

# **After Sales Technical Documentation**

## **NHE-1/3/4 SERVICE SOFTWARE INSTRUCTIONS**

### AMENDMENT RECORD SHEET

Amendment Number	Date	Inserted By	Comments

# NHE-1/3/4 SERVICE SOFTWARE INSTRUCTIONS

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## Introduction

### General

The NHE-1/3/4 Service Software is specially designed to facilitate the servicing of GSM cellular telephones.

The software can be used to control the phone according to the user's requirements merely by entering commands via the keyboard or mouse of a PC connected to the phone.

This section refers to the Service Software Version 2.3. NMP After Sales will notify service personnel about future upgrades via Technical Bulletins. Software upgrades will be available from your local NMP outlet.

### Minimum Required Servicing Equipment

- Computer: Intel 386/33 MHz or compatible with one unused serial port (COM1 or COM2\*), one parallel port (LPT1), hard disk recommended.
- Memory: 4 MB or more
- Operating System: DOS Version 5 & Microsoft Windows 3.11 or later
- Display: VGA based display (640 x 480)
- WinTesla Service Software: SWSA1 for 3.5" disk (product code: 0774046)
- Software Protection Key PKD-1 (product code 0750018)
- M2BUS interface cable DAU-2 (product code 0750006)
- RS-232 adapter, 9 to 25 pins (product code 4626170)
- Service cable SCS-1 (product code 0770010)

\*) Note: A number of PC's of an older generation use the Intel, National Semiconductor, or United Microelectronics IC 8250 as the serial port UART. This is a comparatively inefficient circuit for current purposes and does not necessarily support the M2BUS adapter at 9600 baud. The newer UART's NS16450 and NS16550AF of National Semiconductor offer solutions for these problems.

## Mechanical Connections

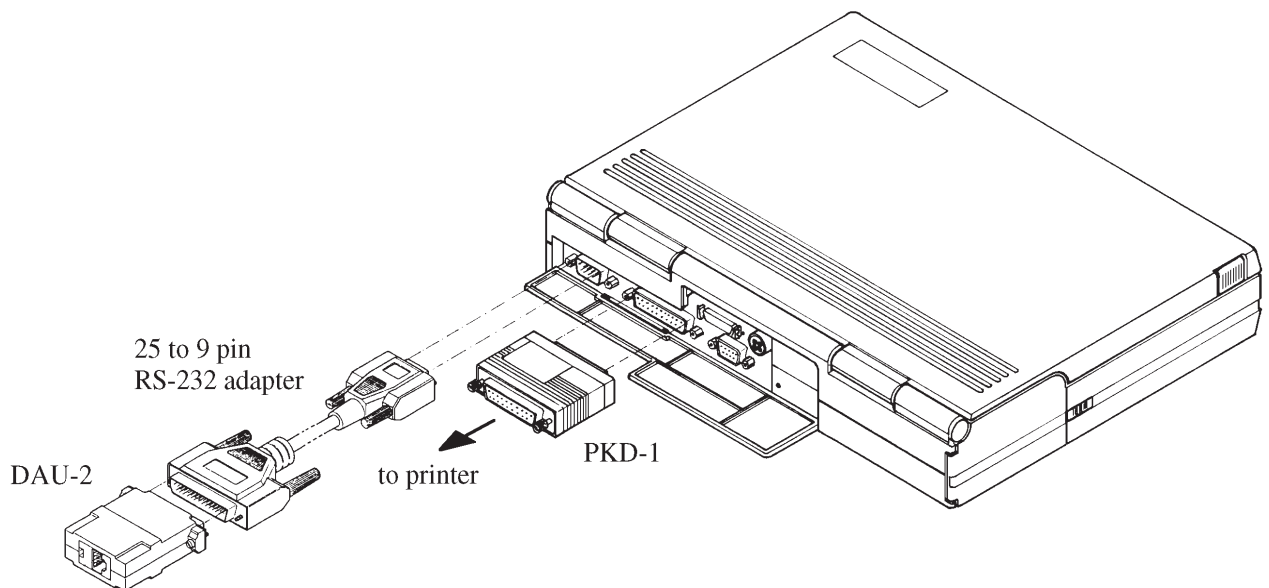
*Caution: Ensure that you have switched off the PC and the printer before making connections !*

*Caution: Do not connect the PKD-1 to the serial port. This could damage the PKD-1 !*

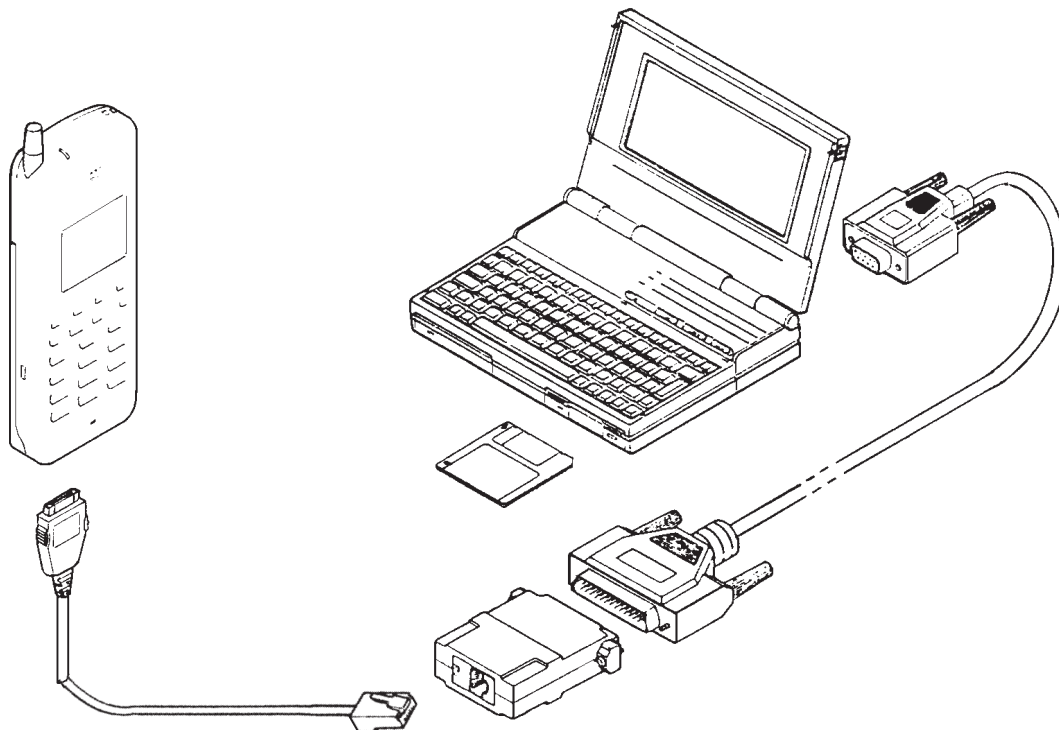
The software controls the phone via a separate adapter connected to the serial port of the PC and to the telephone's M2BUS (DAU-2 and SCS-1).

Attach the protection key PKD-1 to parallel port one (25-pin female D-connector) of the PC. When connecting the PKD-1 to the parallel port be sure that you insert the PC end of the PKD-1 to the PC (male side). If you use a printer on parallel port one, place the PKD-1 between the PC and your printer cable.

The PKD-1 should not effect devices working with it. If some errors occur (errors in printing are possible) please try printing without the PKD-1. If printing is OK without the PKD-1 please contact your dealer. We will offer you a new PKD-1 in exchange for your old one.



Attach first the RS-232 adapter cable to the PC's 9-pin serial port. Connect the M2BUS adapter (DAU-2) to the RS-232 cable. Connect the service cable SCS-1 to the M2BUS adapter (DAU-2) and attach the other end of the cable to the bottom connector of the phone.



## Start Up Procedure

Start the phone by pressing the power-on button of the handset. Switch PC power on.

To installing software, proceed as follows:

1. Insert Service Software disk into drive A of your PC
2. Start Windows: **type *WIN* and press *Enter***
3. Start Installing program: **select *File* → *Run* from Program Manager menu, then type *A:INSTALL* and press *OK* button**
4. Follow Installation Software instructions

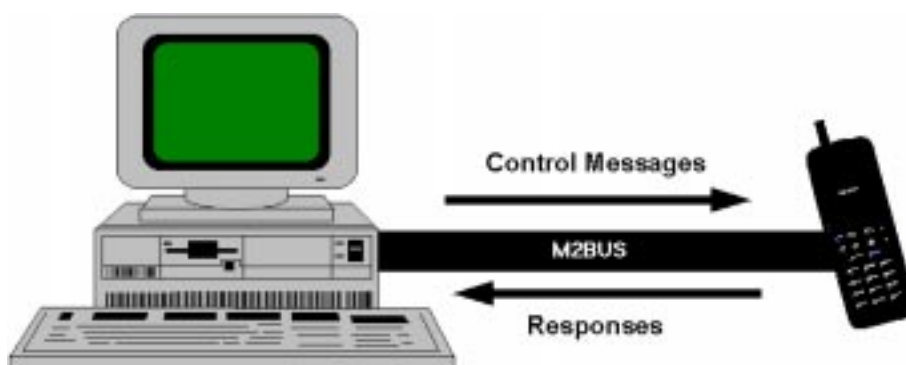


## Introduction to Service Software Package User Interface

This chapter gives a short description of the Service Software properties.

### Service Software/Hardware Environment

To run the Service Software, a parallel port software protection device (PKD-1) has to be connected. The user can use the Service Software functions for testing all supported Phone Types. The functions send messages from the PC to the phone, receive results and show them on the PC display. The messages are sent via a low level NMP proprietary bus protocol. An example bus is an M2BUS interface, which needs M2BUS adapter (DAU-2) connected to the PC RS-232 port and special M2BUS cable.



The recommended minimum hardware standard to run the Service Software package is any computer which is 386 33Mhz or greater with at least 4 MB of memory and VGA type display (640x480). This assumes that only the Service Software package is active, i.e. other Windows packages are not running in the background.

Note: if the Service Software is to be run on a laptop, the power saving feature MUST be switched off.

### Service Software Environment

Service Software user interface is intended for Microsoft Windows 3.11 environment running in enhanced mode. For those who are familiar with Windows environment this application will be easy to use. Detailed information about Windows and application usage can be found from Ref 3- Microsoft Windows Version 3.11 Users Guide chapter one (Windows Basics) and chapter two (Application Basics).

As an ordinary Windows application, the main idea in the user interface is that selections are made with menus, push buttons and shortcut keys. Selections can be done by using keyboard and/or mouse. When messages from phone

are received, they cause display updating in special display windows. There is always a status bar displayed at the bottom of the main window which contains information about current actions.

### **Service Software Executables**

Only one executable is needed – WinTesla.

For NHE-1/3/4 there are two DLL's:

- Functionality DLL is NH134.DLL
- User Interface DLL is NH134EN.DLL

### **Command Line Parameters**

There are NO command line parameters.

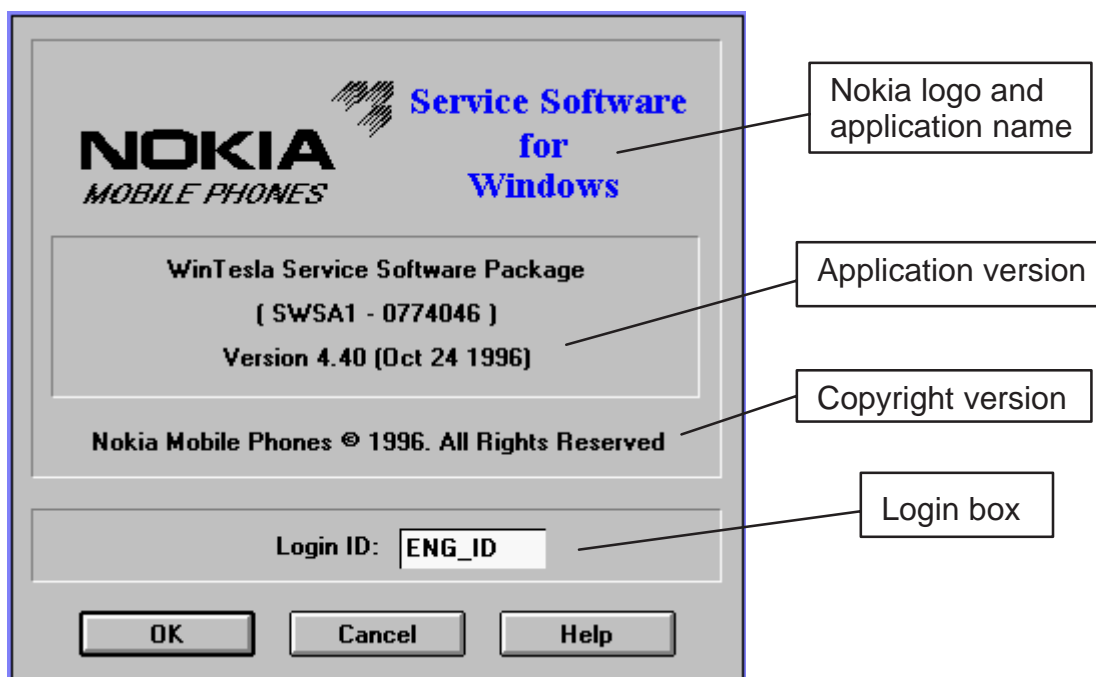
## Common Properties of the User Interface

This chapter describes how the User Interface CLF must appear to the user.

The User Interface **MUST** be capable of being driven without the use of a mouse, as the service engineer rarely has space on the bench to use a mouse.

### Login Dialog

When the Service Software application is invoked, by checking on the Service Software icon, the **Login** dialog box will be displayed on the screen.



#### **Nokia logo and application name** bitmap (–)

Displays Nokia logo and name of the application.

#### **Application version** static text (–)

Contains the name and version of the application.

#### **Copyright notice** static text (–)

Copyright is informed as: "**Nokia Mobile Phones (c) 1996. All Rights Reserved**".

#### **Login Box** edit box (–)

The user Login ID edit box, where the user enters his faultlog user name. (See Faultlog User Guide)

#### **OK** button (default key)

The user name is stored in memory and the dialog box is closed. When the dialog box is closed, the application starts.

**Cancel** button (ESC)

The Dialog box is closed and application is started, but the Faultlog feature is disabled.

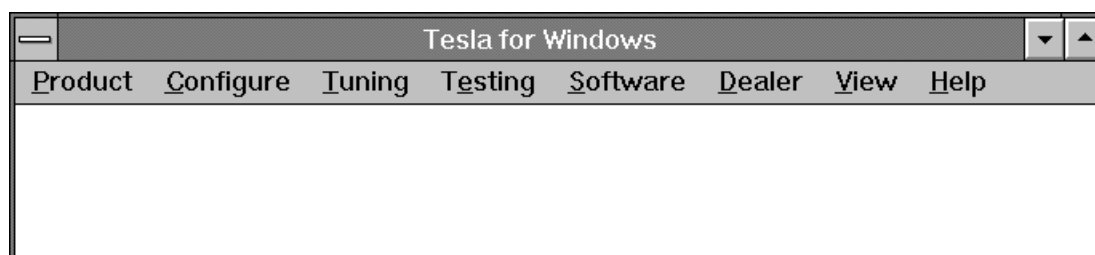
**Help** button (F1)

Activates the Windows Help application and displays context sensitive Help.

## Main Window

The application supports a *Multiple Document Interface (MDI)*. However, the service software interface will present a *Single Document Interface (SDI)* appearance.

Note: MDI is to allow for future expansion, e.g. R&D features.

**Title bar**

The *title bar* is located at the top of the window.

A title bar contains the following elements:

- Application Control–menu button
- Maximise button
- Minimise button
- Name of the application
- Restore button

The properties of these elements and their usage is described in Ref 3– Microsoft Windows Version 3.11 Users Guide chapter one (Windows Basics) and chapter two (Application Basics).

**Menu bar**

The *menu bar* is below the title bar and contains all available menu selections. The menu bar is a dynamic element and is dependent on the dongle type fitted, and whether a phone is connected.

Underlined characters in menu names and options indicates that the menu selection can be done by pressing *Alt+ underlined character*. Options can also be selected by activating menu bar with *Alt-* key ( or *F10* key ) and using arrow-keys to highlight the desired menu. In that case, selection is done by pressing *Enter*.

Menus can also be selected by using the mouse as described in Ref 3-Microsoft Windows Version 3.11 Users Guide

### **Status bar**

The *status bar* is displayed at the bottom of the Service Software main window. The status bar contains information about the menu selections and events.

The left area of the status bar describes the actions of menu items as the user uses the arrow keys to navigate through menus.

The status bar texts are explained in detailed in each of command's description.

The right areas of the status bar indicate which of the following keys are latched down:

<b>Indicator</b>	<b>Description</b>
USER	Entered Login ID.
CAP	The Caps Lock key is latched down.
NUM	The Num Lock key is latched down.
SCRL	The Scroll Lock key is latched down.

### **Tool bar**

The *tool bar* is NOT defined and will not be implemented until specified by this document.

## Menu Bar

The Service Software package will have two menu bar configurations. The first, is an abbreviated version that contains the minimum number of menus that allows package configurations when a phone is NOT connected. The second is described below:

The menu bar MUST only contain the follow menus for the Service Software package when a phone is connected:

- Product\*
- Configure\*
- Tuning
- Testing
- Software
- Dealer
- View
- Help\*

\* – always displayed, even if no phone is connected.

A menu is broken down into sections that are indicated with menu separators. Each sections identifies a logical difference from itself and other sections, i.e. between transmitter and receiver. Any items that are required to be added to a menu lists will be added on the bottom of the appropriate menu section list. If a new item is to be added which is common to two or more phone types, then that menu item will become a common menu item.

The menu lists will use the Microsoft [...] symbol after an item name to indicate that selecting that item will NOT initiate an operation immediately, i.e. a dialog box will be displayed for the user to select options or type in data and press the OK button before the operation is performed.

## Product

The Product menu contains the following menu items:

- New                                  Ctrl+R
- Open...
- Close
- Initialize
  - Normal Mode                  F5
  - Local Mode                      Shift+F5
- Faultlog
  - Activate Faultlog...         F9
  - Edit Faultlog...
- Exit                                      Alt+F4

<u>P</u> roduct	<u>C</u> onfigure
<u>N</u> ew	Ctrl+R
<u>O</u> pen...	
<u>C</u> lose	
<u>I</u> nitialise	▶
<u>F</u> aultlog	▶
<u>E</u> xit	Alt+F4

## Configure

The Configure menu contains the following menu items:

- Options...
- Directories...
- Faultlog...
- Phone Type Specific configuration items (where applicable)

<u>C</u> onfigure	<u>Tu</u>
<u>O</u> ptions...	
<u>D</u> irectories...	
<u>F</u> aultlog...	

## Tuning

The Tuning menu contains the following menu sections:

- Receiver
- Transmitter
- Voltages
- Phone Type Specific tuning items (where applicable)

An example Tuning menu is shown below:

- AFC...
- RSSI (AGC)...
- Tx Power...
- Tx I/Q...
- Battery A/D
- Charger A/D...

<u>T</u> uning	<u>T</u> esting
<u>A</u> FC...	
<u>R</u> SSI (AGC)...	
<u>T</u> x Power...	
<u>T</u> x I/Q...	
<u>B</u> attery A/D...	
<u>C</u> harger A/D...	

Additional menu items may be added within the sections according to the phone type being tuned, e.g. a Charger tuning menu item will be added after the Battery tuning item, but not in the Transmitter tuning section.

## Testing

The Testing menu contains the following menu sections:

- Quick Tests
- Digital
- User Interface Flexi
- Transmitter
- Receiver
- Automatic Tests
- Phone Type Specific testing items (where applicable)

An example Testing menu is shown below:

- Quick Testing (RF)...
- Self Tests
- ADC Readings
- Audio
- Display
- Call Simulation...
- Noise Sensitivity...

<b>Testing</b>	<b>S</b> oftware
<u>Q</u> uick Testing (RF)...	
<u>S</u> elf Tests...	
<u>A</u> DC Readings...	
<u>A</u> udio...	
<u>D</u> isplay...	
<u>C</u> all Simulation...	
<u>N</u> oise Sensitivity...	

Additional menu items may be added within the sections according to the phone type being tested.

Where a menu item consists of more than one test, a pop-up menu may be added to identify the appropriate sub-tests, e.g. there may be two receiver tests required for a particular phone type (Bit Error Rate and RSSI Monitoring). These will be shown as a popup from the Receiver menu item.

## **Software**

The Software menu contains the following menu sections:

- Phone Intity/Numbers
- Flashing
- Phone Type Specific software items (where applicable)

An example Software menu is shown below:

- Phone Intity
- Serial Number Transfer...
- Product Profile...
- Start Up Self-tests...
- Set Default Values

<b>Software</b>	<b>D</b> ealer	<b>V</b> iew
<u>P</u> hone <u>I</u> ntity...		
Serial Number <u>T</u> ransfer...		
<u>P</u> roduct Profile...		
<u>S</u> tart Up Self-tests...		
Set Default <u>V</u> alues		



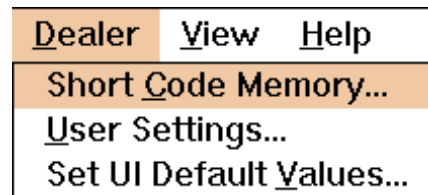
## **Ddealer**

The Ddealer menu contains the following menu sections:

- Phone UI Data Editors
- Phone UI Data Transfer
- Phone Re-Initialization Functions
- Subscriber Data
- Phone Type Specific dealer items (where applicable)

An example Ddealer menu is shown below:

- Short Code Memory
- User Settings
- Set UI/DEV Default Values ...



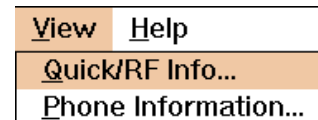
## **View**

The View menu contains the following sections:

- Service Windows
- Production Windows (where applicable)
- R&D Windows (where applicable)

An example View menu is shown below:

- Quick/RF Info...
- Phone Information...



## **Phone Identity Window**

The Phone Identity window should contain, as a minimum, the following data:

- Software Version(s)
- Hardware Version(s)
- Serial Number(s)
- Product Code

This window will only be used as a display window and therefore will not allow editing of the displayed data. This window will not contain any controls other than a scroll bar.

## **Help**

The Help menu contains the following menu items:

- Index
- General Help
- Using Help
- About WinTesla

<u>H</u> elp
<u>I</u> ndex
<u>U</u> sing Help
<u>C</u> ontext Help
<u>A</u> bout...

## Mouse Cursors

The standard Windows pointer will be used as the mouse cursor.

During time consuming tasks e.g. communication to phone, an hour glass will be shown informing the user that a task is in progress. The application uses the hour glass cursor to inform user that the application has taken the control and any actions from user will be ignored.

When a function is initiated, the hour glass will be displayed and when the function has finished the mouse pointer will return to normal.

## Reserved Keys

The following Hot keys and Short Cut keys are reserved either as Microsoft standard keys or as part of the Common Look and Feel specified by this document.

### Short Cut Function Keys

Key	Description	Defined by
F1	Context Sensitive Help	Microsoft
F5	Normal Mode	NMP
Shift+F5	Local Mode	NMP
F9	Activate Faultlog	NMP
F10	Goto Menu Bar	Microsoft
Ctrl+F4	Close Active Window	Microsoft

### Alt Hot Keys

Key	Description	Defined by
Alt+F4	Exit Active Application	Microsoft
Alt+H	Help	Microsoft

### Ctrl Hot Keys

Key	Description	Defined by
Ctrl+N	<u>F</u> ile – <u>N</u> ew	Microsoft
Ctrl+O	<u>F</u> ile – <u>O</u> pen	Microsoft
Ctrl+P	<u>F</u> ile – <u>P</u> rint	Microsoft
Ctrl+R	<u>P</u> roduct – <u>N</u> ew	NMP

## Shift Hot Keys

Key	Description	Defined by
Shift+F5	Local Mode	NMP

## Key Strokes

Key	Description	Defined by
Alt+P	<u>P</u> roduct Menu	NMP
Alt+P,N	<u>N</u> ew	NMP
Alt+P,O	<u>O</u> pen	NMP
Alt+P,C	<u>C</u> lose	NMP
Alt+P,I	<u>I</u> nitialize Pop-up	NMP
Alt+P,I,N	<u>N</u> ormal Mode	NMP
Alt+P,I,L	<u>L</u> ocal Mode	NMP
Alt+P,F	<u>F</u> aultlog Pop-up	NMP
Alt+P,F,A	<u>A</u> ctivate Faultlog	NMP
Alt+P,F,E	<u>E</u> dit Faultlog	NMP
Alt+P,E	<u>E</u> xit Application	NMP
Alt+C	<u>C</u> onfigure	NMP
Alt+C,O	<u>O</u> ption	NMP
Alt+C,D	<u>D</u> irectories	NMP
Alt+C,F	<u>F</u> aultlog	NMP
Alt+T	<u>T</u> uning Menu	NMP
Alt+T,A	<u>A</u> FC	NMP
Alt+T,R	<u>R</u> SSI(AGC)	NMP
Alt+T,X	<u>T</u> x Power	NMP
Alt+T,Q	Tx I/ <u>Q</u>	NMP
Alt+T,B	<u>B</u> attery	NMP
Alt+T,C	<u>C</u> harger	NMP
Alt+E	<u>T</u> esting Menu	NMP
Alt+E,Q	<u>Q</u> uick Testing RF	NMP
Alt+E,S	<u>S</u> elf Tests	NMP
Alt+E,A	<u>A</u> DC Readings	NMP
Alt+E,U	<u>A</u> udio	NMP

Alt+E,D	<u>D</u> isplay	NMP
Alt+E,C	<u>C</u> all Simulation	NMP
Alt+E,N	<u>N</u> oise Sensitivity	NMP
Alt+S	<u>S</u> oftware Menu	NMP
Alt+S,I	Phone <u>I</u> dentify	NMP
Alt+S,T	Serial Number <u>T</u> ransfer	NMP
Alt+S,P	<u>P</u> roduct Profile	NMP
Alt+S,S	<u>S</u> tart-Up Self Tests	NMP
Alt+S,V	Set Default <u>V</u> alues	NMP
Alt+D	<u>D</u> ealer Menu	NMP
Alt+D,C	Short <u>C</u> ode Memory	NMP
Alt+D,U	<u>U</u> ser Settings	NMP
Alt+D,V	Set UI Default <u>V</u> alues	NMP
Alt+V	<u>V</u> iew Menu	NMP
Alt+V,Q	<u>Q</u> uick/RF Info	NMP
Alt+V,P	<u>P</u> hone Information	NMP
Alt+H	<u>H</u> elp Menu	Microsoft
Alt+H,I	<u>I</u> ndex	Microsoft
Alt+H,G	<u>G</u> eneral Help	Microsoft
Alt+H,U	<u>U</u> sing Help	Microsoft
Alt+H,A	<u>A</u> bout WinTesla	Microsoft

## Help Functions

The Help User Interface will be the standard Windows help tool called WinHelp.

The context sensitive help is activated with **F1**-key. Help contains also Using Help which describes how to use help facility. Refer to the Windows manual for detailed description on the Windows Help.

## Dialog boxes

The Service Software application uses many different dialog boxes. Dialog boxes are used to display data and prompt the user for input.

Dialog boxes are opened from menus or with shortcut keys. Dialog boxes have different properties but some features are common.

All service dialog boxes must be modal, that is, the user will not be able to start another operation without first closing the present dialog box.

All dialog boxes will contain the following entities:

- Help button
- Title bar
- At least one button other than Help
- Application Control–menu Button

## Common Dialog boxes

This sections describes the common dialog boxes used in the Service Software package, and the context in which they will be used.

### Note Message Box

When the user has made an illegal selection, a *note message box* dialog will be opened and message text is displayed. The message box is also opened when the program has some information for the user. The size of the dialog box may vary. An information dialog box is recognized by the !–icon.



The dialog box will also contain an OK button and a Help button.

**OK** button (default key):

Acknowledge displayed information and continue. The dialog box is closed after selection.

**Help** button (Alt+H):

Opens context sensitive help as F1–key does.

### Query Message Box

Confirmations and questions are asked in a *query message box*. A query dialog box is recognized by the ?–icon.



The dialog box will also contain a Yes button, a No button, and a Help button.

**Yes** button (Alt+Y or Y) (default key):

Accepts confirmation or question.

**No** button (Alt+N or N):

Denies confirmation or question.

**Help** button (Alt+H):

Opens context sensitive help as F1–key does.

The buttons may also be OK and Cancel. The operation of these buttons are the same as in the Note dialog box.

## Error Message Box

Error message dialog boxes use the Stop–icon. When a “Stop”–dialog box is shown, the current operation is terminated.

The dialog box has a description about the failed operation and reason. Pressing F1 (Help) application opens the appropriate help topic that gives information about recommended actions.



The dialog box will also contain an OK button and a Help button.

**OK** button (default key):

Acknowledges displayed information and terminate current operation. The dialog box is closed after selection.

**Help** button (Alt+H):

Open context sensitive help as F1–key does.

## Custom Dialog boxes

All custom dialog boxes will contain the predefined buttons as defined below in the section – *Buttons*. However, it is recognised that features may require additional button types, but the addition of these non-standard buttons should be carefully considered to minimise any inconsistencies between implementations.

The buttons will be positioned down the right-hand side of the dialog boxes. The default action will be **OK**, except where that default action could result in an irretrievable failure.

All tuning dialogs that contain tuning results, will display the old tuned data read from the phone before the tuning was performed, as well as the newly tuned data.

List boxes will be used to display lists of data, such as tuning data, test results etc.

The use of Radio buttons should be limited and carefully considered. The use of radio buttons defines the number of possible choices available to the user, which may be acceptable for one project, but not for another.

## Buttons

All buttons must be the Microsoft style of buttons.

In general, the default button will be the OK button, the Close button or the Yes button, but this will depend on the context of the dialog box that the button is associated with.

### **OK** button:

Accepts and validates entered settings and values and closes the dialog. If the values have not been changed, then no action will be taken. The status bar will reflect the status. The user should only be queried, if the settings or values accepted will over-write data that CAN NOT be reproduced.

A greyed **OK** button indicates that settings selected by the user are not acceptable.

### **Close** button:

Closes the current dialog box. Does not send or store anything and closes the dialog. The Close button is only used for dialogs that do not set or change any data.

### **Cancel** button (Esc):

Cancel operation. Does not send or store anything and closes the dialog box.

A greyed **Cancel** button indicates that it is not possible to quit from this dialog box.



**Yes** button (ALT+Y or Y):

Replies Yes to a question asked of the user.

**No** button (ALT+N or N):

Replies No to a question asked of the user.

**Help** button (ALT+H):

Opens context sensitive help as F1-key does.

## Reporting Status

The status bar will be used to report the present status to the user. When a feature is initiated, the status bar will be updated with a brief description of the function. The status bar will also be updated at key points in a time consuming function.

If an error is to be reported to the user, it will be displayed in the status bar as well as displayed in a common error dialog box. This will mean the user is not delayed from progressing on to the next operation unless an error occurs, in which case, the user will have to acknowledge the error by pressing the OK button.

## NHE-1/3/4 Specific Features

### Menu Bar

The Service Software's menus adopts the menu structure specified by CLF.

### Product

#### New command

Activation	Status Bar Text
Alt, P, N Ctrl+R	Rescan a new phone
<p>This command scans a new product. When phone is found a product specific functionality module is loaded. If no phone or wrong phone/cellular type is detected, functionality is unloaded and user is informed.</p> <p>This function is also started automatically when the application is started. The user can also specify a regular poll which enables the WinTesla application to scan the new phone periodically. If the phone is still the same, no changes are done. If the phone is changed (with same phone type only the serial number is changed), the phone will be initialized to a normal mode. If the phone is changed to a different phone type, the current dlls are unloaded and new ones are loaded for that phone.</p> <p>The initialization routine checks the phone's cellular type (GSM/PCN), and if an unsupported phone is detected, the WinTesla application does not load the dlls.</p> <p>If quick info view is open, the window will be automatically updated.</p> <p>If phone identification view is open, the window will be automatically updated.</p>	

#### Open... command

Activation	Status Bar Text
Alt, P, O	Force load phone specific functionality
<p>Enables the user to force load specific phone's WinTesla dll's. It also disables further phone type detection with <b>New</b> command.</p> <p>Note: This selection is for applications that has reflashing functionality. Reflashing is not implemented for NH-1 phones.</p>	

**Close command**

Activation	Status Bar Text
------------	-----------------

---

Alt, P, C	Close loaded functionality
-----------	----------------------------

Closes loaded functionality and sends reset to phone if dlls are loaded by Open command.

**Initialize command**

Activation	Status Bar Text
------------	-----------------

---

Alt, P, I	–
-----------	---

Opens a submenu which contains the following options:

**Normal Mode**

Activation	Status Bar Text
------------	-----------------

---

Alt, P, I, N F5	Initializes phone to normal mode
--------------------	----------------------------------

When normal mode has been activated or program has been started, self-test results will be asked from MCU. If any fault was found in the tests, an error message is shown. If normal mode has been set successfully (no self test error has been found), and paging listening has been started, the used AFC value is requested from MS.

The Initialization routine checks the phone's cellular type (GSM/PCN) and if an unsupported phone is detected, the application unloads the dlls.

If phone identification view is open, the window will be automatically updated. Also if RF Information Window is open it will be updated to quick info view.

**Local Mode**

Activation	Status Bar Text
------------	-----------------

---

Alt, P, I, L Shift+F5	Initialises phone to local mode
--------------------------	---------------------------------

Selection will change the MS state to *local*. When local mode is selected the phone is controlled to the local mode so that special actions can be made (for example RF tunings).

**Faultlog**

Activation	Status Bar Text
------------	-----------------

---

Alt, P, F	–
-----------	---

Opens a submenu which contains following options:

**Activate Faultlog...**

Activation	Status Bar Text
------------	-----------------

---

Alt, P, F, A F9	Activates faultlogging
--------------------	------------------------

**Edit Faultlog...**

Activation	Status Bar Text
------------	-----------------

---

Alt, P, F, E	Activates faultlog editing
--------------	----------------------------

**Exit command**

Activation	Status Bar Text
------------	-----------------

---

Alt, P, X Alt + F4	Exit application
-----------------------	------------------

Double click the application's Control menu button:



This command ends the Service Software session.

## Configure

### Options... command

Activation

Status Bar Text

Alt, C, O

Edit Service Software configuration options

(Sample screen)

The **Options** dialog box contains the following items:

**Language** drop down list.

**Current password** edit box:

**New Password** edit box:

**Retype Password** edit box:

**User ID** edit box.

**M2BUS Com Port** drop down list.

**Automatic Rescan** edit box. Units in seconds (eg. value10 checks the phone every 10 seconds in case it has been replaced).

**OK** button (Alt+O):

The dialog box is closed, and *values are saved* to phone.

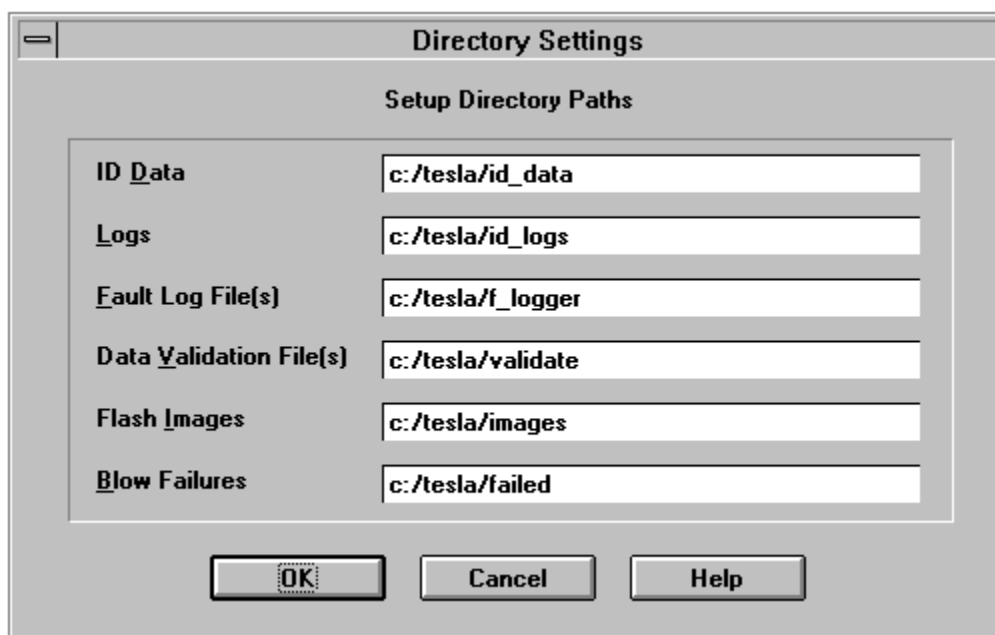
**Cancel** button (Esc):

The dialog box is closed and changes *are not saved* to phone.

### **Directories... command**

Activation                      Status Bar Text

Alt, C, D                      Edit directory settings



The **Directories** dialog box contains the following items:

**ID Data** edit box:

**Logs** edit box:

**Fault log file(s)** edit box:

**Data Validation file(s)** edit box:

**Flash Images** edit box:

**Blow failures** edit box:

**OK** button (Alt+O):

The dialog box is closed, and *values are saved* to phone.

**Cancel** button (Esc):

The dialog box is closed and changes *are not saved* to phone.

**Faultlog... command**

Activation	Status Bar Text
------------	-----------------

---

Alt, C, F	Edit faultlog settings
-----------	------------------------

The **Faultlog** dialog box contains the following items:

**Fault log enabled/disabled** radio buttons:

**Allow Manual Entry enabled/disabled** radio buttons:

**Automatic fault log prompting enabled 1/Disabled 2** radio buttons:

**Station identity** edit box:

**Country of Repair** edit box:

**Warranty period months** edit box / drop down list:

**Maximum Time to repair** edit box:

## Tuning

The tuning menu offers functions for ME adjustments.

### AFC... command (NHE-4)

Activation

Status Bar Text

Alt, T, A

Open an AFC diagram dialog box

Starts AFC tuning.

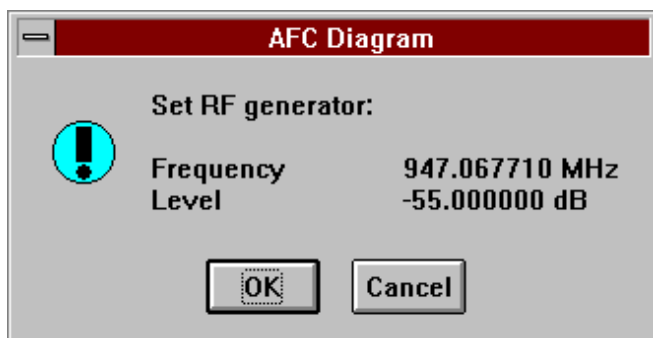
The following are automatically selected when this tuning function is activated:

Active Unit = RX

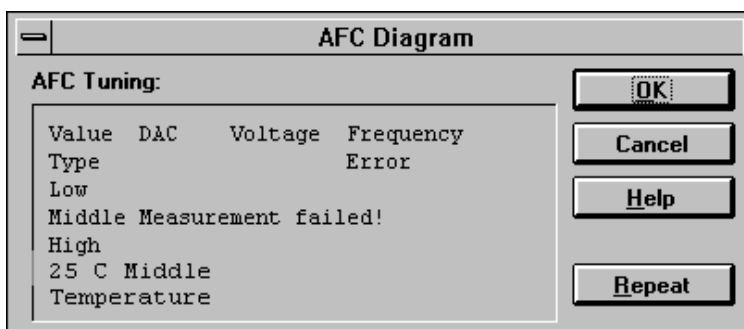
Operation mode = Continuous

Update RF Information window

Before tuning is started, the user is requested to set signal generator to specified input level (read from .INI file).



The **AFC Diagram** dialog box will open when user accepts request:



The **AFC Diagram** dialog box contains the following items:

**Repeat** button (Alt+R):

The measurement can be started again by pressing Repeat button.

**OK** button (Alt+O):

The dialog box is closed, and tuning *is saved* to phone.



**Cancel** button (Esc):

Dialog is closed and tuning *is not saved* to phone.

The D/A converter range (DAC) is from +1023 to -1024 and voltage range is from 0.3 V to 3.9 V (voltage precision is 0.01 V).

The frequency error range is from -134 kHz to +134 kHz with the precision 0.1 kHz. The rounding is made to the closest value.

After exiting with the Cancel button, the following are reset to the values which were selected before this adjustment.

Active Unit

Operation mode

Update RF Information window

The AFC is also reset to its previous value after exiting with the Cancel button.

**AFC... command** (NHE-1)

Activation	Status Bar Text
Alt, T, A	Open an AFC diagram dialog box

Starts AFC tuning.

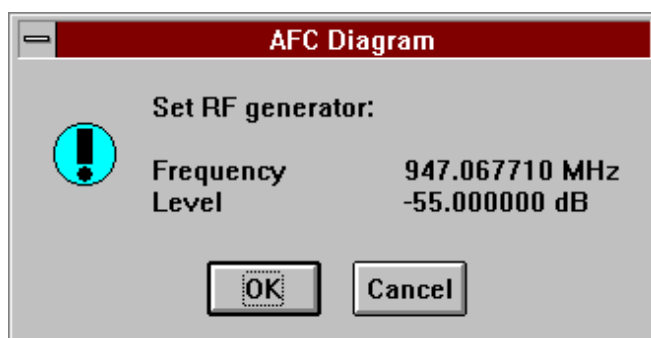
The following are automatically selected when this tuning function is activated:

Active Unit = RX

Operation mode = Continuous

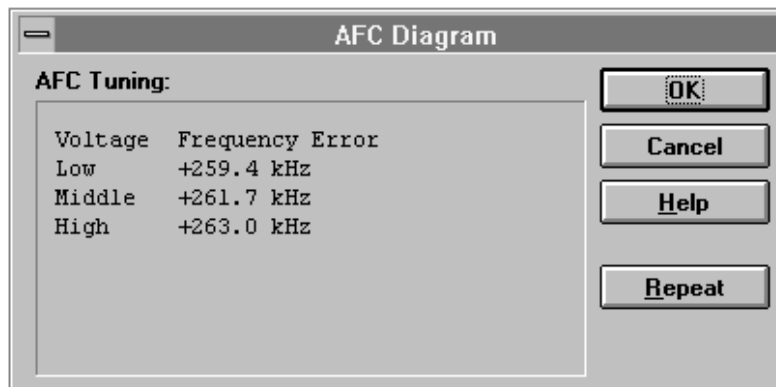
Update RF Information window

Before tuning is started, the user is requested to set signal generator to specified input level (read from .INI file).



The **AFC Diagram** dialog box will open when user accepts request:

(Sample screen)



The **AFC Diagram** dialog box contains the following items:

**Repeat** button (Alt+R):

The measurement can be started again by pressing Repeat button.

**OK** button (Alt+O):

The dialog box is closed, and tuning *is saved* to phone.

**Cancel** button (Esc):

Dialog is closed and tuning *is not saved* to phone.

The frequency error precision is 0.1 kHz. The rounding is made to the closest value.

After exiting with the Cancel button, the following are reset to the values which were selected before this adjustment.

Active Unit

Operation mode

Update RF Information window

The AFC is also set to the middle (zero) value after exiting with the Cancel button.

**RSSI (AGC)... command (NHE-4)**

Activation	Status Bar Text
------------	-----------------

---

Alt, T, R                      Open **RSSI Calibration** dialog box

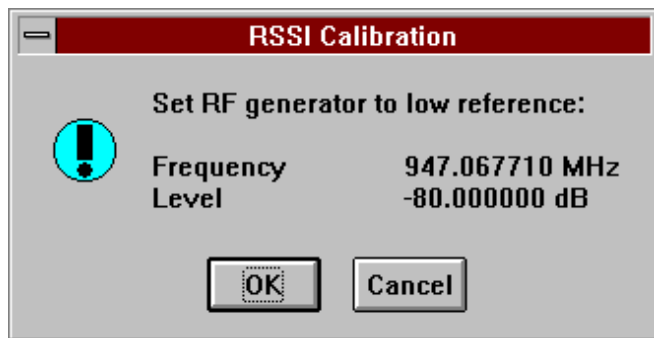
Starts RSSI calibration.

The following are automatically selected when this tuning function is activated:

- Active Unit = RX
- Operation Mode = Continuous
- Update RF Information window

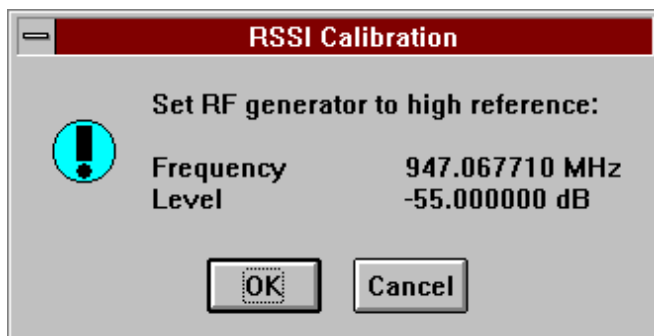
The measurement is started automatically when RSSI calibration is entered. The measurement is done in five steps:

1. The user is requested to set signal generator to low input level (read from .INI file).



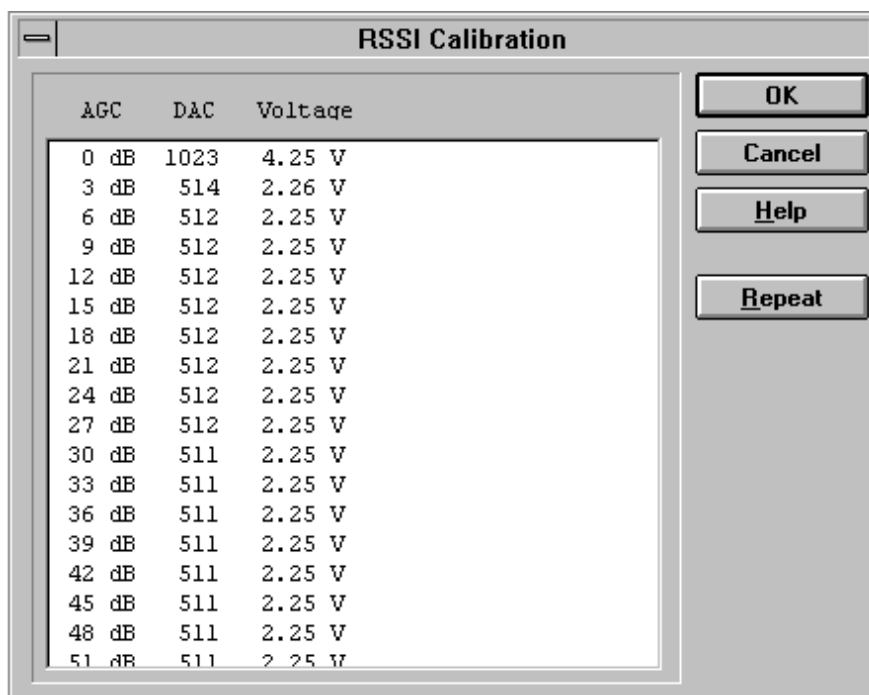
2. Measurement with low input level is executed.

3. The user is requested to set signal generator to high input level (read from .INI file).



4. Measurement with high input level is executed.

5. The **RSSI Calibration** dialog box will be updated when previous steps are done. (Sample screen)



The **RSSI Calibration** dialog box contains the following items:

**AGC List** box (Alt+A):

Gain code DAC can have values from 0 to 1023 and voltage from 0.26 V to 3.86 V (voltage precision is 0.01 V). Note that the needed input signal level is also shown.

The difference column shows the difference between tuned DAC values and mean straight line calculated from part slopes in dBs (see /1/). This can be calculated when all measurement results have been received from phone.

**Repeat** button (Alt+R):

The measurement can be started again by pressing this button.

**OK** button (Alt+O):

The dialog box is closed, and tuning *is saved* to phone.

**Cancel** button (Esc):

The dialog box is closed and tuning *is not saved* to phone.

When calibration is ended, the DAC value check is made, and if it is unsuccessful, an error message is shown. The test checks if all DAC values are in the same order as AGC values in the table.

After exiting with the Cancel button, the following are reset to the values which were selected before this adjustment.

Active Unit

Operation Mode

Update RF Information window

The exit and the use of AGC-control values is done the same way as exit from power level tuning and power coefficient use.

### **RSSI (AGC)... command (NHE-1)**

Activation

Status Bar Text

Alt, T, R

Open **RSSI Calibration** dialog box

Starts RSSI calibration.

The following are automatically selected when this tuning function is activated:

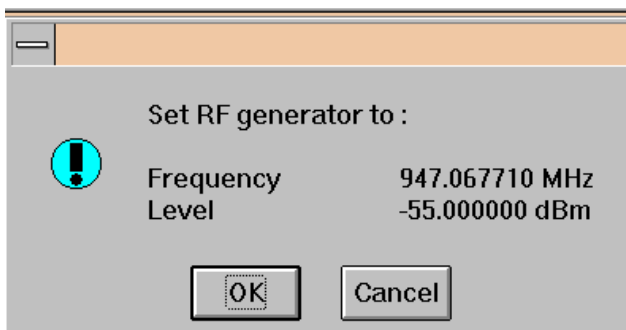
Active Unit = RX

Operation Mode = Continuous

Update RF Information window

The measurement is started automatically when RSSI calibration is entered. The measurement is done in three steps:

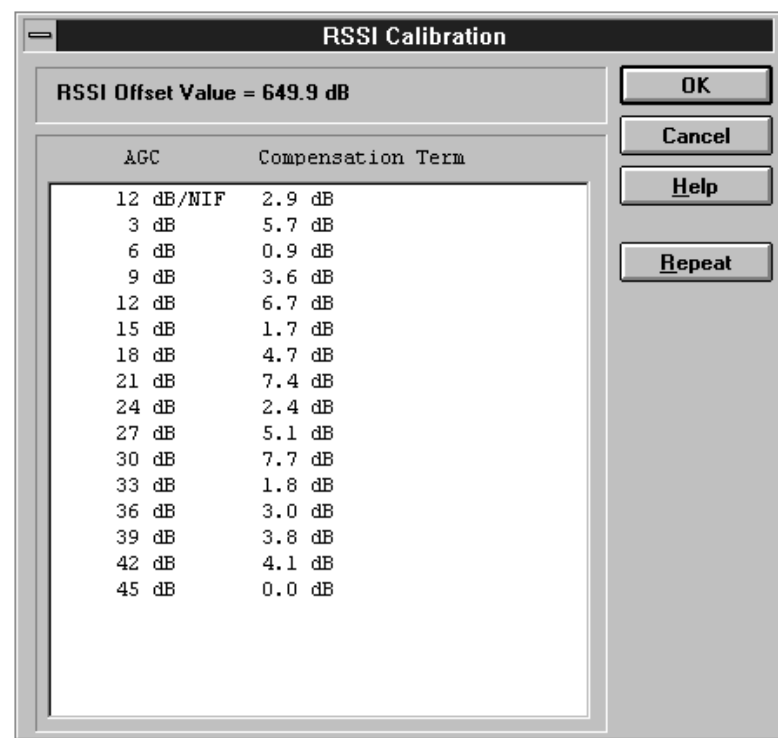
1. The user is requested to set signal generator to low input level (read from .INI file).



2. Measurement with low input level is executed.

3. The **RSSI Calibration** dialog box will be updated when previous steps are done.

(Sample screen)



The **RSSI Calibration** dialog box contains the following items:

**RSSI Offset value:**

RSSI offset value has the 0.1 dB precision.

**AGC List** box (Alt+A):

AGC list box shows gain code values and correspondence compensation term values. AGC compensation terms have the 0.1 dB precision.

**Repeat** button (Alt+R):

The measurement can be started again by pressing this button.

**OK** button (Alt+O):

The dialog box is closed, and tuning *is saved* to phone.

**Cancel** button (Esc):

The dialog box is closed and tuning *is not saved* to phone.

After exiting with the Cancel button, the following are reset to the values which were selected before this adjustment.

Active Unit

Operation Mode

Update RF Information window

The exit and the use of AGC-control values is done the same way as exit from power level tuning and power coefficient use.

### **TX Power... command**

Activation

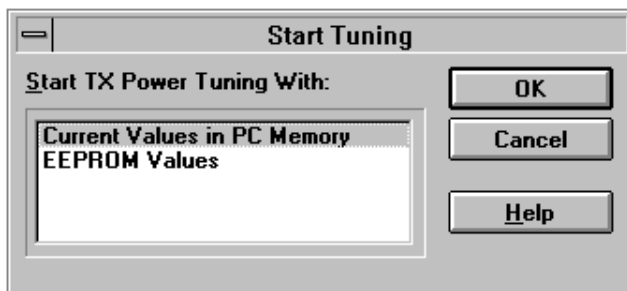
Status Bar Text

Alt, T, X

Open **TX Power Tuning** dialog box

Starts TX power tuning.

The user is first requested to select with which values tuning is started in the **Start Tuning** dialog box.



The **Start Tuning** dialog box contains the following items:

**Start Tuning With** list box (Alt+S):

#### **Current Values in PC memory**

Tuning values are loaded from the program's internal memory.

#### **EEPROM Values**

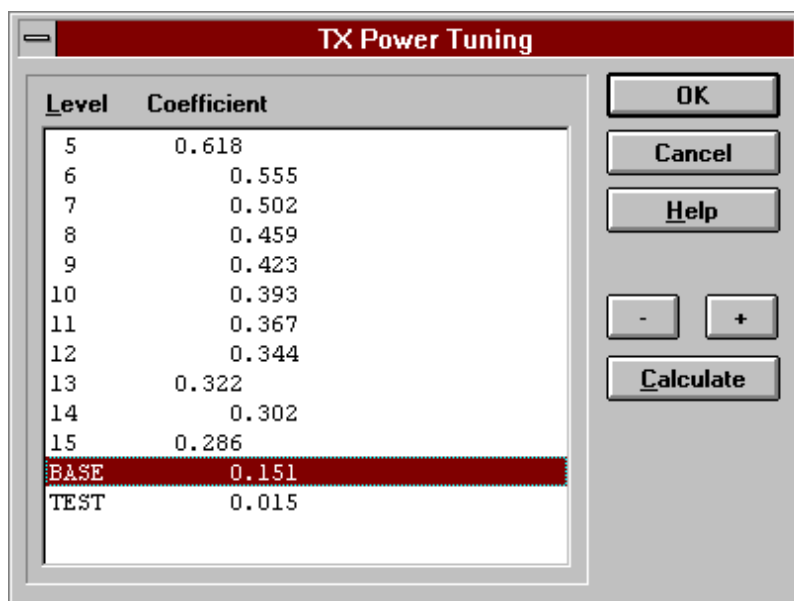
Tuning values are loaded from ME's EEPROM.

The following are automatically selected when this tuning function is activated:

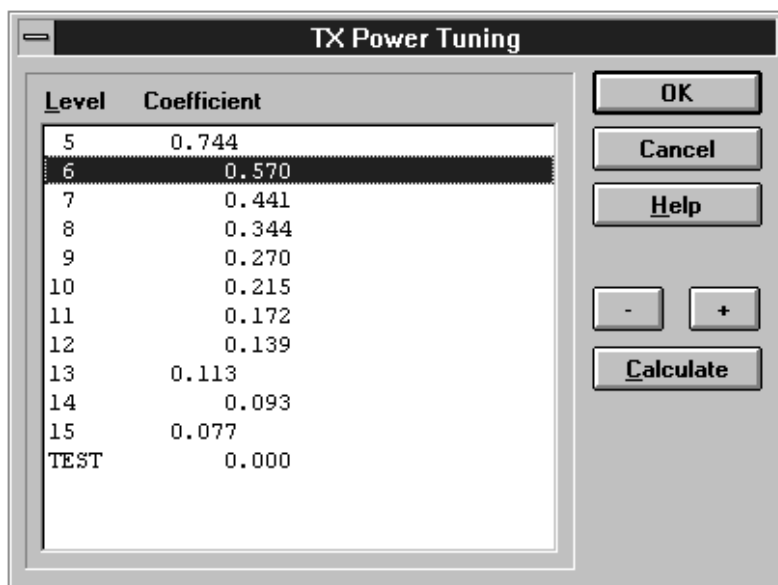
- Active Unit = TX
- the BASE power level is selected
- Operation mode = Burst

The **TX Power Tuning** dialog box will be activated automatically after value selection.

NHE-4 dialog box: (Sample screen)



NHE-1 dialog box: (Sample screen)



The **TX Power Tuning** dialog box contains the following items:

**Power Level & Coefficients** list box (Alt+P):

The power is presented in GSM values (5..15). The base power is selected automatically when the dialog box is opened. The test value is reset to 0.035 when the program is started. The test value is not saved to the EEPROM. The test value can be changed during tuning



as other power coefficients and the program remembers its value when tuning function is activated later again.

If there are more power levels in the phone than can fit into the window, the window is scrollable. When the phone is initialized, the program asks the number of power levels used in the phone.

Only three power coefficients (biggest, third smallest and smallest) are needed to tune and the rest of them are calculated.

The tuning position is highlighted and can be tuned with +/- keys or left/right cursor keys.

**Calculate** button (Alt+C):

The calculation is activated with this button. The power coefficients which are calculated from the tuned coefficients are displayed on the different columns than the others. All values can be tuned if needed.

**+/-** buttons (+/-):

The + and – buttons will cause power changing by 0.25dB steps (D/A converter control value ratio is 1.0292). When these keys are used, the coefficient value is updated on the tuning window.

**OK** button (Enter):

The dialog box is closed, and tuning *is saved* to phone.

**Cancel** button (Esc):

The dialog box is closed, and tuning *is not saved* to phone.

When selections are used, the power value checking is made and if it is unsuccessful, an error message is shown. The test checks that all power coefficients are in descending order (same order as power levels).

If the power tuning function is ended and EEPROM values are not received or EEPROM fault is noticed, an error message is shown.

When all power coefficients have such values that they don't cause any error messages, the dialog box will close. The last selected tuning power will be used after exit.

Because the stored power level range is larger than the number of used power levels, the unused levels should be set to nearest possible power level. (For example in GSM the levels 2–4 are not used, so they are set to same value as level 5).

When this tuning function is ended, the following is automatically selected:

Active Unit = RX

**TX I/Q... command**

Activation

Status Bar Text

Alt, T, Q

Open the **TX I/Q Tuning** dialog box

This function is used for tuning TX I and Q branch DC offset, amplitude difference and phase difference.

The function opens the same **Start Tuning** dialog box as with TX Power Tuning.

When this function is activated the following are automatically selected:

Active Unit = TX

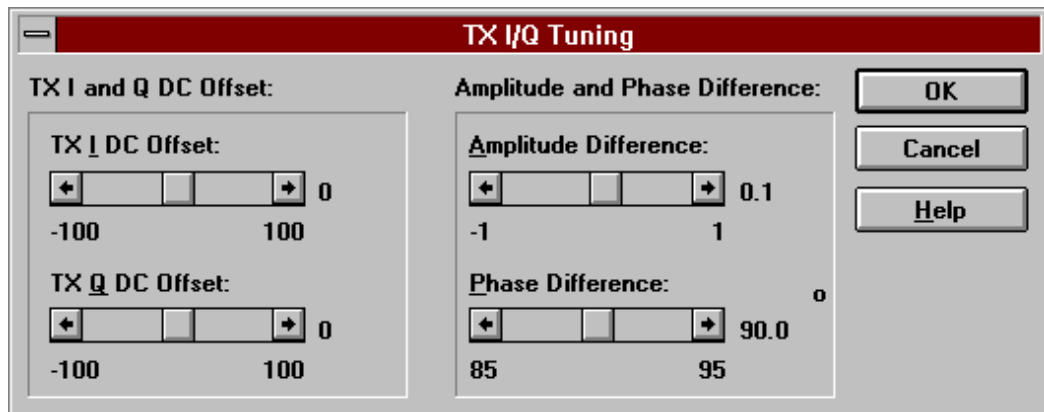
Operation Mode = Burst

TX Power Level = 10

If TX Data Type = RANDOM =&gt; TX Data Type = 1

Update RF Information window

The **TX I/Q Tuning** dialog box is opened. (Sample screen)



The **TX I/Q Tuning** dialog box contains the following items:

**Tune TX I DC Offset** scroll bar (Alt+I):

The DC Offset is shown in percent (%) from the  $\pm$  maximum value. 0% means that there is no DC. The value range is  $-100\%$ ... $100\%$ . The value is rounded to the nearest integer value.

**Tune TX Q DC Offset** scroll bar (Alt+Q):

The operation of this function is the same as one above, except with this selection the Q branch DC Offset is tuned. The value range is  $-100\%$ ... $100\%$ . The value is rounded to the nearest integer value.

**Tune Amplitude Difference** scroll bar (Alt+A):

When this selection is made, the user can increase or decrease the amplitude difference in 0.1 dB steps. The value range is  $-1$ ... $1$ .

**Tune Phase Difference** scroll bar (Alt+P):

When this selection is made, the user can increase or decrease the phase difference in  $0.5^\circ$  steps. The current phase difference is shown in the tuning window with numbers and bar figure. The value range is 85...95.

**OK** button (Enter):

The dialog box is closed, and tuning *is saved* to phone.

**Cancel** button (Esc):

The dialog box is closed, and tuning *is not saved* to phone.

After each value change, the new value is sent to the phone.

The following will be automatically selected when the TX I / Q tuning function is ended:

Active Unit = RX

Update RF Information window

**Battery A/D... command**

Activation

Status Bar Text

Alt, T, B

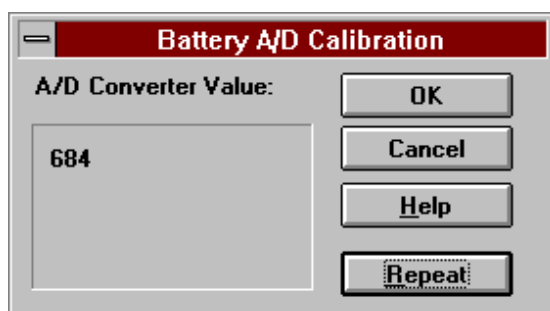
Calibrate battery voltage

This function is for battery a/d tuning.

Before **battery a/d** tuning is started, a voltage setting request is shown to the user:



When an external power is connected, and the user selects OK to continue, the application measures a/d converter and displays the **Battery A/D Calibration** dialog box.



The **Battery A/D Calibration** dialog box contains the following items:

**Repeat button** (Alt+R):

Makes measurement again.

**OK button** (Enter):

The dialog box is closed, and tuning *is saved* to phone.

**Cancel button** (Esc):

The dialog box is closed, and tuning *is not saved* to phone.

**Charger A/D... command**

Activation

Status Bar Text

Alt, T, C

Calibrate charger voltage

Works in the same way as the previous Battery A/D calibration.

## Testing

The **Testing** sub menu offers functions for ME testing.

### Quick Testing (RF)... command (NHE-4)

Activation

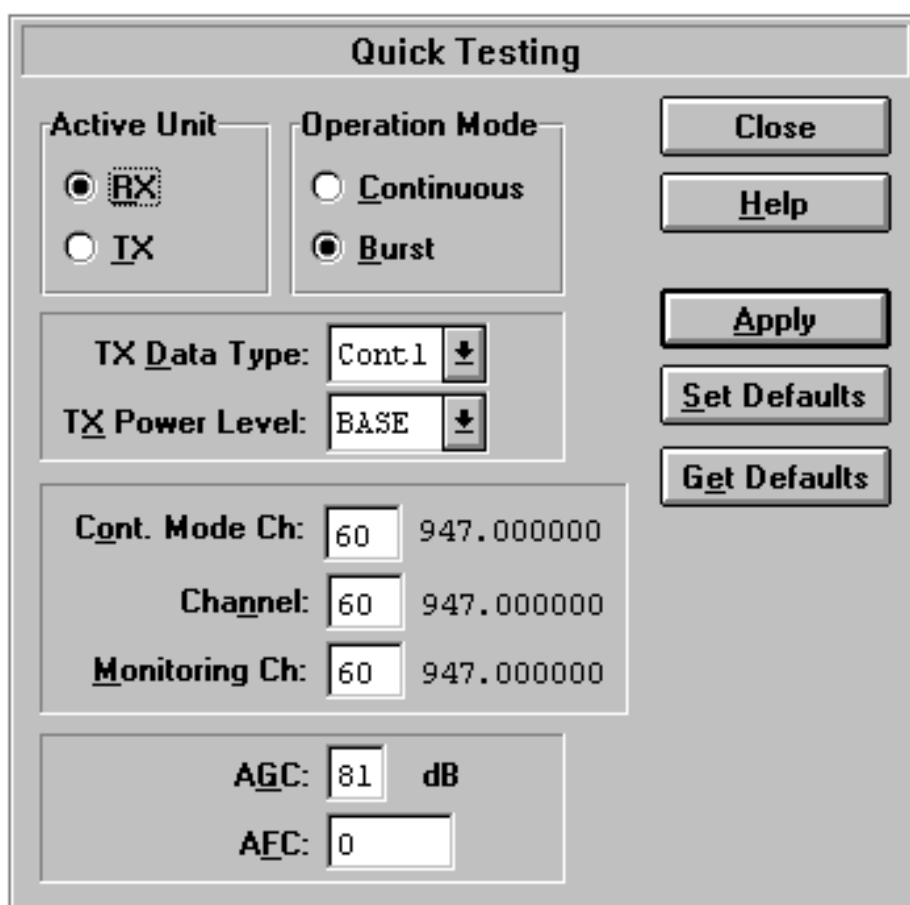
Status Bar Text

Alt, E, Q

Open the **Quick Testing** dialog box

This function is used for quick RF testing.

The command opens the **Quick Testing** dialog box, which contains data for testing and adjustments. (Sample screen)



The **Quick Testing** dialog box contains the following items:

**Active Unit** group:

**RX** radio button (Alt+R):

When *RX* is selected, the next functions are made:

Data transmission is deactivated

TX power is deactivated

If operation mode is continuous,

- AGC is controlled
- RX continuous mode channel is activated

If operation mode is burst,

- RX and Monitoring channels are activated

RF Information window is updated

The RX value is always given as default.

Note! The function is activated immediately, Apply is not needed.

**TX** radio button (Alt+T):

When *TX* is selected, the next functions are made:

- Data transmission is activated
- Operation mode is set to burst, TX power is activated
- RF Information window is updated

Note! The function is activated immediately, Apply is not needed.

**Operation Mode** group:

**Continuous** radio button (Alt+C):

When *continuous* selection is used,

- Synthesiser is set to constant frequency
- Synthesiser channel number is as given with Continuous Mode Channel selection
- Transmitter power is not connected

Note! The function is activated immediately, Apply is not needed.

**Burst** radio button (Alt+B):

When *burst* selection is used, the synthesiser is controlled by using GSM/PCN receiving/transmission/measuring synthesiser.

Control sequence synthesiser channel numbers are as given with Channel/Monitoring Channel selections.

If Active Unit is TX, data (selected with TX Data Type) is sent, and the TX power is connected

Note! The function is activated immediately, Apply is not needed.

**TX Data Type** drop list (Alt+D):

This list changes the transmission data type. The list consists of the following options: 0, 1, and Random. After Random, data selection 0 is used. If Operating Mode is *continuous*, TX Data Type Random causes different data sending than in burst mode.

**TX Power Level** edit box (Alt+X):

With this value it is possible to change the transmission power. The user can give the needed GSM/PCN power value (5..15/0...10) or select the TEST or BASE. These values is found at the end of the list.

**Channel** edit box (Alt+N):

The user can enter here the channel number that is used for both transmission and receiving. The frequency of the selected channel is shown after selection.

**Monitoring Channel** edit box (Alt+M):

This field selects neighbouring monitoring channel. The frequency of the selected channel is shown after selection.

**Continuous Mode Channel** edit box (Alt+O):

To this edit box the user can type the continuous mode channel which may have all GSM channel numbers (1..124) or PCN channel numbers (512...885).

The used frequency depends on the Active Unit. If the Active Unit is RX, then RX frequency is used, else TX frequency. The frequency of the selected channel is shown after selection.

**AGC** edit box (Alt+G):

This selection allows user to edit the AGC absolute value (value from A/D converter). The AGC can have values from 0dB to 93dB in 3dB steps in GSM, and from 0dB to 81dB in PCN.

The AGC value is shown only when its value is controlled by the PC. When the Active Unit has value RX and Operation Mode is continuous, AGC is controlled by the PC except when next adjustment functions are activated:

RSSI Calibration

AFC Diagram

**AFC** edit box (Alt+F):

This selection allows the user to edit the AFC D/A converter value. The AFC can have values from -1024 to 1023.



The AFC value is the last measured AFC D/A converter value (11 bit 2-complement value is used with decimal digits). If the AFC results are not received, no text is shown. The AFC value is neither shown in the next situations i.e. when AFC is not controlled by PC:

#### AFC Diagram

#### **Apply** button (Alt+A):

Accepts entered values and validates them. After validation, the application sends corresponding messages to ME. Closes the dialog box, and updates Info Window.

Note: Active Unit and Operation mode command do not use the Apply button, as they are activated immediately.

Following automatic selections are made when Quick testing function is ended.

Active Unit = RX

Update RF Information window

#### **Set Defaults** button (ALT+S):

Sets current values as default Quick Test values.

#### **Get Defaults** button (ALT+E):

Gets default Quick Test values as current values.

The next table shows the dialog box's properties in different situations:

#### ACTIVE UNIT = TX:

TX Data Type: Updated

AGC values: Greyed

Monitoring Channel: Greyed

#### OPERATION MODE = BURST:

TX Power Level: Updated

Continuous Mode Channel: Greyed

Channel: Updated

#### OPERATION MODE = CONT.:

TX Power Level: OFF, Greyed

Continuous Mode Channel: Updated

Channel: Greyed

## ACTIVE UNIT = RX:

TX Data Type: Greyed

TX Power Level: OFF, Greyed

## OPERATION MODE = BURST:

AGC values: Greyed

AFC values: Greyed

Continuous Mode Channel: Greyed

Channel: Updated

Monitoring Channel: Updated

## OPERATION MODE = CONT:

AGC values: Updated

AFC values: Updated

Continuous Mode Channel: Updated

Channel: Greyed

Monitoring Channel: Greyed

**Quick Testing (RF)... command (NHE-1)**

Activation                      Status Bar Text

Alt, E, Q                      Open the **Quick Testing** dialog box

This function is used for quick RF testing.

The command opens the **Quick Testing** dialog box, which contains data for testing and adjustments. (Sample screen)

**Quick Testing**

**Active Unit**

**RX**

**TX**

**Operation Mode**

**Continuous**

**Burst**

**TX Data Type:** Cont.1 ↓

**TX Power Level:** TEST ↓

**Cont. Mode Ch:** 60 947.000000

**Channel:** 30 941.000000

**Monitoring Ch:** 56 946.200000

**AGC:** 78 dB

**Close**

**Help**

**Apply**

**Set Defaults**

**Get Defaults**

The **Quick Testing** dialog box contains the following items:

**Active Unit** group:

**RX** radio button (Alt+R):

When *RX* is selected, the next functions are made:

Data transmission is deactivated

TX power is deactivated

If operation mode is continuous,

- AGC is controlled
- RX continuous mode channel is activated

RF Information window is updated

The RX value is always given as default.

Note! The function is activated immediately, Apply is not needed.

#### **TX** radio button (Alt+T):

When *TX* is selected, the next functions are made:

Data transmission is activated

If operation mode is continuous, TX continuous mode channel is activated

If operation mode is burst, TX power is activated

RF Information window is updated

Note! The function is activated immediately, Apply is not needed.

#### **Operation Mode** group:

##### **Continuous** radio button (Alt+C):

When *continuous* selection is used,

Synthesiser is set to constant frequency

Synthesiser channel number is as given with Continuous Mode Channel selection

If Active Unit is TX, data (selected with TX Data Type) is sent

Transmitter power is not connected

If Active Unit is RX, AGC is controlled

Note! The function is activated immediately, Apply is not needed.

##### **Burst** radio button (Alt+B):

When *burst* selection is used, the synthesiser is controlled by using GSM/PCN receiving/transmission/measuring synthesiser.

Control sequence synthesiser channel numbers are as given with Channel/Monitoring Channel selections.

If Active Unit is TX, data (selected with TX Data Type) is sent, and the TX power is connected

Note! The function is activated immediately, Apply is not needed.

**TX Data Type** drop list (Alt+D):

This list changes the transmission data type. The list consists of the following options: 0, 1, and Random. After Random, data selection 0 is used. If Operating Mode is *continuous*, TX Data Type Random causes different data sending than in burst mode.

**TX Power Level** edit box (Alt+X):

With this value it is possible to change the transmission power. The user can give the needed GSM/PCN power value (5..15/0...10) or select the test value, which is tuned with the TX power tuning function. The test value is found at the end of the list.

TX Power have value *OFF* and is disabled (*greyed*) when active unit is RX or transmission power as GSM or PCN value. When the TX power is tuned with test value (smallest value) the TX Power has value *TEST*.

**Channel** edit box (Alt+N):

The user can enter here the channel number that is used for both transmission and receiving. The frequency of the selected channel is shown after selection.

**Monitoring Channel** edit box (Alt+M):

This field selects neighbouring monitoring channel. The frequency of the selected channel is shown after selection.

**Continuous Mode Channel** edit box (Alt+O):

To this edit box the user can type the continuous mode channel which may have all GSM channel numbers (1..124) or PCN channel numbers (512...885).

The used frequency depends on the Active Unit. If the Active Unit is RX, then RX frequency is used, else TX frequency. The frequency of the selected channel is shown after selection.

**AGC** edit box (Alt+G):

This selection allows user to edit the AGC absolute value (value from A/D converter). The AGC can have values from 0dB to 93dB in 3dB steps in GSM, and from 0dB to 81dB in PCN.

The AGC value is shown only when its value is controlled by the PC. When the Active Unit has value RX and Operation Mode is continuous, AGC is controlled by the PC except when next adjustment functions are activated:

RSSI Calibration

AFC Diagram

**Apply** button (Alt+A):

Accepts entered values and validates them. After validation, the application sends corresponding messages to ME. Closes the dialog box, and updates Info Window.

Note: Active Unit and Operation mode command do not use the Apply button, as they are activated immediately.

Following automatic selections are made when Quick testing function is ended.

Active Unit = RX

Update RF Information window

**Set Defaults** button (ALT+S):

Sets current values as default Quick Test values.

**Get Defaults** button (ALT+E):

Gets default Quick Test values as current values.

The next table shows the dialog box's properties in different situations:

ACTIVE UNIT = TX:

TX Data Type: Updated

AGC values: Greyed

Monitoring Channel: Greyed

OPERATION MODE = BURST:

TX Power Level: Updated

Continuous Mode Channel: Greyed

Channel: Updated

OPERATION MODE = CONT.:

TX Power Level: OFF, Greyed

Continuous Mode Channel: Updated

Channel: Greyed

ACTIVE UNIT = RX:

TX Data Type: Greyed

TX Power Level: OFF, Greyed

OPERATION MODE = BURST:

AGC values: Greyed

Continuous Mode Channel: Greyed

Channel: Updated

Monitoring Channel: Updated

OPERATION MODE = CONT:

AGC values: Updated

Continuous Mode Channel: Updated

Channel: Greyed

Monitoring Channel: Greyed

**Self Tests... command**

Activation

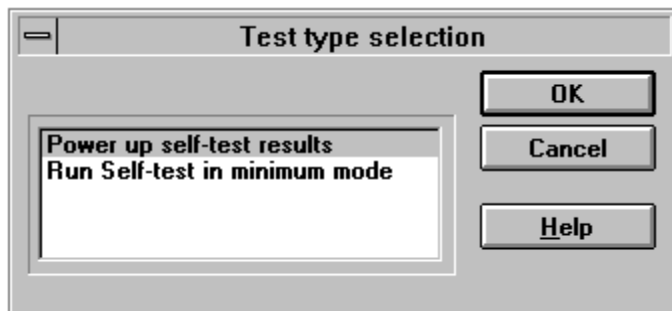
Status Bar Text

Alt, E, S

Open MCU Self-tests dialog box

The command is used for reading self test results and running self tests.

User is first requested to run self-tests in minimum mode, or to look powerup self-tests results with **Test Type Selection** dialog.



The **Test Type Selection** dialog has following items:

**Test Type list** box (ALT+S):

Power up self-test results

Shows power up self-test results in **MCU Powerup Self-tests** dialog.

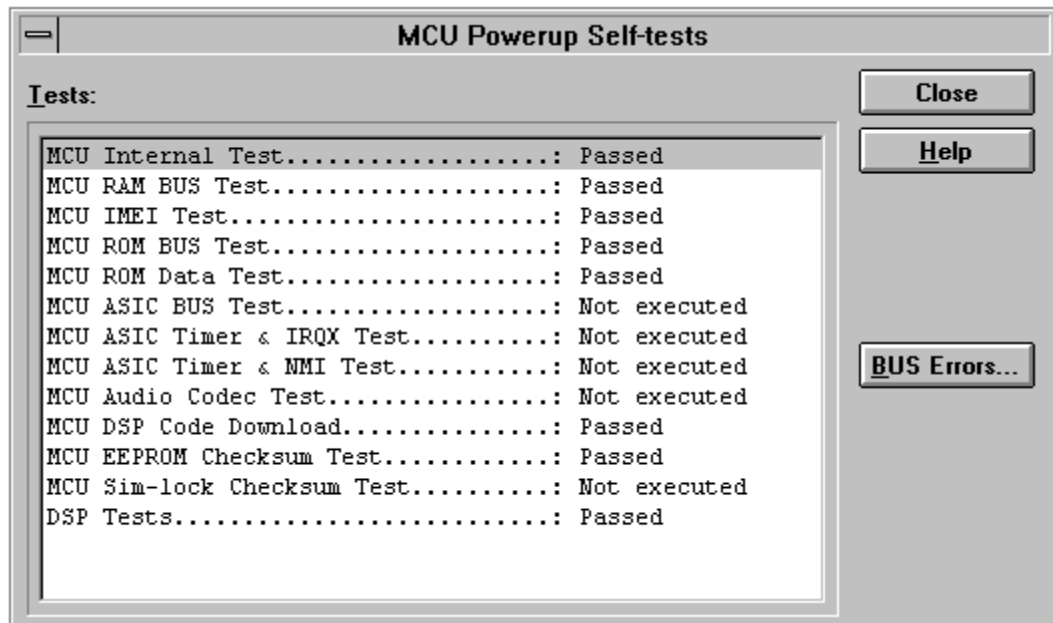
Run Self-tests in minimum mode

Sets phone to minimum mode and opens **MCU Self-tests** dialog.



## MCU Powerup Self-tests

When powerup self-tests are selected the test results are read from the phone and displayed in **MCU Powerup Self-tests** dialog. (Sample screen)



The **MCU Powerup Self-tests** dialog has following items:

When powerup self-tests are selected test results are read from phone and displayed in **MCU Self-tests** dialog.

**Tests list** box (ALT+T):

Test states are updated according to the results received from the phone. Possible test states will be one of the next:

*Passed*

*Failed*

*No response*

*Not executed*

Only on the fault value is indicated in the DSP self-test message. Note that DSP test results can be asked from DSP only when all MCU tests have been passed. Possible DSP error texts are:

*RAM BUS Fault,*

*ASIC BUS Fault,*

*RFI BUS Fault,*

*Unknown and*

*Download Error.*

**Bus Errors...** button (ALT+B):

When this selection is made **Bus Test** dialog is displayed. In this dialog are shown results from the first failed MCU BUS test. When none of MCU BUS tests has been failed this selection is disabled (greyed).

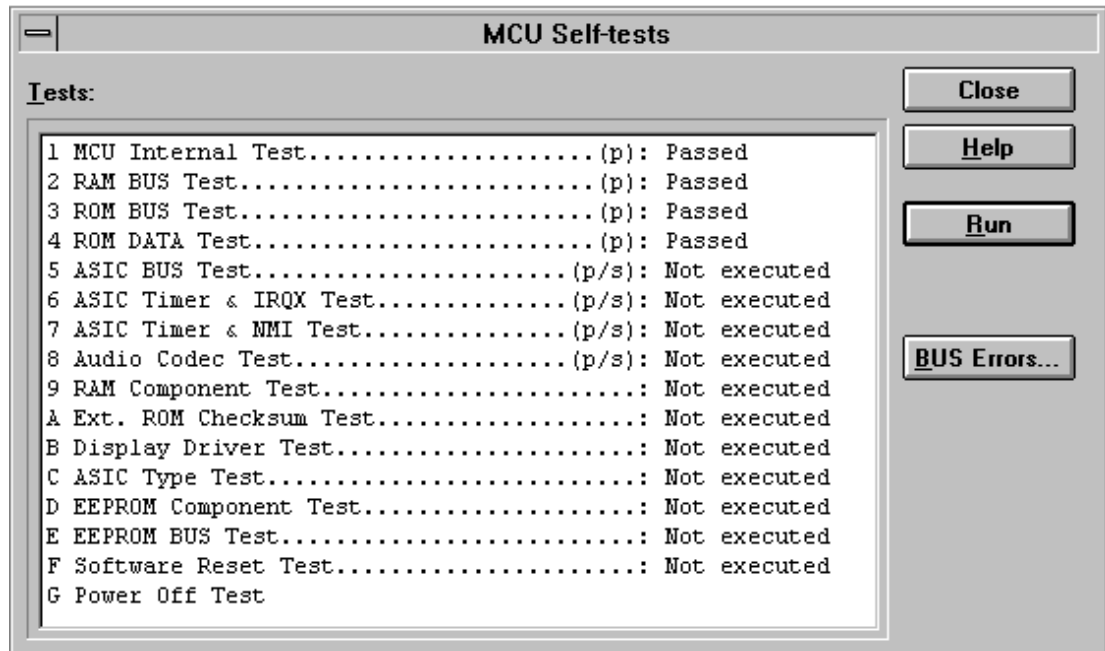
The field "(s)" means that this test is selectable one.

The following tests are available:

- MCU Internal Test.....:
- MCU RAM BUS Test.....:
- MCU IMEI Test.....:
- MCU ROM BUS Test.....:
- MCU ROM Data Test.....:
- MCU ASIC BUS Test.....(s):
- MCU ASIC Timer and IRQX Test..(s):
- MCU ASIC Timer and NMI Test...(s):
- MCU Audio Codec Test.....(s):
- MCU DSP Code Download Test.....:
- MCU EEPROM Checksum Test.....:
- Sim-Lock Checksum Test.....:
- DSP Tests.....:

## MCU Self Tests

When the selection is made, the test result is read from ME. The test result will be shown to the user within the **MCU Self-test** dialog box. (Sample screen)



The **MCU Self-test** dialog box contains the following items:

### **Tests list** box (Alt+T):

The field "(p)" in the screen example means that the test is also run in power up.

The field "/s)" means that this test is selectable one.

Test states are updated according to the results received from the phone. Possible test states will be one of the following:

*Passed*

*Failed*

*No response*

*Not executed*

*RUNNING....*

### **Run** button (Alt+R):

The user can select desired test from list and hit **Run** button. When user selects test to be run, the text *RUNNING...* is shown in the test state field, and test is run. When results are received, the test state field is updated according to the result.

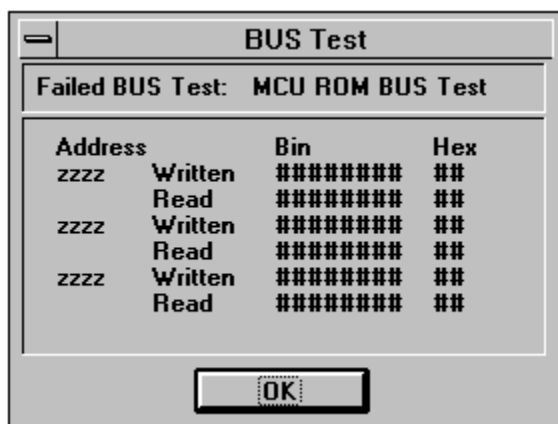
If no response was received in the defined time, a *error message box* will be shown and the test state is changed to *No response*.

**Bus Errors...** button (ALT+B):

When this selection is made **Bus Test** dialog is displayed. In this dialog are shown results from the first failed MCU BUS test. When none of MCU BUS tests has been failed this selection is disabled (greyed).

The following tests are available:

- MCU Internal Test.....(p):
- RAM BUS Test.....(p):
- ROM BUS Test.....(p):
- ROM Data Test.....(p):
- ASIC BUS Test.....(p/s):
- ASIC Timer and IRQX Test.....(p/s):
- ASIC Timer and NMI Test.....(p/s):
- Audio Codec Test.....(p/s):
- RAM Component Test.....:
- Ext. ROM Checksum Test.....:
- Display Driver Test.....:
- ASIC Type Test.....:
- EEPROM Component Test.....:
- EEPROM Bus Test.....:
- Software Reset Test.....:
- Power Off Test



**BUS Errors** dialog has following items:

**Failed BUS Test** static text:

Name of the first failed MCU BUS test.

**Address Bin Hex** static text:

This static text shows, what data was written and what was read from three different addresses. Values are given in binary and hexadecimal formats.

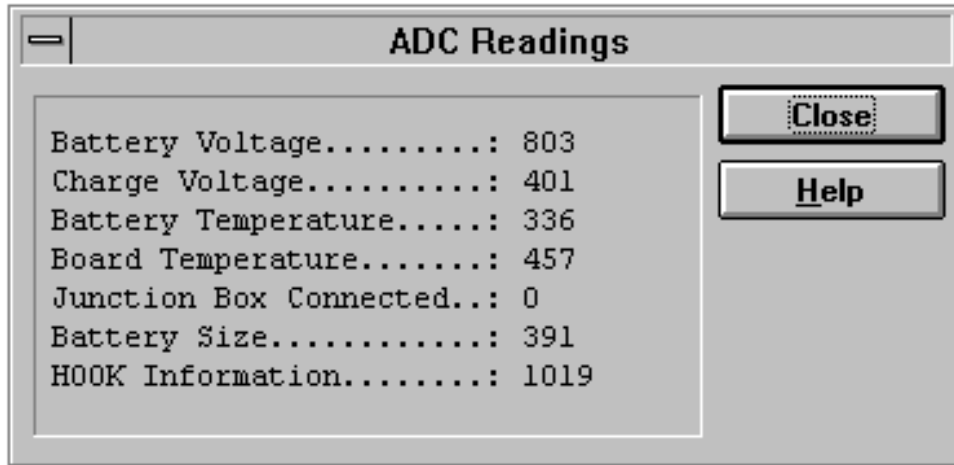
**ADC Readings... command (NHE-4)**

Activation                      Status Bar Text

Alt, E, A                      Open the **ADC Readings** dialog box

The command is used to read and show A/D values from phone.

The command opens the **ADC Readings** dialog box:



The **ADC Readings** dialog box has static text fields where measurements are updated each second.

**A/D Readings**

The following a/d readings are measured:

- Battery Voltage.....:
- Charge Voltage.....:
- Battery Temperature.....:
- Board Temperature.....:
- Junction Box Connected..:
- Battery Size.....:
- HOOK Information.....:

**ADC Readings... command (NHE-1)**

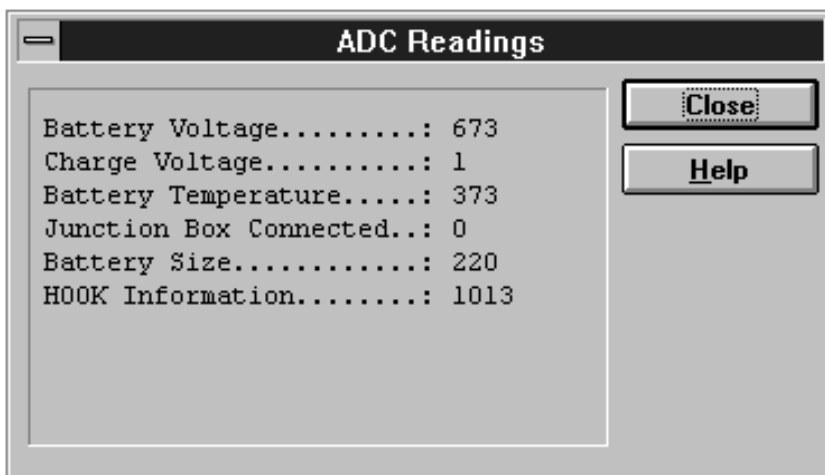
Activation                      Status Bar Text

---

Alt, E, A                      Open the **ADC Readings** dialog box

The command is used to read and show A/D values from phone.

The command opens the **ADC Readings** dialog box: (Sample screen)



The **ADC Readings** dialog box has static text fields where measurements are updated each second.

**A/D Readings**

The following a/d readings are measured:

Battery Voltage.....:

Charge Voltage.....:

Battery Temperature.....:

Junction Box Connected..:

Battery Size.....:

HOOK Information.....:

**Audio... command**

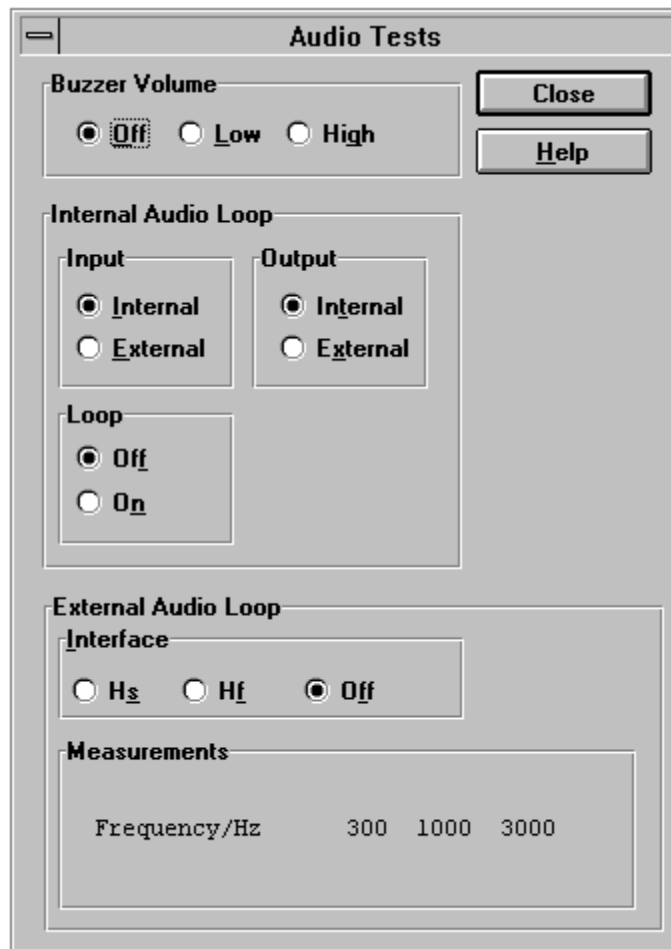
Activation                      Status Bar Text

---

Alt, E, U                      Open Audio Tests dialog box

The command is used for making audio tests in the **Audio Tests** dialog box.

The **Audio Tests** dialog box contains following items: (Sample screen)



**Audio Tests** dialog has following items:

**Buzzer Volume** group:

Next three different values can be selected for Buzzer volume:

**Off** radio button (ALT+O):

Turns buzzer off.

**Low** radio button (ALT+L):

Turns buzzer low. The frequency used in buzzer control is 1600 Hz.

**High** radio button (ALT+G):

Turns buzzer high. The frequency used in buzzer control is 1600 Hz.

**Internal Audio Loop** group:**Input** group:

Next two different values can be selected for input:

**I**nternal radio button (ALT+I):

Turns internal input.

**E**xternal radio button (ALT+I):

Turns external input.

**Output** group:

Next two different values can be selected for output:

**I**nternal radio button (ALT+T):

Turns internal output.

**E**xternal radio button (ALT+X):

Turns external output.

**Loop** group:

Next two different values can be selected for loop:

**O**ff radio button (ALT+F):

Turns audio loop off.

**O**n radio button (ALT+N):

Turns audio loop on.

**External Audio Loop** group:**Interface** group:

Next three different values can be selected for interface:

**H**s radio button:

Selects handset interface for external audio loop and makes measurement. After measurement Off button is checked automatically.

**H**f radio button (ALT+N):

Selects hands-free interface for external audio loop and makes measurement. After measurement Off button is checked automatically.

**O**ff button (ALT+F):

Check box showing that external audio loop is not on.

Note: User does not have to end external audio loop with this button.

Note: When a button is checked in this group, application first checks if internal audio loop is on. If internal audio loop was on, it is ended and Off button is checked Loop group.



**Measurements** group:

Line "Frequency/Hz" shows three frequencies, that are used in measurements. Lines "**OUT OF RANGE**" and "Received level" will be shown only after actual measurement. Received level values have scale from 0 to 256. Received signal strength is square of the received value. "**OUT OF RANGE**" text is only shown, when measurement values are not in acceptable range. Acceptable ranges are:

Frequency f/Hz	HS Interface value	HF Interface value
300	15...35	53...73
1000	22...42	58...78
3000	22...42	58...78

When dialog box is closed, the Buzzer Volume is always switched off. Also Internal Audio Loop is turned off.

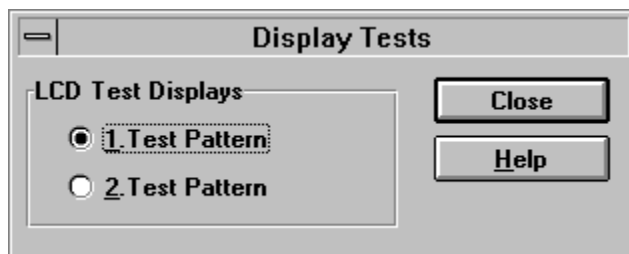
**Display... command**

Activation                      Status Bar Text

---

Alt, E, D                      Open Display Tests dialog box

This command is used for making display tests in the **Display Tests** dialog box.



The **Display Tests** dialog box contains the following items:

**1. Test Pattern** radio button (Alt+1):

In test display 1 all indicators are displayed, and the display is filled with chessboard letters.

**2. Test Pattern** radio button (Alt+2):

In test display 2 the remainder (from test 1) of the indicators are displayed, and the display is filled with inverse chessboard letters.

When the dialog box is closed, the phone LCD display is cleared.

**Call Simulation.. command**

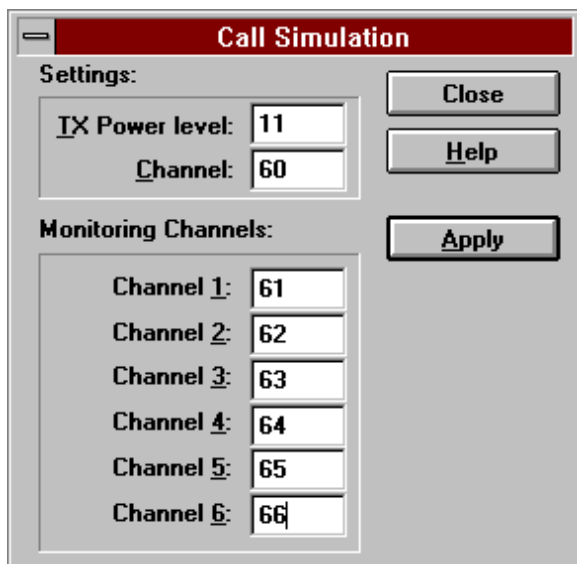
Activation

Status Bar Text

Alt, E, C

Open Call Simulation dialog box

The command is used for making call simulation. The function opens the **Call Simulation** dialog box.



The **Call Simulation** dialog box contains the following items:

**TX Power Level** edit box (Alt+T):

All power levels can be selected. This updates same parameter as **TX Power Level** in the **RF-Controls** dialog box. Note that TEST value cannot be selected. If TEST or BASE value was in use when Call simulation menu selected, power level is changed to smallest value.

**Channel** edit box (Alt+C):

This tells the normal operating RF channel number. Normal GSM/PCN channel numbers can be selected. Same channel is used both for transmission and receiving. This updates same parameter as **Channel** in the **RF-Controls** dialog box.

**Monitoring Channels** group:

**Channel 1,2,3,4,5,6** edit box (Alt+1,2,...):

Channels for monitoring are specified with these six selections. All GSM/PCN channel numbers can be used. If more than one selection has same number, the monitoring channel list (neighbour list) will have less than 6 selected channels. The minimum number of monitoring channels is one (all channels have same value). The monitoring channel can also have same value as normal operating channel.

The first monitoring channel updates the same parameters as **Monitoring Channel** in the **RF-Controls** dialog box.

**Apply** button (Alt+A):

Validates and sends entered data to ME.

**Noise Sensitivity... command**

Activation                      Status Bar Text

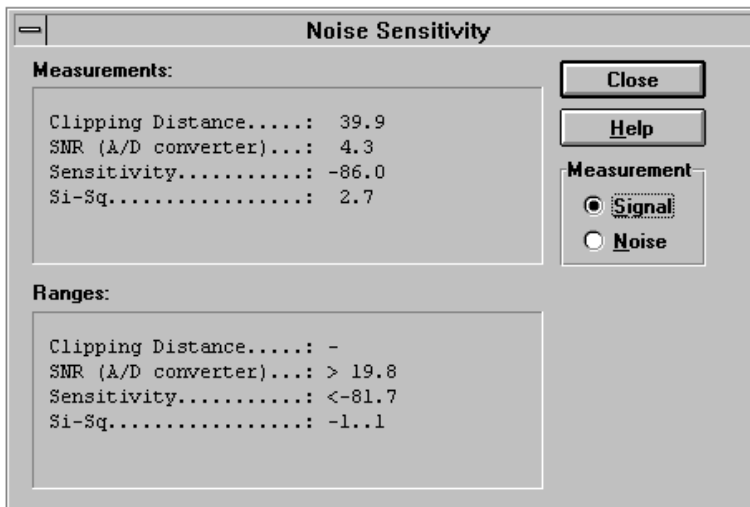
Alt, E, N                      Opens Noise Sensitivity dialog box

The command is used for noise sensitivity measurement.

The following are automatically selected when this tuning function is activated:

- Active Unit = RX
- Operation mode = Continuous
- AGC = 81 dB

The function opens information dialog box, telling the user to use signal generator when measuring signal and not to use signal generator when measuring noise. When the user has accepted information, the application then opens the **Noise Sensitivity** dialog box. (Sample screen)



The **Noise Sensitivity** dialog box contains the following items:

**Measurements** group:

Clipping distance is the difference to the signal clipping value. SNR is measured in the AD converter.

Clipping distance = clipping level (66) – signal value + comp\_factor1  
 SNR = signal value – noise value + comp\_factor1

Sensitivity = –92 dBm + 8 dB + comp\_factor2 – SNR (for GSM)

The last value on the display is signal power difference between I and Q branch. The numbers are shown in 0.1 dB accuracy. The error messages, "OUT OF RANGE", are shown only if the SNR and/or amplitude difference values are not acceptable ( $\text{SNR} \leq 18 \text{ dB} + \text{comp\_factor2} - 0.5 \text{ dB}$  (= accuracy) ; Sensitivity  $\geq -100 \text{ dBm} + 0.5 \text{ dB}$  ;  $|\text{Si} - \text{Sq}| > 1 \text{ dB}$ ).

**Signal/Noise** radio button (Alt+S/Alt+N):

When buttons are pressed, the RX I and Q burst data is asked. The signal level value should be  $-92 \text{ dBm}$  for GSM during signal measurement.

When signal data is received, distance to clipping signal level is shown as dBs on the display. When either signal or noise measurement results are received, measurements are updated to screen. When both measurements (signal and noise) are done at least once, the signal to noise relation and difference are also shown on the display.

After exiting the dialog box, the following are set to the values which were selected before this adjustment.

- Active Unit
- Operation mode
- AGC value

Compensation factors:

$\text{comp\_factor1} = 4.64 \text{ dB}$  (Compensation factor for 67.71 kHz signal, because ASIC filter attenuates 67.71 kHz signal 4.64 dB)

$\text{comp\_factor2} = 2.27 \text{ dB}$  (Compensation factor for real and calculated noise bandwidth difference. Real noise bandwidth is 80 kHz and calculated bandwidth is 135 kHz)

## Software

The settings sub menu offers functions for Mobile Equipment mode and memory settings.

### Phone Identity... command

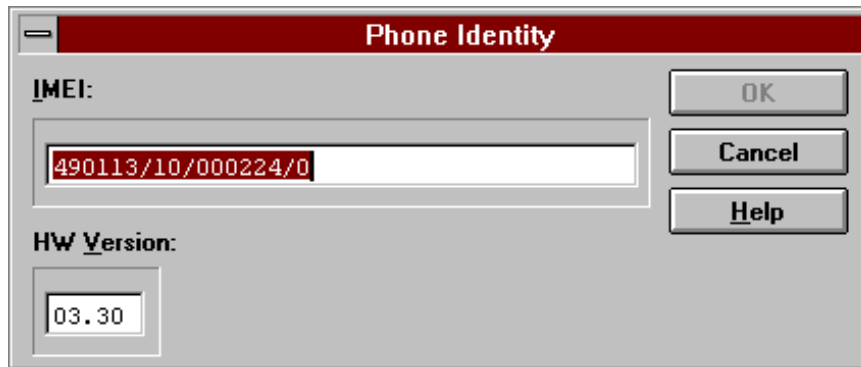
Activation

Status Bar Text

Alt, S, I

Opens the **Phone Identity** dialog box for editing

The function is used to edit phone identity. The function opens the **Phone Identity** dialog box: (Sample screen)



The **Phone Identity** dialog box contains the following items:

**IMEI** edit box (Alt+I):

Field where the user can enter current IMEI value. Field can contain up to 40 digits.

**HW Version** edit box (Alt+V):

Field where user can enter current HW version. Field can contain four digits and one dot. Dot is not sent to ME.

**OK** button (Enter):

Checks if some values are changed and if IMEI was modified, asks for confirmation. After confirmation, it writes values to phone.

**Cancel** button (Esc):

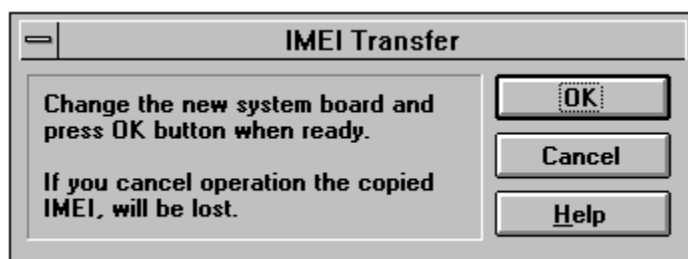
Cancels all edits and does not save values to phone.

## Serial Number Transfer... command

Function is used to transfer IMEI from one system to another.

**Note!** When IMEI is transferred, the phone from which the IMEI was transferred is unusable.

When command is activated, program asks following confirmation before continuing "Are you sure, you want to transfer IMEI?". If **Yes** (ALT+Y) button is used, IMEI is copied from ME. When IMEI code is received, it is erased from ME and **IMEI Transfer** dialog is showed. If **No** (ALT+N) button is used, function is aborted. When IMEI is erased from the old system board, it becomes unusable.



**OK** button (ENTER):

Before user selects this operation, she should switch the phone off and exchange the system boards and switch the phone power on again. A "Self-test failed"-message will appear in the phones display. Now **OK** can be selected and copied IMEI is sent to ME. Dialog box is closed and user can initialize phone with **Initialize/Normal Mode**.

**Cancel** button (ESC):

Asks user the following confirmation before closing dialog "Are you sure, you want to cancel the transfer? If operation is cancelled IMEI is lost." If **Yes** (ALT+Y) button is used, operation is cancelled. If **No** (ALT+N) button is used, control is given back to **IMEI Transfer** dialog.

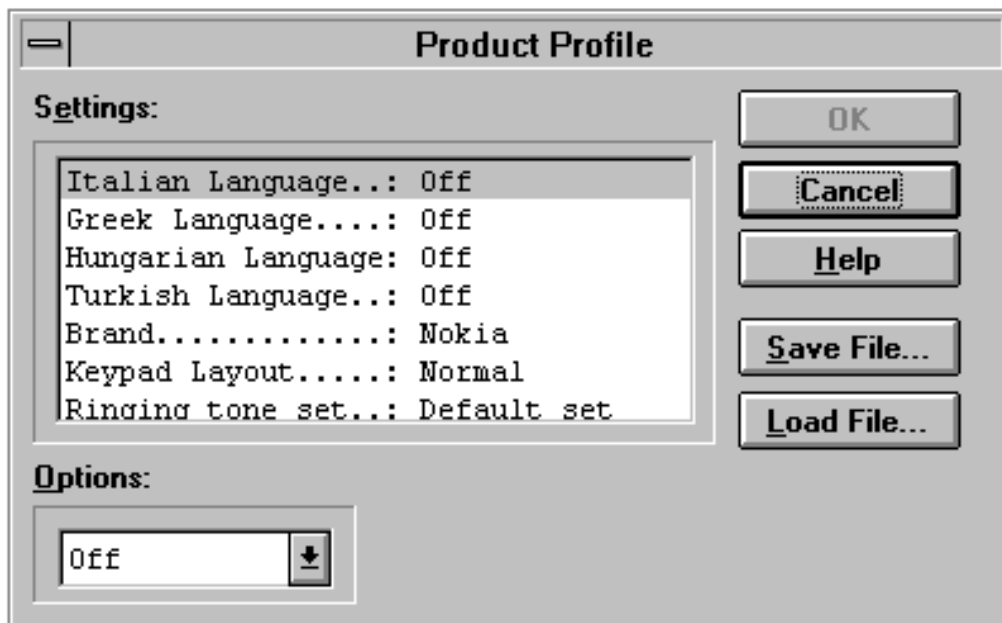
**Product Profile... command** (NHE-4)

Activation                      Status Bar Text

Alt, S, P                      Open **Product Profile** Settings dialog box

The function is used for making product profile settings.

When the command is activated, the product profile information is read from the EEPROM and **the Product Profile** dialog box is opened. (Sample screen)



Note: This is only a screen example, actual settings are explained in more detail in the following section.

The **Product Profile** dialog box contains the following items:

**Settings** list box (Alt+S):

A list where the user can select desired setting.

The user can toggle settings with following **Options** drop list, or by double clicking the desired setting in list box.

**Options** drop list (Alt+O):

List allows user to set options to each setting listed in the **Settings** list box.

**OK** button (ENTER)

Selections are accepted and saved to EEPROM.

**Cancel** button (ESC)

Selections are ignored and control is returned back to main menu.

**Save File...** button

Allows the user to save settings to file. Opens a standard windows **File Save** dialog box.

**Load File...** button

Allows the user to load the settings from a file. Opens a standard windows **File Open** dialog box.

## **NHE-4 Product Profile Settings**

The following settings are available:

Italian Language	On/Off
Greek Language	On/Off
Hungarian Language	On/Off
Turkish Language	On/Off
Brand	Nokia/TPL/3/4/5/6/7/8
Keypad Layout	Normal/AT&T/3/4
Ringtone set	Default set/ Set 1/2/3/4/5/6/7 Nokia

See the NHE-4 Product Profile Specification for more info.



**Product Profile... command (NHE-1)**

Activation                      Status Bar Text

Alt, S, P                      Open **Product Profile** Settings dialog box

The function is used for making product profile settings.

Note! In the E-Plus phones there is not this feature.

When the command is activated, the product profile information is read from the EEPROM and the **Product Profile** dialog box is opened. (Sample screen)



Note: This is only a screen example, actual settings are explained in more detail in the following section.

The **Product Profile** dialog box contains the following items:

**S**ettings list box (Alt+S):

A list where the user can select desired setting.

The user can toggle settings with following **O**ptions drop list, or by double clicking the desired setting in list box.

**O**ptions drop list (Alt+O):

List allows user to set options to each setting listed in the **S**ettings list box.

**O**K button (ENTER)

Selections are accepted and saved to EEPROM.

**Cancel** button (ESC)

Selections are ignored and control is returned back to main menu.

**Save File...** button

Allows the user to save settings to file. Opens a standard windows **File Save** dialog box.

**Load File...** button

Allows the user to load the settings from a file. Opens a standard windows **File Open** dialog box.

**NHE-1 Product Profile Settings**

The following settings are available:

Brand    Nokia/TPL/3/4/5/6/7/8

See the NHE-1 Product Profile Specification for more info.

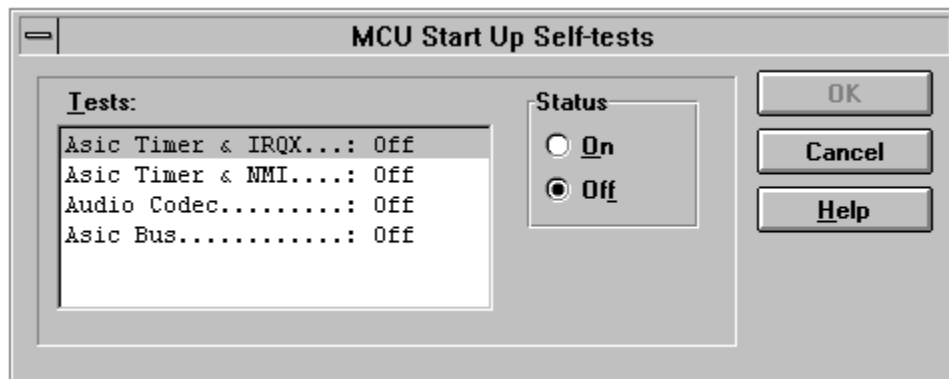
**Start Up Self-tests... command**

Activation	Status Bar Text
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Alt, S, S	Open <b>MCU Start Up Self-tests</b> dialog box
-----------	--

The function is used for changing the state of the EEPROM selectable tests in the **MCU Start Up Self-tests** dialog box.



The **MCU Start Up Self-tests** dialog box contains the following items:

**Tests** list box (Alt+T):

When dialog box is opened, the previous values will be read from the MCU EEPROM and shown on the list box.

**Status** group:

When radio button **On** is selected, the test will be run every time when automatic start up self-tests are activated (e.g. in power up).

**OK** button (Enter)

Selections are accepted and saved to EEPROM.

**Cancel** button (Esc)

Selections are ignored and control is returned back to main menu.

**Set Default Values... command**

Activation	Status Bar Text
------------	-----------------

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Alt, S, V	Set factory default values
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The command is used for resetting default values to phone's EEPROM.

After selection application asks confirmation: "Are you really sure you want make factory settings to phone?". If Yes is answered, default settings are made to phone and phone must be tuned !

## Dealer

The dealer sub menu offers functions for Mobile Equipment settings for dealers.

### Short Code Memory... command

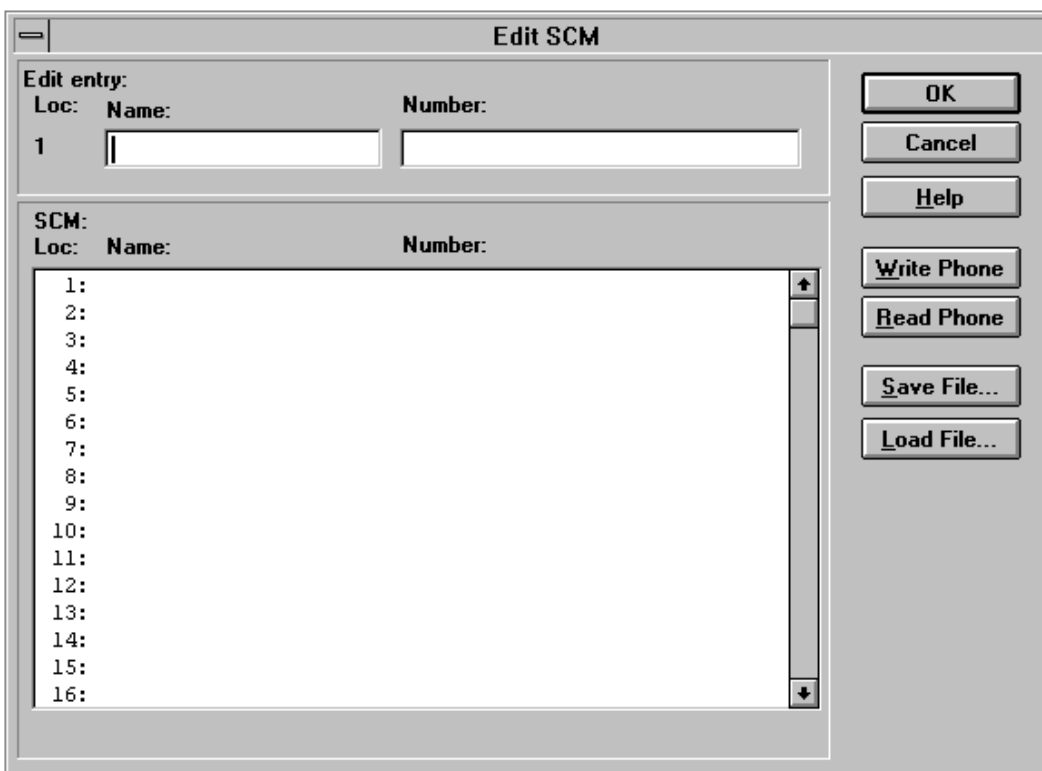
Activation                      Status Bar Text

Alt, D, C                      Opens the **Edit SCM** dialog box.

This command is used for reading, storing and modifying the SCM values.

Short code memory data is read only from the internal memory of the phone (not from SIM card).

After menu selection program makes *query* dialog: "Read SCM entries from phone?". If user answers **Yes**, all needed SCM entries will be read from the ME. During all reading, writing, loading and storing operations program shows *message* dialog: "Please be patient reading entry n of N entries." Where n is 1..N and N is the number of SCM entries in the phone. With this dialog user can cancel the current operation with **Cancel** button. If a reading error happens, an *error* dialog is shown. If reading succeed, **Edit SCM** dialog is opened.



The **Edit SCM** dialog box contains the following items:

**Loc** static text:

Index of active SCM entry and is read only.

**Name** edit box (ALT+A):

Edit name part of the active entry in **SCM** list box. Maximum length is 20 and valid characters in name field are 0AH..0FFH (in ME character codes).

**Number** edit box (ALT+N):

Edit number part of the active entry in **SCM** list box. Maximum length is 30 and valid characters in number field are all digits 0..9, ":", "#", "p", "P", "w", "W" and "+".

**SCM list** box (ALT+C):

User can select one of SCM entries to edit. Editing is done in **Number** and **Name** edit boxes. If there is more entries than can be shown, list box can be scrolled.

**Write Phone...** button (ALT+W):

Writes all SCM entries to phone. If there are invalid characters in name or number fields they are converted to '?' and user is informed after operation. Opens Message box informing user which entry is being written to phone and how many entries there are altogether. User can cancel operation with Cancel button.

**Read Phone...** button (ALT+R):

Reads all SCM entries from phone. Opens Message box informing user which entry is being read from phone and how many entries there are altogether. User can cancel operation with Cancel button.

**Save File...** button (ALT+S):

Opens a default Windows **File Save As** dialog box and asks filename where to save SCM entries. If there are invalid characters in the name or number fields they are converted to '?' and user is informed after operation.

**Load File...** button (ALT+L):

Opens a default Windows **File Open** dialog and asks filename where from load SCM entries. If there are invalid characters in name or number fields they are converted to '?' and user is informed after operation.

**User Settings... command**

Activation

Status Bar Text

Alt, D, U

Open **User Settings and Values** dialog box

This command is used to read, store, and modify the user settings and values.

After menu selection, the program responds with a *query* dialog box: "Read user settings from phone?". If user answers **Yes**, all needed user settings will be read from the ME, including menu settings. If a reading error happens, an *error* dialog box is shown. If reading is successful, the **User Settings and Values** dialog box is opened: (Sample screen)



The **User Settings and Values** dialog box contains the following items:

**Security ID** edit box (Alt+E):

Edit the security code which is saved to the ME memory together with other user settings and values. Only digits are accepted for Security code. Length must be 5 digits.

**Master Code** static:

Code is 10 digits length and it is read only.

**Wake up Message** edit box (Alt+M):

Edit Wake up message. The wake up message name can have up to 30 characters.

**Save File...** button (Alt+S):

Opens a default Windows **File Save As** dialog box and asks filename where to save user settings and values.

**Load File...** button (Alt+L):

Opens a default Windows **File Open** dialog box and asks filename where from load user settings and values.

Data entered in the dialog box is checked validity before it is sent to the phone. If the application finds wrong characters from Wake up message, application will inform the user and requests correction.

Both save file and load file function have default name which is previously used name. For instance, if user data was saved to file USERA.USR and read function is activated the default value is USERA.USR.

### **Set UI Default Values... command**

Activation

Status Bar Text

---

Alt, D, V

Reset phone to UI and SCM factory settings

After selection, the application asks confirmation: "Are you sure you want make UI and SCM factory settings to phone?". If Yes is answered, default settings are made to phone.

**View**

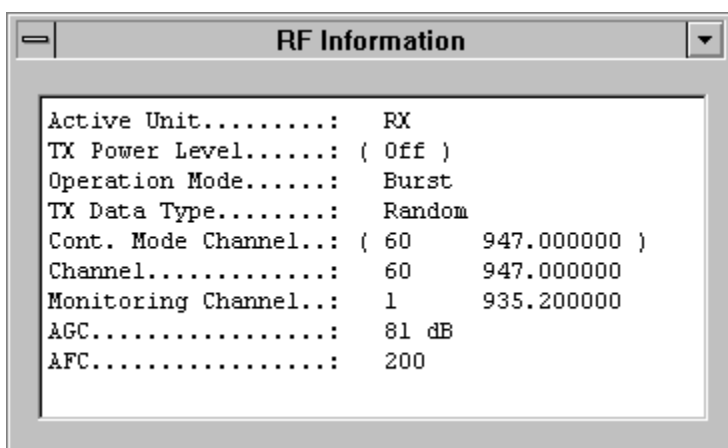
**Quick/RF Info... command (NHE-4)**

Activation                      Status Bar Text

---

Alt, V, R                      View Quick/RF information

Opens a **Quick/RF Info** dialog which shows RF-information. Information is shown in a modeless dialog which may be left open during other operations. It is also updated when ever needed. (Sample screen)



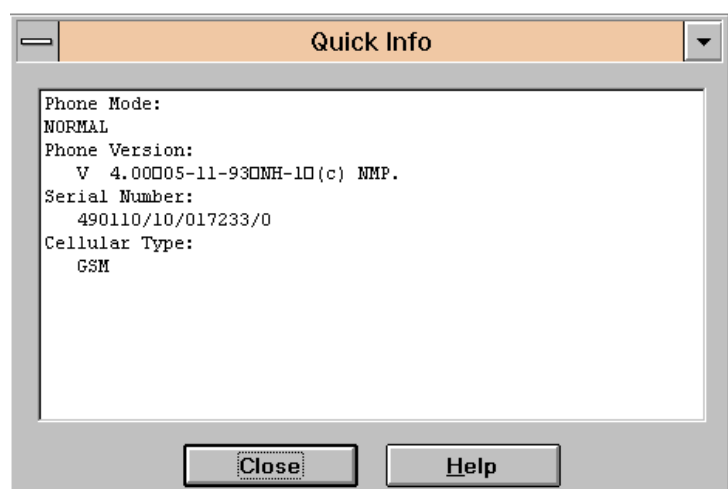
**Quick/RF Info... command (NHE-1)**

Activation                      Status Bar Text

---

Alt, V, R                      View Quick/RF information

Opens a **Quick/RF Info** dialog which shows RF-information. Information is shown in a modeless dialog which may be left open during other operations. It is also updated when ever needed. (Sample screen)





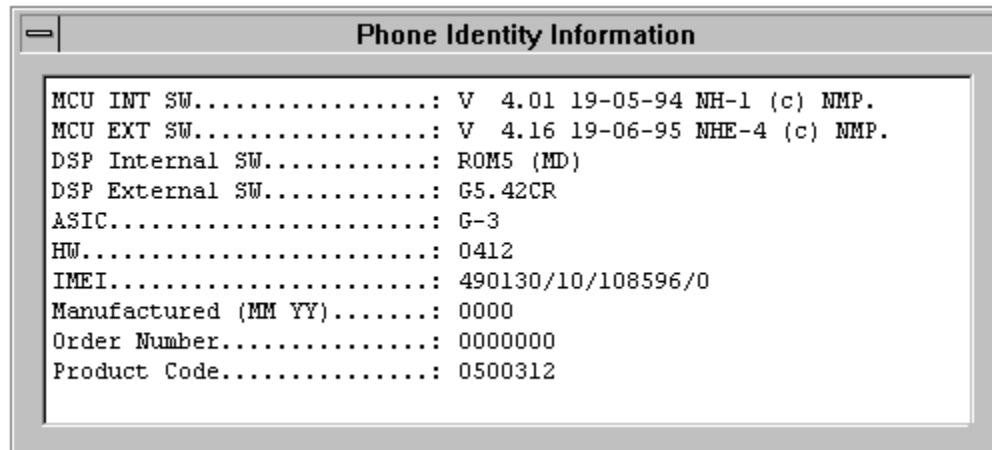
**Phone Identity... command**

Activation                      Status Bar Text

---

Alt, V, P                      View phone identity information

The command opens the **Phone Identity Information** dialog box, which shows identification information. Information is shown in a modeless dialog box, which may be left open during other operations. It is also updated when ever needed.



(Sample screen)

## **Help**

The Help menu offers commands which provide assistance with this application:.

### **Index command**

Activation	Status Bar Text
Alt, H, I	Provide general instructions on using help
The command displays the opening screen of Help. From the opening screen, the user can jump to step-by-step instructions for using Service Software and various types of reference information.	
Once Help is opened, the user can click the Contents button whenever he wants to return to the opening screen.	

### **General help command**

Activation	Status Bar Text
Alt, H, G	General help

### **Using Help command**

Item	Activation	Status Bar Text
<u>U</u> sing Help	Alt, H, U SHIFT F1	Display using help system information

### **About... command**

Activation	Status Bar Text
Alt, H, A	Displays the version number of this application

See **Login Dialog**.

## Initialization File

The service software has its own initialization file which has the extension .INI. The Initialization file is TESLA.INI and includes all the following selections (in mentioned menus or dialog boxes) and parameters:

RF Controls dialog box ([RF Controls])

Active Unit (Active Unit =)

TX Power Level (TX Power Level =)

Operation Mode (Operation Mode =)

TX Data Type (TX Data Type =)

Continuous Mode Channel (Cont Mode Channel =)

Channel (Channel =)

Monitoring Channel 1 (Monitoring Channel 1 =)

AGC dB value (AGC =)

AFC (AFC =)

Call Simulation dialog ([Call Simulation])

Monitoring Channel 2 (Monitoring Channel 2 =)

Monitoring Channel 3 (Monitoring Channel 3 =)

Monitoring Channel 4 (Monitoring Channel 4 =)

Monitoring Channel 5 (Monitoring Channel 5 =)

Monitoring Channel 6 (Monitoring Channel 6 =)

All selections and parameters which are not the same as in the RF Controls menu.

TX Power Tuning dialog ([TX Power Tuning])

TX power coefficients

TX I/Q Tuning dialog ([TX I/Q Tuning])

TX I/Q

## Appendix 1, Vocabulary

Appreviation	Description
AFC	Automatic Frequency Control
AGC	Automatic Gain Control
API	Application Programming Interface
ASIC	Custom circuit which for instance controls communication between MCU and DSP
CLF	Common Look and Field
DATA	DATA interface module
DAU-4S	M2BUS – RS-232 adapter
DCT2	Digital Core Technology Second Generation
DLL	Dynamic Link Library
DSP	Digital signal processor which controls radio interface and speech coding/decoding
EEPROM	Memory for adjustment parameters (Electrically Erasable and Programmable Read Only Memory)
IMEI	International Mobile Equipment Identification code
M2BUS	Serial communication bus which can be connected to accessory devices and test PC
MCU	Master Control Unit processor
MDI	MCU DSP Interface; message interface via ASIC registers
ME	Mobile Equipment
MFC	Microsoft Foundation Class library
MS	Mobile Station
MTI	Message Transfer Interface
PC	IBM PS/AT or compatible personal computer
PCBOX	Local Net driver SW for PC
PCI	Phone Controlling Interface SW for PC
PKD	Parallel Port Software Protection Device
RF	Radio Frequency parts
RFI	Radio Frequency Interface circuit
RSSI	Received Signal Strength Indication
SW	Software
UI	User Interface

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