# Nokia NetMonitor Manual

**Version 0.95**
**11.11.2002**


**Document keeper : nobbi (nobbi@nobbi.com)**
**Base document : Flipo (flipo@gyral.com)**
**PDF + Enhancements to base document : nobbi**
**Graphics : nobbi**

## Phone Models and Software versions

### Notes for 21xx / 31xx / 81xx phones

The older phones netmonitor has some differences when compared with the one of newer models, but this manual can be used as a guide, because the overall working method and the display contents are very similar in most cases.

### Notes for 51xx/61xx/62xx/71xx/88xx/91xx/32xx and other phones

This document covers the majority of pages from these phones netmonitor. Some of them may have little differences, like missing/additional pages, different info, etc.

The **51xx** and **61xx** pages are almost identical, there are a few pages concerning multiband information in **6150** which are different in the singleband phones, and the xx90 pages are partially different, because of some special things in GSM1900.

The **32xx** has some more pages, which are not very well documented yet.

The **62xx** and **71xx** have a whole bunch of pages concerning W@P and the large internal flash memory. These are not documented yet. If you have any clue about theses pages, send me a mail.

The **91xx** pages are almost identical to the **6110** ones, with few additional pages.

The goal right now is to make an accessible manual, that will get better over the time. Please contribute with all the info that you find relevant. Please note that this manual does only deal with pages which are of known content, so if a page is not mentioned here, I have most likely no knowledge about the meaning of the page.

Used Information Sources :


[ 1 ] Netmonitor description (RD843.txt) from Nokia Mobile Phones

[ 2 ] Marcin Wiaceks homepage (http://marcin-wiacek.topnet.pl/)

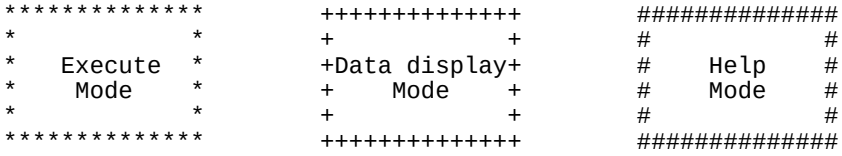
[ 3 ] Researches from Nobbi & various other people

## Menu Modes

There are three Menu Display modes:

- the execute mode
- the data display mode
- the help mode

Different modes are marked in this manual as follows:




The execute mode is entered from the menu by selecting a menu directly with his number. 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 reactivated.
So, be **very careful** when jumping to a netmonitor page directly from the menu selection. You may activate the execute mode incidentally, causing your phone to behave not as expected.

The data display mode is active by default when the Netmonitor is active. During data display mode, the field test data is visible on the main display.

During 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 the asterisk (*) is used to toggle between these two modes.

The arrow keys (^,v) offer an easy way to switch to another test without using the menu. However, 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. 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.

## Reserving SIM phonebook locations

When using a phone with enabled field test displays, it is highly recommended to put some default data into the SIM phonebook locations that are used by some field test displays. Especially Test 17 (BTS TEST) may give some confusing results if SIM phonebook location 33 is not correctly configured.

Additionally, this prevents accidental storing of phone numbers and names into such locations.

Displays 52 and 53 may also write some data to the SIM phonebook locations 35 and 36.

| **Location** | **Default** | **Data Used by Display #** |
|---|---|---|
| 31 | 65535 | 71 |
| 32 | 65535 | 72 |
| 33 | 0 | 17 (BTS TEST) |
| 34,35,36 | 34,35,36 | 52, 53 |

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

## Table of contents



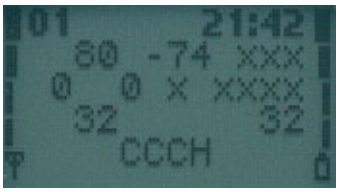
## Basics: Channel numbers in GSM

GSM uses channel numbers between 0 and 1023. These frequency channels are allocated by the different types of GSM as follows:

| Type: | Subtype: | Channels: |
|---|---|---|
| GSM400 | GSM450 | 259 .. 293 |
| | GSM480 | 306 .. 340 |
| GSM700 | GSM750 | 438 .. 511 |
| GSM850 | GSM850 | 128 .. 251 |
| GSM900 | PGSM | 1 .. 124 |
| | EGSM | 0 .. 124 |
| | | 975 .. 1023 |
| | GSM-R | 0 .. 124 |
| | | 955 .. 1023 |
| GSM1800 | GSM1800 | 512 .. 885 |
| GSM1900 | GSM1900 | 512 .. 810 |

## 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 a TCH :
DCH carrier number in decimal.
When mobile is NOT on a 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 is not shown if <=-100

ddd — tx power level. If transmitter is on, symbol * is shown in front of the power level value.

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 criterium (C1). Range is -99 - 999.

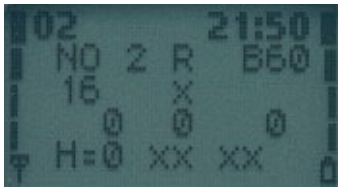
oooo — type of current channel (TCH := Traffic Channel):

- THR0 : TCH HalfRate (HR) subchannel 0
- THR1 : TCH HR subchannel 1
- TFR : TCH FullRate (FR)
- TEFR : TCH EnhancedFullRate
- 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 : Access Grant CHannel
- CCCH : one of the Common Control CHannels
- CBCH : CCCH and cell broadcast receiving on
- BCCH : Broadcast Control CHannel
- SEAR : SEARCHing for available networks
- NSPS : MS is in ’No Service, Power Save’ state

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

## Display 2 – More info about serving cell

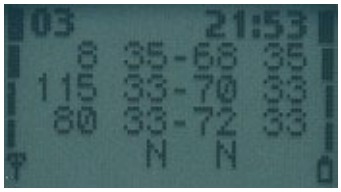
```
+++++++++++++      ##############
+ aa b c Bdd +      #PM RAR Ro BC#
+ ee f       +      #RelR QLF    #
+ ggg hh iii +      #CRO TO PenT #
+ H=j mm nn  +      #H MAIO HSN  #
+++++++++++++      ##############
```




```
aa        paging mode
               NO : normal paging
               EX : extended paging
               RO : paging reorganization
               SB : same as before
b         maximum number of Random Access retransmission
c         roaming indicator, values are 'R' or ' '.
Bdd       Letter B and BSIC value, range is 0 - 63.
ee        Reason of last call release (See Display 39, CC cause codes)
f         RX quality (full), range is 0 - 7
ggg       Cell reselection offset, range 0 - 126 dB.
               [0 .. 63] * 2 dB. 'xxx' in dedicated mode.
hh        Temporary offset, range 0 - 60 dB.
               [0 .. 7] * 10 dB. 70 dB means infinite time.
               'xx' in dedicated mode.
iii       Penalty time, range 0 - 620 s.
               [0 .. 31] * 20 s. 'xxx' in dedicated 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

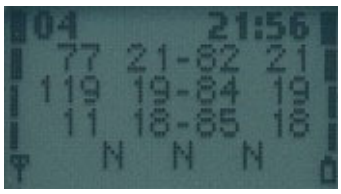
```
+++++++++++++        ##############
+aaabbbcccddd+        #SCH C1 rx C2#
+aaabbbcccddd+        #1CH C1 rx C2#
+aaabbbcccddd+        #2CH C1 rx C2#
+    ef gh   +        #    1N 2N   #
+++++++++++++        ##############
```




```
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, EGSM channels are displayed as Eaa
bbb       idle mode : C1 value, range is -99 - 999
          ded. Mode : 'B' and BSIC value
ccc       RX level in dBm, minus sign is not shown if <=-100
ddd       C2 value, range is -99 - 999
e,g       F : cell is in a forbidden location area
f,h       B : cell is barred
          N : cell is normal priority
          L : cell is low priority
```

## Display 4 & 5 – 3rd to 8th neighbour cell

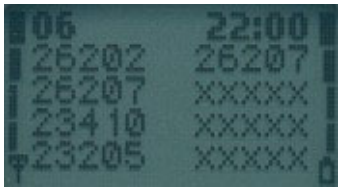
```
    +++++++++++++         ##############
    +aaabbbcccddd+        #3CH C1 rx C2#
    +aaabbbcccddd+        #4CH C1 rx C2#
    +aaabbbcccddd+        #5CH C1 rx C2#
    +  ef gh ij  +        #  3N 4N 5N  #
    +++++++++++++         ##############
```




```
1. row: 3./6. neighbour information
2. row: 4./7. neighbour information
3. row: 5./8. neighbour information
4. row, ef: 3./6. neighbour information
4. row, gh: 4./7. neighbour information
4. row, ij: 5./8. neighbour information

aaa      carrier number in decimal, EGSM channels are displayed as Eaa
bbb      idle mode : C1 value, range is -99 - 999
         ded. Mode : 'B' and BSIC value
ccc      rx level in dBm, minus sign is not shown if <=-100
ddd      C2 value, range is -99 - 999
e,g,i    F : cell is in a forbidden location area
f,h,j    B : cell is barred
         N : cell is normal priority
         L : cell is low priority
```

## Display 6 – Network selection display

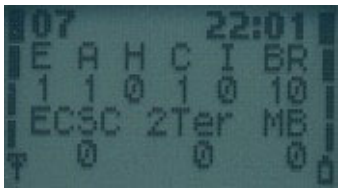
```
    +++++++++++++         ##############
    +aaabb  aaabb+        #LReg   1_For#
    +aaabb  aaabb+        #1_Pre  2_For#
    +aaabb  aaabb+        #2_Pre  3_For#
    +aaabb  aaabb+        #3_Pre  4_For#
    +++++++++++++         ##############
```




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

If a three-digit MNC is used (GSM1900), 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
b  1 is shown if attach-detach-procedure is allowed
c  1 is shown if half rate channels are supported
d  1 is shown if C2 values are broadcasted
e  1 is shown if system information 7 and 8 are broadcasted
f  1 is shown if cell broadcast is supported
g  1 is shown if re-establishment is supported

The following items are used only in dualband phones:

h  In idle mode 1 is shown if Early Classmark (ECSC) sending is supported.
   In dedicated mode (conversation) X is shown.

i  In idle mode 1 is shown if 2Ter messages are supported.
   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 ETS 300578 (TS GSM 05.08), 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**

00 (0)  Normal reporting of the six strongest cells, with known and allowed NCC part of BSIC, irrespective of the band used.

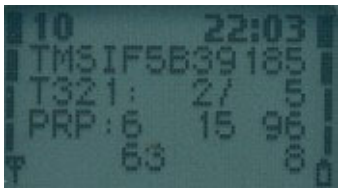
01 (1)  The MS shall report the strongest cell, with known and allowed NCC part of BSIC, in each of the frequency bands in the BA list, excluding the frequency band of the serving cell. The remaining positions in the measurement report shall be used for reporting of cells in the band of the serving cell. 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.

10 (2)  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.

11 (3)  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 10 – Paging Repetition Period, TMSI, Location Update Timer, AFC and AGC

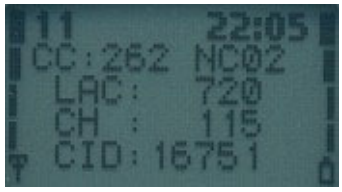
```
    ++++++++++++++        ##############
    +TMSIaaaaaaaa+        #TMSI(hex)   #
    +T321:bbb/ccc+        #T3212ctr/tim#
    +PRP:d  ee ff+        #PaRP DSF AGC#
    + ggggg  hhh +        #  AFC   Ch  #
    ++++++++++++++        ##############
```




```
aaaaaaaa    last assigned 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 a periodic location update will not
            occur)  This value is received from the network.
d           Value of paging repetition period (range is 2 – 9, which means paging will
            be in every Xth multiframe. 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

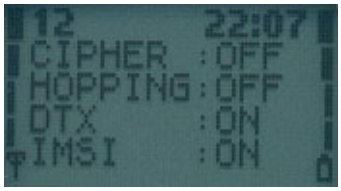
```
    ++++++++++++++        ##############
    +CC:aaa NCbbb+        # MCC    MNC #
    + LAC:ccccc  +        #LocAreaCode #
    + CH : dddd  +        #ServChannel #
    + CID:eeeee  +        #   CellId   #
    ++++++++++++++        ##############
```




```
aaa       MCC value in decimal (MCC=Mobile Country Code)
bbb       MNC value in decimal (MNC=Mobile Network Code)
             Three digits are shown only in GSM1900.
             Two digits are shown in GSM900 and GSM1800.
ccccc     LAC value in decimal (in older SW-versions this value is in hexadecimal)
dddd      Serving cell channel number
eeeee     Cell Identifier in decimal (in older SW-versions this value is in
          hexadecimal)
```

## 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 when the phone is active on a TCH.
```

## Display 13 – Uplink DTX switching display

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


With this display it is possible to see whether the MS uses DTX or not.

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 be changed.

```
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
               NOTALLOWED: BS does not allow MS to decide if it uses
                           DTX or not.
bbb         default state of DTX in MS. The value is either ON or OFF
ccc         is DTX value from BS
               MAY : BS allows MS to decide if it uses uplink DTX or not
               USE : BS controls MS to use DTX (on uplink)
               NOT : BS controls MS not to use DTX (on uplink)
```

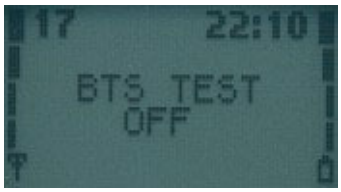
## Display 14 – Toggle Screening Indicator

```
**************                    ###############
*  SCREENING *                    #Use menu to #
*  INDICATOR *                    #  change    #
*    IS XX   *  XX : 00 or 01     # Screening  #
*            *                    # indicator  #
**************                    ###############
```

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

## Display 17 – Switch 'BTS Test' Status

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




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

To **activate** BTS TEST perform the following steps:

- Save desired channel number in SIM phonebook location 33
- Select display 17 in execute mode
- Switch power off and on OR force a cell reselection

If activation succeeded, you will read "BTS TEST ON" in display 17. The 6210 will show "BTS TEST REQUESTED" instead.

To **deactivate** BTS tests either select display 17 in execute mode or save a number in SIM phonebook location 33 which does NOT represent a valid carrier number, then switch power off and on OR force a cell reselection

CAUTION! The display does not show the value of the BTS_TEST flag in EEPROM. Although the value is set, BTS_TEST can show to be off. If there is no legal carrier number in SIM phonebook location 33 (GSM900: 1-124, GSM1800: 512-885, EGSM: 0, 975-1023) 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 a different value from the one in EEPROM.

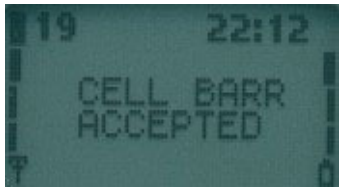
## Display 18 – Lights status control

Forces keyboard and display lights on/off while displaying any netmonitor screen. The light will not remain on after leaving netmonitor

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

## Display 19 – Toggle Cell Barred Status

```
************** ************** ************** ###############
*            * *            * *            * #Use menu to #
* CELL BARR  * * CELL BARR  * * CELL BARR  * #toggle cell #
* ACCEPTED   * * REVERSE    * * DISCARD    * #barr status #
*            * *            * *            * #DIS/ACC/REV #
************** ************** ************** ###############
```




This test is meant to be used when some cells are tested before taking them into commercial use. By setting the CELL_BARRED to on in the base station normal GSM phones will not try to camp on these barred cells.

By selecting CELL BARR REVERSE, the MS will only use the cells which have CELL_BARRED set.

By selecting CELL BARR DISCARD, the MS will use all cells, irrespective wether CELL_BARRED is set or not.

NOTE: If a cell has been selected before barring state in phone is changed the selected cell will remain the current cell. After the next cell reselection the cell barring state is working as expected.

## Display 20 – Charging state

```
**************          ##############
* 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. 7.19 V is shown as 719 on the display

bbbbb Charging mode 5 digit symbol:

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

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 (highest measured voltage), maximum ripple voltage.
ddd Battery down voltage (lowest measured voltage), minimum ripple voltage.
eee Average measured 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 shown.

## 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 if values are shorter than 4 digits.

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.

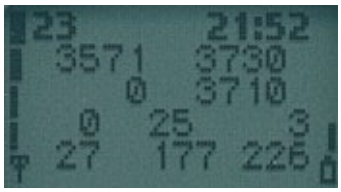
Afff AverDiff membership function set, range 0.00-1.00, decimal point is not shown; e.g. 0.23 is shown as 023.

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 (expected voltage with transmitter switched on), decimal point
          not shown (a.aaa mV)
bbbb      TXoff voltage (expected voltage with transmitter switched off), decimal
          point not shown (b.bbb mV)
cccc      charging current, decimal point not shown (c.ccc mA)
dddd      predicted standby level (expected voltage in standby mode), decimal point
          not shown (d.ddd mV)
eee       estimated age for Li-ion battery (0:new to 100:old). NiMH always shows 33
fff       battery's percentage level (0,25,50,100)
gggg      current consumption indicated by PSM (0.1 mA)
hhh       battery's temperature (C) (Only for Li battery)
iiii      charged capacity (mAh) into battery
jjjj      tells what is the next capacity target (mAh) to reach for next battery bar
          level to be displayed
```

## Display 24 – BSI values

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

```
aaaa
bbbb
cccc      BSI (Battery Size Indicator) value
dddd      minutes elapsed since charger was disconnected or phone was switched on
eeee
ffff
```

## 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 (first frequency of DTMF generator)
ffff      API_2_TONE (first frequency of DTMF generator)
gggg      API_CONFIG
hhhh      API_HF_VOL (Volume setting for Audio output)
```

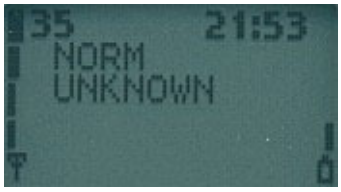
## Display 34 – FBUS display

```
**************          ##############
*aabbccdd    *          #CM LD LM NM #
*eeefff - ggg*          #PEC FEC OEC #
*hhh iii jjj *          #ACC RXS TXS #
*k--         *          #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

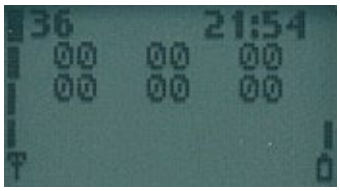
```
**************          ##############
*aaaaa       *          #Reset reason#
*bbbbbbbb    *          #Task name   #
*            *          #            #
*            *          #            #
**************          ##############
```




```
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

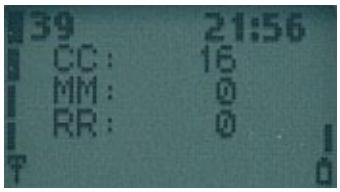
```
++++++++++++++
+ aa  bb  cc +
+ dd  ee  ff +
+            +
+            +
++++++++++++++
```




```
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 39 – Information about reasons for call clearing

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




```
aaaa,
bbbb,
cccc     cause code value, see section 10.5/GSM 04.08, '*' is shown if the cause code
         is made up by the respective layer in MS

CC       1  unassigned (unallocated) number
         3  no route to destination
         8  operator determined barring
         16 normal call clearing
         17 user busy
         18 no user responding
         19 user alerting, no answer
         21 call rejected
         22 number changed
         27 destination out of order
         28 invalid number format/number incomplete
         31 normal/unspecified
         34 no circuit/channel available
         38 network out of order
         41 temporary failure
         42 switching equipment congestion
         44 requested channel not available
         47 ressource unavailable
         50 requested facility not subscribed
         55 Incoming calls barred within the CUG
         57 bearer capability not authorized
         65 bearer service not implemented
         68 ACM equal to or greater than ACMmax
         69 requested facility not implemented
         88 incompatible destination

MM       0  no error
         2  IMSI unknown in HLR
         3  illegal MS
         4  IMSI unknown in VLR
         5  IMEI not accepted
         6  illegal ME
         11 PLMN not allowed
         12 location area not allowed
         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 (call RE)

RR       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, timing advance 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 counters of the handover displays can be reset.

## Display 41 (singleband) – Handover display

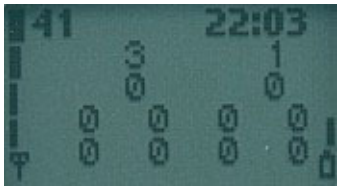
```
++++++++++++++          ##############
+HandOOK: aaa+          #HandOvOKCntr#
+PrevCh : bbb+          #PrevChanCntr#
+HONotOK: ccc+          #HandOvNOKCnt#
+HOIntra: ddd+          #HOIntraOKCnt#
++++++++++++++          ##############
```

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 initialize the counters to zero, select display 40. Display 60 also initializes these counters.

## Display 41 (dualband) – Handover display, INTER CELL

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




aaaa counter of successful handovers (max 9999) from GSM900 to GSM900
bbbb counter of successful handovers (max 9999) from GSM1800 to GSM1800
cccc counter of successful handovers (max 9999) from GSM900 to GSM1800
dddd counter of successful handovers (max 9999) from GSM1800 to GSM900

eee counter for failed handovers (max 999) from GSM900 to GSM900
fff counter for failed handovers (max 999) from GSM1800 to GSM1800
ggg counter for failed handovers (max 999) from GSM900 to GSM1800
hhh counter for failed handovers (max 999) from GSM1800 to GSM900

iii counter of successful back to previous channel attempts (max 999) from GSM900 to GSM900
jjj counter of successful back to previous channel attempts (max 999) from GSM1800 to GSM1800
kkk counter of successful back to previous channel attempts (max 999) from GSM900 to GSM1800
lll counter of successful back to previous channel attempts (max 999) from GSM1800 to GSM900

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

## Display 42 (dualband) – Handover display, INTRA CELL

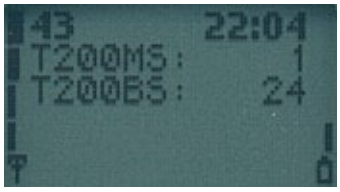
```
      ++++++++++++++         ##############
      + aaaa  bbbb +         #G>G IntraD>D#
      + cccc  dddd +         #G>D  OK  D>G#
      +eeefffggghhh+         #IntraHoFail #
      +iiijjjkkklll+         # BackToPrev #
      ++++++++++++++         ##############
```

| | |
|---|---|
| aaa | counter of successful INTRACELL handovers (max 9999) from GSM900 to GSM900 |
| bbb | counter of successful INTRACELL handovers (max 9999) from GSM1800 to GSM1800 |
| ccc | counter of successful INTRACELL handovers (max 9999) from GSM900 to GSM1800 |
| ddd | counter of successful INTRACELL handovers (max 9999) from GSM1800 to GSM900 |
| eee | counter of failed INTRACELL handovers (max 999) from GSM900 to GSM900 |
| fff | counter of failed INTRACELL handovers (max 999) from GSM1800 to GSM1800 |
| ggg | counter of failed INTRACELL handovers (max 999) from GSM900 to GSM1800 |
| hhh | counter of failed INTRACELL handovers (max 999) from GSM1800 to GSM900 |
| iii | counter of successful back to previous normal INTRA CELL channel attempts (max 999) from GSM900 to GSM900 |
| jjj | counter of successful back to previous normal INTRA CELL channel attempts (max 999) from GSM1800 to GSM1800 |
| kkk | counter of successful back to previous normal INTRA CELL channel attempts (max 999) from GSM900 to GSM1800 |
| lll | counter of successful back to previous normal INTRA CELL channel attempts (max 999) from GSM1800 to GSM900 |

Counters will stop when they reach their maximum. To initialize the counters to zero, select display 40. Also display 60 initializes 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 | GSM900 : counts how many times T200 in MS has expired and therefore a L2 transmission has been repeated. |
| bbbb | GSM900 : counts how many times T200 in BS (network) has expired and therefore a L2 frame was requested again. |
| cccc | GSM1800: counts how many times T200 in MS has expired and therefore a L2 transmission has been repeated. (for dualband phones) |
| dddd | GSM1800: counts how many times T200 in BS (network) has expired and therefore a L2 frame was requested again. (for dualband phones) |

The GSM900 counters are also valid in GSM900/GSM1800 multiband phones. Counters will stop when they reach their maximum. To initialize the counters to zero, select display 40. Display 60 also initializes these counters.

## Display 44 – Toggle revision level

```
      **************                 **************
      *            *                 *            *
      * REVISION   *                 * REVISION   *
      *LEVEL IS 00 *                 *LEVEL IS 01 *
      *            *                 *            *
      **************                 **************
```

When selected, changes the value of Revision Level from 0 to 1 and vice versa. I have no idea if this makes sense in any circumstances.

## Display 45 – Toggle transmitter functionality

```
**************
*            *
*TRANSMITTER *
*  XXXXXXXX  *         XXXXXXXX    ENABLED or DISABLED
*            *
**************
```

This display has no effect in 7110 phone, irrespective of the displayed status the transmitter is always switched on.

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

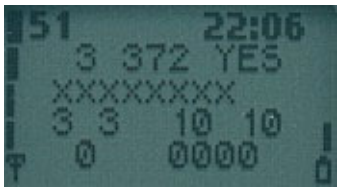
This FTD can be used to simulate easily situations when the MS can hear the network (i.e. receiving signal is good enough), but the network can not receive any messages from the MS.

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#
+ ddddddddd  +         #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/Down/xxxxxxxx if no preferred level |
| 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 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

Note: This display is only valid when a unknown or a stack overflow interrupt has occured.

## Display 60 – Reset counters to zero

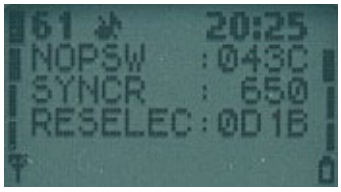
```
**************        ##############
* FIELD TEST *        #Use menu to #
*  DISPLAY   *        #reset field #
*  COUNTERS  *        #test display#
*   RESET    *        # counters   #
**************        ##############
```


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

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

## Display 61 – 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 synchronization measurement attempts in decimal form. If counter value is over 9999 then four x are shown. |
| cccc | counter for cell reselections in hexadecimal form. |

## 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 | GSM900 counter for MDI_NO_PSW_FOUND message received from DSP in decimal form (max 99999). |
| bbbbb | GSM1800 counter for MDI_NO_PSW_FOUND message received from DSP in decimal form (max 99999). |
| ccccc | GSM900 counter for synchronization measurement attempts in decimal form. If counter value is over 99999 then five x are shown. |
| ddddd | GSM1800 counter for synchronization measurement attempts in decimal form. If counter value is over 99999 then five x are shown. |
| eeeee | counter for GSM900 -> GSM900 cell reselections in decimal form (max 99999). |
| fffff | counter for GSM1800 -> GSM1800 cell reselections in decimal form (max 99999). |
| ggggg | counter for GSM900 -> GSM1800 cell reselections in decimal form (max 99999). |
| hhhhh | counter for GSM1800 -> GSM900 cell reselections in decimal form (max 99999). |

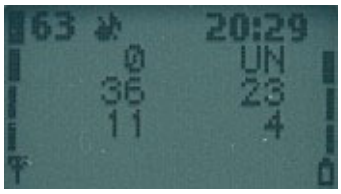
## Display 62 – Neighbour measurement counter display

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


```
aaaa     counter for neighbour PSW measurement attempts
bbbb     counter for neighbour synchronization measurement attempts
cccc     counter for neighbour BCCH measurement attempts
dddd     counter for neighbour BCCH Ext measurement attempts

Counter values are shown in hexadecimal form.
```

## Display 63 – Call attempts counters

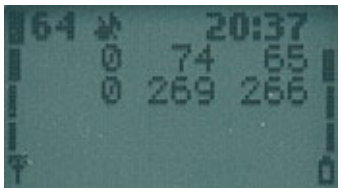
```
    ++++++++++++++        ##############
    +  aa    bb  +        #CalRel RelDi#
    +  ccc   ddd +        #MOCAtmp MOOK#
    +  eee   fff +        #AllMT   MTOK#
    +            +        #            #
    ++++++++++++++        ##############
```




```
aa       Reason of last call release
         Cause from messages DISC and REL_COMP. Refer to TS GSM 04.08/10.5.4.11/Table
         10.86 for further explanation.
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
```

## Display 64 – Location Update attempts counters

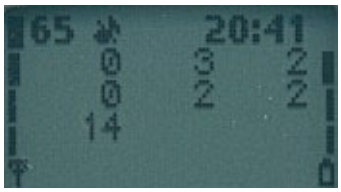
```
    ++++++++++++++        ##############
    + aa bbb ccc +        #Nfai NL NLOK#
    + dd eee fff +        #PFai PL PLOK#
    +            +        # Loc update #
    +            +        #  counters  #
    ++++++++++++++        ##############
```




```
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
```

## Display 65 – SMS attempts counters

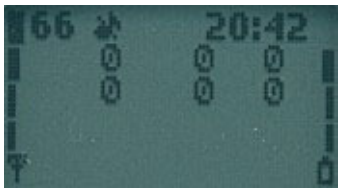
```
        ++++++++++++++        ##############
        + aa bbb ccc +        #SFai MO MOOK#
        + dd eee fff +        #RFai MT MTOK#
        + gggg       +        #Sched Msgs  #
        +            +        #SMS counters#
        ++++++++++++++        ##############
```




```
    aa       Reason of last message sending failure
               1 : Unassigned (unallocated) number
               8 : Operator determined barring
              10 : Call barred
              21 : Short message transfer rejected
              27 : Destination out of service
              28 : Unidentified subscriber
              29 : Facility rejected
              30 : Unknown subscriber
              38 : Network out of order
              41 : Temporary failure
              42 : Congestion
              47 : Resources unavailable, unspecified
              50 : Requested facility not subscribed
              69 : Requested facility not implemented
              81 : Invalid short message transfer reference value
              95 : Invalid message, unspecified
              96 : Invalid mandatory information
              97 : Message type non-existent or not implemented
              98 : Message not compatible with short message protocol state
              99 : Information element non-existent or not implemented
             111 : Protocol error, unspecified
             127 : Interworking, unspecified
    bbb      Count of all MO short message attempts
    ccc      Count of succeeded MO short message attempts
    dd       Reason of last message receiving failure
              22 : Memory capacity exceeded
    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
```

## Display 66 – SMS timeout counters

```
51xx,   ++++++++++++++        ##############
61xx:   + aaa bbb cc +        #TR1 TR2 TRA #
        + ddd eee ff +        #TC1 TC2 SCH #
        +            +        #SMS timeout #
        +            +        #  counters  #
        ++++++++++++++        ##############

7110:   ++++++++++++++        ##############
        + aaa   bbb  +        #  TR1  TR2  #
        + ccc   fff  +        #  TRA  SCH  #
        + ddd   eee  +        #  TC1  TC2  #
        +            +        #            #
        ++++++++++++++        ##############
```




```
    aaa      Counter for TR1M timeouts (SMR-Layer: incoming RP-ACK timed out)
    bbb      Counter for TR2M timeouts (SMR-Layer: outgoing RP-ACK timed out)
    cc       Counter for TRAM timeouts (RETRANS timer expired)
    ddd      Counter for TC1M timeouts (CM-sublayer: CP-ACK timed out)
    eee      Counter for TC2M timeouts (CM-sublayer: )
    ff       Counter for CB schedule timeouts
```

## 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.
This display may not be included in normal SW releases.

## Display 71 & 72 – Control DSP audio enhancements 1 & 2

```
**************        ##############
*AUDIO       *        #Use menu to #
*ENHANCEMENT *        #control DSP #
*DISPLAY 1/2 *        #   audio    #
*    XXXXX   *        #enhancements#
**************        ##############
```

Caution : playing around with this display may result in (temporary) malfunction of the audio path in your phone. Please be careful.

XXXXX  Control word for DSP Audio Enhancements in decimal format.

The control word is sent to the DSP in the MDI_AUDIO_CONFIGURE message.

Prior using this display the control word must be written to location 31/32 of the SIM in decimal format.

When the display 71/72 is choosen 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 72/71.

Used together with display 72/71, this display makes rapid on/off switching of audio DSP algorithms possible. Switching with arrow keys is possible only after this display or display 72/71 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, so it is possible to reset to the correct values by removing the battery.

## Display 73 – Generic display for DSP Audio Enhancements

```
++++++++++++++    Example:   ++++++++++++++        ##############
+ aaa bb  aaa+                + 101 00  408+        #DB1  B1  DB2#
+cccc bb cccc+                +BCDE 88 7FFF+        #HEX1 B2 HEX2#
+cccc bb cccc+                +0001 FF 0003+        #HEX3 B3 HEX4#
+ cccc cccc  +                +  DEAD DEFA +        #  HEX5 HEX6 #
++++++++++++++                ++++++++++++++        ##############
```

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.

## Display 74 – DSP audio enhancements 1 (DRC)

```
++++++++++++++    Example:   ++++++++++++++        ##############
+  aaa  bbb  +                +  101  408  +        #DSigL USigL #
+       ccc  +                +       480  +        #      NseLvl#
+  dd    ee  +                +  01    03  +        # DTbl  UTbl #
+            +                +            +        #           #
++++++++++++++                ++++++++++++++        ##############
```

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.

## 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:   ++++++++++++++        ##############
+ Vaa  Pbbb  +                + V0A  P125  +        #EVol PeakVal#
+ Cccc CAddd +                + C000 CA001 +        #CutOff COAve#
+PAeee       +                +PA353       +        #PkAver      #
+            +                +            +        #            #
++++++++++++++                ++++++++++++++        ##############
```

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.

## Display 77 – Microphone (= uplink) audio display

```
++++++++++++++    Example:   ++++++++++++++        ##############
+ Paaa  Abbb +                + P303  A225 +        #MicPeak MAve#
+ Cccc CAddd +                + C023 CA003 +        #CutOff COAve#
+            +                +            +        #            #
+            +                +            +        #            #
++++++++++++++                ++++++++++++++        ##############
```

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.

## 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  #
+++++++++++++        ##############
```

Decimal point and sign are not shown in values. This means:
-10.5dB would be displayed as "105"
-0.5 dB would be displayed as "  5"

| | |
|---|---|
| aaa | Electro-acoustic attenuation of echo from DSP point of view in dB |
| bbb | Adaptive attenuation of echo |
| ccc | Total echo return loss |
| ddd | RX attenuator gain in dB |
| eee | TX attenuator gain in dB |
| fff | Gain limit for RX and TX |
| ggg | Tx noise level in dB |
| h | Adaptive filter status (0 or 1) |
| I | Comfort noise generation (0 or 1) |
| jjj | AEC mode (0 or 1) |
| kkkk | Shows 16 last RX VAD decisions in HEX format |
| Llll | Shows 16 last TX VAD decisions in HEX format |

## 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 a call is placed. When the call is terminated the display is frozen to show the 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 display 82 can be reset.

These timers will be automatically reset after the battery has been fullycharged 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
*            *
**************
```

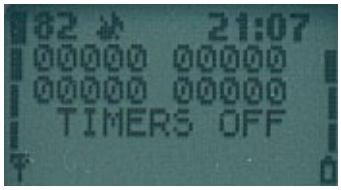

This display will start or stop the timers.

On power off the values of the timer displays are stored onto the EEPROM, where they will be read during power on. To initialize 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.

## 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 service, 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 maxium 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. |

## Display 84, 85 & 86 – Information about tasks

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

| | |
|---|---|
| aaaa | task 0,  8, 16 |
| bbbb | task 1,  9, 17 |
| cccc | task 2, 10, 18 |
| dddd | task 3, 11, 19 |
| eeee | task 4, 12, 20 |
| ffff | task 5, 13, 21 |
| gggg | task 6, 14 |
| hhhh | task 7, 15 |

The numbers are showing 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 when the phone is powered off.

The task names are listed on the help display.

## Display 87 – Information about OS_SYSTEM_STACK

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

| | |
|---|---|
| aaaa | OS_SYSTEM_STACK. No clue what this means. |

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 |
| bbbbbb | PPM version |
| cccccc | date of version.c (e.g. 990102 means 02. January 1999) |
| dddd | MCU SW checksum |
| eeeeeeeeeeee | version of DSP software |

## Display 88 (9210) – Version information for organizer part

```
      **************        ##############
      *Linda SW    *        #Linda SW    #
      *aaaaa bbbbbb*        #Version Date#
      *ChkSum: cccc*        #Checksum    #
      *HW: dddd    *        #HW Version  #
      **************        ##############
```

| | |
|---|---|
| aaaaa | organizer module firmware version |
| bbbbb | organizer module firmware date code |
| cccc | organizer module firmware checksum |
| dddddd | organizer module hardware version |

## 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 89 (9210) – Version information for phone part

```
      **************        ##############
      *CMT SW      *        #CMT SW      #
      *aaaaa bbbbb *        #Version Date#
      *PPM:  cccccc*        #PPM Version #
      *dddddddd    *        #DSP Version #
      **************        ##############
```

| | |
|---|---|
| aaaaa | phone module firmware version |
| bbbbb | phone module firmware date code |
| cccccc | PPM software version code |
| dddddd | DSP software version code |

## Display 96 (3210) – receiver temperature

```
3210    **************        ##############
        *VCX0ADC: aaa*        #ADC VALUE   #
        *TEMP(C):  bb*        #RF TEMP(C)  #
        *TEMP(K): ccc*        #RF TEMP(K)  #
        *             *       #            #
        **************        ##############

    bb                  receiver temperature in degrees C
    ccc                 same value, but in K
```

## Display 99 (7110) – FBUS mode and Accessory mode

```
7110:   **************        ##############
        * Ead:aaaa   *         # EAD value  #
        * Mod:bb     *         # acc.status #
        * MODE: cccc *         # FBUS mode  #
        *            *         #            #
        **************        ##############

    aaaa                no clue
    bb                  type of connected accessory (HP: Headphone, DC: Datacable)
    cccc                currently selected data transfer mode (FBUS, MBUS, AT)
```

## Display 100 (7110, 62XX) – Internal memory usage, overview

```
7110,   **************        ##############
62XX:   *aaaaaa  bb.c*        #MemUseT %Use#
        *cccccc  dd.d*        #MemRelT %Rel#
        *eeeeee  ff.f*        #MemUnuT %Unu#
        *             *       #            #
        **************        ##############

    aaaaaa              the total amount of used memory in the phone
    bb.b                the used percentage of the phones internal memory (% used)
                        (phonebook, tasks, calendar, logos, ring tones etc.)
    cccccc              the total amount of released memory in the memory pool
    dd.d                the percentage of memory which was used, but is currently released
    eeeeee              the total amount of free memory in the phone
    ff.f                the amount of free memory available (% not used)
```

## Display 102 (9210) – last data call type

```
9210    **************        ##############
        *Data call   *        #Data call   #
        *type:       *        #type        #
        *aaaaaa      *        #            #
        *            *        #            #
        **************        ##############

    aaaaaa              type of the last successful data call
```

## Display 103 (9210) – last MT call type

```
9210    **************        ##############
        *Incoming    *        #Incoming    #
        *call type:  *        #call type   #
        *aaaaaa      *        #            #
        *            *        #            #
        **************        ##############

    aaaaaa              type of the last successful MT call
```

## Display 107 (62XX) – Voice dialling feature

```
62XX    **************        ##############
        *ND  a  b  c *        #ND mm cs ps #
        *    d  e  f *        #   ss po da #
        *ggggg hhhhhh*        #Ver   Date  #
        *            *        #            #
        **************        ##############

    a                   number of recorded voice tags currently in phone
    b                   no clue
    c                   status of the voice dialler
                        0 – not initialized
                        1 – last VT not recognized
                        5 – last VT recognized
                        7 – Voice dialling cancelled
                        8 – in use
```

## Display 110 to 115 (7110, 62XX) – Internal memory usage, detail

```
7110,   **************        ##############
62XX:   * a bbbbccccc*        #Pn  Sta %Use#
        *dddddd eeeee*        #EraseCn %Rel#
        *ffffff ggggg*        #NextRec %Unu#
        *h  i j kkkk *        #Cu Cl Cc MmC#
        **************        ##############

    a                   the number of the current memory bank
    bbbb                shows wether this bank is used (0xFFF8)
                        or free (7110: 0xfffe, 62XX: 0xfff0)
    ccccc               percentage of memory used in this bank
    ddddd               erase counter for bank (significant when using flash memory)
    eeeee               percentage of memory which is released in this bank
    ffffff              memory location of next free record
    ggggg               percentage of memory available in this bank
```

## Display 130 (7110) – Slide open counter

```
7110:   **************        ###############
        *aaa    bbbbb*        #Slide   Open#
        *             *       #            #
        *             *       #            #
        *             *       #            #
        **************        ###############
```

| | |
|---|---|
| bbbbb | shows how many times the slide has been opened. The value is shown in hexadecimal digits. |

## Display 132 (3310) – Call information

```
3310:   **************        ###############
        *BS: aaaaaaaa*        #BS_Call Cnt #
        *MO: bbbbbbbb*        #MO_Call cnt #
        *DRC:cccccccc*        #Dropped call#
        *TIM:dddddddd*        #Call time   #
        **************        ###############
```

| | |
|---|---|
| aaaaaaaa | the total number of received (MT) calls |
| bbbbbbbb | the total number of placed (MO) calls |
| cccccccc | the total number of dropped calls |
| dddddddd | the accumulated call time in seconds of all calls |

## Display 133 (3310) – Charger information

```
3310:   **************        ###############
        *BFu:aaaaaaaa*        #FullChargCnt#
        *ChC:bbbb  cc*        #ChaCon Wrong#
        *StB:         *       #Standby time#
        *NSe:         *       # NoServTimer#
        **************        ###############
```

| | |
|---|---|
| aaaaaaaa | shows how many times the ‘Battery Full’-message has been displayed whilst the phone was activated |
| bbbb | shows how often the charger was correctly connected and recognized by the phone. The value is increased either when the charger is recognized or when the charger is inserted, the phone is in a charging state and is switched on |
| cc | number of times a wrong or defective charger was identified |

## Display 240 (no output) – Clear counters and start timers

This Display has no output, but does the following when directly selected:

```
Resets…     …handover counters   (display 40 ff.),
            …test counters       (display 60 ff.) and
            …timers              (display 80 ff.)
```

and starts the test counters from display 81.

## Display 241 (no output) – Disable the netmonitor menu

This Display has no output, but does the following when directly selected:

Disables the netmonitor menu.

Note: Every display number which results in 241 from MOD 256 will deactivate the netmonitor menu, so display 497 and display 753 will do the same. There is **absolutely no such feature** like sending SMS for free or to make free calls for 90 seconds.

To reactivate the netmonitor menu, you may want to

- use Logomanager (http://www.logomanager.co.uk)
- use NetMonitor from A. Schmidt (http://www.aschmidt.de)
- use TAPIR-G from Nobbi (http://www.nobbi.com/monitor/)
- use GNOKII (http://www.gnokii.org)
- use PCLocals from Nokia

## Display 242 (no output) – Disable R&D field test displays

This Display has no output, but does the following when directly selected:

Disables R&D filed test displays, but leaves the netmonitor displays (1..19) active, so you will have only a limited netmonitor activated.