Nokia's NetMonitor Manual

Version 0.8 by FlipO

This is the first release of a complete Netmonitor manual for Nokia phones. For now it only contains the simple specifications for the great majority of screens. If you aren't already familiar with nokia's netmonitor, please wait for the definitive version, probably v1.0. For now I am just releasing this for people to give suggestions and make corrections if necessary.

Phone Models/Software versions

31xx/81xx

Old phones netmonitor has some differences when compared with the newer 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 for now.

51xx/61xx/71xx/88xx/91xx/32xx

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.

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.

Information Sources

Almost all the info available at the moment comes from an official document from Nokia. Some things were added, based on personal experiences and friends contributions. I expect to add more details based on email replys from people reading this document.

Please use the email at the end of the file for suggestions

Things To Do:

- Distribute this document in adobe .pdf format (does anybody nows where I can get Adobe Acrobat Full Version? ☺

- Add a small section that explains how can some netmonitor information can be used by the simple user (battery charging, network details, that kind of things that can be used by non-technical people.

- Change the visual aspect of this manual, making it a good-looking document to print out. (please send me some examples of how you would like to see this… you are free to send me other documents that look nice, so that I can take some ideas.

- Suggestions?

Menu Modes

There are three Menu Display modes:

```
        - execute mode
        - data display mode
        - help mode
```

Different modes are marked in this manual as follows:

```
**************        +++++++++++++        #############
*            *        +           +        #           #
*  Execute   *        +Data display+        #   Help    #
*   Mode     *        +   Mode     +        #   Mode    #
*            *        +           +        #           #
**************        +++++++++++++        #############
```

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

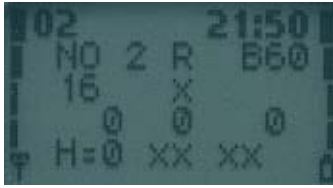|	
a	H, if carrier numbers are scrolled when hopping is on. Otherwise ' '.

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.
e	Time Slot, range is 0 - 7
ff	Timing advance, range is 0 – 63 (see apendix XXXXX)
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: 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 criterium (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 reorganization
                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
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
```
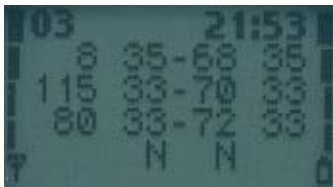
Display 3 – Serving cell, 1st and 2nd neighbour

```
+++++++++++++          #############
+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.
```
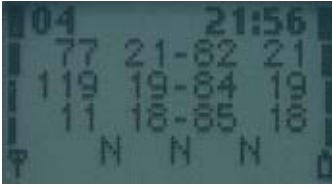
4

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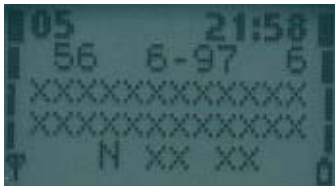
Display 5 – 6th, 7th and 8th neighbour cells


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

```
06        22:00
26202   26207
26207   XXXXX
23410   XXXXX
23205   XXXXX
```
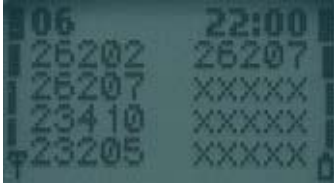
```
#############
#LReg   1_For#
#1_Pre  2_For#
#2_Pre  3_For#
#3_Pre  4_For#
#############
```

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+            #            #
+++++++++++++++          ##############
```
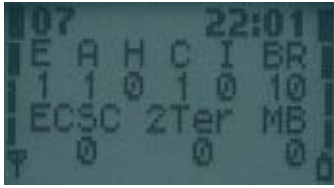
a	1 is shown if emergency calls are supported, else 0
b	1 is shown if attach-detach-procedure is allowed, else 0
c	1 is shown if half rate channels are supported, else 0
d	1 is shown if C2 values are broadcasted, else 0
e	1 is shown if system information 7 and 8 are broadcasted, else 0
f	1 is shown if 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:
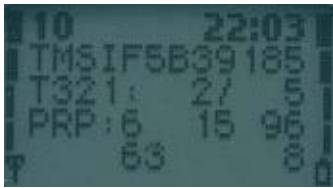
h	In idle mode 1 is shown if Early Classmark (ECSC) sending is supported, else 0. In dedicated mode (conversation) X is shown.
i	In idle mode 1 is shown if 2-Ter messages are supported, else 0. In dedicated mode (conversation) X is shown.
j	MultiBand reporting decimal value (0,1,2,3) is shown if supported. 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.

7

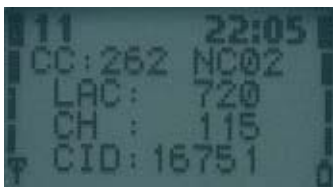## Display 10 – Paging Repeat Period, TMSI, Location Update Timer, AFC and AGC

```
 10       22:03       +++++++++++++        #############
TMSIF5B39185          +TMSIaaaaaaaa+       #TMSI(hex)   #
T321:   2/   5        +T321:bbb/ccc+       #T3212ctr/tim#
PRP:6   15  96        +PRP:d  ee ff+       #PaRP DSF AGC#
      63      8       + ggggg  hhh +       #  AFC   Ch  #
                      +++++++++++++        #############
```

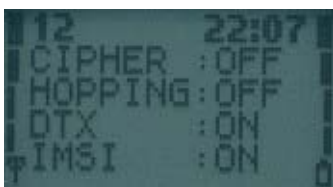|	
aaaaaaaa	TMSI value in hex format
bbb	Current value of T3212 counter (range is 000 - 'ccc', where 1 means 6 min time. So, if this value is 2 less than 'ccc' then next periodic location updating will be made within 2 * 6 min = 12 minutes.
ccc	Timeout value of T3212 counter (range is 000 - 240, where 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

```
 11       22:05       +++++++++++++        #############
CC:262 NC02           +CC:aaa NCbbb+       # MCC    MNC #
 LAC:     720         + LAC:ccccc  +       #LocAreaCode #
 CH :     115         + CH : dddd  +       #ServChannel #
 CID:16751            + 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 – Cyphering, hopping, DTX Status and IMSI

```
 12       22:07       +++++++++++++        #############
CIPHER :OFF           +CIPHER :aaa +       #CipherValue #
HOPPING:OFF           +HOPPING:bbb +       #HoppingValue#
DTX    :ON            +DTX    :ccc +       #DTXValue    #
IMSI   :ON            +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
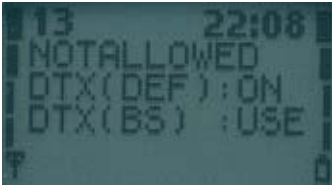

```
**************          #############
*aaaaaaaaaa  *          #DTXMode     #
*DTX(DEF):bbb*          #DefaulDTXSta#
*DTX(BS) :ccc*          #DTXValFromBS#
*            *          #           #
**************          #############
```

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         is 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)

    HELP display:
```

Display 14 – Toggle Screening Indicator

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

```
**************          *************
*  SCREENING *          *  SCREENING *
*  INDICATOR *          *  INDICATOR *
*   IS 00    *          *   IS 01    *
*            *          *            *
**************          *************

HELP display:

#############
#Use menu to #
#  change    #
# Screening  #
# indicator  #
#############
```

Display 17 – Switch BTS_Test Status
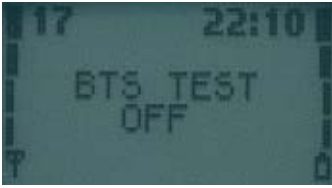

```
#############
#Use menu to #
#toggle BTS  #
#test ON/OFF #
#            #
#############
```

```
**************           *************
*           *           *           *
*  BTS TEST *           *  BTS TEST *
*    ON     *           *    OFF    *
*           *           *           *
*************           *************
```

```
Mobile is                Mobile is
searching only           behaving normally.
one frequency.           Neighbour measurements
Neighbour measurements   are done.
are not 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.

```
**************           *************
*           *           *           *
*  LIGHTS   *           *  LIGHTS   *
*    ON     *           *    OFF    *
*           *           *           *
*************           *************
```

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

Display 19 – Toggle Cell Barred Status

```
█ 19      22:12

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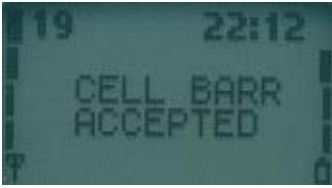
```
#############
#Use menu to #
#toggle cell #
#barr status #
#DIS/ACC/REV #
#############
```

```
**************        **************        **************
*            *        *            *        *            *
* CELL BARR  *        * CELL BARR  *        * 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 initialized.
        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 battey 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 : Maintenace charging checks.
        MaBFD : Maintenace 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.
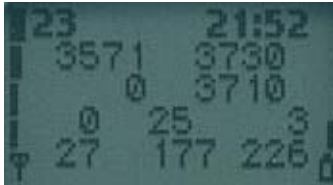
Display 23 – Battery and phone state monitor


```
**************        #############
* 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 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
```
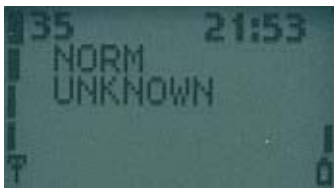
Display 34 – FBUS display

```
**************          #############
*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.
```
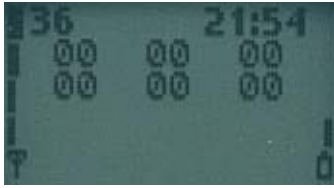
Display 36 – Counters for resets


```
+++++++++++++
+ aa  bb  cc +
+ 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 38 – Memory dump

```
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 offial 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
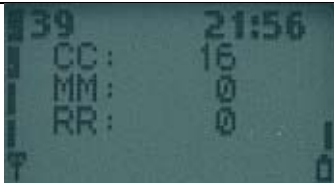

```
+++++++++++++          #############
+ CC: aaaa   +         #CC CauseValu#
+ MM: bbbb   +         #MM CauseValu#
+ RR: cccc   +         #RR CauseValu#
+            +         #            #
+++++++++++++          #############
```

```
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
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
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
```

All cause values are shown in decimal form.

Display 40 – Reset handover counters

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

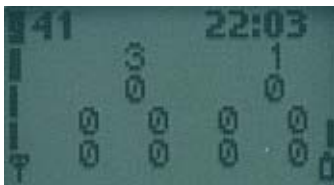   With this display all timers of the handover display can be reset.

Display 41 (in singleband phones) – 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 (in dualband phones) – 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 initialize the counters to zero,
select display 40. Display 60 also initializes these counters.

Display 42 (***in dualband phones) – 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 to GSM
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 initialize the counters to zero,
select display 40. Also display 60 initializes these counters.

Display 43 L2 display
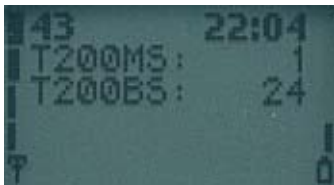
```
+++++++++++++          #############
+T200MS :aaaa+         #T200 MS GSM #
+T200BS :bbbb+         #T200 BS GSM #
+T200MS :cccc+         #T200 MS DCS #
+T200BS :dddd+         #T200 BS DCS #
+++++++++++++          #############
```

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

Display 44 – Toggle revision level

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

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

    HELP display:

    #############
    #Use menu to #
    #  change    #
    # Revision   #
    #  Level     #
    #############
```

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.

```
    **************
    *            *
    *TRANSMITTER *
    *  XXXXXXX   *        XXXXXXX    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.

```
    HELP display:

    #############
    #Use menu to #
    # enable or  #
    #  disable   #
    #transmitter #
    #############
```

Display 51 – SIM information
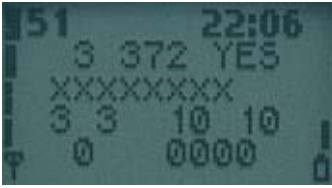
```
 51      22:06      ++++++++++++++   Example display:   ++++++++++++++
  3 372 YES        +aaa bbb ccc +                       +3/5  64 YES +
 XXXXXXX           + ddddddd    +                       +DOWN(UP)    +
  3  3  10 10      + f g  hh ii +                       + 3 2   9 10 +
   0   0000        + j   kkkk   +                       + 2    FE01  +
                   ++++++++++++++                       ++++++++++++++
```

```
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


         HELP display:

         ##############
         #VSel Bau SAl#
         #SCond  CStop#
         #PIN12  PUK12#
         # ATR  FE/PE #
         ##############
```

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

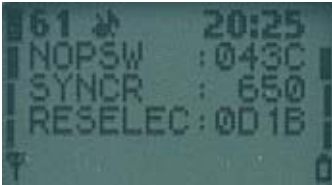Note: This display is only valid when a unknown or a stack overflow interrupt has
occured.

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).

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.

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 (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 synchronization measurement attempts in decimal form. If
        counter value is over 99999 then five x are shown.
ddddd   DCS counter for synchronization 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 initialize 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 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.

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.
Counters are automatically reset to zero when they exceed their maximum value.

Display 63 – Call attempts counters
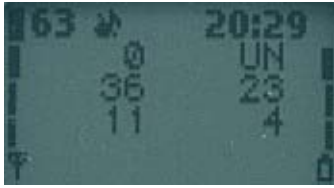
```
++++++++++++++          ##############
+  aa     bb  +          #CalRel RelDi#
+  ccc    ddd +          #MOCAtmp MOOK#
+  eee    fff +          #AllMT   MTOK#
+            +          #            #
++++++++++++++          ##############
```

aa	Reason of last call release
	Cause from messages disconnect and release complete. Refer to ETSI GSM 04.08 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

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. Counters are automatically reset to zero when they exceed their maximum value.

Display 64 – Location Update attempts counters
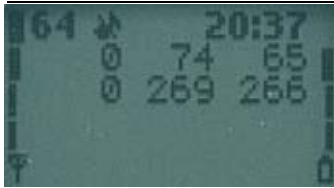
```
++++++++++++++          ##############
+ aa bbb ccc +          #Nfai NL NLOK#
+ dd eee fff +          #PFai PL PLOK#
+            +          # Loc update #
+            +          #  counters  #
++++++++++++++          ##############
```

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 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. 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#
+++++++++++++          #############
```
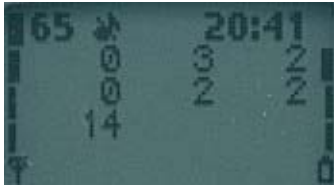
aa	Reason of last sending failure
bbb	Count of all MO short message attempts
ccc	Count of succeeded MO short message attempts
dd	Reason of last receiving failure
eee	Count of all MT short message attempts
fff	Count of succeeded MT short message attempts
gggg	Count of all received cell broadcast schedule messages

On 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. 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 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. 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 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.

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 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.

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.

```
   #############
   #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.

```
#############
#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.

```
      ##############
      #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.

```
      ##############
      #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 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
*            *
**************
```
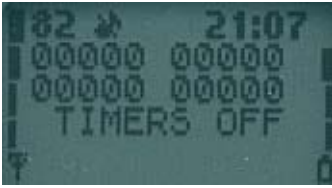
   This display will start or stop the timers.

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.


```
#############
#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 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.
```

```
        #############
        #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.c (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:bbbbbb *           #Text Version#
      *           *           #            #
      *           *           #            #
      **************          #############

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

flipo@gyral.com

```
-----BEGIN PGP PUBLIC KEY BLOCK-----
Version: PGPfreeware 6.0.2i
```

```
mQGiBDbfqukRBADIfexLK1MqpvwWjAFmNzKADCvb4wY1SFJUezJrgGnHQRfURnH+
u9ucAB56o1b/b2rsdrEjR7xL86YMn/31XtCUae/PLfzgoFUcIcyu4TTkQfeRP/WH
l3KKU1kDNKeKS1EgEPIwehEpgNtKpn9OaAodIo2IrlCVnjqaKLDhPHf4JQCg/3d0
+eIvZ7PK7o0aNNQNEB2B6b0D/24+rHGtPkN9rA71bJ6Wjc+aJh0E+koSdowFlWnT
QaJPYx/sEMyFQZTT22aVgcAKxfeWmG8mjqCjz/joP6f8CrHjNgIP6/uoNehS2PD9
33urfHuTQyiNhAtfTga3rxL9WAnIb7qD6vFcfKfkPvx1r2i/2JAIxQtCVyZcb+Em
U0MIA/9Xa2Xe5VY+3NLycUGGMLB+CEjiOILWtlkZ7x15JhHHWrvqgvAUjAKI6uB7
XtgkYL0ZFlvjfIaIrd1Gg2UiKjFErP2+2SvIRW4FqeI90wXc32u93EQ9OdmNvD1c
FiJCIa1DzbPnSAg1NJfOrAryHVanv4C3SmF/uGpWCZiu6YOGgbQXRmxpcE8gPGZs
aXBvQGd5cmFsLmNvbT6JAEsEEBECAAsFAjbfqukECwMCAQAKCRAwMxvYafoMXlq8
AJ4qXfgO7uOtsasUDSWogbCilTjmKgCgj7mnOMY4PhpkyoHTQnvIarfb4di5Ag0E
Nt+q6RAIAPZCV7cIfwgXcqK61qlC8wXo+VMROU+28W65Szgg2gGnVqMU6Y9AVfPQ
B8bLQ6mUrfdMZIZJ+AyDvWXpF9Sh01D49Vlf3HZSTz09jdvOmeFXklnN/biudE/F
/Ha8g8VHMGHOfMlm/xX5u/2RXscBqtNbno2gpXI61Brwv0YAWCvl9Ij9WE5J280g
tJ3kkQc2azNsOA1FHQ98iLMcfFstjvbzySPAQ/ClWxiNjrtVjLhdONM0/XwXV0Oj
HRhs3jMhLLUq/zzhsSlAGBGNfISnCnLWhsQDGcgHKXrKlQzZlp+r0ApQmwJG0wg9
ZqRdQZ+cfL2JSyIZJrqrol7DVekyCzsAAgIH+QG2NtWgB8NDQsIJfShr1F8naaM+
xyM3SwhCAyYrXiiMySIeUx07An/BN3H57qHBZXwU0w+lHo7C2xOIILLXveRq1Xhr
Rpi/RaQU9sHmetpCx6CpBRwRwx1hGJ4TOxRZ/9RwdiEG5xlQqY11T4mUI0bqCk4y
6+EcY4ps16egr7TUm9aNW6JoqRXBCoFacoQuJx9EOlvk/tROZCKV9TxCx478fn6i
rWP6bgun23+WlAU34RrS3oMAaN7TvUntYzp6br8x80Klk45iydmJSuROUqRHLeIe
eAct8cvqzFK2o9ta+kw5j7h0shxyzyyvRAlH5uVpJp0oGokwwy1N3mDecySJAEYE
GBECAAYFAjbfqukACgkQMDMb2Gn6DF5RHQCeNSBR763t/QOmGSPSoCkm8Ut3gvgA
njhf6FOTPe27KFwECymc1SVLO5GK
=bMMm
```
```
-----END PGP PUBLIC KEY BLOCK-----
```