCOMING INSPECTION.

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 the carrier and OPHIR RF immediately.

**STOP!!!  
!!! CAUTION !!!**

**Do not apply power until YOU have read Sections II and III AND YOU have performed all specified procedures. If YOU do not follow this CAUTION, you may damage this equipment. Failure to observe this caution may result in damage to the equipment.**

**!!! CAUTION !!!    !!! CAUTION !!!    !!! CAUTION !!!**

2.2. PREPARATION FOR USE

2.2.1 Cable Connection

The AC power cable connection is made at the rear of the unit via receptacle connector (see figure 2). The RF connections are made at the front or rear panel via Type-N connectors, for the RF Input and Output.

**!!! CAUTION !!!**

**YOU must turn off the front panel POWER SWITCH before YOU connect the AC Power source to the amplifier.**

**If YOU do not follow this CAUTION, you may damage this equipment. Failure to observe this caution may result in damage to the equipment.**

**!!! CAUTION !!!    !!! CAUTION !!!    !!!**

### 2.2.2 Power Requirements.

The power amplifier requires a power source of 100 - 240 VAC, 50 - 60 Hertz capable of delivering 220 Watts. Turn off the front panel Power Switch before connecting the AC power source to the power amplifier.

### 2-2.3 Earthing.

Earthing is achieved simultaneously with connection to main power.

### 2.2.4 Load Requirements.

The power amplifier requires a load, antenna, or dummy load with a 50 Ohm nominal impedance. Make this external load connection before applying power.

## 2.3. REPACKAGING FOR SHIPMENT.

If the power amplifier is to be packaged for shipment, use the original shipping container and packing materials. If these have been discarded or are not in condition for reuse, use a heavy duty carton, which will usually provide adequate protection. If the power amplifier is being returned to the manufacturer, attach an identifying tag, and indicate the cause of return.

Wrap the equipment in heavy paper or plastic, and use enough shock-absorbing material (3 to 4 inch layer) around all sides to provide a firm cushion and to prevent motion within the container. Protect the front and rear panels with cardboard or foam blocks. Seal the shipping container securely, and mark the container "FRAGILE".

## 2-4. RECOMMENDED CARRYING & TRANSPORTING

**!WARNING!**

It is recommended that two (2) people carry this system due to its weight.

## 2-5 CLEANING

Use a rag with isopropyl alcohol to clean exterior surfaces. Use pressurized air to blow dust out of the fan housings.



SECTION III  
OPERATION

3.1. INTRODUCTION

This section describes the operating controls and procedures of the power amplifier.

3-2. STATEMENT AGAINST UNSPECIFIED USE

This system must be used as specified by the manufacturer. Use of this instrument in any way not specified by the manufacturer may impair the safety precautions of the system.

3-3. CONTROLS, INDICATORS AND CONNECTORS.

**Important NOTE!!!**

**Optional User Selectable Control**

**You have ONE control options available for operation of this instrument:**

- 1. Manual control via the front panel controls.**

The indicators of the power amplifier are visible on the front panel. The RF INPUT and RF OUTPUT connections are visible on the front or rear panel. Refer to figure 2 and the following discussion for the location and functional description of all controls, indicators and connectors.

3.4. BASIC OPERATING PROCEDURES.

NOTE

Operation of the power amplifier is passive; that is, after Input power has been applied, no procedures other than turn off are required.

### 3.5 BEFORE TURN ON.

**STOP!!!  
!!! 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 operation.**

**!!! CAUTION !!!    !!! CAUTION !!!    !!! CAUTION !!!**

Perform the following preliminary procedures before energizing the equipment:

- a. Check that POWER switch is off.
- b. At the rear of the unit, verify that the AC cord is properly inserted into the receptacle socket.
- c. Verify that 50 ohm loads are connected to the RF Input and the RF Output ports.

### 3.6. TURN ON.

Perform the following procedures to energize the equipment:

- a. Set POWER switch to the ON position. Verify POWER lamplight.
- b. Apply RF power.

**STOP!!!  
!!! CAUTION !!!**

**To maintain specified performance and retain certain operating characteristics, RF power input should not exceed +10 dBm.**

**!!! CAUTION !!!    !!! CAUTION !!!    !!! CAUTION !!!**

### 3.7. OPERATION.

1. POWER Switch: In the ON position, AC source is applied to the power control circuits of the power amplifier.
2. POWER Lamp: Lights to indicate the distribution of AC power throughout the Power Amplifier.
3. OVER TEMPERATURE: At internal temperature of over 80°C the unit will turn off bias voltage to the main amplifiers modules, and illuminate the front panel red Fault LED and the digital display will indicate high temperature. Bias will return automatically at temperatures below 75°C.
4. If the unit includes the front panel Controller refer to Appendix A for further discussion on the available functions.

### 3.8. TURN OFF.

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

**STOP!!!  
!!! CAUTION !!!**

**TURN the power switch on the front display panel to “OFF” in the event of ANY power failure. Be sure to do so BEFORE YOU reconnect AC POWER to the amplifier.**

**!!! CAUTION !!!    !!! CAUTION !!!    !!! CAUTION !!!**

## SECTION IV

### MAINTENANCE

#### 4.1. INTRODUCTION.

This section describes the performance tests, adjustments, troubleshooting procedures and disassembly and reassembling procedures for the power amplifier.

#### 4.2. PERFORMANCE TEST.

The performance test is identical to the operating procedure described in section III. When the power amplifier operates at maximum efficiency, it is operating at its optimum level.

#### 4.3. ADJUSTMENT PROCEDURES.

There are no adjustments applicable to the power amplifier other than those normally performed at the factory.

#### 4.4. TROUBLESHOOTING PROCEDURES.

##### NOTE

Troubleshooting beyond the level described by these procedures should be performed at the factory.

The following troubleshooting procedures are to be used as a guide in the localizing of an operating area. When the trouble has been localized, repair the power amplifier by replacing the defective module or component.

##### 4.4.1. IMPROPER POWER DISTRIBUTION.

Power is properly distributed throughout the power amplifier when the two internal blowers are operating, the POWER lamp is lit and the AC source is present. In the absence of these positive indications, perform the applicable steps of the following procedure:

- a. Verify the presence of the external source power at the input of the receptacle AC connector.
- b. Check that the internal blowers are operating.
- c. Check Power Light.

#### 4.4.2 LOW OUTPUT POWER

When the power output of the amplifier and the current drawn from the power supply are both low, the power amplifier may have triggered the thermal protection or the main power module is defective. Perform the following procedure

- a. Verify that the drive level is correct.
- b. Verify that the thermal switch is ON.

#### 4.4.3 NO OUTPUT POWER.

If no output power, or very low output power is indicated, and the thermal light is not lit then the main amplifier's module is defective. Replace with a new unit, and send the defective unit to the factory for repair.

## SECTION V

### WARRANTY

5.1 OPHIR RF warrants its RF amplifiers against defects in material and workmanship for a period of (1) year from the date of receipt. An amplifier, which proves to be defective during the warranty period, will be replaced or repaired at OPHIR RF 's option.

This warranty shall not apply to damage or defects caused by abuse, improper handling, unauthorized repair or modification, improper installation, or operating outside the product specifications.

This limited warranty is the sole and exclusive remedy of the buyer. Except as stated above, OPHIR RF makes no warranties, express or implied, including any warranty of merchantability or fitness for a particular purpose. In no event shall OPHIR RF be liable for any incidental, indirect, special, or consequential damages in connection with or arising out of the sale or use of the RF amplifiers.