

Item	Label	Designation and function
<u>44</u>	Hz dB μ V <input type="checkbox"/> C	Dimension key: Frequency Hz Level dB μ V Modulation Hz (FM) Code C
<u>45</u>	dB dBm rad <input type="checkbox"/> D	Dimension key: Level dBm (50 Ω RF, 600 Ω AF) Power dBm Modulation rad (Φ M) Code D
<u>46</u>	VAR	Spin wheel: Any set value can be varied using the tuning knob. The step size can be set as required using the Δ VAR key. The spin wheel is always assigned to the last setting.
<u>47</u>	LOCAL <input type="checkbox"/>	LOCAL: The CMT can be switched from REMOTE mode back to manual operation using this key.
<u>48</u>	REMOTE	REMOTE: The CMT only accepts commands via the IEC bus if the REMOTE LED lights up, the front panel keys, except LOCAL are disabled.

Item	Label	Designation and function
<p><u>49</u></p>	<p>CLEAR</p> <p><input type="checkbox"/></p>	<p>CLEAR:</p> <p>A command can be aborted using the CLEAR key as long as it is incomplete (terminating key not yet pressed).</p> <p>Certain functions (such as ANALOG SELECT, ΔVAR, REF) can be switched off by subsequently pressing the CLEAR key.</p>
<p><u>50</u></p>	<p>RANGE HOLD</p> <p><input type="checkbox"/></p>	<p>RANGE HOLD:</p> <p>This key can be used to fix the measuring range of the analog displays to a desired value.</p> <p>The AUTO RANGE function then has no effect.</p>
<p><u>51</u></p>	<p>ANALOG SELECT</p> <p><input type="checkbox"/></p>	<p>ANALOG SELECT:</p> <p>In conjunction with certain terminating keys (call of measurements), this key enables analog displays to be used independent of the associated digital displays.</p> <p>Function cleared using:</p> <p><input type="checkbox"/> ANALOG SELECT <input type="checkbox"/> CLEAR <input type="checkbox"/> Terminating key</p>
<p><u>52</u></p>	<p>α-DISPL SELECT</p> <p><input type="checkbox"/></p>	<p>α-DISPL SELECT:</p> <p>In conjunction with certain terminating keys (settings) this key enables the display to be transferred to the α display.</p> <p>The display which has now become free can be used for other measurements or settings.</p> <p>Function cleared by pressing a key in frequency field which uses the α display.</p>

Item	Label	Designation and function
<u>53</u>	Δ VAR <input data-bbox="365 325 430 367" type="checkbox"/>	<p>ΔVAR:</p> <p>By entering ΔVAR before certain terminating keys (settings), the spin wheel increment is set to the last entered value.</p> <p>Exception: In the case of frequency settings for AF INT 1 and AF INT 2, a series of fixed frequencies is used as the default step size and not the minimum increment.</p> <p>The parameter increment can be freely selected by additional entry of a number.</p>
<u>54</u>	REF <input data-bbox="365 955 430 997" type="checkbox"/>	<p>REF:</p> <p>In conjunction with certain terminating keys (settings and measurements), the result (or set parameter) is displayed referred to a reference value by pressing the REF key. The reference value is either the current value in the display or an entered value.</p>
<u>55</u>	SPEC <input data-bbox="365 1333 430 1375" type="checkbox"/>	<p>SPEC:</p> <p>Certain functions are combined using this key in conjunction with command numbers (see Section 2.3.8).</p>




Item	Label	Designation and function
<u>56</u>	STORE <input data-bbox="293 289 354 327" type="checkbox"/>	STORE: Used to store complete instrument settings (in conjunction with memory numbers) or individual parameters. See Section 2.3.10 for particular function with the AUTOTEST function.
<u>57</u>	RECALL <input data-bbox="293 611 354 648" type="checkbox"/>	RECALL: Used to recall stored instrument settings.






Item	Label	Designation and function
	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Fig. 2-6</div>	<p>Changeover: (transmitter/ receiver test)</p> <p>Changeover of all settings or of individual fields.</p>
<u>58</u>	XMITTER	<p>XMITTER TEST LED:</p> <p>Lights up if the CMT is in transmitter test mode.</p>
<u>59</u>	RECEIVER	<p>RECEIVER TEST LED:</p> <p>Lights up if the CMT is in receiver test mode.</p>
<u>60</u>	<p>XMITTER <input type="checkbox"/> TEST RECEIVER</p>	<p>TXRX key:</p> <p>For manual changeover from transmitter test to receiver test and vice versa.</p>
<u>61</u>	LOCK	<p>LOCK LED:</p> <p>The CMT remains in the current mode (transmitter or receiver test) irrespective of the entered RF power as long as this LED lights up.</p>
<u>62</u>	<p>LOCK <input type="checkbox"/></p>	<p>LOCK key:</p> <p>To define the mode (transmitter or receiver test) independent of the applied RF power.</p> <p>The function is cleared by pressing the key again.</p>

Item	Label	Designation and function
<u>63</u>	ACK TEST	<p>ACK TEST LED:</p> <p>Lights up if the ACK TEST function is activated.</p>
<u>64</u>	ACK TEST <input data-bbox="272 499 337 541" type="checkbox"/>	<p>ACK TEST key:</p> <p>The CMT is prepared for measurement of transient data messages of the transceiver at the start of each transmission by pressing the ACK TEST key (acknowledgement call test).</p> <p>(PK HOLD, SET f TX, DECODE and LOCK are automatically activated when switching from RX to TX test.)</p>
<u>65</u>	DISPLAY CHANGE <input data-bbox="272 982 337 1024" type="checkbox"/>	<p>DISPLAY CHANGE:</p> <p>This key is used together with the dark grey keys (items <u>5</u>, <u>14</u>, <u>23</u>, <u>32</u>) to change the operating mode of the respective field (transmitter test ↔ receiver test).</p>

Item	Label	Designation and function
	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Fig. 2-7</div>	<p>AUTOTEST:</p> <p>All controls for automatic mode are combined in this field (option CM-B5).</p>
<u>66</u>	START	<p>START LED:</p> <p>The LED above the START key lights up when a test program is running.</p>
<u>67</u>	START <input data-bbox="363 737 423 779" type="checkbox"/>	<p>START key:</p> <p>Start programmed measuring sequences. A start address must always be entered.</p>
<u>68</u>	CONT <input data-bbox="363 961 423 1003" type="checkbox"/>	<p>CONT:</p> <p>A program which has been interrupted can be continued by pressing the CONT key.</p>
<u>69</u>	STOP	<p>STOP LED:</p> <p>This LED lights up when a test program is interrupted.</p>
<u>70</u>	STOP <input data-bbox="363 1438 423 1480" type="checkbox"/>	<p>STOP key:</p> <p>This key is used to interrupt a test program. The STOP and START LEDs light up simultaneously when pressed once and the program can be processed further using CONT.</p> <p>The AUTOTEST function is switched off by pressing the STOP key twice. The test program can be called again using START.</p>

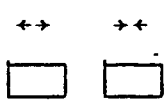
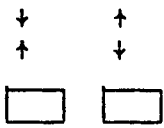


Item	Label	Designation and function
<u>71</u>	PRINT	<p>PRINT LED:</p> <p>This LED lights up as long as data are output to the printer port.</p>
<u>72</u>	PRINT <input data-bbox="282 548 342 583" type="checkbox"/>	<p>PRINT key:</p> <p>Program listings or test logs can be output on a printer (Centronics interface) using this key.</p>
<u>73</u>	TOL IN OUT	<p>TOL IN/OUT LED, TOL LIMITS:</p> <p>An upper tolerance limit can be set during programming of a test program using the UPPER TOL key and a lower tolerance limit using the LOWER TOL key.</p>
<u>74</u>	UPPER <input data-bbox="282 989 342 1024" type="checkbox"/>	<p>The TOL OUT LED lights up and the program is stopped if a measured value is outside the defined range, otherwise the TOL IN LED lights up whilst the program is running.</p>
<u>75</u>	LOWER <input data-bbox="282 1178 342 1213" type="checkbox"/>	

Item	Label	Designation and function
	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Fig. 2-8</div>	<p>Connector strip:</p> <p>This field contains the most important connections for the device under test and a number of control keys.</p>
<u>76</u>		<p>Loadspeaker:</p> <p>For monitoring various AF signals (demodulated signals, BEAT, signals at the AF VOLTM input) depending on the assignment of the AF meter to AF signals.</p>
<u>77</u>	<p>RF  50 Ω 50 WMAX</p> <p></p>	<p>RF IN/OUT:</p> <p>Usually connected to the antenna connector of the transceiver.</p>
<u>78</u>	<p>INPUT SELECT</p> <p><input type="checkbox"/></p>	<p>INPUT SELECT:</p> <p>Selection of required input (RF IN/OUT ↔ INPUT 2).</p> <p>The selected input is displayed by the LED next to the INPUT SELECT key.</p>
<u>79</u>	<p>INPUT 2 ~50 Ω</p> <p></p>	<p>INPUT 2:</p> <p>Second RF input for low input powers (especially for remote measurements).</p>
<u>80</u>	<p>NARROW</p> <p><input type="checkbox"/></p>	<p>NARROW:</p> <p>Connection of a narrowband IF filter into the demodulation branch to increase the selectivity (indicated by the LED above the key).</p>

Item	Label	Designation and function
<u>81</u>	DEMOD SIGNAL 	DEMOD SIGNAL: Output connector for the demodulated AF signal.
<u>82</u>	MOD EXT 10 k Ω 	MOD EXT: Input connector for external modulation signals.
<u>83</u>	MOD GEN ~0 Ω 	MOD GEN: Output connector of the AF generator.
<u>84</u>	AF VOLTM >100 k Ω 	AF VOLTM: The level, distortion and S/N ratio of an AF signal connected to this input connector are analyzed. The frequency of the input signal can also be measured.
<u>85</u>	RF PROBE 	RF PROBE: Connector for the various RF millivoltmeter probes (option CM-B8).
<u>86</u>	MEMORY	MEMORY: Connector for accessory "Transfer memory" (CM-Z1) (used to transfer test programs between various CMTs).
<u>87</u>	VOLUME	Volume control




Item	Label	Designation and function
<u>88</u>	STANDBY	<p>STANDBY LED:</p> <p>The LED lights up if the complete instrument is switched off except for the crystal reference (STANDBY mode).</p>
<u>89</u>	<p>STANDBY</p> <p><input type="checkbox"/></p> <p>ON</p>	<p>STANDBY key:</p> <p>The instrument is switched on and off by pressing the STANDBY key.</p>

Item	Label	Designation and function													
	<div style="border: 1px solid black; padding: 2px; display: inline-block;">Fig. 2-9</div>	<p>Oscilloscope: (model 54)</p>													
<u>90</u>		<p>Oscilloscope screen:</p> <p>Display of various AF signals.</p> <p>The horizontal and vertical screen scales are also output on the screen.</p>													
<u>91</u>	<table style="border: none; width: 100%;"> <tr> <td style="padding-right: 10px;">AC</td> <td rowspan="2" style="font-size: 2em; vertical-align: middle;">}</td> <td rowspan="2" style="vertical-align: middle;">EXT</td> </tr> <tr> <td>DC</td> </tr> <tr> <td colspan="3" style="padding: 10px 0 0 20px;"> </td> </tr> <tr> <td style="padding-right: 10px;">BEAT</td> <td rowspan="4" style="font-size: 2em; vertical-align: middle;">}</td> <td rowspan="4" style="vertical-align: middle;">INT</td> </tr> <tr> <td>DEMOD</td> </tr> <tr> <td>AF</td> </tr> <tr> <td>AUTO</td> </tr> </table>	AC	}	EXT	DC				BEAT	}	INT	DEMOD	AF	AUTO	<p>Status line:</p> <p>The oscilloscope can display signals from various sources. A mark appears in the status line on the oscilloscope above the selected source.</p> <p>AC/DC corresponds to external mode with input signals connected to the EXT connector.</p> <p>BEAT, DEMOD and AF are internal signals corresponding to the measured values displayed in the respective fields.</p> <p>In AUTO position, either the BEAT, DEMOD or AF signal is output on the screen depending on which signal was applied to the AF counter via key <u>8</u>.</p>
AC	}	EXT													
DC															
BEAT	}	INT													
DEMOD															
AF															
AUTO															
<u>92</u>	<p>+</p> <div style="border: 1px solid black; width: 20px; height: 10px; margin: 5px auto;"></div>	<p>Mode keys:</p> <p>Used to select the various input signals identified in the status line (autorepeat).</p>													
<u>93</u>	<p>→</p> <div style="border: 1px solid black; width: 20px; height: 10px; margin: 5px auto;"></div>	<p>Acknowledgement as described for item <u>91</u> via a mark on the oscilloscope screen.</p>													

Item	Label	Designation and function
<u>94</u>	<div style="text-align: center;">  <p>TIME/DIV</p> </div>	<p>Horizontal deflection:</p> <p>The horizontal deflection coefficient can be changed using the TIME/DIV keys. The selected deflection coefficient is output on the screen (autorepeat).</p>
<u>95</u>	<div style="text-align: center;">  <p>AMPLITUDE/DIV</p> </div>	<p>Vertical deflection:</p> <p>Function corresponding to item <u>94</u> for vertical deflection.</p>
<u>96</u>	<p>BEST RANGE INT</p> <div style="text-align: center;">  </div>	<p>BEST RANGE INT:</p> <p>If the oscilloscope outputs AF or DEMOD, the optimum vertical deflection is set by briefly pressing this key.</p> <p>(Only with current level or modulation measurement.)</p> <p>The yellow LED lights up if this key is pressed longer (>0.3 s) and the vertical deflection is continuously matched to the represented signal.</p> <p>This function is switched off by pressing briefly again or by switching off the AF level / modulation measurement.</p>
<u>97</u>	<p>EXT 1 MΩ</p> <div style="text-align: center;">  </div>	<p>INPUT EXT:</p> <p>Maximum permissible voltage 100 V(V_{pp}).</p>
<u>98</u>	<p>Y POS</p>	<p>Controller:</p> <p>To shift the beam in the vertical direction.</p>

2.2.2 Rear Panel
 (See Fig. 2-10 in the Appendix)

Item	Label	Designation and function
	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">Fig. 2-10</div>	<p>→ Connectors</p> <p>for power supply, printer, (option CM-B5) process controller, (option CM-B4) other test devices (spectrum analyzer or similar)</p> <p>→ Control outputs of the CMT</p>
<u>100</u>	11...30 VDC ○ ○ (⊥) +	<p>Battery terminals:</p> <p>Connection for any power source with an output voltage of 11 to 30 V DC and of sufficient power (approx. 70 W depending on configuration).</p>
<u>101</u>	T 16,0	<p>Battery fuse:</p> <p>A 16 A fuse is provided according to the maximum current (at minimum operating voltage).</p>
<u>102</u>	PRINTER PARALLEL INTERFACE	<p>Printer output: (Centronics, parallel)</p> <p>(Only if option CM-B5 is fitted)</p>
<u>103</u>	<div style="border: 1px solid black; padding: 2px; display: inline-block;">IEC 625</div>	<p>Connection for IEC bus:</p> <p>(Only if option CM-B4 is fitted)</p>

Item	Label	Designation and function
<u>109</u>	REF 10 MHz 0 dBm 	The 10-MHz reference signal for synchronization of further instruments can be coupled out at this connector or can be coupled in from an external source (input/output controllable using SPEC function; level >100 mV, max. TTL level).
<u>110</u>	RF POWER INDICATION (TTL) 	A High potential (TTL level) at this connector indicates that an RF signal with a sufficient level for transmitter/receiver test changeover is present at RF IN/OUT <u>77</u> .
<u>111</u>	RF -30 dB 	Bidirectional RF connector for other instruments such as the 2nd test generator (for two-signal measurements) or spectrum analyzer. The connection between the input RF IN/OUT <u>77</u> and RF 30 -dB corresponds to a 30 dB attenuator.
<u>112</u>	FOCUS	Focus control for the oscilloscope (model 54)
<u>113</u>	INTENSITY	Intensity control for the oscilloscope (model 54)
<u>114</u>		Blower: The CMT must be adequately cooled since the output power of the transceiver tested must be converted into heat in addition to the power loss of the CMT during operation. The air flow along the rear of the instrument, through the holes at the sides and behind the fan must remain unhindered at all times.

Item	Label	Designation and function
<u>115</u>	CONTROL B	<p>8 programmable control outputs (only if option CM-B4 is fitted).</p> <p>All switches are floating (relays) with a max. switching load of 25 V/0.25 A.</p> <p>If required, the make contact can be replaced by a changeover contact.</p>
<u>116</u>	CONTROL A	<p>3 programmable control outputs (only if option CM-B5 is fitted).</p> <p>Design as in item <u>115</u>.</p>
<u>117</u>	100/120 V 220/240 V	<p>Voltage selector:</p> <p>For matching to the local power supply.</p>
<u>118</u>	T 4 T 2	<p>Power fuse:</p> <p>The fuse fitted depends on the local power supply:</p> <p>T 4 A with 100/120 V T 2 A with 220/240 V</p>
<u>119</u>	47...420 Hz	Power connection

2.3 Manual Operation

The terms used in this section and in the following sections for the controls and displays largely correspond to the labelling on the front panel. Certain designations which would not be clearly enough emphasized in the text (no coloured printing) have been replaced by the terms defined in Section 2.2.

2.3.1 General Operating Notes

2.3.1.1 Switch-on Status, Permanent Memory and Master Reset

The instrument automatically enters standby mode when an operating voltage (AC supply or battery) is applied and the STANDBY LED 88 lights up. If the instrument is fitted with a temperature-controlled reference oscillator (OCXO), the reference crystal is already now in operation.

The complete instrument is switched on if the STANDBY key 89 is pressed.

All front-panel displays (LEDs and LCD segments) are switched on for testing for the first half of the self-test routine which the instrument carries out during each switch-on phase. All displays are switched off again after approx. 1 second.

Continuation of the self-test is signalled in the α display 2 and the IEC-bus address is output in the frequency display 1 provided the IEC-bus option CM-B4 is fitted.

The CMT outputs "CMT OK" in the α display 2 if the self-test has been completed without faults and the display illumination is switched on. The CMT subsequently assumes the following defined switch-on status:

- Operating mode: Transmitter test
- Demodulation : FM

Results / setting parameters in the displays:

Frequency display <u>1</u>	Output frequency of device under test (if the input signal is of sufficient magnitude, the RF frequency meter sets the operating frequency of the fully automatic modulation meter)
α display <u>2</u>	Frequency of the modulation generator
RF level display <u>12, 13</u>	RF power of device under test
Modulation display <u>21, 22</u>	Modulation meter The type of modulation is defined by the dimension in this field (kHz corresponds to FM, %AM, rad ϕ M)
AF level display <u>30</u>	Output level of the modulation generator

or:

- Operating mode: receiver test

Results / setting parameters in the displays:

Frequency display <u>1</u>	Output frequency of RF signal generator
α display <u>2</u>	Frequency of modulation generator 1
RF level display <u>12</u>	Output level of RF signal generator
RF level display <u>13</u>	Position of the electronic level control in the attenuator of the RF signal generator (see also Sections 2.3.1.5, 2.3.4.2)
Modulation display <u>21</u>	Modulation of the RF signal generator. The type of modulation is determined by the dimension in this field (kHz corresponds to FM)
AF level display <u>30, 31</u>	AF level at connector AF VOLTM <u>84</u>

In order to ensure clear operation, the display assignment is fixed as described in the switch-on status.

All setting parameters such as generator level, frequencies or modulation are not affected by switching off and on, however (memory with battery back-up).

In order to reestablish the condition upon delivery, it is also possible to carry out a master reset (99 SPEC, see also Section 2.3.8).

Complete instrument settings can be stored using STORE 56 and recalled using RECALL 57 (see Section 2.3.7.7).

→ Instrument PRESET (also via autorun control and IEC bus)

Function:

The presetting of the CMT instrument functions corresponds to the factory setting (cf.):

- Switching on of the appropriate measurements
- Switching on of all default special functions
- Front-panel settings
(e.g. key INPUT SELECT → selection of input RF IN/OUT)

As opposed to master reset

- IEC bus (remote/local, address)
- autorun control (LEARN mode, RUN mode, etc.)
- user-specific standard-tone sequences USER0 to USER2,
"double-SPEC" values, e.g. <value>)

remain uninfluenced.

2.3.1.2 Transmitter Test / Receiver Test

The CMT has two main operating modes, the transmitter test and the receiver test.

The set mode is indicated by the XMITTER TEST LED 58 or RECEIVER TEST LED 59. In addition, red or green LEDs 4 in the frequency, RF level, modulation and AF level fields indicate the operating mode of the respective field independent of the complete instrument.

Switching between the receiver and transmitter tests can be carried out in two ways:

- + Press key TXRX 60
- + Apply an RF signal of sufficient power to connector RF IN/OUT 77

The CMT automatically switches back to the receiver test if the applied RF power falls below a certain level.

The automatic switchover can be suppressed by pressing the key LOCK 62. As long as the LOCK LED 61 lights up, the operating mode can only be changed using the TXRX key 60. The LOCK function is cancelled by pressing the LOCK key again.

If it is necessary in practice to display or call a function associated with the opposite mode (especially with duplex radio sets) each of the four fields can be switched over individually using the key DISPLAY CHANGE 65.

Command syntax:

DISPLAY CHANGE	COUNT f / f	(frequency field)
DISPLAY CHANGE	POWER / V_0 SYNTH	(RF level field)
DISPLAY CHANGE	MAX PK / INT 1	(modulation field)
DISPLAY CHANGE	V_0 MOD GEN / AF LEVEL	(AF level field)

2.3.1.3 General Syntax Rules for Entries

The CMT is controlled manually using the front panel keyboard by combining various keys (= command). A command may consist of up to 4 syntax elements:

[Number] [Unit] [Special function] Terminating key

→ **Terminating key:**

The instrument evaluates all previous inputs as soon as the terminating key has been pressed and executes the command. All keys are terminating keys except the numeric keys, unit keys and the special functions (RANGE HOLD 50, ANALOG SELECT 51, α DISPL SELECT 52, ΔVAR 53, REF 54 and DISPLAY CHANGE 65).

→ **Special function:**

Special functions such as RANGE HOLD 50, ΔVAR 53 and REF 54 must be entered immediately before the respective terminating key. No numerical inputs are permissible with the special functions ANALOG SELECT 51, α DISPL SELECT 52 and DISPLAY CHANGE 65. Only one special function is permissible per command.

→ **Number/unit:**

Setting values may be a number, a unit or a combination of both and must always be entered first.

Echo of entered data

For checking the entered value, each keystroke on the numeric keypad is successively indicated in the α display 2 as described below:

Figures <u>39</u>	0 to 9
Minus <u>40</u>	-
Decimal point <u>41</u>	.
Units keys <u>42</u> to <u>45</u>	a to d

Since the key function is selected after the figures have been entered, the above indications are the same for multifunction keys (e.g. A / MHz / mV / %).

The display is cleared by pressing a key outside the numeric keypad (command or CLEAR).

Incomplete commands can be aborted at any point using the key CLEAR.

The following command is used to switch off the special functions RANGE HOLD, ANALOG SELECT, ΔVAR and REF:

Special function	CLEAR	Terminating key
------------------	-------	-----------------

Single-element commands:

→ Terminating key

The associated measurement is called by pressing the terminating key assigned to a measurement.

A terminating key which refers to settings causes the current setting to be displayed.

In the case of toggle keys such as POLARITY SELECT 24 or DEMOD·BEAT 8, repeated pressing of the same key switches between the various functions.

This toggle function is switched off with longer commands (two-element, three-element and four-element commands).

Examples:

V₀ MOD GEN 32

Setting value of modulation generator level is displayed and set.

Repeated pressing does not lead to any further reaction.

POLARITY SELECT 24

Call modulation measurement, the positive peak modulation is displayed.

Repeated pressing switches between positive, average and negative peak modulation.

Two-element commands:

→ Unit Terminating key

If output of a measuring/setting parameter is meaningful in different dimensions (e.g. power in dBm or W), the unit to be displayed can be selected as required by entering the unit before the terminating key.

It should be noted that changing a unit with key 23 (MAX PK in transmitter test or INT 1 in receiver test) switches the operating mode of the CMT (FM, Φ M, AM) and the units of POLARITY SELECT 24 and INT 2 24 are also changed.

Example:

Display of RF power in dBm

→ Number Terminating key

Numbers are entered using the numeric keypad 39 (including the decimal point 41 and the minus sign 40).

Leading zeros before the decimal point need not be entered.

The nearest possible value is set and displayed if the value entered cannot be set (e.g. with output levels of the RF synthesizer whose minimum increment is 0.1 dB).

Inputs without a minus sign are always evaluated as positive numbers. Repeated input of the minus sign also results in a negative number.

→ - not + !

The unit can be obtained from the display (or memory).

Example:

(Unit from display or memory: μ V)

Synthesizer level is set to 10.0 μ V.

→ **Special function Terminating key**

Special functions must always be entered last before the terminating key.

Example:

RANGE HOLD AF LEVEL

The analog value in the AF level display is fixed to the current measurement range.

Three-element commands:

→ **Number Unit Terminating key**

The additional input of a unit is useful when changing the unit or if a value is entered for the first time which has not yet been displayed (unit is only in the memory).

Example:

10.0 μ V V₀ SYNTH

Synthesizer level is set to 10.0 μ V even if the value in the RF level display is in dBm.

1.25 kHz INT 1

The synthesizer is modulated with a deviation of 1.25 kHz and the CMT is in FM mode independent of the previous status.

→ **Number Special function Terminating key**

The entered number refers to the special function in this case (e.g. RANGE HOLD).

The unit can be obtained from the display (or memory).

Example:

Measured value in display: 3.05 % (distortion)

10 RANGE HOLD SINAD·DIST

The measurement range is defined at 10 % full-scale.

→ Special function CLEAR Terminating key

The special functions

RANGE HOLD	<u>50</u>
ANALOG SELECT	<u>51</u>
ΔVAR	<u>53</u>
REF	<u>54</u>

can be cancelled using the key CLEAR. The associated values (e.g. 20 kHz for ΔVAR SET f TX) remain unaffected.

Four-element commands:

→ Number Unit Special function Terminating key

The number and the unit refer here to the special function.

Input of the unit has the same effect as with the two-element and three-element commands, i.e. measured values are displayed in the new unit and the operating mode of the CMT is also switched over (FM, φM or AM).

Example:

Current unit for power measurement: dBm

1 W RANGE HOLD POWER

The measurement range of the power measurement is fixed at 1 W, the display is also in W.

2.3.1.4 Variation of Setting Values

The setting values are mainly varied using the spin wheel. The spin wheel 46 is always assigned to the setting parameter last displayed by pressing a key (identified by the symbol "VAR" next to the associated display). The value is increased by rotating the wheel clockwise and decreased by rotating counterclockwise.

Any increment can be entered using the key Δ VAR 53 (special function) which remains unchanged until the next input independent of whether the instrument is switched on and off.

Example:

The RF synthesizer level is increased or decreased in 10 μV steps if the resolution of the 3-digit RF level display is less than the entered 10 μV.

As soon as the 10 μV steps can no longer be output in the display (10.00 mV, 10.01 mV, 10.02 mV etc.), the variation is made with the smallest step value which can be displayed (in this case with 100 μV steps: 10.1 mV, 10.2 mV, 10.3 mV etc.).

It is possible to return to the minimum step level by entering . The smallest possible step is set for each value when the instrument leaves the factory and after a master reset.

If a continuous variation is not required, any required value can of course be set by direct input (including any possible unit).

Special cases:

a) Modulation generator frequency

It is often useful to set the frequency of the modulation generator in a standard tone sequence,

e.g. upon delivery: 0.3/0.6/1/1.25/2.7/3/6/10 kHz

The tuning steps of the modulation generator frequency therefore always correspond to this frequency sequence unless a different increment has been requested using the key Δ VAR 53.

Example:

100 **Hz** **ΔVAR** **AF INT 1**

The frequency is set in steps of 100 Hz.

ΔVAR **CLEAR** **AF INT 1**

The frequency can be varied again in the standard tone sequence following the command.

b) Oscilloscope

The oscilloscope ranges can be switched over by repeatedly pressing the mode keys X-deflection and Y-deflection (92 to 95). An autorepeat function is available which automatically switches the ranges further when pressed longer.

2.3.1.5 Representation of the Measured Values/Setting Values in the Displays

The representation of the individual measured/setting parameters can be divided into four groups:

a) Frequencies

All used frequencies are represented in the frequency display and in the α display. The resolution with the RF meter is 1 Hz or 10 Hz; MHz is the selected unit.

The resolution is 10 Hz or 100 Hz depending on the frequency range used if the operating frequency of the CMT (function SET f TX, SET f RX) is output in the frequency display; the unit can be selected as required using the unit keys (Hz, kHz, MHz).

The AF meter is output in the α display (max. 10 digits, right-justified) with the unit kHz and a resolution of 0.1 Hz (AF < 4 kHz) or 1 Hz (AF > 4 kHz, via SPEC or also 0.1 Hz selectable with 10-s gate time).

The AF settings are displayed in kHz or Hz (depending on the input) with the maximum resolution which can be achieved in each case.

b) Outputs on the α display

In addition to AF outputs, the α display is used to output all instrument messages (ready message, error messages) in English and to alternately output the measured/setting values from the other displays.

The code of the respective measured/setting parameter (corresponding to the front panel designation), the unit and the number (3 (4) digits) appear at the start of the line if the α display is used as an alternate display.

c) Setting values in the displays:

Frequency, RF level, modulation and AF level

Setting values are output in the 3 1/2-digit display, the associated analog display on the right remains switched off (unless used for other purposes, see ANALOG SELECT 51).

The entered unit is used in the display provided a value of 100 (unit e.g. Hz) is not exceeded. The instrument otherwise converts the value into a suitable format.

Example:

1200	Hz
------	----

 + display = 1.20 kHz

e) Representation of two measured values in one display

If an analog display is set for a fixed measured value using the key ANALOG SELECT 51 (only permissible for certain parameters, see Section 2.3.7.5), the second measured/setting value of the same display is only output in the digital display with the associated unit. The unit and code of the measured value in the analog display are additionally output underneath the bargraph.

Example:

