

# STABILOCK® 4015

The only Radio Test Set you can hold with one hand and load with the other



## Making STABILOCK 4015 dance to your tune

AUTORUN is the capability of STABILOCK 4015 to execute ready test programs or those you write yourself. That's the simple way of describing what is in fact a powerful and very user-friendly tool for effective and precise solutions to your test applications.

### Typical AUTORUN applications

- Automation of repetitive measurements
- Logging of measurements
- Go/nogo tester for different radio sets
- Continuous measurements for detecting sporadic faults
- Computer-supported troubleshooting
- Computer-supported adjustments
- Man/machine interaction in native language

AUTORUN programs are set up on the easily learnt BASIC programming language together with IEEE-488 commands. Using AUTORUN, you have full access to every function of STABILOCK 4015. And the best thing about it is that after brief training you can start writing your own programs.

If you prefer to edit your AUTORUN programs on a PC – no problem. **ARE** (software option), a powerful, menu-prompted, PC-based editor comes to your assistance.

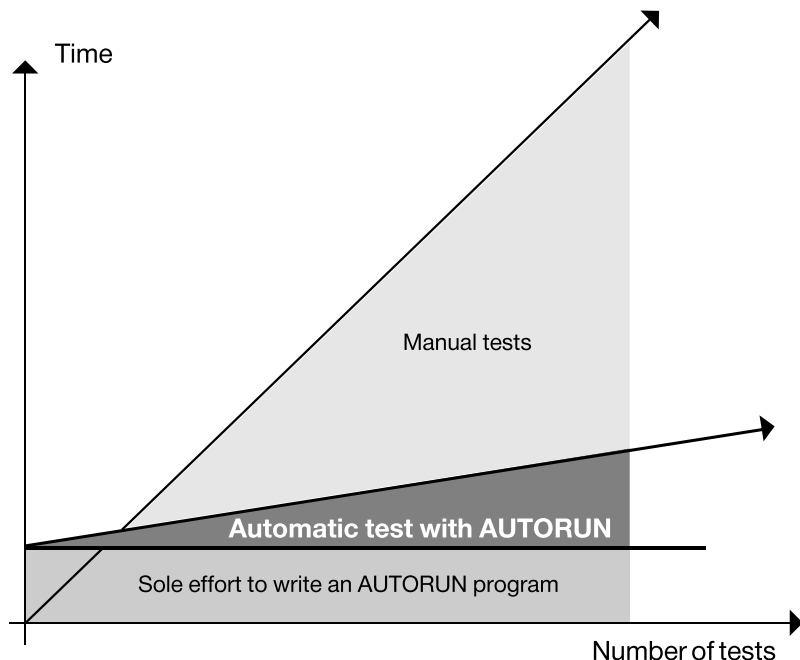
Unlike the case with firmly programmed test sets, AUTORUN offers a maximum degree of flexibility. All kinds of logic decisions are possible and the branches in the program that result from them. Or you can format a report printout the way you want it and insert the name of your company in it too. String processing and output on the RS-232-C interface (option) are just two of the many other features that enable you to get a sure grip on an application.

**AUTORUN:**  
anything else is a waste of time

### LIST

```
5140 REM *** TX DEVIATION MEASUREMENT ***
5150 TX_FM
5160 GENB_OFF
5170 MODAF 1 kHz
5180 GENALEVEL 0.1 V
5190 TXFREQUENCY 888.5125 MHz
5200 A = MDEMULATION
5210 IF A > 5.20 THEN GOSUB 7810
. . . .
. . . .
7810 PRINT " DEVIATION OUT OF LIMIT "
7820 RETURN
. . . .
```

Example of an AUTORUN program

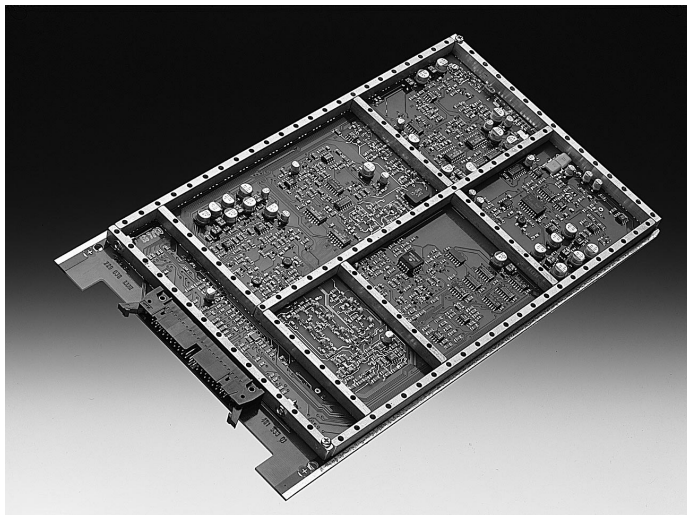
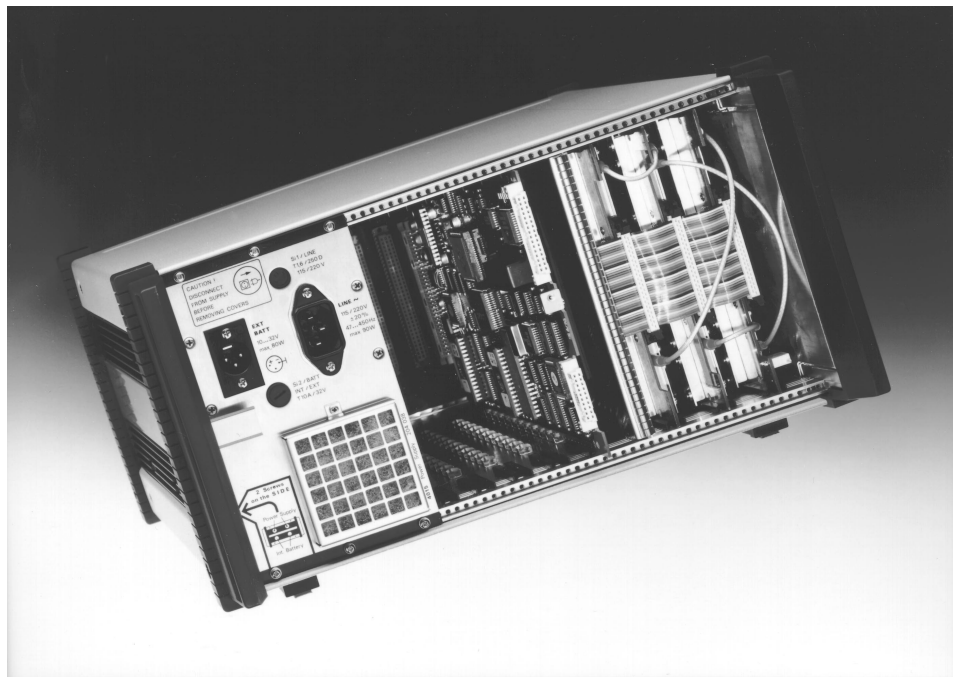


## Flexibility and quality have a name: Wavetek.

Communication test sets from Wavetek are renowned for their flexibility. Well-known companies worldwide depend on them, and for good reason: STABILOCK 4015 comes with a future-proof and open hardware and software architecture. We can provide test solutions for close to 30 cellular systems used in over 110 countries worldwide. Our global expertise in cellular testing is a result of over 35 years of RF experience.

To keep costs of ownership as low as possible, a communication test set simply has to work. Precautions have been taken against every imaginable fault:

- high integration with state of the art SMT components,
- active burn-in of all modules,
- automated longterm tests of all specifications with logged verification for every test set,
- tests at extreme temperatures.



## Maintenance

And if a defect should occur nevertheless, STABILOCK 4015's integrated selfcheck will diagnose it to find out where the trouble lies. Our service centers keep all modules in stock and can dispatch them to you by air courier. So, modules and subassemblies can be exchanged quickly on the job.

**Forget about the subsequent realignment procedures:** even after exchange of modules, we guarantee full conformance of all specifications.

**STABILOCK 4015 –  
designed for the service shop's demands**

# STABILOCK 4015: Technical Data

## Typical Specifications

When we test and qualify our STABILOCKS before we deliver them to you, we get a detailed alignment protocol. We have analysed these protocols and found that the measurement errors of all STABILOCKS out of a long series did not exceed certain values. These values are now called the Typical Specifications. Thus, our Typical Specifications reflect the worst measurement ever received out of a new STABILOCK – and no statistic experiments. This definition is worth comparing it with others.

## Why do we then still give Technical Data ?

Technical Data are guaranteed values and the solid base for our unique maintenance concept. You can rely on Technical Data throughout the whole specified range of temperature and humidity. You can rely on them as your STABILOCK gets older. And you can still rely on them, when you exchange whatever subassemblies. To make the comparison of Typical Specifications and Technical Data as easy as possible, the corresponding value is given in [brackets].

Receiver test (Typical Specifications)		
Level error	(-15 dBm, RX High, f = 1 to 1000 MHz)	< 0.5 dB [ $\leq 2$ dB]
FM setting error	( $f_{mod} = 300$ Hz to 30 kHz)	$\leq 3.5\%$ [ $< 10\%$ ]
FM distortion	( $f_{mod} = 0.3$ to 3 kHz)	$< 0.6\%$ [ $< 1\%$ ]
AM setting error	(m = 50 %, $f_{mod} = 100$ Hz to 6 kHz)	$\leq 5\%$ [ $< 10\%$ ]
AM distortion	(m = 50 %, $f_{mod} = 0.3$ to 3 kHz)	$\leq 0.8\%$ [ $< 2\%$ ]
Transmitter test (Typical Specifications)		
RF power measuring error	(1 to 1000 MHz, selective at 5 W)	$< 7\%$ [ $< 13\%$ ]
RF power measuring error	(800 to 920 MHz, selective at 5 W)	$< 6\%$ [ $< 13\%$ ]
FM measuring error	( $f_{mod} = 0.3$ to 3 kHz)	$\leq 2.5\%$ [ $< 8\%$ ]
AM measuring error	(m > 10 %, $f_{mod} = 0.3$ to 6 kHz)	$\leq 5\%$ [ $< 8\%$ ]
AF Generator and Analysis (Typical Specifications)		
AF Generator distortion	(f = 30 Hz to 30 kHz)	$< 0.4\%$ [ $< 0.6\%$ ]
AF Voltmeter measuring error	(f = 300 Hz to 3 kHz)	$\leq 1.5\%$ [ $< 5\%$ ]

(All values measured at 20°C and 50 % relative humidity)

## Synthesizer

<b>Noise</b> <ul style="list-style-type: none"> <li>Incidental FM, rms, CCITT <math>\leq 9</math> Hz rms</li> <li>Phase noise                             <ul style="list-style-type: none"> <li>25 kHz carrier offset &lt; 125 MHz <math>\leq -97</math> dBc/Hz</li> <li>125 to 250 MHz <math>\leq -112</math> dBc/Hz</li> <li>250 to 500 MHz <math>\leq -107</math> dBc/Hz</li> <li>500 to 1000 MHz <math>\leq -102</math> dBc/Hz</li> </ul> </li> </ul>	<b>Spectral purity</b> <ul style="list-style-type: none"> <li>Spurious, 0.2 to 30 kHz offset <math>\leq -50</math> dBc</li> <li>Harmonics, &lt; 0 dBm unmod. <math>\leq -20</math> dBc</li> </ul>	<b>Reference oscillator</b> <ul style="list-style-type: none"> <li>Frequency error, ambient temperature 0 to 45 °C <math>\leq \pm 0.5</math> ppm</li> <li>Buildup time for &lt; 1 ppm error <math>\leq 2</math> min</li> <li>Aging/year <math>\leq \pm 1</math> ppm</li> <li>Frequency error with option OCXO <math>&lt; \pm 0.05</math> ppm</li> </ul>
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## Receiver test

<b>Carrier frequency</b> <ul style="list-style-type: none"> <li>RF frequency range 0.4 to 1000 MHz</li> <li>Accuracy as reference oscillator</li> <li>Resolution 100 Hz</li> </ul>	<b>Output level</b> <ul style="list-style-type: none"> <li>N socket RX/TX, (AM 6 dB less) <math>-130</math> to <math>-60</math> dBm</li> <li>BNC socket RX HIGH, (AM 6 dB less) <math>-70</math> to <math>+13</math> dBm</li> <li>Resolution 0.1 dB</li> </ul>	<ul style="list-style-type: none"> <li>Level error, unmod., &gt; 2 MHz RX/TX socket, &gt; -120 dBm <math>\leq 2</math> dB</li> <li>RX HIGH socket, &gt; -60 dBm <math>\leq 2</math> dB</li> <li>Reflection                             <ul style="list-style-type: none"> <li>RX/TX <math>\leq 1.2</math> VSWR</li> <li>RX HIGH <math>\leq 3</math> VSWR</li> </ul> </li> </ul>
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## RX modulation

<b>FM AC modulation</b> <ul style="list-style-type: none"> <li>Frequency deviation (peak) 0 to <math>\pm 30</math> kHz</li> <li>Modulation-frequency range, 1 dB bandwidth 0.03 to 10 kHz min.</li> <li>Modulation-frequency setting range 0.03 to 30 kHz</li> <li>Resolution 10 Hz</li> <li>Setting error, 0.3 to 6 kHz, deviation <math>\leq 20</math> kHz <math>\leq 10\%</math></li> <li>Distortion, 1 kHz, deviation &lt; 6 kHz <math>\leq 1\%</math></li> <li>External input 1 M<math>\Omega</math></li> <li>Sensitivity "Fixed" (<math>\pm 5\%</math> error) 10 kHz/V<sub>p</sub></li> <li>Sensitivity "Variable" 0.01 to 10 kHz/mV<sub>p</sub></li> </ul>	<b>Phase modulation</b> <ul style="list-style-type: none"> <li>Phase deviation (peak), &lt; 20 kHz FM deviation 0 to 6 rad</li> <li>Modulation-frequency range, 1 dB bandwidth 0.2 to 6 kHz min.</li> <li>Modulation-frequency setting range 0.03 to 30 kHz</li> <li>Resolution 0.1 rad</li> <li>Setting error, 0.3 to 6 kHz (f x rad <math>\leq 10</math> kHz) <math>\leq 10\%</math></li> <li>Distortion, 1 kHz, <math>\leq 6</math> rad <math>\leq 1\%</math></li> <li>External input 1 M<math>\Omega</math></li> <li>Sensitivity "Fixed" (<math>\pm 5\%</math> error) 10 rad/V<sub>p</sub></li> <li>Sensitivity "Variable" 0.01 to 10 rad/mV<sub>p</sub></li> </ul>	<b>AM modulation</b> <ul style="list-style-type: none"> <li>RF frequency range useable to 1.5 to 520 MHz 1000 MHz</li> <li>Modulation depth 0 to 90 %</li> <li>Modulation-frequency range, 1 dB bandwidth 0.03 to 10 kHz min.</li> <li>Modulation-frequency setting range 0.03 to 30 kHz</li> <li>Resolution 0.1 %</li> <li>Setting error, 1.5 to 520 MHz, <math>f_{mod}</math> 0.1 to 6 kHz, m &lt; 50 % <math>\leq 10\%</math></li> <li>Distortion, 1 kHz, m &lt; 50 % <math>\leq 2\%</math></li> <li>External input 1 M<math>\Omega</math></li> <li>Sensitivity "Fixed" (<math>\pm 5\%</math> error) 100 %/V<sub>p</sub></li> <li>Sensitivity "Variable" 0.03 to 33 %/mV<sub>p</sub></li> </ul>
<b>FM DC modulation</b> <ul style="list-style-type: none"> <li>Frequency offset, &lt; 1 min after calibration                             <ul style="list-style-type: none"> <li>0 to 125 MHz <math>&lt; 500</math> Hz</li> <li>125 to 1000 MHz <math>&lt; 1.3</math> Hz/MHz</li> </ul> </li> </ul>		

## Transmitter test

### Transmitter test, general

- Automatic tuning on RX/TX socket (Count)
 

< 600 MHz	> 1 mW
600 to 1000 MHz	> 10 mW
- Max. input level
 

continuous	≤ 50 W
shortterm (≤ 1 min)	≤ 150 W
- Acoustic alarm in case of high temperature
- P<sub>max</sub> on sockets RX HIGH and TX SENS
 

	250 mW
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 (no power protection if serial number < 0889000)

### Power measurement

- Measurement range
 

RX/TX socket	0.01 mW to 150 W
AM peak	150 W max.
TX SENS socket	-80 to +10 dBm
- Resolution
 

for dBm	0.1 dB
for 1 mW to 150 W	< 1 %
- Measuring error
 

RX/TX socket (P < 50 W)	± 0.6 dB + 2 digits
TX SENS socket	± 2 dB + 2 digits

 < 10 min after calibration

### Frequency measurement

- RF frequency range
 

	1.45 to 1000 MHz
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- Offset frequency range
 

< 0.5 x IF bandwidth	≥ ± 40/10/5 kHz
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- Resolution, selectable (RF and offset frequency)
 

	10 Hz, 1 Hz
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- Measuring error (plus reference-oscillator error)
 

	≤ 20 Hz
	≤ 5 Hz (for 1 Hz res.)
- Input sensitivity (offset measurement),
 

RX/TX socket	< -20 dBm
TX SENS socket	< -80 dBm

## TX modulation measurement

### Modulation measurement, general

- Standard IF filter for AM/FM/ΦM
 

3 dB bandwidth	80 ± 20 kHz
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- Narrowband channel filters, selectable for aural monitoring of FM/ΦM modulation
 

6 dB bandwidth	20/9 kHz min.
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- Input level w/o extra measuring error
 

RX/TX socket	0.1 mW to 150 W
TX SENS socket	-60 to +13 dBm
- Squelch, disconnectible.
 

Response threshold	adjustable
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### FM measurement

- Measurement range
 

	0 to 30 kHz
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- Resolution
 

deviation < 10 kHz	10 Hz
deviation ≥ 10 kHz	100 Hz
- Measuring error,
 

deviation < 10 kHz, 0.3 to 6 kHz	≤ 8 % + 1 digit
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 < 10 min after calibration

- Distortion, deviation < 10 kHz
 

	< 1.3 %
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- Demodulation output
 

Sensitivity	600 Ω
3 dB bandwidth	approx. 0.2 V <sub>pp</sub> /kHz
	0 to approx. 14 kHz
- Sensitivity on TX SENS socket:
 

10 dB SINAD, CCITT, 3 kHz deviation	≤ 2 μV
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### ΦM measurement

- Measurement range, (rad x f<sub>mod</sub> ≤ 30 kHz)
 

	0 to 10 rad
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- Resolution
 

	0.01 rad
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- Measuring error, 0.3 to 6 kHz, rad x f ≤ 10 kHz
 

< 10 min after calibration	≤ 8 % + 1 digit
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- Distortion, deviation < 10 kHz
 

	< 1 %
--	-------
- Demodulation output
 

Sensitivity	600 Ω
3 dB bandwidth	approx. 0.2 V <sub>pp</sub> /rad
	approx. 0.12 to 14 kHz
- Sensitivity on TX SENS socket:
 

10 dB SINAD, CCITT, 3 rad deviation	≤ 2 μV
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### AM measurement

- Measurement range
 

	0 to 100 %
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- Resolution
 

	0.1 %
--	-------
- Measuring error, m < 50 %,
 

0.3 to 6 kHz	≤ 8 % + 1 digit
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- Distortion, m < 50 %
 

	< 1 %
--	-------
- Demodulation output
 

Sensitivity	600 Ω
3 dB bandwidth	dependent on RF level
	0 to approx. 14 kHz

### Spurious-modulation measurement

- Measurement range, for max. measuring error 2 dB, referred to 3 kHz FM,
 

3 rad, 30 % AM	0 to -50 dB
CCITT filter, rms < 500 MHz	0 to -45 dB

## AF generators

### Variable modulation generator A

- Frequency range
 

	0.03 to 30 kHz
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- Frequency resolution < 10 kHz
 

≥ 10 kHz	0.1 Hz
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- Frequency error
 

	≤ 0.02 %
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- Level range, EMF
 

	0 to 3.8 V <sub>rms</sub>
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- Level resolution < 10 mV
 

< 38 mV	0.01 mV
≥ 38 mV	0.1 mV

- Level error 300 Hz to 3 kHz
 

50 Hz to 10 kHz	≤ 2 % + 2 digits
	≤ 5 % + 2 digits
- Distortion 30 Hz to 30 kHz (test bandwidth: 100 kHz)
 

	≤ 0.6 %
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- Output impedance unbal.
 

0.3 to 3 kHz	< 6 Ω
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- Load impedance
 

	≥ 200 Ω
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### 1 kHz modulation generator C

- Distortion
 

(test bandwidth: 100 kHz)	≤ 0.4 %
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 (all other data like var. mod gen. A)

### Beat-frequency oscillator

- Sum level for modulation beating gen. A + B + C/Ext
 

	≤ 15 V <sub>pp</sub>
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 (for gen. B see options, data module)

## AF evaluation

### AF voltmeter

- Frequency range
 

(1 dB bandwidth) DC/AC	0/0.03 to 6 kHz min.
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- AC measurement range
 

	0 to 20 V
--	-----------
- DC measurement range
 

	0 to ± 30 V
--	-------------
- Resolution ≥ 10 V
 

< 10 V	100 mV
< 1 V	10 mV
< 1 V	1 mV
< 0.1 V	0.1 mV
- Measuring error at 1 kHz, DC
 

	≤ 2.5 % + 1 digit
--	-------------------
- Measuring error 0.1 to 3 kHz
 

	≤ 5 % + 1 digit
--	-----------------
- DC offset, after calibration
 

	≤ 2 mV
--	--------
- Input impedance unbal.
 

	≥ 1 MΩ 20 pF
--	--------------
- CCITT filter
 

	to CCITT P53 standard
--	-----------------------
- C-weighting filter
 

	to IEEE 743-1984 standard
--	---------------------------
- Highpass/lowpass/bandpass filters
 

	selectable
--	------------

### AF counter

- Frequency range
 

	0.03 to 30 kHz
--	----------------
- Resolution < 300 Hz
 

≥ 300 Hz	0.1 Hz
	1 Hz
- Measuring error
 

	≤ 2 digits
--	------------
- Input level 0.1 to 3 kHz
 

0.05 to 10 kHz	≥ 10 mV
	≥ 20 mV
- Min. FM deviation for transmitter test
 

	500 Hz
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### Distortion & SINAD meter

- Test frequency
 

(1 kHz for SINAD)	0.2 to 2 kHz
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- Measurement range for distortion
 

	0 to > 50 %
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- Measurement range for SINAD
 

	0 to > 45 dB
--	--------------
- Resolution for distortion measurement for SINAD
 

	0.1 %
	0.1 dB
- Measuring error for distortion < 10 % for SINAD 6 to 20 dB
 

	± 0.5 % absolute
	± 0.5 dB
- Input level
 

	> 100 mV
--	----------
- Min. FM deviation for transmitter test
 

	500 Hz
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# Scope & analyzer

<b>Digital storage oscilloscope</b> <ul style="list-style-type: none"> <li>• Modes <ul style="list-style-type: none"> <li>one shot,</li> <li>continuous,</li> <li>freeze,</li> <li>time measurement</li> </ul> </li> <li>• Frequency range, AC, DC <ul style="list-style-type: none"> <li>like AF voltmeter</li> </ul> </li> <li>• Measuring error <ul style="list-style-type: none"> <li>like AF voltmeter</li> </ul> </li> <li>• Input switching <ul style="list-style-type: none"> <li>like AF voltmeter</li> </ul> </li> <li>• Trigger settings <ul style="list-style-type: none"> <li>autotrigger</li> <li>variable positive/negative</li> </ul> </li> <li>• Trigger signals <ul style="list-style-type: none"> <li>voltmeter</li> <li>TX power</li> <li>RX level</li> <li>external TTL</li> </ul> </li> <li>• Horizontal deflection, timebase <ul style="list-style-type: none"> <li>0.1 to 500 ms/div</li> </ul> </li> <li>• Vertical deflection, (setting manually or automatically) level scale <ul style="list-style-type: none"> <li>2 mV/div to 10 V/div</li> </ul> </li> </ul>	<b>Spectrum analyzer</b> <ul style="list-style-type: none"> <li>• Modes <ul style="list-style-type: none"> <li>• "Analyzer" = spectrum analyzer</li> <li>• "Marker" = analyzer with frequency markers, optionally with automatic tuning of frequency marker</li> <li>• "Freeze" = display stored, with demodulation (and aural monitoring) of marker frequency</li> </ul> </li> <li>• Frequency <ul style="list-style-type: none"> <li>• Frequency range 1.5 to 1000 MHz</li> <li>• Sweep width selectable 0.25 to 10 MHz</li> <li>• Evaluation bandwidth corr. to sweep width max. 20 kHz</li> <li>• Sweep time ≤ 2.5 s</li> </ul> </li> </ul>	<b>Level</b> <ul style="list-style-type: none"> <li>• Dynamic range -100 to +50 dBm</li> <li>• <math>P_{ref}</math>, n x 10 dB switchover <ul style="list-style-type: none"> <li>RX/TX socket +10/+20 to +50 dBm</li> <li>TX SENS socket -50/-40 to 0 dBm</li> </ul> </li> <li>• Display range (<math>P_{ref} = 0</math> dBrel) 0 to -60 dBrel</li> <li>• Measuring error at 0 to -40 dBrel absolute ≤ 3 dB</li> <li>relative, Diff &lt; 20 MHz ≤ 1 dB</li> <li>• Inherent noise ≤ -45 dBrel</li> </ul> <b>Intermodulation products</b> <ul style="list-style-type: none"> <li>• <math>P_{max} \leq +20</math> dBm ≤ -40 dBrel</li> </ul> <b>Signal/image ratio</b> <ul style="list-style-type: none"> <li>• (zero down-conversion!) image-free</li> </ul>
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# Options

<b>HARDWARE OPTIONS</b>	<ul style="list-style-type: none"> <li>• FFSK ≤ 5 kBaud</li> <li>• FSK ≤ 2 kBaud</li> <li>• Manchester ≤ 10 kBaud</li> <li>• Encoder <ul style="list-style-type: none"> <li>additional level setting error ≤ 4 %</li> <li>overshoot on squarewave ≤ 5 %</li> </ul> </li> <li>• Decoder <ul style="list-style-type: none"> <li>FM deviation range 1 to 10 kHz</li> </ul> </li> </ul>	<b>RS-232-C interface</b> <ul style="list-style-type: none"> <li>• Connector submin D plug, 9-way</li> </ul>
<b>External synchronization (10 MHz)</b> <ul style="list-style-type: none"> <li>• Sync display LED</li> <li>• Input BNC socket, approx. 200 Ω</li> <li>• Ref. signal 10 MHz, &gt; 0.2 Vrms</li> </ul>	<b>Variable modulation generator B</b> <ul style="list-style-type: none"> <li>• Additional level error ≤ 2 %</li> <li>• Distortion 0,03 to 30 kHz (test bandwidth 100 kHz) ≤ 1 %</li> <li>• all other data like var. mod gen A</li> </ul>	<b>Interface Centronics/RS-232-C/keyboard</b>
<b>OCXO reference oscillator</b> <ul style="list-style-type: none"> <li>• Reference frequency 10 MHz</li> <li>• Frequency error during warmup (&gt; 4 min after power-up at 25°C, &gt; 7 min at 0°C) &lt; ±0.05 ppm</li> <li>• Frequency error, ambient temp. 0 to 50°C ≤ ±0.05 ppm</li> <li>• Aging/year ≤ approx. ±0.1 ppm</li> </ul>	<b>DTMF module</b> <ul style="list-style-type: none"> <li>• Encoder and decoder, selectable duration and pause.</li> </ul>	<b>Centronics interface</b> <ul style="list-style-type: none"> <li>• Connector Amphenol socket 36-way</li> </ul>
<b>Duplex synthesis</b> <ul style="list-style-type: none"> <li>• For simultaneous RX and TX functions.</li> <li>• All data as for RX and TX above.</li> <li>• Duplex spacing selectable &gt; 2 MHz (usable from 0 to 2 MHz)</li> <li>• Min. TX frequency 1.5032 MHz</li> </ul>	<b>Interface IEEE bus/RS-232-C/keyboard</b>	<b>Keyboard interface</b> <ul style="list-style-type: none"> <li>for keyboard, ordering code 248 192</li> <li>• Connector submin D socket 15-way</li> </ul>
<b>Data module</b>	<b>IEEE bus interface</b> <ul style="list-style-type: none"> <li>• Standard IEEE-488, GPIB</li> <li>• Connector Amphenol socket, 24-way</li> <li>• Functions AH1, SH1, L2, T1, SR1, RL1, DC1</li> </ul>	<b>RS-232-C interface</b> <ul style="list-style-type: none"> <li>• Connector submin D plug, 9-way</li> </ul>
<b>Digital encoder and decoder for radio-data systems</b> <ul style="list-style-type: none"> <li>• Coding NRZ ≤ 10 kBaud</li> </ul>	<b>Keyboard interface</b> <ul style="list-style-type: none"> <li>for keyboard, ordering code 248 192</li> <li>• Connector submin D socket, 15-way</li> </ul>	<b>Internal battery</b> <ul style="list-style-type: none"> <li>• Operating time, battery fully charged &gt; 1 h</li> <li>• Internal charge, automatically controlled approx. 14 h (start when connected to line, stop upon limit temperature)</li> <li>• Battery-voltage indication on display typ. 12 V</li> <li>• Battery operation for line outage automatic switchover</li> </ul>

# General data

<b>Power supply</b> <ul style="list-style-type: none"> <li>• AC line 220/115 V ±20 % 47 to 450 Hz</li> <li>• External DC supply (minus on ground) +10 to 32 V</li> <li>• Upon line outage automatic switchover to internal or external battery</li> <li>• Power consumption approx. 80 W (see options for internal battery)</li> </ul>	<ul style="list-style-type: none"> <li>• TTL control outputs 12</li> <li>inputs 1</li> <li>• Auxiliary power supply 3 DC voltages +15, -15, +5 V current limiting approx. 30 mA</li> </ul>	<b>Environment</b> <ul style="list-style-type: none"> <li>• Operating temperature 0 to 50°C</li> <li>• Storage temperature -40 to +70°C</li> <li>• Full specifications after 15 min</li> <li>• Mechanical strength (to DIN 40046) <ul style="list-style-type: none"> <li>Shock 30 g</li> <li>Vibration 5 to 10 Hz for 10 mm amplitude 10 to 60 Hz, 2 g constant to VDE 0411/IEC 348</li> </ul> </li> <li>Safety</li> </ul>
<b>Control interface</b> <ul style="list-style-type: none"> <li>• Connector submin D socket 25-way</li> <li>• 4 control relays, each with 1 contact = 2 lines freely programmable or as automatic switch for RX/TX, squelch</li> </ul>	<b>Dimensions and weight</b> <ul style="list-style-type: none"> <li>• Weight w/o options approx. 9,5 kg</li> <li>• with all options incl. battery ≤ 13 kg</li> <li>• Dimensions W/H/D 338 / 176 / 350 mm</li> </ul>	<b>Radiated interference</b> <ul style="list-style-type: none"> <li>• RF tightness, measured with coil, 2 turns, 25 mm diameter on 50 Ω at 25 mm distance <ul style="list-style-type: none"> <li>&gt; 60 MHz ≤ 1 μV</li> <li>&lt; 60 MHz ≤ 3 μV</li> </ul> </li> <li>• Radiated interference to VDE 0871 ≤ "limit value B"</li> </ul>

# Check list

Order number	248 145	860 182	236 012	236 013	229 038	248 171	236 016	248 192	
Option	VSWR bridge	IEEE-488 interface PCII A	Interface Centronics/RS-232-C / keyboard or Interface IEEE bus / RS-232-C / keyboard		Duplex synthesis	DTMF module	Data module	Keyboard	Software Option
Application									
Simulation of answer back systems (RF output and feeding in of tone sequences)					●				
DTMF signal encoding/decoding						●			
Program-controlled measurements (AUTORUN)			●					●	
ARE: Software package for PC based development of AUTORUN programs		●		●					897 100
Measuring protocol with explanatory text			●					●	
Measuring protocol, hardcopies from screen, AUTORUN listings			●						
NMT 450 i/900 Scandinavia					●		●		897 818
NMT 450 i					●		●		897 816
NMT 900 Scandinavia					●		●		897 980
NMT 450 universal					●		●		897 975
NMT Benelux					●		●		897 977
NMT France					●		●		897 978
NMT Turkey					●		●		897 901
Natel-C Switzerland					●		●		897 979
C-Net Austria					●		●		897 976
EAMPS					●		●		897 972
ETACS UK					●		●		897 971
JTACS (ETACS Japan)					●		●		897 973
NTACS					●		●		897 935
NAMPS					●		●		897 934
EDACS MS-Test					●		●		897 810
EDACS BS-Test CC Trace					●		●		897 814
RC 2000					●		●		897 968
POCSAG (NRZ)							●		897 981
POCSAG (FFSK)							●		897 982
POCSAG Monitoring							●		897 817
Cityruf							●		897 932
FMS					●		●		897 936
VDEW digital standard					●		●		897 937
ZVEI binary					●		●		897 938
DIGI-S					●		●		897 939
Trunking MPT 1327 / PAA 2424					●		●		897 983
Trunking BS-Test CC Trace							●		897 815
Tracking and Cable Fault Finder	●				●				897 933
US Signalling					●		●		897 984
LTR and US Signalling					●		●		897 966
AT&T Microcell					●		●		897 931
ATIS					●		●		897 821
UIC 751-3					●		●		897 822

# Accessories

<b>Accessories supplied</b> .....	249025
Set of miniature fuses .....	849036/849064
RF-SMD spare fuse (3x) <sup>1)</sup> .....	894049
Power cable standard or .....	880604
Power cable USA or .....	880620
Power cable UK .....	880621
50 Ω BNC termination (2 x) .....	874009
Panel cover (2 x) .....	501370
Headphones jack .....	884123
Battery-cable socket .....	884015
1 memory card (blank, 32 Kbytes) .....	897050
User manual .....	290089

## Recommended extras

IEEE 488 interface PCII A (for PC) .....	860182
Microphone .....	248147
Telescopic antenna .....	248148
Battery pack, external, with connecting cable .....	248185
Keyboard .....	248192
RF probe .....	860108
1 MΩ probe .....	860148
VSWR directional coupler + access. ....	248104
VSWR bridge + accessories .....	248145
Spare cartridge for printer .....	860133
Printer paper 2500 sheets .....	860134
Memory card 32 Kbytes .....	897050
Memory card 64 Kbytes .....	897051
Memory card 128 Kbytes .....	897052
Protecting edges, large, for back panel .....	248146
Symm. AF transformer .....	248194
Heat sink for N socket .....	886220
Submin D connector set, 25-way for control interface .....	300641
Submin D connector set, 9-way for RS-232-C .....	300756
Cable set (RF cables and adapters) .....	300690
IEEE cable (2 m) .....	860110
Centronics cable .....	860180
Service manual .....	291089
Transport case .....	300750
Carrying bag .....	378268
RF-SMD spare fuse .....	894049
RF-power protection <sup>2)</sup> .....	248237

1) from serial No. 0889000 onwards

2) Standard from serial No. 0889000 onwards. For older units please check with your Wavetek representative.

# Ordering data

<b>STABILOCK 4015</b> .....	108901	<b>Software options</b>	RC 2000 .....	897968
<b>Hardware options</b>		NMT 450 i/900 Scandinavia .....	POCSAG (NRZ) .....	897981
Duplex synthesis .....	229038	NMT 450 i .....	POCSAG (FFSK) .....	897982
Data module .....	236016	NMT 900 Scandinavia .....	POCSAG Monitoring .....	897817
DTMF module .....	248171	NMT 450 universal .....	Cityruf .....	897932
Interface Centronics/RS-232-C/Keyboard .....	236012	C-Net Austria .....	FMS .....	897936
Interface IEEE-488/RS-232-C/Keyboard .....	236013	NMT Benelux .....	VDEW digital standard .....	897937
Internal battery .....	205006	NMT France .....	ZVEI binary .....	897938
External synchronization (10 MHz) .....	214026	NMT Turkey .....	DIGI-S .....	897939
OCCO reference oscillator .....	214027	Natel-C Switzerland .....	Trunking MPT 1327 / PAA 2424 .....	897983
		ETACS UK .....	Trunking BS-Test CC Trace .....	897815
		JTACS (ETACS Japan) .....	Tracking and Cable Fault Finder .....	897933
		EAMPS .....	US Signalling .....	897984
		NTACS .....	LTR and US Signalling .....	897966
		NAMPS .....	AT&T Microcell .....	897931
		EDACS MS-Test .....	ATIS .....	897821
		EDACS BS-Test CC Trace .....	UIC 751-3 .....	897822
			ARE AUTORUN Editor (5 1/4 or 3 1/2" disc) .....	897100