

# Long-term monitoring of sound-broadcast and TV transmitters

Like equivalent organizations in other countries, German broadcasting and media companies as well as the Federal Post and Telecommunications Office (BAPT) have the duty to continuously monitor transmitter parameters\*. **Transmitter Monitoring System SMSA** from Rohde & Schwarz is a simple and cost-effective solution to perform this task. It not only monitors the limits for field strength, modulation, frequency offset and bandwidth but also transmitter breakdowns. Any deviation from nominal is immediately signalled as an alarm message at the test site or signalled to remote receiving stations.

\* Seidl, W.D.: Spectrum monitoring the ITU way. News from Rohde & Schwarz (1997) No. 153, pp 26–27

The core of Transmitter Monitoring System SMSA is Spectrum Monitoring Software ARGUS, Test Receiver ESVN40 (9 kHz to 2.75 GHz) or ESVN20 (20 MHz to 1 GHz) and

a process controller (FIG 1). For measuring vertically polarized signals in the frequency range 20 MHz to 1 GHz, Antenna HE309 is directly connected to Test Receiver ESVN20. If several an-

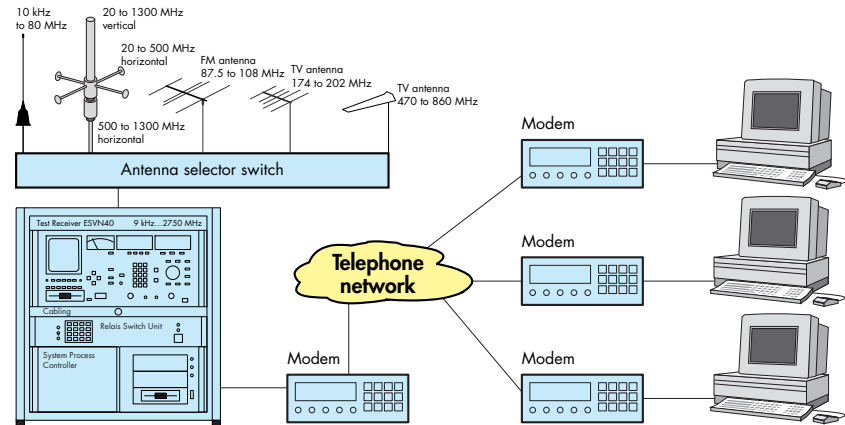


FIG 1 Configuration of Transmitter Monitoring System SMSA



FIG 2  
An antenna system  
of Transmitter  
Monitoring System  
SMSA  
Photo: Pfitzner

tennas are used (extended frequency range, vertical or horizontal polarization, omnidirectional or directional, active or passive), they (FIG 2) are changed over by means of an antenna selector switch. Alarm messages are transmitted via the public phone network if several receiving stations have to be informed or if the test station is unattended. Up to three alarm controllers can receive information about deviations of the transmitter parameters.

For monitoring to be of real value the parameters of all the channels should be measured simultaneously in the shortest possible time. Transmitter Monitoring System SMSA monitors the field strength, modulation (AM and FM) and frequency offset of, for example, ten TV and 40 sound broadcasting channels at a repetition rate of 3 s (without antenna switchover) or 20 s (with switchover between eleven different antennas).

With **Spectrum Monitoring Software ARGUS** the user can define individual limits for the various parameters of each transmit channel. If any of these limits is violated, an alarm message will be issued immediately:

- For the **field strength**, there is a tolerance range, ie if the field strength falls below the lower limit, a transmitter breakdown will be signalled. If the upper limit is exceeded, an impermissible transmit power will be indicated.
- This is also valid for the **frequency offset**. A deviation from the permissible tolerance range is signalled as erroneous operation.
- For **modulation** and **bandwidth**, there are only upper limits.

To avoid alarms being triggered every time a stray value occurs, measurements have to lie outside the tolerance range several times and in a sequence. The number of stray values actually triggering an alarm can be set by the user between one and 1000: a reasonable value would be three. An OK message will be signalled if the limit values are adhered to again (eg following a temporary transmitter breakdown).

This procedure will be illustrated by way of an **example**: the field strength on a channel is measured every 5 s. The number of tolerated limit violations before an alarm is triggered shall be three. The results together with an upper and lower limit line are displayed versus time (FIG 3). At test point 5 (after 20 s) an alarm will not be triggered since the upper limit has only been violated once. At test point 11 (after 50 s), the upper limit is violated again. An alarm message however will not be triggered until test point 13 (after 60 s) is reached since the number of tolerated limit violations was defined as three (3). The alarm message issued relates to the status of test point 11, ie when the problem occurred for the first time. From test point 18 (after 85 s) the measured values are again within tolerance. The OK message will be

sent from test point 20 (after 95 s) since three alarm messages have again been attained. The data of the OK message refer to the field strength at test point 18.

Alarm messages are directly output at the process controller or will be sent via a modem. If only one alarm message occurs, it will be sent to one or several alarm controllers via the public phone network. The messages will be displayed there as shown in FIG 3 or may be printed out (for test report see blue field).

The status information reveals whether a measured value is above the upper limit, below the lower limit or again within tolerance with the latter being indicated by the OK message. Moreover, an alarm can also trigger further actions in the test system: 1. an additional measurement will be carried out and logged (eg bandwidth measurement), 2. a signal tone will be generated (for unattended stations).

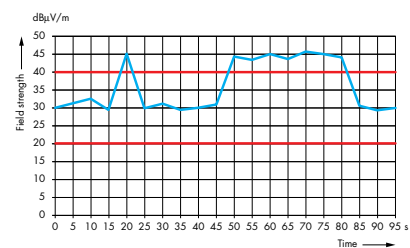


FIG 3 Results curve for field strength (blue); limit lines in red

Transmitter Monitoring System SMSA thus reliably fulfills tasks required for the continuous monitoring of transmitters. It supports the responsible bodies and organizations to eliminate the problems before the first complaints from listeners or viewers come through.

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Message	Date	Time	Frequency	Limit	Measured value	Test parameter	Status	Comment from frequency list
Alarm	14.03.97	12:00:50	98.500000 MHz	40 dBµV/m	44 dBµV/m	Level	High	Bayern 3
Alarm	14.03.97	12:01:25	98.500000 MHz	40 dBµV/m	31 dBµV/m	Level	OK	Bayern 3