STABILOCK 4031 4032

NADC MS Test AUTORUN

AUTORUN Program 897 917

Operating Instructions

47_nadau Doc. Version: 9507-113-B

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Supplement to operating manual; file under Chapter 10

10

Contents

Introduction 10-5
These figures are measured 10-5
General preparations 10-6
Test setup 10-7

Creating Setup 10-8
SETUP menu 10-8
Making entries 10-9
General Setup menu 10-9
Select Printer menu 10-10
Test Environment menu 10-11
Limit Conditions menu 10-12
Saving setups 10-13

Testing Mobiles 10-14
General notes on operation 10-14
Notes on various measurements 10-14
Registration 10-14
SAT/ST measurement in full test 10-15
Speech loopback test 10-15
Individual test 10-16
Test report 10-17

10

☞ **For differences from former software versions:** see the Lifeline at the end of this supplement.

Introduction

The AUTORUN program automatically tests the major quality parameters of NADC, AMPS and EAMPS mobiles. Out-of-tolerance figures appear with the comment FAIL (those that are in tolerance with PASS), so any condition that is not compliant with specifications can be recognized straight away. Test parameters can be stored and recalled for resetting. For this purpose there are five setup files. The test report with all measured figures including their rating appears on the monitor of the Communication Test Set, or you can print it out.

These figures are measured

Depending on the required intensity, the AUTORUN program can run a quick or full test:

	Figure	Quick test	Full test
ANALOG	RF Power	✘	✘
	Frequency Error	✘	✘
	Receiver Sensitivity		✘
	RX Distortion		✘
	TX Distortion		✘
	TX Deviation		✘
	SAT Frequency		✘
	SAT Deviation		✘
	Signal Tone Frequency		✘
	Signal Tone Deviation		✘
DIGITAL	RF Power	✘	✘
	Frequency Error	✘	✘
	RMS Error Vector Magnitude	✘	✘
	Δ Power/Symbol	✘	✘
	Origin Offset	✘	✘
	Error First 10 Symbols	✘	✘
	Error Vector Magnitude	✘	✘
	Max. Phase Error	✘	✘
	Min. Magnitude	✘	✘
	Max. Magnitude	✘	✘
	Time Alignment	✘	✘
	Bit Error Rate	✘	✘
	MAHO Test	✘	✘
	Speech Loopback Test	✘	✘

General preparations

You cannot test mobiles with the AUTORUN program alone, because AUTORUN simply makes the entries that you would normally make manually with the NADC MS Test system program. NADC MS Test is consequently the basic requirement when working with the AUTORUN program.

Hardware and firmware

The requirements that the Communication Test Set must satisfy for testing dual-mode mobiles can be read in the operating instructions for the NADC MS Test system program (software option 897 073), in the section "General preparations".

System program loaded?

Check whether the NADC MS Test system program is already in the main memory of the Communication Test Set. If it is, the EXECUTABLE PROGRAMS directory will show you the file name of the system program in the MEMORY mask. If this entry is missing, you must load the system program from the memory card:

- ❍ Insert the memory card with the system program in the slot on the front panel.
- ❍ Load the system program with AUX+DATA.

Loading AUTORUN program

- ❍ Insert the memory card with the AUTORUN program in the slot on the front panel.
- ❍ Call up the MEMORY mask with MEMORY.
- ❍ Place the cursor bar in the FILES ON MEMORY CARD directory on either of the two files shown there with the extension AUT.
- ❍ Load the program into the main memory of the Communication Test Set with RECALL.
- ❍ Call up the AUTORUN mask with AUTORUN.
- ❍ Start the program with RUN.

You must leave the memory card in the slot because the AUTORUN program accesses it.

Test setup

Levels of < –110 dBm appear when testing (eg bit error rate BER), so the entire setup must be proof against EMI pickup and not radiate any either. The following measures are recommended for this purpose:

- Use a doubly shielded RF cable between the test setup and the mobile.
- Terminate the RF DIRECT socket of the test setup with 50 Ω.
- Make sure that all plug-ins of the test setup (back panel) are screwed in tight.
- Close vacant plug-in slots on the test setup (back panel) with dummy panels.

Mobiles that do not allow the microphone and loudspeaker signal to be coupled out are tested solely on the RF signal path (**Fig. 10.1**). The AF tests "RX Distortion", "TX Distortion" and "TX Deviation" cannot be made then because no AF signal is available (only applies to the full test). Declare the omission of these three tests later on in the `Test Environment` menu of the AUTORUN program.

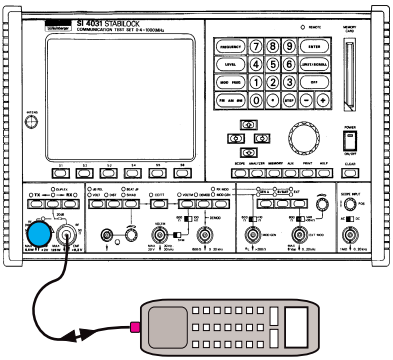


Fig. 10.1: Connection of handy that does not allow microphone and loudspeaker signals to be coupled out. In this case a few AF tests will not be possible.

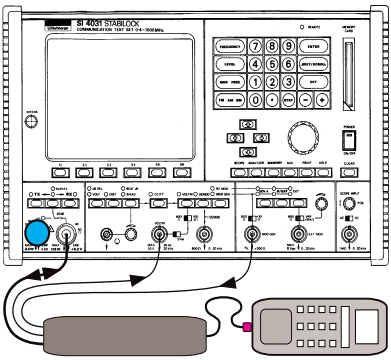


Fig. 10.2: Connection of carphone with coupling out of AF signals. All tests offered by the AUTORUN program are only possible with this setup.

Creating Setup

After the AUTORUN program is started, a request appears on the monitor telling you to choose one of five user setups or the default setup with the softkeys. User setups are very useful because they contain all individually declared test conditions and therefore drastically reduce the time it takes you to prepare for a test.

When you start the program the first time, no user setups exist yet. So continue the program with (DEFAULT). The monitor will then show you a menu that allows you to create your first user setup with the menu item `Setup`. Choose this menu item with (4).

SETUP menu

Now the monitor will show the `SETUP` menu, and with the menu items you can set the momentarily required test parameters. (EXIT) takes you back to the start menu. Below is an overview of the settings that can be made in the different submenus of the `SETUP` menu:

SETUP			
General Setup	**Select Printer**	**Test Environment**	**Limit Conditions**
• A System and Channels	• No Printer	• FM Deviation	• Peak EVM EVM 1st 10 Symbols
• B System and Channels	• HP-2225	• Unit for RF Power	• Phase Error (+/–)
• RF Test Level	• Epson FX80	• SAT Deviation	• Magnitude (Min./Max.)
• Loss of RF Cable	• PT88	• RX Distortion Analog Receiver Sens.	• MAHO/BER Error RF Level
• Graphics Display in PASS Condition	• Mem. Card	• TX Distortion TX Deviation	• BER Result Indicator
	• RS232		
	• RS232 Configuration		
	• RS232 Baudrate		
	• Print Graphics En-/disabled		

Call up the individual submenus with the softkeys (1) through (4). From there you return to the `SETUP` menu with (EXIT). Once all the settings have been made, softkey (5) will initiate their storage in one of the five setup files (more about this in the section "Saving setups").

Making entries

All SETUP menus are dialog-oriented. In other words, you see menu items and choose them simply by hitting the appropriate softkey. When you see an input request (INPUT), proceed as follows:

1. Enter the figure and confirm it with (ENTER).
2. Continue the program with (CONTINUE).

If a menu shows an entry in brackets next to a menu item, this is the momentarily valid setting (when you start the program the first time, these are default figures stored in the program itself).

General Setup menu

A + B System and Channels

In the `General Setup` menu you can make the following settings (with the exception of the home system number) separately for system A and system B:

- Home System Number
- FOCC Control Channel Number
- Analog Traffic Channel Number
- Digital Traffic Channel Number

RF Test Level

Setting of the RF level that the Communication Test Set feeds the test item. This setting is only valid in the quick test!

For the full test the RF output level is always –60 dBm.

Loss of Test Cable

This menu item allows compensation of RF cable loss. The effect is that of the compensation which you would normally set manually in the GENERAL PARAMETERS mask (`Pre-attenuation` field).

☞ Make sure that the compensation is matched if you use different RF cables (otherwise all the levels measured will be corrected wrongly).

Graphics Display in PASS Condition

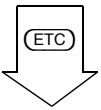
Use this menu item to enable or disable the output of test curves. Normally the numeric figures read out by the program will be enough for judging the condition of a mobile. But in some cases the test curves displayed by the system program, like the burst display, may contain important information. In the event of an error (inadmissible measured figures) these test curves appear on the monitor automatically or are included in the test report. If this happens when the measured figures are admissible, set the menu item to `(YES)` status.

Select Printer menu

No Printer

Choose this menu item if you only want the test report displayed on the monitor and not printed out. For the other menu items (except `Mem.Card`) there is no display of the report on the monitor.

HP-2225
Epson FX80
PT88



If you have one of these printers (with an IEEE interface), choose the corresponding menu item. This will also be the case if you operate one of these printers with a Centronics interface. But then you have to connect the IEEE/Centronics Interface (ordering code 860 190) between the Communication Test Set and your printer.

Mem. Card

If you choose this menu item, the Communication Test Set will write the test report to the memory card (RESULT.RES file). And the test report will also be displayed on the monitor. If you do not have access to a printer at any time, this is a way of saving for printout later on (see Chapter 8, "AUTORUN Test Reports").

RS232

If your Communication Test Set is fitted with the RS232/Centronics Interface option, you can use this menu item to arrange output of the report on any printer with an RS-232 interface. The following two menu items are for setting the communication protocol.

RS232 Config.

This allows the following settings:
- ❍ Number of data bits (7 or 8)
- ❍ Parity (even or odd)
- ❍ Number of stop bits (1 or 2)

RS232 Baudrate

This is for setting the baud rate (110 to 9600 bd).

Print Graphics En/Disabled

Choose `Disabled` if you do not want any graphics to appear in the printout of the test report. Then only ASCII characters will be transmitted to the printer. You should also choose this setting if your printer does not reproduce graphics correctly.

Test Environment menu

FM Deviation	Setting of the analog data deviation (necessary for measuring sensitivity on a mobile receiver). According to AMPS/EMPS specifications the default is 8 kHz.
SAT Deviation	With this menu item you define the permissible tolerance limits for the SAT deviation (analog) measured on a mobile (`lower limit` and `upper limit`). Normally the figure measured should be between 2 and 2.5 kHz. For space reasons this menu item was moved here from the `Limit Conditions` menu.
Set RF Power...	Choose the units for indication of the measured power in the test report (`Watt` or `dBm`).
...RX Distortion Analog Receiver Sens.	With this menu item you decide whether the AF distortion and the RF sensitivity of the mobile's receive path is to be measured in a full test. But only select `Include` if the AF signals are coupled out on the mobile (see "Test Setup"). If the program detects no AF signals, a message appears on the monitor telling you that the cable connection is missing.
...TX Distortion TX Deviation	With this menu item you decide whether the AF distortion of the mobile's transmit path and the frequency deviation of the mobile transmitter are to be measured in a full test. But only select `Include` if the AF signals are coupled out on the mobile (see "Test Setup"). Here too, the program will detect that the cable connection is missing.

Limit Conditions menu

Your entries in the `Limit Conditions` menu define the tolerance limits for digital tests. These limits determine whether the measured results are rated as `PASS` or `FAIL`.

Peak EVM	Limit for the maximum permissible, residual vector error (EVM: error vector magnitude; default = 40 %).
EVM in First 10 Symbols	Limit for the maximum permissible, average residual vector error, measured on the first ten symbols (default = 25 %).
Positive/Negative Phase Error	Limits for the maximum permissible, positive and negative phase error (default = ±25 deg).
Min./Max. Magnitude Error	Limits for the minimum/maximum permissible magnitude error referred to 100 % (defaults = 40 % and 25 %; this corresponds to a permissible magnitude of 60 to 125 %).
MAHO/BER Error RF Level	Minimum RF input level on the mobile at which the bit error rate and the field strength measured by the mobile (RSSI) must still be within specifications (default = –110 dBm). For details of this, refer to the operating instructions for the NADC MS Test system program, section "Mobile-Assisted Handoff (MAHO)".
BER Result Indicator	Permissible bit error rate (in %) for `PASS` condition.

Saving setups

Once you have made all your settings in the submenus of the SETUP menu, hitting (EXIT) (in the SETUP menu) produces the message:

```
Save Changes to Setup File (1-5)
```

Now you can start the save operation with the softkeys (1) through (5) (you are asked first, to make sure that existing setups are not overwritten by mistake). Note the settings of your setups in the table at the end of these operating instructions.

Hit (NOT SAVE) if the settings are not to be saved. In this case your settings are not lost, they are kept until the AUTORUN program is loaded again.

Regardless of which softkey you hit, the monitor will now show the selection menu again so that you can call up the different tests.

Testing Mobiles

Once you have carried out the general preparations, cabled up the mobile and the Communication Test Set correctly and created the required setup files, you are ready to start testing mobiles. Basically, each new test works as follows:

1) Load the required setup from the memory card.
2) Select system A or system B.
3) Select quick, full or individual test (individual test = choice of measurements from what is possible in a full test; see section "Individual test" below). The rest is handled by the AUTORUN program, and all you have to do is occasionally follow the instructions that appear on the monitor.

General notes on operation

Entries

While a test is going on, there are only a few entries that you have to make or things that you have to do:

- Acknowledge messages from the program with (CONTINUE) or abort execution of the program with (EXIT).
- Operate the SEND key on the mobile.
- Activate the MUTE function on the mobile (if possible).
- Speak into the microphone of the mobile (speech loop-back test).

Test report on monitor

If you have set output of a report on the monitor in the SETUP menu `Select Printer`, the program will halt every time that measured figures are rated (the program does not halt at these points if the report is printed out). Hit (CONTINUE) to proceed with the program.

Notes on various measurements

Most of the measurements require no explanation because they are executed automatically and you do not have to intervene. But if you would still like some background information, refer to the operating instructions for the NADC MS Test and EAMPS programs.

Registration

Registration of a mobile is made straight away at the beginning of the quick or full test. The program sees from the SCM message what kind of mobile it is and automatically matches the internal test conditions to it. If the SCM says that it is an analog mobile for instance, the program will omit digital tests. The result of registration is output on both the monitor and the printer.

Repeat registration

Once the quick or full test has been completed, you can start again right away, eg to test another mobile or put a mobile that has just undergone the quick test through the full test. In this case you are asked before registration:

```
New Registration?
```

Answer with (YES) if you have connected another mobile. Otherwise answer with (NO), because you must not register a mobile again that has already been registered.

SAT/ST measurement in full test

When the program reaches SAT and signal tone measurement in a full test, it tells you to activate the MUTE function on the mobile (message: `Press MUTE on Mobile if present`). This muting is necessary so that the measurements are not corrupted by ambient noise. If the mobile has no MUTE function, make sure that the mobile's microphone cannot pick up any noise from the surroundings.

Speech loopback test

The speech loopback test at the end of the quick and full test is the only test that you have to rate yourself. The program halts execution and reports:

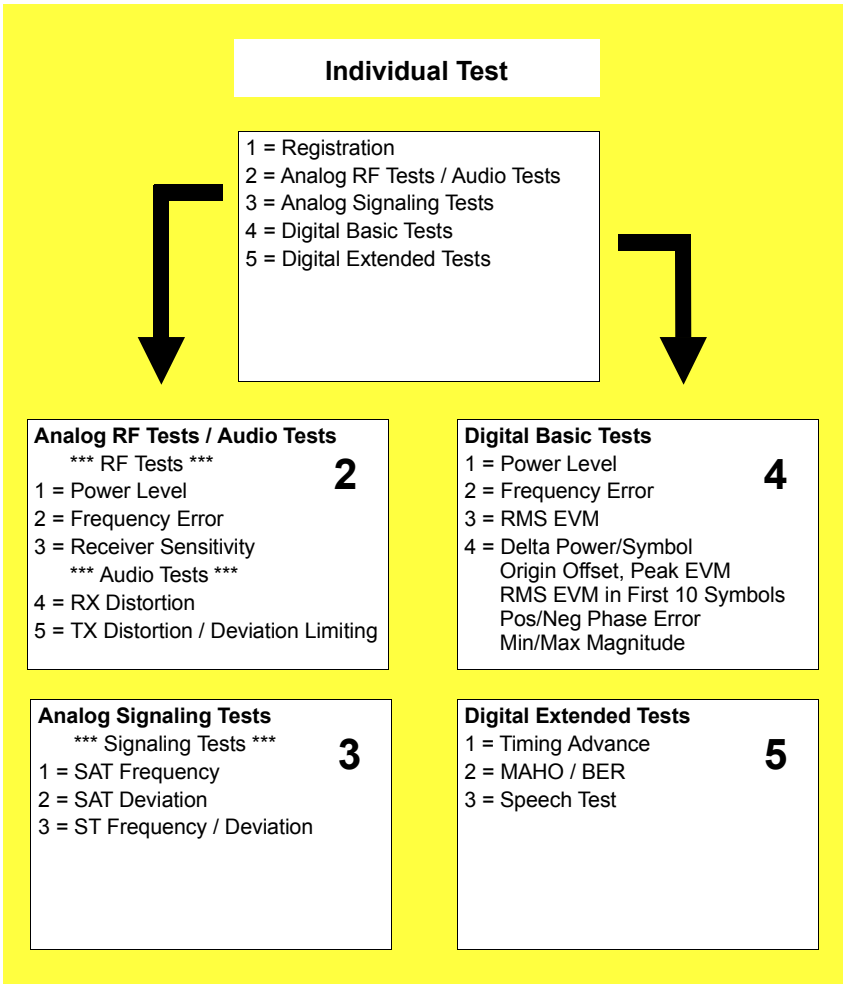
```
Speech Test is active the next 10 seconds
```

Once you have hit (CONTINUE) to carry on with the program, you have 10 s to speak into the mobile's microphone and check whether your voice is reproduced after a brief delay and free of distortion over the loudspeaker of the mobile.

After this pause the program tells you to rate the result with the softkey `PASS` or `FAIL`.

Individual test

An individual test allows you to call up a particular measurement. Unlike in the quick or full test, a call setup is made each time and then cleared down once the measurement has been carried out.



Test report

Here you see an extract from the test report for an NADC mobile that appears to be OK (quick test). At the end of the report (not included here) an overall assessment is made: this will obviously be `FAIL` if a measured figure is out of tolerance. If the report shows graphics, there can be two reasons: a measured value is out of tolerance, or you explicitly declared graphics output in the `General Setup` menu.

```
WAVETEK                    STABILOCK 4032
                           SERIAL NO.    1188344
QUICK-Test  Dual Mode Mobile Test

MS-Modell: ....................................

Name      : ....................................

Date      : ....................................

Note: RF Preattenuation = 0 dB
-------------------------------------------------
        Registration
-------------------------------------------------
        MIN:     1111110111
        SN :     82E2C8B9
                 130/14862521
        SCM:     3 D E 1
        Power Class  3  Extended     Digital
-------------------------------------------------
  Analog  Power Level Test
  PL        Limits          Results
-------------------------------------------------
  2       250 -1000         441.0000 mW      PASS
  3       100 - 400         190.0000 mW      PASS
  4        40 - 160          68.0000 mW      PASS
  5        16 -  64          25.0000 mW      PASS
  6       6.4 -  25          11.0000 mW      PASS
  7       2.5 -  10           6.0000 mW      PASS
-------------------------------------------------
  Analog  Frequency Error
  CH        Limits          Results
-------------------------------------------------
  101     +/- 1 kHz           0.0000 kHz     PASS
  330     +/- 1 kHz          -0.0100 kHz     PASS
  710     +/- 1 kHz           0.1400 kHz     PASS
 1010     +/- 1 kHz           0.1400 kHz     PASS


-------------------------------------------------
  Digital Power Level Test
  PL        Limits          Results
-------------------------------------------------
  2       250 -1000         437.0000 mW      PASS
  3       100 - 400         170.0000 mW      PASS
  4        40 - 160          75.9000 mW      PASS
  5        16 -  64          24.6000 mW      PASS
  6       6.4 -  25           8.9200 mW      PASS
  7       2.5 -  10           3.7200 mW      PASS
-------------------------------------------------
  Digital Frequency Error
  CH        Limits          Results
-------------------------------------------------
  101     +/- 200 Hz         -7.0000  Hz     PASS
  330     +/- 200 Hz        -11.0000  Hz     PASS
  710     +/- 200 Hz        -10.0000  Hz     PASS
 1010     +/- 200 Hz        -15.0000  Hz     PASS
```

Contents of Your Setup Files

	F1	F2	F3	F4	F5
Comments					
General Setup					
A Home System					
A FOCC					
A Analog TC					
A Digital TC					
B Home System					
B FOCC					
B Analog TC					
B Digital TC					
RF Test Level					
Loss of Test Cable					
Graphics (PASS)					
Select Printer					
Printer					
RS232 Data bits					
RS232 Parity					
RS232 Stop bit					
RS232 Baudrate					
Graphics En-/Disabled					
Test Environment					
FM Deviation					
SAT Dev. lower					
SAT Dev. upper					
Unit for RF Power					
RX Distortion					
TX Distort./Deviation					
Limit Conditions					
Peak EVM					
EVM First 10 Symbols					
Phase Error +/–					
Magnitude Min./Max.					
MAHO/BER RF Level					
BER Result Indicator					

Lifeline

The chronological lifeline tells you what modifications have been made to the software (SW) and the operating instructions. After a software update the lifeline helps you to find out quickly about all major changes (see code) in the updated operating instructions that are supplied.

Code: C = Correction, IN = Important Note, NF = New Feature

SW	Doc. Version	Δ pages	Code	Changes
1.13	9506-113-A	no		First edition.
	9507-113-B	10-3	C	Contents now in English language.