SPM-37 ... 39, -137 ... 139
Selective Level Meters

BN 2203/02 ... 07, Series D ...

PSM-37 ... 39, -137 ... 139
Level Test Sets

BN 2203/12 ... 17, Series D ...

Operating Manual

WAVETEK
WANDEL
GOLTERMANN
Communications Test Solutions

Please direct all enquiries to your local Wavetek Wandel Goltermann sales company. The addresses are given at the end of this handbook.

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1 Introduction

1.1 About the instruments

Equipped for the future

Carrier frequency systems will continue to be used around the world for many years to come, generating a need for modern and, above all, economical test equipment. New areas of telecommunications, such as ISDN and local area networks, will provide additional applications for selective level measurement equipment.

It has been demonstrated that the measurement of such analog parameters as impedance, noise, crosstalk, interrupts and frequency response is also essential for these digital systems.

This **range of level meters** is designed primarily for field service applications. Like their predecessors SPM-19 and SPM-15, the instruments are equally suitable for use in the laboratory and in production testing, thanks to high accuracy frequency and level parameters.

Together with the hand-held level meters (SPM-32A through SPM-36A), these new instruments provide users with a comprehensive range of application-oriented level meters covering the frequency spectrum from 50 Hz to 32 MHz.

Versatile, yet easy to use

The new range of level meters is designed for efficiency in use, this being achieved through time-saving measurement routines.

The functions of this range of level meters are menu controlled, making the instruments practical and easy to use. Two special functions are worthy of mention: "Impulsive noise" and "Interrupt" modes, both of which conform to the CCITT requirements for such measurements.

*Features of the **range of level meters***

Telecoms applications

- ❒ Frequency ranges matched to system requirements:
  50 Hz to 8 MHz, 50 Hz to 18 MHz, 50 Hz to 32 MHz.
- ❒ Up to 5 hours operation from rechargeable batteries (optional)
- ❒ End-to-end measurements with graphic display of frequency response results.
- ❒ Phase jitter measurement to CCITT O.91.
- ❒ Interrupt measurement to CCITT O.61.
- ❒ Impulsive noise measurement to CCITT O.71.
- ❒ Real psophometric measurements in speech channels.

Datacoms applications

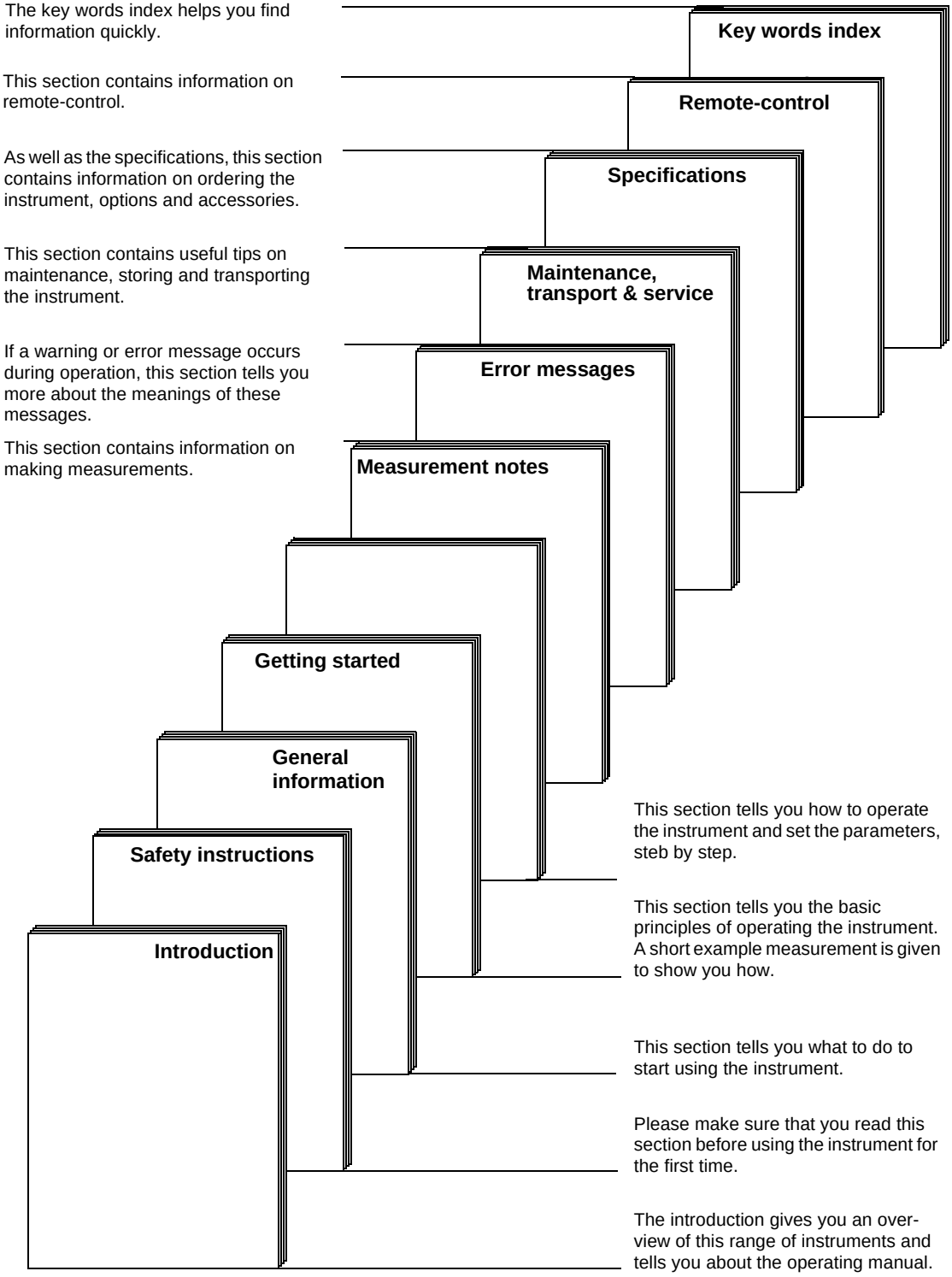
- ❒ Operation network-independent.
- ❒ Impulsive noise and interference signal measurements.
- ❒ Interrupt measurement.
- ❒ Crosstalk measurement (NEXT/FEXT).
- ❒ Frequency response measurement.
- ❒ Signal imbalance measurements (e.g. longitudinal conversion loss LCL).
- ❒ Impedance measurements.
- ❒ Return loss measurement.

1.2 About this manual

This manual applies to the following instruments:

- SPM-37, SPM-38 and SPM-39 Selective Level Meters
- SPM-137, SPM-138 and SPM-139 Selective Level Meters
- PSM-37, PSM-38 and PSM-39 Level Measurement Setups
- PSM-137, PSM-138 and PSM-139 Level Measurement Setups

Information which only applies to certain instrumetns is clearly indicated. The diagram below shows how the manual is arranged and the main contents of each section.



Conventions

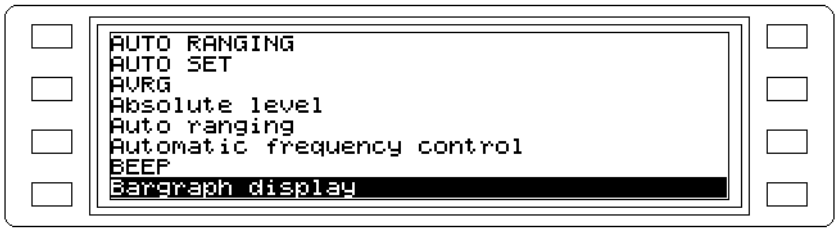
Keys, function keys (= F) and identification numbers on the instrument are shown in this manual as follows:

Keys

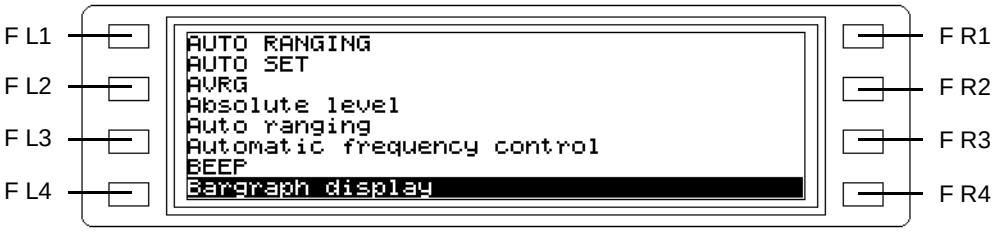
Instrument:	**Operating manual:**
TEST & CONFIG HELP	**[HELP]**

Function keys (= F)

Instrument:



Operating manual:



Identification numbers on the instrument front and back panels

Instrument:	**Operating manual:**
TEST & CONFIG HELP 9	**[9]**

Space for notes:

2 Safety instructions

This instrument left the factory in perfect condition. To maintain this condition and ensure safety in use, the following instructions must be observed when using the instrument.

2.1 Correct usage

The instrument must not be used for any purposes or under any conditions other than those for which it is intended, as indicated in the specifications (section 9 of this manual) and the introduction (section 1).

Warning: Failure to observe this instruction may be dangerous and may result in damage to the instrument (see section 2.3 on page 2-5).

2.2 Connection to circuits carrying dangerous voltages

If the instrument is to be connected to test circuits where dangerous voltages are present, a protective ground connection must be established before the measurement circuit is connected. If the protective ground circuit for the a.c. line can be used for this purpose, the instrument must be connected to the a.c. line before connecting it to the measurement circuit.

If the measurement circuit is provided with its own protective ground connector, this should be connected to the instrument's ground socket before the rest of the measurement circuit is connected.

2.3 Faults and damage

The instrument must be taken out of service and secured against unintentional operation if safe operation is no longer guaranteed. This is the case if:

- ❒ it is visibly damaged
- ❒ it no longer operates correctly
- ❒ it has been used or subjected to excessive stresses (e.g. in storage or transport) under conditions outside the permitted range limits.

2.4 Opening the instrument

Before opening the instrument, disconnect it from all power sources. Capacitors in the instrument may remain charged even if the instrument is disconnected from all power sources. Refer to the circuit diagrams for information.

If calibration, maintenance or repairs on the opened instrument under power are unavoidable, such operations should only be performed by qualified personnel familiar with the risks involved.

Caution: Dangerous voltages.

2.5 Repairs and spare parts

Repairs

Repairs should only be carried out by competent personnel. No constructional feature of the instrument may be modified in any way which reduces operational safety. Creepage and air-paths and insulation thickness in particular must not be reduced.

Spare parts

Only use original spare parts for replacing defective components. Other spares may be used only if they do not adversely affect the safety characteristics of the instrument.

2.6 Tests after repairs and maintenance

Protective ground connection

After repairs or maintenance, the condition of the protective ground conductor shall be checked visually and the resistance between the protective ground contact of the instrument's line plug and the instrument casing (ground socket) shall be measured. The resistance shall be below 0.1 ohms. The line cord shall be moved during the measurement. Any changes in resistance indicate damage to the line cord. A damaged line cord must not be used.

If a further measurement with a new line cord indicates that the line cord itself is not faulty, the instrument shall be disabled and the cause of the resistance changes identified and repaired to conform with the applicable safety regulations.

Insulation resistance

The insulation resistance between the protective ground contact and the a.c. line contacts (shorted together) of the instrument's line plug shall be measured using a 500 V DC insulation tester. The power switch on the back panel of the instrument shall be set to the on position (I) for the test. VDE regulations require that the insulation resistance shall be more than 2 MΩ. If a value below 2 MΩ is indicated, the instrument shall be repaired and re tested before use.

2.7 Inputs and outputs

The balanced receiver input [21] and balanced tracking generator output [23] are designed for connection to standard telephone networks (TNV circuits).

All other inputs and outputs are designed for connection to SELV circuits.

Refer to IEC Guide 105 and EN 41003 / 1991 for more information.

2.8 Electromagnetic compatibility

This instrument meets the requirements of EN 50081-1 and is within Limit Class B of EN 55022 (identical with CISPR 22:1985 and DIN VDE 0878 Part 3).

The instrument has been tested to ensure that the EMI/RFI emission requirements are also met when it is used as part of a system.

For this condition to be met, the system must be correctly assembled and the appropriate connecting cables used.
Adequate screening must be provided.

If the device under test connected to this instrument can itself emit electromagnetic interference, users must ensure that emissions remain within permitted limits. Suitable measures should be taken to ensure that screening is contiguous.

When used in a balanced system, the device under test itself must be adequately balanced

Electromagnetic emissions can be further reduced by operating the instrument from dry or rechargeable batteries, particularly if high signal levels are involved.

2.9 Cleaning the instrument

If the instrument has become dirty through use, it can be cleaned using a soft cloth moistened with a mild solution of detergent. Make sure that the cleaning solution does not get inside the instrument. Parts which have become very dirty may also be cleaned carefully using alcohol.

3 General information

3.1 After unpacking

- ❑ Check: The packaging is undamaged
- ❑ Check: The instrument shows no signs of external damage
- ❑ Check: The AC line cord is present
- ❑ Check: The instrument is at room temperature
- ❑ Check: Have you read the safety instructions in section 2 of this manual ?

3.2 Preparation for use

3.2.1 Setting up the instrument

Operating position

The instrument should be placed on a flat, horizontal surface for operation. Operation comfort can be improved by tilting the instrument slightly. This is done by pressing the buttons on the carry handle pivot simultaneously and moving the handle downwards until it locks into position. The handle now functions as a tilt bail. If the instrument is to be placed flat on the bench and the handle is not required, it can be folded back flat under the instrument by pressing the buttons on the carry handle pivot simultaneously and moving the handle to the position required.

Temperature

The instrument can be operated at ambient temperatures between 0 and +40 ¯C. Ensure that this temperature range is not exceeded, especially if the instrument is fitted into an equipment rack or is operated as part of a larger installation.

3.2.2 Before switching on

Note: The instrument is a safety class I device as per IEC 1010-1. The casing is connected to the protective ground conductor.

- ❑ Operation from AC line: The AC line connection is provided with a protective ground conductor. The line cord supplied is used.
- ❑ Operation from rechargeable batteries: The rechargeable batteries have been charged (see section 8.1.4.2 on page 8-4) before using an instrument equipped with the battery pack option (BN 2203/00.04) for the first time.

3.2.3 19" rack mounting

The instrument can be fitted into standard 19" racks using the 19" conversion kit, order number BN 2203/00.07. The kit basically comprises a 19" wide front panel fitted with handles, the mounting brackets and nuts and bolts (D, E)

Preparing the chassis

- Undo the hex key screws A and remove the top half of the casing. The handle can be lifted out of the lower half of the casing complete with the pivots.
- Remove the chassis from the lower half of the casing.
- Remove the four instrument feet from the lower half of the casing by undoing the screws (C) and remove the nuts (F).
- Remove the two locating pips from the top half of the casing by undoing the hex key screws (B).

Fitting the 19" conversion kit

- Fix one mounting bracket to the upper half of the casing using the holes for the locating pips and fixing screws (D).
- Fix the other mounting bracket to the lower half of the casing using the holes for the front two instrument feet and fixing screws (D).
- Fit the chassis into the lower half of the casing. Make sure that the front and back panels fit into the slots in the casing.
- Replace the top half of the casing and screw it to the lower half using the screws (A).
- Fix the front panel to the mounting brackets using the nuts and bolts (E)

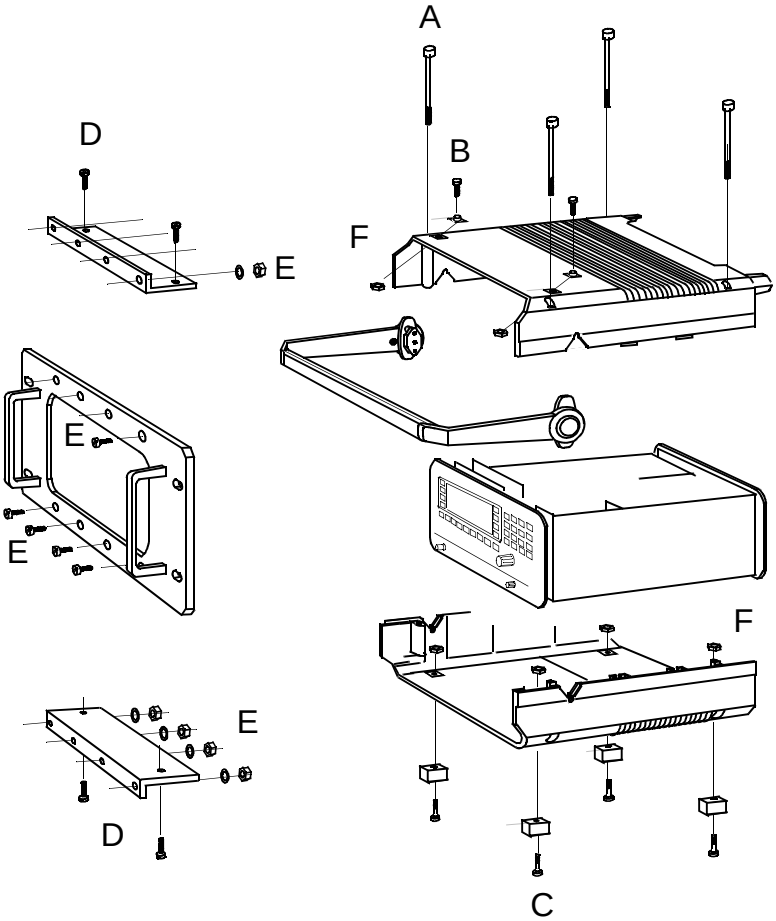


Fig. 3-1 19" rack conversion kit

3.3 Power supply

AC line operation

The instrument power is derived from a switch-mode power supply. The AC line connector is located together with the AC line switch and the fuse on the back panel.

Battery operation

Operation independent of AC line power is possible using the battery pack option, BN 2203/00.04. The batteries are recharged by the switch-mode power supply.

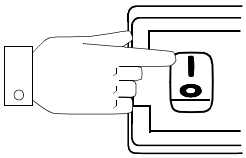
Data retention in the event of power failure

The actual instrument settings are stored in non-volatile semiconductor memory in the same way as setups. This memory is buffered by a lithium battery when the instrument is switched off.

3.4 Switching on and off

3.4.1 AC line operation

Set the AC line switch on the back panel to the I position. The green LED next to the **[⏻ I]** key (front panel) is on whenever the instrument is connected to the AC line and the AC line switch is set to **I.**



Two operating states are possible with this instrument:

– STANDBY status (display blanked)
– Measure status (display active)

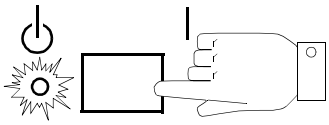
When the instrument is switched on, it assumes the status it was in at the time it was last switched off (or power to the instrument was lost). The instrument settings depend on the preset values specified in the TEST & CONF menu (see section 3.5.3 on page 3-6).

If **measure status** was active before switch-off:

The instrument switches on and performs the switch on test routine, after which it is ready for making measurements.

If **STANDBY mode** was active before switch-off:

The display remains blanked with the instrument in standby mode. Pressing the **[⏻ I]** switch switches the instrument from standby to measure status. The switch on test routine is performed, after which the instrument is ready for making measurements.



○ PERM ON
○ CHARGE

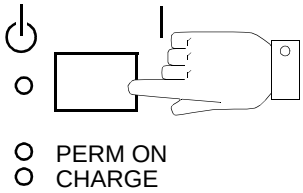
Switching off:

Pressing the **[⏻ I]** key switches the instrument to STANDBY mode.

Switching the AC line switch (back panel) to the O position disconnects the instrument from the AC power supply.

3.4.2 Battery operation

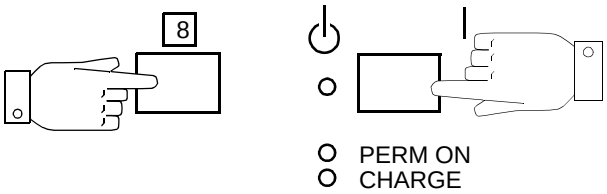
Switching on:



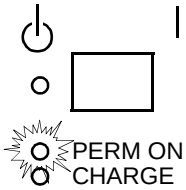
The instrument switches on and invokes the *switch on test routine*. The instrument settings depend on the preset values specified in the TEST & CONF menu
(see section 3.5.1 on page 3-5).

The instrument switches off automatically 15 minutes after the last keystroke. To disable this power saving feature:

- Press **[Blue key]** to call up additional functions
- **Press [⏻ I]** to disable automatic switch off.



The instrument is switched on permanently. Permanent operation is indicated by the red LED.



Note: The battery voltage is checked at the end of the switch on test routine. If it is below 14 V, the instrument switches off again immediately.

Switching off:

- **Press [⏻ I]** to switch the instrument off.

The instrument switches off automatically if

- the battery voltage drops below 14 V
- no key or control is operated for a period of 15 minutes (unless PERMANENT ON mode has been activated).

3.5 After switching on

3.5.1 Switch on test routine

Immediately after being switched on, the instrument performs a self test. This test checks all the important hardware modules, memory modules and interfaces. The self test is in two parts.

Self test — part 1

The CPU and interfaces are tested. The test sequence is determined by the BIOS software.

The following tests are shown in sequence on the display:

– UV-EPROM
– RAM
– FLASH_ROM linear
– FLASH_ROM paged
– V.24
– EEPROM
– HARDKEY
– KIF

Status displays during the test:

– RUNNING
– OKAY = Test completed successfully
– FAILED

Self test — part 2

After the first part of the test, the second part tests the digital signal processors and synthesizer as well as other circuits. The test sequence is determined by the instrument software (Flash ROMs). The progress of the second part of the test is not displayed on the screen. If an error occurs, the instrument reacts as follows:

1. A warning beep is heard and an error message is displayed.
   In such cases, the instrument can still be used, but some restrictions apply.
2. The HARDWARE ERROR menu is displayed. This indicates in which area(s) errors have occurred. In such cases, useful measurements can no longer be made.

In both cases, however, the instrument can be operated. Press any function key to exit from the HARDWARE ERROR menu.

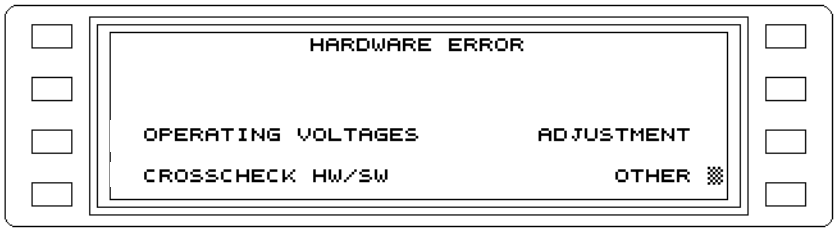


Fig. 3-2 HARDWARE ERROR menu

What if an error occurs?

Contact your local Wandel & Goltermann service agent who will be pleased to help.

The Service Manual also contains further information on the self tests.

3.5.2 Activate/deactivate keyboard click

It may be useful under certain circumstances to have an audible indication that a control has been operated. Activating the KEYBOARD CLICK function results in a "click" sound whenever you press a key or turn the rotary control.

Activate/deactivate KEYBOARD CLICK:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press INSTRUMENT **[F L2]** to open the INSTRUMENT menu
- Press KEYBOARD CLICK **[F L1]** to activate or deactivate the keyboard click.
- Press **[PREV]** to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode.

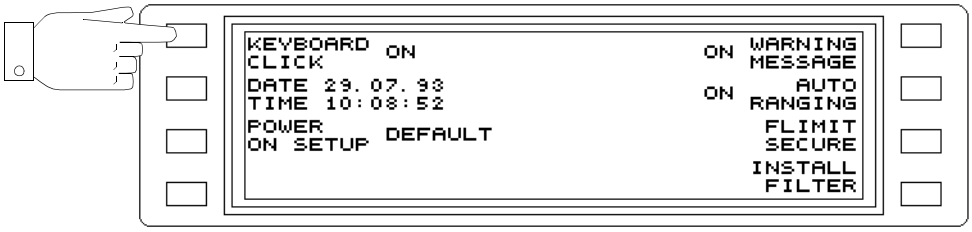


Fig. 3-3 Activating KEYBOARD CLICK

3.5.3 Setting the date and time

To establish the time at which a measurement was made or to start a measurement at a specific time, the actual date and time can be entered. The built-in lithium battery ensures that the clock operates continuously.

Setting the date:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INSTRUMENT** [F L2] to open the INSTRUMENT menu
- Press **DATE/TIME** [F L2] to open the DATE/TIME menu
- Press **ENTER DATE** [F R1] to enable date entry
  Enter the date using the number keys and press **[ENTER]** to confirm the entry. Enter dots to separate the day, month and year.
- Press **[PREV]** to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode.

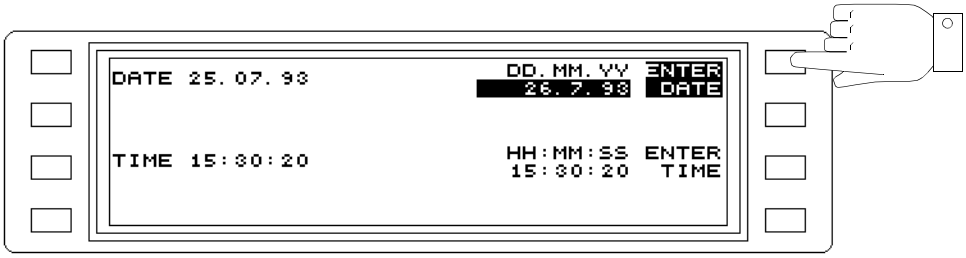


Fig. 3-4 Setting the date

Setting the time:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INSTRUMENT** [F L2] to open the INSTRUMENT menu
- Press **DATE/TIME** [F L2] to open the DATE/TIME menu
- Press **ENTER TIME** [F R3] to enable time entry
  Enter the time using the number keys and press to confirm the entry. Enter colons (use the dot key) to separate the hours, minutes and seconds.
- Press **[PREV]** to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode.

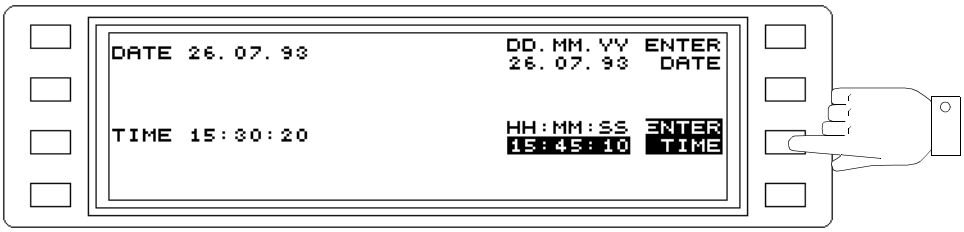


Fig. 3-5 Setting the time

3.5.4 Setting the switch on behavior

When a power failure occurs or if the instrument is switched off and then on again, it is often useful if it reverts to the settings it was in before being switched off. Various pre-set options can be selected for this from the TEST & CONF menu.

DEFAULT	All settings revert to their default values after switching on.
USER	All settings revert to the stored user-defined values after switching on
PREVIOUS MEASUREMENT	The currently set measurement mode is restored after switching on. If power was interrupted during an automatic measurement sequence, the sequence must be re-started.

Setting the switch-on behavior:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **POWER ON SETUP** [F L3] to open the POWER ON SETUP menu
- Press **POWER ON SETUP** [F L1] to make the setting required
- Press **[PREV**] to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode.

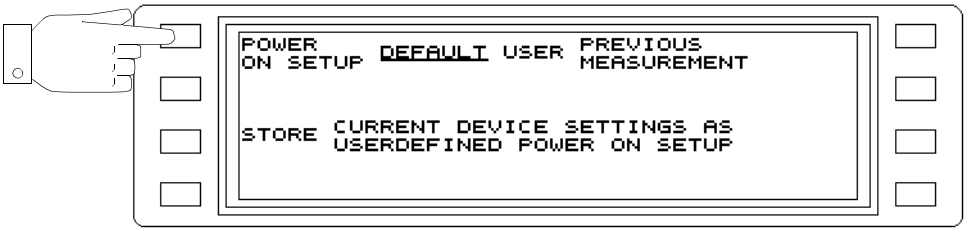


Fig. 3-6 Setting the power on behavior (e.g. DEFAULT)

*Determining the instrument settings for the **USER** POWER ON SETUP*

- Set the instrument to the settings you require
- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **POWER ON SETUP** [F L3] to open the POWER ON SETUP menu
- Press **STORE** [F L3] to store the current instrument settings
- Press **POWER ON SETUP** [F L1] to set USER as the preset setting.
- Press **[PREV**] to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode.

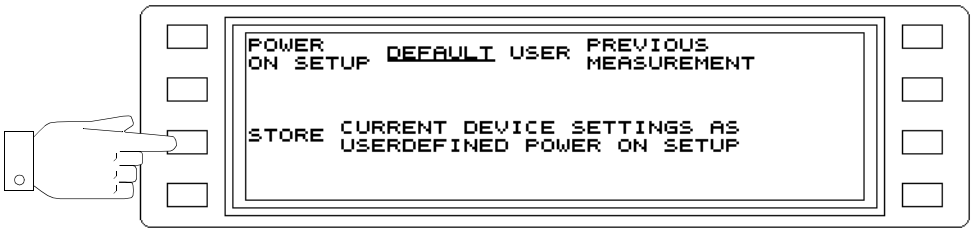


Fig. 3-7 Storing the USER instrument setting

3.5.5 Warning messages

A distinction is made between WARNING and ERROR messages in this instrument. The instrument can be configured so that warning messages are not displayed during operation, but are signalled by a beep.

Display warnings or signal by beep:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INSTRUMENT** [F L2] to open the INSTRUMENT menu
- Press **WARNING MESSAGE** [F R1] to activate / deactivate the display function.
- Press **[PREV**] to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode.

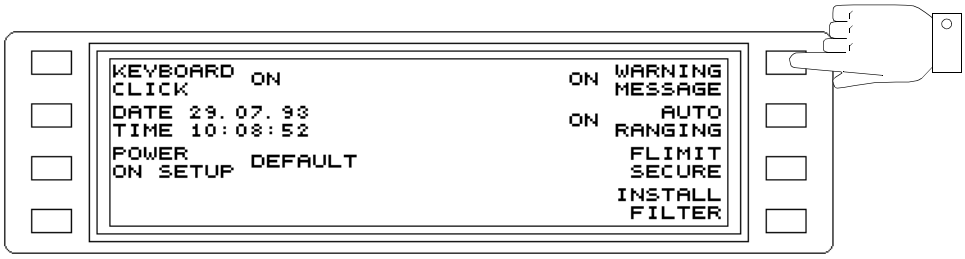


Fig. 3-8 Warnings are displayed during operation when ON is set

3.5.6 Selecting the weighting filter

The Bell systems used in the USA use the C-message weighting filter instead of the CCITT psophometer weighting. You can select the type of filter you require using this instrument.

Selecting the weighting filter:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **MEASUREMENT** [F L3] to open the MEASUREMENT menu
- Press **WEIGHTING** [F L1] to select the desired weighting filter
- Press **[PREV**] to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode

Fig. 3-9 Selecting the weighting filter (e.g. CCITT psophometer)

3.5.7 LCD contrast setting

Instruments in the SPM-37/-38/-39 family are fitted with variable contrast liquid crystal displays. The contrast of the display may require adjustment under certain lighting conditions. To do this, proceed as follows.

Correcting the contrast:

- Press and hold down the **[Blue key]**
- Press the arrow keys **[↓]** or **[↑]** to adjust the contrast so that the lettering is clear and the reference background is almost invisible.

3.6 Reference frequencies

Internal reference frequency

The instrument is equipped with a10 MHz reference frequency oscillator which provides sufficient accuracy for the tuning frequency for normal operation. The 10 MHz reference frequency can also be output from socket [52].

Note: If the reference frequency oscillator is switched on, do not input a reference frequency from any other source to socket [52]. This will avoid unwanted crosstalk interference.

Switching on the internal 10 MHz reference frequency oscillator:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **MEASUREMENT** [F L3] to open the MEASUREMENT menu
- Press **EXT REF** [F L3] to switch on the internal reference frequency oscillator.

Fig. 3-10 EXT REF INT switches socket [52] as an output

External reference frequencies

A reference frequency can be input to socket [52] for a particular measurement, for example if an increase in the accuracy of the tuning frequency is required. The instrument can synchronize to the following reference frequencies: 60 kHz, 300 kHz, 2048 kHz, 4200 kHz, 1 MHz, 2 MHz, 5 MHz and 10 MHz. For this, socket [52] must be switched as an input.

Note: If socket [52] is selected as input and a suitable standard frequency signal is present, the status display will show SETTLING for about 5 seconds, followed by LOCKED to indicate that the instrument is now synchronized to the external standard frequency.
If a standard frequency signal is not present or the signal level is too low, the status display will indicate NO SIGNAL.
If the frequency of the signal is outside the possible signaling range, the message UNLOCKED will be displayed.
In both the latter cases, the error message BAD EXTERNAL REFERENCE FREQUENCY will also be displayed at regular intervals.

Switching socket [52] as a reference frequency input:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **MEASUREMENT** [F L3] to open the MEASUREMENT menu
- Press **EXT REF** [F L3] to activate socket [52] as the reference frequency input.

Fig. 3-11 Activating the reference frequency input

Selecting the reference frequency:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **MEASUREMENT** [F L3] to open the MEASUREMENT menu
- Press **EXT REF FRQ** [F L4] to open the EXT REF FRQ menu.
- **Press [F L1]** through **[F R4]** to select the reference frequency to which the instrument is to synchronize.

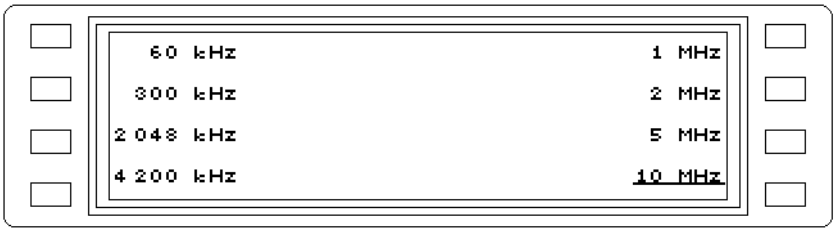


Fig. 3-12 Different reference frequencies to which the instrument can synchronize

3.7 MEMORY CARD

The Memory Card can be used with the SPM/PSM-137/-138/-139 only.

Using the Memory Card

The number of fixed frequencies and setups which can be stored by the instruments in the SPM/PSM-137/-138/-139 series can be increased by the use of a Memory Card:

Fixed frequencies: From 100 to 200 memory positions

Setups: From 7 to 107 memory positions.

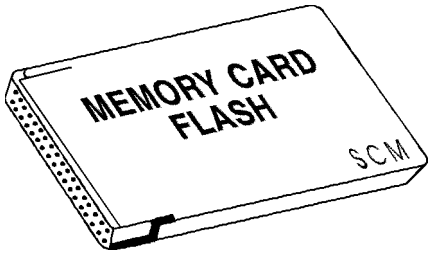


Fig. 3-13 Memory Card

Types of Memory Card which can be used

– SRAM 512 kB
– SRAM 1 MB (supplied with the instrument)
– SRAM 2 MB
– SRAM 256 kB with Attribute Memory
– Flash EPROM 2MB

Handling a Memory Card

Always follow the instructions for use which are supplied with the Memory Card.

Protecting a Memory Card

Memory Cards can be write-protected. Move the slider on the edge of the Memory Card so that it points to the WP label. Observe any instructions printed on the Memory Card.

Formatting a Memory Card

Before you can use a new Memory Card it must be formatted to take data. This is similar to formatting a floppy disk. Five types of Memory Card can be formatted.

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INTERFACES** [F L4] to open the INTERFACES menu.
- Press **MEMCARD** [F L4] to open the MEMORY CARD menu.
- Press **Softkey** to select the format needed.
- Press **OK**. Formatting a 2 MB FLASH card takes about 120 s.

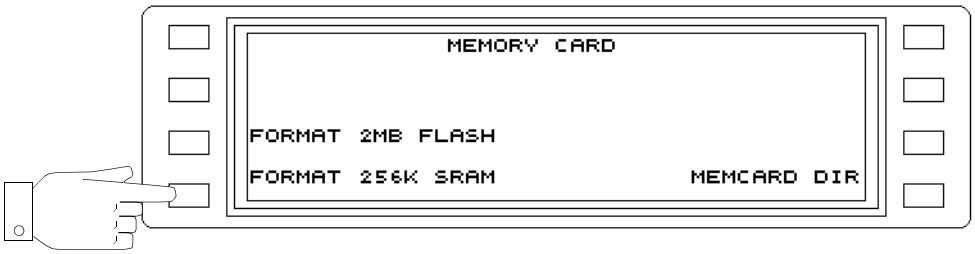


Fig. 3-14 Formatting a SRAM Memory Card

Inserting the Memory Card

- Hold the Memory Card between your thumb and forefinger and push it into the card slot [3], making sure that the connectors are pointing towards the slot and the lettering on the Memory Card is on top.
- Push the Memory Card into the slot until the ejector button to the left of the slot becomes visible.

Ejecting the Memory Card

- Press the ejector button. The Memory Card can now be slid out of the slot.

Displaying the Memory Card contents

The Memory Card directory can be displayed so that you can see what is stored on the card.

Displaying the Memory Card directory:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INTERFACES** [F L4] to open the INTERFACES menu.
- Press **Softkey** for format needed.
- Press **MEMCARD DIR** [F R4] to display the contents of the memory.

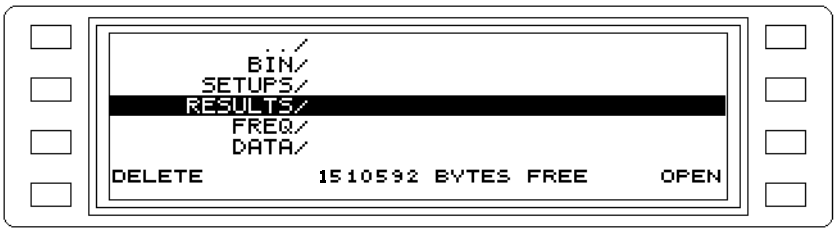


Fig. 3-15 Example of a Memory Card directory

- **Select the directory** using the rotary control or the arrow keys.
- Press **OPEN** [F L4] to open the selected sub-directory.

Deleting directories and files:

Note: A directory can only be deleted when it is empty, i.e. does not contain any files.

- **Select the directory** using the rotary control or the arrow keys.
- **Select the file** using the rotary control or the arrow keys.
- **Press DELETE** [F L4] to delete the selected file. The instrument will first prompt you to confirm that you want to delete the file as a safety measure.

3.8 Setting up the V.24 serial interface

The INTERFACES option in the TEST & CONFIG menu lets you set up the serial interface for outputting the results or remotely-controlling the instrument.

Selecting the handshake:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INTERFACES** [F L4] to open the INTERFACES menu.
- Press **V.24** [F L2] to open the V.24 menu.
- **Press HANDSHAKE** [F L3] to select the interface control function. Each time the key is pressed, a different option is selected:
  NONE = no handshake.
  RTS/CTS = Data transmission is controlled from the receiver using a hardware handshake.
  XON/XOFF = Data transmission is controlled from the receiver using a hardware handshake. The receiver accepts data until the buffer is full, when it transmits the signal XOFF (13h, Ctrl S) on circuit TxD (Pin2) to the transmitter. As soon as this signal is received, the transmitter waits until it receives the signal XON (11h, Ctrl Q) from the receiver indicating that the buffer is empty.
- Press **[PREV**] to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode.

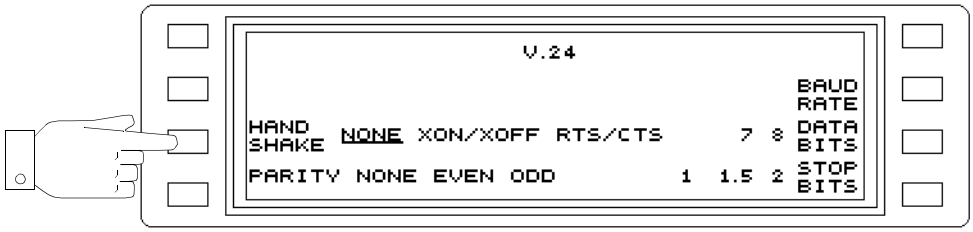


Fig. 3-16 Selecting the interface control

Selecting the parity

Selecting the handshake:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INTERFACES** [F L4] to open the INTERFACES menu.
- Press **V.24** [F L2] to open the V.24 menu.
- **Press PARITY** [F L4] to select the serial interface parity setting. The transmitter can insert a parity bit after the data bits as a means of detecting transmission errors. The receiver checks the data stream as indicated by the transmitter.
  NONE = No parity check.
  EVEN = Even parity, i.e. the number of “1” bits including the parity bit is always even. The transmitter sets the parity bit to “1” if the number of “1” bits in the data word is odd.
  ODD = Odd parity, i.e. the number of “1” bits including the parity bit is always odd. The transmitter sets the parity bit to “1” if the number of “1” bits in the data word is even.
- Press **[PREV**] to return to the previous menus one step at a time, **or**

- Press **[RTN]** to return direct to the main menu of the current operating mode.

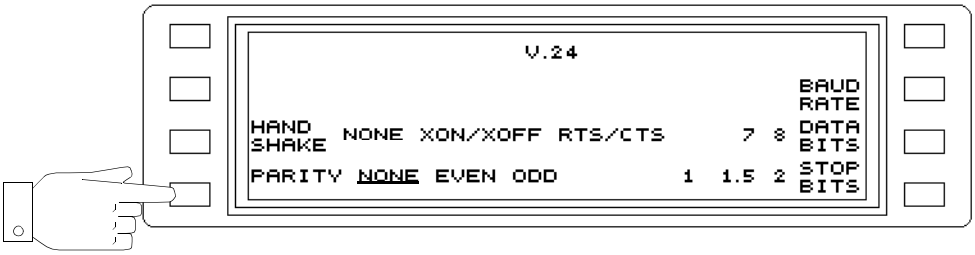


Fig. 3-17 Selecting the parity

Selecting the baud rate:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INTERFACES** [F L4] to open the INTERFACES menu.
- Press **V.24** [F L2] to open the V.24 menu.
- **Press BAUDRATE** [F R2] to open the BAUDRATE submenu.
- **Press [F L1] through [F R4]** to select the required baud rate. The baud rate is the rate at which data is transmitted (1 Baud = 1bps). For example, if the data format is 1 start bit, 7 data bits and 2 stop bits per character, then 960 characters will be transmitted per second if the baud rate is 9600.
- Press **[PREV**] to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode.

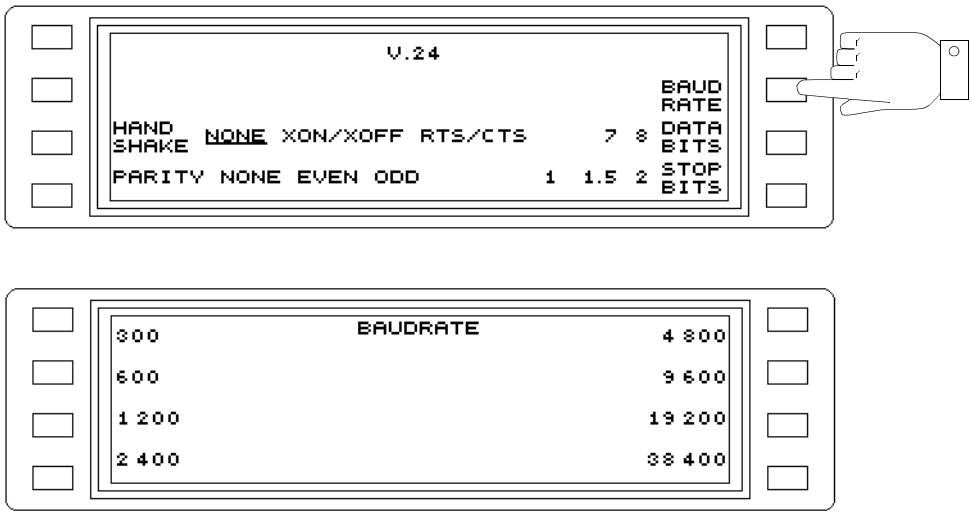


Fig. 3-18 Selecting the baud rate

Selecting the number of data bits:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INTERFACES** [F L4] to open the INTERFACES menu.
- Press **V.24** [F L2] to open the V.24 menu.
- **Press DATA BITS** [F R3] to select the number of data bits per character to be transmitted over the serial interface. The LSB (least significant bit) is transmitted first, the MSB (most significant bit) last.
  7 = Characters are transmitted in 7 bit ASCII code.
  8 = Characters are transmitted in 8 bit ASCII code no. 5.
- Press **[PREV**] to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode.

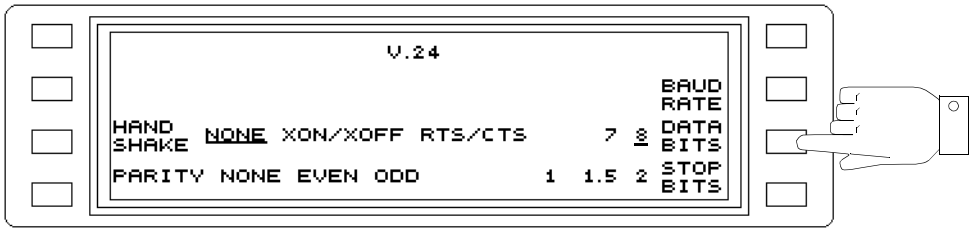


Fig. 3-19 Setting the number of data bits

Setting the number of stop bits:

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INTERFACES** [F L4] to open the INTERFACES menu.
- Press **V.24** [F L2] to open the V.24 menu.
- **Press STOP BITS** [F R4] to set the number of stop bits per character transmitted over the serial interface at the end of each character or parity bit. The stop bit can be 1, 1.5 or 2 bit periods in length.
- Press **[PREV**] to return to the previous menus one step at a time, **or**
- Press **[RTN]** to return direct to the main menu of the current operating mode.

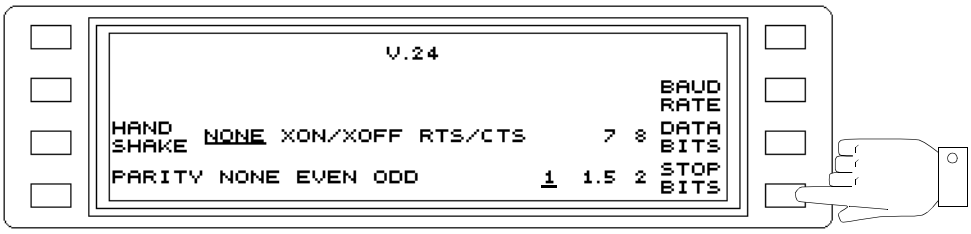


Fig. 3-20 Selecting the number of stop bits

3.9 Default settings

Invoking the default settings:

The default settings for the individual parameters are stored at SETUP address 0 to allow the instrument to be set to a defined initial state.

- Press **[Blue key]** to call up additional functions
- **Press [SETUP]** to call up the SETUP menu
- **Select 00 DEFAULT** using the rotary control or the arrow keys
- Press **RECALL** [F L4] to set the default values

The main menu for LEVEL mode is displayed.

Instrument default settings

Meaning	Parameter	Setting
Acoustic signal (IMPULSIVE NOISE and INTERRUPTION modes)	BEEP	OFF
Response threshold	THRESH	- 20.0 dBm
Display averaging	AVRG	OFF
Drive		LOW NOISE
AUTO STEP mode	MODE	TIME
Automatic ranging	AUTO RANGING	ON
Automatic frequency control	AFC	OFF
Automatic measurement sequence	START/STOP key	STOP
Bandwidth	BANDW	3 100 Hz
Mode	-	LEVEL
Weighting filter (JITTER)	FILTER	20 ... 300 Hz
Weighting filter (IMPULSIVE NOISE)	FILTER	FLAT
Date	DATE	Current date
Input	RX	High-impedance, 75
Receive frequency	FRQ	100 000 Hz
External reference frequency	EXT REF FRQ	10 000 000 Hz
Step threshold	STEP THRESH	- 20.0 dBm
Frequency step	FSTEP	1 000 Hz
RF gain	RF GAIN	- 40.0 dB
Calibration	CAL	OFF
Marker	MARKER	OFF
Maximum value hold	MAXHLD	OFF
Start measurement	START TIME	00:00
Center frequency	FCENT	55 000 Hz
Power on behavior	POWER ON SETUP	Last selection
Notch filter	NOTCH	OFF
Upper level threshold limit	UPPER THRESH	29.0 dBm

Fig. 3-21 Default settings on initialization

Meaning	Parameter	Setting
Level reverence	... LEVEL	ABS LEVEL
Level units	-	dBm
Level threshold	THR/dBm	9.0
Level monitoring	LOWER THRESH	OFF
Level monitoring	UPPER THRESH	OFF
Psophometer filter	PSOPH	OFF
External reference frequency input	EXT REF	OFF
Step rate	TIME/STEP	1s
Step width	STEP WIDTH	1 000 Hz
Sideband	USB/LSB	USB
Scale length	SCALE	100
Scale mode	SCALE RANGE	AUTO
Scale reference	dBm -->	9.0
Scale range	SCALE	20 dB/
Start frequency	FSTART/Hz	10 000 Hz
Start mode	START	MAN
Start threshold	START THRESH	- 20.0 dBm
Stop frequency	FSTOP	100 000 Hz
Keyboard click	KEYBOARD CLICK	Last selection
Test tone frequency	TONE	800 Hz
Gate time	GATE TIME	01:00
Dead time	DEAD TIME	3 ms
Carrier frequency	CAR	100 000 Hz
Time	TIME	Current time
Lower level alarm threshold	LOWER THRESH	- 71. 0 dBm
START/STOP key lock	STOP KEY LOCKED	OFF
Gain	GAIN	20 dB
Warnings	WARNING MESSAGE	ON
Sweep time	SWEEP TIME	1 s
Sweep time selection	SWEEP TIME	AUTO
IF gain	IF GAIN	20.0 dB

Fig. 3-21 Default settings on initialization

3.10 Operation after storage and transport

Safety

Storage or transport may subject the instrument to excessive stresses. Refer to the safety instructions in section 2.

Recovery time

Condensation may form on or inside an instrument which has been stored or transported at a low temperature when it is brought into a warm room. Do not switch the instrument on until any condensation visible on the surface has evaporated. Correct operation is ensured once the instrument has reached a temperature within the guaranteed operating range (+5 to +40 ¯C).

The last point also applies if the instrument was stored at high temperatures.

Built-in lithium battery

The instrument is fitted with a lithium battery for buffering the semiconductor memories used for storing instrument setups and data retention in the event of a power failure. The battery may become discharged after long period of storage. Refer to the service manual for details of how to replace the battery.

4 Getting started

This section explains the principle behind operation of the instrument with the aid of a simple example measurement. It is intended to give first-time users of the instrument a general idea of how to use it and introduces some of the parameters and operating sequences which will be used for other measurement tasks.

The device under test is the reference frequency output of the instrument itself. The output signal is a 10 MHz carrier with output power of about -3.0 dBm into 75 Ω.

Note: The SPM/PSM-37/-137 have an upper frequency limit of 8 MHz. Insert a frequency divider between the reference frequency output [52] and the measurement input [20], or use an appropriate reference frequency source to provide the test signal.
The description of storing instrument settings and measurement results on Memory Cards does not apply to instrument versions SPM/PSM-37 where this function is not available.

Test setup

- Connect the reference frequency output [52] on the instrument back panel to the measurement input [20] usig a short length of BNC cable.

Switching on

- Switch the instrument on using the AC line switch on the back panel.
  If the instrument was set to standby mode the last time it was used, press the **[⏻ I]** key to switch it on.

Default setting

The default setup sets all parameters to their preferred default settings and is stored under address 00 DEFAULT in the setup memory.

- **Press the [BLUE KEY]** to invoke the additional functions.
- **Press [IMPED]** to open the SETUP menu.

Note: The additional function, in this case SETUP, must be selected within 2 seconds of pressing the [BLUE KEY], i.e. while the bar is displayed at the bottom edge of the display.

- **Use the rotary control or the arrow keys to select** 00 DEFAULT.
  (if 00 DEFAULT is not shown as already selected).
- **Press RECALL** [F L4] to invoke the DEFAULT setup. The main menu for LEVEL mode is displayed.

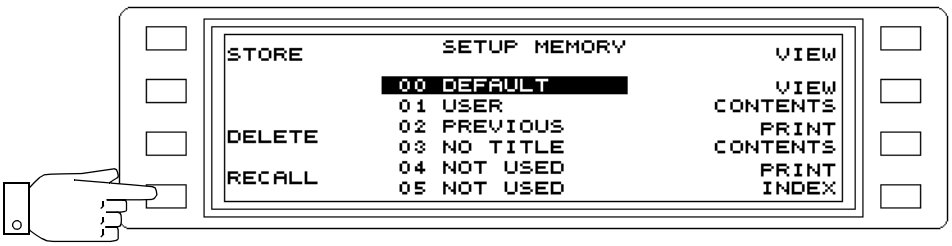


Fig. 4-1 Entering the address

Input impedance

The default setting of the input impedance is 75 Ω with high-impedance termination. To measure the input signal correctly the setting must be changed to termination with Z_0 = 75 Ω. To do this, do the following:

- **Press [IMPED]** to open the impedances menu.
- **Press Z ∞** [F L1] to terminate the input with Z_0 = 75 Ω.
- **Press [PREV]** to return to the measure menu.

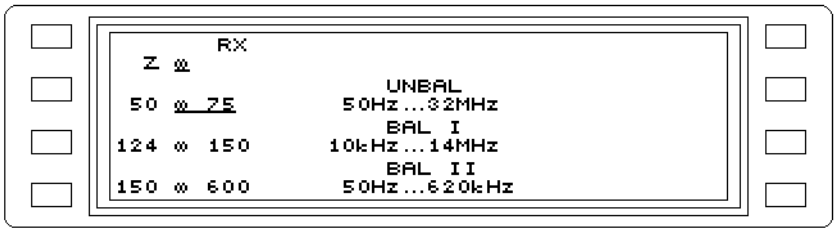


Fig. 4-2 IMPEDANCE menu for selecting the input impedance

Level units

At present, the instrument is set for *selective level measurement* characterized by the current bandwidth setting of 3.1 kHz. The receive frequency is preset to 100 kHz (test signal is 10 MHz). The digital result field shows a value of around < -90 dBm. To get an idea of the magnitude of the displayed level, switch over to the linear level display:

- **Press [UNITS]** to open the level units and reference menu.
- **Press [F R4] 3 x** to switch to display in Watts.
- **Press [PREV]** to return to the measure menu.
  The result shown is a power value of < 1pW which is the noise component at 100 kHz evaluated with a bandwidth of 3.1 kHz. Switching the level units also switches the level reference from an absolute level to a relative level referred to 0 dBm (ABS ---> REL). The result is displayed in dBm0, indicating that the power level applies to the point with relative level of zero (dBr).

Note: The analog display is disabled for linear level display.

- **Press [UNITS]** again to open the level units and reference menu.
- **Press LEVEL ABSOLUTE** [F L2] to switch to displaying absolute level.
- **Press [F R2] 4 times** to switch back to display in **dBm**.

Fig. 4-3 UNITS menu for selecting the level units

- **Press [PREV]** to return to the measure menu. The analog display is shown again.

Analog scale and averaging

The level of random or noise signals is often difficult to determine because of the variation with time. To illustrate this effect clearly, increase the resolution of the analog display. The rapidly fluctuating bar display can be slown down by using the averaging function, allowing the noise level to be read off more easily.

- **Press** [F L2] to open the SCALE menu.
- **Press dB/DIV** [F R3] to set a scale resolution of 2 dB/division.
  Note the changes in the analog display.
- **Press AVRG** [F L4] to activate display averaging (OFF ---> SHORT ---> LONG). The movement of the bar display is reduced markedly when the LONG averaging time is selected.

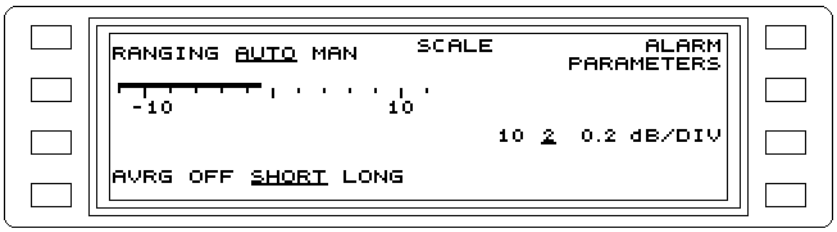


Fig. 4-4 Display averaging activated

- **Press [PREV]** to return to the measure menu.

Note: The resolution of the digital display changes to 0.01 dB when averaging is on.

Wideband level

To measure the power level of the 10 MHz signal from the standard frequency output [52], switch to wideband level measurement:

- **Press BANDW** [F R4] to open the BANDWIDTH menu.
- **Press WIDE** [F R4] to measure the total power level within the specified frequency range of the Level Meter (e.g. from 50 Hz to 32 MHz for the SPM-39).
  The level display jumps to the expected value of around -3 dBm and stabilizes after a settling time (averaging period). Note the automatic scaling of the analog display. This function can be disabled if necessary.

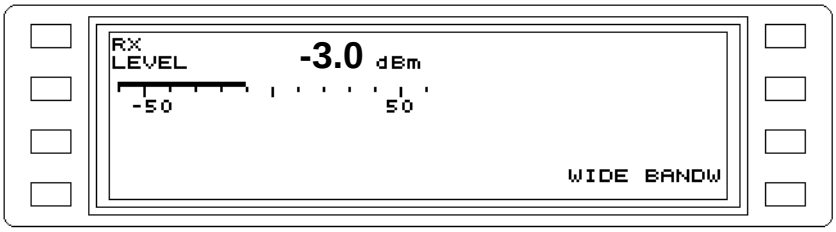


Fig. 4-5 Wideband level measurement mode

Signal frequency

As the wideband level measurement does not tell us anything about the frequency composition of the test signal, a frequency-selective measurement is necessary. The HOT TONE SEARCH operating mode is useful for finding the frequency of an unknown signal. All signals exceeding a preset level threshold are displayed in a graphics field.

- **Press [HOT]** to select HOT TONE SEARCH mode.
- **Press Scale** [F L2] to open the SCALE and then press [F L2] to set 2 dB/division.

- **Press THR/dBm** [F L4] to alter the level threshold; see arrow on the left of the graphic field. Enter a level threshold of e.g.- 5.0 dBm using the number keys and press [ENTER]. (The default threshold of +9 dBm would not detect the signal).
- **Press FSTOP** [F R2] to change the stop frequency. Enter the upper frequency limit of the level meter (e.g.32 MHz) using the number keys and press [MHz] to complete the entry. The lower frequency limit FSTART (default setting 10 kHz) is not changed, as we are assuming that the signal frequency is above 10 kHz.
- **Press [START]** to start the search (STOP LED goes out).
  After about 40 seconds, the signal line is displayed in the graphic field.
- **Press [START] again** to stop the search (STOP LED lights up).
- **Press MARKER** [F L1] to open the marker menu.
- **Press SHOW MARKER** [F L2] to activate/deactivate the marker function.

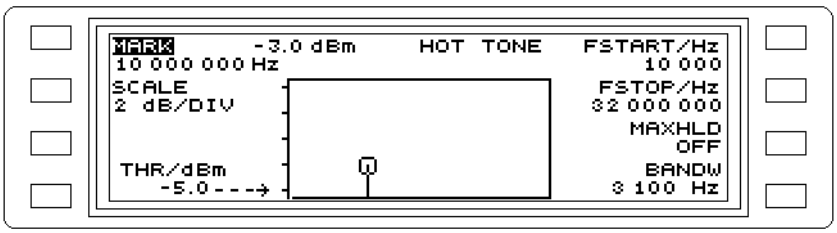


Fig. 4-6 Marker activated; display of frequency and level

- **Press [PREV]** to return to the measure menu.
  The level and frequency values for the test signal are displayed.
- **Press [START(STOP)]** to end the measurement.

Recording the results on a Memory Card

The results can be stored on a Memory Card if the SPM/PSM-137/-138/-139 is used.

Preparation

- **Slide** the **Memory Card** supplied with the instrument into the card slot.

Assigning a file name

- **Press [BLUE KEY]** to access the additional functions.
- **Press [DOCUM]** to open the DOCUMENT menu.

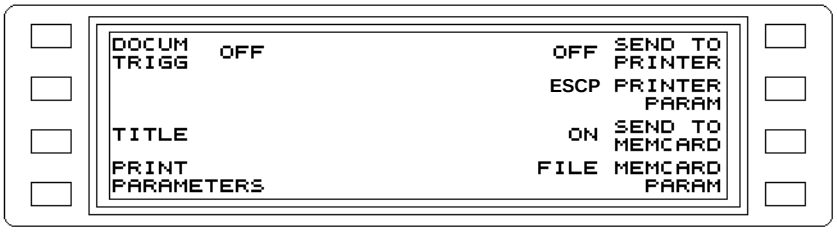


Fig. 4-7 DOCUMENT menu

- **Press FILE MEMCARD PARAM** [F L4] to specify a file name under which the results are to be stored.
- **Press CREATE** [F L3] to open the menu for entering the file name.

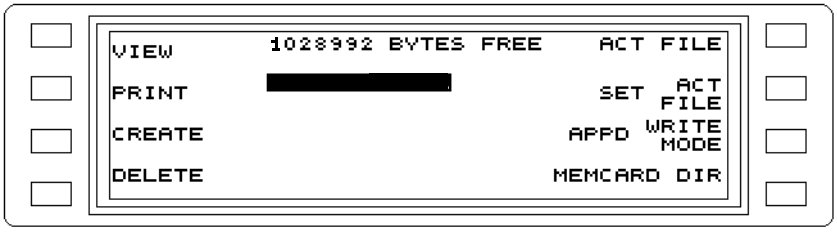


Fig. 4-8 Determining the storage location and memory contents

- **Enter** the name `Meas1` (for example).
- Use the **rotary control**, **arrow keys** or **<--** [F L2] and **-->** [F R2] to **select** the **characters** from the character bar.

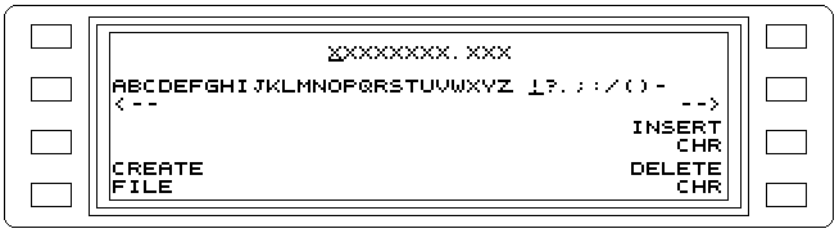


Fig. 4-9 Entering the file name

- **Press INSERT** [F R3] or **[ENTER]** to enter the selected character.
- **Press CREATE FILE** [F L4] to create a file with the selected file name.

Selecting a file

- **Select** the file **MEAS1** using the **rotary control** or the **arrow keys**.
- **Press SET ACT FILE** to store the results in the file **MEAS1**.

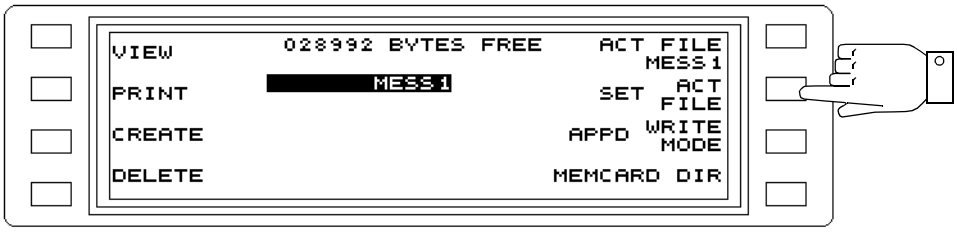
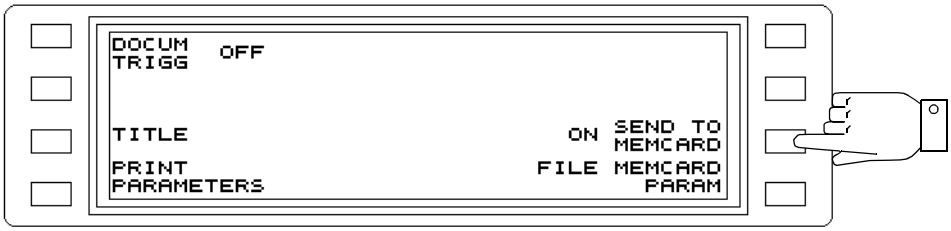


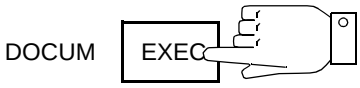
Fig. 4-10 Selecting the file name

Storing the results

- **Press [PREV]** to return to the DOCUMENT menu.
- **Press SEND TO MEMCARD** [F R3] to select the Memory Card as the storage medium.



- **Press PRINT PARAMETERS** to store the measurement parameters.
- **Press [EXEC]** to store the results.



- MEM CARD
- EXT PRINTER

Displaying the stored results

- **Select** the file **MEAS1** using the **rotary control** or the **arrow keys**.
- **Press VIEW** [F L1] to display the contents of the file.

Fig. 4-11 Selecting the file

- You can scroll through the contents of the file **MEAS1** using the **rotary control** or the **arrow keys**.

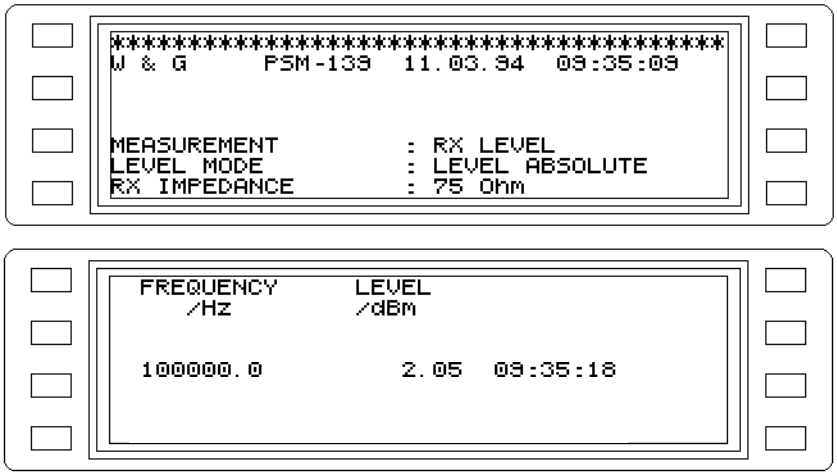


Fig. 4-12 Display of file contents

5 Operation

5.1 Instrument controls and connectors

This section summarizes all instrument controls and connectors in tabular format. The position numbers in the tables agree with those on the instrument.

Front panel

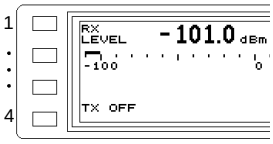
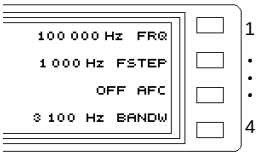
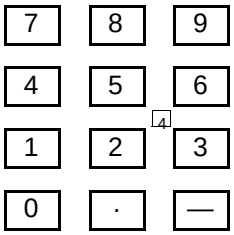
Code no.	Element	Meaning
1		*Function keys (left side, F L1...L4)* Parameter settings - labels depend on menu. If function key [F L4] is labelled with TX level entry, pressing the blue pre-select key [8] provides direct access to the tracking generator functions with this function key.
2		*Function keys (right side, F R1...R4)* Parameter settings - labels depend on menu. If function key [F R1] is labelled with frequency entry, pressing the blue pre-select key [8] provides direct access to the tracking generator functions with this function key.
3		*Memory Card slot* The LED to the left indicates when the Memory Card is being accessed.
4		*Keypad* Digit keys, decimal point key, key for negative sign Entry of numerical values for parameters
		*Keys with ENTER function* Termination of numerical parameter entry and assignment of dimensions
4		*CLR key* Clears digits in steps during numerical parameter entry (until entry is terminated). The instrument is reset by pressing this key along with the POWER ON key. This does not clear the internal SETUP memory, however.

Fig. 5-1 Controls and connectors on the front panel

Code no.	Element	Meaning
5	DOCUM EXEC 5 MEM CARD EXT PRINTER	*EXEC key* Begins storage on the memory card or printing on an external printer. The LED (below) indicates the output medium.
6	IEEE 488 IEC 625 LOCAL 6 REM SRQ CACT LSTN TALK	*LOCAL key* Toggles the instrument from remote control mode to manual mode as long as LOCAL LOCKOUT was not programmed. *IEEE/IEC device status* **REM**: This LED lights when the instrument is in remote control mode. **CACT**: This LED lights when the instrument is acting as controller. **SRQ**: This LED lights when the instrument initiates a SERVICE REQUEST. **LSTN**: This LED lights when the instrument is receiving data. **TALK**: This LED lights when the instrument is transmitting data.
7	JITTER 7 LEVEL	*Mode keys:* Calls the main menu of LEVEL mode.
	blau JITTER 7 LEVEL	Calls the main menu of JITTER mode.
	IMP NOISE DMOD	Calls the main menu of DEMODULATION mode.
	8 IMP NOISE DMOD	Calls the main menu of IMPULSIVE NOISE mode.
	INTERR VOICE	Calls the main menu of VOICE mode.
	8 INTERR VOICE	Calls the main menu of INTERRUPTIONS mode.
	AUTOSTEP NPR	Calls the main menu of NPR mode.
	8 AUTOSTEP NPR	Calls the main menu of AUTOSTEP mode.

Fig. 5-1 Controls and connectors on the front panel

Code no.	Element	Meaning
	GROUP HOT	Calls the main menu of HOT TONE SEARCH mode.
	8 GROUP HOT	Calls the main menu of GROUP PANORAMA mode (Option BN 2203/00.03; not yet available).
8	8	*Preselect key (blue)* • Pressing the blue preselect key before another key activates the secondary function associated with that key (text above the keys or text in blue). • If you accidentally press this key, press it again to clear it (takes about 2 seconds).
9	SETUP IMPED	*Auxiliary function keys* Calls the main menu of auxiliary function IMPEDANCE.
	8 SETUP IMPED	Calls the main menu of auxiliary function SETUP
	DOCUM UNITS	Calls the main menu of auxiliary function UNITS.
	8 DOCUM UNITS	Calls the main menu of auxiliary functionn DOCUMENTATION.
	TEST & Config HELP 9	Calls the main menu of auxiliary function HELP.
	8 TEST & Config HELP 9	Calls the main menu of auxiliary function TEST & CONFIGURATION.
10	10 PREV	Causes a jump back by one menu level
11	11 RTN	Calls the main menu of the mode that is set

Fig. 5-1 Controls and connectors on the front panel

Code no.	Element	Meaning
12	12 FINE	*FINE key* Changes the resolution of the rotary control. LED on: Least significant digit of numerical parameter. Step width 1 Hz, 0.1 dB. LED not lit: Second and third least significant digits of numerical parameter. Step width 100 Hz, 1 dB.
13	13	*Rotary control* • Continuous entry of numerical parameters. • Selection of ASCII characters during generation of setup titles. • Section-by-section scrolling through HELP. Line-by-line scrolling through the contents or keyword directory of HELP. • Scrolling through setup contents, fixed addresses.
14	CONTRAST 14	*Cursor (arrow) keys* • Step-wise alteration of selected parameters which have an internal step-size setting or which allow scrolling. • Section-by-section scrolling through HELP. • Line-by-line scrolling through the contents or keyword directory of HELP.
	8 CONTRAST 14	*Contrast (PSM / SPM-37/-38/-39 only)* Contrast setting for the display. The display contrast is a function of • the light falling on the display and • the viewing angle.
15	CAL 15 OFF	*CAL key* • Switches automatic calibration ON or OFF. • The LED stays lit when automatic calibration is switched OFF.
16	START 16 STOP	*START key (green)* Starts and stops • an automatic measurement sequence in AUTOSTEP mode, • the tone search in HOT TONE SEARCH mode, • event counting in INTERRUPTIONS and IMPULSE NOISE modes. In STOP status, pressing the key always triggers a new measurement sequence, tone search or event count. The red LED indicates STOP status.
17	50Hz...32MHz 50 75	*Display of input impedance and the corresponding frequency ranges* Coaxial input, Z: 50 Ω, high impedance, 75 Ω SPM/PSM-37/-137: 50 Hz to 8 MHz SPM/PSM-38/-138: 50 Hz to 18 MHz SPM/PSM-39/-139: 50 Hz to 32 MHz

Fig. 5-1 Controls and connectors on the front panel

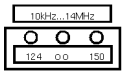
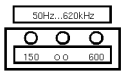
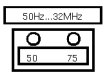
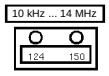
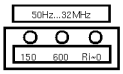
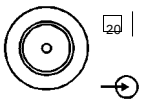
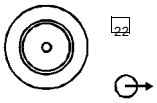
Code no.	Element	Meaning
17		Balanced input I, Z: 124 Ω, high impedance, 600 Ω SPM/PSM-37/-137: 10 kHz to 8 MHz SPM/PSM-38/-138: 10 kHz to 14 MHz SPM/PSM-39/-139: 10 kHz to 14 MHz
		Balanced input II, Z: 150 Ω, high impedance, 600 Ω 50 Hz to 620 kHz
18		*BLANK key (PSM)* Blanks the TX level. A new TX level value can be entered. The LED is on when the output level is blanked.
		*Display of output impedances (PSM) and the corresponding frequency ranges* Coaxial output, Z: 50 Ω, 75 Ω PSM-37/-137: 50 Hz to 8 MHz PSM-38/-138: 50 Hz to 18 MHz PSM-39/-139: 50 Hz to 32 MHz
		Balanced output I (PSM), Z: 124 Ω, 150 Ω PSM-37/-137: 10 kHz to 8 MHz PSM-38/-138: 10 kHz to 14 MHz PSM-39/-139: 10 kHz to 14 MHz
		Balanced output II (PSM), Z: 150 Ω, 600 Ω, Ri ~ 0 Ω 50 Hz to 620 kHz
19		*Jack* Power supply for the TK-11 active probe
20		*Coaxial measurement input* Versacon ® 9 universal connector system (75 Ω basic jack) with BNC insert. Adapts to all commonly used connector systems.
21		*Balanced tracking generator output* 3-pole CF jack (North American version sith additional balanced input [26] WECO 310)
22		*Coaxial tracking generator output* Versacon ® 9 universal connector system (75 Ω basic jack) with BNC insert. Adapts to all commonly used connector systems.

Fig. 5-1 Controls and connectors on the front panel

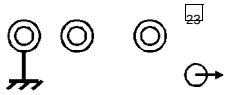
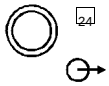
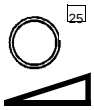
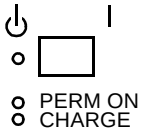
Code no.	Element	Meaning
23		*Balanced tracking generator output (PSM)* 3-pole CF socket. (North American version sith additional balanced input [27] WECO 310)
24		*Headset connector* For monitoring demodulated signals. The same mono output signal is present on both channels of the 6.3 mm stereo jack.
25		Volume control for the built-in loudspeaker and headset output (clockwise ==> louder).
		*Ground jack*
		⏻ I *key* • Green LED indicates power-on status. • Red LED indicates permanent-on under battery power. • Yellow LED indicates charging.

Fig. 5-1 Controls and connectors on the front panel

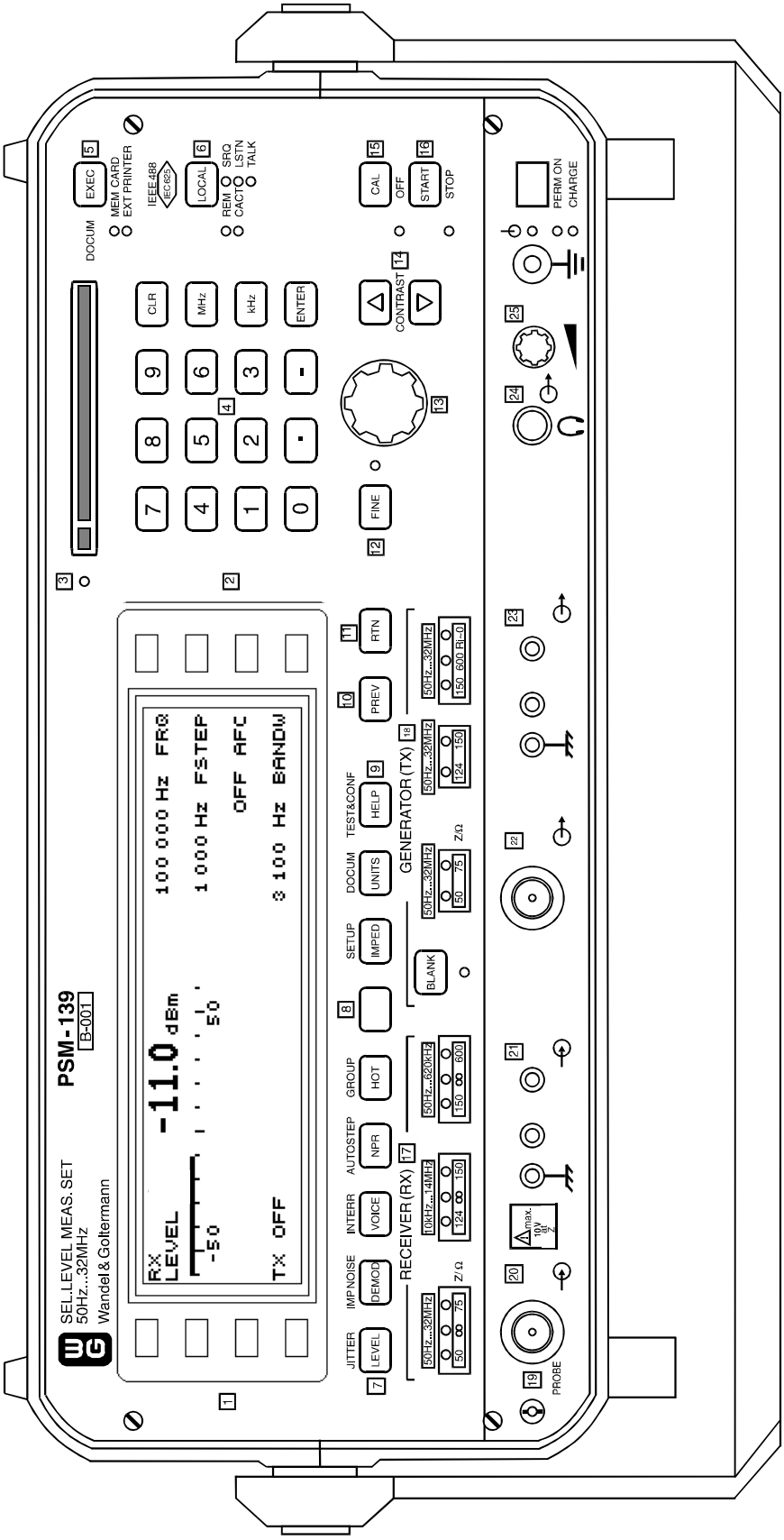


Fig. 5-2 Front panel, e.g. PSM-139, BN 2203/17

Back panel

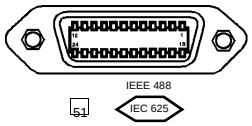
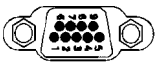
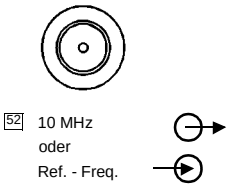
Code no.	Element	Meaning
51		*IEEE 488 remote control connector* Option 2203 / 00.05 24-pole Amphenol socket
50		*V.24 serial interface* Option 2203 / 00.05 Printer connection 9-pole SUB-D plug. Connections: Pin 1: not used Pin 2: Rx Pin 3: Tx Pin 4: DTR Pin 5: ground Pin 6: DSR Pin 7: RTS Pin 8: CTS Pin 9:not used
52		*Reference frequency output / input* BNC socket
53		*Auxiliary inputs / outputs* 9-pole SUB-D socket. Connections: Pin 1: Alarm output: Relay c/o contact, NO Pin 2: Alarm output: Relay c/o contact, NC Pin 3: Y output; control voltage proportional to analog scale 0...5V_{DC} Pin 4: Signal output: Interruption measurement to ITU-T 0.61 Pin 5: External level setting (PSM) ±1dB with ±500mV auxiliary d.c. voltage Pin 6: Alarm output: Relay c/o contact, C/O (see pins1 & 2) Pin 7: Ground Pin 8: Ground Pin 9: Measurement ground for pin 5
54		*Grounding bolt*

Fig. 5-3 Controls and connectors, back panel

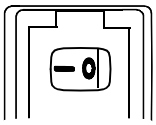
Code no.	Element	Meaning
		*A.C. line switch for activating the power supply* • Power ON: Switch setting I • Power OFF: Switch setting O
	Akku-Zusatz BATTERY PACK	*Battery pack* BAZ-2033 Battery Pack (option) Removable battery pack in the lower half of the instrument's back panel.

Fig. 5-3 Controls and connectors, back panel

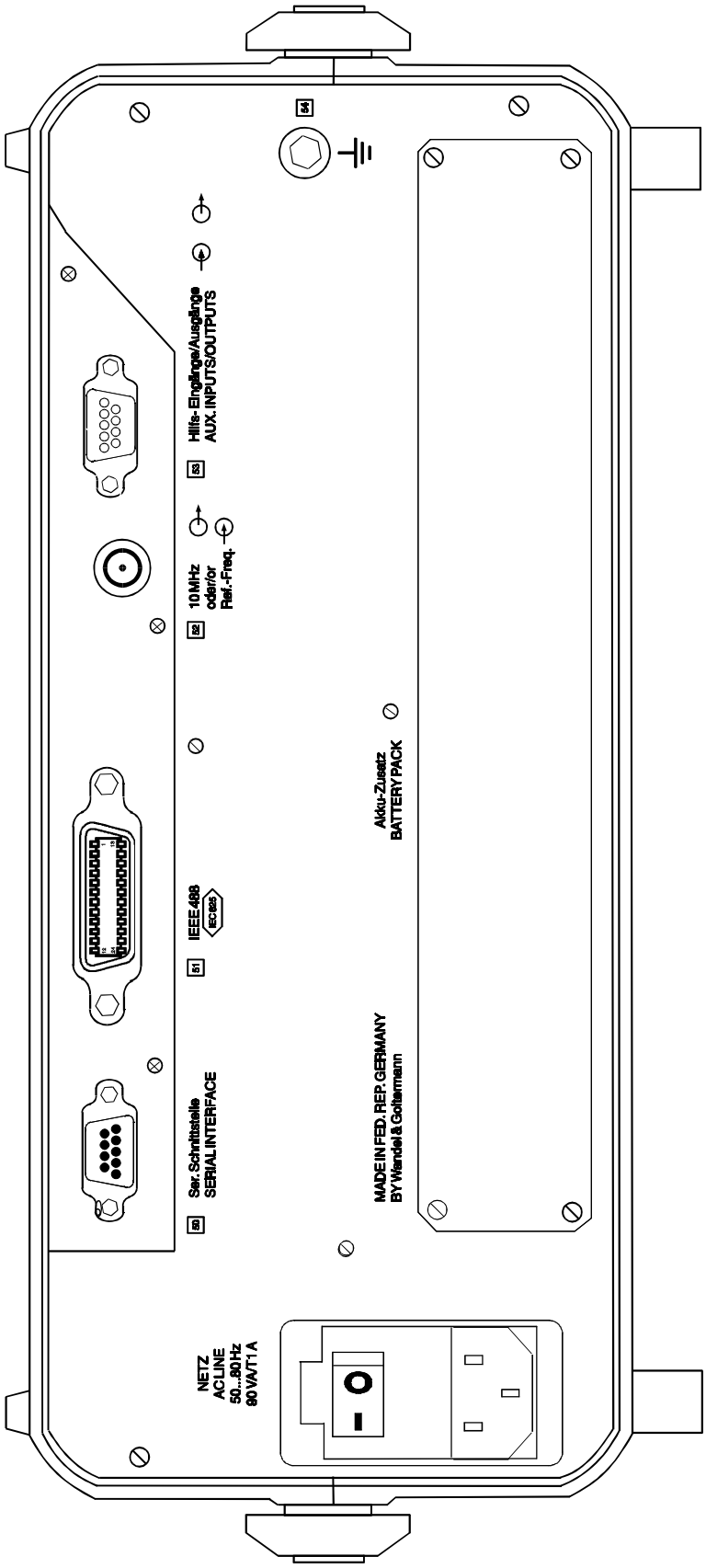


Fig. 5-4 Back panel, e.g. PSM-139

5.2 Operating principle

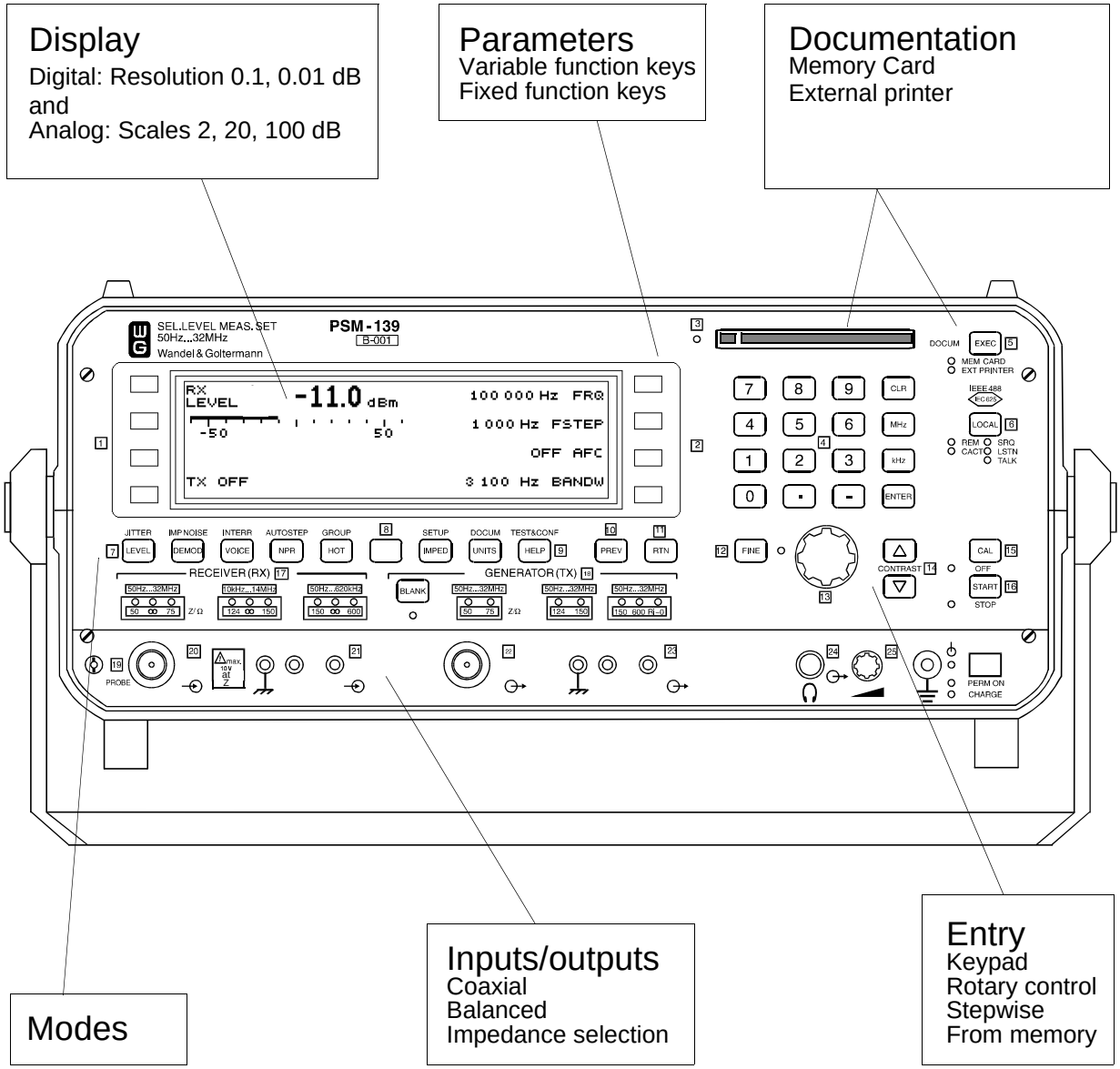


Fig. 5-5 Front panel and structural elements

Display

The display is the main part of the front panel. Depending on the instrument version, it is either a liquid crystal or an electroluminescnt display. Both display types have a format of 240 x 64 pixels The operating mode, measurement results, important instrument parameters, status and error messages are all visible at a glance.

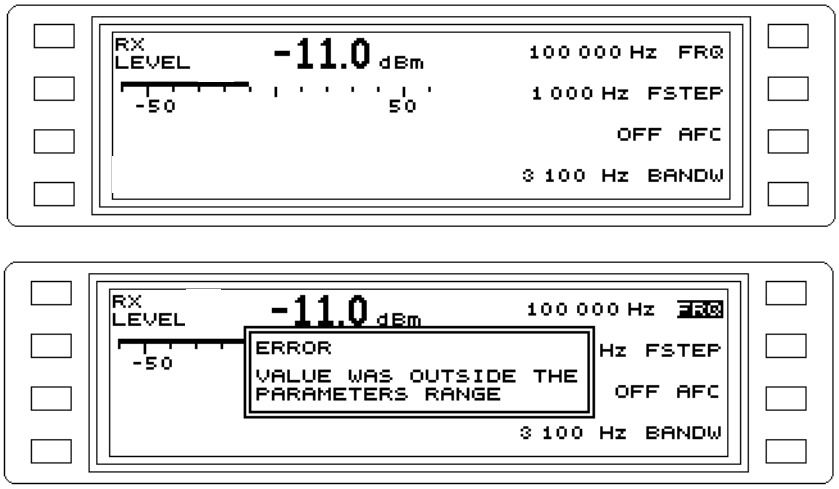


Fig. 5-6 Standard display (operating mode, results, parameters and error messages)

Menu control

The instrument is menu controlled. The instrument functions are grouped into function key menus.

Invoking operating modes and auxiliary function menus

The fixed function keys are used to invoke the main menus for the operating modes and the auxiliary functions. If the blue key [8] is pressed first, the second function printed above the key is invoked.

Changing parameters and functions using the function keys

There are four keys to the right ([F R1] to [F R4])[1] and to the left ([F L1] to [F L4])1 of the display screen. The functions of these keys are controlled by the program and are indicated by labels shown adjacent to each key in the display.

Setting parameters

Different types of parameter are set in different ways.

- Toggle switch: The setting of these parameters changes each time the function key is pressed, e.g. from ON to OFF or from USB to LSB.
- Parameter selection from 2 or 3 possible values: Pressing the function key scrolls through the available settings, e.g. AVRG TIME OFF/SHORT/LONG.

  Parameter selection from up to 8 different values (e.g. Bandwidth, 7 values): When the function key is pressed, a sub-menu opens. The parameter value is selected by pressing the appropriate function key. Once a parameter has been selected, the display reverts to the main menu after a pause of about 2 seconds.

1 Numbered from top to bottom

- Opening a sub-menu using the preselect key and a function key: The fixed frequencies can only be set if the preselect key is first pressed, followed by function key [F R1]. This opens a sub-menu in which [F L1] is labelled FRQ MEMORY.
- Semi-analog setting: Numerical parameters can be set using the rotary control, number keys or arrow keys. This applies to all frequency settings, level thresholds and time values. The fixed frequencies can also be read direct from the memory.

The results

In general, the signal level at a particular frequency or frequency bandwidth is measured. In the default setting, the measured value is displayed digitally with a resolution of 0.1 dB. If the averaging function has been activated in the SCALE menu, the resolution is improved to 0.01 dB.

The absolute or relative level can also be precisely indicated as an analog bar graph with variable scaling.

Automatic measurements, such as HOT TONE SEARCH or AUTO STEP, yield a series of results which are displayed as a graph (results curve).

Inputs and outputs

The inputs and outputs and the impedances are set by pressing the fixed function key [IMPED] and using the variable function keys to select the required values.

Demodulator output

The demodulated test signal can be monitored via loudspeaker or headphones. The output volume can be varied.

Memory card

A slot for a PCMCIA format memory card is provided. The memory card can be used for storing fixed frequencies and measurement results.

IEEE functions

The LEDs labelled REM, CACT, SRQ, LSTN and TALK indicate the status of the IEEE bus during remote-controlled operation. The LOCAL key is used to switch from remote to local operation.

Notes:

5.3 Help function

The help function of the instrument provides short information on every menu of an operating mode or secondary function. This information is normally limited to eight lines of text, and can be called up from the help function main menu in different ways.

1. **CONTENTS**
   List of contents for menu help texts.
2. **INDEX**
   Alphabetical list of all help texts.
3. **CURRENT MENU HELP**
   Help for the current menu being used.

INFO contains a short note on how to use the help function. **README** includes important information on the instrument which was not available at the time of printing the operating manual. The various ways of calling up help are described below.

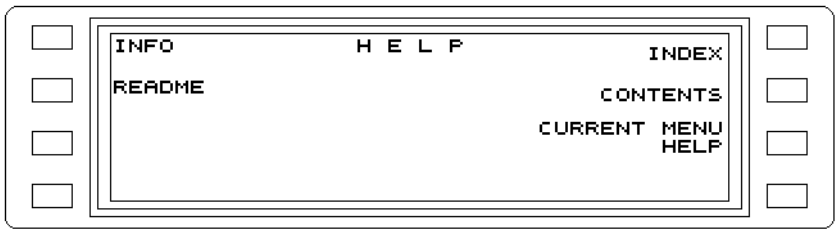


Fig. 5-7 Help function main menu

5.3.1 Calling up help from the INDEX

- Press **[HELP]** to open the help main menu.
- Press **INDEX** [F R1] to call up the alphabetical index list.

  Select the term required (inverse video) using the arrow keys or the rotary control and press **[ENTER]** to call up the help for this term.
- Press **[PREV]** to return to the index list.
- Press **[PREV] twice** to return to the help main menu.
- Press **[RTN]** to return to the current menu.

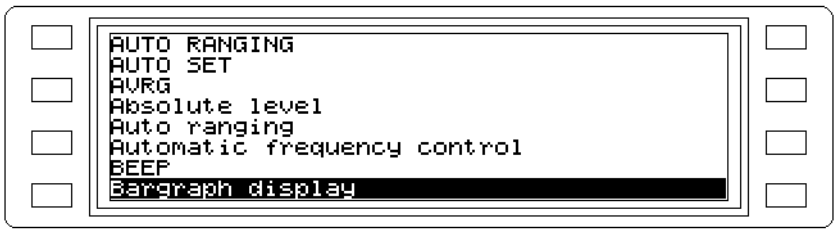


Fig. 5-8 Help index list

5.3.2 Calling up help from the CONTENTS

- Press **[HELP]** to call u the help main menu.
- Press **CONTENTS** [F R2] to call up the contents.

  Select the required section (inverse video) using the arrow keys or the rotary control and press **[ENTER]** to call up the help for this section.
- Press **[PREV]** to return to the contents.
- Press **[PREV] twice** to return to the help main menu.

  Press **[RTN]** to return to the current menu.

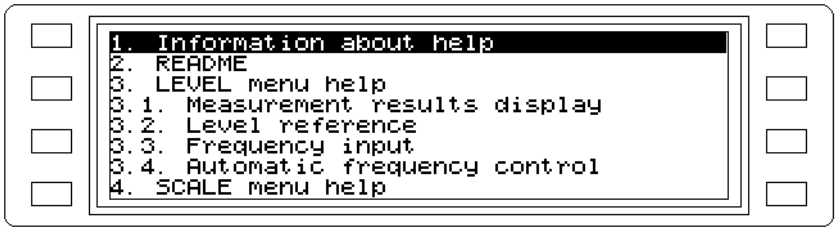


Fig. 5-9 Help contents

5.3.3 Calling up help from the CURRENT MENU HELP

- Press **[HELP]** to call up the help main menu.
- Press **CURRENT MENU HELP** [F R3] to call up the help for the current menu.

  Use the arrow key [↓] to close the introductory text and select help for the parameter required by pressing the appropriate function key.
- Press **[PREV]** to return to the help main menu and re-open current menu help if required.
- Press **[RTN]** to return to the current menu.

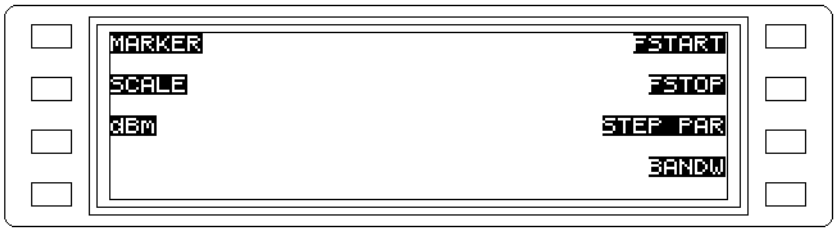


Fig. 5-10 Parameter display for the current menu

Note: Help text is scrolled through paragraph by paragraph using the arrow keys or line by line using the rotary control.

5.4 LEVEL mode

The most important measurement task of the instrument is the measurement of voltages and power levels.
In LEVEL mode, the instrument can be used for a wide range of applications which are encountered during the characterization of an analog communications system. For example, it may be used as:

– A selective level meter (channel or group power, pilots, carrier leaks)
– A wideband level meter (total power level)
– A CF noise level meter (weighted, unweighted)
– A selective RF voltmeter (voltage measurement)
– A selective frequency counter

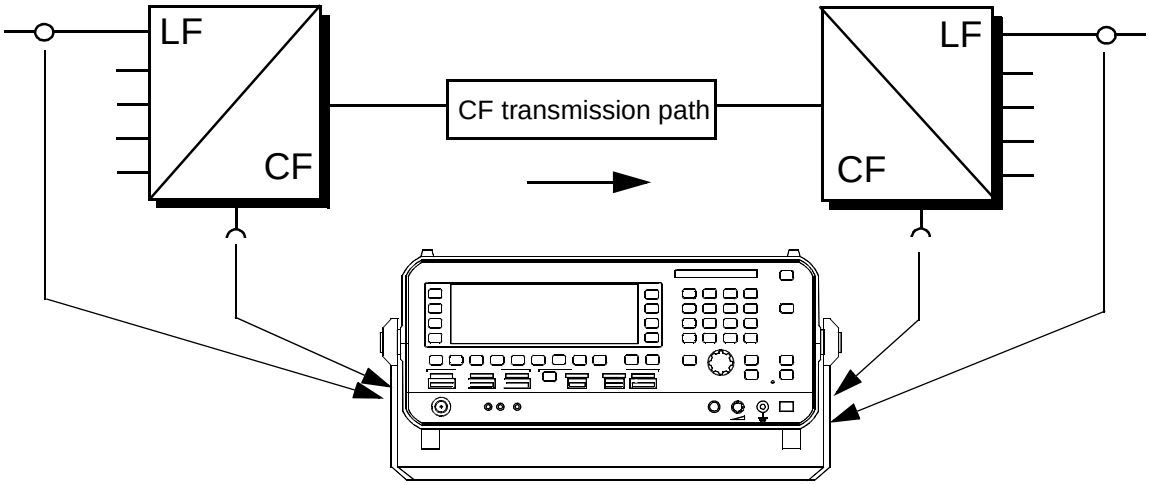


Fig. 5-11 Level and voltage measurements at the various hierarchy levels of a CF system

5.4.1 Calling up the operating mode

- Press **[LEVEL]** to call up the main menu for LEVEL mode.

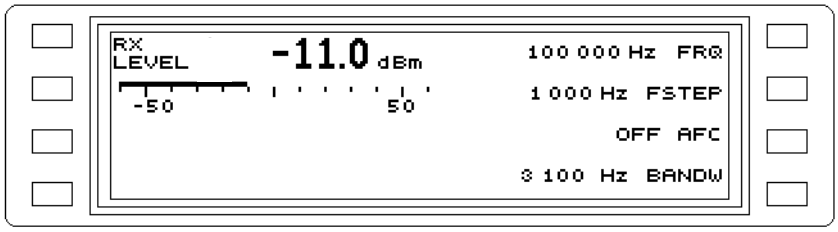


Fig. 5-12 Main menu for LEVEL mode

5.4.2 Selective and wideband level measurement

Select input, impedance and measurement units

[IMPED] --> Setting (see section 5.14.1 on page 5-55)
[UNITS] --> Setting (see section 5.14.3 on page 5-60)

Alter the receive frequency (selective level measurement)

FRQ, FSTEP --> Setting (see section 5.14.8 on page 5-67)
FRQ FMEM (fixed frequencies) --> Setting (see section 5.14.9 on page 5-68)

Absolute voltage/power level, level difference or referred level

LEVEL MODE --> Setting (see section 5.14.2 on page 5-56)

Select bandwidth

Note: Switch to “WIDE” setting for wideband measurements.
BANDW ---> Setting (see section 5.14.16 on page 5-84)

If required: Automatic frequency control

AFC --> Setting (see section 5.14.10 on page 5-78)

If required: Level monitoring

ALARM PARAMETERS --> Setting (see section 5.14.4 on page 5-61)

If required: Disable AUTO RANGING

AUTO RANGING --> Setting (see section 5.14.7 on page 5-66)

5.4.3 Results display

Level measurement display

LEVEL = Display of measured level

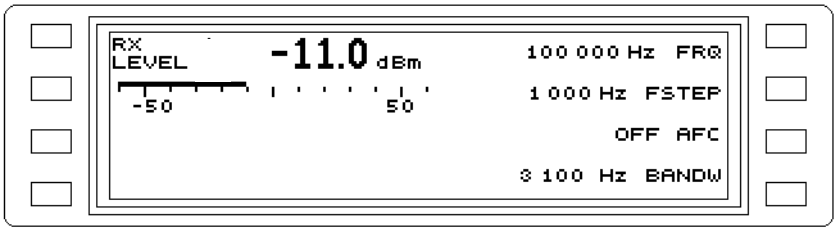


Fig. 5-13 Selective level measurement display

If required: Set scale reference manually

RANGING --> Setting (see section 5.14.19 on page 5-87)

If required: Set scale division

dB/DIV --> (see section 5.14.18 on page 5-87)

If required: Set display averaging

AVRG --> (see section 5.14.21 on page 5-88)

Symbols and characters:

"↑“ in front of the level display: Above range limit (overdriven).

"↓“ in front of the level display: Below range limit (underdriven).

CAL above level units: Instrument is calibrated.

Notes:

5.5 DEMODULATION mode

General information

If the signal or noise in a discrete CF channel is to be measured and evaluated, DEMODULATION mode can be used. The instrument is tuned to the carrier leak and the upper (USB) or lower sideband (LSB) selected. The channel content can be assessed acoustically using a pair of headphones or the built-in loudspeaker.

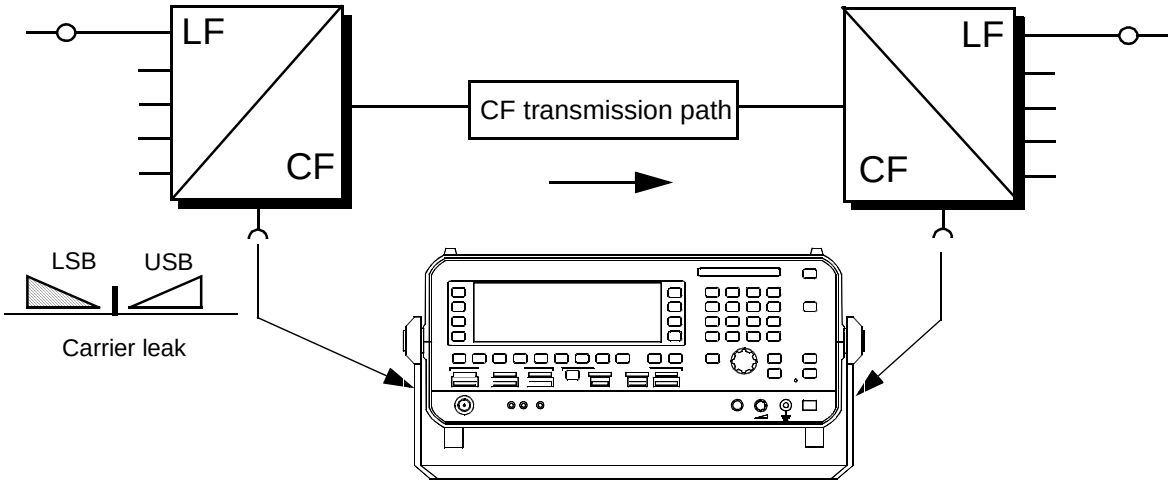


Fig. 5-14 Demodulation of CF signals for qualitative assessment:
Noise power level measurement at the CF level

5.5.1 Calling up the mode

- Press **[DMOD]** to call up the main menu for DEMODULATION mode.

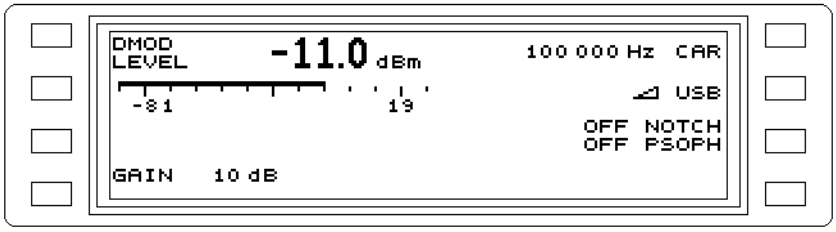


Fig. 5-15 Main menu for DEMODULATION mode

5.5.2 SSB demodulation

Select input, impedance and measurement units

[IMPED] --> Setting (see section 5.14.1 on page 5-55)
[UNITS] --> Setting (see section 5.14.3 on page 5-60)

Altering the receive frequency (selective level measurement)

CAR --> Setting (see section 5.14.8 on page 5-67)
CAR FMEM (fixed frequencies) --> Setting (see section 5.14.9 on page 5-68)

Absolute voltage/power level, level difference or referred level

LEVEL MODE --> Setting (see section 5.14.2 on page 5-56)

Change sideband

USB/LSB --> Setting (see section 5.14.13 on page 5-80)

Correct gain

GAIN --> Setting (see section 5.14.6 on page 5-65)

Automatic gain control

AUTO GAIN --> Setting (see section 5.14.6 on page 5-65)

Activate weighting filter

NOTCH --> Setting (see section 5.14.17 on page 5-85)
PSOPH --> Setting (see section 5.14.17 on page 5-85)

Acoustic evaluation of the demodulated signal

The demodulated signal can be evaluated acoustically using the built-in loudspeaker or a pair of headphones connected via the 6.3 mm jack. The volume is controlled with control [25].

If a headphone is connected to socket [24], the internal loudspeaker is automatically disconnected.

5.5.3 Results display

Demodulation display

DMOD LEVEL = Display of the demodulated signal.

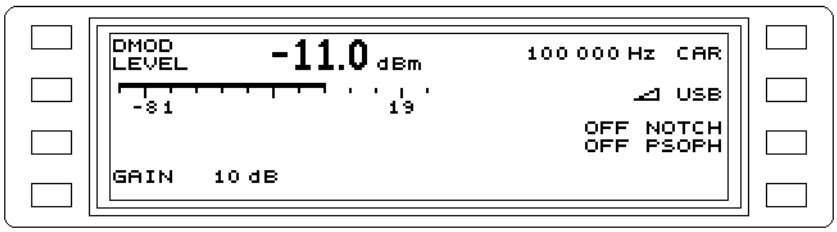


Fig. 5-16 The upper sideband is being received

If required: Set scale division

dB/DIV --> (see section 5.14.18 on page 5-87)

If required: Set display averaging

AVRG --> (see section 5.14.21 on page 5-88)

Symbols and characters:

"↑“ in front of the level display: Above range limit (overdriven).

"↓“ in front of the level display: Below range limit (underdriven).

CAL above level units: Instrument is calibrated.

Notes:

5.6 VOICE mode

General information

One of the most important measurements to be made in voice and data channels is that of wighted noise power. Too much noise worsens the S/N ratio and hence the transmission quality. The weighting filter is activated for measurements conforming to ITU-T O.41.

As well as weighted noise (dBmp, dBrnc), the following can also be measured:

– Unweighted noise or spurious level.
– Quantizing noise (in PCM systems) or psophometrically weighted noise level using a test signal. The test signal (e.g. 1010 Hz) is suppressed by an appropriate notch filter in the instrument.

Note: To increase the sensitivity (ITU-T prescribes -90 dBm), the VOICE band is limited to 10 kHz.

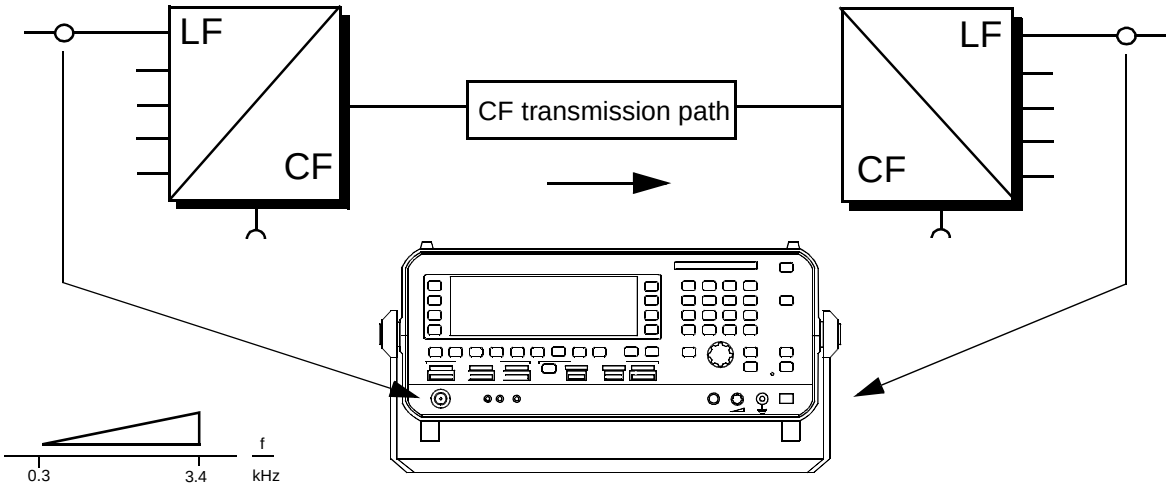


Fig. 5-17 Noise power level measurement at the LF level

5.6.1 Calling up the operating mode

- Press **[VOICE]** to call up the main menu for VOICE mode.

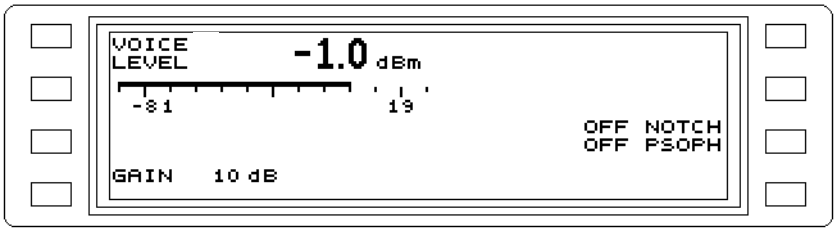


Fig. 5-18 Main menu for VOICE mode

5.6.2 Weighted noise power level measurements

Select input, impedance and measuremet units

[IMPED] --> Setting (see section 5.14.1 on page 5-55)
[UNITS] --> Setting (see section 5.14.3 on page 5-60)

Absolute voltage / power leve, level difference or referred level

LEVEL MODE --> Setting (see section 5.14.2 on page 5-56)

Gain control

GAIN --> Setting (see section 5.14.6 on page 5-65)

Automatic gain control

AUTO GAIN --> Setting (see section 5.14.6 on page 5-65)

Activate weighting filter

NOTCH --> Setting (see section 5.14.17 on page 5-85)
PSOPH --> Setting (see section 5.14.17 on page 5-85)

5.6.3 Result display

Display of noise power level

VOICE LEVEL = Display of noise power level in voice band

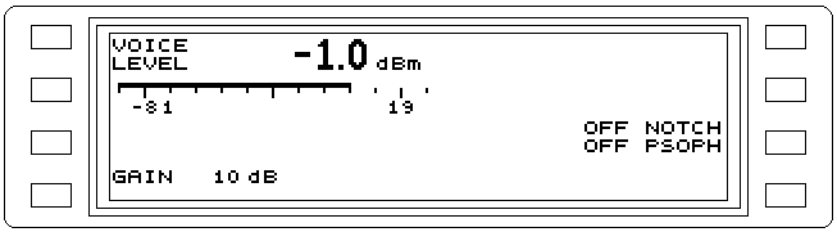


Fig. 5-19 Display of noise power level weighted using a notch filter

If required: Set scale division

dB/DIV --> (see section 5.14.18 on page 5-87)

If required: Set display averaging

AVRG --> (see section 5.14.21 on page 5-88)

Symbols and characters:

"↑" in front of the level display: Above range limit (overdriven).
"↓" in front of the level display: Below range limit (underdriven).
CAL above level units: Instrument is calibrated.

5.7 NPR mode

It is often useful to determine the quality of a multi-channel transmission system during operation. One way of assessing this is to measure the noise power ratio (NPR).

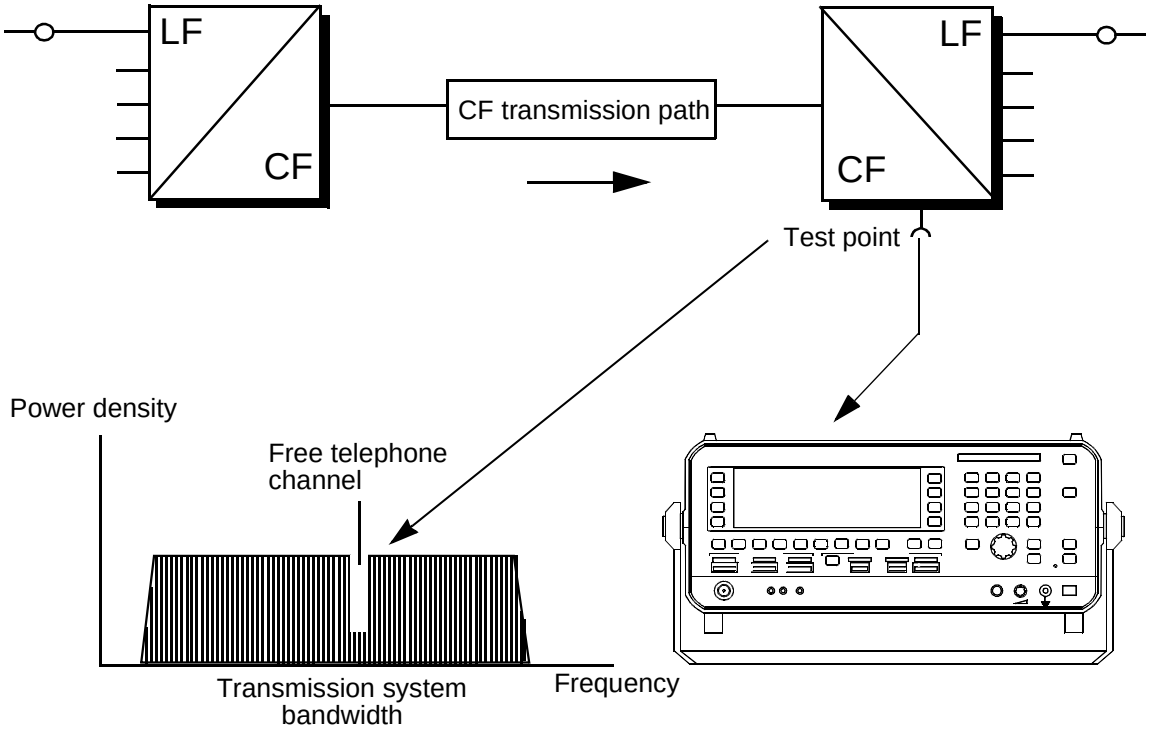


Fig. 5-20 Noise power ratio measurement in a free telephone channel

5.7.1 Calling up the operating mode

- Press **[NPR]** to call up the main menu for NOISE POWER RATIO mode.

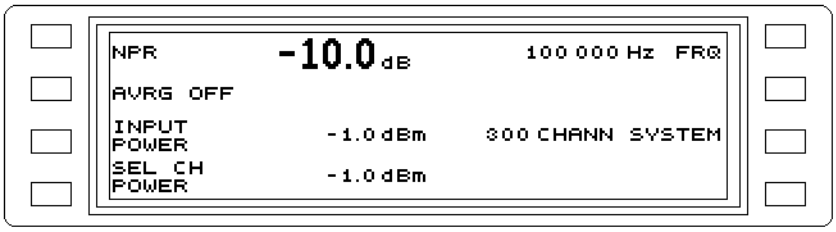


Fig. 5-21 Main menu for NPR mode

5.7.2 Noise power ratio measurement

Select input, impedance and measurement units

[IMPED] --> Setting (see section 5.14.1 on page 5-55)

Alter the receive frequency

FRQ, FSTEP --> Setting (see section 5.14.8 on page 5-67)
FRQ FMEM (fixed frequencies) --> Setting (see section 5.14.9 on page 5-68)

Select channel system

SYSTEM --> Setting (see section 5.14.15 on page 5-82)

5.7.3 Results display

Display for noise power ratio measurement

NPR = Noise power ratio
INPUT POWER = Total input power level
SEL CH POWER = Selective channel noise power level

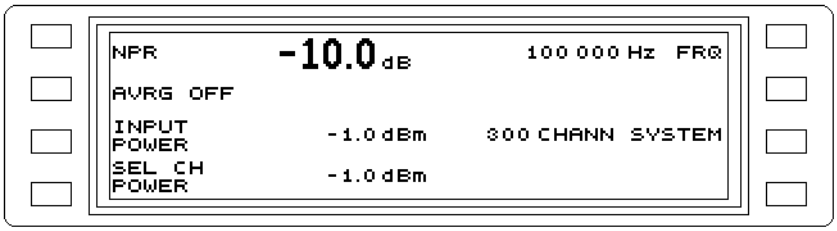


Fig. 5-22 Noise power ratio in a 300 channel system

If required: Set display averaging

AVRG --> (see section 5.14.21 on page 5-88)

Symbols and characters:

"↑" in front of the level display: Above range limit (overdriven).
"↓" in front of the level display: Below range limit (underdriven).
CAL above level units: Instrument is calibrated.

5.8 HOT TONE SEARCH mode

Excessive discrete signals which degrade the S/N ratio of the transmission path can be detected using HOT TONE SEARCH mode. A threshold level which is entered before starting the search serves as criterion for detecting these hot tones. The frequency range to be searched is also entered before starting the search. The [START(STOP)] key controls the measurement. The hot tones are displayed graphically. A marker can be used to additionally display the frequency and level values numerically.

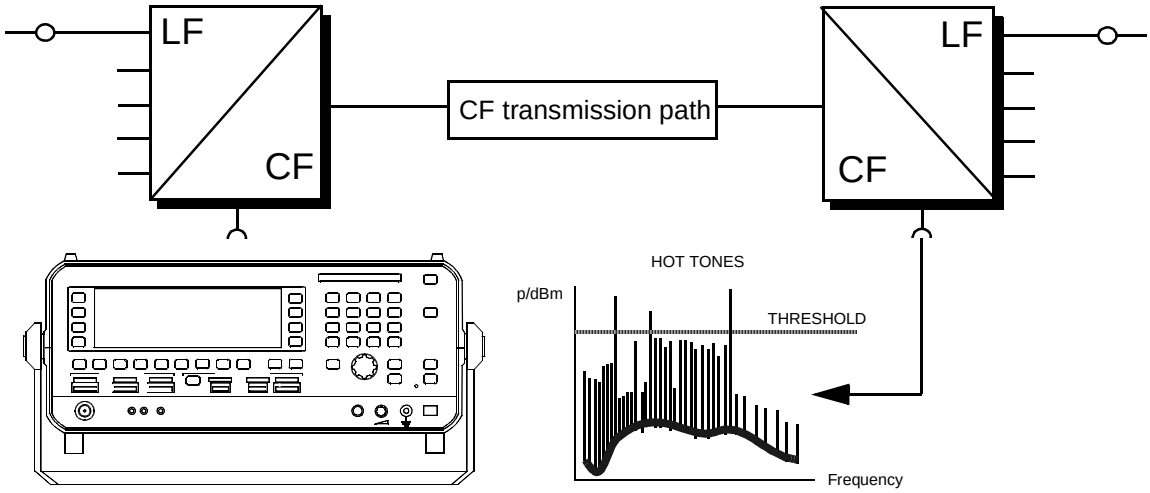


Fig. 5-23 Hot tones in a CF system

5.8.1 Calling up the operating mode

- Press **[HOT]** to call up the main menu for HOT TONE SEARCH mode.

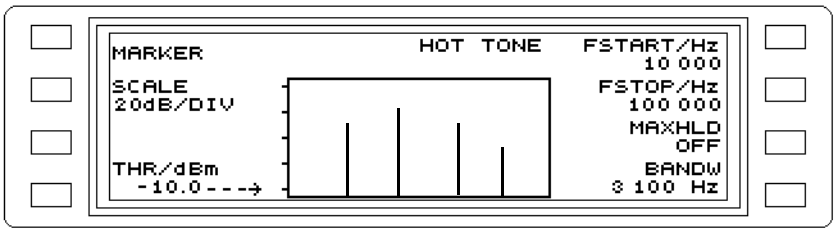


Fig. 5-24 Main menu for HOT TONE SEARCH mode

5.8.2 Hot tone search

Select input, impedance and measurement units

[IMPED] --> Setting (see section 5.14.1 on page 5-55)

[UNITS] --> Setting (see section 5.14.3 on page 5-60)

Set search range

FSTART, FSTOP --> Setting (see section 5.14.11 on page 5-79)

Set search threshold

THR/dBm --> Setting (see section 5.14.5 on page 5-63)

Select bandwidth

BANDW --> Setting (see section 5.14.16 on page 5-84)

5.8.3 Measurement sequence

Start search

- Press **[START(STOP)]** to start the search. The LED next to the key goes out.

  The search is indicated by the status display SEARCHING shown below HOT TONE. Parameters cannot be altered during the search.

  The search for hot tones is repeated continuously if the [START(STOP)] key is not pressed again. When FSTOP is reached, the search resumes from FSTART automatically.

Stop search prematurely

- Press **[START(STOP)]** to interrupt the continuous search. The LED next to the key comes on.

5.8.4 Results display and evaluation

Results display

HOT TONE = Graphic display of hot tones located within the search frequency range.

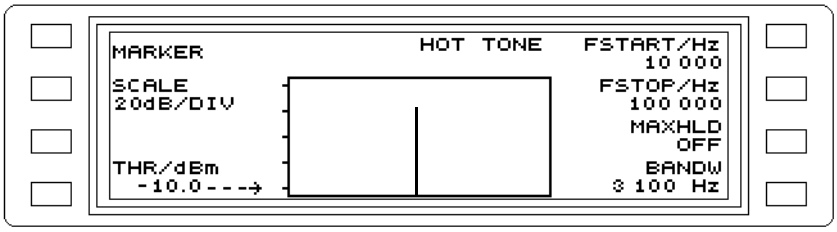


Fig. 5-25 A hot tone displayed in the graphics field

If required: Display hot tone level and frequency values

Note: The marker function can be activated during the search

MARKER --> Setting (see section 5.14.23 on page 5-89)

If required: Display maximum r.m.s. value of a signal

MAXHLD --> Setting (see section 5.14.22 on page 5-89)

If required: Evaluate marker frequency and level in LEVEL mode

MRK FRQ - -> LEVEL MEAS --> Setting (see section 5.14.23 on page 5-89).

Notes:

5.9 JITTER mode

Among the many causes of phase jitter, hum voltages are of particular significance. For this reason, only the jitter components between 4 and 300 Hz are detected. The instrument can evaluate the jitter components from 20 to 300 Hz or from 4 to 20 Hz. When measuring jitter in the voice band (ITU-T O.91), the frequency of the test signal must be taken into account.

5.9.1 Calling up the operating mode

- Press **[Blue key]** to invoke the secondary functions.
- Press **[LEVEL]** to call up the main menu for JITTER mode.

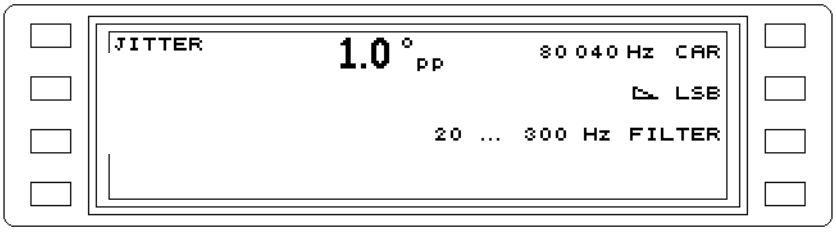


Fig. 5-26 Main menu forJITTER mode

5.9.2 Measuring the phase jitter of a signal

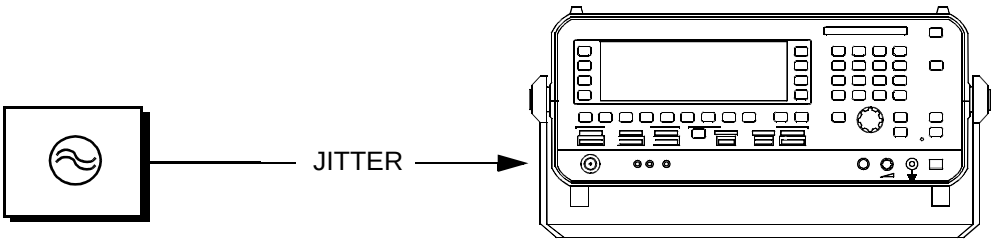


Fig. 5-27 Measuring the phase jitter of a signal

Select input, impedance and measurement units

[IMPED] --> Setting (see section 5.14.1 on page 5-55)

[UNITS] --> Setting (see section 5.14.3 on page 5-60)

Select measurement mode

- Press **JITTER ...** to open the measurement mode menu.
- Press **JITTER** [F L1] to select JITTER mode. The main menu is automatically displayed again.

Set the receive frequency

FRQ --> Setting (see section 5.14.8 on page 5-67)

FRQ FMEM (fixed frequencies) --> Setting (see section 5.14.9 on page 5-68)

Select the filter

FILTER --> Setting (see section 5.14.17 on page 5-85)

5.9.3 Phase jitter measurement to ITU-T O.91

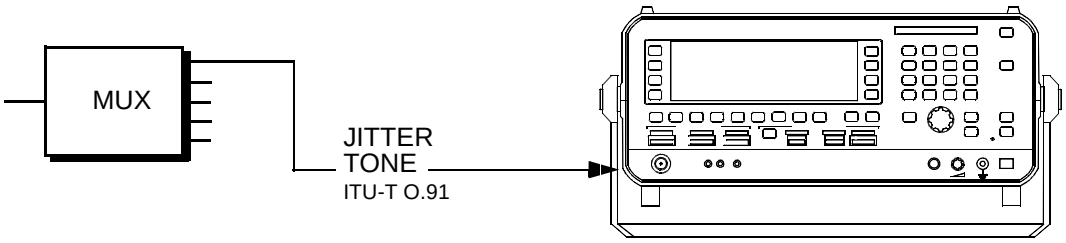


Fig. 5-28 Phase jitter measurement to ITU-T O.91

Select input and impedance

[IMPED] --> Setting (see section 5.14.1 on page 5-55)

[UNITS] --> Setting (see section 5.14.3 on page 5-60)

Select measurement mode

- Press **JITTER ...** to open the measurement mode menu.
- Press **TONE JITTER** [F L3] to select TONE JITTER mode. The main menu is displayed again automatically.

Select the test tone

TONE --> Setting (see section 5.14.14 on page 5-81)

Select the filter

FILTER --> Setting (see section 5.14.17 on page 5-85)

Set the TX level

TX --> Setting (see section 5.18.4 on page 5-120)

5.9.4 Phase jitter measurement in the demodulated voice band

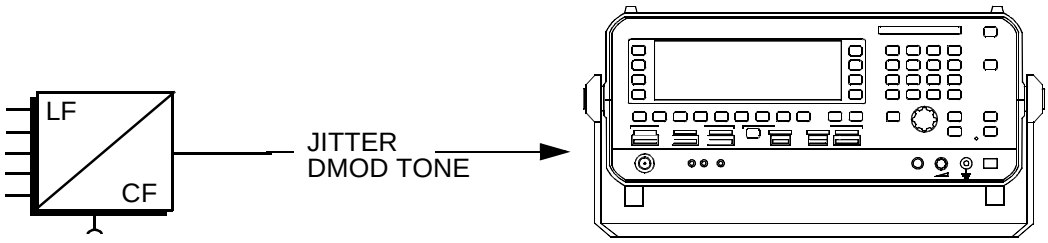


Fig. 5-29 Phasenjittermessung im demodulierten Sprachkanal

Select input and impedance

[IMPED] --> Setting (see section 5.14.1 on page 5-55)

Select measurement mode

- Press **JITTER ...** to open the measurement mode menu.
- Press **DMOD TONE JITTER** [F L2] to select DMOD TONE JITTER mode. The main menu is displayed again automatically.

Select the test tone

TONE --> Setting (see section 5.14.14 on page 5-81)

Set the carrier frequency

CAR --> Setting (see section 5.14.8 on page 5-67)

FMEM (fixed frequencies) --> Setting (see section 5.14.9 on page 5-68)

Select sideband

LSB/USB --> Setting (see section 5.14.13 on page 5-80)

Select the filter

FILTER --> Setting (see section 5.14.17 on page 5-85)

Set the TX level

TX --> Setting (see section 5.18.4 on page 5-120)

5.9.5 Results display

Jitter measurement display

JITTER = Phase jitter in degrees

JITTER DMOD TONE = Phase jitter in degrees, measured in the demodulated voice band

JITTER TONE = Phase jitter in degrees, measured to ITU-T O.91

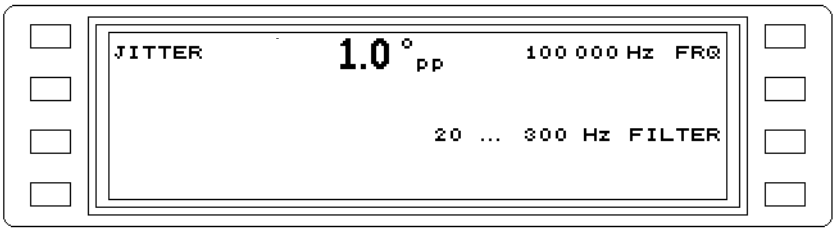


Fig. 5-30 Jitter measurement display

Symbols and characters

NO SYNC instead of the phase jitter: Instrument cannot synchronize (level too low, wrong tuning frequency, etc.).

Notes:

5.10 IMPULSIVE NOISE mode

General information

Impulsive noise is a common cause of problems in data communications. This is often due to crosstalk from the voltage peaks caused by switching in high-tension networks or noise from electromagnetic switching equipment. Impulsive noise causes bit errors if the pulse amplitude reaches that of the signal and the pulse width is about the same as the telephone channel response time (Ý0.3 ms). The instrument counts the pulses exceeding a given amplitude threshold which occur within a defined time period (max. 99h 59 min). The measurement can be started manually or by timer. Two types of impulsive noise measurement are provided:

IMPULSIVE NOISE VOICEBAND: Impulsive noise in the voice band, to ITU-T O.71.
IMPULSIVE NOISE DMOD: Impulsive noise in the demodulated voice band (CF side).

5.10.1 Calling up the operating mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[DMOD]** to call up the main menu for IMPULSIVE NOISE mode.

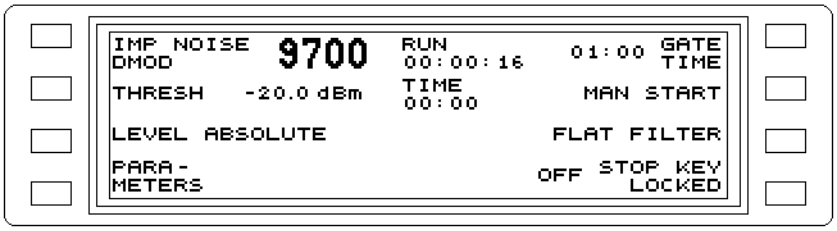


Fig. 5-31 Main menu for IMPULSIVE NOISE mode

5.10.2 Impulsive noise measurement in the voice band to ITU-T O.71

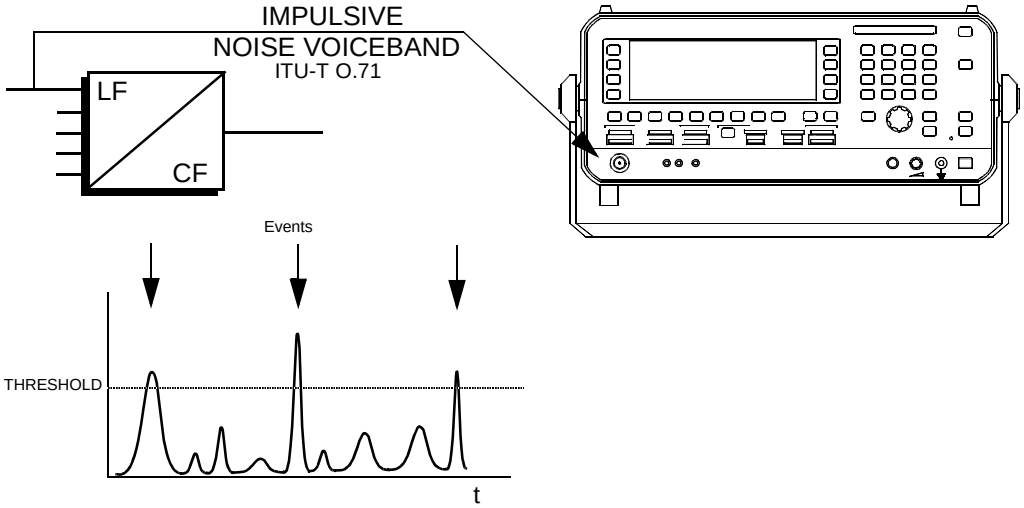


Fig. 5-32 Impulsive noise measurement in the voice band to ITU-T O.71

Select input, impedance and measurement units

[IMPED] --> Setting (see section 5.14.1 on page 5-55)

[UNITS] --> Setting (see section 5.14.3 on page 5-60)

Select measurement mode

- Press **IMP NOISE ...** to call up the measurement mode menu.
- Press **IMPULSIVE NOISE VOICEBAND** [F L1] to call up IMULSIVE NOISE VOICEBAND mode. The display returns to the main menu automatically.

Set level threshold

THRESH --> Setting (see section 5.14.5 on page 5-63)

Absolute voltage / power level, level difference or referred level

LEVEL MODE --> Setting (see section 5.14.2 on page 5-56)

Select weighting filter

NOTCH --> Setting (see section 5.14.17 on page 5-85)

FILTER --> Setting (see section 5.14.17 on page 5-85)

Set gate time

GATE TIME --> Setting (see section 5.14.26 on page 5-92)

Set measurement mode

START --> Setting (see section 5.14.25 on page 5-91)

Set start of measurement

START TIME --> Setting (see section 5.14.25 on page 5-91)

If required: Beeper

BEEP --> Setting (see section 5.14.28 on page 5-93)

5.10.3 Impulsive noise measurement in the demodulated voice band

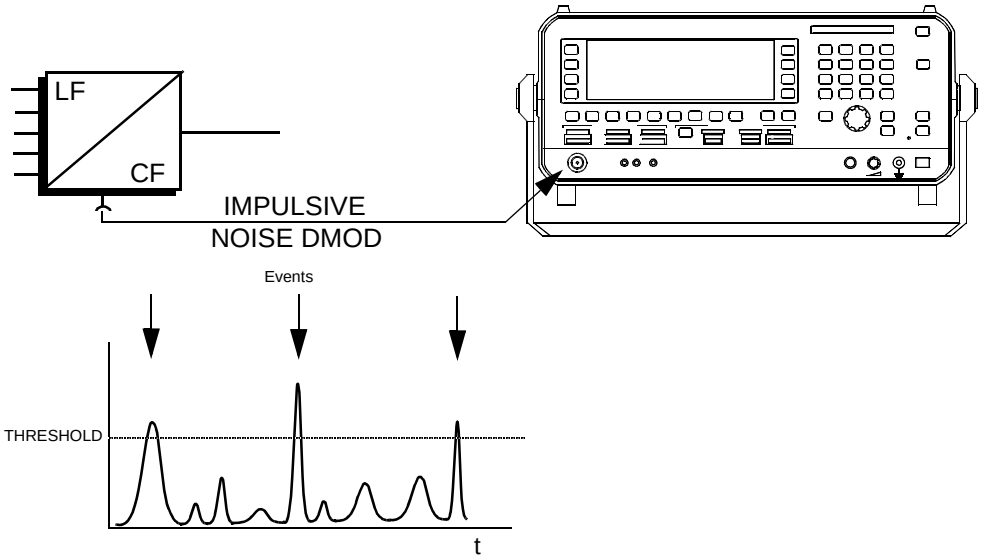


Fig. 5-33 Impulsive noise measurement in the demodulated voice band

Select input, impedance and measurement units

[IMPED] --> Setting (see section 5.14.1 on page 5-55)

[UNITS] --> Setting (see section 5.14.3 on page 5-60)

Select measurement mode

- Press **IMP NOISE ...** to call up the measurement mode menu.
- Press **IMPULSIVE NOISE DMOD** [F L2] to call up IMPULSIVE NOISE DEMODULATION mode. The display returns to the main menu automatically.

Set level threshold

THRESH --> Setting (see section 5.14.5 on page 5-63)

Absolute voltage / power level, level difference or referred level

LEVEL MODE --> Setting (see section 5.14.2 on page 5-56)

Select weighting filter

NOTCH --> Setting (see section 5.14.17 on page 5-85)

FILTER --> Setting (see section 5.14.17 on page 5-85)

Alter carrier frequency

CAR --> Setting (see section 5.14.8 on page 5-67)

CAR FMEM (fixed frequencies) --> Setting (see section 5.14.9 on page 5-68)

Select sideband

LSB/USB --> Setting (see section 5.14.13 on page 5-80)

Set gate time

GATE TIME --> Setting (see section 5.14.26 on page 5-92)

Set measurement mode

START --> Setting (see section 5.14.25 on page 5-91)

Set start of measurement

START TIME --> Setting (see section 5.14.25 on page 5-91)

If required: Beeper

BEEP --> Setting (see section 5.14.28 on page 5-93)

5.10.4 Measurement sequence

Start measurement

Automatic

As soon as the programmed start time is reached, the instrument counts pulses with amplitudes above the preselected level threshold.

Manual

- Press **[START(STOP)]**. The instrument counts pulses with amplitudes above the preselected level threshold.

In both cases, the measurement ends automatically at the end of the preset gate time.

Stop measurement prematurely

Automatic and **manual**:

- Press **[START(STOP)]**.

Disable [START(STOP)] key

- Press **STOP KEY LOCKED** [F R4] to disable (lock) the [START(STOP)] key. This prevents the measurement being stopped prematurely by mistake.

5.10.5 Results display

Impulsive noise measurement dsplay

IMP NOISE DMOD = Display of up to 9999 events

IMP NOISE VOICEBAND = Display of up to 9999 events

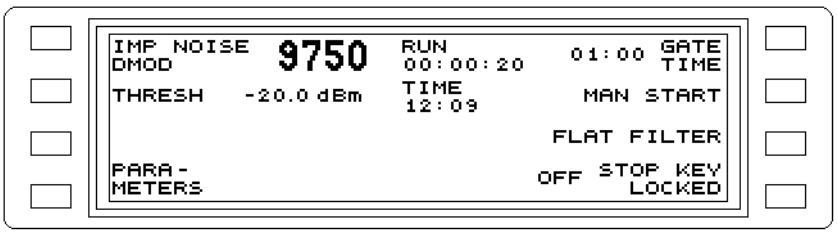


Fig. 5-34 Typical impulsive noise measurement display

Status displays

RUN: Shows the elapsed measurement time.

TIME: Shows the current time of day.

5.11 INTERRUPTIONS mode

General information

Spontaneous drops of 10 dB or more in the level of a data signal generally lead to bit errors if the drop in level persists for longer than the channel response time (~ 0.3 ms). ITU-T specifies that not more that 2 such interruptions should occur within a period of1 hour. The instrument counts the interruptions below a given threshold level occurring within a defined time period (max. 99 h 59 min). No events are registered within a dead time which can be selected. The start of the measurement is timer controlled or manually triggered. Two types of interruption measurement are provided:

INTERRUPTIONS VOICEBAND: Interruptions in the voice band to ITU-T O.61.
INTERRUPTIONS DMOD: Interruptions in the demodulated voice band (CF side)

5.11.1 Calling up the operating mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[VOICE]** to call up the main menu for INTERRUPTIONS mode.

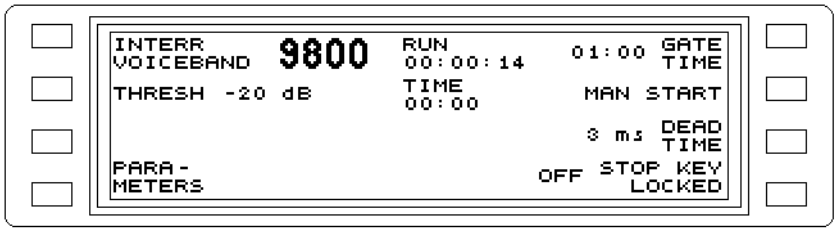


Fig. 5-35 Main menu for INTERRUPTIONS mode

5.11.2 Interruption measurement in the voice band to ITU-T O.61

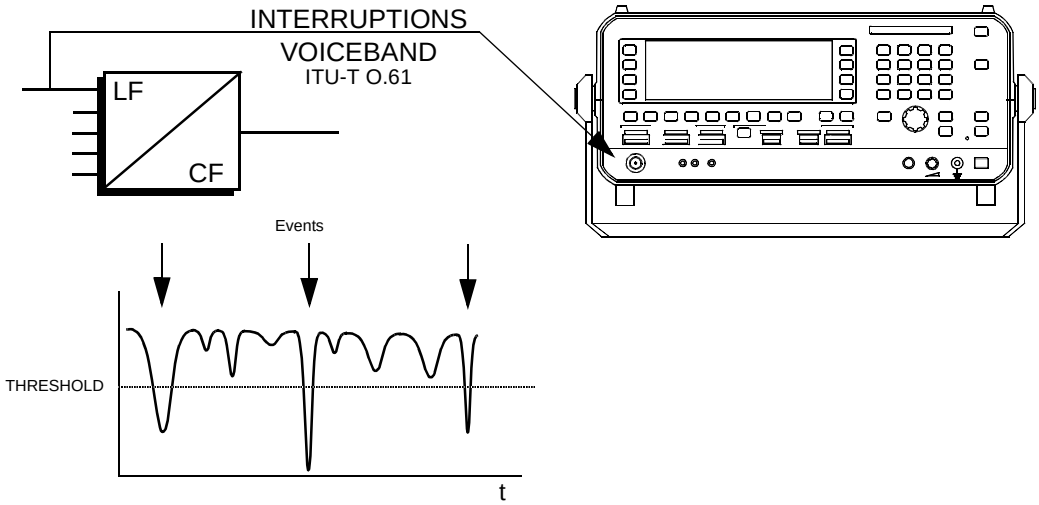


Fig. 5-36 Interruption measurement in the voice band to ITU-T O.61

Select input and impedance

[IMPED] --> Setting (see section 5.14.1 on page 5-55)

Select measurement mode

- Press **INTERR ...** [F L1] to call up the measurement mode menu.
- Press **INTERRUPTIONS VOICEBAND** [F L1] to call up INTERRUPTIONS VOICEBAND mode. The display returns to the main menu automatically.

Set level threshold

THRESH --> Setting (see section 5.14.5 on page 5-63)

Absolute voltage / power level, level difference or referred level

LEVEL MODE --> Setting (see section 5.14.2 on page 5-56)

Set gate time

GATE TIME --> Setting (see section 5.14.26 on page 5-92)

Set dead time

DEAD TIME --> Setting (see section 5.14.27 on page 5-92)

Set measurement mode

START --> Setting (see section 5.14.25 on page 5-91)

Set start of measurement

START TIME --> Setting (see section 5.14.25 on page 5-91)

If required: Beeper

BEEP --> Setting (see section 5.14.28 on page 5-93)

5.11.3 Interruption measurement in the demodulated voice band

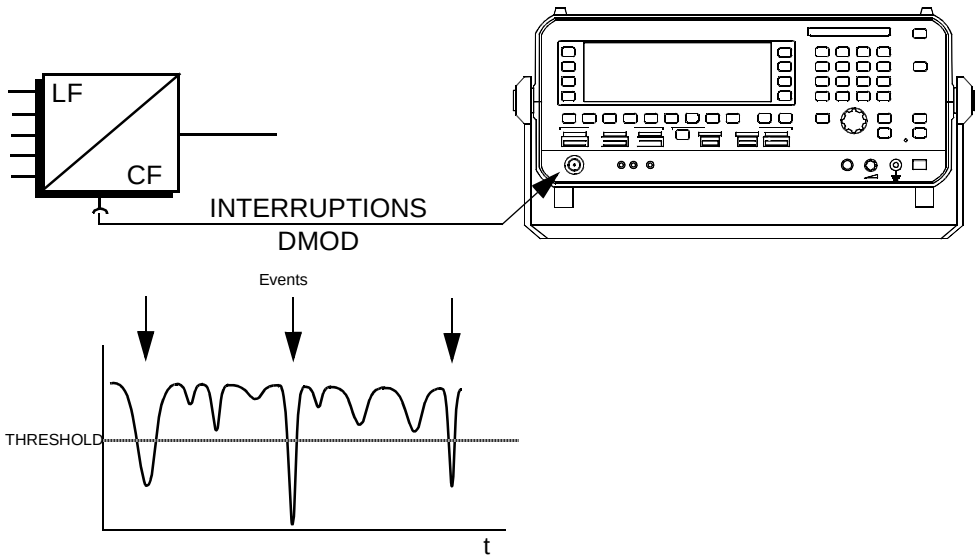


Fig. 5-37 Interruption measurement in the demodulated voice band

Select input, impedance and measurement units

[IMPED] --> Setting (see section 5.14.1 on page 5-55)

[UNITS] --> Setting (see section 5.14.3 on page 5-60)

Select measurement mode

- Press **INTERR ...** to call up the measurement mode menu.
- Press **INTERRUPTIONS DMOD** [F L2] to call up INTERRUPTIONS DEMODULATION mode. The display returns to the main menu automatically.

Set level threshold

THRESH --> Setting (see section 5.14.5 on page 5-63)

Absolute voltage / power level, level difference or referred level

LEVEL MODE --> Setting (see section 5.14.2 on page 5-56)

Select weighting filter

NOTCH --> Setting (see section 5.14.17 on page 5-85)

FILTER --> Setting (see section 5.14.17 on page 5-85)

Alter carrier frequency

CAR --> Setting (see section 5.14.8 on page 5-67)

CAR FMEM (fixed frequencies) --> Setting (see section 5.14.9 on page 5-68)

Select sideband

LSB/USB --> Setting (see section 5.14.13 on page 5-80)

Set gate time

GATE TIME --> Setting (see section 5.14.26 on page 5-92)

Set dead time

DEAD TIME --> Setting (see section 5.14.27 on page 5-92)

Set measurement mode

START --> Setting (see section 5.14.25 on page 5-91)

Set start of measurement

START TIME --> Setting (see section 5.14.25 on page 5-91)

If required: Beeper

BEEP --> Setting (see section 5.14.28 on page 5-93)

5.11.4 Measurement sequence

Start measurement

Automatic

As soon as the programmed start time is reached, the instrument counts pulses with amplitudes above the preselected level threshold.

Manual

- Press **[START(STOP)]**. The instrument counts events where the level drops below the preselected level threshold.

In both cases, the measurement ends automatically at the end of the preset gate time.

Stop measurement prematurely

Automatic and **manual**:

- Press **[START(STOP)]**.

Disable [START(STOP)] key

- Press **STOP KEY LOCKED** [F R4] to disable (lock) the [START(STOP)] key. This prevents the measurement being stopped prematurely by mistake.

5.11.5 Results display

Interruption measurement display

INTERR DMOD = Display of up to 9999 events

INTERR VOICEBAND = Display of up to 9999 events

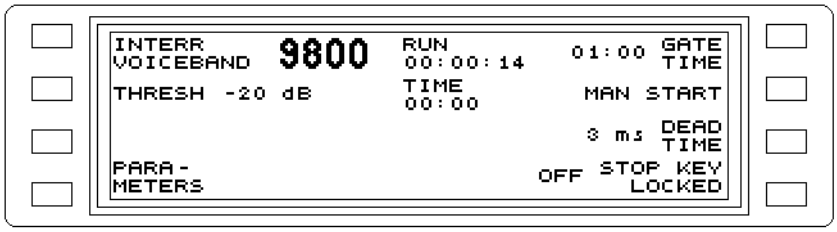


Fig. 5-38 Typical interruption measurement display

Status displays

RUN: Shows the elapsed measurement time.

TIME: Shows the current time of day.

5.12 AUTOSTEP mode

General information

The instrument performs selective level measurements with automatic frequency stepping in AUTOSTEP mode.
This operating mode can be used for:

- Selective, automatic end-to-end measurements without the need for an auxiliary connection for frequency synchronization
- Two-port measurements at precisely defined frequencies (e.g. resonant nodes)
- System monitoring with up to 100 signals (pilots, carriers, channels).

5.12.1 Calling up the operating mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up the main menu for AUTOSTEP mode.

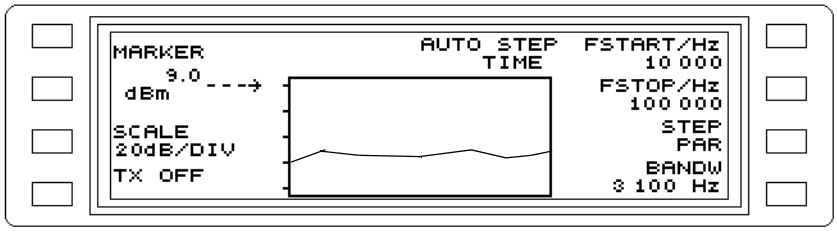


Fig. 5-39 Main menu for AUTO STEP mode

5.12.2 End to end measurement

General information

The frequency response of a transmission path can be displayed graphically using the AUTOSTEP menu, each measurement trace consisting of up to 100 points (corresponding to the number of STEPS).

This measurement can only be performed if a generator having a similar form of frequency conditioning is available which can be programmed to change frequencies automatically. These frequency changes can either be equally-spaced frequency steps or a set number of programmed fixed frequencies.
The PSM-139 or PS-19 from Wandel & Goltermann are suitable instruments.

The generator and receiver should be programmed with identical frequency parameters (FSTART, FSTOP, FSTEP or fixed frequency values).

5.12.2.1 PSM-139 as generator, SPM-139 as receiver

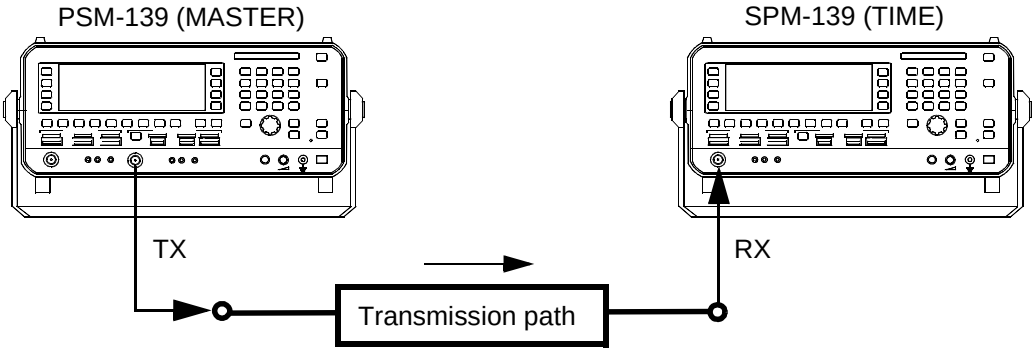


Fig. 5-40 Timer-controlled end to end measurement

Generator settings

Select output, impedances and units:

[IMPED] --> see section 5.14.1 on page 5-55 for details.
[UNITS] --> see section 5.14.3 on page 5-60 for details.

Absolute voltage / power level, level difference or referred level:

LEVEL MODE --> see section 5.14.2 on page 5-56 for details.

Set frequency range:

FSTART/FSTOP --> see section 5.14.11 on page 5-79 for details,
or
FMEM START/FMEM STOP --> see section 5.14.9.4 on page 5-72 for details.

Set step rate:

TIME/STEP --> see section 5.14.24 on page 5-90 for details.

Set step width:

STEP WIDTH --> see section 5.14.24 on page 5-90 for details.

Set number of steps:

STEPS --> see section 5.14.24 on page 5-90 for details.

Set AUTOSTEP mode and measurement mode:

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up the main menu for AUTOSTEP mode.
- Press **STEP PAR** [SK R3] to open the Step Parameter menu.
- Press **MODE** [SK L4] to set the instrument as MASTER.
- Press **SWEEP** [SK L3] to set the measurement mode.
  SING = Single measurement.
  CONT = Continuous measurement.

Set generator level:

TX --> see section 5.18.4 on page ??? for details.

Receiver settings

Select output, impedances and units:

[IMPED] --> see section 5.14.1 on page 5-55 for details.
[UNITS] --> see section 5.14.3 on page 5-60 for details.

Absolute voltage / power level, level difference or referred level:

LEVEL MODE --> see section 5.14.2 on page 5-56 for details.

Set frequency range:

FSTART/FSTOP --> see section 5.14.11 on page 5-79 for details,
or
FMEM START/FMEM STOP --> see section 5.14.9.4 on page 5-72 for details.

Set step rate:

TIME/STEP --> see section 5.14.24 on page 5-90 for details.

Set step width:

STEP WIDTH --> see section 5.14.24 on page 5-90 for details.

Set number of steps:

STEPS --> see section 5.14.24 on page 5-90 for details.

Set start level threshold:

STARTTHRESH --> see section 5.14.5 on page 5-63 for details.

Set scale reference

- **- - - > dBm** --> see section 5.14.30 on page 5-94 for details.

Set AUTOSTEP mode:

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up the main menu for AUTOSTEP mode.
- Press **STEP PAR** [SK R3] to open the Step Parameter menu.
- Press **MODE** [SK L4] to set the instrument to TIME (timer controlled SLAVE instrument).
  This setting monitors the signal level at the start frequency.
  As soon as the level exceeds the start threshold, the measurement is made at the start frequency.
  When the level subsequently drops below the start threshold, i.e. when the generator switches to the next frequency, the receiver also initiates frequency switching which proceeds with the step rate controlled by the timer until the stop frequency is reached.
  The receiver then starts monitoring the level at the start frequency again.
  This operating mode assumes that the step rates for the generator and receiver are exactly the same.

Select bandwidth:

BANDW --> see section 5.14.16 on page 5-84 for details.

Note: For a standard frequency accuracy of ±2 x 10^{-6} for both instruments, the maximum frequency offset for each instrument will be 2 Hz per MHz frequency step.
For a tuning / generator frequency change of, say, 3 MHz, this would mean a frequency offset of Δf = 2 x (3 x 2 Hz) = 12 Hz in the worst case.
If the receiver is set to a bandwidth of 25 Hz, this will result in a level error of about 3 dB.
To prevent this, the chosen measurement bandwidth must be sufficiently large or instruments with much more precise standard frequencies must be used (see PSM-x3y option 2203/00.06).
If the two instruments are located very close together, it is a good idea to use the same standard frequency for both instruments (standard frequency inputs and outputs are on the instrument back panel).

Caution: The settings for
FSTART/FSTOP or **FMEM START/FMEM STOP**
TIME/STEP
STEP WIDTH
STEPS
must be identical for the generator and receiver.

5.12.2.2 Other generator, SPM-139 as receiver

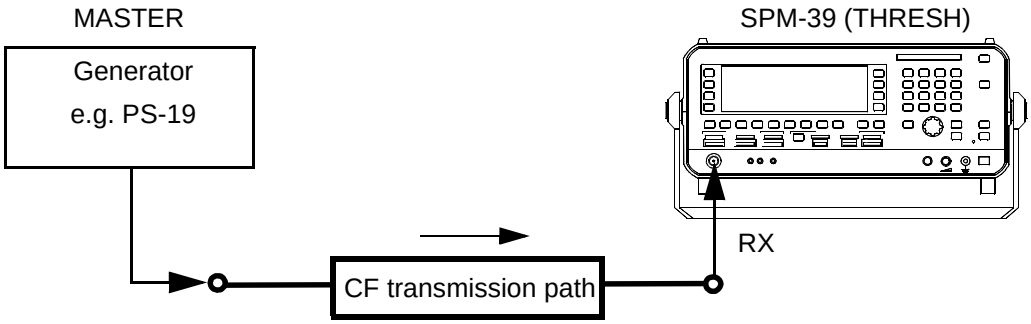


Fig. 5-41 Threshold-controlled end to end measurement

Receiver settings

Select output, impedances and units:

[IMPED] --> see section 5.14.1 on page 5-55 for details.

[UNITS] --> see section 5.14.3 on page 5-60 for details.

Absolute voltage / power level, level difference or referred level:

LEVEL MODE --> see section 5.14.2 on page 5-56 for details.

Set frequency range:

FSTART/FSTOP --> see section 5.14.11 on page 5-79 for details,
or
FMEM START/FMEM STOP --> see section 5.14.9.4 on page 5-72 for details.

Set step rate:

TIME/STEP --> see section 5.14.24 on page 5-90 for details.

Set step width:

STEP WIDTH --> see section 5.14.24 on page 5-90 for details.

Set number of steps:

STEPS --> see section 5.14.24 on page 5-90 for details.

Set level threshold for frequency stepping:

STEPTHRESH --> see section 5.14.5 on page 5-63 for details.

Set scale reference:

- **- - - > dBm** --> see section 5.14.30 on page 5-94 for details.

Set AUTOSTEP mode:

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up the main menu for AUTOSTEP mode.
- Press **STEP PAR** [SK R3] to open the Step Parameter menu.
- Press **MODE** [SK L4] to set the instrument to THRESH (threshold controlled SLAVE instrument).
  This setting monitors the signal level at the each frequency point.
  When the level exceeds the threshold, a measurement will be made after about 2/3 of the time corresponding to the step rate setting has elapsed.
  When the level drops below the threshold after the entire time corresponding to the step rate has elapsed, i.e. because the generator has switched to the next frequency, the receiver will switch to the next frequency step.
  This method allows use of a generator that does not have step timing that is sufficiently accurate for the timer controlled measurement mode (TIME). The step time for the generator must be selected to be greater than or equal to that of the receiver.
  The attenuation range for the path under test must be such that the crossing of the level threshold can be correctly detected at each measured frequency for the measurement to be successful.

Select bandwidth:

BANDW --> see section 5.14.16 on page 5-84 for details.

5.12.3 Measurement sequence

Start measurement:

SLAVE instrument

- Press **[START(STOP)]** to set the instrument to wait for the trigger condition.

  The instrument waits at the start frequency or start address until it measures a level that is above the level threshold setting.

  The instrument steps to the next frequency as soon as the current level drops below the level threshold setting again.

  The frequency or fixed frequency address will be switched at the selected step rate and using the current step width setting.

  When the stop frequency or stop address is reached, the instrument switches back to the start frequency again automatically.

MASTER instrument

- Press **[START(STOP)]** to start the measurement sequence.

  The frequency is switched at the selected step rate using the current step width.

Stopping the measurement prematurely:

- Press **[START(STOP)]** to stop the measurement prematurely.

5.12.4 Two port measurements and system monitoring

Instrument versions PSM-37 to 139 can determine the frequency response, e.g. of a two port network. A special AUTOSTEP mode is provided for this. Frequency stepping takes place at the maximum rate.

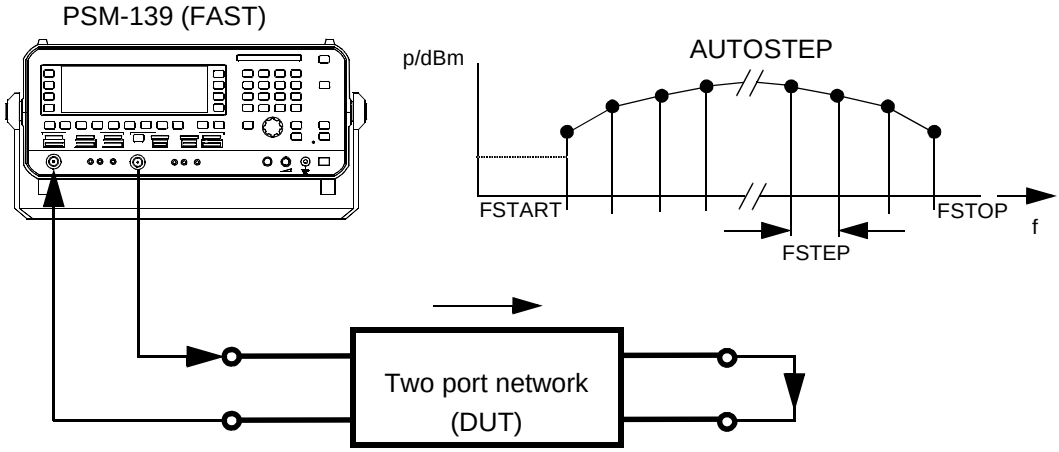


Fig. 5-42 Loop measurement using the PSM-139

Select input, output, impedance and measurement units

[IMPED] --> see section 5.14.1 on page 5-55 for details.

[UNITS] --> see section 5.14.3 on page 5-60 for details.

Set frequency range

FSTART/FSTOP --> see section 5.14.11 on page 5-79 for details.

or

FMEM START/FMEM STOP --> see section 5.14.9.4 on page 5-72 for details.

Set step speed

TIME/STEP --> see section 5.14.24 on page 5-90 for details.

Set step width

STEP WIDTH --> see section 5.14.24 on page 5-90 for details.

Set number of steps

STEPS --> see section 5.14.24 on page 5-90 for details.

Set scale reference

- **- - - > dBm** --> see section 5.14.30 on page 5-94 for details.

Set AUTOSTEP mode and measurement mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up the main menu for AUTOSTEP mode.
- Press **STEP PAR** [F R3] to call up the step parameters menu.
- Press **MODE** [F L4] to select FAST measurement mode.
- Press **SWEEP** [F L3] to select the measurement mode.
  SING = single sweep.
  CONT = continuous sweep.

Select bandwidth

BANDW --> see section 5.14.16 on page 5-84 for details.

Set TX level

TX --> see section see section 5.18.4 on page 5-120 for details

5.12.5 Measurement sequence

Start measurement

- Press **[START(STOP)]** to start the measurement sequence.

  The frequency is switched at the maximum rate allowed by the bandwidth using the current step width setting.

  If fixed frequencies are used, the fixed frequency addresses are recalled one after the other.

Note: The fixed frequency values must be entered in strict ascending order in the fixed frequency list.

In SING mode (=single sweep) the measurement ends when the stop frequency is reached.

In CONT mode (=continuous sweep) the measurement repeats from the start frequency when the stop frequency is reached.

Stop measurement prematurely

- Press **[START(STOP)]** to stop the measurement prematurely.

5.12.6 Measurement results and evaluation

Results display

AUTOSTEP = Graphical display of frequency response.

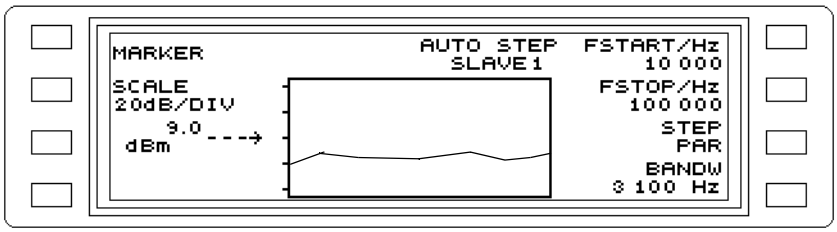


Fig. 5-43 Frequency response measurement result shown in the graphics field

If required: Display individual frequency and level values

Note: The marker function can be activated during the sweep

MARKER --> see section 5.14.23 on page 5-89 for details.

If required: Change scale

SCALE xx dB/DIV --> see section 5.14.20 on page 5-88 for details.

If required: Change scale reference

Note: The scale reference can be changed during the measurement.

- Press **- - - > dBm** [F L3] to alter the scale reference using the rotary control, keypad or arrow keys.

If required: Evaluate marker frequency and level in LEVEL mode

MRK FRQ - -> LEVEL MEAS --> see section 5.14.23 on page 5-89 for details.

5.13 SWEEP mode

Facilities for continuous frequency stepping between two selectable limits FSTART and FSTOP (or around a center frequency FCENT with frequency SPAN) allow you to perform all classic sweep measurements.

The measurement result is displayed as a graph of level (amplitude response, Y axis) versus frequency (X axis).

The measurement accuracy and resolution can be determined by selection of various YSCALE resolutions and different SWEEP TIMES. An automatic SWEEP TIME selection function is useful for selecting the optimum sweep time as determined by the measurement bandwidth and span settings.

The two operating modes LOW NOISE or LOW DISTORTION allow you to set the best instrument configuration (optimum dynamic range) for network or spectrum analysis.

We recommend the use of a PC or laptop, equipped with the LevelPRO software package, order no. BN 2203/93.01, for improved display and management of the measurement results. The software is specially designed for the PSM-37 to PSM-139 Level Measuring Sets and provides database, tolerance mask, A-B and A&B trace processing, printout, storage and other facilities.

5.13.1 Calling up the operating mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[HOT]** to call up the main menu for SWEEP mode.

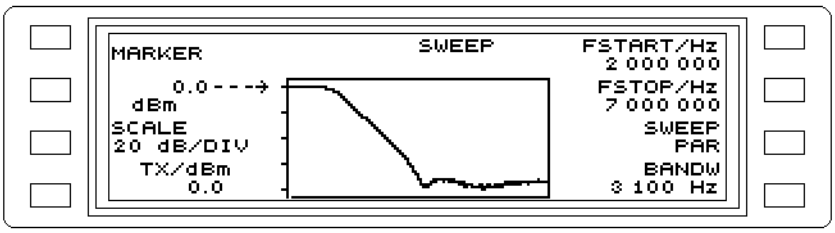


Fig. 5-44 Main menu for SWEEP mode

5.13.2 Sweep measurement

Select input, impedance and measurement units

[IMPED] --> Setting (see section 5.14.1 on page 5-55)

[UNITS] --> Setting (see section 5.14.3 on page 5-60)

Set frequency range:

FSTART/FSTOP --> Setting (see section 5.14.11 on page 5-79)

FCENT/SPAN--> Setting (see section 5.14.12 on page 5-79)

Set sweep rate:

SWEEPTIME--> Setting (see section 5.14.29 on page 5-93)

Display maximum RMS value of signal

MAXHLD --> Setting (see section 5.14.22 on page 5-89)

Set scale reference

- **- - - > dBm** --> Setting (see section 5.14.30 on page 5-94)

Set SWEEP mode:

- Press **[Blue key]** to call up the secondary functions.
- **[HOT] Press [HOT]** to call up the main menu for SWEEP mode.
- Press **SWEEPPAR** [SK R3] to call up the sweep parameter menu.
- Press **SWEEP** [SK L3] to set the sweep mode.
  SING = single sweep.
  CONT = continuous sweep.

Select bandwidth

BANDW --> Setting (see section 5.14.16 on page 5-84)

Set TX level:

TX -->Setting (see section 5.18.4 on page 5-120)

5.13.3 Measurement sequence

Start measurement:

- Press **[START(STOP)]** to start the frequency sweep. The LED next to the key turns off.
- During the sweep you can change only the scale and reference parameters. All other parameters can be altered only after stopping the sweep.

Interrupting a sweep:

- Press **[START(STOP)]** to stop the sweep. The LED next to the key turns on.

5.13.4 Measurement result and evaluation

Results display

SWEEP = graphic display of frequency response within the specified frequency range.

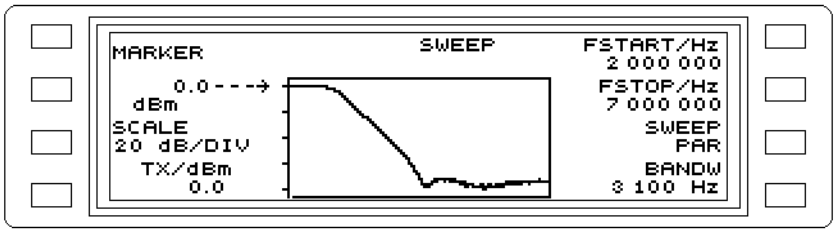


Fig. 5-45 Display of frequency response

If required: Display level and frequency values

> Note:
>
> The marker function can be activated during the SWEEP
> **MARKER** -->Setting (see section 5.14.23 on page 5-89)

If required: Setting the center frequency to the marker frequency

MRK FRQ - -> FCNT--> Setting (see section 5.14.23 on page 5-89)

5.14 Parameters

5.14.1 Inputs and impedances

Caution: The measurement inputs must be protected against input voltages $V_{rms} > 10$ V when terminated with Z_0. See "Specifications" for maximum input voltages at high impedances.

1. The level meter is equipped with one coaxial input [20] covering the entire specified frequency range. The input impedance can be selected from the IMPED menu; values available are: High impedance, 75 Ω and 50 Ω. The selected impedance is indicated by the LED display above the input (see fig. 5-44). The default setting for the coaxial input is high impedance (∞). The LED lit above 75 Ω indicates the reference impedance for the dBm display when making power measurements.

Fig. 5-46 Coaxial input
a) "High impedance" setting, dBm display reference impedance 75 Ω
b) Z_0 = 75 Ω setting

2. Input socket [21] is intended for balanced measurements and has an upper frequency limit of 14 MHz.
   The available impedances are split into two frequency ranges:
   BAL I: 10 kHz to 14 MHz for 124 Ω and 150 Ω impedances.
   BAL II: 50 Hz to 620 kHz for 150 Ω and 600 Ω impedances.

Selecting the input impedance

- Press **[IMPED]** to call up the IMPEDANCE menu.
- Press **Z/∞** [F L1] to select between Z_0 and high impedance ∞.
- Press **50 ∞ 75** [F L2] to select the Z_0 value for the coaxial input.
- Press **124 ∞150** [F L3] to select the Z_0 value for the balanced input (range I).
- Press **150 ∞ 600** [F L4] to select the Z_0 value for the balanced input (range II).
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

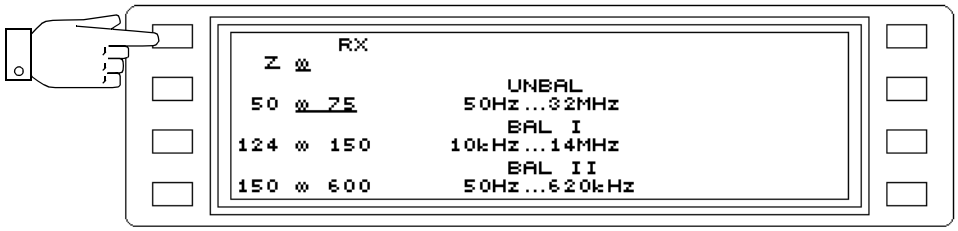


Fig. 5-47 Switching to "high impedance'

5.14.2 Level reference

5.14.2.1 Absolute voltage or power level

The absolute value of the signal at the input is measured and displayed in the default setting of the level meter. If the absolute level is to be displayed as a voltage, the appropriate units can be selected from the UNITS menu (see section 5.14.3 on page 5-60).

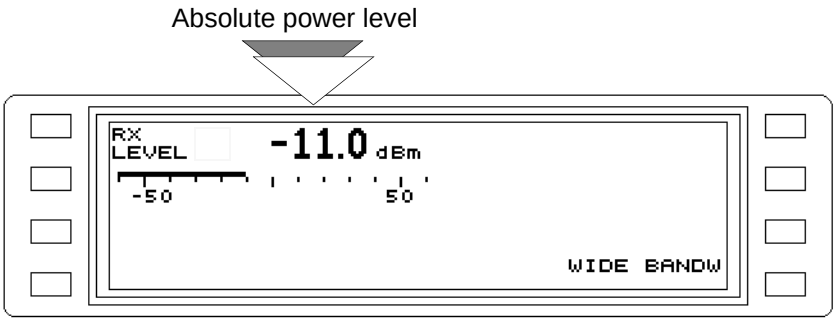


Fig. 5-48 Indication of level reference in the menu, e.g. absolute power level

Measuring absolute level

- Press **[UNITS]** to call up the level reference menu.
- Press **LEVEL ABSOLUTE** [F L2] to measure the absolute level.
- Press **[PREV]**, **[RTN]** or **[LEVEL]** to go to the main menu for LEVEL mode.

Fig. 5-49 Level reference menu: Absolute level measurement setting

5.14.2.2 ABS-REF, level difference

When measuring the insertion loss of a 2-port network, only the level referred to a reference level is of interest. In this type of measurement, the absolute value is first determined and then stored as a reference value.

The next step displays all signal levels as level differences according to the expression:

A-R (dB) = ABS (dBm) - REF (dBm)

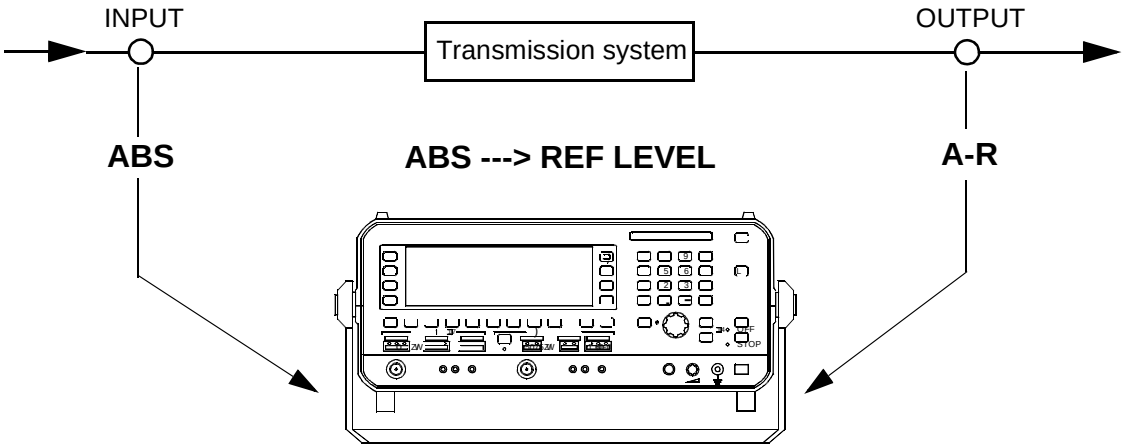


Fig. 5-50 Example measurement
1. ABS: Reference measurement at input of d.u.t (absolute level)
2. ABS ---> REF LEVEL: Sets the input level as the reference level
3. A-R: Level difference at output of d.u.t.

Measuring level difference

- Press **[UNITS]** to call up the level reference menu.
- Press **LEVEL ABS-REF** [F L3] to measure the level difference.
- Press **[PREV]**, **[RTN]** or **[LEVEL]** to go to the main menu for LEVEL mode.

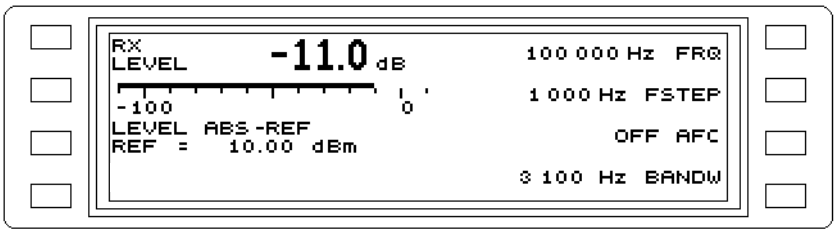


Fig. 5-51 Display of level difference LEVEL ABS -REF

Reference level (REF)

The reference level is used by the instrument for determining the level difference ABS-REF.

the reference level can be altered by:

– Entering a specific value using the keypad or rotary control, or in steps using the arrow keys,
– Storing a measured level in the memory.

Only one value can be entered for the reference level.

Entering a specific reference level

1. Instrument setting: Main menu of current operating mode.

- Press **[UNITS]** to call up the UNITS menu.
- Press **LEVEL ABS-REF** [F L3] to measure the level difference.
- Press **[PREV]**, **[RTN]** or **[LEVEL]** to go to the main menu for LEVEL mode.
- Press **LEVEL ABS-REF** [F L3] to enable entry of the reference level.
- **Enter the reference level** using the keypad, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the keypad.

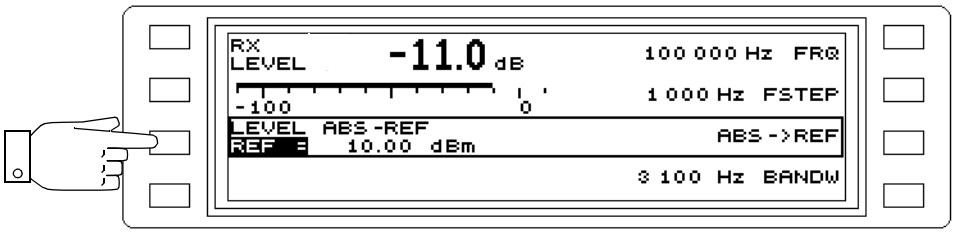


Fig. 5-52 Main menu for LEVEL mode: Entering the reference level REF

2. Instrument setting: UNITS menu

- Press **[UNITS]** to call up the UNITS menu.
- Press **LEVEL ABS-REF** [F L3] to enable entry of the reference level.
- **Enter the reference level** using the keypad, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the keypad. Press **[PREV]**, **[RTN]** or **[LEVEL]** to go to the main menu for LEVEL mode.

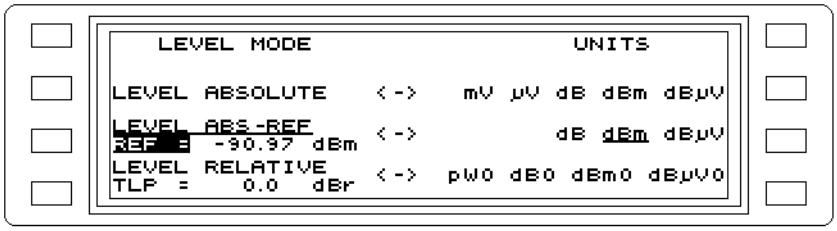


Fig. 5-53 UNITS menu: Entering the reference level REF

Entering the reference level by measurement

Instrument setting: Absolute level measurement and main menu for the current operating mode.

- Press **[UNITS]** to call up the level reference menu.
- Press **LEVEL ABS-REF** [F L3] to measure the level difference.
- Press **[PREV]**, **[RTN]** or **[LEVEL]** to go to the main menu for LEVEL mode.
- Press **LEVEL ABS-REF** [F L3] to enable entry of the reference level.

- Press **ABS --> REF** [F R3] to store the current level as the reference level.

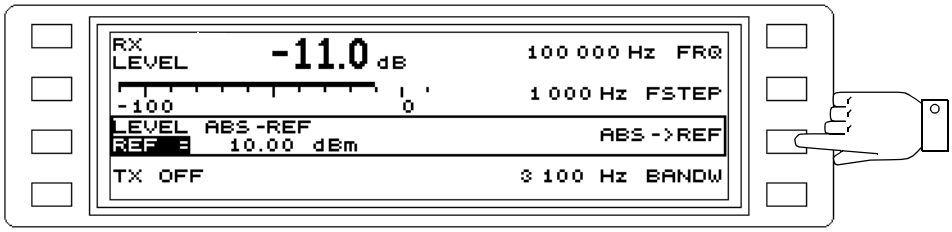


Fig. 5-54 Main menu for LEVEL mode: Storing the current level as reference level

5.14.2.3 Relative level (REL), referred level (dBm0)

In telecommunications, levels are often specified referred to the relative level (dBr) of a given point in the system rather than in absolute terms. To simplify evaluation, the relative level can be set within the limits

-120 dBr and +30 dBr

The measurement result is then shown directly as "referred level", in dBm0 (power level) or in dB0 (voltage level).

The following relationship applies:

REL (dBm0) = ABS (dBm) - REL (dBr)

The referred level is equal to the absolute level at the "0 dBr point" or transmission level point.

Measuring the referred level

The level meter displays the absolute level (see Fig. 5-48, page 5-56).

- Press **[UNITS]** to call up the level reference menu.
- Press **LEVEL RELATIVE** [F L4] to measure the referred level.
- Press **[PREV]**, **[RTN]** or **[LEVEL]** to go to the main menu for LEVEL mode.

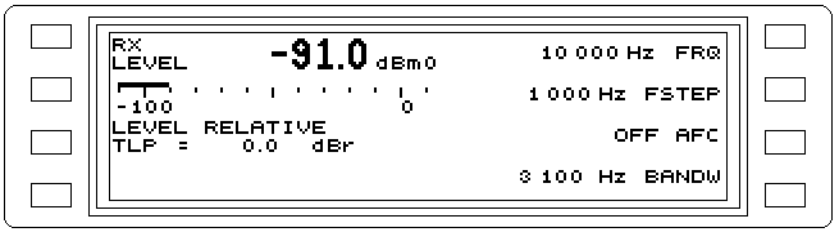


Fig. 5-55 Main menu for LEVEL mode: Display of referred level

Entering the Transmission Level Point (TLP)

1. Instrument setting: Main menu of current operating mode.

- Press **[UNITS]** to call up the level reference menu.
- Press **LEVEL RELATIVE** [F L4] to measure the level difference.
- Press **[PREV]**, **[RTN]** or **[LEVEL]** to go to the main menu for LEVEL mode.
- Press **LEVEL RELATIVE** [F L3] to enable entry of the transmission level point (TLP).

- **Enter the transmission level point** using the keypad, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the keypad.

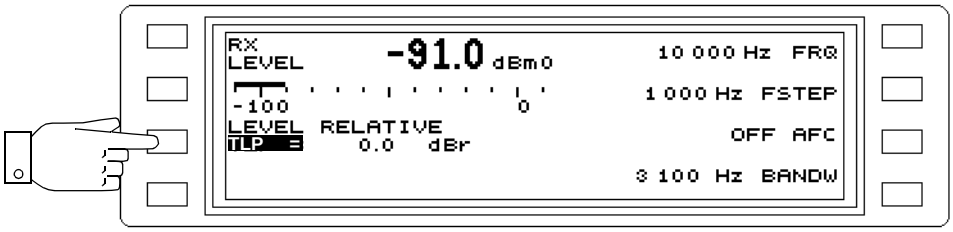


Fig. 5-56 Main menu for LEVEL mode: Entering the transmission level point (TLP)

2. Instrument setting: UNITS menu

- Press **[UNITS]** to call up the UNITS menu.
- Press **LEVEL RELATIVE** [F L4] to enable entry of the transmission level point (TLP).
- **Enter the transmission level point** using the keypad, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the keypad.
- Press **[PREV]**, **[RTN]** or **[LEVEL]** to go to the main menu for LEVEL mode.

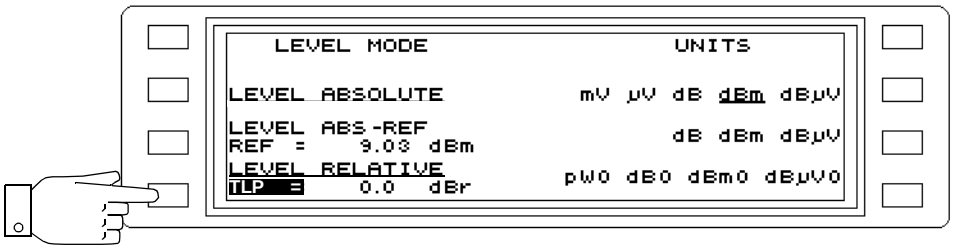


Fig. 5-57 LEVEL MODE menu: Entering the transmission level point (TLP)

5.14.3 Level units

Various units can be selected for each type of level, i.e. absolute, relative, difference and referred. Selecting a level unit also sets the corresponding level reference (LEVEL MODE).

The instrument also converts automatically between logarithmic (dBm, dB) and linear (mV, pW) units.

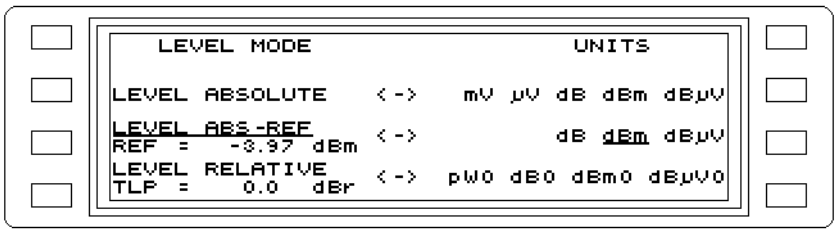


Fig. 5-58 UNITS menu: Entering the level units

Changing the level units

- Press **dBµV ... mV** [F R2] to set the required units for absolute level (scrolling function).
- Press **dBµV ... dB** [F R3] to set the required units for level difference (scrolling function).
- Press **dBµV0 ... pW0** [F R4] to set the required units for referred level (scrolling function).

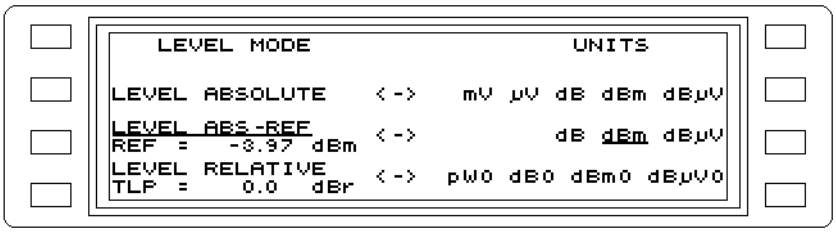


Fig. 5-59 Level units dBm set for level difference

5.14.4 Level monitoring

Limit or threshold values can be entered in LEVEL mode for the minimum and maximum permitted levels in order to monitor the receive level. If the upper limit is exceeded or the value drops below the lower limit, a relay contact closes. The relay contacts are led out to a socket on the back panel.

Note: The relay contact is a changeover switch (see section 9.7.2 on page 9-15.) The following describes the action of the normally open contact.

LEVEL mode

Setting the threshold values

- Press **[LEVEL]** to call up LEVEL mode.
- Press |**---**|**---**-|-- [F L2] to call up the SCALE menu.
- Press **ALARM PARAMETERS** [F R1] to call up the LEVEL ALARM menu.
- Press **UPPER THRESH** [F L3] to enable entry of the upper threshold value.
- **Enter the threshold value** using the keypad, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the keypad.
- Press **LOWER THRESH** [F L4] to enable entry of the lower threshold value.
- Enter in the same way as the UPPER THRESH.
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

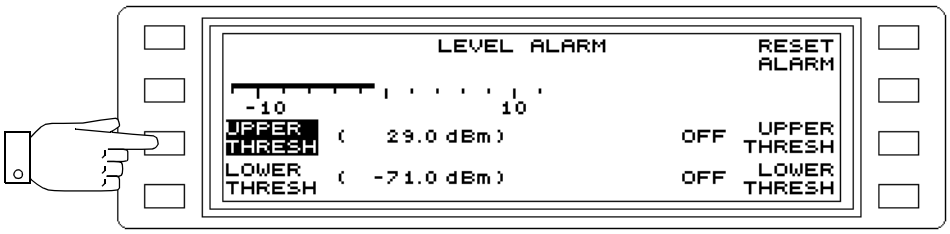


Fig. 5-60 Entering the UPPER THRESH value

Activate / deactivate threshold values

- Press **[LEVEL]** to call up LEVEL mode.
- Press |**---**|**---**|-- [F L2] to call up the SCALE menu.
- Press **ALARM PARAMETERS** [F R1] to call up the LEVEL ALARM menu.
- Press **UPPER THRESH** [F R3] to activate the upper threshold. The value is marked on the analog scale.
- Press **LOWER THRESH** [F R4] to activate the lower threshold. The value is marked on the analog scale.
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

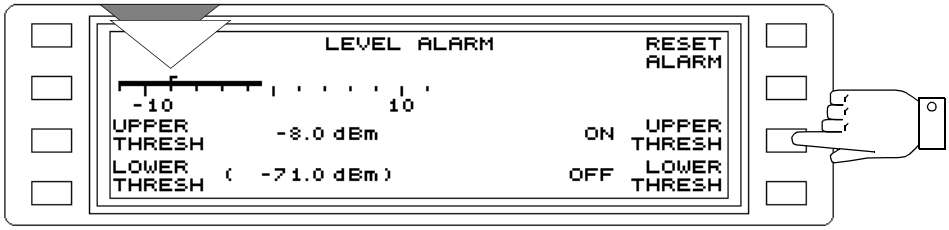


Fig. 5-61 Activating the UPPER THRESH value

Resetting alarms

If an alarm occurs (level outside threshold limits) the relay contact closes. The message "TRIGD" is shown next to RESET ALARM in the LEVEL ALARM menu. The relay contact must be reset in order to register future alarm events.

- Press |**---**|**---**|-- [F L2] to call up the SCALE menu.
- Press **ALARM PARAMETERS** [F R1] to call up the LEVEL ALARM menu.
- Press **RESET ALARM** [F R1] to reset the relay contact. The message "TRIGD" is deleted.
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

Relay contact status

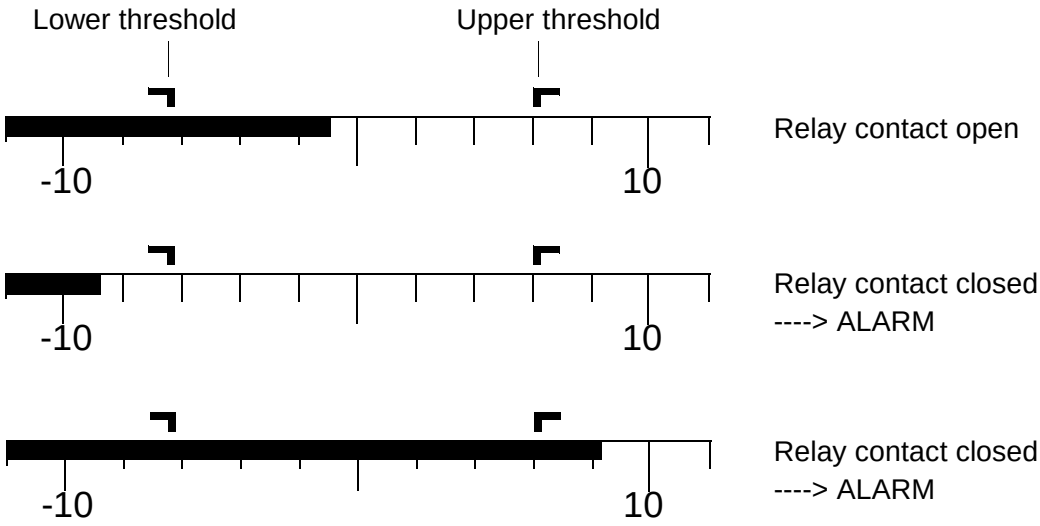


Fig. 5-62 Relay contact status depending on the level measured

5.14.5 Level thresholds

Entering a search threshold

HOT TONE SEARCH mode

- Press **[HOT]** to call up HOT TONE SEARCH mode.
- Press **THR/dBm** [F L4] to enable entry of the search threshold. Any level which is above the current search threshold is displayed as a hot tone.
- **Enter the level value** using the keypad, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the keypad.
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

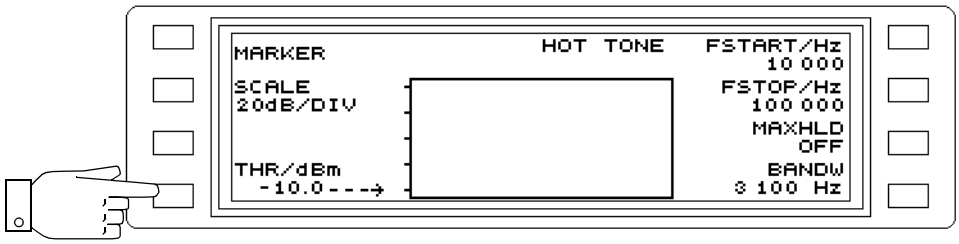


Fig. 5-63 Entering the search threshold

Entering a level threshold

IMPULSIVE NOISE mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[DMOD]** to call up IMPULSIVE NOISE mode.
- Press **THRESH** [F L2] to enable entry of the threshold. Any pulse having a level above the current threshold is counted.
- **Enter the level value** using the keypad, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the keypad.
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

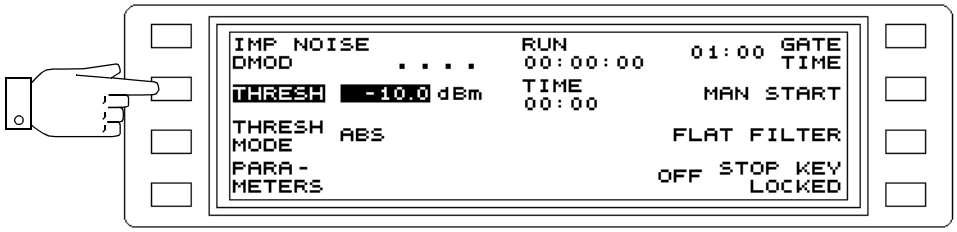


Fig. 5-64 Entering the level threshold

Entering a level threshold

INTERRUPTIONS mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[VOICE]** to call up INTERRUPTIONS mode.
- Press **THRESH** [F L2] to enable entry of the threshold.
- Press **[F L1] ... [F L4]** to select the level threshold required. All interruptions with a level below that of the threshold value are counted. After the selection has been made, the main menu of the operating mode is automatically displayed.

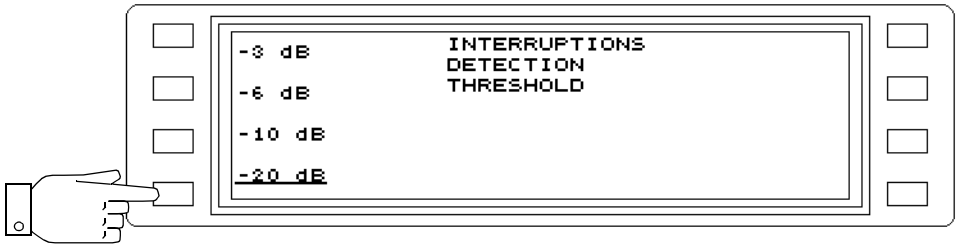


Fig. 5-65 Selecting the level threshold

Entering the start threshold

AUTOSTEP TIME mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up AUTOSTEP mode.
- Press **STEP PAR** [F R3] to change to the STEP PARAMETER menu.
- Press **MODE** [F L4] to set AUTOSTEP to TIME mode.
- Press **START THRESH** [SKL3] to enable entry of the start threshold. When the SLAVE instrument measures a level below this threshold, it starts AUTOSTEP operation.
- **Enter the level value** using the keypad, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the keypad.
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

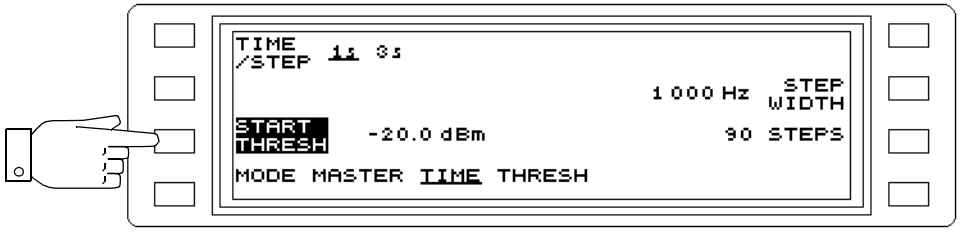


Fig. 5-66 Entering the start threshold

Entering the step threshold:

AUTOSTEP THRESH mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up AUTOSTEP mode.
- Press **STEP PAR** [F R3] to change to the STEP PARAMETER menu.
- Press **MODE** [F L4] to set AUTOSTEP to THRESH mode.
- Press **STEP THRESH** [F L3] to enable entry of the step threshold. Each time the level drops below this threshold the frequency is changed to the next value in the sequence.
- **Enter the level value** using the keypad, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the keypad.
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

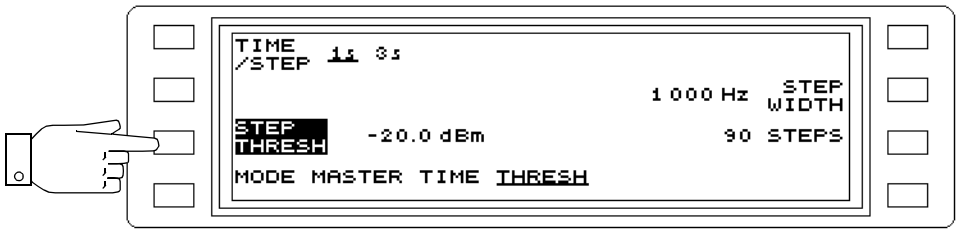


Fig. 5-67 Entering the step threshold

5.14.6 Gain

Controlling the gain:

DEMODULATION and VOICE modes

- Press **GAIN** [F L4] to enable entry.
- **Alter the gain** in 5 dB steps using the rotary control or arrow keys.

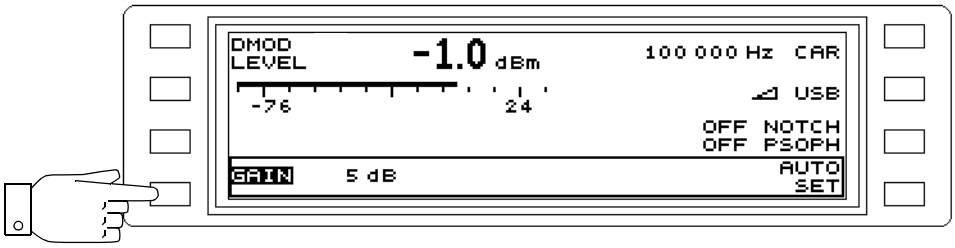


Fig. 5-68 Controlling the gain

Automatic gain control:

DEMODULATION and VOICE modes

- Press **GAIN** [F L4] to enable entry.
- Press **AUTO SET** [F R4] to match the gain to the current input signal. The process is repeated each time the key is pressed.

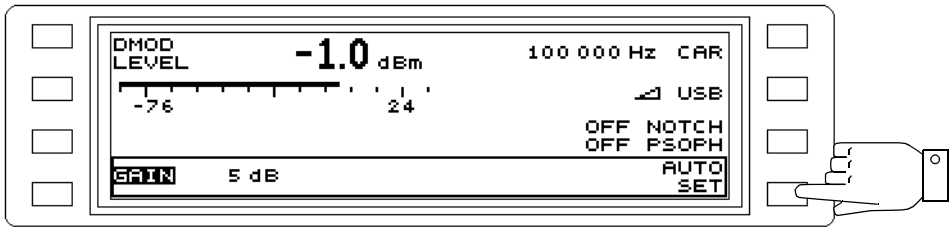


Fig. 5-69 Matching the gain to the input signal automatically

5.14.7 Setting the instrument drive level manually

LEVEL mode

In LEVEL mode, the instrument operates with automatic drive level control which matches the internal amplifier stages to the test signal. For certain applications, this automatic function can be disabled using the AUTO RANGING setting. The RF GAIN and IF GAIN can then be set manually for low noise or low distortion.

Note: For low distortion,
broadband gain (RF GAIN) < - 40 dB - total input level.
For low noise,
broadband gain (RF GAIN) < - 20 dB - total input level.
The IF GAIN should be as large as possible (Caution: ↑ - arrow)

Activate/deactivate manual control

- Press **[Blue key]** to call up the secondary functions.
- Press **[TEST & CONFIG]** to call up the auxiliary function TEST & CONFIGURATION.
- Press **INSTRUMENT** [F L2] to change to the INSTRUMENT menu.
- Press **AUTO RANGING** [F R2] to switch auto ranging on or off (toggle function).
- Press **[LEVEL]** to call up LEVEL mode.
- Press **RF GAIN/IF GAIN** [F R2] to enable entry for RF GAIN. Use the rotary control or keypad to change the gain in steps.
- Press **RF GAIN/IF GAIN twice** [F R2] to enable entry for IF GAIN. Use the rotary control or keypad to change the gain in steps.

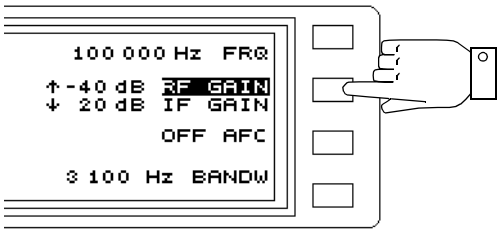


Fig. 5-70 Setting the RF gain manually

5.14.8 Receive frequency

The receive frequency is given by the parameter FRQ[1] in the various menus. It can be entered in several different ways.

Entry using the keypad

- Call up the **operating mode** (e.g. [LEVEL]).
- Press **FRQ** [F R1] to enable entry.
- Enter the **frequency value** using the keypad.
- Press **[MHz]**, **[kHz]** or **[ENTER]** to complete the entry.

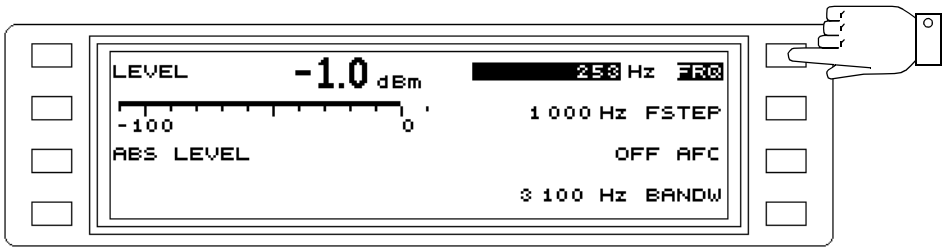


Fig. 5-71 Entering the frequency using the keypad; example shows LEVEL mode

Entry using the rotary control

- Call up the **operating mode** (e.g. [LEVEL]).
- Press **FRQ** [F R1] to enable entry.
- Enter the **frequency value** using the rotary control.

Changing the rotary control resolution

- Press **[FINE]** to change the resolution.
  Resolution 1 Hz = LED next to [FINE] is on.
  Resolution 100 Hz = LED next to [FINE] is off.

Entry using the arrow keys

- Press **[LEVEL]** to call up the main menu for the operating mode.
- Press **FRQ** [F R1] to enable entry.
- Enter the **frequency value** using the arrow keys. The step width is specified by FSTEP. The frequency changes continuously if the arrow key is held down.

Changing the step width

- Press **FSTEP** [F R2] to enable entry.
- Enter the **step width** using the keypad, rotary control or arrow keys. Press **[MHz]**, **[kHz]** or **[ENTER]** to complete entries using the keypad.

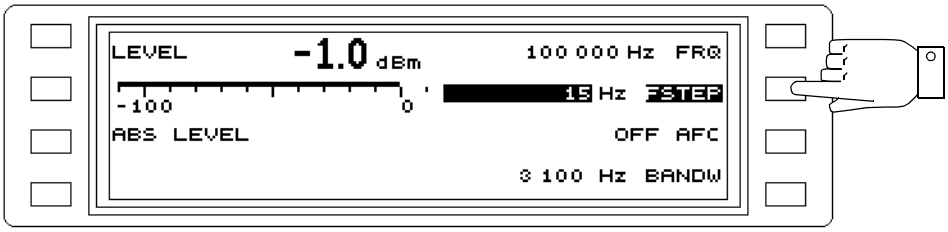


Fig. 5-72 Changing the step width

1 CAR (Carrier) in DEMODULATION mode and for JITTER TONE DEMODULATION, INTERRUPTION DEMODULATION, IMPULSIVE NOISE DEMODULATION measurements.

5.14.9 Fixed frequencies

Fixed frequencies can be stored in the instrument memory for measurements which are often repeated in the following modes:

– LEVEL
– DEMODULATION
– NPR
– JITTER
– AUTOSTEP
– IMPULSE NOISE DEMOD
– INTERRUPTIONS DEMOD

The number of fixed frequencies which can be stored depends on the instrument version:

– 100 fixed frequencies for the SPM/PSM-37/-38/-39,
– 200 fixed frequencies for the SPM/PSM-137/-138/-139.

The addresses of the fixed frequencies can be called up using the rotary control, number keys or arrow keys in LEVEL, DEMODULATION, IMPULSE NOISE DEMOD, INTERRUPTIONS DEMOD and JITTER modes.

In AUTO STEP mode, the fixed frequencies are called up automatically once the active fixed frequency range has been set.

The number of fixed frequencies which can be recalled is determined by the freely selectable range.

The current contents of the fixed frequency memory can be output as a list using an external printer.

100 fixed frequencies (address range C100 to C199) can be stored on a Memory Card for instrument versions SPM/PSM-137/-138/-139.

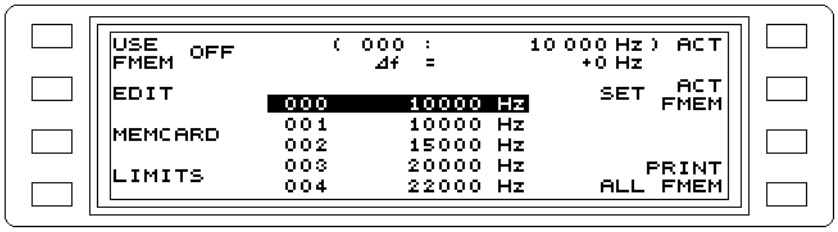


Fig. 5-73 Main menu for the fixed frequency function

Note: The use of fixed frequencies in LEVEL, DEMODULATION, NPR, JITTER and AUTOSTEP differs in parts. Operating steps which are different for different modes are described separately in the sections which follow.

5.14.9.1 Storing, editing and deleting fixed frequencies

Note: Any unused memory addresses are indicated by NOT USED.

Storing fixed frequencies:

- Call up the **operating mode** (e.g. [LEVEL])
- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu.
- Press **EDIT** [F L2] to open the entry menu.
- Select the **address** using the rotary control, arrow keys or by pressing NEXT [F R2].

Note: If an arrow key is pressed and held down, the cursor scrolls through the list of addresses or fixed frequencies.

- Press **EDIT FRQ** [F R1] to enable entry.
- Enter the **frequency value** using the number keys, arrow keys or rotary control. Press **[MHz]**, **[kHz]** or **[ENTER]** to complete entries made using the number keys.
- Press **NEXT** [F R2] to move to the next address. Frequency entry is still enabled, so that the next value can be entered immediately.
- etc.
- Press **[PREV]** to return step-by-step to the previous menus after completing fixed frequency entries, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

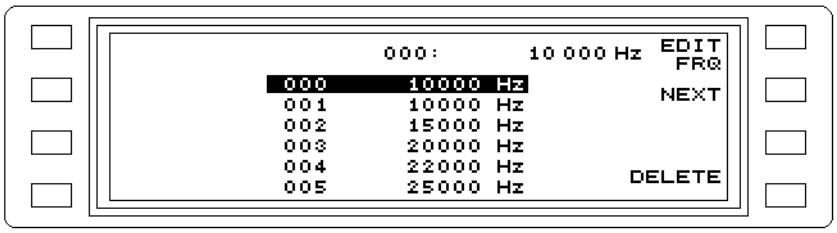


Fig. 5-74 Entering a sequence of fixed frequencies

Editing individual fixed frequencies:

- Call up the **operating mode** (e.g. [LEVEL])
- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu.
- Press **EDIT** [F L2] to open the entry menu.
- Select the **address** using the rotary control, arrow keys or by pressing NEXT [F R2].

Note: If an arrow key is pressed and held down, the cursor scrolls through the list of addresses or fixed frequencies.

- Press **EDIT FRQ** [F R1] to enable entry.
- Enter the **frequency value** using the number keys, arrow keys or rotary control. Press **[MHz]**, **[kHz]** or **[ENTER]** to complete entries made using the number keys.
- Press **EDIT FRQ** [F R1] to disable entry.
- Select the **next address** using the rotary control, arrow keys or by pressing NEXT [F R2].
- Press **EDIT FRQ** [F R1] to enable entry.
- etc.
- Press **[PREV]** to return step-by-step to the previous menus after completing fixed frequency entries, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

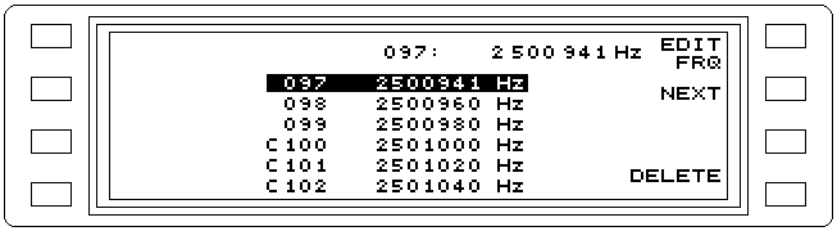


Fig. 5-75 Editing individual fixed frequencies

Deleting fixed frequencies

- Call up the **operating mode** (e.g. [LEVEL])
- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu.
- Press **EDIT** [F L2] to open the entry menu.
- Select the **address** using the rotary control or arrow keys.
- Press **DELETE** [F R4] to delete the fixed frequency. NOT USED is shown against the address.
- Press **NEXT** [F R2] to move to the next address.
- Press **DELETE** [F R4] to delete the fixed frequency.
- etc.
- Press **[PREV]** to return step-by-step to the previous menus after completing fixed frequency entries, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

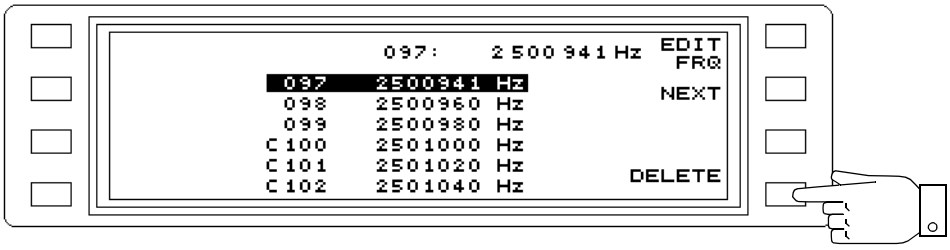


Fig. 5-76 Deleting fixed frequencies

5.14.9.2 Activating/deactivating fixed frequencies

Note: The fixed frequency function is deactivated automatically if a fixed frequency is deleted, edited or a new value is stored.

- Call up the **operating mode** (e.g. [LEVEL])
- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu.
- Press **USE FMEM** [F L1] to activate / deactivate the fixed frequency function.
  The frequency indicated by ACT is set immediately when the fixed frequency function is activated. The last frequency value set is retained when the function is deactivated.

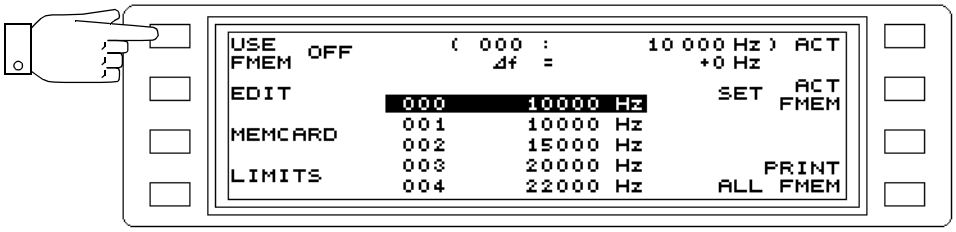


Fig. 5-77 LEVEL mode: "Fixed frequency" function activated

5.14.9.3 Setting the active range of the fixed frequency memory

Not all of the stored fixed frequencies are always required. By entering a first and a last address, the fixed frequencies which can be set are limited to within this range.

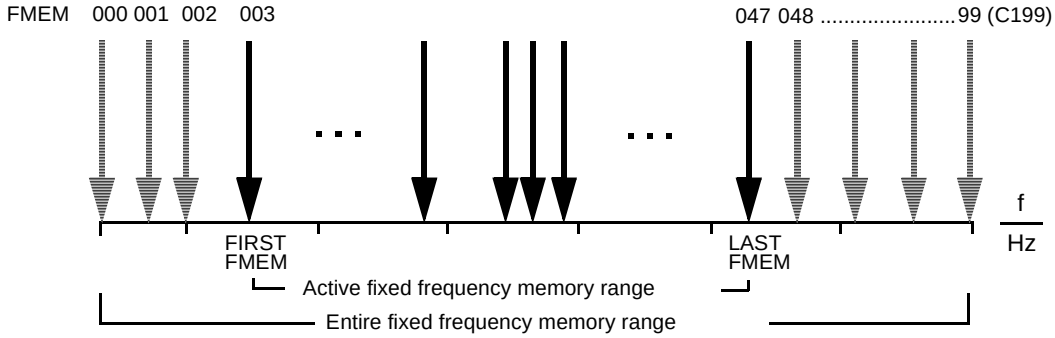


Fig. 5-78 Entire and active fixed frequency memory ranges

LEVEL, DEMODULATION, NPR, JITTER modes

Call up the LIMITS menu:

- Call up the **operating mode** (e.g. [LEVEL])
- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu.
- Press **LIMITS** [F L4] to call up the LIMITS menu.

Note: Always ensure that the last address is higher than the first address when entering values.

Setting the first address:

- Select the **address** using the rotary control or arrow keys.
- Press **SET FIRST FMEM** [F R2] to set the selected address and fixed frequency as the first address in the range.

Setting the last address:

- Select the **address** using the rotary control or arrow keys.
- Press **SET LAST FMEM** [F R2] to set the selected address and fixed frequency as the last address in the range.

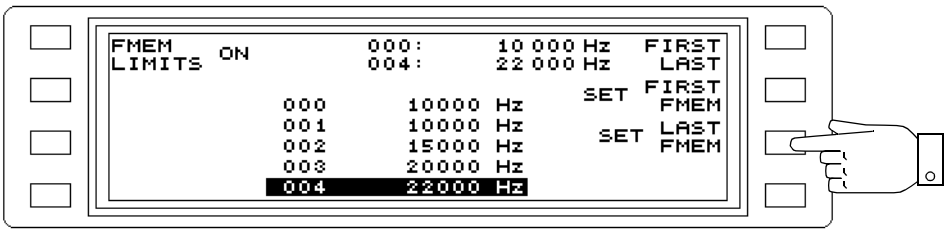


Fig. 5-79 LEVEL mode: Menu for entering frequency limits

Activating / deactivating the set range:

- Press **FMEM LIMITS** [F L1] to activate / deactivate the range limits. When deactivated, the addresses and frequency values of the first and last frequencies are shown in brackets.
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

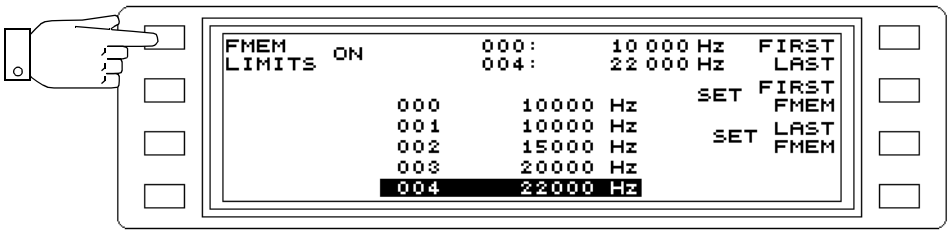


Fig. 5-80 Activating the set frequency limits

5.14.9.4 Selecting the current fixed frequency

LEVEL, DEMODULATION, NPR, JITTER, IMPULSE NOISE DEMOD, INTERRUPTIONS DEMOD modes

Selecting the current fixed frequency:

- Call up the **operating mode** (e.g. [LEVEL])
- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu.
- Select the **address** using the rotary control or arrow keys.
- Press **SET ACT FMEM** [F R2] to set the current fixed frequency. The frequency is displayed next to ACT. This frequency is set immediately when the fixed frequency function is activated.

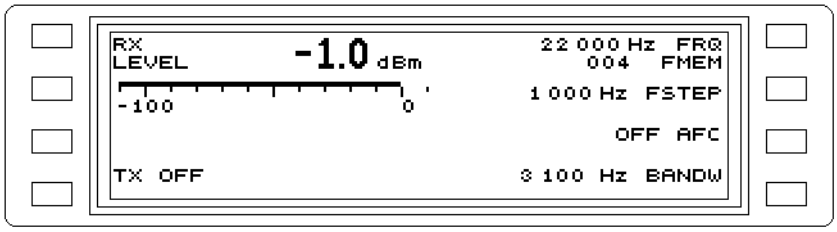


Fig. 5-81 Current fixed frequency after changing to the main menu

AUTO STEP mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up AUTOSTEP mode
- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu.

Setting the start address:

Note: Always ensure that the last address is higher than the first address when entering values.

- Select the **address** using the rotary control or arrow keys.
- Press **SET START FMEM** [F R2] to set the selected address and fixed frequency as the start address.

Setting the stop address:

- Select the **address** using the rotary control or arrow keys.
- Press **SET STOP FMEM** [F R3] to set the selected address and fixed frequency as the stop address.
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

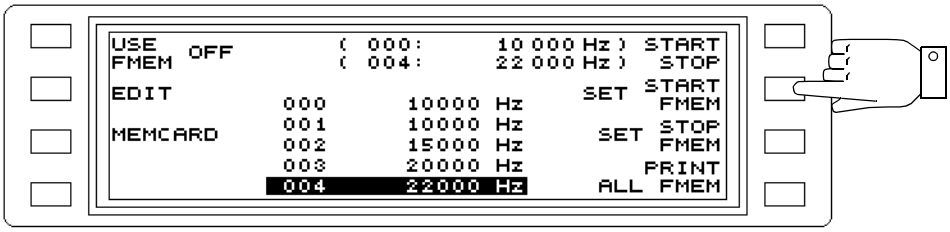


Fig. 5-82 Entering the start and stop frequencies

5.14.9.5 Calling up fixed frequencies

Once the fixed frequency function and the range limits if required have been activated, press [RTN] or one of the mode keys to open the main menu for the operating mode.

Note: Press **[FINE]** (adjacent LED turns on) to change addresses one at a time.

LEVEL, DEMODULATION, NPR, JITTER, IMPUSLE NOISE DEMOD, INTERRUPTIONS DEMOD modes

The address of the fixed frequency set as current frequency is shown below FRQ or CAR.

- Press **FRQ FMEM** [F R1] to enable entry of fixed frequency addresses.
- Select the **addresses** one by one using the rotary control or arrow keys, or enter the address numbers using the number keys. Press [ENTER] to complete entries made with the number keys.

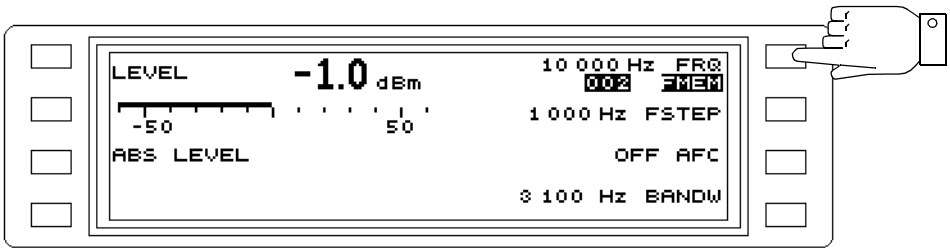


Fig. 5-83 LEVEL mode: Calling up fixed frequencies

AUTOSTEP mode

The start and stop addresses are displayed instead of the start and stop frequencies.

If the start and stop addresses have already been set from the fixed frequency menu, the automatic measurement sweep can begin immediately. The frequency addresses are incremented and the corresponding frequencies set automatically.

Setting fixed frequencies in the main menu of AUTOSTEP mode

Note: Always ensure that the last address is higher than the first address when entering values.

- Press **FMEM START** [F R1] to enable entry of the start address.
- Select the **address** using the rotary control or arrow keys, or enter the address numbers using the number keys. Press [ENTER] to complete entries made with the number keys.
- Press **FMEM STOP** [F R2] to enable entry of the stop address.
- Select the **address** using the rotary control or arrow keys, or enter the address numbers using the number keys. Press [ENTER] to complete entries made with the number keys.

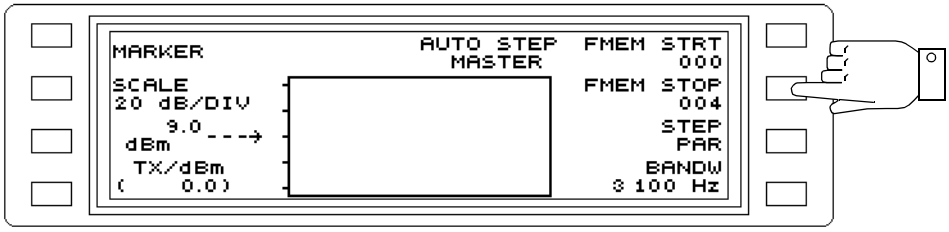


Fig. 5-84 AUTOSTEP mode: Calling up fixed frequencies

5.14.9.6 Editing the current fixed frequency setting

LEVEL, DEMODULATION, NPR, JITTER, IMPULSE NOISE DEMOD, INTERRUPTIONS DEMOD modes

- Press **FRQ FMEM** [F R1] **twice** to enable fixed frequency entry.
- Enter the **frequency value** using the number keys, arrow keys or rotary control. Press **[MHz]**, **[kHz]** or **[ENTER]** to complete entries made using the number keys.

Display frequency offset of current frequency

- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu. The frequency offset from the nominal value and the current frequency value are displayed.

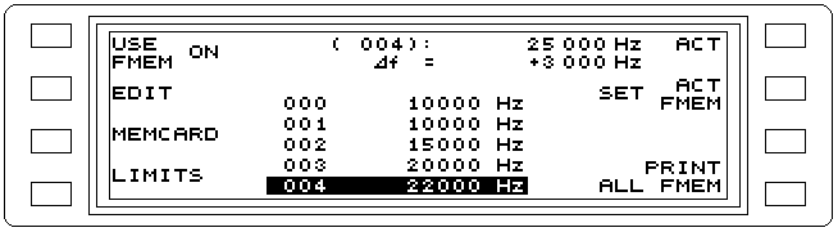


Fig. 5-85 Displaying the frequency offset Δf

5.14.9.7 Recording the offsets of the set fixed frequencies

It is possible to record the frequency offsets in LEVEL mode if the fixed frequency function and the AFC function are both activated.
Δf = actual frequency (FRQ) - fixed frequency (FMEM).

- Call up the **operating mode** (e.g [LEVEL]).
- Measure the **receive frequency** at the start of the measurement period.
- Enter the measured frequency as a fixed frequency. Then activate the fixed frequency function and set the measured frequency entered as the current fixed frequency. Then call up the main menu of the selected operating mode.
- Press **AFC** [F R3] to activate automatic frequency control.

If the frequency differs from the set fixed frequency, Δf is displayed next to the fixed frequency address. An arrow next to this indicates the direction of the offset.

Displaying the frequency offset

(see section Display frequency offset of current frequency).

5.14.9.8 Copying fixed frequencies to the Memory Card

Note: Directory and file names are not required when copying fixed frequencies to the Memory Card.

If a directory and file have not already been created, this is done automatically during copying.

To see the status of the copied fixed frequency file FMEM_01 on the Memory Card, change to the TEST & CONFIG menu. The Memory Card directory can be displayed from here (see section 3.7 on page 3-12). The fixed frequency file is found in directory BN 2203/FREQ.

As well as the file name FMEM_01, the file size and date and time of copying are displayed.

The contents of the file FMEM_01 are overwritten each time a copy is made.

Copying fixed frequencies to the Memory Card

- Call up the **operating mode** (e.g [LEVEL]).
- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu.
- Press **MEMCARD** [F L3] to change to the Memory Card menu.
- Place a formatted **Memory Card** into the **card slot**.
- Press **STORE FMEM...** [F L2] to start copying.
  The contents of the address range C100 to C199 is copied from the instrument memory to the Memory Card as file FMEM_01 in directory BN2203/FREQ.
  The red LED to the left of the card slot is on during copying. The process takes a few seconds and ends as soon as the LED turns off.
- Press **[PREV]** to return step-by-step to the previous menus, **or**

- Press **[RTN]** to return to the main menu of the current operating mode.

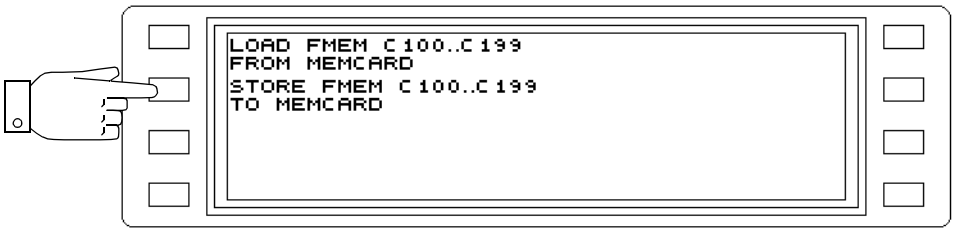


Fig. 5-86 Copying fixed frequencies to the Memory Card

5.14.9.9 Copying fixed frequencies from the Memory Card

Note: The error message: ERROR MEMORY CARD OPERATION FAILED is displayed if there is no fixed frequency file stored on the Memory Card.

Copying fixed frequencies from the Memory Card

- Call up the **operating mode** (e.g [LEVEL]).
- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu.
- Press **MEMCARD** [F L3] to change to the Memory Card menu.
- Place a **Memory Card** with a fixed frequency file into the **card slot**.
- Press **LOAD FMEM...** [F L1] to start copying.
  The contents of file FMEM_01 is copied from the Memory Card to the address range C100 to C199 of the instrument memory.
  The red LED to the left of the card slot is on during copying. The process takes a few seconds and ends as soon as the LED turns off.
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

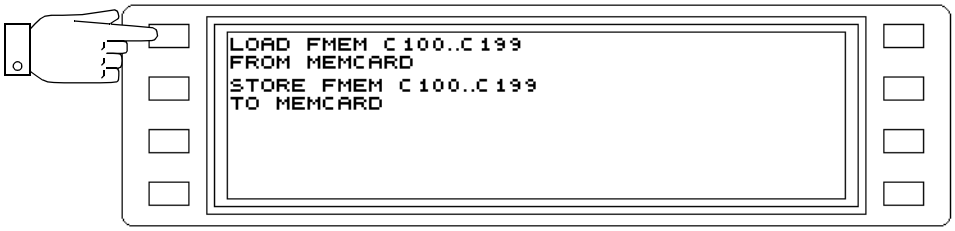


Fig. 5-87 Copying fixed frequencies from the Memory Card

5.14.9.10 Printing the list of fixed frequencies

- Connect and configure the **printer**.
- Call up the **operating mode** (e.g [LEVEL]).
- Press **[Blue key]** to call up the secondary functions.
- Press **function key** [F R1] to call up the fixed frequency menu.
- Press **PRINT ALL FMEM** [F R4] to print a list of the current contents of the fixed frequency memory. The message "PRINTING" appears in place of PRINT ALL FMEM during the print operation.

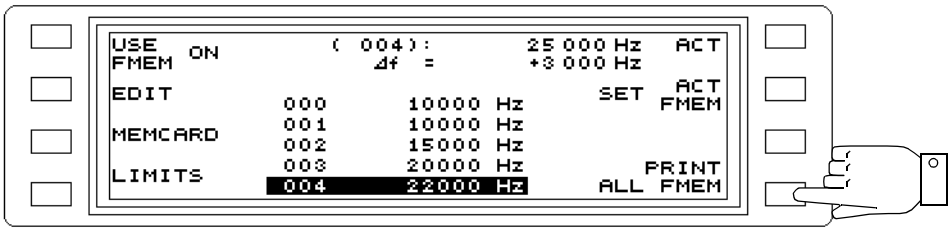


Fig. 5-88 Inhalt des Festfrequenzspeichers ausdrucken

Cancelling the print job:

- Press **PRINTING** [F R4] to call up the print job menu.
- Press **OK** [F L4] to abort the print job.
- Press **CANCEL** [F R4] to continue the print job.

The display reverts automatically to the fixed frequency menu in both cases.

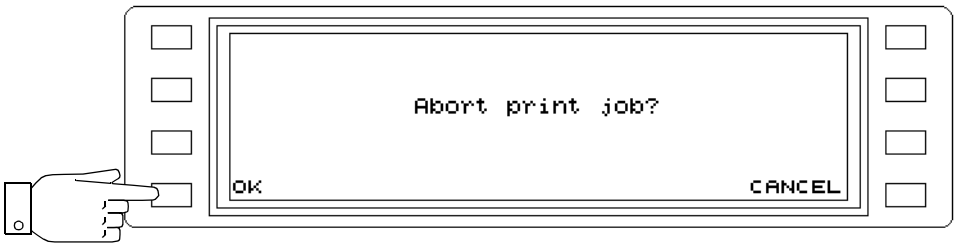


Fig. 5-89 Cancelling the print job

5.14.10 Automatic frequency control (AFC)

The AFC regulates the receive frequency to that of the input signal. It only operates for selective level measurement and only if a discrete signal frequency of sufficient amplitude is present in the passband of the selected filter.

It is a good idea to use AFC when

- the receiver is to be rapidly tuned to the filter center frequency,
- the signal frequency is unstable,
- the signal is to be monitored over a long period of time.

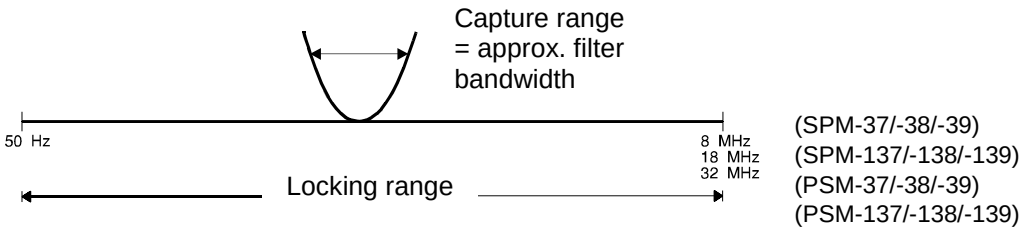


Fig. 5-90 AFC capture and locking ranges

Activating / deactivating AFC

Instrument setting: Main menu of LEVEL mode.

- Press **[AFC]** to activate / deactivate AFC.
- With AFC activated, tune the instrument so that the signal frequency is within the set filter bandwidth.

  Whenever this is not the case, the status message UNLOCKED flashes next to **[AFC]**.

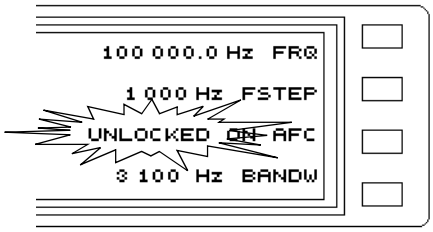


Fig. 5-91 AFC activated

5.14.11 Start and stop frequencies

HOT TONE SEARCH, AUTOSTEP, SWEEP modes

Entering the start and stop frequencies:

- Call up the **operating mode** (e.g. HOT TONE SEARCH).
- Press **FSTART/Hz** [F R1] to enable entry of the start frequency.
- Enter the **frequency value** using the number keys, arrow keys or rotary control. Press **[MHz]**, **[kHz]** or **[ENTER]** to complete entries made using the number keys.
- Press **FSTOP/Hz** [F R2] to enable entry of the stop frequency.
- Enter the **frequency value** using the number keys, arrow keys or rotary control. Press **[MHz]**, **[kHz]** or **[ENTER]** to complete entries made using the number keys.

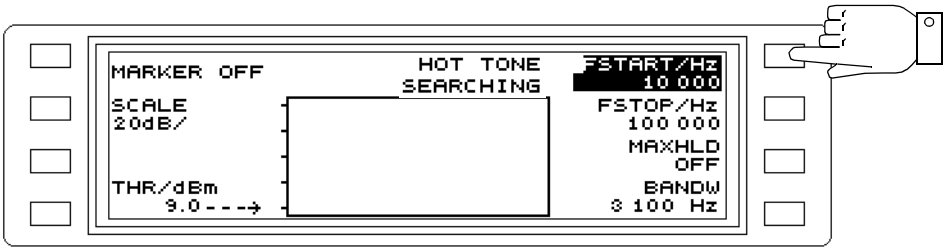


Fig. 5-92 Entering frequency limits, e.g. start frequency

5.14.12 Center frequency and frequency span

SWEEP mode

Switching to center frequency / frequency span display mode:

- Press **[Blue key]** to call up the secondary functions.
- Press **[HOT]** to call up the main menu for SWEEP mode.
- Press **[Blue key]** to call up the secondary functions.
- Press **FSTART/Hz** [SK R1] to switch the frequency display mode.
  Use the same procedure to switch to FSTART/FSTOP display mode.

Setting the center frequency and frequency span:

- Press **[Blue key]** to call up the secondary functions.
- Press **[HOT]** to call up the main menu for SWEEP mode.
- Press **FCENT/Hz** [SK R1] to enable entry of the center frequency.
- Enter the **frequency value** using the number keys, rotary control or arrow keys. Press **[kHz]**, **[MHz]** or **[ENTER]** to complete entries made using the number keys.
- Press **SPAN/Hz** [SK R2] to enable entry of the frequency span.

- Enter the **frequency value** using the number keys, rotary control or arrow keys. Press **[kHz]**, **[MHz]** or **[ENTER]** to complete entries made using the number keys.

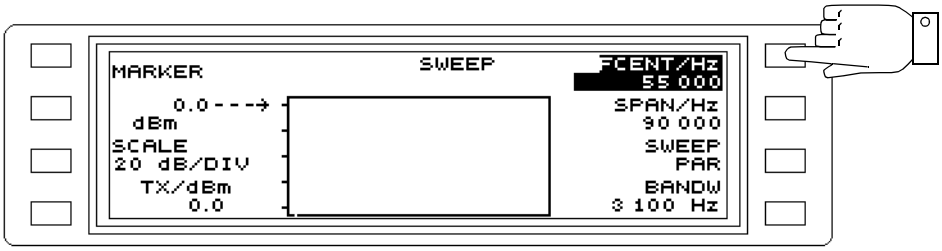


Fig. 5-93 Entering frequency information, e.g. center frequency value

5.14.13 Sidebands

The center band is converted to 1.85 kHz if the instrument is tuned to the center of the channel. If tuned to the suppressed carrier, the receive frequency must be offset for correct demodulation:

– By -1.85 kHz for the lower sideband (LOWER SB)
– By +1.85 kHz for the upper sideband (UPPER SB).

Changing the sideband:

DEMODULATION modes

- Press DEMOD to call up DEMODULATION mode.
- Press **USB** or **LSB** [F R2] to switch to the erect or inverted sideband (upper or lower sideband).

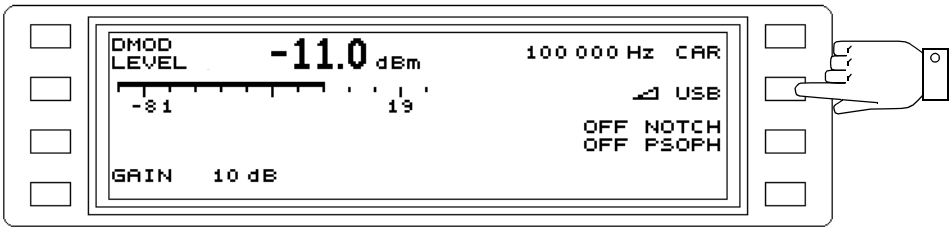


Fig. 5-94 Changing the sideband

JITTER DMOD TONE mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[LEVEL]** to call up JITTER mode.
- Press **JITTER** [F L1] to call up the measurement mode menu.
- Press **[F L2] ... [F L3]** to select a measurement mode. The display reverts to the main menu automatically.
- Press **USB** or **LSB** [F R2] to switch to the erect or inverted sideband (upper or lower sideband).

IMP NOISE DMOD mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[DMOD]** to call up IMPULSIVE NOISE mode.
- Press **PARAMETER** [F L4] to call up the Parameter menu.
- Press **USB** or **LSB** [F R2] to switch to the erect or inverted sideband (upper or lower sideband).
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

5.14.14 Test tones

JITTER DMOD TONE, TONE JITTER modes

- Press **[Blue key]** to call up the secondary functions.
- Press **[LEVEL]** to call up JITTER mode.
- Press **JITTER** [F L1] to call up the measurement mode menu.
- Press **[F L2] ... [F L3]** to select a measurement mode. The display reverts to the main menu automatically.
- Press **TONE** [F L3] to change to the test tone menu.
- Press **[F L1] ... [F L2]** to select the required test tone. The display reverts to the main menu automatically.
  800 Hz ± 50 Hz
  1020 Hz ± 50 Hz
- Press **[PREV]** to return step-by-step to the previous menus, **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

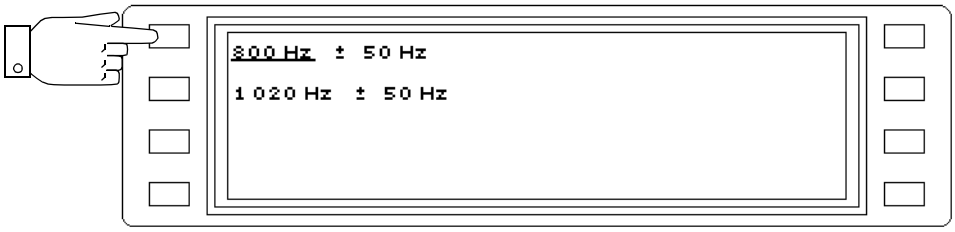


Fig. 5-95 Selecting the test tone

5.14.15 Channel system

NPR mode

Selecting the channel system:

- Press **[NPR]** to call up NPR mode.
- Press **CHANN SYSTEM** [F R3] to change to the channel system menu.
- Select the **channel system** from the existing list using the rotary control or the arrow keys.
- Press **SET ACT CHANN** [F R2] to set the selected channel system. The nominal loading for the channel system is applied immediately. The channel system is displayed next to ACT.

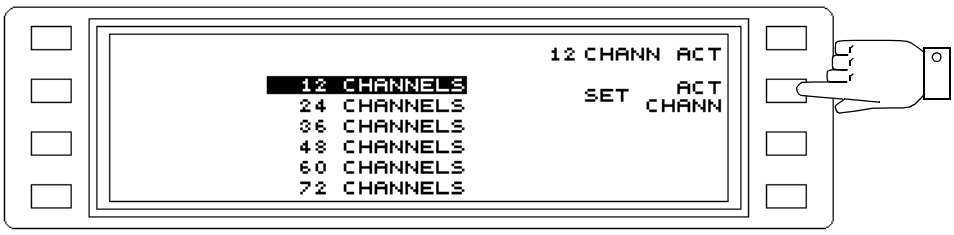


Fig. 5-96 Selecting the channel system

No. of channels in system	Bandwidth in kHz	Level reduction / dB $10\log \cdot \frac{B}{1,74\text{kHz}}$
12	48	14.41
24	96	17.42
36	144	19.18
48	192	20.43
60	240	21.40
72	288	22.19
80	240	21.40
96	396	23.57
120	492	24.51
132	540	24.92
192	792	26.58
240	992	27.56
252	1040	27.76
300	1232	28.50
312	1284	28.68
432	1784	30.11
480	1980	30.56
540	2284	31.18
600	2540	31.64
612	2588	31.72

Fig. 5-97 Nominal loadings of individual channel systems

No. of channels in system	**Bandwidth in kHz**	**Level reduction / dB** $10\log \cdot \frac{B}{1,74kHz}$
792	3272	32.74
900	3828	33.42
960	4040	33.66
972	4088	33.71
1092	4880	34.48
1200	5284	34.82
1260	5540	35.05
1332	5872	35.28
1380	5700	35.15
1500	6968	36.03
1800	7844	36.54
1872	8148	36.71
2100	9848	37.53
2400	11088	38.04
2580	10652	37.87
2700	12044	38.40
3600	17000	39.90

Fig. 5-97 Nominal loadings of individual channel systems

5.14.16 Bandwidths

LEVEL, HOT TONE SEARCH, AUTOSTEP modes

Selecting the bandwidth:

Note: The optional bandwidth is set using [F R3] (see section 8.1.5 on page 8-6.).

- Call up the **operating mode** (e.g. LEVEL).
- Press **[BANDW]** to open the BANDWIDTH menu.
- Press **[F L1] ... [F R4]** to select the bandwidth required. The display reverts automatically to the main menu.

  25 Hz = This narrow filter is suitable for analyzing closely-spaced signal components or for measuring noisy signals.

  100 Hz = This filter allows the instrument to be used for measurements on FM VFT systems.

  1740 Hz[1] = This filter has the effective bandwidth of an ITU-T weighted telephone channel.

  3100 Hz = This filter has the bandwidth of a telephone channel. It is used to measure power and unweighted noise levels in the telephone channel.

  48 kHz (SWEPT) = This bandwidth can be used to measure the power level in a supergroup.

  240 kHz (SWEPT) = This bandwidth can be used to measure the power in a master group.

  WIDE = When *WIDEBAND* is selected, the instrument operates as a broadband receiver. This allows you to measure the broadband loading of a communications system, such as the baseband loading of a CF path.

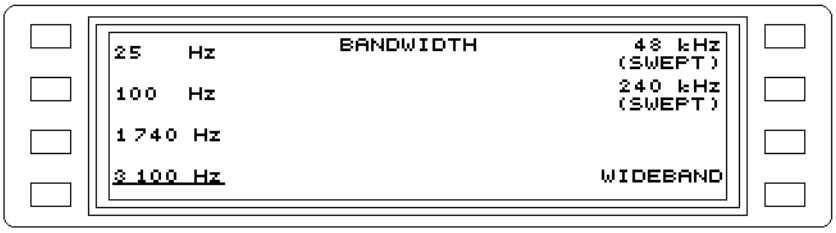


Fig. 5-98 Selecting the bandwidth, e.g. for LEVEL mode

1 1950 Hz if the C-Message filter is activated (see TEST & CONFIG auxiliary function)

5.14.17 Weighting filters

Selecting the weighting filter:

JITTER mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[LEVEL]** to call up JITTER mode.
- Press **FILTER** [F R3] to change to the filter menu.
- Press **[F L1] ... [F L3]** to select the filter required. The display reverts automatically to the main menu:

  20 ... 300 Hz = Standard jitter (STD)

  4 ... 300 Hz = Standard jitter (STD) and low frequency jitter (LF)

  4 ... 20 Hz = Low frequency jitter (LF)

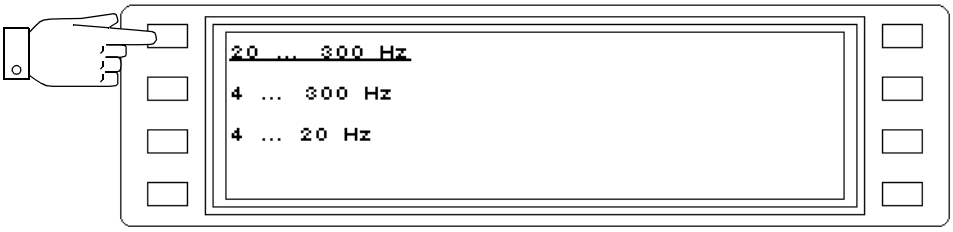


Fig. 5-99 Selecting the filter

IMPULSIVE NOISE mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[DMOD]** to call up IMPULSIVE NOISE mode.
- Press **FILTER** [F R3] to change to the filter menu.
- Press **[F L1] ... [F L3]** to select the filter required. The display reverts automatically to the main menu:

  FLAT

  300 ... 500 Hz

  600 ... 3000 Hz

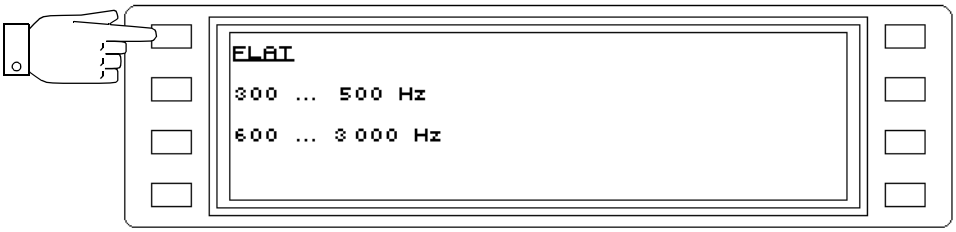


Fig. 5-100 Selecting the filter

Selecting the notch filter:

DEMODULATION mode

- Press **[DMOD]** to call up DEMODULATION mode.
- Press **NOTCH/PSOPH** [F R3] to call up the filter menu.
- Press **NOTCH** [F R3] to select and set the required notch filter.

  825 Hz

  1010 Hz
- Press **[PREV]** to return to the previous menus step by step, **or**.
- Press **[RTN]** to return to the main menu of the current operating mode.

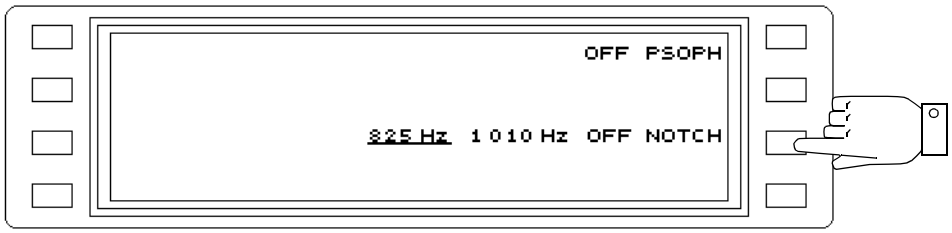


Fig. 5-101 Setting and activating the notch filter

IMPULSIVE NOISE mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[DMOD]** to call up IMPULSIVE NOISE mode.
- Press **PARAMETER** [F L4] to call up the parameter menu.
- Press **NOTCH** [F R3] to select and set the required notch filter:

  825 Hz

  1010 Hz
- Press **[PREV]** to return to the previous menus step by step, **or**.
- Press **[RTN]** to return to the main menu of the current operating mode.

Activate psophometer or C-Message weighting filter:

DEMODULATION mode

Note: Either the psophometer filter or the C-Message weighting filter can be selected, depending on the setting chosen in the TEST& CONF menu.

- Press **[DMOD]** to call up DEMODULATION mode.
- Press **NOTCH/PSOPH** [F R3] to call up the NOTCH/PSOPH menu.
- Press **PSOPH (CMES)** [F R1] to activate the filter.
- Press **[PREV]** to return to the previous menus step by step, **or**.
- Press **[RTN]** to return to the main menu of the current operating mode.

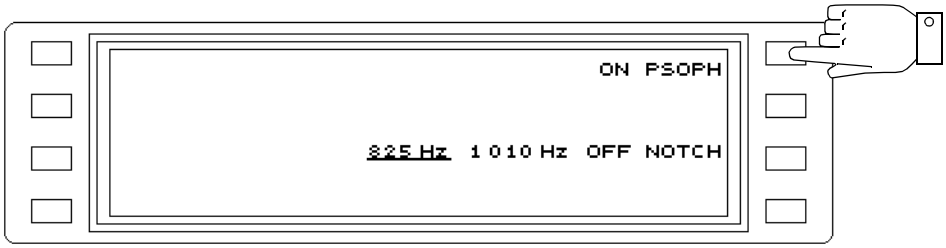


Fig. 5-102 Activating the psophometer filter

5.14.18 Scaling

LEVEL, DEMODULATION, VOICE modes

Selecting the scaling

Note: In LEVEL mode, an additional scaling of 0.2 dB /division is available.

- Call up the operating mode (e.g. LEVEL).
- Press **|---|---**|-- [F L2] to call up the SCALE menu.
- Press **dB/Div** [F R3] to set the required scaling (scroll-through function)
- Press **[PREV]** to return to the previous menus step by step, **or**.
- Press **[RTN]** to return to the main menu of the current operating mode.

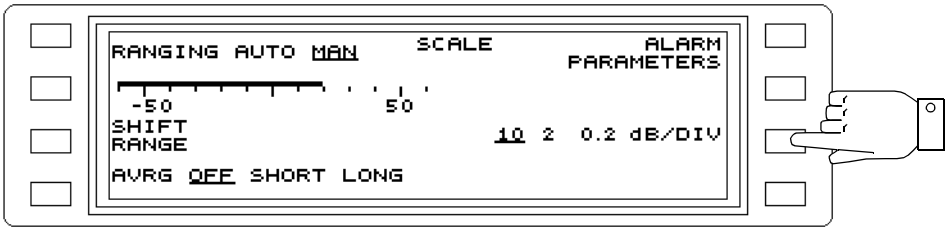


Fig. 5-103 Setting the scaling

5.14.19 Setting the scale reference manually

LEVEL mode

Setting the scale reference manually:

- Call up the operating mode (e.g. LEVEL).
- Press **|---|---**|-- [F L2] to call up the SCALE menu.
- Press **RANGING** [F L1] to switch from auto to manual ranging.
- Press **SHIFT RANGE** [F L3] to enable entry of a scale reference.
  Alter the **scale reference** stepwise using the rotary control or the arrow keys. The step width depends on the scaling selected.
- Press **[PREV]** to return to the previous menus step by step, **or**.
- Press **[RTN]** to return to the main menu of the current operating mode.

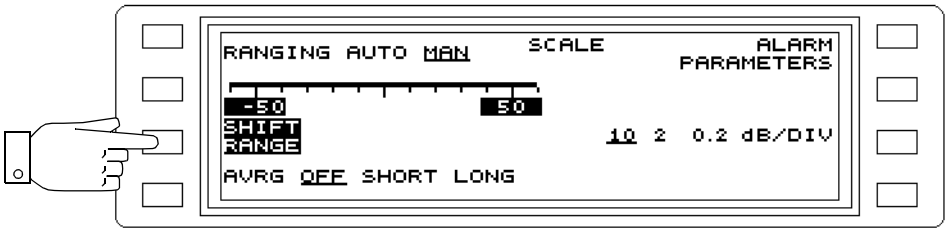


Fig. 5-104 Setting the scale reference manually

5.14.20 Selecting the scale

HOT TONE SEARCH, AUTOSTEP, SWEEP modes

Selecting the scale:

- Call up the operating mode (e.g. AUTOSTEP).
- Press **SCALE** [F L2] to call up the SCALE menu.
- Press **[F L1]** ... **[F R2]** to select the scale required. The display reverts automatically to the main menu of the current operating mode.

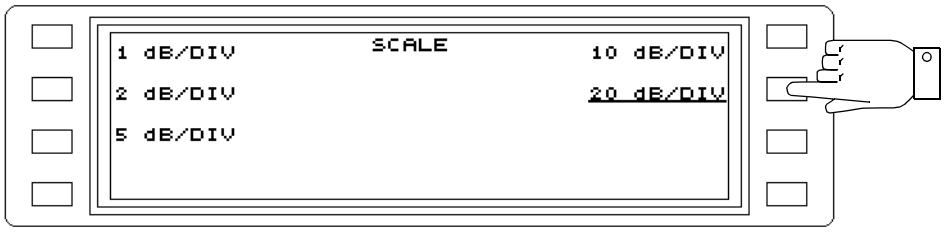


Fig. 5-105 Selecting the scale

5.14.21 Display averaging

The display may fluctuate and make reading the results difficult when measuring small signals at relatively small bandwidths. To achieve a stable display, even when the signal is noisy, display averaging can be activated. Select between SHORT averaging time for signals with a low proportion of noise and LONG for very noisy signals.

Setting and activating display averaging:

LEVEL, DEMODULATION, VOICE modes

Note: If display averaging is on, the resolution of the digital result display increases to two decimal places.

- Call up the operating mode (e.g. LEVEL).
- Press **|---|---**|-- [F L2] to call up the SCALE menu.
- Press **AVRG** [F L4] to select the averaging required.

  OFF = Display averaging off.

  SHORT = Short averaging time.

  LONG = Long averaging time.
- Press **[RTN]** to return to the main menu of the current operating mode.

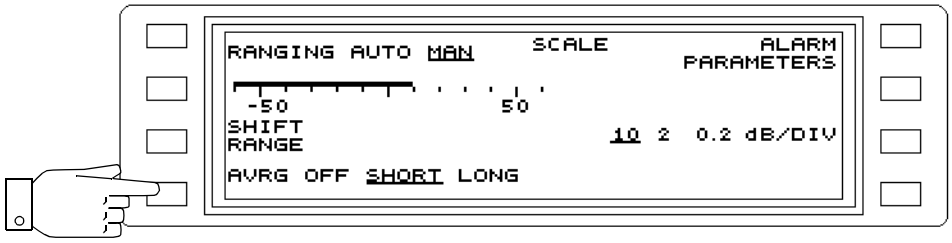


Fig. 5-106 Setting the averaging, e.g. SHORT

NPR mode

- Press **[NPR]** to call up NPR mode.
- Press **AVRG** [F L2] to activate / deactivate display averaging.

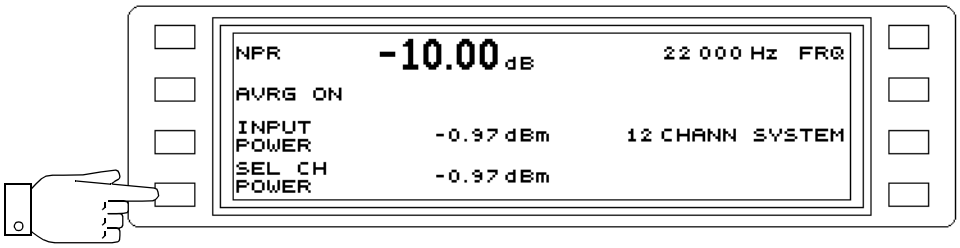


Fig. 5-107 Display averaging activated

5.14.22 Maximum hold function

HOT TONE SEARCH mode

Activating the MAXHLD function causes the largest r.m.s. value of a varying signal level occurring during the observation period to be displayed. In this way it is possible to determine whether interference tones or hot tones occur within a given period in both free and occupied channels of a communications system. The signal duration must, however, be sufficient for the instrument's autoranging function to set itself to the signal.

Activating / deactivating maximum hold

- Press **[HOT]** to call up HOT TONE SEARCH mode.
- Press **MAXHLD** [F R3] to toggle between ON and OFF.

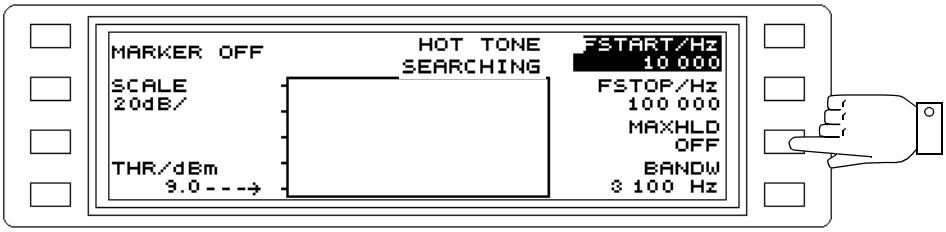


Fig. 5-108 MAXHLD function disabled

5.14.23 Marker function

HOT TONE SEARCH, AUTOSTEP, SWEEP modes

Activate / deactivate marker function

Note: The marker function can be enabled or disabled during a search or during a measurement.

- Call up the operating mode (e.g. HOT TONE SEARCH).
- Press **MARKER** [F L1] to call up the marker menu.
- Press **SHOW MARKER** [F L2] to activate / deactivate the marker function.
- Press **[PREV]** to return to the previous menus step by step, **or**.
- Press **[RTN]** to return to the main menu of the current operating mode.

- **The frequency and level values** of the first hot tone or measured point are displayed immediately. Other pairs of values can be displayed using the rotary control or arrow keys.

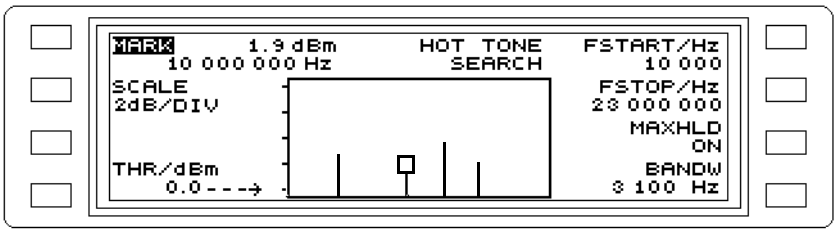


Fig. 5-109 HOT TONE SEARCH mode: Marker function on; display of frequency and level values

HOT TONE SEARCH, AUTOSTEP modes

Evaluating marker frequency and level in LEVEL mode:

Note: Activate the marker function.

- Call up the operating mode (e.g. HOT TONE SEARCH).
- Press **MARK** [F L1] to call up the marker menu.
- Press **MRK FRQ - - > LEVEL MEAS** to change to LEVEL mode. The current marker frequency is set and the level measured.

SWEEP mode

Setting the center frequency to the marker frequency:

Note: Activate the marker function.

- Press **[Blue key]** to call up the secondary functions.
- Press **[HOT]** to call up the main menu for SWEEP mode.
- Press **MARK** [F L1] to call up the marker menu.
- Press **MRK FRQ - - > FCNT** to set the actual marker frequency as the new center frequency.

5.14.24 STEP parameters

AUTOSTEP mode

Frequency step width

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up the main menu for AUTOSTEP mode.
- Press **STEP PAR** [F R2] to call up the step parameter menu.
- Press **STEP WIDTH** [F R2] to enable entry of the step width.
- Enter the **frequency step width** using the number keys, rotary control or arrow keys. Press **[kHz]**, **[MHz]** or **[ENTER]** to complete entries made using the number keys.

  The number of STEPS is calculated from the frequency step width and the current frequency range.

Number of frequency steps (alternative entry)

Note: A maximum of 100 STEPS can be entered.

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up the main menu for AUTOSTEP mode.
- Press **STEP PAR** [F R2] to call up the step parameter menu.
- Press **STEPS** [F R3] to enable entry of the number of steps.

- Enter the **number** of steps using the number keys, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the number keys.

Step speed:

- Press **[Blue key]** to call up the secondary functions.
- Press **[NPR]** to call up the main menu for AUTOSTEP mode.
- Press **STEP PAR** [F R2] to call up the step parameter menu.
- Press **TIME/STEP** [F L1] to change the step speed.

  1 s, 3 s = time for each frequency step setting

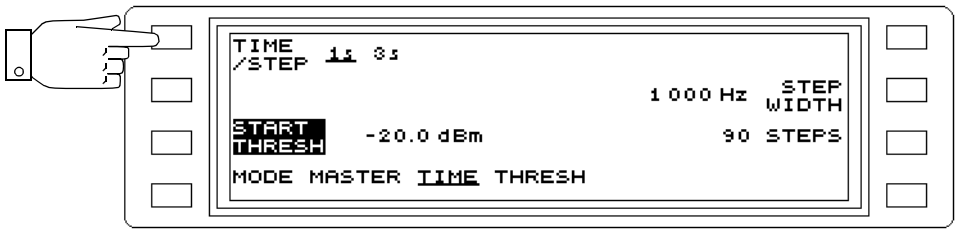


Fig. 5-110 Entering the step speed

5.14.25 Start mode

IMPULSIVE NOISE, INTERRUPTIONS modes

Setting the start mode:

- Call up the operating mode (e.g. INTERRUPTIONS).
- Press **START** [F R2] to call up the start mode.
- Press **START** [F R1] to set the start mode.

  MAN = The measurement must be started manually by pressing the [START(STOP)] key.

  AUTO = The measurement starts automatically at the time set on the timer.

Fig. 5-111 Setting the start mode

Setting the time for an automatic measurement start:

- Call up the operating mode (e.g. INTERRUPTIONS).
- Press **START** [F R2] to call up the start mode.
- Press **START TIME** [F R2] to enter the time.
- Enter the **time** using the number keys (in hours and minutes separated by a full stop) or using the rotary control.
- Press **[ENTER]** to complete the entry.
- Press **[PREV]** to return to the previous menus step by step, **or**.

- Press **[RTN]** to return to the main menu of the current operating mode.

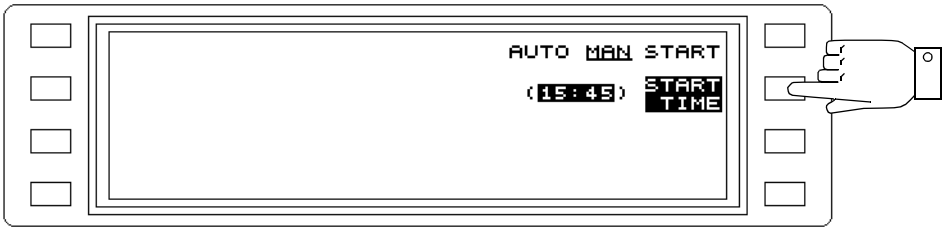


Fig. 5-112 Entering the time, e.g. 15:45

5.14.26 Gate time

IMPULSIVE NOISE, INTERRUPTIONS modes

Setting the gate time:

- Call up the operating mode (e.g. INTERRUPTIONS).
- Press **GATE TIME** [F R1] to enable entry of the gate time.
- Enter the **time** using the number keys (in hours and minutes separated by a full stop) or using the rotary control.
- Press **[ENTER]** to complete the entry.

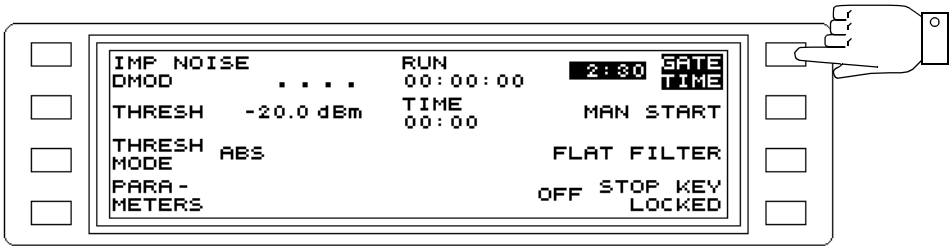


Fig. 5-113 Entering the gate time, e.g. 2 hours 30 minutes

5.14.27 Dead time

INTERRUPTIONS mode

Selecting the dead time

- Call up the operating mode (e.g. INTERRUPTIONS).
- Press **DEAD TIME** [F R3] to select the required dead time.

  3 ms or 125 ms = No interruptions are detected during this time.

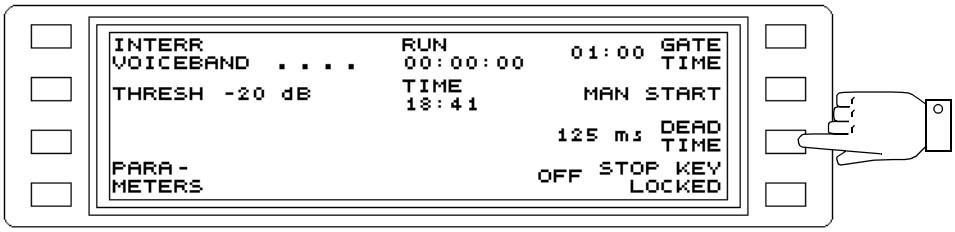


Fig. 5-114 Entering the dead time, e.g. 125 ms

5.14.28 Acoustic warning (BEEP)

IMPULSIVE NOISE, INTERRUPTIONS modes

Activating /deactivating the function:

- Call up the operating mode (e.g. INTERRUPTIONS).
- Press **PARAMETER** [F L4] to call up the parameter menu.
- Press **BEEP** [F L1] to activate / deactivate the function.

  ON = Events are signalled by a beep.

  OFF = Events are not signalled by a beep.

Fig. 5-115 Beeper switched off

5.14.29 Sweep time

SWEEP mode

Setting the sweep time manually:

- Press **[Blue key]** to call up the secondary functions.
- Press **[HOT]** to call up the main menu for SWEEP mode.
- Press **SWEEP PAR** [SK R3] to call up the sweep parameter menu.
- Press **SWEEP TIME** [SK L2] to call up the sweep time menu.

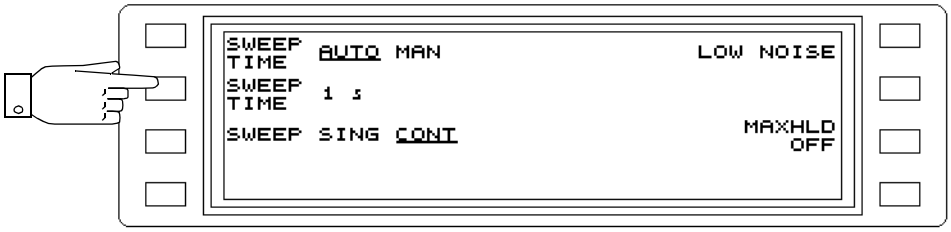


Fig. 5-116 Setting the sweep time

- Press **[SK L1] to [SK R2]** to select the required sweep time. The sweep parameter menu reappears automatically.
- Press **[PREV]** to return to the previous menus step by step.
- Press **[RTN]** to return to the main menu of the current operating mode

Fig. 5-117 Selecting the sweep time

5.14.30 Reference line

AUTOSTEP, SWEEP modes

The reference line determines the drive limit for the instrument. It should therefore be selected to correspond with the maximum expected input level to avoid incorrect measurements.

Entering the reference line:

- Press **[Blue key]** to call up the secondary functions.
- Press **[HOT]** e.g. to call up SWEEP mode.
- Press **- - - > dBm** [SK L2] to enable entry of the reference line.
- Enter a **level value** using the numerical keypad, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the numerical keypad.

5.14.31 Drive conditions

Depending on the measurement task, it may be useful to optimize the dynamic range of the measuring receiver for maximum signal-to-noise ratio (LOW NOISE) or minimum distortion (LOW DISTORTION).

Low noise setting is useful when displaying the transfer function of a two-port network having a high attenuation difference within the selected frequency range (network analysis).

Low distortion setting is useful when measuring the non-harmonic components of an input signal without invoking measurement errors due to the intrinsic distortion of the measuring receiver (spectrum analysis).

SWEEP mode

- **Press [Blue key]** to call up the secondary functions.
- **Press [HOT]** to call up the main menu for SWEEP mode.
- **Press SWEEP PAR** [SK R3] to call up the sweep parameter menu.
- **Press [SK R1]** to toggle between the settings LOW NOISE and LOW DISTORTION.
- **Press [PREV]** to return to the previous menus step by step.
- **Press [RTN]** to return to the main menu of the current operating mode.

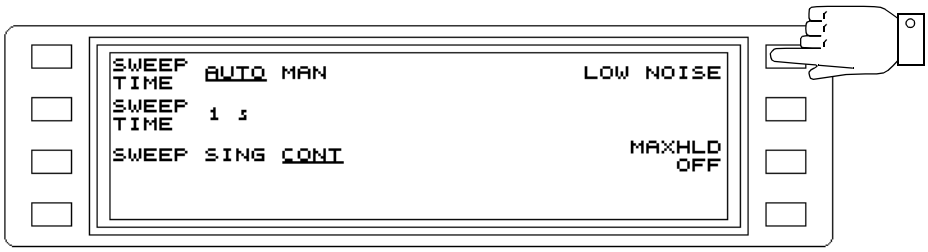


Fig. 5-118 Setting the drive conditions

5.15 Calibration

The instrument calibrates automatically

– after switch on,
– whenever a parameter relevant to a measurement is changed,
– at regular intervals after switch on,
– if the instrument temperature changes.

This ensures that the instrument always measures with maximum accuracy.

Measurements are interrupted by calibration. If this is undesirable, e.g. during long-term monitoring, the calibration function can be disabled.

Enabling / disabling automatic calibration:

- Press **[CAL]** to enable or disable automatic calibration (toggle function). The red LED of the key is lit when automatic calibration is switched off.

Notes:

5.16 Setups

Up to 7 complete instrument settings (SETUPS) can be stored in the internal memory of the instrument for recall at any time.

If a MEMORY CARD is used (SPM/PSM-137/-138/-139) the number of memory positions can be increased to 97.

Calling up the SETUP menu

- Press **[Blue key]** to call up the secondary functions.
- Press **[IMPED]** to call up the SETUP menu.

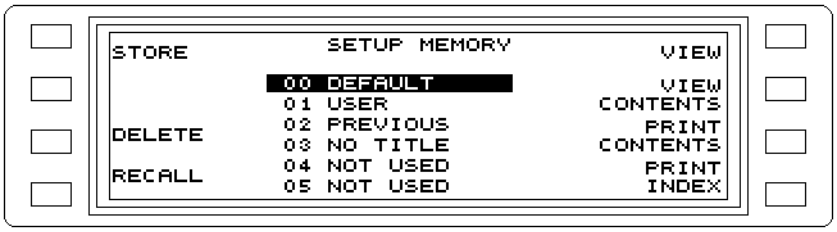


Fig. 5-119 Main menu for the SETUP MEMORY function

5.16.1 Addresses

The instrument settings are stored at the following addresses. Only one setup can be stored at each address. The entire memory available, i.e. internal and Memory Card, is displayed.

If the Memory Card addresses are to be used, a Memory Card must be placed in the card slot.

Instrument internal memory

Total memory area: Addresses 00 to 09

Reserved memory: Addresses 00 to 02

Note: Addresses 00 to 02 cannot be overwritten.

Address 00 = DEFAULT SETUP: Default settings for reset (initialization).

Address 01 = USER: Instrument setting to be assumed at power on, selected by the user (see POWER ON SETUP in TEST & CONFIG menu)

Address 02 = PREVIOUS: Instrument settings at the point power was last switched off.

Available memory area: Addresses 03 to 09

MEMORY CARD (SPM/PSM-137/-138/-139)

Memory area: Addresses C10 to C99

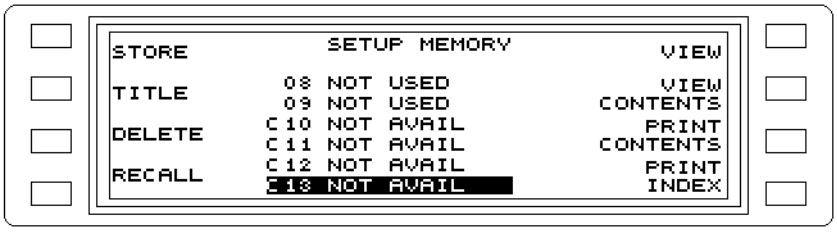


Fig. 5-120 Indication of memory address areas when no Memory Card s available

Address labelling

DEFAULT SETUP: Default settings for reset (initialization).

USER: Instrument setting to be assumed at power on, selected by the user (see POWER ON SETUP in TEST & CONFIG menu)

PREVIOUS: Instrument settings at the point power was last switched off.

NOT USED Unused memory position.

NO TITLE Memory position occupied but no title assigned to setup.

NOT AVAIL Memory position not available as no Memory Card fitted.

5.16.2 Storing a setup

Note: The parameters relevant to measurements with the other measurement modes are stored along with those of the current measurement mode.
It is therefore a good idea to set the other measurement modes according to requirments before storing the setup.
In this way, only the appropriate mode key need be pressed after recalling a setup in order to begin measurements immediatel with the correct settings.

- **Set the instrument** as required.
- Press **[Blue key]** to call up the secondary functions.
- Press **[IMPED]** to call up the SETUP menu.
- **Select the address** using the rotary control or arrow keys.
  If the setup is to be stored on a Memory Card, place a formatted card in the card slot.
- Press **STORE** [F L1] to store the setup. The label changes from NOT USED to NO TITLE. The instrument setting is stored.

Note: If the address is already used, a prompt will ask if you want to overwrite it.

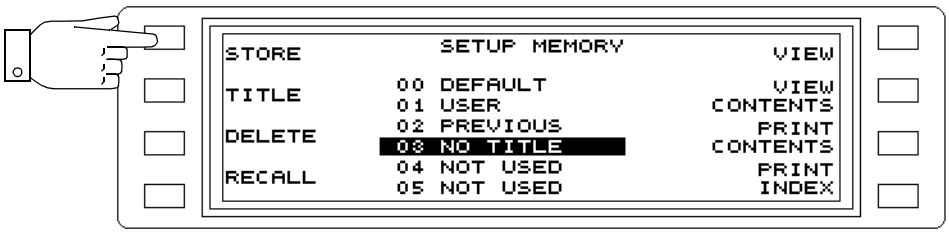


Fig. 5-121 Selecting the address for storing the current instrument setting

5.16.3 Labelling setups

Setups which have been stored can be labelled with a name of up to 12 characters after pressing the appropriate function key.

- Press **TITLE** [F L2] to call up the TITLE menu for labelling the current setup.
- **Select a character** using the rotary control, arrow keys or [F L2] and [F R2] by placing the cursor under the required character.
- Press **INSERT CHR** [F R3] to store the selected character.
- Select the next character and store by pressing INSERT CHR and so on until the label has been entered.
- Pressing **DELETE CHR** [F R4] deletes the last character entered.
- Press **ENTER TITLE** [F L4] to assign the label to the current setup.

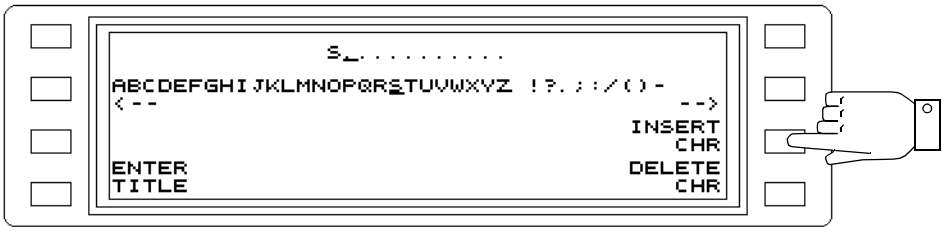


Fig. 5-122 Labelling a setup

5.16.4 Recalling a setup

Setups can be recalled from the memory as often as required. The instrument setting applies immediately and measurements in the selected mode can begin immediately.

- Press **[Blue key]** to call up the secondary functions.
- Press **[IMPED]** to call up the SETUP menu.
- **Select the address** using the rotary control or arrow keys.
  If the setup is to be recalled from a Memory Card, place a formatted card in the card slot.
- Press **RECALL** [F L4] to recall the selected setup.
  The instrument will be set accordingly.

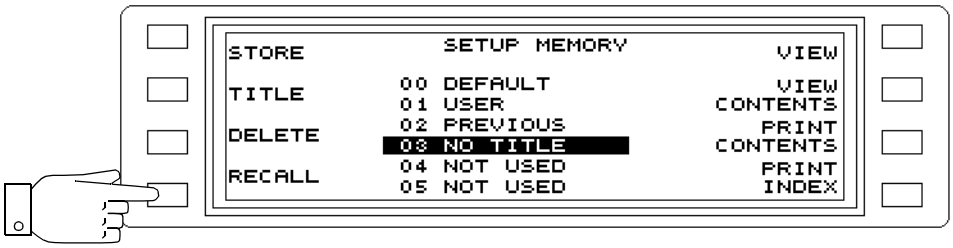


Fig. 5-123 Selecting the address of the required setup

5.16.4.1 Deleting a setup

- Press **[Blue key]** to call up the secondary functions.
- Press **[IMPED]** to call up the SETUP menu.
- **Select the address** using the rotary control or arrow keys.
  If the setup is to be deleted from a Memory Card, place a formatted card in the card slot.
- Press **DELETE SETUP** [F L3] to delete the setup after you have confirmed that you want to delete the setup.

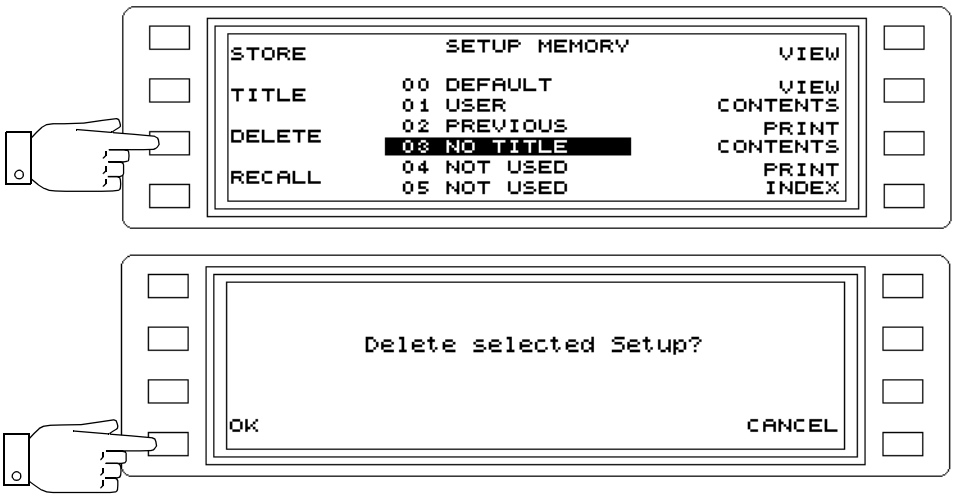


Fig. 5-124 Selecting the address of a setup to be deleted

5.16.4.2 Displaying setups

The setup contains the stored measurement mode and all parameters relevant to the measurement. It also contains the parameter settings for the other measurement modes which were current when the setup was stored.

The VIEW and VIEW CONTENTS functions can be used to view the setups without activating them.

VIEW displays the parameters for the initial measurement mode which is set when the selected setup is recalled.

VIEW CONTENTS displays all measurement parameters for all measurement modes stored in the selected setup.

Viewing the measurement parameters of the current setup measurement mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[IMPED]** to call up the SETUP menu.
- **Select the address** using the rotary control or arrow keys.
- Press **VIEW** [F R1] to view the parameters for the current measurement mode.

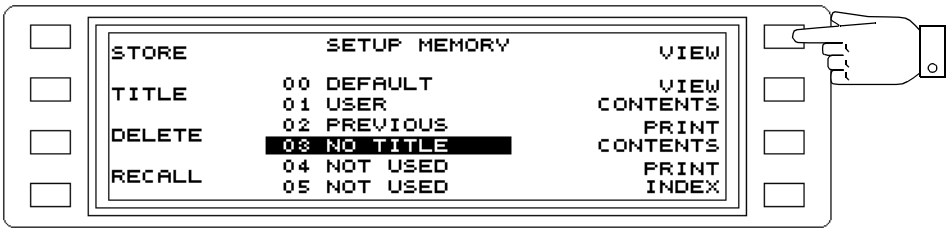


Fig. 5-125 Display of measurement parameters for the measurement mode set after recalling a setup

The contents of the selected setup can be scrolled through using the rotary control.

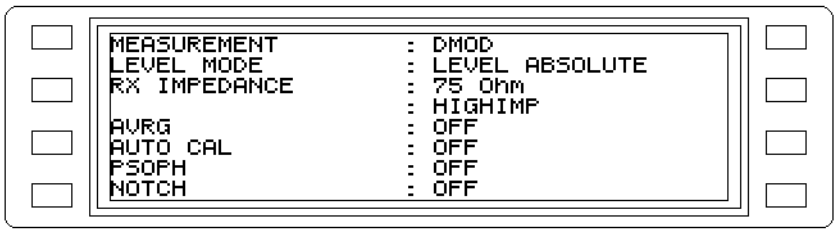


Fig. 5-126 Display of measurement parameters

Displaying the measurement parameters for all measurement modes

- Press **[Blue key]** to call up the secondary functions.
- Press **[IMPED]** to call up the SETUP menu.
- **Select the address** using the rotary control or arrow keys.
- **VIEW CONTENTS** [F R2] to view the entire contents of the setup.

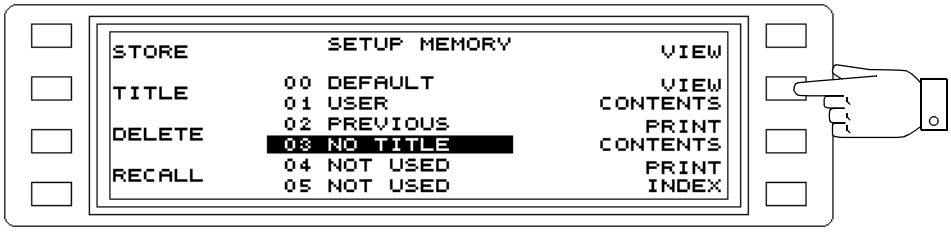


Fig. 5-127 Displaying all measurement parameters for all measurement modes stored in a setup

Display of the entire setup. The contents of the selected setup can be scrolled through using the rotary control.

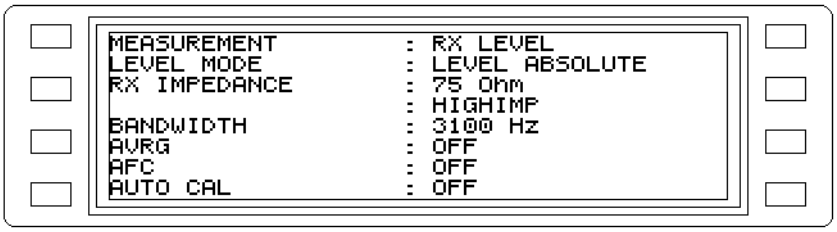


Fig. 5-128 Display of all measurement parameters

5.16.4.3 Printing out the setup contents or setup index

Printing out the setup index

- Press **[Blue key]** to call up the secondary functions.
- Press **[IMPED]** to call up the SETUP menu.
- Press **PRINT INDEX** [F R4] to print out the setup index (list).

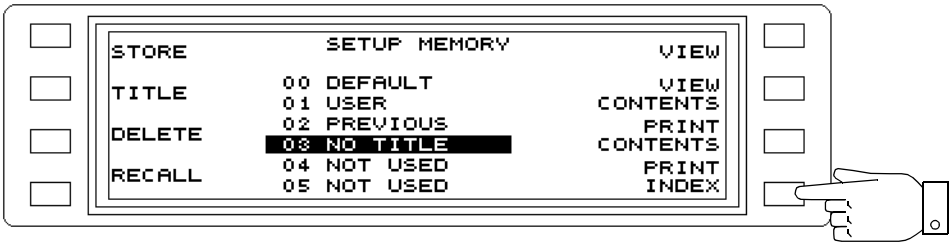


Fig. 5-129 Printing out the setup index

Printing out the setup contents

- Press **[Blue key]** to call up the secondary functions.
- Press **[IMPED]** to call up the SETUP menu.
- Press **PRINT CONTENTS** [F R3] to print out the setup contents.

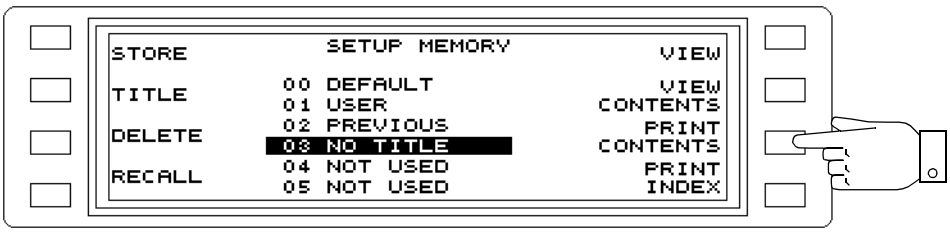


Fig. 5-130 Printing out the setup contents

Cancelling the print job:

The message "PRINTING" is displayed next to the function key in place of PRINT CONTENTS or PRINT INDEX. The print job menu is called up by pressing the appropriate function key. When the print job is complete, the original functions are restored.

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **PRINTING** [F R3] or [F R4] to call up the print job menu.
- Press **OK** [F L4] to confirm the query "Abort print job?" and cancel the printout.

- Press **CANCEL** [F L4] to continue printing.

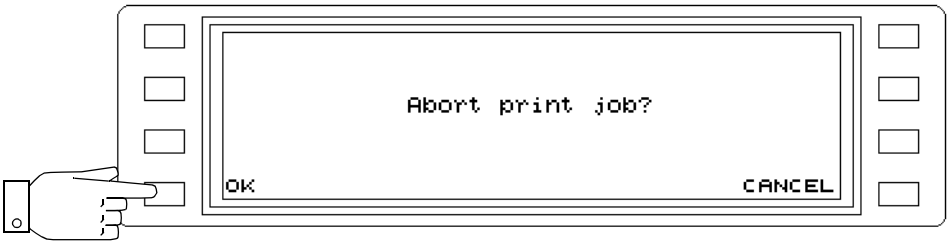


Fig. 5-131 Cancelling the print job

5.16.4.4 Notes on the Memory Card

Setups are stored in the directory BN2203/SETUPS of the Memory Card. This directory is created automatically when a setup is stored on the Memory Card
(see section 3.7 on page 3-12.).

5.17 Documenting the results

All instrument versions[1] are capable of documenting the results using an external printer.

They can also be stored on a Memory Card if the SPM/PSM-137/-138-139 are used.

The following describes the most important features of the results documentation function:

– Automatic documentation of results on completion of a measurement as determined by the current operating mode
– Manual triggering of result documentation
– Selection between various printers
– Display or printout of the contents of a measurement result file
– Simultaneous documentation on the printer and the Memory Card (SPM/PSM-137/-138-139).

All parameters required for result documentation are found in the DOCUMENTATION menu.

Calling up the DOCUMENTATION menu:

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.

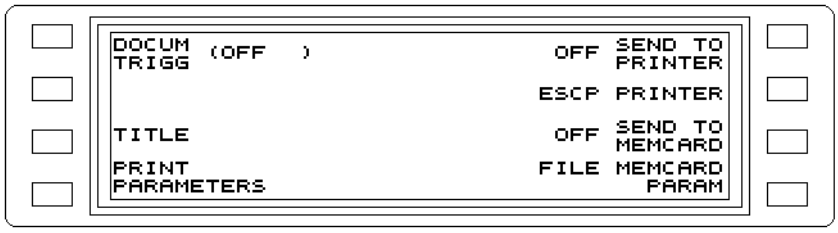


Fig. 5-132 Main menu of the DOCUMENTATION function

5.17.1 Labelling the measurement result record

A header line for the results record can be entered using a menu selection. The title or label is applied to both the printout and the stored record.

Note: The title must be entered before the result record is printed out.

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **TITLE** [F L3] to call up the TITLE menu for entering a title of up to 40 characters for the measurement results record of the next measurement.
- **Select a character** using the rotary control, arrow keys or <-- [F L2] and --> [F R2] by placing the cursor under the required character.
- Press **INSERT CHR** [F R3] to store the selected character.
- Select the next character and store by pressing INSERT CHR and so on until the title has been entered.
- Pressing **DELETE CHR** [F R4] deletes the last character entered.
- Press **ENTER TITLE** [F L4] to assign the title to the current measurement record.
- Press **[PREV]** to return to the previous menus step by step **or**

1 The SPM/PSM-37/-38/-39 instrument versions must be equipped with Option 2203/00.05 (IEEE 488.2/V.24 Interface).

- Press **[RTN]** to return to the main menu of the current operating mode.

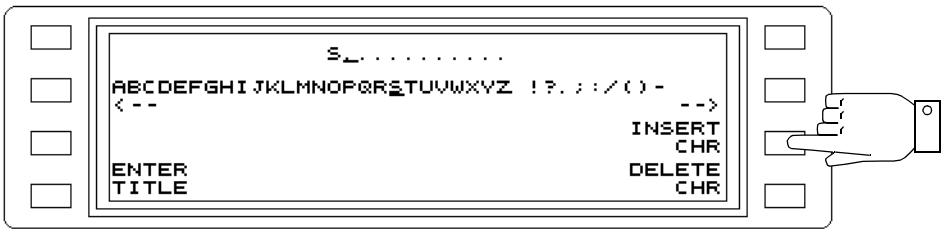


Fig. 5-133 Entering a title for the measurement record

5.17.2 Preparing to print out results

Various settings need to be made before the results can be printed out.

Setting the printer as output device:

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **SEND TO PRINTER** [F R1] to set the printer as the output device. The display changes from OFF to ON. The LED next to EXT PRINTER below the [EXEC] key comes on.
  ON = Results output to the external printer.
  OFF = Results not output to external printer.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

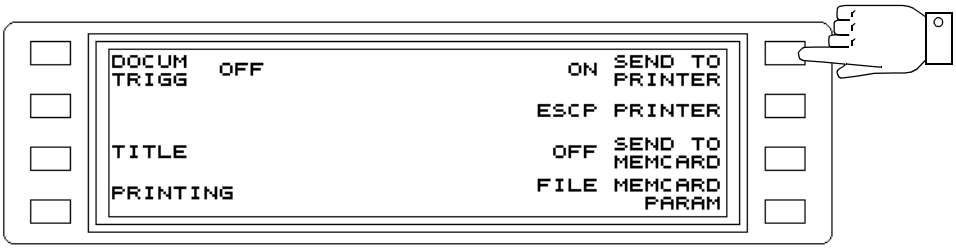


Fig. 5-134 Setting the printer as output device

Selecting the printer type:

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **PRINTER** [F R2] to change to the PRINTER menu.
- Press **TYPE** [F L2] to change the printer type.
- Press **PCL** [F R1], **ESCP** [F R2] or **THINK JET** [F R3] to select the type required.
  PCL = Laser printer, e.g. HP Laserjet series II
  ESCP = Pin printer, e.g. Epson FX 80
  THINK JET = Inkjet printer, e.g. HP Thinkjet
- Press **[PREV]** to return to the previous menus step by step **or**

- Press **[RTN]** to return to the main menu of the current operating mode.

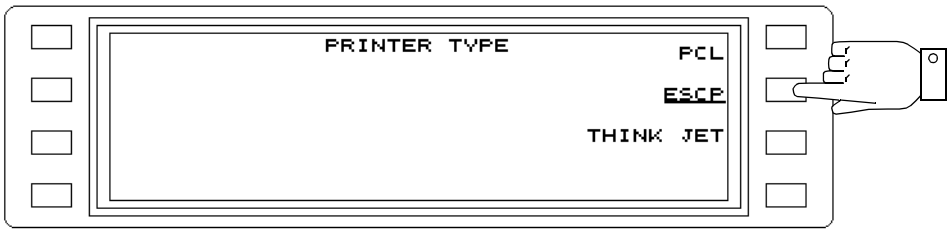


Fig. 5-135 Selecting the printer type

If required: Specify page length:

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **PRINTER** [F R2] to change to the printer parameter menu.
- Press **PAGE LENGTH** [F R1] to enable entry of the number of lines per page to be printed.
- **Enter the number of lines** using the rotary control, arrow keys or number keys. Press **[ENTER]** to complete entries made with the number keys.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

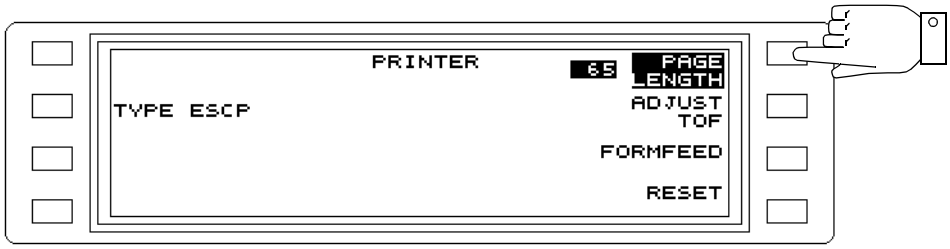


Fig. 5-136 Specifying the page length

Reset the line counter:

Note: Only required for pin and inkjet printers.

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **PRINTER** [F R2] to change to the printer parameter menu.
- Press **ADJUST TOF** [F R2] to reset the internal line counter (top of file).
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

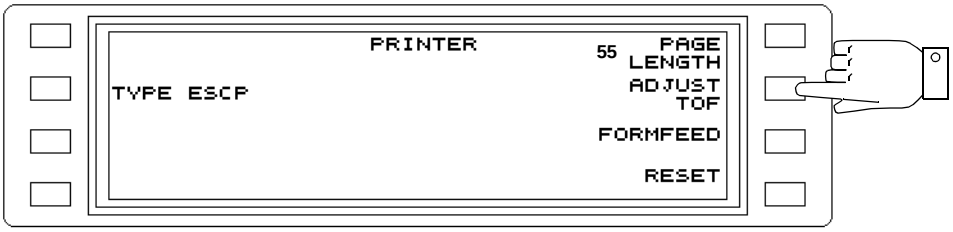


Fig. 5-137 Resetting the line counter

If required: Reset printer

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **PRINTER** [F R2] to change to the printer parameter menu.
- Press **RESET** [F R4] to reset the printer, i.e. set it to a defined state. This may include adjusting the print head position, clearing the buffer and so on.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

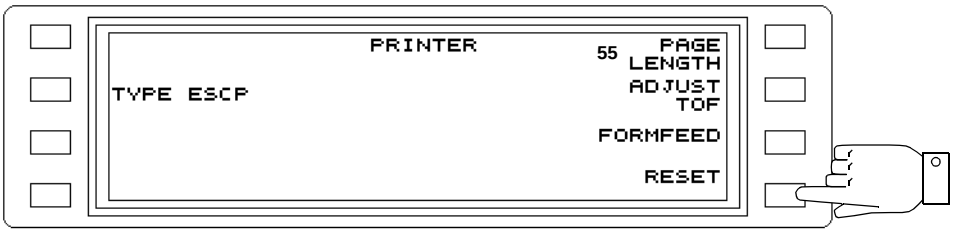


Fig. 5-138 Resetting the printer

If required: Trigger manual form feed:

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **PRINTER** [F R2] to change to the printer parameter menu.
- Press **FORMFEED** [F R3] to set the paper to the start of the next page.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

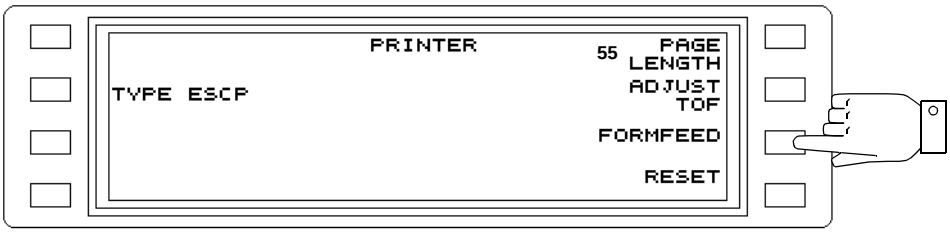


Fig. 5-139 Triggering a form feed

5.17.3 Preparing to store measurement results (SPM/PSM-137/-138-139)

Various settings need to be made before results can be stored on a Memory Card. For all the instructions below, a Memory Card must be present in the card slot.

Setting the Memory Card as output device:

Note: Determine the measurement result file.

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **SEND TO MEMCARD** [F R3] to select the MEMCARD as output device. The LED next to MEMCARD below the [EXEC] turns on.
  ON = Results are stored on the Memory Card.
  OFF = Results are not stored on the Memory Card.

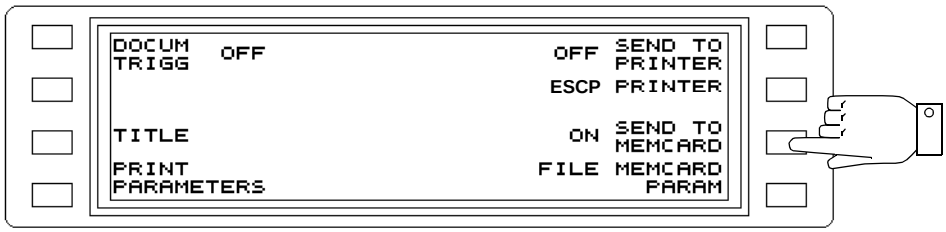


Fig. 5-140 Selecting the Memory Card as output device

Creating a result file or selecting an existing file as the current result file:

Creating a result file

Note: Observe the DOS name convention.
The name should be limited to 8 characters.

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **MEMCARD PARAM** [F R4] to call up the Memory Card parameter menu
- **Select a character** using the rotary control, arrow keys or <-- [F L2] and --> [F R2] by placing the cursor under the required character.
- Press **INSERT CHR** [F R3] to store the selected character.
- Select the next character and store by pressing INSERT CHR and so on until the name has been entered.
- Pressing **DELETE CHR** [F R4] deletes the last character entered.
- Press **CREATE FILE** [F L4] to store the file name. The display reverts automatically to the previous menu.

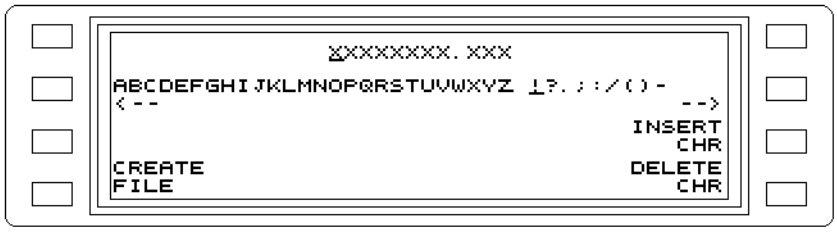


Fig. 5-141 Entering a file name for the results file

Selecting the current result file

- **Select a result file** from the existing list using the rotary control or the arrow keys.
- Press **SET ACT FILE** [F R2] to set the selected file as the current file. The file name is shown below ACT FILE in the display.

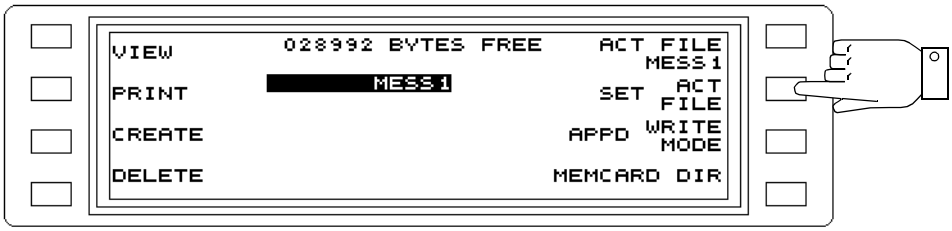


Fig. 5-142 Selecting the current result file

Storing the measurement parameters for only one set of results

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **MEMCARD PARAM** [F R4] to call up the Memory Card parameter menu.
- Press **WRITE MODE** [F L3] to set the store mode to OVER.
- Press **[PREV]** to return to the DOCUMENTATION menu.
- Press **PRINT PARAMETERS** [F L4] to store the measurement parameters on the Memory Card.
  The results can now be stored (see section 5.17.4 on page 5-110).

Note: If PRINT PARAMETERS [F L4] is pressed again, the as yet complete set of data is deleted and overwrtten. Only the last set of data is stored on the Memory Card.

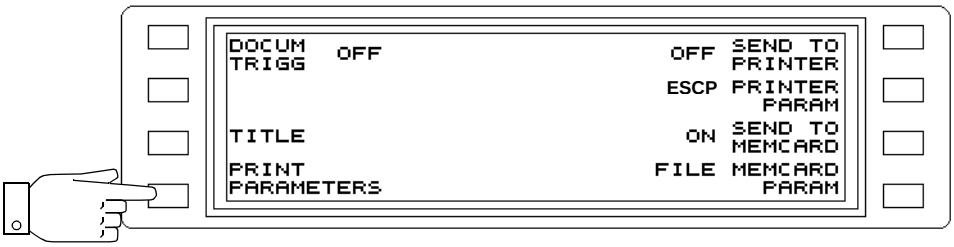


Fig. 5-143 Storing the measurement parameters

Storing the measurement parameters for further sets of results:

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **MEMCARD PARAM** [F R4] to change to the Memory Card parameter menu.
- Press **WRITE MODE** [F L3] to set the store mode to APPD (append).
- Press **[PREV]** to return to the DOCUMENTATION menu.
- Press **PRINT PARAMETERS** [F L4] o store the measurement parameters on the Memory Card.
  The results can now be stored (see section 5.17.4 on page 5-110).

Note: If PRINT PARAMETERS [F L4] is pressed again, the new set of measurement parameters and any subsequent results is appended to the previous sets of data. No data is deleted or overwritten.

5.17.4 Triggering result printout and / or storage manually

Start printout or store process:

Note

The instrument must already be set up to print out or store the results (see section 5.17.2 on page 5-105) and (see section 5.17.3 on page 5-108).

HOT TONE, AUTOSTEP, NPR modes

Note: Only manual triggering of the printout or store process is provided in these modes.

- Press **[EXEC]** to start storing and / or printing the results.

LEVEL, DEMODULATION, VOICE, JITTER, IMP NOISE, INTERRUPTIONS modes

Note: Manual or automatic triggering of the printout or store process is provided in these modes.

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **DOCUM TRIGG** [F L1] to change to the AUTO DOCUMENT TRIGGER menu.
- Press **OFF** [F L1] to disable automatic documentation.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.
- Press **[EXEC]** to start storing and / or printing the results after a measurement has been made.

The following are recorded:

Operating mode	**Results and data recorded**			
VOICE	LEVEL	TIME		
RX LEVEL	FREQUENCY	LEVEL	TIME	
DMOD	CAR FRQ	LEVEL	TIME	
NPR	NPR	INPUT POWER	SEL CH POWER	TIME
HOT TONE and AUTO STEP	FREQUENCY	LEVEL		
JITTER	FREQUENCY	JITTER	TIME	
IMPULSIVE NOISE	TIME	IMP NOISE (events)		
INTERRUPTIONS	TIME	INTERRUPTIONS (events)		

Fig. 5-144 Results which are recorded

Cancelling the print job:

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **PRINTING** [F L4] to call up the print job menu.
- Press **OK** [F L4] to confirm the query "Abort print job?" and cancel the printout.
- Press **CANCEL** [F R4] to continue printing.

Note: Function key [F L4] is labelled PRINT PARAMETERS again when the print job is finished. During the print job, the key is labelled PRINTING.

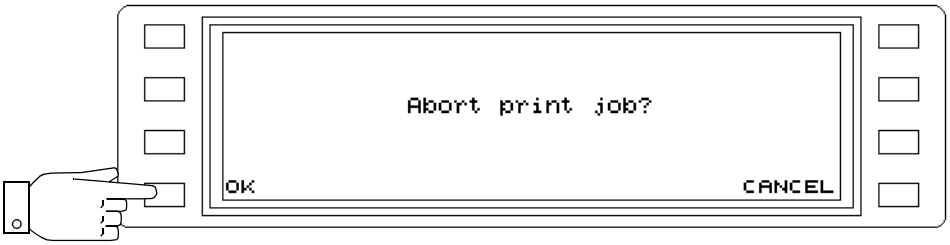


Fig. 5-145 Cancelling the print job

5.17.5 Starting result printout and / or storage automatically

Note: Make sure that a printer is connected and configured before staring a printout.
Make sure that a formatted Memory Card is in the card slot before storing results.

Timer-controlled printout or storage of results:

LEVEL, DEMODULATION, VOICE, JITTER modes

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **DOCUM TRIGG** [F L1] to change to the AUTO DOCUMENT TRIGGER menu.
- Press **TIMER** [F L3] to enable timer-controlled result documentation.
- Press **SET INV** [F R3] to enable entry of the time interval. The result documentation starts at the end of the first time interval.
- **Enter the time interval** using the rotary control, arrow keys or number keys. Press **[ENTER]** to complete entries made with the number keys.
  Pressing the [FINE] sets the resolution of the rotary control or arrow keys:
  Resolution 1 minute --> [FINE] key: LED next to the key is on.
  Resolution 10 minutes --> [FINE] key: LED next to the key is off.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

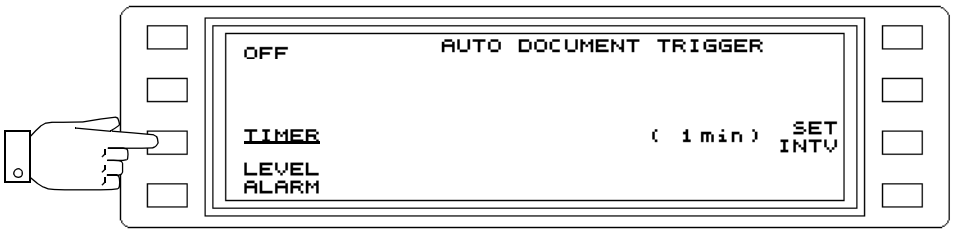


Fig. 5-146 Activating the timer

Printng or storing level alarms:

Note: The level limits must be set and activated in LEVEL mode (see section 5.14.4 on page 5-61).

LEVEL mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **DOCUM TRIGG** [F L1] to change to the AUTO DOCUMENT TRIGGER menu.
- Press **LEVEL ALARM** [F L4] to enable documentation of level alarms. The results are documented as soon as a level alarm occurs (level above or below limit values).
- Press **[PREV]** to return to the previous menus step by step **or**

- Press **[RTN]** to return to the main menu of the current operating mode.

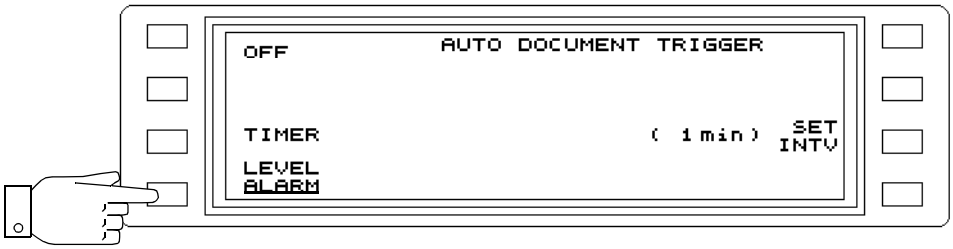


Fig. 5-147 Enabling documentation of level alarms

Event-controlled storage and /or printout of results

IMPULSIVE NOISE, INTERRUPTIONS mode

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **DOCUM TRIGG** [F L1] to change to the AUTO DOCUMENT TRIGGER menu.
- Press **EVENT** [F L4] to enable event-controlled documentation of results. Results are documented as soon as an event occurs.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

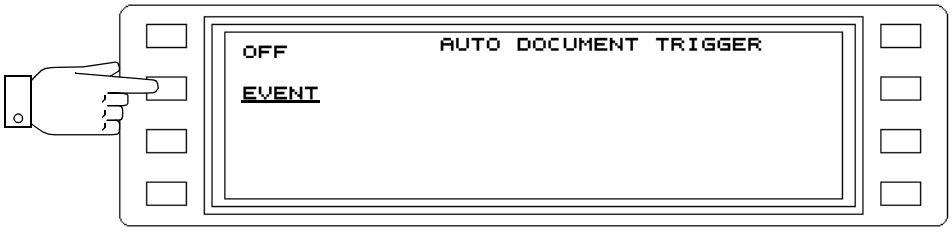


Fig. 5-148 Activating event-controlled result documentation

Ending automatic result documentation:

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **DOCUM TRIGG** [F L1] to change to the AUTO DOCUMENT TRIGGER menu.
- Press **OFF** [F L1] to disable automatic result documentation.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

5.17.6 After storing results on the Memory Card

Once results have been stored on the Memory Card, the contents of the current result file can be displayed, printed out or deleted entirely.

Displaying the result file contents

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **MEMCARD PARAM** [F R4] to change to the Memory Card parameter menu.
- **Select a result file** from the existing list using the rotary control or the arrow keys.
- Press **SET ACT FILE** [F R2] to set the selected file as the current file. The file name is shown next to ACT FILE in the display.
- Press **VIEW** [F L1] to display the contents of the current result file.
- Scroll through the **contents** of the result file using the rotary control or the arrow keys.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

Printing the contents of the result file

Note: Make sure that a printer is connected and configured before staring a printout of the result file contents.

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **MEMCARD PARAM** [F R4] to change to the Memory Card parameter menu.
- **Select a result file** from the existing list using the rotary control or the arrow keys.
- Press **SET ACT FILE** [F R2] to set the selected file as the current file. The file name is shown next to ACT FILE in the display.
- Press **PRINT** [F L2] to print out the contents of the current result file. The message PRINTING is displayed instead of PRINT.
  Pressing function key [F L2] calls up the print job menu. The print job can be cancelled from here (see section 5.17.4 on page 5-110).
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

Deleting the result file

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **MEMCARD PARAM** [F R4] to change to the Memory Card parameter menu.
- **Select a result file** from the existing list using the rotary control or the arrow keys.
- Press **SET ACT FILE** [F R2] to set the selected file as the current file. The file name is shown next to ACT FILE in the display.
- Press **DELETE** [F L4] to delete the contents of the current result file after confirming the query.
- Press **[PREV]** to return to the previous menus step by step **or**
- **RTN**
- Press **[RTN]** to return to the main menu of the current operating mode.

Calling up the Memory Card directory

- Press **[Blue key]** to call up the secondary functions.
- Press **[DOCUM]** to call up the DOCUMENTATION menu.
- Press **MEMCARD PARAM** [F R4] to change to the Memory Card parameter menu.
- Press **MEMCARD DIR** [F R4] to display the directory for the current result file (see section 3.7 on page 3-12).

5.17.6.1 Notes on the Memory Card

Results are stored in the directory BN2203/RESULTS of the Memory Card. This directory is created automatically when results are stored on the Memory Card
(see section 3.7 on page 3-12.)

5.18 Tracking generator (PSM-37/-38/-39/-137/-138/-139)

The PSM instruments are equipped with a tracking generator. These instruments are thus capable of selective measurements of attenuation and distortion. The following parameters are available:

BLANK = TX level blanking. ON / OFF function.

TX = Entry of TX level. If TX OFF, the tracking generator must be switched on first.

AUTO BLANK = Soft blanking of TX level at every frequency change.

FRQ LIMIT = The TX frequency range can be restricted by setting a MAX FRQ and a MIN FRQ. This frequency range can be altered at any time. The FRQ LIMIT ON/OFF function activates / deactivates the frequency limits.

FLIMIT SECURE = This allows a frequency range to be set which, unlike FRQ LIMIT, can be protected against alteration by third parties.

MAX FRQ = Upper limit for TX frequency entry; the maximum permitted value depends on the instrument version.

MIN FRQ = Lower limit for TX frequency entry; the minimum permitted value depends on the instrument version.

EXT LEVLG = External level control. The EPM-1 Milliwatt Power Level Meter from Wandel & Goltermann canbe used to form an external amplitude control loop e.g. to compensate for the insertion losses of long cables or level changes at the feed point.

LEVEL LIMIT = Activate / deactivate TX level limits.

MAX LEVEL = Maximum permitted TX level entry value.

TX POWER = Activate / deactivate tracking generator.

5.18.1 Activating / deactivating the tracking generator

Activating the tracking generator:

Note: For safety reasons, the TX level remains blanked when the tracking generator is activated in the TX menu. The LED below the [BLANK] key is on. Pressing the [BLANK] key switches the set TX level to the selected output and the LED turns off.

- Call up the **operating mode** (e.g. LEVEL).
- Press **TX OFF** [F L4] to call up the TX menu.
- Press **TX POWER** [F R4] to activate the tracking generator. The LED below the [BLANK] key is on.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

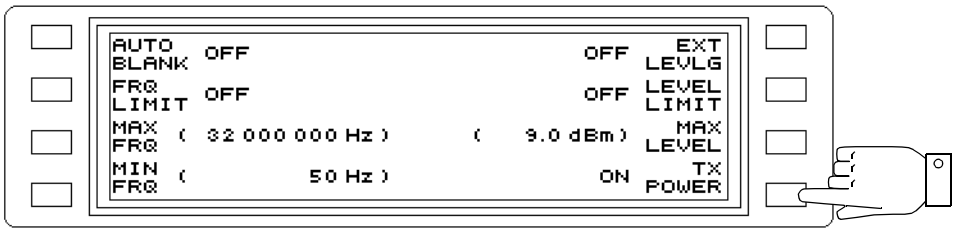


Fig. 5-149 Tracking generator activated

Activating the tracking generator output:

- Press **[BLANK]** to activate the output

Deactivating the tracking generator:

- Press **[Blue key]** to call up the secondary functions.
- Press **TX x.x dBm** [F L4] to call up the TX menu.
- Press **TX POWER** [F R4] to deactivate the tracking generator. Function key [F L4] in the main menu of the operating mode is labelled with TX OFF again.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

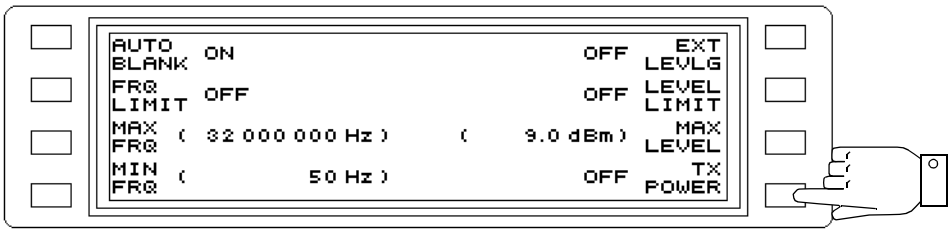


Fig. 5-150 Tracking generator deactivated

5.18.2 TX frequency

Entering the TX frequency:

The TX frequency corresponds to the receiver tuning frequency (see section 5.14.8 on page 5-67).

Setting the frequency range:

- Call up the **operating mode** (e.g. LEVEL).
- Press **TX OFF** [F L4] **or**
- Press **[Blue key]** to call up the secondary functions.
- Press **TX x.x dBm** [F L4] to call up the TX menu.
- Press **MAX FRQ** [F L3] to enable entry of the upper range limit.
- Enter the **frequency value** using the number keys, rotary control or arrow keys. Press **[kHz]**, **[MHz]** or **[ENTER]** to complete entries made using the number keys.
- Press **MIN FRQ** [F L4] to enable entry of the lower range limit.
- Enter the **frequency value** as described under MAX FRQ.

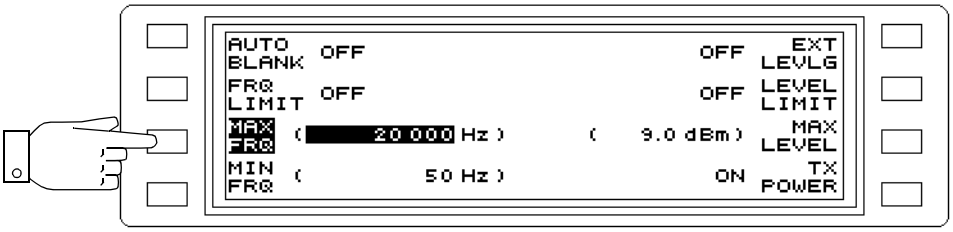


Fig. 5-151 Setting the frequency limits

Activating / deactivating the frequency limits

- Press **TX OFF** [F L4] **or**
- Press **[Blue key]** to call up the secondary functions.
- Press **TX x.x dBm** [F L4] to call up the TX menu.
- Press **FRQ LIMIT** [F L2] to activate / deactivate the frequency limits (toggle function).
- **P**ress **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

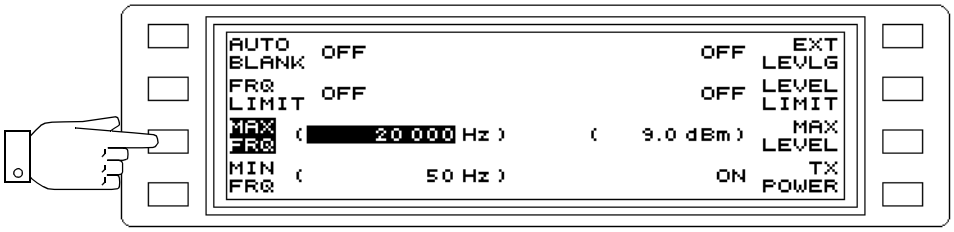


Fig. 5-152 Activating the frequency limits

5.18.3 Protecting the TX frequency setting range from change

It may be necessary to restrict the frequency ranges that can be used for transmissions.

The setting range of the TX frequency can be specified. By assigning a numerical code. the setting range can be protected against unauthorized alteration by third parties.

Setting the numerical code:

Note: The instrument is set to a numerical code of “00000” when delivered.

- Press **[Blue key]** to call up the secondary functions.
- Press **[TEST & CONF]** to call up the TEST & CONFIGURATION function.
- Press **INSTRUMENT** [F L2] to change to the INSTRUMENT menu.
- Press **FLIMIT SECURE** [F R3] to change to the TX LIMITS menu.
- Press **UNLOCK CODE** [F R1] to enable entry of the numerical code.
- **Enter the numerical code** using the number keys and press **[ENTER]** to conclude the entry. The function key label changes to LOCK CODE.
- Press **LOCK CODE** [F R1] to enable entry of a new numerical code.
- **Enter the numerical code** using the number keys and press **[ENTER]** to conclude the entry. The new numerical code is set as soon as the menu is changed, eg. by pressing the [PREV] key or the [LEVEL] key.

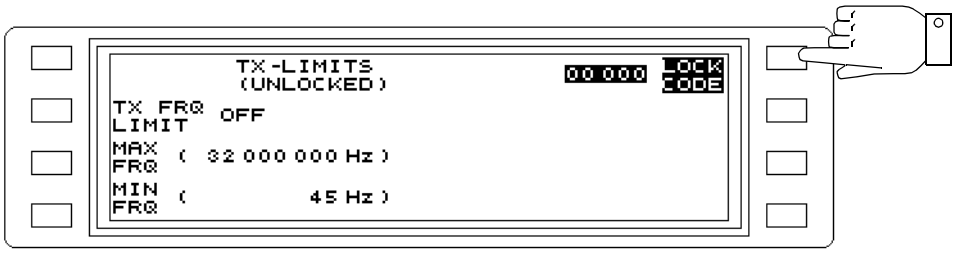


Fig. 5-153 Changing or entering the numerical code

Forgotten the numerical code?

Contact your Wandel & Goltermann sevice center for assistance.

Setting the range limits:

Note: When setting the limits always ensure that the upper limit value is greater than the lower limit value.

- Press **[Blue key]** to call up the secondary functions.
- Press **[TEST & CONF]** to call up the TEST & CONFIGURATION function.
- Press **INSTRUMENT** [F L2] to change to the INSTRUMENT menu.
- Press **FLIMIT SECURE** [F R3] to change to the TX LIMITS menu.
- Press **UNLOCK CODE** [F R1] to enable entry of the numerical code.
- **Enter the numerical code** using the number keys and press **[ENTER]** to conclude the entry. The status display below TX-LIMITS changes from LOCKED to UNLOCKED. The setting range limits can now be entered or changed and activated or deactivated.

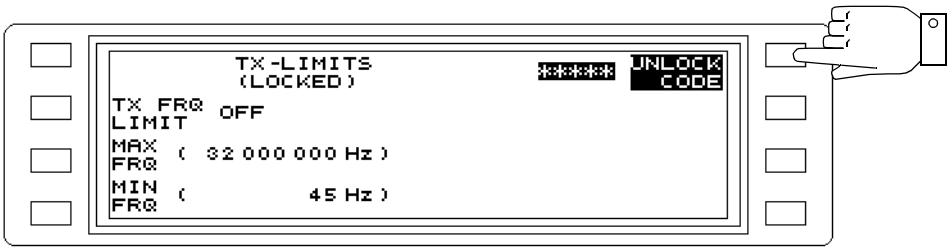


Fig. 5-154 Entering the numerical code

- Press **MAX FRQ** [F L3] to enable entry of the upper range limit.
- Enter the **frequency value** using the number keys, rotary control or arrow keys. Press **[kHz]**, **[MHz]** or **[ENTER]** to complete entries made using the number keys.
- Press **MIN FRQ** [F L4] to enable entry of the lower range limit.
- Enter the **frequency value** as described under MAX FRQ.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

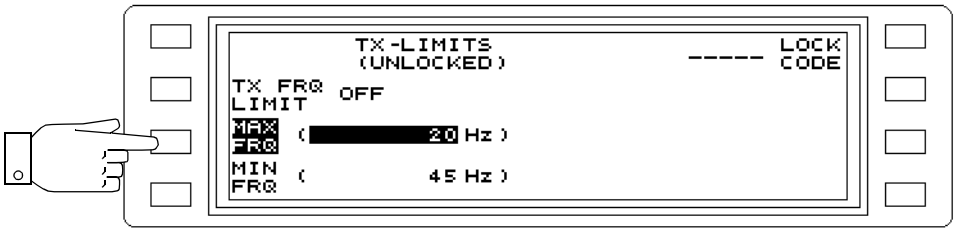


Fig. 5-155 Entering the setting range limits

Activating / deactivating the setting range limits:

- Press **[Blue key]** to call up the secondary functions.
- Press **[TEST & CONF]** to call up the TEST & CONFIGURATION function.
- Press **INSTRUMENT** [F L2] to change to the INSTRUMENT menu.
- Press **FLIMIT SECURE** [F R3] to change to the TX LIMITS menu.
- Press **UNLOCK CODE** [F R1] to enable entry of the numerical code.
- **Enter the numerical code** using the number keys and press **[ENTER]** to conclude the entry „Setting the range limits:" on page 5-119.
- Press **TX FRQ LIMIT** [F L2] to activate / deactivate the setting range limits (toggle function).
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

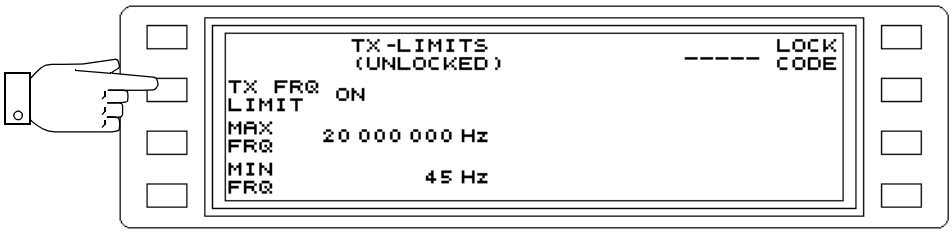


Fig. 5-156 Activating the setting range limits

5.18.4 TX level

Entering the TX level:

- Call up the **operating mode** (e.g. LEVEL).
- Press **TX OFF** [F L4] to call up the TX menu.
- Press **TX POWER** [F R4] to activate the tracking generator. The LED below the [BLANK] key is on.
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.
- Press **TX x.x dBm** [F L4] to enable entry.
- **Enter the TX level** using the number keys, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the number keys.

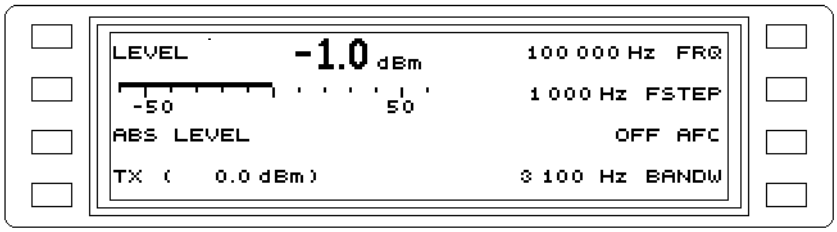


Fig. 5-157 TX level 0.0dBm, blanked (BLANK ON)

Limiting the settable TX level:

- Call up the **operating mode** (e.g. LEVEL).
- Press **TX OFF** [F L4] **or**
- Press **[Blue key]** and then
- Press **TX x.x dBm** [F L4] to call up the TX menu.
- Press **MAX LEVEL** [F R3] to enable entry of the upper range limit.
- **Enter the level value** using the number keys, rotary control or arrow keys. Press **[ENTER]** to complete entries made using the number keys.

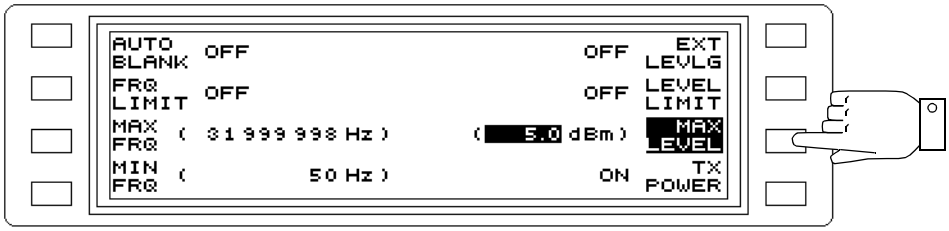


Fig. 5-158 Setting the TX level upper limit

Activating / deactivating the level limit:

- Press **TX OFF** [F L4] **or**
- Press **[Blue key]** and then
- Press **TX x.x dBm** [F L4] to call up the TX menu.
- Press **LEVEL LIMIT** [F R2] to activate / deactivate the upper level limit (toggle function).
- Press **[PREV]** to return to the previous menus step by step **or**
- Press **[RTN]** to return to the main menu of the current operating mode.

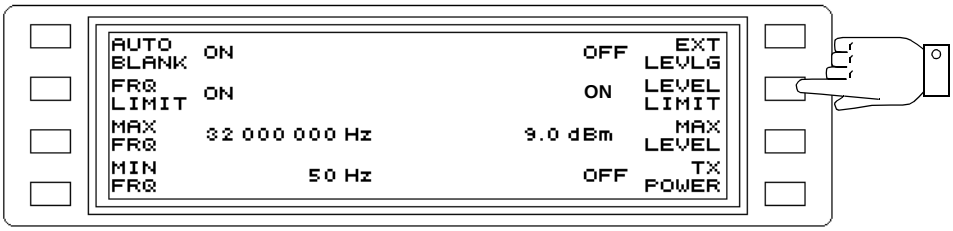


Fig. 5-159 Activating the level limit

Blanking the TX level

Blank on frequency change:

- Press **TX OFF** [F L4] **or**
- Press **[Blue key]** and then
- Press **TX x.x dBm** [F L4] to call up the TX menu.
- Press **AUTO BLANK** [F L1] to activate / deactivate the auto blanking function (toggle function). When activated, the TX level is "soft" blanked and then unblanked each time the frequency is changed.

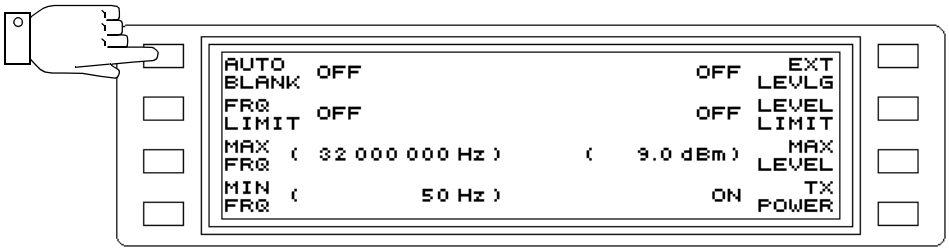


Fig. 5-160 AUTO BLANK function deactivated

Manual TX level blanking:

- Press **[BLANK]** to activate / deactivate the function (toggle function). If activated, the TX level is permanently blanked. The LED below [BLANK] is on.

5.18.5 Outputs and impedances

The instrument is fitted with one coaxial and one balanced output. In the IMPED menu, both the output impedance and the output itself can be selected. An LED display above the output socket lights to indicate which output and which impedance has been set.

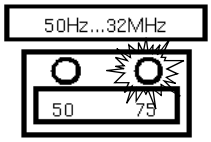


Fig. 5-161 Example: Coaxial output, impedance setting Z_0 = 75 Ω

Selecting the impedance and output:

- Press **[IMPED]** to call up the IMPEDANCE menu.
- Press **[F R2] ... [F R4]** to select the output and impedance required.

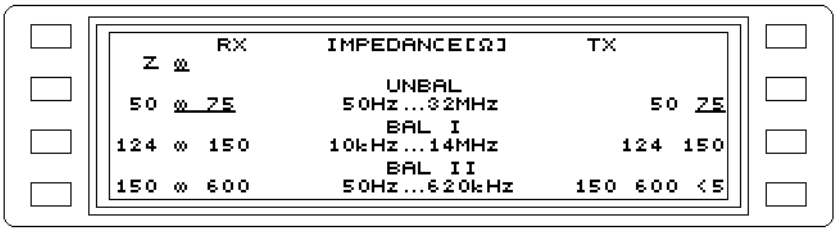


Fig. 5-162 Switching "high impedance" to a Z_0 value

5.18.6 External level control

An external control voltage from the EPM-1 Milliwatt Power Meter can be fed into the auxiliary input/output socket [53] (pin 5: Signal, pin 9: Ground) on the back panel of the instrument to form an external control loop. The TX level is measured as close to the device under test as possible, using the probe of the EPM-1. A d.c. voltage proportional to the difference between the nominal and actual TX level is output from the control voltage output of the EPM-1to socket [53] of the instrument. This level control circuit allows cable losses due to long feed cables or the frequency response of the generator output impedance and of the test cables to be compensated for.

Switching to external level control:

Instrument setting: Main menu of LEVEL or AUTO STEP mode

- Press **TX OFF** [F L4] **or**
- Press **[Blue key]** and then
- Press **TX x.x dBm** [F L4] to call up the TX menu.
- Press **EXT LEVLG** [F R1] to switch to external level control.

Notes:

6 Measurement notes

6.1 Measuring high attenuations

General considerations

When making level measurements on two-port networks with high attenuations, a high return impedance Z_s is required between the generator and receiver of the test set.

If the return impedance is not infinite, additional measurement errors result from the voltage drops U_{ST} across the ground wire resistances r_1 and r_2[1] of the test cable used.

Fig. 6-1 shows the problem with a test setup using a device under test with infinite attenuation.

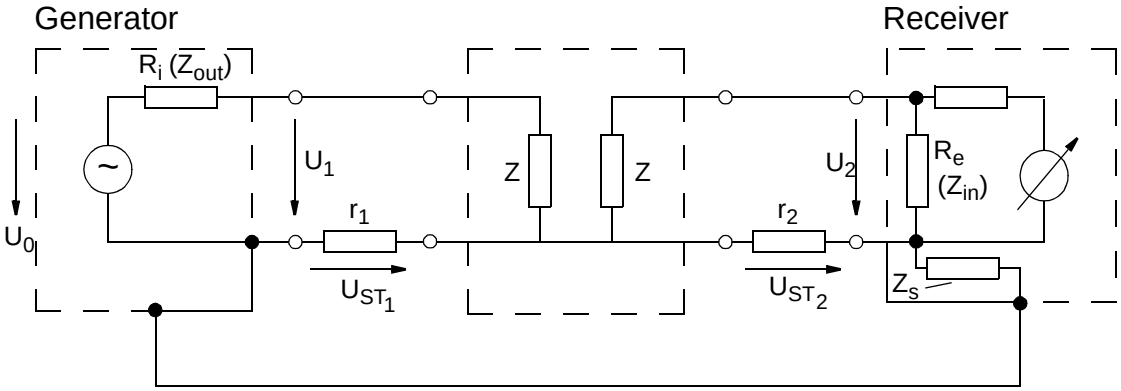


Fig. 6-1 Measuring high attenuations

To ensure broadband performance and conformance to important EMI/RFI requirements, no internal increase has been made in the return impedance for the PSM-37 to 39 or PSM-137 to 139 Level Test Sets.

For this reason, short cables with low impedance screening should be used when measuring high attenuations. Connections must be clean and corrosion-free.

The return impedance can also be increased significantly by inserting a coaxial choke.

1 r_1 and r_2 are often referred to as coupling resistances in the case of coaxial cables, plugs, etc. and are defined as follows:
Coupling resistance =
Voltage drop on the outer surface of the outer conductor
Current on the inner surface of the outer conductor
Coupling resistance =
Voltage drop on the inner surface of the outer conductor
Current on the outer surface of the outer conductor

If the MSD-2 Coaxial Choke BN 2227/1 (Wandel & Goltermann) is inserted in the test circuit, the return impedance at 200 Hz is already >10 Ω (see Fig. 6-2). The choke can be used at frequencies up to 50 MHz.

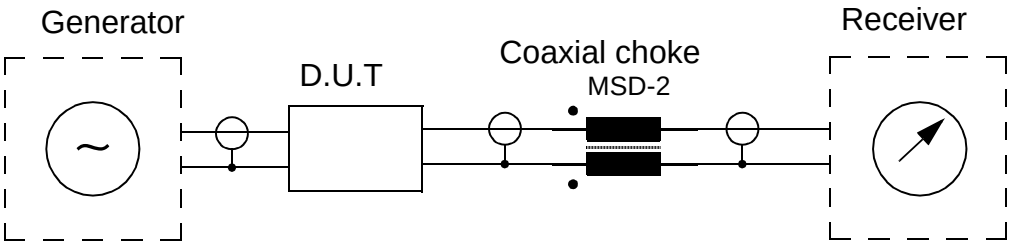


Fig. 6-2 Increased return impedance through the use of a MSD-2 coaxial choke

6.2 Measurement error due to residual carrier

All selective level meters which use heterodyning may show results display interference from the residual carrier at low tuning frequencies.

The measurement error resulting from this depends on the ratio of the residual carrier level to the measured signal (signal to interference ratio).

This ratio is determined by the following parameters among others:

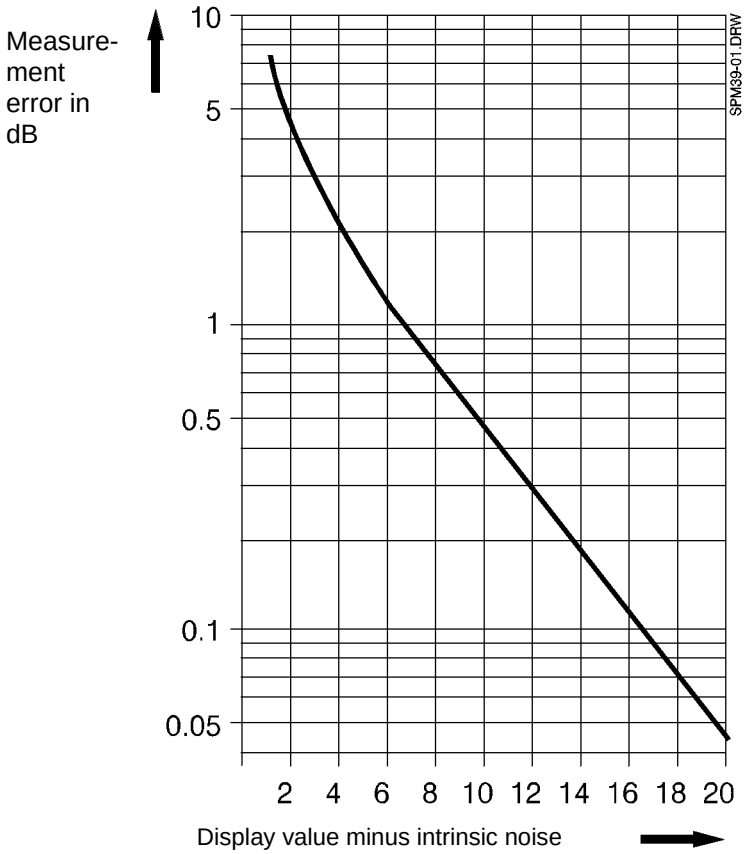
– Individual magnitude of the residual carrier (production scatter, actual temperature, etc.)
– Tuning frequency ≤ 2 kHz
– Current measurement bandwidth
– Magnitude of the signal being measured
– Magnitude of any wideband loading (automatic wideband attenuator setting)

To determine the size of the measurement error, the signal to interference ratio must be measured.

Measuring the signal to interference ratio:

- Press **[Blue key]** to activate the additional functions.
- Press **[TEST & CONFIG]** to enable the TEST & CONFIGURATION function.
- Press **INSTRUMENT** [F L2] to open the INSTRUMENT menu.
- Press **AUTO RANGING** [F R2] to disable auto-ranging.
- Press **[LEVEL]** to invoke LEVEL measurement mode.
- Disconnect the **test signal** from the input socket. The drop in the display value corresponds to the signal to interference ratio.

The measurement error can be determined from the graph below.



The residual carrier has the same effect as the intrinsic noise.

Examples of measurement errors at given signal to interference ratios:

Ratio 20 dB --> measurement error approx. 0.04 dB

Ratio 10 dB --> measurement error approx. 0.48 dB

The measurement error is negligible if the signal to interference ratio is more than 20 dB.

Re-enabling auto-ranging:

- Press **[Blue key]** to activate the additional functions.
- Press **[TEST & CONFIG]** to enable the TEST & CONFIGURATION function.
- Press **INSTRUMENT** [F L2] to open the INSTRUMENT menu.
- Press **AUTO RANGING** [F R2] to enable auto-ranging.
- Press **[LEVEL]** to invoke LEVEL measurement mode.

Notes:

7 Error messages and warnings

This instrument makes a distinction between error messages and warnings. Both types are displayed on screen in plain text.

WARNING Warnings are displayed e.g. if a function is invoked which is not implemented in the instrument version you are using.

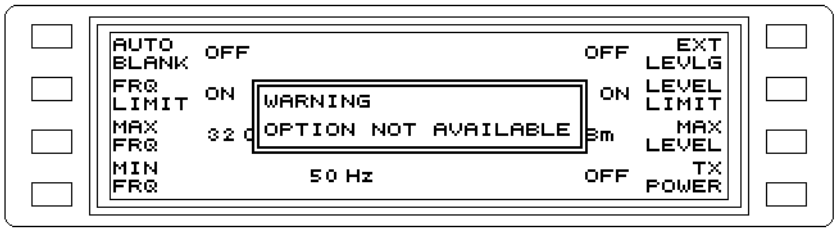


Fig. 7-1 Example of a warning

ERROR Error messages are displayed if e.g. the setting range for a parameter is exceeded.

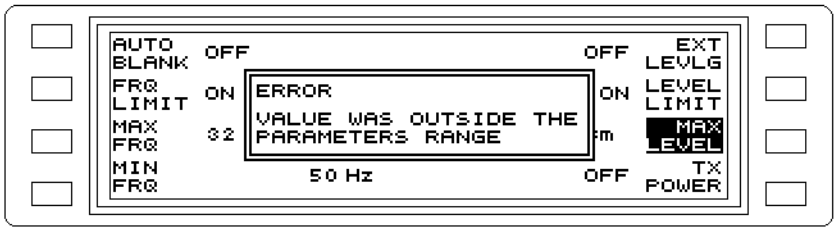


Fig. 7-2 Example of an error message

Querying the last error message

The last error message can be displayed and acknowledged from the HELP menu.

- Press **[HELP]** to open the main help menu.
- Press **QUIT** [F R4] to clear the current error message.

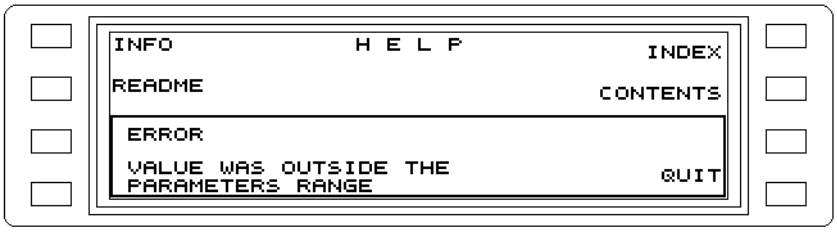


Fig. 7-3 Clearing the current error message

List of error messages and warnings:

USE FMEM CAN'T BE MODIFIED

Fixed frequencies cannot be used in HOT TONE mode. This error message only appears under IEEE bus remote control.

AUTO-DOCUMENTATION-TRIGGER
AND MEASMODE DON'T MATCH

The selected trigger for automatic recording of results cannot be used in this measurement mode. This error message only appears under IEEE bus remote control.

AUTO STEP MASTER REQUIRES
GENERATOR ON

The generator must be switched on for AUTO STEP MASTER measurements. This error message only appears under IEEE bus remote control.

BAD EXTERNAL REFERENCE FREQUENCY

The instrument is unable to synchronize to the external reference frequency being input.

BANDWIDTH CAN'T BE MODIFIED

The bandwidth for the chosen measurement is preset at a fixed value and cannot be altered. This error message only appears under IEEE bus remote control.

CALIBRATION ERROR

An error has occurred during calibration.

CARRIER LEAK
FREQUENCY TOO LOW

The receive frequency is so low that the carrier leak of the instrument may lead to a measurement error (see section 6.2, page 6-2).

CHANNEL AND IMPEDANCE
FOR RX DON'T MATCH

The combination selected for the input socket and input impedance is not possible. This error message only appears under IEEE bus remote control.

DIRECTORY MUST BE EMPTY
BEFORE DELETION

The directory onthe Menory Card which you want to delete still contains some files.

EEPROM OPERATION FAILED

An error has occurred during a read / write operation to the EEPROM.

FDM-MEASMODE BUT
FDM-OPTION NOT AVAILABLE

Note: FDM plans are not yet available.

An FDM sub-measurement mode has been selected for the selected measurement mode but the FDM option is not available.

FMEM-ACT-ID GREATER
THAN FMEM-LAST-ID

The actual memory address is higher than the memory address for the upper fixed frequency limit.

FMEM-ACT-ID LESS
THAN FMEM-FIRST-ID

The actual memory address is lower than the memory address for the lower fixed frequency limit.

FMEM-FIRST-ID GREATER
THAN FMEM-LAST-ID

The memory address selected for the first fixed frequency is above that selected for the upper fixed frequency limit

FMEM-LIST NOT MONOTONOUS

The frequency values in the fixed frequency list for AUTO STEP measurements must increase steadily (= monotonic) if the step frequencies are taken from the fixed frequency list.

FMEM-START-ID AND FMEM-STOP-ID
ARE IDENTICAL

The fixed frequency addresses for the start and stop frequencies must be different in AUTO STEP measurement modes.

FREQUENCY AND BANDWIDTH
DON’T MATCH

The set frequency and the 48 kHz or 240 kHz do not match.

FREQUENCY AND FREQLIMIT
DON’T MATCH

The selection frequency required is outside the set frequency limits.

FREQUENCY AND SIDEBAND
DON’T MATCH

The carrier frequency must be above 1850 Hz + 45 Hz = 1895 Hz for lower sidebands (LSB), otherwise the selection frequency would be below the frequency limit of 45 Hz.

FREQUENCY TOO HIGH
FOR RX CHANNEL

The selection frequency setting is higher than the limit frequency for the output socket selected.

(Balanced output I: Fmax = 14 MHz,

balanced output II: Fmax = 620 kHz).

FREQUENCY TOO HIGH
FOR TX-CHANNEL

The transmit frequency setting is higher than the limit frequency for the output socket selected (PSM instruments only).

(Balanced output I: Fmax = 14 MHz,

balanced output II: Fmax = 620 kHz).

FREQUENCY TOO LOW
FOR RX-CHANNEL

The selection frequency setting is lower than the limit frequency for the output socket selected (Balanced input II: Fmin = 10 kHz).

FREQUENCY TOO LOW
FOR TX-CHANNEL

DieThe transmit frequency setting is lower than the limit frequency for the output socket selected (PSM instruments only).

(Balanced output II: Fmin = 10 kHz).

GAIN TOO LOW

The set gain value is less than the relative level setting.

GENERATOR AND BANDWIDTH
DON’T MATCH

The generator cannot be activated for bandwidths of 48 kHz or 240 kHz (PSM instruments only).

GENERATOR ON AND MEASMODE
DON’T MATCH

The generator can only be activated in AUTOSTEP and LEVEL measurement modes. This error message only appears under IEEE bus remote control.

GENERATOR OFF
BLANK OFF NOT POSSIBLE

The generator cannot be blanked as it is already switched off (PSM instruments only).

IF-GAIN OUT OF RANGE

The IF gain setting required is outside the range of values. This error message can only occur when the wideband gain is altered, as the IF gain is changed at the same time.

KEY HAS NO FUNCTION
AT THIS MOMENT

An unassigned function key was pressed.

LOWER ALARM THRESHOLD
OUT OF RANGE

The lower alarm threshold value is outside the range of values. This error message only occurs when the relative level is changed.

MARKER OFF ->
NO FREQUENCY TO TRANSFER

A change to selective level measurement by transferring the marker frequency is not possible from AUTOSTEP or HOT TONE SEARCH modes as the marker is switched off and no transfer frequency is selected.

MEASUREMENT ALREADY RUNNING

A further command to start the measurement was issued when the measurement was already running. This error message only appears under IEEE bus remote control.

MEMORY-CARD FULL

There is no more space left for storage on the Memory Card.

MEMORY-CARD NOT AVAILABLE

A Memory Card has not been fitted into the slot.

MEMORY-CARD OPERATION FAILED

An error has occurred during a read / write operation to the Memory Card.

MEMORY-CARD WRITE PROTECTED

The Memory Card is write-protected.

MISSING RESULT

An attempt was made to read out a result before any resuls were available. This error message only appears under IEEE bus remote control.

NO FURTHER CHARACTER
CAN BE DELETED

All characters in the current title have been deleted.

NO FURTHER CHARACTER
CAN BE INSERTED

The maximum number of characters for a setup title is 11.

NO GENERATOR INSTALLED

The instrument is not fitted with a generator. This error message only appears under IEEE bus remote control.

NO MEMORYCARD-FILE SPECIFIED

No file has been specified for storing the results on the Memory Card.

NO OUTPUT-DEVICE SPECIFIED

No device has been specified to which to output the results record.

NO RESULTS YET ->
NO FREQUENCY TO TRANSFER

A change to selective level measurement by transferring the marker frequency in AUTOSTEP or HOT TONE SEARCH modes is not possible yet as no results are available and therefore no

NO SUCH FILE

The selected file does not exist on the Memory Card, either because a different card was used or because the file has been deleted.

NO VALUE AT SPECIFIED POSITION
IN FMEM-LIST AVAILABLE

There are no entries in the fixed frequency list, so the frequency cannot be selected from the fixed frequencies.

NOT YET IMPLEMENTED

The selected instrument function is not available.

ONLY ONE PRINT JOB
POSSIBLE

Only one print job can be managed at any one time.

OPERATION NOT POSSIBLE
WHILE PRINTING

The 'form feed' and 'top of form' commands cannot be processed when the printer is printing.

OPTION FDM NOT INSTALLED

The instrument is not equipped with the option selected.

OPTION MEMORY-CARD NOT INSTALLED

The instrument is not equipped with the option selected.

OPTION NOT AVAILABLE

The instrument is not equipped with the option selected.

PARAMETER CAN'T BE MODIFIED
DURING RUNNING MEASUREMENT

Any measurement already running must be stopped before a parameter can be altered in IMPULSIVE NOISE, INTERRUPTIONS, AUTO STEP and HOT TONE SEARCH modes. This error message only appears under IEEE bus remote control.

PERMISSION DENIED

Acces to the Memory Card has been denied.

PRESS STOP FIRST

Any measurement already running must be stopped before a parameter can be altered in IMPULSIVE NOISE, INTERRUPTIONS, AUTO STEP and HOT TONE SEARCH modes.

RAM CORRUPTED
FMEM LIST LOST

The fixed frequency list cannot be used due to a memory error.

RAM CORRUPTED
SETUP LOST

The instrument setups cannot be used due to a memory error.

RAM CORRUPTED
USING DEFAULT SETTINGS

The RAM contents have been corrupted. The instrument has been set to the default settings.

REL LEVEL AND GAIN
DON’T MATCH

The relative level and gain settings do not correlate.

REQUESTED OPTION’S LICENCE
IS NOT VALID FOR THIS DEVICE

The selected optional band filter has not been released for use with this instrument.

SENDLEVEL AND LEVELLIMIT
DON’T MATCH

The required value for the send level cannot be set (PSM instruments only).

SEND LEVEL OUT OF RANGE

The required value for the send level is outside the range of values.This error message only appears when the relative level is changed.

SETUP ’PREVIOUS’ LOST

The contents of the "PREVIOUS" POWER ON SETUP memory position is corrupted.

SETUP ’PREVIOUS’ LOST
USING DEFAULT-SETTINGS

The contents of the "PREVIOUS" POWER ON SETUP memory position is corrupted. The instrument has been set to the default settings.

SETUP ’USER’ LOST

The contents of the "USER" POWER ON SETUP memory position is corrupted.

SETUP ’USER’ LOST
USING DEFAULT-SETTINGS

The contents of the "USER" POWER ON SETUP memory position is corrupted. The instrument has been set to the default settings.

SETUP CORRUPTED

The setup on the Memory Card is corrupted (memory error or incorrect size).

SETUP DOESN’T MATCH WITH DEVICE

The setup which is to be loaded from the memory card is for a different instrument type

SETUP DOESN’T MATCH DEVICE

The setup selected from memory does not match the instrument, e.g. because no generator is fitted, no IEEE bus is fitted, etc.

SETUP NOT USED

No setup is stored under the memory address selected.

SETUP WRITE PROTECTED

A write protected setup (addresses 00, 01 and 02) cannot be overwritten.

SIDEBAND CAN'T BE MODIFIED

The sideband position for the selected measurement is fixed and cannot therefore be changed. This error message only appears under IEEE bus remote control.

START-THRESHOLD OUT OF RANGE

The required value for the start threshold cannot be set.

START-FREQUENCY AND STOP-FREQUENCY ARE IDENTICAL

The start and stop frequencies used in AUTO STEP and HOT TONE SEARCH modes must be different.

START-FREQUENCY GREATER THAN STOP-FREQUENCY

The start frequency must be less than the stop frequency for a HOT TONE SEARCH.

STEPWIDTH AND STEPCOUNT DON'T MATCH WITH STARTFREQ AND STOPFREQ

A maximum of 100 steps can be performed between the start and stop frequencies in AUTO STEP mode.

STEPWIDTH TOO LOW, MODIFY FIRST

The minimum step width for AUTO STEP mode is 1 Hz.

STOP KEY LOCKED

The START/STOP key is disabled. The STOP KEY LOCKED parameter must be set to OFF to re-enable the START/STOP key

SYNTHESIZER UNLOCKED

The internal frequency is not correct as one or more of the phase-locked loops is not locked.

TERMINATOR, CHANNEL AND IMPEDANCE FOR TX DON'T MATCH

This combination of output socket, impedance and termination cannot be set. This error message only appears under IEEE bus remote control.

THRESHOLD OUT OF RANGE

The search threshold for a HOT TONE SEARCH is outside the range of values. This error message can ony appear when the relative level is changed.

TOO MANY STEPS

A maximum of 100 steps can be performed between the start and stop frequencies in AUTO STEP mode.

UNLOCK FIRST

Enter the code to unlock the frequency limits for the tracking generator.

UPPER ALARM THRESHOLD OUT OF RANGE

The value for the upper alarm threshold is outside the range of values. This error message can ony appear when the relative level is changed.

USING FMEM DEACTIVATED

Frequency selection from the fixed frequencies was deactivated because the fixed frequency position selected was empty.

USING FMEM-LIMITS DEACTIVATED

Limiting of the fixed frequency selection was deactivated because one of the limits selected was unassigned.

VALUE IN FMEM LIST OUT OF RANGE

The fixed frequency list contains an entry with a value above the frequency limit of the instrument. This error message only occurs if the frequency list is loaded from a memory card for an instrument with higher frequency limits.

VALUE WAS OUTSIDE THE PARAMETERS RANGE!

An attempt was made to enter a parameter value outside the range for the selected parameter using the number keys.

WRONG VALUE FOR BANDWIDTH

The required bandwidth value cannot be set. This error message only appears under IEEE bus remote control.

Y-SCALE-REFERENCE OUT OF RANGE

The value for the Y scale reference is outside the range of values. This error message can ony appear when the relative level is changed.

Notes:

8 Maintenance, servicing and transport

8.1 Maintenance

Instrument configuration

Please quote the instrument identification in addition to the type name in the event of any queries or when ordering options and accessories relating to this instrument.

Instrument identifier

The instrument identifier is made up from the series index and the serial number. These are printed below the type name which is located on the front panel above the display.

Software status

The current software status can be queried from the TEST&CONFIG menu.

- Press **[Blue key]** to call up the subsidiary functions.
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION function.
- Press **SOFTWARE** [F R2] to query the current software status..

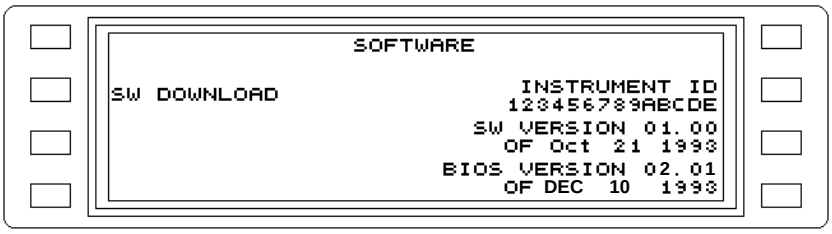


Fig. 8-1 Software status display

INSTRUMENT ID

Identification number of the instrument, required when ordering software options.

SW VERSION

Instrument software version number and release date. The instrument software contains the measurement, control, result recording, evaluation, display and printout functions for the instrument.

BIOS VERSION

BIOS software version number and release date. The BIOS EPROM is read directly following switch-on. This tells the instrument what is to be set at power on, how to react if the instrument software cannot be loaded, etc.

8.1.1 Changing the Versacon inserts

As delivered, the inputs and outputs on the front panel are equipped with basic 75 ohm Versacon 9 connectors. The BNC inserts can be exchanged for other inserts from the Versacon 9 range at any time.

Removing the sockets

1. Undo the locknut using the pin wrench (order number W1) by turning it anticlockwise.
2. Screw the locknut forwards as far as it will go.
3. The insert can now be unscrewed. If it is stiff, use the pin wrench to loosen it.

Fitting the socket

1. Screw the locknut onto the insert as far as it will go.
2. Screw the insert as far as it will go into the basic socket mounted on the instrument.
3. Screw the locknut back (clockwise) as far as it will go and tighten it using the pin wrench.

8.1.2 Changing the fuse

If the instrument does not function when switched on and the power connection to the instrument appears to be in order, the main ac line fuse may have blown.

Check

Warning: Danger of electric shock. Disconnect the instrument from the ac line.

1. Open the fuse cover using a small screwdriver (see Fig. 8-2 on page 8-2).
2. Remove the fuseholder (see Fig. 8-3 on page 8-3).
3. Check the fuse for continuity.
4. If the fuse is defective, replace itr with a new one.
5. Replace the fuseholder (arrow points to the right).
6. Close the fuse cover.
7. Connect up and switch on. If the fuse blows again, contact your local Wandel & Goltermann service center

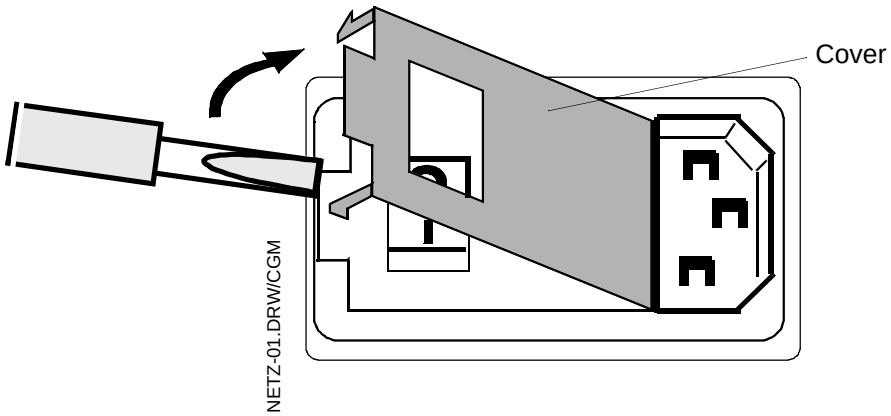


Fig. 8-2 Opening the fuse cover

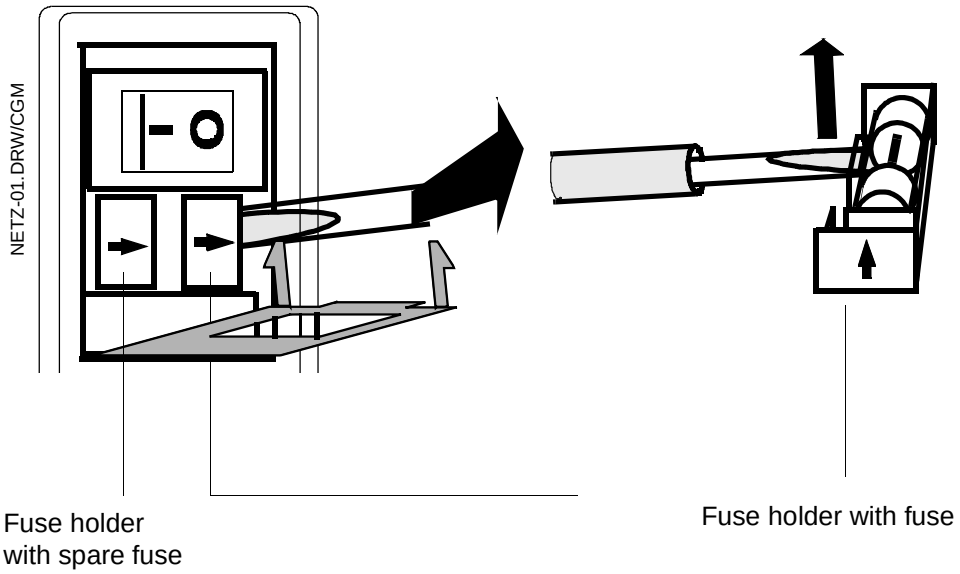


Fig. 8-3 Removing the fuse holder complete with fuse

8.1.3 Cleaning the instrument

Do not use solvents for cleaning the front panel and casing:

- ❒ Solvents such as denatured alcohol or petroleum may attack the lettering and finish of the instrument.
- ❒ Cleansers for plastic surfaces or furniture often contain polishing agents which may also damage the lettering and finish of the instrument.

To clean the instrument, moisten a cloth with warm water to which a little detergent has been added. Make sure that no water enters the instrument. Wipe off damp surfaces with a dry cloth to remove any marks.

8.1.4 Rechargeable battery pack option BN 2203/00.04

8.1.4.1 Fitting and removing the battery pack

The instrument can be equipped with the rechargeable battery pack option BN 2203/00.04 to allow operation independent of the ac line supply. The subsections below explain how to fit or remove the battery pack.

1. Remove the panel below the "Battery pack" label.
2. Slide the battery pack into the slot with the connector to the left.
3. Fix the battery pack in position by tightening the screws.
4. Fit the panel on to the battery pack.
5. To remove the battery pack, proceed in reverse order.

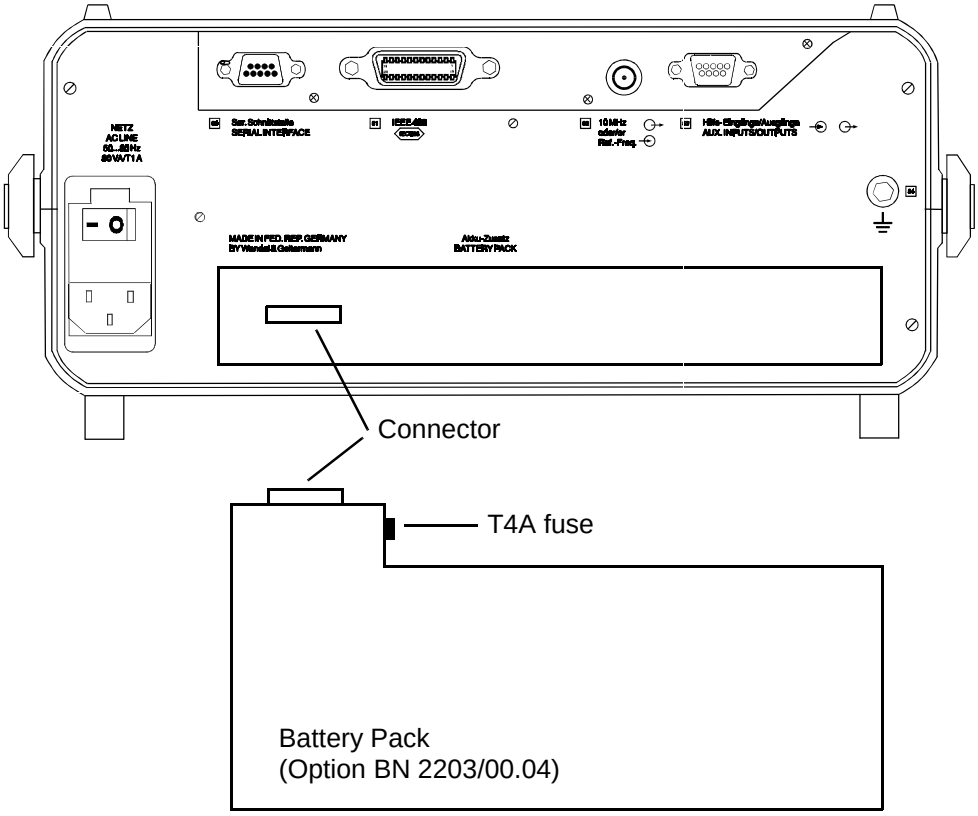
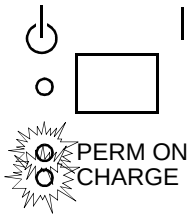


Fig. 8-4 Fitting and removing the battery pack

8.1.4.2 Charging the batteries

The batteries will be charged as soon as you have connected the instrument to the ac line and have set the ac line switch to the **I** position and have activated STANDBY mode. Charging continues until STANDBY mode is disabled. If the batteries are completely flat, a complete charging cycle takes about 14 hours, after which a very small charging current will flow to compensate for the self-discharging of the batteries.

The yellow LED indicates that charging is in progress.

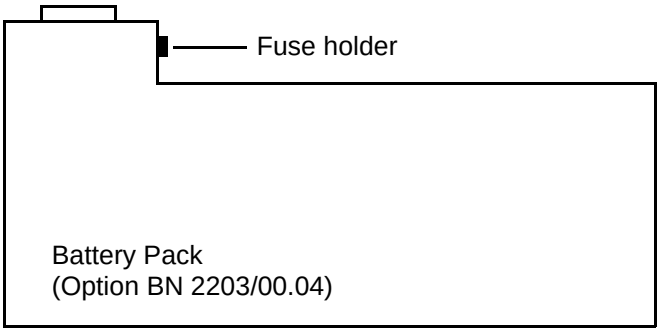


8.1.4.3 Changing the fuse

If the instrument fails to operate from the batteries although these are fully charged, it is possible that the battery pack fuse may have blown.

Check

1. Undo the battery pack fixing screws.
2. Slide the battery pack out of the slot.
3. Unscrew the fuse holder on the inner face of the battery pack.



4. Remove the fuse and check it for continuity. If the fuse is defective, replace it with a new one, type T 4A.
5. Screw the fuse holder back into position.
6. Re-fit the battery pack as indicated in section 8.1.4 on page 8-4.
7. Switch the instrument on.
8. If the instrument still does not work, please contact your nearest Wandel & Goltermann service center for assistance.

8.1.4.4 Protecting the environment

The battery pack contains NiCd batteries. If the battery pack is no longer required because of being exchanged or scrapped, do not dispose of the batteries in normal household refuse as they contain toxic heavy metals. You can return them to our service centers or dispose of them according to the regulations governing such items in your local area.

8.1.4.5 Using the BAZ-2203 Battery Pack

Caution: For your own safety and to ensure correct operation of the instrument, please observe the following instructions.

- Handle the BAZ-2203 Battery Pack with care.
- Never short-circuit the contacts of the BAZ-2203 Battery Pack, e.g. by touching them with a metal object, as this may cause the Battery Pack to explode or ignite.
- Do not drop, damage, dismantle or expose the BAZ-2203 to temperatures outside the permitted ranges.
- Only charge the BAZ-2203 as described in this section.
- Do not store the BAZ-2203, either alone or when built-in to the instrument, for more than one or two days at the sort of high temperatures which may occur in a car.
- Do not leave a BAZ-2203 in the instrument for more than a week in the discharged state without connecting the instrument to the ac power suply.
- Do not store the BAZ-2203 for more than six months without occasionally recharging it.

8.1.5 Optional bandwidth

All versions of the instrument can be equipped with an additional bandwidth. This can be loaded from the Memory Card.

- Insert the **Memory-Card** with the additional bandwidth into the card slot.
- Press **[Blue key]** to call up the subsidiary functions.
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION function.
- Press **INSTRUMENT** [F L2] to open the instrument configuration menu.
- Press **INSTALL FILTER** [F R4] to access the stored bandwidth.
- Select the bandwidth using the rotary control or the arrow keys.
- Press **INSTALL** [F L3] to store the selected bandwidth in the instrument..

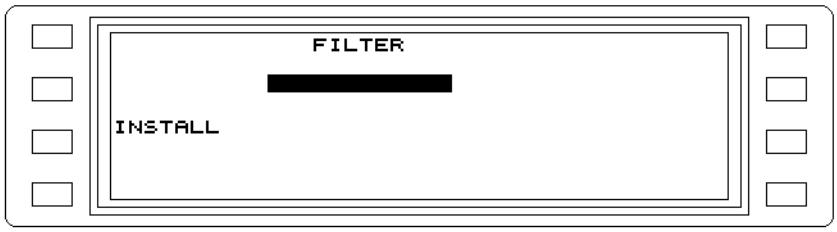


Fig. 8-5 Installing the optional bandwidth in the instrument

8.1.6 Software upgrade

A software upgrade can become necessary when:

- The instrument hardware is upgraded, or
- Extended software functions are released.

8.1.6.1 Exchanging/Loading the instrument software

The instrument software is stored in flash EPROMs. With these devices, the content can be altered after they are installed. During each loading operation, all memory cells in the flash EPROMs are first set to one and then to zero. After each step, the content is read to check whether the device or board is okay. Then, the new software is loaded via the selected interface and the flash EPROMs reprogrammed.

The new software can be loaded:
- From the MEMORY CARD (see page 8-9), or
- Via the serial interface of a PC (see page 8-10).

The interface is selected in the SW DOWNLOAD menu:

- Press **[Blue key]** to call up the secondary functions.
- Press **[TEST & CONF]** to call up the TEST & CONFIGURATION secondary function.
- Press **SOFTWARE** [F R2] to call up the software menu.
- Press **SW DOWNLOAD** [F L2] to call up the interface selection menu.
- Press **LOAD FROM SERIAL LINK** [F L2] to load the software via the serial interface, **or**
- Press **LOAD FROM MEMCARD** [F L3] to load the software from the currently inserted MEMORY CARD.

Fig. 8-6 Selecting the interface for loading software

After selecting the interface, you are prompted to acknowledge your choice and start transmission, or interrupt the operation.

- Press **OK** [F L4] to confirm your choice and begin transmission, **or**
- Press **CANCEL** [F R4] to interrupt the operation.

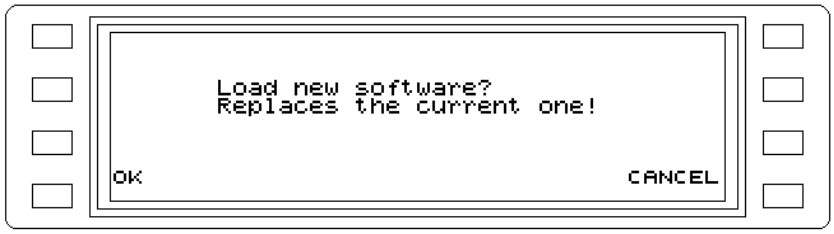


Fig. 8-7 Confirming the download procedure

Loading the software from the MEMORY CARD

- Insert the MEMORY CARD containing the software
- Press **[Blue key]** to call up the secondary functions.
- Press **[TEST & CONF]** to call up the TEST & CONFIGURATION secondary function.
- Press **SOFTWARE** [F R2] to call up the software menu.
- Press **SW DOWNLOAD** [F L2] to call up the interface selection menu.
- Press **LOAD FROM MEMCARD** [F L3] to load the software from the currently inserted MEMORY CARD.
- Press **OK** [F L4] to confirm your choice and begin transmission.

As a confirmation, the instrument displays the LOAD MENU with the selected interface. The inserted MEMORY CARD is first checked for a file with the valid instrument software.

Fig. 8-8 Checking for valid software on the Memory Card

The file name means:

2203

Instrument type, BN for the SPM-/PSM-37-139 family

9312

Component no. for the flash EPROMs

978

The software status (a serial count is used during the search procedure; the instrument starts with the number 99x and counts down). This ensures that the latest software version is always found on the inserted MEMORY CARD.

Various messages and warnings are displayed (e.g. the MEMORY CARD cannot be read, does not contain valid software, is faulty or was changed).

Caution: The file name is not compared with the software status in the instrument. The newest software version found on the inserted MEMORY CARD is loaded into the instrument.

If a file with valid instrument software is found, it is loaded. The loading procedure is indicated along with the file name.

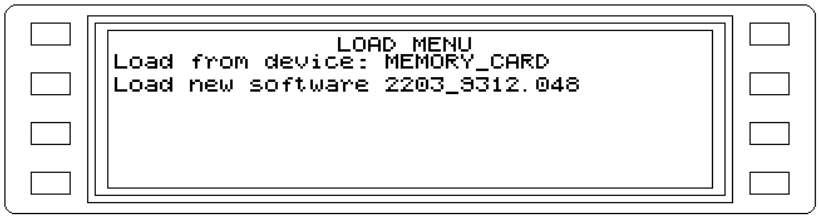


Fig. 8-9 Starting the download operation for new software

The first step in the loading procedure involves erasing the content of the flash EPROMs.

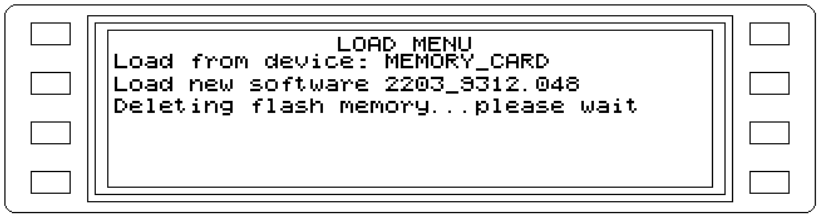


Fig. 8-10 Erasing the flash EPROM

Once the content is successfully erased, loading of the new software and programming of the flash EPROMs can begin. The programming status and the quantity of data already transferred are displayed both numerically and in a bargraph.

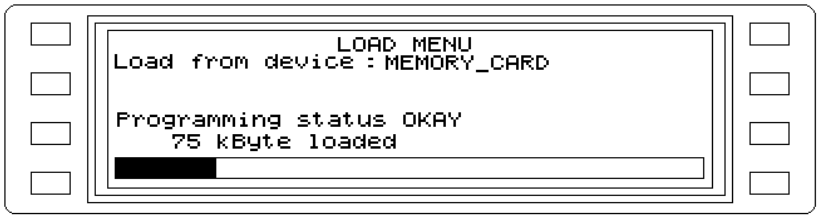


Fig. 8-11 Status display during the download operation

Once the programming is completed ("Programming done"), the instrument is reinitialized.

Loading the software via the serial interface

Necessary equipment

The software is loaded from a PC via the V.24/RS-232 serial interface. This interface can be found on the back panel of the instrument (9-pin subminiature D connector [50]).

The following are required to load the instrument software:

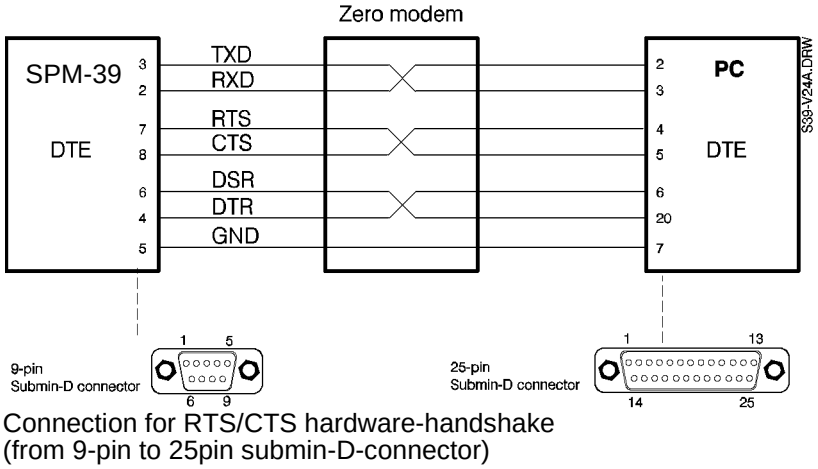
- IBM-compatible PC with V.24/RS-232 interface (COM1 or COM2), allowing a transmission rate of 115 200 baud.
- Diskette with the loading/instrument software.
- RS 232 adapter cable for hardware handshake.

Connect the serial interfaces:

- Connect the COM1 or COM2 port on the PC to the serial interface of the instrument via adapter cable . The figure below shows other possible connections.

Like a PC, the instrument is a data terminal equipment (DTE).
A zero modem is thus required. Connect the following pins:

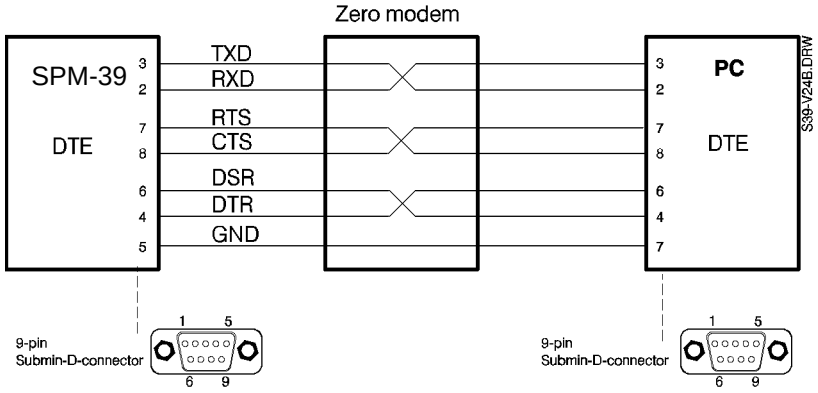
Version 1



Connection for RTS/CTS hardware-handshake
(from 9-pin to 25pin submin-D-connector)

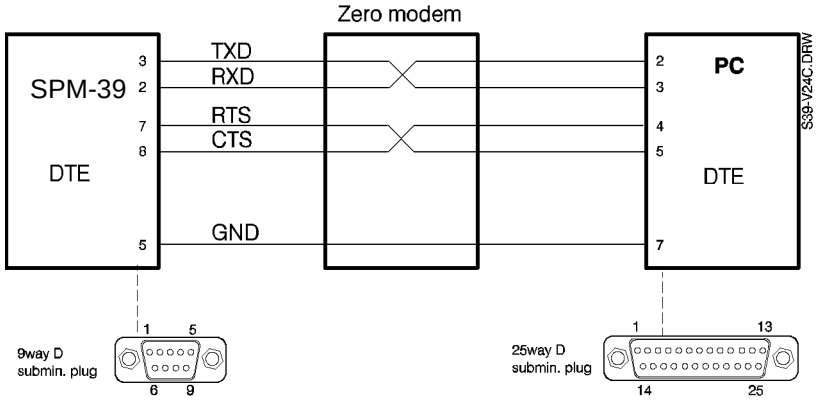
Fig. 8-12 Possible serial interface connections between the instrument and PC

Version 2



Connection for RTS/CTS hardware-handshake
(to/from 9-pin submin-D-connector)

Version 3



Minimum configuration (5-pin connection)

Fig. 8-13 Possible serial interface connections between the instrument and PC (continued)

Prepare the instrument

- Press **[Blue key]** to call up the secondary functions.
- Press **[TEST & CONF]** to call up the TEST & CONFIGURATION secondary function.
- Press **SOFTWARE** [F R2] to call up the software menu.
- Press **SW DOWNLOAD** [F L2] to call up the interface selection menu.
- Press **LOAD FROM SERIAL LINK** [F L2] to load the software via the serial interface.

The instrument starts the loading program and indicates that it is ready for data transmission and waiting to establish a connection with the PC.

Fig. 8-14 Waiting for the connection to the PC

Start the PC loading program

There is a README.TXT file on the diskette containing the loading/instrument software. This file indicates how to operate version 2.xx of the loading program.

- Insert the diskette into the PC (e.g. in drive A)
- If COM1 is the valid interface, start the loading program by typing:
  `A:\LOADCOM1`
- Acknowledge your entry by pressing the Enter key. The program will respond with "FIRMWARE LOADER" and display the transmission parameters of the serial interface, followed by the name of the file which contains the instrument software.
- Press the Enter key to begin data transmission from the PC. If the SPM-39 is ready to receive ("Waiting for connection"), the loading procedure will begin.

Fig. 8-15 Starting the download operation for new software

An automatic routine will now test the serial connection between the PC and instrument. The serial interface of the instrument will be automatically configured (e.g. handshake, transmission protocol, timeout).

If the test is successful, the flash EPROMs will now be erased.

Fig. 8-16 Erasing the flash EPROMs

Once the EPROMs are erased, loading of the new software and programming of the flash EPROMs can begin. The programming status and the quantity of data already transferred are displayed both numerically and in a bargraph.

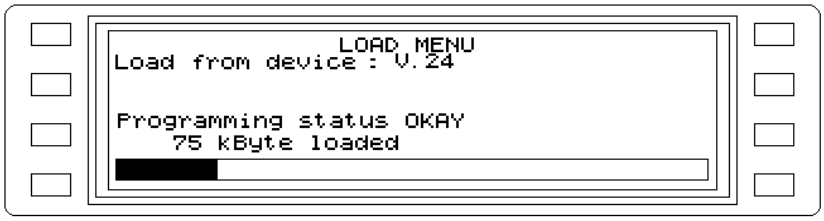


Fig. 8-17 Download operation status display

Once the programming is completed ("Programming done"), the instrument is reinitialized

Note: You can speed up the loading procedure via the RS232 interface by setting up a RAM disk on your PC (see your DOS handbook). Transfer the files from the diskette to the RAM disk and start the firmware loader there.

Interrupting the loading procedure

If you need to interrupt the loading procedure during the readiness phase ("Waiting for data"), press the "ESC" key.

If the loading procedure is interrupted by an external event such as a power failure or interruption of the serial connection ("Loading halted"), the SPM-39 will be non-functional when powered up since the flash EPROMs were partially erased.

The same is true if the flash EPROMs cannot be properly erased or the serial connection is disrupted or interrupted during the programming procedure ("Programming halted").

The instrument’s power-on test recognizes this state (EPROM FAILED) and branches automatically to the loading routine. The instrument first attempts to load from the MEMORY CARD. If no card is present or the wrong card is present, the instrument waits for data on the serial interface.

Messages and error messages while loading the software

Load from device: V.24

In the load menu, loading of the software via the serial interface was selected.

Load from device: MEMORY_CARD

In the load menu, loading of the software from the MEMORY CARD was selected.

Search software : 2203-9312.xxx

A search is made for a valid instrument software version on the MEMORY CARD. While searching, the instrument counts down from ...9312.99x to ...9312.00x in order to find the latest version (with the highest number).

Load software : 2203-9312.xxx

The instrument found a valid software version and is loading it into the flash EPROMs.

x kByte loaded

The x shows how much data was already loaded into the flash EPROMs. This is also indicated graphically in the box below the message.

Programming status OKAY

Loading of the instrument software into the flash EPROMs is proceeding normally.

Programming failed

An error occurred while loading the instrument software into the flash EPROMs.

Unknown record

The loading procedure was started but no valid data format was present (e.g. the MEMORY CARD was removed while the flash EPROMs were being erased).

Checksum error in record

The checksum for a data packet was in error. The firmware loader retransmits the last record.

Bad address in 72-record

An incorrect address was transmitted in a data packet. The firmware loader retransmits the last record.

Flash not deleted

The flash EPROMs were not properly erased prior to loading of the instrument software.

Programming done

Loading and programming of the flash EPROMs were successfully completed.

BREAK DETECTED
Programming halted

Loading via the serial interface was interrupted (e.g. by a BREAK signal from the transmitter or an interruption in the connection cable).

FRAMING ERROR DETECTED
Programming halted

An error in the transmission frame was detected while loading via the serial interface.

DATA LOST
Programming halted

Data were lost while loading via the serial interface.

PARITY ERROR DETECTED
Programming halted

A parity bit error occurred while loading via the serial interface.

NO MEMORY-CARD FILESYSTEM DETECTED

The file system on the MEMORY CARD is faulty (e.g. unformatted).

MEMORY-CARD CHANGED ERROR

The MEMORY CARD was changed during the loading procedure.

MEMORY-CARD FILESYSTEM EOF-ERROR

An End of File (EOF) was not detected on the MEMORY CARD.

MEMORY-CARD FILESYSTEM ERROR

The directory on the MEMORY CARD is faulty; the instrument cannot access a file.

Waiting for Data

The start handshake was successfully completed and the instrument is waiting for data from the serial interface (e.g. while data are being read from the diskette).

Waiting for connection...

The instrument is waiting for a connection with the serial interface of the PC. The PC has not yet started the start handshake.

Bad start command (-->power off/on)
Loading halted

The start handshake was faulty, the flash EPROMs are not being erased and the loading is being halted. Turn the instrument off and on again and restart the function in the menu.

Deleting flash memory...please wait

The flash EPROMs are erased before the new program is loaded. As a precaution to ensure that the device is in proper working order, all bits are set to zero and then to one.

Flash erase fault (-->power off/on)

The flash EPROMs could not be completely erased. The loading procedure is being halted and must be restarted by turning the power off and on again. Since the flash EPROMs were partially erased, the self-test will detect this faulty state and branch automatically to the loading menu.

Flash erase zero fault (-->power off/on)

The flash EPROMs cannot be written to zero. The loading procedure is being halted and must be restarted by turning the power off and on again. Since the flash EPROMs were partially erased, the self-test will detect this faulty state and branch automatically to the loading menu

Waiting for memory-card...

In the load menu, loading of the software from the MEMORY CARD was selected, but no MEMORY CARD is present.

Waiting for memory-card changed...

Valid instrument software is not present on the inserted MEMORY CARD. Please insert the proper card.

8.2 Servicing

8.2.1 Initialization

It is possible that the semiconductor memory may be disconnected from the built-in Lithium battery during repairs. This may mean that it contains undefined values. It can be initialized or reset to a defined state as follows:

- Switch the instrument off using the ((symbol)) key
- Press the [CLR] key and at the same time switch on again using the ((symbol)) key
- Keep holding down the [CLR] key until the switch-on test routine has ended (indicated by a beep).

This results in the default settings being made. Any stored setups are **not** deleted.

Lockup

The above procedure should also be used if the instrument locks up as a result of external interference pulses and cannot be restarted by switching it off and then on again. Any stored setups are **not** deleted.

8.3 Storage and transport

Retain the original packing for possible future use, e.g. when returning the instrument to a W&G service center for repairs. It will ensure that the instrument is correctly protected against damage should it become necessary to transport the instrument at some time.

Packing

If possible, use the original packing if you wish to transport the instrument.

If the original packing is no longer available, observe the following instructions:

Storage or transport under damp conditions

It is a good idea to re-use the silica-gel drying agent provided in the original packing

– if the transport period is to be very long, or
– if the instrument is to be subjected to damp conditions during a long period of storage.

The sachets of drying agent should be placed with the instrument inside the plastic bag provided in the original packing. The drying agent is blue when dehydrated and pink when saturated.

Do not use saturated drying agent as this may increase the humidity and cause damage.

Seal the bag tightly using good quality adhesive tape.

Stable container

Use a box made from double-layer corrugated cardboard with a wall thickness of at least 4 mm.

The box should be dimensioned such that space for at least 70 mm of padding on all sides of the instrument is available. Rigid plastic foam or corrugated cardboard is suitable as padding.

The padding must ensure that the instrument cannot shift position in the box and as large an area as possible of the instrument should be padded. Any free space in the box may be filled with polystyrene chips.

Polystyrene chips alone are not suitable for use as padding.

Use fiber-reinforced, water-resistant self-adhesive tape at least 70 mm wide to seal the box along the butt edges.

Checklist

Make up a checklist of all the parts contained in the box and store this along with the box.

9 Specifications

The following specifications are valid for the operating ranges of the influence quantity stated under "General Specifications" (see section 9.9.7, page 9-19), after a warm-up period of about 15 minutes, unless otherwise stated. All values quoted for measurement error and influence effects are limit values.

The influence of external electromagnetic interference is not included in the following specifications.

All specifications marked with an asterisk ✷ are traceable to international standards.

9.1 Frequency

Frequency range

Instrument version	SPM/PSM-37/-137	SPM/PSM-38/-138	SPM/PSM-39/-139
Coaxial input			
Frequency range f_{min} to f_{max}	50 Hz to 8 MHz	50 Hz to 18 MHz	50 Hz to 32 MHz
Balanced input			
Frequency range I f_{min} to f_{max}	10 kHz to 8 MHz	10 kHz to 14 MHz	
Frequency range II f_{min} to f_{max}	50 Hz to 620 kHz		

Frequency setting

Entry using

Keyboard, resolution . . . . . 1 Hz

Rotary control, resolution . . . . . .100 Hz/1 Hz, coarse/fine setting

STEP keys, step width . . . . . 1 Hz to f_{max} (see above)

Recall of fixed frequencies . . . . . up to 100 stored in device memory
100 more on RAM card

Frequency display

AFC off . . . . . 8 digits, resolution 1 Hz

AFC on . . . . . 9 digits, resolution 0.1 Hz

✷ *Tuning frequency error limits*

including aging for 1 year . . . . . 2×10^{-6}
(5×10^{-7} with option)

9.2 Automatic frequency scans

Search scan

Automatic search for levels above a presettable level threshold. The search takes place between the frequencies f_1 and f_2 within the frequency range of the instrument (see section 9.1 on page 9-1).

If the level threshold is exceeded, the values of level and frequency are stored (max. 100 pairs of values).

End-to-end measurement using two instruments (AUTOSTEP)

Operation switchable between MASTER and SLAVE functions

❒ MASTER (PSM-37/-38/-39/-137/-138/-139)

Frequency scan is timer-controlled

❒ SLAVE

Frequency scan starts when the level is below a presettable threshold value. The next steps can be controlled by subsequent occurrence of levels below the threshold or by timer

Time / step . . . . . .1 s or 3 s

Frequency scan

As frequency steps . . . . . between START and STOP frequencies, frequency step width(see section 9.1 on page 9-1)

or a sequence of

fixed frequencies . . . . . from first fixed frequency to last fixed frequency

Loop back measurements (generator and receiver in the same instrument) are also possible.

Automatic frequency control (AFC)[1]

Holding range . . . . . entire frequency range (see section 9.1 on page 9-1)

Capture range. . . . . approximately equal to selection filter 30 dB bandwidth (see section 9.3.7, page 9-9)

9.3 Voltage and power levels

9.3.1 Measurands

Absolute level

Voltage level in . . . . . dB referred to 0.7746 V

Voltage level in . . . . . dBµV referred to 1 µV

Power level in . . . . . .dBm referred to 1 mW

Noise level in . . . . . dBmp (dBrnC for US version)

Voltage

Voltage level in . . . . . µV, mV

1 No AFC at 48 kHz and 240 kHz

Level difference [dB]

The difference in dB between the absolute level and a stored reference level

Reference level entry . . . . . via keyboard, rotary control or absolute level transfer

Level referred to 0 dB

the difference between the absolute level and a stored relative level [dBr]

Displayed as

Referred voltage level in dB0

Referred power level in dBm0

Referred power in pW0

Referred noise level in . . . . . dBm0p[1]

Referred power in . . . . . pW0p[2]

Relative level entry . . . . . via keyboard, rotary control or absolute level transfer

9.3.2 Display

Digital display

	with averaging	without averaging
Resolution	0.01dB	0.1dB

Semi-analog display

Scale segment selection . . . . . manual or automatic

Scale length . . . . . 100, 20 or 2 dB

Resolution . . . . . 0.5, 0.1 or 0.01 dB

9.3.3 Measurement range selection

Automatic for most operating modes. Manual selection is in 5 dB steps with drive level monitoring.

9.3.4 Automatic calibration

Normally, calibration is carried out at the set tuning frequency (tracking generator principle). The correction values thus determined are stored. Broadband measurements are calibrated at 10 kHz. The tracking generator is blanked during calibration (LED below [BLANK] key is lit). Automatic calibration can be disabled. When enabled, calibration is made if the temperature of the instrument changes by more than 0.5°C or if a certain time has elapsed (approx. 10 min) or if an operating state is set for which no correction values are available. Automatic calibration can be matched to the current measurement task when the instrument is remote-controlled.

1 US version: dBrnC0
2 US version: pWC0

9.3.5 Display ranges for power and voltage

Absolute levels

Input	Units	Selective	Voice)	Broadband
Z=50/75 Ω	dB	– 140 to +22	– 120 to + 20	– 60 to + 20
	dBm	– 130 to +30	– 110 to + 30	– 50 to + 30
Z=124/150 Ω	dB	– 130 to +22	– 110 to + 20	– 50 to + 20
	dBm	– 125 to +25	– 105 to + 25	– 45 to + 25
Z=600 Ω	dB	– 130 to +22	– 110 to + 20	– 50 to + 20
	dBm	– 130 to +22	– 110 to + 20	– 50 to + 20

The lower display range limit is approximately 5 dB above the intrinsic noise floor (selective; Measurement bandwidth = 25 Hz)

Level difference

Difference between absolute and reference level

Reference level range . . . . . -140 to +20 dB

Referred level

Difference between absolute and relative levels

Relative level range . . . . . -120 to +30 dBr

Voltage

Measurement range . . . . . 80 nV to 7.7 V

9.3.6 Level display error limits

The values quoted are valid when:

- The input is fed from a source with internal impedance Z_0 and terminated with the receiver input impedance Z_0,
- The signal is a sinewave
- Automatic calibration is on
- AFC is on
- AVRG (noise averaging) is on.

The influence of individual discrete interference (see section 9.6.2, page 9-13) and the influence of external electromagnetic interference quantities is not taken into account.

9.3.6.1 Selective measurement

The frequencies specified apply to the SPM-39/-139 and PSM-139. The upper limits for the other instruments are as given in the table (see section 9.1 on page 9-1). The real r.m.s. value is measured

The overall error limits (IEC publication 359) apply within the operating ranges of the influence quantities and within the measurement ranges of the measurands.

The intrinsic error limits (IEC publication 359) apply for the reference values or reference ranges for the influence quantities or measurands.

Unless otherwise stated, all measurement errors apply to measurement frequencies ≥ 2 kHz at a measurement bandwidth of 3.1 kHz and to measurement frequencies < 2 kHz at a measurement bandwidth of 25 Hz.

If the measurement bandwidths 48 kHz and 240 kHz are used (swept bandwidths), the error limits increase by typically 0.25 dB.

Overall error limits

50/75Ω input

Input level dB/dBm	Overall error limit in dB, Z = 75 Ω (Z = 50 Ω)	
+ 20/+ 30	0,4 (0.45)	0.2 (0.25)
0/+ 10		
– 80/– 70		

Frequency range 50 Hz 200 Hz 32 MHz

Balanced input 124 Ω, frequency range I (see section 9.1 on page 9-1)

Input level dB/dBm	Overall error limit in dB				
+ 20/+25	—	—	—	0.9	0.3
0/+5					
– 70/–65					

Frequency range 50 Hz 200 Hz 2 kHz 10 kHz 60 kHz 14 MHz

Balanced input 150 Ω, frequency range I (see section 9.1 on page 9-1)

Input level dB/dBm	Overall error limit in dB					
+ 20/+25	—	—	—	0.9	0.3	0.4
0/+5						
– 70/–65						

Frequency range 50 Hz 200 Hz 2 kHz 10 kHz 60 kHz 8 MHz 14 MHz

Balanced input 150 Ω / 600 Ω, frequency range II (see section 9.1 on page 9-1)

Input level dB/dBm	Overall error limit in dB			
+ 20/+25	1.0	0.35	0.25	0.35
0/+5				
– 70/–65				

Frequency range 50 Hz 200 Hz 2 kHz 100 kHz 620 kHz

The following influence effects are included in the overall error limits:

✷ *Intrinsic error*

of level display versus frequency for an input level of 0 dB/dBm, at 23° ± 3°C

Input		Error limits in dB, Z_0 = 75 Ω								
Coaxial 75 Ω(1)		0.2	0.1							
Balanced	124 Ω	—			0.8	0.2				—
	150 Ω				0.8	0.2			0.4	
Balanced	150 Ω 600 Ω	1.0	0.2	0.15			0.2	—		
Frequency range		50 Hz	200 Hz	2 kHz	10 kHz	60 kHz	100 kHz	620 kHz	8 MHz	14 MHz 32 MHz

1) If 50 Ω coaxial input impedance is activated, the intrinsic error increases by 0.05 dB in each case.

Average variation with temperature

in the range 0 to +50 °C . . . . . 0.0035 dB/K

Variation with level

Excluding the discrete interference effects indicated in section 9.6.

Coaxial input 50/75 Ω, f=200 Hz to f_{max} (see section 9.1 on page 9-1)

Input level	– 100 dB	– 80 dB	0 dB	+ 20 dB
	0.15	0.1	0.15	
Input level	– 90 dBm	– 70 dBm	+ 10 dBm	+ 30 dBm

Balanced inputs 124/150/600 Ω, f=200 Hz to f_{max} (see section 9.1 on page 9-1)

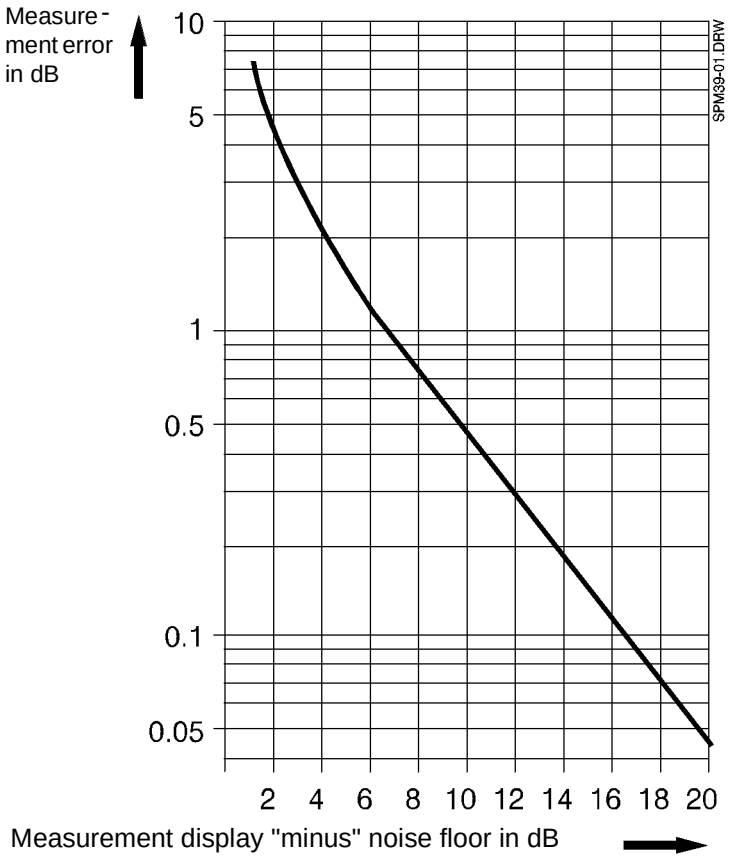
Input level	– 90 dB	– 70 dB	0 dB	+ 20 dB/dBm (600 Ω)
	0.15	0.1	0.15	
Input level	– 85 dBm	– 65 dBm	+ 5 dBm	+ 25 dBm (124/150 Ω)

Measurement error due to intrinsic noise

Additional errors may be caused by the intrinsic noise of the receiver at levels < -100 dB (-90 dBm) coaxial or < -90 dB (-85 dBm) balanced. The size of the error depends on the measurement bandwidth.

Automatic broadband attenuator setting (RF GAIN) must be switched to manual (AUTO RANGING OFF) in order to check the ratio of the measurement signal to the intrinsic noise level (signal-to-noise ratio).

The additional measurement error due to intrinsic noise can be read off from the following graph.



9.3.6.2 LF range measurements

Frequency range . . . . . 50 Hz to 10 kHz

Overall error limits

50/75Ω coaxial input

Input level dB/dBm	Overall error limit in dB	
+ 20/+30	0.5	0.35
0/+10		
– 80/–70		

Frequency range 50 Hz 200 Hz 10 kHz

Balanced input 150Ω/600Ω, frequency range II (see section 9.1 on page 9-1)

Input level dB/dBm	Overall error limit in dB	
+ 20/+30	1.2	0.45
0/+5		
– 70/–65		

Frequency range 50 Hz 200 Hz 10 kHz

✷ *Intrinsic error*

of level display versus frequency for 0 dBm/dB input level at an ambient temperature of 23 ° ± 3 °C

Input		Error limits in dB		
Coaxial 75 Ω		0.4	0.2	0.3
Balanced	150 Ω 600 Ω	1.0	0.25	0.35

Frequency range 50 Hz 200 Hz 4 kHz 10 kHz

Average variation with temperature

In the range 0 to +50 °C . . . . . 0.0035 dB/K

Variation with level

Coaxial input, 50/75 Ω

Input level – 90 dB – 80 dB 0 dB + 20 dB

0.15	0.1	0.15

Input level – 80 dBm – 70 dBm + 10 dBm + 30 dBm

Balanced input 150/600Ω, frequency range II (see section 9.1 on page 9-1)

Input level – 80 dB – 70 dB 0 dB + 20 dB/dBm (600 Ω)

0.15	0.1	0.15

Input level – 75 dBm – 65 dBm + 5 dBm + 25 dBm (150 Ω)

Measurement error due to intrinsic noise (see graph on page 9-7)

Additional errors may be caused by the intrinsic noise of the receiver at levels < -90 dB (-80 dBm) coaxial or < -80 dB (-75 dBm) balanced. The size of the error depends on the bandwidth.

To check the intrinsic signal to noise ratio, disconnect the test signal from the input and do **not** activate AUTO RANGING.

9.3.6.3 Broadband measurement

Quasi r.m.s. rectification; the values apply to sinusoidal signals.

Overall error limits

Including variation with temperature, level and frequency response errors.

Input		Input error limits in dB					
Coaxial 50/75 Ω		—	0.6				
Balanced	124 Ω 150 Ω	—		1.0	0.7		—
Balanced	150 Ω 600 Ω	—	0.7			—	
Frequency range		50 Hz	200 Hz	10 kHz	60 kHz	620kHz	14 MHz 32 MHz

✷ *Intrinsic error*

of level display versus frequency for 0 dBm/dB input level at an ambient temperature of 23 ° ± 3 °C

Input		Error limits in dB					
Coaxial 50/75 Ω		—	0.4				
Balanced	124 Ω 150 Ω	—		0.9	0.6		—
Balanced	150 Ω 600 Ω	—	0.5			—	
Frequency range		50 Hz	200 Hz	10 kHz	60 kHz	620 kHz	14 MHz 32 MHz

9.3.7 Selectivity and filters

Measurement bandwidth	Effective noise bandwidth ±15%	Spacing Δf from filter center frequency for an attenuation of	
		> 50 dB	> 60 dB
25 Hz[1]	26 Hz ± 5%	80 Hz	200 Hz
100 Hz[1]	104 Hz ± 5%	350 Hz	1 kHz
1.74 kHz	1.74 kHz ± 15%	—	2 kHz
1.95 kHz[2]	1.95 kHz ± 15%		
3.1 kHz	3.1 kHz ± 15%		
48 kHz	48 kHz	28 kHz	—
240 kHz	240 kHz	124 kHz	

1 3 dB bandwidths
2 US Version

Filters

Psophometer . . . . . frequency response to CCITT O.41
C message . . . . . frequency response to CCITT O.41
Notch, 804 to 850 Hz . . . . . frequency response to CCITT O.132
Notch, 1004 to 1020 Hz. . . . . frequency response to CCITT O.132

AF band limiting

Frequency	Attenuation in dB
≤ 10 kHz	≤ 0.2
≥ 22 kHz	≥ 60 (typ.)

9.4 Other measurement modes

9.4.1 Phase jitter measurement

Measurement in voice channel to CCITT O.91

Frequency setting . . . . . not required
Test tone frequency . . . . . .1020 Hz ± 50 Hz
Test tone level range . . . . . -60 dBm to +10 dBm
Test channel bandwidth. . . . . 400 Hz to 1800 Hz
Weighting filters 4 Hz to 300 Hz
4 Hz to 20 Hz
20 Hz to 300 Hz
Display . . . . . digital, resolution 0.1° pp

Other similar measurements

The above measurement can also be performed on the demodulated signal or on any selectively measured signal. The only difference is the additional band limiting introduced by the 3.1 kHz channel filter (bandpass).

Measurement in the demodulated voice channel (CF systems)

Frequency set to . . . . . .channel carrier
Frequency range at input . . . . . 3 kHz to f_{max} (see section 9.1 on page 9-1)
Test tone frequency. . . . . .1020 Hz ± 50 Hz

Measurement of any signal

Frequency setting . . . . . tuned to signal
Carrier frequency at input. . . . . 3 kHz to f_{max} (see section 9.1 on page 9-1)

Measurement range

Measurement range . . . . . 0.2 to 30 ° pp

Overall error limits

The overall error limits (IEC publication 359) apply within the operating ranges of the influence quantities and within the measurement ranges of the measurands.

Overall error limits . . . . . ± 5% ± 0.1° pp

Additional intrinsic jitter . . . . . ≤ 0.2 ° pp

when measuring IF or demodulator signals.

9.4.2 Impulsive noise measurement

Measurement in voice channel to CCITT O.71

Level range . . . . . -50 dBm to 0 dBm

Threshold settable in steps of . . . . . 1 dB

Threshold deviation . . . . . ± 0.5 dB

Difference between Ò thresholds . . . . . ≤ 0.5 dB

Dead time . . . . . 125 ms ± 10%

(143 ms ± 10% for US version)

Additional NOTCH filter,

50 dB suppression between . . . . . 800 Hz and 855 Hz or

1000 Hz to 1025 Hz

Additional bandwidths

Filter 1 (-3 dB) . . . . . 600 Hz to 3000 Hz

Filter 2 (-3 dB) . . . . . 300 Hz to 500 Hz

Counter, display . . . . . capacity up to 9999 events

Timer control

Gate time . . . . . 1 min to 99 h 59 min

Measurement start . . . . . by pressing [START] or timer-controlled

Other similar measurements

The above measurement can also be performed on the demodulated signal. The only difference is the additional band limiting introduced by the 3.1 kHz channel filter (bandpass).

Measurement in the demodulated voice channel

Frequency set to . . . . . channel carrier

Frequency range at input . . . . . 3 kHz to f_{max} (see section 9.1 on page 9-1)

9.4.3 Interruption measurement

Measurement in voice channel to CCITT O.61

Test tone frequency . . . . . 900 Hz to 2.1 kHz

Test tone level range . . . . . -50 dBm to +10 dBm

Trigger thresholds referred to test tone . . . . . -3, -6, -10, -20 dB

Threshold deviation . . . . . ± 1 dB

Dead time . . . . . .3 ms ± 1 ms or

125 ms ± 10%

(143 ms ± 10% in US version)

Counter, display . . . . . capacity up to 9999 events

Timer control

Gate time . . . . . 1 min to 99 h 59 min

Measurement start . . . . . by pressing [START] or timer-controlled

TTL signal (see section 9.7.2, page 9-15)

logical 0: signal above level threshold

logical 1: signal below level threshold

Other similar measurements

The above measurement can also be performed on the demodulated signal. The only difference is the additional band limiting introduced by the 3.1 kHz channel filter (bandpass).

Measurement in the demodulated voice channel

Frequency set to . . . . . channel carrier

Frequency range at input . . . . . 3 kHz to f_{max} (see section 9.1 on page 9-1)

Test tone frequency . . . . . 900 Hz to 2.1 kHz

9.4.4 Measurement of noise power ratio (NPR)

Measurement sequence

The broadband power at the input and the power in a 1.74 kHz band symmetrical to the tuning frequency are measured. The NPR value is calculated from these two values, taking the number of channels entered (= bandwidth of broadband power level measured) into account.

NPR measurement specifications

Measurement range . . . . . 0 to 70 dB

Number of channels . . . . . 300 to 3600

Display . . . . . digital, resolution 0.1dB

Total input level (broadband level) 50/75 Ω input . . . . . .0 dBm to - 22 dBm

Overall measurement error

The limits of overall measurement error (IEC Publ. 359) are valid within the operating ranges of the influence quantities and within the specified ranges of the measurement quantities.

NPR value ≤ 50 dB . . . . . ± 1.0 dB

Intrinsic NPR value(see under intrinsic noise power ratio (NPR on page 9-13)

9.5 Demodulator

Single sideband demodulation

Switchable . . . . . .upper or lower sideband

Built-in loudspeaker and headphone socket

Output volume . . . . . variable

9.6 Dynamic range (intrinsic noise signals)

9.6.1 Noise dependent on the input signal

Non-linear distortions

For total input level ≤ 0 dB and manual RF gain (broadband attenuator) setting (AUTORANGING OFF) according to the relationship:

RF gain [dB] ≤ -40 dB total input level [dB]

The above relationship is normally fulfilled for automatic setting of the broadband attenuator (AUTORANGING ON).

If high distortion and intermodulation attenuation (< 60 dB) are being measured, automatic optimization of the drive level (broadband/RF attenuator exchange for optimum noise/ intermodulation ratio) may result in settings of the broadband attenuator which do not fulfil the above requirement. It is therefore a good idea to use manual setting (see example above) for critical measurements.

2nd and 3rd order harmonic distortion attenuation at fundamental frequencies of

f ≥ 3 kHz . . . . . ≥ 80 dB

f ≥ 300 Hz (bandwidth 25 Hz . . . . . typically 70 dB

3rd order intermodulation noise ratio when loaded with

two signals spaced by Δf = 10 kHz at frequencies of

≥ 3 kHz . . . . . ≥ 80 dB

≥ 1 MHz . . . . . ≥ 90 dB

Image frequency and IF attenuation

Intermediate frequencies . . . . . 59.3 MHz / 10.7 MHz / 1.85 kHz

Image frequency attenuation . . . . . ≥ 70 dB

IF attenuation . . . . . ≥ 70 dB

attenuation of non-harmonic interference signals . . . . . ≥70 dB

Intrinsic noise power ratio (NPR)

when loaded with white noise in the frequency range 0.3 to 12 MHz, measured in any notch in the center band, B_{eff} ≥ 20 kHz, bandwidth 1.74 kHz and broadband level 0 to -22dBm

When using the NPR program (software option)

for 300 channels . . . . . .≥ 62 dB (typically 67 dB)

for 2700 channels. . . . . .≥ 60 dB (typically 65 dB)

For selective level measurement (LEVEL) . . . . . typically 55 dB

9.6.2 Noise independent of the input signal

Intrinsic noise

Selective level measurement, bandwidth 25 Hz, input terminated with Z_0 and total signal level ≥ -60 dB at f ≥ 10 kHz

75 Ω or 50 Ω input . . . . . ≤ -140 dB (typically -145 dB)

124 Ω150 Ω input . . . . . ≤ -130 dB (typically -135 dB)

150 Ω 600 Ω input . . . . . ≤ -130 dB (typically -135 dB)

Sideband noise ratio

Tuning frequency . . . . . ≥ 100 kHz

Frequency difference from signal
≥ 2 kHz . . . . . typically 103 dBc√Hz
≥ 20 kHz . . . . . typically 123 dBc√Hz

Display of individual discrete interference signals

Inputs terminated with Z_0
75 Ω or 50 Ω input . . . . . ≤ -130 dB (typically -140 dB)
124 Ω / 150 Ω input . . . . . ≤ -120 dB (typically -130 dB)
150 Ω / 600 Ω input . . . . . ≤ -120 dB (typically -130 dB)

9.7 Connectors

9.7.1 Measurement inputs

Coaxial input

Socket . . . . . .Versacon 9 universal connector system
Input impedance . . . . . .Z = 75 Ω, 50 Ω
. . . . . or high impedance Z approx. 10 kΩ || 40 pF
Frequency range . . . . . f_{min} to f_{max} (see section 9.1 on page 9-1)
Return loss at
50 Hz to 2 MHz . . . . . ≥ 35 dB (typically 40 dB)
2 MHz to f_{max} (see section 9.1 on page 9-1) . . . . . ≥ 30 dB
Insertion loss of high impedance input
f = 200 Hz to 1 MHz. . . . . ≤ 0.05 dB

Balanced input

Socket . . . . . 3-pole CF connector[1]

Frequency range I

(see section 9.1 on page 9-1)
Input impedance . . . . . Z = 124 Ω, 150 Ω (135 Ω[2])
or high impedance Z approx. 10 kΩ || 10 mH || 30 pF
Signal balance ratio
60 kHz to 5 MHz . . . . . ≥ 40 dB
5 MHz to f_{max} (see section 9.1 on page 9-1) . . . . . typically 30 dB
Return loss at 100 kHz . . . . . .typically 40 dB
Insertion loss of high impedance input
f = 60 kHz to 620 kHz . . . . ≤ 0.06 dB

Frequency range II

(see section 9.1 on page 9-1)
Input impedance . . . . . Z = 150 Ω (135 Ω[2]), 600 Ω

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1 US version: Frequency range I: 3-pole CF socket;
Frequency range II: WECO 310 socket
Japanese version: Frequency ranges I and II: 2-pole I-214B socket with earthing socket
2 US version

Or . . . . . high impedance Z approx. 10 kΩ || 2.5 H || 80 pF
Signal balance ratio . . . . . ≥ 40 dB
Return loss at 10 kHz . . . . . typically 50 dB
Insertion loss of high impedance input
f = 500 Hz to 300 kHz . . . . . ≤ 0.06 dB

Permitted input voltage levels for the above inputs

Overload limit when terminated with Z_0 . . . . . V_{rms} ≤ 10 V

For high impedance input

- Coaxial

Permissible d.c. input voltage . . . . . ≤ 60 V
The sum of the d.c. input voltage and the peak value
of the superimposed a.c. voltage must not exceed 60 V!

- Balanced

Permissible d.c. input voltage . . . . . ≤ 100 V
Permissible ringing voltage . . . . . ≤ 100 V

9.7.2 Other inputs and outputs

Headphone jack (front panel)

Connector . . . . . 6.3 mm jack socket
Output impedance . . . . . 600 Ω
Output signal for selective level measurement . . . . . IF signal
Demodulator operation and tuning to carrier leak . . . . . 0.3 to 4 kHz

Auxiliary inputs and outputs (back panel)

Connector . . . . . 9-way submin. D type

Connections

1. Y output (pin 3)
   DC output voltage proportional to analog scale . . . . . 0 to +5 V
2. Alarm output (pins 1/2/6)
   Settable using the SCALE menu;
   Relay contacts . . . . . 1 changeover, max. 42 V/2 A
   pin 1= NO, pin 2 = NC, pin 6 = C/O
3. Interrupt measurement event output (pin 4)
   TTL signal to CCITT Rec. O.61:
   Logical "0": signal above level threshold
   Logical "1": interruption, signal below level threshold

Ground connections: pins 7 and 8

Input and output for external timebase (back panel)

Connector . . . . . BNC
When connected as output:
Frequency . . . . . 10 MHz
Output impedance . . . . . 600 Ω
Voltage . . . . . 2.5 V_{pp} (squarewave) into 600 Ω

When connected as input:

Frequencies . . . . . 60 kHz, 300 kHz, 2048 kHz, 4200 kHz, 1 MHz, 2 MHz, 5 MHz or 10 MHz

Input impedance . . . . . 600 Ω

Voltage . . . . . 100 mV to 10 V_{pp}

Pulling range . . . . . ± 2 ppm

A check is made to determine if the instrument synchronizes to the external standard frequency.

Power supply for TK-11 test probe

Located on front panel . . . . . approx. -11 V

9.8 Tracking generator[1]

Setting[2]

Transmit level . . . . . keyboard, rotary control
Resolution . . . . . 0.1 dB

Display

Absolute level . . . . . in dB, dBm, dBµV
Voltage . . . . . in µV, mV
Referred level . . . . . in dB0, dBm0, dBµV0

Operating range

Coaxial output, frequency range (see section 9.1 on page 9-1)

Z0 = 75Ω or 50Ω . . . . . -60 dBm to +9 or +10 dBm
-70 dB to 0 dB

Balanced output, frequency range I (see section 9.1 on page 9-1)

Z_0 = 124Ω, 150Ω . . . . . -60 dBm to +6 dBm
-70 dB to 0 dB

Balanced output, frequency range II (see section 9.1 on page 9-1)**)**

150 Ω (135 Ω US-version)	– 60 dBm to – 3 dBm – 69 dB to – 9 dB	to + 3 dBm to – 3 dB	to + 9 dBm to + 3 dB
600 Ω	– 69 dBm to – 9 dBm – 69 dB to – 9 dB	to – 3 dBm to – 3 dB	to + 3 dBm to + 3 dB
~ 5 Ω ($R_L \geq$ 135 Ω)	– 60 dB to – 3 dB	to + 3 dB	to + 9 dB

Frequency range 50 Hz 100 Hz 200 Hz 620 kHz

Error limits

The values quoted apply for generator output impedance = receiver input impedance and automatic level calibration. All table values are quoted in ± dB.

The frequency values refer to the SPM-39, SPM-139, PSM-39 and PSM-139. The upper limits (see section 9.1 on page 9-1) apply for the other instruments.

The overall error limits (IEC publication 359) apply within the operating ranges of the influence quantities and within the measurement ranges of the measurands.

The intrinsic error limits (IEC publication 359) apply for the reference values or reference ranges for the influence quantities or measurands.

1 For PSM-37/-38/-39/-137/-138/-139 only
2 The reference or relative level is set in the same way as for the receiver.

Overall error limit of output level

Input		Error limits in dB					
Coaxial 50/75 Ω		0.25					
Balanced	124 Ω 150 Ω	—		0.3			—
Balanced	150 Ω 600 Ω	0.3	0.25		0.3	—	

Frequency range 50 Hz 200 Hz 10 kHz 100 kHz 620 kHz 14 MHz 32 MHz

✷ *Intrinsic output level error* (included in overall error)

at 0 dB/dBm, f = 10 kHz (100 kHz for frequency range I, (see section 9.1 on page 9-1), 23 ° ± 3 °C

Coaxial output. . . . . ± 0.1 dB

Balanced output. . . . . ± 0.2 dB

Dynamic range (intrinsic noise signals) at $R_{in} = R_{out} = Z_0$

Intrinsic 2nd and 3rd order harmonic distortion ratio . . . . . ≥ 40 dB

Ratio of discrete, non-harmonic interference signals

Ratio to wanted signal for levels ≥ -50 dB . . . . . ≥ 60 dB

Signal to noise ratio

Referred to 1 Hz bandwidth at an output level of 0 dB/dBm,

output frequency ≥ 10 kHz at ≥ 20 kHz from wanted signal . . . . . ≥ 120 dB

Blanking

By pressing [BLANK] or, if required, automatically whenever the frequency is changed (AUTO BLANK).

Blanking attenuation for levels ≥ -40 dB . . . . . .≥ -60 dB

Blanking attenuation on frequency change for levels ≥ -60 dB . . . . . ≥ -40 dB

Coaxial output

Socket. . . . . Versacon 9 universal connector system

Permissible reverse voltage . . . . . 0 V

Frequency range . . . . . f_{min} to f_{max} (see section 9.1 on page 9-1)

Output impedance, switchable . . . . . 75 Ω or 50 Ω

Return loss at

50 Hz to 2 MHz . . . . . ≥ 46 dB

2 MHz to f_{max} (see section 9.1 on page 9-1) . . . . . ≥ 26 dB

Balanced output

Socket. . . . . 3-pole CF connector[1]

Permissible reverse voltage . . . . . .0 V

Frequency range I . . . . . f_{min} to f_{max} (see section 9.1 on page 9-1)

Output impedance, switchable . . . . . 124 Ω or 150 Ω (135 Ω[1])
Signal balance ratio. . . . . ≥ 40 dB
Return loss at 100 kHz . . . . . ≥ 40 dB
Frequency range II . . . . . f_{min} to f_{max} (see section 9.1 on page 9-1)
Input impedance . . . . . 150 Ω (135 Ω[2]), 600 Ω or ≈ 5 Ω
Signal balance ratio. . . . . ≥ 40 dB
Return loss at 10 kHz . . . . . ≥ 40 dB
The return loss is maintained approximately when the instrument is switched off.

Auxiliary inputs and outputs (back panel)

Connector. . . . . 9-way submin. D type
External level setting (pin 5, ground pin 9) . . . . . ± 1 dB
using ± 500 mV auxiliary voltage, variable

9.9 Sweep measurements

The result is shown on the built-in display as a graph.

X axis, frequency

Quasi-continuous frequency sweep within the set frequency limits:
FSTART / FSTOP or FCENT / FSPAN

Frequency step size . . . . . approx. FSPAN * 35 µs / SWT

Display resolution SWT = 1 s . . . . . 51 pixels
SWT ≥ 3 s . . . . . 101 pixels

Y axis, amplitude

SCALE, selectable . . . . . 20 dB/div, 10 dB/div, 5 dB/div, 2 dB/div, 1 dB/div
Display range in each case . . . . . 4 divisions (div)
Display resolution div/10

Sweep parameters

SWEEP TIME (SWT), selectable, AUTO / MAN . . . . . .1 s, 3 s, 10 s, 30 s, 100 s, 300 s

- AUTO
  Automatic selection of SWT
  coupled with FSPAN and BANDW (bandwidth)
  Amplitude error due to settling . . . . . ≤ 0.5 dB

Amplitude error due to settling occurs when large spontaneous changes in level occur during a sweep (e.g. during spectrum analysis).

- MAN
  Manual selection of SWT

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1 US version: Frequency range I: 3-pole CF socket;
Frequency range II: WECO 310 socket
Japanese version: Frequency ranges I and II: 2-pole I-214B socket with earthing socket
1 US version

If only small changes in level per unit time are expected during a sweep, the SWEEP TIME (SWT) can normally be reduced by one to three steps compared with the automatic SWT setting.

SWEEP, selectable

SING . . . . . SINGLE sweep

CONT . . . . . CONTINUOUS sweep

MAXHLD ON / OFF (MAXHOLD)

Display of highest amplitude values measured during the entire sweep measurement.

Drive conditions, selectable

LOW NOISE: . . . . . preferred setting for network analysis with wide measurement dynamic range

LOW DISTORTION: . . . . . preferred setting for spectrum analysis with high intrinsic distortion and intermodulation attenuation values

Markers

Numeric evaluation of graphic measurement result display using MARKERS:

- SHOW MARKER ON /OFF
  Frequency and amplitude measurement
  Frequency resolution SPAN/100
  Amplitude resolution . . . . . 0.1 dB
- MRK FRQ ---> FCENT, marker transfer:
  The actual marker frequency is set as center frequency FCENT; the frequency span FSPAN setting remains unchanged.

9.10 General specifications

9.10.1 Safety

Basic standards to . . . . . IEC publication 1010-1
Safety class I
Overvoltage category II
Pollution grade II
Safety with regard to the
connection to the telephone network . . . . . IEC Guide 105 and EN 41003

9.10.2 Electromagnetic compatibility

EMF emission. . . . . to CISPR 22 class B/EN 55022 and EN 50081-1[1]

Refer also to section 2.8
Immunity to interference . . . . . to IEC 801-2, -3, -4 and EN 50082-1[1]

9.10.3 Power supply

The built-in power supply also operates as a battery charger.

AC line operation
Nominal voltage range . . . . . 100 to 240 V
Operating range limits . . . . . 90 to 264 V
AC line frequency . . . . . 50/60 Hz ±5%

Battery operation (see section 9.11.2 on page 9-23)

9.10.4 Display

SPM/PSM-37/-38/-39 . . . . . LCD
240 x 60 pixels,
can be blanked by remote control
SPM/PSM-137/-138/-139 . . . . . Electroluminescent
240 x 60 pixels,
can be blanked by remote control

9.10.5 Timer

Built-in real-time clock and calendar

1 CE conformance is based on adherence to these standards

9.10.6 Memory

Internal memory . . . . . storage of 100 fixed frequencies
7 setups for user requirements
plus . . . . . 1 DEFAULT setup
1 reserved for USER setup (for power on behavior)
1 reserved for PREVIOUS setup (for power on behavior)
Memory card[1] . . . . . .JEIDA version 4.1, PCMCIA 2.0
for storing further setups,
fixed frequencies and results

9.10.7 Service aids

Self test, service support

9.10.8 Temperature and humidity specifications

Temperature

Reference range . . . . . 23 °C ± 3 °C
Operating range . . . . . 0 to +40 °C
Limits operating range . . . . . 0 to +40 °C
Storage and transport range
SPM/PSM-37/-38/-39 (LC display) . . . . . -20 to +60 °C
SPM/PSM-137/-138/-139 (EL display) . . . . . -40 to +70 °C

Condensation

Occasional short-term condensation is permitted as a limit condition.

Air humidity

Operating range:
Relative humidity, up to +40 °C . . . . . 5 to 95%
Absolute humidity, above +40 °C . . . . . ≤ 30 g/m^3

9.10.9 Dimensions

Width . . . . . 320 mm
Height . . . . . 140 mm
Depth . . . . . 360 mm

9.10.10 Weight

All SPM versions . . . . . approx. 8.0 kg
ALL PSM versions . . . . . approx. 8.7 kg
Rechargeable battery pack . . . . . approx 2.5 kg

1 SPM-137/-138/-139, PSM-137/-138/-139 only

9.11 Options

9.11.1 Standard frequency oscillator

Improved frequency accuracy

Tuning frequency error including aging for 1 year . . . . . ± 5 x 10^{-7}

This option can be fitted by a Wandel & Goltermann service center. Instruments fitted with this option require a warm-up period of approx. 15 minutes before use. Battery operation is restricted.

9.11.2 Battery pack BAZ-2203

NiCd rechargeable battery . . . . . Nominal voltage 16.8 V
. . . . . .Nominal capacity 4 Ah
Battery pack (14 cells, sealed) . . . . . .to IEC 285-2, type KR 35/62
Operating time, SPM-37/-38/-39 without TK-11 test probe . . . . . approx. 5 hours
Built-in fuse . . . . . .T4 A (slow-blow)

Charging

Charging time . . . . . approx. 14 hours

The batteries are trickle-charged by the built-in a.c. power supply during measurements. Charging can be timer-controlled.

9.11.3 Remote control

(see *Options* on page 9-24)

IEEE bus and V.24 interface for control of all instrument functions (operation from AC line only)

9.12 Ordering information

Level meters

SPM-37 . . . . . BN 2203/02
SPM-38 . . . . . BN 2203/03
SPM-39 . . . . . BN 2203/04
SPM-137 . . . . . BN 2203/05
SPM-138 . . . . . BN 2203/06
SPM-139 . . . . . BN 2203/07

Level test sets

PSM-37 . . . . . BN 2203/12
PSM-38 . . . . . BN 2203/13
PSM-39 . . . . . BN 2203/14
PSM-137 . . . . . BN 2203/15
PSM-138 . . . . . BN 2203/16
PSM-139 . . . . . BN 2203/17

Options

Battery pack BAZ 2203 . . . . . BN 2203/00.04
IEEE 488.2/V.24 interface . . . . . BN 2203/00.05
Standard frequency oscillator 5×10^{-7} [1] . . . . . BN 2203/00.06
19" rack conversion kit . . . . . BN 2203/00.07

US version

Level meter . . . . . BN 2203/00.10
Level test sets . . . . . BN 2203/00.10 and BN 2203/00.11

Japanese version

Level meter BN2203/00.12
Level test sets . . . . . BN 2203/00.12 and BN 2203/00.13

Accessories

Return loss bridge RFZ-12 . . . . . BN 810/01
Signal balance ratio bridge SDZ-12. . . . . BN 811/01
Balanced measurement bridge SDZ-30 . . . . . BN 2234/01
Return loss bridge RFZ-1 . . . . . BN 2045/..
Active test probe TK-11 (with contact) . . . . . BN 573/..
ISDN signal balance ratio bridge ISM-1 . . . . . BN 2098/..
ISDN impedance bridge IMB-1 . . . . . BN 3003/01
Coaxial choke MSD-2, 50 Hz to 50 MHz . . . . . BN 2227/01
Transport covers SD-930 (set of 2) . . . . . BN 0960/00.01
LevelPRO Software Package . . . . . BN 2203/93.01
(databases, A, B, A-B A&B trace manipulation, tolerance masks, etc.)

1 Order together with basic instrument. Option can also be retrofitted by a Wandel & Goltermann service center.

10 Remote control

10.1 Introduction

Standards

The device is a processor-controlled measuring instrument. All measurement parameters which can be set manually can also be controlled from an external controller. Two remote-control interfaces are available for this purpose:
All instruments: RS 232 or V.24/V.28 serial interface,
SPM/PSM-137 to 139 instruments: IEEE 488 (IEC 625) remote control interface[1].

The main advantages of the V.24 / V.28 interface are:

- Control over long distances (point-to-point connection)
- Control using a PC without additional IEEE bus card

The main advantages of the IEEE bus interface are:

- Fast data transfer rate
- measurement systems (multi-point connections)

Remote control behavior

Remote control behavior corresponds to the standards IEC 625-1:1993/IEEE 488.1-1978 and IEC 625-2:1993/IEEE 488.2-1992 (referred to as IEC/IEEE in this manual).

This allows IEC/IEEE bus or V.24 programs to be transferred from each other.

SCPI (Standard Commands for Programmable Instruments), which is based on the 488.2 standard, specifies a standardized set of commands for remote control, with standardized syntax and semantics. The remote control commands which are implemented for the device are structured according to the SCPI rules 1994.0.

Differences between IEEE bus and V.24

The IEEE remote-control interface is a bus system with a talker and a listener. The V.24 remote-control interface is a full-duplex serial link which means that it is possible to transmit and receive simultaneously.

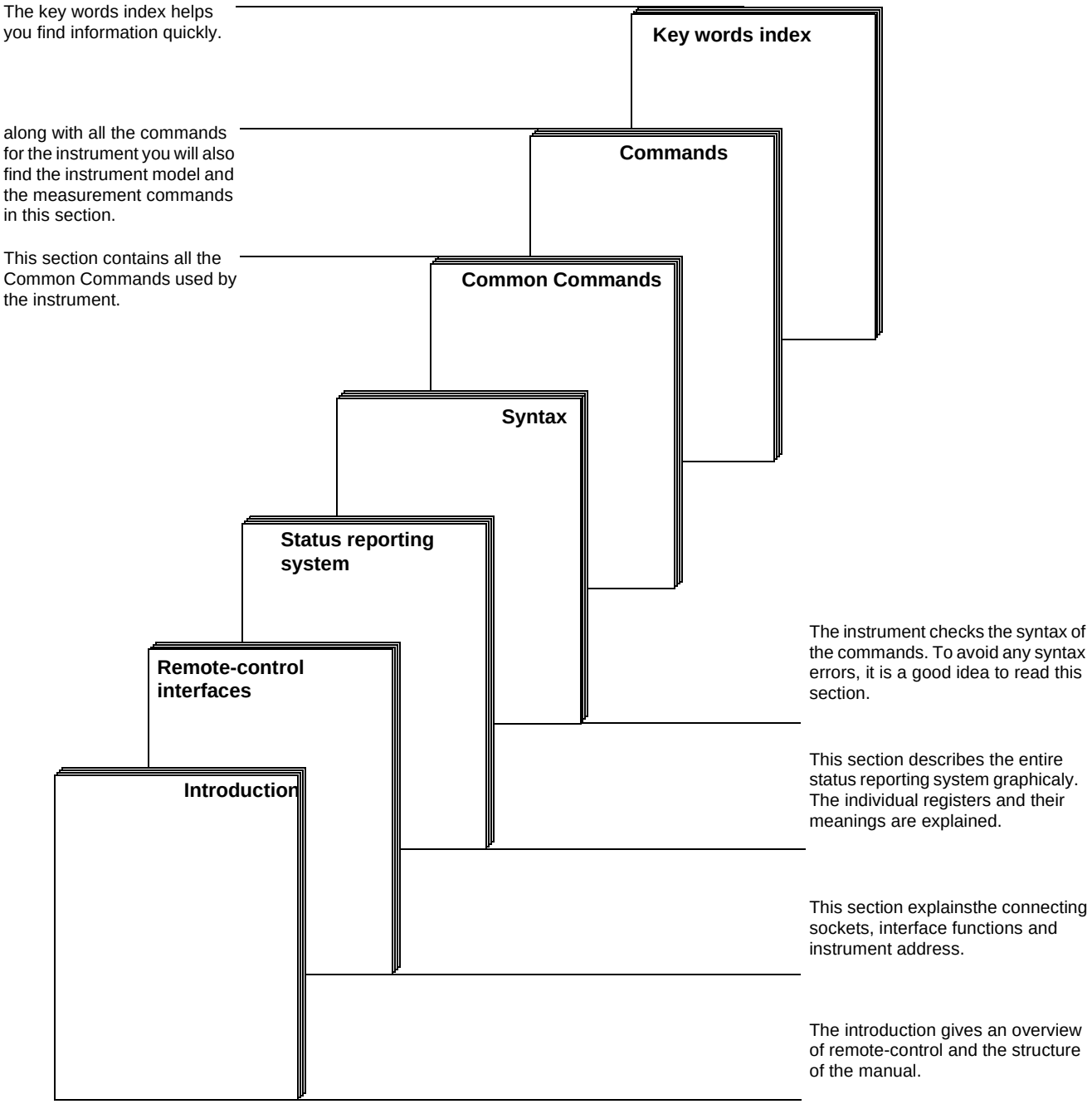
The IEEE bus interface functions are not implemented in V.24 remote-control. Some of these interface functions are, however, simulated by V.24 (see section 10.3.2.1 "Interface functions").

LOCAL operation

It is possible to change over to manual operation from remote control mode by pressing the LOCAL key, unless LOCAL LOCKOUT has been programmed.

1 Optional for SPM/PSM-37 to 39

10.2 About this remote-control manual



10.3 Remote-control interfaces of the device

10.3.1 IEC/IEEE remote-control interface

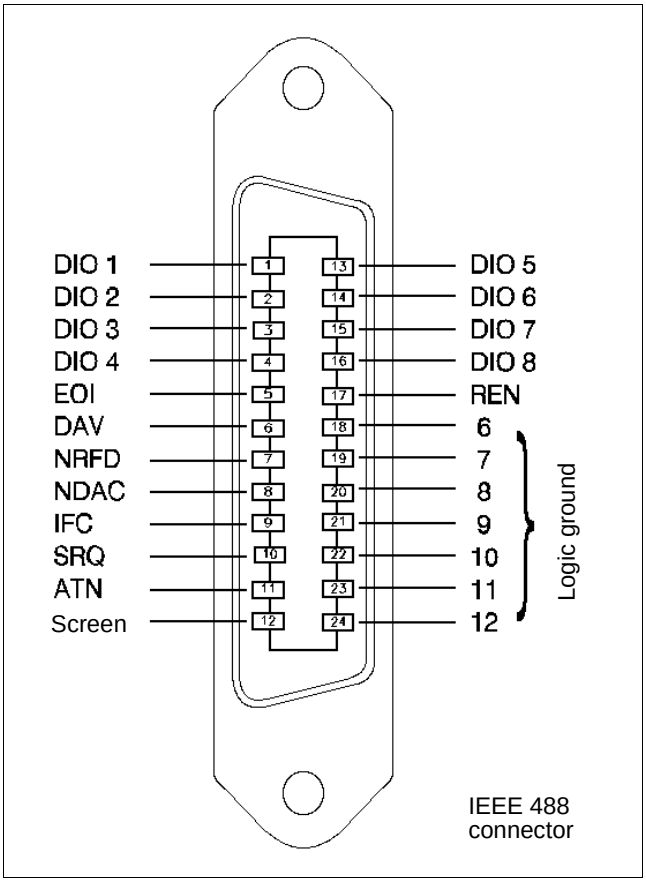
10.3.1.1 Bus connections

Overview

Up to 15 devices can be connected together in an interface system using special IEEE bus cables. The maximum permissible cable length which can be used when a group of devices is connected together in a bus system is 2 m times the number of devices, though no more than 15 m. None of the individual cables must be more than 2 m long. (See also IEC 625 Part 1, Section 39, Page 71.)

Connector

The built-in IEC bus board is equipped with a 24-pole connector. The pin connections are shown in Fig. 10-1.



DIO 1 … DIO 8 = Input / Output

EOI = End or Identify

DAV = Data Valid

NRFD = Not Ready for Data

NDAC = Not Data Accepted

IFC = Interface Clear

SRQ = Service Request

ATN = Attention

REN =Remote Enable

Fig. 10-1 IEEE bus connector pin connections

IEC/IEEE bus cables

IEEE bus cables in various lengths are available for connecting the device to other devices or controllers:
- 1.2 m long: K 420
- 2.0 m long: K 421

10.3.1.2 Instrument address

Each device must be given a unique address, to allow it to be activated directly by the controller in a measurement system.

- Press **[Blue key]** to call up additional functions
- Press **[TEST & CONF]** to invoke the TEST & CONFIGURATION auxiliary function
- Press **INTERFACE** [F L4] to change to the INTERFACE menu.

Fig. 10-2 Device address

Note: Each device address must only be allocated once in an interface system, and the controller address must not be used. Certain devices with particular addresses are often linked by specific attributes (e.g. printers with address 30).

10.3.1.3 Interface functions

Figure below summarizes the interface functions of the device. They conform to the IEC 625.1 and IEEE 488.1 standards.

Functions	**IEEE 488.1**	**IEEE 488.2, Chapter:**
Source Handshake	SH1	5.1.1
Acceptor Handshake	AH1	5.1.2
Talker	T6	5.3
Listener	L4	5.4
Service Request	SR1	5.5
Remote/Local	RL1	5.6
Parallel Poll	PP1	5.7
Device Clear	DC1	5.8
Driver/Receiver Ports	E2	5.11

Fig. 10-3 Interface functions

10.3.2 V.24 / V.28 remote-control interface

The instrument is also fitted with a V.24/V.28 connection which can be used for remote control.

Note: When the serial interface is used for remote control, the first command sent must be `SYSTEM:COMMUNICATE:REMOTE ON` in order to guarantee correct remote-controlled operation.

10.3.2.1 Interface functions

The IEEE bus interface functions are not implemented in V.24 remote control.

The following functions are simulated:

IEEE bus command	V.24 simulation
Service Request (SRQ)	In the event of a SRQ, a special character is sent to the control computer (<BEL> = 07hex)
Device Clear (DCL)	DCL is triggered by sending a BREAK signal to the SPM/PSM.
Remote / Local (RL)	Simulated by the V.24 command: “SYSTEM:COMMUNICATE:REMOTE ON (OFF)"

The following functions cannot be simulated:

– Parallel Poll (PPC / PPU)
– Serial Poll (SPE / SPD)

10.3.2.2 Bus connections

The serial interface is defined by two CCITT recommendations:

1. V.24 Interface circuits
2. V.28 Electrical characteristics

The following types of connection can be used with the instrument:

– Connection to a PC 25-pole connection
– Connection to a PC 9-pole connection
– Connection to a PC 3-pole connection

Pin	Pin	DIN 66020	CCITT V.24	EIA RS 232	Description		Direction	
9pole	25pole						SPM/PSM	Modem
-	1	E1	101	AA	PG	Protected Ground	-	-
3	2	D1	103	BA	TXD	Transmit Data	Out	In
2	3	D2	104	BB	RXD	Receive Data	In	In
7	4	S2	105	CA	RTS	Request To Send	Out	In
8	5	M2	106	AB	CTS	Clear To Send	In	Out
6	6	M1	107	CC	DSR	Data Set Ready	In	Out
5	7	E2	102	AB	SG	Signal Ground	-	-
1	8	M5	109	CF	DCD	Carrier Detector	In	Out
4	20	S1.2	108.2	CD	DTR	Data Terminal Ready	Out	In
9	22	M3	125	CE	RI	Ring Indicator	In	Out

Connection to a PC

The SPM/PSM is a data terminal equipment (DTE) just like the PC. Azero modem is therefore required for the connection. The following connections should be made:

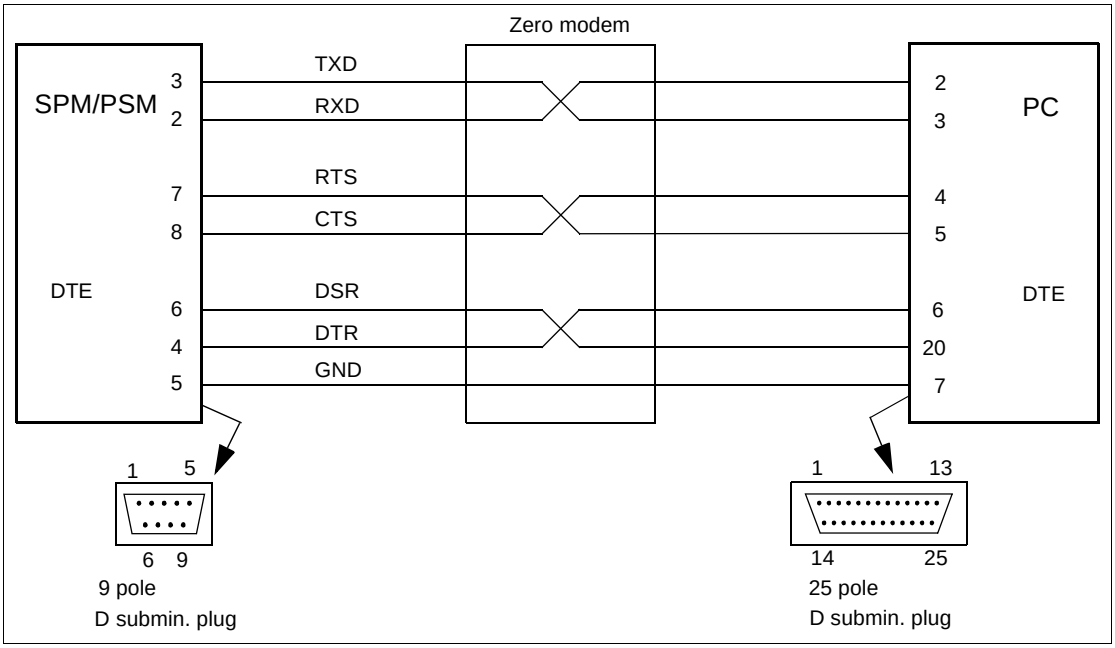


Fig. 10-4 9 to 25-pole connection

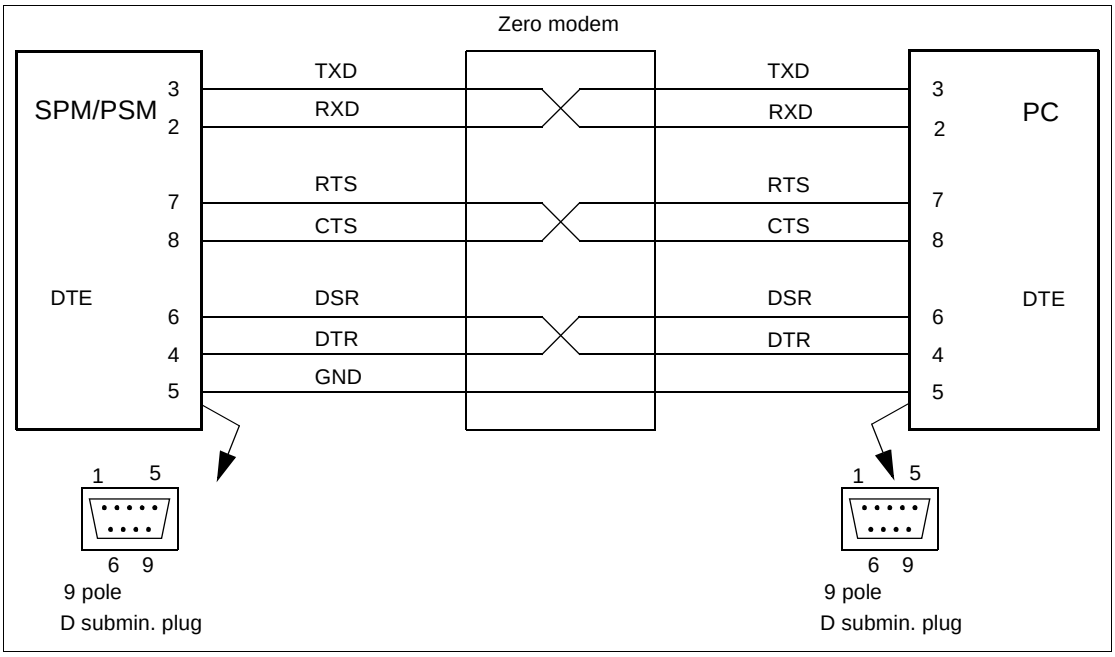


Fig. 10-5 9-pole connection

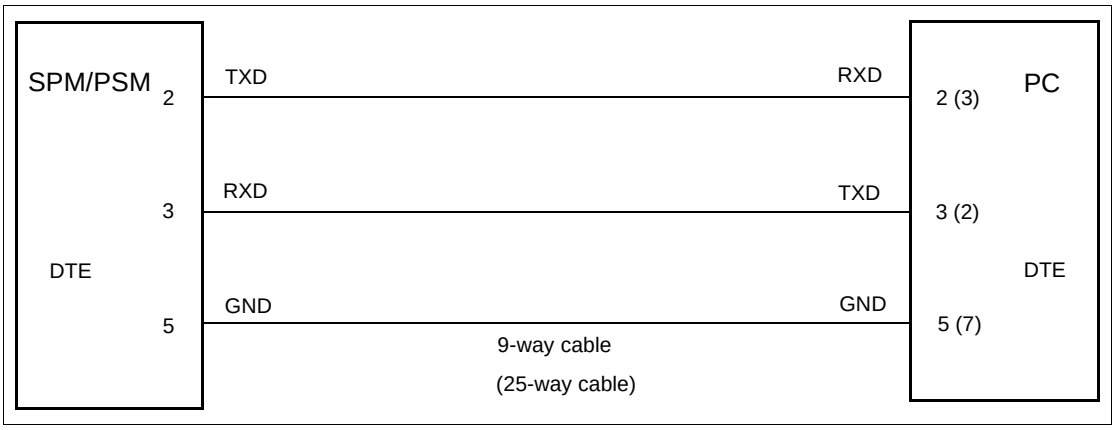


Fig. 10-6 3-pole connection (XON / XOFF operation)

10.3.2.3 Parameters

To ensure correct transmission, the physical transmission parameters of the SPM/PSM, and PC must be set to the same values. The parameters include:

- Baud rate: 300, 600, 1200, 2400, 4800, 9600, 19200, 38400 Bit/s
- Parity: None, Even, Odd
- Data bits per character: 7, 8
- Stop bits per character: 1, 1.5, 2
- Flow control: Software Handshake XON / XOFF, Hardware Handshake RTS / CTS

10.4 Standard reporting system

10.4.1 General structure to SCPI

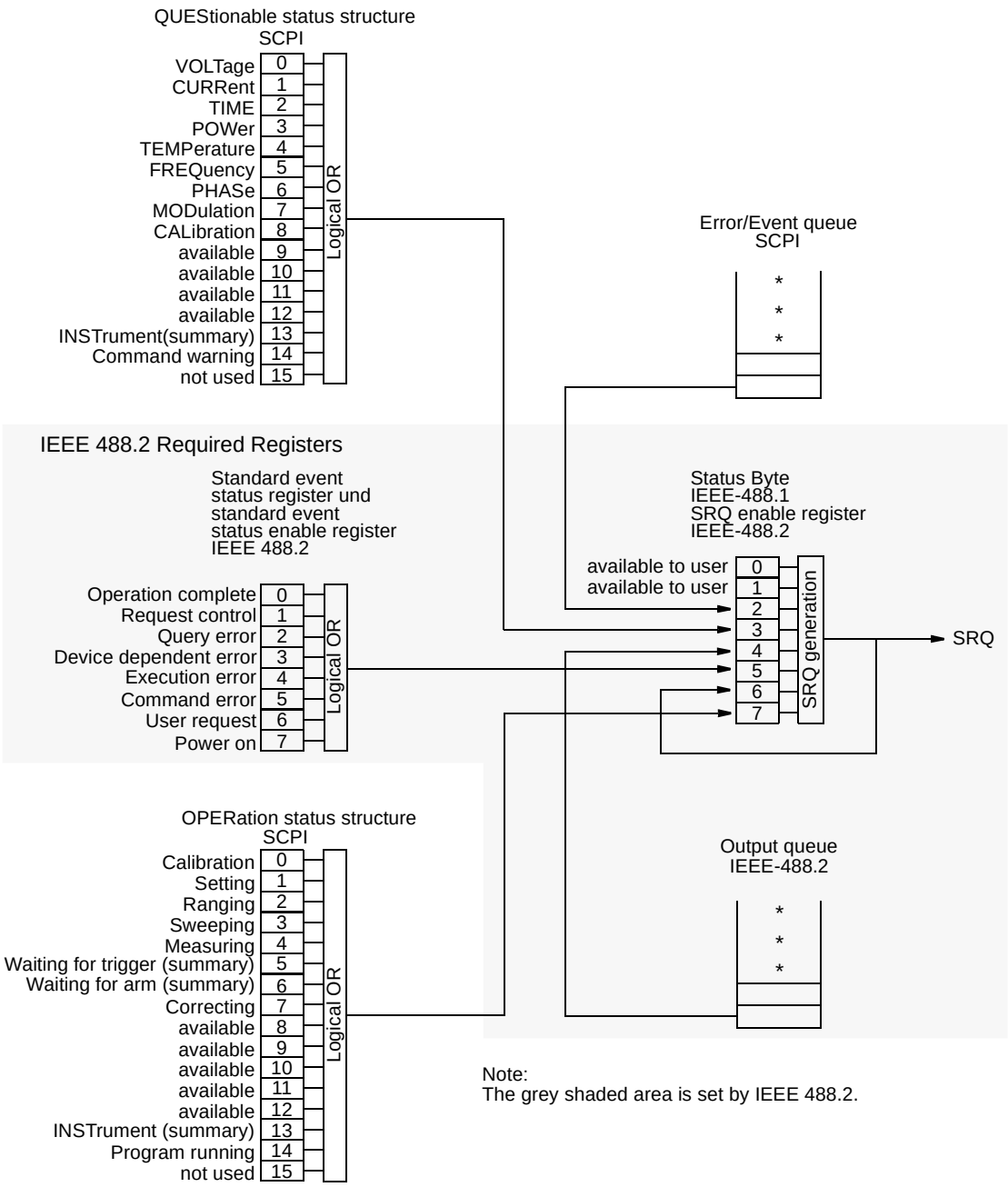


Fig. 10-7 Structure of the status reporting system

10.4.2 Status Byte Register STB

Program word

The status byte register contains the sum message of the event status registers, the output queue and the RQS or MSS message

Bit assignment

Bit no.	Meaning
2	ERR: Error queue bit This indicates the sum message of the error queue. The ERR bit is true if an error message has been made available for polling.
3	QUE: Questionable Status bit This indicates the sum message of the questionable status register system if abnormal operating conditions prevail.
4	MAV: Message available bit This indicates the sum message of the output queue. The MAV bit is true if the device has made data available for polling in the output queue.
5	ESB: Event status bit This indicates the sum message of the linked event registers (standard event status register and standard event status enable register).
6	RQS: Request service bit The RQS bit changes to "1" if the sum message of the STB register and the SRE register has initiated a service request. The bit is reset by a SERIAL POLL - together with the SRQ message. MSS: Master summary status bit The MSS bit changes to "1" if the sum message of the STB register and the SRE register has initiated a service request. The bit is **not** reset by a poll with *STB? - the SRQ message thus also remains sett.
7	OPR: Operational status bit This indicates the sum message of the operational status register system under normal operating conditions.

Read the register

SERIAL POLL

The status byte information of a serial poll includes the RQS bit. The RQS bit is reset after the serial poll (RQS ≡ SRQ).

STB?

The status byte information of a poll with the *STB? command includes the MSS bit. The bit is not reset after the poll.

Clearing the register The contents of the register can be cleared with the common *CLS command. The command has no effect on the MAV bit, however.

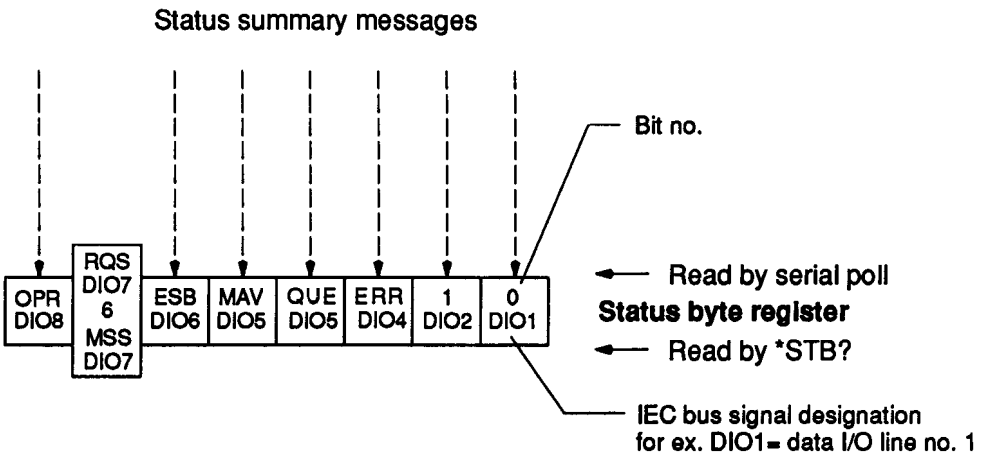


Fig. 10-8 Structure of the status byte register

10.4.3 Service Request Enable Register SRE

Program word The status byte register must be masked with the service request enable register, in order to define which sum message initiates a service request.

Define the register The contents of the register can be defined with the common *SRE <decimal-no.> command.

Bit no.	Meaning	Decimal no.
7	OPR bit	128
6	Not available	(64)
5	ESB bit	32
4	MAV bit	16
3	QUE bit	8
2	ERR bit	4
1	Not used	(2)
0	Not used	(1)

Read the register The contents of the register can be read with the common *SRE? command. The result is a decimal number in the range from 0 to 255.

Clearing the register The contents of the register can be cleared with the common `*SRE 0` command.

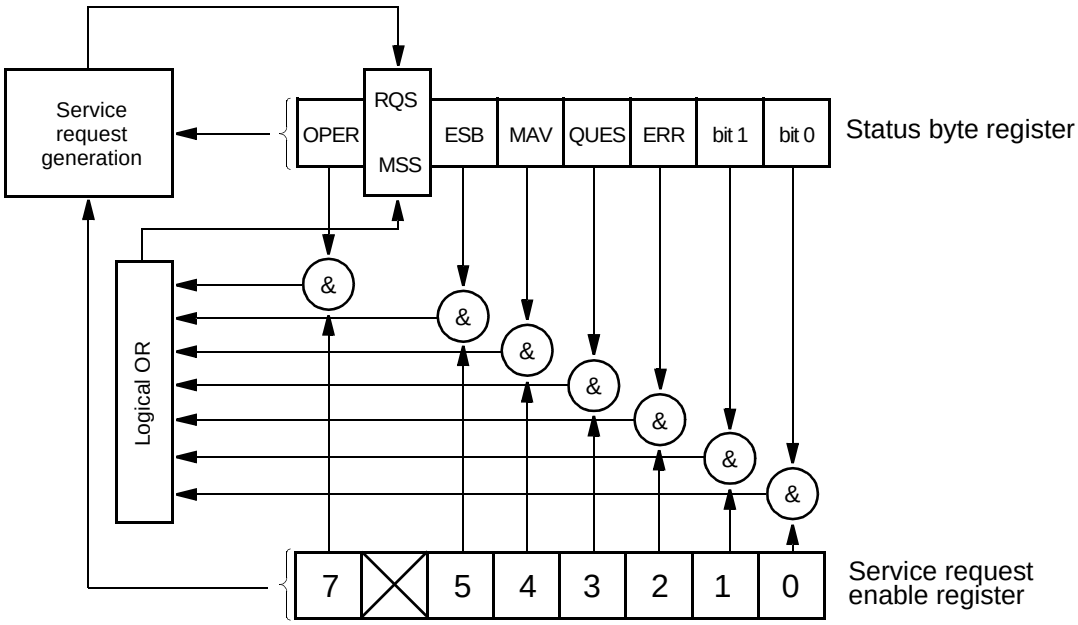


Fig. 10-9 Service request

10.4.4 Event Standard Register ESR

Program word

The standard event status register contains the device states defined by the IEEE 488.2 standard (see bit assignment).

Bit assignment

Bit no.	Meaning
0	OPC Operation complete. The bit is set after the device has executed an instruction and is ready to accept new instructions, providing *OPC has been programmed beforehand.
2	QYE Query error. The bit is set if: - An attempt has been made to read the contents of the output queue, but the queue is empty or - The contents of the output queue have been lost, e.g. due to a queue overflow.
3	DDE Device-dependent error. Example: The bit is set if a programming instruction cannot be executed as a result of a device status. It indicates that the error is not a command, query or execution error.
4	EXE Execution error (parameter error). The bit is set, for example, if the parameter value of an instruction is outside the permissible setting range of the device.
5	CME Command error (unknown command). A command error is caused by the following events: Syntax error Semantic error
7	PON Power on. The bit is set after the device is switched on or after it starts up again following a power failure.

Read the register

The contents of the register can be read with the common *ESR? command. The result is a decimal number in the range from 0 to 255. Reading the register causes its contents to be cleared.

Clearing the register The contents of the register can be cleared with the common *CLS and *ESR? commands.

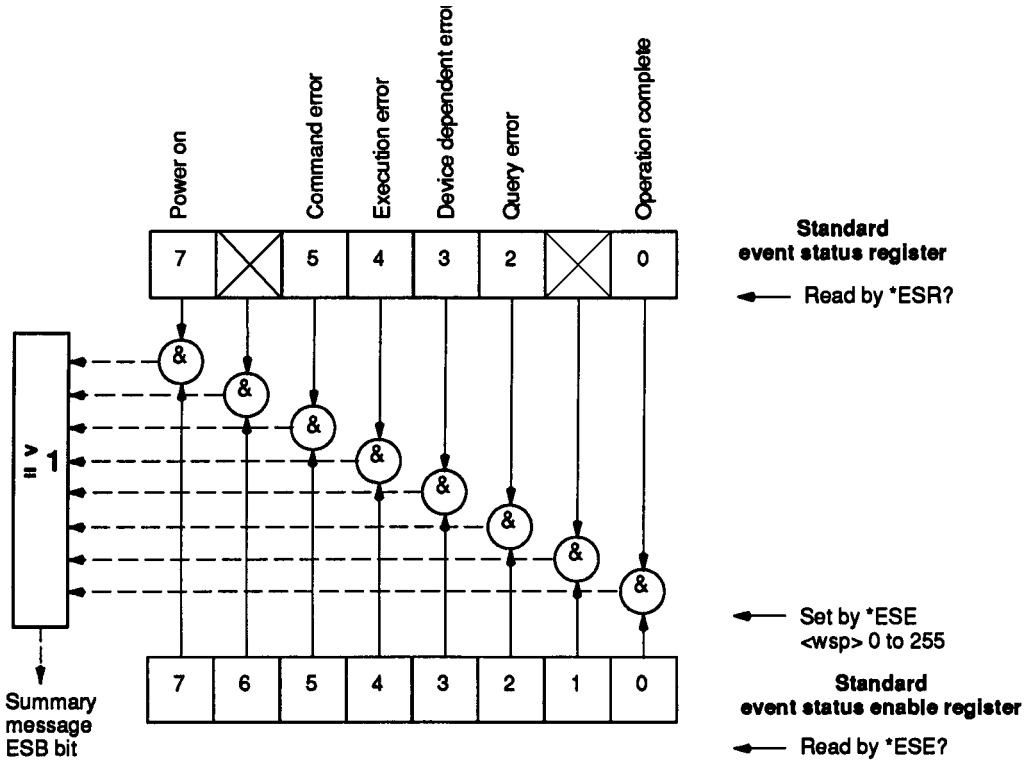


Fig. 10-10 Structure of the standard event register

10.4.5 Standard event status enable register ESE

Program word The standard event status enable register can be used to mask the standard event status register, in order to define which device states form the sum message (ESB bit) for the status byte register .

Define the register The contents of the register can be defined with the common *ESE <decimal-no.> command. The decimal number must be in the range from 0 to 255.

Bit no.	Meaning	Decimal no.
0	Operation complete	1
1	Not used	(2)
2	Query error	4
3	Device-dependent error	8
4	Execution error	16
5	Command error	32
6	Not used	(64)
7	Power on	128

Read the register The contents of the register can be read with the common `*ESE?` command. The decimal number must be in the range from 0 to 255.

Clearing the register The contents of the register can either be cleared with the common `*ESE 0` command or overwritten with another decimal number.

10.4.6 Output queue

Program word The output queue is used to buffer the device response messages until they are read by the controller. If the output queue contains data, the MAV bit in the status byte is set..

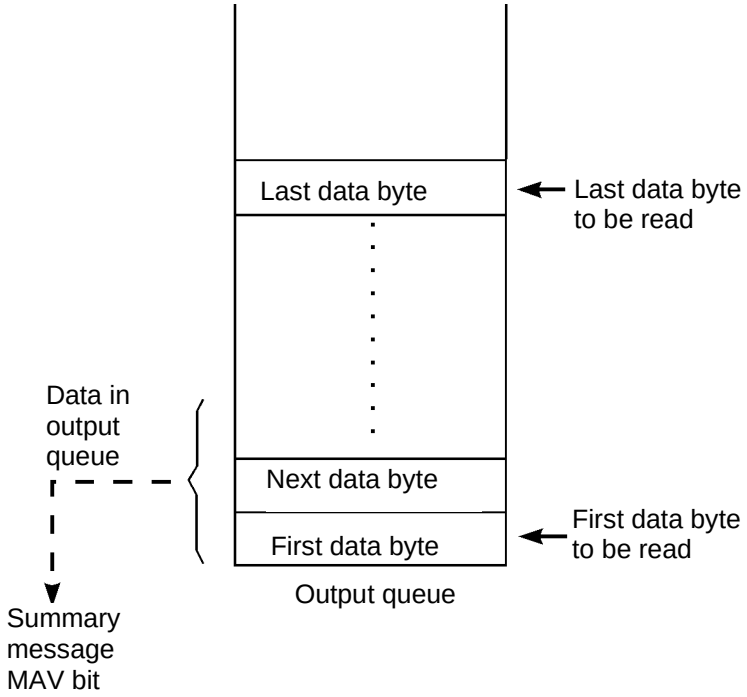


Fig. 10-11 Standard output queue

10.4.7 Parallel Poll

Program word

The device has a parallel poll function as well as a serial poll one. This interface function (PP 1) conforms to the IEEE 488.2 standard.

The primary PPC command (parallel poll configure) is used to configure the device for a parallel poll. The data line on which the device is to respond is then assigned with the secondary PPE command (parallel poll enable).

PRE register

The status byte register can be masked with the parallel poll enable register.

Define the register

The contents of the register can be defined with the common `*PRE` <decimal-no.> command. The decimal number must be in the range from 0 to 65535.

Clearing the register

`*PRE 0` clears the contents of the register. They can also be overwritten by entering another decimal number.

Read the register

The contents of the register can be read with the common `*PRE?` command. The result is a decimal number in the range from 0 to 65535. (Bits 8 to 15 are not used.)

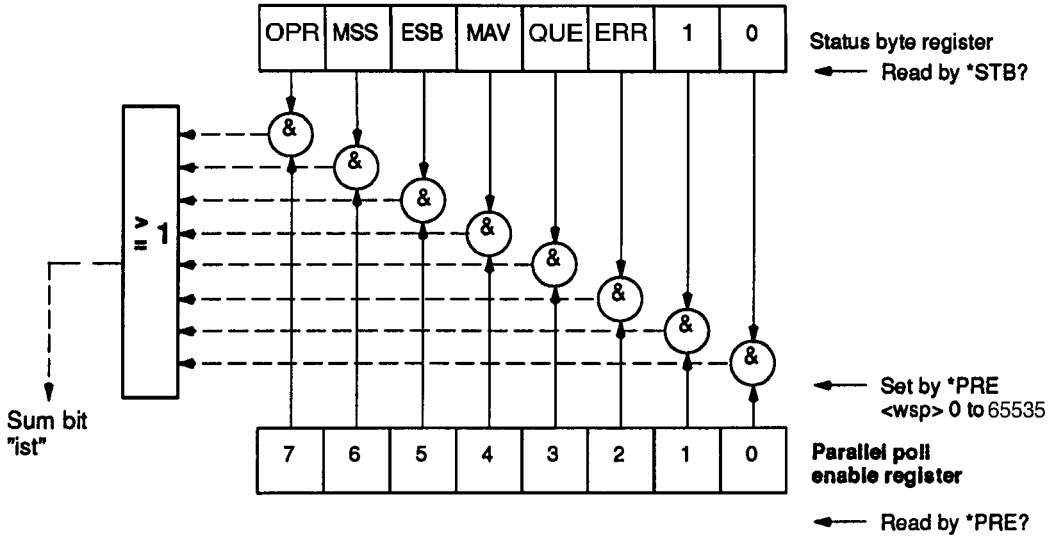


Fig. 10-12 Structure of the parallel poll register

Poll sum bit

The internal device message (status bit: "ist") can be polled with the common `*IST?` command, without initiating a parallel poll. This internal device message is linked with the sense bit when a parallel poll occurs.

10.4.8 Initializing the device

The contents of the standard event status register and the status byte register may cause an SRQ to be initiated during the initialization process with *RST and *CLS, as a result of the instrument setups. The control computer must therefore not be enabled for processing SRQs (SRQ enable) until after the initialization routine has finished.

10.4.9 Extended SCPI status report system

General

The status report system is responsible for management of all device states in accordance with IEEE 488.2, Chapter 11. A special status register management facility with the following enhancements makes this task easier:

– *Operation* status register system
  with the summary bit 7 in the status byte
– *Questionable* status register system
  with the summary bit 3 in the status byte

Register components

The operation and questionable status groups have the register components. An SCPI status register basically consists of two status registers, namely CONDition and EVENT, whereby the COND register contains the current device status. The EVENT register saves this status as a non-recurring event dependent on the transition registers.

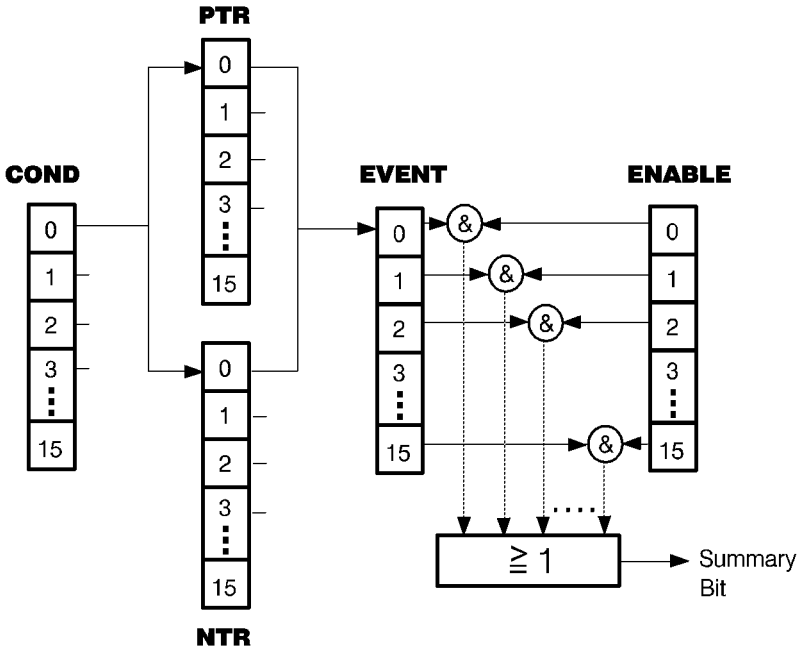


Fig. 10-13 Principle of status polling; &: logical AND, ≥1: logical OR

COND

Condition register: Contains the current device status. The status does not change as a result of reading the register.

PTR

Positive transition filter: Defines a positive edge for saving in the EVENT register. (A "0 --> 1" transition in the COND register generates a 1 in the EVENT register if the corresponding PTR bit is set.)

NTR

Negative transition filter: Defines a negative edge for saving in the EVENT register. (A "1 --> 0" transition in the COND register generates a 1 in the EVENT register if the corresponding NTR bit is set).

EVENT

Event register: Saves the contents of the condition register until a poll takes place (:STAT:OPER:EVEN?).

ENABLE

Enable register: Contains the mask for the event register and is used as a switch for masking the contents of the event register in the status byte register.

10.4.9.1 Operation Status

The operation status register manages the states occurring during normal operation of the instrument. Every status node (except the nodes of the status byte itself) posesses its own 16 bit wide Condition, Event and Enable Register and Transition Filter. For clarity, not all of the register components are shown in the following diagram.

Operation Register Commands

Reset all SCPI registers

```
STATus
      :PRESet
```

Operating states

```
STATus
    :OPERation
        CONDition?
        ENABle <NRf>
        ENABle?
        EVENT?
        NTRansition <NRf>
        NTRansition?
        PTRansition <NRf>
        PTRansition?
```

Questionable Status

Questionable Status Registers contain bits which indicate the quality of the last measurement values determined or setting parameters. They can be polled (questioned) if required. If a bit is set, the results or setting parameters are outside the specified limits.

Questionable Register Commands

Question status regarding

STATus

:QUEStionable
CONDition?
ENABle <NRf>
ENABle?
EVENT?
NTRansition <NRf>
NTRansition?
PTRansition <NRf>
PTRansition?

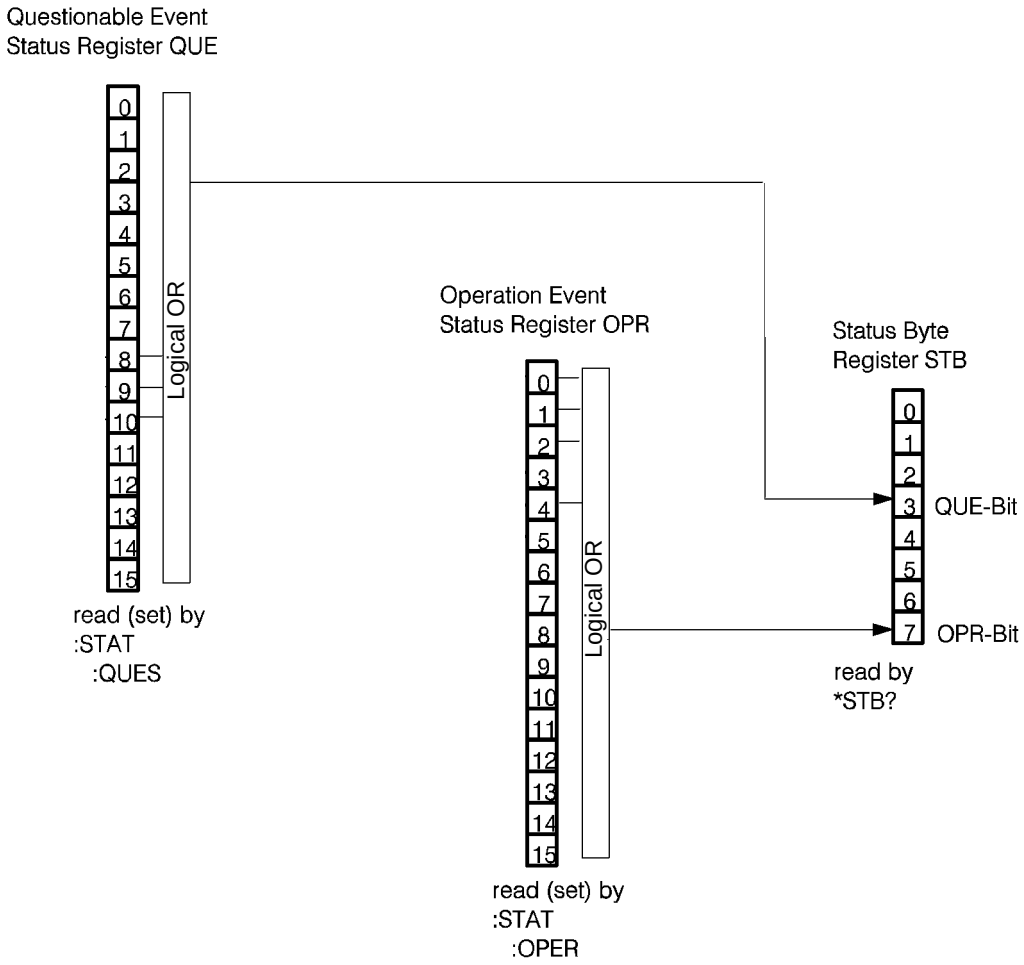


Fig. 10-14 Extended SCPI status report system

10.4.10 Initializing the extended SCPI status management system

General SCPI/IEEE 488.2 rules

Initialization to SCPI and IEEE 488.2

	SCPI Trans. Filter	**SCPI Enable Register**	**SCPI Event Register**	**488.2 Register ESE, SRE**	**488.2 Register SESR, STB**
*RST	none	none	none	none	none
*CLS	none	none	clear	none	clear
power-on	preset#	preset#	clear#	clear#	clear#
STATUS :PRESET	preset	preset	none	none	none

#: If the power-on status clear flag is true. No change if the power-on status clear flag is false.

Register initialization; STATUS:PRESET

Register	**Filter/enable**	**Preset value =**
OPERational	ENABle PTR NTR	0 ’ s 1 ’ s 0 ’ s
QUEStionable	ENABle PTR NTR	0 ’ s 1 ’ s 0 ’ s

10.5 Syntax

General

A fixed syntax must be observed in order for external controllers and the device to be able to understand one another when they exchange device messages. This syntax is defined in IEEE 488.2 and explained below.

A distinction is made between the talker syntax and the listener syntax. The two basic principles are precision when talking and tolerance when listening.

Program message

The listener syntax applies when a message is sent from the controller to the instrument (program message). A program message comprises the following components:

1. Program message unit(s)

The program message unit is the program word which sets the instrument. A distinction is made between the command message unit and the query message unit. The command message unit causes the instrument to be set, while the query message unit causes the instrument to make data available for output.

2. Program message unit separator(s)

The program message unit separator separates a string of command or query message units within a program message.

3. Program message terminator (PMT)

The program message terminator indicates the end of a program message: either the EOI line is activated at the end of a data transfer (^END) or a line feed character is transmitted in the data stream (NL = LF ASCII character).

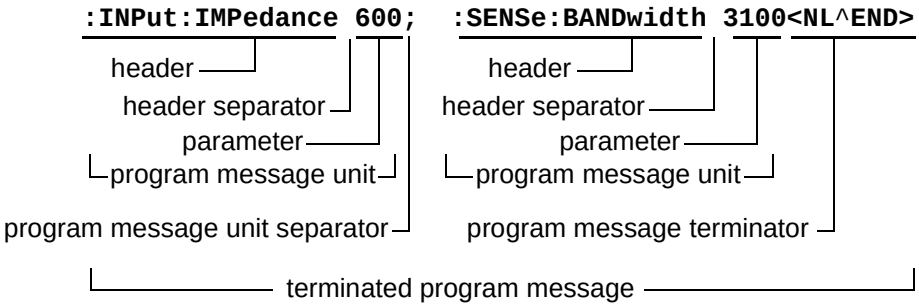


Fig. 10-15 Example showing a program message

A programming word (command or query message) comprises the following components:

1. Command or query program header
2. Program header separator <white space>
3. Program data (parameters)

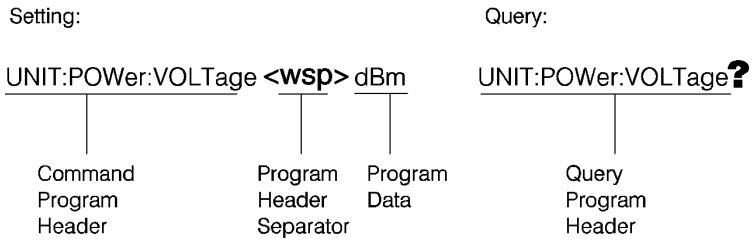


Fig. 10-16 Example showing a program word

Tree structure

The device is programmed with programming words in a tree structure. The components of the programming words are similar to those of a tree in nature.

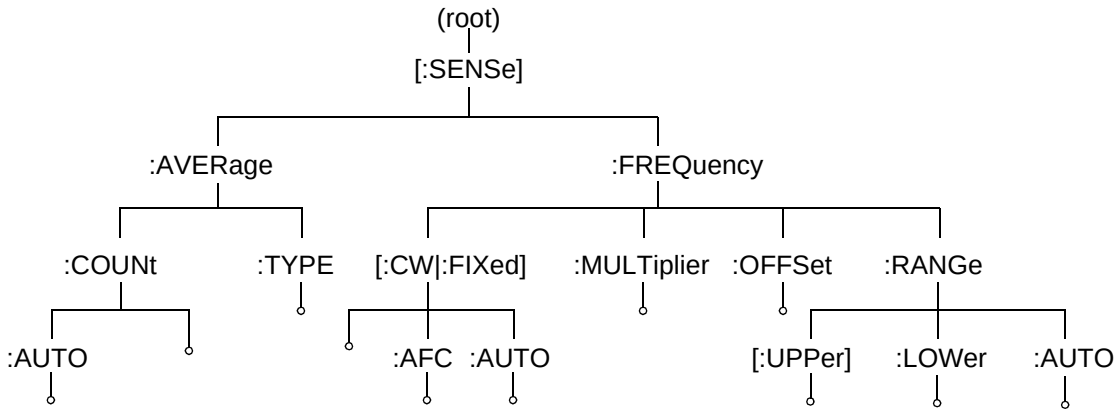


Fig. 10-17 Example of a programming word tree structure

Input

The device-specific programming words are shown here in their long forms. The short form consists of the uppercase letters in the respective programming word. When programming, you must enter either the complete long form or exactly the short form. When the programming words are entered, either upper or lower-case letters may be used; see also SCPI Vol. 1, Chapter 6.

Program data

Various types of program data are used to enter parameter values in the device:

Character program data

For entering parameters which require an alphanumeric expression, e.g. activation of an operating mode; see also IEEE 488.2, 7.7.1. The character program data of the device is generally based on the menu designations used in manual mode.

SCPI also allows numeric values to be set using character program data, providing the parameter values are defined ones. This alternative method is particularly useful for parameter values with several digits.

MIN corresponds to the minimum value of the parameter

MAX corresponds to the maximum value of the parameter

DEF corresponds to the default value of the parameter

UP increases the value of the parameter by a fixed amount (e.g. FSTEP)

DOWN decreases the value of the parameter by a fixed amount (e.g. FSTEP)

Note: The character program data may be entered in the device in either the short or long form.

Decimal numeric program data

For entering numerical parameter values in the device; see also IEEE 488.2, 7.7.2. Decimal numeric program data can be entered in various ways, as shown by the example below with a selective frequency of 32 MHz:

1. As an integer number <NR1>

`32 000 000`

2. As a floating-point number without an exponent <NR2>

`32 000 000.0`

3. As a floating-point number with an exponent <NR3>

`32.E+6`

The input must always refer to the basic unit (in this case Hz).

Suffix program data

Serves as a suffix for defining the unit of decimal numeric program data; see also IEEE 488.2, 7.7.3.

Example: Frequency = 10 MHz

Input: **`10MHZ`** oder **`0.01GHZ`** etc.

If a suffix is not used, **`1.E7`** must be entered instead in this example, since the basic unit is 'Hz'.

Boolean

For parameters which always have one of two states (e.g. switch functions).

`ON  | 1`
`OFF | 0`

All numbers which are not 0 are interpreted as 1 (ON).

Program header separator

The program header separator **`<white space>`** (blank) separates program data from the command program header;

abbreviation **`<wsp>`**.

Program data separator

The program data separator **`<,>`** (comma) separates program data within a program message unit.

Response message

The talker syntax applies when a message is sent from the instrument to the controller (response message). An device response message comprises the following components:

1. Response message unit(s)
2. Response message terminator <RMT>

The response message terminator indicates the end of a response message (line feed character); see also IEEE 488.2, 8.3 (terminated response messages).

Response data

Various types of response data are used to output parameter values and for general queries:

Character response data

In response to queries concerning parameters containing alphanumeric expressions; see also IEEE 488.2, 8.7.1. The short form is always used in the output.

Numeric response data

In response to normal parameter queries; see also IEEE 488.2, 8.7.2 ... 4. A suffix is not sent with the numeric response data. The same distinction is made as with decimal numeric data:

`<NR1>` Integer numbers

`<NR2>` Floating-point numbers without an exponent

`<NR3>` Floating-point numbers with an exponent

It should be noted that numeric data must always refer to a fixed basic unit.

0/1

In response to parameter queries (concerning Boolean programming data) for which there are only two possible states; output either **`0`** or **`1`**.

String response data

Status or error messages, setup titles, etc. which consist of long character strings are output as string response data; see also IEEE 488.2, 8.7.8.

Arbitrary ASCII response data

In response to queries concerning, for example, the device version, when alphanumeric character blocks of different lengths must be sent (7-bit ASCII code); see also IEEE 488.2, 8.7.11.

Arbitrary block response data

Used to output large volumes of data in 8-bit ASCII code with a fixed block length; see also IEEE 488.2, 8.7.9.

10.6 Common Commands

This section describes the common commands in alphabetical order.

Common Command	Meaning	Page
`*CLS`	Clear Status Command	10-25
`*ESE <num.>`	Standard Event Status Enable Command	10-25
`*ESE?`	Standard Event Status Enable Query	10-26
`*ESR?`	Standard Event Status Query	10-26
`*IDN?`	Identification Query	10-27
`*IST?`	Individual Status Query	10-27
`*OPC`	Operation Complete Command	10-28
`*OPC?`	Operation Complete Query	10-28
`*PRE <num.>`	Parallel Poll Enable Register Command	10-29
`*PRE?`	Parallel Poll Enable Register Query	10-29
`*PSC <NR1>`	Power-on Status Clear	10-30
`*PSC?`	Power-on Status Clear Query	10-30
`*RCL <NR1>`	Recall Command	10-31
`*RST`	Reset Command	10-31
`*SAV <NR1>`	Save Command	10-32
`*SRE <num.>`	Service Request Enable Command	10-32
`*SRE?`	Service Request Enable Query	10-33
`*STB?`	Satus Byte Query	10-33
`*WAI`	Wait Command	10-34

Fig. 10-18 Common Commands

*CLS

*CLS clears all status data structures and forces the:

1. Operation complete command idle state
2. Operation complete query idle state

Parameters None

Depencencies None

Comments If *CLS occurs directly after a program message terminator:

1. The output queue is canceled
2. The MAV bit is reset

Example *CLS

Related commands *RST

*ESE

*ESE can be used to define the contents of the standard event status enable register.

Parameters

Parameter Name	Parameter Type	Range of Values
—	Numeric	0 to 255 | #B00000000 to #B11111111 | #H00 bis #HFF

Depencencies None

Comments None

Example *ESE 32

Related commands *ESE?

*ESE?

*ESE? can be used to query the contents of the standard event status enable register

Parameters

None

Response

Response Name	Response Type	Range of Values
Bit mask	<NR1>	0 to 255

Depencencies

None

Comments

None

Example

*ESE?

Response: 32

Related commands

*ESE

*ESR?

*ESR? can be used to read the contents of the standard event status register. The register contents are cleared at the same time.

Parameters

None

Response

Response Name	Response Type	Range of Values
Bit field	<NR1>	0 to 255

Depencencies

None

Comments

The register contents are cleared at the same time

Example

*ESR?

Response: 16

Related commands

None

*IDN?

`*IDN?` can be used to identify the device.

Parameters

None

Response

Response Name	Response Type	Range of Values
—	<Arbitrary ACII ResponseData>	ASCII character set

Depencencies

None

Comments

The response takes the form of four fields containing the device data and separated by commas: <Company name>,<Model>,<Serial number>,<Software version>

Example

`*IDN?`

Response: `WANDEL & GOLTERMANN,SPM-139,C-0039,1.00`

Related commands

None

*IST?

`*IST?` can be used to query the sum bit ("ist") without initiating a parallel poll.

Parameters

None

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Depencencies

None

Comments

0 = "ist" false

1 = "ist" true

Example

`*IST?`

Response: `0`

Related commands

None

*OPC

*OPC sets bit 0 of the standard event status register after all the preceding programming instructions, setups and internal procedures have been completed.

Parameters None

Depencencies None

Comments None

Example *OPC

Related commands `*OPC?, *WAI`

*OPC?

*OPC? writes the ASCII character "1" in the output queue after all the preceding programming instructions have been executed.

Parameters None

Response

Response Name	Response Type	Range of Values
Identifier	<NR1>	1

Depencencies None

Comments Bit 0 of the standard event status register is not modified.

Example *OPC?

Response: 1

Related commands `*OPC?, *WAI`

*PRE

*PRE can be used to define the contents of the parallel poll enable register.

Parameters

Parameter Name	Parameter Type	Range of Values
—	<numeric>	0 to 65535 | #B0000000000000000 bis #B1111111111111111 | #H0000 bis #HFFFF

Depencencies None

Comments None

Example *PRE

Related commands *PRE?

*PRE?

*PRE? can be used to read the current contents of the parallel poll enable register.

Parameters None

Response

Response Name	Response Type	Range of Values
Bit field	<NR1>	0 to 65535

Depencencies None

Comments None

Example *PRE?

Response: 0

Related commands *PRE

*PSC

*PSC can be used to set the power-on status clear flag in order to control the power-on behavior of the device.

Parameters

Parameter Name	Parameter Type	Range of Values
—	<NR 1>	0 | 1

Depencencies None

Comments

0 = SRQ after power on. The standard event status enable register, the service request enable register and the parallel poll enable register retain their contents after the power is switched on.

1 = No SRQ after power on. The contents of the above-mentioned registers are cleared after the power is switched on.

Example *PSC

Related commands *PSC?

*PSC?

*PSC? can be used to query the status of the power-on status clear flag.

Parameters None

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Depencencies None

Comments

0 = SRQ after power on. The standard event status enable register, the service request enable register and the parallel poll enable register retain their contents after the power is switched on.

1 = No SRQ after power on. The contents of the above-mentioned registers are cleared after the power is switched on.

Example *PSC?

Response: 1

Related commands * PSC

*RCL

*RCL recalls device settings (Setups) storedat addresses 0 to 9 (10-99 on the MemCard).

0: Default

1: User Defined

2: Previous

Parameters

Parameter Name	Parameter Type	Range of Values
—	<NR 1>	0 to 9 (to 99 with MemCard)

Depencencies The number of setups that can be stored depends on the device version.

Comments None

Example *RCL 16

Related commands *SAV

*RST

*RST can be used to initialize the device. The initial setups are restored; see also section 3.

Parameters None

Depencencies None

Comments The initialization procedure has no effect on:

- The interface status
- The device address
- The output queue
- The standard status enable register
- The standard event status enable register
- The power-on status clear flag

Example *RST

Related commands *CLS

*SAV

*SAV stores the current device settings (Setup) at the addresses 3 to 9 (10-99 on the MemCard).

Parameters

Parameter Name	Parameter Type	Range of Values
—	<NR 1>	3 to 9 (to 99 with MemCard)

Depencencies

The number of setups that can be called up depends on the device version.

Comments

Setups 0 (DEFAULT), 1 (USER) and 2 (PREVIOUS) cannot be overwritten with this command.

Example

*SAV 5

Related commands

RCL

*SRE

*SRE can be used to define the contents of the service request enable register.

Parameters

Parameter Name	Parameter Type	Range of Values
—	<NR 1>	0 to 255 | #B00000000 to #B11111111 | #H00 to #HFF

Depencencies

None

Comments

None

Example

*SRE 16

Related commands

*SRE?

*SRE?

*SRE? can be used to read the contents of the service request enable register.

Parameters None

Response

Response Name	Response Type	Range of Values
Bit mask	<NR1>	0 to 255

Depencencies None

Comments Meaningful range: 0 - 63, 128 - 191

Example *SRE?

Response: 32

Related commands *SRE

*STB?

*STB? can be used to read the contents of the status byte register.

Parameters None

Response

Parameter Name	Parameter Type	Range of Values
Bit field	<NR 1>	0 to 255

Depencencies None

Comments The register contents are not modified.

Example *STB?

Response: 32

Related commands None

*WAI

`*WAI` prevents the next program message unit from being executed until the current program message unit has been completed.

Parameters None

Depencencies None

Comments Synchronization command

Example `*WAI`

Related commands `*OPC, *OPC?`

10.7 Programming Commands

10.7.1 Instrument model

The programming commands of the SCPI standard are based on a general model for a remote-controllable measuring instrument. The instrument is split into individual function blocks.

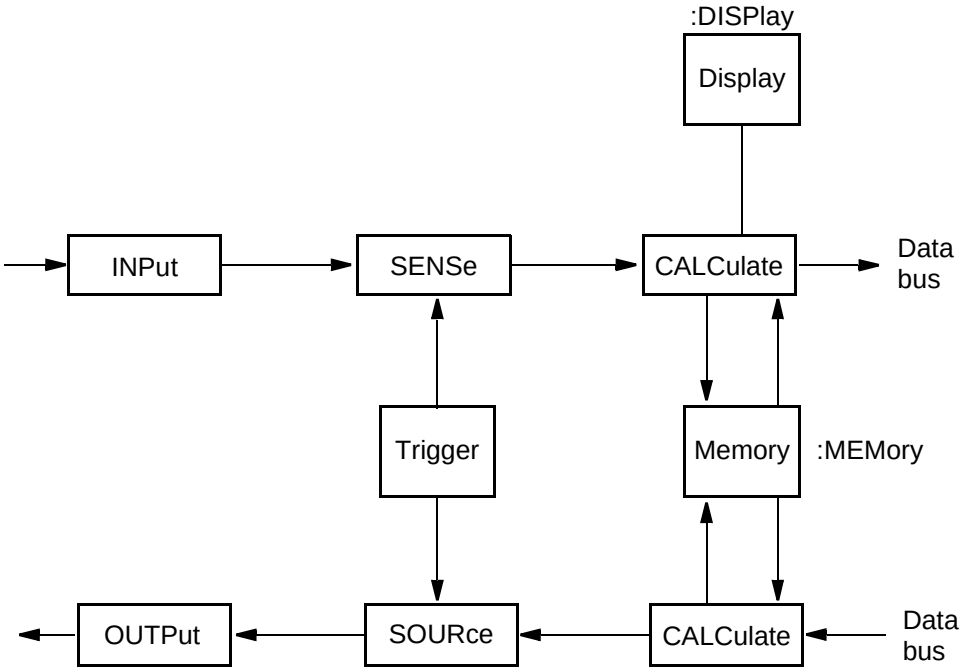


Fig. 10-19 Instrument model according to SCPI

The function blocks are designated as sub-systems, from which the individual programming commands are derived. This results in a hierarchical structure to the commands.

The sub-systems of this instrument are given below:

DISPlay

The commands for this sub-system influence the display of measurement results and parameters on the display.

TRIGger

The commands for this sub-system control the recording of measurement values or the output of signals.

SOURCe

The commands for this sub-system cause a signal to be generated according to specific settings.

SENSe

The commands for this sub-system evaluate the measurement results and convert them for further internal processing.

CALCulate

The commands for this sub-system process the recorded data and pass it on to a sub-system which has data output functions.

INPut

The commands for this sub-system control the receiver input.

OUTPut

The commands for this sub-system control the generator output.

10.7.2 Measurement Commands

This instrument uses the commands: CONFigure, READ?, INITiate and FETCh? for making measurements and the command ABORt to abort a measurement.

CONFigure/READ?

The command CONFigure:Parameter sets the instrument for a measurement. Subsequently, further commands can be inserted, e.g. to set the gain to a specific value.

READ? starts the measurement and queries the result.

CONFigure/INITiate/FETCh?

INITiate/FETCh? in effect splits the READ? command. INITiate starts the measurement and FETCh? queries the result. This makes sense particularly when the measurement takes a longer period of time since using the command READ? the IEEE bus would be blocked during the entire measurement duration or a time-out would occur.

ABORt

`ABORt` cancels the started measurement (triggered by INITiate:[IMMediate]).

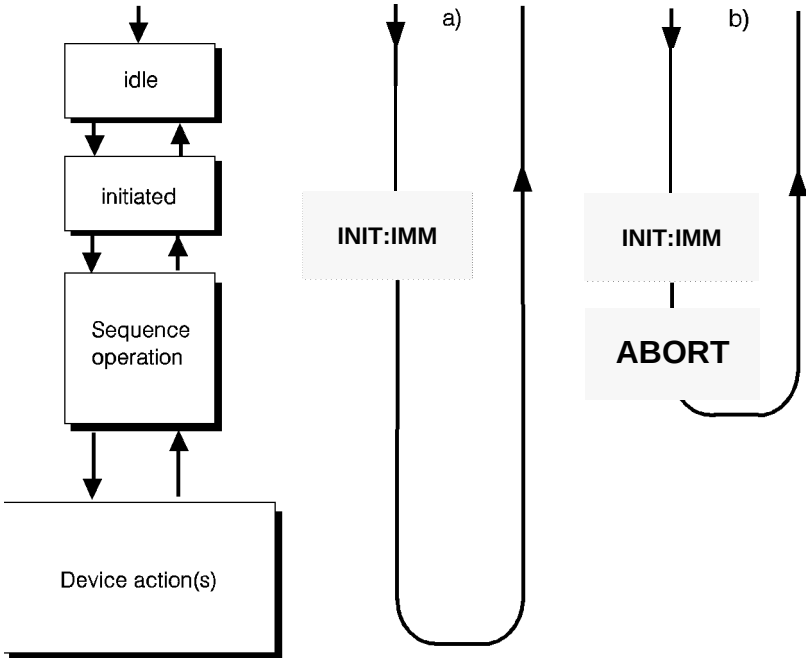


Fig. 10-20 Measurement sequence: a) normal b) aborted

Example ABOR

Related commands

```
INITiate:[IMMediate]
FETCh?
READ?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]

`CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]` sets LEVEL as the current operating mode.

Comments Manual operation: [LEVEL] key

Example `CONFigure:POWer:LEVel:AC`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                   :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST

`CONFigure:[SCALar]:[POWer] | [VOLTage] :LEVel:ASTep:FAST` sets the device for loop measurement in autostep mode.

Comments Manual operation: MODE FAST; Operating mode AUTOSTEP (PSM).

Example `CONF:LEV:AST:FAST`

Related Commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                   :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer

`CONFigure:[SCALar]:[POWer] | [VOLTage] :LEVel:ASTep:MASTer` sets the instrument as MASTER for AUTOSTEP mode.

Comments

Manual operation: MODE MASTER; Operating mode AUTOSTEP (PSM)

Example

`CONF:LEV:AST:MAST`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                 :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe

`CONFigure:[SCALar]:[POWer] | [VOLTage] :LEVel:ASTep:TIMe` sets the instrument as SLAVE with timer controlled frequency switching in AUTOSTEP mode.

Comments

Manual operation: MODE TIME; Operating mode AUTOSTEP.

Example

`CONF:LEV:AST:TIM`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                    :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh

`CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel :ASTep:THResh` sets the instrument as SLAVE with threshold-controlled frequency switching in AUTOSTEP mode

Comments

Manual operation: MODE THRESH; Operating mode AUTOSTEP.

Example

`CONF:LEVel:AST:THR`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                    :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone

`CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone` sets HOT TONE SEARCH as the current operating mode.

Comments

Manual operation: [HOT] key.

Example

`CONF:LEV:HOTT`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                  :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]

`CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]` sets JITTER as the current operating mode.

Comments

Manual operation:[Blue key] and [LEVEL] key.

Example

`CONF:LEV:JITT`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                  :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]

`CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]` sets NPR as the current operating mode.

Comments

Manual operation: [NPR] key

Example

`CONF:LEV:NPR`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                   :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:SWEep:[AC]

`CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:SWEep` sets the actual operating mode to SWEEP.

Comments

Manual operation: [Blue Key] and [HOT] key

Example

`CONF:LEVel:SWE`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                   :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]

`CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]` sets DEMODULATION as the current operating mode.

Comments Manual operation: [DMOD] key

Example `CONF:DEM`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                  :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise

`CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise` sets IMPULSIVE NOISE DEMODULATION in the operating mode IMPULSIVE NOISE as the current measurement mode.

Comments Manual operation: Measurement mode IMPULSIVE NOISE DEMODULATION; Operating mode IMPULSIVE NOISE.

Example `CONF:DEM:INO`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                  :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption

`CONFigure:[SCALar]:[POWer] | [VOLTage] :DEMod:INTerruption` sets INTERRUPTIONS DEMODULATION in the operating mode INTERRUPTIONS as the current measurement mode.

Comments

Manual operation: INTERRUPTIONS DMOD; Operating mode INTERRUPTIONS.

Example

`CONF:DEM:INT`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                  :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]

`CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod :JITTer:[AC]` sets TONE JITTER DEMODULATION in the operating mode JITTER as the current measurement mode.

Comments

Manual operation: Measurement mode DEMODULATION TONE JITTER; Operating mode JITTER.

Example

`CONF:DEM:JITT`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                  :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]

`CONFigure:[SCALar]:[POWer] | [VOLTage] :VOICeband:[AC]` sets VOICE as the current operating mode.

Comments Manual operation: [VOICE] key

Example `CONF:VOIC`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                  :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise

`CONFigure:[SCALar]:[POWer] | [VOLTage] :VOICeband:INOise` sets IMPULSIVE NOISE VOICEBAND in the operating mode IMPULSIVE NOISE as the current measurement mode.

Comments Manual operation: Measurement mode IMPULSIVE NOISE VOICEBAND; Operating mode IMPULSIVE NOISE.

Example `CONF:VOIC:INO`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                  :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INTerruption

`CONFigure:[SCALar]:[POWer] | [VOLTage] :VOICeband:INTerruption` sets INTERRUPTIONS VOICEBAND in the operating mode INTERRUPTIONS as the current measurement mode.

Comments

Manual operation: Measurement mode INTERRUPTIONS VOICEBAND; Operating mode INTERRUPTIONS.

Example

`CONF:VOIC:INT`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
CONFigure?
```

CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]

`CONFigure:[SCALar]:[POWer] | [VOLTage] :VOICeband:JITTer:[AC]` sets TONE JITTER in the operating mode JITTER as the current measurement mode.

Comments

Manual operation: Measurement mode TONE JITTER; Operating mode JITTER

Example

`CONF:VOIC:JITT`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                   :VOICeband:INTerruption
CONFigure?
```

CONFigure?

`CONFigure?` determines the current setting of the operating mode and measurement mode.

Response

Response Name	Response Type	Range of Values
MODE	String	LEV LEV:AST:FAST LEV:AST:MAST LEV:AST:TIM LEV:AST:THR LEV:HOTT LEV:JITT LEV:NPR LEV:SWE DEM DEM:INO DEM:INT DEMod:JITT VOIC VOIC:INO VOIC:INT VOIC:JITT

Example

`CONF?`

Response: `LEV`

Related commands

```
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:FAST
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:MASTer
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:TIMe
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:ASTep:THResh
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:HOTTone
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:LEVel:NPR:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:DEMod:JITTer:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:[AC]
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:INOise
CONFigure:[SCALar]:[POWer] | [VOLTage]
                                  :VOICeband:INTerruption
CONFigure:[SCALar]:[POWer] | [VOLTage]:VOICeband:JITTer:[AC]
```

INITiate:[IMMediate]

`INITiate:[IMMediate]` triggers a measurement.

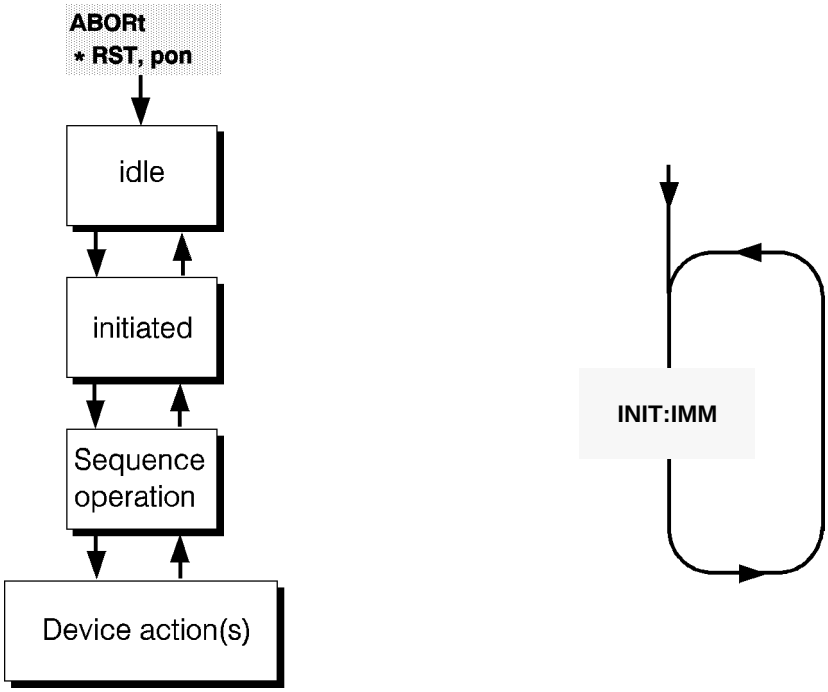


Fig. 10-21 INITiate trigger model

Measurements with this instrument can be triggered by the INITiate command. Since no other trigger events (event detection states) need be considered, the measurements can be controlled using the simple model.

Comments

Idle state is assumed again at the end of the measurement sequence.

Example

`INIT`

Related Commands

`ABORt`
`FETCh?`
`READ?`

FETch?

FETch? causes output of the current measured value once the measurement has been triggered at least once by the INItiate command. The measured value is placed ready in the instrument's output buffer at the end of the measurement sequence.

Response

Operating mode	Response name	Response type
LEVEL, DEMOD, VOICE	Level (logarithmic UNIT)	<NR2>
	Level (linear UNIT)	<NR3>
NPR	NPR value, Input power, Selective channel noise.	<NR2>, <NR2>, <NR2>
HOT TONE SEARCH	One pair of values for each hot tone found: Frequency, Level (logarithmic UNIT)	<NR3>, <NR2>
	Frequency, Level (linear UNIT)	<NR3> <NR3>
AUTOSTEP	One pair of values for each measurement: Frequency, Level (logarithmic UNIT)	<NR3>, <NR2>
	Frequency, Level (linear UNIT)	<NR3> <NR3>
SWEEP	51 (Sweeptime 1 sec) or 101 (Sweeptime >1sec) Values: Level (Logarithmic UNIT)	<NR2>
	Level (linear UNIT)	<NR3>
JITTER	Jitter value	<NR3>
IMPULSIVE NOISE	Events	<NR1>
INTERRUPTIONS	Events	<NR1>

Overflow/underflow monitoring is possible by querying the relevant status register.

Error codes

If the result is queried before the end of the first measurement after a *RST , the error code -230 "Data corrupt or stale" is generated.

Example

FETC?

Response: `-20.00,`

Related commands

READ?
INITiate
ABORt

READ?

READ? triggers a measurement and queries the result.

Response

Table as for FETCh? command (see above).

Example

READ?

Response: -20.00 dBm

Related commands

FETCh?
INITiate:[IMMediate]
ABORt

CALCulate:AVERage:[STATe]

CALCulate:AVERage:[STATe]activates or deactivates the result averaging function or calls up the default setting of this parameter.

Parameters

Parameter Name	Parameter Type	Range of Values
AVRG	Boolean	ON | OFF | DEFault | 0 | 1

Comments

Manual operation: AVRG; Operating modes LEVEL, DEMODULATION, NPR, VOICE

Example

CALC:AVER ON

Related commands

CALCulate:AVERage:[STATe]?

CALCulate:AVERage:[STATe]?

CALCulate:AVERage:[STATe]? determines the current status of the result averaging function

Parameters

Parameter Name	Parameter Type	Range of Values
AVRG	Character data	<none>| DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Example

CALC:AVER? DEF

Response: 0

Related Commands

CALCulate:AVERage:[STATe]

CALibration:AUTO

`CALibration:AUTO` controls the instrument autocalibration function;
AUTO ON: Switch on autocalibration
AUTO OFF: Switch off autocalibration
AUTO ONCE: Perform autocalibration once

Parameters

Parameter Name	Parameter Type	Range of Values
CAL	Boolean	ON | OFF | DEFault | ONCE | 0 | 1

Comments

Manual operation: [CAL] key

Example

`CAL:AUTO ON`

Related commands

```
CALibration:AUTO?
CALibration:DATA?
CALibration:STATe
CALibration:STATe?
```

CALibration:AUTO?

`CALibration:AUTO?` determines the current statu of the autocalibration function.

Parameters

Parameter Name	Parameter Type	Range of Values
CAL	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Example

`CAL:AUTO? DEF`

Response: `0`

Related commands

```
CALibration:AUTO
CALibration:DATA?
CALibration:STATe
CALibration:STATe?
```

CALibration:DATA?

`CALibration:DATA?` reads out the current calibration data.

Operating mode LEVEL:

Correction as <NR2> in dB
or 9.91E+37 (Not a Number), e.g. with calibration switched off.

Operating mode DEMODULATION:

Correction as <NR2> in dB
or 9.91E+37 (Not a Number), e.g. with calibration switched off.

Operating mode VOICE:

Correction as <NR2> in dB
or 9.91E+37 (Not a Number), e.g. with calibration switched off.

Operating mode AUTOSTEP:

Correction as <NR2> in dB
or 9.91E+37 (Not a Number), e.g. with calibration switched off.

Operating mode HOT TONE SEARCH:

Correction as <NR2> in dB
or 9.91E+37 (Not a Number), e.g. with calibration switched off.

Operating mode NPR:

Two corrections as <NR2>, <NR2> in dB or 9.91E+37 (Not a Number).
1st correction for the selective channel noise
2nd correction for the input power

or only one correction 9.91E+37 (NoN), e.g. with calibration switched off.

Operating mode IMPULSIVE NOISE:

Correction after starting the measurement. Before starting, 9.91E+37 (NoN) is output.

Operating modes JITTER and INTERRUPTIONS:

No correction. 9.91E+37 (NoN) is always output.

Related commands

`CALibration:AUTO`
`CALibration:AUTO?`
`CALibration:STATe`
`CALibration:STATe?`

CALibration:STATe

`CALibration:STATe` determines whether the calibration data are to be applied or not.
STATe ON: Calibration data are applied as corrections to the measured values.
STATe OFF: Calibration data are ignored.

Parameters

Parameter Name	Parameter Type	Range of Values
---	Boolean	ON | OFF | DEFault | 0 | 1

Comments

STATe is set to ON by *RST.

Example

`CAL:STAT ON`

Related commands

```
CALibration:STATe?
CALibration:AUTO
CALibration:AUTO?
CALibration:DATA?
```

CALibration:STATe?

`CALibration:STATe?` determines the current status as to whether the current calibration data are to be applied or not.

Parameters

Parameter Name	Parameter Type	Range of Values
__	Character data	<none> | DEFault

Response

Parameter Name	Parameter Type	Range of Values
Status	<NR1>	0 | 1

Example

`CAL:STAT? DEF`

Response: `1`

Related commands

```
CALibration:STATe
CALibration:AUTO
CALibration:AUTO?
CALibration:DATA?
```

DISPlay:ENABle

`DISPlay:ENABle` switches the screen display during remote-controlled operation on or off.

ENABLE ON: Display on

ENABLE OFF: display off

Parameters

Parameter Name	Parameter Type	Range of Values
—	Boolean	ON | OFF| DEFault | 0 | 1

Comments

The measurement finishes faster since the screen display does not have to be computed.

Example

`DISP:ENAB ON`

Related commands

`DISPlay:ENABle?`

DISPlay:ENABle?

`DISPlay:ENABle?` Determines the current status of the display.

0 = Display off
1 = Display on

Parameters

Parameter Name	Parameter Type	Range of Values
—	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

The measurement finishes faster since the screen display does not have to be computed.

Example

`DISP:ENAB? DEF`

Response: `1`

Related commands

`DISPlay:ENABle`

DISPlay:[WINDow]:TRACe:Y:[SCALe]:PDIVision

`DISPlay:[WINDow]:TRACe:Y:[SCALe]:PDIVision`
sets the Y axis resolution.

Parameter

Parameter Name	Parameter Type	Range of Values
SCALE	Numeric data	DEFault | 1 | 2 | 5 | 10 | 20 dB/Div

Comments.

The measurement finishes faster since the screen display does not have to be computed.

Example

`DISP:TRAC:Y:PDIV 1`

Related commands

`DISPlay:[WINDow]:TRACe:Y:[SCALe]:PDIVision?`

DISPlay:[WINDow]:TRACe:Y:[SCALe]:PDIVision?

`DISPlay:[WINDow]:TRACe:Y:[SCALe]:PDIVision?`
queries the actual Y axis resolution setting.

Parameter

Parameter Name	Parameter Type	Range of Values
SCALE	<NR1>	<none>|DEFault

Response

Response Name	Response Type	Range of Values
Scale division	<NR1>	1 | 2 | 5 | 10 | 20

Example

`DISP:TRAC:Y:PDIV? DEF`

Response: `20`

Related commands

`DISPlay:[WINDow]:TRACe:Y:[SCALe]:PDIVision`

DISPlay:[WINDow]:TRACe:Y:[SCALe]:RLEVel

`DISPlay:[WINDow]:TRACe:Y:[SCALe]:RLEVel` sets the Y reference for the modes AUTOSTEP and SWEEP.

Parameter

Parameter Name	Parameter Type	Range of Values
—	Numeric data	MINimun | MAXimum | DEFault | -170 to 170 dB

Comments

The range of values depends on the active unit and the input impedance; the specified range of values applies for the "dB" unit.

Example

`DISP:TRAC:Y:RLEV DEF`

Related commands

`DISPlay:[WINDow]:TRACe:Y:[SCALe]:RLEVel?`

DISPlay:[WINDow]:TRACe:Y:[SCALe]:RLEVel?

`DISPlay:[WINDow]:TRACe:Y:[SCALe]:RLEVel?` queries the actual Y reference setting.

Parameter

Parameter Name	Parameter Type	Range of Values
—	Character data	<none> | MINimum | MAX|mum | DEFault

Response

Response Name	Response Type	Range of Values
Scale reference level	<NR2>	-170 to 170 dB

Comments

The range of values depends on the active unit and the input impedance; the specified range of values applies for the "dB" unit.

Example

`DISP:TRAC:Y:RLEV? DEF`

Response: `0.00`

Related commands

`DISPlay:[WINDow]:TRACe:Y:[SCALe]:RLEVel`

INPut:CHANnel

`INPut:CHANnel` switches the receiver input.
UNBalanced = Coaxial input
HFBalanced = Balanced input **I** (HIGH FREQUENCY BALANCED)
LFBalanced = Balanced input **II** (LOW FREQUENCY BALANCED)

Parameters

Parameter Name	Parameter Type	Range of Values
RX	Character data	UNBalanced | HFBalanced | LFBalanced | DEFault

Dependencies

The correct setting for the receiver input includes the input (INPut:CHANnel), the impedance (INPut:IMPedance) and the termination (INPut:TERMination). The following are valid combinations:

INPut:CHANnel												
UNBalanced	X	X	X	X								
HFBalanced					X	X	X	X				
LFBalanced									X	X	X	X
INPut:IMPedance												
50	X	X										
75			X	X								
124					X	X						
135 (US version)							X	X	X	X		
150 (European version)												
600											X	X
INPut:TERMination												
MATChed	X		X		X		X		X		X	
HIMPedance		X		X		X		X		X		X

Comments

Manual operation: [IMPED] key.
Switch the receiver input with a "Program Message“.

Example

```
INP:CHAN UNB; IMP 75; TERM MATC
```

Related Commands

```
INPut:CHANnel?
INPut:IMPedance
INPut:IMPedance?
INPut:TERMination
INPut:TERMination?
```

INPut:CHANnel?

`INPut:CHANnel?` determines the current input setting.
UNB = Coaxial input
HFB = Balanced input **I**
LFB = Balanced input **II**

Parameters

Parameter Name	Parameter Type	Range of Values
RX	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Input	Character response data	UNB | HFB | LFB

Example

`INP:CHAN? DEF`

Response: `UNB`

Related Commands

```
INPut:CHANnel
INPut:IMPedance
INPut:IMPedance?
INPut:TERMination
INPut:TERMination?
```

INPut:GAIN

`INPut:GAIN` sets the input signal gain in DEMODULATION mode.
Units are dB.

Parameters

Parameter Name	Parameter Type	Range of Values
Gain	Numeric data	MINimum | MAXimum | DEFault | 0 to 120 dB in 5 dB steps)

Comments

Manual operation: GAIN, Operating modes DEMODULATION, VOICE
This setting is not coupled to the input attenuator.
The value on *RST depends on the instrument setting.
Range setting in 5 dB steps.

Example

`INPut:GAIN MIN`

Related commands

```
INPut:GAIN?
INPut:GAIN AUTO
INPut:GAIN AUTO?
```

INPut:GAIN?

`INPut:GAIN?` determines the current gain setting for the operating mode DEMODULATION.

Parameters

Parameter Name	Parameter Type	Range of Values
GAIN	Character data	<none> | DEFault | MINimum | MAXimum

Response

Response Name	Response Type	Range of Values
Gain	<NR2>	0 to 120 dB

Comments

Range setting in 5 dB steps. Units are always dB.

Example

`INP:GAIN? MAX`

Response: `120.00`

Related commands

`INPut:GAIN`
`INPut:GAIN:AUTO`
`INPut:GAIN:AUTO?`

INPut:GAIN:AUTO

INPut:GAIN:AUTO
ON: Automatic level control is on. The input and measurement amplifiers are optimized as they are controlled by the input level.
(Operating mode LEVEL).
OFF: Input and measurement amplifier settings are not altered. The amplifiers may therefore be over- or underdriven which can lead to noise and distortion. If the level conditions are known and the amplifiers are set correctly, however, measurements will be faster than in auto mode.
(Operating mode LEVEL).
ONCE: The overall gain is matched once to the input signal
(Operating modes DEMODULATION, VOICE).

Parameters

Parameter Name	Parameter Type	Range of Values
AUTO RANGING AUTO GAIN GAIN	Boolean	ON | OFF | DEFault | ONCE | 0 | 1

Comments

Manual operation:
AUTO RANGING (Aux. function TEST& CONFIG) same as AUTO ON/OFF.
AUTO SET (Operating mode DEMODULATION, VOICE) same as AUTO ONCE;
After *RST this parameter is set to ON.

Example

```
INPut:GAIN:AUTO ONCE
```

Related commands

```
INPut:GAIN:AUTO?
INPut:GAIN
INPut:GAIN?
INPut:GAIN:IF
INPut:GAIN:IF?
INPut:GAIN:RF
INPut:GAIN:RF?
```

INPut:GAIN:AUTO?

`INPut:GAIN:AUTO?` determines if automatic level control is on or off in LEVEL operating mode.

Parameters

Parameter Name	Parameter Type	Range of Values
AUTORANGING	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

After *RST this parameter is set to ON.

Example

`INP:GAIN AUTO?`

Response: `1`

Related commands

```
INPut:GAIN:AUTO
INPut:GAIN
INPut:GAIN?
INPut:GAIN:IF
INPut:GAIN:IF?
INPut:GAIN:RF
INPut:GAIN:RF?
```

INPut:GAIN:IF

`INPut:GAIN:IF` sets the IF gain (Operating mode LEVEL).
IF MINimum: Minimum IF gain
IF MAXimum: Maximum IF gain

Parameters

Parameter Name	Parameter Type	Range of Values
IF	Numeric data	MINimum | MAXimum | DEFault | 0 to 80

Comments

Manual operation: IF GAIN, deactivate auto level control.
Range setting in 5 dB steps. Units are always dB.

Example

`INPut:GAIN:IF MINimum`

Related commands

```
INPut:GAIN:AUTO
INPut:GAIN
INPut:GAIN?
INPut:GAIN:IF?
INPut:GAIN:RF
INPut:GAIN:RF?
```

INPut:GAIN:IF?

`INPut:GAIN:IF?` determines the current IF gain.

Parameters

Parameter Name	Parameter Type	Range of Values
IF	Character data	<none> | DEFault | MINimum | MAXimum

Response

Response Name	Response Type	Range of Values
Gain	<NR2>	0 to 80

Comments

Range setting in 5 dB steps. Units are always dB

Example

`INP:GAIN:IF? MAX`

Response: `80.00`

Related commands

```
INPut:GAIN:AUTO
INPut:GAIN
INPut:GAIN?
INPut:GAIN:IF
INPut:GAIN:RF
INPut:GAIN:RF?
```

INPut:GAIN:RF

`INPut:GAIN:RF` sets the RF gain for LEVEL operating mode.

Parameters

Parameter Name	Parameter Type	Range of Values
RF	Numeric data	MINimum | MAXimum | DEFault | 20 to -40 dB

Comments

Manual operation: RF GAIN, deactivate auto level control.
Range setting in 5 dB steps. Units are always dB.

Example

`INP:GAIN:RF DEF`

Related commands

```
INPut:GAIN:AUTO
INPut:GAIN
INPut:GAIN?
INPut:GAIN:IF
INPut:GAIN:IF?
INPut:GAIN:RF?
```

INPut:GAIN:RF?

`INPut:GAIN:RF?` determines the current IF gain setting.

Parameters

Parameter Name	Parameter Type	Range of Values
RF	Character Data	<none> | DEFault | MINimum | MAXi-mum

Response

Response Name	Response Type	Range of Values
Gain	<NR2>	20 to -40

Comments

Range setting in 5 dB steps. Units are always dB.

Example

`INP:GAIN:RF? MIN`

Response: `-40.00`

Related commands

```
INPut:GAIN:AUTO
INPut:GAIN
INPut:GAIN?
INPut:GAIN:IF
INPut:GAIN:IF?
INPut:GAIN:RF
```

INPut:IMPedance

`INPut:IMPedance` sets the impedance of the receiver input.
IMPedance 50: The impedance is 50 Ω.
IMPedance 75: The impedance is 75 Ω.
IMPedance 124: The impedance is 124 Ω.
IMPedance 135: The impedance is 135 Ω (US version).
IMPedance 150: The impedance is 150 Ω (European version).
IMPedance 600: The impedance is 600 Ω.

Parameters

Parameter Name	Parameter Type	Range of Values
IMPED	Numeric data	DEFault 50 | 75 | 124 | 135 | 150 | 600

Dependencies

The correct setting for the receiver input includes the input
(INPut:CHANnel), the impedance (INPut:IMPedance) and
the termination (INPut:TERMination). The following are valid combinations:

INPut:CHANnel												
UNBalanced	X	X	X	X								
HFBalanced					X	X	X	X				
LFBalanced									X	X	X	X
INPut:IMPedance												
50	X	X										
75			X	X								
124					X	X						
135 (US version)							X	X	X	X		
150 (European version)												
600											X	X
INPut:TERMination												
MATChed	X		X		X		X		X		X	
HIMPedance		X		X		X		X		X		X

Comments

Manual operation: [IMPED] key.
Switch the receiver input with a "Program Message“.

Example

```
INPut:CHAN UNB; IMP 75; TERM MATC
```

Related commands

```
INPut:CHANnel
INPut:CHANel?
INPut:IMPedance?
INPut:TERMination
INPut:TERMination?
```

INPut:IMPedance?

`INPut:IMPedance?` queries the impedance setting of the receiver input.

IMPedance 50: The impedance is 50 Ω.

IMPedance 75: The impedance is 75 Ω.

IMPedance 124: The impedance is 124 Ω.

IMPedance 135: The impedance is 135 Ω (US version).

IMPedance 150: The impedance is 150 Ω (European version).

IMPedance 600: The impedance is 600 Ω.

Parameters

Parameter Name	Parameter Type	Range of Values
IMPED	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Impedanz	<NR2>	50 | 75 | 124 | 135 | 150 | 600

Example

`INPut:IMPedance?`

Response: `600`

Related commands

```
INPut:CHANnel
INPut:CHANel?
INPut:IMPedance
INPut:TERMination
INPut:TERMination?
```

INPut:TERMination

`INPut:TERMination` sets the input termination.
TERMination MATChed: The input is terminated with the selected impedance.
TERMination HIMPedance: The input is terminated with a high impedance. The impedance value is used to compute power-based results (units such as dBm).

Parameters

Parameter Name	Parameter Type	Range of Values
TERM	Character data	MATChed | HIMPedance | DEFault

Dependencies

The correct setting for the receiver input includes the input
(INPut:CHANnel), the impedance (INPut:IMPedance) and
the termination (INPut:TERMination). The following are valid combinations:

INPut:CHANnel												
UNBalanced	X	X	X	X								
HFBalanced					X	X	X	X				
LFBalanced									X	X	X	X
INPut:IMPedance												
50	X	X										
75			X	X								
124					X	X						
135 (US version)							X	X	X	X		
150 (European version)												
600											X	X
INPut:TERMination												
MATChed	X		X		X		X		X		X	
HIMPedance		X		X		X		X		X		X

Comments

Manual operation: [IMPED] key.
Switch the receiver input with a "Program Message“.

Example

```
INP:CHAN UNB; IMP 75; TERM MATC
```

Related commands

```
INPut:CHANnel
INPut:CHANel?
INPut:IMPedance
INPut:IMPedance?
INPut:TERMination?
```

INPut:TERMination?

`INPut:TERMination?` queries the input termination setting.

MATC: The input is terminated with the selected impedance.
HIMP: The input is terminated with a high impedance.

Parameters

Parameter Name	Parameter Type	Range of Values
TERM	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Termination	Character response data	MATC | HIMP

Example

`INPut:TERMination?`

Response: `MATC`

Related commands

```
INPut:CHANnel
INPut:CHANel?
INPut:IMPedance
INPut:IMPedance?
INPut:TERMination?
```

MIXer:LEVel

`MIXer:LEVel` sets the receiver dynamic range conditions.
LEVel LNOise: Low noise setting
LEVel LDIStortion: Low distortion setting

Parameter

Parameter Name	Parameter Type	Range of Values
—	Character data	LNOise | LDIStortion | DEFault

Comments Manual operation: LOW NOISE or LOW DISTORTION; SWEEP mode

Example `MIXer:LEVel LNOIse`

Related commands `MIXer:LEVel?`

MIXer:LEVel?

`MIXer:LEVel?` queries the actual receiver dynamic range conditions.
LNO: Low noise setting
LDIS: Low distortion setting

Parameter

Parameter Name	Parameter Type	Range of Values
—	Character data	<none>| DEFault

Response

Response Name	Response Type	Range of Values
Mixer setting	Character response data	LNO | LDIS

Example `MIXer:LEVel?`
Response: `LNO`

Related commands `MIXer:LEVel`

OTHers:GTIMe

`OTHers:GTIMe` sets the gate time for operating modes IMPULSIVE NOISE and INTERRUPTIONS.
The gate time format is: hh:mm

Parameters

Parameter Name	Parameter Type	Range of Values
GATE TIME	Decimal data, Decimal data	0 h, 1 min to 99 h 59 min

Comments

Manual operation: GATE TIME; operating modes IMPULSIVE NOISE, INTERRUPTIONS

Example

`OTH:GTIM 02,30`

Related commands

`OTHers:GTIMe?`

OTHers:GTIMe?

`OTHers:GTIMe?` queries the current gate time status in operating modes IMPULSIVE NOISE and INTERRUPTIONS.

Response

Response Name	Response Type	Range of Values
Gate time	<NR1>,<NR1>	1 min to 99h 59 min

Example

`OTH:GTIM?`

Response: `02,30`

Related commands

`OTHers:GTIMe`

OTHers:INTerruption:DTIMe

`OTHers:INTerruption:DTIMe` sets the dead time, after which interruptions are recorded.

Parameters

Parameter Name	Parameter Type	Range of Values
DEAD TIME	Numeric data	DEFault | 0.125 | 0.003 | 0.143

Comments

Manual operation: DEAD TIME; operating mode INTERRUPTIONS. Units are seconds.

Example

`OTH:INT:DTIM 0.003`

Related commands

`OTHers:INTerruption:DTIMe?`

OTHers:INTerruption:DTIMe?

`OTHers:INTerruption:DTIMe?` queries the current dead time.

Parameters

Parameter Name	Parameter Type	Range of Values
DEAD TIME	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Dead time	<NR2>	0.125 | 0.003 | 0.143

Example

`OTHers:INT:DTIM?`

Response: `0.125`

Related commands

`OTHers:INTerruption:DTIMe`

OTHers:MAXHold

OTHers:MAXHold determines whether the maximum value is stored in operating mode HOT TONE SEARCH.

MAXHold ON: Maximum value is stored.

MAXHold OFF: Maximum value is not stored.

Parameters

Parameter Name	Parameter Type	Range of Values
`MAXHold`	Boolean	ON | OFF | DEFault | 0 | 1

Comments

Manual operation: MAX HLD

Example

`OTHers:MAXH ON`

Related commands

`OTHers:MAXHold?`

OTHers:MAXHold?

`OTHers:MAXHold?` queries whether the maximum values are stored in operating mode HOT TONE SEARCH.

Parameters

Parameter Name	Parameter Type	Range of Values
MAXHLD	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

1: Maximum value is stored.

0: Maximum value is not stored.

Example

`OTH:MAXH? DEF`

Response: `0`

Related commands

`OTHers:MAXHold`

OTHers:NPR:SCHannels

`OTHers:NPR:SCHannels` sets the channel system for which the NPR measurement is performed.

Parameters

Parameter Name	Parameter Type	Range of Values
SYSTEM	Numeric data	DEFault | 12 | 24 | 36 | 48 | 60 | 72 | 80 | 96 | 120 | 132 | 192 | 240 | 252 | 300 | 312 | 432 | 480 | 540 | 600 | 612 | 792 | 900 | 960 | 972 | 1092 | 1200 | 1260 | 1332 | 1380 | 1500 | 1800 | 1872 | 2100 | 2400 | 2580 | 2700 | 3600

Dependencies

With the SPM/PSM-(1)37 devices, only up to channel system 1800.

Comments

Manual operation: SYSTEM.

Example

`OTHers:NPR:SCHannels 2700`

Related commands

`OTHers:NPR:SCHannels?`

OTHers:NPR:SCHannels?

`OTHers:NPR:SCHannels?` queries the current number of transmission channels for the NPR measurement.

Parameters

Parameter Name	Parameter Type	Range of Values
SYSTEM	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Channel system	<NR1>	12 | 24 | 36 | 48 | 60 | 72 | 80 | 96 | 120 | 132 | 192 | 240 | 252 | 300 | 312 | 432 | 480 | 540 | 600 | 612 | 792 | 900 | 960 | 972 | 1092 | 1200 | 1260 | 1332 | 1380 | 1500 | 1800 | 1872 | 2100 | 2400 | 2580 | 2700 | 3600

Example

`OTHers:NPR:SCHannels?`

Response: `2700`

Related commands

`OTHers:NPR:SCHannels`

OTHers:SIDeband

`OTHers:SIDeband` sets the sideband.

SIDeband UPPer: The upper sideband is measured (USB)

SIDeband LOWer: The lower sideband is measured (LSB)

Parameters

Parameter Name	Parameter Type	Range of Values
SIDeband	Character data	UPPer | USB | LOWer | LSB | DEFault

Comments

Manual operation: LSB or USB; operating modes DEMODULATION,
Measurement mode IMPULSIVE NOISE DEMODULATION,
Measurement mode INTERRUPTION DEMODULATION
Measurement mode JITTER DEMODULATION TONE

Example

`OTH:SID LOW`

Related commands

`OTHers:SIDeband?`

OTHers:SIDeband?

`OTHers:SIDeband?` queries the current sideband setting.

UPP: The upper sideband is measured (USB)

LOW: The lower sideband is measured (LSB)

Parameters

Parameter Name	Parameter Type	Range of Values
LSB/USB	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Sideband	Character response data	USB | LSB

Example

`OTH:SID?`

Response: USB

Related commands

`OTHers:SIDeband`

OTHers:THReshold:ASTep

`OTHers:THReshold:ASTep` sets the level threshold in master-slave operation for operating mode AUTOSTEP. When the threshold is reached, the slave switches frequency in sync. with the master. The threshold is based on the reference level (upper scale end).

Parameters

Parameter Name	Parameter Type	Range of Values
START THRESHOLD or STEP THRESHOLD	Numeric data	MINimum | MAXimum | DEFault | -70 to 0 dB

Comments

Manual operation:
STEP THRESH; AUTOSTEP mode THRESH
START THRESH; AUTOSTEP TIME.
Units are always dB.

Example

`OTH:THR:AST MIN`

Related commands

`OTHers:THReshold:ASTep`
`DISPlay:[WINDow]:TRACe:Y:[SCALe]:RLEVel`

OTHers:THReshold:ASTep?

`OTHers:THReshold:ASTep?` queries the current level threshold in master-slave operation for operating mode AUTOSTEP.

Parameters

Parameter Name	Parameter Type	Range of Values
START THRESHOLD or STEP THRESHOLD	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Level threshold	<NR2>	-70 to 0

Example

`OTH:THR:AST? MIN`

Response: `-70.00`

Related commands

`OTHers:THReshold:ASTep`

OTHers:THReshold:HOTTone:[ABSolute]

`OTHers:THReshold:HOTTone:[ABSOlute]` sets the search threshold above which the input level is recorded in operating mode HOT TONE SEARCH. Level reference LEVEL ABSOLUTE.

Parameters

Parameter Name	Parameter Type	Range of Values
THR	Numeric data	MINimum | MAXimum | DEFault | -80 to 6 dB

Dependencies

The range of values depends on the active unit and the input impedance; the specified range of values applies for the "dB" unit.

Comments

Manual operation: THR

Example

`OTH:THR:HOTT MAX`

Related commands

```
OTHers:THReshold:HOTTone:[ABSolute]?
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence:STATe
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:HOTTone:[ABSolute]?

`OTHers:THReshold:HOTTone:[ABSOlute]?` queries the current level threshold setting above which the input level is recorded.

Parameters

Parameter Name	Parameter Type	Range of Values
THR	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Search threshold	<NR2>	-80 to 6

Dependencies

The range of values depends on the active unit and the input impedance; the specified range of values applies for the "dB" unit.

Example

`OTH:THR:HOTT? MIN`

Response: -80

Related commands

```
OTHers:THReshold:HOTTone:[ABSolute]?
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence:STATe
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:HOTTone:REFerence

`OTHers:THReshold:HOTTone:REFerence` sets the search threshold above which the input level is recorded in operating mode HOT TONE SEARCH. Level reference LEVEL ABS-REF.

Parameters

Parameter Name	Parameter Type	Range of Values
THR	Numeric data	MINimum | MAXimum | DEFault | -80 to 6 dB

Dependencies

The range of values depends on the active unit, the input impedance and the reference level; the specified range of values applies for the "dB" unit and the 0 dB reference level.

Comments

Manual operation: THR

Example

`OTH:THR:HOTT:REF MIN`

Related commands

```
OTHers:THReshold:HOTTone:REFerence?
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:HOTTone:REFerence?

`OTHers:THReshold:HOTTone:REFerence?` queries the current level threshold setting above which the input level is recorded.

Parameters

Parameter Name	Parameter Type	Range of Values
THR	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Search threshold	<NR2>	-80 to 6

Dependencies

The range of values depends on the active unit, the input impedance and the reference level; the specified range of values applies for the "dB" unit and the 0 dB reference level.

Example

`OTH:THR:AST:HOTT:REF? MIN`

Response: `-80.00`

Related commands

```
OTHers:THReshold:HOTTone:REFerence?
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:HOTTone:TLP

`OTHers:THReshold:HOTTone:TLP` sets the search threshold above which the input level is recorded in operating mode HOT TONE SEARCH. Level reference LEVEL RELATIVE.

Parameters

Parameter Name	Parameter Type	Range of Values
THR	Numeric data	MINimum | MAXimum | DEFault | -80 to 6 dB

Dependencies

The range of values depends on the active unit, the input impedance and the reference level; the specified range of values applies for the "dB" unit and the 0 dB reference level.

Comments

Manual operation: THR

Example

`OTHers:THReshold:ASTep:TLP MIN`

Related commands

```
OTHers:THReshold:ASTep:TLP?
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:HOTTone:TLP?

`OTHers:THReshold:HOTTone:TLP?` queries the current level threshold setting above which the input level is recorded.

Parameters

Parameter Name	Parameter Type	Range of Values
THR/x	Character data	<none> |MINimum|MAXimum| DEFault

Response

Response Name	Response Type	Range of Values
Search threshold	<NR2>	-80 to 6

Dependencies

The range of values depends on the active unit, the input impedance and the reference level; the specified range of values applies for the "dB" unit and the 0 dB reference level.

Example

`OTHers:THReshold:HOTTone:TLP? MIN`

Response: `-80.00`

Related commands

```
OTHers:THReshold:ASTep:TLP?
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:INOise:[ABSolute]

`OTHers:THReshold:INOise:[ABSolute]` sets the level threshold above which events are registered in operating mode IMPULSIVE NOISE. Level reference LEVEL ABSOLUTE

Parameters

Parameter Name	Parameter Type	Range of Values
THRESH	Numeric data	MINimum | MAXimum | DEFault | -70 to 0 dB

Dependencies

The range of values depends on the active unit and the input impedance; the specified range of values applies for the "dB" unit.

Comments

Manual operation: THRESH

Example

`OTH:THR:INO MIN`

Related commands

```
OTHers:THReshold:INOise:[ABSolute]?
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence:STATe
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:INOise:[ABSolute]?

`OTHers:THReshold:INOise:[ABSolute]?` queries the current level threshold above which events are registered in operating mode IMPULSIVE NOISE.

Parameters

Parameter Name	Parameter Type	Range of Values
THR/x	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Level threshold	<NR2>	-70 to 0

Dependencies

The range of values depends on the active unit and the input impedance; the specified range of values applies for the "dB" unit.

Example

`OTH:THR:INO? MIN`

Response: `-70.00`

Related commands

```
OTHers:THReshold:INOise:[ABSolute]?
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence:STATe
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:INOise:REFerence

`OTHers:THReshold:INOise:REFerence` sets the level threshold above which events are registered in operating mode IMPULSIVE NOISE. Level reference LEVEL ABS-REF.

Parameters

Parameter Name	Parameter Type	Range of Values
THRESH -REF	Numeric data	MINimum | MAXimum | DEFault | -70 to 0 dB

Dependencies

The range of values depends on the active unit, the input impedance and the reference level; the specified range of values applies for the "dB" unit and the 0 dB reference level.

Comments

Manual operation: THRESH

Example

```
OTH:THR:INO:REF MIN
```

Related commands

```
OTHers:THReshold:INOise:REFerence?
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:INOise:REFerence?

`OTHers:THReshold:INOise:REFerence?` queries the current level threshold above which events are registered in operating mode IMPULSIVE NOISE.

Parameters

Parameter Name	Parameter Type	Range of Values
THRESH-REF	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Level threshold	<NR2>	-70 to 0

Dependencies

The range of values depends on the active unit, the input impedance and the reference level; the specified range of values applies for the "dB" unit and the 0 dB reference level.

Example

```
OTH:THR:INO:REF? MIN
Response: -70.00
```

Related commands

```
OTHers:THReshold:INOise:REFerence?
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence
[SENSe]:POWer|VOLTage:[AC]|[DC]:REFerence:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:INOise:TLP

`OTHers:THReshold:INOise:TLP` sets the level threshold above which events are registered in operating mode IMPULSIVE NOISE. Level reference LEVEL RELATIVE.

Parameters

Parameter Name	Parameter Type	Range of Values
THRESH-TLP	Numeric data	MINimum | MAXimum | DEFault | -70 to 0 dB

Dependencies

The range of values depends on the active unit, the input impedance and the reference level; the specified range of values applies for the "dB" unit and the 0 dB reference level.

Comments

Manual operation: THRESH

Example

`OTH:THR:INO:TLP MIN`

Related commands

```
OTHers:THReshold:INOise:TLP?
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:ASTep:TLP?

`OTHers:THReshold:INOise:TLP?` queries the current level threshold above which events are registered in operating mode IMPULSIVE NOISE.

Parameters

Parameter Name	Parameter Type	Range of Values
THRESH-TLP	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Level threshold	<NR2>	70 to 0

Dependencies

The range of values depends on the active unit, the input impedance and the reference level; the specified range of values applies for the "dB" unit and the 0 dB reference level.

Example

`OTH:THR:INO:TLP? MIN`

Response: `-70.00`

Related commands

```
OTHers:THReshold:INOise:TLP?
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP
[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP:STATe
UNIT:POWer|VOLTage
```

OTHers:THReshold:INTerruption

`OTHers:THReshold:INTerruption` sets the level threshold from which events are registered in operating mode INTERRUPTIONS.

Parameters

Parameter Name	Parameter Type	Range of Values
THRESH	Numeric data	DEFault | -3 | -6 | -10 | -20

Comments

Manual operation: THRESH. Units are always dB.

Example

`OTH:THR:INT -20 dB`

Related commands

`OTHers:THReshold:INTerruption?`

OTHers:THReshold:INTerruption?

`OTHers:THReshold:INTerruption?` queries the current level threshold from which events are registered in operating mode INTERRUPTIONS.

Parameters

Parameter Name	Parameter Type	Range of Values
THRESH	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Level threshold	<NR1>	-3 | -6 | -10 | -20

Example

`OTH:THR:INT?`

Response: `-20`

Related commands

`OTHers:THReshold:INTerruption`

OUTPut:CHANnel

`OUTPut:CHANnel` switches the generator output.
UNBalanced = Coaxial output
HFBalanced = Balanced output **I**
LFBalanced = Balanced output **II**

Parameter

Parameter Name	Parameter Type	Range of Values
TX	Character data	UNBalanced | HFBalanced | LFBalanced | DEFault

Dependencies

The correct setting for the generator output includes the output (OUTPut:CHANnel), the impedance (OUTPut:IMPedance) and the termination (OUTPut:TERMination). The following are valid combinations:

OUTPut:CHANnel							
UNBalanced	X	X					
HFBalanced			X	X			
LFBalanced					X	X	X
OUTPut:IMPedance							
50	X						
75		X					
124			X				
135 (US-Version)				X	X		
150 (Europa)							
600						X	X
OUTPut:TERMination							
MATChed	X	X	X	X	X	X	
LIMPedance							X

Comments

Manual operation: [IMPED] key.
Instrument versions PSM-37 to 139.
Switch the generator output with a "Program Message“.

Example

`OUTP:CHAN UNB; IMP 75; TERM MATC`

Related commands

`OUTPut:CHANnel?`
`OUTPut:IMPedance`
`OUTPut:IMPedance?`
`OUTPut:TERMination`
`OUTPut:TERMination?`

OUTPut:CHANnel?

`OUTPut:CHANnel?` determines the current setting of the generator output.

`UNB` = Coaxial output
`HFB` = Balanced output **I**
`LFB` = Balanced output **II**

Parameters

Parameter Name	Parameter Type	Range of Values
TX	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Output	Character response data	UNB | HFB | LFB

Comments

Instrument versions PSM-37 to 139.

Example

`OUTP:CHAN?`

Response: `UNB`

Related commands

`OUTPut:CHANnel`

OUTPut:IMPedance

`OUTPut:IMPedance` sets the impedance of the generator output.
IMPedance50: The impedance is 50 Ω
IMPedance 75: The impedance is 75 Ω
IMPedance 124: The impedance is 124 Ω
IMPedance 135: The impedance is 135 Ω (US version)
IMPedance 150: The impedance is 150 Ω (European version)
IMPedance 600: The impedance is 600 Ω

Parameters

Parameter Name	Parameter Type	Range of Values
IMPED	Numeric data	DEFault | 50 | 75 | 124 | 135 | 150 | 600

Dependencies

The correct setting for the generator output includes the output (OUTPut:CHANnel), the impedance (OUTPut:IMPedance) and the termination (OUTPut:TERMination). The following are valid combinations:

OUTPut:CHANnel							
UNBalanced	X	X					
HFBalanced			X	X			
LFBalanced					X	X	X
OUTPut:IMPedance							
50	X						
75		X					
124			X				
135 (US-Version)				X	X		
150 (Europa)							
600						X	X
OUTPut:TERMination							
MATChed	X	X	X	X	X	X	
LIMPedance							X

Comments

Manual operation: [IMPED] key.
Instrument versions PSM-37 to 139.
Switch the generator output with a "Program Message“.

Example

```
OUTP:CHAN UNB; IMP 75; TERM MATC
```

Related commands

```
OUTPut:CHANnel
OUTPut:CHANnel?
OUTPut:IMPedance?
OUTPut:TERMination
OUTPut:TERMination?
```

OUTPut:IMPedance?

`OUTPut:IMPedance?` queries the current setting of the impedance of the generator output.

IMPedance50: The impedance is 50 Ω

IMPedance 75: The impedance is 75 Ω

IMPedance 124: The impedance is 124 Ω

IMPedance 135: The impedance is 135 Ω (US version)

IMPedance 150: The impedance is 150 Ω (European version)

IMPedance 600: The impedance is 600 Ω

Parameters

Parameter Name	Parameter Type	Range of Values
IMPED	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Impedance	<NR1>	50 | 75 | 124 | 135 | 150 | 600

Comments

Instrument versions PSM-37 to 139.

Example

`OUTPut:IMP?`

Response: `600`

Related commands

```
OUTPut:CHANnel
OUTPut:CHANnel
OUTPut:IMPedance
OUTPut:TERMination
```

OUTPut:[STATe]

`OUTPut:[STATe]` sets whether the generator is blanked or a signal is present at the output.

OUTPut:[STATe] ON: The TX level is present at the output.

OUTPut:[STATe] OFF: the generator is blanked.

Parameters

Parameter Name	Parameter Type	Range of Values
BLANK	Boolean	ON | OFF| DEFault | 0 | 1

Comments

Instrument versions PSM-37 to 139.
Manual operation: [BLANK] key.

Example

`OUT: ON`

Related commands

```
OUTPut:[STATe]?
OUTPut:STATe:AUTO
OUTPut:STATe:AUTO?
```

OUTPut:[STATe]?

`OUTPut:[STATe]?` determines whether the output signal is blanked.

1 : The TX level is present at the output.

0 : The generator is blanked.

Parameters

Parameter Name	Parameter Type	Range of Values
BLANK	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

Instrument versions PSM-37 to 139

Example

`OUTPut?`

Response: `1`

Related commands

`OUTPut:[STATe]`
`OUTPut:STATe:AUTO`
`OUTPut:STATe:AUTO?`

OUTPut:[STATe]:AUTO

`OUTPut:[STATe]:AUTO` sets whether the TX level is automatically blanked each time the frequency is changed.

ON: The TX level is blanked when the frequency changes.

OFF: The TX level is not blanked when the frequency changes.

Parameters

Parameter Name	Parameter Type	Range of Values
AUTO BLANK	Boolean	ON | OFF| DEFault | 0 | 1

Comments

Instrument versions PSM-37 to 139.
Manual operation: AUTO BLANK

Example

`OUTPut:AUTO ON`

Related commands

`OUTPut:[STATe]:AUTO?`
`OUTPut:[STATe]`
`OUTPut:[STATe]?`

OUTPut:[STATe]AUTO?

`OUTPut:[STATe]:AUTO?` queries whether the TX level is automatically blanked each time the frequency is changed.

Parameters

Parameter Name	Parameter Type	Range of Values
AUTO BLANK	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

1: AUTO ON; The TX level is blanked when the frequency changes.

0: AUTO OFF; The TX level is not blanked when the frequency changes.

Instrument versions PSM-37 to 139.

Example

`OUTPut:AUTO?`

Response: `1`

Related commands

`OUTPut:[STATe]:AUTO`
`OUTPut:[STATe]`
`OUTPut:[STATe]?`

OUTPut:TERMination

`OUTPut:TERMination` lsets the output termination.
TERMination MATChed: The output is terminated with the selected impedance.
TERMination LIMPedance: The output is terminated with R_i = 0.

Parameters

Parameter Name	Parameter Type	Range of Values
Termination	Character data	MATChed | LIMPedance | DEFault

Dependencies

The correct setting for the generator output includes the output (OUTPut:CHANnel), the impedance (OUTPut:IMPedance) and the termination (OUTPut:TERMination). The following are valid combinations:

OUTPut:CHANnel							
UNBalanced	X	X					
HFBalanced			X	X			
LFBalanced					X	X	X
OUTPut:IMPedance							
50	X						
75		X					
124			X				
135 (US-Version)				X	X		
150 (Europa)							
600						X	X
OUTPut:TERMination							
MATChed	X	X	X	X	X	X	
LIMPedance							X

Comments

Manual operation: [IMPED] key.
Instrument versions PSM-37 to 139.
Switch the generator output with a "Program Message“.

Example

```
OUT:CHAN UNB; IMP 75; TERM MATC
```

Related commands

```
OUTPut:CHANnel
OUTPut:CHANnel?
OUTPut:IMPedance
OUTPut:IMPedance?
OUTPut:TERMination?
```

OUTPut:TERMination?

`OUTPut:TERMination?` queries the current termination of the output.

MATC: The output is terminated with the selected impedance.
LIMP: The output is terminated with $R_i = 0$.

Parameters

Parameter Name	Parameter Type	Range of Values
TERM	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Termination	Character response data	MATC | LIMP

Comments

Instrument versions PSM-37 to 139.

Example

`OUTPut:TERM?`

Response: `MATC`

Related commands

```
OUTPut:CHANnel
OUTPut:CHANnel?
OUTPut:IMPedance
OUTPut:IMPedance?
OUTPut:TERMination
```

[SENSe]:BANDwidth | BWIDth:[RESolution]

`SENSe]:BANDwidth | BWIDth:[RESolution]` sets the resolution bandwidth of the IF filter.

WIDEband: Wideband level measurement.

DEFault: Default setting.

25: 25 Hz filter is set.

100: 100 Hz filter is set.

1740: 1740 Hz filter is set.

3100: 3100 Hz filter is set.

48000: 48 kHz filter (swept bandwidth) is effective.

240000: 240 kHz filter (swept bandwidth) is effective.

Parameters

Parameter Name	Parameter Type	Range of Values
BANDW	Character data	DEFault | WIDEband | 25 | 100 | 1740 | 3100 | 48000 | 240000

Comments

The following can be entered instead of WIDEband:
SPM/PSM-37/137 = 8 000 000
SPM/PSM-38/138 = 18 000 000
SPM/PSM-39/139 = 32 000 000
If an optional filter is installed, this can be set by entering its bandwidth.
Manual operation: BANDW; operating modes LEVEL, HOTTONE SEARCH, AUTOSTEP and SWEEP.
The 48 kHz and 240 kHz IF filters are only available in the operating mode LEVEL.

Example

`BAND 3100`

Related commands

`SENSe]:BANDwidth | BWIDth:[RESolution]?`

[SENSe]:BANDwidth | BWIDth:[RESolution]?

`SENSe]:BANDwidth | BWIDth:[RESolution]?` queries the current setting of the IF filter bandwidth.

Response

Response Name	Response Type	Range of Values
Bandwidth	<NR1>	25 | 100 | 1740 |3100 | 48000 | 240000 I 8 000 000 | 18 000 000 | 32 000 000

Comments

SPM/PSM-37/137 = 8 000 000: Wideband level measurement is set.
SPM/PSM-38/138 = 18 000 000: Wideband level measurement is set.
SPM/PSM-39/139 = 32 000 000: Wideband level measurement is set.

25: 25 Hz filter is set.

100: 100 Hz filter is set.

1740: 1740 Hz filter is set.

3100: 3100 Hz filter is set.

48 000: 48 kHz filter (swept bandwidth) is effective.

240 000: 240 kHz filter (swept bandwidth) is effective.

The 48 kHz and 240 kHz IF filters are only available in the operating mode LEVEL.

Example

`BAND`

Response: `3100`

Related commands

`[SENSe]:BANDwidth | BWIDth:[RESolution]`

[SENSe]:FILTer:CCITt:[STATe]

`[SENSe]:FILTer:CCITt:[STATe]` sets evaluation of the signal using the psophometer filter (operating modes DEMODULATION and VOICE).

ON: Das Psophmeter filter is on.

OFF: Das Psophmeter filter is off.

Parameters

Parameter Name	Parameter Type	Range of Values
PSOPH	Boolean	ON | OFF | DEFault | 0 | 1

Dependencies

If CCITt ON is set, the C-message filter is automatically deactivated.

Comments

Manual operation: WEIGHTING; Aux. function TEST & CONFIG.

Example

`FILT:CCIT`

Related commands

```
[SENSe]:FILTer:CCITt:[STATe]?
[SENSe]:FILTer:CMESsage:[STATe]
[SENSe]:FILTer:CMESsage:[STATe]?
```

[SENSe]:FILTer:CCITt:[STATe]?

`SENSe]:FILTer:CCITt:[STATe]?` queries if the psophometer filter is active.

Parameters

Parameter Name	Parameter Type	Range of Values
PSOPH	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

1: Psophometer filter is on.
0: Psophometer filter is off.

Example

`FILT:CCIT?`

Response: `1`

Related commands

```
[SENSe]:FILTer:CCITt:[STATe]
[SENSe]:FILTer:CMESsage:[STATe]
[SENSe]:FILTer:CMESsage:[STATe]?
```

[SENSe]:FILTer:CMESsage:[STATe]

`SENSe]:FILTer:CMESsage:[STATe]` sets evaluation of the signal using the C-message weighting filter (operating modes DEMODULATION and VOICE).

ON: C-message weighting filter is on.

OFF: C-message weighting filter is off.

Parameters

Parameter Name	Parameter Type	Range of Values
C-MESS	Boolean	ON | OFF | DEFault | 0 | 1

Dependencies If CMES ON is set, the psophometer filter is automatically deactivated.

Comments Manual operation: WEIGHTING; Aux. function TEST & CONFIG.

Example `FILT:CMES ON`

Related commands

```
[SENSe]:FILTer:CCITt:[STATe]
[SENSe]:FILTer:CCITt:[STATe]?
[SENSe]:FILTer:CMESsage:[STATe]?
```

[SENSe]:FILTer:CMESsage:[STATe]?

`SENSe]:FILTer:CMESsage:[STATe]?` queries whether the C-message weighting filter is activated.

Parameters

Parameter Name	Parameter Type	Range of Values
C-MESS	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

1: C-message weighting filter is on.
0: C-message weighting filter is off.

Example `FILT:CMES`

Response: `0`

Related commands

```
[SENSe]:FILTer:CCITt:[STATe]
[SENSe]:FILTer:CCITt:[STATe]?
[SENSe]:FILTer:CMESsage:[STATe]
```

[SENSe]:FILTer:INOis

`[SENSe]:FILTer:INOise` sets the weighting filter for the operating mode IMPULSIVE NOISE.

INOise FLAT: The signal is not weighted.

INOise LRANge: 300 to 500 Hz (lower range)

INOise URANge: 600 to 3000 Hz (upper range)

Parameters

Parameter Name	Parameter Type	Range of Values
FILTER	Character data	DEFault | FLAT | LRANge | URANge

Comments

Manual operation: FILTER; operating mode IMPULSIVE NOISE.

Example

`FILT:INO URANG`

Related commands

`[SENSe]:FILTer:INOise?`

[SENSe]:FILTer:INOise?

`[SENSe]:FILTer:INOise?` queries the current weighting filter for the operating mode IMPULSIVE NOISE.

Parameters

Parameter Name	Parameter Type	Range of Values
FILTER	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Setting	Character response data	FLAT | LRAN | URAN

Comments

FLAT: The signal is not weighted.

LRANge: Weighting 300 to 500 Hz

URANge: Weighting 600 to 3000 Hz

Example

`FILT:INO?`

Response: URAN

Related commands

`[SENSe]:FILTer:INOise`

[SENSe]:FILTer:JITTer

`[SENSe]:FILTer:JITTer` sets the weighting filter for the jitter measurement.

LRANge: 4 to 20 Hz (Lower range)

FRANge: 4 to 300 Hz (Full range)

URANge: 20 to 300 Hz (Upper range)

Parameters

Parameter Name	Parameter Type	Range of Values
FILTER	Character data	LRANge | FRANge | URANge | DEFault

Comments

Manual operation: FILTER; operating mode JITTER

Example

`FILT:JITT LRANG`

Related commands

`[SENSe]:FILTer:JITTer?`

[SENSe]:FILTer:JITTer?

`[SENSe]:FILTer:JITTer?` queries the current weighting filter setting for the jitter measurement.

Parameters

Parameter Name	Parameter Type	Range of Values
FILTER	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Setting	Character response data	LRAN | FRAN | URAN

Comments

LRAN: 4 to 20 Hz

FRAN: 4 to 300 Hz

URAN: 20 to 300 Hz

Example

`FILT:JITT?`

Response: `FRAN`

Related commands

`[SENSe]:FILTer:JITTer`

[SENSe]:FILTer:NOTCh

`[SENSe]:FILTer:NOTCh` lsets the notch filter.
825: The center frequency of the notch filter is 825 Hz.
1010: The center frequency of the notch filter is 1010 Hz.
OFF: The notch filter is off.

Parameters

Parameter Name	Parameter Type	Range of Values
NOTCH	Numeric data	0 | 825 | 1010 | OFF | DEFault

Comments

Manual operation: NOTCH; operating mode DEMODULATION, measurement mode IMPULSIVE NOISE DEMODULATION.

Example

`FILT:NOTC 1010`

Related commands

`[SENSe]:FILTer:NOTCh?`

[SENSe]:FILTer:NOTCh?

`[SENSe]:FILTer:NOTCh?` queries the current notch filter setting.

Parameters

Parameter Name	Parameter Type	Range of Values
NOTCH	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Filter	<NR1>	0 | 825 | 1010

Comments

0: The notch filter is off.
825: The center frequency of the notch filter is 825 Hz.
1010: The center frequency of the notch filter is 1010 Hz.

Example

`FILT:NOTC?`

Response: `825`

Related commands

`[SENSe]:FILTer:NOTCh`

[SENSe]:FREQuency:AFC

`[SENSe]:FREQuency:AFC` switches automatic frequency control on or off.
AFC ON: Automatic frequency control is on.
AFC OFF: Automatic frequency control is off.

Parameters

Parameter Name	Parameter Type	Range of Values
AFC	Boolean	ON | OFF | DEFault | 0 | 1

Comments

Manual operation: AFC; operating mode LEVEL.

Example

`FREQ:AFC ON`

Related commands

`[SENSe]:FREQuency:AFC?`

[SENSe]:FREQuency:AFC?

`[SENSe]:FREQuency:AFC?` queries the current automatic frequency control setting.

Parameters

Parameter Name	Parameter Type	Range of Values
AFC	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

1: Automatic frequency control is on.
0: Automatic frequency control is off.

Example

`FREQ:AFC? DEF`
Response: `0`

Related commands

`[SENSe]:FREQuency:AFC`

[SENSe]:FREQuency:ASTep

`[SENSe]:FREQuency:ASTep` sets the frequency step width for operating mode AUTOSTEP.

Parameters

Parameter Name	Parameter Type	Range of Values
STEP WIDTH	Numeric data	MINimum | MAXimum | DEFault | 1 to 31 999 955 Hz| 1 to 17 999 955 Hz| 1 to 8 999 955 Hz

Dependencies

The frequency step width depends on the frequency range setting, ([SENSe]:FREQuency:STOP) and on the number of steps setting, ([SENSe:FREQuency:ASTep:COUNt).

Comments

Manual operation: STEP WIDTH; operating mode AUTOSTEP.
It is a good idea to first select the frequency range and the number of frequency steps. The frequency step width is then calculated automatically.

Example

`FREQ:AST 2000`

Related commands

`[SENSe]:FREQuency:ASTep?`

[SENSe]:FREQuency:ASTep?

`[SENSe]:FREQuency:ASTep?` queries the frequency step width setting for operating mode AUTOSTEP.

Parameters

Parameter Name	Parameter Type	Range of Values
STEP WIDTH	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Frequency step width	<NR3>	1 to 31 999 955 | 1 to 17 999 955 | 1 to 8 999 955

Example

`FREQuency:AST?`

Response: `2000.0E+0`

Related commands

`[SENSe]:FREQuency:ASTep`

[SENSe]:FREQuency:ASTep:COUNt

`[SENSe]:FREQuency:ASTep:COUNt` sets the number of frequency steps.

Parameters

Parameter Name	Parameter Type	Range of Values
STEPS	Numeric data	MINimum | MAXimum | DEFault | 1 to 100

Dependencies

The number of frequency steps affects the step width ([SENSe:Frequency:ASTep).

Comments

Manual operation: STEPS; operating mode AUTOSTEP.

Example

`FRE:AST:COUN`

Related commands

`[SENSe]:FREQuency:ASTep:COUNt?`

[SENSe]:FREQuency:ASTep:COUNt?

`[SENSe]:FREQuency:ASTep:COUNt?` queries the number of frequency steps.

Parameters

Parameter Name	Parameter Type	Range of Values
STEPS	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Number of steps	<NR1>	1 to 100

Example

`FREQ:AST:COUN?`

Response: `90`

Related commands

`[SENSe]:FREQuency:ASTep:COUNt`

[SENSe]:FREQuency:CENTer

`[SENSe]:FREQuency:CENTer` sets the actual center frequency in SWEEP mode.

Parameters

Parameter Name	Parameter Type	Range of Values
FCENT	Numeric data	MINimum | MAXimum | DEFault | 45 Hz to 8 MHz, (18 MHz), (32 MHz)

Dependencies

The frequency range depends on the selected input and output and on the instrument version.

Comments

Manual operation: FCENT operating mode SWEEP

Example

`FREQu:CENT 200000`

Related commands

`[SENSe]:FREQuency:CENTer?`
`[SENSe]:FREQuency:SPAN`
`[SENSe]:FREQuency:SPAN?`

[SENSe]:FREQuency:CENTer?

`[SENSe]:FREQuency:CENTer?` queries the actual center frequency in SWEEP mode.

Parameters

Parameter Name	Parameter Type	Range of Values
FCENT	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Center frequency	<NR3>	45 to 32000000 | 18000000 | 8000000

Dependencies

The frequency range depends on the selected input and output and on the instrument version.

Example

`FREQ:CENT?`

Response: `200000.0E+0`

Related commands

`[SENSe]:FREQuency:CENTer`
`[SENSe]:FREQuency:SPAN`
`[SENSe]:FREQuency:SPAN?`

[SENSe]:FREQuency:[CW] | [FIXed]

`[SENSe]:FREQuency:[CW]|[FIXed]` sets the receive or transmit frequency.

Parameters

Parameter Name	Parameter Type	Range of Values
FRQ|CAR	Numeric data	MINimum | MAXimum | DEFault | UP | DOWN | 45 Hz to 8 MHz, (18 MHz), (32 MHz)

Dependencies

The frequency range depends on the instrument version.

Comments

Manual operation: FRQ (operating modes LEVEL, NPR)
CAR (operating modes DEMODULATION, JITTER)

Example

`FREQ:5MHz`

Related commands

`[SENSe]:FREQuency:[CW] | [FIXed]?`

[SENSe]:FREQuency:[CW] | [FIXed]?

`[SENSe]:FREQuency:[CW]|[FIXed]?` queries the current transmit or receive frequency setting.

Parameters

Parameter Name	Parameter Type	Range of Values
FRQICAR	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Frequenz	<NR3>	45 to 32000000 | 18000000 | 8000000

Dependencies

The frequency range depends on the input or output selected and on the instrument version.

Example

`FREQ?`

Response: `5000000.0E+0`

Related commands

`[SENSe]:FREQuency:[CW]|[FIXed]`

[SENSe]:FREQuency:MODE

`[SENSe]:FREQuency:MODE` switches the fixed frequency function on or off.
CW: Switch off fixed frequency function
LIST: Switch on fixed frequency function

Parameters

Parameter Name	Parameter Type	Range of Values
FMEM	Character data	CW | FIXed | LIST | DEFault

Comments

Manual operation: USE FMEM ON/OFF

Related commands

```
[SENSe]:FREQuency:MODE?
[SENSe]:LIST:FREQuency
[SENSe]:LIST:FREQuency:POINts?
[SENSe]:LIST:SEQuence:SINGle
[SENSe]:LIST:SEQuence:STARt
[SENSe]:LIST:SEQuence:STOP
[SENSe]:LIST:SEQuence:POINts?
```

[SENSe]:FREQuency:MODE?

`[SENSe]:FREQuency:MODE?`
determines the current setting of the fixed frequency function.

Parameters

Parameter Name	Parameter Type	Range of Values
FMEM	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Frequency selection	Character response data	CW | LIST

Comments

CW: Fixed frequency function off
LIST: Fixed frequency function on

Example

`FREQ:MODE?`

Response: `CW`

Related commands

```
[SENSe]:FREQuency:MODE
[SENSe]:LIST:FREQuency
[SENSe]:LIST:FREQuency:POINts?
[SENSe]:LIST:SEQuence:SINGle
[SENSe]:LIST:SEQuence:STARt
[SENSe]:LIST:SEQuence:STOP
[SENSe]:LIST:SEQuence:POINts?
```

[SENSe]:FREQuency:SPAN

`[SENSe]:FREQuency:SPANP` sets the sweep span in SWEEP mode.

Parameters

Parameter Name	Parameter Type	Range of Values
SPAN	Numeric data	MINimum | MAXimum | DEFault | 0 Hz to 8 MHz, (18 MHz), (32 MHz)

Dependencies

The frequency range depends on the selected input and output and on the instrument version.

Comments

Manual operation: SPAN; operating mode SWEEP

Example

`FREQuency:SPAN 4000`

Related commands

```
[SENSe]:FREQuency:SPAN?
[SENSe]:FREQuency:CENTer
[SENSe]:FREQuency:CENTer?
```

[SENSe]:FREQuency:SPAN?

`[SENSe]:FREQuency:SPAN?` queries the actual sweep span setting in SWEEP mode.

Parameters

Parameter Name	Parameter Type	Range of Values
SPAN	Character data	<none> MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Sweep span	<NR3>	45 to 32000000|18000000 | 8000000

Dependencies

The frequency range depends on the selected input and output and on the instrument version.

Example

`FREQ:SPAN?`

Response: `4000.0E+0`

Related commands

```
[SENSe]:FREQuency:SPAN
[SENSe]:FREQuency:CENTer
[SENSe]:FREQuency:CENTer?
```

[SENSe]:FREQuency:STARt

`[SENSe]:FREQuency:STARt` sets the start frequency for the operating modes AUTOSTEP and HOTTONE SEARCH.

Parameters

Parameter Name	Parameter Type	Range of Values
FSTART	Numeric data	MINimum | MAXimum | DEFault | UP | DOWN | 45 Hz to 8 MHz, (18 MHz), (32 MHz)

Dependencies

The frequency range depends on the input or output selected and on the instrument version.

Comments

Manual operation: FSTART; operating modes AUTOSTEP, HOTTONE SEARCH.

Example

`FREQ:STAR 12 000`

Related commands

`[SENSe]:FREQuency:STARt?`
`[SENSe]:FREQuency:STOP`
`[SENSe]:FREQuency:STOP?`

[SENSe]:FREQuency:STARt?

`[SENSe]:FREQuency:STARt?` queries the current start frequency setting for operating modes AUTOSTEP and HOTTONE SEARCH.

Parameters

Parameter Name	Parameter Type	Range of Values
FSTART	Character data	<none> MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Start frequency	<NR3>	45 to 32000000 | 18000000 | 8000000

Dependencies

The frequency range depends on the input or output selected and on the instrument version.

Example

`FREQ:STAR?`

Response: `12000.0E+0`

Related commands

`[SENSe]:FREQuency:STARt`
`[SENSe]:FREQuency:STOP`
`[SENSe]:FREQuency:STOP?`

[SENSe]:FREQuency:STEP

`[SENSe]:FREQuency:STEP` sets the frequency step width for the operating mode LEVEL.

Parameters

Parameter Name	Parameter Type	Range of Values
FSTEP	Numeric data	MINimum | MAXimum | DEFault | 45 Hz to 8 MHz, (18 MHz), (32 MHz)

Dependencies

The frequency range depends on the input or output selected and on the instrument version.

Comments

Manual operation: FSTEP; operating mode LEVEL

Example

`FREQ:STEP 2000`

Related commands

`[SENSe]:FREQuency:STEP?`
`[SENSe]:FREQuency UP|DOWN`

[SENSe]:FREQuency:STEP?

`[SENSe]:FREQuency:STEP?` queries the current frequency step width setting for operating mode LEVEL.

Parameters

Parameter Name	Parameter Type	Range of Values
FSTEP	Character data	<none> MINimum | MAXimum | DEFault)

Response

Response Name	Response Type	Range of Values
Frequency step width	<NR3>	45 to 32000000 | 18000000 | 8000000

Dependencies

The frequency range depends on the input or output selected and on the instrument version.

Example

`FREQ:STEP?`

Response: `2000.0E+0`

Related commands

`[SENSe]:FREQuency:STEP`

[SENSe]:FREQuency:STOP

`[SENSe]:FREQuency:STOP` sets the stop frequency for the operating modes AUTOSTEP and HOT TONE SEARCH.

Parameters

Parameter Name	Parameter Type	Range of Values
FSTOP	Numeric data	MINimum | MAXimum | DEFault | UP | DOWN | 45 Hz to 8 MHz, (18 MHz), (32 MHz)

Dependencies

The frequency range depends on the input or output selected and on the instrument version.

Comments

Manual operation: FSTOP; operating modes AUTOSTEP, HOT TONE SEARCH.

Example

`FREQ:STOP 233000`

Related commands

`[SENSe]:FREQuency:STOP?`
`[SENSe]:FREQuency:STARt`
`[SENSe]:FREQuency:STARt?`

[SENSe]:FREQuency:STOP?

`[SENSe]:FREQuency:STOP?` queries the current stop frequency setting for the operating modes AUTOSTEP and HOT TONE SEARCH.

Parameters

Parameter Name	Parameter Type	Range of Values
FSTOP	Character data	<none> MINimum | MAXimum | DEFault)

Response

Response Name	Response Type	Range of Values
Stop frequency	<NR3>	45 to 32000000 | 18000000 | 8000000

Dependencies

The frequency range depends on the input or output selected and on the instrument version.

Example

`FREQ:STOP?`

Response: `233000.0E+0`

Related commands

`[SENSe]:FREQuency:STOP`
`[SENSe]:FREQuency:STARt`
`[SENSe]:FREQuency:STARt?`

[SENSe]:FREQuency:TONE

`[SENSe]:FREQuency:TONE` sets the test tone frequency.

Parameters

Parameter Name	Parameter Type	Range of Values
TONE	<NR2>	DEFault | 800 | 1020

Comments

Manual operation: TONE -> 800 Hz | 1020 Hz
Operating mode JITTER, measurement modes JITTER DEMODULATION and JITTER TONE

Example

`FREQ:TONE 1020`

Related commands

`[SENSe]:FREQuency:TONE?`

[SENSe]:FREQuency:TONE?

`[SENSe]:FREQuency:TONE?` queries the current setting of the test tone frequency.

Parameters

Parameter Name	Parameter Type	Range of Values
TONE	Character data	<none> | DEFault)

Response

Response Name	Response Type	Range of Values
Test tone	Numeric data	1020 | 800

Example

`FREQ:TONE?`

Response: `1020.0E+0`

Related commands

`[SENSe]:FREQuency:TONE`

[SENSe]:LIST:FREQuency

`[SENSe]:LIST:FREQuency` writes to the fixed frequency memory starting at memory location 0.

Parameters

Parameter Name	Parameter Type	Range of Values
FMEM EDIT FRQ	Numeric data, Numeric data,...	MINimum | MAXimum | DEFault | 45 Hz to 8 MHz, (18 MHz), (32 MHz)

Dependencies

The frequency range depends on the selected input and output and on the instrument version.

Comments

Manual operation: FMEM - EDIT
Up to 100 values can be transferred.

Example

`LIST:FREQ 10000,20000,30000,40000`

Related commands

```
[SENSe]:FREQuency:MODE
[SENSe]:LIST:FREQuency:POINts?
[SENSe]:LIST:SEQuence:SINGle
[SENSe]:LIST:SEQuence:SINGle?
[SENSe]:LIST:SEQuence:STARt
[SENSe]:LIST:SEQuence:STOP
[SENSe]:LIST:SEQuence:STOP?
[SENSe]:LIST:SEQuence:POINts?
```

[SENSe]:LIST:FREQuency:POINts?

`[SENSe]:LIST:FREQuency:POINts?` queries the current number of stored fixed frequencies**.**

Response

Response Name	Response Type	Range of Values
List length	<NR1>	0 to100

Example

`LIST:FREQ:POIN?`

Response: `4`

Related commands

```
[SENSe]:FREQuency:MODE
[SENSe]:FREQuency:MODE?
[SENSe]:LIST:FREQuency
[SENSe]:LIST:SEQuence:SINGle
[SENSe]:LIST:SEQuence:SINGle?
[SENSe]:LIST:SEQuence:STARt
[SENSe]:LIST:SEQuence:STOP
[SENSe]:LIST:SEQuence:POINts?
```

[SENSe]:LIST:SEQuence:POINts?

`[SENSe]:LIST:SEQuence:POINts?` queries the number of selected fixed frequencies.

Response

Response Name	Response Type	Range of Values
Frequency count	<NR1>	1 to 100

Example

`LIST:SEQ:POINts?`

Response: 4

Related commands

```
[SENSe]:FREQuency:MODE
[SENSe]:FREQuency:MODE?
[SENSe]:LIST:FREQuency
[SENSe]:LIST:FREQuency:POINts?
[SENSe]:LIST:SEQuence:SINGle
[SENSe]:LIST:SEQuence:SINGle?
[SENSe]:LIST:SEQuence:STARt
[SENSe]:LIST:SEQuence:STARt?
[SENSe]:LIST:SEQuence:STOP
[SENSe]:LIST:SEQuence:STOP?
```

[SENSe]:LIST:SEQuence:SINGle

`[SENSe]:LIST:SEQuence:SINGle` selects the desired fixed frequency (operating modes LEVEL, DEMOD, NPR, JITTER, IMPULSE NOISE DEMOD and INTERRUPTIONS DEMOD).

Parameters

Parameter Name	Parameter Type	Range of Values
ACT FMEM	Decimal data	0 to 99, (199)

Comments

A fixed frequency can be selected only if a value is stored for it.

Example

`LIST:SEQ:SING 3`

Related commands

```
[SENSe]:FREQuency:MODE
[SENSe]:LIST:FREQuency
[SENSe]:LIST:FREQuency:POINts?
[SENSe]:LIST:SEQuence:POINts?
[SENSe]:LIST:SEQuence:SINGle?
[SENSe]:LIST:SEQuence:STARt
[SENSe]:LIST:SEQuence:STOP
```

[SENSe]:LIST:SEQuence:SINGle?

`[SENSe]:LIST:SEQuence:SINGle?` queries the current fixed frequency number (operating modes LEVEL, DEMOD, NPR, JITTER, IMPULSE NOISE DEMOD und INTERRUPTIONS DEMOD).

Parameter

Parameter Name	Parameter Type	Range of Values
ACT FMEM	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
List space	<NR1>	0 to 99, (199)

Example

`LIST:SEQ:SING?`

Response: 3

Related commands

```
[SENSe]:FREQuency:MODE
[SENSe]:LIST:FREQuency
[SENSe]:LIST:FREQuency:POINts?
[SENSe]:LIST:SEQuence:POINts?
[SENSe]:LIST:SEQuence:SINGle
[SENSe]:LIST:SEQuence:STARt
[SENSe]:LIST:SEQuence:STOP
[SENSe]:LIST:SEQuence:STOP?
```

[SENSe]:LIST:SEQuence:STARt

`[SENSe]:LIST:SEQuence:STARt` selects the desired first fixed frequency (operating mode AUTOSTEP).

Parameters

Parameter Name	Parameter Type	Range of Values
START FMEM	Decimal data	0 to 99, (199)

Comments

A fixed frequency can be selected only if a value is stored for it.

Example

`LIST:SEQ:STAR 1`

Related commands

```
[SENSe]:FREQuency:MODE
[SENSe]:LIST:FREQuency
[SENSe]:LIST:FREQuency:POINts?
[SENSe]:LIST:SEQuence:POINts?
[SENSe]:LIST:SEQuence:SINGle
[SENSe]:LIST:SEQuence:SINGle?
[SENSe]:LIST:SEQuence:STARt?
[SENSe]:LIST:SEQuence:STOP
```

[SENSe]:LIST:SEQuence:STARt?

`[SENSe]:LIST:SEQuence:STARt?` fragt die Festfrequenznummer der ersten Festfrequenz ab (operating mode AUTOSTEP).

Parameters

Parameter Name	Parameter Type	Range of Values
START FMEM	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Typ	Range of Values
List start	<NR1>	0 to 99, (199)

Example

`LIST:SEQ:STAR?`

Response: 2

Related commands

```
[SENSe]:FREQuency:MODE
[SENSe]:LIST:FREQuency
[SENSe]:LIST:FREQuency:POINts?
[SENSe]:LIST:SEQuency:POINts?
[SENSe]:LIST:SEQuence:SINGle
[SENSe]:LIST:SEQuence:SINGle?
[SENSe]:LIST:SEQuence:STARt
[SENSe]:LIST:SEQuence:STOP
```

[SENSe]:LIST:SEQuence:STOP

`[SENSe]:LIST:SEQuence:STOP` selects the desired last fixed frequency (operating mode AUTOSTEP)..

Parameters

Parameter Name	Parameter Type	Range of Values
STOP FMEM	Decimal data	0 to 99, (199)

Comments

A fixed frequency can be selected only if a value is stored for it.

Example

`LIST:SEQ:STOP 4`

Related commands

```
[SENSe]:FREQuency:MODE
[SENSe]:LIST:FREQuency
[SENSe]:LIST:FREQuency:POINts?
[SENSe]:LIST:SEQuence:POINts?
[SENSe]:LIST:SEQuence:SINGLE
[SENSe]:LIST:SEQuence:SINGle?
[SENSe]:LIST:SEQuence:STARt
[SENSe]:LIST:SEQuence:STOP?
```

[SENSe]:LIST:SEQuence:STOP?

`[SENSe]:LIST:SEQuence:STOP?` queries the fixed frequency number of the last fixed frequency (operating mode ATUOSTEP).

Parameters

Parameter Name	Parameter Type	Range of Values
STOP FMEM	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
List end	<NR1>	0 to 99, (199)

Example

`LIST:SEQ:STOP?`

Response: `4`

Related commands

```
[SENSe]:FREQuency:MODE
[SENSe]:LIST:FREQuency
[SENSe]:LIST:FREQuency:POINts?
[SENSe]:LIST:SEQuence:POINts?
[SENSe]:LIST:SEQuence:SINGle
[SENSe]:LIST:SEQuence:SINGle?
[SENSe]:LIST:SEQuence:STARt
[SENSe]:LIST:SEQuence:STOP
```

[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence

`[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence` sets the reference level. This value is deducted from the measurement result (operating modes LEVEL, DEMODULATION, VOICE) or from the curent level threshold (IMPULSIVE NOISE).

Parameters

Parameter Name	Parameter Type	Range of Values
REF	Numeric data	MINimum | MAXimum | DEFault | -150 to +20 dB

Dependencies

The range of values depends on the active unit and the input impedance; the specified range of values applies for the "dB" unit.

Comments

Manual operation: LEVEL ABS-REF (UNITS menu).

Example

`POW:REF MIN`

Related commands

```
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence?
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATE
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATE?
```

[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence?

`[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence?` queries the reference level.

Parameters

Parameter Name	Parameter Type	Range of Values
REF	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Reference level	<NR2>	-150 to +20 dB

Dependencies

The range of values depends on the active unit and the input impedance; the specified range of values applies for the "dB" unit.

Example

`POWer:REF?`

Response: `-70.00`

Related commands

```
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATE
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATE?
```

[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATe

`[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATe` switches on the level difference display.

ON = Level difference display on.

OFF= Level difference display off.

Parameters

Parameter Name	Parameter Type	Range of Values
LEVEL ABS-REF	Boolean	ON | OFF | DEFault | 0 | 1

Dependencies

If POWer:REFerence:STATe ON is set, the relative level display is automatically switched off.

Comments

Manual operation: LEVEL ABS-REF (UNITS menu).

Example

`POW:REF:STAT OFF`

Related commands

```
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATe?
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence?
```

[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATe?

`[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATe?` queries whether the level difference display is switched on.

Parameters

Parameter Name	Parameter Type	Range of Values
LEVEL ABS-REF	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Example

`POW:REF:STAT?`

Response: `1`

Related commands

```
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATe
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence?
```

[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP

`[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP` sets the transmission level point.

Parameters

Parameter Name	Parameter-typ	Range of Values
TLP	<NR2>	MINimum | MAXimum | DEFault | -30 to -120 dBr

Dependencies

The range of values for TLP depends on the TX level setting (PSM)

Comments

Manual operation: LEVEL RELATIVE TLP (UNITS menu); operating modes LEVEL, DEMODULATION, VOICE, IMPULSIVE NOISE, .
Units are always dBr.

Example

`POW:TLP MIN`

Related commands

```
[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP?
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATE
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATE?
```

[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP?

`[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP?` queries the current setting of the transmission level point.

Parameters

Parameter Name	Parameter Type	Range of Values
TLP	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Relative level	<NR2>	- 30 to -120

Example

`POW:TLP?`

Response: `-25.00`

Related commands

```
[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATE
[SENSe]:POWer | VOLTage:[AC] | [DC]:REFerence:STATE?
```

[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP:STATe

`[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP:STATe` sets whether the relative level is effective.

Parameters

Parameter Name	Parameter Type	Range of Values
LEVEL RELATIVE	Boolean	ON | OFF | DEFault | 0 | 1

Dependencies

If POWer:TLP:STATe ON is set, the level dfference display is switched off automatically.

Comments

Manual operation: LEVEL RELATIVE TLP (UNITS menu); operating modes LEVEL, DEMODULATION, VOICE, IMPULSIVE NOISE.

Example

`POW:TLP:STAT ON`

Related commands

```
[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP:STATe?
[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP
[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP?
```

[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP:STATe?

`[SENSe]:POWer|VOLTage:[AC]|[DC]:TLP:STATe?` queries whether the relative level is effective.

Parameters

Parameter Name	Parameter Type	Range of Values
LEVEL RELATIVE	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<Nr1>	0 | 1

Example

`POWer:TLP:STAT?`

Response: `1`

Related commands

```
[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP:STATe?
[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP
[SENSe]:POWer | VOLTage:[AC] | [DC]:TLP?
```

[SENSe]:ROSCillator:EXTernal:FREQuency

`[SENSe]:ROSCillator:EXTernal:FREQuency` sets the external reference frequency to which the instrument is to synchronize.

Parameters

Parameter Name	Parameter Type	Range of Values
EXT REF FRQ	Numeric data	DEFault | 60 kHz | 300 kHz | 2048 kHz | 4200 kHz | 1 MHz | 2 MHz | 5 MHz | 10 MHz

Comments

The command [SENSe]:ROSCillator:SOURce EXTernal switches socket [52] as an input.
Manual operation: REF FRQ; Aux. function TEST & CONFIG

Example

`ROSC:EXT:FREQ .06 MHz`

Related commands

```
[SENSe]:ROSCillator:EXTernal:FREQuency?
[SENSe]:ROSCillator:SOURce
[SENSe]:ROSCillator:SOURce?
```

[SENSe]:ROSCillator:EXTernal:FREQuency?

`[SENSe]:ROSCillator:EXTernal:FREQuency?` queries the frequency to which the instrument is to synchronize.

Parameters

Parameter Name	Parameter Type	Range of Values
EXT REF FRQ	Character data	<none> | DEFault

Response

Response Name	Anwtorttyp	Range of Values
Reference frequency	<NR1>	60000 | 300000 | 2048000 | 4200000 | 1000000 | 2000000 | 5000000 | 10000000

Comments

Output is always in Hz

Example

`ROSC:EXT:FREQ?`

Response: `1000000`

Related commands

```
[SENSe]:ROSCillator:EXTernal:FREQuency
[SENSe]:ROSCillator:SOURce
[SENSe]:ROSCillator:SOURce?
```

[SENSe]:ROSCillator:SOURce

`[SENSe]:ROSCillator:SOURce` sets the reference frequency source. The timebase may be the internal oscillator or an external oscillator connected to socket [52].

SOURce INTernal: The timebase is derived from the internal oscillator.

SOURce EXTernal: The instrument synchronizes to the frequency of the external oscillator.

Parameters

Parameter Name	Parameter Type	Range of Values
REF FRQ	Character data	INTernal | EXTernal | DEFault

Comments

Manual operation: REF FRQ; Aux. function TEST & CONFIG
If the external oscillator is selected, the reference frequency must be specified with the command [SENSe]:ROSCillator:EXTernal:FREQuency.

Example

`ROSC:SOUR EXT`

Related commands

`[SENSe]:ROSCillator:SOURce?`
`[SENSe]:ROSCillator:EXTernal:FREQuency`
`[SENSe]:ROSCillator:EXTernal:FREQuency?`

[SENSe]:ROSCillator:SOURce?

`[SENSe]:ROSCillator:SOURce?` queries the source of the reference frequency.

Parameters

Parameter Name	Parameter Type	Range of Values
REF FRQ	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Reference frequency source	Character response data	INT | EXT

INT: The timebase is derived from the internal oscillator.

EXT: The instrument synchronizes to the frequency of the external oscillator.

Example

`ROSC:SOUR?`

Response: `EXT`

Related commands

`[SENSe]:ROSCillator:SOURce`
`[SENSe]:ROSCillator:EXTernal:FREQuency`
`[SENSe]:ROSCillator:EXTernal:FREQuency?`

[SENSe]:SWEep:COUNt

`[SENSe]:SWEep:COUNt` sets the number of measurement cycles which are triggered by INITiate (operating modes AUTOSTEP, SWEEP and HOT TONE SEARCH).

Parameters

Parameter Name	Parameter Type	Range of Values
—	Numeric data	MINimum | MAXimum | DEFault | 1 to 65635

Comments

The value is set to 1 by *RST.

Example

`SWE:COUN 5`

Related commands

`[SENSe]:SWEep:COUNt?`
`[SENSe]:SWEep:DWELI`
`[SENSe]:SWEep:DWELI?`

[SENSe]:SWEep:COUNt?

`[SENSe]:SWEep:COUNt?` queries the number of measurement cycles triggered by INITiate (operating modes AUTOSTEP, SWEEP and HOT TONE SEARCH).

Parameters

Parameter Name	Parameter Type	Range of Values
—	Character data	<none> | DEFault | MINimum | MAXimum

Response

Response Name	Response Type	Range of Values
Number	<NR1>	1 to 65535

Example

`SWE:COUN?`

Response: `20`

Related commands

`[SENSe]:SWEep:COUNt`
`[SENSe]:SWEep:DWELI`
`[SENSe]:SWEep:DWELI?`

[SENSe]:SWEep:DWELl

`[SENSe]:SWEep:DWELl` sets the dwell time for each measurement point (operating mode AUTOSTEP).

Parameters

Parameter Name	Parameter Type	Range of Values
TIME/STEP	Numeric data	DEFault | 1 | 3

Comments

Units are seconds.

Example

`SWE:DWEL 1`

Related commands

`[SENSe]:SWEep:DWELl?`
`[SENSe]:SWEep:COUNt`
`[SENSe]:SWEep:COUNt?`

[SENSe]:SWEep:DWELl?

`[SENSe]:SWEep:DWELl?` queries the current setting of the dwell time (operating mode AUTOSTEP).

Parameters

Parameter Name	Parameter Type	Range of Values
TIME/STEP	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Dwell time	<NR1>	1 | 3

Example

`SWE:DWEL?`

Response: `3`

Related commands

`[SENSe]:SWEep:DWELl`
`[SENSe]:SWEep:COUNt`
`[SENSe]:SWEep:COUNt?`

[SENSe]:SWEep:TIME

`[SENSe]:SWEep:TIME` sets the time taken for a sweep in SWEEP mode.

Parameter

Parameter Name	Parameter Type	Range of Values
SWEEP TIME	Numeric data	DEFault | 1 | 3 | 10 | 30 | 100 | 300 s

Comments

Units are seconds.

Example

`SWE:TIME 1`

Related commands

```
[SENSe]:SWEep:TIME?
[SENSe]:SWEep:TIME:AUTO
[SENSe]:SWEep:TIME:AUTO?
```

[SENSe]:SWEep:TIME?

`[SENSe]:SWEep:TIME?` queries the sweep time setting in SWEEP mode.

Parameter

Parameter Name	Parameter Type	Range of Values
SWEEP TIME	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Sweep time	<NR1>	1| 3 | 10 | 30 | 100 | 300

Example

`SWE:TIME?`

Response: `3`

Related commands

```
[SENSe]:SWEep:TIME
[SENSe]:SWEep:TIME:AUTO
[SENSe]:SWEep:TIME:AUTO?
```

[SENSe]:SWEep:TIME:AUTO

`[SENSe]:SWEep:TIME:AUTO` determines how the instrument sweep time is selected:
AUTO ON: The sweep time is selected automatically to match the sweep width and bandwidth settings.
AUTO OFF: The sweep time is not changed.
AUTO ONCE: The sweep time is optimized once.

Parameter

Parameter Name	Parameter Type	Range of Values
AUTO	Boolean	ON | OFF | DEFault | ONCE | 0 | 1

Comments

Manual operation: SWEEP TIME

Example

`SWE:TIME:AUTO ON`

Related commands

```
[SENSe]:SWEep:TIME:AUTO?
[SENSe]:SWEep:TIME
[SENSe]:SWEep:TIME?
```

[SENSe]:SWEep:TIME:AUTO?

`[SENSe]:SWEep:TIME:AUTO?` queries the actual setting of the automatic sweep time selection function.

Parameter

Parameter Name	Parameter Type	Range of Values
AUTO	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Example

`SWE:TIME:AUTO? DEFault`

Response: `1`

Related commands

```
[SENSe]:SWEep:TIME:AUTO?
[SENSe]:SWEep:TIME
[SENSe]:SWEep:TIME?
```

SOURce:FREQuency:LIMit:LOWer

`SOURce:FREQuency:LIMit:LOWer` sets the lower limit of the TX frequency setting.

Parameters

Parameter Name	Parameter Type	Range of Values
MIN FRQ	Numeric data	MINimum | MAXimum | UP | DOWN | DEFault | 45 Hz to 8 MHz, (18 MHz), (32 MHz)

Dependencies

The frequency range depends on the selected input and output and on the instrument version.

Comments

Instrument versions PSM 37 to 139
Manual operation: MIN FRQ; operating modes LEVEL, AUTOSTEP, JITTER

Example

`SOUR:FREQ:LIM:LOW MAX`

Related commands

```
SOURce:FREQuency:LIMit:LOWer?
SOURce:FREQuency:LIMit:STATe
SOURce:FREQuency:LIMit:STATe?
```

SOURce:FREQuency:LIMit:LOWer?

`SOURce:FREQuency:LIMit:LOWer?` queries the lower limit of the TX frequency setting.

Parameters

Parameter Name	Parameter Type	Range of Values
MIN FRQ	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
TX frequency limit	<NR3>	45 to 8000000 | 18000000 | 32000000

Comments

Instrument versions PSM 37 to 139

Example

`SOUR:FREQ:LIM:LOW?`

Response: `50.0E+0`

Related commands

```
SOURce:FREQuency:LIMit:LOWer
SOURce:FREQuency:LIMit:STATe
SOURce:FREQuency:LIMit:STATe?
```

SOURce:FREQuency:LIMit:STATe

`SOURce:FREQuency:LIMit:STATe` determines whether the TX frequency limits set using LIMIT UPPER/LOWER are to be applied.

STATe ON: The TX frequency limits are set by LIMIT: UPPER and LIMIT: LOWER.

STATe OFF: The TX frequency limits do not depend on LIMIT: UPPER and LIMIT: LOWER.

If the frequency setting is outside one of the frequency limits, the generator is blanked.

Parameters

Parameter Name	Parameter Type	Range of Values
FRQ LIMIT	Boolean	ON | OFF | DEFault | 0 | 1

Instrument versions PSM 37 to 139
Manual operation: FRQ LIMIT; operating mode LEVEL, AUTOSTEP, JITTER
If the frequency setting is outside one of the frequency limits, the generator is blanked.

Example

`SOUR:FREQ:LIM:STAT OFF`

Related commands

`SOURce:FREQuency:LIMit:STATe?`

SOURce:FREQuency:LIMit:STATe?

`SOURce:FREQuency:LIMit:STATe?` queries whether the frequency limits set with LIMIT UPPER/LOWER are being applied.

Parameters

Parameter Name	Parameter Type	Range of Values
FRQ LIMIT	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

1: The TX frequency limits are set by LIMIT: UPPER and LIMIT: LOWER.

Comments

0: The TX frequency limits do not depend on LIMIT: UPPER and LIMIT: LOWER.

Example

`SOUR:FREQ:LIM:STAT?`

Response: `1`

Related commands

```
SOURce:FREQuency:LIMit:STATe
SOURce:FREQuency:LIMit:LOWer
SOURce:FREQuency:LIMit:LOWer?
SOURce:FREQuency:LIMit:UPPer
SOURce:FREQuency:LIMit:UPPer?
```

SOURce:FREQuency:LIMit:UPPer

`SOURce:FREQuency:LIMit:UPPer` sets the upper limit for the TX frequency.

Parameters

Parameter Name	Parameter Type	Range of Values
MAX FRQ	Numeric data	MINimum | MAXimum | UP | DOWN | DEFault | 45 Hz to 8 MHz, (18 MHz), (32 MHz)

Dependencies

The frequency range depends on the selected output and on the instrument version

Comments

Instrument versions PSM 37 to 139
Manual operation: MAX FRQ; operating mode LEVEL, AUTOSTEP, JITTER

Example

`SOUR:FREQ:LIM:UPP 32000000`

Related commands

```
SOURce:FREQuency:LIMit:UPPer?
SOURce:FREQuency:LIMit:LOWer
SOURce:FREQuency:LIMit:LOWer?
SOURce:FREQuency:LIMit:STATe
SOURce:FREQuency:LIMit:STATe?
```

SOURce:FREQuency:LIMit:UPPer?

`SOURce:FREQuency:LIMit:UPPer?` queries the current setting of the upper TX frequency limit.

Parameters

Parameter Name	Parameter Type	Range of Values
MAX FRQ	Character data	<none> |MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
TX frequency limit	<NR3>	45 to 32000000 | 18000000 | 8000000

Comments

Instrument versions PSM-37 to 139

Example

`SOUR:FREQ:LIM:UPP?`

Response: `32000000.0E+0`

Related commands

```
SOURce:FREQuency:LIMit:UPPer
SOURce:FREQuency:LIMit:LOWer
SOURce:FREQuency:LIMit:LOWer?
SOURce:FREQuency:LIMit:STATe
SOURce:FREQuency:LIMit:STATe?
```

SOURce:POWer | VOLTage:ELControl

`SOURce:POWer | VOLTage:ELControl` switches to external level control.

ON: External level control on.

OFF: External level control off.

Parameters

Parameter Name	Parameter-typ	Range of Values
EXT LEVLG	Boolean	ON | OFF| DEFault | 0 | 1

Comments Manual operation: EXT LEVLG

Example `SOUR:POW:ELC OFF`

Related commands `SOURce:POWer | VOLTage:ELControl?`

SOURce:POWer | VOLTage:ELControl?

`SOURce:POWer | VOLTage:ELControl?` queries whether external level control is active or not.

Response

Response Name	Response Type	Range of Values	Default setting
Status	<NR1>	0 | 1	0

Comments

1: External level control on.
0: External level control off.

Example `SOUR:ELC?`

Response: `1`

Related commands `SOURce:POWer | VOLTage:ELControl`

SOURce:POWer | VOLTage:[LEVel]

`SOURce:POWer|VOLTage:[LEVel]` sets the TX level.

Parameters

Parameter Name	Parameter Type	Range of Values
TX	Numeric data	MINimum | MAXimum | DEFault | 0.0 dB (9.0 dB)[1] to -70 dB

Comments

Instrument versions PSM-37 to 139
Manual operation: TX POWER; operating mode LEVEL, AUTOSTEP, SWEEP, JITTER

Example

`SOUR:POW MAX`

Related commands

```
SOURce:POWer | VOLTage:[LEVel]?
SOURce:POWer | VOLTage:LIMIT:[AMPLITUDE]
SOURce:POWer | VOLTage:LIMIT:[AMPLITUDE]?
SOURce:POWer | VOLTage:LIMIT:STATe
SOURce:POWer | VOLTage:LIMIT:STATe?
```

SOURce:POWer | VOLTage:[LEVel]?

`SOURce:POWer|VOLTage:[LEVel]?` queries the current TX level setting.

Parameters

Parameter Name	Parameter Type	Range of Values
TX	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
TX level	<NR2>	0.0 dB (9.0 dB)[1] to -70 dB

Comments

Instrument versions PSM-37 to 139

Example

`SOUR:POW? MAX`

Response: 9

Related commands

```
SOURce:POWer | VOLTage:[LEVel]
SOURce:POWer | VOLTage:LIMIT:[AMPLITUDE]
SOURce:POWer | VOLTage:LIMIT:[AMPLITUDE]?
SOURce:POWer | VOLTage:LIMIT:STATe
SOURce:POWer | VOLTage:LIMIT:STATe?
```

[1]) see chapter 9.8

SOURce:POWer | VOLTage:LIMit:[AMPLitude]

`SOURce:POWer | VOLTage:LIMit:[AMPLitude]` sets the amplitude limit for the current constant TX level.

Parameters

Parameter Name	Parameter Type	Range of Values
MAX LEVEL	Numeric data	MINimum | MAXimum | DEFault | 10 dB to -75 dB

Dependencies

The range of values depends on the active unit and the output impedance; the specified range of values applies for the "dB" unit.

Comments

Instrument versions PSM-37 to 139
Manual operation: MAX LEVEL; operating mode LEVEL, AUTOSTEP, JITTER

Example

`SOUR:POW:LIM -20 dBm`

Related commands

```
SOURce:POWer | VOLTage:LIMit:[AMPLitude]?
SOURce:POWer | VOLTage:LIMIT:STATe
SOURce:POWer | VOLTage:LIMIT:STATe?
SOURce:POWer | VOLTage:LIMIT:[LEVel]
```

SOURce:POWer | VOLTage:LIMit:[AMPLitude]?

`SOURce:POWer | VOLTage:LIMit:[AMPLitude]?` queries the TX amplitude level limit.

Parameters

Parameter Name	Parameter Type	Range of Values
MAX LEVEL	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
TX level limit	<NR2>	10 to -75

Dependencies

The range of values depends on the active unit and the output impedance; the specified range of values applies for the "dB" unit.

Comments

Instrument versions PSM-37 to 139

Example

`SOUR:POW:LIM?`

Response: `-20.00`

Related commands

```
SOURce:POWer | VOLTage:LIMit:[AMPLitude]
SOURce:POWer | VOLTage:LIMIT:STATe
SOURce:POWer | VOLTage:LIMIT:STATe?
SOURce:POWer | VOLTage:LIMIT:[LEVel]
SOURce:POWer | VOLTage:LIMIT:[LEVel]?
```

SOURce:POWer | VOLTage:LIMit:STATe

`SOURce:POWer | VOLTage:LIMit:STATe` determines whether the TX level limiting is effective or not.

ON: TX level limiting is on.

OFF: TX level limiting is off.

Parameters

Parameter Name	Parameter Type	Range of Values
LEVEL LIMIT	Boolean	ON | OFF | DEFault | 0 | 1

Comments

Instrument versions PSM-37 to 139
Manual operation: LEVEL LIMIT; operating mode LEVEL, AUTOSTEP, JITTER

Example

`SOUR:POW:LIM:STAT ON`

Related commands

```
SOURce:POWer | VOLTage:LIMit:STATe?
SOURce:POWer | VOLTage:LIMit:[AMPLitude]
SOURce:POWer | VOLTage:LIMit:[AMPLitude]?
SOURce:POWer | VOLTage:LIMIT:[LEVel]
SOURce:POWer | VOLTage:LIMIT:[LEVel]?
```

SOURce:POWer | VOLTage:LIMit:STATe?

`SOURce:POWer | VOLTage:LIMit:STATe?` queries whether the TX level limiting is effective or not.

Parameters

Parameter Name	Parameter Type	Range of Values
LEVEL LIMIT	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

1: TX level limiting is on.

0: TX level limiting is off.

Example

`SOUR:POW:LIM:STAT?`

Response: `1`

Related commands

```
SOURce:POWer | VOLTage:LIMit:STATe
SOURce:POWer | VOLTage:LIMit:[AMPLitude]
SOURce:POWer | VOLTage:LIMit:[AMPLitude]?
SOURce:POWer | VOLTage:LIMIT:[LEVel]
```

SOURce:[STATe]

`SOURce:STATe` switches the generator on or off.

ON: Generator on.

OFF: Generator off.

Parameters

Parameter Name	Parameter Type	Range of Values
TX POWER	Boolean	ON | OFF | DEFault | 0 | 1

Comments

Instrument versions PSM-37 to 139
Manual operation: TX POWER

Example

`SOUR:STAT ON`

Related commands

`SOURce:STATe?`

SOURce:[STATe]?

`SOURce:STATe?` queries whether the generator is on or off.

Parameters

Parameter Name	Parameter Type	Range of Values
TX POWER	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

1: Generator on

0: Generator off

Example

`SOUR:STAT?`

Response: `1`

Related commands

`SOURce:STATe`

STATus:OPERation:CONDition?

`STATus:OPERation:CONDition?` queries the current status of the instrument (see COND on page 10-16).

Response

Response Name	Response Type	Range of Values
Bit field	<NR1>	0 to 65 535

Comments

This register is not updated for the SPM/PSM.

Example

`STAT:OPER:COND?`

Response: `15`

Related commands

```
STATus:OPERation:CONDition
STATus:OPERation:ENABle
STATus:OPERation:ENABle?
STATus:OPERation:[EVENt]?
STATus:OPERation:NTRansition
STATus:OPERation:NTRansition?
STATus:OPERation:PTRansition
STATus:OPERation:PTRansition?
```

STATus:OPERation:ENABle

`STATus:OPERation:ENABle` sets the Enable Register mask. The Enable Register masks the contents of the Event Register in the Status Byte Register, see fig. 10-10.

Parameters

Parameter Name	Parameter Type	Range of Values
—	<NR1>	0 to 65535 | #B0000000000000000 to #B1111111111111111 | #H0000 to #HFFFF

Comments

Part of the extended status reprting system. The Operation Status Register handles states which occur in normal operation, e.g. setting parameters, measurement sequence.

Example

`STAT:OPER:ENAB 22463`

Related commands

```
STATus:OPERation:CONDition
STATus:OPERation:ENABle?
STATus:OPERation:[EVENt]?
STATus:OPERation:NTRansition
STATus:OPERation:NTRansition?
STATus:OPERation:PTRansition
STATus:OPERation:PTRansition?
```

STATus:OPERation:ENABle?

`STATus:OPERation:ENABle?` queries the Enable Register mask.

Response

Response Name	Response Type	Range of Values
Bit mask	<NR1>	0 to 65 535

Comments

Part of the extended status reprting system. The Operation Status Register handles states which occur in normal operation, e.g. setting parameters, measurement sequence.

Example

`STAT:OPER:ENAB?`

Response: `17`

Related commands

```
STATus:OPERation:CONDition
STATus:OPERation:ENABle
STATus:OPERation:[EVENt]?
STATus:OPERation:NTRansition
STATus:OPERation:NTRansition?
STATus:OPERation:PTRansition
STATus:OPERation:PTRansition?
```

STATus:OPERation:[EVENt]?

`STATus:OPERation:[EVENt]?` queries the contents of the Event Register.

Response

Response Name	Response Type	Range of Values
Bit field	<NR1>	0 to 65 535

Comments

This register is not updated for the SPM/PSM.

Example

`STAT:OPER:?`

Response: `15`

Related commands

```
STATus:OPERation:CONDition
STATus:OPERation:ENABle
STATus:OPERation:ENABle?
STATus:OPERation:NTRansition
STATus:OPERation:NTRansition?
STATus:OPERation:PTRansition
STATus:OPERation:PTRansition?
```

STATus:OPERation:NTRansition

`STATus:OPERation:NTRansition` sets the contents of the Negative Transition Filter. When the corresponding bit in this register is 1, a “1-->0” transition in the COND Register generates a 1 in the Event Register (see fig. 10-13).

Parameters

Parameter Name	Parameter Type	Range of Values
—	<NR1>	0 to 65535 | #B0000000000000000 to #B1111111111111111 | #H0000 to #HFFFF

Comments

Part of the extended status reprting system. The Operation Status Register handles states which occur in normal operation, e.g. setting parameters, measurement sequence.

Example

`STAT:OPER:NTR 27`

Related commands

```
STATus:OPERation:CONDition
STATus:OPERation:ENABle
STATus:OPERation:ENABle?
STATus:OPERation:[EVENt]?
STATus:OPERation:NTRansition?
STATus:OPERation:PTRansition
STATus:OPERation:PTRansition?
```

STATus:OPERation:NTRansition?

`STATus:OPERation:NTRansition?` queries the contents of the Negative Transition Filter.

Response

Response Name	Response Type	Range of Values
Bit mask	<NR1>	0 to 65 535

Comments

Part of the extended status reprting system. The Operation Status Register handles states which occur in normal operation, e.g. setting parameters, measurement sequence.

Example

`STAT:OPER:NTR?`

Response: `15`

Related commands

```
STATus:OPERation:CONDition
STATus:OPERation:ENABle
STATus:OPERation:ENABle?
STATus:OPERation:[EVENt]?
STATus:OPERation:NTRansition
STATus:OPERation:PTRansition
STATus:OPERation:PTRansition?
```

STATus:OPERation:PTRansition

`STATus:OPERation:PTRansition` sets the contents of the Positive Transition Filter. If the corresponding bit of this register is 1, a “0-->1” transition in the COND Register generates a 1 in the Event Register (see fig. 10-13).

Parameters

Parameter Name	Parameter Type	Range of Values
—	<NR1>	0 to 65535 | #B0000000000000000 to #B1111111111111111 | #H0000 to #HFFFF

Comments

Part of the extended status reprting system. The Operation Status Register handles states which occur in normal operation, e.g. setting parameters, measurement sequence.

Example

`STAT:OPER:PTR 23465`

Related commands

```
STATus:OPERation:CONDition
STATus:OPERation:ENABle
STATus:OPERation:ENABle?
STATus:OPERation:[EVENt]?
STATus:OPERation:NTRansition
STATus:OPERation:NTRansition?
STATus:OPERation:PTRansition?
```

STATus:OPERation:PTRansition?

`STATus:OPERation:PTRansition?` queries the contents of the Positive Transition Filter.

Response

Response Name	Response Type	Range of Values
Bit mask	<NR1>	0 to 65 535

Comments

Part of the extended status reprting system. The Operation Status Register handles states which occur in normal operation, e.g. setting parameters, measurement sequence.

Example

`STAT:OPER:PTR?`

Response: `15`

Related commands

```
STATus:OPERation:CONDition
STATus:OPERation:ENABle
STATus:OPERation:ENABle?
STATus:OPERation:[EVENt]?
STATus:OPERation:NTRansition
STATus:OPERation:NTRansition?
STATus:OPERation:PTRansition
```

STATus:QUEStionable:CONDition?

`STATus:QUEStionable:CONDition?` queries the current status of the measurement results (see COND on page 10-16).

Response

Response Name	Response Type	Range of Values
Bit field	<NR1>	0 to 65 535

Comments

This register is not updated for the SPM/PSM.

Example

`STAT:QUES:COND?`

Response: `15`

Related commands

```
STATus:QUEStionable:ENABle
STATus:QUEStionable:ENABle?
STATus:QUEStionable:[EVENt]?
STATus:QUEStionable:NTRansition
STATus:QUEStionable:NTRansition?
STATus:QUEStionable:PTRansition
STATus:QUEStionable:PTRansition?
```

STATus:QUEStionable:ENABle

`STATus:QUEStionable:ENABle` sets the mask for the Enable Register. The Enable Register masks the contents of the Event Register in the Status Byte Register, see fig. 10-10.

Parameters

Parameter Name	Parameter Type	Range of Values
—	<NR1>	0 to 65535 | #B0000000000000000 to #B1111111111111111 | #H0000 to #HFFFF

Comments

Part of the extended status reporting system. The QUEStionable Status Register handles states indicating the quality of the measured values or setting parameters last determined.

Example

`STAT:QUES:ENAB 27`

Related commands

```
STATus:QUEStionable:CONDition?
STATus:QUEStionable:ENABle?
STATus:QUEStionable:[EVENt]?
STATus:QUEStionable:NTRansition
STATus:QUEStionable:NTRansition?
STATus:QUEStionable:PTRansition
STATus:QUEStionable:PTRansition?
```

STATus:QUEStionable:ENABle?

`STATus:QUEStionable:ENABle?` queries the Enable Register mask.

Response

Response Name	Response Type	Range of Values
Bit mask	<NR1>	0 to 65 535

Comments

Part of the extended status reporting system. The QUEStionable Status Register handles states indicating the quality of the measured values or setting parameters last determined.

Example

`STATus:QUEStionable:ENABle?`

Response: `15`

Related commands

```
STATus:QUEStionable:CONDition?
STATus:QUEStionable:ENABle
STATus:QUEStionable:[EVENt]?
STATus:QUEStionable:NTRansition
STATus:QUEStionable:NTRansition?
STATus:QUEStionable:PTRansition
STATus:QUEStionable:PTRansition?
```

STATus:QUEStionable:[EVENt]?

`STATus:QUEStionable:[EVENt]?` queries the contents of the Event Register.

Response

Response Name	Response Type	Range of Values
Bit field	<NR1>	0 to 65 535

Comments

This register is not updated for the SPM/PSM.

Example

`STAT:QUES?`

Response: `15`

Related commands

```
STATus:QUEStionable:CONDition?
STATus:QUEStionable:ENABle
STATus:QUEStionable:ENABle?
STATus:QUEStionable:NTRansition
STATus:QUEStionable:NTRansition?
STATus:QUEStionable:PTRansition
STATus:QUEStionable:PTRansition?
```

STATus:QUEStionable:NTRansition

`STATus:QUEStionable:NTRansition` sets the contents of the Negative Transition Filter. When the corresponding bit in this register is 1, a “1-->0” transition in the COND Register generates a 1 in the Event Register (see fig. 10-13).

Parameters

Parameter Name	Parameter Type	Range of Values
—	<NR1>	0 to 65535 | #B0000000000000000 to #B1111111111111111 | #H0000 to #HFFFF

Comments

Part of the extended status reporting system. The QUEStionable Status Register handles states indicating the quality of the measured values or setting parameters last determined.

Example

`STAT:QUES:NTR 37`

Related commands

```
STATus:QUEStionable:CONDition?
STATus:QUEStionable:ENABle
STATus:QUEStionable:ENABle?
STATus:QUEStionable:[EVENt]?
STATus:QUEStionable:NTRansition?
STATus:QUEStionable:PTRansition
STATus:QUEStionable:PTRansition?
```

STATus:QUEStionable:NTRansition?

`STATus:QUEStionable:NTRansition?` queries the contents of the Negative Transition Filter.

Response

Response Name	Response Type	Range of Values
Bit mask	<NR1>	0 to 65 535

Comments

Part of the extended status reporting system. The QUEStionable Status Register handles states indicating the quality of the measured values or setting parameters last determined.

Example

`STAT:QUES:NTR?`

Response: `15`

Related commands

```
STATus:QUEStionable:CONDition?
STATus:QUEStionable:ENABle
STATus:QUEStionable:ENABle?
STATus:QUEStionable:[EVENt]?
STATus:QUEStionable:NTRansition
STATus:QUEStionable:PTRansition
STATus:QUEStionable:PTRansition?
```

STATus:QUEStionable:PTRansition

`STATus:QUEStionable:PTRansition` sets the contents of the Positive Transition Filter. If the corresponding bit of this register is 1, a “0-->1” transition in the COND Register generates a 1 in the Event Register (see fig. 10-13).

Parameters

Parameter Name	Parameter Type	Range of Values
—	<NR1>	0 bis 65535 | #B0000000000000000 to #B1111111111111111 | #H0000 to #HFFFF

Comments

Part of the extended status reporting system. The QUEStionable Status Register handles states indicating the quality of the measured values or setting parameters last determined.

Example

`STAT:QUES:PTR 37563`

Related commands

```
STATus:QUEStionable:CONDition?
STATus:QUEStionable:ENABle
STATus:QUEStionable:ENABle?
STATus:QUEStionable:[EVENt]?
STATus:QUEStionable:NTRansition
STATus:QUEStionable:NTRansition?
STATus:QUEStionable:PTRansition?
```

STATus:QUEStionable:PTRansition?

`STATus:QUEStionable:PTRansition?` queries the contents of the Positive Transition Filter.

Response

Response Name	Response Type	Range of Values
Bit mask	<NR1>	0 to 65 536

Comments

Part of the extended status reporting system. The QUEStionable Status Register handles states indicating the quality of the measured values or setting parameters last determined.

Example

`STAT:QUES:PTR?`

Response: `15`

Related commands

```
STATus:QUEStionable:CONDition?
STATus:QUEStionable:ENABle
STATus:QUEStionable:ENABle?
STATus:QUEStionable:[EVENt]?
STATus:QUEStionable:NTRansition
STATus:QUEStionable:NTRansition?
STATus:QUEStionable:PTRansition
```

STATus:PRESet

`STATus:PRESet` sets all status registers to a defined default setting (see page 10-19).

Example STAT:PRES

SYSTem:BEEPer:[IMMediate]

SYSTem:BEEPer:[IMMediate] triggers a short warning beep.

Example `SYST:BEEP`

Related commands
`SYSTem:BEEPer:STATe`
`SYSTem:BEEPer:STATe?`

SYSTem:BEEPer:STATe

`SYSTem:BEEPer:STATe` determines whether events occurring during an impulsive noise or interruptions measurement are signalled by a beep.

ON: Events are signalled by a beep.

OFF: Events are not signalled by a beep.

Parameters

Parameter Name	Parameter Type	Range of Values
BEEP	Boolean	ON | OFF| DEFault | 0 |1

Comments

Manual operation: BEEP; operating modes IMPULSIVE NOISE, INTERRUPTION.

Example

`SYST:BEEP:STAT ON`

Related commands

`SYSTem:BEEPer:STATe?`
`SYSTem:BEEPer:[IMMediate]`

SYSTem:BEEPer:STATe?

`SYSTem:BEEPer:STATe?` queries whether an event occurring during an impulsive noise or interruptions measurement is indicated by a beep.

Parameters

Parameter Name	Parameter Type	Range of Values
BEEP	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Status	<NR1>	0 | 1

Comments

1: Events are signalled by a beep.

0: Events are not signalled by a beep.

Example

`SYST:BEEP:STAT?`

Response: `1`

Related commands

`SYSTem:BEEPer:[IMMediate]`
`SYSTem:BEEPer:STATe`

SYSTem:COMMunicate:GPIB:[SELF]:ADDRess

`SYSTem:COMMunicate:GPIB:[SELF]:ADDRess` sets the instruments own IEC/IEEE address.

Parameters

Parameter Name	Parameter Type	Range of Values
IEC BUS ADDRESS	Numeric data	MINimum | MAXimum | DEFault | 0 to 30

Comments

Manual operation: IEC BUS ADDRESS, Aux. function TEST & CONFIG

Example

`SYST:COMM:GPIB:ADDR`

Related commands

`SYSTem:COMMunicate:GPIB:[SELF]:ADDRess?`

SYSTem:COMMunicate:GPIB:[SELF]:ADDRess?

`SYSTem:COMMunicate:GPIB:[SELF]:ADDRess?` queries the current setting of the instrument's own IEC/IEEE address.

Parameters

Parameter Name	Parameter Type	Range of Values
IEC BUS ADDRESS	Character data	<none> | MINimum | MAXimum | DEFault

Response

Response Name	Response Type	Range of Values
Address	<NR1>	0 to 30

Example

`SYST:COMM:GPIB:ADDR?`

Response: 4

Related commands

`SYSTem:COMMunicate:GPIB:[SELF]:ADDRess`

SYSTem:COMMunicate:REMote:[STATe]

`SYSTem:COMMunicate:REMote:[STATe]` switches the instrument to remote-control.

ON: Remote control on.

OFF: Remote control off.

Parameters

Parameter Name	Parameter Type	Range of Values
—	Boolean	ON | OFF | 0 |1

Comments

When remote-controlling via V.24/V.28, the command to switch to remote control operation must be transmitted first (see section 10.3.2).
This command is superfluous for IEC/IEEE remote control.

Example

`SYST:COMM:REM ON`

Related commands

`SYSTem:COMMunicate:REMote:[STATe]?`

SYSTem:COMMunicate:REMote:[STATe]?

`SYSTem:COMMunicate:REMote:[STATe]?` determines whether the device is currently in remote control mode.

Response

Response Name	Response Typ	Range of Values
Status	<NR1>	0 | 1

Example

`SYST:COMM:REM?`

Response: `1`

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:BAUD`

SYSTem:COMMunicate:SERial:[RECeive] | [TRANsmit]:BAUD

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:BAUD` sets the baud rate. The baud rate determines the speed at which data is transmitted (1 Baud = 1 bit/s). For example, if the data format is one start, seven data and two stop bits and the baud rate is 9600, exactly 960 characters will be transmitted per second.

Parameters

Parameter Name	Parameter Type	Range of Values
BAUDRATE	Numeric data	300 | 600 | 1200 | 2400 | 4800 | 9600 | 19200 | 38400 | DEFault

Example

`SYST:COMM:SER:BAUD 9600`

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:BAUD?`

SYSTem:COMMunicate:SERial:[RECeive] | [TRANsmit]:BAUD?

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:BAUD?` queries the set baud rate of the serial interface

Parameters

Parameter Name	Parameter Typ	Range of Values
BAUDRATE	Character data	<none> | DEFault

Response

Response Name	Response Typ	Range of Values
Baud rate	<NR1>	300 | 600 | 1200 | 2400 | 4800 | 9600 | 19200 | 38400

Example

`SYST:COMM:SER:BAUD? DEF`

Response: `2400`

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:BAUD`

SYSTem:COMMunicate:SERial:[RECeive] | [TRANsmit]:BITS

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:BITS` sets the number of data bits used over the serial interface. The LSB (least significant bit) is transmitted first, the MSB (most significant bit) last.

7 = Characters are transmitted in 7-bit ASCII.

8 = Characters are transmitted in 8-bit ITU-T Code No. 5.

Parameters

Parameter Name	Parameter Type	Range of Values
DATABITS	Numeric data	7 | 8 | DEFault

Example

`SYST:COMM:SER:BITS`

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:BITS?`

SYSTem:COMMunicate:SERial:[RECeive] | [TRANsmit]:BITS?

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:BITS?` queries the number of data bits for the serial interface.

Parameters

Parameter Name	Parameter Type	Range of Values
DATABITS	Character data	<none> | DEFault

Response

Response Name	Response Typ	Range of Values
Data bits	<NR1>	7 | 8

Example

`SYST:COMM:SER:BITS? DEF`

Response: 8

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:BITS`

SYSTem:COMMunicate:SERial:[RECeive] | [TRANsmit]:SBITs

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:SBITs?` queries the number of data bits for the serial interface.

Parameters

Parameter Name	Parameter Type	Range of Values
STOPBITS	—	1 | 1.5 | 2 | DEFault

Example

`SYST:COMM:SER:SBIT 1`

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:SBITs?`

SYSTem:COMMunicate:SERial:[RECeive] | [TRANsmit]:SBITs?

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:SBITs?` queries the number of stop bits for the serial interface.

Parameters

Parameter Name	Parameter Type	Range of Values
STOPBITS	Character data	<none> | DEFault

Response

Response Name	Response Typ	Range of Values
Stop bits	<NR2>	1 | 1.5 | 2

Example

`SYST:COMM:SER:SBIT? DEF`

Response: `1`

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:SBITs`

SYSTem:COMMunicate:SERial:[RECeive] | [TRANsmit]:PACE

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:PACE` sets the handshake method for data communications.

NONE = No interface control.

RTS/CTS = Receiver controls data communication with hardware handshake.

XON = Receiver controls data communication with software handshake. The receiver accepts data until its buffer is full. It then sends XOFF (13h, Ctrl S) via TxD (Pin2) to the generator. On receiving this character, the generator goes into the wait state. When the receiver buffer is empty again, it transmits the signal XON (11h, Ctrl Q).

Parameters

Parameter Name	Parameter Type	Range of Values
HANDSHAKE	Character data	NON | XON | RTS | DEFault

Example

`SYST:COMM:SER:PACE NONE`

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:PACE?`

SYSTem:COMMunicate:SERial:[RECeive] | [TRANsmit]:PACE?

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:PACE?` queries the handshake procedure for the serial interface.

Parameters

Parameter Name	Parameter Type	Range of Values
HANDSHAKE	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Handshake	Charcter response data	NONE | XON | RTS

Example

`SYST:COMM:SER:PACE? DEF`

Response: `XON`

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:PACE`

SYSTem:COMMunicate:SERial:[RECeive] | [TRANsmit]:PARity

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:PARity` sets the serial interface parity. The generator can insert a parity bit after the data bits for detecting errors. The receiver checks the bit stream as determined by this parity bit and can detect any transmision errors.

NONE = No parity check.

EVEN = Even parity, the number of "1" bits including the parity bit is always even; i.e. the generator sets the parity bit if the number of "1" bits in the data word is odd.

ODD = Odd parity, the number of "1" bits including the parity bit is always odd; i.e. the generator sets the parity bit if the numberof "1" bits in the data word is even.

Parameters

Parameter Name	Parameter Type	Range of Values
PARITY	Charakter data	NON | EVEN | ODD | DEFault

Example

`SYST:COMM:SER:PAR ODD`

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:PARity?`

SYSTem:COMMunicate:SERial:[RECeive] | [TRANsmit]:PARity?

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANs-mit]:PARity?` queries the parity setting for the serial interface.

Parameters

Parameter Name	Parameter Type	Range of Values
PARITY	Character data	<none> | DEFault

Response

Response Name	Response Type	Range of Values
Parity	Character response data	NONE | EVEN | ODD

Example

`SYST:COMM:SER:PAR?`

Response: `ODD`

Related commands

`SYSTem:COMMunicate:SERial:[RECeive]|[TRANsmit]:PARity`

SYSTem:DATE

`SYSTem:DATE` sets the date for the instrument clock. The clock is battery powered and continues running even when the instrument is switched off.
The date format is:
YY,MM,DD

Parameters

Parameter Name	Parameter Type	Range of Values
DATE	Numeric data, Numeric data, Numeric data	0 to 99 1 to 12 1 to 31

Comments

Manual operation: ENTER DATE, Aux. function TEST & CONFIG

Example

`SYST:DATE 94,08,05`

Related commands

`SYSTem:DATE?`

SYSTem:DATE?

`SYSTem:DATE?` queries the instrument date setting.

Response

Response Name	Response Type	Range of Values
Date	<NR1>, <NR1>, <NR1>	0 to 99 1 to 12 1 to 31

Example

`SYST:DATE?`
Response: `94,08,05`

Related commands

`SYSTem:DATE`

SYSTem:ERRor?

`SYSTem:ERRor?` queries error messages from the error queue. The error queue is a FIFO register (first in first out).

Response

Response Name	Response Type	Range of Values
Error message	<NR2>,<String response data>	see under "Error messages"

Comments

The error queue can store up to 30 error messages. Messages which have been queried are deleted.

Example

`SYST:ERR?`

Response: `-102,“Syntax error”`

SYSTem:PRESet

`SYSTem:PRESet` sets all parameters to a defined default setting (DEFault).

Parameters

none

Example

`SYST:PRES`

Related commands

`*RST?`

SYSTem:TIME

`SYSTem:TIME` sets the time for the instrument clock. The instrument clock is battery powered and continues running even if the instrument is switched off.

The time is entered in the following format:

hh,mm,ss

Parameters

Parameter Name	Parameter Type	Range of Values
TIME	Decimal data, Decimal data, Decimal data	0 to 23 0 to 59 0 to 59

Comments

Manual operation: ENTER TIME, Aux. function TEST & CONFIG.

Example

`SYST:TIME 11,55,55`

Related commands

`SYSTem:TIME?`

SYSTem:TIME?

`SYSTem:TIME?` queries the current time of the instrument clock.

Response

Response Name	Response Type	Range of Values
Time	<NR1> <NR1> <NR1>	0 to 23 0 to 59 0 to 59

Example

`SYST:TIME?`

Response: `11,55,55`

Related commands

`SYSTem:TIME`

SYSTem:VERSion?

`SYSTem:VERSion?` queries the SCPI version.

Response

Response Name	Response Type	Range of Values
SCPI version	<NR2>,	1993.0 or greater

Example

`SYST:VERS?`

Response: `1993.0`

Related commands

`*IDN?`

UNIT:POWer | VOLTage?

`UNIT:POWer | VOLTage?` sets the level units.

Parameters

Parameter Name	Parameter Type	Range of Values
UNIT	Character data	DEFault I V I MV I UV I W I PW I DB I DBV I DBUV I DBW I DBMW I DBM I DBPW I DBRN

Comments

In remote controlled operation, the level is always shown on the display in dB, regardless of the valid units for setting and meaurement values.

Value meanings

V Voltage in V
MV Voltage in mV
UV Voltage in µV

W Power in W
PW Power in pW

DB Voltage ratio in dB, referred to 0.775 V
DBV Voltage ratio in dB, referred to 1V
DBUV Voltage ratio in dB, referred to 1µV

DBW Power ratio in dB, referred to 1 W

DBMW,
DBM Power ratio in dB, referred to 1 mW

DBPW,
DBRN Power ratio in dB, referred to 1 pW

Example

`UNIT:POW DBM`

Related commands

`UNIT:POWer | VOLTage?`

UNIT:POWer | VOLTage

`UNIT:POWer | VOLTage?` queries the current level unit setting.

Response

Response Name	Response Type	Range of Values
Current level	Character response data	DEFault I V I MV I UV I W I PW I DB I DBV I DBUV I DBW I DBMW I DBM I DBPW I DBRN

Comments

In remote controlled operation, the level is always shown on the display in dB, regardless of the valid units for setting and meaurement values.

Value meanings

V Voltage in V
MV Voltage in mV
UV Voltage in µV

W Power in W
PW Power in pW

DB Voltage ratio in dB, referred to 0.775 V
DBV Voltage ratio in dB, referred to 1V
DBUV Voltage ratio in dB, referred to 1µV

DBW Power ratio in dB, referred to 1 W

DBMW,
DBM Power ratio in dB, referred to 1 mW

DBPW,
DBRN Power ratio in dB, referred to 1 pW

Example

`UNIT:POW?`
Response: `DBM`

Related commands

`UNIT:POWer | VOLTage`

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Wavetek Wandel Goltermann Environmental Management Program

Superb performance and high quality have always characterized Wavetek Wandel Goltermann (WWG) datacom and telecom measurement technology products. In this same world-class tradition, WWG has an established, proactive program of environmental management.

Environmental management is an integral part of WWG's business philosophy and strategy requiring the development of long-term, productive solutions to problems in the key areas of economics, technology, and ecology.

A systematic environmental management program at WWG is essential in regard to environmental policy and enhances cooperation between ourselves and our business partners.

The WWG Environmental Management Program considers:

Product design and manufacture

Environmental restrictions and requirements are taken into account during planning and manufacture of WWG products. This attention ranges form the raw materials and finished components selected for use and the manufacturing processes employed, through to the use of energy in the factory, and right on up to the final stages in the life of a product, including dismantling.

Hazardous materials

WWG avoids or uses with care any hazardous or dangerous material in the manufacturing process or the end product. If the use of a dangerous material cannot be avoided, it is identified in product documentation and clearly labeled on the product itself.

Packaging materials

Preference is given to reusable or biodegradable single-substance packaging materials whenever possible.

Environmental management partnerships

WWG encourages our customers and suppliers who take this responsibility seriously to join WWG in establishing their own environmental management programs.

Recycling used products

Wavetek Wandel Goltermann has an effective program for the recycling and/or disposal of used equipment. Our customers in Germany can already take advantage of our return service for used instruments. In Europe, all new equipment purchased from WWG can be returned for scrapping at the end of its useful life, free of charge.

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