Nokia NetMonitor Manual

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by el.gambo

This is my new release (ver. 2.1a) of a NetMonitor manual for Nokia phones. It only contains the simple specifications for the great majority of screens. You can give suggestions and make corrections if necessary.

You can download this document (or new and improved version) from http://www.mob385.com
Also, there you can find descriptions of most interesting displays with some more details (in Croatian only).

Information Sources

Most of the info available at the moment comes from an official document from Nokia (rd843.txt).
Some things were added, based on personal experiences and friends contributions.

Phone Models/Software versions

31xx/81xx
Old phones NetMonitor has some differences when compared with the new models, but this manual can be used as a guide, because the overall working method and the info given by the phone is very similar. However, I won't get into more details about old/new phones NetMonitor differences.

51xx/6xxx/71xx/8xxx/9xxx/3xxx
This document covers the majority of menus from these phones NetMonitor. Some of them may have little differences, like missing/additional menus, different info, etc.

Activating the Field Test Display

The Field Test Display is located at the end of the main menu loop.
It is activated as follows:

- press the Menu button
- scroll in the main menu loop to field test display item (NETWORK MONITOR)
- press the Select button
- enter the index number of the test to be activated at the TEST NUMBER prompt
- confirm with the OK button

The field test data will then appear in a moment. The index number of the test will appear in the top right corner of the display. If given test number is not valid "No Test" -text will appear to the display.

A quicker way to activate the Field Test Display is to use the menu shortcut. The field test display is the last item in the main menu loop. The shortcut activation of the field test display is done in the following way:

MENU <number of the last item> <number of the desired field test display>

If the last number of the main menu loop is e.g. 8, in order to activate test display number 20, just press Menu, 8, 20 and OK in a sequence.

Deactivating the Field Test Display

The Field Test Display is deactivated as follows:

- press the Menu button
- scroll in the main menu loop to field test display item
- press the Select button
- enter 0 at the TEST NUMBER prompt
- confirm with the OK button

Signal and battery levels

When Field Test Display is active, normal signal and battery level bars are visible.

Reserving SIM SCM locations (recommendations)

When starting to use a SIM-card in a phone with field test displays, it is recommended to put some default data into SIM SCM locations that are used by field test displays. This prevents accidental storing of phone numbers and names into such locations. Displays 52 and 53 also write some data to SIM SCM locations 35 and 36 overwriting any previous data.

SIM SCM location	Recommended number	Recommended text (name)	Location used by display
31	65535	AUD DSP 1	71
32	65535	AUD DSP 2	72
33	0	BTS TEST	17
34	34		52, 53
35	35		52, 53
36	36		52, 53

Reserving SIM SCM locations is not necessary if the user is sure that he/she will never select these displays using menu shortcut (which executes the display).

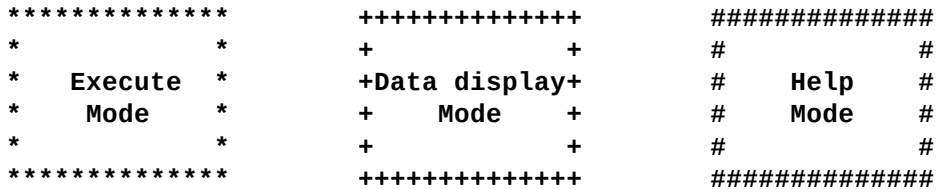
In DCT3 phones it is not possible to select the SIM location number where the number and the name will be stored. So, reserving a SIM location must be done by some PC software or, for example, by DCT2 phone.

Menu Modes

There are three Menu Display modes:

- execute mode
- data display mode
- help mode

Different modes are marked in this manual as follows:



The execute mode is entered from the menu by scrolling and selecting or shortcut. If the test index entered pertains to a test that resets a timer (test 80) for example, then the timer is reset as soon as the OK button has been pressed in the menu, and the data display mode takes over. In other words, the execute mode is of the one-shot type. To run another test in the execute mode, the Field Test Display menu must be re-activated.

During the data display mode, the field test data (e.g. carrier, power level, cell) is visible on the main display. During the help mode, one screen of instructions is shown for each test to make it easier to identify the test in question. A long press of asterisk (*) is used to toggle between these two modes.
(on some 3110 versions, the help screens follow the data display modes on the list)

The arrow keys (^,v) offer an easy way to switch to another test without using the menu. However, the data display mode remains, i.e. nothing will be executed or set on although such tests would be passed. This is to prevent the user from accidentally clearing any valuable data. (see 3.7.2 for details and 2.5 for recommendations).
The help mode is also a non-execute mode. Display numbers have been selected in such way that no 5-terminated test number is an execute display.

Display 1 – Serving cell info


```
++++++++++++++    ###############
+abbb ccc ddd+    #CH RxL TxPwr#
+ e ff g mmmm+    #TS TA RQ RLT#
+ nnn     ppp+    # C1      C2 #
+    oooo    +    #    CHT     #
++++++++++++++    ###############
```

a — H, if carrier numbers are scrolled when hopping is on. Otherwise ' '.

bbb — When mobile is on TCH: DCH carrier number in decimal.
When mobile is NOT on TCH: CH means carrier number in decimal.
If hopping is on, used channels are scrolled when display is updated.

ccc — RX level in dBm, minus sign not shown if <=-100

ddd — TX power level. If transmitter is on, symbol * is shown in front of the power level value (PL).

PL:	5	6	7	8	9	10	11	12	13	14	15
dB:	33	31	29	27	25	23	21	19	17	15	13
Watts:	2.0	1.3	0.8	0.5	0.3	0.2	0.13	0.08	0.05	0.03	0.02

These values can easily be calculated using the following formulas:
dB = 33 + (PL-5)*2 Watts = (2/1995) * (10^(dB/10))

e — Time Slot, range is 0 - 7

ff — Timing advance, range is 0 – 63

g — RX quality (sub), range is 0 - 7

mmmm — Radio Link Timeout value. If value is negative, 0 is shown.
Maximum value is 64. When mobile is NOT on TCH then xx is shown.

nnn — value of the path loss criteria (C1). Range is -99 - 999.

oooo — type of current channel:

- THR0 : TCH HR subchannel 0
- THR1 : TCH HR subchannel 1
- TFR : TCH FR
- TEFR : TCH EFR
- F144 : TCH FR data channel, speed 14.4 kbps
- F96 : TCH FR data channel, speed 9.6 kbps
- F72 : TCH FR data channel, speed 7.2 kbps
- F48 : TCH FR data channel, speed 4.8 kbps
- F24 : TCH FR data channel, speed 2.4 kbps
- H480 : TCH HR data channel, speed 4.8 kbps, subch 0
- H481 : TCH HR data channel, speed 4.8 kbps, subch 1
- H240 : TCH HR data channel, speed 2.4 kbps, subch 0
- H241 : TCH HR data channel, speed 2.4 kbps, subch 1
- FA : TCH FR signalling only (FACCH) channel
- FAH0 : TCH HR signalling only (FACCH) channel, subch 0
- FAH1 : TCH HR signalling only (FACCH) channel, subch 1
- SDCC : SDCCH
- AGCH : AGCH
- CCCH : CCCH
- CBCH : CCCH and cell broadcast receiving on
- BCCH : BCCH
- SEAR : SEARCH
- NSPS : MS is in No Serv Power Save state

ppp — Value of the cell reselection criteria (C2).
Range is -99 - 999. If phone is phase 1 then C1 value is shown.

Display 2 – More info about serving cell


```
++++++++++++++      ##############
+ aa b c Bdd +      #PM RAR Ro BC#
+ ee f       +      #RelR QLF    #
+ ggg hh iii +      #CRO TO PenT #
+ H=j mm nn  +      #H MAIO HSN  #
++++++++++++++      ##############
```

aa	Paging mode NO : normal paging EX : extended paging RO : paging reorganisation SB : same as before
b	Maximum number of Random Access retransmission
c	Roaming indicator, values are R or empty.
Bdd	Letter B and BSIC value, range is 0 - 63.
ee	Reason of last call release. This parameter is also present in test 63, you will find explanation there.
f	RX quality (full), range is 0 - 7
ggg	Cell reselect offset, range 0 - 126 dB. 0 - 63 * 2 dB. 'xxx' in active mode.
hh	Temporary offset, range 0 - 60 dB. 0 - 7 * 10 dB. 70 dB means infinite time. 'xx' in active mode.
iii	Penalty time, range 0 - 620 s. 0 - 31 * 20 s. 'xxx' in active mode.
j	Hopping channel 0 Single RF channel 1 RF hopping channel
mm	Mobile allocation index offset, MAIO Range: 00 to 63 / xx when H=0
nn	Hopping sequence number, HSN Range: 00 to 63 / xx when H=0

Display 3 – Serving cell, 1st and 2nd neighbour


```
++++++++++++++      ##############
+aaabbbcccddd+      #SCH C1 rx C2#
+aaabbbcccddd+      #1CH C1 rx C2#
+aaabbbcccddd+      #2CH C1 rx C2#
+    ef gh   +      #    1N 2N   #
++++++++++++++      ##############
```

1. row: serving cell information
2. row: 1. neighbour information
3. row: 2. neighbour information
4. row, ef: 1. neighbour information
4. row, gh: 2. neighbour information

aaa	Carrier number in decimal
bbb	C1 value, range is -99 - 999, displayed only in idle mode. Instead of C1 value, letter 'B' and BSIC value will be displayed in active mode.
ccc	RX level in dBm, minus sign not shown if <=-100
ddd	C2 value, range is -99 - 999
e,g	F is shown if cell is in a forbidden location area otherwise location is empty.
f,h	B is Barred, N is normal priority and L is low priority otherwise location is empty.

Display 4 – 3rd, 4th and 5th neighbour cells


```
++++++++++++++          ##############
+aaabbbcccddd+          #3CH C1 rx C2#
+aaabbbcccddd+          #4CH C1 rx C2#
+aaabbbcccddd+          #5CH C1 rx C2#
+  ef gh ij  +          #  3N 4N 5N  #
++++++++++++++          ##############
```

1. row: 3. neighbour information
2. row: 4. neighbour information
3. row: 5. neighbour information
4. row, ef: 3. neighbour information
4. row, gh: 4. neighbour information
4. row, ij: 5. neighbour information

aaa	Carrier number in decimal
bbb	C1 value, range is -99 - 999, displayed only in idle mode. Instead of C1 value, letter 'B' and BSIC value will be displayed in active mode.
ccc	RX level in dBm, minus sign not shown if <=-100
ddd	C2 value, range is -99 - 999
e,g,I	F is shown if cell is in a forbidden location area otherwise location is empty.
f,h,j	B is Barred, N is normal priority and L is low priority otherwise location is empty.

Display 5 – 6th, 7th and 8th neighbour cells


```
++++++++++++++          ##############
+aaabbbcccddd+          #6CH C1 rx C2#
+aaabbbcccddd+          #7CH C1 rx C2#
+aaabbbcccddd+          #8CH C1 rx C2#
+  ef gh ij  +          #  6N 7N 8N  #
++++++++++++++          ##############
```

1. row: 6. neighbour information
2. row: 7. neighbour information
3. row: 8. neighbour information
4. row, ef: 6. neighbour information
4. row, gh: 7. neighbour information
4. row, ij: 8. neighbour information

aaa	Carrier number in decimal
bbb	C1 value, range is -99 - 999, displayed only in idle mode. Instead of C1 value, letter 'B' and BSIC value will be displayed in active mode.
ccc	RX level in dBm, minus sign not shown if <=-100
ddd	C2 value, range is -99 - 999
e,g,i	F is shown if cell is in a forbidden location area otherwise location is empty.
f,h,j	B is Barred, N is normal priority and L is low priority otherwise location is empty.

Display 6 – Network selection display


```
##############
#LReg   1_For#
#1_Pre  2_For#
#2_Pre  3_For#
#3_Pre  4_For#
##############
```

This display shows the last registered network country code and network code as well as the codes for four forbidden networks and the first 3 preferred networks.

```
+++++++++++++
+aaabb  aaabb+
+aaabb  aaabb+
+aaabb  aaabb+
+aaabb  aaabb+
+++++++++++++
```

If three digit MNC is used (DCS1900), display looks different:

```
+++++++++++++
+aaabbbaaabbb+
+aaabbbaaabbb+
+aaabbbaaabbb+
+aaabbbaaabbb+
+++++++++++++
```

1. row: last registered network - 1st forbidden network
2. row: 1st preferred network - 2nd forbidden network
3. row: 2nd preferred network - 3rd forbidden network
4. row: 3rd preferred network - 4th forbidden network

aaa	Country code coded in BCD
bbb	Network code coded in BCD, third digit can be 'F'

Display 7 – System information bits for serving cell


```
++++++++++++++          ##############
+E A H C I BR+          #Serving Cell#
+a b c d e fg+          #System Info #
+ECSC 2Ter MB+          #Bits        #
+  h    i   j+          #            #
++++++++++++++          ##############
```

a 1 is shown if emergency calls are supported, else 0
b 1 is shown if attach-detach-procedure is allowed, else 0
c 1 is shown if half rate channels are supported, else 0
d 1 is shown if C2 values are broadcasted, else 0
e 1 is shown if system information 7 and 8 are broadcasted, else 0
f 1 is shown if cell broadcast is supported, else 0
g 1 is shown if re-establishment is supported, else 0

The following items are used only in dualband phones:

h In idle mode 1 is shown if Early Classmark (ECSC) sending is supported, else 0.
In dedicated mode (conversation) X is shown.
i In idle mode 1 is shown if 2-Ter messages are supported, else 0.
In dedicated mode (conversation) X is shown.
j MultiBand reporting decimal value (0,1,2,3) is shown if supported.
This is shown both in idle and dedicated mode.

The following is picked from Phase2+ ETSI GSM 05.08 version 5.4.0, Section 8.4.3 ""Additional cell reporting requirements for multi band MS"".

For a multi band MS the number of cells, for each frequency band supported, which shall be included in the measurement report is indicated by the parameter, MULTIBAND_REPORTING. The meaning of different values of the parameter is specified as follows:

Value	Meaning
0 (00)	Normal reporting of the six strongest cells, with known and allowed NCC part of BSIC, irrespective of the band used.
1 (01)	The MS shall report the strongest cell, with known and allowed NCC part of BSIC, in each of the frequency bands in the BA list, excluding the frequency band of the serving cell. The remaining positions in the measurement report shall be used for reporting of cells in the band of the serving cell. If there are still remaining positions, these shall be used to report the next strongest identified cells in the other bands irrespective of the band used.
2 (10)	The MS shall report the two strongest cells, with known and allowed NCC part of BSIC, in each of the frequency bands in the BA list, excluding the frequency band of the serving cell. The remaining positions in the measurement report shall be used for reporting of cells in the band of the serving cell. If there are still remaining positions, these shall be used to report the next strongest identified cells in the other bands irrespective of the band used.
3 (11)	The MS shall report the three strongest cells, with known and allowed NCC part of BSIC, in each of the frequency bands in the BA list, excluding the frequency band of the serving cell. The remaining positions in the measurement report shall be used for reporting of cells in the band of the serving cell. If there are still remaining positions, these shall be used to report the next strongest identified cells in the other bands irrespective of the band used.

Display 8 – Preferred network selection

In Nokia 6185/6188 it looks like follows:

```
++++++++++++++
+TADD TDROP  +
+TCOMP TTDROP+
+WW1 WW2 WW3 +
+            +
++++++++++++++
```

TADD - threshold to add a new active PN (raw value ex: 28 = Ec/Io at -14 dB), [TDROP] : threshold to drop an active PN (raw value ex: 32 = Ec/Io at -16 dB)
TCOMP - other threshold to add an active PN when a candidate PN becomes stronger than an active PN
TTROP - timer to drop a PN when power of this PN goes below TDROP
WW1 - value of the seach window for the active PN
WW2 - value of the seach window for the neighbour PN,[WW3]: value of the seach window for the remaining PN.

In Nokia 6210 it looks like follows:

```
++++++++++++++
+TS for Rx   +
+TS for Tx   +
+MainCh/PwrLv+
+            +
++++++++++++++
```

and is probably connected with HSCDS...

Display 9 – Preferred network selection

In Nokia 6185/6188 it looks like follows:

```
++++++++++++++
+006 330 270 +
+047 062 062 +
+342 102 030 +
+062 062 062 +
++++++++++++++
```

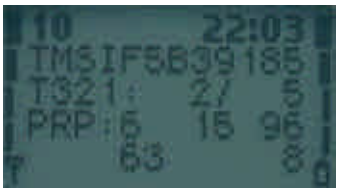
Tracked PN Offsets (lines 1,3) and EC/SO (Energy per chip per noise). An EC/SO of 062 likely means not really usable? lower numbers are better strengths). See test 2 for PN offset information.

In Nokia 6210 it looks like follows:

```
++++++++++++++
+MainCh/PwrLv+
+PwrLv TS 0-3+
+PwrLv TS 4-7+
+            +
++++++++++++++
```

and is probably connected with HSCDS...

Display 10 – Paging Repeat Period, TMSI, Location Update Timer, AFC and AGC




```
++++++++++++++        ##############
+TMSIaaaaaaaa+        #TMSI(hex)   #
+T321:bbb/ccc+        #T3212ctr/tim#
+PRP:d  ee ff+        #PaRP DSF AGC#
+ ggggg  hhh +        #  AFC   Ch  #
++++++++++++++        ##############
```

aaaaaaaa	TMSI value in hex format
bbb	Current value of T3212 counter (range is 000 - 'ccc', where 1 means 6 min time. So, if this value is 2 less than 'ccc' then next periodic location updating will be made within 2 * 6 min = 12 minutes.
ccc	Timeout value of T3212 counter (range is 000 - 240, where 1 means 6 min time between location updates and 240 means 240 * 6 min = 24 h between location updates. 000 means that periodic location update is not in use.) This value is received from the network.
d	Value of paging repeat period (range is 2 - 9, when paging is in every second multiframe, mobile takes more current than if it were in every 9th multiframe)
ee	Downlink signalling failure value. If value is negative, 0 is shown. Maximum value is 45. When mobile is on TCH then xx is shown.
ff	Gain value on TCH/SDCCH, range is 0 - 93
ggggg	VCTCXO AFC DAC control, range is -1024 - 1023
hhh	Serving cell channel number

Display 11 – Network parameters


```
++++++++++++++        ##############
+CC:aaa NCbbb+        # MCC    MNC #
+ LAC:ccccc  +        #LocAreaCode #
+ CH : dddd  +        #ServChannel #
+ CID:eeeee  +        #   CellId   #
++++++++++++++        ##############
```

aaa	MCC value in decimal (MCC = Mobile Country Code)
bbb	MNC value in decimal (MNC = Mobile Network Code) Three digits are shown only in DCS1900. In other systems only two digits are shown.
ccccc	LAC value in decimal (LAC = Location Area Code)
dddd	Serving cell channel number
eeeee	Cell Identifier in decimal format

Some software versions display LAC and CID differently. These can be shown in hex format or even both decimal and hexadecimal formats on the same line.

Display 12 – Ciphering, hopping, DTX Status and IMSI


```
++++++++++++++        ##############
+CIPHER :aaa +        #CipherValue #
+HOPPING:bbb +        #HoppingValue#
+DTX    :ccc +        #DTXValue    #
+IMSI   :ddd +        #IMSIAttach  #
++++++++++++++        ##############
```

aaa	Ciphering value, OFF/A51/A52
bbb	Hopping value, ON/OFF
ccc	DTX value ON/OFF
ddd	IMSI attach ON : IMSI attach on OFF : IMSI attach off

These values are updated only on the TCH.

Display 13 – Uplink DTX switching display


```
++++++++++++++          ##############
+aaaaaaaaaa  +          #DTXMode     #
+DTX(DEF):bbb+          #DefaulDTXSta#
+DTX(BS) :ccc+          #DTXValFromBS#
+            +          #            #
++++++++++++++          ##############
```

With this display it is possible to change MS to use DTX or not, if BS allows MS to decide it.

This display must be activated from MENU to change DTX state. When MENU is not active and the user is scrolling field test displays with NEXT and PREVIOUS, the DTX state will not change.

aaaaaaaaaa	Status of switched mode. DTX:ON: MS uses DTX DTX:OFF: MS does not use DTX DTX:DEF: MS use default state of DTX. Defined in MS_PAR.H NOTALLOWED: BS does not allow MS to decide if it uses DTX or not.
bbb	Default state of DTX. Defined in MS_PAR.H The value is either ON or OFF
ccc	DTX value from BS MAY : BS allows MS to decide if it uses DTX or not on uplink. USE : BS controls MS to use DTX (on uplink) NOT : BS controls MS not to use DTX (on uplink)

Display 14 – Toggle Screening Indicator

When selected, changes the value of Screening Indicator from 0 to 1 and vice versa.

```
**************          ##############
*  SCREENING *          #Use menu to #
*  INDICATOR *          #  change    #
*    IS xx   *          # Screening  #
*            *          # indicator  #
**************          ##############
```

xx = 00 or 01

Display 15 – AMPS display

In Nokia 5190/6190 it looks like follows:

```
++++++++++++++          ##############
+aaa bbb cccc+          #CH RxL TxPwr#
+ ddd eee f  +          #MdSt SAT DCC#
+  gg hh ii  +          #ST   TxA RxA#
+ jjjjjjjjj +          #  CS STATE  #
++++++++++++++          ##############
```

When you don't have additional module (it's between "main" phone and battery), you will see "AMPS display not available" here. After connecting it you will see values connected AMPS:

aaa	- channel used for communication with cell (0 during standby)
bbb	- level of received signal in dB
ccc	- level of the transmitted signal (0 during standby)
eee	- SAT, x during standby
f	- DCC (Digital Color Code) on the ACCH channel (0-3, - = not locked), x during standby
jjjjjjjjj	- cellular state:
	IDLE - standby
	CALL GOING - exchange of data required to make call
	IN CALL - during call
	PCH INIT - scanning available paging channels ? (for example, after call)
	CCH INIT - scanning control channels ?
	ACCESS - accessing network ?

In Nokia 6210 it looks like follows:

```
++++++++++++++
+Sent frames +
+Re-transmis.+
+Rec. frames +
+Re-send reqs+
++++++++++++++
```

Display 17 – Switch BTS_Test Status


```
**************        ###############
*            *        #Use menu to #
* BTS TEST   *        #toggle BTS  #
*    xx      *        #test ON/OFF #
*            *        #            #
**************        ###############
```

xx = ON or OFF

ON: Mobile is searching only one frequency. Neighbour measurements are not done.
OFF: Mobile is behaving normally. Neighbour measurements are done.

This display is used to toggle BTS_TEST status on EEPROM. If BTS_TEST status is set on EEPROM each time the mobile sends a search list it uses only the carrier number stored on SIM SCM-location 33. Also the neighbour information from system information messages is ignored. If the BTS_TEST status is not set, then the value of SIM SCM-location 33 is ignored and the mobile behaves normally (i.e. does the neighbour measurements according the GSM specifications).

To activate BTS tests perform following steps:

- Save desired channel number in SIM SCM-location 33.
- Select display 17 in execute mode
- Switch power off and on

If activation succeeded, there is text "BTS TEST ON" in display 17.

To deactivate BTS tests either select display 17 in execute mode or save number 0 in SIM SCM-location 33 and switch power off and on.

NOTE! The display does not show the value of BTS_TEST status in EEPROM. Although the value is set, BTS test can be off. If there is not legal carrier number in SIM location 33 (GSM: 1-124, DCS1800: 512-885) the display shows that BTS test is off. Also if the mobile was already registered to some carrier before switching BTS_TEST status, the display can show different value from the one in EEPROM.

Display 18 – Lights status control

Forces keyboard and display lights on/off while displaying any NetMonitor screen.

```
**************          ##############
*            *          #Use menu to #
*   LIGHTS   *          #  toggle    #
*    xx      *          #  lights    #
*            *          #  ON/OFF    #
**************          ##############
```

xx = ON or OFF

Display 19 – Toggle Cell Barred Status


```
##############
#Use menu to #
#toggle cell #
#barr status #
#DIS/ACC/REV #
##############
```

```
**************          **************          **************
*            *          *            *          *            *
* CELL BARR  *    or    * CELL BARR  *    or    * CELL BARR  *
* ACCEPTED   *          * REVERSE    *          * DISCARD    *
*            *          *            *          *            *
**************          **************          **************
```

This test is meant to be used when some cells are tested prior taking them into commercial use. By setting the barring on in the base station normal GSM phones will not try to register these barred cells. By selecting cell barring reversed, the MS will only use the cells to be tested. However, if at the same time it is wanted that MS will be capable to use normal network cell barring ignored can be set. Display 19 will show the cell barring mode.

NOTE! If a cell has been selected before barring state is changed the selected cell may have different barring state than what the display shows. After reselection the cell barring state is working for sure.

Display 20 – Charging status


```
++++++++++++++          ##############
+ aaa  bbbbb +          #BatVol ChMod#
+ Tccc  dddd +          #Btemp ChTime#
+ Ceee  Wfff +          #ChrgVol Pwm #
+ gggg  hhhh +          # Btyp  BFDC #
++++++++++++++          ##############
```

aaa Battery voltage in decimal, range is 0.00 - 9.99 V, decimal point is not shown; e.g. 7.19V is shown as 719 on the display

bbbbb Charging mode 5 digit symbol:

- xxxxx : Charger not connected or charging disabled.
- Charg : Charging.
- Maint : Maintenance charging.
- Faile : Failure.
- DisCh : Battery discharging going.
- InitC : EM charging is being initialised.
- BatCk : Battery testing is going.
- ChaCk : EM is checking charger.
- CelBr : Charging off because one or more cells broken inside battery.
- BSIFa : Charging off because of battery BSI measurement failed.
- TmpFa : Charging off because of battery NTC measurement failed.
- VolFa : Charging off because charger voltage measurement failed.
- CurFa : Charging off because charger current measurement failed.
- FastC : Fast charging going.
- FullM : Battery full and maintenance going.
- HotM : Battery hot and maintenance going.
- ColdM : Battery cold and maintenance going.
- TxOnC : TX on and Ni charging going.
- TxNoF : TX on, Ni charging going and battery is not full anymore.
- LithC : Charging of Lithium-ion battery.
- LiAFu : PWM level is below the battery full limit.
- LiFul : PWM has been below the battery full limit for a certain time that is specified for full battery.
- LiTxO : TX on and Li charging going.
- LNFTx : TX on, Li charging going and battery is not full anymore.
- ColdC : Cold charging.
- I_Che : Init checks.
- L_Che : Li charging checks.
- F_Che : Fast charging checks.
- M_Che : Maintenance charging checks.
- MaBFD : Maintenance BFD charging.
- LiDCH : Li-ion DCH charging.
- LiHot : Li-ion hot charging.

ccc Battery temperature in centigrade, from -30 to +90.

ddd Charging time. Format is HMM. Timer is automatically reset and started when charger is connected and stopped when battery is full or charger is disconnected.

eee Charger voltage in decimal, range is 0.0 - 18.7 V, decimal point is not shown.

fff Charge control output, decimal, range is 000 - 255.

gggg Lithium battery type (BSI value multiplied by 4), or NiMH battery size.

hhhh Battery full delay counter. When battery is getting full and charging current is less than predefined limit, this timer will be started. If timer reaches 0, charging will be stopped.

Display 21 – Constant voltage charging display

```
++++++++++++++          ##############
+ aaaa  bbbb +          #MTDif MPDif #
+ cccc  dddd +          #BupV  BDownV#
+ eeee  ffff +          #AverV SumMF #
+            +          #            #
++++++++++++++          ##############
```

aaaa Difference between measured voltage and goal voltage, decimal point is not shown.

bbbb Difference between measured voltage and result of previous measurement (basically same as using change of error), decimal point is not shown.

ccc Battery up voltage, maximum ripple voltage.

ddd Battery down voltage, minimum ripple voltage.

eee Average voltage.

fff Sum of membership function sets beliefs, range 0.00-9.99, decimal point is not shown; e.g. 1.53 is shown as 153. If sum of 1.00 is reached then battery full indication is given.

Display 22 – Battery full detection

```
++++++++++++++          ##############
+ Eaaa  Cbbb +          #DeriC ChAm  #
+ Dccc  Rddd +          # VDif VDrop #
+ Ieee  Afff +          # VDTi AvDif #
+ Tggg  hhhh +          # Temp Volt  #
++++++++++++++          ##############
```

Letters E, C, D, R, I, A, T and V are displayed constantly.

Eaaa DerivCount membership function set, range 0.00-1.00, decimal point is not shown; e.g. 0.23 is shown as 023.

Cbbb ChargeAmount membership function set, range 0.00-1.00, decimal point is not shown; e.g. 0.23 is shown as 023.

Dccc VolDiffToMax membership function set, range 0.00-1.00, decimal point is not shown; e.g. 0.23 is shown as 023.

Rddd VolDropCnt membership function set, range 0.00-1.00, decimal point is not shown; e.g. 0.23 is shown as 023.

Ieee VolDiffTime membership function set, range 0.00-1.00, decimal point is not shown; e.g. 0.23 is shown as 023.

Afff AverDiff membership function set, range 0.00-1.00, decimal point is not shown; e.g. 0.23 is shown as 023.

Tggg Temperature membership function set, range 0.00-1.00, decimal point is not shown; e.g. 0.23 is shown as 023.

Vhhh Voltage membership function set, range 0.00-1.00, decimal point is not shown; e.g. 0.23 is shown as 023.

Display 23 – Battery and phone state monitor


```
++++++++++++++          ##############
+ aaaa  bbbb +          #TxOn   TxOff#
+ cccc  dddd +          #ChCur  Stdby#
+eee fff gggg+          #Age CAP Curr#
+hhh iiiijjjj+          #Tmp CmAhTarg#
++++++++++++++          ##############
```

aaaa	TXon voltage, decimal point not shown (a.aaa mV)
bbbb	TXoff voltage, decimal point not shown (b.bbb mV)
cccc	Charging current, decimal point not shown (c.ccc mA)
dddd	Predicted standby level, decimal point not shown (d.ddd mV)
eee	Estimated age for Li-ion battery (0..100, 0=new, 100=old)
fff	Battery's percentage level (0..100)
gggg	Current consumption indicated by PSM (deci-mA)
hhh	Battery's temperature (C) (Only for Li battery)
iiii	Charged capacity (mAh) (into battery)
jjjj	Tells what is the next capacity target to reach next battery bar level (mAh)

Display 24 – Battery indicators

```
++++++++++++++          ##############
+ aaaa  bbbb +          #V_inst V_avg#
+ BSI:  cccc +          # BSI value  #
+ ET:   dddd +          #Elapsed time#
+ eeee  ffff +          #RST_m  RST_h#
++++++++++++++          ##############
```

bbbb	(Voltage average) average value of voltage from battery
ccc	(Battery Size Indicator) info connected with battery
dddd	how many minutes phone work from enabling (minutes)
eeee	(Rest Standby Time minutes) does phone estimate here, how long phone can be in standby up to next charging (minutes)
ffff	(Rest Standby Time hours) does phone estimate here, how long phone can be in standby up to next charging (hours)

Display 30 – Audio API register display

```
++++++++++++++          ##############
+ aaaa bbbb  +          #A1Cnf  A2Cnf#
+ cccc dddd  +          #  ST   AU3  #
+ eeee ffff  +          #1Tone  2Tone#
+ gggg hhhh  +          # Conf  HFVol#
++++++++++++++          ##############
```

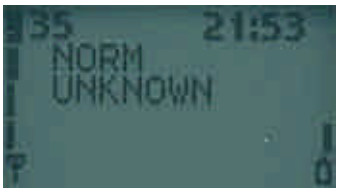
aaaa	API_AUD1_CTRL
bbbb	API_AUD2_CTRL
cccc	API_SIDETONE
dddd	API_AU3
eeee	API_1_TONE
ffff	API_2_TONE
gggg	API_CONFIG
hhhh	API_HF_VOL

Display 34 – FBUS display

```
+++++++++++++          ##############
+aaaaaa -    +          #CM LD LM NM #
+bbbbbbb- a -+          #PEC FEC OEC #
+cc          +          #ACC RXS TXS #
+H--         +          #Mod         #
+++++++++++++          ##############
```

aa	Current FBUS media in hex
bb	Last sender dev in hex
cc	Last sender media in hex
dd	Next media to be connected. Same as aa if the connection is not pending.
eee	FBUS parity error counter
fff	FBUS framing error counter
ggg	FBUS overrun error counter
hhh	FBUS alive check counter
iii	RX Sequence number
jjj	TX Sequence number
k	Phone mode: S = slave, H = host

Display 35 – Reasons for SW resets



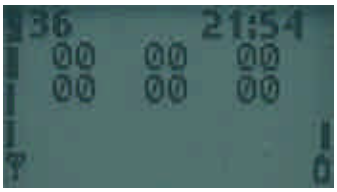

```
+++++++++++++          ##############
+aaaaa       +          #Reset reason#
+bbbbbbbb    +          #Task name   #
+            +          #            #
+            +          #            #
+++++++++++++          ##############
```

aaaaa Last reset reason.

- NORM : Probably normal power up.
- UNKNO : Default value, reset reason is unknown.
- HW WD : ASIC watchdog timeout.
- SWDSP : DSP recovery reset
- SWSIM : SIM contact failure reset
- SWIDL : Idle task not running reset
- STACK : Task stack overflow

bbbbbbbb Name of running task before reset.

Display 36 – Counters for resets




```
+++++++++++++          ##############
+ aa  bb  cc +          # UN  WD DSP #
+ dd  ee  ff +          #SIM IDL STK #
+            +          #   Reset    #
+            +          #  counters  #
+++++++++++++          ##############
```

aa	Unknown resets
bb	ASIC watchdog resets
cc	DSP recovery resets
dd	SIM contact failure resets
ee	Idle task not running resets
ff	Task stack overflow resets

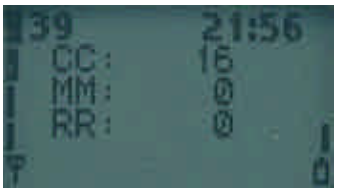
Display 38 – Memory dump

```
+++++++++++++        ##############
+aaaaaaaaaaaa+        #Memory dump #
+aaaaaaaaaaaa+        #            #
+aaaaaaaaaaaa+        #            #
+aaaaaaaaaaaa+        #            #
+++++++++++++        ##############
```

aaaa.... hex dump of 24 successive memory locations

The start address of the dump is entered as 6 digit address value into SIM alpha memory location #30.
An example: address 0x0C89AB -> enter 'name' 0C2089AB into SIM alpha memory location #30.
Dump address is changed only when field test display #38 is selected via menu, changing memory location #30 is not enough! This display will not be included in official software, but designers can use it for their own test purposes. Display can be switched on by defining flag DEV_FT_MEMORY_DUMP_IN_USE in ftd_conf.h.

Display 39 – Information about reasons for call clearing




```
+++++++++++++        ##############
+ CC: aaaa   +        #CC CauseValu#
+ MM: bbbb   +        #MM CauseValu#
+ RR: cccc   +        #RR CauseValu#
+            +        #            #
+++++++++++++        ##############
```

aaaa CC cause value, see section 10.5.4.11/GSM 04.08
'*' is shown in front of cause value if cause is made up by CC layer in MS
This parameter is also present in test 63, you will find explanation there.

bbbb MM cause value, see section 10.5.3.6/GSM 04.08
'*' is shown in front of cause value if cause is made up by MM layer in MS
2: IMSI unknown in HLR (SIM card not active in network)
3: illegal phone
4: IMSI unknown in VLR
5: phone's IMEI was not accepted
6: illegal ME
11: PLMN not allowed (you tried to log into network, which doesn't have roaming convention with your home network - your phone displays 'No access', when you try to select it manually
12: Location Area not allowed. You can check it in test 11
13: roaming not allowed in this Location Area
17: network failure
22: network congestion
32: service option not supported
33: service option not subscribed
34: service temporarily out of order
38: call cannot be identified

cccc RR cause value, see section 10.5.2.31/GSM 04.08
'*' is shown in front of cause value if cause is made up by RR layer in MS
0: normal release
1: unspecified
2: channel unacceptable
3: timer expired
4: no activity on the radio path
5: Pre-emptive release
8: handover impossible, TA out of range
9: channel mode unacceptable
10: frequency not implemented
65: call already cleared
97: message type not compatible with protocol state
101: no cell allocation available
111: protocol error unspecified

Display 40 – Reset handover counters

```
**************          ##############
*   RESET    *          #  Use menu  #
*  HANDOVER  *          #  to reset  #
*  COUNTERS  *          #  handover  #
*            *          #  counters  #
**************          ##############
```

With this display all timers of the handover display can be reset.

Display 41 (singleband) – Handover display

```
++++++++++++++          ##############
+HandOOK: aaa+          #HandOvOKCntr#
+PrevCh : bbb+          #PrevChanCntr#
+HONotOK: ccc+          #HandOvNOKCnt#
+HOIntra: ddd+          #HOIntraOKCnt#
++++++++++++++          ##############
```

aaa	Counter for successful handovers (max. amount 999)
bbb	Counter for successful back to previous channel attempts
ccc	Counter for failed handovers
ddd	Counter for successful intracell handovers or assignments (max. amount 999)

Counters will stop when they reach their maximum. To initialise the counters to zero, select display 40. Display 60 also initialises these counters.

Display 41 (dualband) – Handover display, INTER CELL


```
++++++++++++++          ##############
+ aaaa  bbbb +          #G>G InterD>D#
+ cccc  dddd +          #G>D  OK  D>G#
+eeefffggghhh+          #InterHoFail #
+iiijjjkkklll+          # BackToPrev #
++++++++++++++          ##############
```

aaaa	Counter of successful handovers (max 9999) from GSM to GSM
bbbb	Counter of successful handovers (max 9999) from DCS to DCS
cccc	Counter of successful handovers (max 9999) from GSM to DCS
dddd	Counter of successful handovers (max 9999) from DCS to GSM
eee	Counter for failed handovers (max 999) from GSM to GSM
fff	Counter for failed handovers (max 999) from DCS to DCS
ggg	Counter for failed handovers (max 999) from GSM to DCS
hhh	Counter for failed handovers (max 999) from DCS to GSM
iii	Counter of successful back to previous channel attempts (max 999) from GSM to GSM
jjj	Counter of successful back to previous channel attempts (max 999) from DCS to DCS
kkk	Counter of successful back to previous channel attempts (max 999) from GSM to DCS
lll	Counter of successful back to previous channel attempts (max 999) from DCS to GSM

Counters will stop when they reach their maximum. To initialise the counters to zero, select display 40. Display 60 also initialises these counters.

Display 42 (dualband) – Handover display, INTRA CELL

```
++++++++++++++          ##############
+ aaaa  bbbb +          #G>G IntraD>D#
+ cccc  dddd +          #G>D  OK  D>G#
+eeefffggghhh+          #IntraHoFail #
+iiijjjkkklll+          # BackToPrev #
++++++++++++++          ##############
```

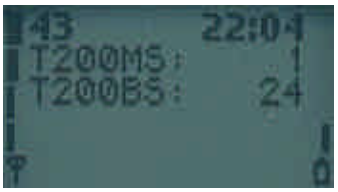
aaa Counter of successful INTRA CELL handovers (max 9999) from GSM to GSM
bbb Counter of successful INTRA CELL handovers (max 9999) from DCS to DCS
ccc Counter of successful INTRA CELL handovers (max 9999) from GSM to DCS
ddd Counter of successful INTRA CELL handovers (max 9999) from DCS to GSM

eee Counter of failed INTRA CELL handovers (max 999) from GSM to GSM
fff Counter of failed INTRA CELL handovers (max 999) from DCS to DCS
ggg Counter of failed INTRA CELL handovers (max 999) from GSM to DCS
hhh Counter of failed INTRA CELL handovers (max 999) from DCS to GSM

iii Counter of successful back to previous normal INTRA CELL channel attempts (max 999) from GSM toGSM
jjj Counter of successful back to previous normal INTRA CELL channel attempts (max 999) from DCS to DCS
kkk Counter of successful back to previous normal INTRA CELL channel attempts (max 999) from GSM to DCS
lll counter of successful back to previous normal INTRA CELL channel attempts (max 999) from DCS to GSM

Counters will stop when they reach their maximum. To initialise the counters to zero, select display 40. Also display 60 initialises these counters.

Display 43 - L2 display




```
++++++++++++++          ##############
+T200MS :aaaa+          #T200 MS GSM #
+T200BS :bbbb+          #T200 BS GSM #
+T200MS :cccc+          #T200 MS DCS #
+T200BS :dddd+          #T200 BS DCS #
++++++++++++++          ##############
```

aaaa GSM: Counts how many times T200 in MS has expired and therefore L2 transmission has been repeated.
bbbb GSM: Counts how many times T200 in BS (network) has expired and therefore L2 transmission has been repeated.
cccc DCS: Counts how many times T200 in MS has expired and therefore L2 transmission has been repeated. (for dualband phones)
dddd DCS: Counts how many times T200 in BS (network) has expired and therefore L2 transmission has been repeated. (for dualband phones)

Counters will stop when they reach their maximum. To initialise the counters to zero, select display 40. Display 60 also initialises these counters.

Display 44 – Toggle revision level

When selected, changes the value of Revision Level from 0 to 1 and vice versa.

```
**************          ##############
*            *          #Use menu to #
* REVISION   *          #  change    #
*LEVEL IS xx *          # Revision   #
*            *          #  Level     #
**************          ##############
```

xx = 01 or 02

Display 45 – Toggle transmitter functionality

When selected, disables transmitter functionality if enabled and vice versa. New setting is valid until next power off or until new execute of this display.

```
**************        ##############
*            *        #Use menu to #
*TRANSMITTER *        # enable or  #
*  xxxxxxxx  *        #  disable   #
*            *        #transmitter #
**************        ##############
```

xxxxxxxx = ENABLED or DISABLED

This FTD can be used to simulate easily situations when the MS can hear the network (i.e. receiving signal is good enough), but the network can not receive any messages from the MS.

Location updating attempts or MO call establishment attempts can be failed (random access failure) by this FTD and field testing of these failures is much easier now.

Next periodic location updating can be checked from the display 10 (chapter 3.1.10) by taking the difference of current T3212 counter value and T3212 timeout value.

Display 51 – SIM information


```
++++++++++++++        ###############
+aaa bbb ccc +        #VSel Bau SAl#
+ dddddddd   +        #SCond  CStop#
+ f g  hh ii +        #PIN12  PUK12#
+  j   kkkk  +        # ATR  FE/PE #
++++++++++++++        ###############
```

aaa	SIM voltage selection type (5, 3 or 3/5)
bbb	SIM baudrate (372, 64, 32 or 0)
ccc	Clock stop allowed, Yes or No
dddd	Clock stop condition, Up or down (preferred)
eee	Clock stopped, Yes or No (NOT IMPLEMENTED)
f	PIN1 attempts left (0,1,2,3)
g	PIN2 attempts left (0,1,2,3)
hh	PUK1 attempts left (0-10)
ii	PUK2 attempts left (0-10)
j	ATR retransmission counter (0-9)
kkkk	Transmission frame/parity errors, FE/PE + hexadecimal count

Display 52 – Reading datafield from SIM card

```
++++++++++++++          ##############
+ Read SIM-  +          # Use menu to#
+ data field +          # read SIM-  #
+ to SIM-SCM +          # data field #
+            +          # to SIM-SCM #
++++++++++++++          ##############
```

This display reads a binary datafield from SIM card to SIM SCM memory (SCM = Short Code Memory and it means phonebook on SIM card).

Prior using this display the identifier of datafield has to be stored as an alpha-identifier of SCM location number 34 of SIM memory. The datafield must be written in hexadecimal notation. The identifiers can be found from the GSM 11.11.

The contents of datafield is stored as a data-identifier of SCM location number 35 of SIM memory. The contents are displayed in hexadecimal notation. The maximum length of the datafield is 10 bytes, but the length depends on the name length of the SIM memory. In case the datafield cannot be read the alpha-identifier of SCM location is NOT DONE.

The information of how the read succeeded can be read from the SCM location 36 of SIM memory and on the display for a short period.

The following results are possible:

OK datafield was read correctly
NOT BINARY datafield is either formatted or cyclic
NOT FOUND datafield was not found from SIM card
CARD ERROR something weird happened, card did not respond as expected
NO RIGHTS not enough rights to read the datafield (PIN2,adm..)
NOT STORED could not store into the result memory place
NO ADDRESS could not read the address from the SCM-location
UNKNOWN unidentified error

For the time being following binary datafields exist in SIM. In future there could be more. All of these are not necessarily on all SIM cards.

2FE2 ICC identification (10 bytes)
6F05 Language preference (variable length)
6F07 IMSI (9 bytes)
6F20 Ciphering key Kc (it's read from card after entering PIN) (9 bytes)
6F30 PLMN selector (variable length)
6F31 HPLMN (home network ?) search period (1 byte)
6F37 ACM maximum value (3 bytes)
6F38 SIM service table (2-4 bytes)
6F41 Price per unit and currency table (5 bytes)
6F45 Cell broadcast message identifier selection (variable length)
6F74 Broadcast control channels (16 bytes)
6F78 Access control class (2 bytes)
6F7B Forbidden PLMNs (see test 7) (12 bytes)
6F7E Location information (TMSI, Local Area Information (consist of MCC, MNC & LAC - see test 11 for them), last Location Update status) (11 bytes)
6FAD Administrative data (variable length)
6FAE Phase identification (1 byte)
6F43 SMS status (variable length)

Next two binary datafields are phase 2+ features which are not currently in use

6F3E Group Identifier Level 1 (variable length)
6F3F Group Identifier Level 2 (variable length)

Display 53 – Writing datafield into SIM card

```
++++++++++++++          ##############
+    Write    +          # Use menu to#
+ data field  +          # write data  #
+from SIM-SCM+           #field to SIM#
+   to SIM    +          #             #
++++++++++++++          ##############
```

This display writes data for a binary datafield in SIM card by using data in SCM memory of SIM card.

Prior using this display the identifier of datafield has to be stored as an alpha-identifier of SCM location number 34 of SIM memory. The datafield must be written in hexadecimal notation. The identifiers can be found from the GSM 11.11. In addition the data to be stored into SIM card has to be entered as an alpha-identifier of SCM location number 35 of SIM memory. The data has to be stored in hexadecimal notation.

The result of write operation can be seen from the alpha-identifier of SCM-location 36 of SIM-memory and on the display for a short period.

The following results are possible:

OK datafield was read correctly
NOT BINARY datafield is either formatted or cyclic
NOT FOUND datafield was not found from SIM card
CARD ERROR something weird happened, card did not respond as expected
NO RIGHTS not enough rights to read the datafield (PIN2,adm..)
DATA ERROR the data contents in SCM location is coded wrongly
NOT STORED could not store into the result memory place
NO ADDRESS could not read the address from the SCM location
UNKNOWN unidentified error

If you want to see changes, often you have to restart your phone.

Display 54 – Block display 1

```
++++++++++++++          ##############
+aa bb  aa bb+          #ResF1  ResF2#
+aa bb  aa bb+          #ResF3  ResF4#
+aa bb  aa bb+          #ResF5  ResF6#
+aa bb  aa bb+          #ResF7  ResF8#
++++++++++++++          ##############
```

1. row: Block set 1, block set 2
2. row: Block set 3, block set 4
3. row: Block set 5, block set 6
4. row: Block set 7, block set 8

aa	Number of reserved blocks
bb	Number of free blocks in worst case

Display 55 – Block display 2

```
++++++++++++++          ##############
+aa bb  aa bb+          #ResF9 ResF10#
+aa bb  aa bb+          #ResF11ResF12#
+aa bb  aa bb+          #ResF13ResF14#
+aa bb  aa bb+          #ResF15ResF16#
++++++++++++++          ##############
```

1. row: Block set 9, block set 10
2. row: Block set 11, block set 12
3. row: Block set 13, block set 14
4. row: Block set 15, block set 16

aa Number of reserved blocks
bb Number of free blocks in worst case

Display 56 – Block display 3

```
++++++++++++++          ##############
+ aaaaaa bbb +          # Ptr   Cntr #
+ cccccccc   +          # Task       #
+            +          #            #
+            +          #            #
++++++++++++++          ##############
```

aaaaaa Pointer to memory where double deallocation was called, in hex format.
bbb Counter for failed deallocations.
cccccccc Name of task which last tried to double deallocate a block.

Note: This display is only valid when the counter for failed deallocations is not zero.

Display 57 – Memory status before reset

```
++++++++++++++          ##############
+aaaaaaaaaaaa+          # Status of  #
+aaaaa...     +          # stacks     #
+bbbbbbbb     +          # Block sets #
+             +          #            #
++++++++++++++          ##############
```

aaaaaa Status of each stack before reset. First position contains the status of stack 0, second position the status of stack 1 and so on. The last position contains the status of System stack. Number of stacks depends on the current configuration of SW. Possible values for each stack are:

0 : status OK, no overflow
1 : status not OK, stack overflow,

bbbbbbb Status of each block set before reset. First position contains the status of block set 1, second position the status of block set 2 and so on. Possible values for each block set are:

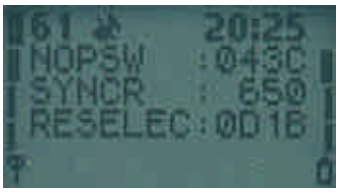
0 : status OK
1 : block set full
2 : (de)allocation error or total memory corruption

Display 60 – Reset counters to zero


```
**************          ##############
* FIELD TEST *          #Use menu to #
*  DISPLAY   *          #reset field #
*  COUNTERS  *          #test display#
*   RESET    *          # counters   #
**************          ##############
```

With this display all counters of the field test display can be reset (i.e. all counters in 40 and 60 series).

Display 61 (singleband) – Search and reselection counter display




```
++++++++++++++        ##############
+NOPSW  :aaaa+        #PSWMesgCntr #
+SYNCR  :bbbb+        #SyncMeasCntr#
+RESELEC:cccc+        #CellReselCtr#
+            +        #            #
++++++++++++++        ##############
```

aaaa Counter for MDI_NO_PSW_FOUND message received from DSP in hexadecimal form.
bbbb Counter for synchronisation measurement attempts in decimal form. If counter value is over 9999 then four x are shown.
cccc Counter for cell reselections in hexadecimal form.

On power off the values of the counter displays are stored onto the EEPROM, where they will be read during power on. To initialise the counters to zero, select display 60. These counters are automatically reset to zero when they exceed their maximum value.

Display 61 (dualband) – Search and reselection counter display

```
++++++++++++++        ##############
+aaaaa  bbbbb+        #NOPswGSM DCS#
+ccccc  ddddd+        #Sync GSM DCS#
+eeeee  fffff+        #reselG>G D>D#
+ggggg  hhhhh+        #reselG>D D>G#
++++++++++++++        ##############
```

aaaaa GSM counter for MDI_NO_PSW_FOUND message received from DSP in decimal form (max 99999).
bbbbb DCS counter for MDI_NO_PSW_FOUND message received from DSP in decimal form (max 99999).
ccccc GSM counter for synchronisation measurement attempts in decimal form.
If counter value is over 99999 then five x are shown.
ddddd DCS counter for synchronisation measurement attempts in decimal form.
If counter value is over 99999 then five x are shown.
eeeee Counter for GSM->GSM cell reselections in decimal form (max 99999).
fffff Counter for DCS->DCS cell reselections in decimal form (max 99999).
ggggg Counter for GSM->DCS cell reselections in decimal form (max 99999).
hhhhh Counter for DCS->GSM cell reselections in decimal form (max 99999).

On power off the values of the counter displays are stored onto the EEPROM, where they will be read during power on. To initialise the counters to zero, select display 60. Counters are automatically reset to zero when they exceed their maximum value.

Display 62 – Neighbour measurement counter display


```
++++++++++++++        ##############
+ PSW  :aaaa +        #NeghbrPSWCtr#
+ SYNCR:bbbb +        #SyncMeasCntr#
+ BCCH :cccc +        #BCCHMeasAtmp#
+ BCCHE:dddd +        #BCCHExtMeAtm#
++++++++++++++        ##############
```

aaaa Counter for neighbour PSW measurement attempts
bbbb Counter for neighbour synchronisation measurement attempts
cccc Counter for neighbour BCCH measurement attempts
dddd Counter for neighbour BCCH Ext measurement attempts

Counter values are shown in hexadecimal form.
On power off the values of the counter displays are stored onto the EEPROM, where they will be read during power on. To initialise the counters to zero, select display 60. Counters are automatically reset to zero when they exceed their maximum value.

Display 63 – Call attempts counters


```
++++++++++++++        ##############
+  aa    bb  +        #CalRel RelDi#
+  ccc   ddd +        #MOCAtmp MOOK#
+  eee   fff +        #AllMT   MTOK#
+            +        #            #
++++++++++++++        ##############
```

aa Reason of last call release
1: unassigned (unallocated) number
3: no route to destination
8: operator determined barring
16: normal end of call
17: user busy:
if it was outgoing call, dialled number was busy (phone even displayed 'Number busy')
if it was incoming call, a man, who dialled to you, heard busy signal - you were speaking or you rejected it
18: no user responding
19: user alerting (phone displayed 'No answer') or when incoming call was diverted to voice mailbox, no answer
21: call rejected: phone wasn't in network coverage (message 'No coverage network'), when you tried to make call, or you tried to call to non existing phone number or you heard busy signal
22: number changed
27: destination out of order
28: invalid number format/number incomplete. Phone displayed 'Invalid phone number'
31: unspecified. It seems, that with this error connection is end by network (for example, when it's overcharged). Shown sometimes too, when you call for not supported for some tariffs numbers.
34: no circuit/channel available to make call. Phone displayed 'Network busy'.
38: network out of order
41: temporary failure
42: switching equipment congestion (message "Network busy")
44: requested channel not available
47: resource unavailable. Phone displayed 'Error in connection' for example because of empty battery
50: requested facility not subscribed. Message "Check operator services".
65: bearer service not implemented
68: ACM equal to or greater than ACMmax
69: requested facility not implemented
79: error with message 'Check operator services'. You have it, when you enable ALS (Alternative Line Service) function, don't have second number on SIM card, select it and try to make call
88: incompatible destination
111:'Error in connection'

bb Direction of last call release
UN : Unknown
MO : Mobile originated
MT : Mobile terminated
IN : Internal (ME CS sw)

ccc Count of all MO call attempts made

ddd Count of succeeded MO calls

eee Count of all call setups received

fff Count of succeeded MT calls

On power off the values of the counter displays are stored onto the EEPROM, where they will be read during power on. To initialise the counters to zero, select display 60. Counters are automatically reset to zero when they exceed their maximum value.

Display 64 – Location Update attempts counters


```
++++++++++++++        ##############
+ aa bbb ccc +        #Nfai NL NLOK#
+ dd eee fff +        #PFai PL PLOK#
+           +        # Loc update #
+           +        #  counters  #
++++++++++++++        ##############
```

aa	Reason of last normal location update failure
bbb	Count of normal location update attempts
ccc	Count of succeeded normal location updates
dd	Reason of last periodic or IMSI attach location update failure
eee	Count of all periodic and IMSI attach location update attempts
fff	Count of succeeded periodic and IMSI attach location updates

On power off the values of the counter displays are stored onto the EEPROM, where they will be read during power on. To initialise the counters to zero, select display 60.
Counters are automatically reset to zero when they exceed their maximum value.

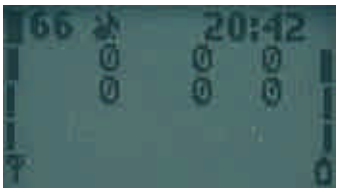
Display 65 - SMS attempts counters


```
++++++++++++++        ##############
+ aa bbb ccc +        #SFai MO MOOK#
+ dd eee fff +        #RFai MT MTOK#
+ gggg       +        #Sched Msgs  #
+           +        #SMS counters#
++++++++++++++        ##############
```

aa	Reason of last sending failure 1: 'Number not in use' 21: 'Message not sent this time'. This error happens, when you try to send messages from prepaid card without this possibility, when you send message for incorrect number (SMSC is correct), SMSC is blocked on your network or when you send SMS with alphanumeric number over SMSC, which doesn't support it. 28: 'Number not in use' 38: 'Message not sent this time'. Error with sending message during SMSC blocked on your network. 42: probably phone shows this error, when used SMSC is overworked (too many sent messages in the same time) and can't send your message in this moment 50: 'Check operator services'. Error displayed after sending SMS from some prepaid cards without this possibility. 96: 'Message sending failed'. The reason is wrong number of SMSC 111: 'Message sending failed'. The reason is wrong target number or wrong number of SMSC 166: 'Message sending failed'. Displayed when SMSC number was wrong or SMSC is blocked for your network 178: 'Message sending failed'. Error displayed after sending SMS from some prepaid cards without this possibility 252: 'Message sending failed'. Displayed, when phone's transmitter was disabled in test 45 or phone can't find network (when BTS test in test 17 was enabled on channel without network) 253: 'Message sending failed'. Displayed, when SMSC number was wrong
bbb	Count of all MO short message attempts
ccc	Count of succeeded MO short message attempts
dd	Reason of last receiving failure 22: full memory for SMS messages
eee	Count of all MT short message attempts
fff	Count of succeeded MT short message attempts
gggg	Count of all received cell broadcast schedule messages

On power off the values of the counter displays are stored onto the EEPROM, where they will be read during power on. To initialise the counters to zero, select display 60. Counters are automatically reset to zero when they exceed their maximum value.

Display 66 - SMS timeout counters




```
++++++++++++++        ##############
+ aaa bbb cc +        #TR1 TR2 TRA #
+ ddd eee ff +        #TC1 TC2 SCH #
+            +        #SMS timeout #
+            +        #  counters  #
++++++++++++++        ##############
```

aaa	Counter for TR1M timeouts
bbb	Counter for TR2M timeouts
cc	Counter for TRAM timeouts
ddd	Counter for TC1M timeouts
eee	Counter for TC2M timeouts
ff	Counter for CB schedule timeouts

On power off the values of the counter displays are stored onto the EEPROM, where they will be read during power on. To initialise the counters to zero, select display 60. Counters are automatically reset to zero when they exceed their maximum value.

Display 70 - Temporary counters of DSP

```
++++++++++++++        ##############
+ aaaa bbbb  +        # Temporary  #
+ cccc dddd  +        #DSP counters#
+ eeee ffff  +        #(R DSP2FTD) #
+ gggg hhhh  +        #            #
++++++++++++++        ##############
```

aaaa	Contents of API memory location r_dsp2ftd+0 in hex format
bbbb	Contents of API memory location r_dsp2ftd+1 in hex format
cccc	Contents of API memory location r_dsp2ftd+2 in hex format
dddd	Contents of API memory location r_dsp2ftd+3 in hex format
eeee	Contents of API memory location r_dsp2ftd+4 in hex format
ffff	Contents of API memory location r_dsp2ftd+5 in hex format
gggg	Contents of API memory location r_dsp2ftd+6 in hex format
hhhh	Contents of API memory location r_dsp2ftd+7 in hex format

The display is to be used by special debugging DSP SW which can put some useful information to the memory locations on API RAM. When this display is selected then MCU copies the contents of those memory locations into display with format specified above.

Display 71 - Control DSP audio enhancements 1

```
**************        ##############
*AUDIO       *        #Use menu to #
*ENHANCEMENT *        #control DSP #
*DISPLAY 1   *        #   audio    #
*    XXXXX   *        #enhancements#
**************        ##############
```

XXXXX Control word for DSP Audio Enhancements in decimal format.
The control word is sent to the DSP in mdi audio configure message.

Prior using this display the control word must be written to location 31 of SIM-card in decimal format.

When the display 71 is chosen from the menu, (EXECUTE MODE) the control word is sent to the DSP in mdi audio configure message immediately. Mdi audio configure message is also sent every time when this display is entered using arrow keys and previous display was 72.

Used together with display 72, this display makes rapid on/off switching of audio DSP algorithms possible. Switching with arrow keys is possible only after this display or display 72 has been selected from the menu. This prevents accidental on/off switching of algorithms when browsing displays by arrow keys. Entered values are not saved to EEPROM.

Display 72 - Control DSP audio enhancements 2

```
**************        ##############
*AUDIO       *        #Use menu to #
*ENHANCEMENT *        #control DSP #
*DISPLAY 2   *        #   audio    #
*    XXXXX   *        #enhancements#
**************        ##############
```

XXXXX Control word for DSP Audio Enhancements in decimal format.
The control word is sent to the DSP in mdi audio configure message.

Prior using this display the control word is written to SCM-location 32 of SIM-card in decimal format.

When the display 72 is chosen from the menu, (EXECUTE MODE) the control word is sent to the DSP in mdi audio configure message immediately. Mdi audio configure message is also sent every time when this display is entered using arrow keys and previous display was 72.

Used together with display 71, this display makes rapid on/off switching of audio DSP algorithms possible. Switching with arrow keys is possible only after this display or display 71 has been selected from the menu. This prevents accidental on/off switching of algorithms when browsing displays by arrow keys. Entered values are not saved to EEPROM.

Display 73 - Generic display for DSP Audio Enhancements

```
++++++++++++++    Example display:   ++++++++++++++
+ aaa bb  aaa+                       + 101 00  408+
+cccc bb cccc+                       +BCDE 88 7FFF+
+cccc bb cccc+                       +0001 FF 0003+
+ cccc cccc  +                       +  DEAD DEFA +
++++++++++++++                       ++++++++++++++
```

aaa	General dB value, e.g. signal level in dB. decimal point and sign is not shown, ie. -10.5 is show 105.
bb	General byte value, used for combined flags. Value is in hex format.
cccc	General hex value.

The display is reset and restarted when call is taken (if FT display counters are enabled). When call is terminated the display is frozen to show last values. Display values will not be saved to the EEPROM.

HELP display:

```
##############
#DB1  B1  DB2#
#HEX1 B2 HEX2#
#HEX3 B3 HEX4#
#  HEX5 HEX6 #
##############
```

Display 74 - DSP audio enhancements 1 (DRC)

```
++++++++++++++    Example display:   ++++++++++++++
+  aaa  bbb  +                       +  101  408  +
+       ccc  +                       +       480  +
+  dd    ee  +                       +  01    03  +
+           +                       +           +
++++++++++++++                       ++++++++++++++
```

aaa	Downlink signal level in dB, calculated using DRC level measuring block. Decimal point and sign is not shown, ie. -10.5 is show 105.
bbb	Uplink signal level in dB, calculated using DRC level measuring block. Decimal point and sign is not shown, ie. -10.5 is show 105.
ccc	Background noise signal level in dB, calculated using DRC level measuring block, decimal point and sign is not shown, ie. -10.5 is show 105.
dd	Downlink DRC table value, shown in decimal integer, two digits.
ee	Uplink DRC table value, decimal integer, two digits.

The display is reset and restarted when call is taken (if FT display counters are enabled). When call is terminated the display is frozen to show last values. Display values will not be saved to the EEPROM.

HELP display:

```
##############
#DSigL USigL #
#      NseLvl#
# DTbl  UTbl #
#            #
##############
```

Display 75 - Audio path status

```
++++++++++++++        ##############
+Mod:aaaaaaaa+        #ExtAudStatus#
+AudReq: bbbb+        #AudioRequest#
+AccMod: cccc+        #AccessoryMod#
+H2Path: dd  +        #HFU2Path    #
++++++++++++++        ##############
```

aaaaa	External audio status, values are: HP, HF, HEADSET, EXT and HP_OFFHO
bbbb	Audio_request bitmap in hex, contents (masks) are specified in AUD_DATA.H
cccc	Accessory audio mode
dd	HFU-2 path

Display 76 - Ear (= downlink) audio display

```
++++++++++++++    Example display:   ++++++++++++++
+ Vaa  Pbbb  +                       + V0A  P125  +
+ Cccc CAddd +                       + C000 CA001 +
+PAeee       +                       +PA353       +
+            +                       +            +
++++++++++++++                       ++++++++++++++
```

aa	Volume level.
bbb	Peak value of downlink audio signal during last frame in dB, decimal point and sign is not shown, ie. -10.5 is show 105.
ccc	Cut off counter value of last frame. This counter counts how many samples are saturated during last frame.
ddd	Moving average of cut off counter, decimal point and sign is not shown, ie. -10.5 is show 105.
eee	Moving average of peak levels.

The display is reset and restarted when call is taken (if FT display counters are enabled). When call is terminated the display is frozen to show last values. Display values will not be saved to the EEPROM.

HELP display:

```
##############
#EVol PeakVal#
#CutOff COAve#
#PkAver      #
#            #
##############
```

Display 77 - Microphone (= uplink) audio display

```
++++++++++++++    Example display:   ++++++++++++++
+ Paaa  Abbb +                       + P303  A225 +
+ Cccc CAddd +                       + C023 CA003 +
+            +                       +            +
+            +                       +            +
++++++++++++++                       ++++++++++++++
```

aaa Peak value of uplink audio signal during last frame in dB decimal point and sign is not shown, ie. -10.5 is show 105.

bbb Moving average of peak levels, decimal point and sign is not shown, ie. -10.5 is show 105.

ccc Cut off counter value of last frame. This counter counts how many samples are saturated during last frame.

ddd Moving average of cut off counter

The display is reset and restarted when call is taken (if FT display counters are enabled). When call is terminated the display is frozen to show last values. Display values will not be saved to the EEPROM.

HELP display:

```
###############
#MicPeak MAve#
#CutOff COAve#
#            #
#            #
###############
```

Display 78 - DSP audio enhancements (AEC)

```
++++++++++++++        ###############
+aaa bbb ccc +        #EAA Ada ERL #
+ddd eee fff +        #RxG TxG GLi #
+ggg h i jjj +        #TxN Sta Mod #
+ kkkk llll  +        # RVAD TVAD  #
++++++++++++++        ###############
```

aaa Electro-acoustic attenuation of echo from DSP point of view in dB. Decimal point and sign is not shown. E.g. -10.5dB would be displayed as "105", -0.5 dB would be displayed as " 5". 20*log10(Q15)

bbb Adaptive attenuation of echo. Decimal point is not shown. 20*log10(Q15)

ccc Total echo return loss. Decimal point is not shown.
20*log10(Q15)

ddd RX attenuator gain in dB. Decimal point and sign is not shown.
20*log10(Q15 aec_rx_gain)

eee TX attenuator gain in dB. Decimal point and sign is not shown.
20*log10(Q15 aec_tx_gain)

fff Gain limit for RX and TX. Decimal point and sign is not shown.
20*log10(Q15 aec_gain_limit)

ggg TX noise level in dB. Decimal point and sign is not shown. 20*log10(Q15 aec_tx_noise)

h Adaptive filter status. (Q0 aec_nlms_state) (bit UPDATE << 2) | (bit NLMS2 << 1) | (bit NLMS1)

I Comfort noise generation (0 or 1) (Q0 AEC_TX_COMF_GEN)

jjj AEC mode. (byte Q0 s_AEC_mode)

kkkk Shows 16 last RX VAD decisions in HEX format.
Hex(Q0 aec_rx_vadreg)

Llll Shows 16 last TX VAD decisions in HEX format.
Hex(Q0 aec_tx_vadreg)

Display 79 - Audio equalizer display

```
++++++++++++++    Example:    ++++++++++++++          ##############
+aaaaa bbbbb +                +12345 54321 +          #MiCutB MiCTA#
+ccccc ddddd +                + 2353 46187 +          #EpCutB EPCTA#
+-ee.e -ff.f +                +-46.5 -27.4 +          #MicLev EarLv#
+            +                +            +          #            #
++++++++++++++                ++++++++++++++          ##############
```

aaaaa	Saturated samples before microphone equalizer in decimal 16 bit unsigned integer format.
bbbbb	Saturated samples after microphone equalizer in decimal 16 bit unsigned integer format.
ccccc	Saturated samples before earpiece equalizer in decimal 16 bit unsigned integer format.
ddddd	Saturated samples after earpiece equalizer in decimal 16 bit unsigned integer format.
-ee.e	Level of the microphone signal level detector in dB format. Requires log10 function in MCU. 16 bit signed value in DSP, 0 dB = 32768.
-ff.f	Level of the signal after earpiece equalizer in dB format. Requires log10 function in MCU. 16 bit signed value in DSP, 0 dB = 32768.

The display is reset and restarted when call is taken. When call is terminated the display is frozen to show last values. Display will not be saved to EEPROM. Saturated sample counters aaaaa - ddddd are counted in DSP and only the new counter value is sent to MCU. The microphone and earpiece signal levels are calculated in DSP and it sends the linear values to MCU which makes the linear to dB transformation (20*log10(x)) for the level values.

Display 80 - Reset and restart timers


```
**************        ##############
*            *        #  Use menu  #
*   TIMERS   *        #  to reset  #
*   RESET    *        # field test #
*            *        #   timers   #
**************        ##############
```

With this display all timers of the display 82 can be reset.
These timers will be automatically reset after the battery has been fully charged and the charger is disconnected. Thus it's not always necessary to use the display 80.

Display 81 - Enable or disable timers

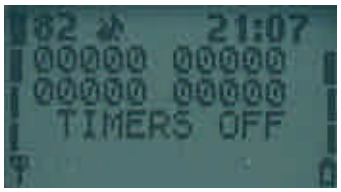

```
**************
*            *
*   TIMERS   *
*  XXXXXXXX  *   XXXXXXXX    ENABLED or DISABLED
*            *
**************
```

This display will start or stop the timers.
On power off the values of the timer displays are stored onto the EEPROM, where they will be read during power on. To initialise the counters to zero, use display 80. Timers will be automatically disabled when recharge battery message is reached.
Also the current state of timer disabling/enabling is stored onto the EEPROM.

HELP display:

```
##############
#Use menu to #
#control test#
#  display   #
#  timers    #
##############
```

Display 82 - Test timer display




```
++++++++++++++        ##############
+aaaaa bbbbb +        #PwrOn InServ#
+ccccc ddddd +        #NSPS  TxON  #
+ TIMERS eee +        #   Timers   #
+            +        #   Status   #
++++++++++++++        ##############
```

aaaaa	Timer for how long the phone has been powered on
bbbbb	Timer for how long the phone has been in service
ccccc	Timer for NO-SERV POWER-SAVE state
ddddd	Timer for how long the transmitter has been on
eee	State of timers, ON/OFF

All the values are shown in one minute resolution. The accuracy of the timers is about one second. The display uses following format for timers:
HHHMM where HHH is hours and MM is minutes.
All timers of this display will be reset if the charger is disconnected from the mobile with fully charged battery. The maximum value of the timers is 99 h 59 min. When 'powered on' timer has reached value 9959, all timers will be stopped.
NOTE: When the maximum usage time of the phone is required (e.g. idle time measurement) then ALL field test displays must be deactivated!

Display 83 - Control of task information displays

```
**************
*            *
* SHOW TASK  *
* XXXXXXXXX  *   XXXXXXXXX is "STACKS", "MSG BUFS" or "FAST BUFS"
*            *
**************
```

Shows what information about tasks is currently shown in displays 84 - 87.

To select the type of information select this display via menu.
Type is changed in order STACKS -> MSG BUFS -> FAST BUFS -> STACKS.
So, if STACKS is currently displayed and you want to see FAST BUFS, you have to select this display twice via menu.

"STACKS"	shows free stack space in worst case.
"MSG BUFS"	shows the peak number of pending messages.
"FAST BUFS"	shows the peak number of pending fast messages.

HELP display:

```
##############
#Use menu to #
#select shown#
# task info  #
#            #
##############
```

Display 84 - Information of task numbers 0 - 7

```
++++++++++++++
+ aaaa bbbb  +
+ cccc dddd  +
+ eeee ffff  +
+ gggg hhhh  +
++++++++++++++
```

aaaa	task 0
bbbb	task 1
cccc	task 2
dddd	task 3
eeee	task 4
ffff	task 5
gggg	task 6
hhhh	task 7

Numbers tell how many stack memory locations have been empty in the worst case. So, if number is zero, stack has been full.

Values are not stored to EEPROM.
Task names are listed on help display.

Display 85 - Information of task numbers 8 - 15

```
++++++++++++++
+ aaaa bbbb  +
+ cccc dddd  +
+ eeee ffff  +
+ gggg hhhh  +
++++++++++++++
```

aaaa	task 8
bbbb	task 9
cccc	task 10
dddd	task 11
eeee	task 12
ffff	task 13
gggg	task 14
hhhh	task 15

Values are not stored to EEPROM.
Task names are listed on help display.

Display 86 - Information of task numbers 16 - 23

```
++++++++++++++
+ aaaa bbbb  +
+ cccc dddd  +
+ eeee ffff  +
+            +
++++++++++++++
```

aaaa	task 16
bbbb	task 17
cccc	task 18
dddd	task 19
eeee	task 20
ffff	task 21
gggg	task 22
hhhh	task 23

Values are not stored to EEPROM.
Task names are listed on help display.

Display 87 - Information of OS_SYSTEM_STACK

```
++++++++++++++        ###############
+ aaaa  bbbb +        #  FIQ  IRQ   #
+            +        #             #
+            +        #             #
+            +        #             #
++++++++++++++        ###############
```

aaaa	OS_SYSTEM_STACK

Values are not stored to EEPROM.

Display 88 - Information of the current MCU and DSP software versions

```
++++++++++++++        ###############
+aaaaa bbbbbb+        #MCUSW  PPM   #
+Date  cccccc+        #MCUSW_Date   #
+ChkSum dddd +        #MCU_Checksum#
+eeeeeeeeeeee+        #DSP_Version  #
++++++++++++++        ###############
```

aaaaa	Version number of MCU SW (e.g. 5.02)
bbbbbb	PPM version (e.g. 5.02A)
cccccc	Date of version (e.g. 990102 means 02. January 1999)
dddd	MCU SW checksum
eeeeeeeeeeee	Version of DSP software

Display 89 - Information of the current HW and TXT versions

```
++++++++++++++        ##############
+HW: aaaa     +        #HW Version  #
+TXT:bbbbbbb +        #Text Version#
+             +        #            #
+             +        #            #
++++++++++++++        ##############
```

aaaaa	Hardware version (e.g. 2350)
bbbbbb	Text version (e.g. U190199)

Display 90 - Misc counters

In Nokia 9110 this test looks like follows:

```
++++++++++++++        ##############
+Cover  aaaa +        # CoverCnt   #
+CarKit bbbb +        # CarKitCnt  #
+Heads  cccc +        # HeadsetCnt #
+             +        #            #
++++++++++++++        ##############
```

aaaa	- how many times Communicator's cover was opened
bbbb	- how many times carkit was connected
cccc	- how many times headset was used

In Nokia 7110/8210/6210 looks like follows:

```
++++++++++++++        ##############
+PS0 aaaa     +        #Page0 Status#
+EC0 bbbbbbbb+        #EraseCounter#
+PS1 cccc     +        #Page1 Status#
+EC1 dddddddd+        #EraseCounter#
++++++++++++++        ##############
```

aaaa	- the same to the parameter bbbb from test 92
bbbbbbbb	- the same to the parameter dddddddd from test 92
cccc	- the same to the parameter bbbb from test 93
dddddddd	- the same to the parameter dddddddd from test 93

Display 91 - Misc counters / Reseting counters

In Nokia 9110 this test looks like follows:

```
**************        ##############
*   RESET    *        #  Use menu  #
*   MISC     *        #  to reset  #
*   COUNTERS *        #    misc    #
*            *        #  counters  #
**************        ##############
```

By direct enter to this test you can reset counters from test 90.

In Nokia 7110/8210/6210 this test is different:

```
++++++++++++++        ##############
+FL  005FC998+        #NextEntry   #
+E2    0    0+        #Addr  Length#
+PR   30    1+        #Small   Long#
+OM    0 0000+        #ErCnt ErMask#
++++++++++++++        ##############
```

Display 92, 93 - Misc counters / Toggle headset

In Nokia 9110 test 92 looks like follows:

```
**************        ##############
*            *        #Use menu to #
*  Headset   *        #  toggle    #
*    xxx     *        #  headset   #
*            *        #  ON/OFF    #
**************        ##############
```

xxx = ON or OFF

By direct enter to this test you can enable "headset" profile normally accessible after connecting headset. When you will use it, value of counter from test 90 don't change.
Use this test, when you need 'Automatic Answer' function, which allow to receive incoming call without pressing phone's key. This function is normally enable in never Nokia phones with connected set only (in older phones - like Nokia 2110i - it's always visible).

In Nokia 7110/8210/6210 test 92 and 93 are different:

```
++++++++++++++        ##############
+EP aaaa bbbb+        #EMark PgStat#
+#0      cccc+        #PgType      #
+    dddddddd+        #EraseCount  #
+eeeeeeeeeeee+        #PpInd PpECnt#
++++++++++++++        ##############
```

bbbb - the same to the parameter aaaa from test 90
dddddddd - the same to the parameter bbbbbbbb from test 90

Display 95 - Lowest values at shut down

```
++++++++++++++        ##############
+1:aaa 4:ddd +        # 6 lowest   #
+2:bbb 5:eee +        # values at  #
+3:ccc 6:fff +        # shut down  #
+            +        #            #
++++++++++++++        ##############
```

Display 96 - Temperature

In Nokia 3210 this test looks like follows:

```
++++++++++++++        ##############
+VCX0ADC: aaa+        # ADC VALUE  #
+TEMP(C):  bb+        # RF TEMP(C) #
+TEMP(K): ccc+        # RF TEMP(K) #
+            +        #            #
++++++++++++++        ##############
```

bb - temperature of bb counter (in Celsius degrees)
ccc - temperature of bb counter (in Kelvin degrees: K = C + 273)

In Nokia 7110 this test looks different, for example:

```
++++++++++++++        ##############
+Co:49 A: 279+        #Contrast ADC#
+Tu:49 K: 305+        #Tuned Kelvin#
+Of: 0 C:+32 +        #Offset    C #
+V5: 2       +        #            #
++++++++++++++        ##############
```

Display 99 - Enabling FBUS protocol

In Nokia 8810 this test looks like follows:

```
**************        ##############
* ENTERING   *        # Switches   #
*   FBUS     *        # phone      #
*   MODE     *        # to FBUS    #
*            *        # mode       #
**************        ##############
```

For enabling FBUS protocol instead of normal used infrared connection.

In Nokia 7110 this test looks different (similar is in Nokia 6210):

```
++++++++++++++        ##############
+ Ead:aaaa   +        # EAD value  #
+ Mod:bb     +        # Acc. status#
+ MODE: cccc +        # FBUS mode  #
+ V5: 2      +        #            #
++++++++++++++        ##############
```

bb - type of connected sound accessories (example values: HP in normal state, HD with headset - for example HDC-9P, DC for datacable). In other phones this information is displayed in test 75
cccc - "FBUS" in connection made during FBUS or MBUS cable from older Nokia phone (5xxx, 6xxx) or during Irda connection

Display 100 - Information about using phone's memory / voice dialling feature

In Nokia 9110 this test looks like follows:

```
++++++++++++++        ##############
+ a  b       +        # UWS DWS    #
+ c  ddd   e +        # T1  N1  T2 #
+            +        #            #
+            +        #            #
++++++++++++++        ##############
```

In Nokia 7110/6210 this test looks like follows:

```
++++++++++++++        ##############
+ XXXX aa.a* +        #MemUseT %Use#
+ YYYY bb.b* +        #MemRelT %Rel#
+ ZZZZ cc.c* +        #MemUnuT %Unu#
+            +        #            #
++++++++++++++        ##############
```

aa.a	the usage (% used) of the internal memory (phonebook, tasks, calendar, logos, ring tones etc.)
bb.b	the usage (% used) of the phonebook memory
cc.c	the amount (% not used) of free memory available

And in Nokia 8210/3310 is different (they're information about the voice dialling feature):

```
++++++++++++++        ##############
+ ND  a  b  c+        #ND mm cs ps #
+     d  e  f+        #   ss po da #
+            +        #            #
+ggggg hhhhhh+        #Vers: Date: #
++++++++++++++        ##############
```

a	- number of recorded voice tags in phone. Maximal value is 8 (for Nokia 8210/3310) or 10 (for Nokia 6210). It's displayed in test 101 and test 102 (Nokia 8210/3310) or test 108 and test 109 (Nokia 6210)
c	- info about using voice dialling engine: 0 - it wasn't used after enabling phone 1 - voice tag was not recognised or Play/Save function were used 5 - voice tag was recognised 7 - user was in voice dialling function menu and selected Cancel function
ggggg	- version of voice dialling engine (?)
hhhhhh	- date of releasing voice dialling engine (?)

Values of counters (without "a" parameter) are not saved to EEPROM, when phone is disabled.

Display 101 - Information about TX & RX frames / voice dialling feature

In Nokia 9110 this test looks like follows:

```
++++++++++++++        ##############
+  aaaaaaaa  +        #TX Frame Cnt#
+  bbbbbbbb  +        #RX Frame Cnt#
+  cccccccc  +        #TX Retx Cnt #
+  dddddddd  +        #RX Tetx Cnt #
++++++++++++++        ##############
```

All values are in hexadecimal values.

In Nokia 7110/6210 this test looks like follows:

```
++++++++++++++        ##############
+ #0 0  #1 0 +        #Pn LoCPn LoC#
+ #2 0  #3 0 +        #Pn LoCPn LoC#
+ #4 0  #5 0 +        #Pn LoCPn LoC#
+            +        #            #
++++++++++++++        ##############
```

Information about using phone's memory (information displayed here is probably about phonebook memory).

And in Nokia 8210/3310 it's different again (information about the recording voice tags in voice dialling feature):

```
++++++++++++++        ##############
+ Train      +        # Train      #
+ a   b   c  +        # r  ii  mm  #
+ dddd  eeee +        # strt  durn #
+ ffff  gggg +        # minm  maxm #
++++++++++++++        ##############
```

a	- number of voice tags failed to record (it increases for example, when phone didn't recognise any voice to record)
b	- number of recorded tags, when this test was enabled
c	- number of recorded tags in phone. Maximal value is 8 (for Nokia 8210/3310) or 10 (for Nokia 6210). It's displayed in test 100 and test 102 (Nokia 8210/3310) or test 107 and test 109 (Nokia 6210).
dddd	- how loud was start of recorded voice during last recording (the higher, the more loud)
eeee	- how loud was recorded voice during last recording (the higher, the more loud)
ffff, gggg	- another parameters unique to each recorded voice (hex values ?)

Values of counters (without "c" parameter) are not saved to EEPROM, when phone is disabled.

Display 102 - Information about data call flow control / voice dialling feature

In Nokia 9110 this test looks like follows:

```
++++++++++++++        ##############
+aaaaaaaaaa   +        # Data call  #
+bbbbbbbbbbbb+        #flow control#
+ccccccccccc +        #   info     #
+            +        #            #
++++++++++++++        ##############
```

In Nokia 8210/3310 it's different (information about the recognising voice tags in voice dialling feature):

```
++++++++++++++        ##############
+ Recog a   b+        #Recog r  mm #
+ c dddd eeee+        #i1 scr1 minm#
+ f gggg hhhh+        #i2 penH maxm#
+ i jjjj kkkk+        #i3 penL penC#
++++++++++++++        ##############
```

b - number of recorded tags in phone. Maximal value is 8 (for Nokia 8210/3310) or 10 (for Nokia 6210). It's displayed in test 100 and test 101 (Nokia 8210/3310) or test 107 and test 108 (Nokia 6210)

2nd line - info about last recognised by phone voice tag (c = number of voice tag)
3rd line - info about previous recognised by phone voice tag (f = number of voice tag)
4th line - info about previous recognised by phone voice tag (i = number of voice tag)

Values of counters (without "b" parameter) are not saved to EEPROM, when phone is disabled.

Displays 110-115 - WAP settings?

```
++++++++++++++        ###############
+0 FFFE  0.0 +        # Pn  Sta %Use#
+000002   0.0+        # EraseCn %Rel#
+000000 100.0+        # NextRec %Unu#
+ 3  1 0 FFE0+        # Cu Cl Cc MmC#
++++++++++++++        ###############
```

Probably connected with browser and another settings of connections to WAP.

Display 130 - Sliding cover counter / DSP resets

In Nokia 7110 this test looks like follows:

```
++++++++++++++        ##############
+ aaa bbbbbb +        # Slide Open #
+            +        #            #
+            +        #            #
+            +        #            #
++++++++++++++        ##############
```

bbbbbb - how many times phone's sliding cover has been opened. Value is shown in hexadecimal.

In Nokia 3310 it's different:

```
++++++++++++++        ##############
+DSP_RST:aaaa+        #DSP resetcn #
+CS: bbbbbbbb+        #CStandbyLoss#
+ cc dd ee ff+        #sw as pw st #
+0000   gggg +        #BadPwr insim#
++++++++++++++        ##############
```

aaaa - number of DSP resets. Displayed also in test 36

Display 131 - Sum of handovers

```
++++++++++++++        ##############
+STO:aaaaaaaa+        #Stack overfl#
+NB:bbLB:cc  +        #NoBuf LongBu#
+HOF:dddddddd+        #HandOver Cnt#
+eeee ZR:ffff+        #HOfail ZonFa#
++++++++++++++        ##############
```

dddddddd - sum of handovers from test 41 (?). Unfortunately, values don't match always (firmware bug ?)

Counters are in hexadecimal form.

Display 132 - Received calls counter

```
++++++++++++++        ##############
+BS: aaaaaaaa+        #BS_Call Cnt #
+MO: bbbbbbbb+        #MO_Call cnt #
+DRC:cccccccc+        #Dropped call#
+TIM:dddddddd+        # Call time  #
++++++++++++++        ##############
```

aaaaaaaa - how many times you received call. Please notice one difference to MTOK parameter from test 63: you can't reset this value from phone's menu

bbbbbbbb - how many times you made successful outgoing call from your phone. Please notice one difference to MOOK parameter from test 63 - you can't reset this value from phone's menu. One interesting thing: this counter can have bigger value than MOOK from test 63 (firmware bug ?)

Counters are in hexadecimal form.

Display 133 - Displayed info about full charged battery counter

```
++++++++++++++        ##############
+BFu:aaaaaaaa+        #FullChargCnt#
+ChC:bbbb  cc+        #ChaCon Wrong#
+StB:         +       #Standby time#
+NSe:         +       #NoServTimer #
++++++++++++++        ##############
```

aaaaaaaa - how many times info about full charged battery was displayed (when it was done correctly - for example FullM info in test 20...or not - for example MaBFD info in the same test). Counter doesn't increase value, when phone is disabled.

bbbb - how many times charger was connected. Counter increases value, when (each time, when you will do it):
- phone is enabled, you connect charger
- phone is disabled, you connect changer and enable phone

Counter doesn't increase, when phone is disabled.

Display 240 - Zero and start counters

Following actions performed:

- reset handover counters (display 40)
- reset counters to zero (display 60)
- reset timers (display 80)
- enable timers (display 81)

The active field test display is not affected.

Display 241 - Disable field test display

The field test display is totally disabled by writing the EEPROM value.

Display 242 - Disable RD field test displays

The R&D field test displays are disabled by writing the EEPROM value.
So only the displays 1-19 are active after this command.
The active field test display is not affected.

Display 243 - Enable RD field test displays

Enables full NetMonitor.

Display 245 - Clear OS post-mortem dump information

To clear OS post-mortem dump information displays, i.e. only display 57 in DCT3.
The active field test display is not affected.