



**PMM Costruzioni
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UNI EN ISO 9001 Certified Quality System

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Operating Manual

PMM 3000

WIDEBAND RF SIGNAL GENERATOR 10 kHz ÷ 1000 MHz

EQUIPMENT SERIAL NUMBER

You can find the Serial Number on the rear panel of your instrument.

Serial Number is in the form : 0000X00000.

The first four digits and the letter are the Serial Number prefix, the last five digits are the Serial Number suffix. The prefix is the same for identical instruments, it changes only when a configuration change is made to the instrument.

The suffix is different for each instrument.

NOTE :

This product and related documentation must be reviewed carefully for familiarization with safety instructions before operation.

To ensure correct equipment operation and safety, the user of this product must fulfill all information and warnings contained in this document.



This product is a **Safety Class I** instrument according to IEC classification (provided with a protective earth terminal), and has been designed to meet the requirements of EN61010-1 (Safety Requirements for Electrical Equipment for Measurement, Control and Laboratory Use).

This product is an **Installation Category II** instrument intended for operation from a normal single phase supply.

An uninterruptible safety earth ground must be provided from the main power source to the product protective earth connection before operation.



If this product is to be connected to other equipment or accessories, prior to energizing either unit verify that a common ground exists between them.

The information contained in this document is subject to change without notice.

EXPLANATION OF ELECTRICAL AND SAFETY SYMBOLS:



- Caution, shock hazard



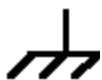
- Read operating manual and instruction, observe safety symbols used



- Protective ground connection



- Ground



- Unit ground



- Equipotential, (floating ground)

EXPLANATION OF SYMBOLS USED IN THIS DOCUMENT:



- **WARNING:**

The WARNING sign brings into evidence a potential hazard of personal injury. All conditions indicated in the associated text must be fully understood and met before proceed.



- **CAUTION:**

The CAUTION sign brings into evidence a potential hazard of damage of the equipment. All conditions indicated in the associated text must be fully understood and met before proceed.



- **NOTE:**

The NOTE sign brings into evidence an important information.

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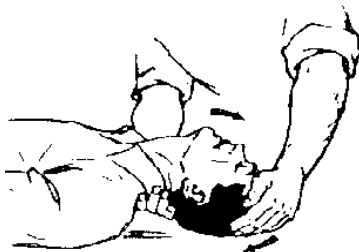


SAFETY CONSIDERATIONS AND INSTRUCTIONS

This product has been designed, manufactured and tested in Italy and has left the company in full working order and in compliance with safety standards; in order to ensure the safety and the correct use of this product, the following general instructions must be fully understood and adhered to before proceeding.

- When the unit needs to be connected permanently, and before any other connection is made, attach an earth wire protective conductor.
- If the unit needs to be connected to other equipment or accessories, ensure that there is a common earth wire connection between them.
- In the case of permanent connections of units to the mains without built-in fuses or other safety devices, ensure that the main power supply is provided with adequate protection matching that of the unit rates of consumption.
- If the unit needs to be connected to mains power supply, check that the voltage and fuses are the correct rating before applying power.
- All units complying with Safety Standard Class I, are provided with cable and plug for attachment to the mains, and must only be connected to power sockets provided with earth ground connection.
- Any interruption or loosening of the earth wire protective conductor, either inside or outside the unit, or mishandling of the connecting cable can cause a potential risk to personal safety.
- The earth wire protective conductor must not be interrupted intentionally.
- In order to avoid the danger of an electric shock do not remove covers or the unit protective panels, for maintenance and assistance refer only to a qualified PMM service centre.
- To avoid the risk of fire, replace the fuses only with those of the same type and rating.
- Always observe safety rules and regulations and any additional information contained in this manual in order to prevent and avoid damage and personal injury.

FIRST AID RULES in case of electric shock :



- 1) lay the injured person on his back;
- 2) remove any obstruction from his mouth and throat;
- 3) rotate his head, as shown in the picture, this will help breathing;
- 4) with your fingers, block his nostrils;
- 5) take a deep breath;
- 6) cover his mouth with yours and blow making sure his chest is rising;

NOTE: blow forcefully into the mouth of adults, gently into children's;

- 7) move your face away to allow him to breath out, and make sure his chest is falling;



- 8) repeat this five or ten times at a rapid rate, then every three to five seconds;
- 9) keep his head tilted back as far as possible all the time;
- 10) **ask for help and have someone send for a Doctor;**
- 11) **Keep the patient warm and loosen his clothing.**

**DO NOT GIVE THE PATIENT ANYTHING TO DRINK
UNTIL HE HAS REGAINED CONSCIOUSNESS**



EC Declaration of Conformity

(to EMC Directive 89/336/EEC and Low Voltage Directive 73/23/EEC)

This is to certify that the product: PMM 3000 Wideband RF Signal Generator 10 kHz - 1 GHz

manufactured by: PMM S.r.l.
Via Benessea 29/B
17035 Cisano sul Neva (SV) - ITALY

conforms to the following European Standards:

Safety: EN 61010-1:1993 + A2:1995

EMC: EN 55011 - EN 61000-3-2 - EN 61000-3-3 - EN 50082-1

The product herewith complies with the requirements of the Low Voltage Directive 73/23/EEC, amended by 93/68/EEC, and the EMC Directive 89/336/EEC amended by 92/31/EEC, 93/68/EEC, 93/97/EEC.

PMM S.r.l.

1 - General Information

Documentation

Enclosed with this manual are:

- a service questionnaire to send back to PMM in case of equipment service is needed
- an accessories check list to verify all accessories enclosed in the packaging.

Instruments covered by this manual

You can find the Serial Number on the rear panel of your instrument.

Serial Number is in the form: 0000X00000.

The first four digits and the letter are the Serial Number prefix, the last five digits are the Serial Number suffix. The prefix is the same for identical instruments, it changes only when a configuration change is made to the instrument. The suffix is different for each instrument.

Introduction to PMM3000

PMM3000 is a wide band RF signal generator covering 10 kHz to 1000 MHz frequency range. The generator is fully automatic and programmable via RS232/485 serial port. Due to his performances it is an ideal tool for all EMC immunity test applications.

The instrument has several features not even included into high cost generator such as: internal pulse modulation, sweeping and correction table downloading.

Instrument items

The PMM 3000 includes the following items:

- RF signal generator;
- N-Bnc adapter
- RS232 cable;
- RS232 adapter 9-25 pin;
- Power supply cable;
- Operating Manual.

PMM Optional accessories

- PMM 6000N RF 10W(15W) amplifier 9 kHz - 230 MHz;
- PMM 6600 RF Power meter for EMC application;
- PMM 6600D Slave power meter;
- M75 IFI 75W, 10 kHz - 230 MHz;
- F-203I-23 Injection Clamp;
- F-203I-23-DCN Decoupling Network;
- F-120-9A Injection Probe;
- F-33-1 Current Monitor;
- Wide range of CDNs;
- 150-50 Calibration kit for CDNs;
- Load-50 50 Ohm load;
- 6 dB, 50 Ohm fixed attenuators, 10, 15, 30, 100 W;
- Coupling/Decoupling Networks;
- EM current injection clamp
- RF power meter;
- PMM SW 06 Immunity software for IEC 1000-4-6 and ENV50141.

Main specifications

Table 1-1 lists the PMM3000 performance specifications.

The following conditions apply to all specifications:

- The PMM3000 needs at least a 15 minutes warm-up before to operate.
- The ambient temperature shall be 10° to 50° C.

TABLE 1-1 - TECHNICAL SPECIFICATIONS

Frequency	
Range	10 kHz to 1 GHz
Resolution	1 kHz (freq. < 100 MHz), 10 kHz (freq. > 100 MHz)
Accuracy	± 50 ppm
Level	
	- 80 to + 10 dBm
Range	0.1 dB
Resolution	± 1 dB
Accuracy	± 1 dB
Level flatness	50 Ω
Output impedance	N (female)
Connector	
Spectral purity	
Harmonic	< - 30 dBc for level @ 0 dBm
Non harmonic	< - 50 dBc
AM modulation	
Internal	400 or 1 kHz at 80%
External	100 Hz to 10 kHz max. 90%
Input impedance	> 1 kΩ
Connector	BNC female (Absolute maximum rating 10Vpp)
Pulse modulation	
Internal	200 Hz
ON/OFF ratio	@ 100 MHz > 70 dB, @ 900 MHz > 40 dB
Frequency accuracy	± 10%
Pulse mod. 1 Hz	
Internal	1 Hz
ON/OFF ratio	@ 900 MHz, 0 dBm > 70 dB
Frequency accuracy	± 10%
Remote control	
System interface	RS-232/485
Connector	DB9
User port	RF Off, Start/stop test, RF-ON
Display	
	4 lines LCD
Power supply	
AC	115/230 VAC, 30 VA, 50-60 Hz
DC	22-26 VDC
Size	
	257 x 110 x 315 mm (WxHxD)
Weight	
	4.5 kg

Front and rear panel

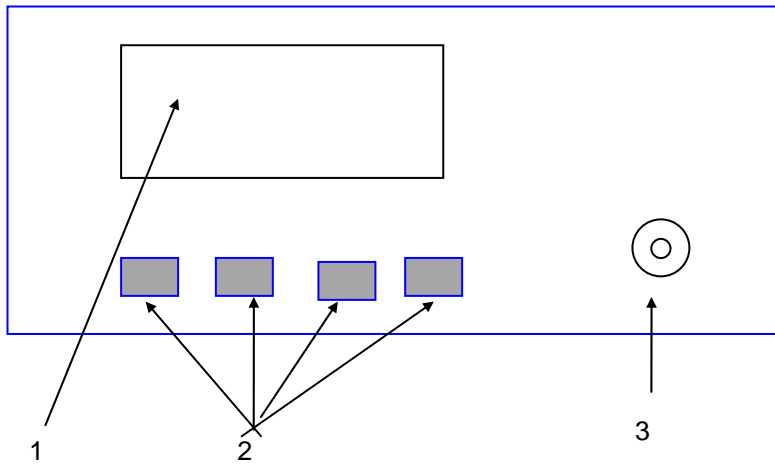


Figure 1: Front Panel

Legend:

- 1.- LCD display
- 2 - Functional keys
- 3 - RF output connector

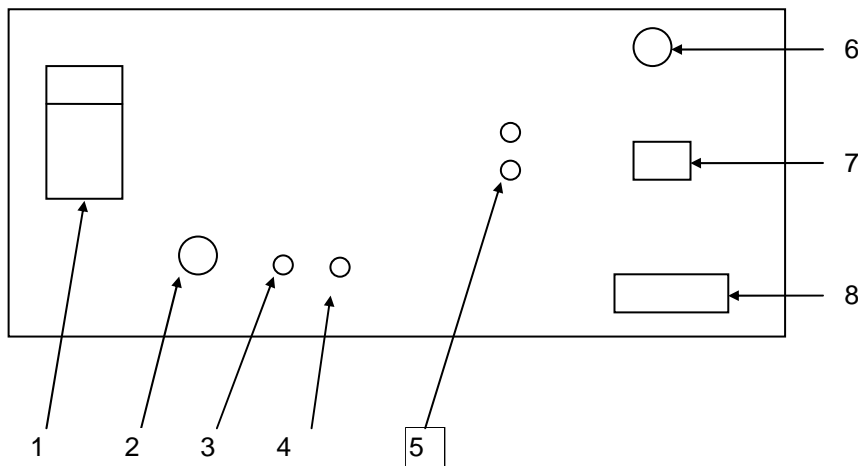


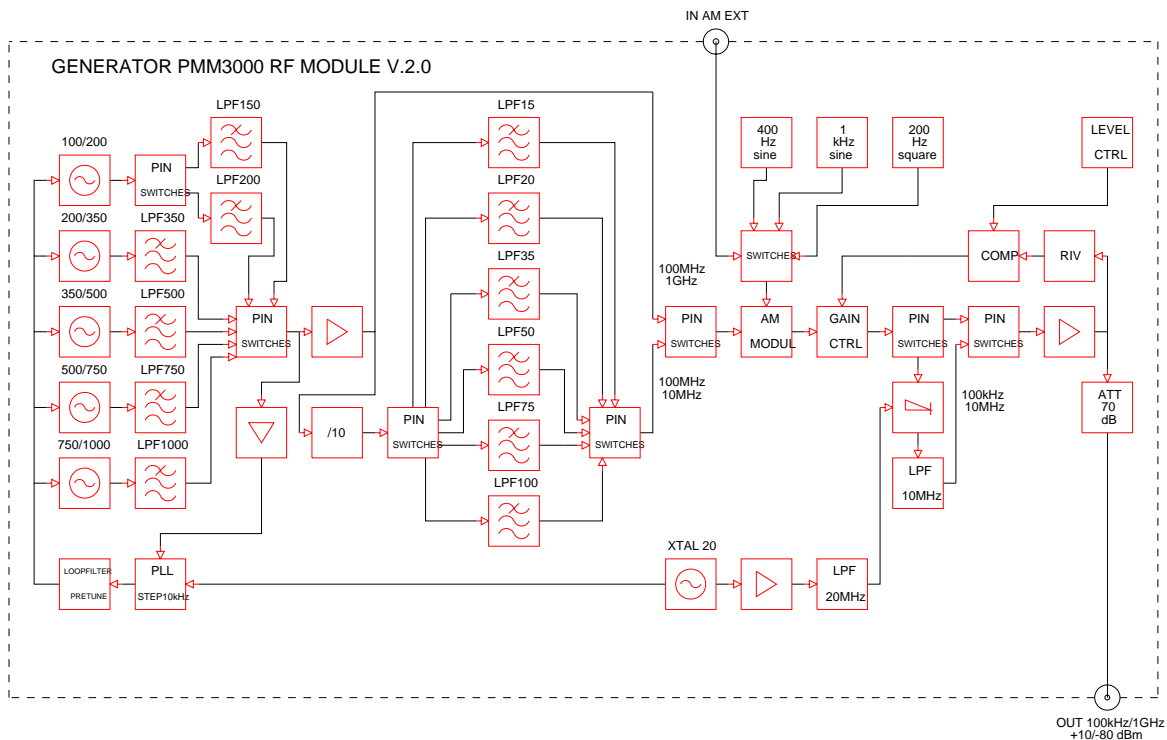
Figure 2: Rear Panel

Legend:

- 1.- Mains plug
- 2 - voltage selector
- 3 - ground lead
- 4 - DC input power
- 5 - RX- TX leds
- 6 - External AM modulation
- 7 - RS232/485 interface
- 8 - User I/O port

1.5 Functional description

PMM3000 philosophy is based on high technology approach to offer high performance into small instrument. The block diagram give you an idea how it works.



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CE Conformity

2 - Installation

Introduction

This section provides the information needed to install your PMM3000. Included is information pertinent to initial inspection, power requirements, line voltage and fuse selection, power cables, interconnection, environment, instrument mounting, cleaning, storage and shipment.

Initial inspection



To avoid hazardous electrical shock, do not turn on the instrument when there are signs of shipping damage to any portion of it.

Packing and Unpacking

Inspect the shipping container for damage. If the shipping container or cushion material is damaged, it should be kept until the contents of the shipment have been checked for completeness and the instrument has been checked mechanically and electrically. Verify the accessories availability in the shipping referring to the accessories check list enclosed with the Users Manual. Notify any damage to the carrier personnel as well as the PMM Representative.

Preparation for use

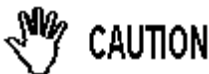


This is a Safety Class I equipment, it is provided with a protective earth terminal. An uninterruptible safety earth ground must be provided from the main power source to the product input wiring terminals through the power cable (or supplied power cable set). Verify the safety earth ground functionality before operation.

Installation Check list

Before operation the following steps shall be taken:

- Check the line voltage to ensure the compatibility with the equipment settings.
- Verify that the fuse rating is appropriate for the line voltage used.



Before plugging PMM 3000 into the main supply line ensure that the line voltage is in the range specified, and that the appropriate fuse have been selected.

Line voltage selection

The line voltage can be changed from the rear panel switching the rotary switch to the right voltage according to your mains.

Fuse selection

Line Voltage	Fuse Rating	Type
90 ÷ 135 V	T 250 mA	T (Time delay slow-blow)
175 ÷ 264 V	T 125 mA	T (Time delay slow-blow)



Before connecting this instrument, ensure that an uninterruptible safety earth ground is provided from the main power source to the product protective earth connection. If this instrument is to be connected to other equipment or accessories, prior to energizing either unit verify that a common ground exists between them.

Any interruption or loosening of the protective earth ground conductor, either inside or outside the unit or in an extension cable will cause a potential shock hazard that could result in personal injury.

Power cable

This instrument is equipped with a three wires power cable. When connected to an appropriate AC power receptacle, this cable grounds the instrument chassis.

Environment

The operating environment is specified to be within the following limitations:

- Temperature +10° to +40° C
- Humidity < 90% relative
- Altitude < 4000 meters

The instrument should be stored in a clean, dry environment

The storage and shipping environment is specified to be within the following limitations:

- Temperature -40° to + 50° C
- Humidity < 95% relative
- Altitude < 15000 meters

Return for service

If the instrument should be returned to PMM for service, please complete the service questionnaire enclosed with the Users Manual and attach it to the instrument.

To minimize the repair time, be as specific as possible when describing the failure. If the failure only occurs under certain conditions, explain how to duplicate the failure.

If possible, reuse of the original packaging to ship the equipment is preferable.

In case other package should be used, ensure to wrap the instrument in heavy paper or plastic.

Use a strong shipping container and use enough shock absorbing material around all sides of the equipment to provide a firm cushion and prevent movement in the container.

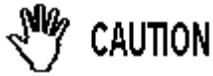
To prevent damage during shipment in particular protect the front panel.

Seal the shipping container securely.

Mark the shipping container FRAGILE to encourage careful handling.

Equipment cleaning

Use a non abrasive clean, soft and dry cloth for equipment cleaning.



To clean the equipment do not use any solvent, thinner, turpentine, acid, acetone or similar matter to avoid damage to external enclosure.

Hardware Installation

PMM 3000 is delivered ready to use. Remove the signal generator from his cardboard box and connect power cable to rear panel mains plug. Push the main switch to "ON" position and wait few seconds. Then PMM 3000 is ready to use.

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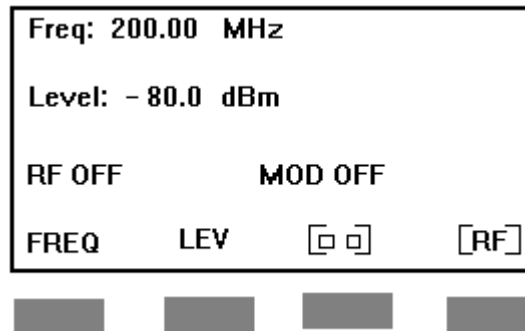
3 - Operation instructions

3.1 Starting PMM3000

PMM 3000 has been designed with a user friendly interface to be used by EMC engineer as well by non-skilled personnel.

All functions can be recalled by the four functional keys located on the bottom of LCD display. When instrument is turned on the firmware initiate the internal testing procedure. If everything is OK, the display will show:

Main menu display

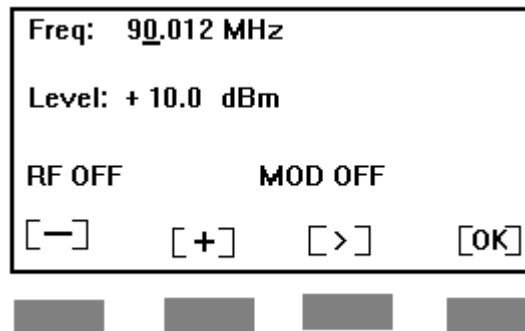


The main commands are:

- FREQ** to select the RF frequency
- LEV** to select output level
- []** to select the second commands row
- RF** to turn On or Off the output power

Activating the function key under the FREQ you will enter the frequency menu that shows:

Frequency setting

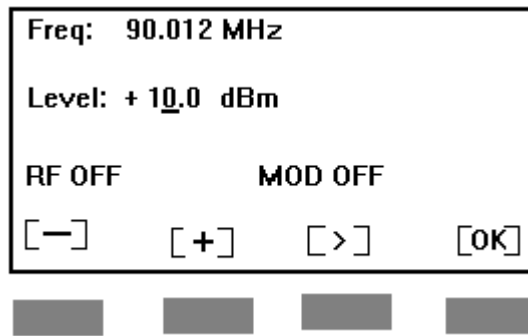


To change the frequency value you should position the cursor under the decimal you want to change; then using the key [-] or [+] you can decrease or increase the value. When done confirm the selection pushing [OK] button.

IF you keep the [-] or [+] key depressed the selected value will decrease or increase automatically.

Activating the function key under the **LEV** you will enter the level menu that shows:

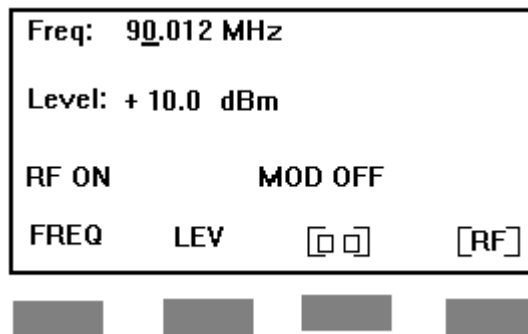
Level setting



To change the output level value you should position the cursor under the decimal you want to change; then using the key [-] or [+] you can decrease or increase the value. When done confirm the selection pushing [OK] button.

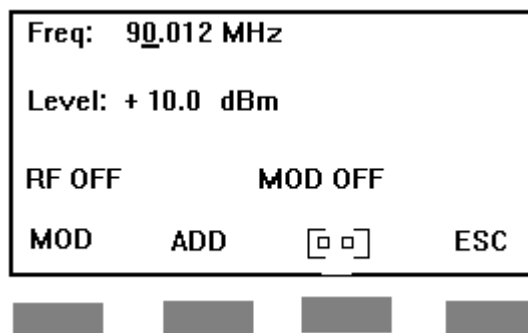
Pushing the RF function key you turn On or OFF the generator. The display will be:

To enable the RF output



To modulate the RF output you should enter the modulation menu. From the main menu you must push [] []. The display will show:

To enable the modulation



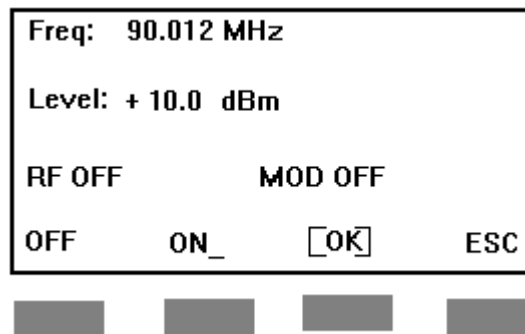
Where the functions have the following meaning:

- **MOD** to enable modulation mode
- **ADD** to define RS485 address
- **[□□]** to go to third command row
- **ESC** to go back to main menu

Activating the function **MOD** the display will show all the modulation capabilities.

The menu will be:

Modulation choice



Pushing the key **ON_** you can go through the following choices:

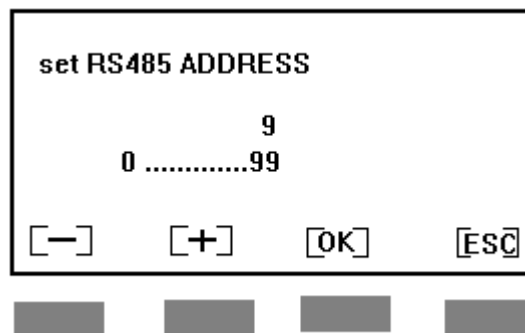
- MOD 400 Hz
- MOD 1 kHz
- MOD PULSE
- 1 Hz PULSE
- MOD EXT

Confirm your choice pushing OK. Pushing ESC you exit modulation mode of operation.

Setting RS-485 address

With the key **ADD** you can change the RS-485 address. Activating it, the menu will be:

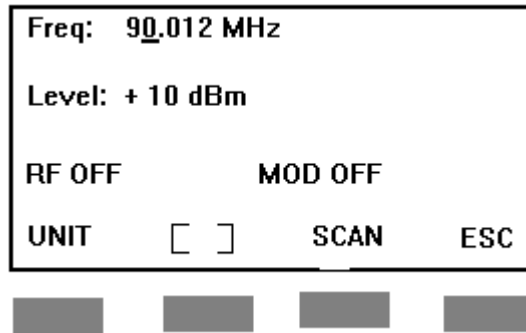
Selecting the Unit



Use key [-] or [+] to increase or decrease the address.
 Push OK to confirm.
 Push ESC to exit ADDRESS mode of operation.

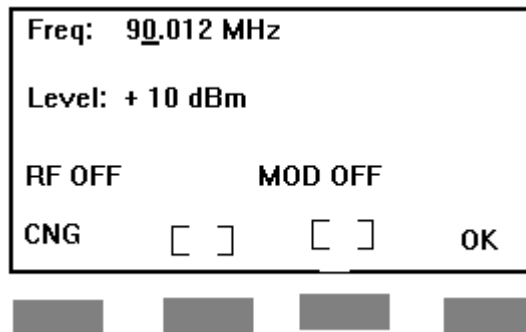
From main menu activating twice the button [] you enter the menu for changing the Unit and to use SCAN mode of operation. The display will show:

Unit mode of operation



Pressing UNIT you get the following choices:

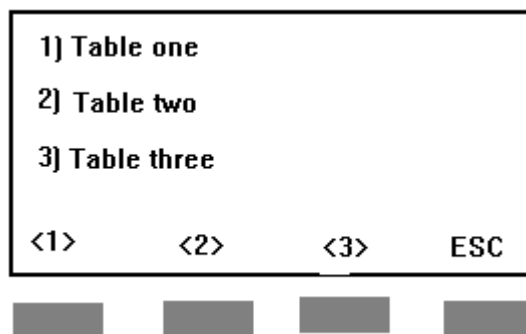
Selecting units



Pushing the **CNG** button you switch the unit from dBm to dBµV. Push OK to confirm.

SCAN mode of operation PMM3000 allows you to run immunity tests without to be controlled by any PC. Using our immunity software SW-02 (radiated) or SW-06 (conducted) you can download from the PC up to three different correction tables. For example, the three test level according to your Standard. From main menu, pushing twice the [] button you can enter the SCAN mode of operation. Pushing SCAN button the display will be:

List of tables



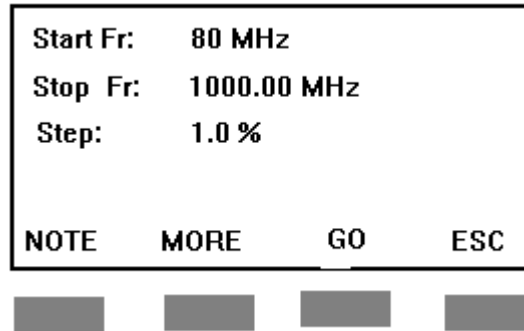
The above display examples shows the case where three different tables have been loaded. The name of the tables 1), 2) or 3) have been transferred from our software automatically. You can not change them from PMM3000 keyboard.

NULL Table

When you select a **NULL Table** no action is taken..

Using a table

Selecting one of the three tables you get the following display with all commands to perform the sweeping over a frequency range defined by the selected table. The display will be:

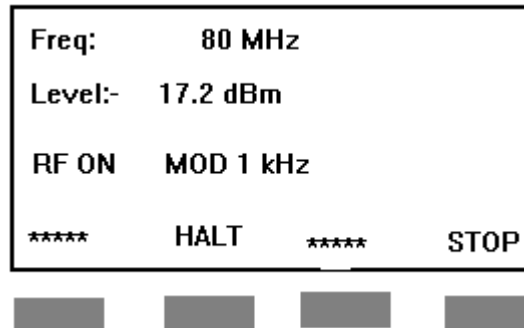


The new functions are:

- **NOTE** shows the table comment defined during table creation
- **MORE** shows the other table parameters (i.e. dwell time, limit, modulation)
- **GO** to start the sweep
- **ESC** to go to the previous menu

Starting a sweep

Activating the “**GO**” command PMM3000 will start sweeping using all parameters defined into the transferred table. The display will shows:



The sweepings can be halted with **HALT** command and then the user can manually change all the RF generator parameters. Using **STOP** you can definitely stop you sweep. When pressing **HALT** the user can continue form the nearest frequency associated with the table and the software will use same level defined into the table.

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4 - How to program

Introduction

PMM3000 has been designed to be programmed through his serial port using either RS232 as well RS485.

When using RS232 you can use only one instrument connected to PC serial port. If using RS485 you can connect up to 31 instruments to the same PC serial port.

PMM3000 uses the same connector for both communications.

Communication

Half duplex communication is implemented. The logical levels are identical for RS232 and RS485.

A built-in automatic tool identify the type of communication used and shows it on LCD display. Typical communication is implemented at 9600 baud with 8 bit, one stop bit and no parity.

Protocol

Be aware that only the PC can send the commands. PMM3000 will answer when is inquired only.

Communication is done at 9600 Baud with 8 bit, 1 stop bit and no parity.

The communication uses strings with variable byte width. The characters used inside the strings are in ASCII format (00 - 127) at 7 bit. The most significant bit are ignored in reception and put to 0 during transmission.

Every strings starts with the special character “#” and stops with “*”.

Address

When you drive PMM3000 via RS485 the address is embedded with the two digit following the first character “#”.

The address can be assigned from 01 to 99. When using RS232 this two character are ignored.

The host computer does not have any address because it can receive the message only. Therefore there is no direct communication between host and the instruments.

In order to impose the address to PMM3000 you should follow the procedure described on pag. 3-4.

Format

All messages are content between “#” and “*” characters for strings send to Host PC and between “address” and “*” for strings send to the instrument.

The string sent to the PMM3000 has the following format: “#iic..c*”. Where:

- # Start character
- ii RS485 address
- c..c Command
- * End character

PMM3000 will respond with the following string: - “#c..c”. In this case the address is not used because the PC does not need it.

Between “C..C” there is the message text where the length can varies from 1 to 100 characters.

PMM3000 commands	The following are the commands that PMM3000 can understand or gives back to PC:
frequency programming	<ul style="list-style-type: none"> • #00V* request to send back to PC the type of generator in use • #00v* request to send back to PC the revision number • #00F<freq>* send the frequency value in MHz • #00?f* request to send back to PC the actual frequency. The answer will be: "F.<freq>MHz".
modulation programming	<ul style="list-style-type: none"> • #00M4* to enable 400 Hz modulation • #00M1* to enable 1 kHz modulation • #00Me* to enable external modulation • #00Mp* to enable Pulse modulation • #00M5* to enable 1 Hz Pulse modulation • #00M0* to disable all modulation • #00?m* request to send back to PC which type of modulation is present. The possible answers are: <ul style="list-style-type: none"> • "MOD:1" 1 kHz modulation • "MOD:4" 400 Hz modulation • "MOD:p" Pulse modulation • "MOD:5".....1 Hz Pulse modulation • "MOD:e" external modulation • "MOD:0" NO modulation
level programming	<ul style="list-style-type: none"> • #00L<lev> to set the output level in dBm • #00?L" request to send back to PC the actual level. The answer will be: "Lev:<lev>dBm"
RF OFF RF ON	<ul style="list-style-type: none"> • #00R0* to set RF off • #00R1* to set RF on • #00?r* request to send back to PC the RF status.



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YOUR EMC PARTNER

Mod. 18-1

Egregio Cliente

grazie per avere scelto prodotti e servizi PMM : siamo fiduciosi essi possano incontrare pienamente le Sue necessità. PMM riconosce l'importanza del Cliente come ragione di esistenza : ciascun commento e suggerimento sottoposto all'attenzione della nostra organizzazione è tenuto in grande considerazione. La nostra qualità è alla ricerca del miglioramento continuo.

Se uno dei Suoi strumenti PMM necessita di riparazione o calibrazione può aiutarci a servirla più efficacemente compilando questa scheda e accludendola all'apparecchio.

Dear Customer

thank you for having chosen PMM products and services: we are confident they can fully meet your requirements.

PMM recognizes the importance of the Customer as reason of existence: in this view, any comment and suggestion you would like to submit to the attention of our service organization is kept in great consideration. Moreover, we are continuously improving our quality, but we know this is a never ending process. We would be glad if our present efforts are pleasing you.

Should one of your PMM equipment need service you can help us serve you more effectively filling out this card and enclosing it with the product.

Servizio richiesto: *Service needed:*

Solo calibrazione **Riparazione** **Riparazione & Calibrazione** **Taratura SIT** **Altro:**

Calibration only Repair Repair & Calibration Certified Calibration Other:

Ditta:

Company:

Indirizzo:

Address:

Persona da contattare:

Technical contact person:

Telefono:

Phone no.

Modello:

Equipment model:

Numero di serie:

Serial no.

Accessori ritornati con l'apparecchiatura: **Nessuno** **Cavo(i)** **Cavo di alimentazione** **Altro:**

Accessories returned with unit: None Cable(s) Power cable Other:

Sintomi o problemi osservati: *Observed symptoms/problems:*

Guasto: **Fisso** **Intermittente** - **Sensibile a :** **Freddo** **Caldo** **Vibrazioni** **Altro**

Failure: Solid Intermittent - **Sensitive to:** Cold Heat Vibration Other

Descrizione del guasto/condizioni di funzionamento:

Failure symptoms/special control settings description:

