



ROHDE & SCHWARZ

Test and Measurement
Division

Release Notes

Firmware Release 3.82 (XP)

with Service Pack 1

for R&S ESCI EMI Test Receivers

and R&S ESPI Test Receivers

Release Note Revision: 2

Printed in the Federal
Republic of Germany

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History

Date	Rel Note Rev	Changes
22 November 2005	1	First Revision for 3.82
06 March 2006	2	Service Pack 1

General Topics

Firmware Update

Generation of the update disk set

The files needed for the firmware update are grouped according to the disk contents:

Disk 1:	disk1.bin	(self-extracting ZIP file; needs to be renamed to disk1.exe before unpacking)
Disk 2:	data3.cab	(packed contents of disk 2, will be automatically unpacked by FW update)
Disk 3:	data4.cab	(packed contents of disk 3, will be automatically unpacked by FW update)
...
Disk 9:	data10.cab	(packed contents of disk 9, will be automatically unpacked by FW update)
Disk 10:	data11.cab	(packed contents of disk 10, will be automatically unpacked by FW update)
Disk 11:	data12.cab	(packed contents of disk 11, will be automatically unpacked by FW update)

Please note that the difference in disk number and filename of the corresponding archive file is by intention, not by chance!

The contents of disk 1 are packed in a self-extracting ZIP file and need to be unzipped.

For this purpose the following steps are necessary:

1. Create a temporary directory on your local PC (e.g. MyTemp on drive C:)
2. Copy disk1.bin into that directory and rename it to disk1.exe
3. Execute disk1.exe. Under Windows 95/98/NT/2000 this is done best using the following sequence:
`<CTRL><ESC> - RUN - C:\MyTemp\Disk1 - <ENTER>`
 or
`<CTRL><ESC> - AUSFÜHREN - C:\MyTemp\Disk1 - <ENTER>` for a German Windows version.
 The files will be unzipped
4. Delete disk1.exe from the temporary directory.
 The temporary directory will now contain the following files:

data1.cab	data1.hdr	data2.cab	ikernel.ex_	layout.bin
RestInst.exe	Setup.exe	Setup.ini	setup.inx	ISSetup.exe

Please make sure that all the filenames are spelt correctly on your disks before you try to use them for the firmware update. Especially the trailing underscore ('_') as used in ikernel.ex_ is essential for correct operation of the update program.

5. Copy the contents of the temporary directory onto update disk #1.

The contents of the other disks are already packed in the format required by the firmware update program and need no further processing. The files only need to be copied onto disks #2 to #9, the number in the filename (minus 1) indicating the corresponding disk number (data3.cab => disk #2 etc, data4.cab => disk#3, etc.).

Preparing an installation via LAN or USB stick:

If the installation is performed via LAN or USB stick please set up a directory structure as shown on the right.

Copy all files as mentioned in the previous section in the directories Disk1 – Diskxx.

The directory path shall not contain more the 64 characters.



Performing the firmware update on the instrument

The firmware update process is performed in the following steps:

1. Switch the instrument on and wait until the Analyzer has resumed operation.
2. For updates from LAN or USB use the SETUP | NEXT | FIRMWARE UPDATE | UPDATE PATH softkey to specify any path for the location of the disk directory (e.g. F:\MyTemp). For floppy usage the default A:\ must not be changed
3. Press SETUP → NEXT → FIRMWARE UPDATE
4. Confirm the query "Do you really want to update the firmware?" with OK
5. Insert update disk #1 to #11 as requested (for LAN or USB just confirm the copy process)
6. 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.

Known problems during firmware update

After switching on the instrument for the first time after a successful firmware update, the following system message might occur once:

System Message
CDS: Error...

In this case the unit needs to be switched off and on again. This system message does not appear again during further power-on cycles.

Note: *If the unit is not restarted as described, system error correction data (CAL TOTAL) of a later date will be lost when switching the unit on again.*

Firmware update with ESPI-B20 and ESCI-B20 (flash disk):

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 ESxI-B20 is installed.

Workaround: Accept that message via the 'OK' button twice. The firmware update will continue without any problem! This problem is solved with version 3.50 or later.

Message box: Can't open front panel driver, error code=0x2

For some constellations this message box 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 message box 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 software

The R&S FS-K7 FM demodulator software package is included in the basic instrument firmware. It therefore needs no separate firmware update procedure.

Enabling the option via option key code entry

For activation of the R&S FS-K7 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 ESPI or delivered as a part of the R&S FS-K7 option package. The key sequence for entering the license key 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.

Modified Functions

The following functions are modified in version 3.32 SP3:

1. Receiver: Number of stored results per trace increased to 1 Mio.

The maximal number of measured frequencies is limited to 1.000.000. A maximum of 3 x 1.000.000 values (1.000.000 per detector) can be stored for postprocessing (was 100.000 before).

2. Receiver: Downrange limit for Quasipeak Detector

The level limit for the autoranging function has been increased. Attenuation is now decreased earlier to get a better signal to noise ratio.

3. Receiver: Audio not longer disabled with Quasipeak settling time

The following functions are modified in version 3.82:

1. Receiver: Improved frequency tuning with Quasipeak Detector.

The level bargraph will not longer be blanked when the frequency is tuned manually.

2. Analyzer: 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.

3. Analyzer: 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.

4. Analyzer: 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.

5. Display of RBW type

The selected type of the resolution bandwidth is displayed as label on the right side of the diagram.

3DB	NORMAL (3dB)
6DB	NORMAL (3dB)
FFT	FFT
CHN	CHANNEL
RRC	RRC

6. 1 MHz 6 dB Resolution Bandwidth

The 1 MHz 6 dB resolution bandwidth has been adjusted to better match the impulse bandwidth.

Problems Eliminated

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

1. (V3.32) **Measurement in Receiver scan mode too fast**
The measurement time in scans started from below 150 kHz could be faster than defined in the scan table.
2. (V3.32) **Level of Display line could not be changed (Receiver mode)**
The Level value of a display line was fixed.
3. (V3.32) **Changing from a Setup, Hardcopy or File Menu to another menu needed two keystrokes**
4. (V3.32) **Video trigger in conjunction with transducer factors corrected.**
5. (V3.32) **FS-K7: all marker info disappears when markers are switched off.**
6. (V3.82) **Instrument Firmware did not start.**
When the instrument has been switched off with full screen in receiver mode, the firmware did not start when the instrument was switched on again.
7. (V3.32) **Video Trigger and Transducer**
The Video Trigger level does now take active transducer factors into account.

Known Problems

none

Modifications to the Operating Manual

The order numbers for the current manual sets for R&S ESCI are

- 1166.6004.11-01
1166.6004.81-01 (German)
- 1166.6004.12-01
1166.6004.82-02 (English).
- 1166.6004.19-01
1166.6004.89-02 (English, letter format).

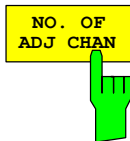
The order numbers for the current manual sets for R&S ESPI (XP) are

- 1164.6459.11-01
1164.6459.81-01 (German)
- 1164.6459.12-01
1164.6459.82-01 (English).
- 1164.6459.19-01
1164.6459.89-01 (English, letter format).

The corresponding PDF-Files for the operating manuals are separately available on our web page.

Last minute changes to the operating manual

Menu MEAS – CHAN PWR ACP / MULT PWR ACP – CP/ACP CONFIG (Analyzer)



The *NO. OF ADJ CHAN* softkey enables input of the number $\pm n$ of adjacent channels which are taken into account for the adjacent channel power measurement.

Numbers between 0 and 12 can be entered.

IEC/IEEE bus command:

```
:SENS:POW:ACH:ACP 0..12
```

This increased number of adjacent channels is realized through all the relevant settings like:

ACLR LIMIT CHECK

```
:CALC:LIM:ACP:ACH:RES?  
:CALC:LIM:ACP:ALT1..11:RES?
```

The following summary bits are introduced to `STAT:QUES:ACPL:`

Bit 14 : ALT3..11 LOWER or UPPER FAIL (screen B)

Bit 6 : ALT3..11 LOWER or UPPER FAIL (screen A)

EDIT ACLR LIMITS

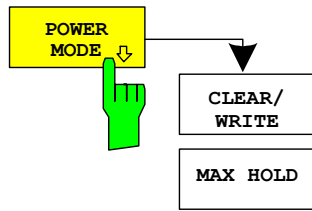
```
:CALC:LIM:ACP:ACH:STAT ON  
:CALC:LIM:ACP:ACH:ABS -10dBm,-10dBm  
:CALC:LIM:ACP:ACH:ABS:STAT ON  
:CALC:LIM:ACP:ALT1..11 0dB,0dB  
:CALC:LIM:ACP:ALT1..11:STAT ON  
:CALC:LIM:ACP:ALT1..11:ABS -10dBm,-10dBm  
:CALC:LIM:ACP:ALT1..11:ABS:STAT ON
```

ADJ CHAN BANDWIDTH

```
:SENS:POW:ACH:BWID:ALT1..11 30kHz
```

ADJ CHAN SPACING

```
:SENS:POW:ACH:SPAC:ALT1..11 4MHz
```

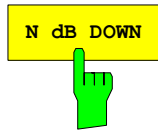


The *POWER MODE* sub menu allows to change between the normal (*CLEAR/WRITE*) and the max hold power mode. In the *CLEAR/WRITE* mode the channel power and the adjacent channel powers are calculated directly from the current trace. In *MAX HOLD* mode the power values are still derived from the current trace, but they are compared with a maximum algorithm to the previous power value. The greater value is remained.

IEC/IEEE bus command:

```
:CALC:MARK:FUNC:POW:MODE WRIT|MAXH
```

Menu MKR FCT (Analyzer)



The *N dB DOWN* softkey activates the temporary markers T1 and T2 which are n dB below the active reference marker. Marker T1 is placed to the left and marker T2 at the right of the reference marker. The value n can be input in a window.

If a negative value is entered than the markers are placed n dB above the active reference marker. This is then a n dB up function which can be used for notch filter measurements,

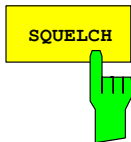
The default setting is 3 dB.

IEC/IEEE-bus command:

```
:CALC:MARK1:FUNC:NDBD:STAT ON
```

```
:CALC:MARK1:FUNC:NDBD -3dB 'n dB up function with negative values
```

Menu MKR FCT - MARKER DEMOD - SQUELCH (Analyzer)



The *SQUELCH* softkey enables the input of a level threshold below which the audible AF is cut off. The squelch function is associated with the internal trigger function (TRIGGER menu), which will be switched on automatically with the squelch. Squelch level and trigger level do have the same value.

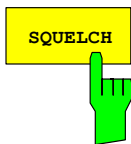
The default setting for the squelch is off.

IEC/IEEE-bus command:

```
:CALC:MARK1:FUNC:DEM:SQU ON | OFF
```

```
:CALC:MARK1:FUNC:DEM:SQU:LEV 80 PCT
```

Menu MEAS - DEMOD - SQUELCH (Receiver)



The *SQUELCH* softkey enables the input of a level threshold below which the audible AF is cut off. The squelch function is associated with the internal trigger function (TRIGGER menu), which will be switched on automatically with the squelch. Squelch level and trigger level do have the same value.

The default setting for the squelch is off.

IEC/IEEE-bus command:

```
:SENS:DEM:SQU ON | OFF
```

```
:SENS:DEM:SQU:LEV 80 PCT
```

Menu SETUP – SYSTEM INFO MEAS – STATISTICS

For new delivered devices the specifications version (document of the hardware properties) is shown. For already delivered device dashes (---) are displayed.

Menu MEAS – STATISTICS – CCDF ON / APD ON – SCALING (Analyzer)



The softkey *Y-UNIT* *%/ABS* defines the scaling type on the y-axis. The default case are the absolute probability. This can be changed to percent values. The softkeys *Y-AXIS MIN* and *Y-AXIS MAX* are using values based on the *Y-UNIT* setting.

IEC/IEEE-bus command:

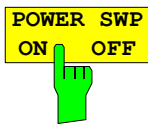
```
:CALC:STAT:SCAL:Y:UNIT PCT | ABS
```

The 0.1%, 1% and 10% value from the CCDF measurement are shown in the bottom screen half. Those values can also queried via remote:

IEC/IEEE-bus command:

```
:CALCulate<1|2>:STATistics:CCDF:X<1..4>? P0_1 | P1 | P10
```

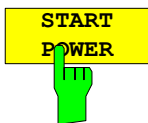
Menu NETWORK with option R&S FSP-B9



The softkey *POWER SWP ON/OFF* activates or deactivates the power sweep. If the power sweep is ON the enhancement label TGPWR is shown and the analyzer is set in zero span mode (span = 0Hz). During the sweep time of the zero span the power at the internal tracking generator is changed linear from start power to stop power. The start and stop power values are shown on the right side below the diagram.

IEC/IEEE-bus command:

```
:SOUR:POW:MODE SWE  
:SOUR:POW:MODE FIX
```

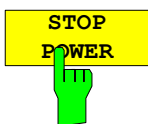


The softkey *START POWER* defines the start power of the power sweep.

The start power can be set between -30 and +0 dBm for the R&S FSP and between -30 dBm and +5 dBm for the R&S FSU. With the option FSU-B12 the power can be set between -100 and + 5 dBm.

IEC/IEEE-bus command:

```
:SOUR:POW:STAR -20dBm
```




The softkey *STOP POWER* defines the stop power of the power sweep.

The stop power can be set between -30 and +0 dBm for the R&S FSP and between -30 dBm and +5 dBm for the R&S FSU. With the option FSU-B12 the power can be set between -100 and + 5 dBm. The stop value can be smaller than the start value.

IEC/IEEE-bus command:

```
:SOUR:POW:STOP -10dBm
```

Menu NETWORK with option R&S FSP-B10 – EXT SOURCE



The *FREQUENCY SWEEP* softkey opens a table for setting the generator level as well as the multiplier and the offset used to derive the generator frequency from the analyzer frequency.

Since version 3.7x the external generator can also be used to sweep in the reverse direction. This can be achieved by setting a **negative** offset in the following formula:

$$F_{Generator} = \left| F_{Analyzer} * \frac{Numerator}{Denominator} + F_{Offset} \right|$$

Example for reverse sweep:

$$\begin{aligned} F_{AnalyzerStart} &= 100 \text{ MHz} \\ F_{AnalyzerStop} &= 200 \text{ MHz} \\ F_{Offset} &= -300 \text{ MHz} \\ Numerator = Denominator &= 1 \\ \rightarrow F_{GeneratorStart} &= 200 \text{ MHz} \\ \rightarrow F_{GeneratorStop} &= 100 \text{ MHz} \end{aligned}$$

If the offset is adjusted in a way that the sweep of the generator crosses the 0 Hz Frequency, it is indicated by the additional statement "via 0 Hz".

Example for reverse sweep via 0 Hz

$$\begin{aligned} F_{AnalyzerStart} &= 100 \text{ MHz} \\ F_{AnalyzerStop} &= 200 \text{ MHz} \\ F_{Offset} &= -150 \text{ MHz} \\ Numerator = Denominator &= 1 \\ \rightarrow F_{GeneratorStart} &= 50 \text{ MHz} \\ \rightarrow F_{GeneratorStop} &= 50 \text{ MHz via 0 Hz} \end{aligned}$$

IEC/IEEE-bus command:

```
SOUR:EXT:FREQ:NUM 1
SOUR:EXT:FREQ:DEN 1
SOUR:EXT:FREQ:OFFS -300MHZ
```

Menu MEAS – NEXT – HARMONIC DIST (Analyzer)

HARMONIC ON OFF
NO. OF HARMONICS
HARMONIC SWEEPTIME
HARMONIC RBW AUTO
ADJUST SETTINGS

The softkey *HARMONIC DISTORTION* opens this menu and activates the harmonic distortion measurement. With this measurement it is possible to measure easily the harmonics e.g. from a VCO. In addition the THD (total harmonic distortion) is calculated in % and dB.

There are 2 possible modes within the harmonic measurement. When entering the harmonic measurement from a frequency sweep (span > 0 Hz) an automatic search for the first harmonic is carried out within that given frequency range. Also a level adjust will be carried out. Is the zero span mode active before entering the harmonic measurement, the center frequency is unchanged.

IEC/IEEE-bus command:

```
:CALCulate:MARKer:FUNCTion:HARMonics:STATe ON | OFF
```

With the softkey *NO. OF HARMONICS* the number of harmonics which shall be measured can be adjusted. The range is from 1 to 26.

IEC/IEEE-bus command:

```
:CALCulate:MARKer:FUNCTion:HARMonics:NHARmonics  
<numerical value>
```

The *HARMONIC SWEEPTIME* softkey allows to set the value how long the zero span measurement on each harmonic frequency shall take place. This is an alias softkey to the normal sweep time of the zero span, therefore the same parser command is to be used.

In the upper screen the zero span sweeps on all harmonics are shown, separated by a grid line. This allows a very good overview about the measurement. In the lower screen the mean RMS results are displayed in numerical values and the THD values can be seen in the marker info field.

The resolution bandwidth will be automatically adjusted: $RBW_n = RBW_1 * n$, if that RBW is not available the next higher value is used. This feature can be disabled with the softkey *HARMONIC RBW AUTO*.

IEC/IEEE-bus command:

```
:CALCulate:MARKer:FUNCTion:HARMonics:BANDwidth:AUTO  
ON | OFF
```

With the adjust setting function the frequency search in the frequency range from before starting the harmonic measurement (if harmonic measurement was started from frequency sweep) and the level adjust can be activated.

IEC/IEEE-bus command:

```
:CALCulate:MARKer:FUNCTion:HARMonics:PRESet
```

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:DIS TORTion? TOTal
```

Comma separated list of harmonic levels, for each harmonic one value:

```
:CALCulate:MARKer:FUNCTion:HARMonics:LIST?
```

Menu MEAS – MULT CARR ACP – CP/ACP CONFIG (Analyzer)



The softkey CHANNEL SPACING opens a table which allows to set the spacings for the TX channels as well as for the adjacent channels. Up to now the TX spacing was a single parameter valid for all TX channels. Now the spacing between every TX channels can be defined separately. Therefore a TX spacing 1-2 for the spacing between the first and the second carrier, a TX spacing 2-3 for the spacing between the second and the third carrier and so on can be defined. In order to allow a convenient setup for the system with equal TX channel spacing, the value of TX spacing 1-2 will be copied in all the spacing below after entry, the TX spacing 2-3 will be copied in all the spacing below after entry and so forth. For different spacings a setup from top to bottom is necessary.

If the spacings are not equal the channel distribution according to the center frequency is as follows:

Odd number of TX channels:

The middle TX channel is centered to center frequency.

Even number of TX channels:

The two TX channels in the middle are used to calculate the frequency between those two channels. This frequency is aligned to the center frequency.

IEC/IEEE-bus command:

```
[SENSe<1|2>:]POWer:ACHannel:SPACing:CHANnel<1..11>
100 Hz ... 2000 MHz
```

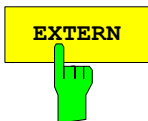
This command defines the channel spacing of the carriers. At the same time the spacing of carriers with higher channel number are set to the same value. If the spacing is equal between all carriers it is sufficient to set the spacing between carrier 1 and 2 with the command SENS:POW:ACP:SPAC:CHAN1 or SENS:POW:ACP:SPAC:CHAN. If the spacing are set in ascending order individual spacing of the carriers can be set.

Example: "POW:ACH:SPAC:CHAN2 4.8MHz"
'sets the spacing between TX carrier 2 and 3 to 4.8 MHz.

Note:

If the ACP or MCACP measurement is started all settings according to the standard including the channel bandwidths and channel spacings are set and can be adjusted afterwards.

Menu TRIG



With the softkey *EXTERN* the external trigger source can be selected. From firmware V2.60/3.60 on also the external trigger level can be adjusted in the range from 0.5V to 3.5V. The default value is 1.4V.

IEC/IEEE-bus command:

```
:TRIGger[:SEquence]:LEVel[:EXternal] <numeric_value>
```

Menu MEAS – CHAN PWR ACP or MULTI CHAN ACP (Analyzer)



The *CP/ACP STANDARD* softkey opens a list of selectable standards. WLAN 802.11A and WLAN 802.11B is appended to that list.

Notes:

FAST ACP is not available if a WLAN standard is selected.

IEC/IEEE-bus command:

```
CALC:MARK:FUNC:POW:PRES AWLan | BWLan
```

Menu MEAS – MULTI CARR ACP – CP/ACP CONFIG (Analyzer)

With the softkey *NO. OF TX CHAN* now up to 12 carriers can be measured.

IEC/IEEE-bus command:

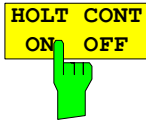
```
[ :SENSe<1|2> ] :POWer:ACHannel:TXChannel:COUNT 1..12
```

Menu TRIG - NEXT (Analyzer)

The *DELAY COMP ON/OFF* softkey enables the filter group delay compensation for the external trigger. If a bursted signal is analyzed in zero span and the delay compensation is on, a change of the RBW will not change the rising slope of the signal. Default is OFF.

IEC/IEEE-bus command:

```
TRIG:HOLD:ADJ:AUTO <boolean>
```

Menu TRACE - NEXT (Analyzer)

The *HOLD CONT* softkey defines whether the traces in min hold and max hold mode are reset after some definite parameter changes.

OFF The traces are reset after some definite parameter changes (default)

ON This mechanism is switched off.

In general, parameter changes require a restart of the measurement before results are evaluated (e. g. with markers). For those changes that are known to require a new measurement (e. g. modification of the span), the trace is automatically reset so that erroneous evaluations of previous results are avoided.

This mechanism can be switched off for those exceptional cases where the described behavior is unwelcome.

IEC/IEEE-bus command

```
:DISPlay[:WINDow<1|2>]:TRACe<1..4>:MODE:HCON ON|OFF
```

Menu SETUP - TRANSDUCER

When a transducer factor is used, the trace is moved by a calculated shift. However, an upward shift reduces the dynamic range for the displayed values. With the softkey *REFLVL ADJ* an automatic reference level offset adaptation allows to restore the original dynamic range by also shifting the reference level by the maximum value of the transducer factor.

IEC/IEEE-bus command:

```
[ :SENSe<1|2> : ]CORRection:TRANsducer:ADJust:RLEVel[:STATE] ON | OFF
```

Note: Command `SENS:CORR:TRAN:SEL` or `SENS:CORR:TSET:SEL` has to be sent prior to this command

Menu MKR - NEXT (Analyzer)



With the softkey *LINK MKR1 AND DELTA1* the delta marker1 can be linked to marker1, so if the x-axis value of the marker1 is changed the delta marker1 will follow on the same x-position. The link is default off, and can be switched on.

Example for setup:

- PRESET
- TRACE | MAX HOLD
- TRACE | SELECT TRACE | 2 | AVERAGE
- MKR (Switches marker1 on)
- MARKER NORM DELTA | DELTA (Delta Marker 1 ON)
- MKR-> | MKR->TRACE | 2
- LINK MKR1 AND DELTA1

Now select the Marker1 (by switching MARKER1 from DELTA back to NORM) and when changing the x-axis value (by knob wheel or UP/DOWN keys) the delta marker1 will follow automatically.

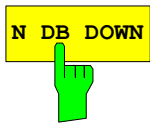
The delta marker1 x-value can not be changed away from 0 as long as the link functionality is active.

IEC/IEEE-bus command:

```
CALCulate<1|2>:DELTAmarker<1..4>:LINK ON | OFF
```

The suffix at *DELTAmarker* can only be 1 or not present, because the functionality is only available for marker1.

Menu MKR FCTN (Analyzer)



The softkey *N DB DOWN* is now also available in zero span mode. The pulse width result (PWIDTH) is shown at the display.

IEC/IEEE-bus command:

```
:CALCulate<1|2>:MARKer<1..4>:FUNction:NDBDown:
STATE ON|OFF
```

```
//switches ndb down on or off
```

```
:CALCulate<1|2>:MARKer<1..4>:FUNction:NDBDown:RESult?
```

```
//queries the result pulse width
```

```
:CALCulate<1|2>:MARKer<1..4>:FUNction:NDBDown:TIME?
```

```
//queries the two marker x-values in seconds
separated by a comma
```


Menu SETUP - GENERAL SETUP - GPIB



The *GPIB LANGUAGE* softkey opens a list of selectable remote-control languages:
 SCPI, 8560E, 8561E, 8562E, 8563E, 8564E, 8565E, 8566A, 8566B, 8568A, 8568B, 8591E, 8594E, 71100C, 71200C, 71209A

Notes:
Selecting a language different from "SCPI" will set the GPIB address to 18 if it was 20 before.
Start / stop frequency, reference level and # of sweep points will be adapted to the selected instrument model.

IEC/IEEE-bus command:

```

SYST:LANG "SCPI" | "8560E" | "8561E" | "8562E" |
"8564E" | "8565E" | "8566A" | "8566B" | "8568A" |
"8568B" | "8591E" | "8594E" | "71100C" | "71200C" |
"71209A"
    
```

Menu NETWORK with option R&S FSP-B10 – EXT SOURCE



Within the list of types of external generators the following R&S SMU models can be selected in addition: SMU02, SMU02B31, SMU03, SMU03B31, SMU04, SMU04B31, SMU06, SMU06B31.

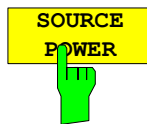
Note:
There is a minimum version requirement of the R&S SMU firmware. Please install V1.10 or higher on the R&S SMU!

IEC/IEEE-bus command:

```

SYST:COMM:RDEV:GEN2:TYPE 'SMU03'
    
```

Menu NETWORK with option R&S FSP-B10

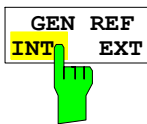


The *SOURCE POWER* softkey activates the input of the generator output level. The value range depends on the selected generator (See table of chapter "Configuration of the External Generator").

If both option External Generator Control FSP-B10 and option Tracking Generator B9 are installed, the softkey will modify the output power of the generator currently in use.

The default output power is -20 dBm.

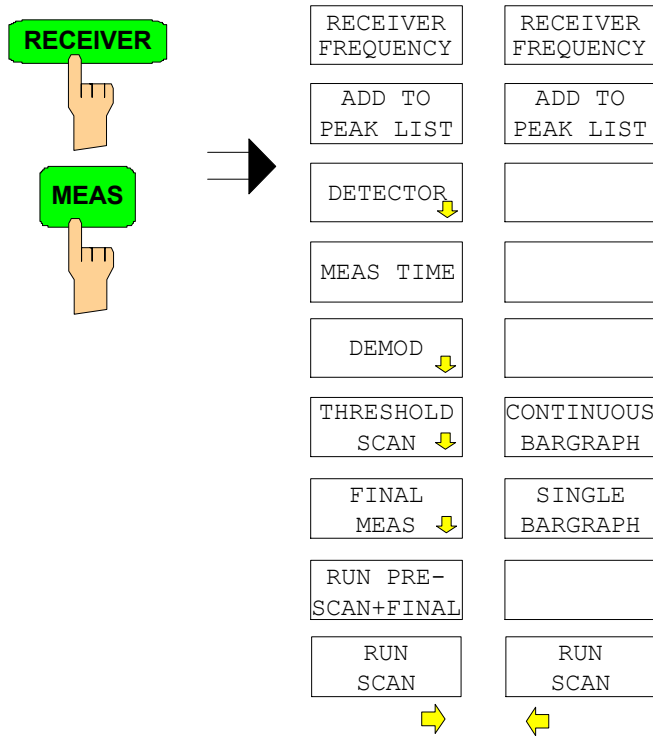
IEC/IEEE-bus command: `SOUR:EXT:POW -20dBm`



The *GEN REF INT/EXT* softkey selects the reference signal for the external generator. Selection EXT allows connecting the external generator to an external reference frequency source. By default the external generator will use its internal frequency reference.

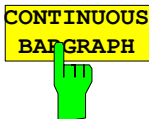
IEC/IEEE-bus command: `SOUR:EXT1:ROSC INT | EXT`

Hotkey RECEIVER, Menu MEAS (Receiver)



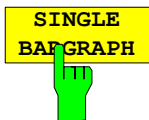
The softkey *RUN PRESCAN+FINAL* is starting a sequence, consisting of a prescan, the peak search-function and the final measurement.

IEC/IEEE-bus command: `INITiate:EMITest`



The *CONTINUOUS BARGRAPH* softkey selects the continuous measurement mode.

IEC/IEEE-bus command: `INITiate:CONTinuous ON`



Pressing the *SINGLE BARGRAPH* softkey triggers a single level measurement.

The enhancement label *SGL* displayed at the screen edge indicates that the single-measurement mode is set.

IEC/IEEE-bus command: `INITiate:CONTinuous OFF`



The *ADD TO PEAK LIST* softkey adds the current receiver frequency to the peak list (see also Section "Data Reduction and Peak List").

IEC/IEEE-bus command: `--`

New commands of version 3.82

VXI-11 Support

The VXI-11 channel is now also supported. To remote control the instrument via LAN beside RSIB also the TCP/IP connection is possible.

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

This command queries all the names of the limit lines saved on the hard disc.

The syntax of the output is:

<sum of file length of all following files>,<free spaces on hard disc>,<1st file name>,<1st file length>,<2nd file name>,<2nd file length>,...,<nth file name>,<nth file . length>

Example: " :CALC:LIM:CAT?"

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

This command queries all the names of the transducer files saved on the hard disc.

The syntax of the output is:

<sum of file length of all following files>,<free spaces on hard disc>,<1st file name>,<1st file length>,<2nd file name>,<2nd file length>,...,<nth file name>,<nth file . length>

Example: " :CORR:TRAN:CAT?"

:SYSTem:IDENTify:FACTory

With this command it is possible to reset the *IDN string to the factory default (Softkey: ID STRING FACTORY).

Example: " :SYST:IDEN:FACT?"

[SENSe<1|2>:]LIST:POWer:SET:AVERAge:TYPE LINear | LOGarithmic

With this command the average type of the sense list measurement can be set either to linear (default) or logarithmic. In linear mode voltages are averaged in logarithmic mode levels.

Example: "LIST:POW:SET:AVER LOG" 'sets log averaging for list measurement.

TRACe<trace #>:IMMEDIATE:LEVeL? and TRACe<trace #>:IMMEDIATE:RESult?

These query command returns instantaneous measurement results. During a sweep which shall not have a synchronization on the sweep end last measured value can be read out. This makes sense if measurement values shall be obeyed during long sweep times. The LEVeL? command only returns the level, where the RESult? command returns comma separated the x and y value. For a better time resolution the number of sweep points can be increased.

Example:	"INIT:CONT OFF"	'switches to single sweep mode
	"INIT"	'starts a sweep (without waiting for the sweep end!)
	"TRAC1:IMM:LEV?"	'queries the level of the last measured measurement point

[SENSe<1|2>:]MPOWer[:SEQuence] <analyzer freq>,<rbw>,<meas time>,<trigger source>,<trigger level>,<trigger offset>,<type of meas>,<# of meas>

For MPOW also the RRC and CFILer can be used by defining the filter type with the command:

[SENSe<1|2>:]BANDwidth[BWIDth[:RESolution]:TYPE NORMal | FFT | CFILter | RRC

before using the MPOW command.

[SENSe<1|2>:]LIST:POWer[:SEQuence] <analyzer freq>, <ref level>, <rf att>, <el att>, <filter type>, <rbw>, <vbw>, <meas time>, <trigger level>, ...

The LIST:POW command supports now the following filter types:

<filter type>:	NORMAL:	normal resolution filter
	CFILter:	channel filter. These are especially steep-edged filters, which are used for example in Fast ACP measurement to ensure the band-limiting of a transmission channel in the time domain.
	RRC:	Root Raised Cosine filter. This special filter form is used to determine the channel power for some mobile radio standards.

For allowed <rbw> setting for <filter type> = CFILter and <filter type> = RRC see table "List of available channel filters" in section "Setting Bandwidths and Sweep Time – Key BW".

MMEMory:CATalog:LONG? <path>

This command queries the directories and files in the given path.

Parameter: <path>::= DOS path

Example: "MMEM:CAT:LONG? 'D:\USER\DATA' 'queries the contents of directory D:\USER\DATA"

Return value: <used_bytes_in_this_directory>, <free_bytes_on_this_disk>, "<file_name>, <file_type>, <filesize_in_bytes>", "<file_name>, <file_type>, <filesize_in_bytes>", ...

with

<file_name>	name of file or directory
<file_type>	file type: DIR (directory), ASCII (ASCII file), BINary (binary file) and STATe (file with device settings)
<filesize_in_bytes>	size of file, 0 for directories

[SENSe<1|2>:]SWEep:COUNT:CURRent?

This query command returns the current number of started sweeps. A sweep count value should be set and the device should be in single sweep mode.

Example:	"SWE:COUNT 64"	'sets sweep count to 64
	"INIT:CONT OFF"	'switches to single sweep mode
	"INIT"	'starts a sweep (without waiting for the sweep end!)
	"SWE:COUN:CURR?"	'queries the number of started sweeps

Supported 85xx-commands

85xx - command	Modification	Description
AMB ON OFF		Trace A minus B
ADJALL		Adjust all
ADJCRT	1)	Adjust CRT
ADJIF	1)	Auto adjust IF
APB		Trace A plus B
AUTOCP		Coupling default
AXB		Exchange trace A and B
BL, BML		B - display line --> B
BTC		Transfer B to C
BXC		Exchange B and C
CHNPWR		Channel power
CHPWRBW		Channel power bandwidth
COUPLE AC DC		Select input coupling
D1	1)	Display size normal
DA	1)	Display address
DEMODAGC	1)	Demodulation AGC
DEMOT		Demodulation time
DLE		Display line enable
DW	1)	Write to display and increment address
ERR	Now some errors are mapped to HP errors: ERR 250 cal level error ERR 300 LO unlock ERR 472 cal error digital filter ERR 473 cal error analog filter ERR 552 cal error log amp ERR 902 unscale tracking generator ERR 906 oven cold ERR117 numeric unit error ERR112 Unrecognized Command	Error
ERR?		Erases the error bit in the status register but always returns 0.
EX		Exchange trace A and B
FREF		Reference frequency internal/external
FUNDEF		Define Function Function must be in one line between delimiters @
GRAT ON OFF	1)	Grid on/off
KEYDEF		Key definition
KEYEXEC		Key execute
KS(Lock registers
KS)		Unlock registers
KS91		Read amplitude error
KS/	1)	Manual peaking
KSK		Marker to next peak

¹⁾ Command accepted, but ignored

85xx - command	Modification	Description
KSO		Delta marker to span
KSQ		Band lock off
KSG		CRT beam off
KSh		CRT beam on
KSn	1)	Grid on
KSo		Character display off
KSp		Character display on
KSr		Create service request
KSt		Band lock on
KSV		Signal ident on
L0		Display line off
LB		Label
LF		Preset with low frequency band selection
LL	1)	Cursor to lower left corner
M3	M3 M3 <numeric_value> HZ KHZ MHZ GHZ M3 DN M3 UP M3?	Default value value range step size. Noise measurement activated with KSM is automatically switched off with any M3- command..
MDS		Measurement data size
MKA		Marker amplitude
MKDR		Delta Marker reverse
MKDR?		Delta marker reverse query
MKFC ON OFF		Marker frequency count
MKP		Marker position
MKPT	MKPT MKPT HI MKPT NH MKPT NR MKPT NL	
MKSP		Deltamarker to span
MKT		Marker to time point
MKTYPE AMP		Marker type
NORMALIZE		Normalize trace
NRPOS		Normalize trace position
O2		Trace readout
OT	OT after CF or SP now returns Center/Span values rather than Start/Stop string 27 now indicates the current sweep status	Output annotations
PA	1)	Plot absolute
PD	1)	Pen down
PLOTORG	1)	Plot origin
PLOTSRC	1)	Plot source
PWRBW		Power Bandwidth
PRINT	accept numeric parameter	Print
PSDAC	1)	Preselector DAC
PSTATE	1)	Protect state
PU	1)	Pen up
RBR		Resolution bandwidth/span ratio
RLCAL	1)	Reference level cal
RCLOSCAL		Recall open/short reference trace into trace B, set instrument to the stored open/short reference state.

¹⁾ Command accepted, but ignored

85xx - command	Modification	Description
RCLT TRA TRB, <number>		Recall Trace Data
RCLTHRU		Recall the thru-reference trace into trace B, set instrument to stored thru-reference state.
SAVET TRA TRB, <number>		Save Trace Data
SMOOTH		Smooth trace
SQUELCH	1)	Squelch
STOREOPEN		Set open/short reference
STORESHORT		Set open/short reference
STORETHRU		Set thru reference
SWPCPL SA SR	1)	
SWPOUT	1)	Sweep Output
T2	1)	Line trigger
TACL?, TBCL?, TCCL?		Returns instantaneous measurement results. See TRACe<trace #>:IMMEDIATE:LEVel? for full description.
TACR?, TBCR?, TCCR?		Returns instantaneous measurement results. See TRACe<trace #>:IMMEDIATE:RESult? for full description.
TDF	Parameters: P Meas Unit, like dBm, V etc. (already supported) M Display Unit B Binary A Binary with length I Binary without length	Trace data format
THE		Threshold enable
TM LINE	1)	Trigger Line
TRSTAT		The TRSTAT command returns trace states to the controller: clear-write, off, view, or blank.
UR	1)	Cursor to upper right corner
OA		
OT		
RESET		
REV?		
TRA/TRB	Trace input in the following format: B Binary data without header A Binary data with length I Binary data without length	
TRA?		
TRB?		
TDF	TDF P	
VARDEF		Variable definition, Command ignored
VTL		Video trigger level

¹⁾ Command accepted, but ignored

Model dependent default settings

When selecting a 85xx model language the GPIB address will be automatically set to 18, if the FSP default address (20) is active. Other values than 20 will be left unchanged. On return to GPIB language SCPI the current GPIB address will be preserved.

The following table shows the default settings which will be set when selecting the GPIB language or when using the commands IP, KST and RESET.

Model	# of Trace Points	Start Freq.	Stop Freq.	Ref Level	Input Coupling
8566A/B	1001	2 GHz	22 GHz	0 dBm	DC (FSU) AC (FSP)
8568A/B	1001	0 Hz	1.5 GHz	0 dBm	AC
8560E	601	0 Hz	2.9 GHz	0 dBm	AC
8561E	601	0 Hz	6.5 GHz	0 dBm	AC
8562E	601	0 Hz	13.2 GHz	0 dBm	AC
8563E	601	0 Hz	26.5 GHz	0 dBm	AC
8564E	601	0 Hz	40 GHz	0 dBm	AC
8565E	601	0 Hz	50 GHz	0 dBm	AC
8594E	401	0 Hz	3 GHz	0 dBm	AC

Note on selected stop frequency:

The stop frequency indicated in the table will be limited by the maximum stop frequency of the analyzer.

Note on the selected number of trace points:

The adaptation of the number of trace points will only be performed on the LOCAL -> REMOTE transition.

Trace data output formats

Two formats are supported for trace data output: display units (command O1) and physical values (commands O3 or TDF P). With format "display units" the level data will be converted into value range and resolution of the 8566/8568 models. On transition to REMOTE state the number of trace points will be reconfigured in order to be conforming to the selected instrument model (1001 for 8566A/B and 8568 A/B, 601 for 8560E to 8565E, 401 for 8594E).

GPIB status reporting system

The assignment of the status bits performed by commands R1, R2, R3, R4, RQS is supported since firmware V1.80. Commands STB and a serial poll on the GPIB will return an 8 bit value with the following bit assignment:

Bit enabled by RQS
1 (Units key pressed)
2 (End of Sweep)
3 (Device Error)
4 (Command Complete)
5 (Illegal Command)
6 (Service Request)

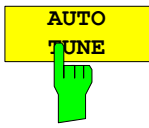
Bits 0 and 7 are unused and always set to 0.

Please note that the FSP reports any key pressed on the front panel rather than only the unit keys if bit 1 was enabled.

Another difference is the behavior of bit 6 when using the STB? query. On the HP analyzers this bit monitors the state of the SRQ line on the bus. On the FSP this is not possible. Therefore this bit is set, as soon as one of the bits 1 to 5 is set. It won't be reset by performing a serial poll.

R&S FS-K7 Extensions

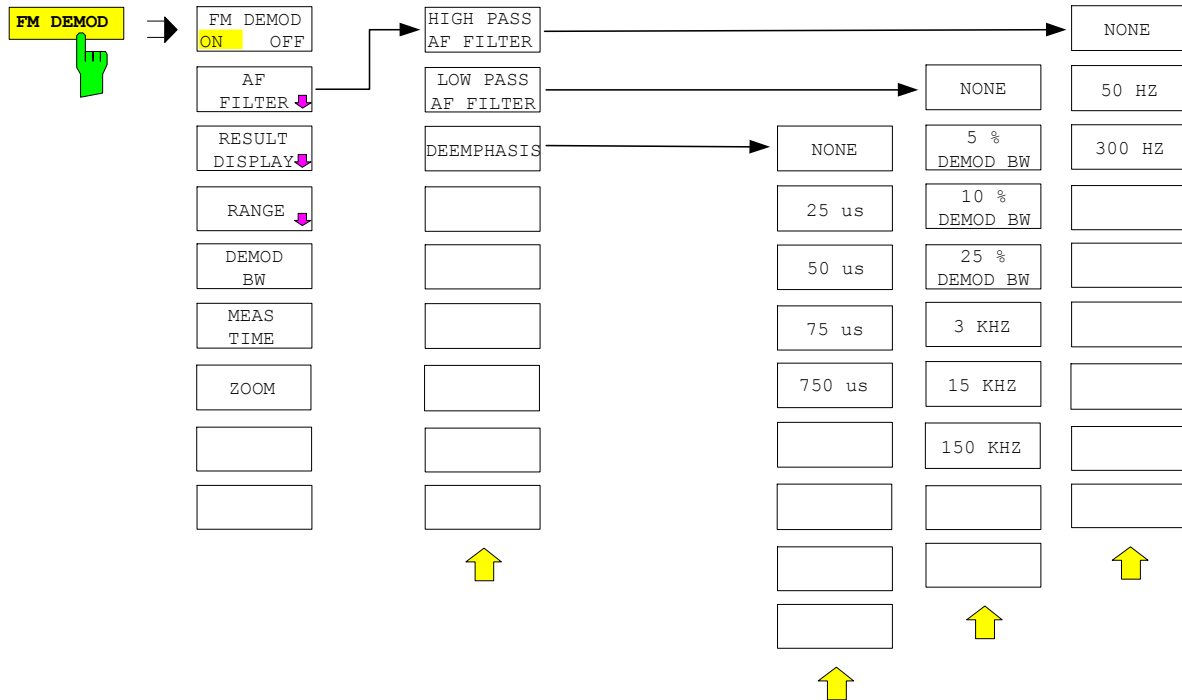
Menu FREQUENCY



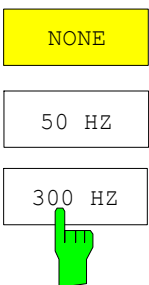
This softkey activates an automatic signal search.

IEC/IEEE-bus command: SENS:FREQ:CW:AFC ONCe

The FS-K7 has been extended about AF filters. The bandwidth of the demodulated signal can be reduced by high pass or low pass filters and also a de-emphasis can be switched on.



HIGH PASS AF FILTER



The 50 HZ and 300 HZ softkeys switch on a high pass filter with the given limit to separate the DC component. The filters are indicated by the 3 dB cutoff frequency. The filters are designed as 2nd-order Butterworth filter (12 dB/octave).

The NONE softkey deactivates the AF high pass filter. Default is NONE.

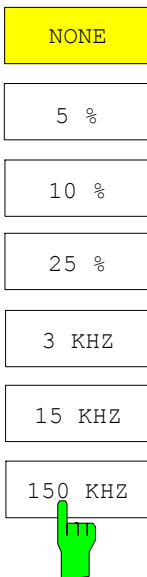
The R&S FSP requires the option FSP-B70 for the high pass filter.

The high pass filter are active in the following demodulation bandwidth range:
 50 Hz 200 Hz ≤ demodulation bandwidth ≤ 4 MHz
 300 Hz 800 Hz ≤ demodulation bandwidth ≤ 16 MHz

IEC/IEEE-bus command:

[SENSe:]FILTEr:HPASs[:STATe] ON | OFF
 [SENSe:]FILTEr:HPASs:FREQuency 50 Hz | 300 Hz

LOW PASS AF FILTER



The 5 %, 10% and 25% HZ softkeys switch on a relative low pass filter. The filter (3 dB) can be selected in % of the demodulation bandwidth. The filters are designed as 5th-order Butterworth filter (30 dB/octave).

The 3 KHZ, 15 KHZ and 150 KHZ softkeys switch on a absolute low pass filter. The filter are indicated by the 3 dB cutoff frequency. The 3 kHz and 15 kHz filters are designed as 5th-order Butterworth filter (30 dB/octave). The 150 kHz filter is designed as 8th-order Butterworth filter (48 dB/octave).

The NONE softkey deactivates the AF low pass filter. Default is NONE.

The FSP requires the option FSP-B70 for the absolute low pass filter 3 kHz, 15 kHz and 150 kHz. The relative low pass filters are always available.

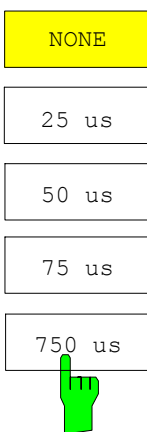
The relative low pass filters are active for all demodulation bandwidth's. The absolute low pass filters are active in the following demodulation bandwidth range:

3 kHz	6.4 kHz ≤ demodulation bandwidth ≤ 4 MHz
15 kHz	50 kHz ≤ demodulation bandwidth ≤ 16 MHz
150 kHz	400 kHz ≤ demodulation bandwidth ≤ 16 MHz

IEC/IEEE-bus command:

```
[SENSe:]FILTEr:LPASs[:STATe] ON | OFF
[SENSe:]FILTEr:LPASs:FREQuency:RELative 5 | 10 | 25
[SENSe:]FILTEr:LPASs:FREQuency 3 kHz | 15 kHz | 150 kHz
```

DEEMPHASIS



The 25 us, 50 us, 75 us and 750 us softkeys switch on a de-emphasis with the given time constant.

The NONE softkey deactivates the de-emphasis. Default is NONE.

The R&S FSP requires the option FSP-B70 for the de-emphasis.

The de-emphasis is active in the following demodulation bandwidth range:

25 μs	25 kHz ≤ demodulation bandwidth ≤ 30 MHz
50 μs	6.4 kHz ≤ demodulation bandwidth ≤ 18 MHz
75 μs	6.4 kHz ≤ demodulation bandwidth ≤ 18 MHz
750 μs	800 Hz ≤ demodulation bandwidth ≤ 4 MHz

The following table shows the required demodulation bandwidth for an error less than 0.5 dB up to a maximum AF frequency.

Deemphasis	25 μs	50 μs	75 μs	750 μs
Maximum AF Frequency	25 kHz	12 kHz	8 kHz	800 Hz
Required demodulation bandwidth	≥ 200 kHz	≥ 100 kHz	≥ 50 kHz	≥ 6.4 kHz

For higher AF frequencies the demodulation bandwidth must be increased.

IEC/IEEE-bus command:

```
[SENSe:]FILTEr:DEMPHasis[:STATe] ON | OFF
[SENSe:]FILTEr:DEMPHasis:TCONstant 25 us | 50 us |
75 us | 750 us
```

The FS-K7 has been extended about the AM result display. With active FM demodulator (ADEM ON or INST:SEL ADEM) the AM evaluation can be activated with the command CALC:FEED 'XTIM:AM:REL'. The settings and measurement result queries are similar as in the FM evaluation. The diagram scaling is in the unit % instead of Hz.

command for FM

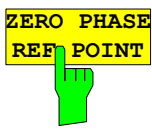
CALC:FEED 'XTIM:FM'
 CALC:FEED 'XTIM:FMS'
 CALC:FEED 'XTIM:FM:AFSP'
 CALC:MARK:FUNC:ADEM:FM:RES
 ADEM:FM:TYPE
 ADEM:FM:RES
 TRIG:SOUR FM
 TRIG:LEV:FM

command for AM

CALC:FEED 'XTIM:AM:REL'
 CALC:FEED 'XTIM:AMS:REL'
 CALC:FEED 'XTIM:AM:REL:AFSP'
 CALC:MARK:FUNC:ADEM:AM:RES
 ADEM:AM:REL:TYPE
 ADEM:AM:REL:RES
 TRIG:SOUR AMR
 TRIG:LEV:AM:REL

The other commands of the AM evaluation are identical to the FM evaluation. In addition to the FM evaluation the modulation depth of AM modulated signals can be queried with CALC:MARK:FUNC:MDEP:RES?.

The PM demodulation has been extended about the following new functions:



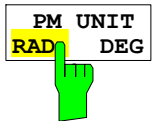
The *ZERO PHASE REF POINT* softkey activates the input of the reference point, where the phase is set to 0 rad.

IEC/IEEE-bus command: SENS:ADEM:PM:RPO:X 10us



The *PHASE WRAP ON/OFF* softkey activates the phase wrapping to $-\pi \dots +\pi$ ($-180^\circ \dots +180^\circ$).

IEC/IEEE-bus command: CALC:FORM PHAS | UPH



The *PM UNIT RAD/DEG* softkey selects the unit for PM traces.

IEC/IEEE-bus command: UNIT:ANGL RAD | DEG

The range of the demodulation bandwidth has been extended down to 100 Hz.

new demodulation bandwidth	sampling rate
6.4 kHz	7.8125 kHz
3.2 kHz	3.90625 kHz
1.6 kHz	1.953125 kHz
800 Hz	976.5625 Hz
400 Hz	488.28125 Hz
200 Hz	244.140625 Hz
100 Hz	122.0703125 Hz

Information to Demod BW 8 MHz:

This filter is only flat for about 6 MHz, it has a 3dB decay at 7 MHz.

Appendix: Contact to our hotline

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

USA & Canada

Monday to Friday (except US-state holidays)
8:00 AM - 8:00 PM (Eastern Standard Time)

USA: 888-test-rsa (888-837-8772) (opt 2)
From outside USA: +1 410 910 7800 (opt 2)
Fax: 410 910 7801

E-Mail: Customer.Support@rsa.rohde-schwarz.com

Rest of World

Monday to Friday (except German-state holidays)
08:00 - 17:00 (Central European Time)

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