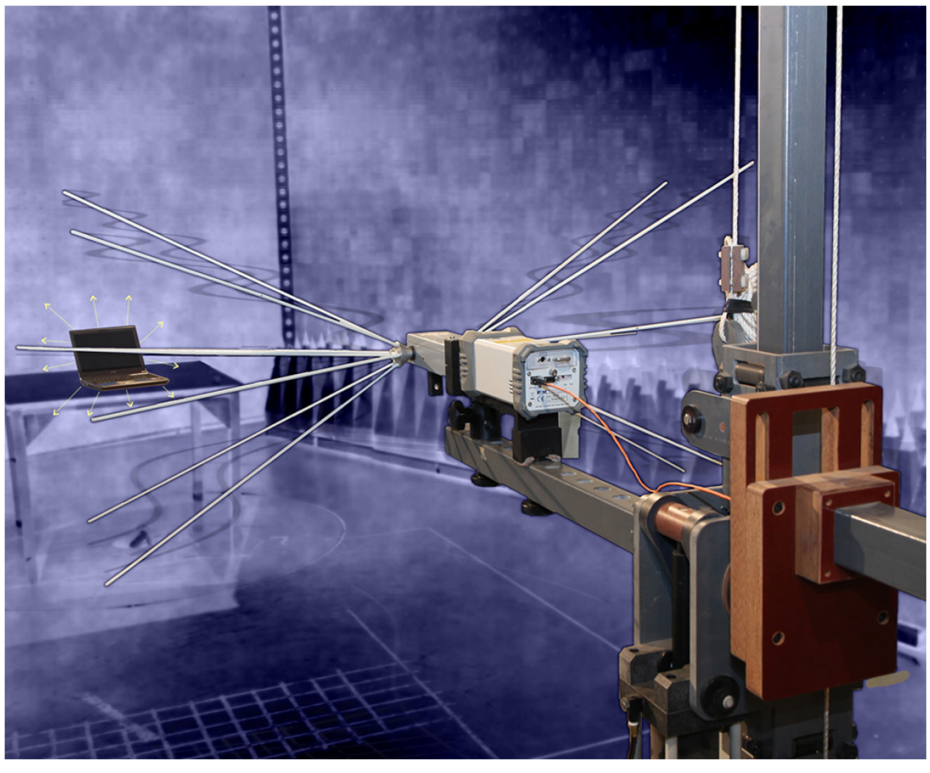
PMM A BRAND OF narda Safety Test Solutions

Application Note | PMM Receivers

Advantages of automatic Table-Mast control in radiated emission tests

A time-saving feature by PMM Emission Suite Software

The measurement of electromagnetic emissions detects radiated disturbances from any electronic device. For this kind of measurement, the equipment under test (EUT) has to be placed in a measurement site with known, CISPR-compliant characteristics. The site typically consists of a semi-anechoic chamber that can isolate signals in the external environment and provide a space where the disturbances to be measured propagate in a standardized pattern, similar to an infinite half-space on a ground plane.



The standards require emissions to be measured on appropriate frequency bands, such as those that CISPR 16-1-1 defines as “C” and “D” (between 30 and 1000 MHz) and “E” (above that range). The disturbances are captured by antennas, whose characteristics are specified in the standards. The antennas must be placed at different heights, with the disturbances emitted by the EUT measured at each of them, and the disturbances have to fall within certain limits. In addition, the EUT has to be rotated around the axis of the table, with a measurement taken for every angle of rotation. In other words, a complete measurement consists of a matrix of readings for every antenna height and every angle of rotation of the table on which the EUT is placed.

The Table-Mast option of PMM Emission Suite completely automates this phase, allowing the computer to control the drivers of the adjustable height mast, the rotating table, and the measuring receiver.

According to the standards, for each frequency, the operator has to find the point, antenna height and angle of rotation, at which the emission is greatest, to make sure it does not exceed the limits for the specific EUT. This requires a great number of measurements and is extremely time-consuming.

PMM Emission Suite makes this procedure much faster without compromising reliability: the prescan phase quickly finds the positions and frequencies with the greatest disturbances. The prescan is followed by a final measurement, tuned frequency by frequency, in the vicinity of those positions in order to detect the maximum emission points.

By setting up PMM Emission Suite correctly, we obtain the same result as we would with a frequency-by-frequency approach for every height and angle, which would be unacceptably slow.

The PMM Table – Mast option is designed to operate the receiver together with a turntable and a mast for controlled positions. This option is currently available, for a modest fee, for the controllers EMCO 2090, INNCO CO2000 and CO3000, Maturo MCU, SCU, NCD and FCU, and Frankonia FC06-1. A “mock” model is also provided for dummy testing. On request, our developers can add support for additional models.

When using this software option, the following settings page appears:

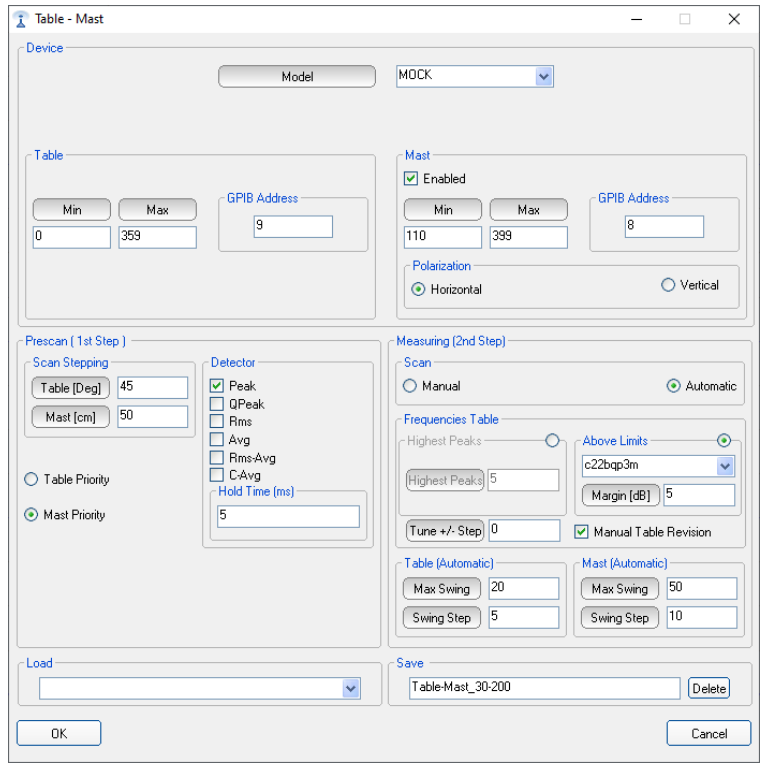


Fig.1 – Table-Mast option settings

The user can select the model to be controlled, as well as the geometrical limits for Table and Mast and the communication addresses (GPIB or Ethernet, depending on the model).

All prescan (first step) and final measurement (second step) parameters, such as start-stop (Min-Max) angle for table rotation and antenna polarization, can be freely set.

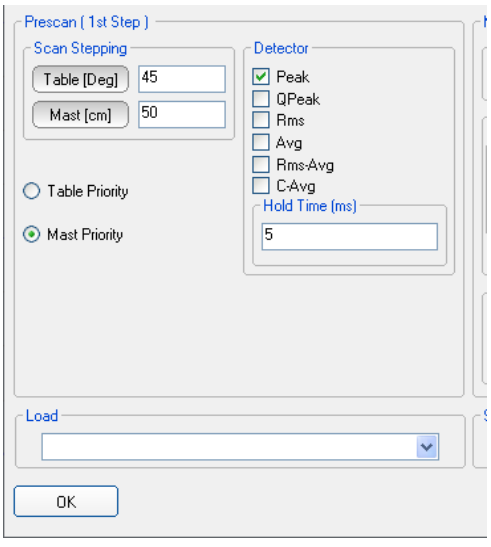
The test begins with the prescan. After the most significant frequencies and positions are detected, the final measurement is carried out in their vicinity.

Pratical example

The example in Fig. 1 refers to a measurement between 30 and 200 MHz with the use of a biconical antenna.

For the prescan, the table will be rotated 360° with a reading every 45°, for a total of 8 readings for the full rotation. The mast height will range from 110 to 399 cm, in intervals of 50 cm
(1st step)

Prescan (1st step) The settings used for the prescan step are as follows:



Scan stepping

- **Table [45 deg]** is the angle step, in degrees, for the table rotation
- **Mast [50 cm]** is the interval of the height change in cm

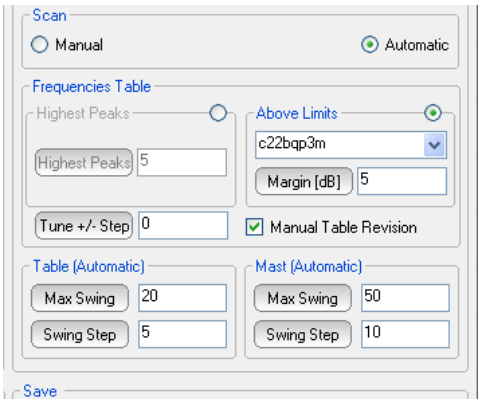
Detector

- **Peak** is the detector used for the prescan
- **Hold Time [5 ms]** is the observation time for each frequency of any prescan detection

“Mast Priority” selected means that table is fully rotated for every mast position. Conversely, Table Priority would scan the full mast height for every table position.

Measuring (2nd step) The settings used for the final measurement are as follows:

Scan



Automatic: the table rotation and mast height are controlled automatically by the software, using the settings of the Table (Automatic) and Mast (Automatic) frames.
The swing parameters specify angle and height apertures for automatic maximum search around the point previously detected.
The maximum emission can also be searched manually.

Frequencies Table frame

Measurements are taken while the receiver is tuned around the **frequencies** previously detected. In this example, the frequencies are those for which the measurement was at least 5 dB (Margin) from the limit during the prescan.
The measurement for each of these frequencies is taken with the selected span (null in this case).

The settings are selected on the basis of the antenna characteristics and frequency range, as they are strictly related to the radiation pattern and the signal reflections from the floor.

For debugging purposes, the Table and Mast positions can also be controlled manually.

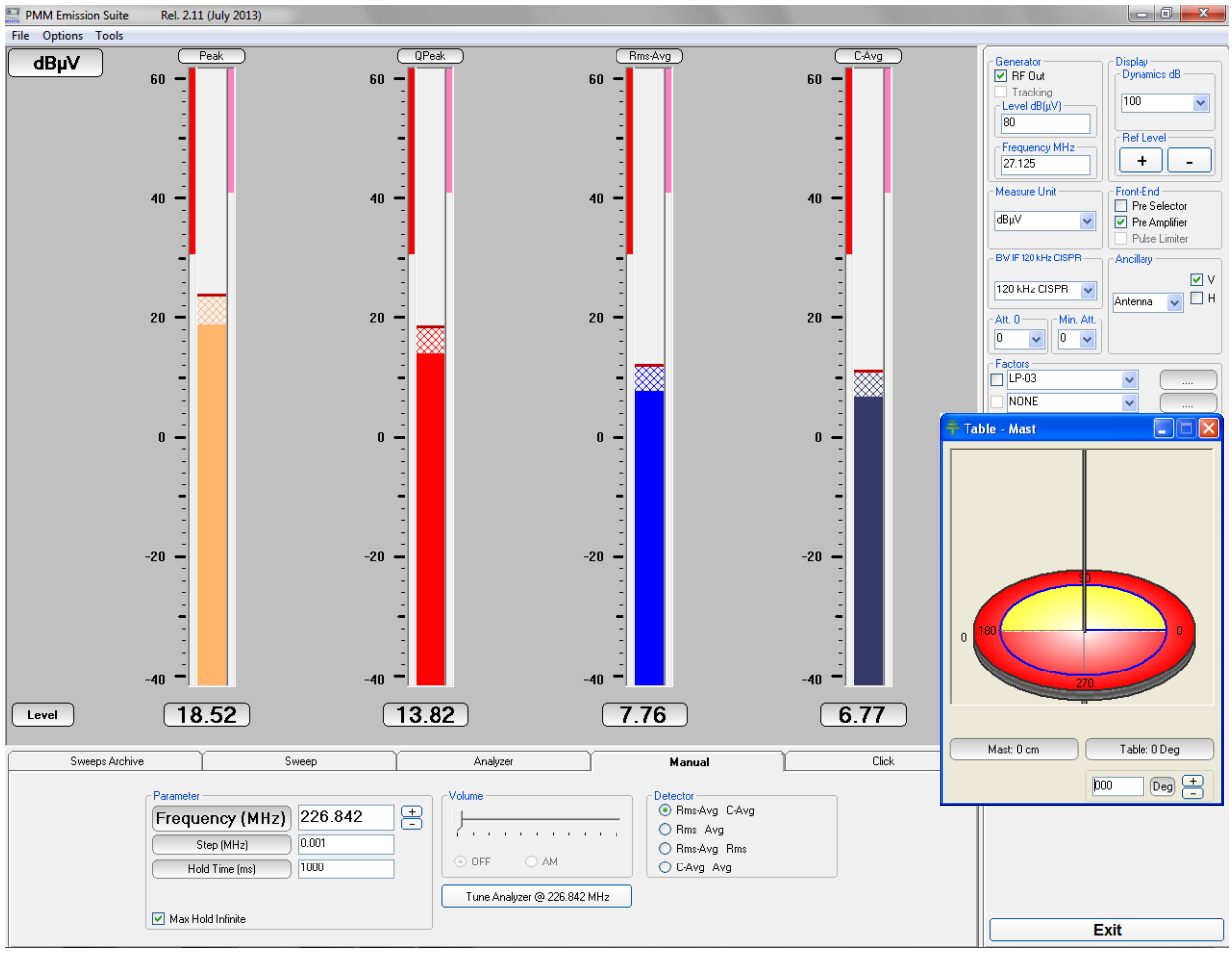


Fig. 2 – Table-Mast main measurement

Conclusion

The free PMM Emission Suite software, which works with PMM receivers, offers a Mast-Table option for a modest fee that can pilot a number of Table-Mast controllers available on the market. Controllers that are not yet supported can be added on request.

With this software option, measurements are highly automated, as well as simple and accurate. The program manages the entire procedure by setting the height of the antenna on the mast and the rotation of the table on which the EUT is placed, and reads and collects measurements for every combination. This means that measurements are not only easier to perform, but also more reliable and repeatable.

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