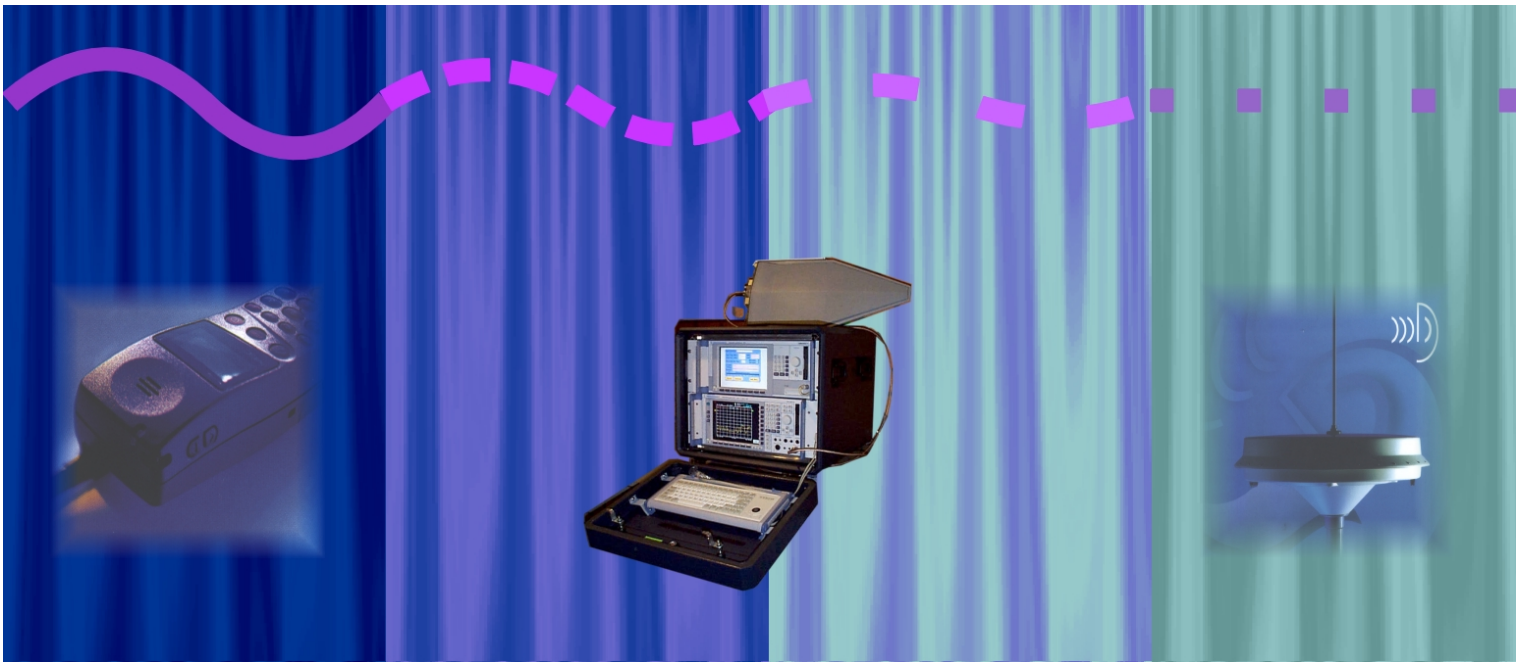


Systems & Projects

Versatile Fieldstrength Monitoring System

ROHDE&SCHWARZ

Introduction

For the observation of the intensity of the transmitted power of a RF source, Rohde & Schwarz offers a test system which allows to log a fieldstrength in a certain frequency range over time, at a certain fixed location.

This is very useful in practice for the following applications:

1) Some of the possible causes for problems in a radio network can be disturbances in the Air-interface. These disturbances can be originated from an external source or from the transmitter itself. External disturbances can be parasite transmitters, which are interfering with the useful channel. The transmitter itself can also have intermittent small fall-out failures (which are maybe not seen by the internal base station power monitoring system). Most of the time, these errors are rare, and can thus not easily be monitored by technicians on-site.

2) The evaluation of a radiating source according to certain (safety) limit lines at a certain location, e.g. in residential living areas, offices or schools close to base stations...

In principle, this application requires the following components :

- the spectrum analyzer as measuring instrument
- calibrated transducers (antennas), corresponding the desired frequency range
- the application software for automatic operation
- the system controller
- the system integration (cabling, rack, trolley, ...)

System components

Hardware

Measuring Instrument

As a spectrum analyzer, we propose the powerful Rohde & Schwarz spectrum analyzer FSP. The selection criterium is based on the desired accuracy, sensitivity, measurement speed, and frequency range.

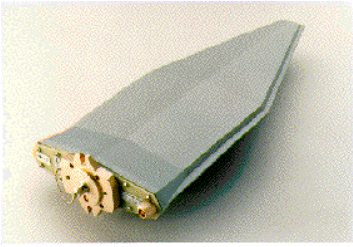
Transducers

Since we are interested in measuring fieldstrength, we should consider the measurement in the far field. In the far field, both electric and magnetic field components are correlated (given by the relation of the 'free space impedance of 377 Ohm). Moreover, in the far field, the fieldstrength decreases linearly with respect to distance from the source.
The near field / far field criterium depends on the type of transmitting antenna, and the wavelength of the radiating source. Practical measurements have shown that for mobile communication applications in the GHz frequency range, far field conditions apply as from several meters.

In real life, reflections on surrounding objects will influence the measurement accuracy of the system.

Since it is the purpose of measuring the maximum fieldstrength at a certain location, it is recommended to measure at different positions, and retain the maximum values for fieldstrength.

The directional log.-periodic antenna HL040 covers the frequency range from 400MHz up to 3000MHz. The directional antenna 'points' to the radiating source, and thus avoid to measure the interference coming from another (undesired) source.



The antenna is supplied with a so-called free-space antenna factor for correct fieldstrength-to-voltage conversion.

It is mounted on a wooden tripod, and connected to the measuring instrument via a high quality coaxial cable.

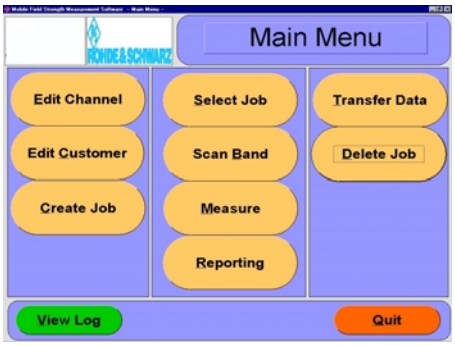
Controller

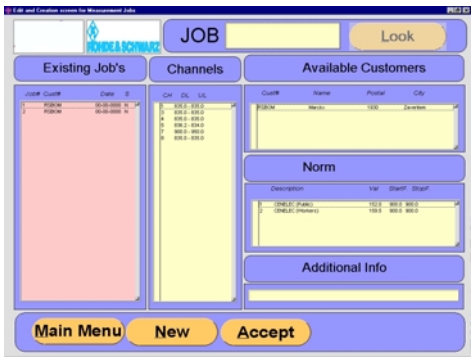
The measuring instrument is controlled by software (see below) via the GPIB bus of the system controller.
As a controller we offer the Rohde & Schwarz Industrial Controller type PSP7. This controller has a built-in colour VGA-screen and GPIB-interface. This controller can alternatively be controlled without external keyboard, thanks to the frontpanel function keys.

As an alternative, Rohde & Schwarz can offer a standard laptop computer built into a rugged transit case.

Carrying case

The spectrum analyzer FSP and industrial controller PSP7 are built into a mobile and ruggedized19 inch transit case with handles, front and rear covers.
Optionally, a watertight carrying case can be used. It has two covers, with the possibility of watertight cable-feedthroughs.





Application software

The software controls the measuring instrument. The following parameters are user definable :

- frequency range (or channels to be measured)
- resolution bandwidth (IF bandwidth)
- measuring speed (per frequency), or sweep speed (per range)
- measuring interval (depending on the measuring speed per frequency, and number of frequencies)
- transducer factor
- applicable limit lines

Now the program will constantly read the fieldstrength values from the spectrum analyser, apply the transducer conversion, display typical values on screen, compare them to the limit line, and store the measurement results into a database.

When the measurements are finished, a standard report can be generated. The report includes information about the measurement job, location, etc.. and the fieldstrength values with corresponding limits in dBµV/m, V/m, mW/cm², etc...

The results can also be transferred to other commercial software for further (statistical) evaluation and reporting.

The software is written in Labwindows/CVI, which is a Windows-based programming environment.

System configuration

Since the philosophy of this test system is quite universal, we support different measuring instruments and antennas. Each system is configured individually according to the customer's application.
The system is built up at Rohde & Schwarz and fully tested before delivery. The system comes with full documentation of the measuring instruments, system components, system configuration, and software.

Verification

We advise the customer to yearly calibrate the measuring instrument, to ensure proper functioning and accurate measurements.

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