



**Recommendation WG 4.88.013 Rev. 1**

**RFI TEST METHODS  
CALIBRATION TECHNIQUES**

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## RECOMMENDATION

**Subject Area:** RFI Testing

**Title:** Calibration Techniques

### *Recommendation*

It is recommended that calibration of RFI test systems be performed by the signal substitution method. The calibration should cover both the frequency and level of the test receiver display. Internal calibration does not allow for level calibration. The input point for the calibration signal should be the test antenna terminals. Calibrations should be performed at least once for each period of measurements. It is also desirable to perform a calibration at the conclusion of a measurement period. The best technique would be to calibrate periodically during a measurement session.

Calibration of the test receiver system for performance of RFI measurements should be performed by signal substitution. Usually, this is done with a single frequency test signal near the center of the band to be measured.

When using the single frequency technique the test receiver system should first be swept with a constant amplitude signal from the desired band start to band end. This will identify any non-linearities across the band due to the response of amplifiers, test cables, etc. If an unacceptable response is detected across the band, an offsetting correction factor should be applied to compensate for any level measurements taken in this particular frequency range.

The test signal should be a frequency within the measurement band. Internal calibration signals (normally 100 MHz) are not adequate for calibrating via signal substitution for a microwave measurement (4 or 6 GHz for example) due to the varying frequency response of the test system. The level of this test signal should be calibrated at the time of measurement. This calibration is normally performed by referencing the signal to a thermal power meter. The calibration of the power meter should also be maintained every 3 to 6 months and certified that the technique used is traceable to the Institute for Telecommunications Sciences (formerly the National Bureau of Standards). Any other attenuators or pads used to reduce this calibrated signal level before injection in the system should also have a regular calibration interval as recommended by the manufacturer.

The calibration signal should be injected into the test system at the test antenna terminals or a point closest to the actual point of measurement in the system. When measuring from a waveguide, the signal would be injected into the end of the cable that would be attached to the waveguide coaxial adapter for example. This step insures that all gains and losses within the test system will be accounted for through the calibration with the exception to frequency response as noted above.

It is very important when using a spectrum analyzer as a test receiver that the vertical linearity of the analyzer also be calibrated with the test signal. This is performed through the complementary adjustment of the RF and IF amplifiers in the analyzer. This can be checked by changing the test signal amplitude in steps and verifying the corresponding change on the analyzer display. This can vary between bands, e.g., 4 vs. 6 GHz, and should be checked during each calibration performed.

Calibration should be performed at least once during each measurement session. It is advisable to perform calibration at the end of each session also to insure that the system parameters have not changed

due to equipment warming, stress on cables and connectors, etc. The best technique is to calibrate periodically during the measurement period.

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Notes: Replaces WG4.88.013 (To Membership 03-27-89)