



ROHDE&SCHWARZ

Test and Measurement
Division

Manual

**EMI Test Software for
R&S EMI Receivers and Accessory**

ES-K1

1026.6790.02

Version 1.71

Printed in the Federal
Republic of Germany

In this manual	Index
I. Basic Package (ES-K1)	
1. Introduction	1
2. Graphical User Interface	2
3. Standard Scripts	3
4. Standard Device Handler	4
5. Dynamic Data Exchange (DDE)	5
II. Options	
1. ES-K2 Script Development Kit	6
2. ES-K1x Device Handler: Test Receiver and Spectrum Analyzers	7
3. ES-K3x Device Handler: Accessory	8
4. ES-Kxx Special Device Handlers	9

Content

1	Introduction.....	1-0
1.1	Overview.....	1-1
1.1.1	Introduction to the Manual.....	1-1
1.1.2	Short Description.....	1-2
1.1.2.1	Graphical User Interface	1-2
1.1.2.2	Operating Modes of the Software	1-2
1.1.2.3	Measuring and Analyzing Functions.....	1-3
1.1.2.4	Graphics and Report	1-3
1.1.3	Licence	1-3
1.2	Installation.....	1-4
1.2.1	System Requirements.....	1-4
1.2.2	Options Concept.....	1-4
1.2.2.1	Basic Program.....	1-5
1.2.2.2	Options	1-5
1.2.2.3	Multiple-user Licences.....	1-5
1.2.3	Installation Instructions.....	1-5
1.2.3.1	Manuals on the CD-ROM.....	1-6
1.2.3.2	ES-K1 on the Controller Function of the EMI Analyzer ESIB.....	1-6
1.2.3.3	Authentication.....	1-6
1.2.3.4	Option Disk.....	1-7
1.2.3.5	Preparation for Installation	1-7
1.2.3.6	Starting the Installation.....	1-7
1.2.3.7	Installation Options.....	1-8
1.2.3.7.1	Option Installation.....	1-9
1.2.3.7.2	Option Update.....	1-13
1.2.3.7.3	Option „Demo Installation“	1-14
1.2.3.7.4	De-installation of ES-K1 Software.....	1-14
1.2.3.8	First Steps after Installation.....	1-15
1.3	Introduction to Operation	1-17
1.3.1	Measurement Task (Example).....	1-17
1.3.1.1	Test Setup	1-17
1.3.1.2	Block Diagram.....	1-18
1.3.1.3	Definition of Terms	1-18
1.3.2	Starting ES-K1 Software	1-19
1.3.3	Programming a Measurement with ES-K1 Software.....	1-20
1.3.4	Preparatory Operations for Measurement.....	1-22
1.3.4.1	Performing the Measurement.....	1-23
1.3.4.2	Editing Data in Scan Editor Window	1-24
1.3.4.2.1	Adding a Receiver.....	1-24
1.3.4.2.2	Changing a Frequency Range.....	1-24
1.3.4.2.3	Deleting a Frequency Range	1-25
1.3.5	Measurement	1-27
1.3.5.1	Example of Virtual Measurement.....	1-27
1.3.5.2	Practical Measurements.....	1-29
1.3.5.2.1	Measurement of Broadband Interferer in Range 150 kHz to 30 MHz	1-29
1.3.5.2.2	Measurement of Broadband Interferer in Range 9 kHz to 30 MHz	1-30
2	Graphical User Interface	2-0
2.1	Overview.....	2-1

2.2	Files	2-2
2.3	Filetypes	2-6
2.3.1	Script	2-6
2.3.2	Script Parameters	2-6
2.3.3	Sequence	2-6
2.3.4	Measurement Result	2-6
2.3.5	Limit Line	2-6
2.3.6	Transducer and System Transducer	2-6
2.3.7	Graphics Configuration	2-7
2.3.8	Report Header	2-7
2.3.9	Report Configuration	2-7
2.3.10	Scan/Sweep Table	2-7
2.3.11	Frequency List	2-7
2.3.12	Test Configuration	2-8
2.3.13	Text File	2-8
2.4	Editors	2-9
2.4.1	Sequence Editor	2-9
2.4.2	Script Parameter Editor	2-9
2.4.3	Table Editor	2-10
2.4.4	Graphics Configuration Editor	2-12
2.4.5	Report Header Editor	2-16
2.4.6	Report Configuration Editor	2-16
2.4.7	Scan/Sweep Editor	2-17
2.4.8	Test Configuration Editor	2-18
2.4.9	Text Editor	2-19
2.5	Report	2-20
2.5.1	Print	2-20
2.5.2	Printer Setup	2-21
2.6	Special Functions	2-22
2.6.1	Configuration	2-22
2.6.2	Quit (<i>Alt-F4</i>)	2-22
2.7	Options Menu	2-23
2.7.1	Device Configuration	2-23
2.7.2	Selftest	2-24
2.7.3	Simulator	2-25
2.7.4	Login, User List and Change Password	2-26
2.7.5	Edit Accessory and Configure Accessory	2-28
2.7.6	Main Toolbar, Device Toolbar and Status Bar	2-28
2.7.7	Background	2-29
2.7.8	Change Language	2-29
2.8	Measurement Functions	2-30
2.8.1	Interactive Device Dialog	2-30
2.8.2	Sequence	2-30
2.8.3	Script	2-30
2.8.4	Measurement Functions	2-31

2.8.4.1	Scan and Sweep Functions with Automatically Generated Graphics	2-31
2.8.4.2	Single Measurement	2-33
2.9	Evaluation Functions	2-37
2.9.1	Acceptance Analysis	2-37
2.9.2	Peak Reduction	2-38
2.9.3	Subrange Maxima Reduction	2-39
2.9.4	Subrange Minima Reduction	2-40
2.9.5	Maxima Reduction	2-41
2.9.6	Octave Maxima Reduction	2-41
2.9.7	Narrowband/Broadband Discrimination	2-41
2.9.8	Conversion to ... / MHz	2-43
2.9.9	Unit Conversion	2-43
2.9.10	Merge Data	2-44
2.9.11	Exclude Ambients	2-44
2.9.12	Weighted Addition	2-44
2.9.13	Reduce to Frequency List	2-45
2.9.14	GTEM Correlation	2-45
2.9.15	S-LINE Correlation	2-48
3	Standard Scripts	3-0
3.1	Cable Calibration	3-7
3.1.1	Description	3-7
3.1.2	List of the Script Parameters	3-8
3.2	Probe Calibration	3-12
3.2.1	Description	3-12
3.2.2	List of the Script Parameters	3-13
3.3	Site Attenuation	3-18
3.3.1	Description	3-18
3.3.2	List of the Script Parameters	3-21
3.4	Overview Test	3-28
3.4.1	Description	3-28
3.4.2	List of the Script Parameters	3-29
3.5	Semi Interactive Test	3-35
3.5.1	Description	3-35
3.5.2	List of the Script Parameters	3-36
3.6	Power Test	3-42
3.6.1	Description	3-42
3.6.2	Parameter Sets	3-42
3.6.3	List of the Script Parameters	3-43
3.7	Voltage Mains Test	3-52
3.7.1	Description	3-52
3.7.2	Parameter Sets	3-52
3.7.3	List of the Script Parameters	3-53
3.8	Voltage Terminal Test	3-63
3.8.1	Description	3-63

3.8.2	Parameter Sets	3-63
3.8.3	List of the Script Parameters.....	3-64
3.9	Azimuth Chart Test.....	3-70
3.9.1	Description	3-70
3.9.2	List of the Script Parameters.....	3-71
3.10	Field Strength Test	3-76
3.10.1	Description	3-76
3.10.2	Parameter Sets	3-77
3.10.3	List of the Script Parameters.....	3-78
3.11	Field Strength Test (fast)	3-91
3.11.1	Description	3-91
3.11.2	Parameter Sets	3-91
3.11.3	List of the Script Parameters.....	3-92
3.12	Magnetic Field Strength Test	3-102
3.12.1	Description	3-102
3.12.2	Parameter Sets	3-102
3.12.3	List of the Script Parameters.....	3-103
3.13	GTEM Test.....	3-112
3.13.1	Description	3-112
3.13.2	Parameter Sets	3-112
3.13.3	List of the Script Parameters.....	3-113
3.14	S-LINE Test.....	3-121
3.14.1	Description	3-121
3.14.2	Parameter Sets	3-121
3.14.3	List of the Script Parameters.....	3-122
3.15	Automotive Test.....	3-129
3.15.1	Description	3-129
3.15.2	Parameter Sets	3-129
3.15.3	List of the Script Parameters.....	3-130
3.16	EMI STD Test.....	3-137
3.16.1	Description	3-137
3.16.2	Parameter Sets	3-137
3.16.3	List of the Script Parameters.....	3-138
3.17	MIL STD 461/462 C Test	3-144
3.17.1	Description	3-144
3.17.2	Parameter Sets	3-144
3.17.3	List of the Script Parameters.....	3-145
3.18	MIL STD D Limits	3-151
3.18.1	Description	3-151
3.18.2	List of the Script Parameters.....	3-152
3.19	GAM Test.....	3-153
3.19.1	Description	3-153
3.19.2	Parameter Sets	3-153
3.19.3	List of the Script Parameters.....	3-154

3.20	RF Exposure Test	3-160
3.20.1	Description	3-160
3.20.2	Parameter Sets	3-161
3.20.3	List of the Script Parameters	3-162
4	Standard Device Drivers	4-0
4.1	V Networks ESH2-Z5 / ENV 4200 and ES-H3-Z5 / ENV 216	4-1
4.1.1	Interactive Mode	4-1
4.1.2	Script Mode	4-1
4.1.3	IEEE Bus Commands	4-1
4.2	Triple Loop Antenna HM020	4-3
4.2.1	Interactive Mode	4-3
4.2.2	Script Mode	4-3
4.2.3	IEEE Bus Commands	4-3
4.3	Relay Matrix RSU/PSU	4-4
4.3.1	Concept	4-4
4.3.2	Setup of the RSU Drivers	4-4
4.3.3	Setup of the SUPER-RSU Driver	4-5
4.3.4	Script Mode	4-5
4.4	Driver LPT I/O	4-6
4.4.1	Overview	4-6
4.4.2	Hardware	4-6
4.4.3	Properties	4-6
4.4.4	Dialog mode	4-6
4.4.5	Script Commands	4-8
4.5	Relay Matrix TS-RSP	4-9
4.5.1	Device	4-9
4.5.2	Properties	4-9
4.5.3	Operating Dialog	4-10
4.5.4	Overview of the Script Commands	4-11
5	Dynamic Data Exchange (DDE)	5-0
5.1	General	5-1
5.1.1	DDE Commands	5-1
5.2	DDE with MS WORD for Windows™	5-1
5.1.1	General Command Syntax with WORD for Windows™	5-1
5.1.2	Creating a Test Report	5-2
5.3	DDE Commands of the Application ES-K1	5-6
5.3.1	ES-K1 DDE Topics	5-6
5.3.1.1	General State of the System	5-6
5.3.1.2	Lists	5-7
5.3.1.3	Graphics Configuration	5-8
5.3.1.4	Report Header	5-9
5.3.1.5	Report Configuration	5-10
5.3.1.6	Scan/Sweep Table	5-11

1 Introduction

1.1 Overview

1.1.1 Introduction to the Manual

The following chapters provide a complete description of the EMI Application Software ES-K1. Users working with the EMI Application Software ES-K1 for the first time are recommended to read through chapters 1 to 4 one after the other.

- Chapter 1 Introduction , provides a general overview.
- Chapter 2 Graphical User Interface , describes the elements of the graphical user interface.
- Chapter 3 Standard Script Description , provides information on the enclosed standard scripts.
- Chapter 4 Standard Device Drivers , describes the function of the Rohde Schwarz V-networks, relay switching units, etc..

The Options ES-Kxx provide information about the use of the script language FSL (Flexible Script Language) and the device drivers.

- Option ES-K2,** Script Development Kit , explains how a script is produced and includes a description of the general language elements of FSL and a list of all standard functions, system-specific and device-specific functions.
- Option ES-K1x,** Device Driver , contains a list of all device drivers for test receivers and spectrum analyzers including their application, which are supported by the EMI Application Software ES-K1.
- Option ES-K3x,** Device Driver , contains a list of all device drivers for accessories including their application, which are supported by the EMI Application Software ES-K1.
- Option ES-K50,** Device Driver , contains the universal IEEE-bus device driver for simple ASCII communication with devices that can be controlled via IEEE bus.
- Option ES-K80,** Device driver , contains the device driver for the R S TTL card PS-B11.

1.1.2 Short Description

The Rohde Schwarz EMI Software package ES-K1 is an up-to-date and user-friendly software which can be ideally used for all EMI measurements of conducted and radiated interference.

The number of measurements required to ensure electromagnetic compatibility (EMV) is continuously increasing, along with the demand for reliability, reproducibility and economic efficiency of these measurements.

Features of the EMI Application Software ES-K1

- User-friendly software for Microsoft Windows™ 95 / 98 / 98SE / ME / NT 4.0 / 2000 / XP
- EMI measurements both to international **commercial standards** (CISPR, VDE, FCC, VCCI, ANSI, EN) and **military standards** (MIL, VG, DEF-STAN, GAM-EG13)
- Possible adaptation to other standards
- Automatic and interactive mode
- Transmission factors and limit lines are automatically considered in the calculation of the results
- Evaluation of narrowband and broadband interference
- Calibration of the test setup
- Comfortable and flexible documentation of measurement results
- Various ways of data export
- Future extensions can be easily implemented due to the option concept

1.1.2.1 Graphical User Interface

The EMI Application Software ES-K1 for WINDOWS™ is equipped with a **graphical user interface**, which permits to start with the program immediately and can be readily operated by the user.

1.1.2.2 Operating Modes of the Software

The measurement procedures can be executed either in interactive mode or automatically, depending on the application of the software.

a) Interactive mode

In interactive mode, each device can be controlled individually by means of its own window. All other functions such as measuring and analyzing functions can also be operated interactively.

b) Automatic mode

The automatic measurement runs are implemented by scripts of a macro language, thus releasing the user from routine tasks. The scripts control the measurement run, evaluate the measurement results and produce the necessary reports for documentation of the measurement results.

An option for the system software is the **Script Development Environment** (ES-K2). This environment permits the user to modify the supplied standard scripts in order to match them to the latest standards. It also allows him to develop scripts that cover completely new standards. Of course, this environment also contains debugging aids and test facilities, which simplify the generation and modification of the scripts.

1.1.2.3 Measuring and Analyzing Functions

The Software ES-K1 supports a number of measuring and analyzing functions. This is necessary to minimize the number of measurements to be performed again, which are very time-consuming.

Possible measurements are the scan, the execution of a fast overview measurement (sweep) and the measurement performed at discrete frequencies.

The most important **ways of evaluation** (data reduction) are the acceptance analysis, peak reduction, subrange maxima and subrange minima reduction, maxima reduction and narrowband/broadband discrimination.

Further possible evaluations are used to combine measurement results, output MIL measurement results in a broadband-related display (/MHz) and eliminate known interference, e.g. ambients.

A very particular type of data handling is the GTEM correlation, which permits to convert measurement results to open-area conditions using the GTEM cell.

A similar correlation for S-LINE measurement cells is also available.

1.1.2.4 Graphics and Report

Measurement results, limit lines and transducer factors can be displayed in a manifold and flexible way as **table** or **graphics**. Up to eight different traces can be shown in a window with linear or logarithmic frequency axis. The shape, line style and colour of the graphical elements can be optimally adapted to the requirements of the documentation.

For interactive, graphical evaluation of the measurement results, a marker and a delta marker are available, which can be easily positioned using the mouse. The zoom function permits to enlarge any section of the measurement. The measurement results can be displayed simultaneously in various windows.

The measurement results are summed up in a report which is configured by the user himself. In addition to a report header, all data relevant to the measurement can be output, e.g. scan and sweep table. The output of the measurement results, limit lines and transducers is possible both in tabular and graphical form.

1.1.3 Licence

The EMI Application Software ES-K1 is protected by a hardware adapter (hardlock), which is connected to the parallel interface of the computer. This does not impair the function of the interface, i.e. the adapter is transparent for the user.

Note:

The user must make sure that the hardlock is firmly connected

1.2 Installation

1.2.1 System Re uirements

EMI Application Software ES-K1 can be used with any computer fulfilling the following system requirements

- Microsoft Windows™ 95 / 98 / 98SE / ME / NT 4.0 / 2000 / P
- CPU 486 PENTIUM recommended
- 16 Mbyte RAM 64 Mbytes recommended
- At least 60 Mbytes free memory on the harddisk
- SVGA graphics adapter (800x600 pixels) VGA (1024x768 pixels) recommended
- GPIB interface compatible with National Instruments GPIB interface with Windows device driver (PCII/IIA, AT-GPIB , AT-GPIB/TNT, PCI-GPIB, PCMCIA-GPIB)

EMI Software ES-K1 fitted with the associated drivers for GPIB interface can be used with the operating systems listed above.

The installation software automatically considers the conditions depending on the operating system.

t All t t t t t - t / t t

tt / t t t

1.2.2 Options Concept

Due to its **options concept** the software is easy to handle and future-safe. The drivers required for the units and additional software options are combined to form the software core.

EMI Software ES-K1 supports all EMI test receivers and spectrum analyzers from Rohde Schwarz, ie the models of receiver family ESCS, ESHS, ESVS, ESVD, ESPC und ESS, the EMI test receivers based on spectrum analyzers ESPI, ESIB, ESAI, ESBI und ESMI and still the instruments ESH3, ESVP and E M.

In addition to these receivers, a large number of remote-controllable accessories is used. These are amongst others artificial-mains networks and V-networks ESH2- 5, ENV4200, ESH3- 5 and ENV216, Absorbing Clamp Slideways for the measurement of conducting interference as well as remote-controllable Positioning Mast and Turntable for measuring RFI fieldstrength. Relay matrices are used for switching the antenna and transducers.

1.2.2.1 Basic Program

EMI Software **ES-K1** comprise the following components

- EMI software core under Windows™ contains the graphics user interface, standard scripts for automated test sequences and other standard data (limit values, etc.)
- Drivers for R S artificial-mains networks ESH2- 5, ENV4200, ESH3- 5 and ENV216 as well as for R S relay switch units (PSU, RSU, PSN, TS-RSP).
- Internal database for data management (scripts, limit-value lines, transducers, graphics, scan tables, test results, etc.)

The data of ES-K1 internal database can be exported for transfer and filing operations, new data can be imported.

The internal database can be configured with the supplied standard data during the installation.

1.2.2.2 Options

The following options (receiver and accessories) can be used with ES-K1

ES-K2 Script development environment

ES-K10 Driver for R S EMI test receivers ESCS / ESPC / ESHS / ESVS / ESVD

ES-K11 Driver for R S EMI test receivers ESS

ES-K12 Driver for R S EMI test receivers ESAI / ESBI / ESMI

ES-K13 Driver for R S EMI test receivers ESH3 / ESVP

ES-K14 Driver for R S EMI test receivers ESH3-E M / ESVP-E M

ES-K15 Driver for R S spectrum analyzers FSA / FSB / FSM

ES-K16 Driver for R S EMI test receivers ESIB and spectrum analyzers FSE (FSIQ)

ES-K17 Driver for R S tempest receivers FSET

ES-K18 Driver for R S EMI test receivers ESPI

ES-K19 Driver for R S spectrum analyzers FSP and FSU

ES-K20 Driver for R S EMI test receivers ESCI

ES-K30 Driver for Sch fer Mast HCM (RSM) and Turntable HCT (RST)

ES-K31 Driver for Sch fer Absorbing Clamp Slidebar HCA (RSA)

ES-K32 Driver for EMCO Mast with Controller 1050 and EMCO Turntable with Controller 1060, as well as for combined Controllers 1090 and 2090

ES-K33 Driver for DEISEL Mast and Turntable with Controller HD50/100

ES-K34 Driver for DEISEL Absorbing Clamp Slidebar with Controller HD50/100

ES-K37 Driver for AK O Mast and Turntable with Controller ASC-300

ES-K40 Driver for EMCO Mast and Turntable with Controller 2090, and for SUNOL Mast and Turntable with Controller SC9xV

ES-K50 Universal GPIB driver

1.2.2.3 Multiple-user Licences

ES-K100 Licence for the use of EMI Application Software by several users. An additional hardlock will be supplied for each ES-K100 ordered.

1.2.3 Installation Instructions

Scope of supply of EMI Software ES-K1

- CD-ROM for installing the software

- Hardlock key (dongle) for authentication (not with an update)
- Option disk with customer-specific authentication code (not with an update)
- Operating manual (not with an update)

The EMI Software ES-K1 is installed on the PC from the the CD-ROM.

If necessary then a set of installation disks can be generated from the CD-ROM through starting the batch file DISKS.BAT . Eight formatted disks will be needed then.

1.2.3.1 Manuals on the CD-ROM

On the CD-ROM there s a subdirectory Manuals which holds PDF files that represent the manuals. Those files can be viewed and printed with the Acrobat Reader from Adobe Systems Inc. It also enables to perform full text searches.

The Acrobat Reader is an application which is available free of charge (freeware) and also included on the CD-ROM. If that application is already installed on the PC then PDF files can be viewed without further action. In the Internet there are many documents stored as PDF files. The latest version of the Acrobat Reader can also be downloaded from the Internet ([http //www.adobe.com](http://www.adobe.com)).

To install the Acrobat Reader (version 4.0) from the CD-ROM on your computer proceed as follows (drive D refers to the CD-ROM drive)

Go to the Start button and select Run .

Enter D AcroRd32 setup and follow the instructions of the installation program.

1.2.3.2 ES-K1 on the Controller Function of the EMI Analyzer ESI

If the application ES-K1 shall be installed on the controller function (Windows NT) of the EMI analyzer ESIB then the following topics have to be considered

The built-in LCD display has a resolution of 640x480 pixels (VGA), but the application requires a resolution of minimum 800x600 pixels (SVGA). Therefore the application can only be operated with an external monitor for which a higher resolution can be selected. To do so the softkey Ext. Monitor in the general setup of the instrument firmware has to be activated and then on the PC side (Windows NT) the property settings of the Display (Control Panel) have to be modified. Further details can be found in the ESIB manual (chapter 1.7 Connecting an External Monitor).

For the installation of the application under Windows NT you need administrator access privileges because also the hardlock driver (a system driver) needs to be installed. ou have to do a login with the administrator identification. Further details can be found in the ESIB manual (chapter 1.4 Controller Function). Once the application has been successfully installed you can change back to the original login with instrument identification.

If the application doesn t need to control any other GPIB devices besides the ESIB then a second GPIB interface is not necessary and can be replaced by the internal software interface RSIB . Further details can be found in the ES-K16 manual (Operation with the RSIB Interface)

1.2.3.3 Authentication

When using ES-K1 software, the hardlock key (dongle) is required for authentication if a test receiver and/or accessories are to be controlled via the GPIB interface. If the software is operated without a suitable hardlock, it runs in the im **Demo mode**, i.e. the GPIB interface cannot be physically addressed, the units can only be operated virtually. The other functions can all be used without any restriction.

The hardlock is not required during installation but on starting the ES-K1.

1.2.3.4 Option Disk

This disk which is supplied in addition to the installation disk and queried by the software during installation contains the ID files (ID identification) coded to the associated hardlock key according to the specific customer's requirements. The files allow the use of ES-K1 with the user's test receivers or options (accessories). The options are offered by the setup program for installation.

If no option disk is available then only an update can be done which in turn requires the existence of an earlier installation or version of the application.

If an installation of version 1.50 exists then an option disk can be generated from there through starting the batch file OPT-DISK.BAT in the referring subdirectory ... E ECUTE .

1.2.3.5 Preparation for Installation

Prior to installation, check the GPIB configuration for correct settings (using the configuration program supplied with the GPIB card)

<u>DMA Channel</u>	NONE , driver setting and interface setting should match
<u>Base I/O Address</u>	driver setting and interface setting should match
<u>Interrupt Line</u>	driver setting and interface setting should match may also be set to NONE
<u>Enable Auto Serial Polling</u>	NO
<u>Assert REN when System Controller</u>	ES

All settings can be performed independent of the operating system using the associated configuration programs. The configuration can be set in the Control Panel under System using the Device Manager , under Windows NT 4.0 in the Control Panel .

If the software is operated on a computer without GPIB driver, the ES-K1 displays the error message (Data error - Data GPIB.DLL not found.). This message can be ignored, the software runs in the demo mode in this case.

1.2.3.6 Starting the Installation

The EMI Application Software ES-K1 has to be installed under Windows. To do this, the first installation disk is to be inserted in the corresponding drive.

The installation is performed via the taskbar under Windows 95 / 98 / NT4.0 (for Windows NT4.0 / 2000 / P administrator access privileges are required for the installation)

1. Open the **Start** menu. Select the menu item **settings** and **system control** to open the associated window.
2. The dialog is opened by clicking the icon **Software** and the **setup.exe** program is automatically selected from the disk by clicking the Installation key.

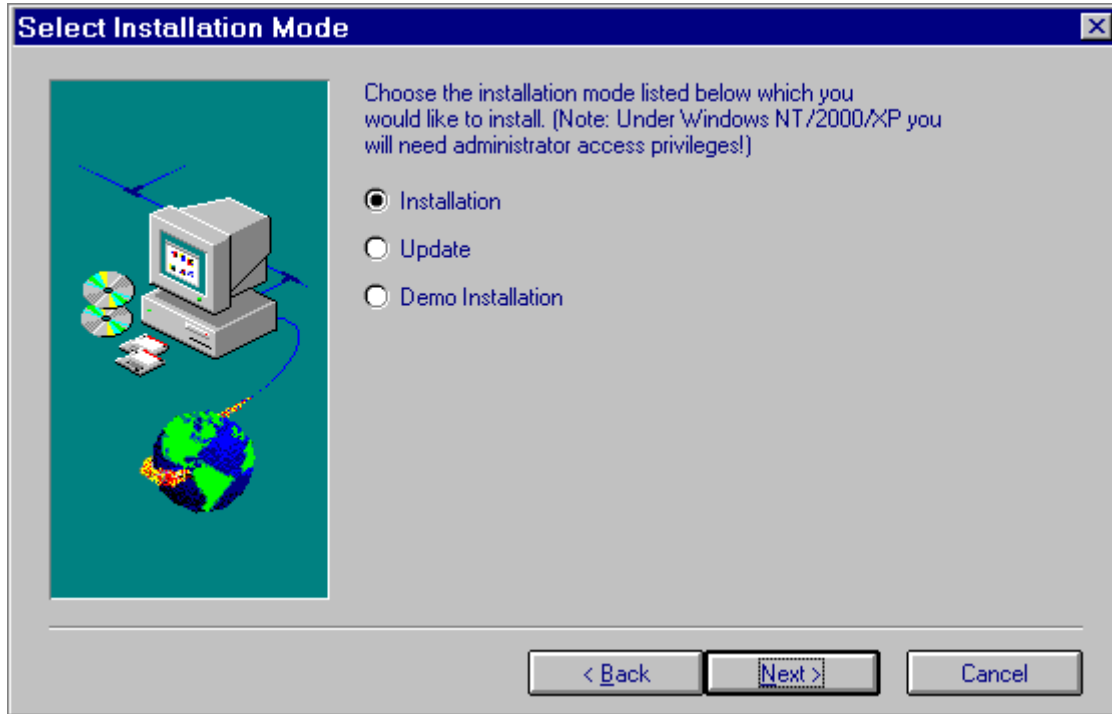
t t // t / / t t t t t t t //

t / t

When re-installing EMI Software ES-K1 all presettings offered in the queries and dialogs of the installation program can be accepted with **Next** or **Continue**.

1.2.3.7 Installation Options

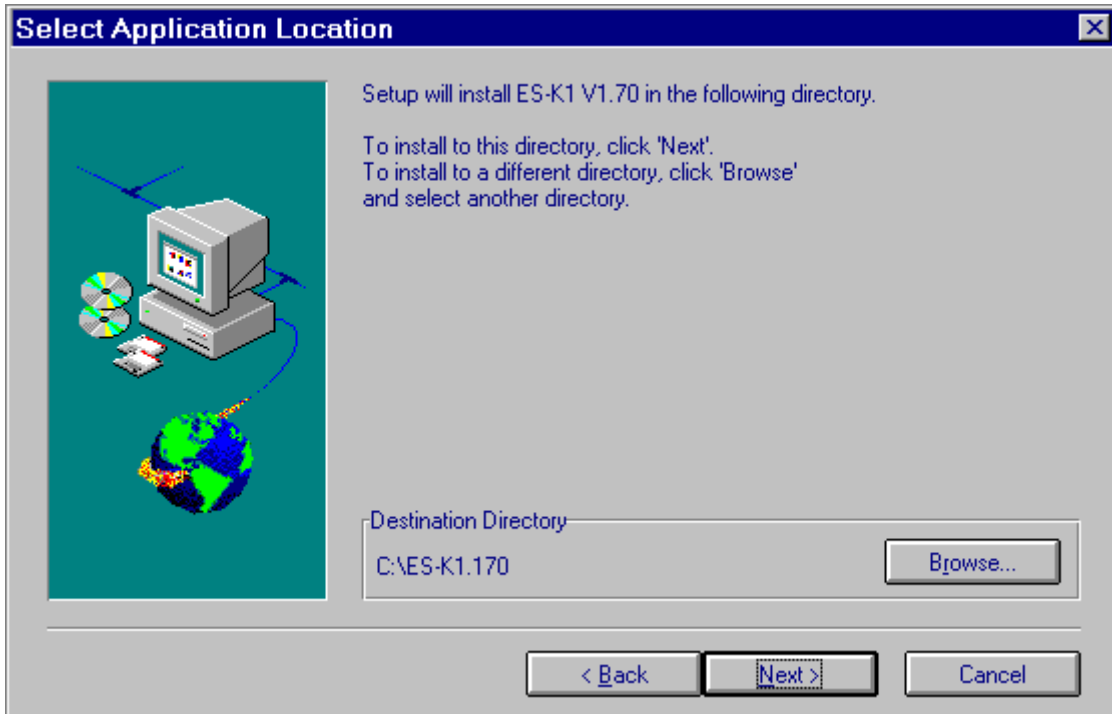
After starting the setup program the following is displayed on the screen



The option **Update** is used for former versions of the EMI software, which is installed in the system. The option **Demo Installation** performs an installation of the ES-K1 specifically for demos.

1.2.3.7.1 Option Installation

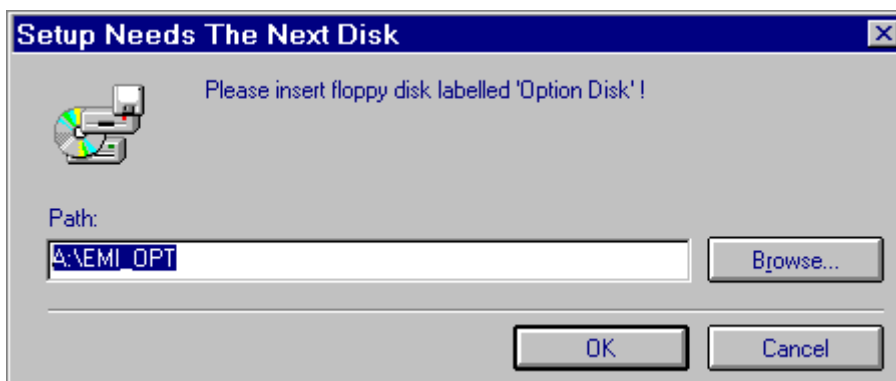
This option allows the installation of EMI Software ES-K1, the supplied drivers and options (by querying the option disk) and the pre-configured database.



This dialog field selects the directory, in which EMI Software ES-K1 is to be installed. Use the **rowse..** key to change the directory or to enter a new directory.

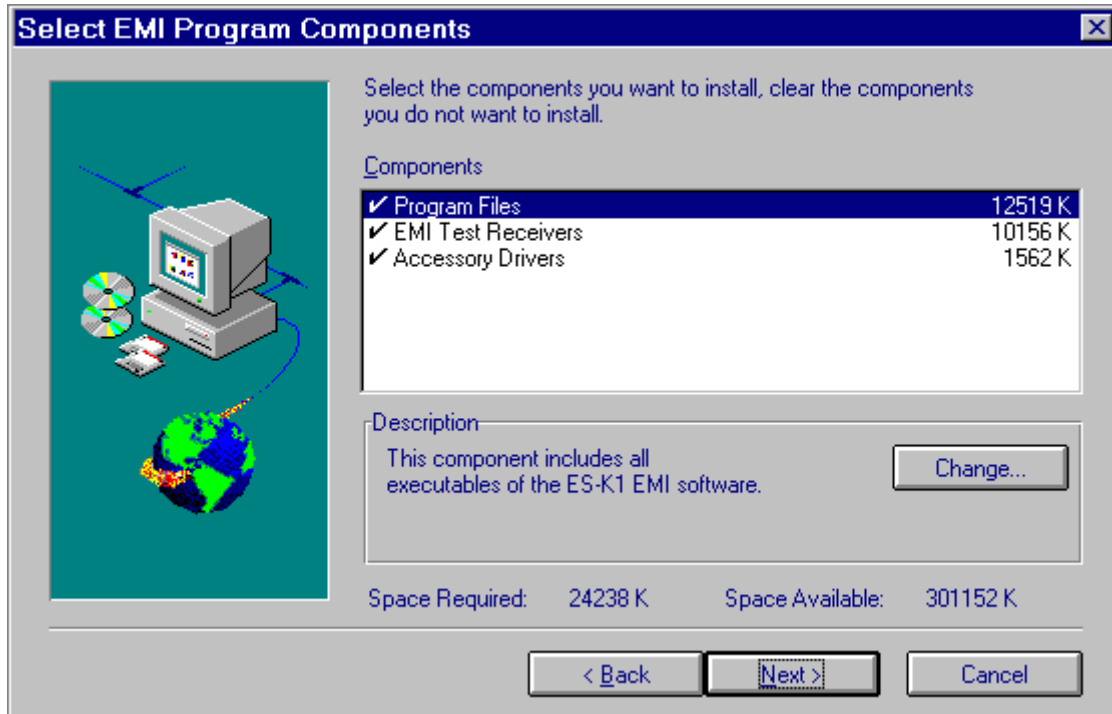
t / t t t - t t t // / t

The setup program then queries the customer-specific option disk

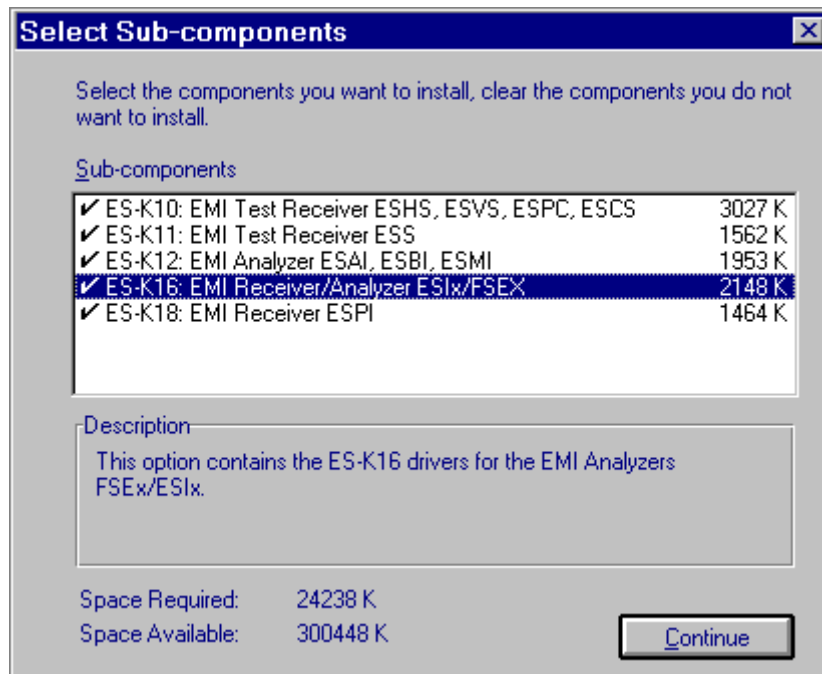


After inserting the option disk in the cooresponding drive, the setup program offers the drivers and options for EMI Software ES-K1 via the supplied ID files. All supplied components are usually installed, confirmation with the **Next** key is sufficient.

If only specific options are to be installed, selection is via **Change..** key from selected components **Program Files**, **EMI Test Receivers** and **Acessory Drivers**



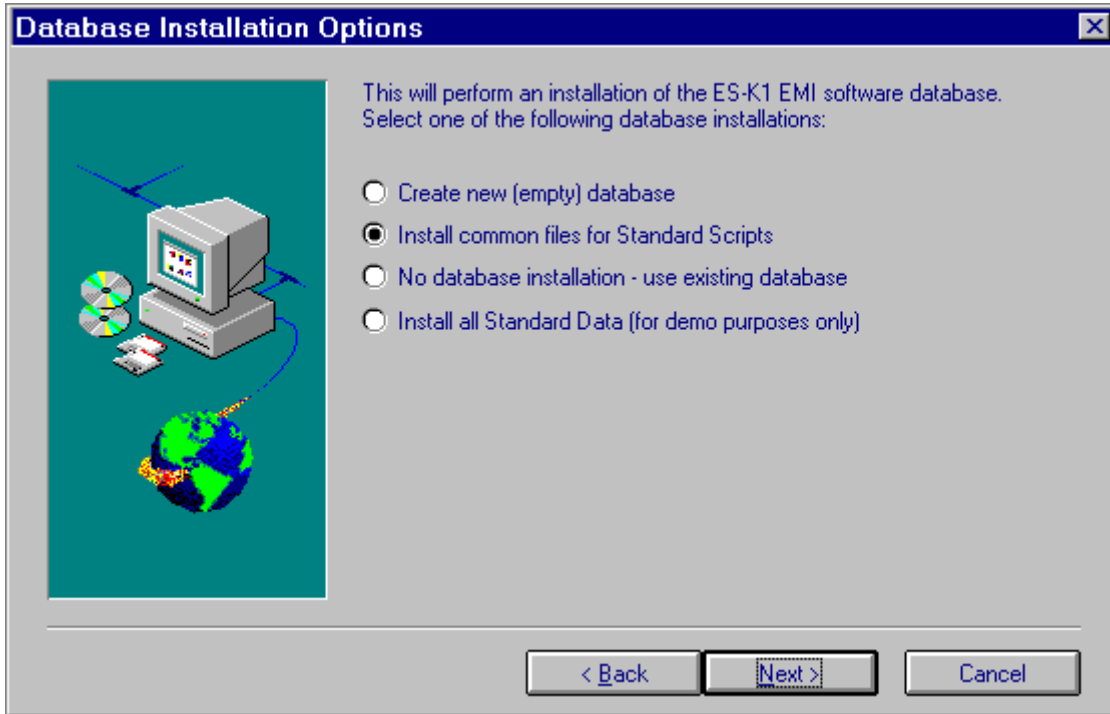
After selecting the corresponding components and clicking the **Change...** key, another dialog field allows the specific selection of options by a click



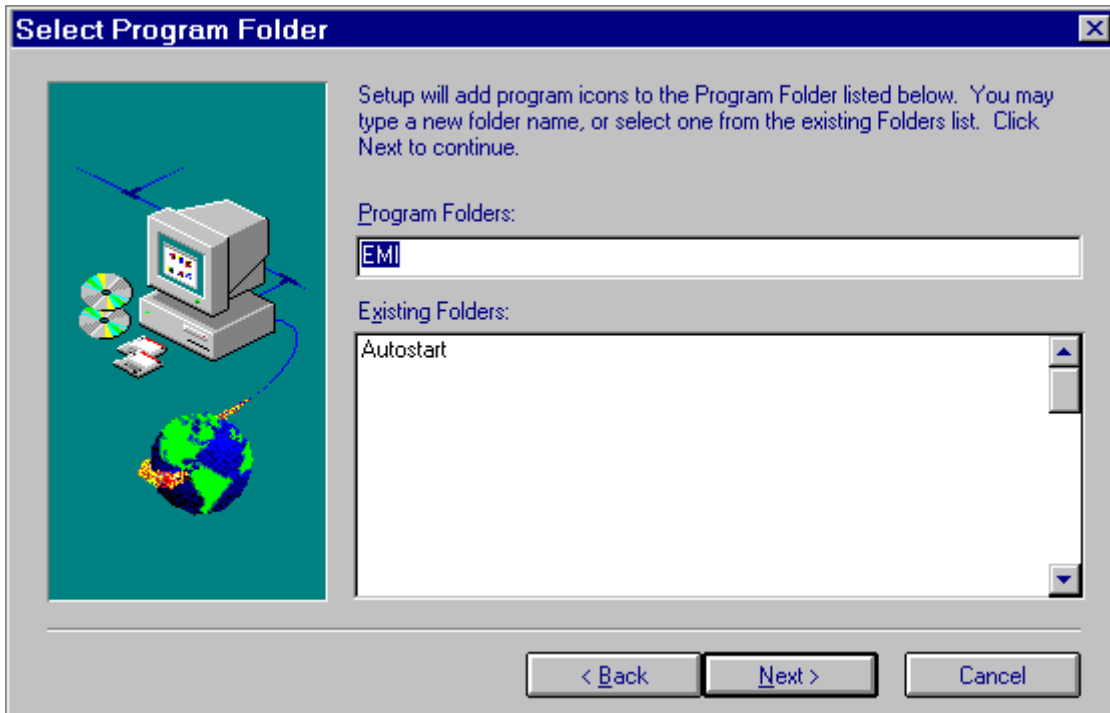
After selecting the components and options to be installed, the installation of the pre-configured database for EMI Software ES-K1 is offered.

The option **Install Standard Database** installs the pre-configured database with the standard data (scripts, limit-value lines, scan data, transducers, etc.). The option **Create New Database** is used when an existing external database is to be imported after the installation.

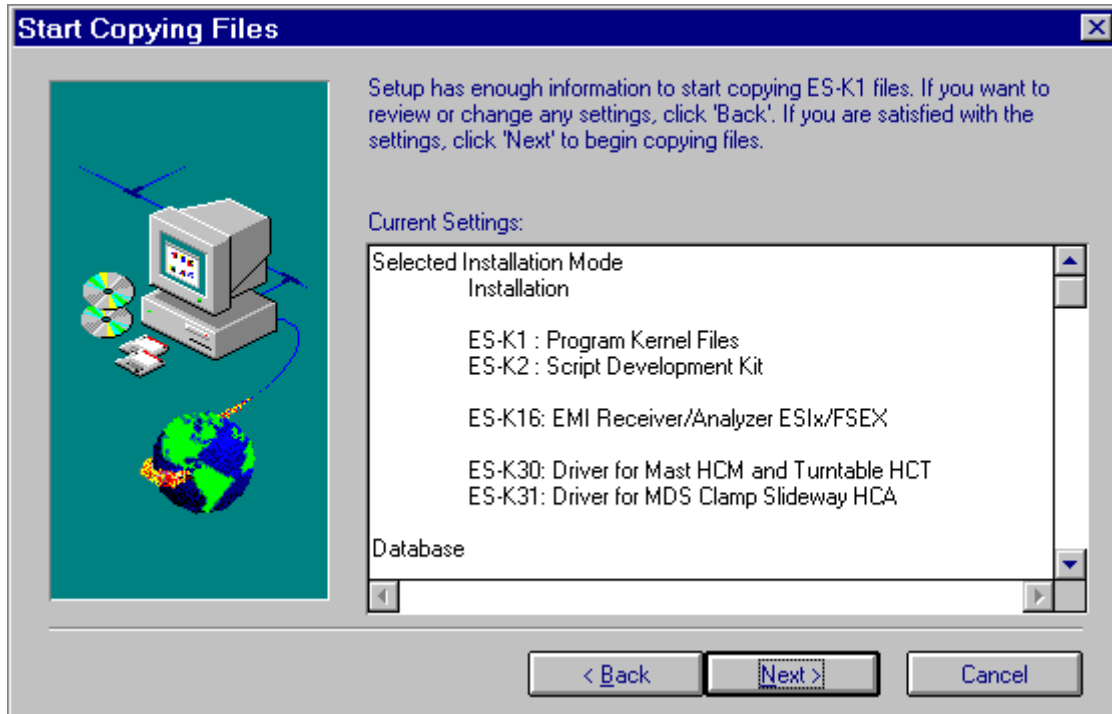
If an ES-K1 database is detected, either the existing database is saved in a backup directory before creating the new database or this step is skipped by selecting the option **No Database Installation**.



EMI Software ES-K1, the associated Readme files of the installed components and options as well as the Help files are combined in a **program group**, which can be selected via the next dialog. Program group **EMI** is offered as a default setting.

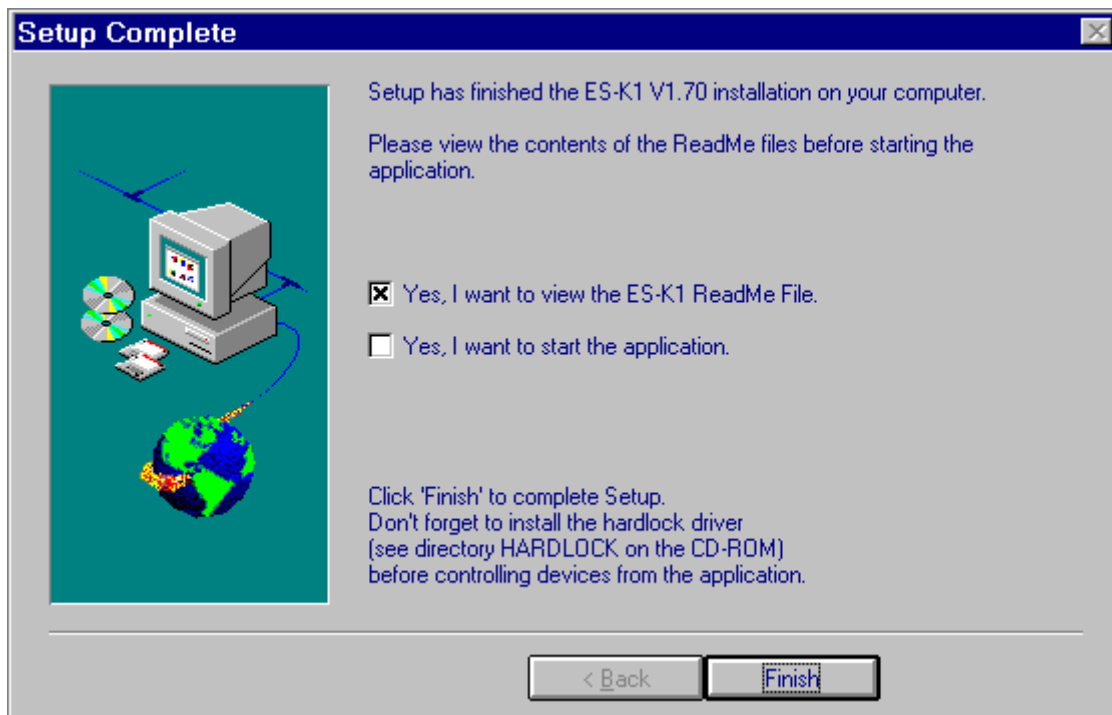


Before the installation is performed by transferring the files from the installation disks, the setup program again indicates the selected installation options, the selected components and options, the program path and the program group for verification.

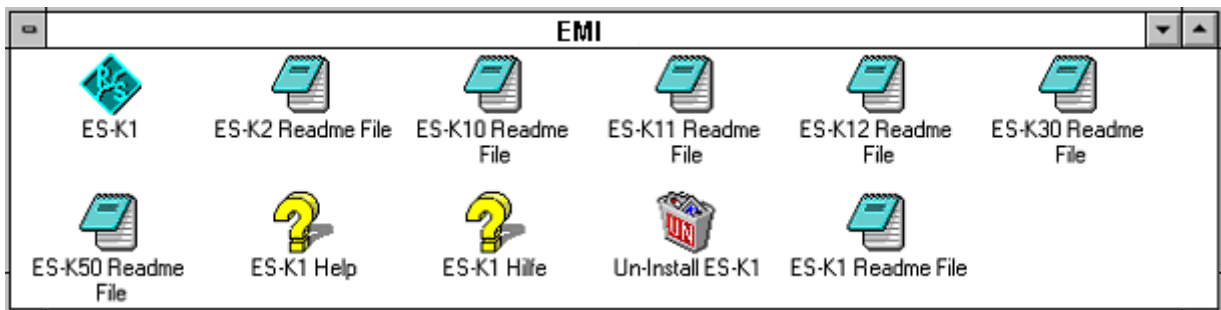


The current state of the file transfer to the harddisk is displayed during the subsequent installation through a progress bar.

At the end of the installation, a re-start of Windows or of the computer (depending on the operating system) is offered to activate the newly installed driver of the hardlock required to operate the ES-K1



The ES-K1 program can be started in the selected program group by clicking the R S icon after termination of the setup program



The **ES-K1 Readme File** contains general and additional current information on EMI Software ES-K1, which must be taken into account before using the ES-K1 software.

Directory structure of EMI Software ES-K1:

<ul style="list-style-type: none"> [-] ES-K1.170 <ul style="list-style-type: none"> [+] DATA [+] DATANULL [+] DOC [-] EXECUTE <ul style="list-style-type: none"> [+] DEVICES [+] ES-K1 [+] I02 [+] I10 [+] I11 [+] I12 [+] I13 [+] I14 [+] I15 [+] I16 [+] I17 [+] I18 [+] I19 [+] I20 [-] IMPSTD <ul style="list-style-type: none"> [+] AUTO [+] BASE [+] CAL [+] COND [+] EXP [+] GAM [+] INT [+] MIL [+] NSA [+] RAD [+] TEM [+] UTIL [+] OPTIONS [+] WMF 	<p>The database of EMI Software ES-K1 is installed in the DATA directory or in the directories below. All relevant data such as limit lines, transducers, scan and sweep data, test results, scripts, etc. are stored here.</p> <p>The directory DOC contains README files for the installed options and more.</p> <p>The executable program components (binaries, DLLs etc.) are located in the directory EXECUTE and the referring subdirectories DEVICES and ES-K1 .</p> <p>The supplied databases which are pre-installed by the setup program is available through a number of directories</p> <p>The directory I02 holds script examples from the manual for the script development kit ES-K2.</p> <p>The receiver-specific scan and sweep tables can be imported from subdirectories of Ixx (refers to receiver option ES-Kxx).</p> <p>The Standard Data (limit lines standard scripts etc.) are located in subdirectories of IMPSTD .</p> <p>The meaning of the subdirectories inside (topics) is explained in the Readme file.</p> <p>The OPTIONS directory contains the customer-specific authentication files for the hardlock.</p> <p>The background pictures for the ES-K1 software are stored in the WMF directory.</p>
---	--

1.2.3.7.2 Option Update

The installation of the option **Update** serves for the automatic transfer of customer-specific hardlock key files of an existing former EMI software installation. This option does not require a specific option disk since a check for the presence of an ES-K1 software is performed at the beginning of the installation. If such a version is detected, the drivers and options offered for the installation result from the existing ID files.

t t // t t t t t - / / t

Existing data sets can be exported from the old version and imported into the new version of ES-K1.

1.2.3.7.3 Option Demo Installation

No customer-specific option disk is required for the installation of the demo mode, all drivers and options can be selected. This installation of EMI Software ES-K1 is provided for trying out the software in the demo mode (without active operation via the GPIB interface) or for full operation of ES-K1 with demo hardlock code 0001.

1.2.3.7.4 De-installation of ES-K1 Software

To de-install EMI Software ES-K1, double-click the **Un-Install ES-K1** icon. The de-installation software clears all subdirectories generated under the installation directory and files, except the database files created by the user after the installation as well as the file ES-K1.INI in the subdirectory .. E ECUTE . The above-mentioned files or the paths created after the installation are to be manually cleared, as required.

1.2.3.8 First Steps after Installation

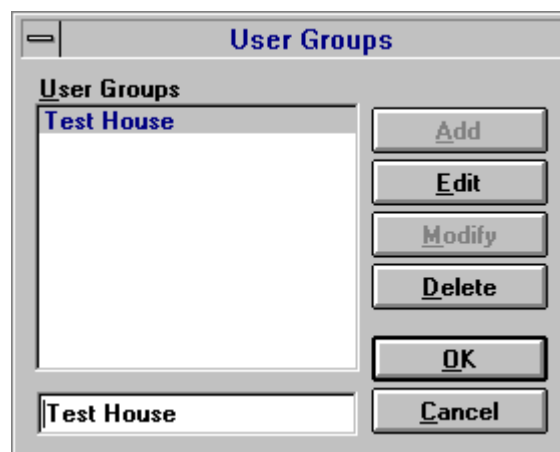
EMI Software ES-K1 has a **password protection** for each user, which offers the following advantages

- The data are protected against unauthorized access
- The configuration of the system can be only changed by authorized persons

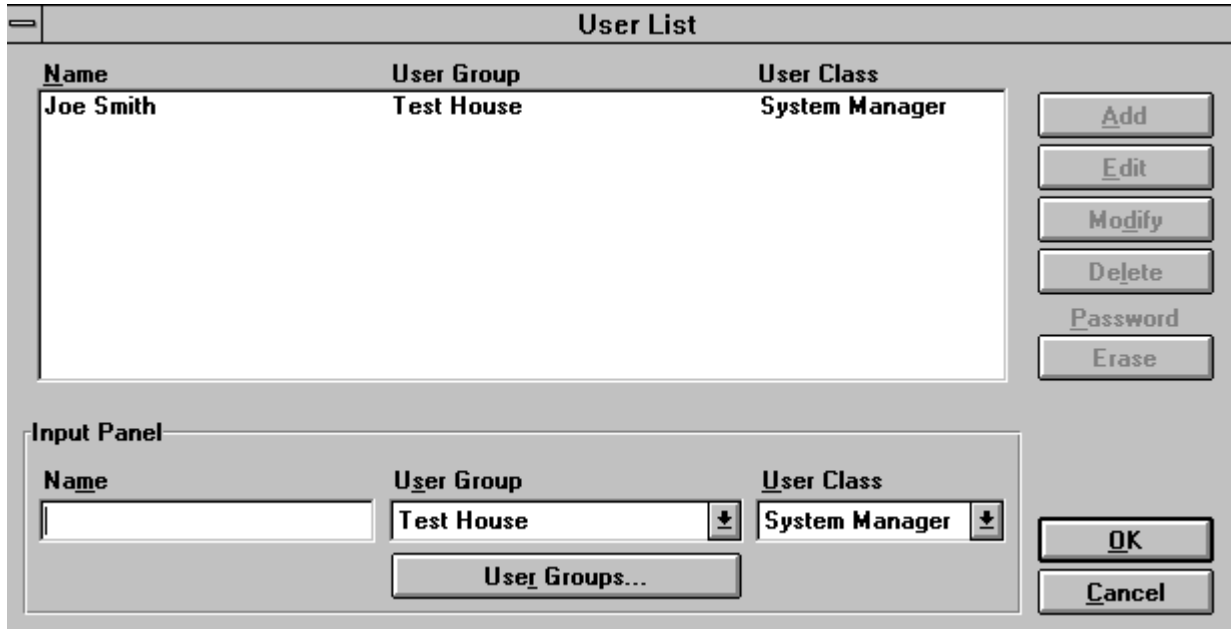
In addition, each user of ES-K1 is allocated to a **user group**. The user groups can be allocated to the three **user classes** with different **access rights**

- System manager
- Extended
- Standard

User groups or user names are not provided on delivery of the software. Therefore, **log-in** dialog is not called when the ES-K1 software is started for the first time, but the **user group** dialog



After setting up the user group with the ADD key, the list of users to belong to the defined group is entered in the subsequent dialog



t At/ t te n e / t / t t
t t t / t

When a user logs in for the first time, the entry and confirmation of the password is required



After these steps, the installation and the setup of EMI Software ES-K1 is terminated for the user. The next chapter gives an introduction on how to perform measurements.

Annotation
When the application window is minimized under Windows NT 4.0, then the window cannot be restored with the left mouse button, but with the right mouse button instead.

Important Note:

t t t / t t lt /
t t t

1.3 Introduction to Operation

In the example below, interactive control of the software is explained step by step to familiarize the user with the logical sequence of operations.

The example is based on a specific measurement task that can be performed immediately with the equipment shown. For practising, the measurement can also be performed without the said equipment in the virtual operating mode. This mode is automatically selected if there is no hardlock at the printer output of the computer. In this case, the Test Setup and Block Diagram sections are irrelevant, and the values entered into the test report are simulated values supplied by an internal random generator.

1.3.1 Measurement Task (Example)

Measurement of EMI voltage on the power line of a **domestic appliance** with 200 W power consumption continuous interference, pure broadband interference, ie without internal processor or the like.

Test setup to **CISPR 16-2 Figure 2**.

Limit values to **EN 55014**

1.3.1.1 Test Setup

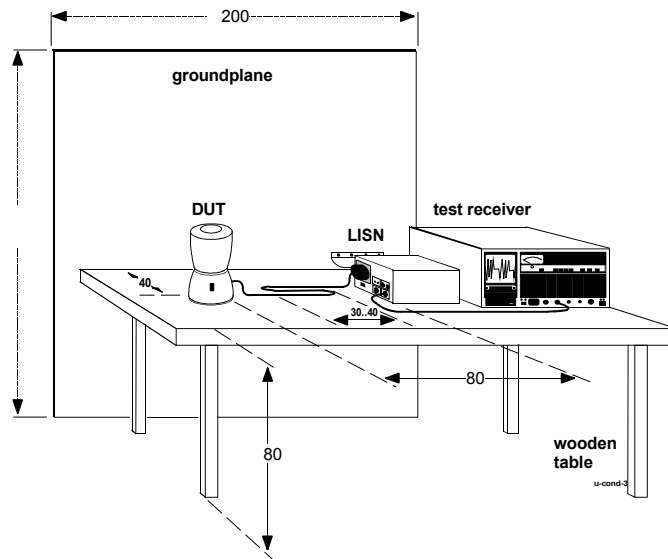


FIG 1 Test setup to CISPR 16-2

1.3.1.2 Block Diagram

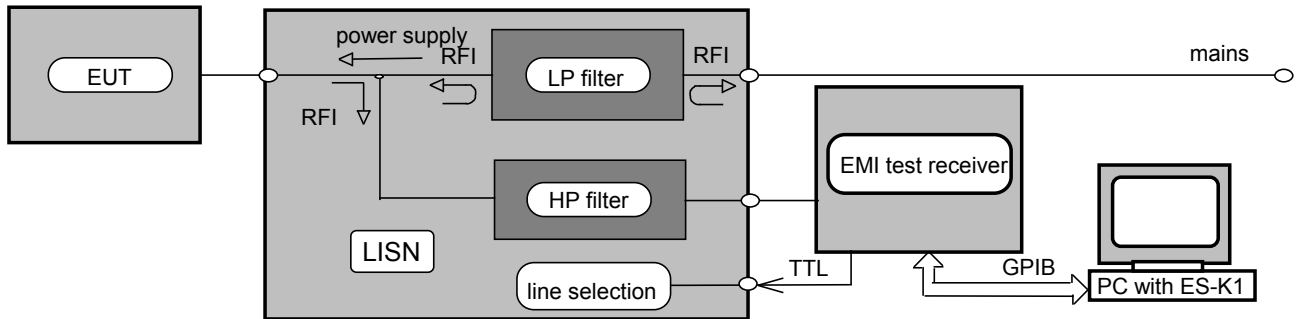


FIG 2 Block diagram of EMI test setup

1.3.1.3 Definition of Terms

Some terms necessary for understanding ES-K1 operation are explained below.

Transducers are four-terminal networks connected between the input of the test setup and the test receiver, for example a test antenna in EMI field strength measurements. The antenna converts in a defined manner the EMI field strength level (given in dB(V/m) for electrical field strength) into a voltage level (measured in dB(V)), which is displayed by the test receiver. The difference between the two numerical values is referred to as transducer factor (unit dB(1/m)), which is usually frequency-dependent. Stored transducer data, therefore, always include the transducer factor and the conversion into the correct unit so that the result displayed has the correct magnitude and unit.

Standards, which are listed in the ES-K1 database, contain information on emission limit values, the frequency range to which a given standard applies and on the setup of the test receiver. All of the standards in question cover product families. For example, the EN55014 standard applies to Electrical equipment and systems covering, among other equipment, all domestic appliances and electric tools.

Scanning is the tuning of the test receiver step by step across a given frequency range. For this, the step size (absolute or as percentage of the tuning frequency), the dwell time for each frequency, and the start and stop frequencies are to be defined. Synthesized test receivers (eg ESxS, ESS, ESPC) are typically tuned by scanning.

Sweeping is the continuous tuning of a test receiver across a given frequency range. In addition to start and stop frequencies, the time for the receiver to sweep the frequency range is to be defined. This tuning mode is typically employed by spectrum analyzers, although some analyzers can be tuned step by step as well (eg ESMI). Series ESxS and ESS test receivers have no sweep capability. No sweep tables are therefore supplied for these units.

1.3.2 Starting ES-K1 Software

Activate ES-K1 icon in Windows Program Manager field.



FIG 3 ES-K1 software icon

When program has been loaded, enter user name and password (log-in)



FIG 4 Log-in dialog window

E / - / tt t t t t t t -
t t t t t t t t t t t t // lt
t t t t t t t t t t t t
t // t

Confirm user name with TAB key (not with RETURN), and password with OK or RETURN.

The response message depends on whether or not a hardlock is installed at the printer output. For practising, the program can be run without hardlock. In this case, the window (FIG 5) shown opposite will appear



FIG 5

On confirmation with **OK** the default background mask of ES-K1 Software (FIG 6) appears, from which operation of the program can be started.

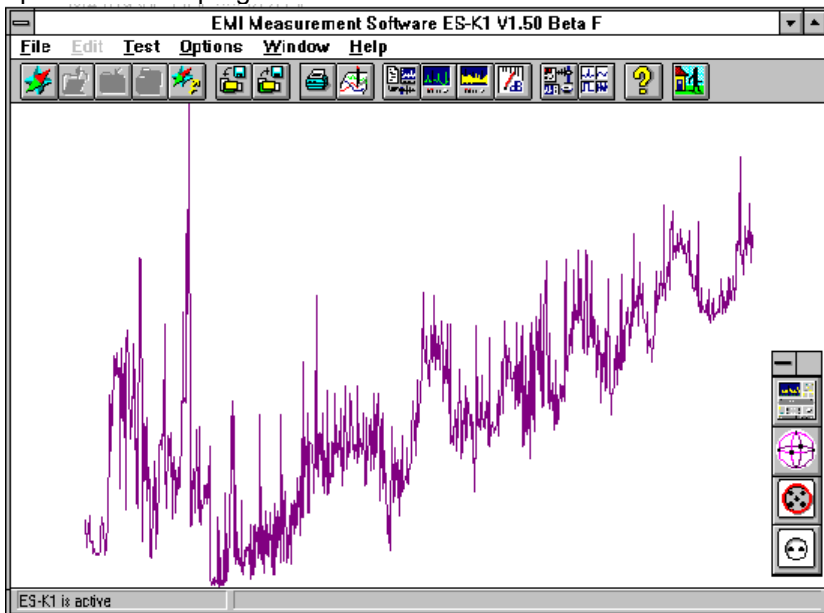


FIG 6 Background mask for Software ES-K1

1.3.3 Programming a Measurement with ES-K1 Software

As an initial step, configuration of the test equipment as shown in the test setup (FIG 2) is to be defined. For this, select **Device Configuration...** from the **Options** menu.



FIG 7 Device configuration dialog window

Instruments addressed by ES-K1 can be loaded into the **Device** field.

On clicking on **Load**, available devices appear after approx. 10 s in the **Device** field from where they can be selected by means of the scrollbar. In this example, Test Receiver ESHS is selected. Then the **Interface** (GBIB0), **Address** (17) and **Mode** are to be set. The **virtual** or **physical** mode is selected automatically depending on whether a hardlock is installed or the measurement is performed with real devices, see 1.3). Devices can be switched passive (**Active** not selected). This prevents measurement errors in the case of devices listed but not connected.

Entries in the **Name** field are optional. They describe a device more precisely if several devices of the same type are used. Entries in the **Description** field are optional, too.

On clicking on **Insert** ESHS is transferred as the first device to position **End of table** which thus moves one line down, ie **End of table** is always indicated at the end of the list.

Next, Two-Line V-Network ESH3- 5 is to be selected in the **Device** field. ESH3- 5 has no GPIB interface but is driven via the parallel TTL interface of the test receiver (see FIG 2), so the GPIB address of the test receiver is to be entered, ie the default address 20 is to be changed to 17. Then Two-Line V-Network ESH3- 5 is to be transferred to the device table by clicking on **Insert**. FIG 8 shows the complete device configuration. Any entries made in the **Name** and **Description** fields are displayed in the corresponding columns of the device table.

Make sure to confirm the settings made in the **Device Configuration** window with **OK** otherwise the settings will be lost. Note if there is no response on clicking on **OK** click on **Modify** even if no modifications were made, then **OK** will be active in any case.

Name	Device	Description	Interface	Addr	Mode	Active	Busy
ESH5	ESH5		GFIB0	17	virtual	Yes	No
ESH2Z5	ESH2Z5		GFIB0	17	virtual	Yes	No

<End of table>

Input Field: Device

Name: Device: Interface: Mode: physical virtual

Description: Address: Active

Buttons: Load, Empty, Insert, Edit, Modify, Delete, Properties...

Bottom Buttons: OK, Cancel

FIG 8 Completed device configuration. Return to main menu with .

1.3.4 Preparatory Operations for Measurement

The shortest way of parameterizing the devices used is by calling the data stored in the database of the software, ie tuning mode of test receiver (scan or sweep), transducer characteristics (eg of artificial mains networks) and limit values stipulated by standards. The ES-K1 database is managed by the **Navigator** which is called from the **File** menu (FIG 10).

For initial use of the ES-K1 software, information first has to be loaded into the database and is then available for any subsequent measurements.

Software handling is therefore different after initial installation and subsequent operations.

After installation, the **Scan Table** for the receiver used must be loaded. To load the table, first call the **Navigator (Backup Database)** from the **File** menu.

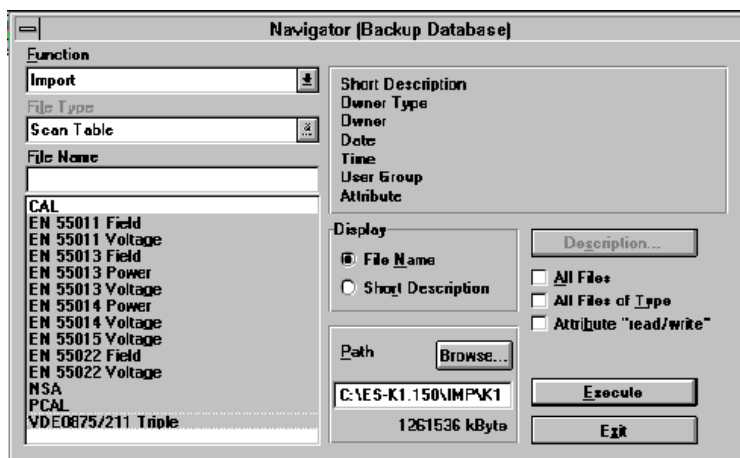


FIG 9

The **rowse** key (FIG 9) activates the **Path** dialog window with the import directory (see README files) from which a subdirectory with the scan tables for the receiver used is selected.

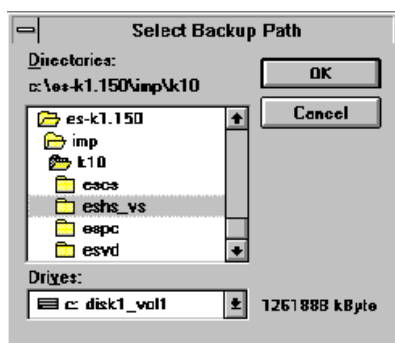


FIG 10 Subdirectory K10/EHS with scan tables for Receiver EHS

Then the required scan tables designated with the name of the standard are marked and transferred to the scan table under **Navigator...** by means of **Execute**.

The standard import database is stored in the same directory in which the ES-K1 Software was installed. The scan and sweep tables can be selected from the subdirectories for the receiver versions (K10, K11, etc).

1.3.4.1 Performing the Measurement

When preparatory operations as described under 1.3.4 are completed (required only after installation, not for recall of ES-K1 Software), the measurement task as defined in chapter 1.3.1 is performed through the following steps

Call **Navigator** from the **File** menu. In the **Navigator** window (FIG 11), click on **Open** under **Function** and select **Scan Table** under **File Type**. Under **File Name** select **EN55014 Voltage** and click on **OK**. The **Scan Editor** window (FIG 13) will appear.

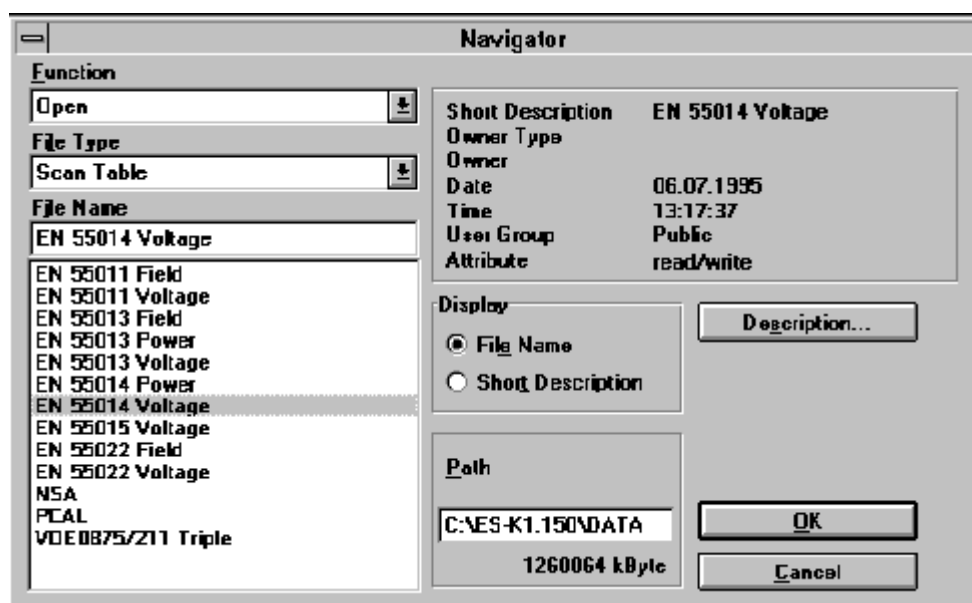


FIG 11 **Navigator** database manager selected from **File** menu. Selection of **Open** function and **Scan Table** file type. Calling of **EN55014 Voltage** file.

The **Scan Editor** window usually already contains data from previous settings. What the operator has to do is to edit the data to make the required settings for each subrange. The **Subranges** list box (upper right in FIG 16) is of primary importance. The list box will however be empty after installation of the software. In this case, proceed as described under 1.1.4.2.

It is important to note that for each subrange selected from the **Subranges** list box the settings in the **Subrange** window below are made separately, while the settings made under **Unit**, **Detector** and **Mode** above apply jointly to all subranges. It is therefore advisable to assign one of the four possible detectors (**MaxPeak**, **Average**, **uasiPeak** and **RMS** selectable under **Detector**) to each of the four curves (**Curve 1 to 4**). Desired detectors for the individual subranges can then be selected from the **Control** window below the **Subrange** window.

Select the desired subrange from the **Subranges** list box by means of a double click . The associated settings will be displayed in the **Subrange** window.

1.3.4.2 Editing Data in Scan Editor Window

1.3.4.2.1 Adding a Receiver

By clicking on **Receiver** in the **Subrange** window, all receivers entered in the **Device Configuration** table can be called. The selected receiver is shown with the settings stored in previous measurements displayed in the various windows under **Subrange**. Make the required settings including **Attenuation/Gain Transducer, Curve 1 to 4** and **Demodulation**. Conclude settings with **Subrange Check**. Click on **Insert** (upper right). In doing so, make sure that the blue selection line in the **Subranges** list box indicates a frequency range higher than the subrange to be added. Otherwise an error message will be output. Store setting with **OK**.

1.3.4.2.2 Changing a Frequency Range

Select frequency range from **Subranges** list box with blue selection line. Double-click on frequency range to activate it. All associated settings will appear in the **Subrange** window. Change range as required and conclude setting with **Subrange Check**. If the new value does not match existing settings (eg artificial mains network above 30 MHz), the operator is prompted to make an appropriate correction. Click on **Modify** to confirm the change. Store with **OK**.

1.3.4.2.3 Deleting a Frequency Range

Select frequency range from **Subranges** list box with blue selection line. Activate range by means of single click. Then click on **Delete** and store with **OK**.

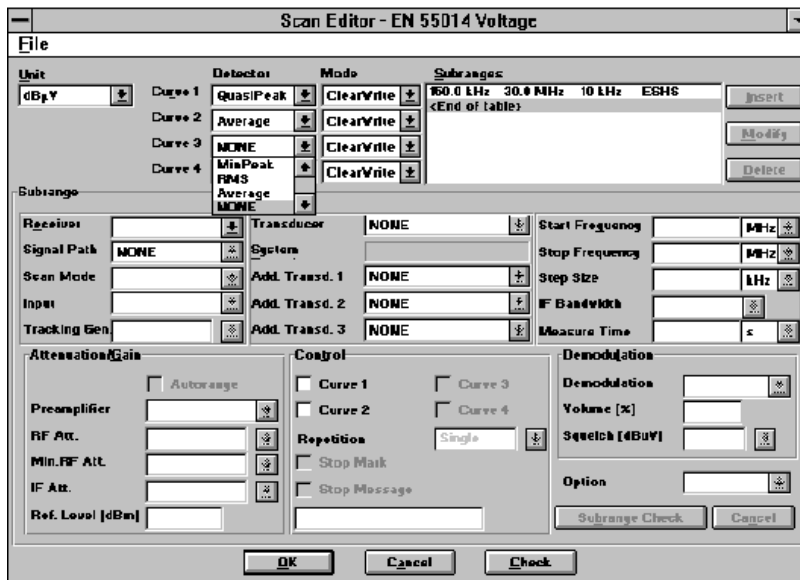


FIG 12 Scan Editor - EN55014 Voltage

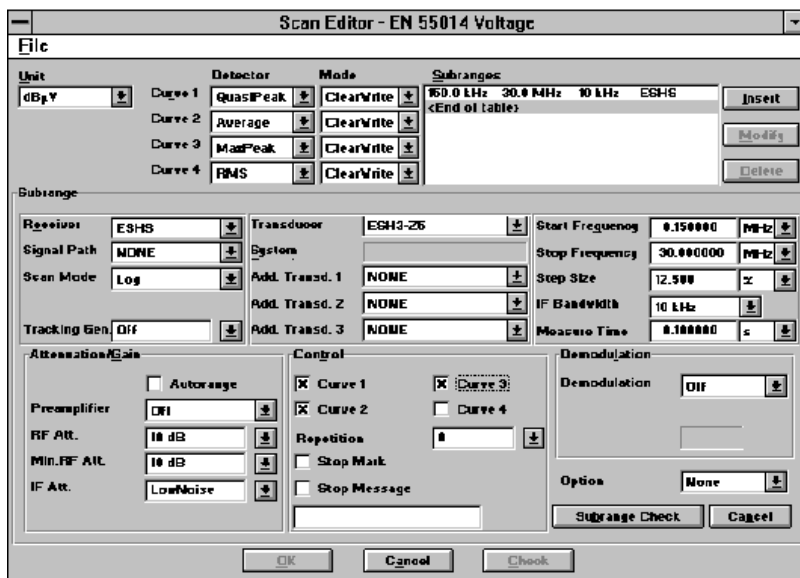


FIG 13 Scan Editor - EN55014 Voltage, after double-click on test receiver marked blue in **Subranges** list box and calling of transducer ESH3- 5 confirmation with **Insert** in the upper right. Curve 4 (rms detector in this case) is not available for ESHS.

It should be noted that **MaxPeak** in conjunction with 10 ms measurement time will provide a coarse result for orientation only. For measurements in line with standards, the quasi-peak detector would have to be selected for curve 1, as well as a measurement time of 1 s. However, this would lead to uneconomical measurement times, so a time-saving approach (subrange analysis) is usually taken for this type of measurement.

The DUT in this measurement task is a pure broadband interferer. This means that it does not cause sinusoidal interference on just a single frequency. In this special case, it is not obligatory to measure at

each single frequency of the range but the range can be scanned in steps larger than the bandwidth of the test receiver. It is appropriate to select logarithmic steps. With a step size of 12.5 , total measurement time at each frequency will in this case be ust about 1 min 40 s even for the standard-conforming measurement time of 1 s.

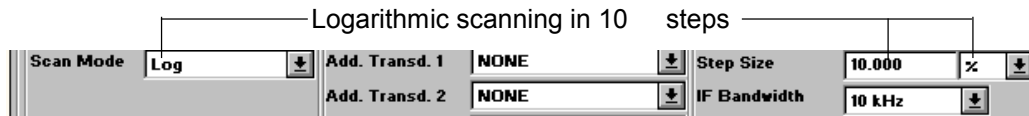


FIG 14 Selection of logarithmic scanning. It should be noted that the step size actually selectable depends on the receiver characteristics. Type ESxS and ESPC receivers allow for step sizes with a factor of $100 / 2^n$ only, ie 100 , 50 , 25 , 12.5 , etc. The nearest possible step size is set and displayed in the **Step Size** window after clicking on **Insert**. In this case, this is 12.5 .

1.3.5 Measurement

1.3.5.1 Example of Virtual Measurement

The measurement described in this section is based on the settings made in the previous sections 1.3.3 and 1.3.4. In this case, however, no hardlock is installed (virtual measurement). Results (FIG 18) are supplied by an internal function generator (simulated by the software). The measurement described is therefore suitable for demonstration.

Select **Test** from the menu line of the initial mask. From the **Test** menu, select **Measurement** and then **Scan** (FIG 19)

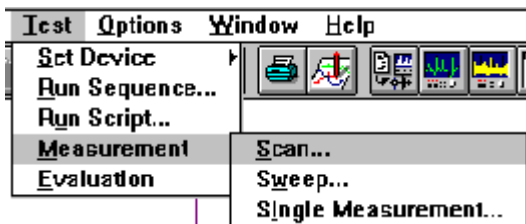


FIG 15 Calling **Measurement** and then **Scan** from the **Test** menu

Click on **Scan**. The scan settings made before are displayed (FIG 20).

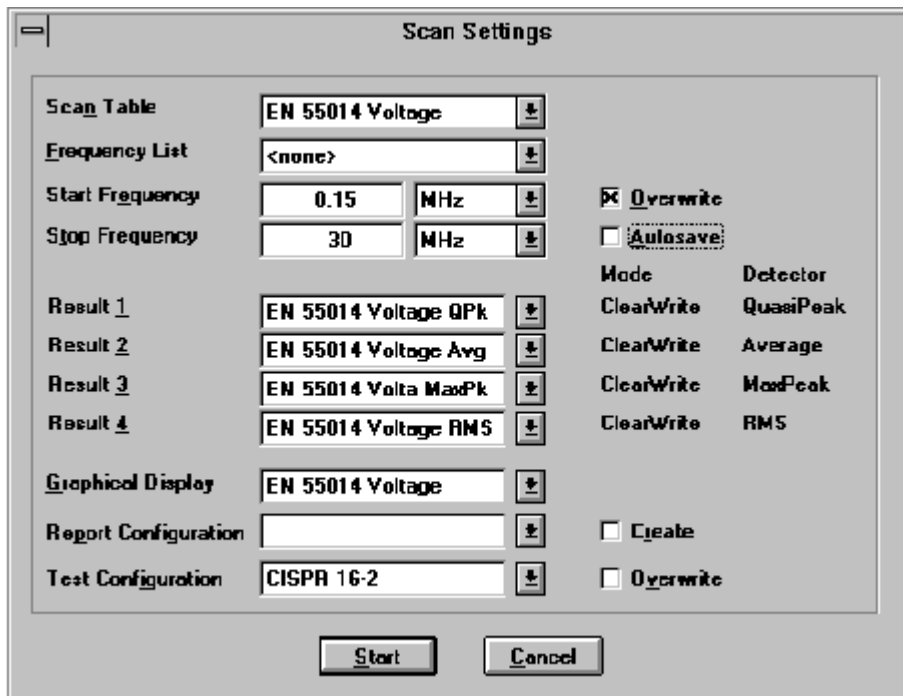


FIG 16 Scan settings. Note No rms measurement will be performed because **Curve 4 (rms detector)** cannot be selected in the **Scan Editor** since Receiver ESHS contains no rms detector. Despite this, **Result 4 (rms value)** is included in the **Scan Settings** because it is possible that a subrange not used here is used by an ESS (with rms detector), and the scan table applies to all subranges.

The measurement is activated by clicking on **Start**.

The graphics shown in FIG 18 is displayed while the measurement is being performed. The icons numbered 1 to 8 for the various curve configurations can be assigned as required to the two test curves (QP (quasi-peak) and AV (average)) and to the limit lines from the database.

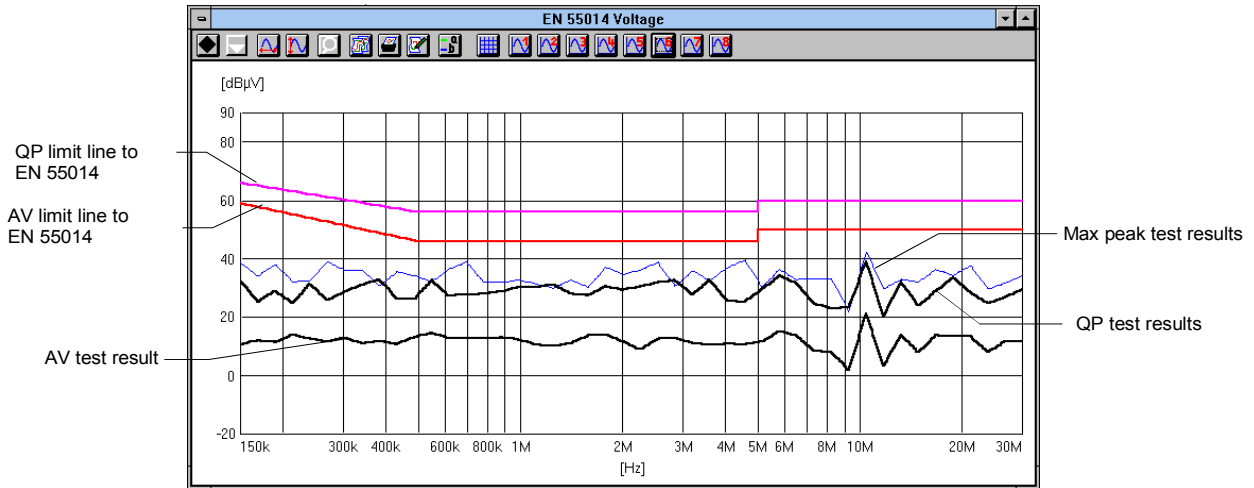


FIG 17 Display of results

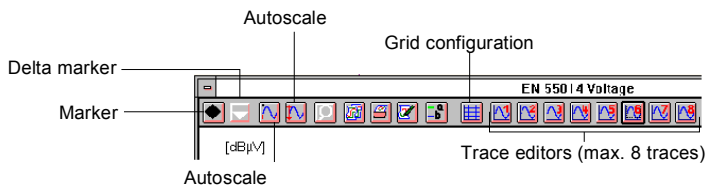


FIG 18 The line of icons above the chart is used for configuring the chart with the test curves as required. Particularly helpful is the zoom function, which is always active and operated with the lefthand mouse key. The icon is for returning to the unzoomed chart.

1.3.5.2 Practical Measurements

1.3.5.2.1 Measurement of roadband Interferer in Range 150 kHz to 30 MHz

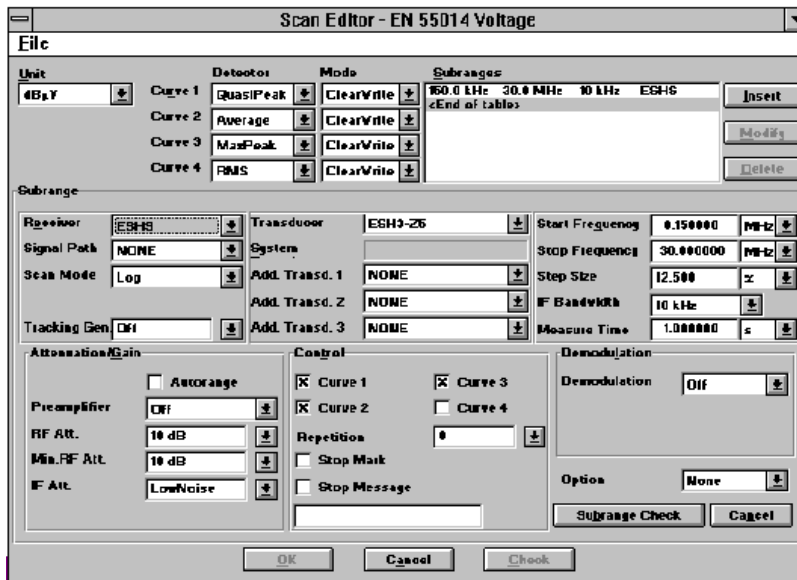


FIG 19 Scan Editor. Note that curve 4 is switched off in this case too because ESHS contains no rms detector.

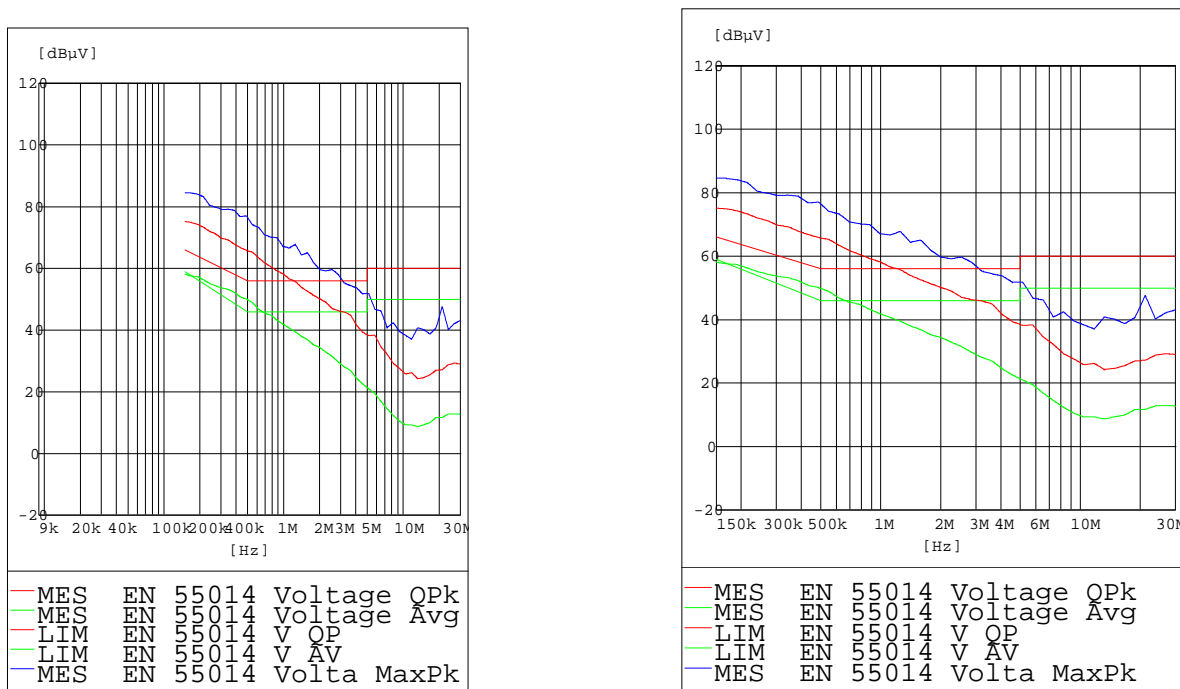



FIG 20 Display of results. Left using graticule stored in previous measurement with frequency axis from 9 kHz to 30 MHz. Right after clicking on Autoscale icon . ESHS test sequence QP and AV values determined in first run, MaxPeak in second run.

1.3.5.2.2 Measurement of roadband Interferer in Range 9 kHz to 30 MHz

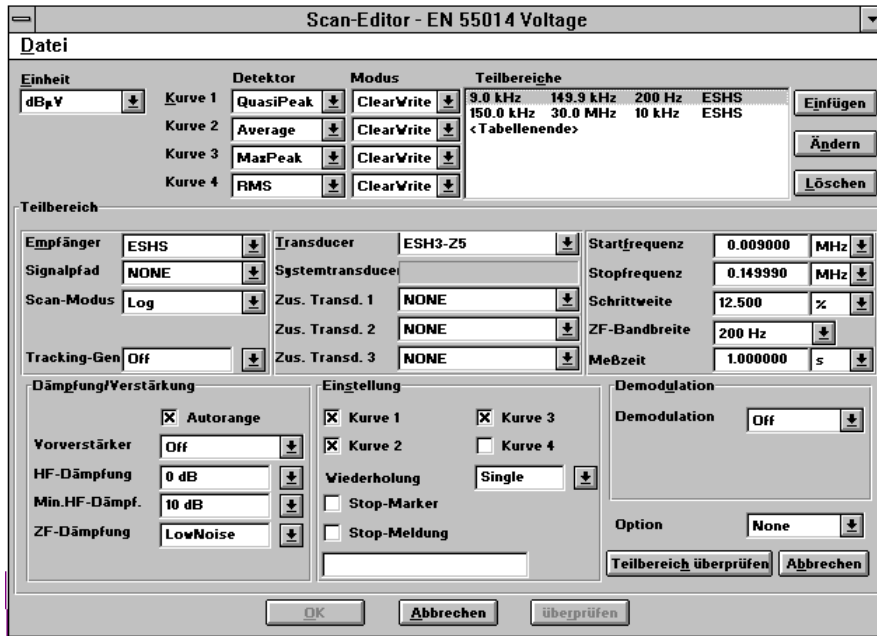


FIG 21 Note 149 kHz is the highest frequency selectable for CISPR band A (9 kHz to 150 kHz) in conjunction with a bandwidth of 200 Hz and QP display. The program will not accept the value 150 kHz for CISPR band A with QP and 200 Hz bandwidth.

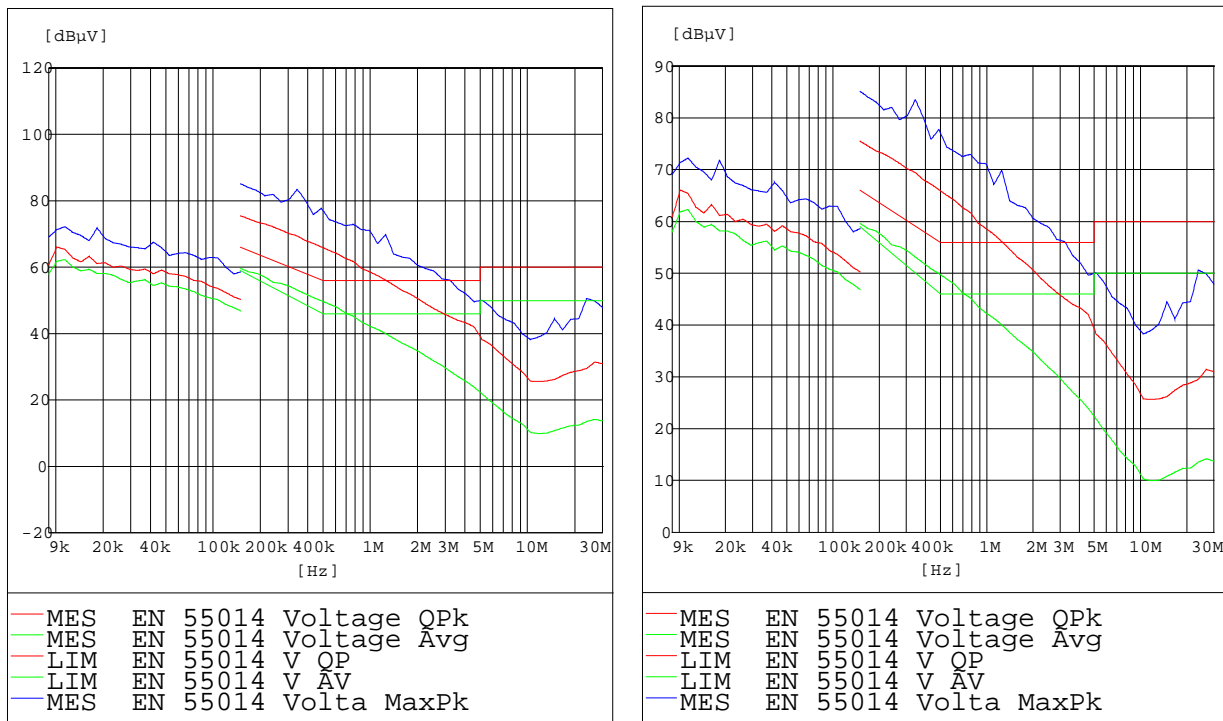



FIG 22 Display of results. Left in default diagram. Right in diagram with level range adjusted as required by clicking on Autoscale icon .

From the above figure it can be seen that the legend for the curves is printed completely on the hardcopy. On the screen, there is only one line displayed at a time the lines for the other curves can be displayed by scrolling.

2 Graphical User Interface

2.1 Overview

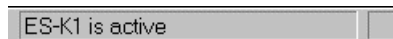
The graphical user interface is very similar to the widely used standard interface for MS-WINDOWS. This environment permits the user to perform all operations in interactive mode. The dialogs and input masks provide a complete overview of all possible settings, such as file and graphics operations, parameter settings, measuring and analyzing functions, etc. The measurement results can be easily transferred to other WINDOWS programs in tabular or graphical format.

When using the mouse (or the trackball), various functions are very easily accessible by means of the fields in the **Main Toolbar**. The same is true for the **Device Toolbar**, which permits to start the device dialogs (activation in the menu **Options**)



As soon as the mouse cursor rests one second on an icon then an explanation is displayed next to the icon. Note At that moment the global Windows system keys like e.g. ALT TAB are not effective.

The **status bar** is used to display short help texts for various menu items



The background of the main window of the application can be assigned a graphics of the WMF type (Windows Metafile Format), i.e. a vector graphics. E.g. a representation of the test setup generated with a respective graphics program could be displayed there. Any WMF file can be defined as **background** display via a file selection window.

The graphical user interface contains the following submenus

- File
- Edit
- Test
- Options
- Window
- Help

The submenus are explained in greater detail in the following chapters.

2.2 Files

The core of the software contains a local database for management of all occurring file types. This data base uses its own file names and file attributes, which are not directly derived from a DOS file system. Thus it is possible to use longer file names and any additional descriptive texts for each database element.

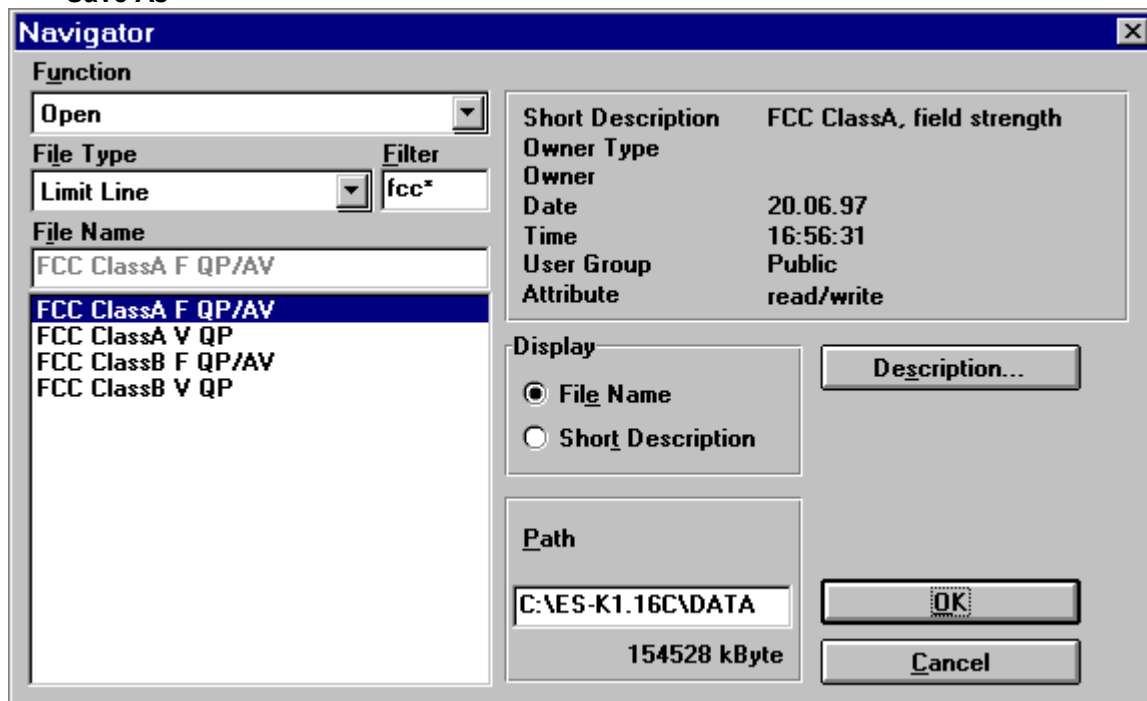
In the following, database elements are referred to as files, however, they are not to be understood in the sense of DOS files.

By exporting database elements, a new external database is created or extended (e.g. on a floppy disk), from where these data can be imported again at a later point in time.

File functions are selected from two **Navigators** in the **File** menu. One Navigator provides functions on the **internal** (local) database whereas the other one offers the functions on **external** (exported) databases.

File functions on the **internal** database

Delete
Export
Move
New
Open
Rename
Save As

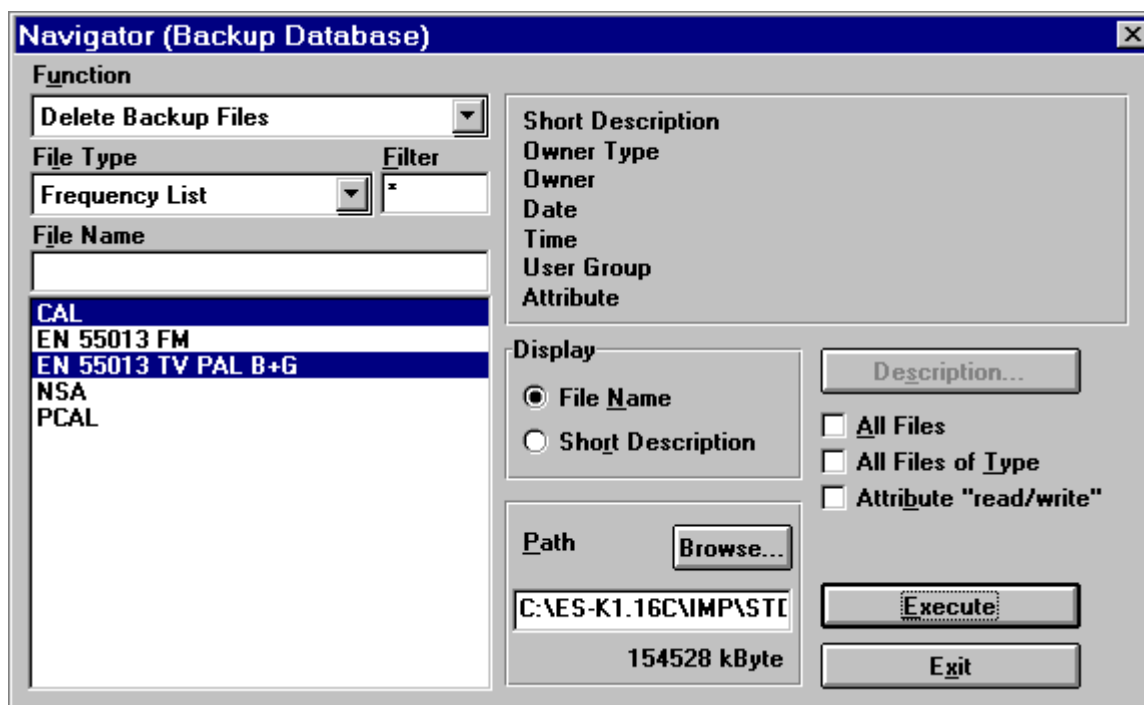


File functions on the **external** database

Delete **Backup Files**
Import

Note

File names should not contain special characters and should not start with a blank or an underscore.



The submenu **New** offers all kinds of file types.

Open is possible only with files that already exist.

If a new or existing file of any file type is opened for editing then the matching editor will be automatically loaded.

If a new file has been created or modified, this modification has usually not been stored yet. Using **Save** or **Save As** the file is saved under its existing name or under a new name (in the local database).

Rename simply changes the name of a file.

Using **Delete** a file can be deleted from the local database, unless it can be modified by an editor at this point in time (e.g. an opened graphic). It is also possible to mark several files of the same file type and delete them at the same time.

The function **Export** permits to export files. To this end, a drive must be selected first. The files to be exported are marked and copied to the external database by means of **Execute** should this database not exist yet, it is newly created there. If retention of the user name is not activated, the file is copied with the attribute Public.

Move means that files are exported and right after deleted. This way it is possible to easily archive data that are currently not being used, e.g. onto a server.

The function **Import** permits files to be copied from external databases to the local database. To this end, a drive must be specified and the required file type selected (depending on the contents of the external database). The individual files can then be marked and imported using **OK**. A prompt protects against unintentional overwriting of the files in the local database.

For **Import** the drive and the directory path can be set by making use of the **rowse...** dialogue. The total pathname will be shown in a text field.

The same is true for **Export** and **Move**. With these functions the pathname can also be edited. If the given path doesn't exist then it will be automatically created with the first file transfer.

Note that the maximum length of the path must not exceed 37 characters.

Export and **Move** can optionally be done in a way so that all transferred files in the external database will have the file attribute `!w` thus automatically protecting those files against overwriting. On the other hand **Import** can change the file attribute of all transferred files to `t` thus enabling immediate editing of those files.

Besides, with **Export**, **Import** and **Move** either all files of the current filetype or the whole source database can be selected for the transfer. This way a complete backup can easily be done (also see filetype Test Configuration).

The menu item **Delete Backup Files** is used to delete specific files in an external database (i.e. exported files).

The field **Filter** allows to reduce the displayed file names to those which match the string characters, with an asterisk representing any sequence of characters (similar to MS-DOS wildcards for file names).

The following table shows all available **File Types** including their function

File type	Function	Editor
Sequence	A sequence of scripts	Sequence editor
Script	An automatic test procedure	Script editor (can only be operated with option ES-K2)
Script Parameters	Definition of script parameters	Script parameter editor
Measurement result	Display of measurement results	Table editor
Graphics configuration	Definition and display of graphics	Graphics configuration editor
Limit line	Definition of limit line	Table editor
Transducer	Definition of probe transducer (e.g. for antenna, absorbing clamp)	Table editor
System transducer	Definition of system transducer (e.g. for cables, paths)	Table editor
Report header	Definition of report header	Report header editor
Report configuration	Definition of report configuration	Report configuration editor
Scan table	Definition of scan table	Scan editor
Sweep table	Definition of sweep table	Sweep editor
Frequency list	Definition of frequency list	Table editor
Test configuration	Definition of files belonging to a test	Test configuration editor
Text file	Definition of a description text	Text editor

The associated files are displayed in the selection window **File Name**. When a file is selected (when a letter is entered, the mark slips to the first file with the same initial, if provided), file-specific information is output in an extra field. This information is user-defined and can be edited by clicking on the key **Description** (see below).

In a further field, the drive (belonging to the local database) and the available storage capacity are displayed.

OK is used to check the entries when a file is created or opened, the respective editor is loaded. **Abort** closes the dialog window without saving the settings.

The key **Description** permits to edit specific file information. The following dialog window appears on the screen

The user may enter the purpose of the file in the editable field **Short Description**. For a detailed description, use the input field below.

The access status of the file (read/write , read only , not removable) can be set in the window **Attribute**.

The window **Owner** refers to a fixed reference of the respective file, at the moment only for script parameter sets. It indicates with which script the respective parameter set is connected.

In the text field **Application Info** the user name of the original user of the file is additionally recorded this text field cannot be edited.

With **User Group** the file is either assigned to the user group which includes the original user of the file, or defined as Public , i.e. generally accessible.

OK is used to check and save the settings, **Abort**, on the other hand, ignores them in both cases, the window is closed.

Close (menu **File**) is used to close an open text file or graphics configuration, which means that it is no longer available for processing for the time being. If the file has been modified, the user is asked whether he wishes to store the modifications in the file. Without storage, the modifications will be lost for good.

2.3 Filetypes

2.3.1 Script

A script constitutes an automatic program run which is controlled by the program text (FSL Flexsys Script Language similar to the programming language PASCAL) (Interpreter). Thus, almost all functions that are accessible in interactive mode can be automated so that even complex measurement runs can still be operated and reproduced.

Generation or modification of a script is performed by the script editor of the script development environment (Option ES-K2) it also permits to execute scripts in single steps and inspect variables (debugger).

2.3.2 Script Parameters

A script can be assigned parameters. The script parameters can be edited directly or when the script is started and can be stored as a complete parameter set. Various parameter sets can be created for each script that uses script parameters. During execution of a script, all parameters are constant, i.e. they cannot be changed any more.

2.3.3 Sequence

A sequence describes a sequence of automatic program runs or scripts. If the individual scripts are executed without user interaction, very complex measurement tasks can thus be handled fully automatically.

2.3.4 Measurement Result

A measurement result (trace) consists of a list (thousands of lines are possible) with columns for frequency and level. A measurement result is produced by functions such as scan or sweep, which is why the name of the respective scan or sweep table is also recorded internally.

2.3.5 Limit Line

Complying with a specification, limit lines are frequency-dependent maximum values for measured values, displayed as lines. They are defined as frequency/level pairs, the level being assigned the required unit.

2.3.6 Transducer and System Transducer

Since the measuring instruments only measure the voltage at the input, the measured values must be corrected in order to take into account the frequency characteristic of sensors and cables.

The (probe) transducer describes the frequency-dependent correction (represented as frequency/level pairs) of sensors, i.e. antennas, current probes, etc., the associated level unit (dB V, dB A, dB V/m, etc.) having to be specified for the transducer.

System transducers, on the other hand, are correction values (frequency/level pairs) with the unit dB, defining the frequency-dependent characteristics of cables, amplifiers, attenuators, power dividers, etc.

Note

When opening a transducer file then a so called source unit will be displayed which cannot be modified. It is the level unit found at the input of the measuring instruments, dB V with EMI measurements.

2.3.7 Graphics Configuration

A graphics configuration describes the appearance of the graphics (always level versus frequency). Thus frequency range and level range are defined on the one hand and the elements to be displayed such as traces, limit lines, transducers with type of display and colour on the other hand. Furthermore, marker, deltamarker or legend are determined here.

2.3.8 Report Header

The report that is part of the test typically contains various specifications that are relevant to the test. This includes e.g. test conditions, test site, designation of the EUT or name of the user. This information is recorded as report header.

2.3.9 Report Configuration

For generation of a test report, a report configuration is used, which permits to vary the appearance of the report. It permits to define a combination of e.g. report header, graphics and measurement results which is to be included in the printout with this report configuration.

2.3.10 Scan/Sweep Table

A scan or sweep is used to record a section of the frequency spectrum.

In the case of a **Scan**, the test frequency is repeatedly increased by the defined step size (or, as an alternative, set to the next frequency of a frequency list), and a (peak and/or average) level is measured until the end of the specified frequency range has been reached. Depending on the specifications, a single sweep may contain thousands of test points. A scan is usually a time-consuming procedure, however, it permits to measure the spectrum in detail.

Contrary to this, a **Sweep** (only with analyzers) permits fast measurement of the spectrum (only with the PEAK detector) the spectrum is also measured completely, however, with a limited frequency resolution of e.g. 900 pixels per sweep. This resolution is usually not sufficient to analyze the spectrum thoroughly. Sweeps therefore constitute an appropriate means for obtaining a fast overview of the spectrum, whereas scans are required for a detailed analysis, not least because of the detectors defined in the specifications.

All test parameters required for a scan or sweep - e.g. the setting of the attenuation, test bandwidth or correction values to be used - are defined in a scan/sweep table which must always be selected for such a measurement run.

2.3.11 Frequency List

A frequency list serves various purposes. It may be used, e.g., to display a list of ambients at an open-area test site, but also to list critical frequency points of a EUT, which are to be measured by means of a frequency list scan.

2.3.12 Test Configuration

The filetype Test Configuration provides a link between files to export, move or import these files bundled. For instance, a Test Configuration could contain a link to all those files that belong to a test or to a test series.

Besides it is possible to create a kind of test template

On a server (in a directory that can only be read) there could be a number of test configurations including all the linked files, ready for use with the Import function. By importing of one of those Test Configurations, all files that are necessary to run a test (e.g. scan tables, transducers, limit lines, scripts) could then be transferred into the local database.

Using the same Test Configuration - extended by the measurement results - could then enable to export or move all the files from the test into a certain directory on e.g. a file server.

A Test Configuration is a kind of bracket around selected files with those files being listed only, i.e. without the file contents. Through exporting, moving or importing of a Test Configuration those files listed inside will also be transferred.

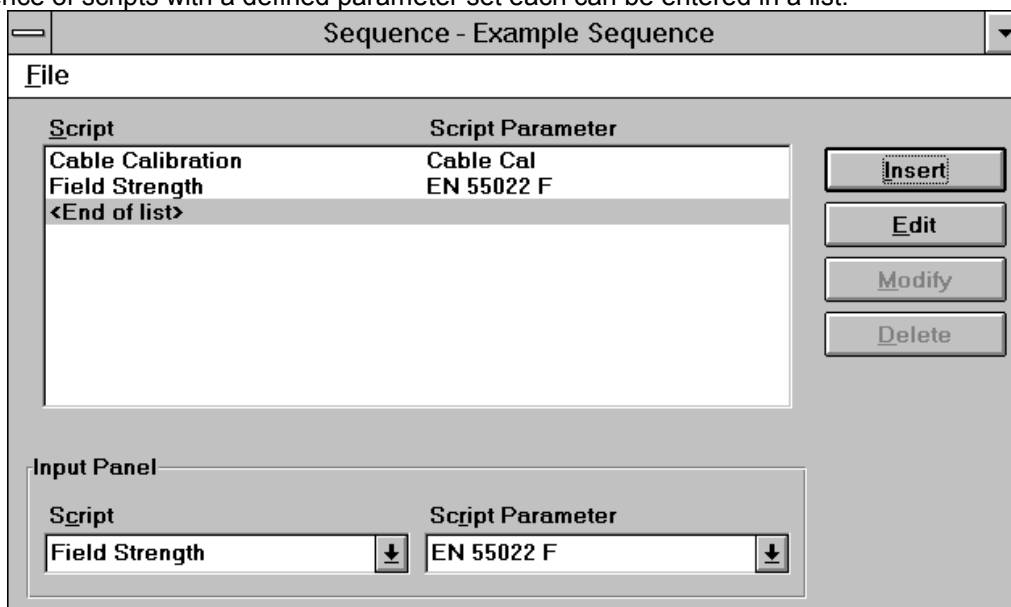
2.3.13 Text File

The filetype Text can hold any kind of text or comment (max. 30000 characters) that shall be part of the application's database. Text files can be directly printed, be stored as a DOS text file (default extension is .LOG) or be part of a test report.

2.4 Editors

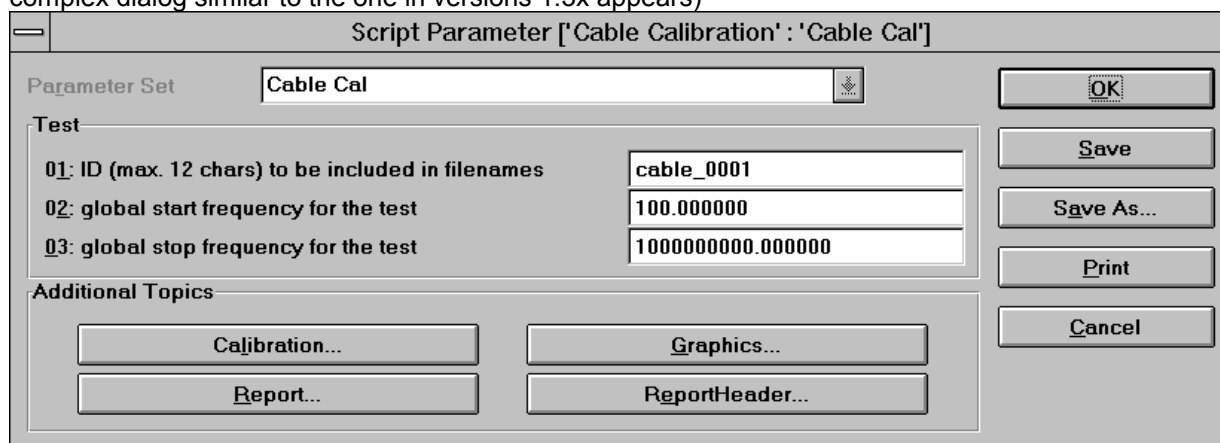
2.4.1 Sequence Editor

The sequence editor is used to define a sequence for execution of the scripts. A sequence of scripts with a defined parameter set each can be entered in a list.



2.4.2 Script Parameter Editor

If a script parameter set or a script containing script parameters is opened, the following dialog is displayed (only with extended syntax for the parameter definition without extended syntax, a less complex dialog similar to the one in versions 1.3x appears)



The heading of the dialog contains both the name of the associated script and the name of the selected script parameter set. The parameter set to be used is set using the selection menu at the very top of the dialog window. The main parameters are shown below, the short description at the left and a select or edit element at the right. In the lower area of the dialog, additional keys for further topics can be offered depending on the syntax of the associated script. Thus, further groups of parameters are accessible.

The total script parameter set can be stored (maybe under another name) or printed out by means of **Print**. If a script has been started, it is actually only run after the dialog has been left (the last modifications are saved using OK or ignored using Cancel), unless the run is interrupted by means of the additional **Stop** key.

Notes:

If a new parameter set is to be created using **New...**, an existing script must be defined as **Owner** in the dialog **Description...**

If new parameters are added to a script, the old parameter set remains compatible. The additional parameters are assigned their standard values.

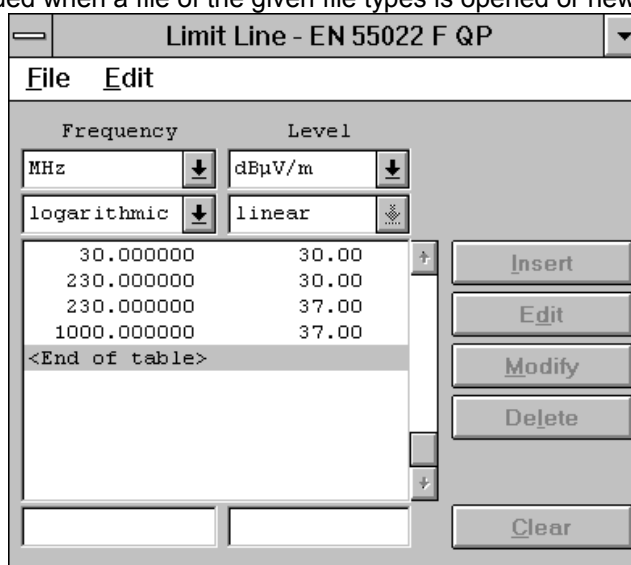
If parameters are deleted from a parameter set, the parameter set can still be used.

If a script is deleted, all parameter sets assigned to the script are deleted as well.

2.4.3 Table Editor

The table editor permits the user to generate or modify frequency lists, limit lines, measurement results, probe transducers and system transducers.

The editor is always loaded when a file of the given file types is opened or newly created.



The dialog window is divided into three areas. The upper area contains the selection window, where the user may define e.g. units. The table contents are displayed in the middle area. The lower area contains input fields.

The frequency unit is always offered, whereas a level unit is not available for frequency lists. The intermodulation mode for the frequency can be set to linear or logarithmic for limit lines and transducers (interpolated lines with linear or logarithmic display). The source unit is always dB V (in the case of transducers), the correction level unit is always dB for system transducers.

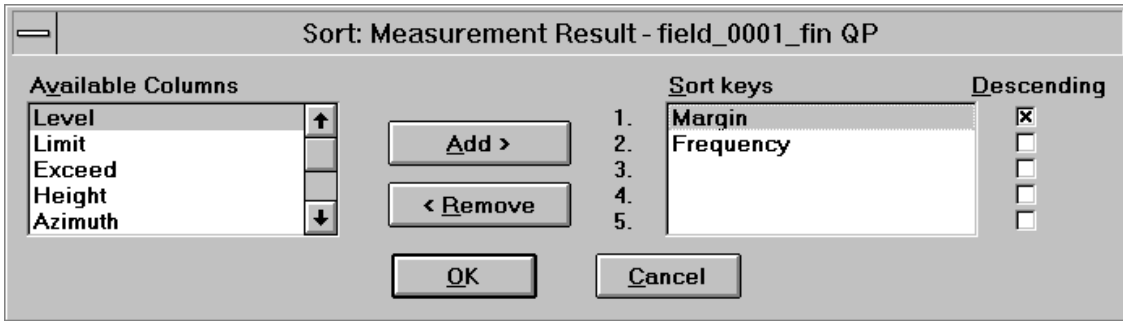
The lower input fields permit to enter new lines, which can be inserted into the list ahead of the active line using **Insert**. As an alternative, the active line in the list can be overwritten by means of **Modify**. **Edit** (or a double-click) permits to copy the contents of the active line into the input fields. The active line can be removed from the list by means of **Delete**, which causes the next line in the list to become active.

Copy permits to copy the complete contents into the clipboard. If particular lines have been selected (marked), only these are copied. Thus data can be very easily transferred to other applications.

The menu item **Print** permits the complete list to be directly output to the printer without the need for a report configuration.

The **column layout** can be extended (**Add Column...**) or modified (**Modify Column x...**) in various ways. Up to ten columns can be represented, the elements of which can be edited almost at will (the file types limit line, transducer and system transducer require rising frequencies). Added columns can again be deleted from back to front (**Delete Column**). The longer one of the two headings determines the width of the column. Possible file types are floating-point numbers, integers or character strings (max. 15 characters) a large number of physical units is available for the unit of numerical values.

For **Sorting** of lists (only for file types measurement result and frequency list), a very flexible window dialog is available

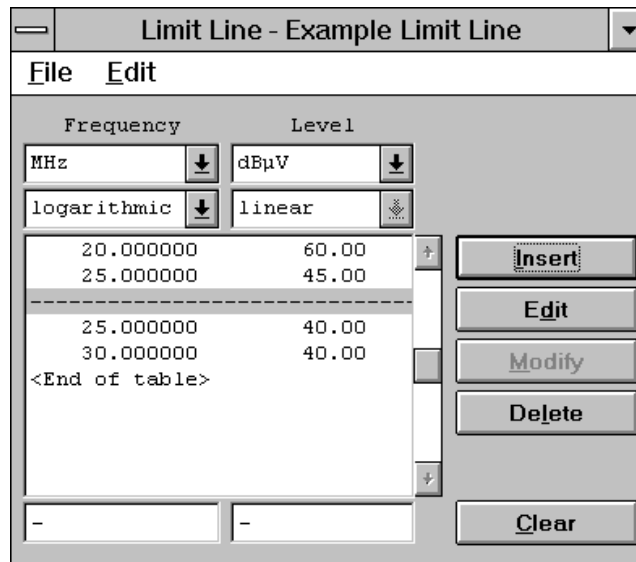


Up to five columns can be defined as **sorting keys** (decreasing priority) with optionally rising or falling values for the elements. Measurements which are not sorted with rising frequency, however, should not be displayed with line graphics display, since the sequence in the list is valid for the graphics.

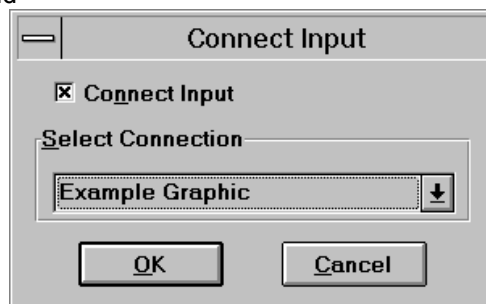
The columns described in the left field can be selected individually and entered or added as sorting criterion by means of **Add**. Likewise, they can be removed again by means of **Remove**, the subsequent entries being shifted accordingly.

Sorting is always accomplished with falling values if the associated select box has been marked, otherwise, rising values are used. **OK** starts the sorting procedure.

The file type **Limit Line** also permits to define gaps by entering just a minus sign into the edit fields for frequency and level



The file type **Frequency List** is provided with a special function which allows comfortable editing of a frequency list **Connect Input...** determines from which of the opened graphics the marker frequency is to be transferred to the edit field



If there is such a connection, the frequency is continuously updated in the edit field of the frequency list when the marker is shifted.

Data lists are often available as files. For example, ever more antennas are delivered along with a floppy disk that contains the correction factor as a DOS (text) file in an ASCII format. Such a list can be easily transferred into the ES-K1

When creating a new table file (transducer, system transducer, limit line, measurement result list, frequency list), then the empty columns (including those that are added) can be filled with the content of the ASCII file. Before starting the import, the units for frequency, level, etc. have to be selected according to those in the ASCII file. By selecting **File Import ASCII Table...** the following dialogue comes up

The DOS filename (including pathname) of the ASCII file to be imported has to be entered in the field . Alternatively the file can be searched in the file system by pressing **rowse...** . The number of header lines to be skipped enables to ignore those lines that include header information - therefore a modification of the ASCII file is not necessary.

The type of separators between numbers as well as between lines has to be defined. Separators between numbers are blanks (spaces), tabulators or any other user defined character carriage return or line feed can be selected as line separators. Characters that cannot be part of a number will be ignored until a valid field separator will be found. For example, a line like

```
+5.6789E+007MHz +2.345E+001dBµV/m 3:45p.m.
```

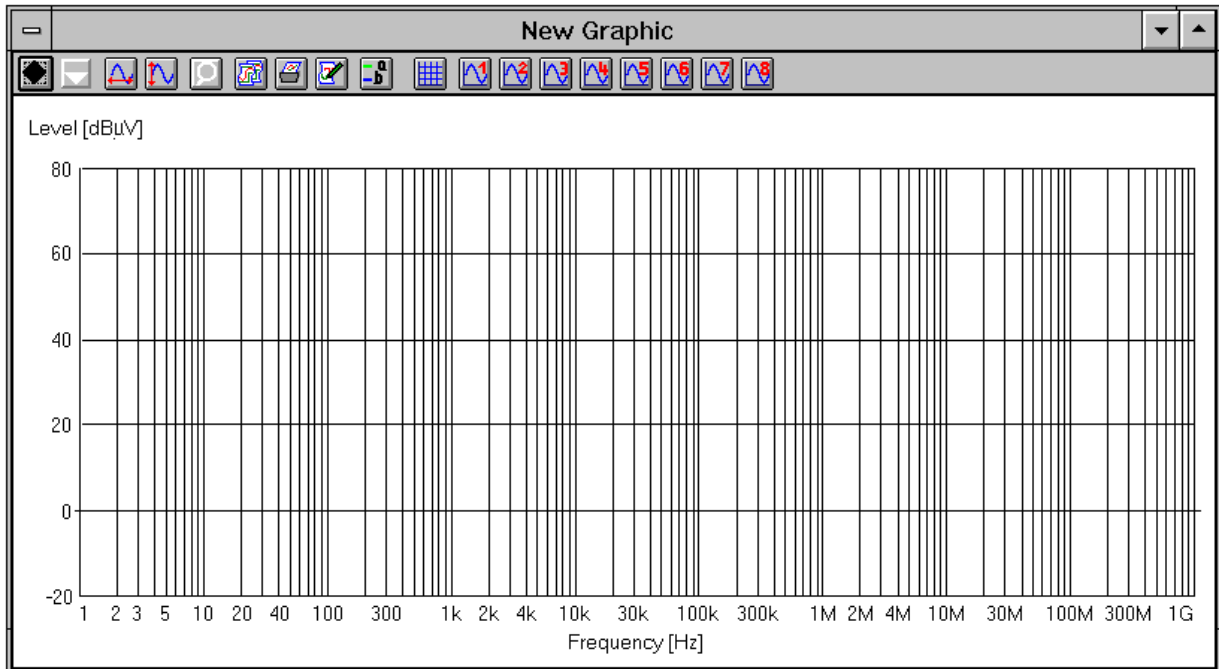
will be correctly be interpreted if there is an extra string column defined.

If a column within a line cannot be filled then this will be indicated with an asterisk.

2.4.4 Graphics Configuration Editor

This editor permits the user to generate or modify a graphic. Graphics are used for presentation of the measurement results. To this end, a number of functions such as zoom, Marker, Legend and Element configuration are available.

If the editor is loaded via **New...**, a standard value is assigned to each element and a standard graphics appears on the screen.



The name of the graphic is indicated in the heading of the dialog window. The dialog window is divided into two areas. The upper area contains the function bar for configuration of the graphics elements. Up to 8 trace elements can be edited independently of each other. The lower field displays the configured graphics. A complete graphics configuration comprises the elements grid, traces 1 to 8, marker and legend. All graphics settings are accessible via the menu item **Edit**.

The status information on marker and delta marker are then displayed in the graphics window above the diagram.

Grid 

The function **Grid...** permits the user to configure the grid on his own.

The figure shows the 'Grid - New Graphic' dialog window. It is divided into sections for X Axis, Y Axis, and Grid. The X Axis section has fields for Unit (Hz), Scale Type (log.), Minimum (1 MHz), Maximum (1 GHz), and Label (Frequency). The Y Axis section has fields for Unit (dBµV), Scale Type (lin.), Minimum (0 dBµV), Maximum (80 dBµV), and Label (Level). The Grid section has fields for Line Style (solid line) and Colour (black), and checkboxes for Vertical Lines and Horizontal Lines. There are OK and Cancel buttons at the bottom.

Value range, unit and label can be selected for the two axes separately. Besides, the scale type of the -axis may be defined as linear or logarithmic, whereas the -axis is always linear. In addition, the dialog permits to set the colour of the grid as well as to fade out the horizontal or vertical lines.

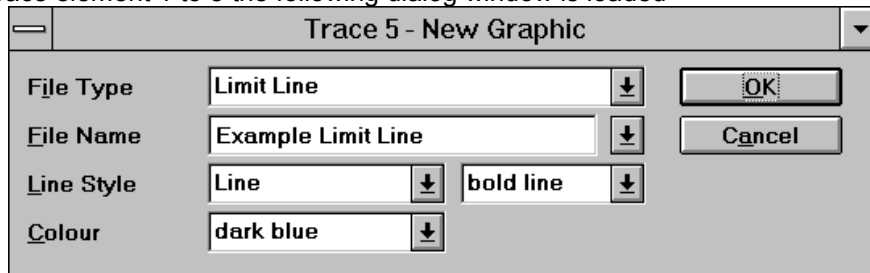
The frequencies of a diagram can easily be modified through shortcuts for the frequency units. A frequency of e.g. 300 MHz can be entered as

The line style of the diagram grid can be selected. A dotted line for example makes it easier to recognise horizontal limit lines as well as harmonic signals from a quartz oscillator.

The (linear or logarithmic) display of voltages is also possible.

Trace ...

Using the function **Trace** ... the user can determine the graphics configuration on his own. When selecting the trace element 1 to 8 the following dialog window is loaded



Possible **File Types** for the display are measurement result, limit line, probe transducer and system transducer. The appropriate file is selected in the field **File Name** the trace can only be displayed if the level unit corresponds to that of the diagram.

The alternative type of trace **constant** is used to display a horizontal line instead of a file name, the associated level will be entered then.

The line style and the colour can be set for each trace various options are possible for line and dotted display.

Note The active traces are always drawn from back to front, i.e. trace 8 is always at the very bottom (but still on the grid), trace 1 is always at the very top.

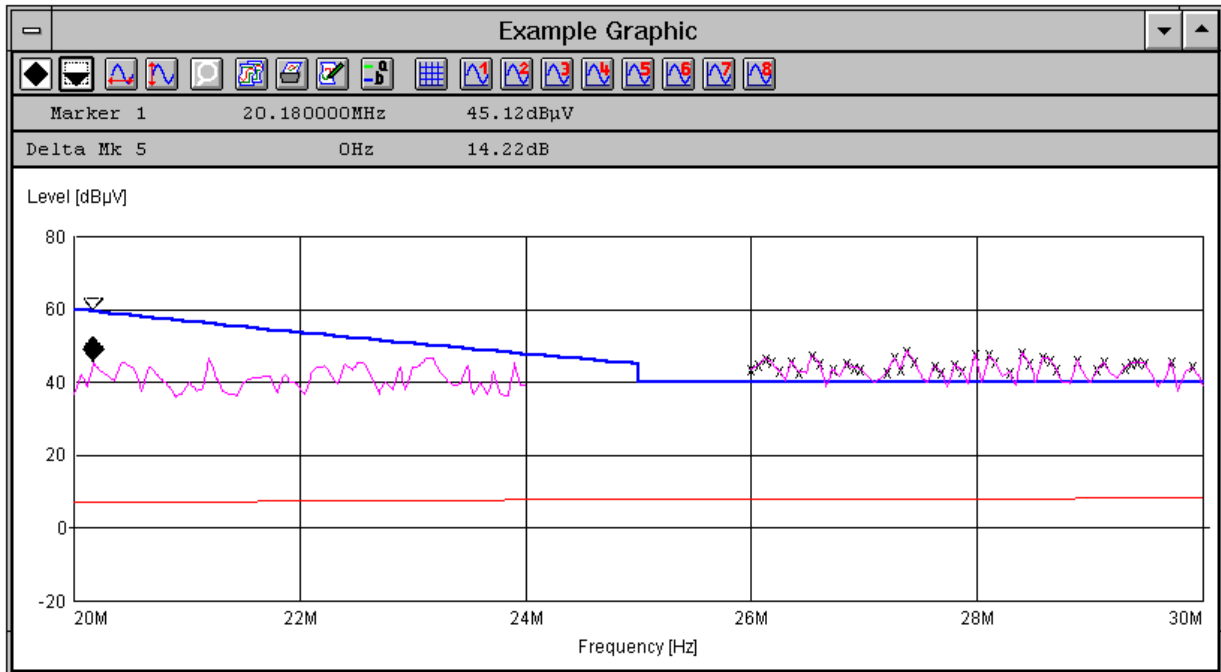
Autoscale Autoscale

Automatic scaling of the graphic - for the two axes separately - leads to a complete display of all displayed traces. The associated value range of the grid is changed accordingly.

Marker Deltamarker

The functions **Marker** and **Deltamarker** permit the user to position two markers in the graphics for interactive graphical evaluation of the measurement results. First, the marker is activated and positioned. Then, the deltamarker can be added however, it cannot be used without the marker.

The status information on marker and deltamarker is indicated inside the graphics window above the diagram. The markers can be shifted using the mouse or the t and t . If the mouse is used, the active marker can be moved by selecting the marker with the left mouse key and shifting it to the new position with the mouse key depressed. When using the cursor keys Left and Right, the marker is shifted in the desired direction on the trace. The speed at which the marker is moved can be increased by means of the key combination t / t / t / t . If **Pixel Mode** is activated, the markers are not shifted on the trace points, but in the pixel grid of the graphics display. The function **Marker Coupled** synchronizes the deltamarker to the marker. The currently active marker can also be set to a particular frequency using **Set Marker...** (t / t) or to the maximum of the examined trace using **Marker - Max** and to the minimum using **Marker - Min**. If more than one trace element is displayed, the markers can be set to the next trace element using **Next Trace** or **Previous Trace** or by means of the cursor keys Up/Down.



Zoom 

The function **Zoom** permits the user to enlarge any section of a graphics area. The area is selected by pressing the left mouse key and shifting to the opposite corner with the mouse key depressed. After releasing the mouse key, the zoomed part of the graphics is displayed on the screen. Zooming is possible several times. If the zoom is active, the function symbol is emphasized and permits to return to the original display. Zooming enables to achieve better presentations, however, it is not taken into account when the graphics configuration is saved.

Copy 

A graphic can be copied to the clipboard with all included elements. It is not copied as a rigid pixel graphic which requires a lot of storage capacity, but in a more complex and flexible WINDOWS-internal vector format. The memory requirements are dependent on the contents of the diagram.

Print 

If a printer driver has been installed for printing, a diagram can also be directly output as a whole-page graphic without the need for a report configuration.

Legend 

The function **Legend** provides a short description of the displayed trace elements.

Both the line style (short designation) and trace name are indicated for a trace element. It is possible to change to the next trace element by clicking on the arrow keys. The key can then be switched on or off if it is switched on, the function symbol is emphasized.

The following short forms are used

- LIM Limit line
- MES Measurement result
- TP Probe transducer
- TS System transducer.

2.4.5 Report Header Editor

This editor permits the user to generate or modify a report header.

Report Header - Example ReportHeader	
File	
1. Heading	Example Report Header
2. Heading	
EUT	Dummy
Manufacturer	Rohde & Schwarz
Operating Condition	Normal
Test Site	Munich
Operator	Donald Duck
Test Specification	Virtual Mode
Comment	Simulation with Function Generator

The text for the report header is entered into the editable fields. A text of max. 20 characters can be entered in the left column, a text of max. 50 characters in the right column.

2.4.6 Report Configuration Editor

This editor permits the user to generate or modify a report configuration

Report Configuration - Example Report			
Selection / Lines		Available	
Report Header	Measurement Result	File Type	
Example 14		Text	
Scan Table <input checked="" type="checkbox"/> Compact	Transducer	File Name	
EN 55022 Field 8		abc	
EN 55022 Voltage 8			
Sweep Table <input checked="" type="checkbox"/> Compact	System Transducer		
EN 55022 Field 8			
EN 55022 Voltage 8			
Graphics Configuration	Text	Add	Delete
Example Graphic 20	Example Description 15		
Frequency List	Limit Line		
Graphic Arrangement	Footnote		
User defined	<input checked="" type="checkbox"/> Text footnote		
Legend 4		OK	Cancel
Marker 2			

The actual configuration is indicated in the Selection field, whereas the individual elements can be selected in the Available field.

The entries for the selection are performed by means of **Add**. Each element (report header (max. 1), scan or sweep table (max. 16 each), graphics configuration (max. 2), measurement result (max. 16), probe or system transducer (max. 4 each), limit line (max. 4)) is determined in the selection windows File Type and File Name in the Available field. An element selected in the Selection field can be removed using the **Delete** key.

The **Graphic Arrangement** can be set such that the diagrams are arranged half-page, at least half-page until the end of page or whole-page.

Besides, all pages can be provided with a **footnote** consisting of date, time and a predefined text (max. 40 characters).

The layout of the test report can be defined to a certain extent.

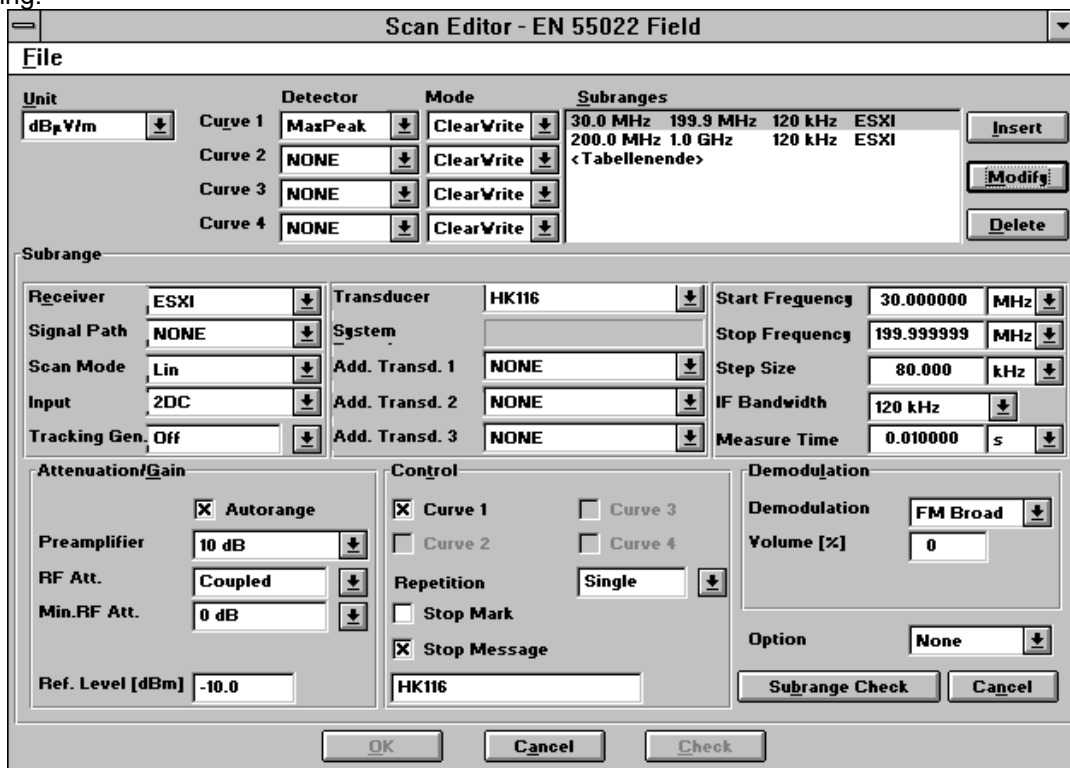
For each part of the test report (e.g. report header, graphics, result list) a number of lines can optionally be reserved. A value of 0 means no reservation, i.e., the number of printed lines simply depends on the content of the referring part. If a number of lines is given, then exactly this number of lines will be printed, which means that depending on the content of the current part there will be either empty lines at the end or some lines may be cut off. The legend and the marker of a graphics diagram are handled separately from the diagram, i.e., the graphics diagram can be printed in a reproducible size. Scan and sweep tables can optionally be printed in a compact format (the main parameters in a single line per range and per detector).

The most recently defined layout will automatically be used as a default for a new report configuration. When starting a printout with a report configuration then the content as well as the report header selected inside can be edited (a shortcut for editing).

2.4.7 Scan/Sweep Editor

These editors permit the user to generate or modify a scan or sweep table. Such a table determines the settings of the test receivers used for performing the scan/sweep.

The two editors are very similar, so that the differences will only be mentioned if required in the following.



The dialog window is divided into two areas. The upper area displays the general settings of the scan table. The settings of a selected subrange are indicated in the lower area (the appearance of the dialog varies according to the selected receiver). For modification, the selection can be made by a / - /

on the selection window **Subranges**. The subranges (max. 30) can be edited independently of each other.

Note:

The frequency ranges of the various subranges must not overlap. The frequency ranges must be arranged in increasing order.

When a new table is created, the appropriate **unit** for the level and all required **detectors** (only peak in the case of sweeps) are determined first. The **detector mode** MaxHold (maxima reduction) only makes sense in conjunction with multiple scans/sweeps, otherwise the mode ClearWrite (overwrite) is used.

Subsequently, the **subranges** defined in the lower area can be lined up by means of **Insert** or subsequently overwritten by means of **Modify**. By double-clicking on an existing subrange, the associated parameters are transferred into the lower area.

For definition of a subrange, the appropriate **receiver** must be determined first, which causes the remaining fields to be adapted to the facilities of the hardware and be assigned standard values.

The probe transducer must comply with the subrange with respect to frequency range and level unit, but it can also be set to for the time being. If various switching paths have been defined by means of the RSU superhandler, they can be selected as **Signal Path**, a **System Transducer** defined to this end being displayed to the right (grey, i.e. cannot be changed). Up to three **additional system transducers** for cable attenuations, etc. can also be activated.

Settings for the **scan/sweep mode** and for the receiver input used are also dependent on the hardware, e.g. in the case of the **Tracking Generator** which is only required for measurements on four-terminal networks.

The fields for the **start and stop frequency** are to be defined such that the selected transducers match the frequency range. Note that the settings of the next subrange are valid for the stop frequency if this stop frequency is identical with the start frequency of the next subrange.

A **step size** can only be entered for scans normally, it is determined by the IF bandwidth (factor of approx. 0.5 to 0.7).

The **IF bandwidth** (resolution bandwidth), in turn, results from the specification in the case of sweeps, the video bandwidth may also be set.

The **measuring time** (for scans) or the **sweep time** is also dependent on the IF bandwidth, but also on the detectors used.

The settings for **attenuation/gain** are dependent on the device used, of course. In particular in the case of analyzers, note that the signal levels to be expected lie within the dynamic range. In the case of scans, this can in most cases be achieved by activating the **autorange** function, which causes the attenuation to be matched accordingly as soon as the signal exceeds the dynamic range.

Usually, **demodulation** of the test signal is only of interest for single measurements which are based on a scan table.

In the case of analyzers, measurements according to the standard require the use of the **Preselection**.

The entries made for **Setting** control the procedure. On the one hand, it is possible to determine which of the preselected detectors is to be used in the current subrange, on the other hand, a multiple scan/sweep (**repetition**) can be defined, i.e. instead of Single any multiple or even Continuous (must be aborted explicitly), which is also possible in combination with maxima reduction for the detector. In the case of a few receivers, this may be performed by the device itself (**Repetition by device**), which accelerates the procedure, however without updating the graphics.

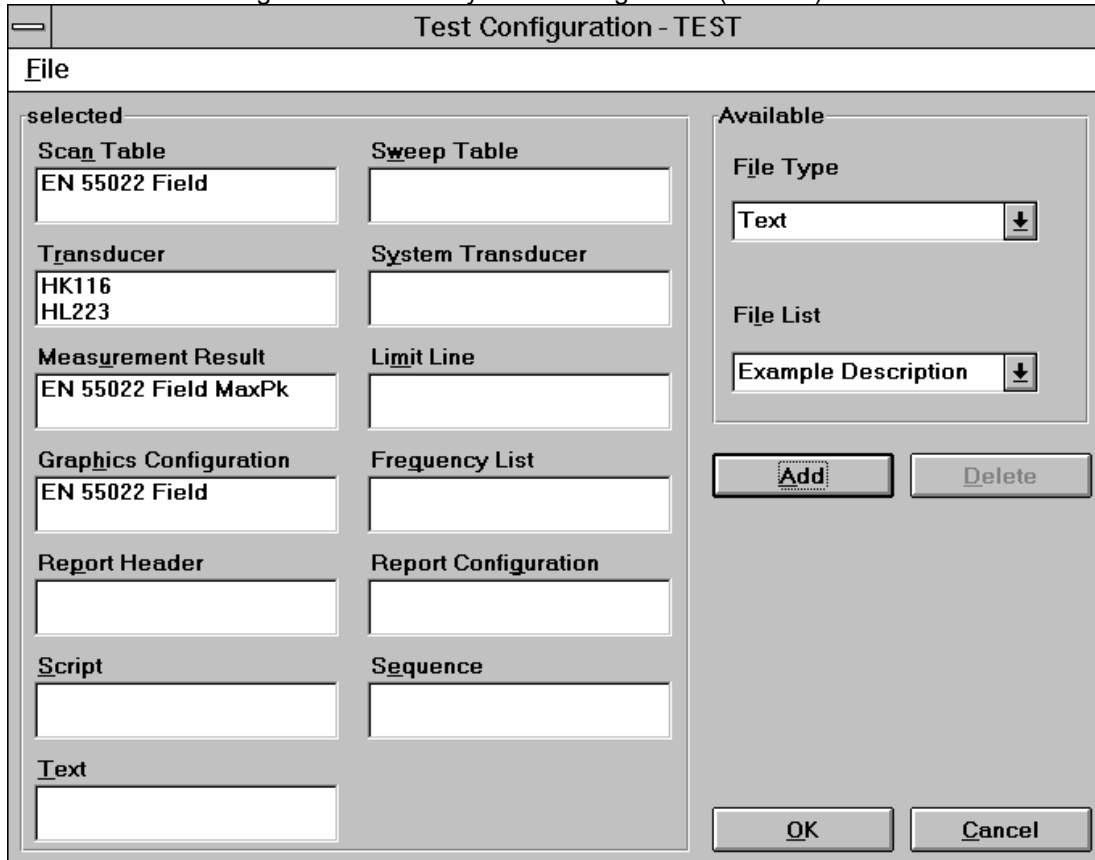
If the procedure is to be aborted when changing from one subrange to the next, e.g. in order to be able to mount another antenna, the **stop mark** must be activated. Thus, the procedure is stopped before this subrange is executed and must be continued by the user (or, as an alternative, be aborted for good). In addition, a **stop message** can be activated, so that the entered text (up to approx. 15 characters) is also output e.g. a prompt to mount a particular antenna may thus be output.

Check subrange is used to determine whether the specifications for the subrange are consistent. Then the subrange can be transferred to the list of all subranges (appropriate position must be preselected) by means of **Insert** or **Modify** the table will be definitely stored when the dialog is closed with **OK**.

A scan or sweep table can also be defined with voltage as the measurement unit, a non-level unit. In this case the transducers works as a linear factor (levels the transducers are simply added to the raw reading). Any additional system transducers (e.g. a cable loss or a preamplifier) can still be included (as with levels) through the normal level definitions.

2.4.8 Test Configuration Editor

This editor can be used to generate or modify a test configuration (see 2.3).

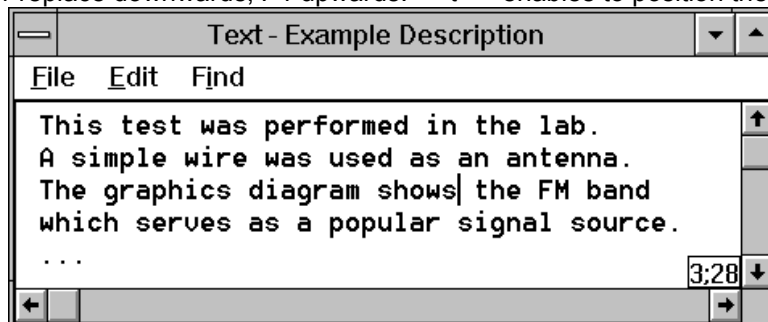


The actual configuration is indicated in the Selection field, whereas the individual elements can be selected in the Available field.

The entries for the selection are performed by means of **Add**. Each element is determined in the selection windows File Type and File Name in the Available field. An element selected in the Selection field can be removed using the **Delete** key.

2.4.9 Text Editor

The text editor is quite similar to the Windows text editor Notepad. Text can be inserted at the current cursor position. The position of the cursor (line column) is displayed in the right lower corner of the editor window. Edit - Wrap toggles the automatic line wrapping. The typical clipboard functions are available in the same menu. The search menu contains the function and / . F repeats a search or replace downwards, F4 upwards. t enables to position the cursor into any line.

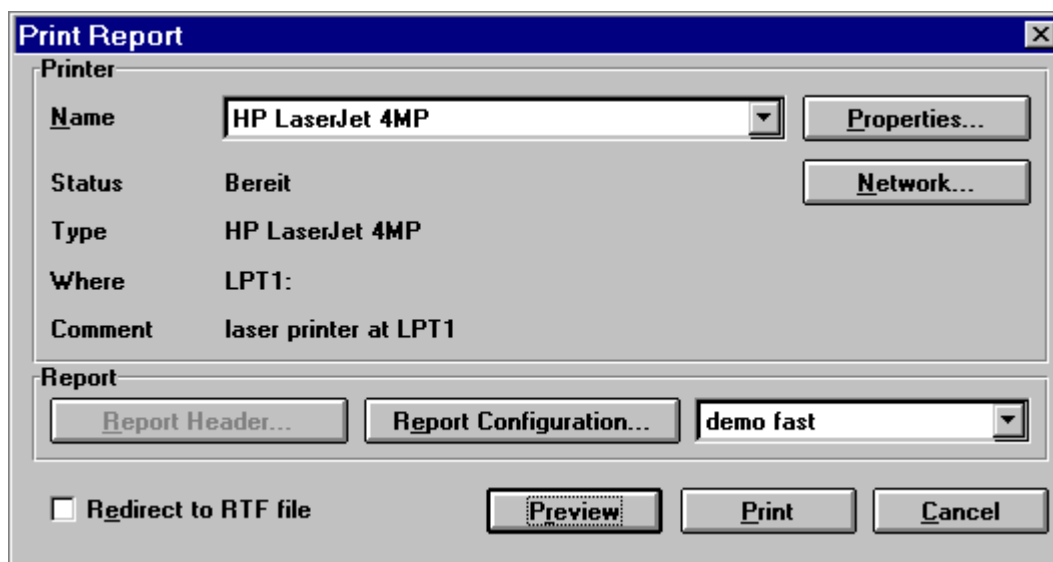


2.5 Report

The test report function generates an output of test relevant results either onto a printer or into a file.

2.5.1 Print...

This function is used to output a report on the selected printer. Before the output can be started, the report configuration to be used has to be selected (the layout of the dialog depends on the operating system)



From this dialog it is possible to edit the content of the report configuration as well as the report header selected inside (a shortcut for editing).

If a graphics configuration or a list file only shall be printed, then the dialog looks quite similar, but without any selections referring to report configurations.

With **Preview** a print preview of the hardcopy layout will be started. The preview window enables to display the pages either separate or two at a time.

Pressing the **Print** button starts the normal hardcopy on the selected printer.

If the option **Redirect to RTF file** is selected, then with **Print** no hardcopy will be created, but instead a file dialog will come up (with **Preview** after closing of the preview window) which enables to specify the file name (and the path) of the RTF file to be created.

An RTF file (Rich Text Format) stores texts and graphics in a generic Windows format which can directly be imported into any text processing software with the ability to edit the file further in any way. This way a complete test report can be stored in a single file which can be used at a later time (maybe on another PC) to generate documentation on the test.

2.5.2 Printer Setup...

This function is used for selection of the printer device driver only. The available device drivers are displayed. The selection is made by / on the device driver name. The associated interface is also shown.

Properties... permits to specify the settings of the selected printer (e.g. output format, paper feed, etc.)

Notes:

In the event that the provided printer is not listed in the selection window, the respective device driver must be installed. A detailed description is to be found in the WINDOWS operating manual or can be obtained by the WINDOWS online help.

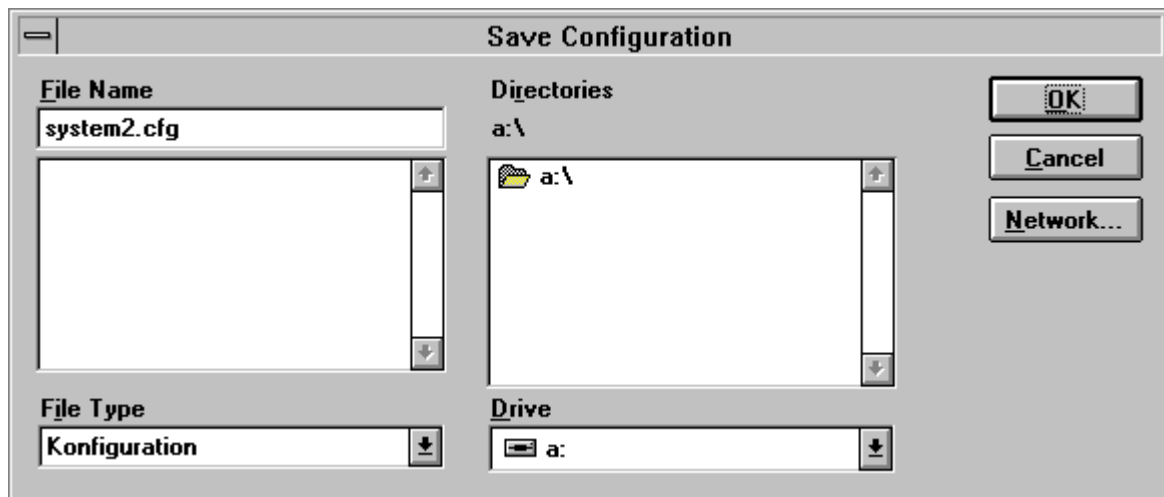
A report can be output into a file in ASCII format. For this purpose, the device driver **Generic/Text only** must be provided together with the interface **FILE:** installed as continuous printer without formfeeds. During the output, an additional window for entering a DOS file name is opened. This ASCII file can be easily imported into other software applications.

2.6 Special Functions

2.6.1 Configuration

The function **Save Configuration...** enables the user to save all files of the application that include configuration data (.INI) in a given directory on floppy disk or hard disk (as copy).

Vice versa, **Load Configuration...** permits a software configuration to be restored. Thus, the configuration can also be used for another installation of the software.
After this step the application must be closed and restarted



2.6.2 uit (t-)

Terminates the program ES-K1 and saves various general settings. If files have been modified but not saved yet, an additional prompt is displayed.

2.7 Options Menu

The menu **Options** is used for setting general parameters, e.g. device configuration and dialog language.

The menu consists of the following functions

- Device Configuration
- Selftest
- Simulator
- Login
- User List
- Change Password
- Edit Accessory
- Configure Accessory
- Main Toolbar Visible
- Device Toolbar Visible
- Toolbar Strings Visible
- Status Bar Visible
- Background
- Change Language

The functions will be explained in detail on the following pages.

2.7.1 Device Configuration

The function Device Configuration enables the user to incorporate new devices in the software or modify the configuration for the provided devices.

The loaded device drivers are displayed in the upper selection window. They can be selected by double-clicking on the device name. Then the specific device settings can be performed.

Name	Device	Description	Interface	Addr	Mode	Active	Busy
ESXI	ESMI		GPIB0	20	virtual	Yes	No
MAST	HCM		GPIB0	15	virtual	Yes	No
TURNTABLE	HCT		GPIB0	15	virtual	Yes	No
ESH2-Z5	ESH2-Z5		GPIB0	18	virtual	Yes	No
ESH3-Z5	ESH3-Z5		GPIB0	20	virtual	Yes	No

Input Field: Device

Name: ESXI

Device: ESMI

Interface: GPIB0

Mode: physical virtual

Address: 20

Active

Buttons: Insert, Edit, Modify, Delete, Properties..., Load, Empty, OK, Cancel

All device functions can be executed in two different operating modes

a) physical mode

The parameters are set on the device.

b) virtual mode

The settings are simulated by the software. The device is not addressed.

A (newly) installed device driver can be inserted by means of **Load**. After actuating the key, the respective device can be selected for editing in the selection window **Device**.

The device to be incorporated (designation of the device driver) is selected by means of **Device** the function **Load** must already have been executed.

The **Name** is used to establish a reference to the software.

A short **description** - e.g. Analyzer - can be assigned to each device.

When the software is started, the communication via the specified **interface** is checked. The software settings must comply with the implemented hardware. The interface GPIB0 (IEEE bus) is used as standard.

The **IEEE address** is important for the connected devices. For proper communication, the IEEE addresses in the device configuration must comply with the hardware settings on the device.

The **operating mode** determines whether the device is to be operated in **physical** or **virtual** mode.

All devices that are to be addressed or simulated via the software must be set to **active**. Before a device can be set to active, the respective device driver must be installed. The software recognizes an existing device driver, and is displayed in the column *A t* . If the instrument is just being used, is also entered in the column .

Modify is used to transfer the modified settings to the device configuration.

Insert transfers the settings to the device configuration (above the currently selected device) as a new device.

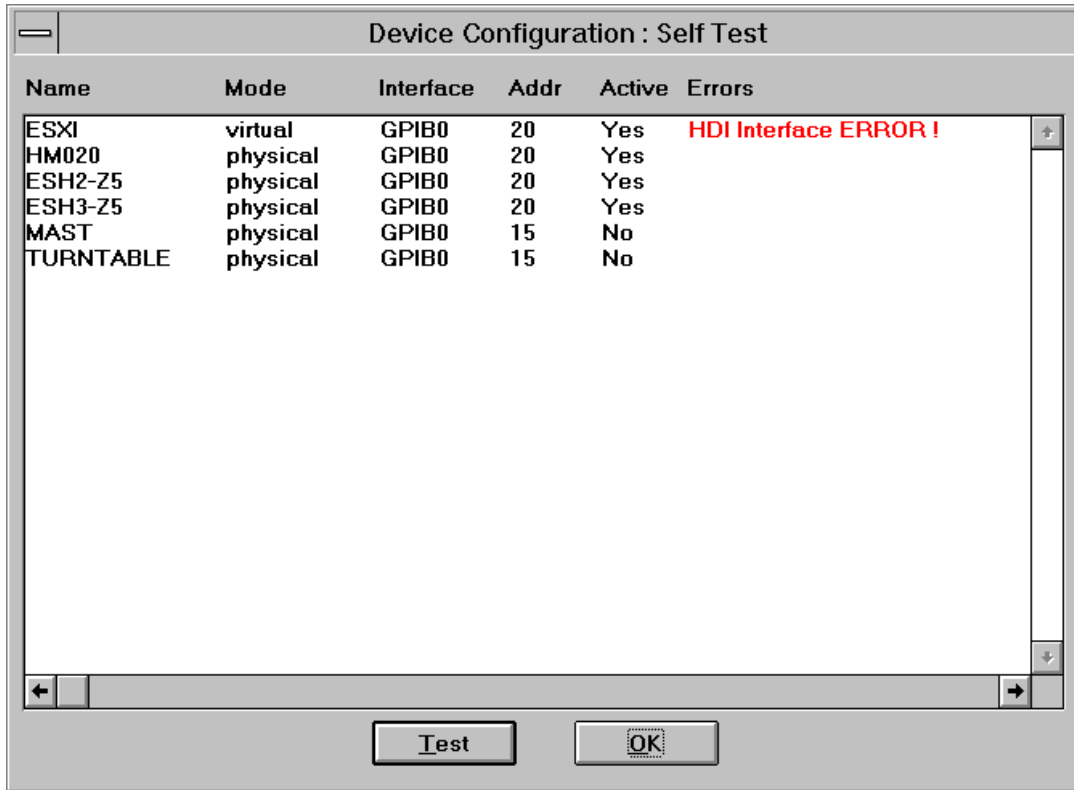
Delete is used to remove the selected device from the device configuration.

The definition of the device-specific **Properties** (see description of the respective device driver) must comply with the hardware of the device.

2.7.2 Selftest

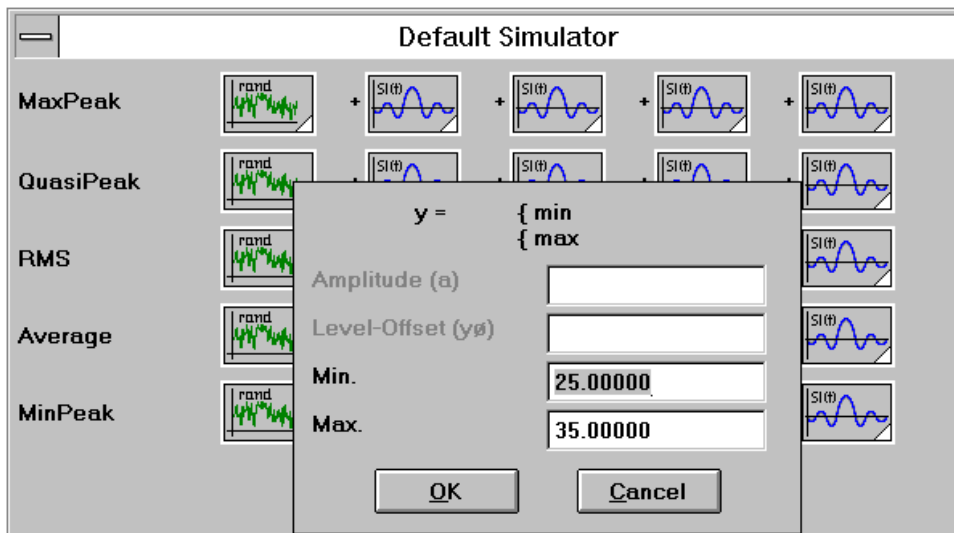
The menu item **Selftest** repeats checking of the device list (according to the device configuration) as in the case of the software start. This is particularly useful if one or several devices were not yet in operation by mistake when the software was started. In this case, the software does not have to be restarted, and correction of the device configuration (for subsequently changing the devices not found from the virtual to the physical operating mode) is not necessary.

Note The abbreviation HDI means handler device interface and refers to the interface, normally to the GPIB system. If an error message tells about an HDI problem, then make sure that the devices to be controlled are ready for operation (maybe switching off and on again helps) and that all bus cables are working properly.



2.7.3 Simulator

The function generator permits to simulate a scan or sweep with devices operated in virtual mode. A dialog window is opened for defining the settings (see below). A total of up to 5 basic functions can be superimposed (see below). The basic function is selected by clicking on the white triangle in the function symbol.



Sine function

$$y(f) = y_0 + a \sin(2\pi (f - f_0) / F)$$

Amplitude (a), level offset (y_0), period (F) and freq. offset (f_0) can be specified in a dialog window by clicking on the function symbol. The sine function can be used for simulation of broadband interference.

Si-Function (sin(x)/x)

$$y(f) = y_0 + a \sin(2\pi (f - f_0) / F) / (2\pi (f - f_0) / F)$$

Amplitude (a), level offset (y_0), period (F) and freq. offset (f_0) can be specified in a dialog window by clicking on the function symbol. The Si-function can be used for simulation of narrowband interference.

S uare function

$$y(f) = y_0 \text{ with } f \text{ s and } f \text{ e}$$

$$y(f) = a - y_0 \text{ with } s \leq f \leq e$$

Amplitude (a), y-offset (y_0), start frequency (s) and stop frequency (e) can be specified in a dialog window by clicking on the function symbol. The square function can be used for simulation of broadband interference.

Random function

$$y(f) = \min \text{ max}$$

Minimum value (min) and maximum value (max) can be specified in a dialog window by clicking on the function symbol. The random function can be used for simulation of background noise.

2.7.4 Login User List and Change Password

The Software ES-K1 is provided with password protection. This is of great importance for two reasons

1. the data are protected against unauthorized access
2. the system configuration is only changed by authorized people

The program includes three user classes with different rights of access

1. System manager
2. Extended
3. Standard

Besides, every user is assigned to a user group.

The rights of access are distributed as follows

ÿ The **system manager** has access to all components and data of the software.

ÿ The **user with extended access rights** is assigned the same access rights as a system manager, with the following exceptions

ÿ Processing of the device configuration

ÿ Processing of the path configuration

ÿ Processing of the user groups

ÿ Processing of the user list

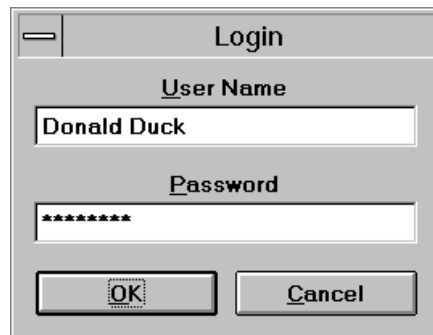
ÿ Processing of the files outside his group (exception files with the attribute **Public** may be processed)

ÿ The **user with standard access rights** has the same access rights as a user with extended access rights, with the following exceptions

ÿ Processing of the file type script

ÿ Reading of the files outside his group (exception files with the attribute **Public** can be read)

When the software is started, the following dialog window appears



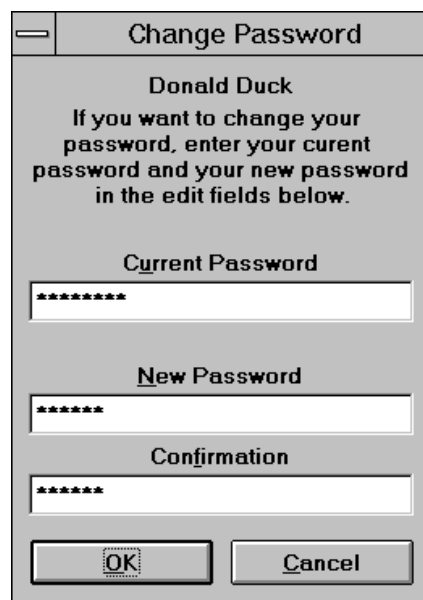
The user must enter his user name and password in this window. On pressing the **OK** key, the settings are checked and, in the case of a correct login, the main menu is entered. The **Cancel** key is used to abort the start of the software and open Windows.

Option Login

This function is used to reregister a user in the software. The currently registered user is thus logged out automatically. Besides, the same is true as for login on starting of the software.

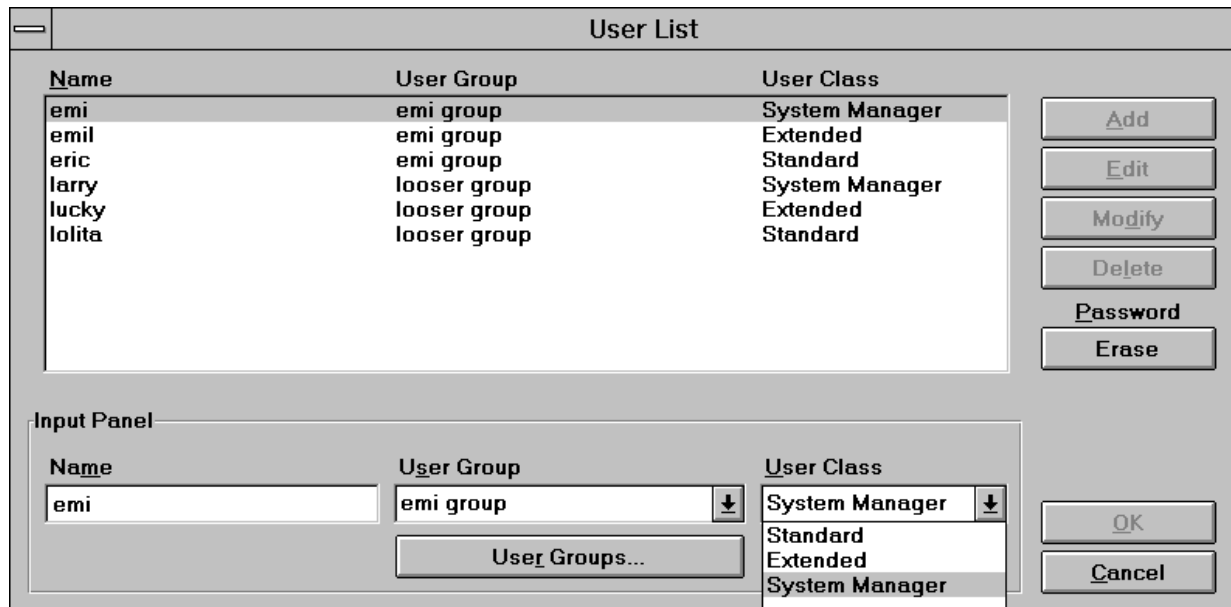
Option Change Password

To change the password, both the old and the new password must be entered (twice to avoid typing errors)

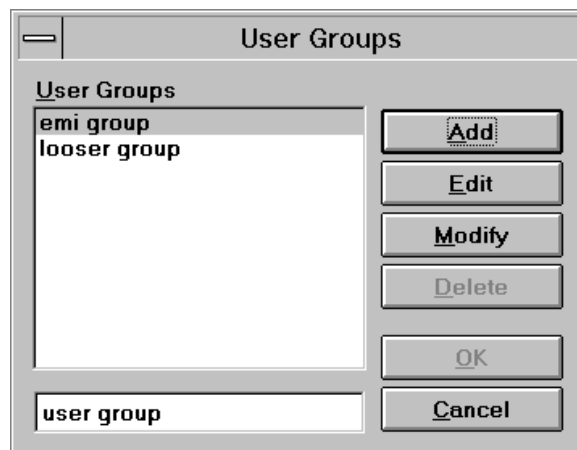


Option **User list**

In this dialog window, a user group and a user class are assigned to the user and made known to the system. The password can also be cancelled in this window, which permits the respective user to assign a new password without having to specify the old one



For every user, an existing **user group** is to be selected and one of the three user classes allocated. The list of user groups can be edited via an extra dialog window



2.7.5 Edit Accessory and Configure Accessory

see 2.8.4.2 Single Measurement

2.7.6 Main Toolbar Device Toolbar and Status ar

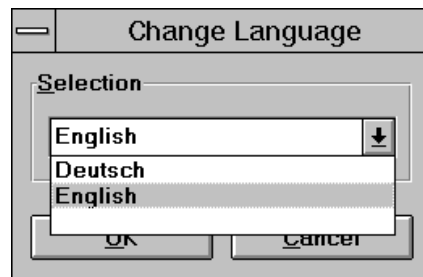
see 2.1 Overview

2.7.7 ackground

see 2.1 Overview

2.7.8 Change Language

This function permits the user to change the language used in the dialog at the moment, only English and German are offered.



2.8 Measurement Functions

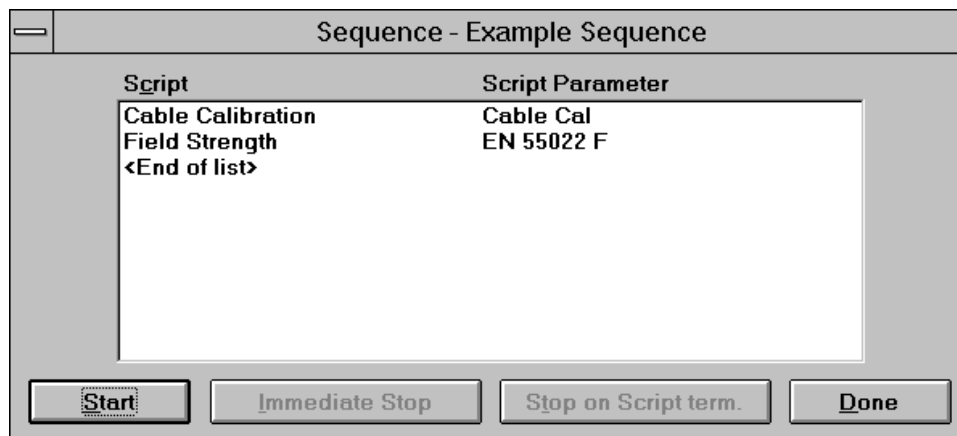
The menu **Test** is used e.g. for execution of the various measurement functions, for starting of scripts and for operation of the devices.

2.8.1 Interactive Device Dialog

Set Device permits to select a device entered in the device configuration for single operation. This function is identical with the selection of a device with the (activated) Device Toolbar. The dialog window of the respective device driver is opened and the settings can be made by the user in interactive mode. If an error occurs during the device access, the cause of the error must be determined by referring to the operating manual of the device involved. A detailed description of the dialog windows can be obtained from the respective description of the device driver.

2.8.2 Sequence

Execute Sequence... offers a choice of the provided sequences. A selected sequence can then be started using **Start** and is continued until the end unless it is aborted before by pressing the keys **Immediate Stop** or **Stop on Script term.**



2.8.3 Script

Execute Script... offers all provided scripts, however, only main scripts (MAINSCRIPT) can be started, whereas all other scripts are included in the main scripts (INCLUDE ... , SUBSCRIPT). After confirming the selection by means of **OK** the devices are checked. The devices that are in virtual mode are indicated in a window.



Subsequently, the dialog for the script parameter editor is displayed. It permits to select and edit the desired parameter set (see 2.4.2)

The script is executed using **OK** or **Cancel** (the last modifications on the parameter set are saved or ignored) or aborted using **Stop**. During the script run, the script can be interrupted and continued again or aborted for good.

2.8.4 Measurement Functions

The submenu **Measurement** permits to select the EMI measurement functions. The following measurement functions are offered

- Y Scan
- Y Sweep
- Y Single measurement

2.8.4.1 Scan and Sweep Functions with Automatically Generated Graphics

As soon as a table has been selected in the dialog for starting a scan or a sweep, the remaining fields are assigned names (derived from the table names) and the entire frequency range of the table is set. It is then possible to vary these entries at will, e.g. to define a limited frequency range or skip a suggested detector by deleting the result name. If the receiver is not capable of measuring in parallel with various detectors, the traces are recorded sequentially.

In the case of scans, it is additionally possible to select a **frequency list**. In this case, the measurement is not made with the step size specified in the scan table, but only at the frequencies of the frequency list that lie within the given frequency range.

If **Overwrite** is set, already existing measured values are completely deleted and overwritten. Otherwise, existing measured data are only overwritten or supplemented in the given frequency range.

If **Autosave** is set, the results are automatically saved. If the selection switch is not set, the data are lost unless they are displayed as a list or graphically.

Besides, the dialog permits to generate a **graphics configuration** for all data (traces) produced in the measurement run. For this purpose, a name for a configuration must be given for graphical display of the measurement results. If there is no graphics configuration under the given name yet, a new configuration with appropriate settings with respect to frequency range, level unit and traces is created. Otherwise, the existing graphic is only opened and the traces are entered this however means that it might become necessary to adjust the diagram, thus making a currently measured curve visible.

When starting a scan or a sweep, then besides the graphics configuration the software also can create a default **test configuration** or a default **report configuration**.

The test configuration holds all referring files The scan/sweep range table, the transducer and system transducers inside the range table, the graphics configuration, measurement results and the selected report configuration (incl. its report header if defined).

If **t** is selected then a new test configuration will be created. If not, then the entries will simply be added into an existing test configuration.

As a report configuration either an existing one can be selected which will simply be added to the test configuration, or a new one can be **t** which by default contains the following file entries The scan/sweep range table, the graphics configuration and scan measurement results if those results were gained with a frequency list.

Once started, the progress of the scan or sweep can additionally be observed in a field at the current frequency note that scan results are supplemented in blocks, whereas in the case of sweeps, only complete sweep subranges (according to the sweep table) are added.

Meas. State	
Subrange	2
Scan	1
Current Frequency	225.920000 MHz
<input type="button" value="Stop Immediately"/> <input type="button" value="Continue Current Frequency"/>	
<input type="button" value="Break"/> <input type="button" value="Continue Next Subrange"/>	

A scan or sweep can be interrupted by the user and continued again. As soon as the scan or sweep has been aborted, it can be continued exactly at this position (frequency display), in the next subrange (if provided) or at a given frequency. For this purpose, the frequency display must be edited appropriately depending on the set value, existing measurement results will be overwritten or there will be a gap in the measurement run. Thus, a test does not have to be repeated completely if a sudden change in the measurement conditions is detected immediately. The measurement run is simply aborted and continued at a lower frequency after correction of the measurement conditions.

If the stop frequency of a subrange and the start frequency of the next subrange are identical, this frequency is measured with the settings of the upper subrange. If both subranges are used, e.g. with different antennas (transducers), the stop frequency of the lower subrange should be slightly reduced (e.g. by one step size).

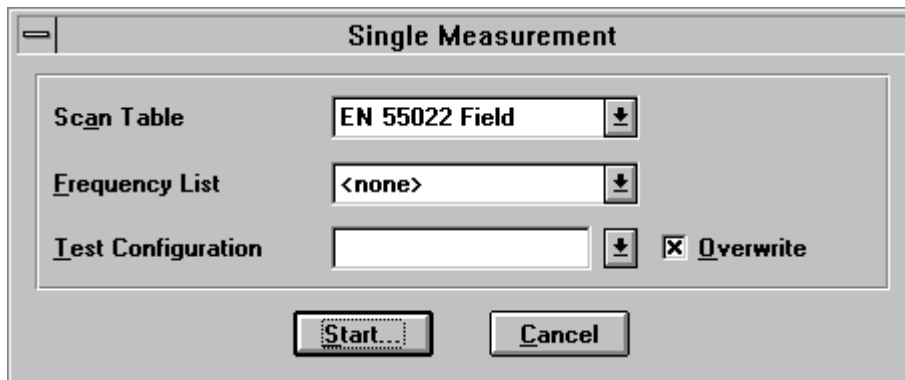
At the end of a scan or sweep, the frequency dependent transducer factor of the last range can optionally be programmed into the receiver - depending on the instrument's capabilities (if the number of correction values in the receiver is not sufficient then they will be interpolated). This way measurements can be done from the front panel of the instrument without any control from the software, but still with level readings that include a transducer correction. As long as the software controls the instrument, any transducer correction will be done in the software only which is much faster. The **transducer download** can be activated in the device properties dialogues of the receivers.

2.8.4.2 Single Measurement

The dialog for interactive single measurements offers the following functions

- a frequency variation is immediately set on the receiver with the next measurement
- the frequency variation by means of keys uses either the step size of the given scan table or the frequencies of a selected **frequency list**
- a measurement result is always produced or an existing measurement result varied or extended
- the measurement result can be extended by **predefined columns** which will be automatically filled with the **settings of accessories** (polarisation, artificial mains network lines, etc.) at the time of the measurement
- the frequency display can be coupled to a **marker** located on a trace for display of the measurement result

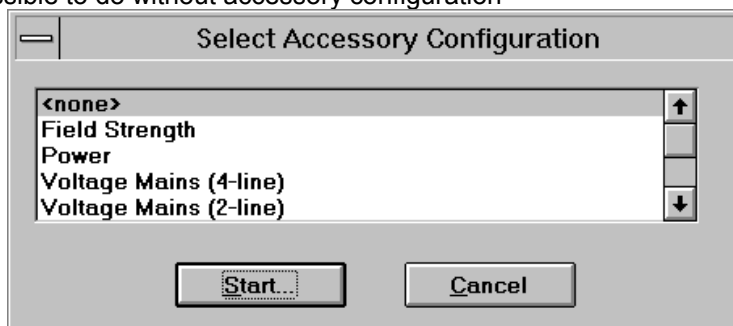
When a single measurement is started, the **Scan Table** to be used and an optional **Frequency List** are to be selected



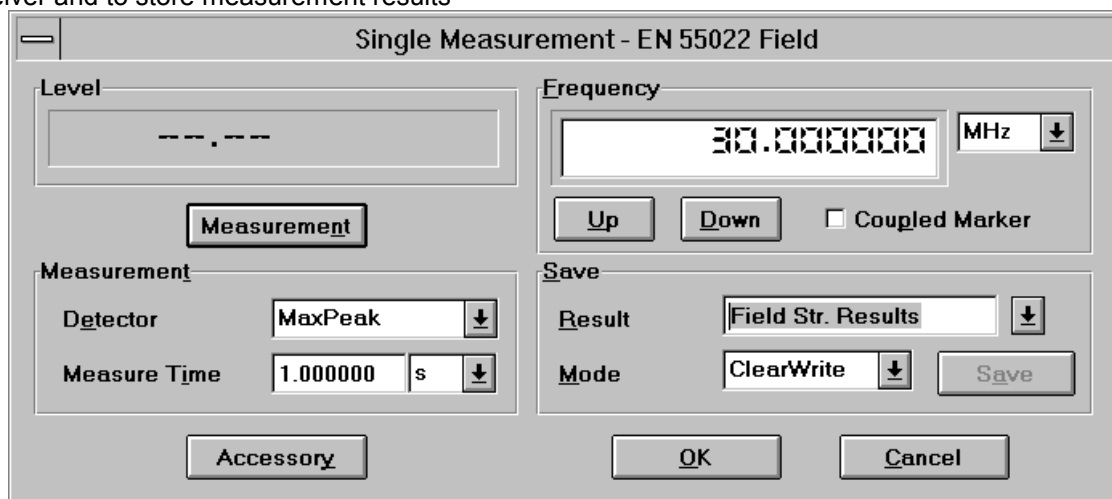
When starting a single measurement, then the software can optionally create a default **Test Configuration** which holds all referring files (scan/sweep table, transducer, system transducers, measurement result file).

If *t* is selected then a new test configuration will be created. If not, then the entries will simply be added into an existing test configuration.

Subsequently, a choice of the **Accessory Configuration** is offered (determines the column layout of the produced measurement result and the accessory to be connected for editing of the configuration see below). It is also possible to do without accessory configuration



Then the actual **Single Measurement dialog** is displayed, which is used to control the respective receiver and to store measurement results



The frequency may vary throughout the entire frequency range of the associated scan table. Besides, the detector and the measuring time can be varied all other test parameters result from the settings of the scan table.

The value for the measurement time can be defined at will however, depending on the receiver used, the next higher possible measuring time may be set on the instrument.

Using the key **Measurement**, the first measurement run is started and repeated continuously. Each frequency variation causes a corresponding change on the receiver (a variation of detector or measuring time is transferred by means of **Measurement** or a further frequency variation).

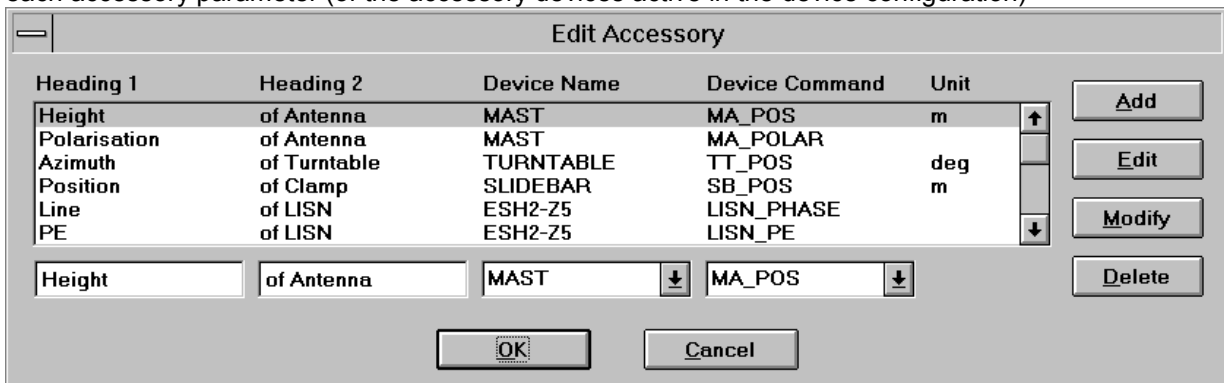
Save is used to insert the current measured value in the measurement result or vary it together with accessory settings if selected and if the associated device dialogs have been started before (see below).

The frequency display can be coupled to the marker of a diagram. For this purpose, the **Coupled Marker** function must be activated in the dialog window on the one hand and an appropriate device configuration opened on the other hand, in which the specified measurement result is indicated and on the trace of which the marker is located. For already existing test points, the marker frequency and the test frequency shown in the single measurement dialog correspond to each other, i.e. shifting of the marker also causes a frequency variation in the receiver.

If a frequency list has been selected with the scan table, the **Up/Down** keys only permit to set the frequencies of the list lying inside the frequency range of the scan table of course, additional intermediate values can be set by editing the frequency display, and the measurement result can be extended accordingly.

Columns can automatically be added to the measurement result, in which the current settings of accessory devices are stored for each measurement. If a single measurement result is stored, the associated accessory settings are automatically entered in the respective fields (i.e. next to frequency and level, e.g. the turntable angle). To this end, the columns must be defined accordingly, i.e. the columns must be assigned to the accessory (e.g. an automatic antenna mast) and the associated parameter (e.g. polarisation). For this purpose, two dialogs are provided, the first one allowing to edit the setup of all columns, the second one to produce a combination of these columns.

The menu item **Edit Accessory** (options) is used to open a dialog which permits to define a column for each accessory parameter (of the accessory devices active in the device configuration)



The first heading must be clearly designated the width of the column is determined by the longer one of the two headings (max. 15 characters). When a (symbolic) device name has been selected, the associated device command (query for a particular setting) must also be selected. Such a column definition can then be appended to the existing list and also modified or deleted subsequently.

The second dialog is started by means of the menu item **Configure Accessory** (options)

Configure Accessory

Accessory Configurations

Field Strength
Power
Voltage Mains (4-line)
Voltage Mains (2-line)
Magn. Field Strength

Add

Delete

Heading 1	Heading 2	Device Name	Device Command	Unit	
Height	of Antenna	MAST	MA_POS	m	↑
Polarisation	of Antenna	MAST	MA_POLAR		
Azimuth	of Turntable	TURNTABLE	TT_POS	deg	
Position	of Clamp	SLIDEBAR	SB_POS	m	
Line	of LISN	ESH2-Z5	LISN_PHASE		
PE	of LISN	ESH2-Z5	LISN_PE		↓

OK Cancel

The upper field lists the names of the column configurations, whereas the lower field shows all existing column definitions (produced with the dialog **Edit Accessory**). When a name has been selected in the upper field, the associated columns are marked in the lower field this marking can be changed at will (best to be done using the mouse key with simultaneously pressed Ctrl key) and any combinations can be formed, which become valid immediately when the dialog is terminated with OK.

The edit field in the middle permits to generate new column configurations, which can be edited immediately or subsequently by means of a marking in the lower field.

To make a column configuration effective the following steps are needed

First the device dialogs have to be started (they might be iconized).

Then the single measurement dialog has to be started, which requires to select a scan table (plus optionally a frequency list and a test configuration, see above) and a column configuration.

Now a measurement can be started.

The name of the measurement result file has to be entered or selected.

When the **Save** key is pressed for the first time the columns will be added to the file and the result along with the device positions will be stored.

2.9 Evaluation Functions

The menu **Test** is used e.g. for execution of the various analyzing functions. The submenu **Evaluation** includes the following functions

- Acceptance Analysis
- Peak Reduction
- Subrange Maxima Reduction
- Subrange Minima Reduction
- Maxima Reduction
- Octave Maxima Reduction
- NB / BB Discrimination
- Conversion to ... / MHz
- Unit Conversion
- Merge Data
- Exclude Ambients
- Weighted Addition
- Reduce to Freq.List
- GTEM Correlation

Most evaluation functions permit to generate a **Graphics Configuration** including all data relevant to the evaluation (e.g. input/output files, limit line). To this end, a name for a configuration for graphical display of the data must be specified. If there is no existing graphics configuration under the specified name yet, a new configuration with appropriate settings of frequency range, level unit, traces, etc. is created (if an evaluation function uses two different level units at the same time, two graphics configurations are created accordingly) otherwise, the existing graphics is only opened.

The duration of the evaluation functions is usually a few seconds however, it may be longer if large input files are involved and if they are to be displayed graphically at the same time. The GTEM Correlation requires very time-consuming calculations so that the size of the input file makes itself felt clearly.

Evaluation functions with a specified limit line ignore all test points of the input file for which the limit value is no longer defined.

2.9.1 Acceptance Analysis

The acceptance analysis is used to filter off signals which are further off a specified limit line. This includes in particular the background noise of the receiver. The acceptance analysis is implemented by means of an imaginary acceptance line which cuts off all measured values falling below it. The acceptance line runs parallel to a limit line with a specified offset (e.g. an offset of -10 dB means 10 dB below the limit line).

If the offset is very large (e.g. 200 dB), all signals are cut off, if it is very small (e.g. -200 dB), they are all maintained.

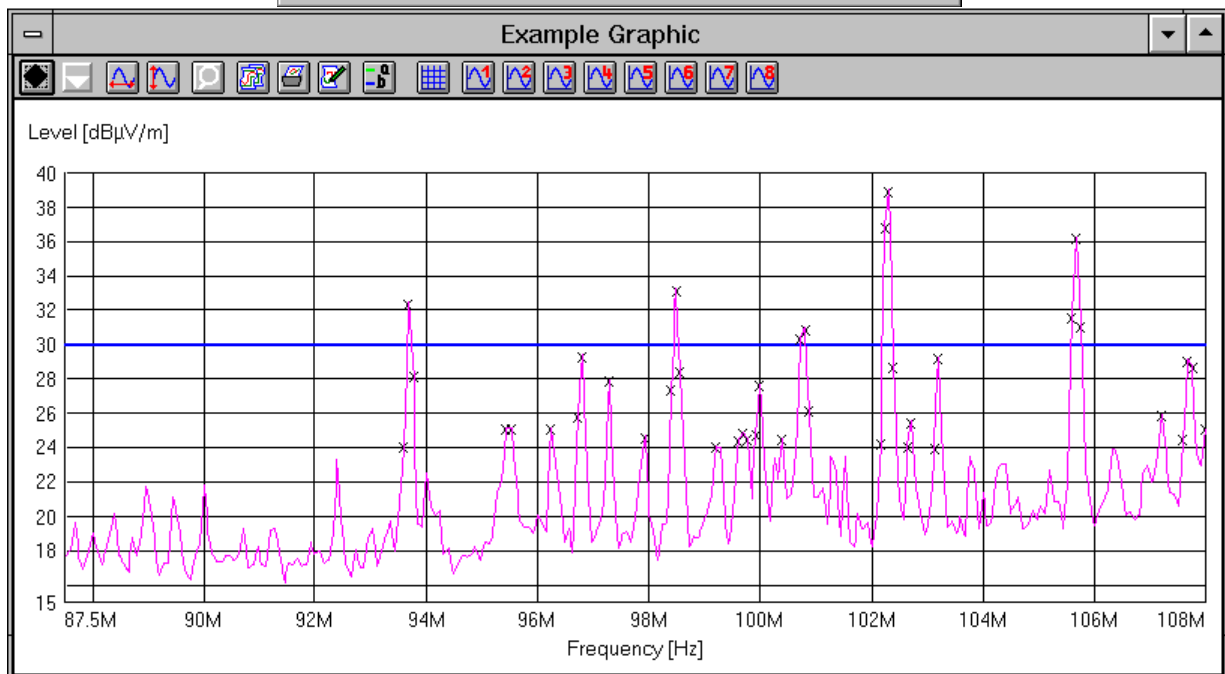
Acceptance Analysis

Input File
 Scan Results ↓

Output File
 Acceptance Results Autosave

Limit Line
 EN 55022 F QP ↓
 Acceptance Offset dB

Graphical Display
 Example Graphic ↓

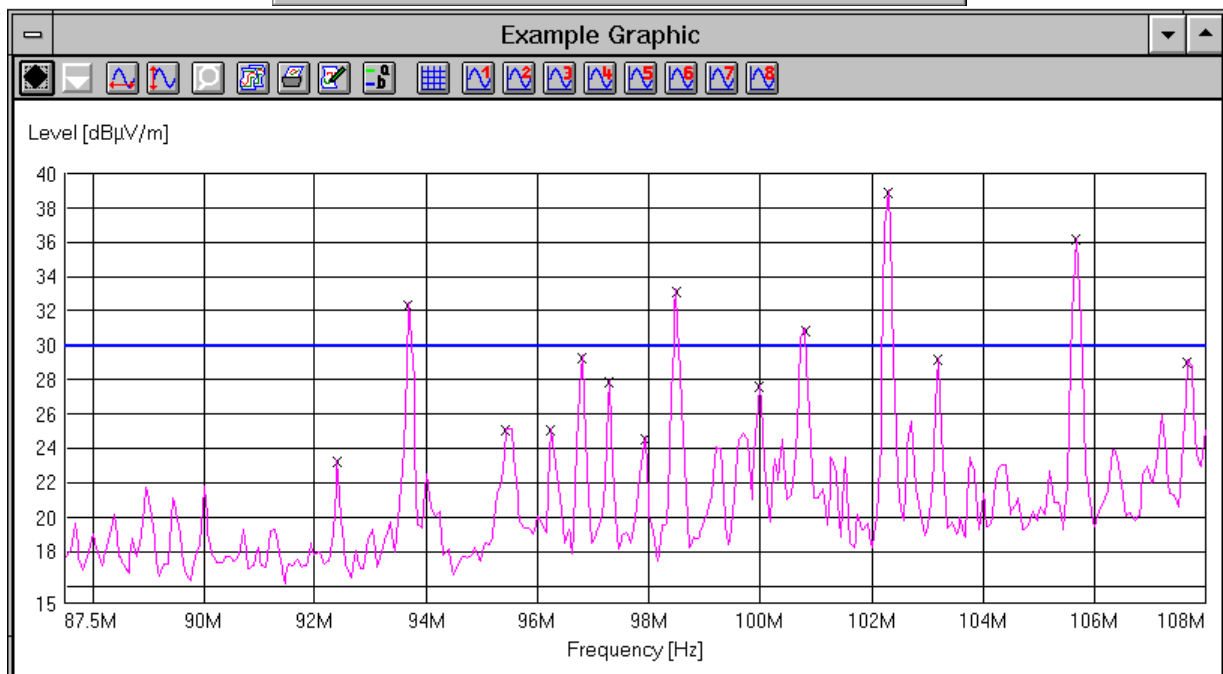
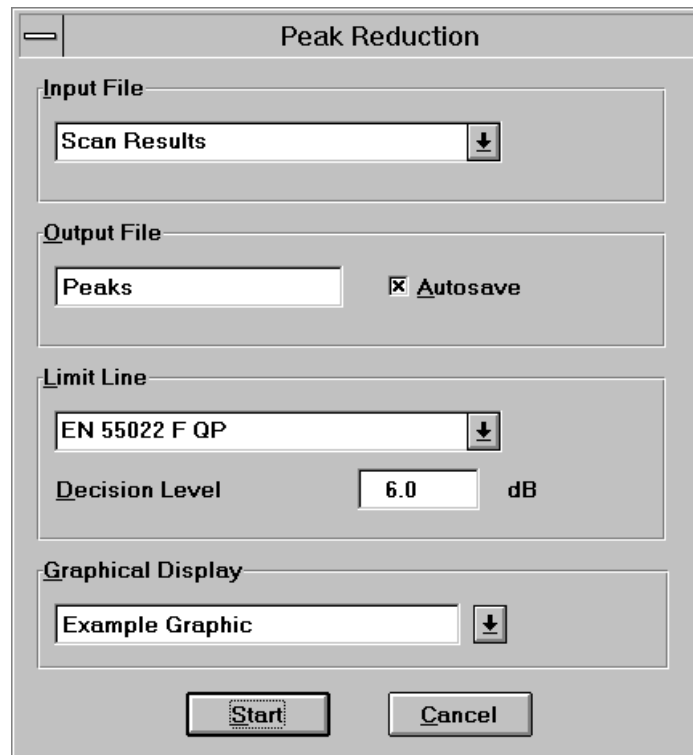


2.9.2 Peak Reduction

This function is used to determine all Peaks (preferably narrowband interference) depending on a user-defined decision level. For this purpose, the trace is analyzed by means of a special algorithm. The decision level determines how far a local maximum must exceed the adjacent lower test points to be considered as a Peak and appear in the output file (see flowchart on next page).

If a limit line is also specified, not the absolute level characteristic of the trace is examined, but the distance between the test point and the respective limit value.

With a decision level of 0 dB, all local maxima are detected as Peaks, whereas, with a value of e.g. 20 dB, only distinctive narrowband signals are detected.



2.9.3 Subrange Maxima Reduction

This function is used to split the trace of the input file into a given number (max. 1000) of subranges. The maximum is determined for each subrange and transferred to the output file. If a limit line is also specified, not the absolute level characteristic of the trace is examined, but the distance between the test points and the respective limit value. The limits of the subrange are equidistant for linear or logarithmic scales. The function is suitable for detecting broadband signals in addition to narrowband signals over the complete measured spectrum.

Subrange Maxima Reduction

Input File
 Scan Results ↓

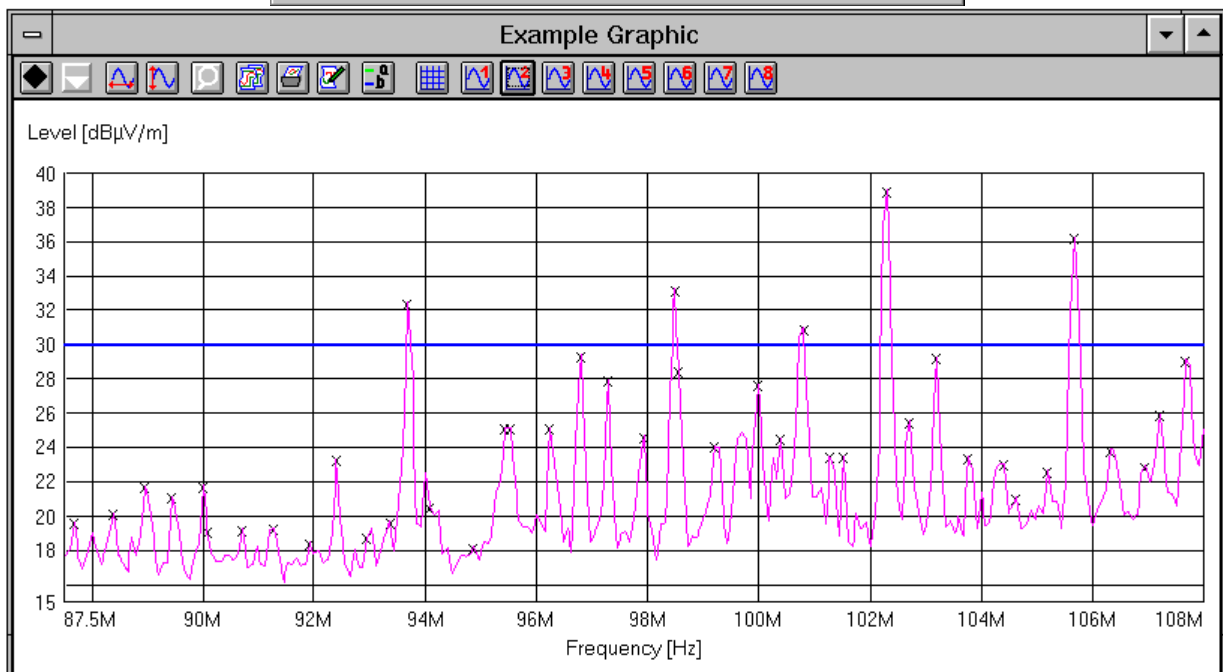
Output File
 Subrange Maxima Autosave

Limit Line
 EN 55022 F QP ↓

Subrange
 Number 41 Linear ↓

Graphical Display
 Example Graphic ↓

Start Cancel



2.9.4 Subrange Minima Reduction

This function is used to determine the subrange minima of a measurement result. It is used for example in open-area measurements. It permits to identify frequency points which are little or not at all occupied by external signals. Such frequencies are best suited for measuring antennas or similar.

The handling of the parameters for subrange minima reduction is similar to that of the subrange maxima reduction (see 2.9.3).

2.9.5 Maxima Reduction

This function is used to transfer a given number (max. 1000) of maximum levels of the input file into the output file. If a limit line is also specified, not the absolute level characteristic of the trace is examined, but the distance between the test points and the respective limit value. Thus it is possible to focus e.g. on the 10 most critical points of a measurement result.

2.9.6 Octave Maxima Reduction

This function is used to split the trace of the input file into frequency octaves. For each octave, a given number of level maxima is determined and transferred into the output file. If a limit line is also specified, not the absolute level characteristic of the trace is examined, but the distance between the test points and the respective limit value.

2.9.7 Narrowband/ roadband Discrimination

This function is used to discriminate between narrowband (NB) and broadband interference (BB). Four methods are provided, the tuning methods analysing only the shape of the trace

Peak/Average value comparison:

Two data lists are available, one being measured with the PEAK detector, the other with the AVERAGE detector.

Narrowband interference

$$(\text{PEAK} - \text{AVERAGE}) \leq \text{decision level.}$$

Potential broadband interference

$$(\text{PEAK} - \text{AVERAGE}) \leq \text{decision level.}$$

Peak/RMS value comparison:

Two data lists are available, one being measured with the PEAK detector, the other with the RMS detector (root mean square).

Narrowband interference

$$(\text{PEAK} - \text{RMS}) \leq \text{decision level.}$$

Potential broadband interference

$$(\text{PEAK} - \text{RMS}) \leq \text{decision level.}$$

Tuning methods

a) Tuning by \pm one bandwidth:

A data list is available that was measured with a scan step size of
0.45 ... 0.55 IF bandwidth.

The decision range lies between reference level and the decision level (e.g. 3 dB below). A total of 2 adjacent levels are investigated.

Narrowband interference

The 2nd adjacent levels lie below the decision range and the 1st adjacent levels lies below the reference level.

Potential broadband interference

The point has not been identified as being a narrowband signal.

Note:

Those points at the edge of a scan range will also be analysed, with the missing point assumed as fulfilling the condition for narrowband interference.

Only potential **broadband interference** that is not located close to (\pm one IF bandwidth) narrowband interference is actually determined as broadband interference.

b) Tuning by \pm two bandwidths:

A data list is available which was measured with a scan step size of
0.60 ... 0.75 IF bandwidth (0.45 ... 0.60 IF bandwidth).

The decision range lies between reference level and the decision level (e.g. 3 dB below). A total of three (four) adjacent levels are investigated.

Narrowband interference

The 3rd (4th) adjacent levels lies below the decision range and the remaining two (three) adjacent levels lie below the reference level.

Potential broadband interference

The point has not been identified as being a narrowband signal.

Note:

Those points at the edge of a scan range will also be analysed, with the missing point(s) assumed as fulfilling the condition for narrowband interference.

Only potential **broadband interference** that is not located close to (\pm two IF bandwidths) narrowband interference is actually determined as broadband interference.

2.9.8 Conversion to ... / MHz

This function is used to add a broadband factor to a level as is required in particular specifications for the description of broadband interference.

The level unit is changed to level unit per MHz (for military specifications in the USA). The IF bandwidth depends on the scan or sweep table and the frequency at which the level has been measured. The broadband factor is $-20 \log(\text{IF bandwidth} / 1 \text{ MHz})$.

As a further conversion (numerical values remain unchanged), the unit can be changed to level unit per bandwidth (for military specifications in France).

The following conversions are possible

Level unit before conversion	Level unit after conversion with .../MHz	Level unit after conversion with .../BW
dB V	dB V/MHz	dB V/BW
dB V/m	dB V/m/MHz	dB V/m.BW
dB A	dB A/MHz	dB A/BW
dB A/m	dB A/m/MHz	dB A/m.BW

2.9.9 Unit Conversion

This function is used for unit conversion. The following conversions are possible (R characteristic impedance, e.g. R 50 ohms)

Unit	Unit after conversion
dB V	y dB A $x \text{ dB V} - 20 \log(R)$
	y dBpW $x \text{ dB V} - 10 \log(R)$
	y dBm $x \text{ dB V} - 10 \log(R) - 90$
dB V/MHz	y dB A/MHz $x \text{ dB V/MHz} - 20 \log(R)$
dB V/m	y dB A/m $x \text{ dB V/m} - 20 \log(R)$
dB V/m/MHz	y dB A/m/MHz $x \text{ dB V/m/MHz} - 20 \log(R)$
dB A	y dB V $x \text{ dB A} - 20 \log(R)$
	y dBpW $x \text{ dB A} - 10 \log(R)$
	y dBm $x \text{ dB A} - 10 \log(R) - 90$
dB A/MHz	y dB V/MHz $x \text{ dB A/MHz} - 20 \log(R)$
dB A/m	y dB V/m $x \text{ dB A/m} - 20 \log(R)$
dB A/m/MHz	y dB V/m/MHz $x \text{ dB A/m/MHz} - 20 \log(R)$
dBm	y dBpW $x \text{ dBm} - 90$
	y dB A $x \text{ dBm} - 90 - 10 \log(R)$
	y dB V $x \text{ dBm} - 90 - 10 \log(R)$
dBpW	y dBm $x \text{ dBpW} - 90$
	y dB A $x \text{ dBpW} - 10 \log(R)$
	y dB V $x \text{ dBpW} - 10 \log(R)$
dBpT	--

2.9.10 Merge Data

This function is used to merge all values of two measurement result lists. If the frequencies are the same, the complete line will be entered into the data list with the maximum/minimum level (Maxhold/Minhold). If the frequencies are not the same, both lines will be entered into the data list. The column structure in the two data lists must comply with each other.

2.9.11 Exclude Ambients

This function is used for removing ambients from a measurement result.

Two methods can be selected

1. All entries of the **frequency range** between a start and a stop frequency are removed.
2. Small ranges are removed according to a frequency list. A delta range about the frequencies must be entered with a **factor**
 Delta range Frequency **Factor** 10 ppm (10 millionth)
 z.B. Frequency 100 MHz, Factor 50
 Delta range 100 MHz 50 10e-6 50 kHz , i.e. 25 kHz about 100 MHz

Exclude Ambients

Input File

Output File

 Autosave

Disturbing Frequencies

Selection By Frequency List Frequency Range

Frequency List

Range * 10 ppm

Frequency Range

Start

Stop

Graphical Display

2.9.12 Weighted Addition

The **weighted addition** permits to treat two data sets in **correlated** (addition of the voltages), **uncorrelated** (addition of the powers) or even **direct** mode (addition of the levels). In the **direct** mode, even negative factors can be easily used, i.e. even any subtractions can be implemented, since the values are not logarithmized

direct	dest	a source1	b source2
correlated	dest	$20 \log a \cdot 10^{\text{source1}/20}$	$b \cdot 10^{\text{source2}/20}$
uncorrelated	dest	$10 \log a \cdot 10^{\text{source1}/10}$	$b \cdot 10^{\text{source2}/10}$
	a, b	Factors (weighting) of the data sets.	

2.9.13 Reduce to Frequency List

Using the evaluation function **Reduce to Frequency List** a frequency list can be generated from a measurement result. As input file, an existing measurement result file is selected and, by means of the evaluation function, an output file of the type frequency list is generated with the specified name. Figuratively speaking, only the first column of the measurement result, i.e. the one with the frequency, is transferred. Such a file may e.g. serve the purpose of running a scan only at the frequencies of this frequency list.

2.9.14 GTEM Correlation

This function is used for converting emitted EMI that has been measured by an EUT in a GTEM cell (Gigahertz Transverse Electromagnetic). This function permits to compare the data with the measured electrical field of an open-area test site (OATS).

The correlation algorithm is based on the following model

- The test item is measured in the directions x, y and z in the GTEM cell. The respective results are referred to as V_x , V_y and V_z .
- Based on V_x , V_y and V_z the interfering power of the test item is calculated depending on the GTEM dimensions.
- The calculated interfering power is simulated as follows
The test item is replaced by a dipole which is aligned according to the polarization of the test antenna and corresponds to the calculated interfering power. The corresponding electrical fieldstrength is calculated at the position of the antenna. In the case of an anechoic chamber with metal floor, the maximum fieldstrength of the various antenna heights is the corresponding electrical fieldstrength.

Two methods can be selected

a) Measurement result conversion

The interfering voltages V_x , V_y and V_z are measured. The fieldstrength characteristic is obtained by means of correlation and can be directly compared with the respective fieldstrength limit line.

The input files correspond to the interfering voltages of the test item measured in three orthogonal directions. At least one input file must be specified. The scan or sweep tables of the input files must be identical. Input files that are not entered are set to zero.

The output files correspond to the fieldstrengths for horizontal and vertical polarization. At least one output file must be specified. Output files that are not entered are not calculated.

b) Conversion of Limit Lines

In contrast to the first method, the fieldstrength limit line is first converted into a voltage limit line $V_{x,y,z} = (V_x^2 + V_y^2 + V_z^2)^{1/2}$. The advantage of this method is that the resulting interfering voltage from V_x , V_y and V_z can be directly compared with the calculated limit line.

Additional values determines the number of the additional sampling points for calculation of the limit line. Since the number of sampling points is usually very small and the conversion results in a more complex trace, it is advisable to use more sampling points - e.g. 100. The calculation is performed in two steps

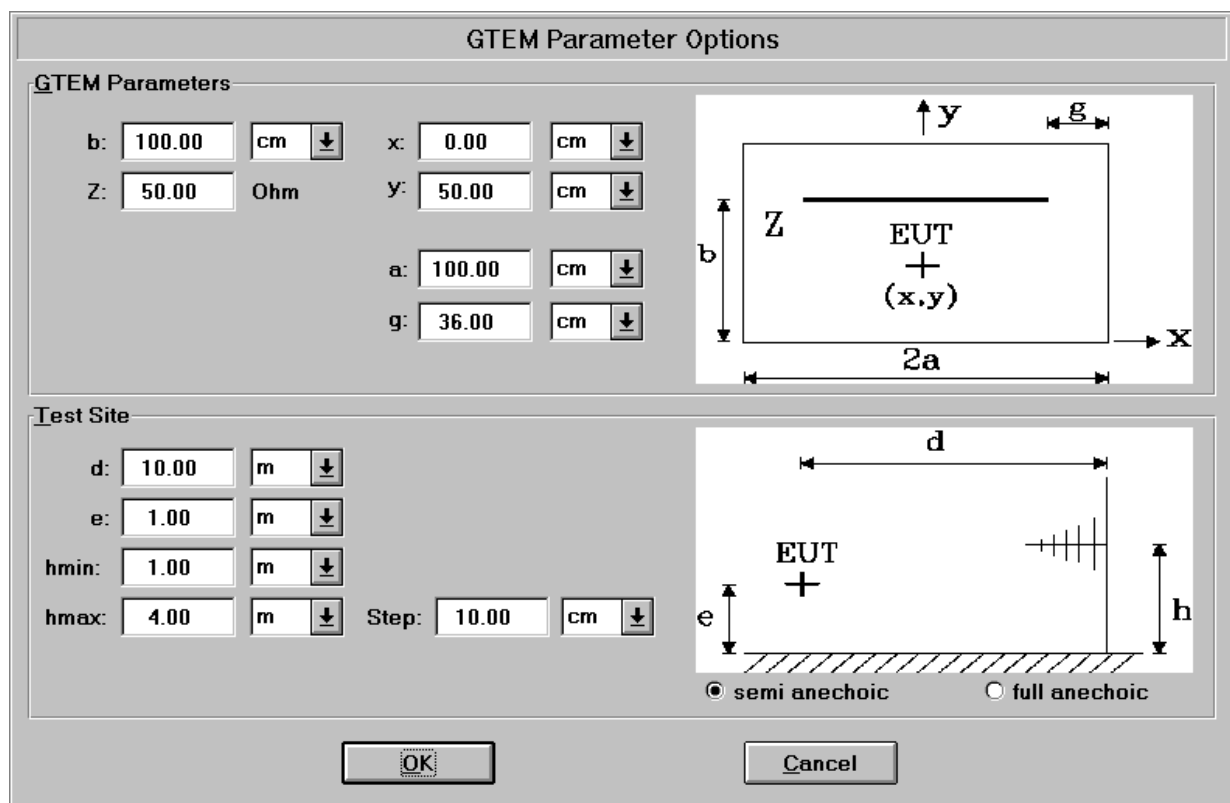
First of all, each point of the entered limit line (frequency / level) is converted.

In addition to the provided points, the entire frequency range is divided into the specified number of sampling points, linearly or logarithmically (according to the intermodulation mode of the limit line).

Each of these sampling points (frequency / interpolated level) is then converted.

The output files correspond to the respective voltage limit lines of the entered fieldstrength limit line of the standard used. A distinction is made between limit lines for horizontal, vertical and horizontal vertical polarization. Output files that are not specified are not calculated.

The key **Start** checks the settings and the correlation is started. When selecting the key **Option ...** an additional dialog window for entering the parameters for the GTEM dimensions and the reference open-area test site is opened.



The fields **GTEM Parameters** permit to set the dimensions of the GTEM cell. The geometry of a GTEM cell is defined by $2a$ and b . The values x and y indicate the middle of the test item. These values are normally 0 and 0 . When changing the value a , the values for x , y and g are automatically adapted. The value Z indicates the impedance of the GTEM cell, the standard value for Z is 50 ohms.

The fields **Test Site** determine the dimensions of the reference open-area test site.

With **semi anechoic** selected, the measurement is simulated for a test site with conductive ground plane. In this case, the maximum level is calculated between minimum antenna height h_{min} and maximum antenna height h_{max} .

With **full anechoic** selected, on the other hand, the measurement is simulated for a test site with absorbing ground plane. In this case, the level is calculated for one antenna height only.

2.9.15 S-LINE Correlation

This function is used for converting emitted EMI that has been measured by an EUT in a S-LINE cell (Gigahertz Transverse Electromagnetic). This function permits to compare the data with the measured electrical field of an open-area test site (OATS).

The correlation algorithm is based on the following model

- a) The test item is measured in the directions x, y and z in the S-LINE cell. The respective results are referred to as V_x , V_y and V_z .
- b) Based on V_x , V_y and V_z the interfering power of the test item is calculated depending on the S-LINE dimensions.
- c) The calculated interfering power is simulated as follows
The test item is replaced by a dipole which is aligned according to the polarization of the test antenna and corresponds to the calculated interfering power. The corresponding electrical fieldstrength is calculated at the position of the antenna.

Two methods can be selected

a) Measurement result conversion

The interfering voltages V_x , V_y and V_z are measured. The fieldstrength characteristic is obtained by means of correlation and can be directly compared with the respective fieldstrength limit line.

The input files correspond to the interfering voltages of the test item measured in three orthogonal directions. All three input file must be specified. The scan or sweep tables of the input files must be identical.

The output file corresponds to the fieldstrength.

Algorithm

S in V^2 , U_{Meas} in dB V

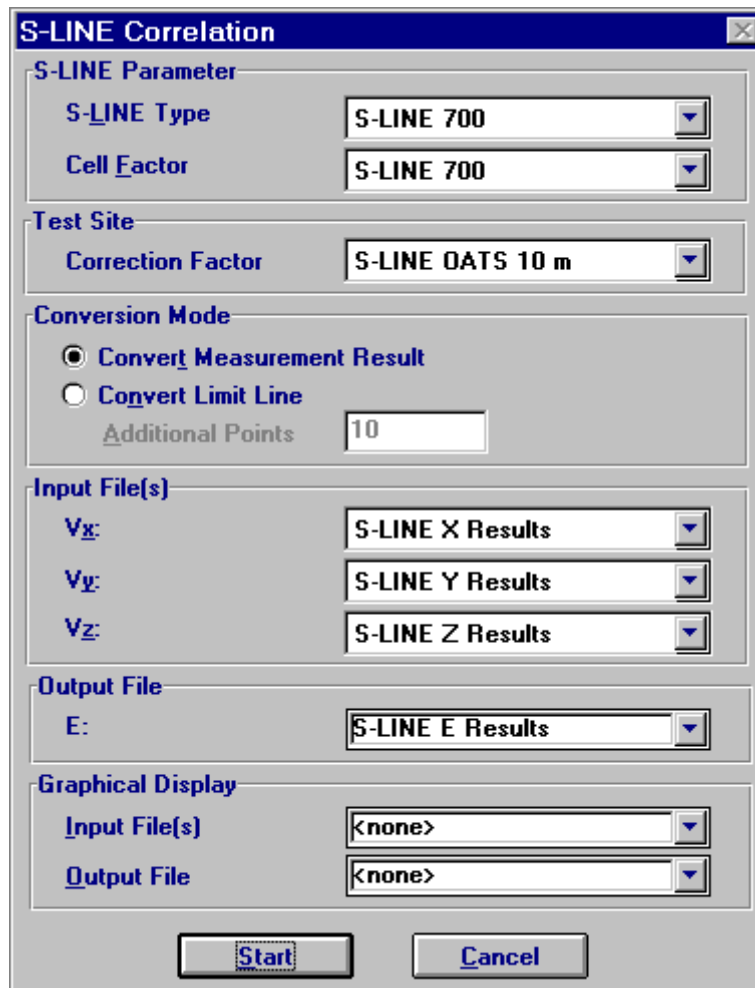
$$S = 10^{\frac{U_{Meas\ x} - 120}{10}} + 10^{\frac{U_{Meas\ y} - 120}{10}} + 10^{\frac{U_{Meas\ z} - 120}{10}}$$

L in dB V/m , f in MHz , S in V^2

C1 Cell Correction Factor

C2 OATS Correction Factor

$$L = 106 - C1 - C2 - 20 \log(f) - 10 \log(S)$$



b) Conversion of Limit Lines

In contrast to the first method, the fieldstrength limit line is first converted into a voltage limit line $V_{x,y,z} = (V_x^2 + V_y^2 + V_z^2)^{1/2}$. The advantage of this method is that the resulting interfering voltage from V_x , V_y and V_z can be directly compared with the calculated limit line.

Additional values determines the number of the additional sampling points for calculation of the limit line. Since the number of sampling points is usually very small and the conversion results in a more complex trace, it is advisable to use more sampling points - e.g. 100. The calculation is performed in two steps

First of all, each point of the entered limit line (frequency / level) is converted.

In addition to the provided points, the entire frequency range is divided into the specified number of sampling points, linearly or logarithmically (according to the intermodulation mode of the limit line).

Each of these sampling points (frequency / interpolated level) is then converted.

The output file corresponds to the respective voltage limit line of the entered fieldstrength limit line of the standard used.

Algorithm

U_{Limit} in dB V , L in dB V/m , f in MHz

C1 Cell Correction Factor

C2 OATS Correction Factor

$$U_{Limit} = 14 - C1 - C2 - L - 20 \log (f)$$

S-LINE Correlation

S-LINE Parameter

S-LINE Type: S-LINE 700

Cell Factor: S-LINE 700

Test Site

Correction Factor: S-LINE OATS 10 m

Conversion Mode

Convert Measurement Result

Convert Limit Line

Additional Points: 10

Input File(s)

E: EN 55022 F QP

Output File

Y: EN 55022 S-LINE QP

Graphical Display

Input File(s): <none>

Output File: <none>

Start Cancel

The fields **S-LINE-Parameter** determine the the S-LINE type and the appropriate cell factor (a system transducer).

The field **Test Site** enables to select the appropriate correction factor (a system transducer) for the site, depending on the distance between EuT and antenna.

The **Start** button checks the settings and the correlation is started.

3 Standard Scripts

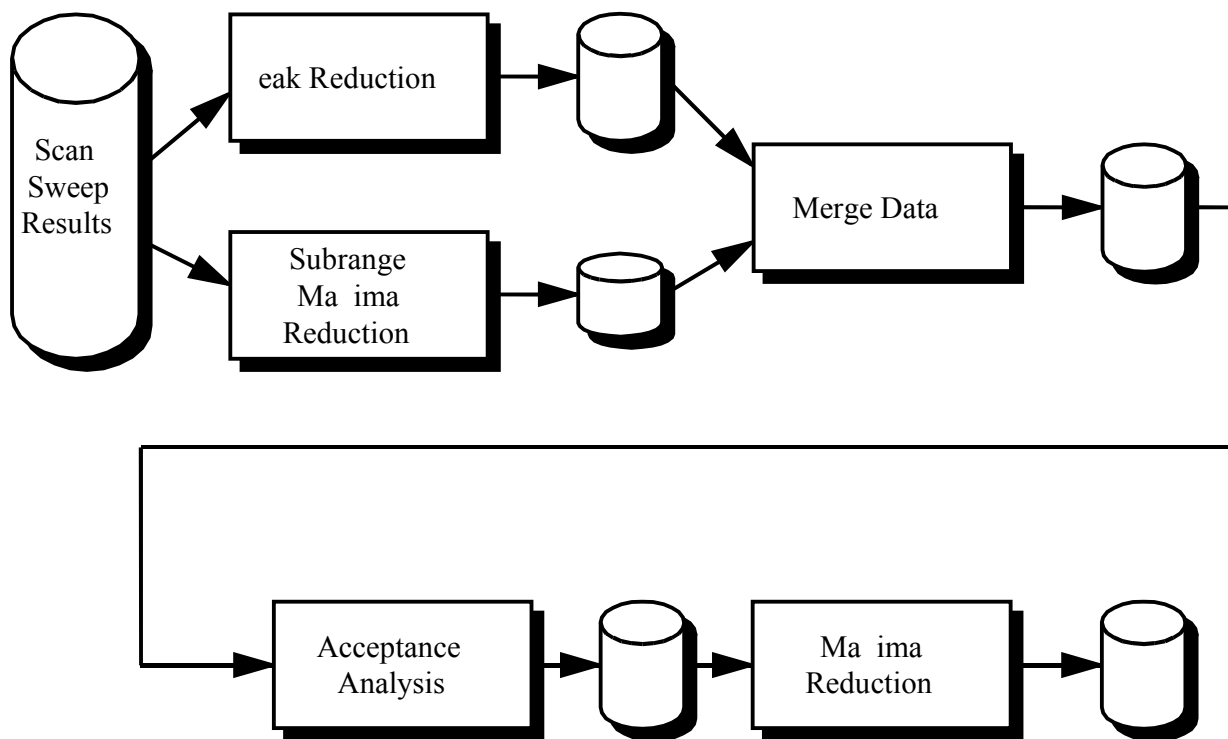
The standard scripts are designed for a maximum flexibility thus enabling to perform the tests most effectively with all kinds of test equipment.

The design of the scripts helps to save time while still providing complete measurements as required for compliance testing. Through a wide range of parameters (accessible after starting a test) that can be stored and reloaded as Script Parameters, it is possible to adapt and optimize the test proceedings to the needs of the operator

- when a test has been completed, the **results can be partially overwritten through remeasuring** in a second test, defining a frequency band only
- the preview test can be skipped and instead a **former preview result** can be defined as an input of the data reduction and the final test alternatively, **frequency lists** or **former final results** can be used as an input of a final test
- in a **semi automatic mode** the operator can skip certain parts of the test (preview test, final test, test report) or repeat the same test, then optionally leaving out other parts than during the first pass
- the total frequency range of the test can be split into **subranges** (linear or logarithmic, with respect to the ranges of the range table) that will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in the field strength test one single antenna change during the whole test)
- an **ID string** makes it easy to identify results and other files related to the test the string will be used to build up default filenames (e.g. if test reports shall always include the same report header), but it is also possible to define fixed names
- since the variation of accessory devices (LISN, automatic turntable and antenna mast, etc.) can be specified for preview and final test separately, it is possible to **optimize the test to the test equipment** (the kind of test also influences the optimum concept)
 - **EMI analyzer (fast sweeps** with limited frequency resolution)
 - preview test with sweeps on a number of accessory settings, storing the maximum levels and the corresponding settings
 - data reduction
 - final test on the accessory settings found in the preview test
 - partial scans to compensate for the limited frequency resolution of the preview sweeps
 - search for local maxima through fine tuning of the accessory (if possible)
 - measurements with final detector QP (AV)
 - **EMI test receiver** (relatively slow scans with **high frequency resolution**)
 - preview test with one or two scans on accessory settings, where all interesting frequencies should be detectable (exact level information may be of less interest because of the complete final test)
 - data reduction, maybe with an increased acceptance offset to compensate for the few preview settings
 - optional partial scans to detect drifting interference
 - measurements on all (predefined) accessory settings, storing the maximum levels and the corresponding settings
 - measurements with final detector QP (AV) on the worst case accessory settings
- besides the normal test results (frequency, level, etc.), **frequency lists derived from the preview or final results** will implicitly be generated, labeled with the same name as the

corresponding source results such a frequency list might be used to perform a scan on these frequencies

Y the data reduction has a very flexible design the scan or sweep results are analyzed on the one hand with the peak reduction (a level threshold of 0 dB means no reduction a value of 10 dB means that only obvious pikes in the spectrum will come through a value of e.g. 100 dB should block all data), on the other hand with the subrange maxima reduction (number of subranges is identical to the maximum number of results to be kept from each test range in the script) a smaller level threshold means fewer subrange maxima will remain in the end the remaining points will be merged (only one list entry if frequencies are identical) and further filtered with an acceptance analysis (cut off all points below an imaginary acceptance line an acceptance offset of e.g. -100 dB wouldn't filter any points) for certain tests where the measurements come close to the sensitivity limitations of the instruments, the acceptance analysis can alternatively work with an arbitrarily defined acceptance line (which means no offset in reference to a limit line) so that the acceptance line goes above the noise floor from the remaining points only those many will be kept (the margin will be evaluated) as defined by the operator if more broadband signals shall be kept then the level threshold for the peak reduction (which finds narrowband interference) should be set to a higher value.



The optional interactive frequency selection enables to review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test. To do so you have to position the marker accordingly and select Remove or Test in a dialog.

Before the standard scripts can be used, some data has to be imported from the **Standard Data import directories**

- the **scripts** needed for testing plus the referring subscripts
- the **limit lines** for the required specifications
- the **probe and system transducers** that are used for the tests (the files hold typical values and - if available - should be replaced with the exact values for the transducers in use)
- for calibration tests the frequency lists if needed (for open area measurements the lists should be adapted to the ambient interference of the test site)

In addition the required **scan and / or sweep range tables** have to be imported from the corresponding **import directories** for the receivers(s) in use (ES-K1x) these range tables are already adapted to the receivers and the test specifications, but they normally need some modification concerning the specified transducers (depending on the test equipment).

When a script has been started, a window will come up that enables the operator to modify the so called script parameters to control the proceedings of the test. Pressing **ENTER** or clicking the **OK** button (modified parameters will be stored) or the **Cancel** button (modified parameters will be ignored) will close this window and the test will run, using the stored settings of the script parameters **Stop** aborts the test immediately.

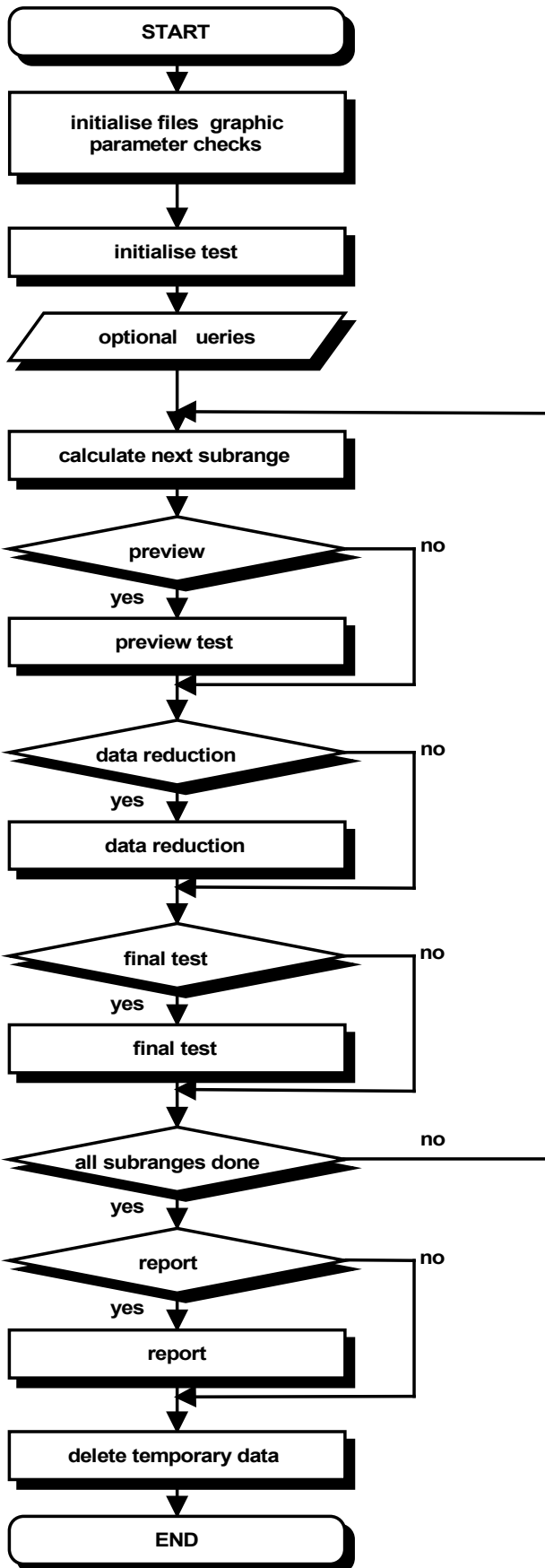
To select other (default) settings for the script parameters (e.g. to run the test with another specification), the selection box on top of the script parameter window has to be used a list with script parameters matching those of the current test will come up any of the given script parameter files can be chosen to replace the current parameter settings with **Save As** new parameter sets can be created.

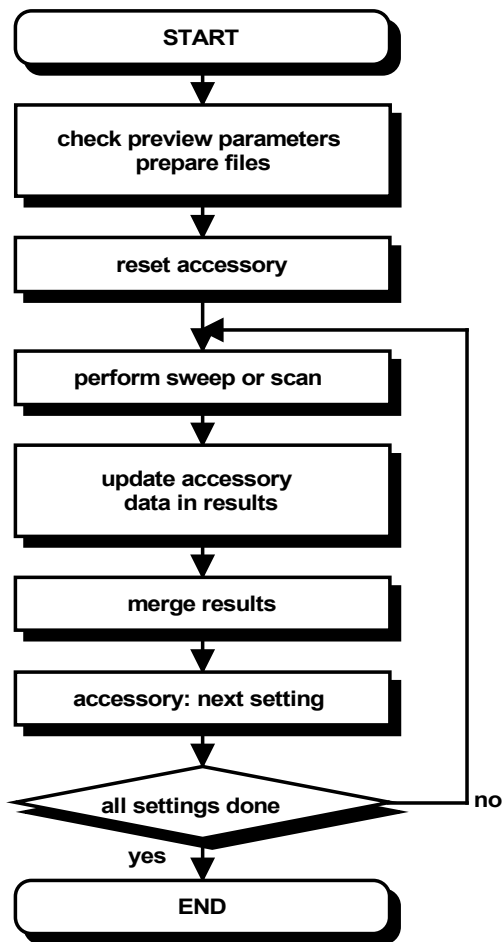
A running test may be aborted at any time with the **Stop** button (an active sweep or scan might have to be aborted before), but the measurements stored so far may be of only limited use. Afterwards the test can't be continued but restarted from the beginning.

Although the scripts provide automatic printing at the end of a test, sometimes it may be useful to skip the report, redefine some elements in the graphics configuration (e.g. line styles, colors, etc.), in the report header or in the report configuration, and then start the report with the selection of **Print...** in the **File** menu.

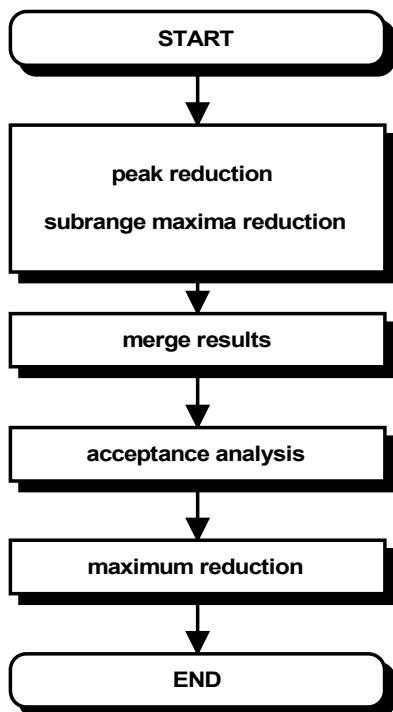
On the following pages there are some flowcharts that show in principle the steps of the tests

Standard est rocedure



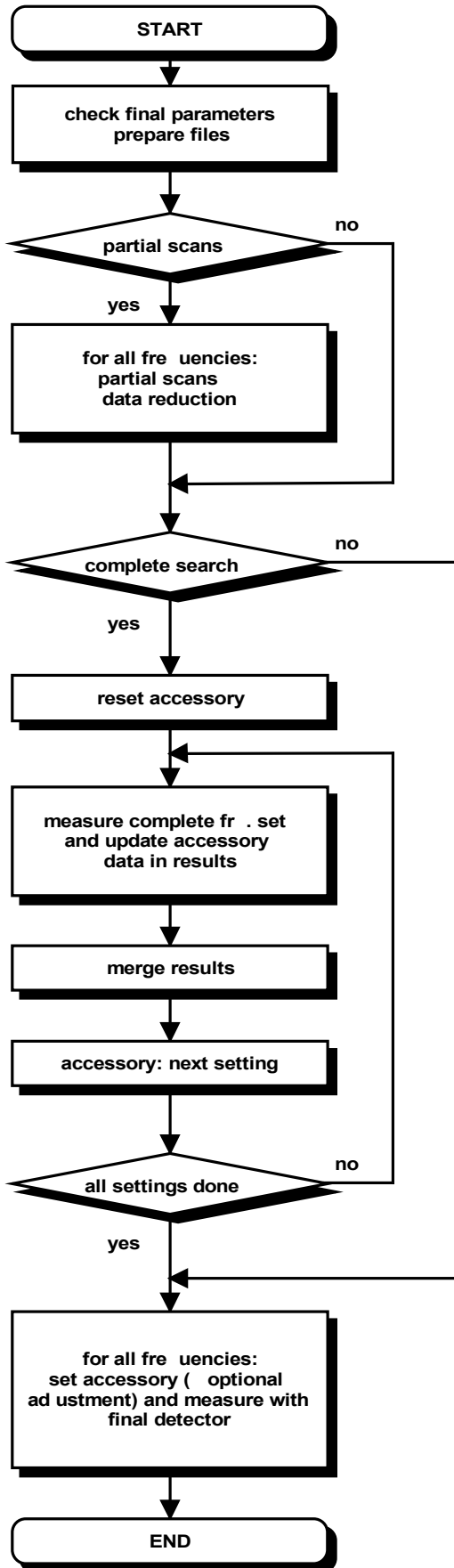


review
est
rocedure



Data
Reduction

Final est rocedure



3.1 Cable Calibration

3.1.1 Description

This test provides measuring cable transducers or any other system transducers (e.g. impedance converters, preamplifiers, attenuators, filters, etc.). The main result of the test is a system transducer table that can directly be used for level correction in the ES-K1 (scan/sweep tables).

The test can be performed with a scan or a sweep (plus data reduction), as well as on a given frequency list.

Since the test represents a two-gate measurement, a scan or sweep table has to be used that activates the tracking generator of the instrument an empty (dummy) transducer (or simply none) has to be declared as the probe transducer. For scan tables it is recommended to use the average detector in combination with a very small IF bandwidth.

For measurements on a frequency list (not with scans/sweeps) an external generator can be used as a replacement for the tracking generator. This requires the option ES-K50 (Universal GPIB Driver).

If this option is installed, then the driver USER IEC can be added to the device list the assigned to this driver could be e.g. GENERATOR or the model name of the generator (e.g. SMP). The settings should first be checked with the corresponding interactive dialog (Set Device...).

In the script parameters of **Topic ExtGenerator** the device has to be selected and the appropriate GPIB commands have to be entered.

The script parameters for the newer generators from R S (SMxx) have to be set like this

...

Topic Calibration

Parameter Value 04 **scan table for measurements must be selected**

Parameter Value 05 **optional fre u. list for single measurements must be selected**

Parameter Value 06 **sweep table for measurements none**

...

Topic ExtGenerator

Parameter Value 02 GPIB initialization command
RST CLS POW -10D M FRE :CW 1E9 OUTP1 ON

Parameter Value 03 GPIB frequ. command incl. format string
FRE :CW G

Parameter Value 04 frequency factor (e.g. 1E-6 for MHz)
1

...

3.1.2 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames cable 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 0.1 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 1000 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 test configuration, none ID none optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used
Topic	Calibration
Parameter Default value Function	01 result file (default ID) none optional filename for the results from the test (filetype is system transducer) if no filename is specified then a default name will be used
Parameter Default value Function	02 name of correction factor from reference meas. Cable Reference filename of a reference correction factor to be used for the test if a reference measurement shall be done, then the levels from the reference measurements with the reference cable attached will be stored as a system transducer of the given name, before the actual comparison test starts any further tests - if run under the same conditions - then can be performed without the reference measurements (see next parameter) if the appropriate reference file is selected
Parameter Default value Function	03 create new reference factor (else use given factor) checked if checked then a reference measurement will be performed and stored as a system transducer with the given name (see previous parameter) else no reference measurements will be done but the selected system transducer will be taken as the corresponding reference measurement result
Parameter Default value Function	04 scan table for measurements CAL filename of the scan range table to be used for the test
Parameter	05 optional frequency list for single measurements

Default value CAL
Function filename of an optional frequency list to be used for single measurements this frequency list can be used only in combination with a scan table

Parameter 06 sweep table for measurements
Default value none
Function filename of the sweep range table to be used for the test

Parameter 07 no. of results kept from scan/sweep
Default value 20
Function the number of results that shall be kept from a scan or sweep through data reduction (if no single measurements according to a frequency list are done)

Topic Graphics

Parameter 01 graphics configuration, none ID
Default value none
Function optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used

Topic Report

Parameter 01 generate printer hardcopy
Default value checked
Function if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter 02 generate RTF file
Default value not checked
Function if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter 03 RTF file path name8.3 , empty dialog
Default value c xxx.rtf
Function path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up

Parameter 04 report config. for printing, none ID prnt
Default value none
Function optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used

Parameter 05 footnote, empty field ID
Default value
Function optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used

Parameter 06 optional text file to be included
Default value none
Function filename of an optional file of type Text which shall be included in the report

Topic ReportHeader

Parameter 01 test report header, none ID

Default value	none
Function	optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	Cable Calibration
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 cable name
Default value	Cable
Function	a string that will be taken as the description of the test ob ect if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)

Default value
Function a string that will be taken as a comment line if no string is given then the start time of the test will be entered

Topic ExtGenerator

Parameter 01 external generator device
Default value none
Function symbolic name of the device for controlling of an external generator as defined in the device configuration

Parameter 02 GPIB initialization command
Default value RECALL 09
Function GPIB command for the initialization of the external generator it is recommended to store the settings (fixed RF level, no modulation, etc.) in the memory of the generator and to load them with this command

Parameter 03 GPIB frequ. command incl. format string
Default value RF G MH
Function GPIB command for the setup of the RF frequency of the external generator the frequency - multiplied by the factor from the next parameter - will be inserted at the position of the format string **G** variations for the format string are possible as with the C function t or as described in the ES-K2 manual on the script function t

Parameter 04 frequency factor (e.g. 1E-6 for MHz)
Default value 1.0E-6
Function the frequency to be programmed is internally represented with the unit Hertz the frequency will be multiplied by this factor to enable a GPIB output in i.e. MHz

3.2 Probe Calibration

3.2.1 Description

This test provides measuring of the transducer factor of antennas or any other probes through a comparing test with a probe of known transducer factor. The main result of the test is a probe transducer table that can directly be used for level correction in the ES-K1 (scan/sweep tables).

The test can be performed with a scan or a sweep (plus data reduction), as well as on a given frequency list.

For open area test site (OATS) measurements, the test should run using a frequency list that has been modified so that any measurement of ambient signals will never happen.

Since the test represents a two-gate measurement, a scan or sweep table has to be used that activates the tracking generator of the instrument an empty (dummy) transducer (or simply none) has to be declared as the probe transducer. For scan tables it is recommended to use the average detector in combination with a very small IF bandwidth.

Calibration of antennas is done best with vertical polarization and at a preferably high position (e.g. 4 m) the antennas should be mounted in a way so that their axes match exactly.

For measurements on a frequency list (not with scans/sweeps) an external generator can be used as a replacement for the tracking generator. This requires the option ES-K50 (Universal GPIB Driver).

If this option is installed, then the driver USER IEC can be added to the device list the assigned to this driver could be e.g. GENERATOR or the model name of the generator (e.g. SMP). The settings should first be checked with the corresponding interactive dialog (Set Device...).

In the script parameters of **Topic ExtGenerator** the device has to be selected and the appropriate GPIB commands have to be entered.

The script parameters for the newer generators from R S (SMxx) have to be set like this

...

Topic	Calibration
Parameter Value	04 scan table for measurements must be selected
Parameter Value	05 optional fre u. list for single measurements must be selected
Parameter Value	06 sweep table for measurements none

...

Topic	ExtGenerator
Parameter Value	02 GPIB initialization command RST CLS POW -10D M FRE :CW 1E9 OUTP1 ON
Parameter Value	03 GPIB frequ. command incl. format string FRE :CW G
Parameter Value	04 frequency factor (e.g. 1E-6 for MHz) 1

...

3.2.2 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames probe 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 0.1 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 1000 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked filename of a reference correction factor to be used for the test if a reference measurement shall be done, then the levels from the reference measurements with the known probe will be stored as a system transducer of the given name, before the actual comparison test starts any further tests - if run under the same conditions - then can be performed without the reference measurements (see next parameter) if the appropriate reference file is selected
Parameter Default value Function	05 test configuration, none ID none optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used
Topic	Calibration
Parameter Default value Function	01 result file (default ID) none optional filename for the results from the test (filetype is probe transducer) if no filename is specified then a default name will be used
Parameter Default value Function	02 name of correction factor from reference meas. Probe Reference filename of a reference correction factor to be used for the test if a reference measurement shall be done, then the levels from the reference measurements with the known probe will be stored as a system transducer of the given name, before the actual comparison test starts any further tests - if run under the same conditions - then can be performed without the reference measurements (see next parameter) if the appropriate reference file is selected
Parameter Default value Function	03 create new reference factor (else use given factor) checked if checked then a reference measurement will be performed and stored as a system transducer with the given name (see previous parameter) else no reference measurements will be done but the selected system transducer will be taken as the corresponding reference measurement result
Parameter	04 scan table for measurements

Default value	CAL
Function	filename of the scan range table to be used for the test
Parameter	05 optional frequency list for single measurements
Default value	CAL
Function	filename of an optional frequency list to be used for single measurements this frequency list can be used only in combination with a scan table
Parameter	06 sweep table for measurements
Default value	none
Function	filename of the sweep range table to be used for the test
Parameter	07 no. of results kept from scan/sweep
Default value	20
Function	the number of results that shall be kept from a scan or sweep through data reduction (if no single measurements according to a frequency list are done)
Parameter	08 receive antenna reference probe transd. table
Default value	none
Function	probe transducer to be used for the reference measurements (transducer correction of the receiving antenna)

Topic Graphics

Parameter	01 graphics configuration, none ID
Default value	none
Function	optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used

Topic Report

Parameter	01 generate printer hardcopy
Default value	checked
Function	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter	02 generate RTF file
Default value	not checked
Function	if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter	03 RTF file path name8.3 , empty dialog
Default value	c xxx.rtf
Function	path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up
Parameter	04 report config. for printing, none ID prnt
Default value	none
Function	optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter	05 footnote, empty field ID
Default value	
Function	optional text as a footnote on the pages of the test report if an empty string is

used then the ID string of the test will be used

Parameter 06 optional text file to be included
 Default value none
 Function filename of an optional file of type Text which shall be included in the report

Topic ReportHeader

Parameter 01 test report header, none ID
 Default value none
 Function optional filename for the report header to be used in the test if no filename is specified then a default name will be used

Parameter 02 optional test report header template, none ID
 Default value none
 Function optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used

Parameter 03 1st header line
 Default value TEST
 Function a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed

Parameter 04 2nd header line
 Default value Probe Calibration
 Function a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed

Parameter 05 probe name
 Default value Probe
 Function a string that will be taken as the description of the test ob ect if no string is given then the referring entry of the report header won t be changed

Parameter 06 manufacturer
 Default value
 Function a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed

Parameter 07 operating conditions
 Default value
 Function a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed

Parameter 08 test site
 Default value
 Function a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed

Parameter 09 operator
 Default value
 Function a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed

Parameter 10 test specification
 Default value

Function a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed

Parameter 11 comment line

Default value

Function a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed

Parameter 12 2nd comment line (empty field start time)

Default value

Function a string that will be taken as a comment line if no string is given then the start time of the test will be entered

Topic Mast

Parameter 01 use manual positioning only

Default value checked

Function if checked then manual control of the antenna mast through dialogue boxes will be used

Parameter 02 use auto positioning only

Default value not checked

Function if checked then automatic control of the antenna mast will be used

Parameter 03 symbolic name of autom. moved mast

Default value MAST

Function symbolic device name of the automatically controlled antenna mast as defined in the device configuration menu

Parameter 04 antenna height cm for antenna mounting

Default value 100

Function defines the antenna height for mounting of the antenna (at the beginning and at the end of the test, each time with horizontal polarization)

Parameter 04 antenna height cm for measurements

Default value 400

Function defines the antenna height for the measurements

Topic Polarization

Parameter 01 use manual switching only

Default value checked

Function if checked then manual control of the antenna polarization through dialogue boxes will be used

Parameter 02 use auto switching only

Default value not checked

Function if checked then automatic control of the antenna polarization will be used

Parameter 03 symbolic name of autom. controlled polariz.

Default value MAST

Function symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu

Parameter 04 delay time sec for auto switching

Default value 4

Function defines a waiting time with automatic switching of the antenna polarization the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)

Parameter 05 measurements with horizontal polariz. only

Default value not checked

Function if checked then the all measurements will be done with horizontal polarization only

Parameter 06 measurements with vertical polariz. only

Default value checked

Function if checked then the all measurements will be done with vertical polarization only

Topic **ExtGenerator**

Parameter 01 external generator device

Default value none

Function symbolic name of the device for controlling of an external generator as defined in the device configuration

Parameter 02 GPIB initialization command

Default value RECALL 09

Function GPIB command for the initialization of the external generator it is recommended to store the settings (fixed RF level, no modulation, etc.) in the memory of the generator and to load them with this command

Parameter 03 GPIB frequ. command incl. format string

Default value RF G MH

Function GPIB command for the setup of the RF frequency of the external generator the frequency - multiplied by the factor from the next parameter - will be inserted at the position of the format string **G** variations for the format string are possible as with the C function `tf` or as described in the ES-K2 manual on the script function `tf`

Parameter 04 frequency factor (e.g. 1E-6 for MHz)

Default value 1.0E-6

Function the frequency to be programmed is internally represented with the unit Hertz the frequency will be multiplied by this factor to enable a GPIB output in i.e. MHz

3.3 Site Attenuation

3.3.1 Description

This test provides measuring of the normalized site attenuation (NSA).

The test can be performed with a scan or a sweep (plus data reduction), as well as on a given frequency list (also necessary for measurements with tuned dipoles).

For open area test site (OATS) measurements, the test should run with single measurements on a frequency list that has been modified so that measurements of ambient signals will never happen.

With a spectrum analyzer in combination with broadband antennas, measurement is also possible through continuous sweeps while the antenna captures the whole height range (as described in CISPR 16-1 swept frequency method).

Since the test represents a two-gate measurement, a scan or sweep table has to be used that activates the tracking generator of the instrument an empty (dummy) transducer (or simply none) has to be declared as the probe transducer. The transducers tables of the transmit and receive antennas have to be selected with the script parameters for each subrange (max. 5) of the scan/sweep table. For scan tables it is recommended to use the average detector in combination with a very small IF bandwidth.

The ideal NSA is defined as a limit line its name indicates the significant parameters of the test, including antenna type (tuned half wave Dipole or broadband), distance between antennas (3 / 10 / 30 m), height of the transmit antenna (1 / 1.5 / 2 / 2.7 m) and antenna polarization (horizontal or vertical).

Example NSA B 10m h 1m ver means

- antenna type broad band dipole
- distance between antennas 10 m
- height of transmit antenna 1 m
- polarization of antennas vertical

The following test setups are currently supported directly (see also CISPR 16, CISPR 22)

NSA B 3m h 2m hor
 NSA B 3m h 1m ver
 NSA B 3m h 1.5m ver

NSA B 10m h 1m hor
 NSA B 10m h 2m hor
 NSA B 10m h 1m ver
 NSA B 10m h 1.5m ver

NSA B 30m h 1m hor
 NSA B 30m h 2m hor
 NSA B 30m h 1m ver

NSA D 3m h 2m hor
 NSA D 3m h 2.7m ver

NSA D 10m h 2m hor
 NSA D 10m h 2.7m ver

NSA D 30m h 2m hor
 NSA D 30m h 2.7m ver

Optionally an additional correction (mutual impedance correction, defined as a system transducer) can be used to compensate for the coupling effects of the antennas in the near field (so far the mutual

impedance correction is defined only for tuned dipoles antennas 3 m apart see CISPR 16-1 and CISPR 22).

Example CPL D 3m h 1m hor means

- antenna type tuned half wave dipole
- distance between antennas 3 m
- height of transmit antenna 1 m
- polarization of antennas horizontal

To retrieve reference levels, a reference measurement will be done first for each subrange, which means that the cables that are normally connected to the antennas have to be put directly together. Once the reference levels have been stored (as a system transducer) they can be used again for further NSA tests.

The names of the transducer tables that refer to the transmitting and to the receiving antennas have to be specified for each (max. 5) range (of the scan / sweep table), as well as the stepsize for the height variation of the receiving antenna.

The NSA will be displayed with two diagrams, one for the absolute representation of the ideal and the measured NSA, and one for the relative representation of the measured NSA in comparison to the ideal NSA.

The columns of the result list contain the following

- frequency
- measured level
- measured reference level
- measured NSA
- (measured level, corrected with reference level, mutual impedance correction and antenna transducer corrections)
- ideal NSA
- deviation of the measured NSA from the ideal NSA
- antenna height of minimum attenuation (not with continuous sweeps during height variation)

For measurements on a frequency list (not with scans/sweeps) an external generator can be used as a replacement for the tracking generator. This requires the option ES-K50 (Universal GPIB Driver).

If this option is installed, then the driver USER IEC can be added to the device list the assigned to this driver could be e.g. GENERATOR or the model name of the generator (e.g. SMP). The settings should first be checked with the corresponding interactive dialog (Set Device...).

In the script parameters of **Topic ExtGenerator** the device has to be selected and the appropriate GPIB commands have to be entered.

The script parameters for the newer generators from R S (SMxx) have to be set like this

...

Topic	NSA
Parameter Value	07 scan table for measurements must be selected
Parameter Value	08 optional fre u. list for single measurements must be selected
Parameter Value	10 sweep table for measurements none

...

Topic	ExtGenerator
Parameter Value	02 GPIB initialization command RST CLS POW -10D M FRE :CW 1E9 OUTP1 ON

Parameter Value 03 GPIB frequ. command incl. format string
FRE :CW G

Parameter Value 04 frequency factor (e.g. 1E-6 for MHz)
1

...

3.3.2 List of the Script Parameters

Topic	Test
Parameter	01 ID max. 12 chars to be included in filenames
Default value	site 0001
Function	a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter	02 global start frequency MHz for the test
Default value	30
Function	no measurements will be done below this frequency
Parameter	03 global stop frequency MHz for the test
Default value	1000
Function	no measurements will be done above this frequency
Parameter	04 suppress queries as far as possible
Default value	not checked
Function	if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter	05 test configuration, none ID
Default value	none
Function	optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used
Topic	NSA
Parameter	01 NSA name (defined as limit line)
Default value	none
Function	filename of the ideal NSA, defined as a limit line
Parameter	02 opt. mutual imped. correction (defined as system transd.)
Default value	none
Function	filename of the optional mutual impedance correction to compensate for the coupling effects of the antennas in the near field, defined as a system transducer
Parameter	03 result file (default ID)
Default value	none
Function	optional filename for the results from the test (filetype is system transducer) if no filename is specified then a default name will be used
Parameter	04 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) therefore it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged
Parameter	05 name of correction factor from reference
Default value	NSA Reference

Function	filename of the reference correction, stored as a system transducer if a reference measurement will be done, then first then before the actual NSA test there will be measurements with the coaxial cables connected directly together these results will be stored as a system transducer so that any further NSA tests can use these results - if the same cables are used - without another reference measurement (see next parameter)
Parameter	06 create new reference factor (else use given factor)
Default value	checked
Function	if checked then a reference measurement will be performed and stored as a system transducer with the given name (see previous parameter) else no reference measurements will be done but the selected system transducer will be taken as the corresponding reference measurement result
Parameter	07 scan table for measurements
Default value	NSA
Function	filename of the scan range table to be used for the test
Parameter	08 opt. frequency list for single meas. mode
Default value	NSA
Function	filename of an optional frequency list to be used for single measurements this frequency list can be used only in combination with a scan table
Parameter	09 tuned dipoles (with single meas. only)
Default value	not checked
Function	if checked then with each new frequency the antenna will be put to horizontal polarization, set to the lowest height and the required dipole length be displayed for measurements with vertical polarization the lowest position depends on the length of the dipoles this mode can be used only in combination with single measurements based on a frequency list
Parameter	10 sweep table for measurements
Default value	none
Function	filename of the sweep range table to be used for the test
Parameter	11 continuous sweeping (with sweep table only)
Default value	not checked
Function	if checked then the antenna won t be moved step by step but continuously (and preferably slowly) over the whole range (upwards down) while new sweeps will start all the time (see also CISPR 16-1 swept frequency method) this mode can be used only in combination with a selected sweep table and represents the fastest method although without information about corresponding antenna heights
Parameter	12 time sec for single measurements
Default value	1.0
Function	a time that will be used for the single measurements based on a frequency list, regardless of the setting in the scan table
Parameter	13 NSA tolerance dB
Default value	4.0
Function	tolerance level for the maximum deviation of the measured NSA from the ideal NSA (parameter will be used with a later version)
Parameter	14 no. of results kept from scan/sweep per range
Default value	20

Function the number of results that shall be kept from a scan or sweep through data reduction (if no single measurements according to a frequency list are done)

Topic Antennas

Parameter 01 1st range transmit antenna probe transd. table

Default value none

Function filename of the transducer table of the transmit antenna to be used for the 1st subrange of the scan/sweep table

Parameter 02 1st range receive antenna probe transd. table

Default value none

Function filename of the transducer table of the receive antenna to be used for the 1st subrange of the scan/sweep table

Parameter 03 1st range height step size cm

Default value 20

Function stepsize for the antenna movements to be used for the 1st subrange of the scan/sweep table

Parameter 04 2nd range transmit antenna probe transd. table

Default value none

Function filename of the transducer table of the transmit antenna to be used for the 2nd subrange of the scan/sweep table

Parameter 05 2nd range receive antenna probe transd. table

Default value none

Function filename of the transducer table of the receive antenna to be used for the 2nd subrange of the scan/sweep table

Parameter 06 2nd range height step size cm

Default value 10

Function stepsize for the antenna movements to be used for the 2nd subrange of the scan/sweep table

Parameter 07 3rd range transmit antenna probe transd. table

Default value none

Function filename of the transducer table of the transmit antenna to be used for the 3rd subrange of the scan/sweep table

Parameter 08 3rd range receive antenna probe transd. table

Default value none

Function filename of the transducer table of the receive antenna to be used for the 3rd subrange of the scan/sweep table

Parameter 09 3rd range height step size cm

Default value 5

Function stepsize for the antenna movements to be used for the 3rd subrange of the scan/sweep table

Parameter 10 4th range transmit antenna probe transd. table

Default value none

Function filename of the transducer table of the transmit antenna to be used for the 4th subrange of the scan/sweep table

Parameter 11 4th range receive antenna probe transd. table

Default value	none
Function	filename of the transducer table of the receive antenna to be used for the 4th subrange of the scan/sweep table
Parameter	12 4th range height step size cm
Default value	5
Function	stepsize for the antenna movements to be used for the 4th subrange of the scan/sweep table
Parameter	13 5th range transmit antenna probe transd. table
Default value	none
Function	filename of the transducer table of the transmit antenna to be used for the 5th subrange of the scan/sweep table
Parameter	14 5th range receive antenna probe transd. table
Default value	none
Function	filename of the transducer table of the receive antenna to be used for the 5th subrange of the scan/sweep table
Parameter	15 5th range height step size cm
Default value	5
Function	stepsize for the antenna movements to be used for the 5th subrange of the scan/sweep table

Topic Graphics

Parameter	01 1st graphics config., none ID
Default value	none
Function	optional filename for the graphics configuration to be used in the test (absolute representation) if no filename is specified then a default name will be used
Parameter	02 2nd graphics config., none ID rel
Default value	none
Function	optional filename for the graphics configuration to be used in the test (relative representation) if no filename is specified then a default name will be used

Topic Report

Parameter	01 generate printer hardcopy
Default value	checked
Function	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter	02 generate RTF file
Default value	not checked
Function	if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter	03 RTF file path name8.3 , empty dialog
Default value	c xxx.rtf
Function	path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up
Parameter	04 report config. for printing, none ID prnt

Default value	none
Function	optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter	05 footnote, empty field ID
Default value	
Function	optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used
Parameter	06 optional text file to be included
Default value	none
Function	filename of an optional file of type Text which shall be included in the report
Topic	ReportHeader
Parameter	01 test report header, none ID
Default value	none
Function	optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	Site Attenuation
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 NSA name
Default value	NSA ...
Function	a string that will be taken as the description of the test ob ect if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed

Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered

Topic Mast

Parameter	01 use manual positioning only
Default value	checked
Function	if checked then manual control of the antenna mast through dialogue boxes will be used
Parameter	02 use auto positioning only
Default value	not checked
Function	if checked then automatic control of the antenna mast will be used
Parameter	03 symbolic name of autom. moved mast
Default value	MAST
Function	symbolic device name of the automatically controlled antenna mast as defined in the device configuration menu
Parameter	04 min. height cm to be measured
Default value	100
Function	defines the minimum mast height for the measurements
Parameter	05 max. height cm to be measured
Default value	400
Function	defines the maximum mast height for the measurements
Parameter	06 speed value for movements
Default value	4
Function	defines the speed of the mast movements faster for absolute positioning, slower for continuous sweeps

Topic Polarization

Parameter	01 use manual switching only
Default value	checked
Function	if checked then manual control of the antenna polarization through dialogue boxes will be used

Parameter	02 use auto switching only
Default value	not checked
Function	if checked then automatic control of the antenna polarization will be used
Parameter	03 symbolic name of autom. controlled polariz.
Default value	MAST
Function	symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu
Parameter	04 delay time sec for auto switching
Default value	4
Function	defines a waiting time with automatic switching of the antenna polarization the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)
Parameter	05 measurements with horizontal polariz. only
Default value	not checked
Function	if checked then the all measurements will be done with horizontal polarization only
Parameter	06 measurements with vertical polariz. only
Default value	checked
Function	if checked then the all measurements will be done with vertical polarization only

Topic **ExtGenerator**

Parameter	01 external generator device
Default value	none
Function	symbolic name of the device for controlling of an external generator as defined in the device configuration
Parameter	02 GPIB initialization command
Default value	RECALL 09
Function	GPIB command for the initialization of the external generator it is recommended to store the settings (fixed RF level, no modulation, etc.) in the memory of the generator and to load them with this command
Parameter	03 GPIB frequ. command incl. format string
Default value	RF G MH
Function	GPIB command for the setup of the RF frequency of the external generator the frequency - multiplied by the factor from the next parameter - will be inserted at the position of the format string G variations for the format string are possible as with the C function t or as described in the ES-K2 manual on the script function t
Parameter	04 frequency factor (e.g. 1E-6 for MHz)
Default value	1.0E-6
Function	the frequency to be programmed is internally represented with the unit Hertz the frequency will be multiplied by this factor to enable a GPIB output in i.e. MHz

3.4 Overview Test

3.4.1 Description

This test consists of a preview test (scan or sweep) as well as an automatic and/or a manual data reduction (for finding critical frequencies).

The automatic data reduction works as with other standard scripts.

With the manual data reduction the user can select suspect frequencies with the marker from the spectrum of the preview test and add these to a list. In addition, either a partial scan or a partial sweep can be run around these frequencies, thus improving the accuracy of the frequencies.

It is a good idea to define the scan/sweep table such that a continuous repetition will occur. If any accessory dialogs (e.g. for a LISN or an automatic antenna mast) then these devices can be controlled al over the test, i.e. the user himself does the maximization through varying of the accessories.

3.4.2 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames ovw 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 1000 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	06 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	07 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value Function	08 test configuration, none ID none optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic **Preview**

Parameter	01 preview result file, none ID pre
Default value	none
Function	optional filename for the results (1 st detector, e.g. PEAK) from the preview test if no filename is specified then a default name will be used
Parameter	02 2nd preview result file, none ID pre2
Default value	none
Function	optional filename for the results (2 nd detector, e.g. AVERAGE) from the preview test if no filename is specified then a default name will be used
Parameter	03 scan table for preview
Default value	none
Function	filename of the scan range table to be used for the preview test
Parameter	04 sweep table for preview
Default value	none
Function	filename of the sweep range table to be used for the preview test
Parameter	05 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged
Parameter	06 optional input preview result file
Default value	none
Function	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test, one (e.g. for PK or for PK AV) or optionally two (e.g. 1 st for PK, 2 nd for AV) input files
Parameter	07 optional input preview result file (2nd det.)
Default value	none
Function	see previous parameter

Topic DataReduction

Parameter	01 perform manual (interactive) data reduction
Default value	not checked
Function	if checked then you can select and review the critical points (also those that have been found through the automatic data reduction if also the next parameter is activated), i.e. you can remove points or add new ones for the test . to do so you have to position the marker accordingly and select Remove or Test in a dialog
Parameter	02 perform automatic data reduction
Default value	not checked
Function	if checked then an automatic data reduction will be performed if the previous parameter is also activated then the manual data reduction will be done after the automatic one
Parameter	03 1st limit line
Default value	none
Function	a filename that corresponds to the limit line assigned to the 1 st detector (e.g.

QUASIPeAK)

Parameter	04 optional 1st acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of the preview results from the 1 st detector if used then the given value for the acceptance offset will be ignored
Parameter	05 optional 2nd limit line
Default value	none
Function	a filename that corresponds to the limit line assigned to the 2 nd detector (e.g. AVERAGE)
Parameter	06 optional 2nd acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of preview results from the 2 nd detector if used then the given value for the acceptance offset will be ignored
Parameter	07 max. no. of results kept per test range
Default value	6
Function	the maximum number of results that will be kept from each test range through data reduction
Parameter	08 decision threshold dB for peak reduction
Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter	09 level offset dB for acceptance analysis
Default value	-10.0
Function	determines the level offset when data reduction is done with the Acceptance Analysis
Parameter	10 freq. list of ambients to be cut out from preview
Default value	none
Function	optional name of a frequency list (ambient interference) with frequencies to be cut out from measurement results (preview test scans/sweeps, final test partial scans), each cut with a range corresponding to the current IF bandwidth, e.g. +/- 60 kHz around each of the frequencies if an IF bandwidth of 120 kHz is used to blank a modulated interference it might be necessary to provide more than one frequency in the list
Parameter	11 cutting width for sweeps (ambients) no. of IF-BWs
Default value	10
Function	with sweeps the width of a cut range (see previous parameter) has to be larger because of the lower frequency resolution of the results therefore this factor (number of IF bandwidths) will be used to enlarge the range compared with the range used on scan results

Topic **Monitor**

Parameter	01 scan table for partial scans
Default value	none
Function	filename of the scan table to be used for partial scans this parameter cannot be used together with the next parameter to observe the spectrum more easily it is recommended to define a scan table with continuous repetitions
Parameter	02 sweep table for partial sweeps
Default value	none
Function	filename of the sweep table to be used for partial sweeps this parameter cannot be used together with the previous parameter to observe the spectrum more easily it is recommended to define a sweep table with continuous repetitions note that partial sweeps only give back a very small number of measurement points, e.g. a 1 portion of the frequency range as defined in the sweep table range will result in 1 of the sweep trace points only this is due to a conceptual limitation to the handling of sweep trace data the situation can be improved through a sweep table which is defined with many ranges so that a partial sweep still covers more than only a small fraction of the corresponding sweep range of the selected table alternatively use partial scans
Parameter	03 partial scan/sweep width no. of IF-BWs (0 use ratio)
Default value	0
Function	determines the frequency range for partial scans/sweeps expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter	04 partial scan/sweep width ref. frequ. ratio
Default value	0.01
Function	determines the frequency range for partial scans/sweeps (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0

Topic Final

Parameter	01 final result file, none ID fin PK
Default value	none
Function	optional filename for the results (1 st detector, e.g. QUASIPeAK) from the final measurements if no filename is specified then a default name will be used
Parameter	02 2nd final result file, none ID fin2
Default value	none
Function	optional filename for the results (2 nd detector, e.g. AVERAGE) from the final measurements if no filename is specified then a default name will be used

Topic Graphics

Parameter	01 graphics configuration, none ID
Default value	none
Function	optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional graphics template (new graph only)
Default value	none
Function	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

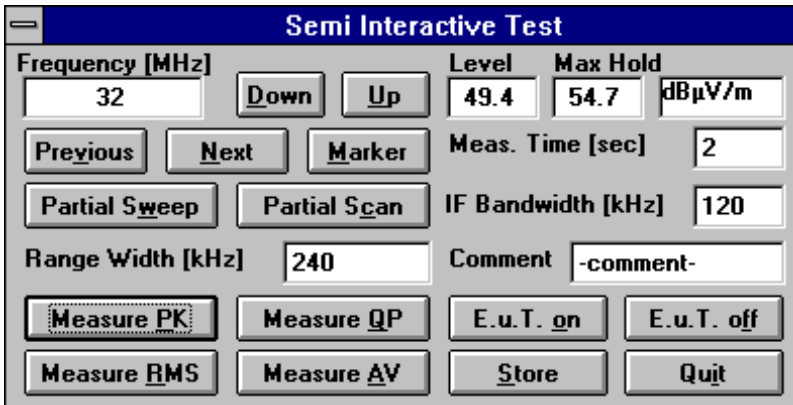
Topic	Report
Parameter Default value Function	01 generate printer hardcopy checked if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter Default value Function	02 generate RTF file not checked if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter Default value Function	03 RTF file path name8.3 , empty dialog c xxx.rtf path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up
Parameter Default value Function	04 report config. for printing, none ID prnt none optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter Default value Function	05 footnote, empty field ID optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used
Parameter Default value Function	06 optional text file to be included none filename of an optional file of type Text which shall be included in the report
Topic	ReportHeader
Parameter Default value Function	01 test report header, none ID none optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter Default value Function	02 optional test report header template, none ID none optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter Default value Function	03 1st header line TEST a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	04 2nd header line Overview a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed

Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered

3.5 Semi Interactive Test

3.5.1 Description

An open area test site (OATS) is normally not suitable for automatic tests because of the many ambient disturbances. In this case the operator has to find out (e.g. through switching the EuT off and on if possible or by looking at / listening to the signal) whether the field strength generated by the EuT is above the limit, but sometimes this can be impossible, when the ambient disturbance exceeds the limit. This test provides interactive single measurements plus protocolling, controlled from a special dialog

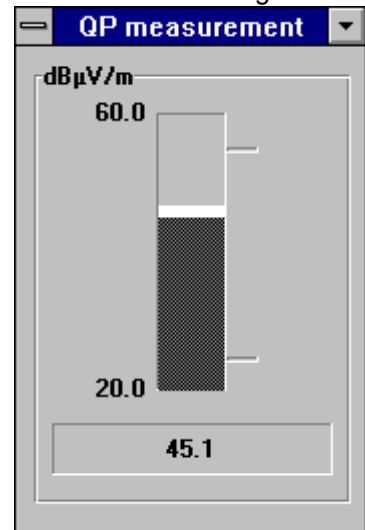


By clicking **Down** and **Up** the arbitrarily editable frequency will be decreased and increased by the step size defined in the scan table. If the test is based on a frequency list or on a measurement result list then with **Previous** and **Next** the dialogue will switch to the corresponding frequency. With measurement results the referring positions of the antenna and the EuT can optionally be set. A click on the button **Marker** will copy the

marker frequency of the currently active graphics diagram (if it has the marker activated).

The buttons **Partial Sweep** and **Partial Scan** start measurements to watch the spectrum around the current frequency if suitable range tables are selected with the script parameters. If those range tables are defined with continuous repetitions then also variations in the spectrum can be observed (e.g. while moving the antenna). The resulting curve(s) will be shown in an extra window with the marker activated so that the maximum of the curve can easily be retrieved. The width of the partial scan or sweep can be defined in the field Range Width.

Through activating one of the measurement detectors (**Measure Peak / uasipeak / RMS / Average**) a single measurement will be started, using the given values for measurement time (Meas.Time in seconds) and for IF filter bandwidth (IF Bandwidth in kHz). The level will be displayed both digitally in the dialogue (current and maximum value) and as an analog bar. The analog bar display which can also be seen from a distance will adapt its operating range to the current level value. As soon as the maximum has been found, the result (the maximum level) along with a short text (Comment) can be saved by pressing **Store**. For each of the detectors there will be one measurement result file which also holds information about the limit and optionally about the settings of mast and turntable.



If the EuT can be remotely switched then by pressing **EuT on** and **EuT off** a line of the parallel port (device driver LPT I/O) can be used as a TTL control signal this feature enhances the identification of interference signals on an OATS.

3.5.2 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames semi 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 1000 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 frequency list to be used (if next param is NONE) none optional name of a frequency list with frequencies on which the test shall be based the list might hold critical frequencies that have been entered manually or have been the output of a data reduction this frequency list won't be used if a measurement result list is selected with the next parameter
Parameter Default value Function	06 measurement result to be used none optional name of a measurement result list with frequencies on which the test shall be based the list might hold results that have been the output of a data reduction or of an automatic test if this result list also holds information (columns) about mast and turntable settings, then parameter <i>F /</i> will make the script use these data for positioning mast and turntable accordingly
Parameter Default value Function	07 test configuration, none ID none optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used
Topic	Final
Parameter Default value Function	01 file for PEAK results, none ID fin PK none optional filename for the PEAK results from the data reduction if no filename is specified then a default name will be used
Parameter Default value Function	02 file for QUASPEAK results, none ID fin QP none optional filename for the QUASPEAK results from the data reduction if no filename is specified then a default name will be used
Parameter	03 file for AVERAGE results, none ID fin AV

Default value	none
Function	optional filename for the AVERAGE results from the data reduction if no filename is specified then a default name will be used
Parameter	04 file for RMS results, none ID fin RMS
Default value	none
Function	optional filename for the RMS results from the data reduction if no filename is specified then a default name will be used
Parameter	05 scan table for single measurements
Default value	none
Function	filename of the scan range table to be used for single measurements the settings will be loaded and then modified according to the settings of the dialogue (detector, IF bandwidth and measurement time)
Parameter	06 scan table for partial scans
Default value	none
Function	filename of the scan range table to be used for partial scans to observe the spectrum more easily it is recommended to define a scan table with continuous repetitions
Parameter	07 sweep table for partial sweeps
Default value	none
Function	filename of the sweep range table to be used for partial sweeps to observe the spectrum more easily it is recommended to define a sweep table with continuous repetitions note that partial sweeps only give back a very small number of measurement points, e.g. a 1 portion of the frequency range as defined in the sweep table range will result in 1 of the sweep trace points only this is due to a conceptual limitation to the handling of sweep trace data the situation can be improved through a sweep table which is defined with many ranges so that a partial sweep still covers more than only a small fraction of the corresponding sweep range of the selected table alternatively use partial scans
Parameter	08 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged
Parameter	09 use/store field mast/turntable data if available
Default value	not checked
Function	if checked then any information about mast/turntable positions will be used (measurement result list as a basis for the test, see parameter t) those positions will be directly set each time when a frequency is selected (previous or next) besides, the current positions will be stored in the result files of the test
Topic	Limits
Parameter	01 optional PEAK limit line
Default value	none
Function	a filename that corresponds to an optional limit line for the PEAK detector if selected then the result file that corresponds to the detector will also show the values of the limit and the margin

Parameter 02 optional QUASIPeAK limit line
 Default value none
 Function a filename that corresponds to an optional limit line for the QUASIPeAK detector if selected then the result file that corresponds to the detector will also show the values of the limit and the margin

Parameter AVERAGE
 Default value none
 Function a filename that corresponds to an optional limit line for the AVERAGE detector if selected then the result file that corresponds to the detector will also show the values of the limit and the margin

Parameter 04 optional RMS limit line
 Default value none
 Function a filename that corresponds to an optional limit line for the RMS detector if selected then the result file that corresponds to the detector will also show the values of the limit and the margin

Topic Graphics

Parameter 01 graphics configuration, none ID
 Default value none
 Function optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used

Parameter 02 optional graphics template (new graph only)
 Default value none
 Function optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter 03 range of the analog level bar display dBxx
 Default value 40
 Function defines the display range of the analogue level display as soon as the level comes closer than 5 dB to one end of the display range then the range will be shifted accordingly by 10 dB

Topic Report

Parameter 01 generate printer hardcopy
 Default value checked
 Function if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter 02 generate RTF file
 Default value not checked
 Function if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter 03 RTF file path name8.3 , empty dialog
 Default value c xxx.rtf
 Function path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up

Parameter	04 report config. for printing, none ID prnt
Default value	none
Function	optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter	05 footnote, empty field ID
Default value	
Function	optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used
Parameter	06 optional text file to be included
Default value	none
Function	filename of an optional file of type Text which shall be included in the report

Topic ReportHeader

Parameter	01 test report header, none ID
Default value	none
Function	optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	Semi Interactive Test
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given

then the referring entry of the report header won t be changed

Parameter 09 operator
 Default value
 Function a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed

Parameter 10 test specification
 Default value
 Function a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed

Parameter 11 comment line
 Default value
 Function a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed

Parameter 12 2nd comment line (empty field start time)
 Default value
 Function a string that will be taken as a comment line if no string is given then the start time of the test will be entered

Topic SwitchEUT

Parameter 01 symbolic name of autom. EuT switch
 Default value LPTIO
 Function symbolic device name of the CENTRONICS parallel I/O interface driver as defined in the device configuration menu one output line will be used as a TTL control line

Parameter 02 LPT I/O output pin no. (1-9)
 Default value 2
 Function defines an output line (connector pin no. 1 - 9) of the parallel port as the control line for automatic switching of the EuT

Topic Mast

Parameter 01 use manual positioning only
 Default value checked
 Function if checked then manual control of the antenna mast through dialogue boxes will be used

Parameter 02 use auto positioning only
 Default value not checked
 Function if checked then automatic control of the antenna mast will be used

Parameter 03 symbolic name of autom. moved mast
 Default value MAST
 Function symbolic device name of the automatically controlled antenna mast as defined in the device configuration menu

Parameter 04 speed value for movements
 Default value 4
 Function determines the speed of the automatically moved mast

Topic Turntable

Parameter 01 use manual positioning only
 Default value checked
 Function if checked then manual control of the turntable through dialogue boxes will be used

Parameter 02 use auto positioning only
 Default value not checked
 Function if checked then automatic control of the turntable will be used

Parameter 03 symbolic name of autom. moved turntable
 Default value TURNTABLE
 Function symbolic device name of the automatically controlled turntable as defined in the device configuration menu

Parameter 04 speed value for faster movements
 Default value 4
 Function determines the speed of the automatically moved turntable

Topic Polarization

Parameter 01 use manual switching only
 Default value checked
 Function if checked then manual control of the antenna polarization through dialogue boxes will be used

Parameter 02 use auto switching only
 Default value not checked
 Function if checked then automatic control of the antenna polarization will be used

Parameter 03 symbolic name of autom. controlled polariz.
 Default value MAST
 Function symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu

Parameter 04 delay time sec for auto switching
 Default value 4
 Function defines a waiting time with automatic switching of the antenna polarization the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)

3.6 Power Test

3.6.1 Description

This test provides automatic measurement of electromagnetic interference (power) using a power absorbing clamp moved along the mains cable, optionally with control of a sidebar for moving the clamp automatically.

The exact positions for the clamp settings will be calculated from the actual start and stop frequencies of the active test range through a simple but very effective algorithm (position step size depends on highest frequency, maximum position depends on lowest frequency).

With test receivers the preview test (for finding the relevant frequencies) is normally done with the absorbing clamp in the zero position, which means very close to the equipment under test (EuT) with that position all critical frequencies should show up, but not necessarily with the maximum level that might be detected at an other position.

If the test chamber is not shielded properly then ambient signals might find their way into the long mains cable. The software can help An optional frequency list with ambients can be used to cut out for each frequency a range one IF bandwidth wide that won t be further analyzed of course this method has its problems if one or more frequencies of ambient interference are identical to those critical ones of the EuT

If needed, an **auxiliary switch** can be used for additional switching (extra shielding, different operation modes, etc.), currently with the states ON and OFF only if activated, an extra column, holding the state of that switch, will be added to the results. If both states are defined for searching, then this will double the number of states to be analyzed.

3.6.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

EN 55014

Frequency Range	30 - 300 MHz
Detectors	QP and AV
Test Samples	Household Equipment

3.6.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames pow 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 300 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter Default value Function	06 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	07 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	08 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value	09 test configuration, none ID none

Function optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic Preview

Parameter 01 preview result file, none ID pre
 Default value none
 Function optional filename for the results (1st detector, e.g. PEAK) from the preview test if no filename is specified then a default name will be used

Parameter 02 2nd preview result file, none ID pre2
 Default value none
 Function optional filename for the results (2nd detector, e.g. AVERAGE) from the preview test if no filename is specified then a default name will be used

Parameter 03 scan table for preview
 Default value none
 Function filename of the scan range table to be used for the preview test

Parameter 04 sweep table for preview
 Default value none
 Function filename of the sweep range table to be used for the preview test

Parameter 05 complete search (all accessory settings)
 Default value not checked
 Function if checked sweeps/scans will be done **on all clamp settings** as specified with clamp parameters for the preview test (recommended for preview tests with sweeps, e.g. with an EMI analyzer)
 else only one sweep/scans will be done **with one fixed setting** as specified with clamp parameters for the preview test (recommended for preview tests with scans, e.g. with an EMI test receiver)

Parameter 06 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten
 else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic DataReduction

Parameter 01 also perform interactive frequency selection
 Default value not checked
 Function if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test. to do so you have to position the marker accordingly and select Remove or Test in a dialog

Parameter 02 1st limit line
 Default value none
 Function a filename that corresponds to the limit line assigned to the 1st detector (e.g. QUASIPEAK)

Parameter	03 2nd limit line
Default value	none
Function	a filename that corresponds to the limit line assigned to the 2 nd detector (e.g. AVERAGE)
Parameter	04 max. no. of results kept per test range
Default value	6
Function	the maximum number of results that will be kept from each test range through data reduction
Parameter	05 decision threshold dB for peak reduction
Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter	06 level offset dB for acceptance analysis
Default value	-10.0
Function	determines the level offset when data reduction is done with the Acceptance Analysis
Parameter	07 freq. list of ambients to be cut out from preview
Default value	none
Function	optional name of a frequency list (ambient interference) with frequencies to be cut out from measurement results (preview test scans/sweeps, final test partial scans), each cut with a range corresponding to the current IF bandwidth, e.g. +/- 60 kHz around each of the frequencies if an IF bandwidth of 120 kHz is used to blank a modulated interference it might be necessary to provide more than one frequency in the list
Parameter	08 cutting width for sweeps (ambients) no. of IF-BWs
Default value	10
Function	with sweeps the width of a cut range (see previous parameter) has to be larger because of the lower frequency resolution of the results therefore this factor (number of IF bandwidths) will be used to enlarge the range compared with the range used on scan results
Parameter	09 merge all points from both detectors into same list
Default value	not checked
Function	if checked then the points that have been found through the automatic data reduction from both detectors will be merged into one single list which in turn will be used for both detectors in the final test
Topic	Final
Parameter	01 final result file, none ID fin
Default value	none
Function	optional filename for the results (1 st detector, e.g. QUASIPeAK) from the final measurements if no filename is specified then a default name will be used
Parameter	02 2nd final result file, none ID fin2
Default value	none
Function	optional filename for the results (2 nd detector, e.g. AVERAGE) from the final measurements if no filename is specified then a default name will be used

Parameter	03 scan table for partial scans maximization
Default value	none
Function	filename of the corresponding scan range table to be used for maximization measurements as well as for partial scans
Parameter	04 perform partial scans
Default value	not checked
Function	if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter	05 max. no. of results kept from partial scans
Default value	2
Function	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference this parameter limits the number of results from a partial scan (after data reduction)
Parameter	06 partial scan width no. of IF-BWs (0 use ratio)
Default value	0
Function	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter	07 partial scan width ref. frequ. ratio
Default value	0.01
Function	determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0
Parameter	08 complete search (all accessory settings)
Default value	checked
Function	determines the search mode for the preview test complete search means that measurements will be done on all clamp settings as specified with clamp parameters for the final test (recommended when the preview test has been performed with a fixed setting of the clamp) else measurements will be done on those clamp settings that were determined through a complete search in the preview test
Parameter	09 perform accessory adjustment
Default value	checked
Function	if checked then an additional search (in a small range) for the (local) maximum level will be performed with the absorbing clamp this is recommended, if the preview test was performed with only one or a small number of clamp positions
Parameter	10 adjustment full range
Default value	not checked
Function	if an additional search for the maximum level will be performed then not a small range will be analyzed but the full positioning range of the absorbing clamp
Parameter	11 scan table for final measurements
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements

Parameter	12 opt. scan table for final meas. 1GHz
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements, but only for frequencies above 1 GHz this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASIPeAK)
Parameter	13 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged
Parameter	14 optional input preview result file
Default value	none
Function	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test, one (e.g. for PK or PK AV) or optionally two (e.g. 1st for PK, 2nd for AV) input files
Parameter	15 optional input preview result file (2 nd det.)
Default value	none
Function	see previous parameter
Parameter	16 optional input frequency list
Default value	none
Function	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test, one (e.g. for QP or QP AV) or optionally two (e.g. 1st for QP, 2nd for AV) input files
Parameter	17 optional input frequency list (2nd det.)
Default value	none
Function	see previous parameter
Parameter	18 optional input final result file
Default value	none
Function	if the test shall be performed without a preview test then an existing final result file can be specified as an input for the final test, one (e.g. for QP or QP AV) or optionally two (e.g. 1st for QP, 2nd for AV) input files
Parameter	19 optional input final result file (2nd det.)
Default value	none
Function	see previous parameter
Topic	Graphics
Parameter	01 graphics configuration, none ID
Default value	none
Function	optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional graphics template (new graph only)
Default value	none
Function	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color

settings)

Parameter 03 split result display
 Default value not checked
 Function if checked then the results will be displayed with two graphics
 the first shows the PEAK and QUASIPEAK results and the QUASIPEAK limit
 line
 the second shows the AVERAGE results and the AVERAGE limit line
 the name of the second diagram is based on the first one's plus 2 appended
 to it

Parameter 04 minimize graphics for test
 Default value not checked
 Function if checked then the graphics will be minimized before the measurements starts
 and it will be restored before generating the report therefore no graphics
 updates will occur which in turn avoids any possible delays when handling very
 long scan curves

Topic Report

Parameter 01 generate printer hardcopy
 Default value checked
 Function if checked then a report configuration for printing will be generated and a
 hardcopy will be sent to the device which is defined as the printer for the
 software

Parameter 02 generate RTF file
 Default value not checked
 Function if checked then a report file will be created using the Rich Text Format (a kind
 of generic MS Word format) which can be edited with many other text
 processing software products

Parameter 03 RTF file path name8.3 , empty dialog
 Default value c xxx.rtf
 Function path file name (8.3 name format) of the RTF file if the RTF report is activated
 if an empty string is used then a file selection dialog will come up

Parameter 04 report config. for printing, none ID prnt
 Default value none
 Function optional filename for the report configuration for printing, if printer output is
 selected if no filename is specified then a default name will be used

Parameter 05 footnote, empty field ID
 Default value
 Function optional text as a footnote on the pages of the test report if an empty string is
 used then the ID string of the test will be used

Parameter 06 optional text file to be included
 Default value none
 Function filename of an optional file of type Text which shall be included in the report

Topic ReportHeader

Parameter 01 test report header, none ID
 Default value none
 Function optional filename for the report header to be used in the test if no filename is

	specified then a default name will be used
Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	Power Test
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start

time of the test will be entered

Topic	Clamp
Parameter Default value Function	01 use manual positioning only checked if checked then manual control of the absorbing clamp through dialogue boxes will be used
Parameter Default value Function	02 use auto positioning only not checked if checked then automatic control of the absorbing clamp will be used
Parameter Default value Function	03 symbolic name of autom. moved clamp CLAMP symbolic device name of the automatically controlled absorbing clamp as defined in the device configuration menu
Parameter Default value Function	04 speed value for slower movements 2 determines the speed of the automatically moved clamp for the relatively slow movements for the adjustment in the final test (some 1 or 2 measurements per sec. only)
Parameter Default value Function	05 speed value for faster movements 4 determines the speed of the automatically moved clamp for the relatively fast movements for absolute positioning
Parameter Default value Function	06 fixed/max. length cm to be measured (preview) 500 depending on the mode of the preview test complete preview search determines the maximum length to be used for measurements initial setting only position to be used for measurements (normally 0 cm)
Parameter Default value Function	07 no. of steps per shortest half wave length (preview) 3 determines the number of steps that shall be measured within the first half wave of the highest frequency (of the current test range), with steadily increasing stepsize for greater distances, e.g. a test 60 - 200 MHz, 3 steps per shortest half wave length 3 steps within 75 cm (half wave length at 200 MHz) ever increasing steps (factor is 1 1/3) up to 250 cm (half wave length at 60 MHz) positions 0 / 25 / 50 / 75 / 100 / 133 / 177 / 237 / 250 cm
Parameter Default value Function	08 max. length cm to be measured (finals) 500 depending on the mode of the final test complete final search determines the maximum distance of the absorbing clamp to be used for measurements in the final test else preview data will be used
Parameter Default value	09 no. of steps per shortest half wave length (finals) 3

Function determines the number of steps that shall be measured within the first half wave of the highest frequency (of the current test range), with steadily increasing stepsize for greater distances, see example above (parameter /)

Parameter 10 no. of steps as ad ustment range (finals)

Default value 1

Function final test with ad ustment
determines the number of steps that shall be taken as a position range for the ad ustment of the clamp

Topic Auxiliary

Parameter 01 use manual auxiliary switching

Default value not checked

Function if checked then manual control of an auxiliary switch through dialogue boxes will be used if activated an extra column, holding the state (ON or OFF) of the switch will be added to the results

Parameter 02 name of auxiliary device

Default value Auxiliary Device

Function name of the auxiliary switch (will be displayed with the dialog boxes for switching)

Parameter 03 preview measurements with aux. switch OFF

Default value not checked

Function if checked then the preview measurements will (also) be done with the state OFF

Parameter 04 preview measurements with aux. switch ON

Default value not checked

Function if checked then the preview measurements will (also) be done with the state ON

Parameter 05 final measurements with aux. switch OFF

Default value not checked

Function if checked then the final measurements will (also) be done with the state OFF

Parameter 06 final measurements with aux. switch ON

Default value not checked

Function if checked then the final measurements will (also) be done with the state ON

3.7 Voltage Mains Test

3.7.1 Description

This test provides automatic measurement of electromagnetic interference on supply lines, optionally with automatic control of an artificial mains network (LISN).

Depending on the kind of LISN, the parameters have to be set

- Y with a **single line LISN** measurements are normally done on a number of (AC or DC) supply lines switching between lines has to be done manually
- Y with a **2-line LISN** like the ESH3- 5 switching can be done automatically between lines N and L1, protective earth between grounded floating (with ENV 216 high pass setting)
- Y with a **4-line LISN** like the ESH2- 5 switching can be done automatically between lines N, L1, L2 and L3, protective earth between grounded floating (not with ENV 4200)

With test receivers the preview test (for finding the critical frequencies) is normally done on a single setting of the LISN (e.g. phase L1 with the protective earth floating).

The artificial mains networks ESH2- 5 and ESH3- 5 are normally controlled via the user port of the receiver. With this test procedure the parallel interface can alternatively be defined for controlling, using the LPT I/O driver. When doing so, the lines of the parallel port will be used as follows

- DATA 0 (Pin No. 2) N
- DATA 1 (Pin No. 3) L1
- DATA 2 (Pin No. 4) L2 (ESH2- 5 only)
- DATA 3 (Pin No. 5) L3 (ESH2- 5 only)
- DATA 4 (Pin No. 6) PE for ESH2- 5
- DATA 5 (Pin No. 7) PE for ESH3- 5

If needed, an **auxiliary switch** can be used for additional switching (extra shielding, different operation modes, etc.), currently with the states ON and OFF only if activated, an extra column, holding the state of that switch, will be added to the results. If both states are defined for searching, then this will double the number of states to be analyzed.

3.7.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

EN 55015

Frequency Range	0.15 - 30 MHz
Detectors	QP and AV
Test Samples	Fluorescent Lamps and Luminaries

EN 55022

Frequency Range	0.15 - 30 MHz
Detectors	QP and AV
Test Samples	ITE Class B

3.7.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames vol 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 0.15 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 30 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter Default value Function	06 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	07 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	08 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value	09 test configuration, none ID none

Function optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic**Preview**

Parameter 01 preview result file, none ID pre
 Default value none
 Function optional filename for the results (1st detector, e.g. PEAK) from the preview test if no filename is specified then a default name will be used

Parameter 02 2nd preview result file, none ID pre2
 Default value none
 Function optional filename for the results (2nd detector, e.g. AVERAGE) from the preview test if no filename is specified then a default name will be used

Parameter 03 scan table for preview (N)
 Default value none
 Function filename of the scan range table to be used for the preview test

Parameter 04 opt. scan table for preview on LISN line L1
 Default value none
 Function filename of an additional scan range table for the preview test to be used only when measurements are done on line L1 if used then the first scan range table will only be used with measurements on line N

Parameter 05 opt. scan table for preview on LISN line L2
 Default value none
 Function filename of an additional scan range table for the preview test to be used only when measurements are done on line L2

Parameter 06 opt. scan table for preview on LISN line L3
 Default value none
 Function filename of an additional scan range table for the preview test to be used only when measurements are done on line L3

Parameter 07 sweep table for preview (N)
 Default value none
 Function filename of the sweep range table to be used for the preview test

Parameter 08 opt. sweep table for preview on LISN line L1
 Default value none
 Function filename of an additional sweep range table for the preview test to be used only when measurements are done on line L1 if used then the first sweep range table will only be used with measurements on line N

Parameter 09 opt. sweep table for preview on LISN line L2
 Default value none
 Function filename of an additional sweep range table for the preview test to be used only when measurements are done on line L2

Parameter 10 opt. sweep table for preview on LISN line L3
 Default value none
 Function filename of an additional sweep range table for the preview test to be used only when measurements are done on line L3

Parameter 11 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic DataReduction

Parameter 01 also perform interactive frequency selection
 Default value not checked
 Function if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test . to do so you have to position the marker accordingly and select Remove or Test in a dialog

Parameter 02 1st limit line
 Default value none
 Function a filename that corresponds to the limit line assigned to the 1st detector (e.g. QUASPEAK)

Parameter 03 2nd limit line
 Default value none
 Function a filename that corresponds to the limit line assigned to the 2nd detector (e.g. AVERAGE)

Parameter 04 max. no. of results kept per test range
 Default value 6
 Function the maximum number of results that will be kept from each test range through data reduction

Parameter 05 decision threshold dB for peak reduction
 Default value 6.0
 Function determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through

Parameter 06 level offset dB for acceptance analysis
 Default value -10.0
 Function determines the level offset when data reduction is done with the Acceptance Analysis

Parameter 07 merge all points from both detectors into same list
 Default value not checked
 Function if checked then the points that have been found through the automatic data reduction from both detectors will be merged into one single list which in turn will be used for both detectors in the final test

Topic Final

Parameter 01 final result file, none ID fin
 Default value none
 Function optional filename for the results (1st detector, e.g. QUASPEAK) from the final measurements if no filename is specified then a default name will be used

Parameter	02 2nd final result file, none ID fin2
Default value	none
Function	optional filename for the results (2 nd detector, e.g. AVERAGE) from the final measurements if no filename is specified then a default name will be used
Parameter	03 scan table for partial scans maximization (N)
Default value	none
Function	filename of the corresponding scan range table to be used for maximization measurements as well as for partial scans
Parameter	04 opt. scan table for partial scans max. (L1)
Default value	none
Function	filename of an additional scan range table for maximization measurements and for partial scans to be used only when measurements are done on line L1 if used then the first scan range table will only be used with measurements on line N
Parameter	05 opt. scan table for partial scans max. (L2)
Default value	none
Function	filename of an additional scan range table for maximization measurements and for partial scans to be used only when measurements are done on line L2
Parameter	06 opt. scan table for partial scans max. (L3)
Default value	none
Function	filename of an additional scan range table for maximization measurements and for partial scans to be used only when measurements are done on line L3
Parameter	07 perform partial scans
Default value	not checked
Function	if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter	08 max. no. of results kept from partial scans
Default value	2
Function	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference this parameter limits the number of results from a partial scan (after data reduction)
Parameter	09 partial scan width no. of IF-BWs (0 use ratio)
Default value	0
Function	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter	10 partial scan width ref. frequ. ratio
Default value	0.01
Function	determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0
Parameter	11 complete search
Default value	checked

Function	determines the search mode for the preview test complete search means that measurements will be done on all LISN(/AU) settings as specified with LISN(/AU) parameters for the final test (recommended for final tests, when the preview test has not been performed as complete search normally with EMI test receivers) use LISN(/AU) data means that measurements will be done on those LISN(/AU) settings that were determined through a complete search in the preview test (normally with EMI analyzers)
Parameter	12 scan table for final measurements (N)
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements
Parameter	13 opt. scan table for final measurements (L1)
Default value	none
Function	filename of an additional scan range table for the final measurements to be used only when measurements are done on line L1 if used then the first scan range table will only be used with measurements on line N
Parameter	14 opt. scan table for final measurements (L2)
Default value	none
Function	filename of an additional scan range table for the final measurements to be used only when measurements are done on line L2
Parameter	15 opt. scan table for final measurements (L3)
Default value	none
Function	filename of an additional scan range table for the final measurements to be used only when measurements are done on line L3
Parameter	16 QP limit relaxation according to FCC
Default value	not checked
Function	if checked then every final measurement with the 1 st detector will be extended through an additional measurement with the AVERAGE detector should the QUASIPeAK level then be more than 6 dB above the AVERAGE level, then we have a broadband signal as a consequence the QUASIPeAK limit will be increased (relaxed) by 13 dB as described in the FCC standard
Parameter	17 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged
Parameter	18 optional input preview result file
Default value	none
Function	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test, one (e.g. for PK or for PK AV) or optionally two (e.g. 1 st for PK, 2 nd for AV) input files
Parameter	19 optional input preview result file (2nd det.)
Default value	none
Function	see previous parameter
Parameter	20 optional input frequency list

Default value	none
Function	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test, one (e.g. for QP or for QP AV) or optionally two (e.g. 1 st for QP, 2 nd for AV) input files
Parameter	21 optional input frequency list (2nd det.)
Default value	none
Function	see previous parameter
Parameter	22 optional input final result file
Default value	none
Function	if the test shall be performed without a preview test then an existing final result file can be specified as an input for the final test, one (e.g. for QP or for QP AV) or optionally two (e.g. 1 st for QP, 2 nd for AV) input files
Parameter	23 optional input final result file (2nd det.)
Default value	none
Function	see previous parameter

Topic Graphics

Parameter	01 graphics configuration, none ID
Default value	none
Function	optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional graphics template (new graph only)
Default value	none
Function	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)
Parameter	03 split result display
Default value	not checked
Function	if checked then the results will be displayed with two graphics the first shows the PEAK and QUASIPEAK results and the QUASIPEAK limit line the second shows the AVERAGE results and the AVERAGE limit line the name of the second diagram is based on the first one's plus 2 appended to it
Parameter	04 minimize graphics for test
Default value	not checked
Function	if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

Topic Report

Parameter	01 generate printer hardcopy
Default value	checked
Function	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter	02 generate RTF file
Default value	not checked
Function	if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter	03 RTF file path name8.3 , empty dialog
Default value	c xxx.rtf
Function	path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up
Parameter	04 report config. for printing, none ID prnt
Default value	none
Function	optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter	05 footnote, empty field ID
Default value	
Function	optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used
Parameter	06 optional text file to be included
Default value	none
Function	filename of an optional file of type Text which shall be included in the report

Topic**ReportHeader**

Parameter	01 test report header, none ID
Default value	none
Function	optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	Voltage Mains Test
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no

	string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered
Topic	LISN
Parameter	01 use manual switching only
Default value	checked
Function	if checked then manual control of the artificial mains network (LISN) through dialogue boxes will be used
Parameter	02 use auto switching only
Default value	not checked
Function	if checked then automatic control of the artificial mains network (LISN) will be used
Parameter	03 use LPT I/O switching only
Default value	not checked
Function	if checked then automatic control of the artificial mains network (LISN) via the driver LPT I/O will be used in this case the lines of the parallel port will be used as follows DATA 0 (Pin No. 2) N DATA 1 (Pin No. 3) L1 DATA 2 (Pin No. 4) L2 (ESH2- 5 only) DATA 3 (Pin No. 5) L3 (ESH2- 5 only) DATA 4 (Pin No. 6) PE for ESH2- 5 DATA 5 (Pin No. 7) PE for ESH3- 5

Parameter	04 symbolic device name of autom. switched LISN
Default value	ESH2- 2
Function	symbolic device name of the automatically controlled artificial mains network as defined in the device configuration menu the device properties must match with the controlling device (e.g. IEEE command strings for an EMI test receiver)
Parameter	05 single line LISN
Default value	not checked
Function	if checked then a single-line-LISN for measurements on a number of supply lines is assumed
Parameter	06 sgl. no. of lines to be measured for preview
Default value	0
Function	specifies the number of lines to be analyzed in the preview test, if a single-line-LISN is used
Parameter	07 sgl. no. of lines to be measured for finals
Default value	0
Function	specifies the number of lines to be analyzed in the final test, if a single-line-LISN is used
Parameter	08 preview measurements with PE floating
Default value	checked
Function	if checked then the preview measurements will (also) be done with the protective earth floating
Parameter	09 preview measurements with PE grounded
Default value	checked
Function	if checked then the preview measurements will (also) be done with the protective earth grounded
Parameter	10 preview measurements on line N
Default value	checked
Function	if checked then the preview measurements will (also) be done on the neutral line N
Parameter	11 preview measurements on line L1
Default value	checked
Function	if checked then the preview measurements will (also) be done on the line L1
Parameter	12 preview measurements on line L2
Default value	checked
Function	if checked then the preview measurements will (also) be done on the line L2
Parameter	13 preview measurements on line L3
Default value	checked
Function	if checked then the preview measurements will (also) be done on the line L3
Parameter	14 final measurements with PE floating
Default value	checked
Function	if checked then the final measurements will (also) be done with the protective earth floating
Parameter	15 final measurements with PE grounded
Default value	checked
Function	if checked then the final measurements will (also) be done with the protective

earth grounded

Parameter 16 final measurements on line N
 Default value checked
 Function if checked then the final measurements will (also) be done on the neutral line N

Parameter 17 final measurements on line L1
 Default value checked
 Function if checked then the final measurements will (also) be done on the line L1

Parameter 18 final measurements on line L2
 Default value checked
 Function if checked then the final measurements will (also) be done on the line L2

Parameter 19 final measurements on line L3
 Default value checked
 Function if checked then the final measurements will (also) be done on the line L3

Topic Auxiliary

Parameter 01 use manual auxiliary switching
 Default value not checked
 Function if checked then manual control of an auxiliary switch through dialogue boxes will be used if activated an extra column, holding the state (ON or OFF) of the switch will be added to the results

Parameter 02 name of auxiliary device
 Default value Auxiliary Device
 Function name of the auxiliary switch (will be displayed with the dialog boxes for switching)

Parameter 03 preview measurements with aux. switch OFF
 Default value not checked
 Function if checked then the preview measurements will (also) be done with the state OFF

Parameter 04 preview measurements with aux. switch ON
 Default value not checked
 Function if checked then the preview measurements will (also) be done with the state ON

Parameter 05 final measurements with aux. switch OFF
 Default value not checked
 Function if checked then the final measurements will (also) be done with the state OFF

Parameter 06 final measurements with aux. switch ON
 Default value not checked
 Function if checked then the final measurements will (also) be done with the state ON

3.8 Voltage Terminal Test

3.8.1 Description

This test provides automatic measurement of conducted electromagnetic interference on the antenna terminals of TV sets, VCRs and radios.

The test starts with a preview test to look for critical frequencies while the tuner is in a channel search mode . If there are any of them (ambient signals can optionally be cut out according to a frequency list), then the user can decide whether to continue testing with test signals. In that case (a power divider will be required and the signal loss has to be defined as a system transducer for the sweep/scan tables) the critical frequencies will be analyzed to find the corresponding channel (IF will be subtracted and a frequency list with channel width information will be used)

A message will come up to provide a test signal (channel carrier frequency) for the (next) required channel. The oscillator frequency and all harmonic frequencies within the test range will be evaluated against the matching limit. Then these frequencies will be cut out from the spectrum and the rest will be evaluated against the limit that is defined for other signals. The procedure will be repeated for all critical frequencies from the preview test. In the test report for all QP measurements (if level is above the acceptance line) a note will indicate the signal type and the corresponding carrier frequency.

Without QP measurements, the list with the critical points from the preview test (PK results) will be shown in the test report.

3.8.2 Parameter Sets

Currently the following specification is supported by the ES-K1 Standard Data

EN 55013

Frequency Range	0.15 - 30 MHz
Detectors	QP and AV
Test Samples	Television Sets, FM Tuners, VCRs, DVD Players, etc.

3.8.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames vterm 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 1000 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter Default value Function	06 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	07 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	08 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value	09 frequency list with channel info none

Function	defines the channel list to be used in the test, a frequency list which also holds information like channel names and channel widths
Parameter	10 measurement of wanted signals (ignore IF offset)
Default value	not checked
Function	if checked then the test is configured for the measurement of wanted signals (e.g. for measuring VCRs or DVD players) the value of the tuner IF offset will be ignored and the carrier will not be cut off the spectrum
Parameter	11 test configuration, none ID
Default value	none
Function	optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic**Preview**

Parameter	01 preview result file, none ID pre
Default value	none
Function	optional filename for the results (1 st detector, e.g. PEAK) from the preview test if no filename is specified then a default name will be used
Parameter	02 scan table for preview
Default value	none
Function	filename of the scan range table to be used for the preview test
Parameter	03 sweep table for preview
Default value	none
Function	filename of the sweep range table to be used for the preview test
Parameter	04 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged

Topic**DataReduction**

Parameter	01 all/others limit line
Default value	none
Function	a filename that corresponds to the required limit line for all other (not fundamental and harmonic) frequencies (e.g. a QUASIPeAK limit)
Parameter	02 fundamentals limit line
Default value	none
Function	a filename that corresponds to the required limit line for the oscillator's fundamental frequencies (e.g. a QUASIPeAK limit)
Parameter	03 harmonics limit line
Default value	none
Function	a filename that corresponds to the required limit line for the oscillator's harmonic frequencies (e.g. a QUASIPeAK limit)
Parameter	04 max. no. of results kept per testrange

Default value	6
Function	the maximum number of results that will be kept from each testrange through data reduction
Parameter	05 decision threshold dB for peak reduction
Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter	06 level offset dB for acceptance analysis
Default value	-10.0
Function	determines the level offset when data reduction is done with the Acceptance Analysis
Parameter	07 frequency list of ambients to be cut out of from preview
Default value	none
Function	optional name of a frequency list (ambient interference) with frequencies to be cut out from measurement results (preview test scans/sweeps, final test partial scans), each cut with a range corresponding to the current IF bandwidth, e.g. +/- 60 kHz around each of the frequencies if an IF bandwidth of 120 kHz is used to blank a modulated interference it might be necessary to provide more than one frequency in the list
Parameter	08 cut factor for sweeps (ambients osc. har.)
Default value	10
Function	with sweeps the width of a cut range has to be larger because of the lower frequency resolution of the results therefore this factor (number of IF bandwidths) will be used to enlarge the range compared with the range used on scan results
Topic	Final
Parameter	01 final result file, none ID fin
Default value	none
Function	optional filename for the (QUASIPeAK) results from the final test if no filename is specified then a default name will be used
Parameter	02 final result file, none ID fin2
Default value	none
Function	optional filename for the (PeAK) results from the final test if no filename is specified then a default name will be used
Parameter	03 scan table for meas. with carrier on
Default value	none
Function	filename of the scan range table to be used for the final test, when a carrier signal is present
Parameter	04 sweep table for meas. with carrier on
Default value	none
Function	filename of the sweep range table to be used for the final test, when a carrier signal is present
Parameter	05 scan table for partial scans
Default value	none

Function	filename of the corresponding scan range table to be used for partial scans
Parameter	06 perform partial scans
Default value	not checked
Function	if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter	07 partial scan width no. of IF-BWs (0 use ratio)
Default value	0
Function	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter	08 partial scan width ref. frequ. ratio
Default value	0.01
Function	determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0
Parameter	09 scan table for final measurements
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements
Parameter	10 opt. scan table for final meas. 1GHz
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements, but only for frequencies above 1 GHz this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASIPeAK)
Parameter	11 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged
Parameter	12 optional input preview result file
Default value	none
Function	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test
Parameter	13 optional input frequency list
Default value	none
Function	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test
Parameter	14 optional input final result file
Default value	none
Function	if the test shall be performed without a preview test then an existing final result file can be specified as an input for the final test

Topic	Graphics
Parameter	01 graphics configuration, none ID
Default value	none
Function	optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional graphics template (new graph only)
Default value	none
Function	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Topic	Report
Parameter	01 generate printer hardcopy
Default value	checked
Function	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter	02 generate RTF file
Default value	not checked
Function	if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter	03 RTF file path name8.3 , empty dialog
Default value	c xxx.rtf
Function	path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up
Parameter	04 report config. for printing, none ID prnt
Default value	none
Function	optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter	05 footnote, empty field ID
Default value	
Function	optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used
Parameter	06 optional text file to be included
Default value	none
Function	filename of an optional file of type Text which shall be included in the report

Topic	ReportHeader
Parameter	01 test report header, none ID
Default value	none
Function	optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional test report header template, none ID

Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	Voltage Terminal Test
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered

3.9 Azimuth Chart Test

3.9.1 Description

With this test the radiation pattern of an EuT as well as the azimuth pattern of an antenna can be measured and be displayed in a polar chart.

For gaining the radiation pattern of an EuT, the device has to be mounted onto a turntable.

The azimuth pattern of an antenna can be retrieved by turning the (receiving) antenna (optionally with a turntable) while transmitting antenna - e.g. mounted on a tripod - radiates with a constant level (provided by the tracking generator of the receiver). Maximum eight frequencies will be measured with each azimuth step. The measured levels will be stored along with the azimuths and displayed in a polar diagram (level against azimuth one curve per frequency). The display of the levels may be either absolute or relative to the levels of the main azimuth (an offset can be defined) the levels of the main azimuth can be stored as a reference so that with another test they can be used for a relative display.

For measurements on a frequency list (not with scans/sweeps) an external generator can be used as a replacement for the tracking generator. This requires the option ES-K50 (Universal GPIB Driver).

If this option is installed, then the driver USER IEC can be added to the device list the assigned to this driver could be e.g. GENERATOR or the model name of the generator (e.g. SMP). The settings should first be checked with the corresponding interactive dialog (Set Device...).

In the script parameters of **Topic ExtGenerator** the device has to be selected and the appropriate GPIB commands have to be entered.

The script parameters for the newer generators from R S (SMxx) have to be set like this

...

Topic Calibration

Parameter Value 04 **scan table for measurements must be selected**

Parameter Value 05 **optional frequency list for single measurements must be selected**

Parameter Value 06 **sweep table for measurements none**

...

Topic ExtGenerator

Parameter Value 02 GPIB initialization command
RST CLS POW -10D M FRE :CW 1E9 OUTP1 ON

Parameter Value 03 GPIB frequency command incl. format string
FRE :CW G

Parameter Value 04 frequency factor (e.g. 1E-6 for MHz)
1

...

3.9.2 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames chart 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 frequ. list for single measurements CAL frequency with the frequencies to be measured only the first eight frequencies within the given and available frequency range will be used
Parameter Default value Function	03 global start frequency MHz for the test 30 no measurements will be done below this frequency
Parameter Default value Function	04 global stop frequency MHz for the test 1000 no measurements will be done above this frequency
Parameter Default value Function	05 main azimuth deg (used as azimuth offset) 0 defines the main azimuth the value will be used as an offset for the results
Parameter Default value Function	06 relative display not checked if checked then the levels will be calculated relatively either to the main azimuth or to the loaded reference
Parameter Default value Function	07 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	08 name of reference results to be used name of the reference file (stored as a transducer) which shall be used for the relative display of the levels
Parameter Default value Function	09 name of reference results to be stored name of the reference file which holds the levels of the main azimuth (will be stored as a transducer)
Parameter Default value Function	10 test configuration, none ID none optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic Measurement

Parameter Default value	01 scan table for single measurements none
----------------------------	---

Function filename of the scan range table to be used for the (single) measurements

Topic Graphics

Parameter 01 graphics configuration, none ID
 Default value none
 Function optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used

Parameter 02 minimum level
 Default value 0
 Function defines the minimum level of the polar graphics diagram

Parameter 03 maximum level
 Default value 80
 Function defines the maximum level of the polar graphics diagram

Topic Report

Parameter 01 generate printer hardcopy
 Default value checked
 Function if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter 02 generate RTF file
 Default value not checked
 Function if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter 03 RTF file path name8.3 , empty dialog
 Default value c xxx.rtf
 Function path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up

Parameter 04 report config. for printing, none ID prnt
 Default value none
 Function optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used

Parameter 05 footnote, empty field ID
 Default value
 Function optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used

Parameter 06 optional text file to be included
 Default value none
 Function filename of an optional file of type Text which shall be included in the report

Topic ReportHeader

Parameter 01 test report header, none ID
 Default value none
 Function optional filename for the report header to be used in the test if no filename is specified then a default name will be used

Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	Azimuth Chart
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered

Topic	Turntable
Parameter Default value Function	01 use manual positioning only checked if checked then manual control of the turntable through dialogue boxes will be used
Parameter Default value Function	02 use auto positioning only not checked if checked then automatic control of the turntable will be used
Parameter Default value Function	03 symbolic name of autom. moved turntable TURNTABLE symbolic device name of the automatically controlled turntable as defined in the device configuration menu
Parameter Default value Function	04 min. azimuth deg 0 defines the minimum azimuth for the measurements
Parameter Default value Function	05 max. azimuth deg 360 defines the maximum azimuth for the measurements
Parameter Default value Function	06 azimuth stepsize deg for finals 45 defines the stepsize for the azimuth variation
Parameter Default value Function	07 speed value for positioning movements 4 determines the speed of the automatically moved turntable
Parameter Default value Function	08 use continuous movements not checked if checked then the turntable will not be moved in steps but will rotate continuously while the single measurements are being performed and stored along with their current azimuth the azimuth steps are somewhat random because they depend on the measurement time and the turntable speed
Parameter Default value Function	09 speed value for continuous movements 4 determines the speed of the automatically moved turntable for continuous movements
Topic	ExtGenerator
Parameter Default value Function	01 external generator device none symbolic name of the device for controlling of an external generator as defined in the device configuration
Parameter Default value Function	02 GPIB initialization command RECALL 09 GPIB command for the initialization of the external generator it is recommended

to store the settings (fixed RF level, no modulation, etc.) in the memory of the generator and to load them with this command

Parameter 03 GPIB frequ. command incl. format string
 Default value RF G MH
 Function GPIB command for the setup of the RF frequency of the external generator the frequency - multiplied by the factor from the next parameter - will be inserted at the position of the format string **G** variations for the format string are possible as with the C function *t* or as described in the ES-K2 manual on the script function *t*

Parameter 04 frequency factor (e.g. 1E-6 for MHz)
 Default value 1.0E-6
 Function the frequency to be programmed is internally represented with the unit Hertz the frequency will be multiplied by this factor to enable a GPIB output in i.e. MHz

3.10 Field Strength Test

3.10.1 Description

This test provides automatic measurement of electric field strength with antennas, optionally with control of an automatic antenna tower for setting the antenna height and polarization automatically (two masts are also possible), as well as an automatic turntable for setting the orientation of the equipment under test (EuT).

For a complete test the critical frequencies have to be measured with all settings of the three dimensions antenna height, antenna polarization and turntable azimuth.

Depending on the defined stepsizes the test may become time consuming but smaller steps do not necessarily lead to significantly higher levels normally it is better to compensate for this uncertainty through an appropriate acceptance margin (e.g. 6 dB) during the analysis.

Alternatively to the field strength preview test, a frequency list from a power test (30 - 1000 MHz, PEAK-Detector, advantage no expensive test chamber required, see 3.2) could be used as an input to the field strength final test this method however is not considered as very reliable with larger EuTs.

For the preview test it is important to find all disturbances from the EuT (the corresponding frequencies) but because of the superimposition of emitted and reflected signals (on a metallic ground) the antenna might be positioned in a minimum for certain frequency bands measurements should generally be done with both horizontal and vertical polarization the antenna should be directed both to the front and to the back of the EuT the appropriate antenna height depends on the kind of test chamber

In a **screened chamber** (only partially applied with absorbers not suitable for final tests but almost no ambient interference) a single mid position (ca. 2 m) seems to be sufficient but because of the many reflections some minor disturbances might be pushed up whereas some stronger ones may come up with a decreased level therefore the data reduction of the preview should be done with a larger acceptance offset and more frequencies have to be kept for the final test (e.g. in the open area).

In an **anechoic chamber with metallic ground** it seems to be sufficient to measure at two positions (1 m and 2.5 m), if the distance between antenna and EuT is 3 m for greater distances (e.g. 10 m) more positions (e.g. a step size of 1 m) on the full height range (1 m up to 4 m or more) have to be analyzed.

In an **anechoic chamber with ground absorbers** the reflections on the ground can be disregarded (requires a limit line lowered by 6 dB) so that a single mid position (ca. 2 m) should be sufficient for the preview test.

An **open area test site** (OATS) is normally not suitable for automatic preview tests because of the many ambient disturbances but the software can help An optional frequency list with ambients can be used to cut out for each frequency a range one IF bandwidth wide that won't be further analyzed of course this method has its problems if one or more frequencies of ambient interference are identical to those critical ones of the EuT in this case the operator has to find out (e.g. through switching the EuT off and on if possible or by looking at the signal with a smaller IF bandwidth) whether the field strength generated by the EuT is above the limit, but sometimes this can be impossible, when the ambient disturbance exceeds the limit.

The **delivered script parameters** are designed for compliance testing with measurement receivers measurements with spectrum analyzers the preview test using (fast) sweeps could be done on more settings of the mast and turntable and the final test then could run without a complete search but with partial scans and adjustment of antenna height and turntable azimuth.

For so called **ERP measurements** (ERP effective radiated power unit in dBm power in reference to a half wave dipole) that have to include the test site attenuation, it is necessary to have an individual level correction for each polarization, i.e., two sweep/scan tables that are identical except different system transducers will be used. A second range table for preview and final test respectively has to be defined that will be effective for all measurements with vertical polarization, whereas the first range table will be active with horizontal polarization. That means the range table have different additional corrections (1.

site attenuation for the corresponding polarization and distance 2. correction factor of the half wave dipole 3. conversion of electrical voltage (dBuV) into electrical power (dBm).

If two automatic antenna masts are available then each of them can be used for a complete antenna range (e.g. a biconical antenna 30 - 300 MHz / a log. per. antenna 300 - 1000 MHz), thus eliminating manual interaction (if signal switching is done with a relay matrix) when antennas have to be changed (a second symbolic name, e.g. MAST2 has to be specified for mast and polarization). To compensate for the azimuth deviation of each mast against the zero position axis of the turntable, azimuth correction values have to be defined (e.g. 20 / -20 deg).

Annotation There are antennas now available that are suitable for the whole frequency range from 30 MHz up to 1 GHz this way any changing of antennas can be made totally superfluous within that range.

If needed, an **auxiliary switch** can be used for additional switching (extra shielding, different operation modes, etc.), currently with the states ON and OFF only if activated, an extra column, holding the state of that switch, will be added to the results. If both states are defined for searching, then this will double the number of states to be analyzed.

3.10.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

EN 55022

Frequency Range	30 - 1000 MHz
Detector	QP
Test Samples	ITE Class B
Distance	10m

FCC Part 15 Class A

Frequency Range	30 - 18000 MHz
Detector	QP below 1GHz AV above 1 GHz
Test Samples	
Distance	10m

FCC Part 15 Class

Frequency Range	30 - 5000 MHz
Detector	QP below 1GHz AV above 1 GHz
Test Samples	
Distance	10m

3.10.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames field 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 1000 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter Default value Function	06 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	07 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	08 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value	09 test configuration, none ID none

Function optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic Preview

Parameter 01 preview result file, none ID pre
 Default value none
 Function optional filename for the results (1st detector, e.g. PEAK) from the preview test if no filename is specified then a default name will be used

Parameter 02 2nd preview result file, none ID pre2
 Default value none
 Function optional filename for the results (2nd detector, e.g. AVERAGE) from the preview test if no filename is specified then a default name will be used

Parameter 03 scan table for preview
 Default value none
 Function filename of the scan range table to be used for the preview test

Parameter 04 optional 2nd scan table for preview (vertical)
 Default value none
 Function filename of a second scan range table for the preview test which to be used only when measurements are done with vertical polarization if used then the first scan range table will be used with horizontal polarization only

Parameter 05 sweep table for preview
 Default value none
 Function filename of the sweep range table to be used for the preview test

Parameter 06 optional 2nd sweep table for preview (vertical)
 Default value none
 Function filename of a second sweep range table for the preview test which will be used only when measurements are done with vertical polarization if used then the first sweep range table will be used with horizontal polarization only

Parameter 07 complete search (all accessory settings)
 Default value not checked
 Function if checked sweeps/scans will be done **on all accessory settings** as specified with the mast/turntable/polarization parameters for the preview test (recommended for preview tests with sweeps, e.g. with an EMI analyzer) else only one sweep/scans will be done **with one fixed setting** as specified with clamp parameters for the preview test (recommended for preview tests with scans, e.g. with an EMI test receiver)

Parameter 08 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic DataReduction

Parameter 01 also perform interactive frequency selection

Default value	not checked
Function	if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test . to do so you have to position the marker accordingly and select Remove or Test in a dialog
Parameter	02 1st limit line
Default value	none
Function	a filename that corresponds to the limit line assigned to the 1 st detector (e.g. QUASIPEAK)
Parameter	03 optional 1st acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of the preview results from the 1 st detector if used then the given value for the acceptance offset will be ignored
Parameter	04 optional 2nd limit line
Default value	none
Function	a filename that corresponds to the limit line assigned to the 2 nd detector (e.g. AVERAGE)
Parameter	05 optional 2nd acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of preview results from the 2 nd detector if used then the given value for the acceptance offset will be ignored
Parameter	06 max. no. of results kept per test range
Default value	6
Function	the maximum number of results that will be kept from each test range through data reduction
Parameter	07 decision threshold dB for peak reduction
Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter	08 level offset dB for acceptance analysis
Default value	-10.0
Function	determines the level offset when data reduction is done with the Acceptance Analysis
Parameter	09 freq. list of ambients to be cut out from preview
Default value	none
Function	optional name of a frequency list (ambient interference) with frequencies to be cut out from measurement results (preview test scans/sweeps, final test partial scans), each cut with a range corresponding to the current IF bandwidth, e.g. +/- 60 kHz around each of the frequencies if an IF bandwidth of 120 kHz is used to blank a modulated interference it might be necessary to provide more than one frequency in the list

Parameter 10 cutting width for sweeps (ambients) no. of IF-BWs
 Default value 10
 Function with sweeps the width of a cut range (see previous parameter) has to be larger because of the lower frequency resolution of the results therefore this factor (number of IF bandwidths) will be used to enlarge the range compared with the range used on scan results

Parameter 11 merge all points from both detectors into same list
 Default value not checked
 Function if checked then the points that have been found through the automatic data reduction from both detectors will be merged into one single list which in turn will be used for both detectors in the final test

Topic Final

Parameter 01 final result file, none ID fin
 Default value none
 Function optional filename for the results (1st detector, e.g. QUASIPeAK) from the final measurements if no filename is specified then a default name will be used

Parameter 02 2nd final result file, none ID fin2
 Default value none
 Function optional filename for the results (2nd detector, e.g. AVERAGE) from the final measurements if no filename is specified then a default name will be used

Parameter 03 scan table for partial scans maximization
 Default value none
 Function filename of the corresponding **scan range table** to be used for maximization measurements as well as for partial scans

Parameter 04 optional 2nd scan table (vertical)
 Default value none
 Function filename of the corresponding **scan range table** to be used for maximization measurements as well as for partial scans it will be used only when measurements are done with vertical polarization if used then the first scan range table will be used with horizontal polarization only

Parameter 05 perform partial scans
 Default value not checked
 Function if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)

Parameter 06 emulate partial scans through single meas.
 Default value not checked
 Function if checked then each partial scan will not be performed as a real scan, but instead will be emulated through single measurements at the corresponding frequencies this is necessary if the receiver only provides a spectrum analyzer mode (pseudo single measurements through zero-span-sweeps plus marker-to-peak to gain the level result)

Parameter 07 max. no. of results kept from partial scans
 Default value 2
 Function when a partial scan is performed then after data reduction there might still be

	more than one significant frequency linked to interference this parameter limits the number of results from a partial scan (after data reduction)
Parameter	08 partial scan width no. of IF-BWs (0 use ratio)
Default value	0
Function	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter	09 partial scan width ref. frequ. ratio
Default value	0.01
Function	determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0
Parameter	10 complete search
Default value	checked
Function	determines the search mode for the preview test complete search means that measurements will be done on all mast/turntable/polarization settings as specified with the corresponding parameters for the final test (recommended when the preview test has been performed with a fixed setting) else measurements will be done on those mast/turntable/polarization settings that were determined through a complete search in the preview test
Parameter	11 perform accessory adjustment
Default value	checked
Function	if checked then an additional search (in a small range) for the (local) maximum level will be performed (mast height and turntable azimuth) this is recommended, if the preview test was performed with only one or a small number of settings of mast and turntable
Parameter	12 adjustment full range
Default value	not checked
Function	if an additional search for the maximum level will be performed then not a small range will be analyzed but the full positioning range (mast and turntable)
Parameter	13 scan table for final measurements
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements
Parameter	14 optional 2nd scan table (vertical)
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements it will be used only when measurements are done with vertical polarization if used then the first scan range table will be used with horizontal polarization only
Parameter	15 opt. scan table for final meas. 1GHz
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements, but only for frequencies above 1 GHz this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASIPeAK)
Parameter	16 optional 2 nd scan table (vertical)

Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements, but only for frequencies above 1 GHz it will be used only when measurements are done with vertical polarization if used then the first scan range table will be used with horizontal polarization only
Parameter	17 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged
Parameter	18 optional input preview result file
Default value	none
Function	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test, one (e.g. for PK or PK AV) or optionally two (e.g. 1st for PK, 2nd for AV) input files
Parameter	19 optional input preview result file (2 nd det.)
Default value	none
Function	see previous parameter
Parameter	20 optional input frequency list
Default value	none
Function	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test, one (e.g. for QP or QP AV) or optionally two (e.g. 1st for QP, 2nd for AV) input files
Parameter	21 optional input frequency list (2nd det.)
Default value	none
Function	see previous parameter
Parameter	22 optional input final result file
Default value	none
Function	if the test shall be performed without a preview test then an existing final result file can be specified as an input for the final test, one (e.g. for QP or QP AV) or optionally two (e.g. 1st for QP, 2nd for AV) input files
Parameter	23 optional input final result file (2nd det.)
Default value	none
Function	see previous parameter
Topic	Graphics
Parameter	01 graphics configuration, none ID
Default value	none
Function	optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional graphics template (new graph only)
Default value	none
Function	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter 03 minimize graphics for test
 Default value not checked
 Function if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

Topic Report

Parameter 01 generate printer hardcopy
 Default value checked
 Function if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter 02 generate RTF file
 Default value not checked
 Function if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter 03 RTF file path name8.3 , empty dialog
 Default value c xxx.rtf
 Function path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up

Parameter 04 report config. for printing, none ID prnt
 Default value none
 Function optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used

Parameter 05 footnote, empty field ID
 Default value
 Function optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used

Parameter 06 optional text file to be included
 Default value none
 Function filename of an optional file of type Text which shall be included in the report

Topic ReportHeader

Parameter 01 test report header, none ID
 Default value none
 Function optional filename for the report header to be used in the test if no filename is specified then a default name will be used

Parameter 02 optional test report header template, none ID
 Default value none
 Function optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used

Parameter 03 1st header line
 Default value TEST

Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	Field Strength Test
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered
Topic	Mast
Parameter	01 use manual positioning only
Default value	checked
Function	if checked then manual control of the antenna mast through dialogue boxes will be used
Parameter	02 use auto positioning only

Default value	not checked
Function	if checked then automatic control of the antenna mast will be used
Parameter	03 symbolic name of autom. moved mast
Default value	MAST
Function	symbolic device name of the automatically controlled antenna mast as defined in the device configuration menu
Parameter	04 azimuth offset deg of mast
Default value	0
Function	if two automatic masts are used so that these mast are not located in the 0 degree axis of the turntable, then a value for the azimuth correction can be used
Parameter	05 symbolic name of optional 2nd automatic mast
Default value	MAST2
Function	symbolic device name of the optional 2nd automatically controlled antenna mast as defined in the device configuration menu to make the script run with two masts, an appropriate stop message has to be defined for each subrange in the scan/sweep tables used for the preview or final test example 1st mast 1 or 1 xxxxx (string has to start with a 2nd Mast 2 or 2 xxxxx digit followed by a blank) for a full automatic test (without manual interaction) an additional relay matrix (RSU) would have to be used for switching between antennas (the corresponding signal paths would have to be selected in the scan/sweep tables)
Parameter	06 azimuth offset deg of optional 2nd mast
Default value	0
Function	if two automatic masts are used so that these mast are not located in the 0 degree axis of the turntable, then a value for the azimuth correction can be used
Parameter	07 control priority level (1 highest)
Default value	1
Function	defines the priority level of the controlling of the antenna height (in combination with turntable azimuth and antenna polarization) a value of 1 means highest priority, 3 means lowest priority
Parameter	08 min. height cm to be measured for preview
Default value	100
Function	depending on the mode of the preview test complete preview search minimum height to be used for measurements else value will be ignored
Parameter	09 fixed/max. height cm to be measured for preview
Default value	300
Function	depending on the mode of the preview test complete preview search determines the maximum height to be used for measurements else fixed height to be used for measurements
Parameter	10 height stepsize cm for preview
Default value	200
Function	stepsize for height variation in the preview test normally two or three positions in all is sufficient (for finding all suspect frequencies), if the final test includes a

complete search this stepsize will be used in the final test as the height range for an optional adjustment, if the final test is done without complete search

Parameter 11 min. height cm to be measured for finals
 Default value 100
 Function depending on the mode of the final test
 complete final search determines the minimum height of the mast to be used for measurements in the final test
 else preview data will be used

Parameter 12 max. height cm to be measured for finals
 Default value 400
 Function depending on the mode of the final test
 complete final search determines the maximum height of the mast to be used for measurements in the final test
 else preview data will be used

Parameter 13 height stepsize cm for finals
 Default value 50
 Function stepsize for height variation in the final test this stepsize will also be used as the height range for an optional adjustment, if the final test is done with a complete search

Parameter 14 speed value for slower movements
 Default value 2
 Function determines the speed of the mast for the relatively slow movements for the adjustment in the final test (some 1 or 2 measurements per sec. only)

Parameter 15 speed value for faster movements
 Default value 4
 Function determines the speed of the automatically moved mast for the relatively fast movements for absolute positioning

Topic Turntable

Parameter 01 use manual positioning only
 Default value checked
 Function if checked then manual control of the turntable through dialogue boxes will be used

Parameter 02 use auto positioning only
 Default value not checked
 Function if checked then automatic control of the turntable will be used

Parameter 03 symbolic name of autom. moved turntable
 Default value TURNTABLE
 Function symbolic device name of the automatically controlled turntable as defined in the device configuration menu

Parameter 04 control priority level (1 highest)
 Default value 2
 Function defines the priority level of the controlling of the turntable azimuth (in combination with antenna height and antenna polarization) a value of 1 means highest priority, 3 means lowest priority

Parameter 05 min. azimuth deg to be measured for preview

Default value	90
Function	depending on the mode of the preview test complete preview search minimum azimuth to be used for measurements else value will be ignored
Parameter	06 fixed/max. azimuth deg to be measured for preview
Default value	270
Function	depending on the mode of the preview test complete preview search determines the maximum azimuth to be used for measurements else fixed azimuth to be used for measurements
Parameter	07 azimuth stepsize deg for preview
Default value	180
Function	stepsize for azimuth variation in the preview test normally two positions in all is sufficient (for finding all suspect frequencies), if the final test includes a complete search this stepsize will be used in the final test as the azimuth range for an optional adjustment, if the final test is done without complete search
Parameter	08 min. azimuth deg to be measured for finals
Default value	0
Function	depending on the mode of the final test complete final search determines the minimum azimuth of the turntable to be used for measurements in the final test else preview data will be used
Parameter	09 max. azimuth deg to be measured for finals
Default value	360
Function	depending on the mode of the final test complete final search determines the azimuth of the turntable to be used for measurements in the final test else preview data will be used
Parameter	10 azimuth stepsize deg for finals
Default value	45
Function	stepsize for azimuth variation in the final test this stepsize will also be used as the azimuth range for an optional adjustment, if the final test is done with a complete search
Parameter	11 speed value for slower movements
Default value	2
Function	determines the speed of the turntable for the relatively slow movements for the adjustment in the final test (some 1 or 2 measurements per sec. only)
Parameter	12 speed value for faster movements
Default value	4
Function	determines the speed of the automatically moved turntable for the relatively fast movements for absolute positioning
Topic	Polarization
Parameter	01 use manual switching only
Default value	checked
Function	if checked then manual control of the antenna polarization through dialogue boxes will be used

Parameter	02 use auto switching only
Default value	not checked
Function	if checked then automatic control of the antenna polarization will be used
Parameter	03 symbolic name of autom. controlled polariz.
Default value	MAST
Function	symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu
Parameter	04 symbolic name of optional 2nd autom. polariz.
Default value	none
Function	symbolic device name of an optional 2nd automatically controlled antenna polarization as defined in the device configuration menu (see also Topic Mast)
Parameter	05 control priority level (1 highest)
Default value	3
Function	defines the priority level of the controlling of the antenna polarization (in combination with antenna height and turntable azimuth) a value of 1 means highest priority, 3 means lowest priority
Parameter	06 delay time sec for auto switching
Default value	4
Function	defines a waiting time with automatic switching of the antenna polarization the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)
Parameter	07 preview measurements with horizontal polariz.
Default value	not checked
Function	if checked then the preview measurements will (also) be done with horizontal polarization
Parameter	08 preview measurements with vertical polariz.
Default value	not checked
Function	if checked then the preview measurements will (also) be done with vertical polarization
Parameter	09 final measurements with horizontal polariz.
Default value	not checked
Function	if checked then the final measurements will (also) be done with horizontal polarization
Parameter	10 final measurements with vertical polariz.
Default value	not checked
Function	if checked then the final measurements will (also) be done with vertical polarization
Topic	Auxiliary
Parameter	01 use manual auxiliary switching
Default value	not checked
Function	if checked then manual control of an auxiliary switch through dialogue boxes will be used if activated an extra column, holding the state (ON or OFF) of the switch will be added to the results
Parameter	02 name of auxiliary device

Default value	Auxiliary Device
Function	name of the auxiliary switch (will be displayed with the dialog boxes for switching)
Parameter	03 preview measurements with aux. switch OFF
Default value	not checked
Function	if checked then the preview measurements will (also) be done with the state OFF
Parameter	04 preview measurements with aux. switch ON
Default value	not checked
Function	if checked then the preview measurements will (also) be done with the state ON
Parameter	05 final measurements with aux. switch OFF
Default value	not checked
Function	if checked then the final measurements will (also) be done with the state OFF
Parameter	06 final measurements with aux. switch ON
Default value	not checked
Function	if checked then the final measurements will (also) be done with the state ON

3.11 Field Strength Test (fast)

3.11.1 Description

Basically this test offers the same functionality as the normal Field Strength Test , but it is optimized for using an automatic antenna mast and an automatic turntable

The preview test can be performed with sweeps only (a genuine EMI test receiver cannot be used) with the turntable **simultaneously** being moved. This way the total time for the preview test should be reduced in half.

In the final test a partial scan will be done for each critical frequency.

3.11.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

EN 55022

Frequency Range	30 - 1000 MHz
Detector	QP
Test Samples	ITE Class B
Distance	10m

FCC Part 15 Class A

Frequency Range	30 - 18000 MHz
Detector	QP below 1GHz AV above 1 GHz
Test Samples	
Distance	10m

FCC Part 15 Class

Frequency Range	30 - 5000 MHz
Detector	QP below 1GHz AV above 1 GHz
Test Samples	
Distance	10m

3.11.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames fast 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 1000 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter Default value Function	06 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	07 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	08 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value	09 test configuration, none ID none

Function optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic Preview

Parameter 01 preview result file, none ID pre
 Default value none
 Function optional filename for the results (1st detector, e.g. PEAK) from the preview test if no filename is specified then a default name will be used

Parameter 02 optional 2nd preview result file, none ID pre2
 Default value none
 Function optional filename for the results (2nd detector, e.g. AVERAGE) from the preview test if no filename is specified then a default name will be used

Parameter 03 sweep table for preview
 Default value none
 Function filename of the sweep range table to be used for the preview test

Parameter 04 optional 2nd sweep table for preview (vertical)
 Default value none
 Function filename of a second sweep range table for the preview test which will be used only when measurements are done with vertical polarization if used then the first sweep range table will be used with horizontal polarization only

Parameter 05 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic DataReduction

Parameter 01 also perform interactive frequency selection
 Default value not checked
 Function if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test . to do so you have to position the marker accordingly and select Remove or Test in a dialog

Parameter 02 1st limit line
 Default value none
 Function a filename that corresponds to the limit line assigned to the 1st detector (e.g. QUASPEAK)

Parameter 03 optional 1st acceptance line (no offset)
 Default value none
 Function a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of the preview results from the 1st detector if used then the given value for the acceptance offset will be ignored

Parameter 04 optional 2nd limit line

Default value	none
Function	a filename that corresponds to the limit line assigned to the 2 nd detector (e.g. AVERAGE)
Parameter	05 optional 2nd acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of preview results from the 2 nd detector if used then the given value for the acceptance offset will be ignored
Parameter	06 max. no. of results kept per test range
Default value	6
Function	the maximum number of results that will be kept from each test range through data reduction
Parameter	07 decision threshold dB for peak reduction
Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter	08 level offset dB for acceptance analysis
Default value	-10.0
Function	determines the level offset when data reduction is done with the Acceptance Analysis
Parameter	09 merge all points from both detectors into same list
Default value	not checked
Function	if checked then the points that have been found through the automatic data reduction from both detectors will be merged into one single list which in turn will be used for both detectors in the final test
Topic	Final
Parameter	01 final result file, none ID fin
Default value	none
Function	optional filename for the results (1 st detector, e.g. QUASPEAK) from the final measurements if no filename is specified then a default name will be used
Parameter	02 2nd final result file, none ID fin2
Default value	none
Function	optional filename for the results (2 nd detector, e.g. AVERAGE) from the final measurements if no filename is specified then a default name will be used
Parameter	03 scan table for partial scans maximization
Default value	none
Function	filename of the corresponding scan range table to be used for maximization measurements as well as for partial scans
Parameter	04 optional 2nd scan table (vertical)
Default value	none
Function	filename of the corresponding scan range table to be used for maximization measurements as well as for partial scans it will be used only when measurements are done with vertical polarization if used then the first scan

	range table will be used with horizontal polarization only
Parameter	05 emulate partial scans through single meas.
Default value	not checked
Function	if checked then each partial scan will not be performed as a real scan, but instead will be emulated through single measurements at the corresponding frequencies this is necessary if the receiver only provides a spectrum analyzer mode (pseudo single measurements through zero-span-sweeps plus marker-to-peak to gain the level result)
Parameter	06 partial scan width no. of IF-BWs (0 use ratio)
Default value	0
Function	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter	07 partial scan width ref. frequ. ratio
Default value	0.01
Function	determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0
Parameter	08 adjustment full range
Default value	not checked
Function	if an additional search for the maximum level will be performed then not a small range will be analyzed but the full positioning range (mast and turntable)
Parameter	09 scan table for final measurements
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements
Parameter	10 optional 2nd scan table (vertical)
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements it will be used only when measurements are done with vertical polarization if used then the first scan range table will be used with horizontal polarization only
Parameter	11 opt. scan table for final meas. 1GHz
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements, but only for frequencies above 1 GHz this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASPEAK)
Parameter	12 optional 2 nd scan table (vertical)
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements, but only for frequencies above 1 GHz it will be used only when measurements are done with vertical polarization if used then the first scan range table will be used with horizontal polarization only
Parameter	13 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the

filename used in the final test will be deleted/overwritten
 else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic**Graphics**

Parameter 01 graphics configuration, none ID
 Default value none
 Function optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used

Parameter 02 optional graphics template (new graph only)
 Default value none
 Function optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter 03 minimize graphics for test
 Default value not checked
 Function if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

Topic**Report**

Parameter 01 generate printer hardcopy
 Default value checked
 Function if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter 02 generate RTF file
 Default value not checked
 Function if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter 03 RTF file path name8.3 , empty dialog
 Default value c xxx.rtf
 Function path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up

Parameter 04 report config. for printing, none ID prnt
 Default value none
 Function optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used

Parameter 05 footnote, empty field ID
 Default value
 Function optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used

Parameter 06 optional text file to be included
 Default value none

Function	filename of an optional file of type Text which shall be included in the report
Topic	ReportHeader
Parameter	01 test report header, none ID
Default value	none
Function	optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	Electric Field Strength
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line

Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won't be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered
Topic	Mast
Parameter	01 use auto positioning
Default value	checked
Function	if checked then automatic control of the antenna mast will be used
Parameter	02 symbolic name of autom. moved mast
Default value	MAST
Function	symbolic device name of the automatically controlled antenna mast as defined in the device configuration menu
Parameter	03 azimuth offset deg of mast
Default value	0
Function	if two automatic masts are used so that these mast are not located in the 0 degree axis of the turntable, then a value for the azimuth correction can be used
Parameter	04 symbolic name of optional 2nd automatic mast
Default value	MAST2
Function	symbolic device name of the optional 2nd automatically controlled antenna mast as defined in the device configuration menu to make the script run with two masts, an appropriate stop message has to be defined for each subrange in the scan/sweep tables used for the preview or final test example 1st mast 1 or 1 xxxxx (string has to start with a 2nd mast 2 or 2 xxxxx digit followed by a blank) for a full automatic test (without manual interaction) an additional relay matrix (RSU) would have to be used for switching between antennas (the corresponding signal paths would have to be selected in the scan/sweep tables)
Parameter	05 azimuth offset deg of optional 2nd mast
Default value	0
Function	if two automatic masts are used so that these mast are not located in the 0 degree axis of the turntable, then a value for the azimuth correction can be used
Parameter	06 control priority level (1 highest)
Default value	1
Function	defines the priority level of the controlling of the antenna height (in combination with the antenna polarization) in the preview test a value of 1 means highest priority (after the turntable) , 2 means lowest priority
Parameter	07 min. height cm to be measured for preview
Default value	100
Function	defines the minimum height to be used in the preview test
Parameter	08 max. height cm to be measured for preview

Default value	300
Function	defines the maximum height to be used in the preview test
Parameter	09 height stepsize cm for preview
Default value	200
Function	defines the stepsize for height variation in the preview test
Parameter	10 min. height cm to be measured for ad ustment
Default value	100
Function	defines the minimum height to be used for the ad ustment measurements
Parameter	11 max. height cm to be measured for ad ustment
Default value	400
Function	defines the maximum height to be used for the ad ustment measurements
Parameter	12 height range cm for ad ustment
Default value	50
Function	defines the height range for the ad ustment measurements normally the value corresponds to the height stepsize for the preview test (parameter 09)
Parameter	13 speed value for faster movements
Default value	4
Function	determines the speed of the automatically moved mast for the relatively fast movements for absolute positioning
Parameter	14 speed value for slower movements
Default value	2
Function	determines the speed of the mast for the relatively slow movements for the ad ustment in the final test (some 1 or 2 measurements per sec. only)
Topic	Turntable
Parameter	01 use auto positioning
Default value	checked
Function	if checked then automatic control of the turntable will be used
Parameter	02 symbolic name of autom. moved turntable
Default value	TURNTABLE
Function	symbolic device name of the automatically controlled turntable as defined in the device configuration menu
Parameter	03 min. azimuth deg to be measured for preview
Default value	90
Function	defines the minimum azimuth to be used in the preview test
Parameter	04 max. azimuth deg to be measured for preview
Default value	270
Function	defines the maximum azimuth to be used in the preview test
Parameter	05 bidirectional azimuth sweeps at each position
Default value	not checked
Function	if checked then at each position (made up of polarization and mast height) not one but two movements - each in another direction - will be done within the given azimuth limits
Parameter	06 min. azimuth deg to be measured for final ad ustment

Default value	0
Function	defines the minimum azimuth to be used for the ad ustment measurements
Parameter	07 max. azimuth deg to be measured for final ad ustment
Default value	360
Function	defines the maximum azimuth to be used for the ad ustment measurements
Parameter	08 azimuth stepsize deg for finals
Default value	45
Function	defines the azimuth range for the ad ustment measurements normally the value corresponds to the azimuth range being covered by one sweep in the preview test
Parameter	09 fast speed value for absolute positioning
Default value	4
Function	determines the speed of the automatically moved turntable for the relatively fast movements for absolute positioning
Parameter	10 speed value for azimuth sweeps
Default value	1
Function	determines the (typically slowest) speed of the turntable for the movements in the preview test when sweeps will be simultaneously be performed
Parameter	11 slow speed value for ad ustment
Default value	2
Function	determines the speed of the turntable for the relatively slow movements for the ad ustment in the final test (some 1 or 2 measurements per sec. only)

Topic Polarization

Parameter	01 use auto switching only
Default value	checked
Function	if checked then automatic control of the antenna polarization will be used
Parameter	02 symbolic name of autom. controlled polariz.
Default value	MAST
Function	symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu
Parameter	03 symbolic name of optional 2nd autom. polariz.
Default value	none
Function	symbolic device name of an optional 2nd automatically controlled antenna polarization as defined in the device configuration menu (see also Topic Mast)
Parameter	04 control priority level (1 highest)
Default value	2
Function	defines the priority level of the controlling of the antenna polarization (in combination with the antenna height) in the preview test a value of 1 means highest priority (after the turntable), 2 means lowest priority
Parameter	05 delay time sec for auto switching
Default value	4
Function	defines a waiting time with automatic switching of the antenna polarization the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)

Parameter	06 preview measurements with horizontal polariz.
Default value	not checked
Function	if checked then the preview measurements will (also) be done with horizontal polarization
Parameter	07 preview measurements with vertical polariz.
Default value	not checked
Function	if checked then the preview measurements will (also) be done with vertical polarization

3.12 Magnetic Field Strength Test

3.12.1 Description

This test provides automatic measurement of magnetic interference, optionally with automatic control of a triple loop antenna like the R S HM020. Besides, an automatic turntable can be controlled to turn the EuT.

An **open area test site** (OATS) is normally not suitable for automatic preview tests because of the many ambient disturbances but the software can help. An optional frequency list with ambients can be used to cut out for each frequency a range one IF bandwidth wide that won't be further analyzed. Of course this method has its problems if one or more frequencies of ambient interference are identical to those critical ones of the EuT. In this case the operator has to find out (e.g. through switching the EuT off and on if possible or by looking at the signal with a smaller IF bandwidth) whether the field strength generated by the EuT is above the limit, but sometimes this can be impossible, when the ambient disturbance exceeds the limit.

3.12.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

VDE0875/211

Frequency Range	0.009 - 30 MHz
Detector	QP
Test Samples	ISM

3.12.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames mfield 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 0.09 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 30 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter Default value Function	06 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	07 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	08 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value	09 test configuration, none ID none

Function optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic Preview

Parameter 01 preview result file, none ID pre
 Default value none
 Function optional filename for the results (1st detector, e.g. PEAK) from the preview test if no filename is specified then a default name will be used

Parameter 02 2nd preview result file, none ID pre2
 Default value none
 Function optional filename for the results (2nd detector, e.g. AVERAGE) from the preview test if no filename is specified then a default name will be used

Parameter 03 scan table for preview
 Default value none
 Function filename of the scan range table to be used for the preview test

Parameter 04 sweep table for preview
 Default value none
 Function filename of the sweep range table to be used for the preview test

Parameter 05 complete search (all accessory settings)
 Default value not checked
 Function if checked sweeps/scans will be done **on all settings** as specified with the turntable parameters for the preview test (recommended for preview tests with sweeps, e.g. with an EMI analyzer)
 else only sweeps/scans will be done **with one fixed setting** as specified with turntable parameters for the preview test (recommended for preview tests with scans, e.g. with an EMI test receiver)

Parameter 06 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten
 else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic DataReduction

Parameter 01 also perform interactive frequency selection
 Default value not checked
 Function if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test . to do so you have to position the marker accordingly and select Remove or Test in a dialog

Parameter 02 1st limit line
 Default value none
 Function a filename that corresponds to the limit line assigned to the 1st detector (e.g. QUASPEAK)

Parameter 03 2nd limit line

Default value	none
Function	a filename that corresponds to the limit line assigned to the 2 nd detector (e.g. AVERAGE)
Parameter	04 max. no. of results kept per test range
Default value	6
Function	the maximum number of results that will be kept from each test range through data reduction
Parameter	05 decision threshold dB for peak reduction
Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter	06 level offset dB for acceptance analysis
Default value	-10.0
Function	determines the level offset when data reduction is done with the Acceptance Analysis
Parameter	07 freq. list of ambients to be cut out from preview
Default value	none
Function	optional name of a frequency list (ambient interference) with frequencies to be cut out from measurement results (preview test scans/sweeps, final test partial scans), each cut with a range corresponding to the current IF bandwidth, e.g. +/- 60 kHz around each of the frequencies if an IF bandwidth of 120 kHz is used to blank a modulated interference it might be necessary to provide more than one frequency in the list
Parameter	08 cutting width for sweeps (ambients) no. of IF-BWs
Default value	10
Function	with sweeps the width of a cut range (see previous parameter) has to be larger because of the lower frequency resolution of the results therefore this factor (number of IF bandwidths) will be used to enlarge the range compared with the range used on scan results
Parameter	09 merge all points from both detectors into same list
Default value	not checked
Function	if checked then the points that have been found through the automatic data reduction from both detectors will be merged into one single list which in turn will be used for both detectors in the final test
Topic	Final
Parameter	01 final result file, none ID fin
Default value	none
Function	optional filename for the results (1 st detector, e.g. QUASIPeAK) from the final measurements if no filename is specified then a default name will be used
Parameter	02 2nd final result file, none ID fin2
Default value	none
Function	optional filename for the results (2 nd detector, e.g. AVERAGE) from the final measurements if no filename is specified then a default name will be used
Parameter	03 scan table for partial scans maximization

Default value	none
Function	filename of the corresponding scan range table to be used for maximization measurements as well as for partial scans
Parameter	04 perform partial scans
Default value	not checked
Function	if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter	05 max. no. of results kept from partial scans
Default value	2
Function	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference this parameter limits the number of results from a partial scan (after data reduction)
Parameter	06 partial scan width no. of IF-BWs (0 use ratio)
Default value	0
Function	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter	07 partial scan width ref. frequ. ratio
Default value	0.01
Function	determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0
Parameter	08 complete search
Default value	checked
Function	determines the search mode for the preview test complete search means that measurements will be done on all loop antenna and turntable settings as specified with loop antenna parameters for the final test (recommended when the preview test has been performed with a fixed setting of the loop antenna) else measurements will be done on those loop antenna and turntable settings that were determined through a complete search in the preview test
Parameter	09 perform accessory adjustment
Default value	checked
Function	if checked then an additional search (in a small range) for the (local) maximum level will be performed with the turntable this is recommended, if the preview test was performed with only one or a small number of positions of the turntable
Parameter	10 adjustment full range
Default value	not checked
Function	if an additional search for the maximum level will be performed then not a small range will be analyzed but the full positioning range (mast and turntable)
Parameter	11 scan table for final measurements
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements

Parameter	12 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged
Parameter	13 optional input preview result file
Default value	none
Function	if the test shall be performed without a preview test then an existing preview result file can be specified as an input for the final test, one (e.g. for PK or for PK AV) or optionally two (e.g. 1 st for PK, 2 nd for AV) input files
Parameter	14 optional input preview result file (2nd det.)
Default value	none
Function	see previous parameter
Parameter	15 optional input frequency list
Default value	none
Function	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test, one (e.g. for QP or for QP AV) or optionally two (e.g. 1 st for QP, 2 nd for AV) input files
Parameter	16 optional input frequency list (2nd det.)
Default value	none
Function	see previous parameter
Parameter	17 optional input final result file
Default value	none
Function	if the test shall be performed without a preview test then an existing final result file can be specified as an input for the final test, one (e.g. for QP or for QP AV) or optionally two (e.g. 1 st for QP, 2 nd for AV) input files
Parameter	18 optional input final result file (2nd det.)
Default value	none
Function	see previous parameter
Topic	Graphics
Parameter	01 graphics configuration, none ID
Default value	none
Function	optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional graphics template (new graph only)
Default value	none
Function	optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)
Parameter	03 minimize graphics for test
Default value	not checked
Function	if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report therefore no graphics updates will occur which in turn avoids any possible delays when handling very

long scan curves

Topic

Report

Parameter 01 generate printer hardcopy
 Default value checked
 Function if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter 02 generate RTF file
 Default value not checked
 Function if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter 03 RTF file path name8.3 , empty dialog
 Default value c xxx.rtf
 Function path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up

Parameter 04 report config. for printing, none ID prnt
 Default value none
 Function optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used

Parameter 05 footnote, empty field ID
 Default value
 Function optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used

Parameter 06 optional text file to be included
 Default value none
 Function filename of an optional file of type Text which shall be included in the report

Topic

ReportHeader

Parameter 01 test report header, none ID
 Default value none
 Function optional filename for the report header to be used in the test if no filename is specified then a default name will be used

Parameter 02 optional test report header template, none ID
 Default value none
 Function optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used

Parameter 03 1st header line
 Default value TEST
 Function a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed

Parameter 04 2nd header line
 Default value Magn. Field Strength Test
 Function a string that will be taken as the second header line if no string is given then the

	referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered
Topic	LoopAntenna
Parameter	01 use manual switching only
Default value	checked
Function	if checked then manual control of the loop antenna through dialogue boxes will be used
Parameter	02 use auto switching only
Default value	not checked
Function	if checked then automatic control of the triple loop antenna will be used
Parameter	03 symbolic name of autom. switched triple loop
Default value	HM020
Function	symbolic device name of the automatically controlled triple loop antenna as

defined in the device configuration menu the device properties must match with the controlling device (e.g. IEEE command strings for an EMI test receiver)

Parameter 04 preview measurements on loop
 Default value checked
 Function if checked then the preview measurements will (also) be done with the antenna loop

Parameter 05 preview measurements on loop
 Default value checked
 Function if checked then the preview measurements will (also) be done with the antenna loop

Parameter 06 preview measurements on loop
 Default value checked
 Function if checked then the preview measurements will (also) be done with the antenna loop

Parameter 07 final measurements on loop
 Default value checked
 Function if checked then the final measurements will (also) be done with the antenna loop

Parameter 08 final measurements on loop
 Default value checked
 Function if checked then the final measurements will (also) be done with the antenna loop

Parameter 09 final measurements on loop
 Default value checked
 Function if checked then the final measurements will (also) be done with the antenna loop

Topic Turntable

Parameter 01 use manual positioning only
 Default value checked
 Function if checked then manual control of the turntable through dialogue boxes will be used

Parameter 02 use auto positioning only
 Default value not checked
 Function if checked then automatic control of the turntable will be used

Parameter 03 symbolic name of autom. moved turntable
 Default value TURNTABLE
 Function symbolic device name of the automatically controlled turntable as defined in the device configuration menu

Parameter 04 min. azimuth deg to be measured for preview
 Default value 90
 Function depending on the mode of the preview test
 complete preview search minimum azimuth to be used for measurements
 else value will be ignored

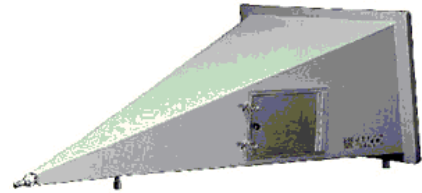
Parameter 05 fixed/max. azimuth deg to be measured for preview

Default value	270
Function	depending on the mode of the preview test complete preview search determines the maximum azimuth to be used for measurements else fixed azimuth to be used for measurements
Parameter	06 azimuth stepsize deg for preview
Default value	180
Function	stepsize for azimuth variation in the preview test normally two positions in all is sufficient (for finding all suspect frequencies), if the final test includes a complete search this stepsize will be used in the final test as the azimuth range for an optional adjustment, if the final test is done without complete search
Parameter	07 min. azimuth deg to be measured for finals
Default value	0
Function	depending on the mode of the final test complete final search determines the minimum azimuth of the turntable to be used for measurements in the final test else preview data will be used
Parameter	08 max. azimuth deg to be measured for finals
Default value	360
Function	depending on the mode of the final test complete final search determines the azimuth of the turntable to be used for measurements in the final test else preview data will be used
Parameter	09 azimuth stepsize deg for finals
Default value	45
Function	stepsize for azimuth variation in the final test this stepsize will also be used as the azimuth range for an optional adjustment, if the final test is done with a complete search
Parameter	10 speed value for slower movements
Default value	2
Function	determines the speed of the turntable for the relatively slow movements for the adjustment in the final test (some 1 or 2 measurements per sec. only)
Parameter	11 speed value for faster movements
Default value	4
Function	determines the speed of the automatically moved turntable for the relatively fast movements for absolute positioning

3.13 GTEM Test

3.13.1 Description

This test provides automatic measurement of radiated electromagnetic interference with an **GTEM** measurement cell. The test starts with a preview test on three orientations of the EuT and does a data reduction. In the final test (again on three orientations) optionally partial scans can be performed at all critical points simple single measurements - based on a scan table - will be done.



The measurement results will always be correlated to OATS results and be displayed in a separate diagram. If a field strength limit is selected, then the correlated final results will be evaluated against this limit, too.

For measurements optionally a manipulator for positioning the EuT can be used. This requires the option ES-K50 (Universal GPIB Driver).

If this option is installed, then the driver USER IEC can be added to the device list the assigned to this driver could be e.g. MANIPULATOR or the model name of the device (e.g. BOSS). The settings should first be checked with the corresponding interactive dialog (Set Device...).

In the script parameters of **Topic Manipulator** the device has to be selected and the appropriate GPIB commands have to be entered.

3.13.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

EN 55022

Frequency Range	30 - 1000 MHz
Detector	Pk
Test Samples	(small and without preferred orientation)

3.13.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames gtem 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 1000 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter Default value Function	06 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	07 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	08 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value	09 test configuration, none ID none

Function optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic Preview

Parameter 01 GTEM preview result, none ID pre
 Default value none
 Function optional filename for the results from the preview test, gained with the EuT oriented to axis if no filename is specified then a default name will be used

Parameter 02 GTEM preview result, none ID pre
 Default value none
 Function optional filename for the results from the preview test, gained with the EuT oriented to axis if no filename is specified then a default name will be used

Parameter 03 GTEM preview result, none ID pre
 Default value none
 Function optional filename for the results from the preview test, gained with the EuT oriented to axis if no filename is specified then a default name will be used

Parameter 04 OATS H preview result, none ID pre H
 Default value none
 Function optional filename for the **correlated field strength results** (horizontal polarization) from the preview test if no filename is specified then a default name will be used

Parameter 05 OATS V preview result, none ID pre V
 Default value none
 Function optional filename for the **correlated field strength results** (vertical polarization) from the preview test if no filename is specified then a default name will be used

Parameter 06 scan table for preview
 Default value none
 Function filename of the scan range table to be used for the preview test

Parameter 07 sweep table for preview
 Default value none
 Function filename of the sweep range table to be used for the preview test

Parameter 08 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic DataReduction

Parameter 01 also perform interactive frequency selection
 Default value not checked
 Function if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test . to do so you have to position the marker accordingly and select Remove

or Test in a dialog

Parameter 02 limit line
 Default value none
 Function a filename of the field strength limit line (for OATS) which shall be used for the evaluation of the correlated final measurements if no limit line is selected, then no evaluation will be done

Parameter 03 max. no. of results kept per test range
 Default value 6
 Function the maximum number of results that will be kept from each test range through data reduction

Parameter 04 decision threshold dB for peak reduction
 Default value 6.0
 Function determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through

Topic Final

Parameter 01 GTEM final result, none ID fin
 Default value none
 Function optional filename for the results from the final test, gained with the EuT oriented to axis if no filename is specified then a default name will be used

Parameter 02 GTEM final result, none ID fin
 Default value none
 Function optional filename for the results from the final test, gained with the EuT oriented to axis if no filename is specified then a default name will be used

Parameter 03 GTEM final result, none ID fin
 Default value none
 Function optional filename for the results from the final test, gained with the EuT oriented to axis if no filename is specified then a default name will be used

Parameter 04 OATS H final result, none ID pre H
 Default value none
 Function optional filename for the **correlated field strength results** (horizontal polarization) from the final test if no filename is specified then a default name will be used

Parameter 05 OATS V final result, none ID pre V
 Default value none
 Function optional filename for the **correlated field strength results** (vertical polarization) from the final test if no filename is specified then a default name will be used

Parameter 06 perform partial scans
 Default value not checked
 Function if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)

Parameter	07 max. no. of results kept from partial scans
Default value	2
Function	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference this parameter limits the number of results from a partial scan (after data reduction)
Parameter	08 partial scan width no. of IF-BWs (0 use ratio)
Default value	0
Function	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter	09 partial scan width ref. frequ. ratio
Default value	0.01
Function	determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0
Parameter	10 scan table for partial scans
Default value	none
Function	filename of the corresponding scan range table to be used for partial scans
Parameter	11 scan table for final measurements
Default value	none
Function	filename of the corresponding scan range table to be used for the single measurements
Parameter	12 opt. scan table for final meas. 1GHz
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements, but only for frequencies above 1 GHz this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASIPeAK)
Parameter	13 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged
Parameter	14 optional input frequency list
Default value	none
Function	if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test

Topic**Graphics**

Parameter	01 GTEM graphics configuration, none ID CELL
Default value	none
Function	optional filename for the graphics configuration to be used in the test to display the results from the GTEM cell if no filename is specified then a default name will be used
Parameter	02 OATS graphics configuration, none ID OATS

Default value none
 Function optional filename for the graphics configuration to be used in the test to display the results correlated for the OATS if no filename is specified then a default name will be used

Parameter 03 optional graphics template (new graph only)
 Default value none
 Function optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Topic Report

Parameter 01 generate printer hardcopy
 Default value checked
 Function if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter 02 generate RTF file
 Default value not checked
 Function if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter 03 RTF file path name8.3 , empty dialog
 Default value c xxx.rtf
 Function path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up

Parameter 04 report config. for printing, none ID prnt
 Default value none
 Function optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used

Parameter 05 footnote, empty field ID
 Default value
 Function optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used

Parameter 06 optional text file to be included
 Default value none
 Function filename of an optional file of type Text which shall be included in the report

Topic ReportHeader

Parameter 01 test report header, none ID
 Default value none
 Function optional filename for the report header to be used in the test if no filename is specified then a default name will be used

Parameter 02 optional test report header template, none ID
 Default value none
 Function optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be

	used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	GTEM Test
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered
Topic	GTEM
Parameter	01 GTEM parameter a (cell size) m
Default value	0.5

Function	defines the GTEM cell parameter a (see chapter 2.9) which represents the size of the cell
Parameter	02 GTEM parameter b (septum height) m
Default value	1.0
Function	defines the GTEM cell parameter b (see chapter 2.9) which represents the height of the septum
Parameter	03 GTEM parameter g (septum gap) m
Default value	0.36
Function	defines the GTEM cell parameter g (see chapter 2.9) which represents the gap besides the septum
Parameter	04 GTEM parameter x (EuT position) m
Default value	0.0
Function	defines the GTEM cell parameter x (see chapter 2.9) which represents the horizontal position of the EuT
Parameter	05 GTEM parameter y (EuT position) m
Default value	0.5
Function	defines the GTEM cell parameter y (see chapter 2.9) which represents the vertical position of the EuT
Parameter	06 GTEM parameter Z_0 (impedance) Ohm
Default value	50
Function	defines the GTEM cell parameter Z_0 (see chapter 2.9) which represents the impedance of the cell
Parameter	07 OATS parameter d (distance) m
Default value	10
Function	defines the OATS parameter d (see chapter 2.9) which represents the measurement distance
Parameter	08 OATS parameter e (EuT height) m
Default value	0.5
Function	defines the OATS parameter e (see chapter 2.9) which represents the vertical position of the EuT
Parameter	09 OATS parameter h_{min} (antenna height) m
Default value	1.0
Function	defines the OATS parameter h_{min} (see chapter 2.9) which represents the minimum antenna height
Parameter	10 OATS parameter h_{max} (antenna height) m
Default value	4.0
Function	defines the OATS parameter h_{max} (see chapter 2.9) which represents the maximum antenna height
Parameter	11 OATS parameter height step size m
Default value	0.5
Function	defines the OATS parameter height step size (see chapter 2.9) which represents the virtual step size of the antenna height positions
Parameter	12 OATS parameter fully absorbing ground plane
Default value	not checked
Function	if checked then a fully absorbing ground plane is assumed, else a metal ground

plane (see chapter 2.9)

Topic	Manipulator
Parameter Default value Function	01 external manipulator device none symbolic name of the device for controlling of a GTEM EuT manipulator as defined in the device configuration
Parameter Default value Function	02 GPIB initialization command RST PLD RTL GPIB command for the initialization of the manipulator
Parameter Default value Function	03 GPIB command for position P4 GPIB command make the manipulator move the EuT to the position
Parameter Default value Function	04 GPIB command for position P5 GPIB command make the manipulator move the EuT to the position
Parameter Default value Function	05 GPIB command for position P6 GPIB command make the manipulator move the EuT to the position
Parameter Default value Function	06 waiting time in s for positioning 10 defines a waiting time positioning of the EuT the delay time depends on the mechanical system and maybe also on the weight of the EuT

3.14 S-LINE Test

3.14.1 Description

This test provides automatic measurement of radiated electromagnetic interference with an **S-LINE** measurement cell. The test starts with a preview test on three orientations of the EuT and does a data reduction. In the final test (again on three orientations) optionally partial scans can be performed at all critical points simple single measurements - based on a scan table - will be done.

The measurement results will always be correlated to OATS results and be displayed in a separate diagram. If a field strength limit is selected, then the correlated final results will be evaluated against this limit, too.



3.14.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

EN 55022

Frequency Range

30 - 1000 MHz

Detector

Pk

Test Samples

(small and without preferred orientation)

3.14.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames s-line 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 1000 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter Default value Function	06 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	07 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	08 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value	09 test configuration, none ID none

Function optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic Preview

Parameter 01 S-LINE preview result, none ID pre
 Default value none
 Function optional filename for the results from the preview test, gained with the EuT oriented to axis if no filename is specified then a default name will be used

Parameter 02 S-LINE preview result, none ID pre
 Default value none
 Function optional filename for the results from the preview test, gained with the EuT oriented to axis if no filename is specified then a default name will be used

Parameter 03 S-LINE preview result, none ID pre
 Default value none
 Function optional filename for the results from the preview test, gained with the EuT oriented to axis if no filename is specified then a default name will be used

Parameter 04 OATS E preview result, none ID pre E
 Default value none
 Function optional filename for the correlated field strength results from the preview test if no filename is specified then a default name will be used

Parameter 05 scan table for preview
 Default value none
 Function filename of the scan range table to be used for the preview test

Parameter 06 sweep table for preview
 Default value none
 Function filename of the sweep range table to be used for the preview test

Parameter 07 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic DataReduction

Parameter 01 also perform interactive frequency selection
 Default value not checked
 Function if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test . to do so you have to position the marker accordingly and select Remove or Test in a dialog

Parameter 02 limit line
 Default value none
 Function a filename of the field strength limit line (for OATS) which shall be used for the evaluation of the correlated final measurements if no limit line is selected, then no evaluation will be done

Parameter	03 max. no. of results kept per test range
Default value	6
Function	the maximum number of results that will be kept from each test range through data reduction
Parameter	04 decision threshold dB for peak reduction
Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Topic	Final
Parameter	01 S-LINE final result, none ID fin
Default value	none
Function	optional filename for the results from the final test, gained with the EuT oriented to axis if no filename is specified then a default name will be used
Parameter	02 S-LINE final result, none ID fin
Default value	none
Function	optional filename for the results from the final test, gained with the EuT oriented to axis if no filename is specified then a default name will be used
Parameter	03 S-LINE final result, none ID fin
Default value	none
Function	optional filename for the results from the final test, gained with the EuT oriented to axis if no filename is specified then a default name will be used
Parameter	04 OATS E final result, none ID fin E
Default value	none
Function	optional filename for the correlated field strength results from the final test if no filename is specified then a default name will be used
Parameter	05 perform partial scans
Default value	not checked
Function	if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter	06 max. no. of results kept from partial scans
Default value	2
Function	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference this parameter limits the number of results from a partial scan (after data reduction)
Parameter	07 partial scan width no. of IF-BWs (0 use ratio)
Default value	0
Function	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter	08 partial scan width ref. frequ. ratio

Default value 0.01
 Function determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0

Parameter 09 scan table for partial scans
 Default value none
 Function filename of the corresponding **scan range table** to be used for partial scans

Parameter 10 scan table for final measurements
 Default value none
 Function filename of the corresponding **scan range table** to be used for the single measurements

Parameter 11 opt. scan table for final meas. 1GHz
 Default value none
 Function filename of the corresponding **scan range table** to be used for the final measurements, but only for frequencies above 1 GHz this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASIPeAK)

Parameter 12 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Parameter 13 optional input frequency list
 Default value none
 Function if the test shall be performed without a preview test then an existing frequency list can be specified as an input for the final test

Topic Graphics

Parameter 01 S-LINE graphics configuration, none ID CELL
 Default value none
 Function optional filename for the graphics configuration to be used in the test to display the results from the S-LINE cell if no filename is specified then a default name will be used

Parameter 02 OATS graphics configuration, none ID OATS
 Default value none
 Function optional filename for the graphics configuration to be used in the test to display the results correlated for the OATS if no filename is specified then a default name will be used

Parameter 03 optional graphics template (new graph only)
 Default value none
 Function optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Topic Report

Parameter	01 generate printer hardcopy
Default value	checked
Function	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter	02 generate RTF file
Default value	not checked
Function	if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter	03 RTF file path name8.3 , empty dialog
Default value	c xxx.rtf
Function	path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up
Parameter	04 report config. for printing, none ID prnt
Default value	none
Function	optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter	05 footnote, empty field ID
Default value	
Function	optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used
Parameter	06 optional text file to be included
Default value	none
Function	filename of an optional file of type Text which shall be included in the report
Topic	ReportHeader
Parameter	01 test report header, none ID
Default value	none
Function	optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	S-LINE Test
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT

Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered
Topic	SLINE
Parameter	01 S-LINE type is 700
Default value	checked
Function	if checked then a cell of the type S-LINE 700 will be assumed
Parameter	02 S-LINE type is 1000
Default value	not checked
Function	if checked then a cell of the type S-LINE 1000 will be assumed
Parameter	03 S-LINE type is 1500
Default value	not checked
Function	if checked then a cell of the type S-LINE 1500 will be assumed
Parameter	04 S-LINE correction factor (C1)
Default value	none
Function	selection of the appropriate correction table (a system transducer) which corresponds to the term C1 of the S-LINE correlation algorithm (for the S-LINE

type)
Parameter 05 OATS correction factor (C2)
Default value none
Function selection of the appropriate correction table (a system transducer) which corresponds to the term C2 of the S-LINE correlation algorithm (for the OATS setup like e.g. the measurement distance)

3.15 Automotive Test

3.15.1 Description

This test provides measurement of conducted and radiated electromagnetic interference according to the automotive standard CISPR 25 (EN55025).

This standard defines limits for narrowband (NB) and broadband (BB) interference.

The NB/BB discrimination is done through a comparison of the PEAK and AVERAGE levels. This requires a sufficiently low noise floor to avoid that NB interferers will be interpreted as BB interferers.

For radiated emissions the script supports measurements with horizontal and vertical antenna polarization (optionally with automatic switching).

The preview test will be done with the PEAK detector.

If the preview test is done with PEAK AVERAGE, then the 2nd detector is informative only.

Those points critical referring to the NB limit will be evaluated with PEAK and AVERAGE, the BB interferers optionally with QUASIPeAK. The NB/BB discrimination is realized through a simple calculation of the difference (variable threshold) between PEAK and AVERAGE levels.

3.15.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

CISPR 25 (EN 55025) conducted

Frequency Range	0.15 - 108 MHz
Detector	Pk (AV) / QP

CISPR 25 (EN 55025) radiated

Frequency Range	0.15 - 960 MHz
Detector	Pk (AV) / QP

3.15.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames auto 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 300 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 confirmation for final test after data reduction not checked if checked then after data reduction a query will come up enables to skip the final test within the current test range
Parameter Default value Function	06 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	07 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	08 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value	09 test configuration, none ID none

Function optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic Preview

Parameter 01 preview result file, none ID pre
 Default value none
 Function optional filename for the results (1st detector, e.g. PEAK) from the preview test if no filename is specified then a default name will be used

Parameter 02 2nd preview result file, none ID pre2
 Default value none
 Function optional filename for the results (2nd detector, e.g. AVERAGE) from the preview test if no filename is specified then a default name will be used

Parameter 03 scan table for preview
 Default value none
 Function filename of the scan range table to be used for the preview test

Parameter 04 optional 2nd scan table for preview (vertical)
 Default value none
 Function filename of a second scan range table for the preview test which to be used only when measurements are done with vertical polarization if used then the first scan range table will be used with horizontal polarization only

Parameter 05 sweep table for preview
 Default value none
 Function filename of the sweep range table to be used for the preview test

Parameter 06 optional 2nd sweep table for preview (vertical)
 Default value none
 Function filename of a second sweep range table for the preview test which will be used only when measurements are done with vertical polarization if used then the first sweep range table will be used with horizontal polarization only

Parameter 07 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic DataReduction

Parameter 01 also perform interactive frequency selection
 Default value not checked
 Function if checked then you can review the points that have been found through the automatic data reduction, i.e. you can remove points or add new ones for the test . to do so you have to position the marker accordingly and select Remove or Test in a dialog

Parameter 02 NB limit line
 Default value none
 Function a filename that corresponds to the NB limit line

Parameter	03 optional NB acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction if used then the given value for the acceptance offset will be ignored
Parameter	04 BB limit line (PK)
Default value	none
Function	a filename that corresponds to the BB limit for PEAK measurements
Parameter	05 optional BB limit line (QP)
Default value	none
Function	a filename that corresponds to the optional BB limit for QUASISPEAK measurements
Parameter	04 max. no. of results kept per test range
Default value	6
Function	the maximum number of results that will be kept from each test range through data reduction
Parameter	05 decision threshold dB for peak reduction
Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter	06 level offset dB for acceptance analysis
Default value	-10.0
Function	determines the level offset when data reduction is done with the Acceptance Analysis
Topic	Final
Parameter	01 final NB result file, none ID fin NB
Default value	none
Function	optional filename for the NB results from the final measurements if no filename is specified then a default name will be used
Parameter	02 final BB result file, none ID fin BB
Default value	none
Function	optional filename for the BB results from the final measurements if no filename is specified then a default name will be used
Parameter	03 scan table for partial scans maximization
Default value	none
Function	filename of the corresponding scan range table to be used for maximization measurements as well as for partial scans
Parameter	04 optional 2nd scan table (vertical)
Default value	none
Function	filename of the corresponding scan range table to be used for maximization measurements as well as for partial scans it will be used only when measurements are done with vertical polarization if used then the first scan range table will be used with horizontal polarization only

Parameter	05 perform partial scans
Default value	not checked
Function	if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter	06 max. no. of results kept from partial scans
Default value	2
Function	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference this parameter limits the number of results from a partial scan (after data reduction)
Parameter	07 partial scan width no. of IF-BWs (0 use ratio)
Default value	0
Function	determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter	08 partial scan width ref. frequ. ratio
Default value	0.01
Function	determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0
Parameter	09 complete search on selected polarisations
Default value	checked
Function	determines the search mode for the preview test complete search means that measurements will be done on all polarization settings as specified with the polarization parameters for the final test else measurements will be done on those clamp settings that were determined through the preview test
Parameter	10 scan table for final measurements
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements
Parameter	11 optional 2nd scan table (vertical)
Default value	none
Function	filename of the corresponding scan range table to be used for the final measurements it will be used only when measurements are done with vertical polarization if used then the first scan range table will be used with horizontal polarization only
Parameter	12 decision threshold dB for NB/BB discrimination
Default value	6
Function	determines the decision level threshold for the selected NB/BB discrimination the standard requires a value of 6.0 dB
Parameter	13 opt. scan table for final QP measurements
Default value	none
Function	optional filename of the corresponding scan range table to be used for the final QP measurements

Parameter 14 optional 2nd scan table (vertical)
 Default value none
 Function optional filename of the corresponding **scan range table** to be used for the final QP measurements it will be used only when measurements are done with vertical polarization if used then the first scan range table will be used with horizontal polarization only

Parameter 15 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic Graphics

Parameter 01 graphics configuration, none ID
 Default value none
 Function optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used

Parameter 02 optional graphics template (new graph only)
 Default value none
 Function optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter 03 minimize graphics for test
 Default value not checked
 Function if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

Topic Report

Parameter 01 generate printer hardcopy
 Default value checked
 Function if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter 02 generate RTF file
 Default value not checked
 Function if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter 03 RTF file path name8.3 , empty dialog
 Default value c xxx.rtf
 Function path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up

Parameter 04 report config. for printing, none ID prnt

Default value	none
Function	optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter	05 footnote, empty field ID
Default value	
Function	optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used
Parameter	06 optional text file to be included
Default value	none
Function	filename of an optional file of type Text which shall be included in the report
Topic	ReportHeader
Parameter	01 test report header, none ID
Default value	none
Function	optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	Automotive Test
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed

Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered
Topic	Polarization
Parameter	01 use manual switching only
Default value	checked
Function	if checked then manual control of the antenna polarization through dialogue boxes will be used
Parameter	02 use auto switching only
Default value	not checked
Function	if checked then automatic control of the antenna polarization will be used
Parameter	03 symbolic name of autom. controlled polariz.
Default value	MAST
Function	symbolic device name of the automatically controlled antenna polarization as defined in the device configuration menu
Parameter	04 delay time sec for auto switching
Default value	4
Function	defines a waiting time with automatic switching of the antenna polarization the delay time depends on the mechanical system and maybe also on the weight of the antenna (the driver never gives a feedback when the switching has been completed)
Parameter	05 measurements with horizontal polarization
Default value	not checked
Function	if checked then the all measurements will (also) be done with horizontal polarization
Parameter	06 measurements with vertical polarization
Default value	checked
Function	if checked then the all measurements will (also) be done with vertical polarization

3.16 EMI STD Test

3.16.1 Description

This test provides automatic measurement of conducted and radiated electromagnetic interference according to those specifications that do not require a classification for narrowband (NB) and broadband (BB) signals (e.g. MIL STD 461/462 D, DEF-STAN, etc.). The test starts with a preview test (sweep or scan with single detector) and does a data reduction. In the final test optionally partial scans can be performed at all critical points simple single measurements - based on a scan table - will be done.

3.16.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

MIL STD 461 D CE101

Frequency Range	0.03 - 10 kHz
Detector	Pk
Test Samples	Power Leads

MIL STD 461 D CE102

Frequency Range	0.01 - 10 MHz
Detector	Pk
Test Samples	Power Leads

MIL STD 461 D RE101

Frequency Range	0.03 - 100 kHz
Detector	Pk
Test Samples	Magnetic Field Emissions

MIL STD 461 D RE102

Frequency Range	10 kHz - 18 GHz
Detector	Pk
Test Samples	Electric Field Emissions

3.16.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames emi 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30e-6 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 10e3 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 split frequency range into test ranges checked the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter Default value Function	06 if splitting of frequency range do with log. scale checked if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter Default value Function	07 no. of test ranges for splitting of frequency range 1 defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter Default value Function	08 test configuration, none ID none optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used
Topic	Preview

Parameter	01 preview result file, none ID pre
Default value	none
Function	optional filename for the (PEAK) results from the preview test if no filename is specified then a default name will be used
Parameter	02 scan table for preview
Default value	none
Function	filename of the scan range table to be used for the preview test
Parameter	03 sweep table for preview
Default value	none
Function	filename of the sweep range table to be used for the preview test
Parameter	04 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged

Topic DataReduction

Parameter	01 limit line
Default value	none
Function	a filename that corresponds to the required limit line
Parameter	02 optional acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction if used then the given value for the acceptance offset will be ignored
Parameter	03 broadband correction (/MHz) of results
Default value	not checked
Function	if checked then an additional bandwidth correction will be done on the results which therefore will be displayed with the broadband unit (required by standard RTCA/DO-160) in that case the limit has to be defined with that level unit, too
Parameter	03 max. no. of results kept per test range
Default value	6
Function	the maximum number of results that will be kept from each test range through data reduction
Parameter	04 decision threshold dB for peak reduction
Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter	05 level offset dB for acceptance analysis
Default value	-10.0
Function	determines the level offset when data reduction is done with the Acceptance Analysis

Topic	Final
Parameter Default value Function	01 final result file, none ID fin none optional filename for the (PEAK) results from the final test if no filename is specified then a default name will be used
Parameter Default value Function	02 scan table for partial scans single meas. none filename of the corresponding scan range table to be used for the final test, for partial scans as well as for single measurements
Parameter Default value Function	03 perform partial scans not checked if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter Default value Function	04 max. no. of results kept from partial scans 2 when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference this parameter limits the number of results from a partial scan (after data reduction)
Parameter Default value Function	05 partial scan width no. of IF-BWs (0 use ratio) 0 determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter
Parameter Default value Function	06 partial scan width ref. frequ. ratio 0.01 determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0
Parameter Default value Function	07 scan table for final measurements none filename of the corresponding scan range table to be used for the final measurements
Parameter Default value Function	08 opt. scan table for final meas. 1GHz none filename of the corresponding scan range table to be used for the final measurements, but only for frequencies above 1 GHz this way measurements above 1 GHz can be done with an other detector (e.g. PEAK) than those below 1 GHz (e.g. QUASIPeAK)
Parameter Default value Function	09 insert results into existing result file not checked if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified

frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic**Graphics**

Parameter 01 graphics configuration, none ID
 Default value none
 Function optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used

Parameter 02 optional graphics template (new graph only)
 Default value none
 Function optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)

Parameter 03 minimize graphics for test
 Default value not checked
 Function if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

Topic**Report**

Parameter 01 generate printer hardcopy
 Default value checked
 Function if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter 02 generate RTF file
 Default value not checked
 Function if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter 03 RTF file path name8.3 , empty dialog
 Default value c xxx.rtf
 Function path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up

Parameter 04 report config. for printing, none ID prnt
 Default value none
 Function optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used

Parameter 05 footnote, empty field ID
 Default value
 Function optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used

Parameter 06 optional text file to be included
 Default value none
 Function filename of an optional file of type Text which shall be included in the report

Topic	ReportHeader
Parameter Default value Function	01 test report header, none ID none optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter Default value Function	02 optional test report header template, none ID none optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter Default value Function	03 1st header line TEST a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	04 2nd header line EMI STD Test a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	05 EuT name EuT a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	06 manufacturer a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	07 operating conditions a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	08 test site a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	09 operator a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	10 test specification a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	11 comment line a string that will be taken as a comment line if no string is given then the

referring entry of the report header won t be changed

Parameter
Default value
Function

12 2nd comment line (empty field start time)

a string that will be taken as a comment line if no string is given then the start time of the test will be entered

3.17 MIL STD 461/462 C Test

3.17.1 Description

This test provides automatic measurement of conducted and radiated electromagnetic interference according to the American MIL STD 461/462 C specifications. Some of the specifications require a classification for narrowband (NB) and broadband (BB) signals.

A NB/BB discrimination can be done only on scan results (from a preview scan or from partial scans in the final test) single measurements will not be performed.

To make use of the PK-AV method the selected scan table has to be defined with exactly these detectors (1st PK, 2nd AV).

The tuning methods require certain scan step sizes, depending on the defined IF bandwidth for the points at the edge of the scan table's subranges there won't be any NB/BB results because the algorithm works within these subranges only.

The PK-AV method is the most reliable discrimination method but the scans require more time to perform (two detectors).

Above 1 GHz no discrimination will be done for that frequency range the specifications don't have BB limits.

3.17.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

MIL STD 461 C CE01

Frequency Range	0.03 - 15 kHz
Detector	Pk (NB)
Test Samples	Part 3 Equipment

MIL STD 461 C CE03

Frequency Range	0.015 - 50 MHz
Detector	Pk (NB), Pk/MHz (BB)
Test Samples	Part 3 Equipment Navy and Air Force

MIL STD 461 C RE01

Frequency Range	0.03 - 50 kHz
Detector	Pk (NB)
Test Samples	Part 3 Equipment

MIL STD 461 C RE02

Frequency Range	0.014 - 10000 MHz (NB), 0.014 - 1000 MHz (BB)
Detector	Pk (NB), Pk/MHz (BB)
Test Samples	Part 3 Equipment (Curve 1)

3.17.3 List of the Script Parameters

Topic	Test
Parameter	01 ID max. 12 chars to be included in filenames
Default value	mil 0001
Function	a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter	02 global start frequency MHz for the test
Default value	30e-6
Function	no measurements will be done below this frequency
Parameter	03 global stop frequency MHz for the test
Default value	10e3
Function	no measurements will be done above this frequency
Parameter	04 suppress queries as far as possible
Default value	not checked
Function	if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter	05 split frequency range into test ranges
Default value	checked
Function	the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter	06 if splitting of frequency range do with log. scale
Default value	checked
Function	if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter	07 no. of test ranges for splitting of frequency range
Default value	1
Function	defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter	08 test configuration, none ID
Default value	none
Function	optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic **Preview**

Parameter	01 preview result file, none ID pre
Default value	none
Function	optional filename for the PEAK results from the preview test if no filename is specified then a default name will be used
Parameter	02 2nd preview result file, none ID pre2
Default value	none
Function	optional filename for the AVERAGE results from the preview test if no filename is specified then a default name will be used
Parameter	03 scan table for preview
Default value	none
Function	filename of the scan range table to be used for the preview test
Parameter	04 sweep table for preview
Default value	none
Function	filename of the sweep range table to be used for the preview test
Parameter	05 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged

Topic DataReduction

Parameter	01 NB limit line
Default value	none
Function	a filename that corresponds to the required NB limit line
Parameter	02 optional NB acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of NB results if used then the given value for the acceptance offset will be ignored
Parameter	03 BB limit line
Default value	none
Function	a filename that corresponds to the required BB limit line
Parameter	04 optional BB acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of BB results if used then the given value for the acceptance offset will be ignored
Parameter	05 max. no. of results kept per test range
Default value	6
Function	the maximum number of results that will be kept from each test range through data reduction
Parameter	06 decision threshold dB for peak reduction

Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter	07 level offset dB for acceptance analysis
Default value	-10.0
Function	determines the level offset when data reduction is done with the Acceptance Analysis
Parameter	08 0/1/2/3 NB/BB discr. none/tun1BW/tun2BW/PK-AV
Default value	2
Function	type of narrowband/broadband discrimination no discrimination / tuning method /- 1 IF bandwidth / tuning method /- 2 IF bandwidths / PK/AV comparison method
Parameter	09 decision threshold dB for NB/BB reduction
Default value	6.0
Function	determines the decision level threshold for the selected NB/BB discrimination recommended values are 6 dB for the tuning methods and 12 dB for the PK-AV comparison method
Parameter	10 max. no. of BB results kept per octave
Default value	3
Function	maximum number of BB results to be kept per octave from the final results
Topic	Final
Parameter	01 final NB result file, default ID fin NB
Default value	none
Function	optional filename for the NB results from the final test if no filename is specified then a default name will be used
Parameter	02 final BB result file, default ID fin BB
Default value	none
Function	optional filename for the BB results from the final test if no filename is specified then a default name will be used
Parameter	03 scan table for partial scans
Default value	none
Function	filename of the corresponding scan range table to be used for partial scans in the final test
Parameter	04 perform partial scans
Default value	not checked
Function	if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter	05 max. no. of results kept from partial scans
Default value	2
Function	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference this parameter limits

the number of results from a partial scan (after data reduction)

Parameter 06 partial scan width no. of IF-BWs (0 use ratio)
 Default value 0
 Function determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter

Parameter 07 partial scan width ref. frequ. ratio
 Default value 0.01
 Function determines the frequency range for partial scans (e.g. 0.01 means $\pm 0.5\%$) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0

Parameter 08 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic Graphic

Parameter 01 NB graphics configuration, default ID NB
 Default value none
 Function optional filename for the graphics configuration to be used for the NB results if no filename is specified then a default name will be used

Parameter 02 BB graphics configuration, default ID BB
 Default value none
 Function optional filename for the graphics configuration to be used for the BB results if no filename is specified then a default name will be used

Parameter 03 minimize graphics for test
 Default value not checked
 Function if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

Topic Report

Parameter 01 generate printer hardcopy
 Default value checked
 Function if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software

Parameter 02 generate RTF file
 Default value not checked
 Function if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products

Parameter 03 RTF file path name8.3 , empty dialog

Default value	c xxx.rtf
Function	path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up
Parameter	04 report config. for printing, none ID prnt
Default value	none
Function	optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter	05 footnote, empty field ID
Default value	
Function	optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used
Parameter	06 optional text file to be included
Default value	none
Function	filename of an optional file of type Text which shall be included in the report

Topic ReportHeader

Parameter	01 test report header, none ID
Default value	none
Function	optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	MIL STD 461/462C Test
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed

Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line
Default value	
Function	a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter	12 2nd comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered

3.18 MIL STD D Limits

3.18.1 Description

In the U.S. norm MIL-STD 461/462 D for conducted measurements, depending on the actual current on the leads, the level limit may be increased. With this auxiliary script it is very easy to derive a corresponding new limit line.

3.18.2 List of the Script Parameters

Topic	Conversion
Parameter Default value Function	01 Name of the reference limit line none name of the limit line which shall be used as a reference
Parameter Default value Function	02 Name of the new limit line none name of the new limit line which shall be calculated (parallel shift by the offset value)
Parameter Default value Function	03 Current in Ampere 1.0 value of the lead current in Ampere
Parameter Default value Function	04 Name of graphics configuration none name of the graphics configuration to be used
Parameter Default value Function	05 Limit shifting according to CE 101-1 not checked if checked then a constant offset will be calculated to define the new limit line a the sum of the reference limit line and of the offset current 3.0 A offset 0 dB current 185.0 A offset 35 dB else offset 20 $\log_{10}(\text{current} / 3.0)$
Parameter Default value Function	06 Limit shifting according to CE 101-2 not checked if checked then a constant offset will be calculated to define the new limit line a the sum of the reference limit line and of the offset current 1.0 A offset 0 dB else offset 20 $\log_{10}(\text{current} / 3.0)$
Parameter Default value Function	07 Limit shifting according to CE 101-3 not checked if checked then a constant offset will be calculated to define the new limit line a the sum of the reference limit line and of the offset current 2.0 A offset 0 dB else offset 20 $\log_{10}(\text{current} / 3.0)$

3.19 GAM Test

3.19.1 Description

This test provides automatic measurement of conducted and radiated electromagnetic interference according to the French military standard GAM EG 13. Some of the specifications require a classification for narrowband (NB) and broadband (BB) signals.

A NB/BB discrimination can be done only on scan results (from a preview scan or from partial scans in the final test) single measurements will not be performed.

To make use of the PK-AV method the selected scan table has to be defined with exactly these detectors (1st PK, 2nd AV).

The tuning methods require certain scan step sizes, depending on the defined IF bandwidth for the points at the edge of the scan table's subranges there won't be any NB/BB results because the algorithm works within these subranges only.

The PK-AV method is the most reliable discrimination method but the scans require more time to perform (two detectors).

Above 1 GHz no discrimination will be done for that frequency range the specifications don't have BB limits.

The standard requires final measurements of NB interferers with AV, BB interferers with PK.

3.19.2 Parameter Sets

Currently the following specifications are supported by the ES-K1 Standard Data

GAM EG 13 C1

Frequency Range 30 Hz - 50 MHz (NB), 10 kHz - 50 MHz (BB)
Detector Pk (NB), Pk (BB)

GAM EG 13 C2

Frequency Range 0.01 - 50 MHz
Detector Pk (NB)

GAM EG 13 C3

Frequency Range 0.01 - 50 MHz
Detector Pk (NB), Pk (BB)

GAM EG 13 R1

Frequency Range 0.03 - 50 kHz
Detector Pk (NB)

GAM EG 13 R3

Frequency Range 0.01 - 10000 MHz (NB), 0.01 - 1000 MHz (BB)
Detector Pk (NB), Pk (BB)

3.19.3 List of the Script Parameters

Topic	Test
Parameter	01 ID max. 12 chars to be included in filenames
Default value	gam 0001
Function	a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter	02 global start frequency MHz for the test
Default value	30e-6
Function	no measurements will be done below this frequency
Parameter	03 global stop frequency MHz for the test
Default value	10e3
Function	no measurements will be done above this frequency
Parameter	04 suppress queries as far as possible
Default value	not checked
Function	if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter	05 split frequency range into test ranges
Default value	checked
Function	the total frequency range of the test can optionally be split into test ranges (linear or logarithmic, with respect to the ranges of the scan/sweep range table) that are calculated by the script and will be completely tested (preview test, data reduction, final test), therefore reducing the time elapsed between preview and final test, which is very useful with interference drifting over frequency besides, this method reduces manual interaction, if more than one probe transducer has to be used for the test (e.g. two antennas for 30 - 1000 MHz in a field strength test) the value given with parameter <i>t</i> has to be interpreted as a minimum value if the value is set to (typically) 1 then nevertheless for each subrange of the scan/sweep table which used for the preview test, a test range will be calculated (e.g. a field strength test with two antennas or scan/sweep ranges will lead to one test range each) if splitting is not used then the whole frequency range of the scan/sweep table will be tested as one single test range (but maybe with a number of messageboxes requiring to change the antenna)
Parameter	06 if splitting of frequency range do with log. scale
Default value	checked
Function	if checked then the splitting of the frequency range (if activated) will lead to test ranges of equal width in the logarithmic scale, else in the linear scale
Parameter	07 no. of test ranges for splitting of frequency range
Default value	1
Function	defines the number of test ranges that shall be calculated for the splitting of the frequency range
Parameter	08 test configuration, none ID
Default value	none
Function	optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used

Topic **Preview**

Parameter	01 preview result file, none ID pre
Default value	none
Function	optional filename for the PEAK results from the preview test if no filename is specified then a default name will be used
Parameter	02 2nd preview result file, none ID pre2
Default value	none
Function	optional filename for the AVERAGE results from the preview test if no filename is specified then a default name will be used
Parameter	03 scan table for preview
Default value	none
Function	filename of the scan range table to be used for the preview test
Parameter	04 sweep table for preview
Default value	none
Function	filename of the sweep range table to be used for the preview test
Parameter	05 insert results into existing result file
Default value	not checked
Function	if not checked then any existing result files with a filename identical to the filename used in the preview test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to remeasure certain bands of the spectrum while keeping the rest unchanged

Topic DataReduction

Parameter	01 NB limit line
Default value	none
Function	a filename that corresponds to the required NB limit line
Parameter	02 optional NB acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of NB results if used then the given value for the acceptance offset will be ignored
Parameter	03 BB limit line
Default value	none
Function	a filename that corresponds to the required BB limit line
Parameter	04 optional BB acceptance line (no offset)
Default value	none
Function	a filename of an optional limit line which will be directly used as a quasi arbitrarily defined acceptance line for the acceptance analysis during data reduction of BB results if used then the given value for the acceptance offset will be ignored
Parameter	05 max. no. of results kept per test range
Default value	6
Function	the maximum number of results that will be kept from each test range through data reduction
Parameter	06 decision threshold dB for peak reduction

Default value	6.0
Function	determines the decision level when data reduction is done with the Peak Reduction a higher (stricter) value means that less peaks will be detected in the spectrum so that more results from the subrange maxima reduction will come through
Parameter	07 level offset dB for acceptance analysis
Default value	-10.0
Function	determines the level offset when data reduction is done with the Acceptance Analysis
Parameter	08 0/1/2/3 NB/BB discr. none/tun1BW/tun2BW/PK-AV
Default value	2
Function	type of narrowband/broadband discrimination no discrimination / tuning method /- 1 IF bandwidth / tuning method /- 2 IF bandwidths / PK/AV comparison method
Parameter	09 decision threshold dB for NB/BB reduction
Default value	6.0
Function	determines the decision level threshold for the selected NB/BB discrimination recommended values are 6 dB for the tuning methods and 12 dB for the PK-AV comparison method
Parameter	10 max. no. of BB results kept per octave
Default value	3
Function	maximum number of BB results to be kept per octave from the final results
Topic	Final
Parameter	01 final NB result file, default ID fin NB
Default value	none
Function	optional filename for the NB results from the final test if no filename is specified then a default name will be used
Parameter	02 final BB result file, default ID fin BB
Default value	none
Function	optional filename for the BB results from the final test if no filename is specified then a default name will be used
Parameter	03 scan table for partial scans
Default value	none
Function	filename of the corresponding scan range table to be used for partial scans in the final test
Parameter	04 perform partial scans
Default value	not checked
Function	if checked then additional partial scans will be performed around the frequencies to be analyzed in this case the final measurements will be done on those frequencies that have been found (through data reduction) with these partial scans (recommended when preview was done with sweeps or when drifting interference is to be expected)
Parameter	05 max. no. of results kept from partial scans
Default value	2
Function	when a partial scan is performed then after data reduction there might still be more than one significant frequency linked to interference this parameter limits

the number of results from a partial scan (after data reduction)

Parameter 06 partial scan width no. of IF-BWs (0 use ratio)
 Default value 0
 Function determines the frequency range for partial scans expressed in multiples of the IF bandwidth used in the referring scan/sweep table if the value is set to 0 then the calculation of the partial scan width is based on the following parameter

Parameter 07 partial scan width ref. frequ. ratio
 Default value 0.01
 Function determines the frequency range for partial scans (e.g. 0.01 means ± 0.5) in reference to the given mid frequency the parameter is effective only if the previous parameter is set to 0

Parameter 08 scan table for final measurements
 Default value none
 Function filename of the corresponding **scan range table** to be used for the final measurements according to GAM EG 13 use 1st detector AV for the NB interferers and 2nd detector PK for the BB interferers

Parameter 08 insert results into existing result file
 Default value not checked
 Function if not checked then any existing result files with a filename identical to the filename used in the final test will be deleted/overwritten else any existing result files will only partly be overwritten (within the specified frequency range) this way it is possible to **remeasure certain bands of the spectrum** while keeping the rest unchanged

Topic Graphic

Parameter 01 NB graphics configuration, default ID NB
 Default value none
 Function optional filename for the graphics configuration to be used for the NB results if no filename is specified then a default name will be used

Parameter 02 BB graphics configuration, default ID BB
 Default value none
 Function optional filename for the graphics configuration to be used for the BB results if no filename is specified then a default name will be used

Parameter 03 PK curve graphics config., none ID PK
 Default value none
 Function optional filename for the graphics configuration to be used for the PEAK results (preview curve) if no filename is specified then a default name will be used

Parameter 04 minimize graphics for test
 Default value not checked
 Function if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report therefore no graphics updates will occur which in turn avoids any possible delays when handling very long scan curves

Topic Report

Parameter 01 generate printer hardcopy
 Default value checked

Function	if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter	02 generate RTF file
Default value	not checked
Function	if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter	03 RTF file path name8.3 , empty dialog
Default value	c xxx.rtf
Function	path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up
Parameter	04 report config. for printing, none ID prnt
Default value	none
Function	optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter	05 footnote, empty field ID
Default value	
Function	optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used
Parameter	06 optional text file to be included
Default value	none
Function	filename of an optional file of type Text which shall be included in the report
Topic	ReportHeader
Parameter	01 test report header, none ID
Default value	none
Function	optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter	02 optional test report header template, none ID
Default value	none
Function	optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter	03 1st header line
Default value	TEST
Function	a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter	04 2nd header line
Default value	GAM EG 13 Test
Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed

Parameter Default value Function	06 manufacturer a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	07 operating conditions a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	08 test site a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	09 operator a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	10 test specification a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	11 comment line a string that will be taken as a comment line if no string is given then the referring entry of the report header won t be changed
Parameter Default value Function	12 2nd comment line (empty field start time) a string that will be taken as a comment line if no string is given then the start time of the test will be entered

3.20 RF Exposure Test

3.20.1 Description

This test provides automatic measurement of electromagnetic power, including the calculation of the absolute and (referring to a limit line) the relative power flux density.

The purpose of the test is to evaluate the total ambient RF power that affects a human being at a certain location. To achieve this, the electric field strength will be measured over a large frequency range with antennas that have a receiving characteristic similar to that of a human body (e.g. vertically polarized rod antennas).

The (proposed) limits existing so far describe the equivalent field strength (V/m) against frequency that a single sinusoidal carrier (nothing else in the whole spectrum) may reach the relative power flux density then has exactly a value of 1.0 .

The units of the limits of the equivalent field strength can be converted using the following formulas

E_g limit of the equivalent electric field strength V/m
 E_g logarithmic value of the limit of the equivalent electric field strength dBuV/m

$$E_g = 20 \log_{10}(E_g \cdot 10^6)$$

and respectively

$$E_g = (10^{(E_g/20)} \cdot 10^{-6})$$

The actual power flux density can be evaluated through summing up of all contributions to the spectrum (3 dB bandwidth of the IF filter)

Absolute power flux density S_{abs} W/m²

E electric field strength V/m
 E logarithmic value of the electric field strength dBuV/m
 ρ electromagnetic impedance in space (120 Ohm 377 Ohm)

$$S_{abs} = \sum \frac{E^2}{\rho}$$

$$1/\rho \sum E^2$$

$$1/\rho \sum 10^{(E/20)} \cdot 10^{-6} \cdot 2$$

$$1/\rho \sum 10^{(E/10)} \cdot 10^{-12}$$

$$1/\rho \sum 10^{(E/10 - 12)}$$

Relative power flux density S_{rel} (has no unit)

- E electric field strength V/m
- E logarithmic value of the electric field strength dBuV/m
- E_g limit of the equivalent electric field strength V/m
- E_g logarithmic value of the limit of the equivalent electric field strength dBuV/m

$$S_{rel} = \frac{\sum E^2}{\sum (10^{(E/20)} \cdot 10^{-6})^2} / \left(\frac{\sum (10^{(E_g/20)} \cdot 10^{-6})^2}{\sum 10^{(E - E_g)/10}} \right)^2$$

The time for calculating the relative power flux density can significantly be shortened if a predefined uncertainty (e.g. maximum 2%) is tolerable, i.e., if only those parts of the spectrum will be considered that contribute enough to the result this method is realized through an acceptance analysis for each range of constant step size and IF bandwidth, with an acceptance offset (in dB) that will be calculated using the following formula

- B step size 3 dB bandwidth of the IF filter Hz
(typ. 0.7 nominal IF bandwidth)
- sw frequency range under consideration (scan width) Hz
(in the test the width of the current subrange)
- tol tolerance (maximum uncertainty)

$$\text{Offset} = 10 \log_{10}(sw / (B \cdot tol/100))$$

For those frequency ranges where no limit is defined, only the absolute power flux density can be evaluated.

The step size in the scan range table has to match with the IF bandwidth in use (step size 3 dB bandwidth), so that the whole spectrum will be evaluated without any gaps and also without any overlaps the only detector suitable for the test is the RMS detector, which means that a receiving instrument without an RMS detector can't be used for the test. The names of the antenna factors to be used in the test have also to be specified in the scan range table.

3.20.2 Parameter Sets

Currently the following specification is supported by the ES-K1 Standard Data

VDE 0848 Part 2

- Frequency Range 30 kHz - 300 GHz
- Detector RMS
- Test Samples (exposition range)

3.20.3 List of the Script Parameters

Topic	Test
Parameter Default value Function	01 ID max. 12 chars to be included in filenames exp 0001 a short string that will be used for building up various default strings (see below) this string enables easy identification of files that belong to the same test
Parameter Default value Function	02 global start frequency MHz for the test 30e-3 no measurements will be done below this frequency
Parameter Default value Function	03 global stop frequency MHz for the test 300e9 no measurements will be done above this frequency
Parameter Default value Function	04 suppress queries as far as possible not checked if not checked then additional queries will come up that help to avoid overwriting of files or to skip certain parts of the test
Parameter Default value Function	05 test configuration, none ID none optional filename of the test configuration (lists all files belonging to the test, for easy transfers through Export/Import/Move) to be created by the test if no filename is specified then a default name will be used
Topic	Preview
Parameter Default value Function	01 preview result file, none ID pre none optional filename for the (PEAK) results from the preview test if no filename is specified then a default name will be used
Parameter Default value Function	02 scan table for preview none filename of the scan range table to be used for the preview test
Topic	Graphics
Parameter Default value Function	01 graphics configuration, none ID none optional filename for the graphics configuration to be used in the test if no filename is specified then a default name will be used
Parameter Default value Function	02 optional graphics template (new graph only) none optional file name of a predefined graphics configuration, from which the graphics configuration to be used in the test shall be derived (line type and color settings)
Parameter Default value Function	03 minimize graphics for test not checked if checked then the graphics will be minimized before the measurements starts and it will be restored before generating the report therefore no graphics

updates will occur which in turn avoids any possible delays when handling very long scan curves

Topic	Report
Parameter Default value Function	01 generate printer hardcopy checked if checked then a report configuration for printing will be generated and a hardcopy will be sent to the device which is defined as the printer for the software
Parameter Default value Function	02 generate RTF file not checked if checked then a report file will be created using the Rich Text Format (a kind of generic MS Word format) which can be edited with many other text processing software products
Parameter Default value Function	03 RTF file path name8.3 , empty dialog c xxx.rtf path file name (8.3 name format) of the RTF file if the RTF report is activated if an empty string is used then a file selection dialog will come up
Parameter Default value Function	04 report config. for printing, none ID prnt none optional filename for the report configuration for printing, if printer output is selected if no filename is specified then a default name will be used
Parameter Default value Function	05 footnote, empty field ID optional text as a footnote on the pages of the test report if an empty string is used then the ID string of the test will be used
Parameter Default value Function	06 optional text file to be included none filename of an optional file of type Text which shall be included in the report

Topic	ReportHeader
Parameter Default value Function	01 test report header, none ID none optional filename for the report header to be used in the test if no filename is specified then a default name will be used
Parameter Default value Function	02 optional test report header template, none ID none optional filename of a report header which shall be taken as a template for the one to be used in the test if no filename is specified then a default name will be used
Parameter Default value Function	03 1st header line TEST a string that will be taken as the first header line if no string is given then the referring entry of the report header won t be changed
Parameter Default value	04 2nd header line RF Exposure

Function	a string that will be taken as the second header line if no string is given then the referring entry of the report header won t be changed
Parameter	05 EuT name
Default value	EuT
Function	a string that will be taken as the description of the equipment under test if no string is given then the referring entry of the report header won t be changed
Parameter	06 manufacturer
Default value	
Function	a string that will be taken as the name of the manufacturer (of the EuT) if no string is given then the referring entry of the report header won t be changed
Parameter	07 operating conditions
Default value	
Function	a string that will be taken as the description of the conditions of the test if no string is given then the referring entry of the report header won t be changed
Parameter	08 test site
Default value	
Function	a string that will be taken as the description of the test site if no string is given then the referring entry of the report header won t be changed
Parameter	09 operator
Default value	
Function	a string that will be taken as the description of the operator if no string is given then the referring entry of the report header won t be changed
Parameter	10 test specification
Default value	
Function	a string that will be taken as the description of the test specification if no string is given then the referring entry of the report header won t be changed
Parameter	11 comment line (empty field start time)
Default value	
Function	a string that will be taken as a comment line if no string is given then the start time of the test will be entered
Topic	RfExposure
Parameter	01 limit line
Default value	none
Function	limit line for the test
Parameter	02 rel. power flux result tolerance (0 no acc. analysis)
Default value	0
Function	defines the maximum uncertainty of the relative power flux density if a data reduction shall be done through an acceptance analysis if the value is set to 0 then all measurements will be considered for the calculation

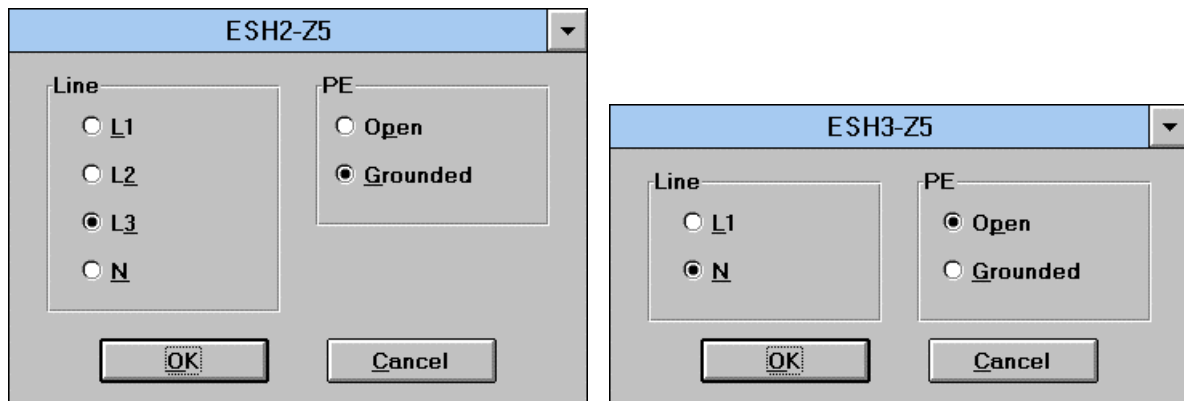
4 Standard Device Drivers

4.1 V Networks ESH2-Z5 / ENV 4200 and ES-H3-Z5 / ENV 216

The drivers provide all functions that are necessary for controlling the artificial mains networks ESH2- 5 / ENV 4200 (four line V-network) and ESH3- 5 / ENV 216 (two line V-network) from Rohde Schwarz.

4.1.1 Interactive Mode

With the selection of **ESH2-Z5...** or **ES-H3-Z5...** in the menu **Test - Set device** the corresponding dialogue comes up



One of the provided lines (live, neutral) can be chosen. In addition the protective earth can be set (no effect on ENV 4200 with ENV 216 this will set the optional high pass filter) to be either open (floating) or grounded.

4.1.2 Script Mode

In the script mode the settings of the artificial mains network are done by means of the commands `set device(...)` and `get device(...)`. A detailed description is given in chapter 5.2 of the script development kit .

Setup of the line to be tested

Command LISN PHASE

Parameter N , P1
P2 , P3 (ESH2- 5 only)

Setup of the PE (floating / grounded)

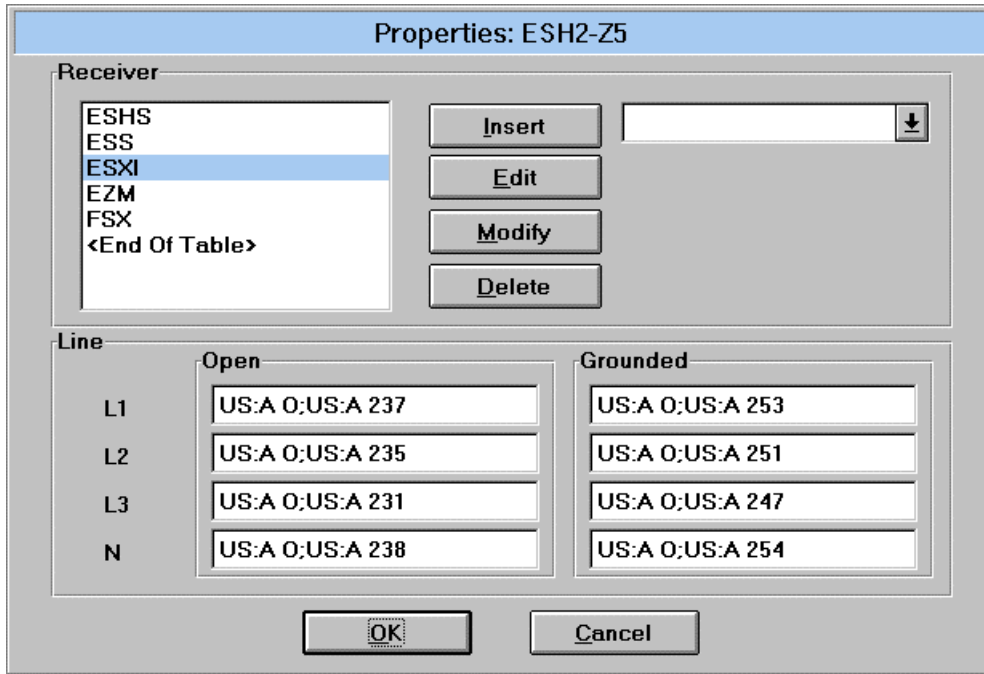
Command LISN PE

Parameter FLO , GND

4.1.3 IEEE us Commands

The IEEE bus commands for remote control are dependant on the instrument to which the artificial mains network is connected to. The control works via the user port of that instrument.

The settings have to be done in the dialogue Properties in the menu Device configuration with respect to the referring instrument.



With the installation of an option ES-K1x all necessary commands are already provided (files for ESH2- 5 / ENV 4200, for ESH3- 5).

Through double clicking of a certain receiver all IEEE bus commands that are suited to control the user port will be displayed in the corresponding fields. Receivers that are not used might be deleted from the list (the commands for those receivers will also be deleted), and only active receivers can be inserted into the list.

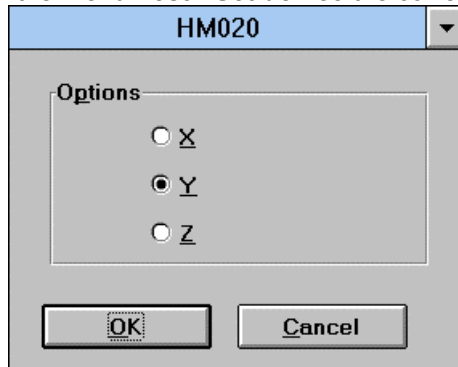
The commands can be arbitrarily edited (max. 50 characters) so that the driver could also be used for other purposes, e.g. for switching - via the user port - of a device under test.

4.2 Triple Loop Antenna HM020

The drivers provide all functions that are necessary for controlling the triple loop antenna HM020 from Rohde Schwarz.

4.2.1 Interactive Mode

With the selection of **HM020...** in the menu **Test - Set device** the corresponding dialogue comes up



One of the three loops can be selected.

4.2.2 Script Mode

In the script mode the settings of the triple loop antenna are done by means of the commands `set device(...)` and `get device(...)`. A detailed description is given in chapter 5.2 of the script development kit .

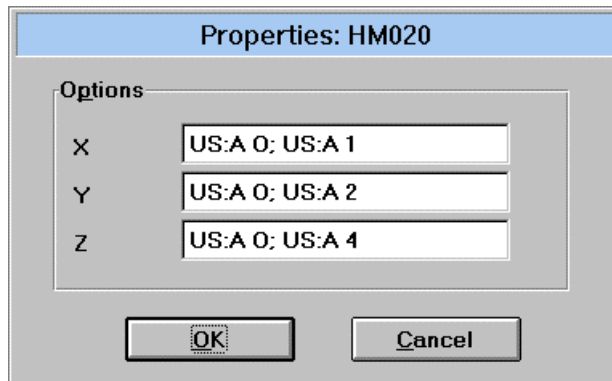
Setup of the loop to be tested

Command LOOP
 Parameter , ,

4.2.3 IEEE us Commands

The IEEE bus commands for remote control are dependant on the instrument to which the artificial mains network is connected to. The control works via the user port of that instrument.

The settings have to be done in the dialogue Properties in the menu Device configuration with respect to the referring instrument.



With the installation of an option ES-K1x all necessary commands are already provided (file) but depending on the cable to be used, other settings might be required (check with volt meter).

The commands can be arbitrarily edited (max. 50 characters) so that the driver could also be used for other purposes, e.g. for switching - via the user port - of a device under test.

4.3 Relay Matrix RSU/PSU

The drivers provide all functions that are necessary for controlling the relay matrix devices RSU and PSU from Rohde Schwarz. The RSU is identical to the PSU except the electrical specifications of the RF relays.

4.3.1 Concept

The software can control up to four RSU units. These units can be used separately as well as combined. For a combined usage there s an extra driver SUPER-RSU that is not associated to any interface but can address any of the installed RSU drivers. Therefore the SUPER-RSU driver is a means to handle a set of RSU drivers, e.g.



Automatic switching of one or more RSUs during sweeps/scans (change of antennas or receivers) is possible only through making use of the SUPER-RSU driver here additional system transducers should be defined to take respect of the signal loss through the relay cabling. For all other puposes it is sufficient to use of the RSU driver(s) only.

4.3.2 Setup of the RSU Drivers

To get the drivers into the device list, one has to go into the device configuration, press the **Load** button and then go into the selection box **Device** .

Select the RSU, edit the name (e.g. RSU1 if you want to use more than one RSU) and the GPIB address, then add the device to the list.

Repeat this for all (max. 4) RSUs you want to install.

If needed, also select the SUPER-RSU and add it to the device list now.

Now the relay switch definitions have to be made

For each RSU driver go to the **Properties...** and define switching paths (Signal Path) and the corresponding commands, e.g.

```

for      (path name / command)
    t                (set relay 1 reset relay 2)
    t                (reset relay 1 reset relay 2)
    t                (reset relay 1 set relay 2)

for      (path name / command)
    t    t    4      (set relay 3 set relay 4)
    t    t    4      (reset relay 3 reset relay 4)
    
```

Now leave the dialogs and test all path definitions through the interactive dialog(s) for the relay matrix

Test Set device... RSU1

Select a path and press **Switch**. Check the relay settings through the RSU s front panel LEDs.

4.3.3 Setup of the SUPER-RSU Driver

Before you define any settings for the SUPER-RSU you should first define system transducers for the cables you're using, e.g. / / and / / .

Now look at the following example

you want to use relay 3 of RSU2 to switch automatically between Antenna1 and Antenna2 during scans/sweeps.

```

Antenna1      'Cable low range'
>>>-----
                |
                |#####
                |# RSU2 #-----('Cable standard')-----> Receiver
                |#####
                |
>>>-----
Antenna2      'Cable hi range'
    
```

you have to go into the **Properties...** dialog (Device Configuration). Define a global Signal Path Name and associate the referring RSUx paths (select and add), along with the corresponding system transducer (cable loss), e.g.

```

A t
    RSU2 Path Left
    (RSUx ...)
    System Transducer / /
A t
    RSU2 Path Left
    (RSUx ...)
    System Transducer /
    
```

Now when you create or edit any scan/sweep range table, select the required Signal Path for each range, e.g.

```

0 - 300 MHz
    A t      (text Cable low range will appear)
300 - 1000 MHz
    A t      (text Cable hi range will appear)
Any cables that belong to both signal paths can be added as Additional Transducers .
    
```

4.3.4 Script Mode

In the script mode the settings of the RSU devices are done by means of the commands set device(...) and get device(...). A detailed description is given in chapter 5.2 of the script development kit .

4.4 Driver LPT I/O

4.4.1 Overview

The driver LPT I/O provides all functions that are necessary for controlling a parallel port of the PC. The driver can be used for simple monitoring and controlling purposes.

4.4.2 Hardware

The parallel port can be used as a controlling/monitoring interface, i.e., the lines of the interface can separately be set as output lines or be read as input lines. Setting and reading of the lines will occur only when the driver is being told to do so, not permanently in the background.

The driver LPT I/O makes use of the following signals (pin no. in brackets)

Reading /ERROR (Pin 15), SLCT (13), PE (12), /ACK (10), /BUS (11)

Writing D0 - D7 (2-9), /STROBE (1), AUTO FEED (14), /INIT (16), SLCT IN (17)

The hardware control registers will be directly accessed.

A more detailed description of the PC s parallel port can be found in various publications.

4.4.3 Properties

Through selecting of the LPT I/O driver in the **device configuration** and clicking onto the button **Properties**, the following dialog for the setup of the driver will appear



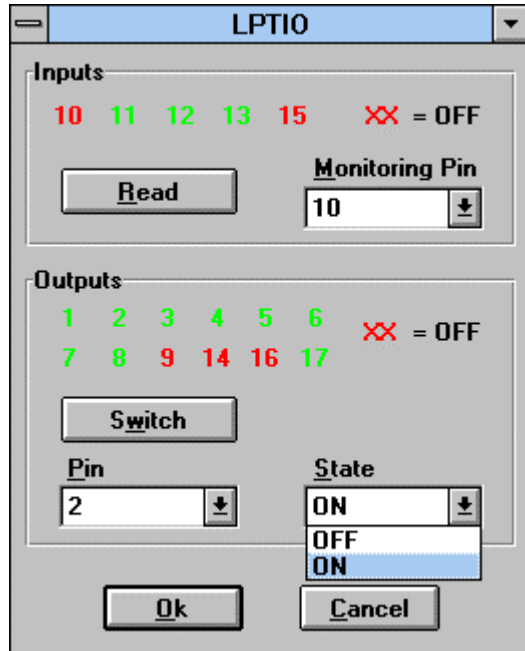
In the upper area of the dialog, one of the parallel ports can be selected as an **interface** (normally there s no problem if the hardlock is attached to the same interface port). With the field **Address** the base I/O address of the port can be selected. If the address is not known then e.g. start the diagnostics program and look for the LPT ports.

Parameter: Interface
Function: selection of the parallel port
Value range: LPT1, LPT2, LPT3.

Parameter: Address
Function: selection of the base I/O address
Value range: 03BChex, 0378hex, 0278hex

4.4.4 Dialog mode

When selecting the LPT I/O driver in the **Test - Set device...** then the referring dialog comes up



The dialog consists of two areas, one for reading the input lines and one for setting the output lines. The numbers refer to the hardware pins of the parallel port.

Display: current states of the **inputs**
Function: Display of the input line states. The state of each line is represented by its colour.

Button: **Read**
Function: Reads and displays the states of all input lines

Parameter: **Monitoring Pin**
Function: Selects the input line to be read (redundant functionality).

Display: current states of the **outputs**
Function: Display of the output line states. The state of each line is represented by its colour.

Parameter: **Pin**
Function: Selects the output line to be switched.

Parameter: **State**
Function: Selects the state of the line selected with **Pin**.
Value range: ON, OFF

Button: **Switch**
Function: Switches the selected line to the selected state and updates the display of the output lines.

4.4.5 Script Commands

Syntax of the script commands:

INTEGER get device (STRING device, INTEGER cmnd, VOID param,
 VAR INTEGER device err no, VAR STRING device err txt)
 INTEGER set device (STRING device, INTEGER cmnd, VOID param,
 VAR INTEGER device err no, VAR STRING device err txt)

Parameter: description of the operation
Data type: description of the data type of the referring data
Transfer: Internal means, the data will be transferred to or from the software driver only.
 External means, the command directly affects the device.

The information about the state of a pin (high or low) is done by a character S (Set) or R (Reset) in the data string of the script function call.

ICS OUT

Usage get device, set device
 Parameter t state of a single output line to be switched
 t state of a single output line (selected by ICS INDE)
 Data type STRING
 Transfer external
 Note t S16 means pin 16 will be set (to high)
 t gives the state of a single output line (selected by ICS INDE)
 syntax e.g. S12 , R1 .

ICS IN

Usage get device
 Parameter state of a single input line (selected by ICS INDE)
 Data type STRING
 Transfer external
 Note syntax z.B. S10 , R15 .

ICS INDE

Usage get device, set device
 Parameter pin index
 Data type INTEGER
 Transfer internal
 Note value range 1, ..., 17.

4.5 Relay Matrix TS-RSP

The TS-RSP device driver provides the functionality required for controlling the relays in the RF Relay Switch Matrix TS-RSP produced by Rohde Schwarz. The device is controlled via the IEEE bus interface.

All functions can be performed in two different modes

Physical Mode:

All settings are transferred to the relay switch matrix.

Virtual Mode:

The operation of the device is software simulated. The switch matrix is not addressed.

The device driver provides the following dialog boxes

Device Operation Dialog Properties Dialog.

The TS-RSP device driver may also be controlled by a script.

4.5.1 Device

The TS-RSP is controlled via IEEE bus interface. It consists out of a main frame which contains an IEEE bus controlled I/O interface. Using this interface allows the control of RF relays which are located on a plug-in board. For making the RF relay switch matrix ready for flexible use in different systems, several relay boards with different types of relays are available

RSP-EMI (EMI Test System, 6 koaxial relays with 1 input and 2 outputs)
 RSP-EMS (EMS Test System, 11 Koaxial Relays with 1 input and 2 outputs,
 RF power meter)
 RSP-BRF (RF Test System, 4 Koaxial Relays with 1 input and 6 outputs)

The following combinations the relay plug-in boards are possible

RSP-EMI RSP-BRF
 RSP-EMS RSP-BRF

4.5.2 Properties

Multiple use of the device driver under a variety of logical names is possible in the **Device Configuration** dialog box.

After selecting the TS-RSP device in the **Device Configuration** Dialog and clicking the **Properties...** button the Properties Dialog Box will appear.

The dialog window is separated into two areas. In the upper area all already defined paths with their names, the used relay board and the corresponding relay settings are displayed in the field **Paths**. These settings can be modified in the lower area of the dialog using the fields **Relay board** and **Relay Settings**.

First in the field **Relay board** is selected, which relay board in the TS-RSP shall be addressed. After this the used relays are activated and configured. Using this principle two independent paths (each using different relays) can be switched without influencing each other. The path names are used via the device dialog, via a script or via the super driver **SUPER-RSU**.

Description of the Elements:

List: Paths

List of paths which can be set at the TS-RSP. The path name, the used relay board and the corresponding relay setting is displayed.

Parameter: Relay board

Function Selection of the desired relay board in the TS-RSP main frame.
Range RSP-EMS, RSP-EMI, RSP-BRF.

Parameter: Relay Setting

Function In this field all available relays for the selected relay board are displayed (for RSP-EMS and RSP-EMI this are two paths switches, for RSP-BRF this are four 6 path switches). For each relay the user can select whether it should be switched for the current path and if yes, to which position it should be set (NC relay closed, NO relay opened).
Range dependent from the current selected relay board.

Parameter: Path

Function Input field for the path name.
Range Maximum 20 characters.

Button: Insert

The settings in the edit fields are added to the **Paths** list in the upper dialog area. But before this move, a check is made that the path does not exist already.

Button: Edit

The marked path settings are moved to the edit fields **path**, **relay board** and **relay setting**. A double click on the desired settings has the same effect.

Button: Modify

The modified settings are moved to the **Paths** list in the upper area of the dialog window. But first, a check is made, that the path is not available double

Button: Delete

A marked path in the **Paths** list is deleted.

Button: Clear

All relays in the field **relay setting** are set to the not selected state. Additionally the edit field **Path** is cleared.

Button: OK

The dialog box is closed after the settings have been saved.

Button: Cancel

The dialog box is closed without the settings being saved.

4.5.3 Operating Dialog

When selecting the RSU device driver from the menu **Test Set Device** the Device Operation Dialog Box will appear.

The paths of the TS-RSP are to be switched here. When a path is switched a corresponding IEEE bus command is sent to the TS-RSP device. Several commands can be sent at the same time if they don't collide.

The settings are made in script mode with the commands `set device(...)` and `get device(...)`. A detailed description of the commands will be found in 4.5.4 Overview of the Script Commands.

Description of the General Elements:

utton: OK

Saves the settings and closes the dialog box.

utton: Cancel

Closes the dialog box without saving the settings.

Display: Paths

List of all paths possible to switch at the TS-RSP device, defined in the Properties.

List: Selected Paths

Path to be switched. One of the paths the Paths list contains which is selected via the Select button.

utton: Select

The marked path is copied to the Selected Paths list. If the new path collides with any path available already in this list, the old path is deleted from the list.

utton: Switch

Function	Switches the paths in the Selected Paths list.
Range	All path names defined in the properties dialog box.
Script command	RSU SETPATH Type STRING Direct transfer to device.

Display: Relay State

In this field the current state of all relays available in the relay board are displayed.

4.5.4 Overview of the Script Commands

Script Command Syntax:

INTEGER get device (STRING Device, INTEGER Command, VOID Data, VAR INTEGER Device Error Code, VAR STRING Device Error Message)
 INTEGER set device (STRING Device, INTEGER Command, VOID Data, VAR INTEGER Device Error Code, VAR STRING Device Error Message)

Parameter	Description of the data to be transferred.
Data Type	Identifies the type of data to be transferred.
Transfer	Internal Data is transferred to or from the device driver. External Command is sent directly to the device.

IDENT

Used in get device
Parameter Device identification
Data type STRING
Transfer Internal

PH NAME

Used in get device
Parameter Physical name of the device.
Data type STRING
Transfer Internal

RSU SETPATH

Can be used in set device
Parameter Path to be switched at the TS-RSP.
Data type STRING

RSU SETCOMMAND

Can be used in set device
Parameter Sends an IEEE bus command string to the TS-RSP.
Datentyp STRING

5 Dynamic Data Exchange (DDE)

5.1 General

DDE (Dynamic Data Exchange) enables to dynamically exchange data between two Windows applications, provided both applications support the DDE functionality of Windows.

Applications that support DDE are MS WORD for WINDOWS as well as MS EXCEL, SUPERBASE, SQL and WordPro and many others.

Different from data transfer via the clipboard, DDE represents a direct communication between two applications. Therefore for DDE transfers both applications (ES-K1 as well as e.g. MS WORD) must have been started from Windows.

The advantage of DDE over the clipboard is that data transfers can be automated. This way data transfers and data updates can be done with minimum user effort.

One of the two applications, the so called client (e.g. MS WORD) controls the communication. The other application (ES-K1) works as the server, which on request delivers data to the client application. The ES-K1 transfers these data as pure text, except the graphics which will be delivered in a vector format.

t t t

5.1.1 DDE Commands

Generally a DDE command consists of three parts

Syntax **ServerName** **TopicName** **ItemName**

The preparation of a DDE transfer is done via the client application through providing of the server application name (ES-K1 in this case), the topic name and the item name. The kind of available data depends on the server application (see chapter 5.3)

The exact Syntax of DDE commands depends on the client application. A detailed description of the command syntax for MS WORD follows.

5.2 DDE with MS WORD for Windows™

DDE enables to use all the presentation functionality in MS WORD for the creation of user defined test reports based on data from the application ES-K1. The automation of this process can be achieved through design of suitable document templates (also see chapter 5.2.2). The WORD document then works as the client which controls the transfers.

5.2.1 General Command Syntax with WORD for Windows™

The buildup of a DDE connection from MS WORD is done by making use of the field functions DDE and DDEAuto.

Syntax **DDE** *t*
DDEAuto *t*
 DDE, DDEAuto WORD field function for dynamic data transfer
t The service name. Here the name **ES-K1** has to be given.
t The topic name. Could be e.g. a file type.
t The item name. Should be the name of the data to be transferred.

Example **DDE** ES-K1 System Topics

This command lists all topics that are available from the server application ES-K1.

The item name consists of the ES-K1 database name and - if necessary - a subitem name which must be separated from the database name by a character.

First an empty function field must be inserted by pressing **STRG F9**. The cursor will be positioned between the brackets that work as field indicators. Now a field function DDE or DDEAuto can be entered, along with the required names. Pressing **F9** updates the field. WORD then automatically changes to the display of the field's result, provided that the global settings of the fields allow to do so.

The field function DDEAuto works different from DDE in that the data will be automatically updated, i.e., a change in the ES-K1 file immediately leads to a change in the WORD document.

5.2.2 Creating a Test Report

For creating a test report via DDE it is a good idea to make use of the powerful table and style functions of MS WORD.

In a first step the layout of the report has to be designed in a WORD document or document template. To do so, tables should be assigned to the topics.

In a second step the items and subitems have to be inserted into the rows and columns of the table.

The style of the function fields can be defined as with normal text. So any kind of style (character font and size, etc.) can be used. The style will also be valid for the result of the field after updating. A resulting graphical diagram can be modified like any other graphics in MS WORD.

Example

company logo as a bitmap

DDE ES-K1 RPH vol 0001 HDR HEAD1

```

DDE      ES-K1      RPH      DDE ES-K1 RPH vol 0001
vol 0001 HDT EUT      HDR EUT

DDE      ES-K1      RPH      DDE ES-K1 RPH vol 0001
vol 0001 HDT MANU     HDR MANU

DDE      ES-K1      RPH      DDE ES-K1 RPH vol 0001
vol 0001 HDT OP COND  HDR OP COND

DDE      ES-K1      RPH      DDE ES-K1 RPH vol 0001
vol 0001 HDT OPER     HDR OPER

DDE      ES-K1      RPH      DDE ES-K1 RPH vol 0001
vol 0001 HDT TEST SPEC HDR TEST SPEC

DDE      ES-K1      RPH      DDE ES-K1 RPH vol 0001
vol 0001 HDT COM1     HDR COM1
    
```

Co ent t t t t t t / / t //

Start	Stop	Step	IF W	Detector	Meastime	RF-ATTN	Preampl.
DDE ES-K1 SCT EN 55022 Voltage fin S S TART F REQ S 1	DDE ES-K1 SCT EN 55022 Voltage fin S S TOP F REQ S 1	DDE ES-K1 SCT EN 55022 Voltage fin S S TEP FR EQ S1	DDE ES-K1 SCT EN 55022 Voltage fin S IF BW S1	DDE ES-K1 SCT EN 55022 Voltage fin S DET C URVE1 S1	DDE ES-K1 SCT EN 55022 Voltage fin S MEAS TIME S1	DDE ES-K1 SCT EN 55022 Voltage fin S RF AT TN S1	DDE ES-K1 SCT EN 55022 Voltage fin S PREA MP S1

DDE ES-K1 GRC vol 0001

Measurement Results (P Detector)

Fre uency	Level	Limit	Margin	Exceed	Line	PE
DDE ES-K1 MES vol 0001 fin R1 C1 R99C1	DDE ES-K1 MES vol 0001 fin R1C2 R99C2	DDE ES-K1 MES vol 0001 fin R1C3 R99C3	DDE ES-K1 MES vol 0001 fin R1 C4 R99C4	DDE ES-K1 MES vol 0001 fin R1C5 R99C5	DDE ES-K1 MES vol 0001 fin R1C6 R99C6	DDE ES-K1 MES vol 0001 fin R1C7 R99C7

Result With updating of the marked function fields the style settings will be used for the resulting elements. Graphics will always be inserted with minimum size (can be stretched to desired size). Graphics can then be modified like any other graphics imported e.g. with the clipboard.

A result of the final example report is shown on the following pages.

Measurement Results (P Detector)

Fre uency	Level	Limit	Margin	Exceed	Line	PE
9.978000	67.79	60.00	-7.79		L3	FLO

Measurement Results (AV Detector)

Fre uency	Level	Limit	Margin	Exceed	Line	PE
10.008000	73.49	50.00	-23.49		L2	FLO

5.3 DDE Commands of the Application ES-K1

5.3.1 ES-K1 DDE Topics

The following topics are available

System	general state of the system
MES	measurement result
LIM	limit line
TP	probe transducer
TS	system transducer
GRC	graphics configuration
FRL	frequency list
RPH	report header
RPC	report configuration
SCT	scan table
SWT	sweep table

Note: The use of database names or codes for table elements works case sensitive. If a database name holds spaces then the whole item name has to be put between characters.

5.3.1.1 General State of the System

If the topic System is used then the DDE connection does not refer to a specific file. It can be used to get general information on the data in the ES-K1.

Topic name **S STEM**

The following items can be retrieved

Topics	lists all available topics in the format name tab
Systems	lists all available items to the current topic in the format name tab
Formats	lists all available data formats in the format name tab

Example with MS WORD

DDE ES-K1 System Formats

5.3.1.2 Lists

- Topic name **MES** (measurement results)
- Topic name **LIM** (limit line)
- Topic name **TP** (probe transducer)
- Topic name **TS** (system transducer)
- Topic name **FRL** (frequency list)

The following items can be retrieved

- Systems** lists all available items to the current topic in the format name tab
- FileType** gives the description of the data type
- FileNames** gives a list of database names, separated through tabs
- SubItems** lists all available subitems (commands after t) in the format
t t

Database name If no subitem is given after the database name then the whole table will be transferred in the following format

```
t t/ F
t t/ F
t t/ F
t t/ 4 F
/ / F
F F
t / t / t F
```

The item name consists of an ES-K1 database name and optionally of a subitem name, separated through a character. No spaces are allowed between database name and subitem name.

The following subitems can be retrieved

- Name** delivers the name of the database element
- Time** delivers the time (last modification) of the database element
- Date** delivers the date (last modification) of the database element
- TabSize** delivers the size of the table in the format
R C t S
number of rows (including text lines)
number of columns
number of additional (single) values

R H C :R C delivers a rectangular portion from the table, rows r1 to rn, columns c1 to cn the columns are separated by t , the rows by t /
with **R** only the values will be transferred no text lines will appear
with **RH** the four text lines (description, units, etc.) come before the values

S :S delivers additional single values in the format
t t F
delivers the name of the range table (scan/sweep table) in measurement results

Example with MS WORD

DDE ES-K1 MES Example Result RH1C1:R8C2

5.3.1.3 Graphics Configuration

Topic name **GRC**

The following items can be retrieved

Systems lists all available items to the current topic in the format name tab

FileType gives the description of the data type

FileNames gives a list of database names, separated through tabs

Subitems lists all available subitems (commands after t) in the format subitem name tab

Database name If no subitem is given after the database name then the whole graphics will be transferred in a vector format.

The item name consists of an ES-K1 database name and optionally of a subitem name, separated through a character. No spaces are allowed between database name and subitem name.

The following subitems can be retrieved

Name delivers the name of the database element

Time delivers the time (last modification) of the database element

Date delivers the date (last modification) of the database element

Example with MS WORD

DDE ES-K1 GRC Example Graphics

5.3.1.4 Report Header

Topic name **RPH**

The following items can be retrieved

- Systems** lists all available items to the current topic in the format name tab
- FileType** gives the description of the data type
- FileNames** gives a list of database names, separated through tabs
- SubItems** lists all available subitems (commands after t) in the format subitem name tab
- Database name** If no subitem is given after the database name then the whole report header will be transferred in the following format

t t t t t t
F

The item name consists of an ES-K1 database name and optionally of a subitem name, separated through a character. No spaces are allowed between database name and subitem name.

With the subitems those with a name **HDT...** give the description of the referring element, those with a name **HDR...** the text of the element.

The following subitems can be retrieved

- Name** delivers the name of the database element
- Time** delivers the time (last modification) of the database element
- Date** delivers the date (last modification) of the database element

HDR HEAD1 HDT HEAD1
1st top line

HDR HEAD2 HDT HEAD2
2nd top line

HDR EUT HDT EUT
description of the E.u.T.

HDR MANU HDT MANU
description of the manufacturer

HDR OP COND HDT OP COND
description of the operating conditions

HDR TEST SITE HDT TEST SITE
description of the test site

HDR OPER HDT OPER
description of the operator

HDR TEST SPEC HDT TEST SPEC
description of the test specification

HDR COM1 HDT COM1
1st comment line

HDR COM2 HDT COM2
2nd comment line

Example with MS WORD

DDE ES-K1 RPH Example Header HDT HEAD1

5.3.1.5 Report Configuration

Topic name **RPC**

The following items can be retrieved

- Systems** lists all available items to the current topic in the format name tab
- FileType** gives the description of the data type
- FileNames** gives a list of database names, separated through tabs
- SubItems** lists all available subitems (commands after t) in the format subitem name tab

Database name If no subitem is given after the database name then the whole report configuration will be transferred in the following format

```

t      t
t      t t t      t      t      t -t t
F
    
```

The item name consists of an ES-K1 database name and optionally of a subitem name, separated through a character. No spaces are allowed between database name and subitem name.

The following subitems can be retrieved

- Name** delivers the name of the database element
- Time** delivers the time (last modification) of the database element
- Date** delivers the date (last modification) of the database element
- RPH** delivers the database name of the report header that belongs to this report configuration
- LIM** delivers a list holding the database names (separated by tabs) of the limit lines that belong to this report configuration
- MES** delivers a list holding the database names (separated by tabs) of the measurement results that belong to this report configuration
- SCT** delivers a list holding the database names (separated by tabs) of the scan tables that belong to this report configuration
- SWT** delivers a list holding the database names (separated by tabs) of the sweep tables that belong to this report configuration
- TS** delivers a list holding the database names (separated by tabs) of the system transducers that belong to this report configuration
- TP** delivers a list holding the database names (separated by tabs) of the probe transducers that belong to this report configuration
- GRC** delivers a list holding the database names (separated by tabs) of the graphics configurations that belong to this report configuration
- REP FOOTNOTE** delivers the setting of the report footnote that belongs to this report configuration
- REP FTNOTET T** delivers the report footnote text that belongs to this report configuration
- REP PICTURE** delivers the setting of the graphics output (full or half)

Example with MS WORD

DDE ES-K1 RPC Example Report

5.3.1.6 Scan/Sweep Table

Topic name **SCT** (scan table)

Topic name **SWT** (sweep table)

The following items can be retrieved

- Systems** lists all available items to the current topic in the format name tab
- FileType** gives the description of the data type
- FileNames** gives a list of database names, separated through tabs
- SubItems** lists all available subitems (commands after t) in the format
t t

Database name If no subitem is given after the database name then the whole table will be transferred in the following format

S : t t : t t t
F

s number of the range range 0 is used for elements that are not dependent on the ranges

The item name consists of an ES-K1 database name and optionally of a subitem name, separated through a character. No spaces are allowed between database name and subitem name.

To retrieve the single values of a scan/sweep table the subitem name will be extended through a subrange description, separated through a character.

A subrange can be defined either through an index or through the frequency

- S** selection of the subrange through an index
index
- F** selection of the subrange through a frequency
frequency in
- K** frequency in
- M** frequency in
- G** frequency in

A subrange with index 0 is used for elements that are not dependent on the subranges. If the subrange information is not given although the value of the item depends on the subrange, then an item will be transferred for all subranges. Single elements are transferred in the following format

t t l

In all other cases the format is as follows

S : t t : t t l F

The following subitems can be retrieved

- Name** delivers the name of the database element
- Time** delivers the time (last modification) of the database element
- Date** delivers the date (last modification) of the database element
- ALL s** delivers all elements of a subrange in the following format

S : t t : t t l
F

Subitems that are valid for all subranges

S COUNT SU delivers the number of subranges

Example with MS WORD

DDE ES-K1 SCT Example Scan Table ALL S1

delivers all elements of the 1st subrange

DDE ES-K1 SCT Example Scan Table S UNIT

delivers the level unit of the scan table

DDE ES-K1 SCT Example Scan Table S START FRE

delivers the start frequency for each of the subranges

DDE ES-K1 SCT Example Scan Table S START FRE S2

delivers the start frequency of the 2nd subrange