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Test & Measurement

- sales
- rentals
- calibration
- repair
- disposal

Complimentary Reference Material

This PDF has been made available as a complimentary service for you to assist in evaluating this model for your testing requirements.

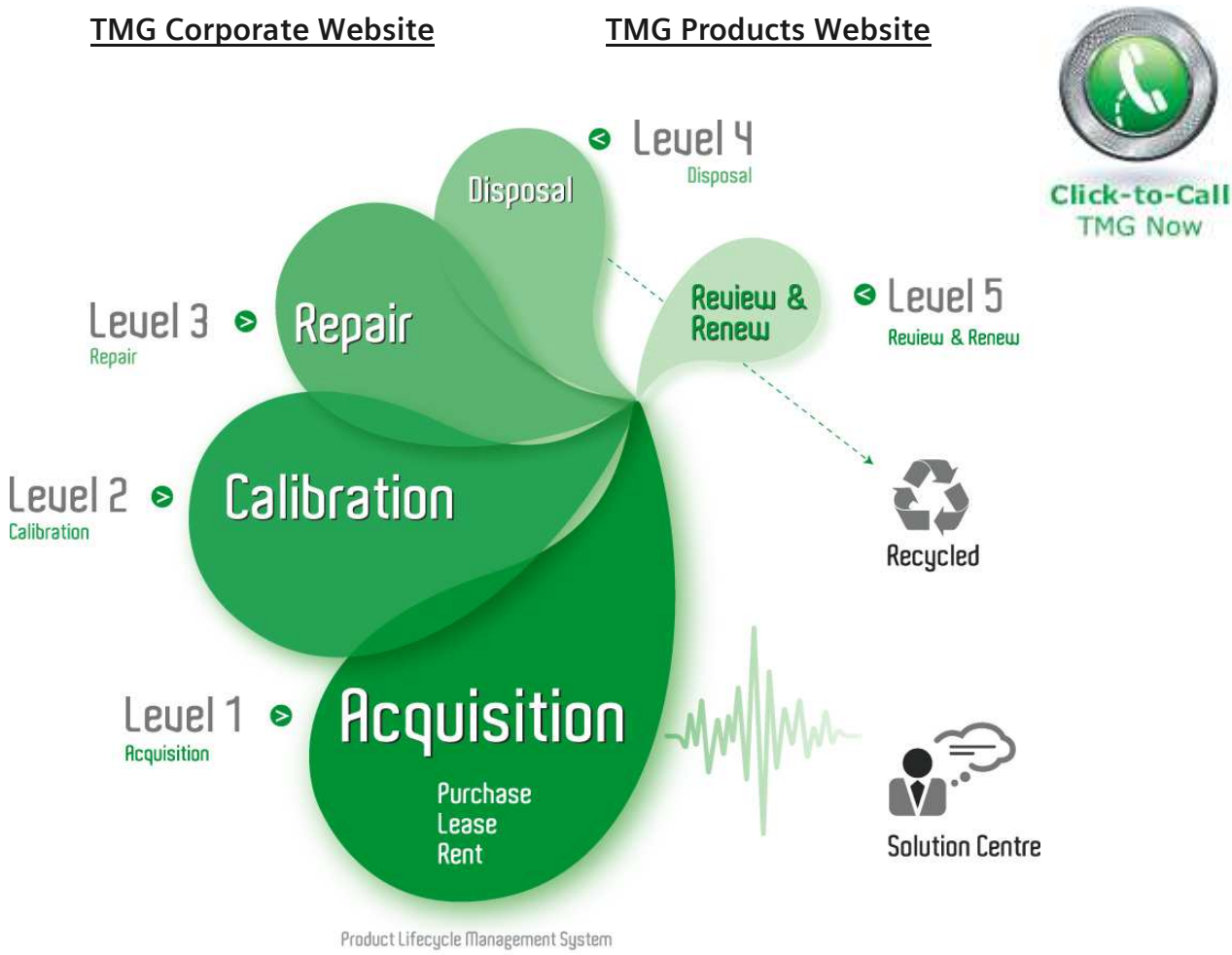
TMG offers a wide range of test equipment solutions, from renting short to long term, buying refurbished and purchasing new. Financing options, such as Financial Rental, and Leasing are also available on application.

TMG will assist if you are unsure whether this model will suit your requirements.

Call TMG if you need to organise repair and/or calibrate your unit.

If you click on the "Click-to-Call" logo below, you can all us for FREE!

TMG Corporate Website **TMG Products Website**



EMS Test System Audio and Video R&S TS9980

Measuring the electromagnetic susceptibility of sound and TV broadcast receivers, satellite and DVB receivers

Automatic measurement to
- EN 55020: 2001
- CISPR 20: Edition 5

Three basic systems
- R&S TS9980 Audio
- R&S TS9980 AV Multistandard
- R&S TS9980 DVB Multistandard

Option R&S TV-MON
- Automatic and objective picture assessment of CRT and TFT monitors

Optimized system software for
- Efficient test routines
- Convenient operation
- High reproducibility

NEW

ROHDE&SCHWARZ

Applications of TS9980

The growth in communications via terrestrial and satellite links and the "frequency crowding" in cable networks may affect reception.

Comprehensive EMS tests are required to verify the capability of receivers to operate satisfactorily – even under adverse conditions.

These tests include the following measurements:

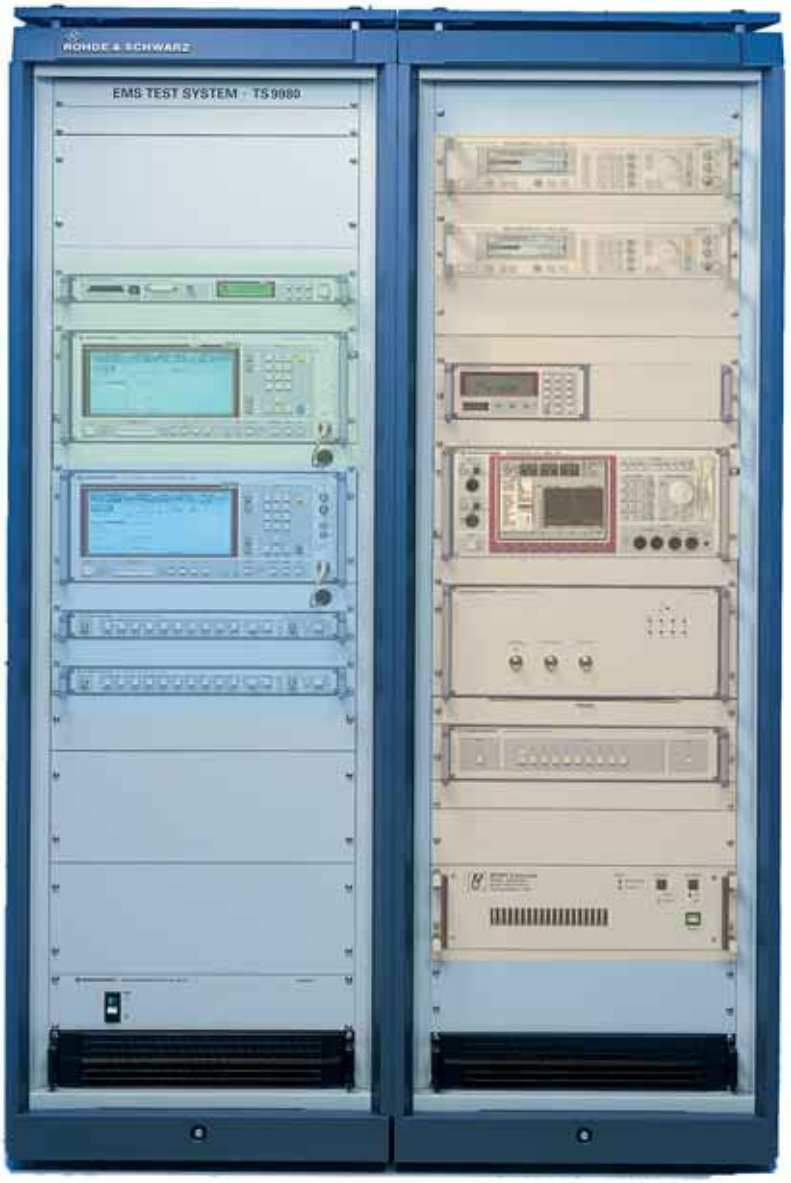
- Input immunity (S1)
- Immunity to conducted voltages (S2a)
- Immunity to conducted currents (S2b)
- Immunity to radiated fields (S3)
- Shielding effectiveness (S4)

Since these tests are highly complex and involve a large number of single measurements, they are carried out with automatic test systems.

The Test System R&S TS9980 has been designed for automatic measurement of the electromagnetic susceptibility of sound and TV broadcast receivers to EN 55020 and CISPR 20.

As part of ongoing technical development, system solutions for satellite receivers, DVB receivers and set-top boxes have been implemented. The system can be used for precompliance measurements, compliance measurements and batch testing.

EMS Test System R&S TS9980



DVB upgrade digital TV

Video upgrade analog TV

Basic system R&S TS9980 Audio

The Test System R&S TS9980 is available in three versions.

R&S TS9980 Audio

The basic system R&S TS9980 Audio (R&S TS9980 A) is suitable for testing all analog sound broadcast receivers, tuners, amplifiers, equalizers, CD players, tape decks and accessories. The basic system R&S TS9980 Audio covers the following broadcast standards:

– FM: VHF (mono/stereo)
– AM: LF/MF/HF (mono)

R&S TS9980 AV Multistandard

The enhanced R&S TS9980 AV Multistandard System (R&S TS9980 AV-M) is suitable for all relevant EMS measurements on analog sound and TV broadcast receivers and video recorders. The following TV standards are covered:

– PAL: B/G, I, D/K
– SECAM: D/K, L/L'
– NTSC: M/N

The relevant audio standards mono, dual sound, NICAM and BTSC (mono) are supported.

R&S TS9980 DVB Multistandard

The full-featured R&S TS9980 DVB Multistandard System (R&S TS9980 DVB-M) is suitable for all relevant EMS measurements on analog and digital sound and TV broadcast receivers, as well as on video recorders and set-top boxes (integrated receiver decoders).

In addition to the analog TV standards, the following digital standards are covered:

– DVB-C QAM (quadrature amplitude modulation) to ETS300429
– DVB-S QPSK (quadrature phase shift keying) to ETS300421
– DVB-T OFDM (orthogonal frequency division multiplex) to ETS300744
– ATSC 8VSB (vestigial sideband) to ATSC Doc. A/53

Option R&S TV-MON

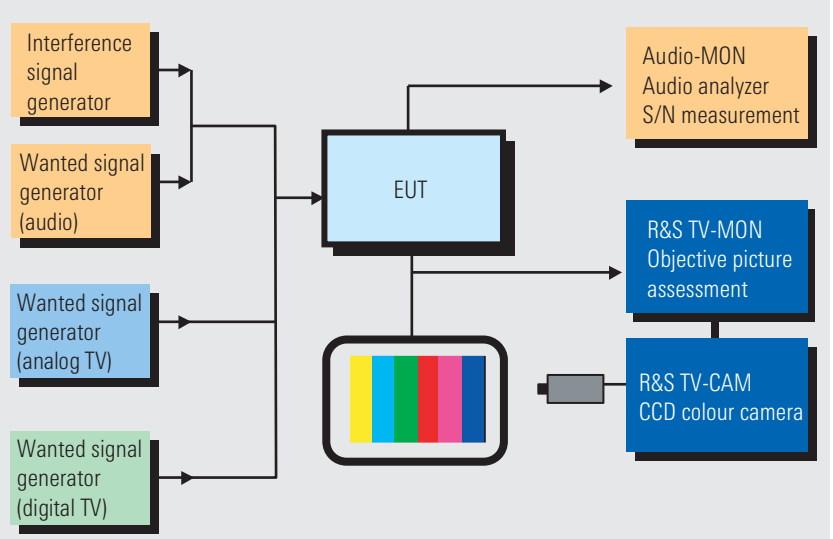
The System Extension R&S TV-MON allows for the first time fully automatic and objective picture assessment in susceptibility tests on TV receivers and associated equipment, independent of the subjective perception of the viewer. This is a special advantage in the very time-consuming and repetitive procedures required for batch testing and compliance measurements.

The user has a variety of benefits:

- Reproducible measurement results
- No need for qualified personnel for picture assessment
- Operating personnel gets familiarized quickly with TV-MON
- Measurements can be integrated into production process
- Test sequences can be optimized to increase production throughput

The results obtained by the objective method are directly comparable to those of the subjective method since the same interference and wanted signals are applied to the equipment under test. The method of objective picture assessment is, therefore, an attractive alternative.

R&S TV-MON system with TV-CAM in use



Integration of R&S TV-MON into the R&S TS9980 system

Automatic and objective assessment of picture degradations

Option R&S TV-MON

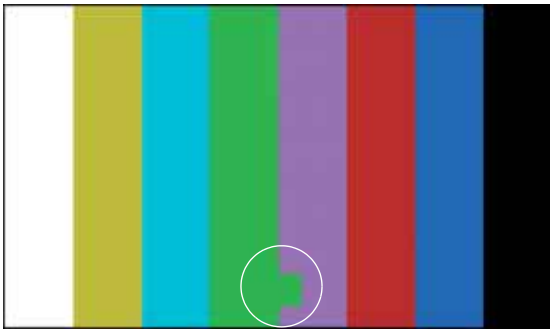
Objective picture assessment is based on comparison with a reference picture orienting on algorithms.
For equipment under test (EUT) without integrated monitor (e.g. video recorders, set-top boxes), the reference and test pictures at the EUT's video output (CCVS) are used. For EUTs with monitor (e.g. TV sets, monitors) the test pictures are recorded with a video camera system (TV-CAM) available as an option.

Four steps are required for an objective picture assessment:

- Setting up the picture recording system
- Taking several reference pictures (at least five). A mean regression function is calculated from the reference pictures. The assessment threshold is given by the maximum deviation of measured values from this function.
- Applying the required interference signal and taking one or more test pictures for each variation of the interference variable (frequency or level)
- Calculating a regression function for each assessment step. If the deviation is greater than that determined for the reference pictures, there is visible picture degradation.

The picture assessment algorithm used here is capable of identifying analog as well as digital picture degradations. The following picture degradations are detected:

- Analog picture degradations
  - Superimposed patterns (sets of lines), moiré patterns
  - Degradation of brightness and contrast
  - Colour loss
  - Sync loss



Test pattern for visual assessment of picture quality of MPEG2 data streams (moving element marked by white circle)

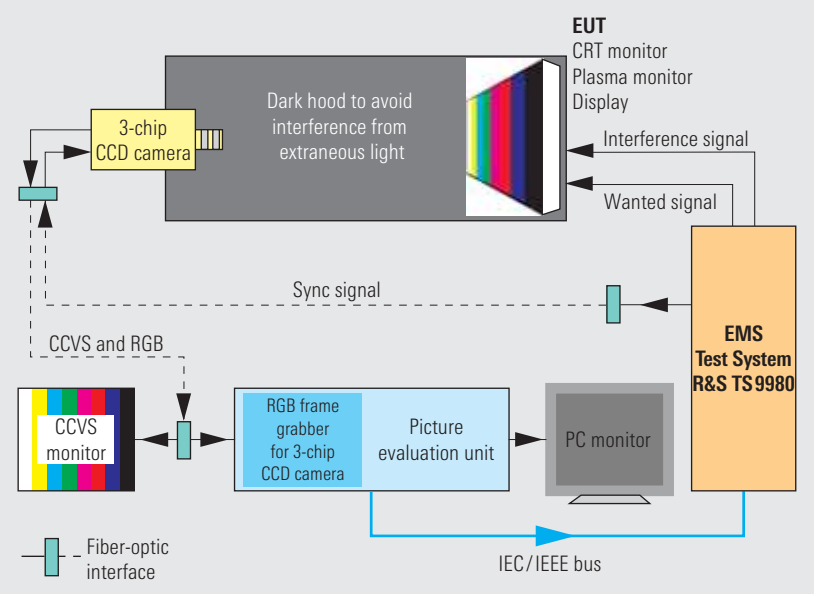
- Digital picture degradations
  - Blocking
  - Total picture loss
  - Freeze of moving element

The colour test pattern stipulated by the standard is not suitable for assessing digital MPEG2 data streams because data stream interruptions cannot be identified visually. A moving element was therefore introduced in the test pattern, and a bit rate of 6 Mbit/s selected for the video data stream.

For automatic control of the test run by the Test System R&S TS9980, the Control Software R&S T80-K4A or -K4D is required.

Test setup for checking TV receivers

For objective picture quality assessment of TV receivers, monitors and displays, a high-grade 3-chip CCD camera is required for taking pictures, and a dark hood to avoid interference from extraneous light. The RGB signal from the camera is taken to the picture evaluation unit via an RGB frame grabber. For synchronization with the picture refresh rate, a sync signal from the video generator must be fed to the camera. The two signal paths use fiber-optic links to avoid electromagnetic pickup.



Principle of objective picture quality assessment of TV receivers using TV-MON and TV-CAM

System Software R&S T80-K1

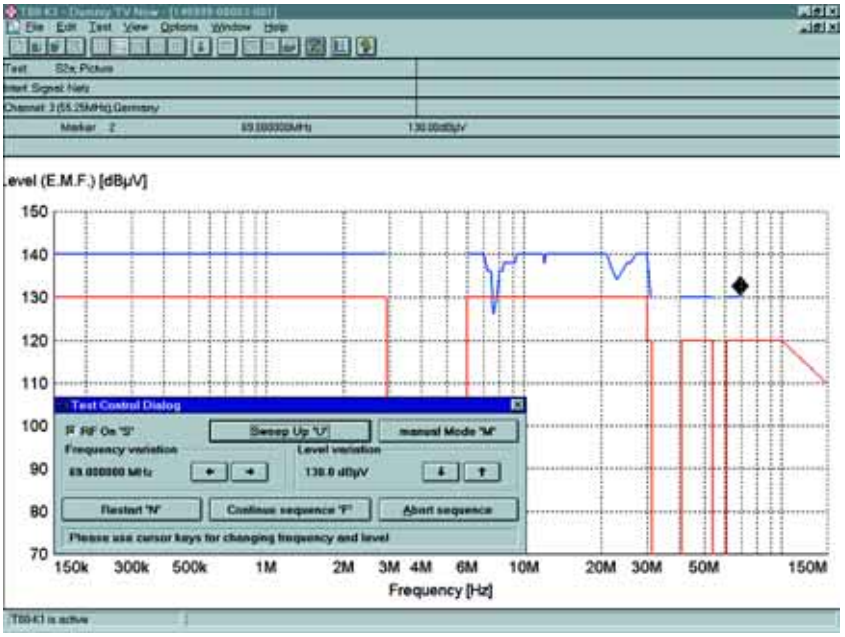
The powerful software package R&S T80-K1 is the basis for automatic control and monitoring of the Test System R&S TS 9980 as well as for data collection and analysis. Effective and hence economically efficient use of the Test System R&S TS 9980 is only possible through automation.

Further benefits:

- Improved reproducibility and higher accuracy of measurement results
- Automatic generation of comprehensive test reports
- Permanent system monitoring
- Improved data management through integrated database
- Automatic calibration and correction of frequency-dependent parameters

A special feature of the R&S T80-K1 software is the way data is stored. Each test result is stored together with the test parameters. The test parameters contain all definitions of the test configuration, such as interference signal and EUT settings, definition of limit values, report header and test run. Thanks to the joint storage of test results and parameters, any measurement performed can be repeated any time with exactly the same settings.

The System Software R&S T80-K1 runs under Windows 2000, Windows NT 4.0 and Windows 95/98. The benefits of these GUIs are uniform operation, multitasking and versatility regarding the integration of other programs. Moreover, the integrated DDE interface allows data exchange between various Windows programs.



Thanks to the modular options, the software can easily be upgraded to meet future requirements. The required device drivers and further software options are simply added to a software kernel. This modular concept makes the software extremely flexible.

The software packages are protected by passwords and various user levels. This ensures that measurement data can only be cleared and the system configuration only be changed by authorized users.

Software options

R&S T80-K4A (option for R&S TV-MON)
Control software for R&S TV-MON for objective picture assessment of analog EUTs.

R&S T80-K4D (option for R&S TV-MON)
Control software for R&S TV-MON for objective picture assessment of analog and digital EUTs.

R&S T80-K5 (video upgrade)
Upgrade for EMS testing of analog TV broadcast receivers and video recorders.

R&S T80-K6 (audio upgrade)
Upgrade for EMS testing of sound broadcast receivers.

R&S T80-K7 (DVB upgrade)
Upgrade for EMS testing of satellite and DVB/ATSC TV broadcast receivers.

R&S T80-K13 (option S4)
Measurement of shielding effectiveness of sound and TV broadcast receivers.

Specifications

Operating temperature range	+5 °C to +45 °C
Humidity	40% to 70% at 25 °C ±10%
AC supply	110 V or 230 V / 240 V ±10%, 47 Hz to 63 Hz
Grounding	impedance <3 Ω in shielded rooms

R&S TS9980 Audio

Dimensions (W x H x D)	606 mm x 1775 mm x 810 mm
Weight	approx. 150 kg
Power consumption	max. 1300 VA

R&S TS9980 AV Multistandard

Dimensions (W x H x D)	1213 mm x 1775 mm x 810 mm
Weight	approx. 240 kg
Power consumption	max. 1600 VA

R&S TS9980 DVB Multistandard

Dimensions (W x H x D)	1213 mm x 1775 mm x 810 mm
Weight	approx. 270 kg
Power consumption	max. 1800 VA

Options

Upgrade from TS9980 Audio to TS9980 AV Multistandard (Audio+Video)

Upgrade from TS9980 AV Multistandard to TS9980 DVB Multistandard

Shielding effectiveness option

Automatic picture evaluation option

Subject to change due to technical progress

Certified Environmental System
ISO 14001
REG. NO 1954

Certified Quality System
ISO 9001
DQS REG. NO 1954

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