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User's Manual

PMM SW03

RADIATED IMMUNITY SOFTWARE

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NOTE:

If the instrument is used in any other way than as described in this Users Manual, it may become unsafe

Before using this product, the related documentation must be read with great care and fully understood to familiarize with all the safety prescriptions.

To ensure the correct use and the maximum safety level, the User shall know all the instructions and recommendations contained in this document.

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

KEY TO THE ELECTRIC AND SAFETY SYMBOLS:

You now own a high-quality instrument that will give you many years of reliable service. Nevertheless, even this product will eventually become obsolete. When that time comes, please remember that electronic equipment must be disposed of in accordance with local regulations. This product conforms to the WEEE Directive of the European Union (2002/96/EC) and belongs to Category 9 (Monitoring and Control Instruments). You can return the instrument to us free of charge for proper environment friendly disposal. You can obtain further information from your local NARDA Sales Partner or by visiting our website at www.narda-sts.it .

Warning, danger of electric shock

Read carefully the Operating Manual and its instructions, pay attention to the safety symbols.

Earth Protection

Earth

Unit Earth Connection

Equipotential

KEY TO THE SYMBOLS USED IN THIS DOCUMENT:

DANGER **The DANGER sign draws attention to a potential risk to a person's safety. All the precautions must be fully understood and applied before proceeding.**

WARNING **The WARNING sign draws attention to a potential risk of damage to the apparatus or loss of data. All the precautions must be fully understood and applied before proceeding.**

CAUTION **The CAUTION sign draws attention against unsafe practices for the apparatus functionality.**

NOTE: **The NOTE draw attention to important information.**

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SAFETY RECOMMENDATIONS AND INSTRUCTIONS

This product has been designed, produced and tested in Italy, and it left the factory in conditions fully complying with the current safety standards. To maintain it in safe conditions and ensure correct use, these general instructions must be fully understood and applied before the product is used.

- When the device must be connected permanently, first provide effective grounding;
- If the device must be connected to other equipment or accessories, make sure they are all safely grounded;
- In case of devices permanently connected to the power supply, and lacking any fuses or other devices of mains protection, the power line must be equipped with adequate protection commensurate to the consumption of all the devices connected to it;
- In case of connection of the device to the power mains, make sure before connection that the voltage selected on the voltage switch and the fuses are adequate for the voltage of the actual mains;
- Devices in Safety Class I, equipped with connection to the power mains by means of cord and plug, can only be plugged into a socket equipped with a ground wire;
- Any interruption or loosening of the ground wire or of a connecting power cable, inside or outside the device, will cause a potential risk for the safety of the personnel;
- Ground connections must not be interrupted intentionally;
- To prevent the possible danger of electrocution, do not remove any covers, panels or guards installed on the device, and refer only to NARDA Service Centers if maintenance should be necessary;
- To maintain adequate protection from fire hazards, replace fuses only with others of the same type and rating;
- Follow the safety regulations and any additional instructions in this manual to prevent accidents and damages.

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1 - General Information

1.1 Documentation

Enclosed with this manual are:

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

1.2 Introduction to SW03

The SW03 immunity permits test for immunity against radiated interference to be carried out in accordance with IEC 801-3 (1984), IEC 1000-4-3, EN 61000-4-3 and EN 50130-4 standards.
All radiated immunity tests shall be performed only into protected environment like TEM/GTEM or anechoic and shielded rooms.

Supplied with SW03 are:

- floppy diskette;
- radiated immunity software manual;
- hardware key;
- RS232 cable with 9/25 pin adapter.
- Operating manual

1.3 System set-up

In order to run PMM SW03 immunity software is necessary to set-up a immunity system chain with at least the following equipment:

- one generator supported by PMM software;
- one RF amplifier;
- one antenna or TEM/GTEM
- one PC to run the software
- RF cables

1.4 Optional accessories

The following can be ordered as options:

- 8052 or 8053 Field Meters or OR02 + SB-04 or OR03;
- 6600 Power meter
- 6600D Secondary Power meter
- TEM or GTEM;
- Shielded or anechoic room;
- RF amplifier;
- Antennas;.

1.5 Main specifications

Table 1-1 lists the PMM SW03 performance specifications.

- The actual software performances will be depending upon the instruments used.

TABLE 1-1 Software specifications

Frequency range	1 Hz - 1000 MHz Automatic scanning between Start and Stop;
Breakpoints	up to 5 sweep stops with warning message window;
Sweep mode	start, stop, pause, continue mode;
Frequency step resolution	
in %	min 0.15 % - max. 5%
in absolute value	min 10 Hz - max. 10 MHz
Modulation in AM	INT (1 kHz), INT (1 kHz, 400 Hz or 1 Hz using PMM 3000 only), EXT, (available upon the generator used);
depth	1 to 100%
Pulsed modulation	Internal 200 Hz square wave with PMM 3000;
Controlled Field	1 to 999 V/m
Direct measured of the Field	with PMM 8051 or PMM 8052 or PMM 8053 isotropic field sensor meters or PMM OR03 or PMM SB-04 + PMM OR02;
Indirect	indirect measurement of the field generated inside a GTEM using a power meter;
Power measurement	
Incident power measurement	with Power meter (directional coupler required);
Reflected power measurement	with two channels power meter or with PMM 6600 and PMM 6600D (dual directional coupler required);
Power meter supported	PMM 6600 & PMM 6600D 4220 Boonton 4230 Boonton 9200 Boonton dummy generator
Generators supported	PMM 3000 Farnell 1000/1000B R&S SMX/SMY/SMT02/SMG HP 8647/8656/8648A Marconi 741A TTi TG1010 dummy generator
Report	Print or save into file all test parameters. Text or BMP format available;

Special function	
Manual mode	frequency and level can be manually changed. RF on/off function is implemented;
Multiscan	sequences up to 8 different set-ups. Each test has own calibration curve and scanning parameters;
Send Scan	up to 3 calibration tables can be downloaded to PMM 3000;
Calibration	up to 16 points. The software will use an automatic algorithm to calculate the best calibration curve where at least 12 points are within 0 - 6 dB tolerance;
Tolerance	levelling can be performed with 0.01 V/M tolerance when using 801.3 standard;
Standards supported	IEC 801-3, ENV 50140, IEC 1000-4-3, EN 61000-4-3, EN 150130-4
General	
Magnetic support	3 ½ inches floppy disc. Software must be installed before running;
PC minimum requirements	4 Mbytes, Windows™ 3.1, 3.11, windows95/98™ operating systems; The PMM SW03 does not work on windows NT™
Interfaces	GP-IB board, National Instrument model PC-IIA is supported to drive all the instrumentation using IEEE-488 interface; one RS232 port is used to connect PMM 3000, 8052 and 6600; one dedicated serial ports is needed to connect PMM 8051, 8053, OR03;
Mouse	required;
Cables	GP-IB cable not supplied**;** one RS232 cable supplied for each PMM products;
Hardware key	supplied with SW-03; to be installed on parallel port;

NOTE

Software updates are available for download at the internet address: www.narda-sts.it. If you don't have an internet connection you can request the software updates directly to your NARDA Representative or to the NARDA Sales Office.

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2 - Installation

2.1 Introduction

This section provides the information needed to install your PMM SW03 immunity software and other instruments to setup a radiated immunity system.
Included is information pertinent to initial inspection, power requirements, line voltage and fuse selection, power cables, interconnection, environment, instrument mounting, cleaning, storage and shipment.

2.2 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.

2.3 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 NARDA Representative.

2.4 Preparation for use

All PMM instruments connected to mains supply are Safety Class I equipment, they are 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.

2.5 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 putting any instruments into the main supply line ensure that the line voltage is in the range specified, and that the appropriate fuse have been selected.

2.6 Line voltage selection

To change the instruments power supply voltage refer to each individual instruction manuals**.**

Before connecting any instruments, 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.

2.7 Power cable

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

2.8 Environment

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

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

The instruments 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

2.9 Return for service

If any instruments should be returned to NARDA 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.

2.10 Equipment cleaning

Use a clean, dry, non abrasive cloth for equipment fan opening cleaning.

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

2.11 PMM System Installation

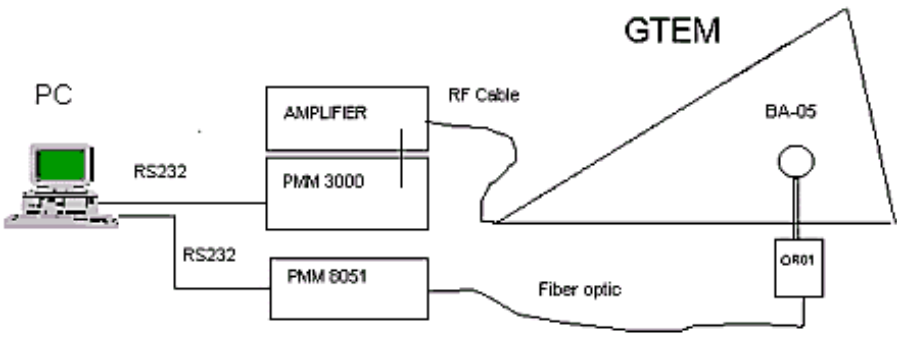
All instruments should be connected according to the specific manuals. If necessary install the GP-IB card (IEEE-488) into your PC.

The below procedure should be followed:

- Remove all power cables including the one used on the PC;
- Open your PC and install IEEE-488 card if required;
- Connect the PC IEEE-488 card to the generator/power meter interface connector using the appropriate GP-IB cable;
- Connect RS-232 cable between PC and PMM 8051 or PMM 8052 or PMM SB-04 or PMM OR03 + 8053-OC, if they are used;
- Connect the RS232 cable between PC and PMM 3000 if it is used;
- Connect the RS232 cable between PC and PMM 6485 if PMM 6600 or PMM 6600D if they are used;
- Plug in the PC, generator, amplifier etc. all the power cables.
- Switch on all the equipment;
- Connect the output of generator to amplifier input;
- Connect the amplifier output to the antenna or GTEM.

2.11.1 8051 application

The typical GTEM/anechoic chamber configuration using PMM 8051 could be:

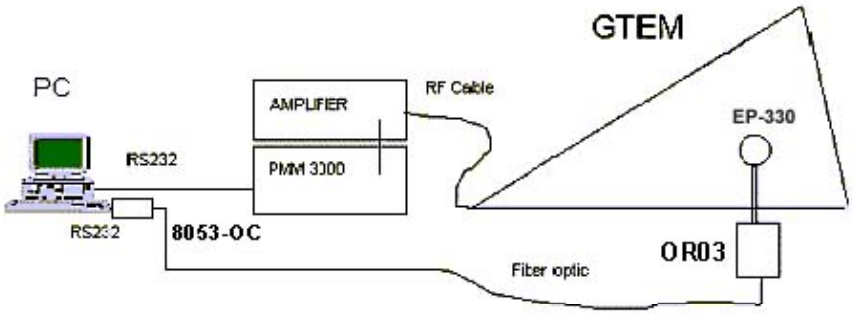


NOTE

PMM 8051 will be used for IEC 801.3 test or during calibration procedure according to IEC1000-4-3.

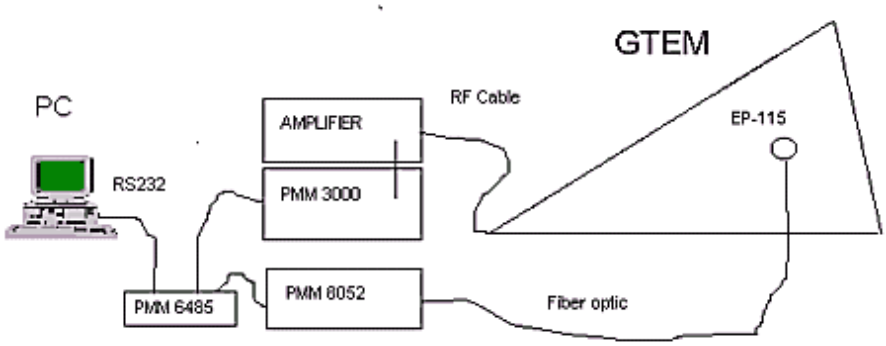
2.11.2 OR03 application

Typical GTEM configuration using PMM OR03



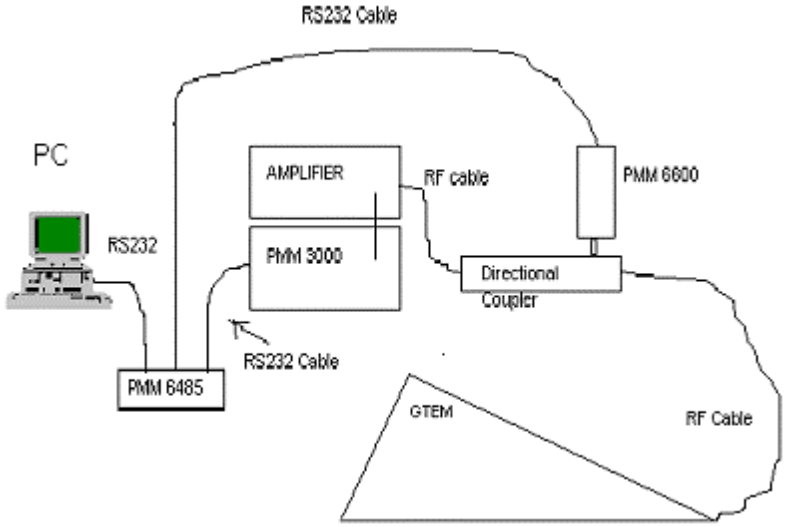
2.11.3 8052 application

Typical GTEM/anechoic chamber configuration using PMM 8052 could be:



2.11.4 Incident power measurement

Typical GTEM configuration using PMM 6600 and single directional coupler:

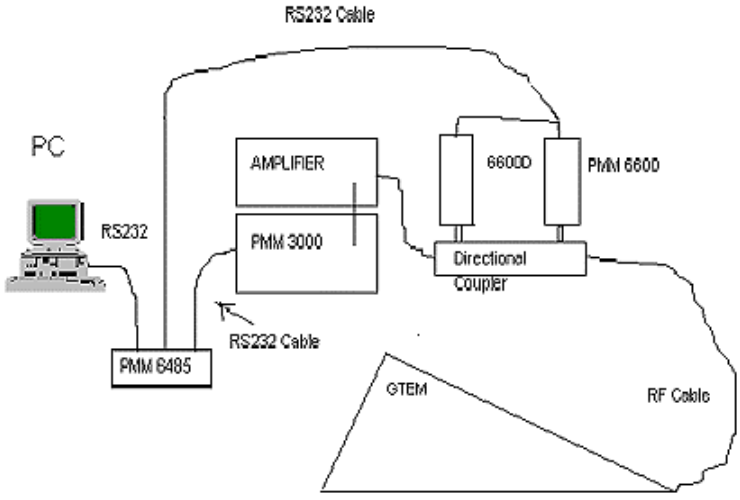


NOTE

The calibration of GTEM can be performed also using a power meter. The SW03 software will calculate the internal field according to GTEM conversion formula.

2.11.5 Incident and reflected power measurement

Typical application with two power meters and dual directional coupler:



NOTE

Using two power meters you can show incident and reflected power.

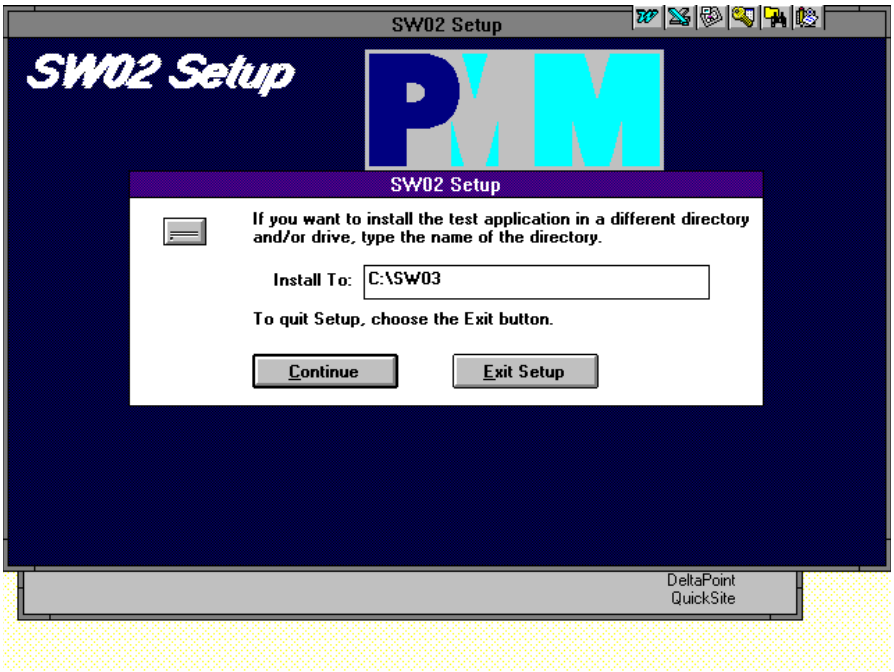
2.12 Software installation

In order to use the PMM SW03 all of the files contained on the supplied diskette must be installed.
Follow the procedure below:

- switch on the PC and launch the Windows operating system.
- insert the PMM SW03 disk in the diskette drive;
- invoke the "**Run**" function from the Program Manager
- enter the command "**A:SETUP**" and press <Enter>.

2.12.1 Confirming directory name

During the installation phase, the program will request confirmation of the directory on which the files are to be installed. Reply with **OK** if you wish to confirm the directory **SW03**, otherwise type in a new name.
The screen display will be similar to the following:



Click on the **Continue** button to continue with the installation procedure, or **Exit Setup** to abort it. During the installation procedure the program will ask if you wish to load also the demonstration program. Answer Yes to install it.

NOTE

It is not necessary to install the National IEEE software for controlling the SW03 software. PMM SW03 already includes the application and diagnostic programs.

WARNING

Never approach the antenna when the system is in operation. The electric field could prove hazardous for the operator. Do not enter the GTEM cell or shielded room or insert limbs or other parts of the body when the system is in operation; hazardous electrical fields are created inside the cell.

Sometimes during the installation, the software can find some files already in use. The window will be:

Answer **Ignore** and proceed with the installation

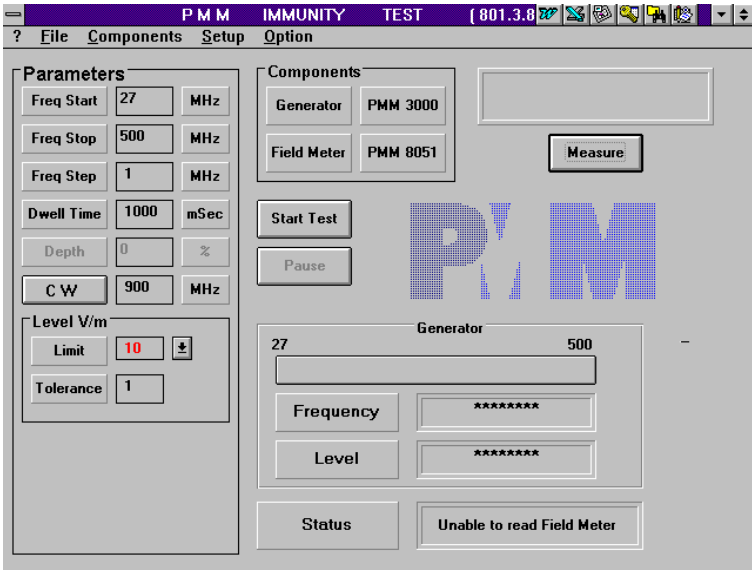
NOTE

During installation, it could happen that a warning window appears on the PC informing that the software can not copy the file SETUP1 (Could not copy SETUP1.exe message). To overcome this problem, with the Program manager go to Windows directory and cancel or rename this file.
Then start again with the installation.

3 - Commands Description

3.1 Typical main menu

Upon launching the radiated immunity program, by double-clicking on the PMM icon, it will display the main commands and all the control and display windows necessary for setting up and checking the test on the monitor. After starting the SW03 program, the following screen display will be shown:



The screen is divided into various areas.

3.1.1 Parameters

The parameters area (**Parameters**) allows the RF generator and test signal level to be set up according the requisite methodologies for carrying out the radiated interference test.

3.1.2 Level

The levels area (**Level V/m**) allows the electrical field that is to be generated and the relative adjustment tolerance to be specified. The tolerance function is only used for the IEC 801-3 test.

3.1.3 Table

The tables area (**TABLE**) shows the table in use and relative comment assigned during table creation. It is only displayed on IEC1000-4-3 test.

3.1.4 Components

The components area (**Components**) shows the model of generator and field meter or power meter used.

3.1.5 Measure

The "**Measure"** button enables the Field meter or power meter to take a reading. The window above the button shows the value of the electrical field expressed in V/m or the incident power expressed in dBm. You can get data only when PMM 8051/PMM 8052/OR03/PMM SB04 + OR02 or a power meter are connected.

3.1.6 Start & Pause

The "**Start Test**" and "**Pause**" buttons respectively start and suspend the test.

3.1.7 Generator

The generator area (**Generator**) indicates the generator's output frequency and level in real-time and test progress via a dynamic horizontal bar strip. Be aware that you should wait few seconds before the blue strip will appear.

3.1.8 Status

Finally, the status area (**Status**) indicates the operations that are currently being performed by the program. For example, reading Field Meter, frequency sent, Stopped, Linking to DDE, End of Test, etc.

3.1.9 Main commands

The main commands are:

- ? Display version number of the software in use
- File File and print report manager
- Components Selection of instruments used
- Setup Select which standards are to be used, Create, modify
- or select correction tables
- or select sweep percent
- Option Insert breakpoints for changing amplifiers or antennas

3.2 ? Command

The **?** command displays the current software version with revision number and date. This manual apply to rev. 1.23 September 2000.

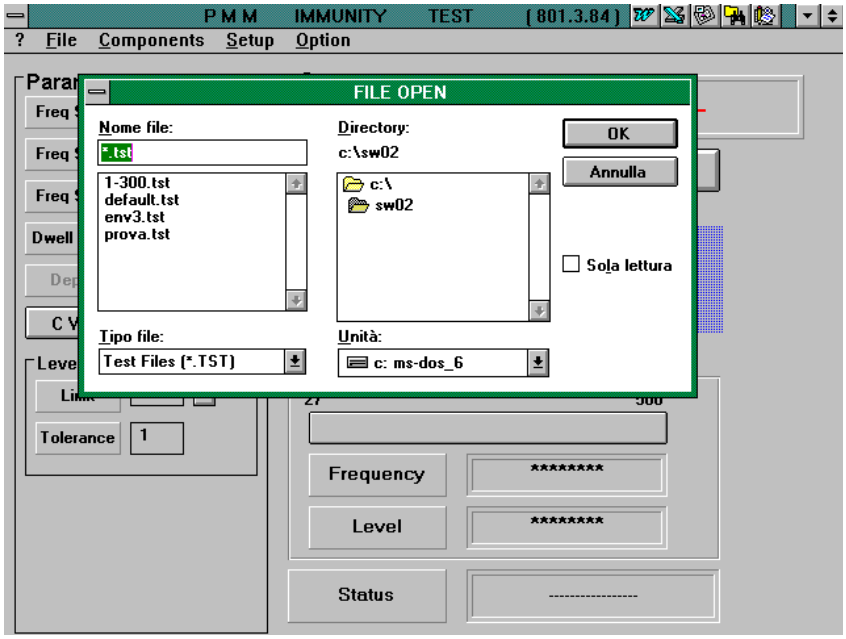
3.3 File commands

The **File** command is used to manage files and report printing. Its subcommands are:

- Open open existing setup files or create a new one
- Save save the measurement setup (configuration)
- Report & Print open a menu for specifying all necessary parameters for printing a test report
- Exit exit interference immunity test program.

3.3.1 Open file

Selecting the **Open** command will result in a display similar to the following:

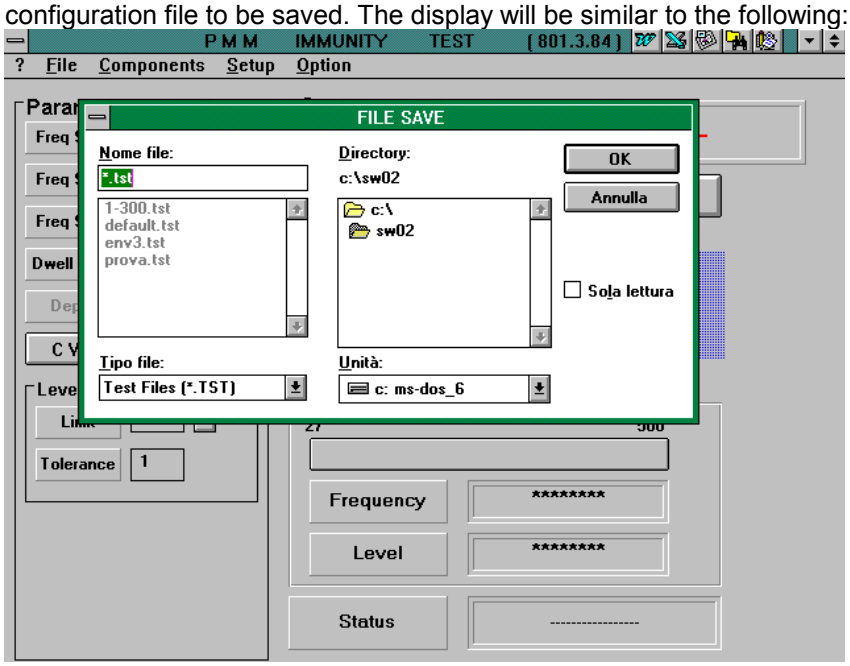


NOTE **All setup files have the .TST extension**.

Normally, the program automatically configures itself with the "**default**" file already present on your directory.
Therefore, if you always want a certain test configuration loaded each time the program is run, all of the corresponding test parameters should be specified and saved in the "**default.tst**" file.

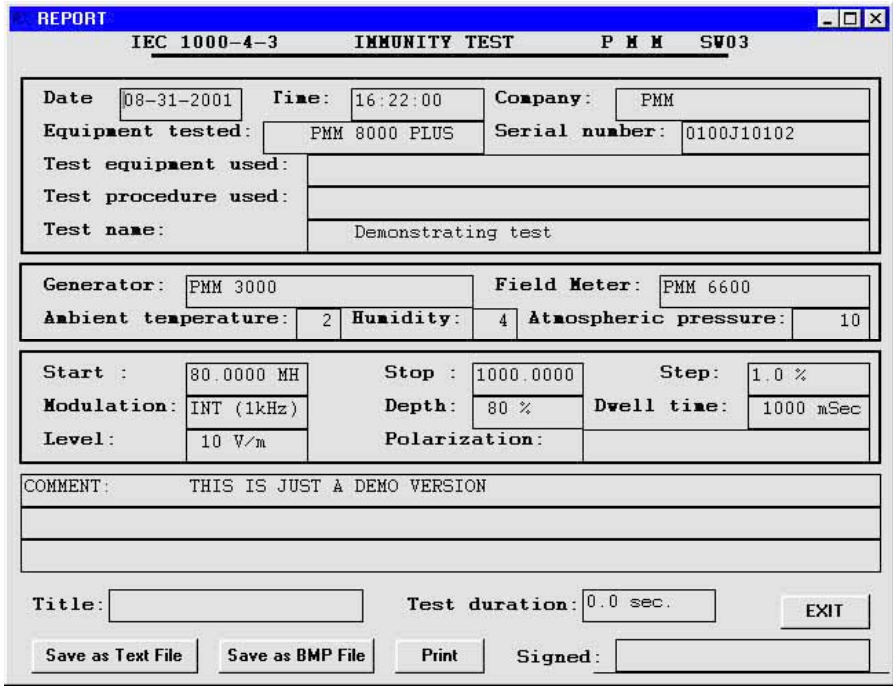
3.3.2 Save

When selecting the **Save** command it is possible to assign a name to the configuration file to be saved. The display will be similar to the following:



3.3.3 Report & Print

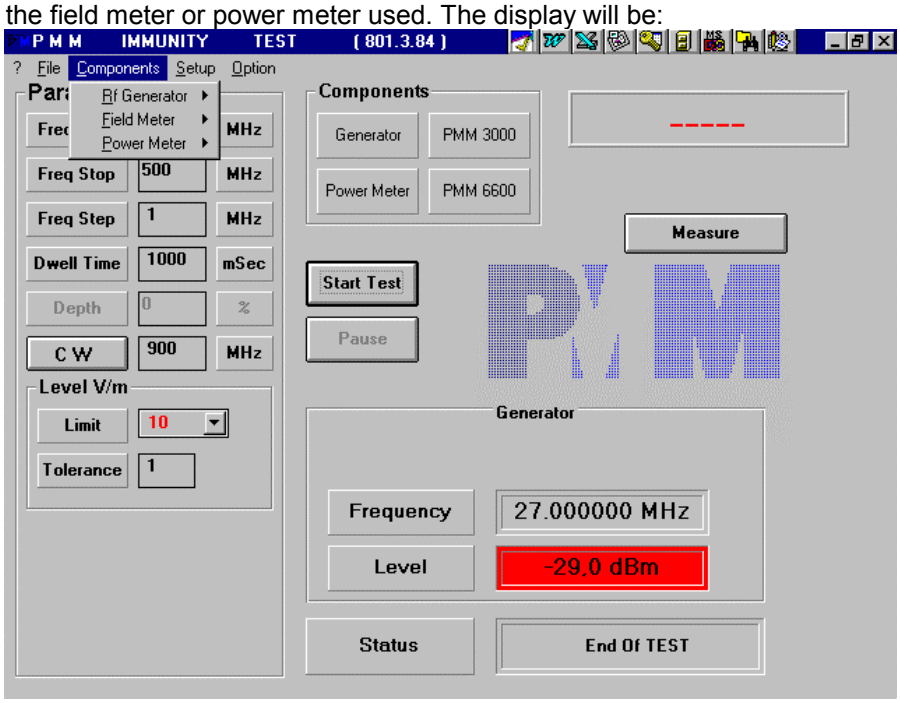
Selecting the **Report & Print** command gives access to the following display, where the operator can specify all of his test parameters and then print the relative report.



Certain parameters are automatically inserted by the SW03 software. The remainder must be manually specified by the operator.

3.4 Components

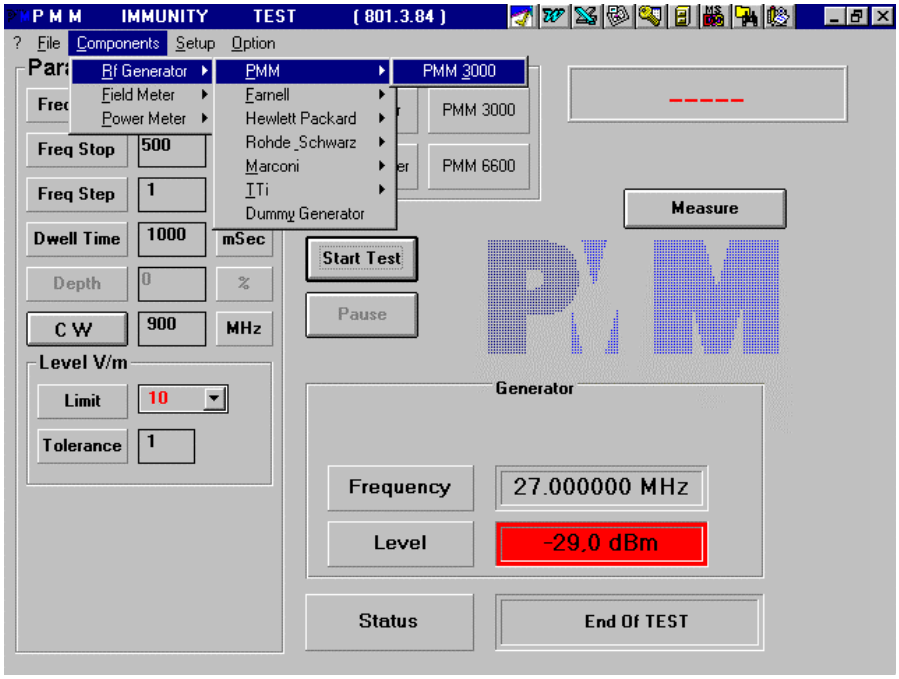
Before to start any test you must configure the SW03 immunity software according to the instruments composing your test system.
The **Components** command is used to select and setup the RF generator, the field meter or power meter used. The display will be:



Point the mouse to the appropriate window and move it to right to select the device.

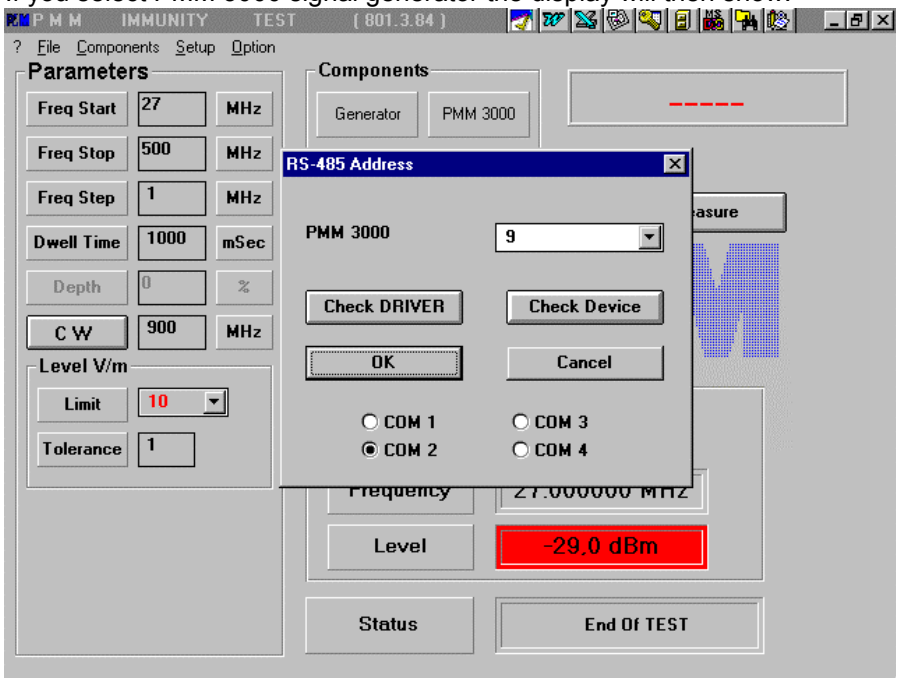
3.4.1 RF Generator

Selecting the **RF Generator** command opens a new window for choosing the generator used in the system. The display will be.



3.4.1.1 Using PMM 3000

If you select PMM 3000 signal generator the display will then show:



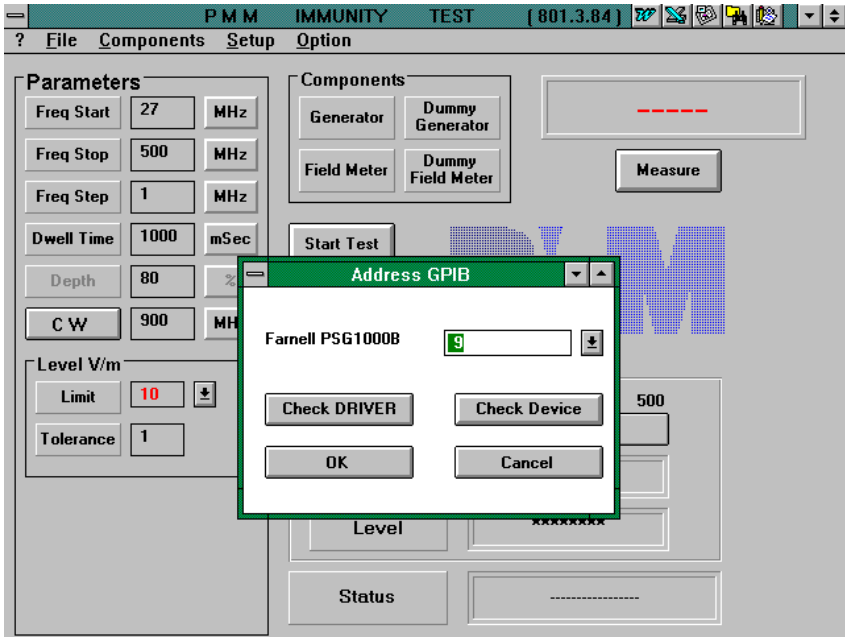
The procedure to follow is:

- type in the RS485 address. Be sure that this number is the same as the address used by PMM 3000;
- Select the appropriate communication port where PMM 3000 is connected to PC;
- check the driver and the device respectively.

NOTE

Be sure that the minimum level assigned with the command LIMITS is >-80 dBm (see SetUp command description).

For all other GP-IB programmable generators, the display will be similar to the following one:



The GP-IB (IEEE-488) address must be identical to that set on the generator. Refer to the operating manual of the generator employed. The Farnell generators have a default address of 09. To see the Farnell generator's address on the display, type #05 on the generator's keyboard. The **Check Driver** and **Check Device** commands permit checking of the Driver and Device respectively.

The **Dummy Generator** is a virtual generator driver. This virtual instrument is very useful for learning to use the software when instrumentation is not available or for creating test sequences in the office and then transferring them to the laboratory's test system.

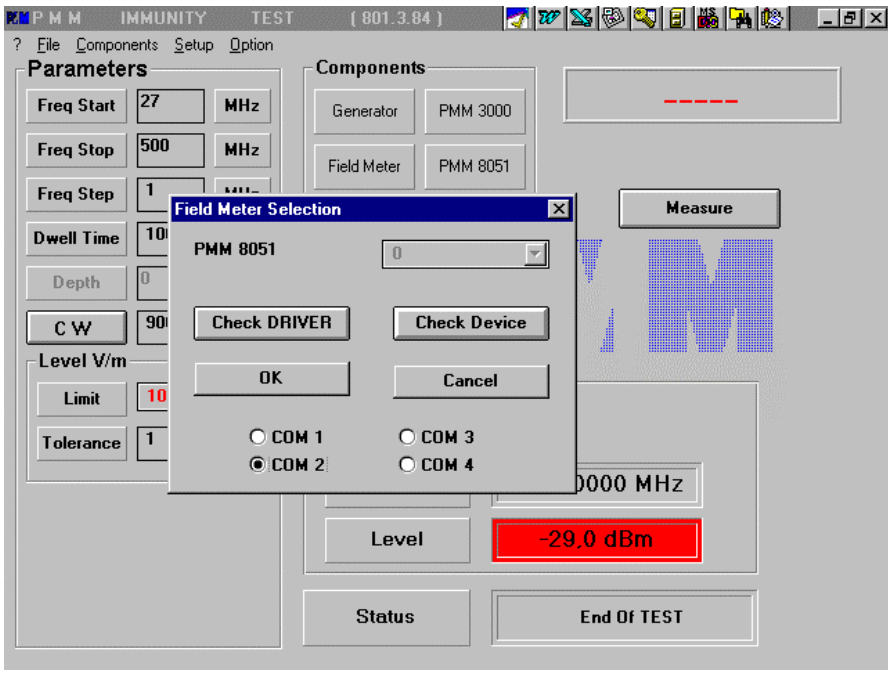
Field meters are used to calibrate your GTEM/Anechoic chamber before starting any tests (IEC1000-4-3) or they are used to monitor the field and provide a feedback to keep your test field at constant level over the frequency (IEC 801.3).

3.4.2 Field Meter

Selecting the **Field Meter** command will give the following options:

PMM 8051
PMM 8052
PMM 8053
PMM OR03
PMM OR02 + PMM SB04
(Dummy)

Selecting the **PMM 8051** option opens a window for defining the serial port of the PC to which the PMM 8051 is connected.
Same for other field meters type.



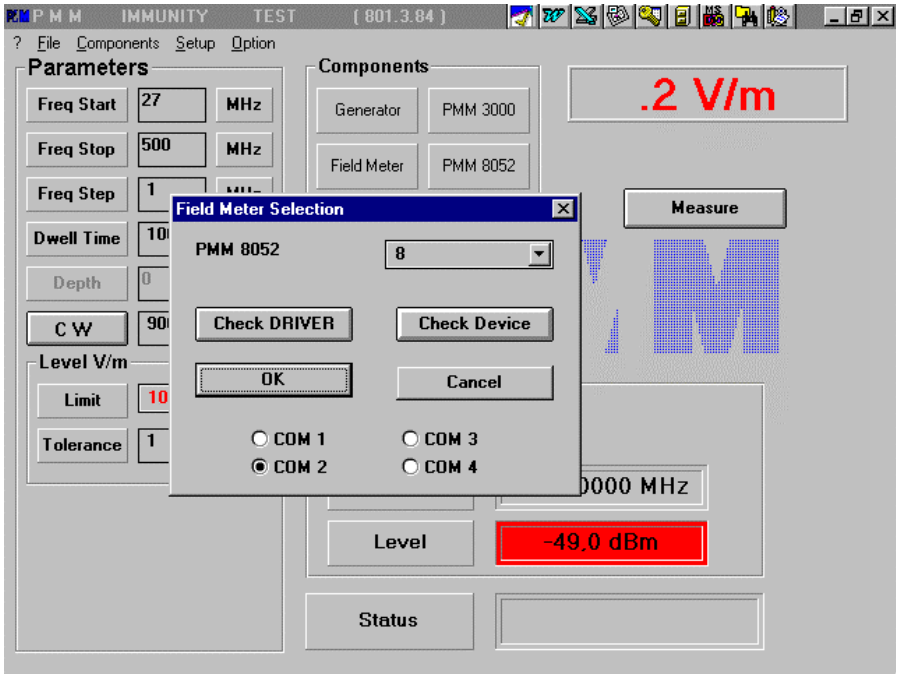
Always check if PMM 8051 is responding correctly pushing **Check DRIVER** and **Check Device** respectively.

CAUTION

Do not use the same port as that already used by the mouse or other devices connected to the PC.
Also, do not insert PMM 8051 to PMM 6485 RS232 Adapter: It doesn't work.

The **Dummy Field Meter** is a virtual field meter. . This virtual instrument is very useful for learning to use the software when instrumentation is not available or for creating correction tables without using any field meters as feed-back device for the measurement chain.

Selecting PMM 8052 you get the following display:



The procedure to follow is:

- type in the RS485 address. Be sure that this number is the same as the address used by PMM 8052;
- Select the appropriate communication port where PMM 8052 is connected to PC;
- check the driver and the device respectively.

NOTE

Do not use the same address used by the PMM 3000 generator otherwise you will get a conflict address problems.

3.4.3 Power Meter

The Power meter can be used for the several application depending upon the device connected to the power amplifier.

Using a GTEM/TEM you can perform:

- to use the power meter as a feedback device when performing IEC 801.3 test;
- to monitor the input power to the cell (either using IEC 801.3 or IEC1000-4-3) during the tests;
- to show the field expressed in V/m based on GTEM formula calculation.

Using an antenna, the software will perform:

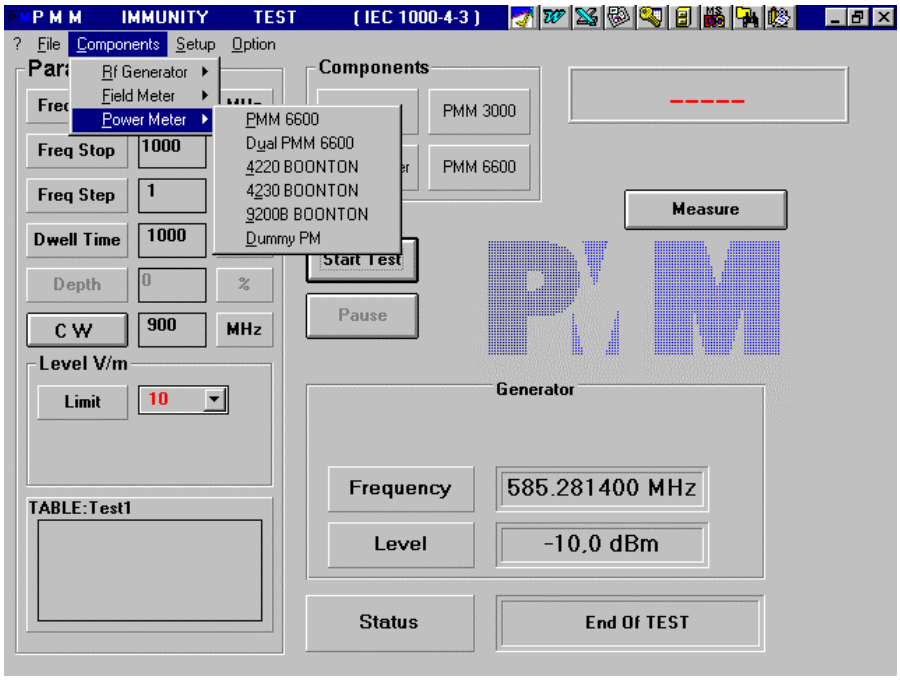
- monitor the incident power to the antenna according to IEC1000-4-3. In this case you need a directional coupler.
- monitor the reflected power. In this case you need PMM 6000D (secondary Power Meter) or other supported dual channel power meters together with double directional coupler.

NOTE

Do note try to use the power meter as a feedback device (like when you perform IEC 801.3). You will get wrong results because the antenna is not linear with the frequency.
Do not try to convert dBm's into V/m because you can not apply for the formula used by GTEM.

3.4.3.1 Power meter's selection

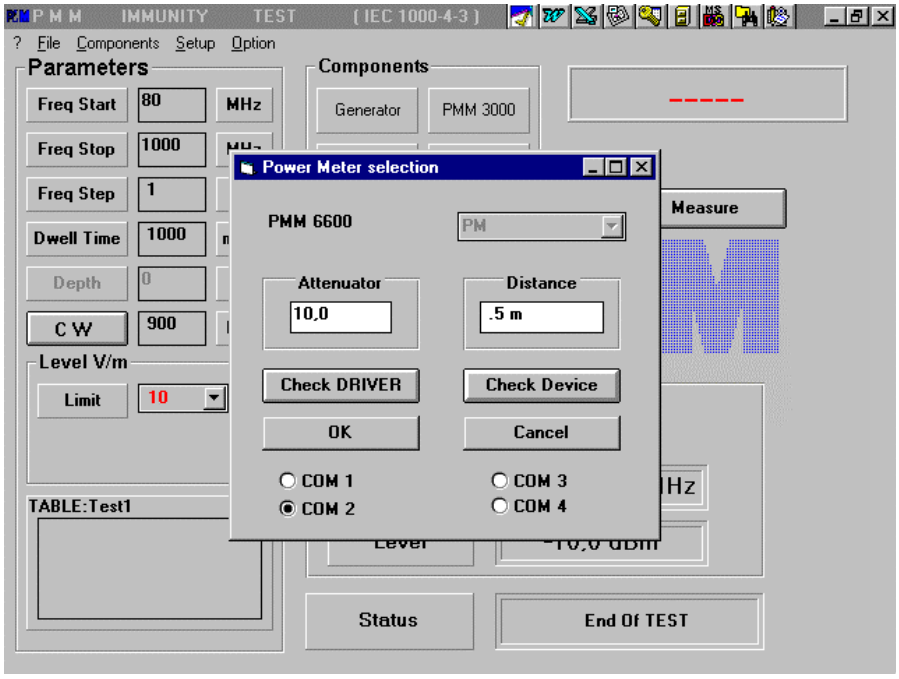
From the main menu, activating **Components** you get the list of supported power meters. The display will be:



As soon as you select one meter listed on the window, the software will open an appropriate menu to setup the selected device.

3.4.3.2 Selecting PMM 6600

Selecting PMM 6600 you have the following display:



The possible choices are:

- **Attenuator** to enter the forward coupling factor of the directional coupler;
- **Distance** to enter the septum height where the EUT is located;
- **Check DRIVER** to test if the software driver is working;
- **Check Device** to test if the instrument is working;
- **Com** to select the serial port used by your PC.

Always check for Driver to be sure that your power meter is working properly.

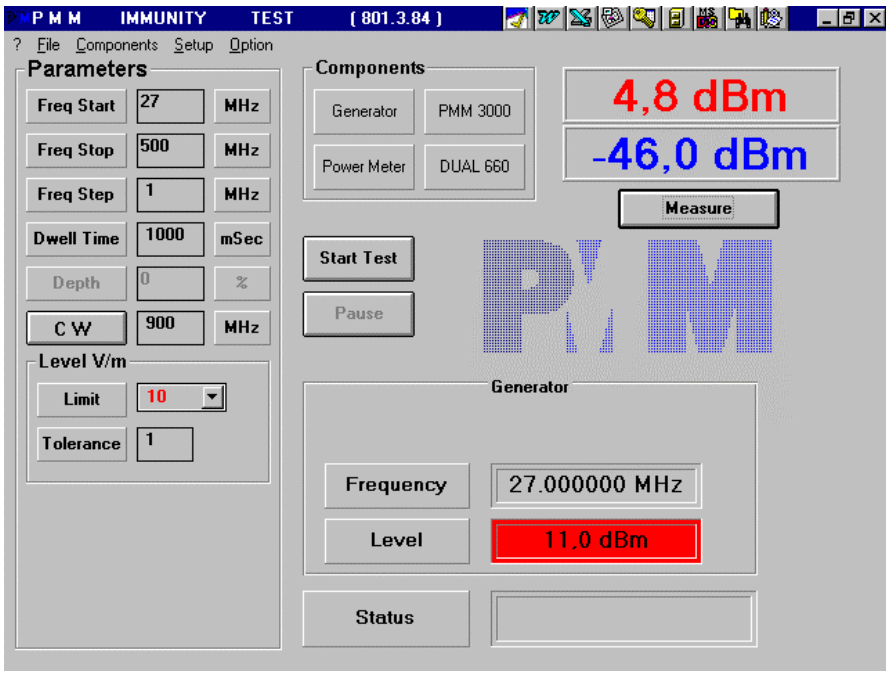
NOTE

Also, due to the specific PMM 6600 design, you should not enter any RS485 address. The software will automatically recognize it.

If you selecting the dual PMM 6600 still you should not apply for the address. Also the second power meter is automatically recognized by the software.

3.4.3.3 Second measurement window

Using one dual power meter, as soon as you push the button **Measure**, the software will open a new measurement window below the main one to show the reflected power. The display will be:



If you are using a GTEM you can switch the units from dBm to V/m using **Option** command.

3.4.4 Setup command

The **Setup** command is used for:

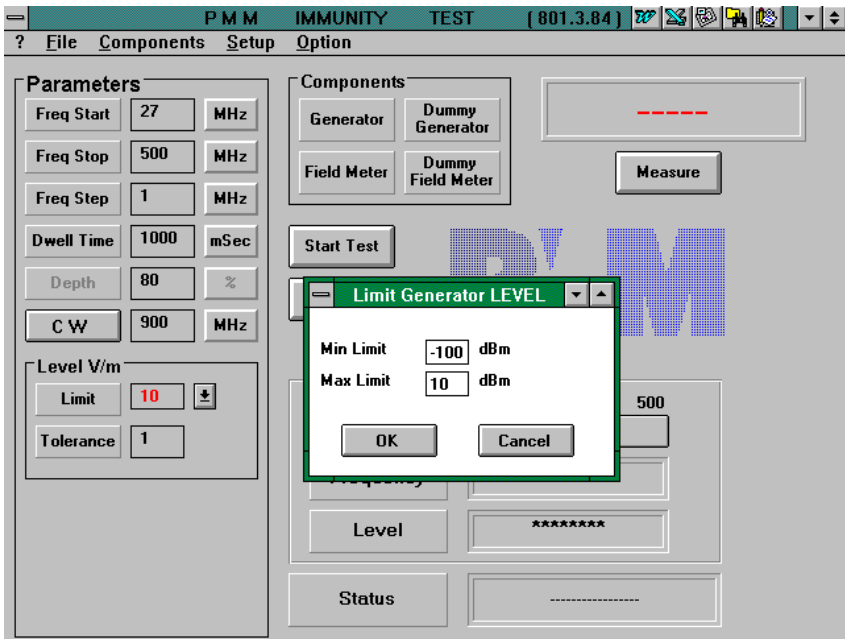
- specifying the permitted generator levels (minimum e maximum);
- selecting the desired standard to use (IEC 801-3.84 or IEC1000-4-3);
- creating the compensation table;
- specifying the generator's AM modulation.
- activating a multi-sequence tests

The available commands are:

- **LIMITS**
- **801-3.84**
- **IEC1000-4-3**
- **SetUP Table**
- **Modulation**
- **Multiscan**

3.4.4.1 LIMITS

The **LIMITS** command sets the minimum and maximum output levels used by the RF generator. The limits are expressed in dBm.
The following window is displayed when this command is selected:



The minimum value chosen will depend on the minimum field value that is to be applied to the equipment under test. Too low a value will slow down the initial procedure for determining the optimal level for equalization.
In order to avoid excessively severe testing, selection of the maximum value should be made according to the maximum electrical field value that is to be applied to the equipment under test.

The value specified will depend on the amplifier's gain, its maximum power output, the gain of the antenna or GTEM cell and the distance between the antenna and the equipment to be irradiated. The minimum and maximum values can be mathematically calculated if all parameters of the measurement chain are known. Normally, it is more practical to carry out empirical tests.

NOTE

When using PMM 3000, the minimum level should be > -80 dBm.

CAUTION

Do not over drive the input stage of the amplifier. Take always care of the maximum input permissible to the RF amplifier. Usually all amplifier can support up to 0 dBm. See the specific amplifier's operating manual.

3.4.4.2 801-3 test

On selecting the **801-3.84** command, the system automatically initializes itself for the generation of signals between 27 and 500 MHz without modulation.
In any case, the operator can specify any parameter including the modulation. Obviously, the **SetUP Table** command is unavailable as it is reserved for IEC1000-4-3 tests only.
The measurement always needs one of the supported field meters, or if you are using a GTEM, any supported power meter (or Dummy Field Meter) for feed-backing the electrical field's measurement chain.

3.4.4.3 IEC1000-4-3 test

Selecting **IEC1000-4-3** sets the measurement from 80 to 1000 MHz with RF generator modulation enabled. The first time that you perform immunity test, it is necessary to create the compensation table via the **SetUP Table** command without the modulation.

3.4.4.4 SetUP Table

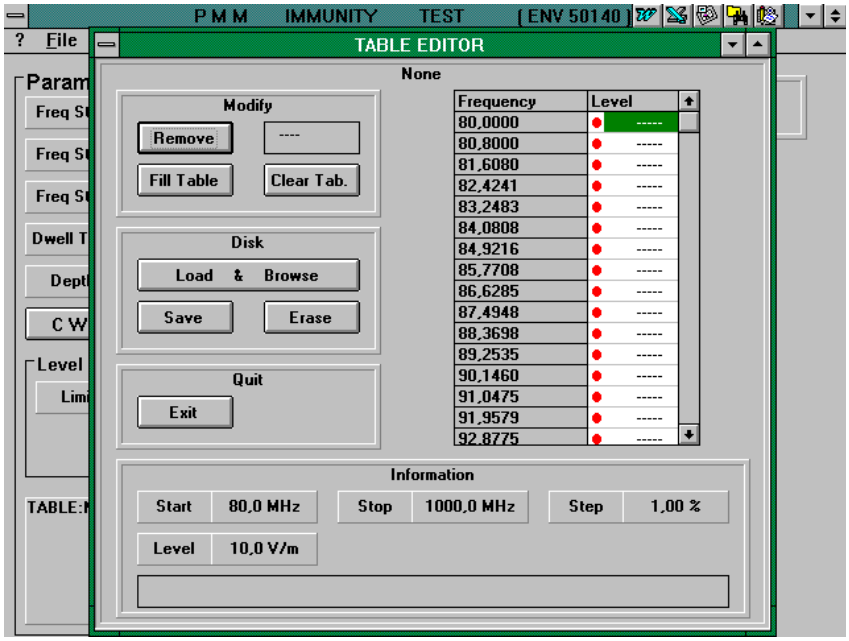
The **SetUP Table** command activates the compensation table creation procedure or load any correction table already available.
Its subcommands are:

- **Edit**
- **Make automatic**

The tables can be manually created and modified with the **Edit** command or automatically created with the **Make automatic** command.

3.4.4.4.1 Typical Edit command window

Selecting the **Edit** command will result in the following display:



It is possible to modify a table in this window via the commands grouped in the **Modify** area.

The available commands are:

3.4.4.4.2 Remove a parameter

- **Remove** remove (and modify) the RF generator value from the field pointed to by the mouse.

3.4.4.4.3 Filling a table

-**Fill Table** automatically insert (fill) the theoretical values obtained from a linear interpolation between initial and final data points in the table. For example: if the first field has a value of 0 and the tenth is set to 10, the program will assign all the intermediate values 1 to 9 (expressed in dBm) to the RF generator.

3.4.4.4.4 Clearing a table

Clear Tab. cancel table contents but keep the table and its structure.

The typical file manager commands are available in the **Disk** area:

3.4.4.4.5 Load & Browse
3.4.4.4.6 Saving a table
3.4.4.4.7 Erasing a table

- **Load & Browse** search for and load a file;
- **Save** save a table (can also be used to rename a table);
- **Erase** completely delete an existing table.

Note: all tables have the **.FAC** extension.

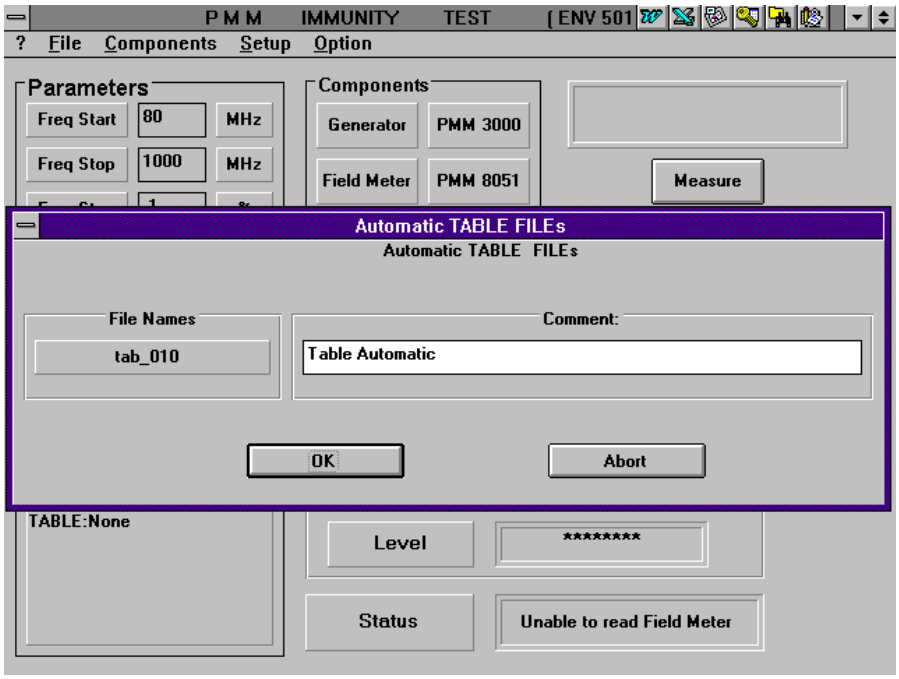
The **Information** area shows the previously selected test parameters together with a field reserved for table comment lines.

3.4.4.4.8 Making a table

The **Make automatic** subcommand automatically generates a correction table. An algorithm inside the program creates a table that satisfies the field uniformity requirements of 0/+6 dB over at least 12 measured points out of 16.
The program always requires the presence of one of the supported field meters (or Dummy Field Meter).

3.4.4.4.9 Make automatic

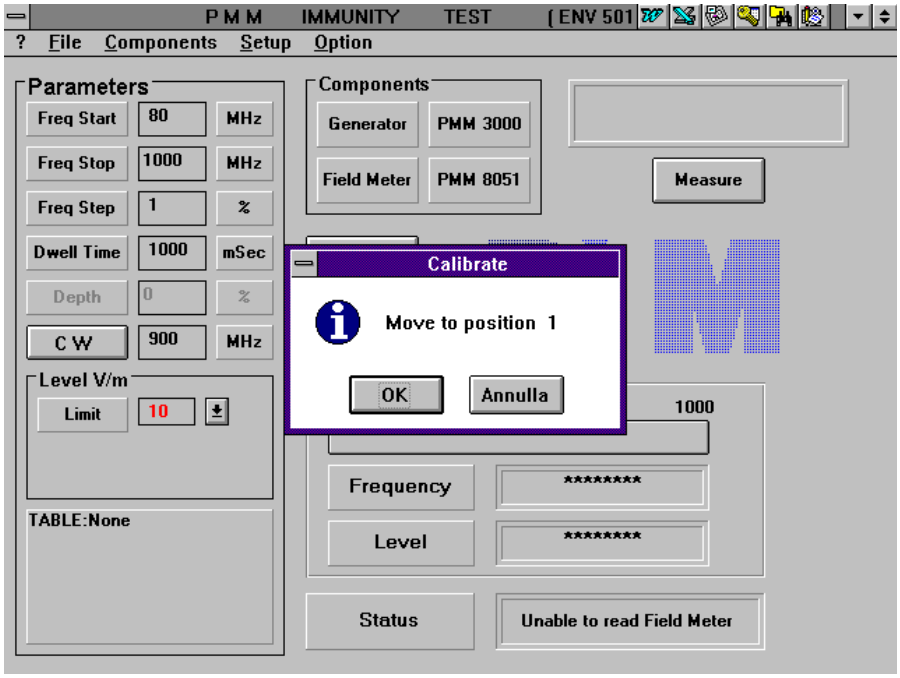
At the start of the **Make automatic** procedure, the program requests confirmation of the table name. Here, an **OK** reply is sufficient; otherwise, to specify an alternative name and relative comment, just click inside the File Names box. The display will be similar to the following:



The created table will be associated with the desired field value.

3.4.4.4.10 Isotropic probe positioning

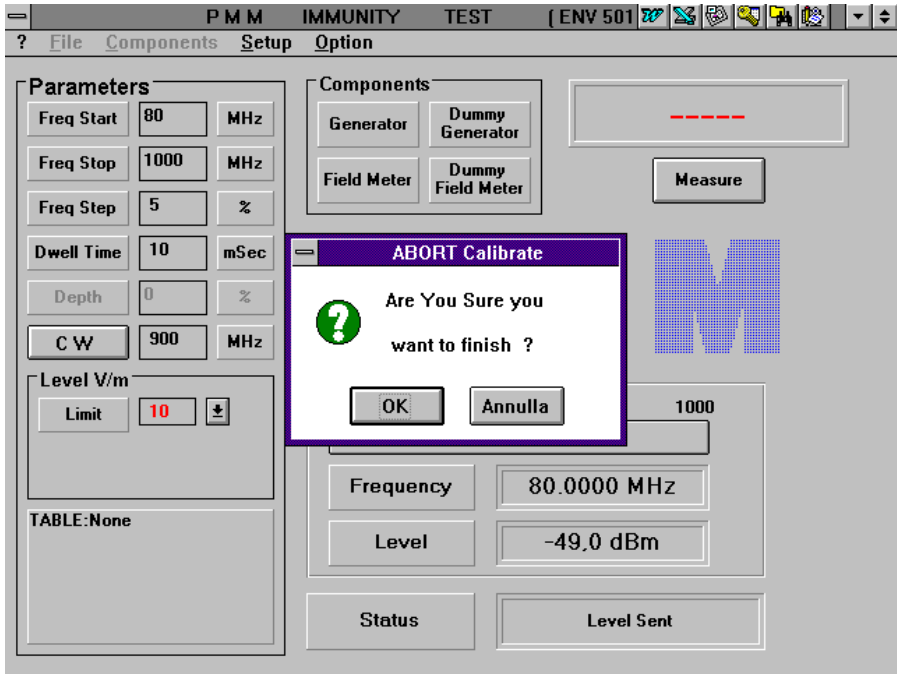
Upon replying **OK**, the program will request that the isotropic probe be set on the first position by displaying the following prompt:



On receiving the **OK** reply, the program will commence the first frequency sweep. Subsequently, the program will prompt for the probe to be moved to the second position. Reply **OK** and the program will carry out the second sweep and so forth. You can perform the calibration making up to 16 measurements. The user can stop at any time.

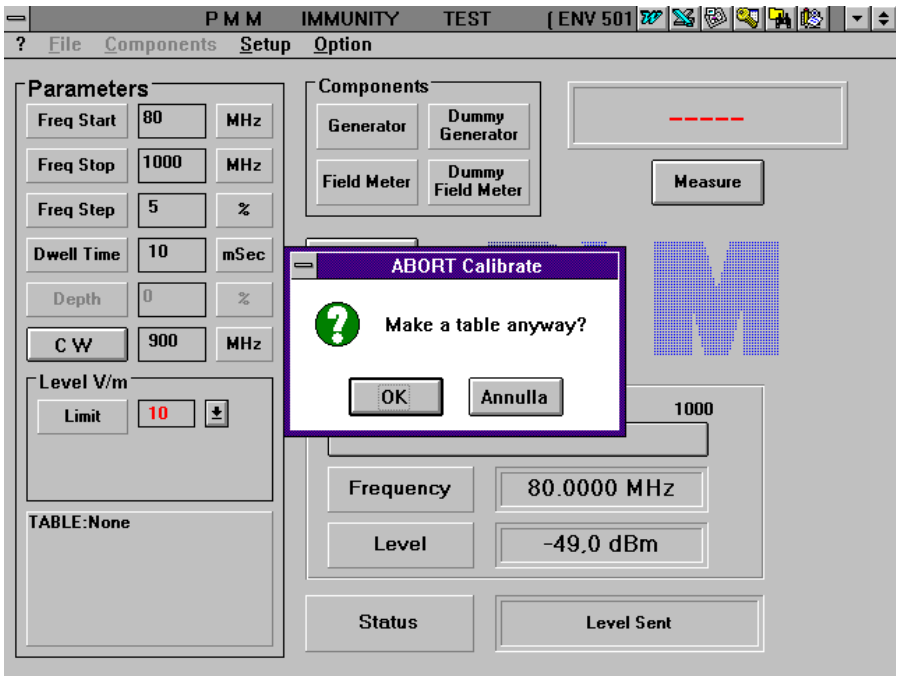
3.4.4.4.11 Confirmation if you want to stop in advance

If you stop before making 16 measurements the following warning message will appear:



3.4.4.4.12 Making a table without 16 complete measurements

If answer Annulla, you will continue the calibration otherwise if you answer **OK** you will get the following message:



If you answer **OK** the software will calculated the best correction table.
You can see such operation looking at sliding bar that will fill up.

3.4.5 Modulation

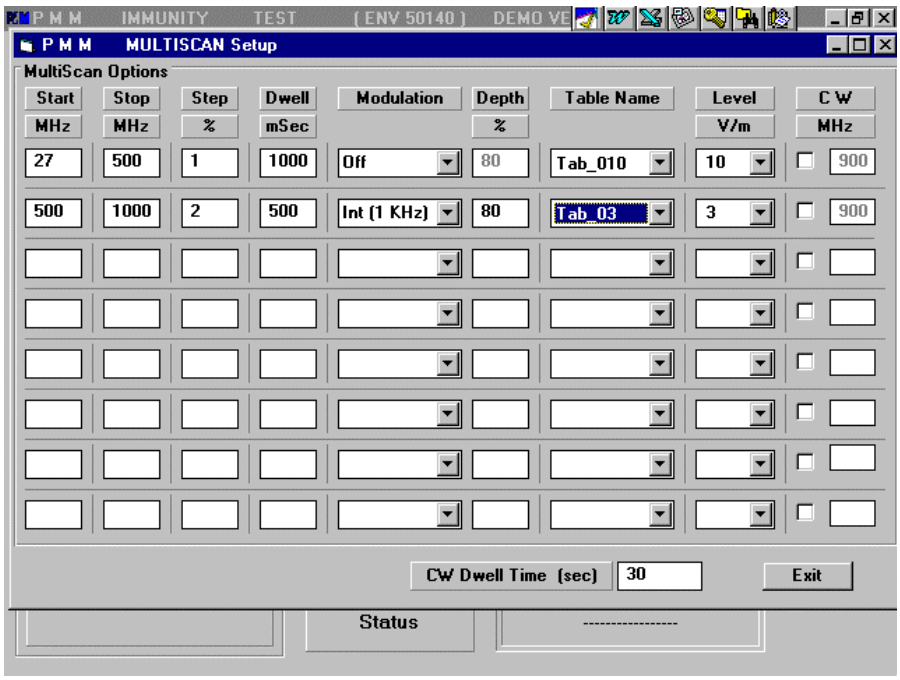
Before using your table and start the test you must apply for modulation.
By selecting the **Modulation** command, it is possible to adjust the RF generator modulation via the following subcommands:

- **OFF** no modulation
- **INT (1 kHz)** AM modulation, internal at 1 kHz
- **INT (400 Hz)** AM modulation at 400 Hz; only when you are using PMM 3000
- **Pulse** 200 Hz pulsed
- **1 Hz Pulse** 1 Hz pulsed
- **Ext** external modulation.

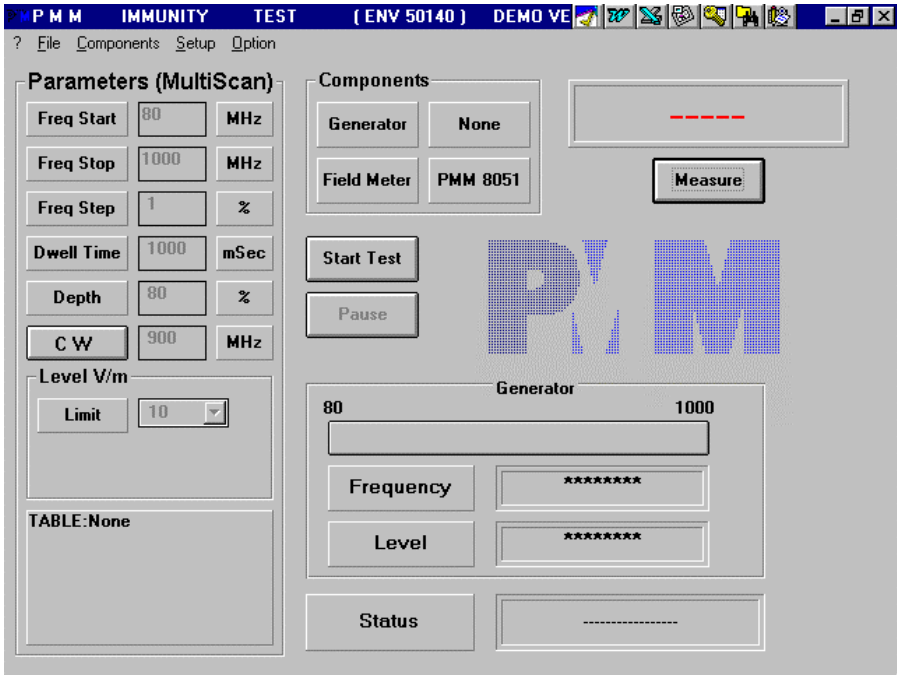
If modulation is **OFF**, the **Depth** parameter in the **Parameters** area remains inactive.

3.4.6 Multiscan

Multiscan is a sequence of sweeps with different parameters. It is very useful to test your products applying different levels in different bandwidth.
Activating **Multiscan** you get the following display:



In this menu you can apply up to 8 different setups. It is mandatory to use for each sweep the proper associated table.
When the menu is filled up, push Exit and go to Main menu.
From **SetUP** you must select **Multiscan** and then **Setup** again.
The display will be:



To start the Multiscan sequence, push Start Test. On the Parameters area you can see all parameters associated with each individual sweep.

3.5 Option command

Selecting the last main command, **Option**, gives access to the following subcommands:

- **Step Percent**
- **BreakPoints**
- **Send Scan to PMM 3000**
- **Show Power as Field**

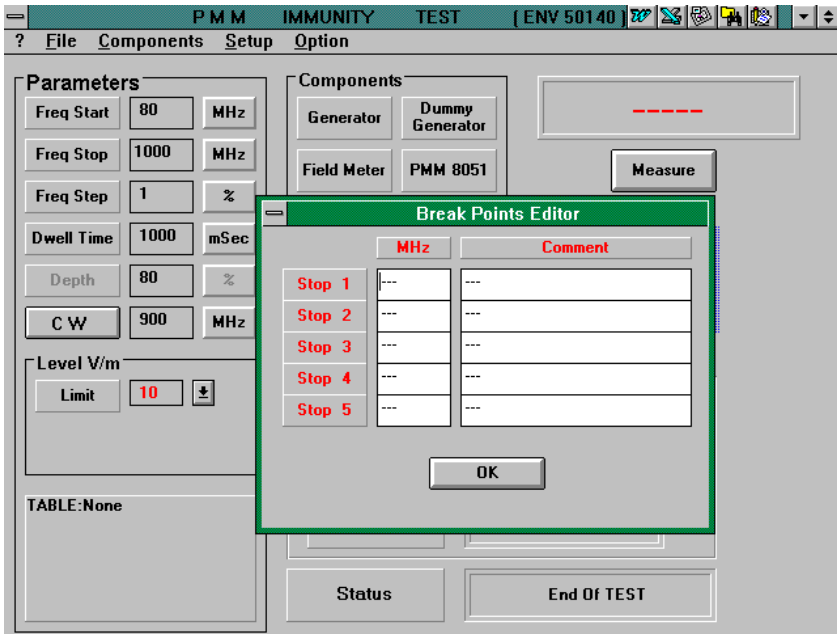
3.5.1 Step Percent

The **Step Percent** subcommand allows the sweep steps to be defined in percentage values instead of absolute frequency increments. The setting can vary between 0.000001 MHz and 10 MHz. For IEC1000-4-3 tests, the frequency step is always a percentage from 0.15% to 5%.

3.5.2 BreakPoints

The **BreakPoints** subcommand opens a table where sweep interruption points can be inserted for changing the antennas or amplifiers.

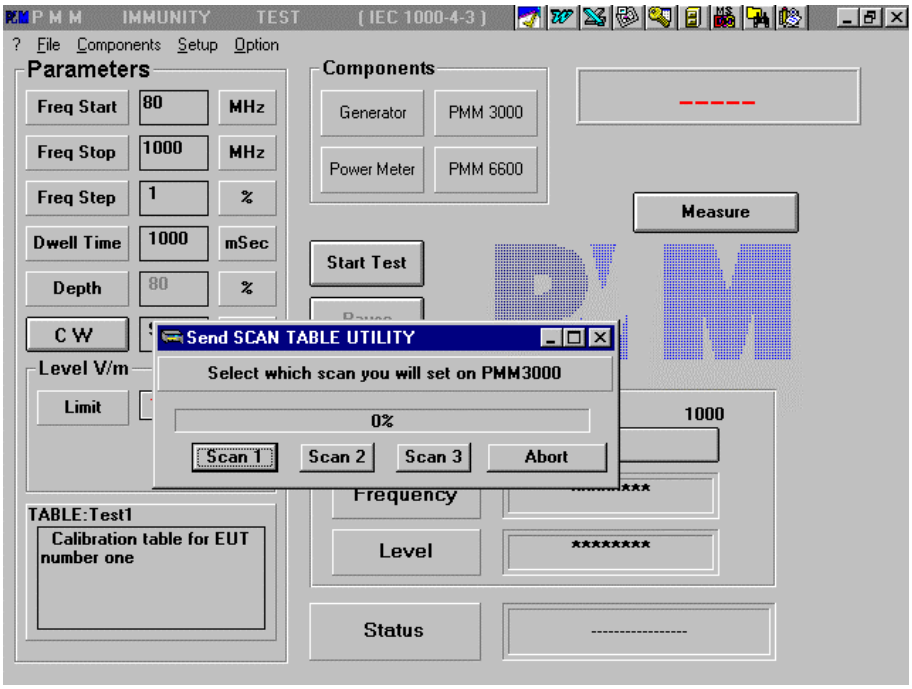
Up to 5 breakpoints can be defined. The program displays the following window:



All that is needed is to insert the stop frequencies in the MHz column, add an eventual comment on the same line and close the window by clicking on the "**OK**" button.

3.5.3 Send Scan to PMM 3000

PMM 3000 generator has a built in a memory to keep up to three tables in order to run a test without using the PC with SW03 immunity software.
This command is used to send such tables to PMM 3000. Refer to PMM 3000 manual to learn how to start the tests from the generator.



Select which PMM 3000 memory you want to fill up choosing Scan1, Scan2 or Scan3.

3.5.4 Show Power as Field

This feature convert the power measured by the power meter into the equivalent electric field expressed in V/m. This conversion applies only when you are using a GTEM.

4 – Test Parameters Specification

4.1 Introduction

Before carrying out any test or calibration, it is necessary to set up the associated parameters.
The following can be set in **Parameters** area:

- **Freq. Start** generator start frequency
- **Freq. Stop** generator stop frequency
- **Freq. Step** step increment in frequency or percentage
- **Dwell time** time that generator remains at a particular generated frequency
- **Depth** depth of modulation
- **CW** RF generator frequency in continuous mode.

The start and stop frequencies are specified in MHz. The minimum value is 10 Hz, the maximum is 1 GHz.

The **frequency step** can be defined as an absolute value (minimum 10 Hz, max. 10 MHz) or as a percentage, from .15 to 5 %.

The **Dwell time** is in msec. It represents the duration time of each individual step.

NOTE

Take care not to specify too small a value with respect to the programming speed of the generator used. This will cause some bus conflict.

The depth of modulation value (**Depth**) is always expressed as a percentage.

In the **Level V/m** area, it is possible to set the following for the electrical field intensity:

- **Limit** defines the desired field. It is possible to choose between three predefined values (1, 3, 10 V/m) or specify a different value as required.
- **Tolerance** specifies the feed-back tolerance, expressed in V/m. This window is only shown if the **801-3.84** command is selected.

NOTE

The equalization procedure, (the process to keep constant the field inside the GTEM or Anechoic room), is slightly slowed down with small tolerance values, but a high level of uniformity against generated field frequency is attained. Using higher values speeds up the equalization process but the precision will be lower.
The tolerance is only handled when the value is lower than the specified electrical field. For example: if the value is 5 V/m and the tolerance is 1 V the correction will only occur for values lower than 5 V/m and above 6 V/m.

The instruments that are part of the measurement chain are displayed in the **Components** area. This display-only area, shows the model of generator and relative field probe or power meter used.

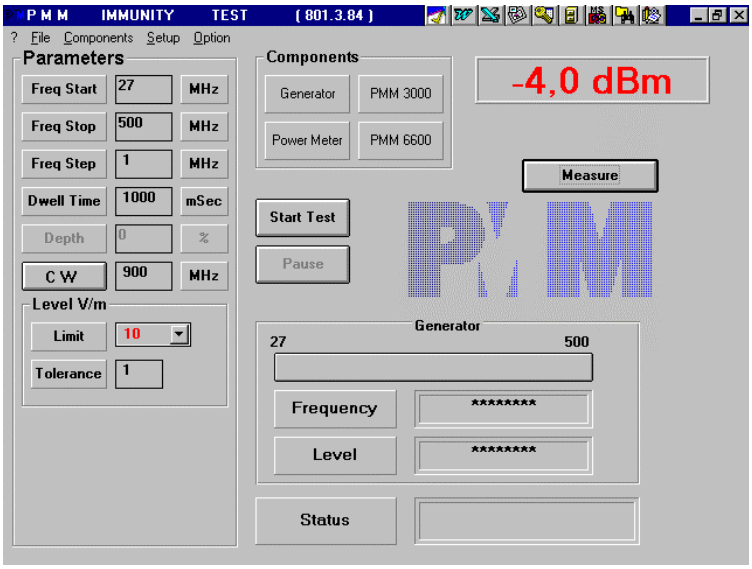
There are three buttons and a window (or two) for displaying the electrical field measured by the selected field meter or power measured by the power meter(s) in the **measure** area. The buttons have the following functions:

Measure

To enable the PMM 8051/8052/8053 or SB04 + OR02 or OR03 or the power meter to take a reading and directly displays the value read. If the Dummy Field Meter is used, a theoretical value near the selected electrical field level will be displayed;

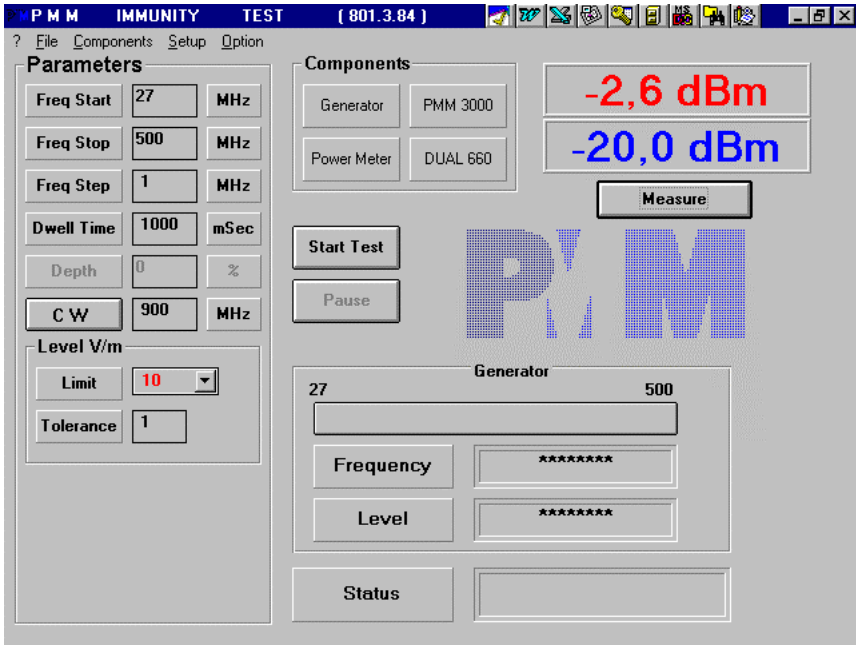
4.2 Single power meter measurement

If you use only one power meter the software shows only one window to display the power measured. The display will be similar to the following one:



4.3 Dual power meter measurement

If you are using two (or dual) power meters, a second window, below the main one, will display the value measured by the second one. The display will be similar to:



NOTE

The second power meter measurement window will appear only when the Measure button is depressed.

If you convert such value into V/m using **Option** function, this conversion is valid only when GTEM is used.

Start Test

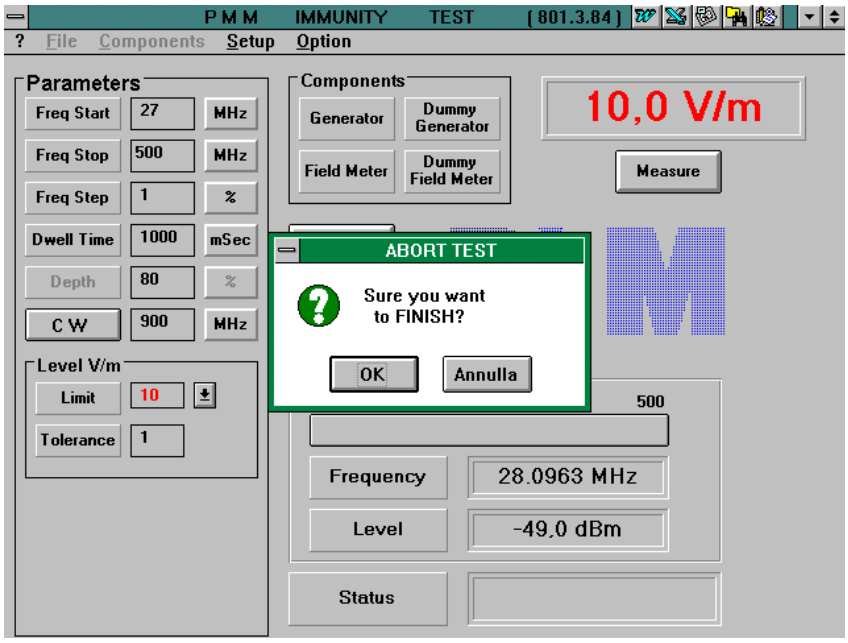
To commence measurement. When this command is activated the button will be substituted by the **Abort Test** button for eventually interrupting the test;

Pause

To temporarily suspend the test. When this command is activated the button will assume the **Continue** function. Activating the **Continue** command restarts the test from the point where it was interrupted by the **Pause** command.

4.4 Abort Test command activation

When the **Abort Test** button is pressed, the following confirmation prompt is displayed:



The program will terminate the test on an **OK** reply. The test will proceed if **Cancel** is pressed.

A bar strip, with limits corresponding to the start and stop frequencies specified in the **Parameters** area, will be activated in the **Generator** area. As the sweep proceeds the bar will grow indicating sweep progress.

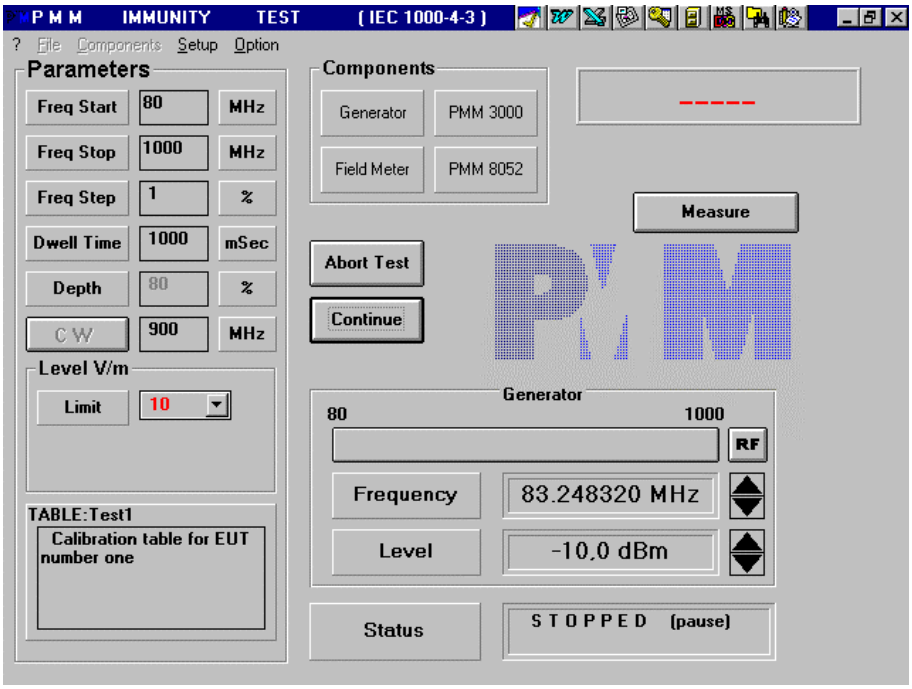
The frequency set on the generator is displayed in the **Frequency** field.

The RF generator output level is displayed in the **Level** field.

The program's operational status is shown in **Status** field, (e.g. waiting for Field Meter, unable to read Field meter, Stopped, leveling, frequency etc.).

4.5 Display screen of measure interrupted by the Pause command

Activating the "**Pause**" command enables two pairs of arrows at the side of the **Frequency** and **Level** fields, via which it is possible manually increase or decrease the generator parameters.



NOTE

When you are in Pause it is possible to turn on/off the generator clicking on RF buttor.

5 – IEC 801.3 Standard Immunity Tests

5.1 Introduction

The test consists in generating a uniform electrical field for irradiating the equipment under test. This test must only be performed inside a shielded room or a TEM/GTEM cell.
The IEC 801.3 standards prescribe that the electrical field be constantly monitored by an electrical field meter during execution of the test.

NOTE

Check that all the components of the measurement chain are connected together and switched on.

The test is completely automatic and its execution immediate. The **Setup** command on the main menu is activated and then **801-3.84** selected. All that is required is to set the desired field level, the Tolerance and click on the **Start Test** button to start the automated generator sweep and thus irradiate the equipment under test.
When the **Start Test** command is activated, the generator level is set to the minimum specified during **Setup** via the **LIMITS** subcommand.

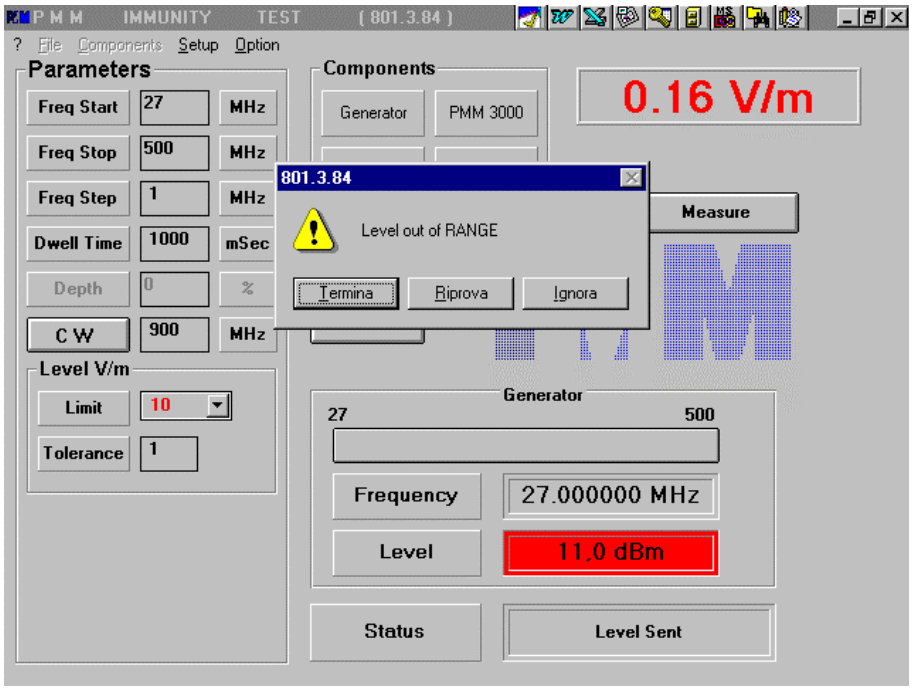
NOTE

When using PMM 3000, be sure that the minimum level is greater then - 80 dBm.

The program initially increases the generator output level until the requested electrical field is attained. During this operation, the **Level** field is highlighted in red until the requested electrical field level is reached.
During the test you can pause it and change frequency and level manually (see Section 4).

5.2 Unable to generate requested level

If the generator reaches its maximum level (specified via the **LIMITS** command) without producing the requested electrical field, a warning message will be displayed as follow:



An **Ignore** reply will cause the program to skip to the next frequency step, searching for the correct value that the generator should now produce.
The generator will start from the beginning if the **Retry** reply is given. The test is abandoned if the **Terminate** is given.

5.3 Possible problems

The possible causes could be:

- power amplifier or generator are OFF;
- antenna is not connected to the amplifier;
- the power amplifier doesn't have enough power;
- wrong band used with dual band amplifier;
- wrong antenna used;
- maximum generator level is set too low.

5.4 Possible solution

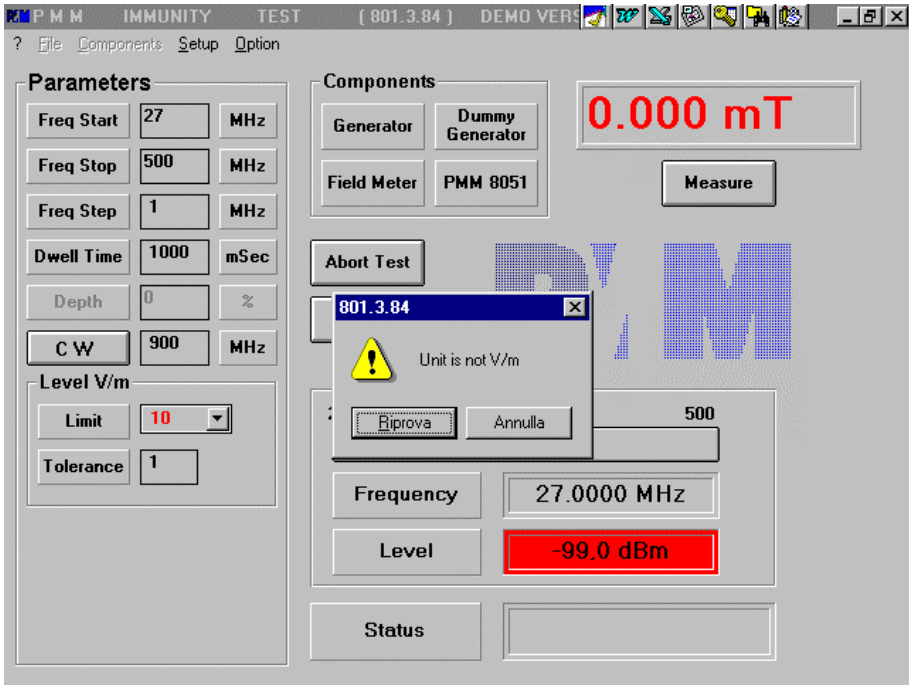
The possible solutions are:

- turn the amplifier/generator ON;
- check the proper amplifier band;
- check antenna connection;
- decrease the distance from antenna to EUT;
- use high gain antenna;
- check LIMITS subcommand.

5.5 Wrong probe installed

NOTE

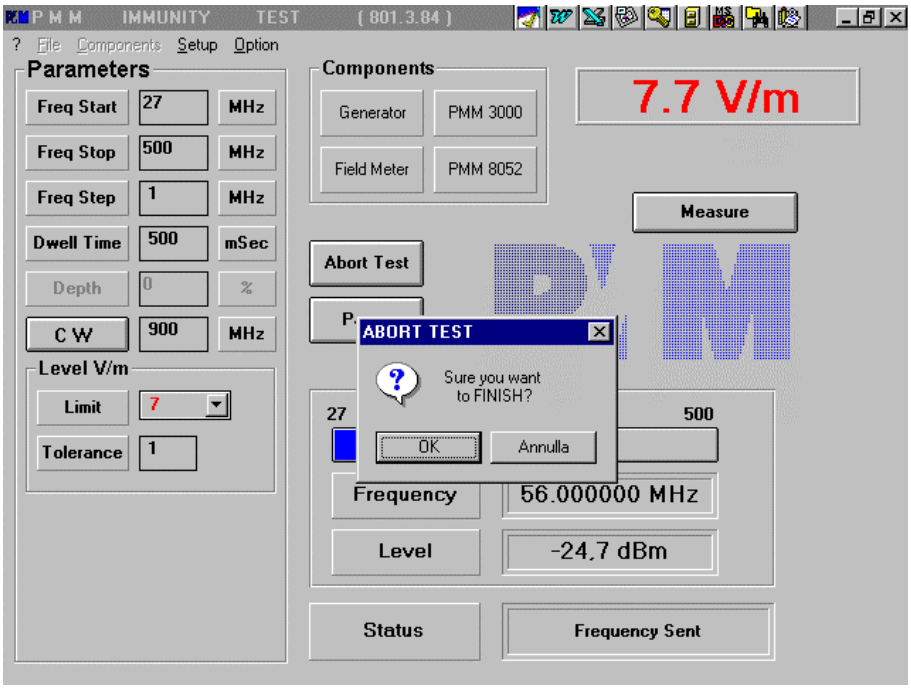
If the PMM 8051 field meter has an isotropic probe for magnetic fields mounted, the following message will be displayed:



To replace it with an electrical probe.

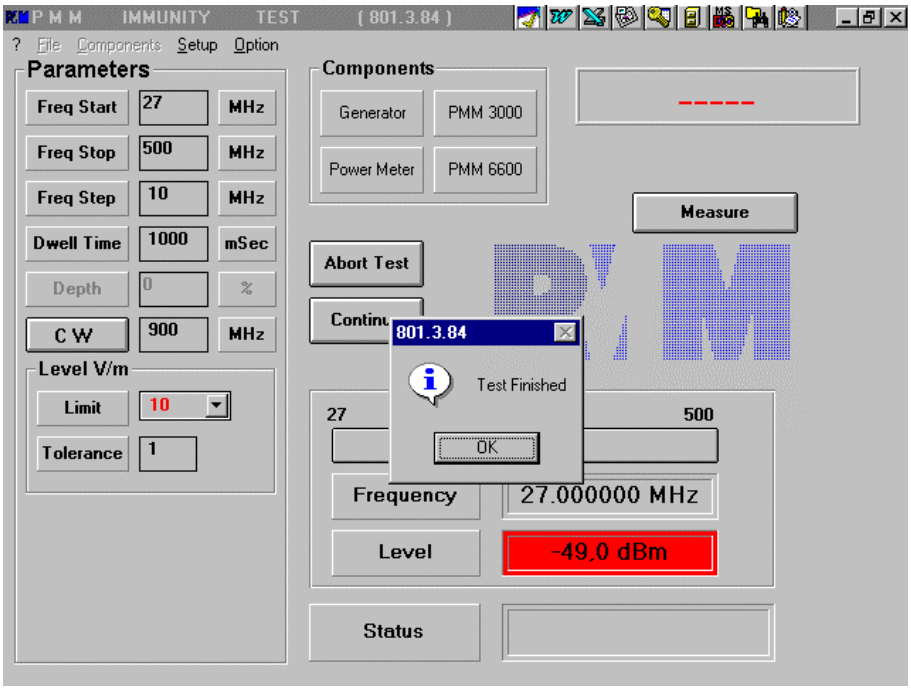
5.6 Aborting the test

To terminate your test, push **Abort Test** button. The software will ask for your confirmation. The display will be:



5.7 Test complete

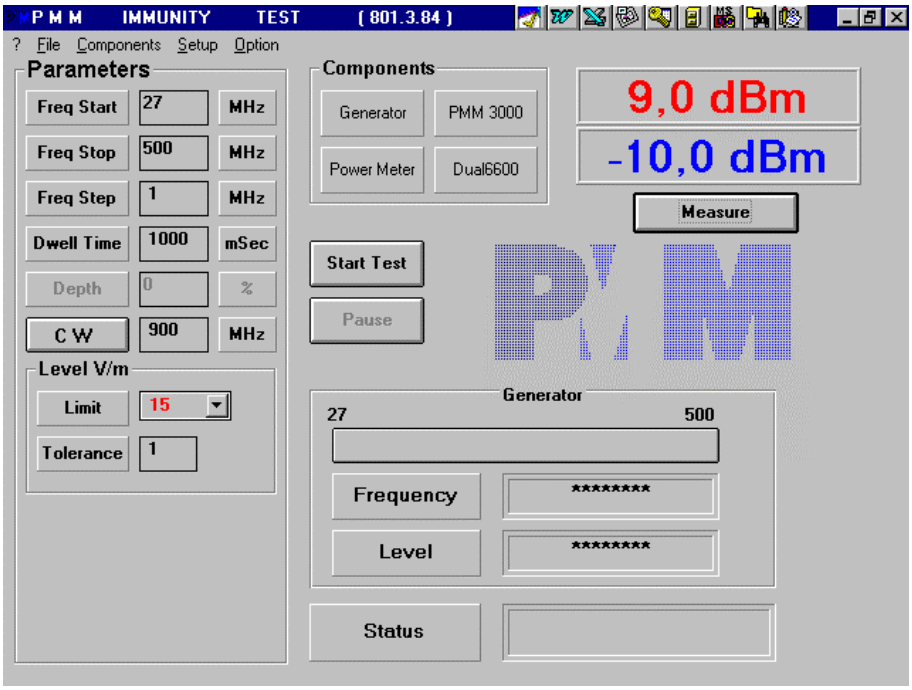
When the test is completed you get the following message:



Answer **OK** and start new tests or print your reports.

5.8 Dual power meters reading

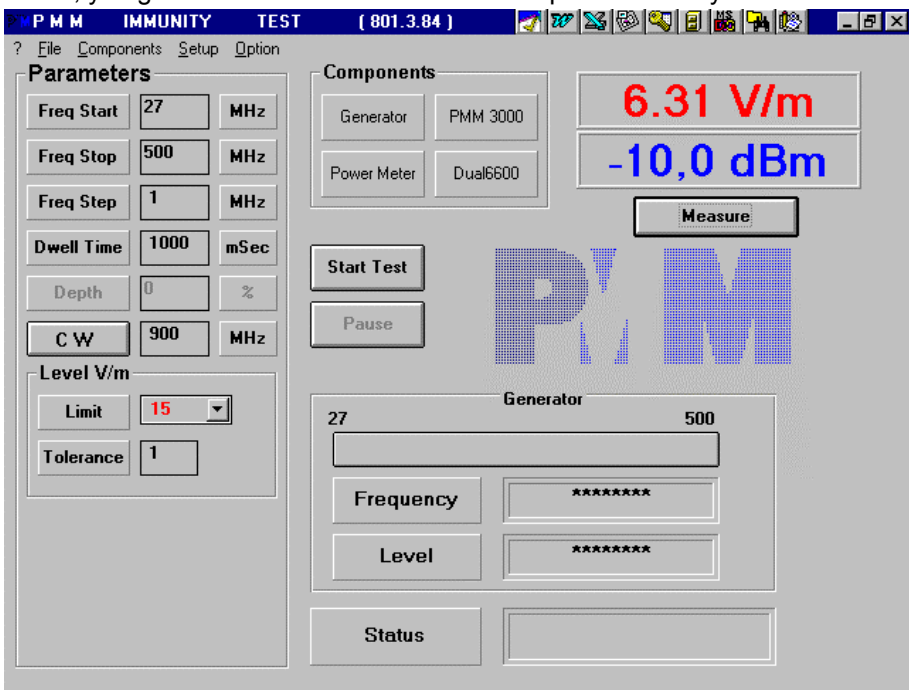
If you are using a dual power meter (i.e. PMM 6600 plus PMM 6600D) with double directional power, you get two windows showing the direct (forward) and reflected power applied to the antenna. The display will be similar to:



The value in red is the forward power, the value in blue is the reflected one

5.9 Equivalent GTEM field monitored with a power meter

If you are using a GTEM or TEM, you can convert the input power to the equivalent electric field. Applying for the command **Show Power as Field**, you get the value in V/m. The reflected power is always in dBm.



6 – IEC 61000-4-3 Standard Immunity Tests

6.1 Introduction

This standard specifies the irradiation of the equipment under test with an electrical field from 80 MHz to 1000 MHz with percentage frequency increments of 1%. In addition, the RF signal must be modulated in amplitude with a 1 kHz signal with a modulation depth of 80%. This test must be carried out without the field probe present inside the anechoic room or TEM/GTEM cell.
Check that all the components of the measurement chain are connected together and switched on before commencing the test.

WARNING

Due to the presence of hazardous electrical fields, never approach the antenna or insert limbs or other parts of the body inside the GTEM cell when the system is in operation.

6.2 Electrical Field Calibration

The standard specifies that an initial field calibration should be made over 16 positions located on a vertical area of 1.5 m by 1.5 m, or less if the equipment under test is very small.

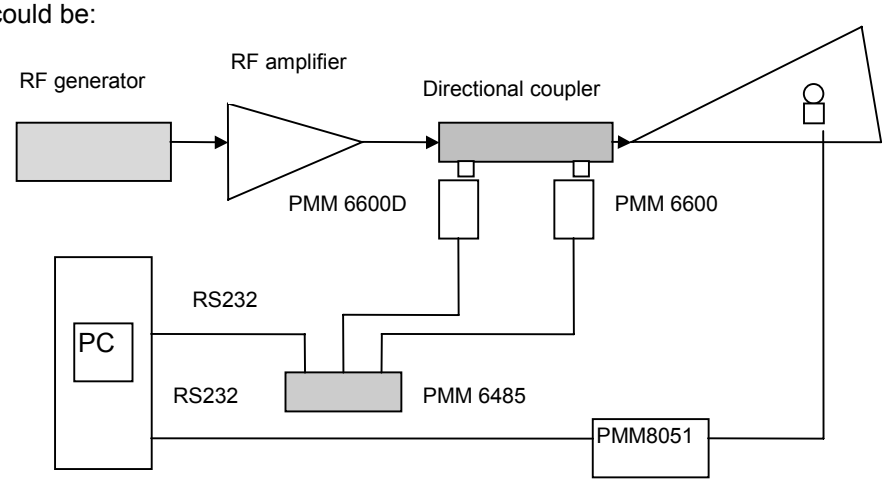
Follow the procedure below:

- Switch on all of the devices that form the measurement chain. Run the SW03 interference immunity software.
- Set up the desired test parameters: start and stop frequencies, step (from .15% to 5%), dwell time and electrical field intensity.

NOTE

During calibration procedure the modulation is always off.

Click on the **Setup** main command. The maximum GTEM configuration could be:

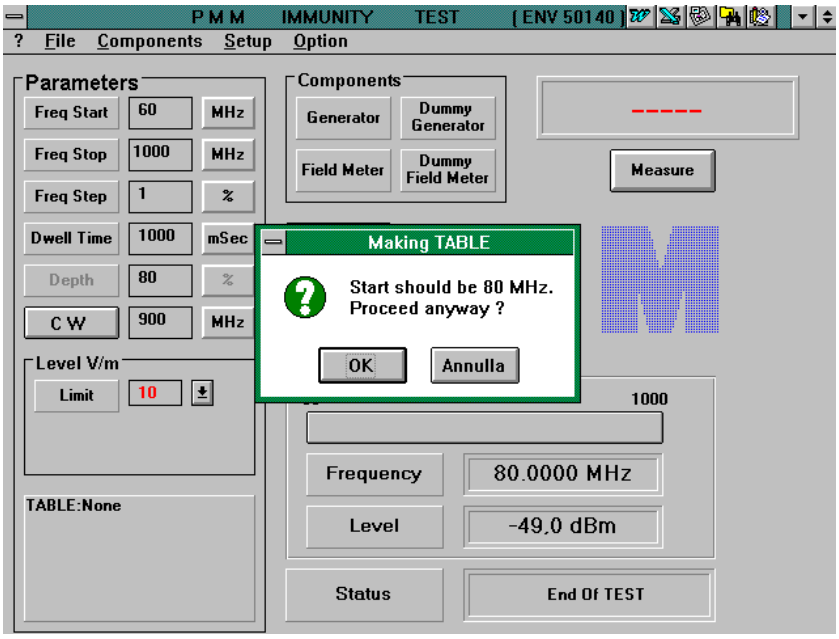


6.2.1 Making a correction table

Activate the **SetUP Table** command and select the "**Make automatic**" command to create the compensation table (0 /+ 6 dB).

6.2.2 Non-standard start frequency warning

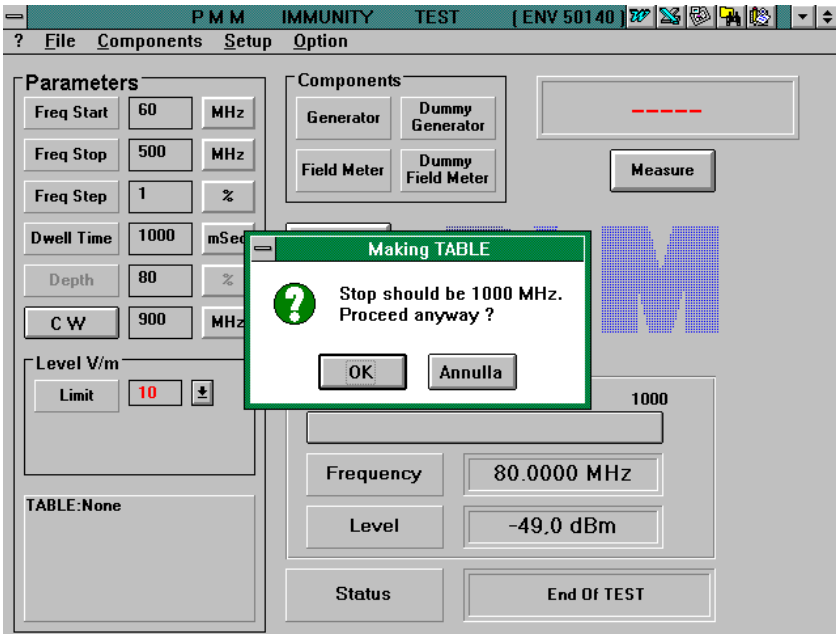
If the specified **start** frequency is not 80 MHz (value indicated by the standard) the following query will be displayed:



If the **Cancel** reply is given, the program will interrupt the test. It the reply is **OK**, the program will start the sweep at the selected start frequency.

6.2.3 Non-standard stop frequency warning

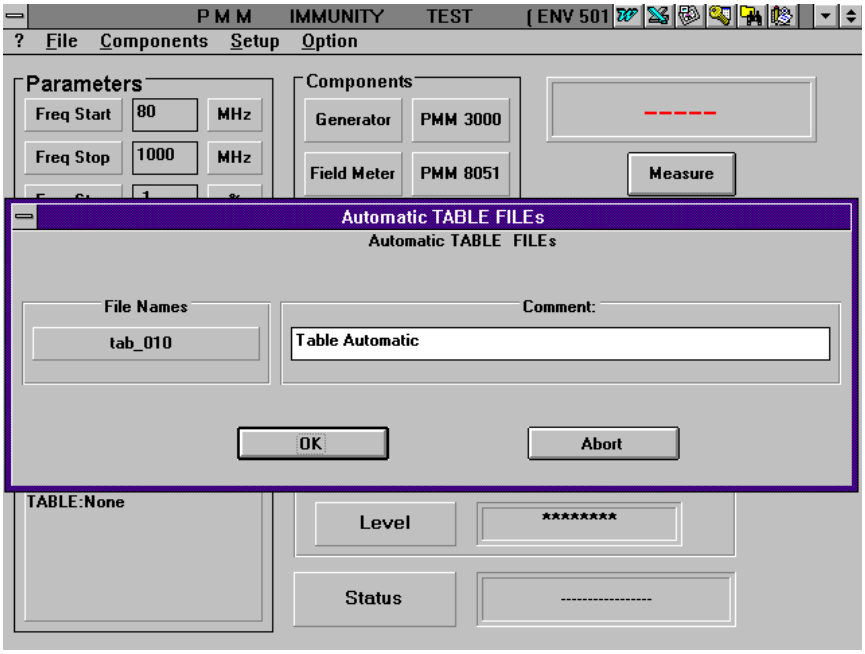
If the **stop** frequency is below 1000 MHz (value indicated by the standard) the following query will be displayed:



If the **Cancel** reply is given, the program will interrupt the test. It the reply is **OK**, the program will stop the sweep at the selected stop frequency.

6.2.4 Assignment of correction tables' name

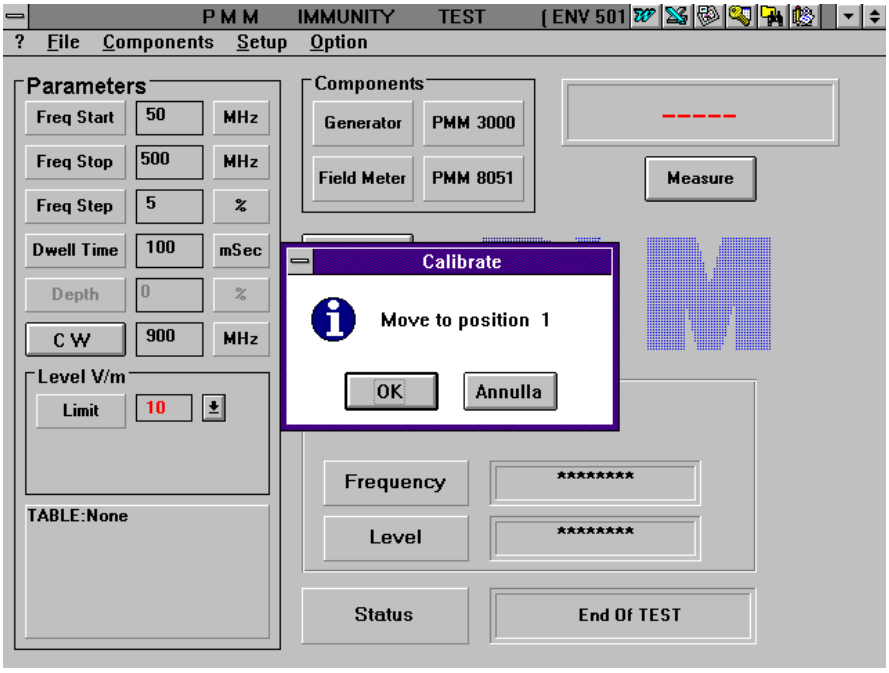
Before starting the sweep, the program opens a window showing the name of the table automatically associated with the above described setup. The table name is usually composed by the four characters **Tab_** followed by the field values selected. The window will be similar to the following:



Clicking on **OK** will create the table with the default names supplied by the program. To specify a different name, click inside the field containing the table name to invoke the **File Manager** and define the new name as desired. The comment can also be changed as desired.

6.2.5 Place probe on first position

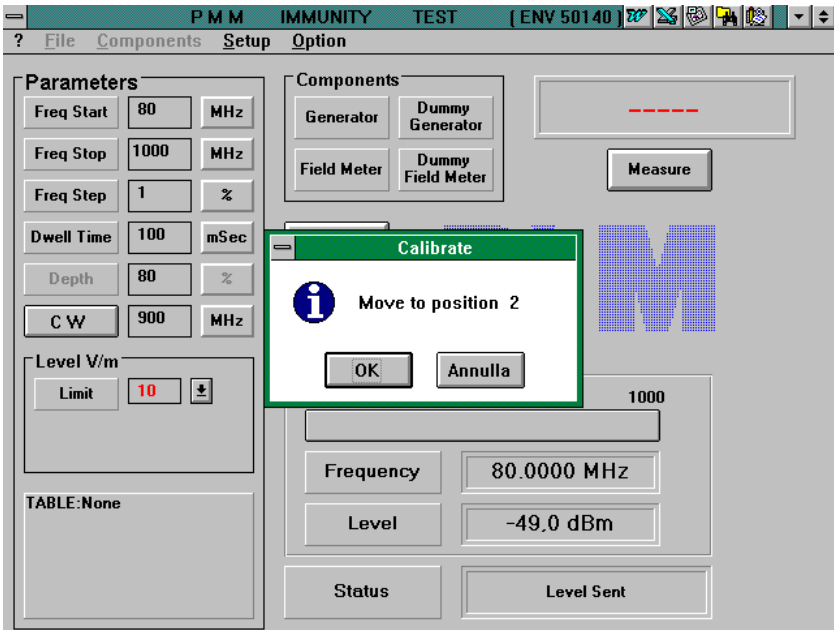
At this point the program will indicate the first step to be taken by displaying the following message:



Move the probe to the first measurement position and click on the **OK** button. The program will then control the generator level to reach the desired electrical field.

6.2.6 Place probe on second position

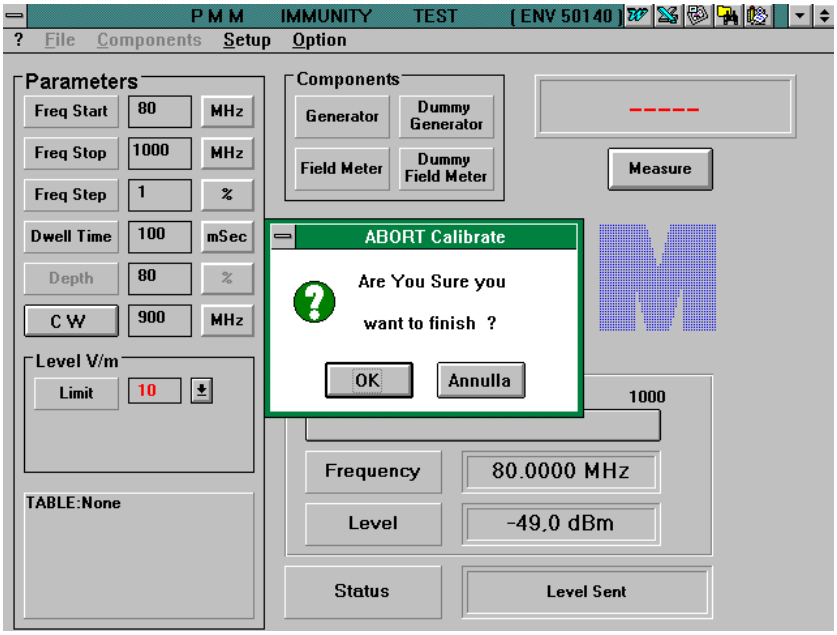
When the sweep terminates (indicated by a full progress bar), the program will request that the probe be moved onto the second position with the following prompt message:



This process should be repeated for all 16 positions.

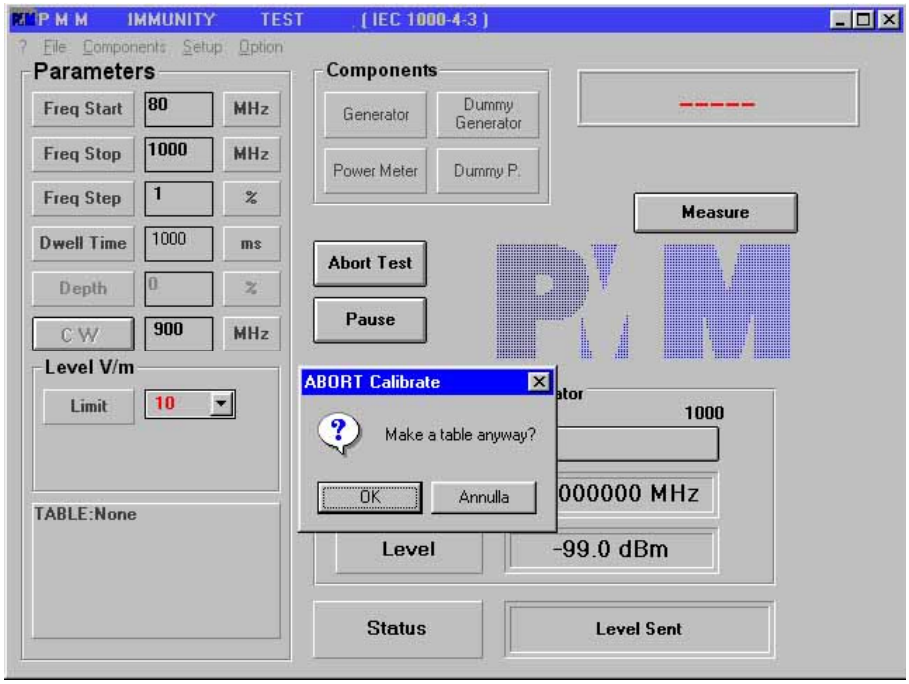
6.2.7 Calibration interrupted with less than 16 positions.

When it desired to only perform calibrations on certain positions, just click on the **Cancel** button. Clicking on **Cancel** results in the following prompt:



6.2.8 Correction table creation

An **OK** reply will cause the program to display the following:



Replying **OK** will create the two tables ready for being associated with the test when the **Start Test** button is clicked on. A **Cancel** reply implies repeating the entire calibration procedure.

6.3 Test Execution

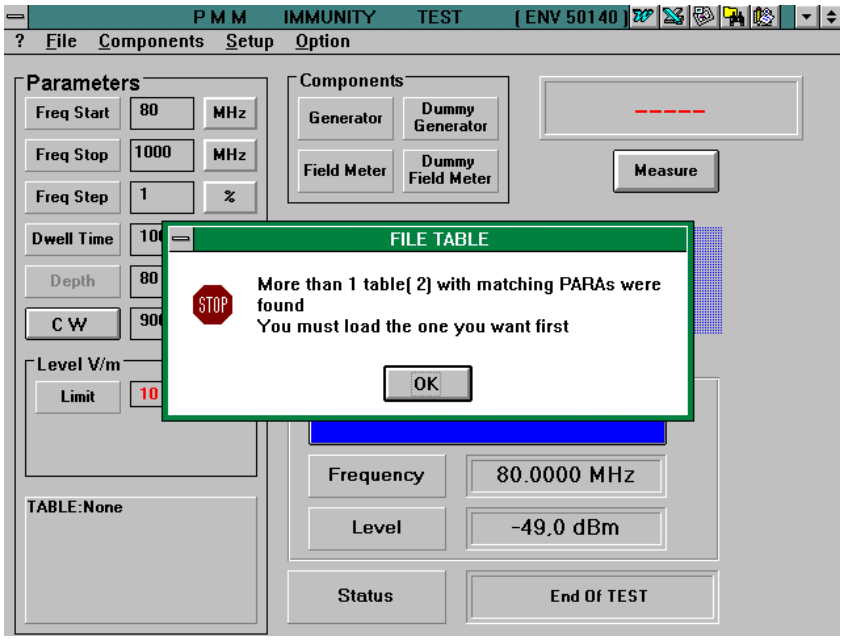
Before running the interference immunity test software, ensure that all of the measurement chain and the equipment under test is connected and operational. Remove the field meter used during the creation of the correction tables.
Follow the procedure below:

- set up the test parameters
- turn on the modulation
- select the correction table
- start the test by clicking on the **Start Test** button
- observe the behavior of the equipment under test

To select the tables, first click on the **Setup** command, followed by **SetUP Table** and then the **IEC1000-4-3** command. At this point the **TABLE EDITOR** must be entered quality via the **Edit** subcommand to choose the table to be used**.** The tables are searched for with the **Load & Browse** command.

6.3.1 Two or more identical tables present error

The program does not know beforehand which table must be used. Therefore, in the presence of two or more tables obtained with the same electrical field level, start, stop and step parameters, the program will display the following message:

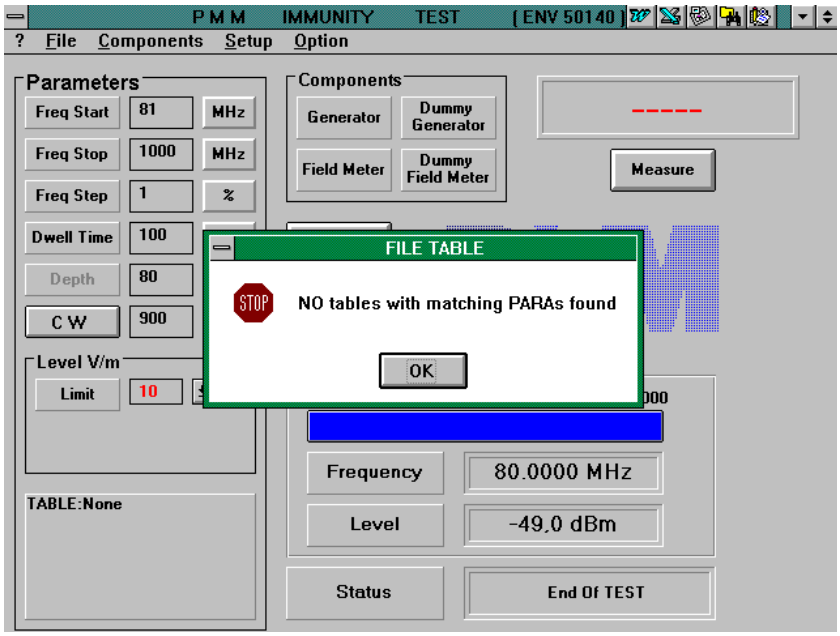


Reply **OK** and select the desired table.

6.3.2 Starting a test without selecting a table

Should **Start Test** be activated without having selected a table, the following error message will be displayed:

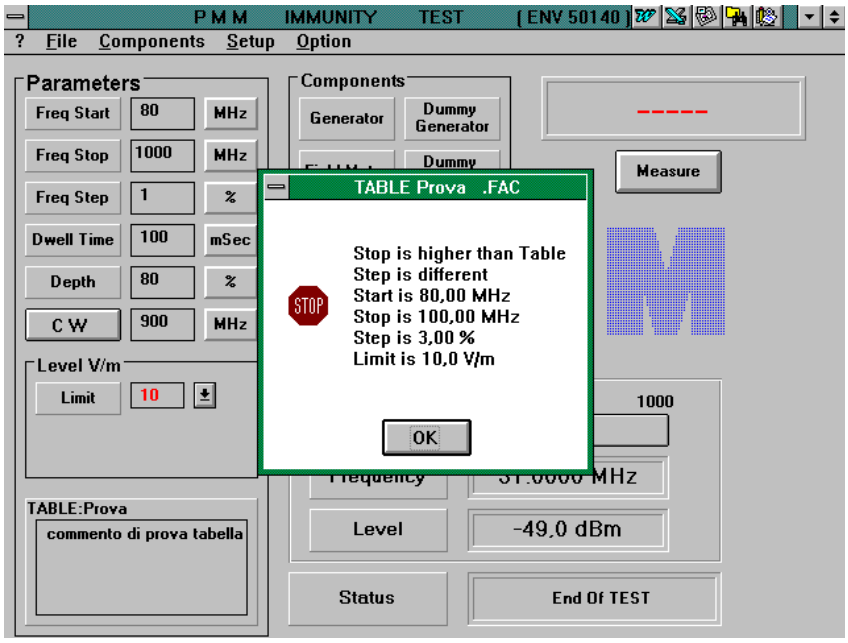
6.3.2.1 Missing table error message



Reply **OK** and call the table editor.

6.3.2.2 Similar tables error

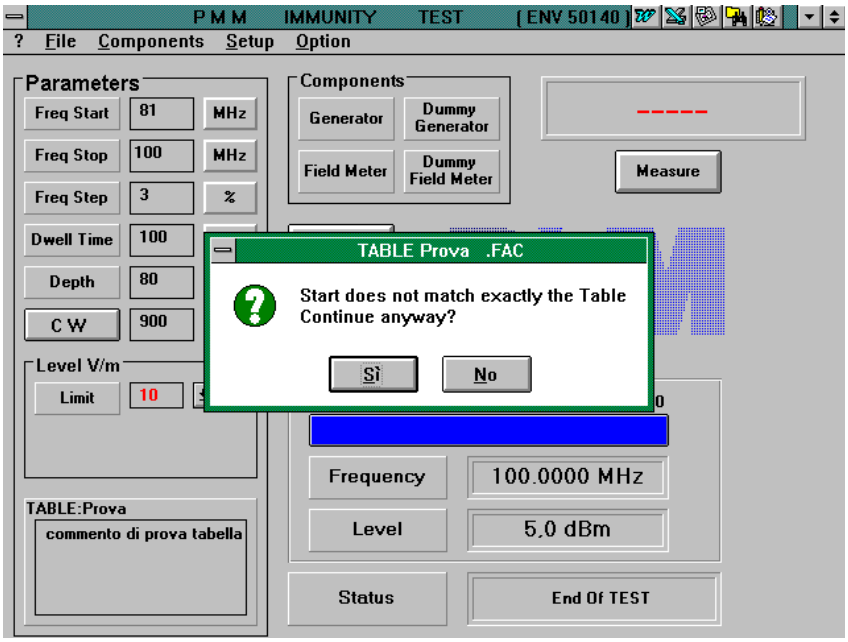
Sometimes the chosen table has parameters that are slightly different from those used during its creation. In such cases the program displays the following error message:



Reply **OK** and change the test parameters.

6.3.2.3 Start frequency different from table

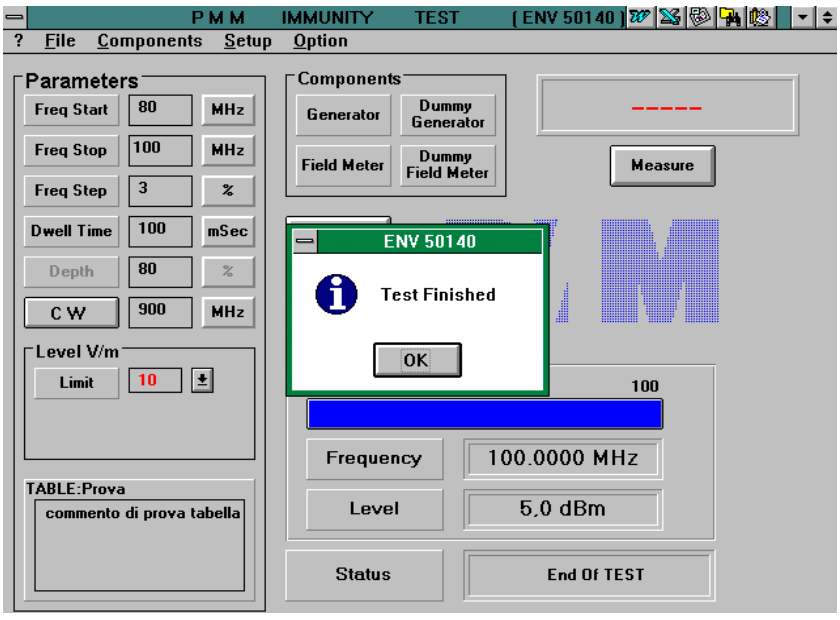
If the only difference is a higher start frequency in the **Parameters** area compared to that of the table, the following prompt will be displayed:



To proceed with the test all the same, reply **Yes**. A **No** reply implies changing the generator parameters or the test level.

6.3.2.4 End of test

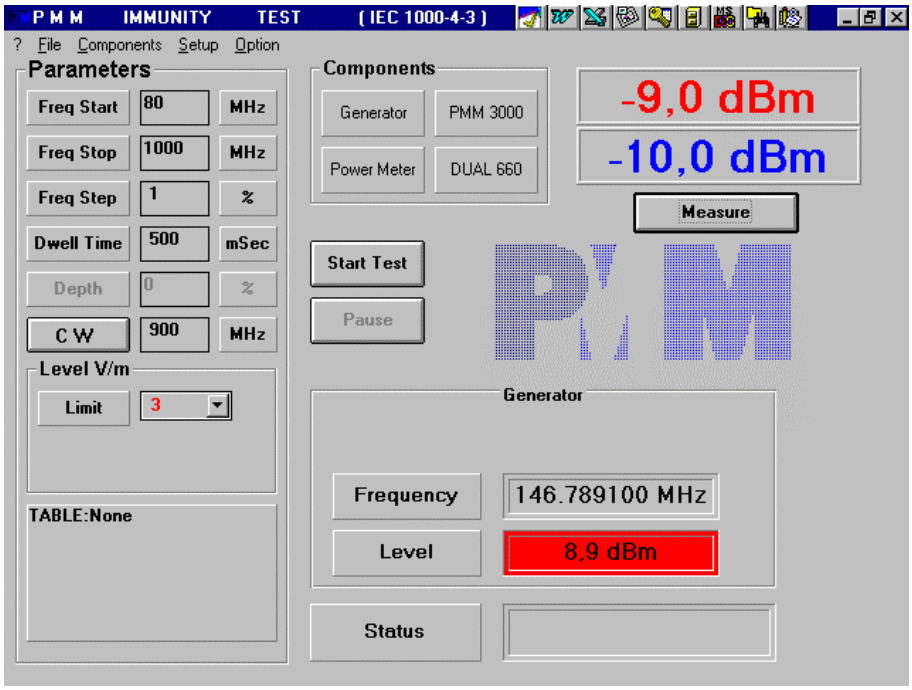
If the test is performed correctly, the progress bar will show the increases in sweep frequency and, when the test terminates, the following message will be displayed:



After replying **OK**, all is ready to carry out a new test.
If you have used a directional coupler with the power meter, you can display the input power applied to the antenna or GTEM.
Using a GTEM you can display the equivalent field inside.

6.4 Dual directional coupler application

If your system includes a dual directional power you can see the forward and reflected power applied to. The SW03 display could be:



6.5 900 MHz pulsed 200 Hz modulation

For whom involved with EN 50082-2, at 900 MHz continuous wave pulsed at 200 Hz, should be produced to irradiate your EUT's.
Just push CW button and apply for 200 Hz Pulsed modulation.
The frequency used will be the closer one to 900 MHz founded on the correction table.

NOTE

This feature is automatically available using PMM 3000. For other generators this function should be recalled manually using the front panel of the generator employed or invoke the external modulation.

6.6 Pulsed 1 Hz modulation

According to EN 50134-4 normative for Alarm Systems, a continuous wave pulsed at 1 Hz, should be produced to irradiate your EUT's.
Just push CW button and apply for 1 Hz Pulsed modulation.

NOTE

Please check that the internal firmware running in the PMM 3000 is up to date, just to be sure that all features described above are available.

The updates firmware are available for download from the internet web site www.narda-sts.it or directly from the commercial offices of NARDA.

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Telefono: *Phone n.*

Modello: *Equipment model:*
Numero di serie: *Serial n.*

☑ ***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*: ☐ Continuous ☐ Intermittent *Sensitive to*: ☐ Cold ☐ Heat ☐ Vibration ☐ Other

Descrizione del guasto/condizioni di funzionamento:
Failure symptoms/special control settings description:

Se l'unità è parte di un sistema descriverne la configurazione:
If unit is part of system please list other interconnected equipment and system set up:

Suggerimenti / Commenti / Note:
Suggestions / Comments / Note: