



ROHDE & SCHWARZ

Test and Measurement
Division

Release Notes

Firmware Release 4.31 (XP)

with Service Pack 1

for R&S FSU Spectrum Analyzers

with order number: 1166.1660.xx

New Features:

- International keyboard driver package supported (German, Spanish, French, Italian and Portuguese)
- New dialogs available for file/path selection (e.g. for Trace Export, Firmware Update Path)
- Application Setup Recovery restores previous settings after application exit
- Additional soft keys available to change the LAN configuration
- New Filter Type 5-POLE DIGITAL
- ACP: Extended upper limits for Ch. Bandwidth (5 GHz) and Ch. Spacing (20 GHz)
Overlapping Adjacent Channels allowed now for parallel measurements
New result output format for number of adj. channels > 3
- FS-K7: Deemphasis is available for active Weighting AF Filter CCTTT and CCIR
- Support for new 3GPP HSPA+ Application Firmware R&S FS-K74+
- Support for new VOR/IL Avionics Measurements Application R&S FS-K15
- HP Emulation: additional commands supported
- FSU-B9: The number of sweep points allowed in analyzer mode is now supported in NETWORK mode, too.

Release Note Revision: 2

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History

<u>Date</u>	<u>Rel Note Rev</u>	<u>Changes</u>
20 March 2008	1	First revision for V4.31.
23 July 2008	2	Problems eliminated with Service Pack 1 added.

General Topics

Firmware Update

Generation of the update set

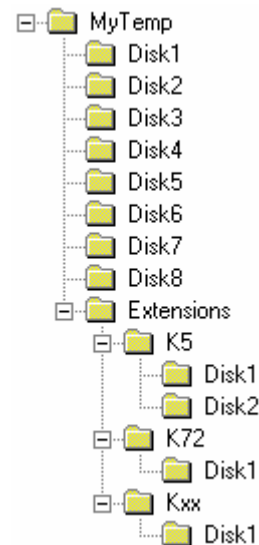
Since basic firmware version V4.21 a ZIP file with basic system firmware and the newest available applications is provided. This ZIP file is available in the instruments FIRMWARE section of the Service Board on GLORIS.

Preparing installation via USB stick or LAN:

- Download the update set ZIP file.
- Extract the contents of the ZIP file to a temporary folder, e.g. C:\MyTemp.
Other files (e.g. release notes) shall not be stored in these directories. These files would be copied on harddisk and may cause a disk full problem on drive E:.
- Now copy the content of the temporary folder including all sub folders to a USB stick.
- The USB stick is now ready to for performing the update.

Following extension's sub folder are used for the instrument's applications:

- K5
- K30
- K40
- K70
- K72 (includes K73, K74, K74+)
- K76 (includes K77)
- K82 (includes K83)
- K84 (includes K85)



Performing the firmware update on the instrument

A new method to install the base system and all required applications is available, if the installed base system firmware is V4.11 or newer.

For updating to version 4.11 or newer first update the bases system only to get the new update manager. Then update base system and all applications using the new update manager.

Base System Update from version < 4.11 to 4.11 or newer:

Skip this step, if the installed base system firmware is V4.11 or newer. The firmware update process is performed in the following steps:

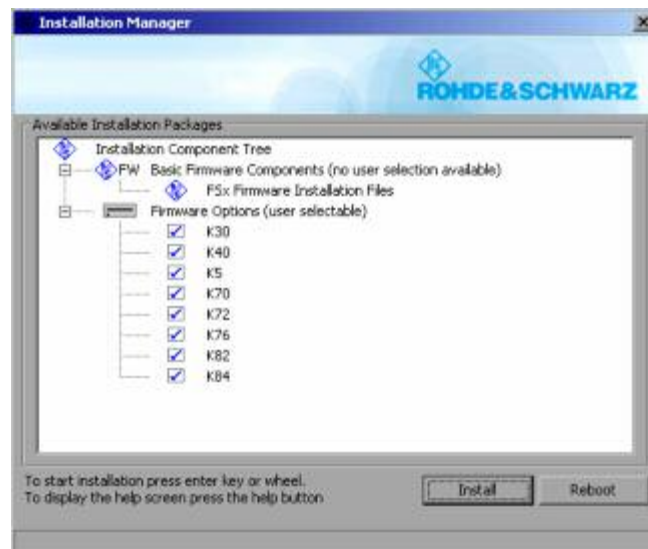
- Switch the instrument on and wait until the Analyzer has resumed operation.
- Use the SETUP | NEXT | FIRMWARE UPDATE | UPDATE PATH softkey to specify any path for the location of the disk directory (e.g. F:\MyTemp).
- Press SETUP → NEXT → FIRMWARE UPDATE
- Confirm the query "Do you really want to update the firmware?" with OK
- Confirm the copy process.

- The instrument will perform several automatic shutdowns, until the new firmware is installed properly.
Do not switch the instrument off until the update process has been finished completely.

Complete Update with update manager:

- Use the SETUP | NEXT | FIRMWARE UPDATE | UPDATE PATH softkey to specify any path for the location of the disk directory (e.g. F:\MyTemp).
- Press SETUP → NEXT → FIRMWARE UPDATE
- Confirm the query "Do you really want to update the firmware?" with OK

The *Installation Manager* will terminate the analyzer application, search for available application update set and will show a selection list.



- Deselect applications, not to be installed and start the installation process with INSTALL. REBOOT will abort the update and restart the analyzer application without any changes.
- The instrument will perform several automatic shutdowns, until the new firmware and all applications are installed properly.

Do not switch the instrument off until the update process has been finished completely.

After a successful firmware update it is necessary to execute the instrument's self alignment process by pressing CAL and softkey CAL TOTAL.

Known problems during firmware update

Firmware update with FSU-B18/19/20 (flash disks):

At the final step of the setup, backup files are stored for the 'Analyzer Firmware Backup' (option during the start-up of the instrument). This backup is only available for analyzers equipped with hard discs. Therefore an error message "Add folder icon failed" occurs twice if the FSU-B18/B19/B20 are installed.

Workaround: Accept that message via the 'OK' button twice. The firmware update will continue without any problem! -> This problem is solved with version 3.51 or later.

Messagebox: Can't open front panel driver, errorcode=0x2

For some constellations this messagebox occurs after the last reboot of the device. Please start the WDMutility with START | PROGRAMS | WDM Utility and click the START button. The device will boot twice (the messagebox will be still shown after the first boot) and after the second boot the measurement application comes up and the problem is solved.

Firmware installation of the R&S FS-K7 FM demodulator, R&S FS-K8 BLUETOOTH Analyzer software, R&S FS-K15 VOR/ILS Avionics Measurements Application and R&S FS-K9 Power Sensor Measurement

The R&S FS-K7, R&S FS-K8, R&S FS-K9 and R&S FS-K15 application software package are included in the basic instrument firmware. It therefore needs no separate firmware update procedure.

Enabling these options via option key code entry

This section can be skipped if the option key was entered once.

For activation of these application software packages a license key for validation must be entered. The license key is printed either on a label on the rear panel of the R&S FSU or delivered as a part of the software package.

The key sequence for entering the license key for every option is:

SETUP - GENERAL SETUP – OPTIONS - INSTALL OPTION

Use the numeric keypad to input the option key number and press ENTER.

- On a successful validation the message 'option key valid' will appear.
- If the validation failed, the option software is not installed.

Compatibility to other Firmware Option Packages

The following firmware option packages are available with their own disks and can be installed separately. Please refer to their release notes.

R&S FSU V4.31 is compatible to the following firmware option releases:

R&S FS-K5	R&S FS-K30	R&S FS-K40	R&S FS-K72 FS-K73 FS-K74 FS-K74+	R&S FS-K76 FS-K77	R&S FS-K82 FS-K83	R&S FS-K84 FS-K85	R&S FSQ-K70
4.30	4.30	4.30 SP1	4.30	4.30	4.30	4.30	4.30 SP1

Hint:

Applications with the version number 3.xx / 4.xx are only compatible with basic firmware 3.yy / 4.yy (see table above).

Do not install application firmware with versions 1.xx or 2.xx on an R&S FSU with basic firmware 3.yy or 4.yy!

New Functions in Version 4.31

- **International keyboard driver package supported (German, Spanish, French, Italian and Portuguese).**
- **New dialogs available for file/path selection (e.g. for Trace Export, Firmware Update Path).**
- **Application Setup Recovery restores previous settings after application exit.**
- **New Filter Type 5-POLE DIGITAL for Analyzer Mode.**
- **ACP: Extended upper limits for Channel Bandwidth (5GHz) and Channel Spacing (20GHz).**
- **ACP: Overlapping Adjacent Channels allowed now for parallel measurements.**
It is now possible to configure overlapping adjacent channels. Based on a common carrier channel setting, it is now possible to measure with two slightly different ADJ channel settings with one measurement.
Example: TX Channel / TX Bandwidth (common for both measurement A and B)
 - ADJ used for measurement A
 - ALT1 used for measurement A
 - ALT2 used as ADJ for measurement B
 - ALT3 used as ALT1 for measurement B
- **ACP: Result output format changed for number of ADJ channels > 3.**
- **Additional softkeys available to change the LAN configuration.**
- **Save dialog reports a warning, if no item to save is selected.**
- **The increment behaviour of the step keys for parameter SWEEP POINTS is changed.**
The behaviour of the knob wheel still has the highest possible resolution.
- **Dummy Video Bandwidth 0 Hz returned for active FFT filter.**
- **HP emulation: Additional remote commands are supported.**
The following commands are supported: ML, MEAS, SUM, LIMIPURGE, EDITLIML, LIMIREL, SDEL, SADD, LIMF, LIMU, LIML, LMM, LIMD, LIMTFL, LIMTSL, SDON, EDITDONE, LIMISAV, LIMIRCL, LIMITEST, LIMIFAIL
- **HP emulation: A new softkey COUPLING FSP/HP is now available to change the Span/RBW and RBW/VBW default coupling.**
- **HP emulation: The default for Sweep Repeat is now OFF for 856x and 859x.**
- **FSU-B9: The number of sweep points allowed in analyzer mode is now supported in NETWORK mode, too.**
- **FS-K7: Deemphasis is now additionally supported for active Weighting AF Filter CCTTT and CCIR.**
- **Support for new option VOR/ILS Avionics Measurements Application R&S FS-K15.**
- **Support for new option 3GPP HSPA+ Application Firmware R&S FS-K74+.**

Modified Functions

The version numbers in brackets indicate the version in which the function was modified.

1. (V3.11) Hardcopy screen comment changed to one comment, not one per screen.

2. (V3.31) Change to SMR setting files for external generator control:

This change enables significant improvements in frequency settling with logarithmic frequency step sizes.

3. (V3.41) Active transducer and adjust reference level procedure:

If transducers are active and the adjust reference level procedure (in measurements like ACP, occupied bandwidth, signal statistics, etc.) is invoked, the *REFLVL ADJ AUTO/MANUAL* of the SETUP|TRANSDUCER menu is set to AUTO thus the best dynamic performance is obtained.

4. (V3.51) External reference frequency not any longer changeable via knob wheel to prevent changing that value by chance.

5. (V3.61) Marker peak list in continuous sweep mode

In continuous sweep mode the marker peak list is not any longer executing a single sweep and then peak list search, but the peak list will immediately work on the current trace. This allows peak list functionality on averaged or max holded traces in continuous sweep mode. The single sweep mode is unchanged.

6. (V3.61) VBW 30 MHz

For analyzers with IF Filter Model 03 or newer a VBW of 30MHz can be selected if the RBW is greater than 10 MHz. The hardware setting is identical to VBW of 10MHz (no VBW usage).

7. (V3.61) RS232 serial remote control

Since version 3.61 the instrument goes in remote mode rather than in local mode when a command is send through the RS232 remote interface. This means the display disappears and the LOCAL softkey appears as when the GPIB bus is used. To change between local and remote mode the commands @LOC and @REM can be send to the instrument.

8. (V3.71) Harmonic measurement

The mixer level within the harmonic measurement is changed to -10 dBm.

The value update in the lower screen happens during the sweep and not only at sweep end.

9. (V3.81) Modifications to HP commands

- Command IP resets format to O3
- Reading a trace with TRA; TRB or TRC is possible even if trace is blank
- Great changes of span (e.g. from 2GHz to 100KHz) will not lost signal when marker track is on
- The R&S FSU has now a mixer level of -10dBm instead of -25dBm

10. (V3.91) CCDF measurement result table extended by 0.01% value.

11. (V3.91) New marker functions AUTO MAX PEAK and AUTO MIN PEAK.

12. (V3.91) HP emulation: HP Models 71100C, 71200C and 71209A are using 800 sweep points

13. (V4.01) Additional number of sweep points 201, 401, 801 and 1601.

14. (V4.01) HP emulation: Additional HP Models 8568A_DC and 8568B_DC using DC coupling.

15. (V4.01) HP emulation: GENERAL SETTINGS - GPIB menu extended by IF GAIN NORM / PULS

16. (V4.01) New spurious emissions measurement LIST EVALUATION

17. (V4.01) FS-K7: The THD Unit is selectable (dB / %) in the AM signal / AF spectrum result

18. (V4.01) New function MARKER FILE EXPORT.

19. (V4.01) Support for FSU-B73.

20. (V4.01) Signal Track: Enhanced sensitivity in marker tracking function.

The marker is now set to the signal peak after very single sweep. In previous versions, this only happened if the difference between signal peak and center frequency exceeded 20 % of the Resolution Bandwidth.

21. (V4.01 SP2) HP emulation: Behaviour of KSK and MKPK changed in single sweep mode.

The commands KSK (next peak) and MKPK NH|NL|NR (next high, next left, next right) do not perform a new sweep in single sweep mode.

22. (V4.01 SP2) IF SHIFT B, additional shift for resolution bandwidth < 200kHz.**23. (V4.11) Improved Firmware Update.****24. (V4.11) New enhancement label to indicate filter type.**

3DB	Gauss filter 3dB
6DB	EMI filter 6dB
FFT	FFT filter
CHN	Channel filter
RRC	RRC filter

25. (V4.11) New filter Type EMI (6dB).**26. (V4.11) Gated statistics measurements APD, CCDF.****27. (V4.11) FS-K8 Enhanced Data Rate (EDR) supported.****28. (V4.11) Support for Power Sensor NRP-Z81.****29. (V4.11) GPIB: Basic remote control of the signal generator which is connected to the additional FSP-B10 GPIB Interface.****30. (V4.11) GPIB: SCPI format for binary block data extended for byte counts > 999.999.999 bytes.****31. (V4.11) GPIB: New commands available**

:[SENSe<1 2>:]CORRection:TRANsducer:ACTive?	returns active transducer
:CALCulate<1 2>:LIMit<1...8>:ACTive?	returns active limit line(s)

32. (V4.11) Trigger Line for video trigger now also visible outside of the trigger menu.**33. (V4.11) Extended resolution for the number of sweep points.**

In addition to currently allowed values an increment of 100 is possible now for number of points ≥ 201 .

34. (V4.11) HP emulation: The OL command returns the mixer level in byte 23**35. (V4.11) HP emulation: The commands MKPK NH | NL | NR and KSK do not perform a sweep start when marker is already switched on****36. (V4.11) HP emulation: The commands SNGLS and CONTS are setting the command complete bit (bit 4) in STB****37. (V4.11) HP emulation: New softkey SETUP - GENERAL SETUP - GPIB - SWEEP REP ON/OFF"****38. (V4.11) HP emulation: New commands: VARDEF, CTA, ADD, SUB, MPY, DIV****39. (V4.11) HP emulation: New command NORMLIZE for tracking generator****40. (V4.11) HP emulation: The command LF performs a reset****41. (V4.11) LXI Class C support****42. (V4.11) Improved measurement speed for EMI filter available (spectrum mode / frequency domain).****43. (V4.11 SP1) New model R&S FSU67 supported.****44. (V4.11SP1) New CPU Board 1091.3104 supported (with the exception of option B73).****45. (V4.11SP2) Option B73 now supported with new CPU Board 1091.3104, too.****46. (V4.21) New Save/Recall menu and dialogs.****47. (V4.21) Easy access to Windows XP Start menu.****48. (V4.21) Required sweeptime reduced for video bandwidth < resolution bandwidth.**

49. (V4.21) ASCII Export function for Marker Peak List.
50. (V4.21) Adjustable marker position knob stepsize.
51. (V4.21) New trace average function Power.
52. (V4.21) HP emulation: Personality Spurious supported.
53. (V4.21) HP emulation: Personality Phase Noise supported.
54. (V4.21) New Service function 0.6.0 to check installation of option FSU-K51
The function returns 0 / 1 if FSU-K51 is not installed / installed.
Example: "DIAG:SERV:SFUN? '0.6.0' "
55. (V4.21) FSP-B10: Upper frequency limit of SMF100A is now 43.5 GHz .
56. (V4.21) The Aquisition Time (for FFT filter) is now readable with remote command "SENS:SWE:TIME?".
57. (V4.21 SP1) FSP-B10: Support for SMA100, SMB100 (1/2/3/6GHz), SMF (22/43GHz) SMJ (3/6GHz).
58. (V4.21 SP1) FSP-B10: Support for SMF100a - TTL mode.
59. (V4.21 SP1) FSU-B21 with Order Number 1157.1126.03 supported.
60. (V4.21 SP1) For local lockout the alias remote command SYSTem:KLOCK ON | OFF is provided.
61. (V4.31) International keyboard driver package supported (German, Spanish, French, Italian and Portuguese).
62. (V4.31) New dialogs available for file/path selection (e.g. for Trace Export, Firmware Update Path).
63. (V4.31) ACP: Extended upper limits for Channel Bandwidth (5GHz) and Channel Spacing (20GHz).
64. (V4.31) ACP: Overlapping Adjacent Channels allowed now for parallel measurements.
It is now possible to configure overlapping adjacent channels. Based on a common carrier channel setting, it is now possible to measure with two slitley different ADJ channel settings with one measurement.
Example: TX Channel / TX Bandwidth (common for both measurement A and B)
ADJ used for measurement A
ALT1 used for measurement A

ALT2 used as ADJ for measurement B
ALT3 used as ALT1 for measurement B
65. (V4.31) ACP: Result output format changed for number of ADJ channels > 3.
66. (V4.31) Additional soft keys available to change the LAN configuration.
67. (V4.31) Save dialog reports a warning, if no item to save is selected.
68. (V4.31) The increment behaviour of the step keys for parameter SWEEP POINTS is changed.
The behaviour of the knob wheel still has the highest possible resolution.
69. (V4.31) Dummy Video Bandwidht 0 Hz returned for active FFT filter.
70. (V4.31) Availability changed for Spurious Measurement.
The Spurious Measurement is not available if the ACP measurement is active.
71. (V4.31) HP emulation: Additional remote commands are supported.
The following commands are supported: ML, MEAS, SUM, LIMIPURGE, EDITLIML, LIMIREL, SDEL, SADD, LIMF, LIMU, LIML, LIMM, LIMD, LIMTFL, LIMTSL, SDON, EDITDONE, LIMISAV, LIMIRCL, LIMITEST, LIMIFAIL
72. (V4.31) HP emulation: A new softkey COUPLING FSP/HP is now available to change the Span/RBW and RBW/VBW default coupling.

- 73. (V4.31) HP emulation: The default for Sweep Repeat is now OFF for 856x and 859x.
- 74. (V4.31) FSU-B9: The number of sweep points allowed in analyzer mode is now supported in NETWORK mode, too.
- 75. (V4.31) FS-K7: Deemphasis is now additionally supported for active Weighting AF Filter CCTT and CCIR.
- 76. (V4.31) Support for new option VOR/ILS Avionics Measurements Application R&S FS-K15.
- 77. (V4.31) Support for new option 3GPP HSPA+ Application Firmware R&S FS-K74+.
- 78. (V4.35) Application Setup Recovery restores previous settings after application exit.

Problems Eliminated

The version numbers in brackets indicate the version in which the problem was observed for the first time.

1. (V4.11) Analyzer crashes in remote operation using command MMEM:CAT? or MMEM:CAT:LONG?.

Note: This problem is already fixed in V4.25 SP1.

2. (V4.21) Remote command *OPT? does not report implicitly contained applications as available.

The analyzer response string only includes 'K91'. The implicitly contained option FSQ-K90 is not returned. The same problem occurs for FSQ-K93/FSQ-K92.

Note: This problem is already fixed in V4.25 SP1.

3. (V4.21) The self alignment function CAL TOTAL, step CalAmp3 requires 5 min execution time.

Note: This problem is already fixed in V4.25 SP1.

4. (V4.21) FSP-B10: Signal drops reported with signal generator R&S SMU.

A signal drop of up to 7dB was reported when performing a sweep from 1 MHz to 1 GHz with signal generator R&S SMU due to insufficient settling times.

Note: This problem is already fixed in V4.25 SP1.

5. (V4.21) The analyzer stops sweeping for low start frequency if function IF SHIFT B is active.

Selecting function IF SHIFT B prevents the trace from being updated, if the start frequency is below 1 MHz

Note: This problem is already fixed in V4.25 SP1.

6. (V4.11) FSQ-K70: Missing EXTREF indication for measurement result Signal - REAL/IMAG combined with SPLIT SCREEN.

An "EXTREF" enhancement label indicates an UNLOCK condition due to a missing external reference. If SPLIT SCREEN is active and one of the screens is using a REAL/IMAG measurement format, the update of this indication is erroneously suppressed. The remote control status information (Status Questionable Frequency register) is not affected and returns the correct status information.

Note: This problem is already fixed in V4.25 SP1.

7. (V4.11) HP emulation: The behaviour of a few remote commands is corrected.

The behaviour for following remote commands is corrected CONTS, M, MA, MKPT, MOV, IP, SS, VAVG, VB.

8. (V4.11) HP emulation: Memory leak using commands EX and AXB fixed.

9. (V4.11) Remote Desktop: Analyzer application crashes during connection to the instrument.

10. (V4.11) Wrong trace information is displayed after changing the number of sweep points.

When trace mode MAXHOLD is active and the number of sweep points is changed during the max hold process (e.g. with CONT. SWEEP) no reset of the trace takes place and therefore a corrupted trace is visible.

11. (V4.11) Auto Recall function does not work with filenames longer than 8 characters.

12. (V4.21) The analyzer does not complete the frequency sweep with following instrument settings:

Gated Trigger	ON
Detector	RMS
Sweep Points	10101
Start Frequency	2390 MHz
Stop Frequency	2476 MHz
Resolution Bandwidth	1 MHz
Video Bandwidth	3 MHz
Sweep time	4 s

13. (V4.21) Spurious Measurement: A wrong sweep time is visible in the Sweep List if gated trigger is active.

The auto sweep time calculation depends on the Gated Trigger state, But is not taken into account when the Sweep Ttime Mmode is switched to AUTO while the Gated Trigger is active. Therefore a wrong sweep time is visible on the Sweep List

14. (V4.21) Analyzer crashes if Phase Noise Auto Peak Search is switched on if the Noise Marker is active.

The noise marker is switched off now in that case.

15. (V4.21) Remote operation: Command CALC:LIM:CLEAR does not erase the limit margin register.

The command CALC:LIM:CLEAR clears the result of the actual limit check, but does not clear the result of the margin. As a result after sending the command CALC:LIM:CLEAR the readout of the margin register status may still return a FAILED state for the margin. for consistency reasons, the CALC:LIM:CLEAR commands clears the limit and the margin status as well.

16. (V4.21) Wrong ACP settings restored after data set recall or reboot of the instrument.

The recall of a data set with modified ACP settings does not restore the complete setting. Certain parameters (e.g. channel spacing, channel bandwidth) are set to the standard dependent default values. The same problem arises after warm boot of the instrument.

17. (V4.11) Network: Save as Transducer Factor generates a wrong transducer file if logarithmic frequency scaling is switched on.**18. (V4.11) Gated Statistics Measurement: Remote control allows illegal period time.**

The period time is common for all three traces but the remote command SENS:SWE:EGAT:TRAC:PER does not ignore the numeric suffix at TRAC.

19. (V4.11) The recall of a data set does not work if a spurious measurement is running.**20. (V4.21) The instrument does not support to store a save set using special characters (e.g. 'ü', 'á') in the file name but no error message is reported.****21. (V4.21) Spurious signal eliminated (Center 133.1 MHz, Span 500 kHz).**

The spurious signal appears about 230 kHz above the signal (at 133 MHz) with following instrument settings:

Center Frequency	133.1 MHz
Span	500 kHz
Resolution Bandwidth	3 kHz
Video Bandwidth	300 Hz

Problems Eliminated with Service Pack 1

Service Pack 1 fixes the following problems. The version numbers in brackets indicate the version in which the problem was observed for the first time.

1. (V4.31) VSA measurement sometimes halted after warm boot.

This problem only occurs on instruments with CPU boards with order number 1091.3104.

2. (V4.31) Hidden analyzer grid after entry/exit of the NOISE or PHASE NOISE personality.

After the following key strokes the internal database setting is corrupted. As a result the analyzer grid is hidden and an UNLOCK message may appear:

- Hotkey AVIONICS
- Hotkey NOISE or PHASE NOISE
- Hotkey ANALYZER (to leave the application back to analyzer mode)

Work around: Leave the AVIONICS application by any other personality, e.g. ANALYZER before pressing NOISE or PHASE NOISE.

3. (V4.25) Analyzer application slows down after several thousand PRESETs or *RST commands.

Known Problems

None.

Modifications to the Operating Manual

The order numbers for the current manual sets are

- 1166.1725.11-06 (German) and
- 1166.1725.12-06 (English).

The corresponding PDF-Files are separately available on the service board.

The firmware options FS-Kxx come with their own operating manual and release notes. Please refer to the corresponding release notes for more information on changes to these packages.

Last minute changes to the operating manual

Manual Operation

Basic Settings - Instrument Drives Usage

The instrument's harddisk is divided in 3 (or 2) logical drives:

C: Contains the operating system Windows XP, printer driver, network driver,...

Other user programs, applications, driver should be stored/installed on drive C:.

D: Contains instrument's firmware and related data sets (limit lines, transducer,...)
D:\user\config is the default location for customer's instrument settings
D:\R_S\instr\temp is the default directory for hardcopy files.

Other user data should be stored on drive D:.

E: Backup storage location for Windows XP. Here a copy of the operating system is saved.
This drive is used to restore Windows XP using "Analyzer Firmware Backup" function on Power On. A copy of the currently installed update sets are located on this drive, too.
This drive is not available on instruments with option B18 Removable Harddisk

No additional data should be stored on this drive.

Basic Settings - International Keyboard Support

Since firmware version 4.3x following international keyboard drivers are supported.

- **French Keyboards**
- **German Keyboards**
- **Italian Keyboards**
- **Portuguese Keyboards**
- **Spanish Keyboards**

These drivers are pre installed if the instrument is shipped with version 4.3x or later. A separate installer file is available on the instrument's download area.

To change the keyboard driver language proceed with the following steps:

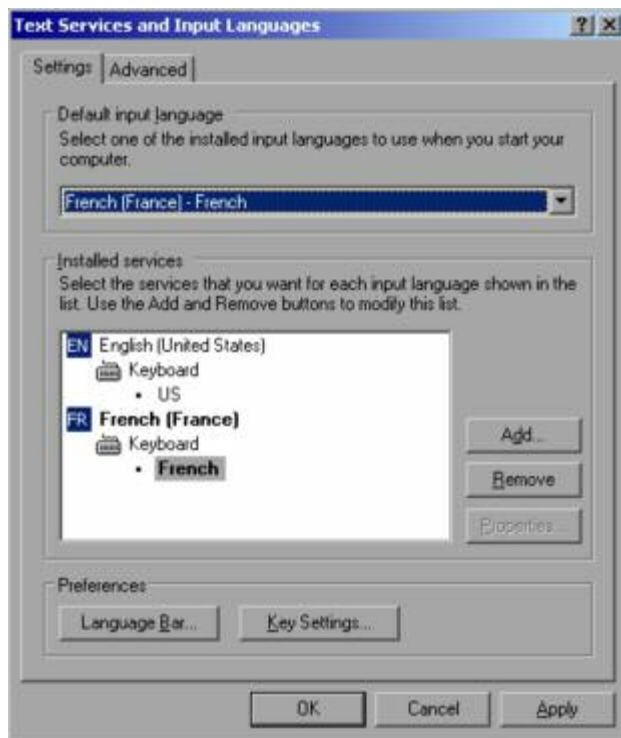
- 1) Start Windows Explorer
- 2) Start the installation procedure with double click onto the file **FsxInternationalKeyboards.msi**.
- 3) Reboot the analyzer.
- 4) Now open the windows start menu by pressing the windows key or <CTRL> <ESC>.
- 5) Select *Settings - Control Panel - Regional and Language Options - Languages*.



- 6) Select *Details*.



- 7) Select *Add*, choose one of the available input languages and confirm with OK and the dialog will be close.
- 8) Now change the *Default input language* as needed and close all open dialogs with OK.



- 9) Reboot the analyzer.

Basic Settings - File and Path Selection using front panel keys

Since firmware version 4.3x the analyzer base system firmware supports new dialogs to select a folder and/or a file, e.g. for trace export.

The following section describes the usage of the instrument's front panel keys using TRACE EXPORT as an example.



TRACE - NEXT - ASCII FILE EXPORT opens the dialog. *File name* has the focus and it is now possible to edit the filename using numerical keys, CURSOR LEFT/RIGHT and BACK.

The drive to be used is checked in following order:

- Connected USB memory stick
if not available then
- Drive A:
if not available or no floppy disk inserted then
- Drive D:

Note: Path and filename are reset to default values with PRESET.



To *change the drive* use the rotary knob until *Save in* gets the focus and press CURSOR RIGHT. Now use CURSOR UP/DOWN to select the drive and press ENTER key or the rotary knob.



To *select a sub folder* or to *select a file* use the rotary knob until the file/sub folder list gets the focus. A selection frame is visible in that case.

Now use CURSOR UP/DOWN to select a folder and press ENTER key or the rotary knob to change the path or select a file to overwrite this file with the new data.



To enter alpha numeric characters for the file name use the rotary knob to set the focus on *edit filename* and press ENTER key or the rotary knob.

Menu File

Save / Recall functions are split in separate sub menus for save and recall (see below).
In addition the save function is extended by an automatic generation of save set names.

SAVE ↓	SAVE FILE	
	SAVE PATH	
	SELECT FILE	
	EDIT FILE NAME	
	EDIT COMMENT	
	SELECT ITEMS↓	SELECT ITEMS
		ENABLE ALL ITEMS
		DISABLE ALL ITEMS
	DELETE FILE	
	NEW FOLDER	
RECALL ↓	RECALL FILE	
	SAVE PATH	
	SELECT FILE	
	EDIT FILE NAME	
	EDIT COMMENT	
	SELECT ITEMS↓	SELECT ITEMS
		ENABLE ALL ITEMS
		DISABLE ALL ITEMS
	DELETE FILE	
	NEW FOLDER	

STARTUP RECALL		
FILE MANAGER ↓		

SAVE -*Edit File Name*

Sets the focus on the File Name field.

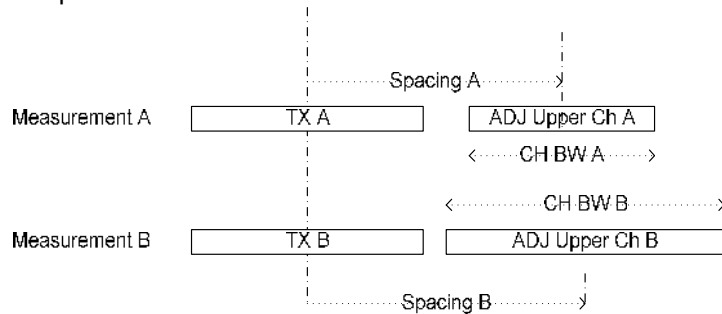
In the Save dialog box, the field already contains a suggestion for a new name: the file name used in the last saving process is counted up to the next unused name. For example, if the name last used was "test_004", the new name "test_005" is suggested, but only if this name is not in use. If the name "test_005" is already in use, the next free name is suggested, e.g. "test_006". You can change the suggested name to any name conform to the following naming conventions.

The name of a settings file consists of a base name followed by an underscore and three numbers, e.g. "limit_lines_005". In the example, the base name is "limit_lines". The base name can contain characters, numbers and underscores. The file extension is added automatically and can not be changed.

Menu MEAS – Channel and Adjacent-Channel Power Measurement

Since firmware version 4.3x it is possible to configure overlapping adjacent channels. Based on a common carrier channel setting, it is now possible to measure with two slightly different ADJ channel settings with one single measurement at a time.

Example:



ACP Measurement A and Measurement B are using identical TX channel settings (Channel Bandwidth).

The ADJ settings for Measurement A and measurement B are different.

It is now possible to do both measurement at a single time.

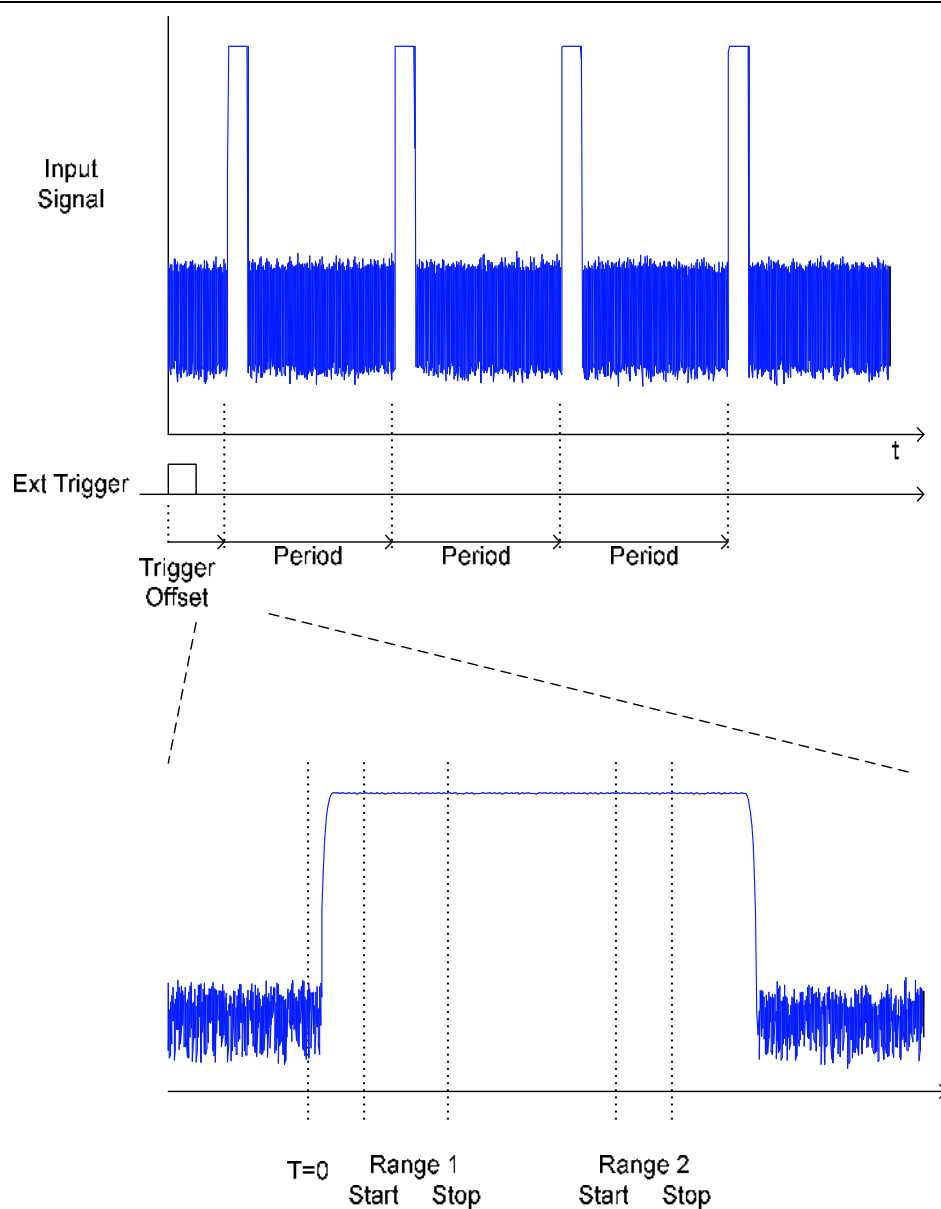
- Configure the ACP measurement with number of ADJ channels = 2.
- Define ADJ settings (bandwidth, spacing) as required for measurement A.
- Define ALT1 settings (bandwidth, spacing) as required for ADJ channel of measurement B
- Perform the ACP measurement
- Read the ACP measurement result
 - The Carrier Power belongs to measurement A and B
 - The ADJ result is the ADJ result of measurement A
 - The ALT1 result is the ADJ result of measurement B.

Note: This feature is only supported for ACP but not for Multi Carrier ACP measurement.

Menu MEAS – SIGNAL STATISTICS - NEXT

MEAS	SIGNAL STATISTICS	GATED TRIGGER
		GATED RANGES

Statistic measurements on pulsed signals can be done using GATED TRIGGER. An external frame trigger is required as a time (frame) reference.



The gate ranges define the part of the I/Q capture data taken into account for the statistics calculation. These ranges are defined relative to a reference point $T=0$. The gate interval is repeated every period time until the end of the I/Q capture buffer. The reference point $T=0$ is defined by the external trigger event and the instrument's trigger offset.

GATED TRIGGER

GATED TRIGGER activates the gating for statistics functions. The trigger source is changed to EXTERN if this function is switched on.

Note:

The I/Q data capturing is repeated until the configured number of valid samples is reached. If the active gate period is outside the I/Q capture buffer or the resulting gate time is zero the measurement will not reach its end. In this case, the range start and stop values have to be checked.

IEC/IEEE-bus command:

[SENSe<1|2>]:SWEep:EGATe ON | OFF

GATED RANGES

GATED RANGES opens a table to configure up to 3 gate ranges for each trace.

GATE RANGES			
	Trace 1	Trace 2	Trace 3
Comment: Period	4.615 ms		
Range 1 Start Stop Use Range	0 us 200 us YES		
Range 2 Start Stop Use Range			
Range 3 Start Stop Use Range			

Comment: Comment string
 Period: Period of the signal to be measured.
 The signal period is common for all ranges.
 Range x Start Begin of time period to be taken into account.
 Range x Stop End of time period to be taken into account.
 Use Range YES / NO: Allows to temporarily disable a range.

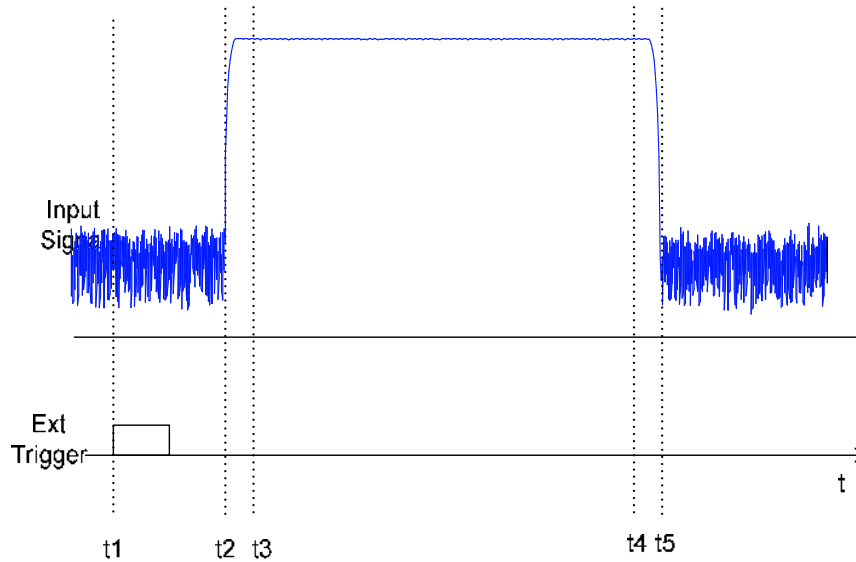
Note: The timing values have full numerical resolution and are only rounded for display.

IEC/IEEE-bus command:

[SENSe<1|2>]:SWEep:EGATe:TRACe<1...3>:COMMe
 [SENSe<1|2>]:SWEep:EGATe:TRACe<1...3>:STATe<1...3> ON | OFF
 [SENSe<1|2>]:SWEep:EGATe:TRACe<1...3>: START<1...3> value
 [SENSe<1|2>]:SWEep:EGATe:TRACe<1...3>: STOP<1...3> value
 [SENSe<1|2>]:SWEep:EGATe:TRACe<1...3>: PERiod value

Gated statistics configuration example:

A statistics evaluation has to be done over the useful part of the signal between t_3 and t_4 .
The period of the GSM signal is 4.61536 ms



- t_1 : External positive trigger slope
- t_2 : Begin of burst (after 25 μs)
- t_3 : Begin of useful part, to be used for statistics (after 40 μs)
- t_4 : End of useful part, to be used for statistics (after 578 μs)
- t_5 : End of burst (after 602 μs)

The instrument has to be configured as follows:

Trigger Offset	$t_2 - t_1 = 25 \mu\text{s}$	now the gate ranges are relative to t_2
Range1 Start	$t_3 - t_2 = 15 \mu\text{s}$	start of range 1 relative to t_2
Range1 End	$t_4 - t_2 = 553 \mu\text{s}$	end of range 1 relative to t_2

Menu MEAS – HARMONIC DISTOR

HARMONIC ON OFF The results can be obtained via IEC/IEEE-bus via the following commands:
Trace read out via the normal trace subsystem. The first harmonic frequency
can be read out via the center frequency command.

THD value comma separated in % and dB:
:CALCulate:MARKer:FUNction:HARMonics:DISToRTion? TOTal

Comma separated list of harmonic levels, for each harmonic one value:
:CALCulate:MARKer:FUNction:HARMonics:LIST?

Menu MKR – NEXT – NEXT

MKR	STEPSIZE STANDARD
	STEPSIZE SWP POINTS

STEPSIZE STANDARD These softkeys control the knob increment/decrement of the marker
position. STEPSIZE STANDARD uses the grid resolution (span/625),
STEPSIZE SWP POINTS STEPSIZE SWP POINTS uses the available sweep points
configured in the SWEEP menu.

IEC/IEEE-bus command:
CALC:MARK:X:SSIZE STANDARD | POINTS

Menu MKR→ – NEXT – NEXT

MKR	AUTO MAX PEAK
	AUTO MIN PEAK

AUTO MAX PEAK *AUTO MAX PEAK / AUTO MIN PEAK* adds an automatic peak search action for Marker 1 at the end of each particular sweep. This function may be used during adjustments of a device under test to keep track of the actual peak marker position and level.

AUTO MIN PEAK The actual marker search limit settings (*LEFT LIMIT*, *RIGHT LIMIT*, *THRESHOLD*, *EXCLUDE LO*) are taken into account.

IEC/IEEE-bus command:

CALCulate<1|2>:MARKer<1...4>:MAXimum:AUTO ON | OFF
 CALCulate<1|2>:MARKer<1...4>:MINimum:AUTO ON | OFF

The suffix at MARKer is ignored.

Menu MKR FCTN

PEAK LIST ↓	Side menu
	PEAK LIST EXPORT
	DECIM SEP

PEAK LIST EXPORT The PEAK LIST EXPORT softkey stores the content of the marker peak list in ASCII format to the specified file.

IEC/IEEE-bus command: MMEM:STOR:PEAK "ilename"

DECIM SEP Selects '.' or ',' as the decimal point.

Menu MKR FKT – PHASE NOISE

MKR FKT	PHASE NOISE	AUTO PEAK SEARCH
---------	-------------	------------------

AUTO PEAK SEARCH The phase noise *AUTO PEAK SEARCH* adds an automatic peak search action for the reference fixed marker 1 at the end of each particular sweep. This function may be used for tracking of a drifting source whilst phase noise measurement. The delta marker 2 which shows the phase noise measurement result keeps the delta frequency value. Therefore the phase noise measurement in a certain offset is valid although the source is drifting. Only when the marker 2 is reaching the border of the span the delta marker value is adjusted to be within the span. Choose a larger span in such situations.

IEC/IEEE-bus command:

CALCulate<1|2>:DELTamarker<1...4>:FUNCTION:PNOise:
 AUTO ON | OFF

The suffix at DELTmarker is ignored.

Menu TRACE – NEXT

AVG MODE (LOG) ↓	LIN
	LOG
	POWER

AVG MODE

The *AVG MODE* softkey selects logarithmic or linear averaging for the logarithmic level display mode.

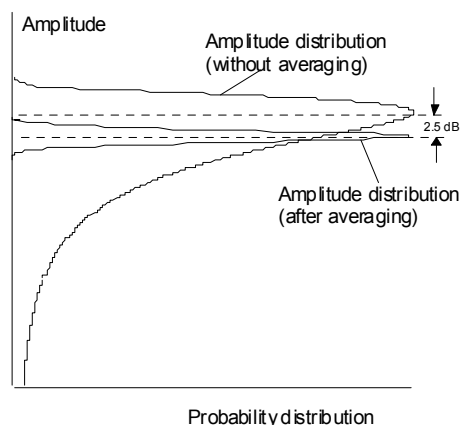
At the same time the difference calculation is switched between linear and logarithmic in submenu *TRACE MATH*.

With logarithmic averaging, the dB values of the display voltage are averaged or subtracted from each other with trace mathematical functions. With linear averaging the level values in dB are converted into linear voltages or powers prior to averaging. Voltage or power values are averaged or offset against each other and reconverted into level values.

For stationary signals the two methods yield the same result.

Logarithmic averaging is recommended if sinewave signals are to be clearly visible against noise since with this type of averaging noise suppression is improved while the sinewave signals remain unchanged.

For noise or pseudo-noise signals the positive peak amplitudes are decreased in logarithmic averaging due the characteristic involved and the negative peak values are increased relative to the average value. If the distorted amplitude distribution is averaged, a value is obtained that is smaller than the actual average value. The difference is -2.5 dB.



This low average value is usually corrected in noise power measurements by a 2.5 dB factor. Therefore the FSG offers the selection of linear averaging. The trace data are delogarithmized prior to averaging, then averaged and logarithmized again for display on the screen. The average value is always correctly displayed irrespective of the signal characteristic.

Following selections are available:

LOG: logarithmic averaging
 LIN linear averaging (delogarithmization depends on selected unit)
 For units VOLT and AMPERE the level values are converted into linear voltages prior to averaging.
 POWER linear averaging (delogarithmization to power for all units)

Note: For correct power averaging with units VOLT or AMPERE, selection POWER has to be used.

IEC/IEEE-bus command CALC:MATH:MODE LIN | LOG | POW

Menu SETUP – NEXT

SETUP	Side menu	
	OPEN START MENU	
	APPL SETUP RECOVERY	
	IF SHIFT	IF SHIFT OFF
		IF SHIFT A
		IF SHIFT B
		AUTO

OPEN START MENU

Softkey OPEN START MENU opens the windows XP start menu. and provides an easy access to standard windows functions if a mouse is connect.

IEC/IEEE-bus command: -

APPL SETUP RECOVERY

Softkey **APPL SETUP RECOVERY** (Application Setup Recovery) controls the instrument behaviour when changing the active application, e.g from **SPECTRUM** to **FM DEMOD** and back from **FM DEMOD** to **SPECTRUM**.

In the default state **OFF** a few parameters of the current analyzer setting are passed to the application (e.g. center frequency, level settings) or from the application back to the analyzer mode.

If **APPL SETUP RECOVERY** is switched **ON**, the settings of the applications are independent of each other. Leaving the **FM DEMOD** application will restore the previous state of the **ANALYZER**.

Note: The individual application settings are stored on the internal harddisk.

IEC/IEEE-bus command: -
 SYSTem:APPLication:SREcovery[:STATe] ON | OFF

IF SHIFT - IF SHIFT OFF

Input signals at a frequency of half the 1st IF (in the frequency range of 2270 MHz to 2350 MHz) will reduce the dynamic range of the analyzer. This problem only occurs for low RF attenuation values. It can be overcome by shifting the 1st IF.

IF SHIFT - IF SHIFT A

For signals from 2270MHz to 2310 MHz *IF SHIFT A* is appropriate, for 2310 MHz to 2350 MHz *IF SHIFT B* must be used.

IF SHIFT - IF SHIFT B

IF SHIFT - AUTO

IF SHIFT AUTO automatically selects the suitable 1st IF shifting. The Signal Frequency has to be specified for that purpose in the Signal Frequency dialog.

Note:
The 1st IF shifting is automatically done for ACP measurements if center frequency (= signal frequency) is in the range of 2270 MHz ... 2350 MHz. The IF SHIFT setting is therefore ignored for ACP measurements.

IEC/IEEE-bus command:
 [SENS<1 | 2>:] SWEep:IF:SHIFt[:MODE] OFF | A | B | AUTO
 [SENS<1 | 2>:] SWEep:IF:SHIFt:FREQuency <numeric value>

Menu SETUP – GENERAL SETUP - CONFIGURE NETWORK

SETUP	GENERAL SETUP	CONFIGURE NETWORK	COMPUTER NAME
			IP-ADDRESS
			SUBNET MASK
			DHCP ON OFF
			CONFIGURE NETWORK
			SHOW CONFIG

COMPUTER NAME Softkey COMPUTERNAME opens a dialog to enter the computer name. The naming conventions of Windows apply. For further details refer to the *Quickstart Guide, Appendix B: LAN Interface*.

IP ADDRESS Softkey IP ADDRESS opens a dialog to configure the instrument's IP address. The TCP/IP protocol is preinstalled with the IP address 10.0.0.10. If the DHCP server is available (DHCP ON) the softkey is not available. For further details refer to the *Quickstart Guide, Appendix B: LAN Interface*.

SUBNET MASK Softkey SUBNET MASK opens a dialog to configure the instrument's TCP/IP subnet mask. The TCP/IP protocol is preinstalled with the subnet mask 255.255.255.0.
The subnet mask consists of four number blocks separated by dots. Each block contain 3 numbers in maximum (e.g.100.100.100.100), but also one or two numbers are allowed in a block (as an example see the preinstalled address). For further details refer to the *Quickstart Guide, Appendix B: LAN Interface*.

SHOW CONFIG Softkey SHOW CONFIG show the current network configuration.

NETWORK ADAPTER – CONFIGURATION	
DHCP	ON
COMPUTER NAME	MYINSTRUMENT
IP ADDRESS	10.114.10.235
NETMASK	255.255.0.0

Note: The Network Configuration softkeys above are available since Firmware Version 4.3x.

Instruments shipped with Windows XP Service Pack1 require an additional installation package (LXI installer) if the softkeys are not visible. This installation package is available on the R&S instrument's download area.

The configuration via softkeys is only possible if the LAN is connected to the instrument.

CONFIGURE
NETWORK

The CONFIGURE NETWORK softkey opens the windows dialog box with the network settings. The most important parameters are accessible by the softkeys COMPUTER NAME, IP ADDRESS, SUBNET MASK and DHCP ON/OFF.

Menu SETUP – GENERAL SETUP - GPIB

SETUP	GENERAL SETUP	GPIB	SWEEP REP ON OFF
			COUPLING FSP HP

SWEEP REP ON OFF

Softkey SWEEP REP ON/OFF controls a repeated sweep of the commands E1 and MKPK HI. If the repeated sweep is OFF, the marker is set without sweeping before.

The softkey is only available in HP emulation mode.

IEC/IEEE bus command: SYSTem:RSWeep ON | OFF

COUPLING FSP HP

Softkey COUPLING FSP/HP controls the default coupling ratios for for span and resolution bandwidth (Span/RBW) and for resolution bandwidth and video bandwidth (RBW/VBW) for the HP emulation mode. In case of FSP the standard parameter coupling of the instrument is used. As a result in most cases a shorter sweep time is used than in case of HP.

The softkey is only available in HP emulation mode.

IEC/IEEE bus command: SYSTem:HPCoupling FSP | HP

Menu SETUP – GENERAL SETUP – NEXT

SETUP	GENERAL SETUP	LXI	DISPLAY ON OFF
			LCI

DISPLAY ON OFF

The LXI menu offers some functions for LXI Class C.

LCI

Note: This menu is only available, if the LXI package is installed and activated (see: LXI Installation).

The DISPLAY ON/OFF softkey switches the LXI Observer window on and off.



Pressing LCI will execute the *LAN Configuration Initialize (LCI)*.

LXI Installation:

The LXI Class C support package is pre installed, if the analyzer is shipped with version 4.1x or newer. A link LXI is visible in the windows start menu.

The installation of the LXI Class C support package requires an external keyboard and/or a mouse.

To install the LXI Class C support package please:

- Download the installer file from the R&S download area.
- Select windows start menu (Windows key or CTRL ESC) and start the windows explorer
- Create the sub directory **D:\LXI**, if this directory does not exist.
- Copy the installer file to this directory via LAN or USB stick.
- Start the installation by double click on the MSI file.

LXI Activation and Deactivation:

After the successful packet installation the LXI support has to be activated:

- Connect the analyzer to the LAN.
- Select windows start menu (Windows key or CTRL ESC)
- Select *LXI*.
- Select *LXI Config*. An LXI configuration dialog will be opened.
- Select the correct instrument (FSU).
- Select *Rescan*. The current IP address will be visible in the bottom line.
- Select *Save*, after successful rescan operation.

To switch LXI OFF, use again the LXI entry from the start menu and select the LXI TURN OFF button.

Remote Operation

:CALCulate<1|2>:LIMit<1...8>:ACTive?

This commands queries the names of all active limit lines. The numeric suffixes at `CALCulate` and `LIMit` are ignored. The list is sorted in alphabetic order. Any empty string is returned, if no limit line is active.

Example: `":CALC:LIM:ACT?"`

Characteristics: *RST value : -
SCPI: device-specific

:CALCulate<1|2>:MARKer<1 to 4>:FUNCtion:HARMonics:BANDwidth:AUTO ON | OFF

This command specifies whether the resolution bandwidth of the 2nd to the nth harmonic should be identical to the bandwidth of the first harmonic (OFF) or to the next largest bandwidth (corresponding to the harmonic) of the multiple of the bandwidth of the first harmonic (ON).

Example: "CALC:MARK:FUNC:HARM:BAND:AUTO OFF"
'Switches automatic bandwidth expansion off

Characteristics: *RST value: ON
SCPI: device-specific

:CALCulate<1|2>:MARKer<1 to 4>:FUNction:HARMonics:PRESet

This command optimizes the device settings depending on the mode in which the harmonic measurement was started:

If the harmonic measurement was started in the frequency domain (span > 0), the frequency and the level of the first harmonic are calculated, from which the measurement list is set up.

If the measurement was started in the time domain (span = 0), the frequency of the first harmonic is not changed. The level, however, is not calculated.

The function is independent of the marker selection, i.e. the suffix `<1|2>` or `<1 to 4>` of `CALCulate` or `MARKer` is irrelevant.

Example: "CALC:MARK:FUNC:HARM:PRES" 'Optimizes the device setting for the measurement of harmonics.

Characteristics: *RST value: --
SCPI: device-specific

This command is an event and therefore has no *RST value and no query.

:CALCulate<1|2>:MARKer<1 to 4>:FUNction:HARMonics:DISToRtion? TOTal

This command queries the results of the total harmonic distortion (THD).

A complete sweep with synchronization to sweep end should be performed between switching on the function and querying the measured value to obtain a valid query result. This is only possible in the single-sweep mode.

The function is independent of the marker selection, i.e. the suffix $\langle 1|2\rangle$ or $\langle 1$ to $4\rangle$ of `CALCulate` or `MARKer` is irrelevant.

Example:	"INIT:CONT OFF"	'Switches to single-sweep mode.
	"CALC:MARK:FUNC:HARM:NHARM 3"	'Sets the number of harmonics to 3.
	"CALC:MARK:FUNC:HARM ON"	'Switches on the measurement of harmonics.

"INIT;*WAI"

'Starts a sweep and waits for the end of measurement.

"CALC:MARK:FUNC:HARM:DIST? TOT"

'Outputs the total harmonic distortion in % and dB.

Characteristics: *RST value: --
SCPI: device-specific

:CALCulate<1|2>:MARKer<1 to 4>:FUNCTION:HARMonics:LIST?

This command reads out the list of harmonics. The first value is the absolute power of the first harmonic in the unit set via UNIT. The other values are relative to the carrier signal and are output in dB.

The numeric values are output, separated by commas. The number corresponds to that of the harmonics to be measured, which are defined with CALC:MARK:FUNC:HARM:NHARM.

A complete sweep with synchronization to sweep end should be performed between switching on the function and querying the measured value to obtain a valid query result. This is only possible in the single-sweep mode.

The function is independent of the marker selection, i.e. the suffix <1|2> or <1 to 4> of CALCulate or MARKer is irrelevant.

Example:

"INIT:CONT OFF"	'Switches to single-sweep mode.
"CALC:MARK:FUNC:HARM:NHARM 3"	'Sets the number of harmonics to 3.
"CALC:MARK:FUNC:HARM ON"	'Switches on the measurement of harmonics.
"INIT;*WAI"	'Starts a sweep and waits for the end of measurement.
"CALC:MARK:FUNC:HARM:LIST?"	'Outputs the three measured harmonics, separated by commas.

Characteristics: *RST value: --
SCPI: device-specific

:MMEMory:STORe<1|2>:MARKer <file_name>

This command saves the data of active markers to a file < file_name >.

Example: File content with 2 active marker in screen A:

```
Marker;1;T1
-25.87;dBm
19.920000000;GHz
Delta;2;T1
-21.90;dB
-5.920000000;GHz
```

Example: "MMEM:STOR:MARK 'C:\marker.txt'" 'Creates the file
'marker.txt, with all marker data of screen A.

Characteristics: *RST-Wert: -
SCPI: device-specific

Mode: A

This command is an event and therefore has no *RST value and no query.

:[SENSe<1|2>:]CORRection:TRANsducer:ACTive?

This command queries the active transducer factor. Any empty string is returned, if no transducer factor is active.

Example: " :CORR:TRAN:ACT?"

Characteristics: *RST value : -
SCPI: device-specific

:[SENSe<1|2>:]LIST:RANGe<1...20>:BANDwidth[:RESolution] <numeric_value>

This command selects the resolution bandwidth (RBW) of a range in the spurious measurement.

Example: " :LIST:RANG2:BAND 10E3" 'sets the RBW to 10 KHz

Features: *RST value: 10 kHz
SCPI: device-specific

Mode: A

:[SENSe<1|2>:]LIST:RANGe<1...20>:BANDwidth:VIDeo <numeric_value>

This command selects the video bandwidth (VBW) of a range in the spurious measurement.

Example: " :LIST:RANG2:BAND:VIDeo 40E3" 'sets the VBW to 40 KHz

Features: *RST value: 30 kHz
SCPI: device-specific

Mode: A

:[SENSe<1|2>:]LIST:RANGe<1...20>:BREak ON | OFF

This command determines whether a sweep is stopped in the spurious measurement when a range is changed.

Example: " :LIST:RANG2:BRE ON" 'sweep stops if the range is changed from 'range 2 to 3

Features: *RST value: OFF
SCPI: device-specific

Mode: A

:[SENSe<1|2>:]LIST:RANGe<1...20>:COUNT?

This command indicates the number of defined ranges of the spurious measurement.

The numeric suffix <1 to 4> with RANGE is not relevant for this command.

Example: " :LIST:RANG:COUN?" 'Indicates the number of ranges

Features: *RST value: OFF
SCPI: device-specific

Mode: A

:[SENSe<1|2>:]LIST:RANGe<1...20>:DELeTe

This command deletes a range.

Example: " :LIST:RANG2:DEL" 'deletes range 2

Features: *RST value: --
SCPI: device-specific

Mode: A

**:
:[SENSe<1|2>:]LIST:RANGe<1...20>:DETector** APEak | NEGative | POSitive | SAMPlE | RMS | AVERage

This command sets the detector in the spurious measurement.

Example: " :LIST:RANG2:DET APE " 'autopeak detector

Features: *RST value: POS
SCPI: device-specific

Mode: A

**:
:[SENSe<1|2>:]LIST:RANGe<1...20>:FILTer:TYPE** NORMal | CHANnel | RRC | P5

This command sets the filter in the spurious measurement.

Example: " :LIST:RANG2:FILT:TYPE RRC " 'RRC filter

Features: *RST value: NORMal
SCPI: device-specific

Mode: A

**:
:[SENSe<1|2>:]LIST:RANGe<1...20>[:FREQuency]:STARt** <numeric_value>

This command sets the start frequency of a range in the spurious measurement.

Example: " :LIST:RANG2:STAR 1GHZ " 'start frequency of range 2 to 1 GHz

Features: *RST value: --
SCPI: device-specific

Mode: A

**:
:[SENSe<1|2>:]LIST:RANGe<1...20>[:FREQuency]:STOP** <numeric_value>

This command sets the stop frequency of a range in the spurious measurement.

Example: " :LIST:RANG2:STOP 2GHZ " 'stop frequency of range 2 to 2 GHz

Features: *RST value: --
SCPI: device-specific

Mode: A

**:
:[SENSe<1|2>:]LIST:RANGe<1...20>:INPut:ATTenuation** <numeric_value>

This command defines the RF attenuation of a range in the spurious measurement.

Example: " :LIST:RANG2:INP:ATT 30db " 'RF attenuation of range 2 to 30 dB

Features: *RST value: -
SCPI: device-specific

Mode: A

**:
:[SENSe<1|2>:]LIST:RANGe<1...20>:INPut:ATTenuation:AUTO** ON | OFF

This command switches the autoranging of a range in the spurious measurement on or off.

Example: " :LIST:RANG2:INP:ATT:AUTO ON" 'activates autorange for range 2

Features: *RST value: ON
SCPI: device-specific

Mode: A

: [SENSe<1|2>]:LIST:RANGe<1...20>:INPut:GAIN:STATe ON | OFF

This command switches the preamplifier of a range in the spurious measurement on or off.

Example: " :LIST:RANG2:INP:GAIN:STAT ON" 'activates the preamplifier for 'range 2

Features: *RST value: OFF
SCPI: device-specific

Mode: A

: [SENSe<1|2>]:LIST:RANGe<1..20>:LIMit <numeric_value>

This command defines the limit of spurious emission measurement LIST EVALUATION.

The numeric suffix at SENSe<1|2> is irrelevant.

Example: "LIST:RANG5:LIM -40" 'Limit Line in Range 5 is -40dB

Characteristics: *RST value: -13dBm
SCPI: device-specific

Mode: A

: [SENSe<1|2>]:LIST:RANGe<1..20>:LIMit:STATe ON | OFF

This command activates/deactivates limit checking of spurious emission measurement LIST EVALUATION.

The numeric suffix at SENSe<1|2> and the numeric suffix at RANGe1..20> are irrelevant.

Example: "LIST:RANG5:LIM -40" 'limit in range 5 is -40dBm
"LIST:RANG7:LIM -20" 'limit in range 7 is -20dBm
"LIST:RANG:LIM:STAT ON" 'activates limit checking

Characteristics: *RST value: OFF
SCPI: device-specific

Mode: A

: [SENSe<1|2>]:LIST:RANGe<1...20>:POINts <numeric_value>

This command defines the number of sweep points of a range in the spurious measurement.

Example: " :LIST:RANG2:POIN 300" 'sets 300 sweep points in range 2

Features: *RST value: 625
SCPI: device-specific

Mode: A

Note: The 1st IF shifting is automatically done for ACP measurements if center frequency (= signal frequency) is in the range of 2270 MHz ... 2350 MHz. The IF SHIFT setting is therefore ignored for ACP measurements.

Example: "SENS:SWE:IF:SHIFT A" ' activates IF SHIFT A

Characteristics: *RST value: OFF
SCPI: device-specific

:[SENSe<1|2>:]SWEep:IF:SHIFt:FREQuency <numeric value>

This command defines the signal frequency to automatically select the suitable 1st IF shifting for mode IF SHIFT AUTO (SENS:SWE:IF:SHIFT:MODE AUTO).

Example: "SENS:SWE:IF:MODE AUTO" ' activates IF SHIFT AUTO
"SENS:SWE:IF:SHIFT:FREQ 2GHz" ' carrier signal at 2 GHz"

Characteristics: *RST value: 1 GHz
SCPI: device-specific

:SYSTem:APPLication:SRECovery[:STATe] ON | OFF

This command controls the instrument behaviour when changing the active application, e.g from SPECTRUM to FM DEMOD and back from FM DEMOD to SPECTRUM. In the default state OFF a few parameters of the current analyzer setting are passed to the application (e.g. center frequency, level settings) or from the application back to the analyzer mode. If APPL SETUP RECOVERY is switched ON, the settings of the applications are independent of each other. Leaving the FM DEMOD application will restore the previous state of the ANALYZER.

Note: The individual application settings are stored on the internal harddisk.

Example: ":SYST:APPL:SREC ON" ' use independent settings

Characteristics: *RST value: OFF
SCPI: device-specific

:SYSTem:COMMunicate:GPIB:RDEvice:COMManD 0..30,<command string>

This command sends a command or query string to the device using the GPIB interface FSP-B10. Usually an external generator is connected to this interface.

Note: Only basic I/O is possible with this device. The first parameter is the GPIB address of the device connected with GPIB interface of option FSP-B10.

Example: ":SYST:COMM:GPIB:RDEF:COMM 18, 'RST'" ' generator reset
' gen. frequency 2 GHz
":SYST:COMM:GPIB:RDEF:COMM 18, 'SOURCE:FREQ:CW 2E9' "
' gen. power 0dBm
":SYST:COMM:GPIB:RDEF:COMM 18, 'SOUR:POW 0'"
":SYST:COMM:GPIB:RDEF:COMM? 18, 'SENS:POW?' "
' queries the generator power

Characteristics: *RST value: -
SCPI: device-specific

:SYSTem:HPCoupling FSP | HP

This command controls the default coupling ratios Span/RBW and RBW/VBW for HP emulation mode. In case of FSP the standard parameter coupling of the instrument is used. As a result in most cases a shorter sweeptime is used than in case of HP. This command can only be selected in the HP emulation mode.

Parameter: FSP Use the instrument's default coupling ratios for span and resolution bandwidth (Span/RBW) and for resolution bandwidth and video bandwidth (RBW/VBW)
HP Origin HP coupling ratios

Example: "SYST:LANG '8566B'" 'changes the parser language to 8566B
"SYST:HPC HP" 'use HP coupling ratios

Characteristics: *RST value: FSP
SCPI: device-specific

Mode: A

:SYSTem:IDENTify:FACTory

With this command it is possible to reset the *IDN string to the factory default (Softkey: ID STRING FACTORY). The command in the form of a query returns "1" for the factory default state and "0" if the ID string is changed.

Example: ":SYST:IDEN:FACT" 'sets the ID string to the factory default

Characteristics: *RST value: -
SCPI: device-specific

Mode: A

:SYSTem:KLOCK ON | OFF

The alias remote command SYST:KLOC can be used to activate the LLO (local lockout) or to return to the local mode (GTL go to local). Parameter ON is LLO, OFF is GTL.

Example: "SYST:KLOC ON" 'activates LLO

Characteristics: *RST value: OFF
SCPI: device-specific

:SYSTem:LXI:DISPlay ON | OFF

This command shows or hides the LXI Observer dialog box. To use this command, the LXI Class C functionality must be installed and enabled.

Example: ":SYST:LXI:DISP ON" 'shows the LXI Observer dialog box.

Characteristics: *RST value: OFF
SCPI: device-specific

:SYSTem:LXI:LCI

This command executes the LAN configuration initialize (LCI) on the instrument. To use this command, the LXI Class C functionality must be installed and enabled.

This command is an event and therefore has no *RST value and no query.

Example: ":SYST:LXI:LCI" 'sets the LAN configuration initialize (LCI).

Characteristics: *RST value: -
SCPI: device-specific

:TRACe<1|2>:DATA? LIST

This command reads the resulting peak list of the spurious emission measurement LIST EVALUATION (CALC:PEAK:AUTO ON).

The output format of the result is:

<result of range 1>,< result of range 2>,...< result of range n>

Every single range has following format:

<No>,<Start>,<Stop>,<rbw>,<freq>,<Levelabs>,<Levelrel>,<Delta>,<Limitcheck>,<unused1>,<unused2>

No	: Range number
Start	: Range start frequency
Stop	: Range stop frequency
Rbw	: Resolution bandwidth
Freq	: Frequency of the peak in the range
Levelabs	: Absolute peak power of the range in dBm
Levelrel	: reserved (0.0)
Delta	: Delta of the peak power to the limit line in dB
Limitcheck	: Limit check state (0 = PASSED, 1 = FAILED)
Unused1	: reserved (0.0)
Unused2	: reserved (0.0)

The number of ranges correspond to the number of ranges define in the spurious sweep list.

The numeric suffix at TRACe<1|2> is irrelevant.

Example: "TRAC:DATA? LIST" ' Read LIST EVALUATION result

Characteristics: *RST value: -
SCPI: device-specific

Mode: A

Command Set of Models 8560E, 8561E, 8562E, 8563E, 8564E, 8565E, 8566A/B, 8568A/B, 8591E, 8594E, 71100C, 71200C and 71209A

Supported in addition to the manual:

Command	Supported subset	Function	Corresponding HP-Models	Status
ADD		Add	HP 8566B / HP 8568B / HP 8594E	available in V4.1x and above
CTA		Convert to absolute units	HP 8566B / HP 8568B / HP 8594E	available in V4.1x and above
DIV		Divide	HP 8566B / HP 8568B / HP 8594E	available in V4.1x and above
EDITDONE		limit line edit done	HP 856xE	available in V4.3x and above
EDITLIML		edit limit line	HP 856xE	available in V4.3x and above
LIMD		limit line delta	HP 856xE	available in V4.3x and above
LIMF		limit line frequency	HP 856xE	available in V4.3x and above
LIMIFAIL		limit fail query	HP 856xE	available in V4.3x and above
LIMIPURGE		purge limit line	HP 856xE	available in V4.3x and above
LIMIRCL		recall limit line	HP 856xE	available in V4.3x and above
LIMIREL		relative limit line	HP 856xE	available in V4.3x and above
LIMISAV		save limit line	HP 856xE	available in V4.3x and above
LIMITEST		limit line test	HP 856xE	available in V4.3x and above
LIML		lower limit line value	HP 856xE	available in V4.3x and above
LIMM		middle limit line value	HP 856xE	available in V4.3x and above
LIMTFL		flat limit line segment	HP 856xE	available in V4.3x and above
LIMTSL		slope limit line segment	HP 856xE	available in V4.3x and above
LIMU		upper limit line value	HP 856xE	available in V4.3x and above
MEAS		measurement status	HP 856xE	available in V4.3x and above
ML		mixer level	HP 8566B / HP 8568B / HP 856xE HP 8594E	available in V4.3x and above
MPY		Multiply	HP 8566B / HP 8568B / HP 8594E	available in V4.1x and above
NORMLIZE		Normalize Trace	HP 856xE	available in V4.1x and above
SADD		add a limit line segment	HP 856xE	available in V4.3x and above
SDEL		delete limit line segment	HP 856xE	available in V4.3x and above

Command	Supported subset	Function	Corresponding HP-Models	Status
SDON		limit line segment done	HP 856xE	available in V4.3x and above
SEDI		edit limit line segment	HP 856xE	available in V4.3x and above
SUB		Subtract	HP 8566B / HP 8568B / HP 8594E	available in V4.1x and above
SUM		sum of trace amplitudes	HP 8566B / HP 8568B / HP 8594E	available in V4.3x and above
VARDEF		Variable definition arrays are not supported	HP 8566B / HP 8568B / HP 8594E	available in V4.1x and above, ignored in earlier versions

856x: Emulation of the Spurious Response Measurement Utility 85672A

General commands for Spurious

Command	Supported subset	Function	Corresponding HP-Models	Status
SP_OK		A value of 1 denotes a successful measurement	HP 856xE	available in V4.1x and above
SP_RMT		A value of 1 means, that the instrument settings are saved to register 9	HP 856xE	available in V4.1x and above
SP_EXTREF		0: use internal reference, 1: use external reference	HP 856xE	available in V4.1x and above
SP_EXIT		Quits spurious	HP 856xE	available in V4.1x and above

Commands for TOI-Measurement

Command	Supported subset	Function	Corresponding HP-Models	Status
SP_TOI		Executes TOI measurement	HP 856xE	available in V4.1x and above
SP_TOIFA		Lower primary signal frequency in Hz	HP 856xE	available in V4.1x and above
SP_TOIFB		Upper primary signal frequency in Hz	HP 856xE	available in V4.1x and above
SP_TOIFS		Primary signal frequency spacing in Hz	HP 856xE	available in V4.1x and above
SP_TOI_SL		Lower signal amplitude in dBm	HP 856xE	available in V4.1x and above
SP_TOI_SU		Upper signal amplitude in dBm	HP 856xE	available in V4.1x and above
SP_TOI_PL		Lower distortion product amplitude in dBm	HP 856xE	available in V4.1x and above
SP_TOI_PU		Upper distortion product amplitude in dBm	HP 856xE	available in V4.1x and above
SP_TOI_A, SP_TOI_B		Third order intercept point in dBm	HP 856xE	available in V4.1x and above
SP_TOINA, SP_TOINB		The flag = 0 indicates a good measurement	HP 856xE	available in V4.1x and above

Commands for Harmonic Distortion

Command	Supported subset	Function	Corresponding HP-Models	Status
SP_HARM		Executes harmonic distortion measurement	HP 856xE	available in V4.1x and above
SP_H_MAX		Maximum harmonic to be measured, range is from 2 to 10	HP 856xE	available in V4.1x and above
SP_H_FFLAG		Displays or hides harmonics	HP 856xE	available in V4.1x and above
SP_HBWMIN		Min resolution bandwidth	HP 856xE	available in V4.1x and above
SP_H_LVL[1..10]		Array of amplitudes for each harmonic in dBc relative to the fundamental. SP_H_LVL[1] = 0 (the level of the fundamental in dBc). The index is the number of the harmonic	HP 856xE	available in V4.1x and above
SP_THD		Total harmonic distortion in percent	HP 856xE	available in V4.1x and above
SP_H_NS[1..10]		Array of flags corresponding to each measurement in the SP_H_LVL array. A value of 0 denotes a good measurement	HP 856xE	available in V4.1x and above
SP_H_FRQ		Frequency of the fundamental in Hz	HP 856xE	available in V4.1x and above
SP_H_AMP		Amplitude of the fundamental in dBm	HP 856xE	available in V4.1x and above

Commands for Spurious

Command	Supported subset	Function	Corresponding HP-Models	Status
SP_TIME		Calculates an estimated time for the spurious search	HP 856xE	available in V4.1x and above
SP_GEN		Executes the spurious search	HP 856xE	available in V4.1x and above
SP_SR_FL		Lower search limit in Hz	HP 856xE	available in V4.1x and above
SP_SR_FU		Upper search limit in Hz	HP 856xE	available in V4.1x and above
SP_DBCFLG		Values in dBm (SP_DBCFLG = 0) or dBc (SP_DBCFLG=1)	HP 856xE	available in V4.1x and above
SP_SR_TH		Lower search amplitude limit in dBm or dBc	HP 856xE	available in V4.1x and above
SP_SR_TG		Upper search amplitude limit in dBm or dBc	HP 856xE	available in V4.1x and above
SP_SRTFLG		Sort flag, 0 = sort output by frequencies, 1 = sort output by amplitudes	HP 856xE	available in V4.1x and above
SP_SR_TM		Estimated search time in seconds	HP 856xE	available in V4.1x and above
SP_NUMSP		Number of spurious signals found	HP 856xE	available in V4.1x and above
SP_SR_F[1..50]		Array of frequencies in Hz for spurious signals found	HP 856xE	available in V4.1x and above
SP_SR_A[1..50]		Array of amplitudes of the spurious signals found in dBm or dBc	HP 856xE	available in V4.1x and above
SP_SR_CF		Reference frequency in Hz for dBc mode	HP 856xE	available in V4.1x and above
SP_SR_CP		Reference amplitude in dBm for dBc mode	HP 856xE	available in V4.1x and above

856x: Emulation of the Phase Noise Utility 85671A

The following commands require option FS-K40 installed and enabled.

Command	Supported subset	Function	Corresponding HP-Models	Status
PH_MKF		Spot frequency in Hz	HP 856xE	available in V4.1x and above
PH_FMIN		Min offset frequency to be measured	HP 856xE	available in V4.1x and above
PH_FMAX		Max offset frequency to be measured	HP 856xE	available in V4.1x and above
PH_MKA		Queries amplitude at the spot frequency	HP 856xE	available in V4.1x and above
PH_DRIFT		0: for stable signals, 1: for drifty	HP 856xE	available in V4.1x and above
PH_RLVL		Reference level for the log plot	HP 856xE	available in V4.1x and above
PH_SMTHV		Trace smoothing	HP 856xE	available in V4.1x and above
PH_VBR		Filtering	HP 856xE	available in V4.1x and above
PH_RMSPT		Amount of data points to skip when doing the integration	HP 856xE	available in V4.1x and above
PH_RMSFL		Lower integration frequency in Hz	HP 856xE	available in V4.1x and above
PH_RMSFU		Upper integration frequency in Hz	HP 856xE	available in V4.1x and above
PH_EXIT		Quits phase noise	HP 856xE	available in V4.1x and above
PH_F_UDT		Updates internal frequency variables	HP 856xE	available in V4.1x and above
PH_LMT_L		Apply limits to PH_FMIN and PH_FMAX	HP 856xE	available in V4.1x and above
PH_MEAS		Generates log frequency plot	HP 856xE	available in V4.1x and above
PH_MKF_D		Updates the spot frequency	HP 856xE	available in V4.1x and above

Command	Supported subset	Function	Corresponding HP-Models	Status
PH_RMS		Requests the rms phase noise	HP 856xE	available in V4.1x and above
PH_RMSFT		Updates internal frequency variables	HP 856xE	available in V4.1x and above
PH_RMSX		Calculates the rms phase noise	HP 856xE	available in V4.1x and above
PH_SPOTF		Executes the spot frequency measurement	HP 856xE	available in V4.1x and above

Basic Steps of IEC/IEEE Programming - Introduction

The following programming examples have a hierarchical structure, i.e. subsequent examples are based on previous ones. It is thus possible to compile very easily an operational program from the modules of the given examples. VISUAL BASIC has been used as programming language. However, the programs can be translated into other languages.

Note: In programming languages as C, C++ or programmes as MATLAB, NI Interactive Control, a backslash starts an escape sequence (e.g. .\n. is used to start a new line). In these programming languages and programmes, two backslashes instead of one must be used in remote commands.

Example: To store instrument settings: instead of
 MMEM:STOR:STAT 1,'D:\USER\DATA\TEST1'
 use MMEM:STOR:STAT 1,'D:\\USER\\DATA\\TEST1' in that case.

R&S FS-K7 Extensions

Operating Manual "FM Measurement Demodulator R&S FS-K7":

- 1141.1821.42-06 (English). and
- 1141.1821.41-06 (German)

The corresponding PDF-Files are separately available on the service board.

Last minute changes to the R&S FS-K7 operating manual

None.

R&S FS-K8 Extensions

The additional Enhanced Data Rate functions are described in a new revision of the operating manual.

Operating Manual "Application Firmware for Bluetooth Measurements R&S FS-K8":

- 1157.2597.41-02 (English). and
- 1157.2597.42-02 (German)

The corresponding PDF-Files are separately available on the service board.

Last minute changes to the R&S FS-K8 operating manual

TRACe:DATA? BTOBits

Reads the packet data bits.

Example: "INST:SEL:BTO " 'activate bluetooth application
 "CONF:BTO:MEAS MCH" 'select Modulation Characteristics.
 "TRACe:DATA? BTOB" 'Read data bits

Characteristics: *RST value: -
 SCPI: device-specific

TRACe:DATA? BTOFm

Reads the FM trace with selected oversampling factor (Pointer per Symbol).

Example: "INST:SEL:BTO " 'activate bluetooth application
 "CONF:BTO:MEAS MCH" 'select modulation characteristics
 "TRACe:DATA? BTOF" 'read FM trace

Characteristics: *RST value: -
 SCPI: device-specific

R&S FS-K9 Extensions

In addition to the normal function of *MEAS->REF* and *REFERENCE VALUE* softkeys the unit of the power sensor display is changed from the absolute unit dBm or Watt to the relative unit dB or %. Use the *UNIT/SCALE* key if absolute units are required again.

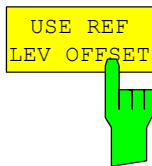
Software Manual "Measurements with Power Sensors, Application Firmware R&S FS-K9":

- 1157.3029.42-03 (English). and
- 1157.3029.44-03 (German)

The corresponding PDF-Files are separately available on the service board.

Last minute changes to the R&S FS-K9 operating manual

Menu PWR METER with option R&S FS-K9 - NEXT



The USE REF LEV OFFSET softkey controls whether the analyzer reference level is taken into account of the measured power (state ON) or not (state OFF).

IEC/IEEE bus command: SENSE1:PMETer:ROFFset[STATe] ON | OFF

R&S FS-K15 Extensions

The R&S FS-K15 VOR/ILS Avionics Measurements Application functions are included in a separate manual set. Please refer to the following order numbers:

Operating Manual "VOR/ILS Avionics Measurements Application Firmware R&S FS-K15":

- 1302.0942.42-01 (English)

The corresponding PDF-File is separately available on the service board.

Appendix: Contact to our hotline

Any questions or ideas concerning the instrument are welcome by our hotline:

USA & Canada

Monday to Friday (except US public holidays)
8:00 AM – 8:00 PM Eastern Standard Time (EST)
Tel. from USA 888-test-rsa (888-837-8772) (opt 2)
From outside USA +1 410 910 7800 (opt 2)
Fax +1 410 910 7801
E-mail Customer.Support@rsa.rohde-schwarz.com

East Asia

Monday to Friday (except Singaporean public holidays)
8:30 AM – 6:00 PM Singapore Time (SGT)
Tel. +65 6 513 0488
Fax + 65 6 846 1090
E-mail Customersupport.asia@rohde-schwarz.com

Rest of the World

Monday to Friday (except German public holidays)
08:00 – 17:00 Central European Time (CET)
Tel. from Europe +49 (0) 180 512 42 42
From outside Europe +49 89 4129 13776
Fax +49 (0) 89 41 29 637 78
E-mail CustomerSupport@rohde-schwarz.com