PAMS Technical Documentation
NHX–7 Series Transceivers

Chapter 5

Service Software and Tuning Instructions

AMENDMENT RECORD SHEET

Amendment Number	Date	Inserted By	Comments
	10/98		Original

CONTENTS

Service Software Instructions

General

The NHX–7 Service Software is specially designed to facilitate the servicing of sixth generation cellular telephones.

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

This section refers to TACS Service Software Version 1.00. 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.

– Operating System: DOS Version 5 & Microsoft Windows 3.11 or later

– Display: VGA based display

– Service Software program: for 3.5" disk (product code: 0774106)

– WinTesla Service Software: SWSA1 (product code: 0774046)

   for 3.5" disk.

– Software Protection Key PKD–1 (product code 0750018)

– M2BUS interface cable DAU–9P (product code 0730109)

*) 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 be-*
fore *making connections !*

Caution: *Do not connect the PKD–1 to the serial port. This could dam-*
age 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–9P).

Attach the protection key PKD–1 to parallel port one (25–pin female D–con-
nector) 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 print-
er 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.
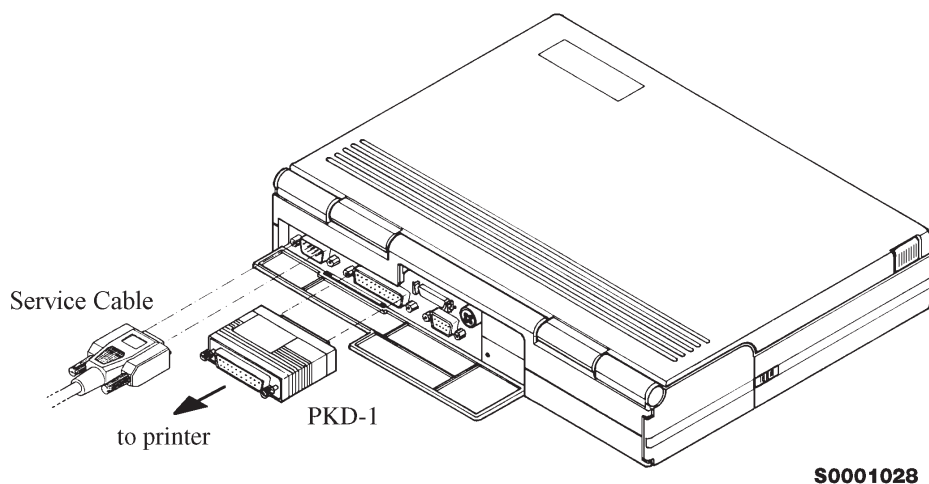
Attach one end of the M2BUS service cable, DAU–9P, to the PC serial port
and the other end to the bottom connector of the phone.

Start Up Procedure

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

NOTE! Make sure that WinTesla and dongle drivers have been installed to PC before installing service software DLL's.

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, receives 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 cable (DAU–9P) connected to the PC RS–232 port and bottom connector of the phone.
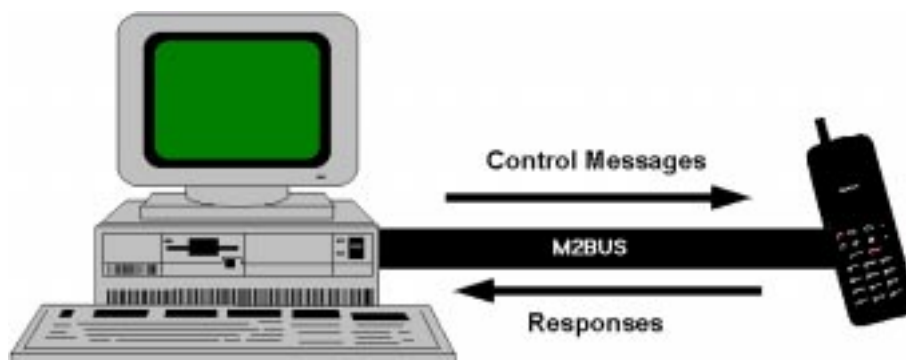
The recommended minimum hardware standard to run the Service Software package is any computer which is 386 33Mhz or greater with at least 4 MB of memory and VGA type display (640x480). This assumes that only the Service Software package is active, i.e. other Windows packages are not running in the background.

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 NHX–7, there are two DLL's:

– Functionality DLL is NHX7.DLL

– User Interface DLL is NHX7EN.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.

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.
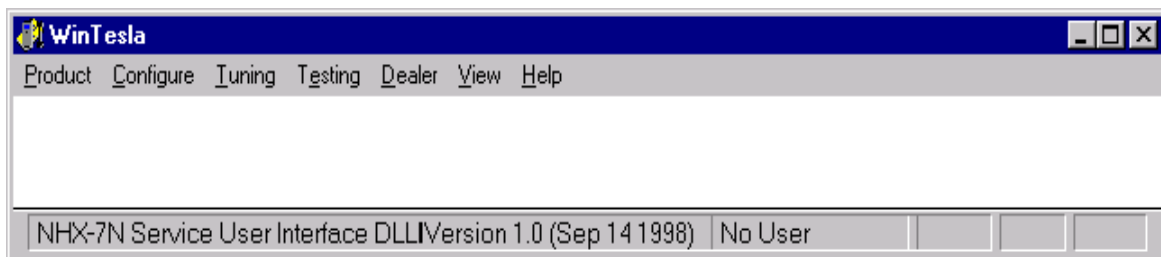
Title bar

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

A title bar contains the following elements:

- Application Control–menu button
- Maximize button
- Minimize button
- Name of the application
- Restore button

The properties of these elements and their usage is described in Ref 3– Microsoft Windows Version 3.1 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:

Indicator	Description
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 has 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

- 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 Mod Shift+F5
- Faultlog
  - Active Faultlog... F9
  - Edit Faultlog...

- Exit   Alt+F4

Configure

The Configure menu contains the following menu items:

- Options...
- Directories...
- Faultlog...
- RF Controls
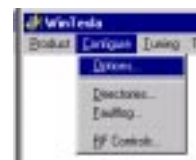
Tuning

The Tuning menu contains the following menu menu items:

- Battery...
- Charger (I)...
- Charger (V)...
- Vctcxo
- Tx Power...
- Deviation...
- RSSI...
- LCD contrast...
- Values...
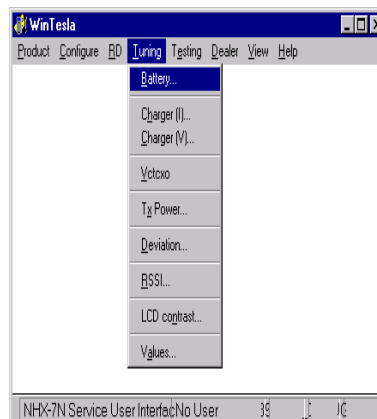
Additional menu items may be added within the sections according to the phone type being tuned, e.g. a Charger tuning menu item will be added after the Battery tuning item, but not in the Transmitter tuning section.

Testing

The Testing menu contains the following menu items:

- Quick Testing...
- ADC Readings
- Display
- SINAD...
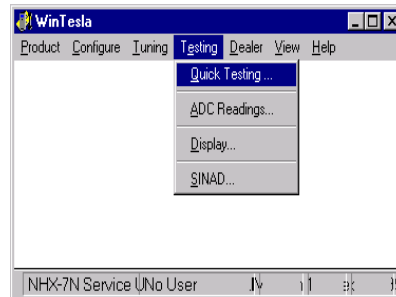
Additional menu items may be added within the sections according to the phone type being tested.

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 pop-up from the Receiver menu item.

Dealer

The Dealer menu contains the following menu items:

- Subscriber Data...
- Short Code Memory...
- Set Default Values...
- User Settings...
- Warranty Info...

View

The View menu contains the following m

- Phone Identity...

Technical Documentation   Service Software and Tuning Instructions

Help

The Help menu contains the following menu items:
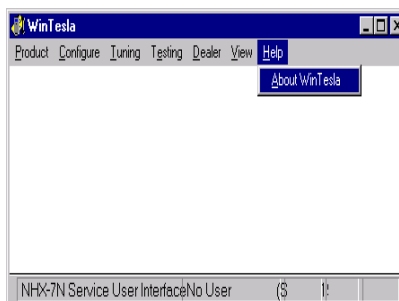
• About WinTesla

Mouse Cursors

The standards 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	File – New	Microsoft
Ctrl+O	File – Open	Microsoft
Ctrl+P	File – Print	Microsoft
Ctrl+R	Product – New	NMP

Shift Hot Keys

Key	Description	Defined by
Shift+F5	Local Mode	NMP

Key Strokes

Key	Description	Defined by
Alt+P	Product Menu	NMP
Alt+P,N	New	NMP
Alt+P,O	Open	NMP
Alt+P,C	Close	NMP
Alt+P,I	Initialize Pop–up	NMP
Alt+P,I,N	Normal Mode	NMP
Alt+P,I,L	Local Mode	NMP
Alt+P,F	Faultlog Pop–up	NMP
Alt+P,F,A	Activate Faultlog	NMP
Alt+P,F,E	Edit Faultlog	NMP
Alt+P,E	Exit Application	NMP
Alt+C	Configure	NMP
Alt+C,O	Options	NMP
Alt+C,D	Directories	NMP
Alt+C,F	Faultlog	NMP
Alt+C,R	RF Controls	NMP
Alt+T	Tuning Menu	NMP

Alt+T,B	Battery	NMP
Alt+T,C	Charger (V)	NMP
Alt+T,H	Charger (I)	NMP
Alt+T,V	VCTCXO	NMP
Alt+T,X	Tx Power	NMP
Alt+T,D	Deviation	NMP
Alt+T,R	RSSI	NMP
Alt+T,N	LCD contrast	NMP
Alt+T,A	Values	NMP
Alt+E	Testing Menu	NMP
Alt+E+Q	Quick Testing	NMP
Alt+E,A	ADC Readings	NMP
Alt+E,D	Display	NMP
Alt+E,S	SINAD	NMP
Alt+E,E	Error Codes	NMP
Alt+D	Dealer Menu	NMP
Alt+D,C	Short Code Memory	NMP
Alt+D,U	User Menu Settings	NMP
Alt+D,V	Set Default Values	NMP
Alt+D,W	Warranty Info	NMP
Alt+V	View Menu	NMP
Alt+V,P	Phone Identity	NMP
Alt+H	Help Menu	Microsoft
Alt+H,I	Index	Microsoft
Alt+H,G	General Help	Microsoft
Alt+H,U	Using Help	Microsoft
Alt+H,A	About WinTesla	Microsoft

Help Functions

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

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 recognized that features may require additional button types, but the addition of these non–standard buttons should be carefully considered to minimize 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.

NHX–7 Specific Features

Product Menu

New command

Activation	Status Bar Text
Alt, P, N Ctrl+R	Rescan a new phone

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.

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.

The initialization routine checks the phone's cellular type (ETACS), and if an unsupported phone is detected, the WinTesla application does not load the dlls.

If quick info view is open, the window will be automatically updated.

If phone identification view is open, the window will be automatically updated.

Open... command

Activation	Status Bar Text
Alt, P, O	Force load phone specific functionality

Enables the user to force load specific phone's WinTesla dll's.

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 F5 and Local mode Shift F5.

Faultlog

Activation	Status Bar Text
Alt, P, F	–

Opens a submenu which contains following options:

<u>A</u>ctivate Faultlog...

Activation	Status Bar Text
Alt, P, F, A F9	Activates faultlogging

<u>E</u>dit Faultlog...

Activation	Status Bar Text
Alt, P, F, E	Activates faultlog editing

E<u>x</u>it 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 Menu

Options... command

Activation	Status Bar Text
Alt, C, O	Edit Service Software options

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

Language drop down list.

User ID edit box.

M2BUS Com Port drop down list.

Automatic Rescan edit box.

Note! This documentation is updated WinTesla integration version 5.38.

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:

Note! This documentation is updated WinTesla integration version 5.38.

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:
Note! This documentation is updated in version 5.38.

RF Controls

Activation	Status Bar Text

Alt, C, R   Edit RF Controls

The **RF Controls** dialog box contains the following items:

TX Level edit box

RSSI Channel edit box

Mid Channel edit box

High Channel edit box

Cancel button (Esc):

Write File button (Alt+F):

Tuning Menu

The tuning menu offers functions for ME adjustments.

Battery Reference

Activation	Status Bar Text
Alt, T, B	Tune Battery Reference Voltage
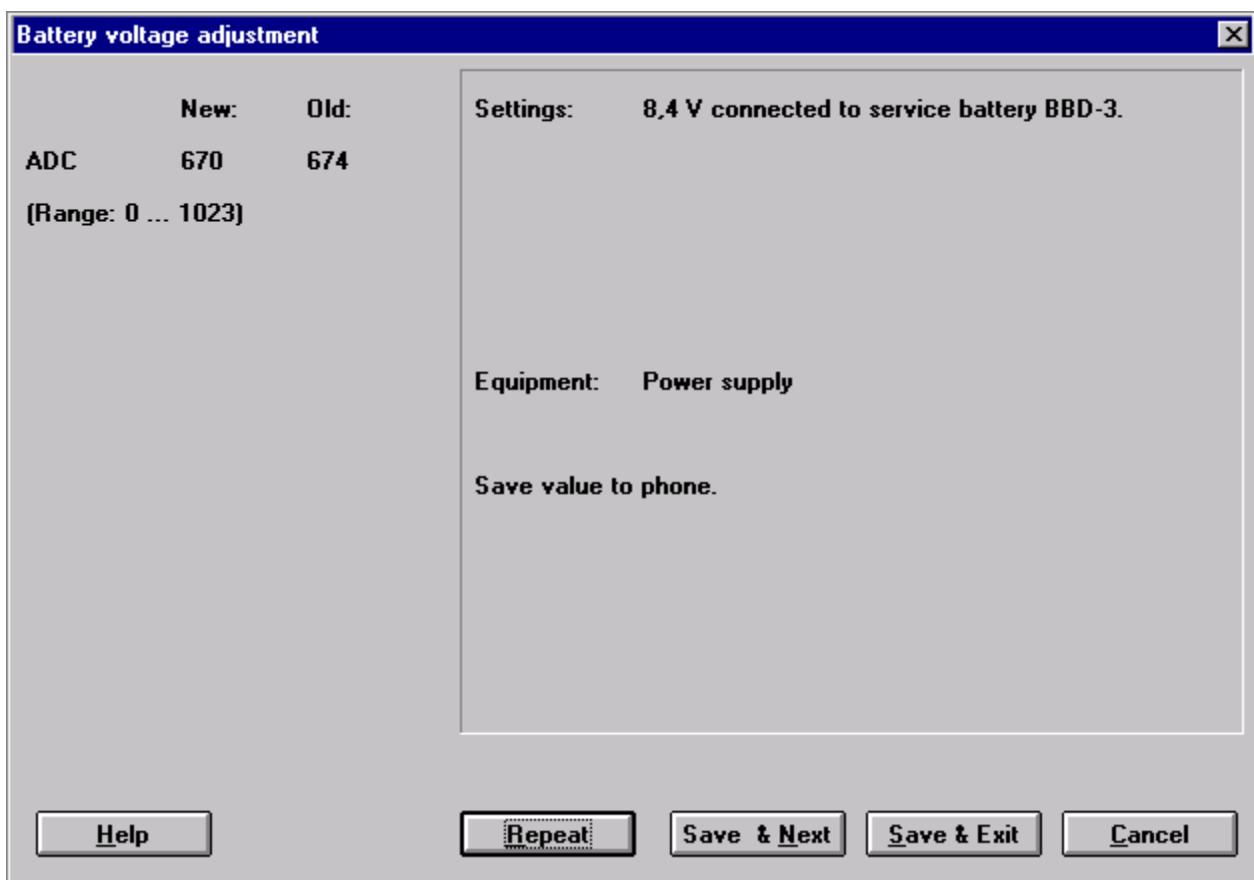
The **Battery Reference** dialog box contains the following items:

Repeat button (Alt+R):

Read AD Converter Value (average of 10 readings).

Save & Next button (Alt+N):

Tuning values are saved to the phone, and the next tuning dialog is entered.

Save & Exit button (Alt+S):

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

Cancel button (Esc):

> The dialog box is closed, and the tuning values are **not** saved to the phone.

Charger Voltage Adjustment

Activation	Status Bar Text
Alt, T, C	Tune Reference Charge Voltage
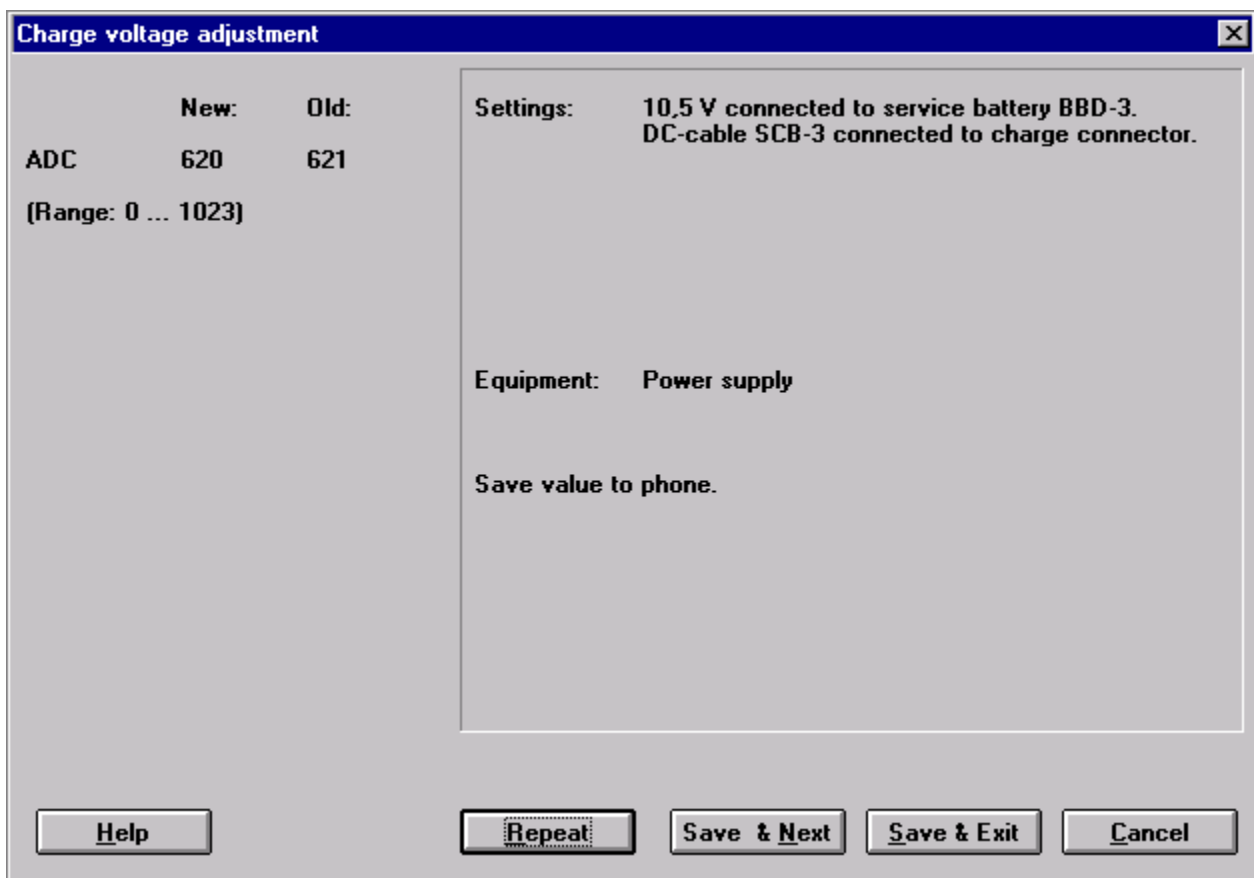
The **Charger Voltage Adjustment** dialog box contains the following items:

Repeat button (Alt+R):

> Read AD Converter Value (average of 10 readings).

Save & Next button (Alt+N):

> Tuning values are saved to the phone, and the next tuning dialog is entered.

Save & Exit button (Alt+S):

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

Cancel button (Esc):

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

Charger Current Adjustment

Activation   Status Bar Text

Alt, T, H   Tune Reference Charge Voltage

The The **Charger Current Adjustment** dialog box contains the following items:

Repeat button (Alt+R):

Read AD Converter Value (average of 10 readings).

Save & Next button (Alt+N):

Tuning values are saved to the phone, and the next tuning dialog is entered.

Save & Exit button (Alt+S):

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

Cancel button (Esc):

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

VCTCXO Tuning

Activation	Status Bar Text

Alt, T, V   Tune VCTCXO

This command is used to tune the VCTCXO frequency of the phone.

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

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.

Help button (Alt+H):

> Not implemented.

Undo button (Alt+U):

> Returns original values to the VCXO number services line.

VCTCXO Default button (Alt+U):

> Writes VCTCXO default values values to the VCXO number
> services line.

TX Power Tuning

Activation	Status Bar Text

Alt, T, X	Tune TX power

This command is used to tune the phone's TX power levels. When selected, the transmitter will be switched on at power level 7 on middle channel (default: channel 1988).

TX Power Tuning

	Target of DAC Values Measurement				
Level	Old	New	mW	dBm	
7 (Mid)	045	045	4.47	6.5±0.8	
7 (High)	047	047	4.47	6.5±0.8	
6 (Mid)	049	049	11.2	10.5±0.5	
6 (High)	053	053	11.2	10.5±0.5	
5 (Mid)	056	056	28.2	14.5±0.5	
5 (High)	062	062	28.2	14.5±0.5	
4 (Mid)	068	068	70.8	18.5±0.4	
4 (High)	078	078	70.8	18.5±0.4	
3 (Mid)	088	088	178	22.5±0.4	
3 (High)	098	098	178	22.5±0.4	
2 (Mid)	106	106	446	26.5±0.3	
2 (High)	120	120	446	26.5±0.3	

(Range: 0...250)

Settings: TX Power On.
             Channel 1988.
             TX frequency 888.4875MHz.

Equipment: Power meter connected to antenna
             connector.

Select TX power level item.
 Use the coarse/fine commands until the target value
is reached.
Follow this procedure for all the power levels.

Value Adjustment

Fine: [-] [+]

Coarse: [PgDn] [PgUp]

[Help]

[Save and Next] [Save & Exit] [Cancel]

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

Fine buttons (Alt++/–):

Increase/decrease DAC value by 1.

Coarse buttons (Alt+PgDn/PgUp):

Increase/decrease DAC value by 10.

Save & Next button (Alt+N):

Tuning values are saved to the phone, and the next tuning dialog is entered.

Save & Exit button (Alt+S):

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

Cancel button (Esc):

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

Deviation Tuning

Activation	Status Bar Text
Alt, T, D	Deviation Tuning

A number of deviation tunings are grouped together in this command. They are, however, still tuned independently of each other.

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

Fine buttons (Alt++/–):

> Increase/decrease tuning factor by 1. Nominal values Increase/ decrease by 2.

Next buttons (Alt+E):

> Cursor jumps next deviation values, between Sig Tone, Maximum and Nominal.

Save & Next button (Alt+N):

> Tuning values are saved to the phone, and the next tuning dialog is entered.

Save & Exit button (Alt+S):

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

Cancel button (Esc):

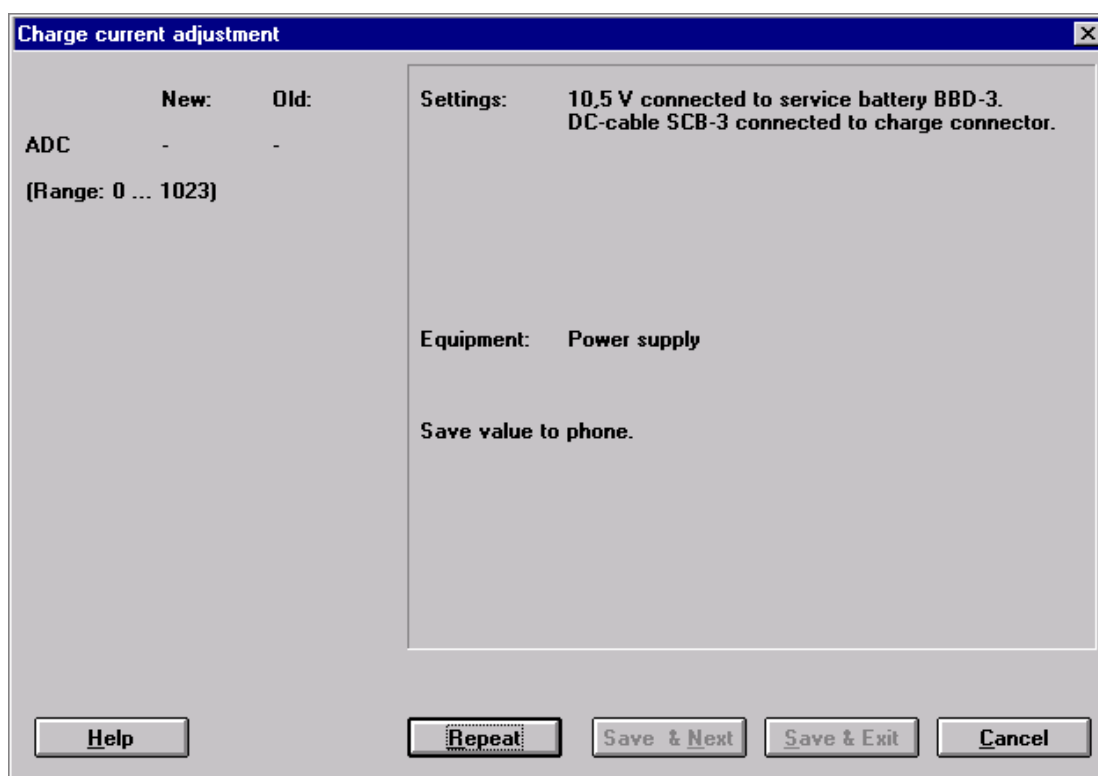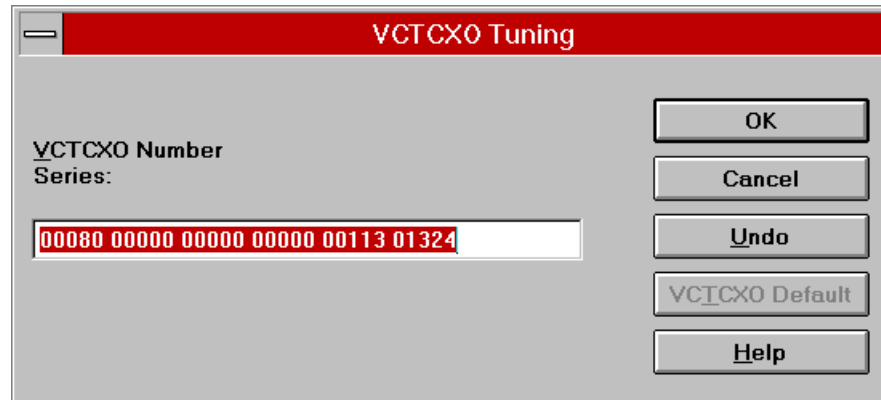> The dialog box is closed, and the tuning values *are not saved* to the phone.

RSSI Reference Adjustment

Activation	Status Bar Text
Alt, T, R	Tune RSSI reference value

This consists of tuning the reference value for the RSSI meter. It is carried out with an external signal.

```
RSSI reference adjustment                                              ☒

            New:      Old:        Settings:    Channel 1988.
ADC          -         -                       RX frequency 933.4875MHz.
                                               -85 dBm signal. No modulation.
(Range: 0 ... 1023)



                                  Equipment:   No equipment


                                  Save value to phone.




   Help                    Repeat      Save & Next   Save & Exit    Cancel
```
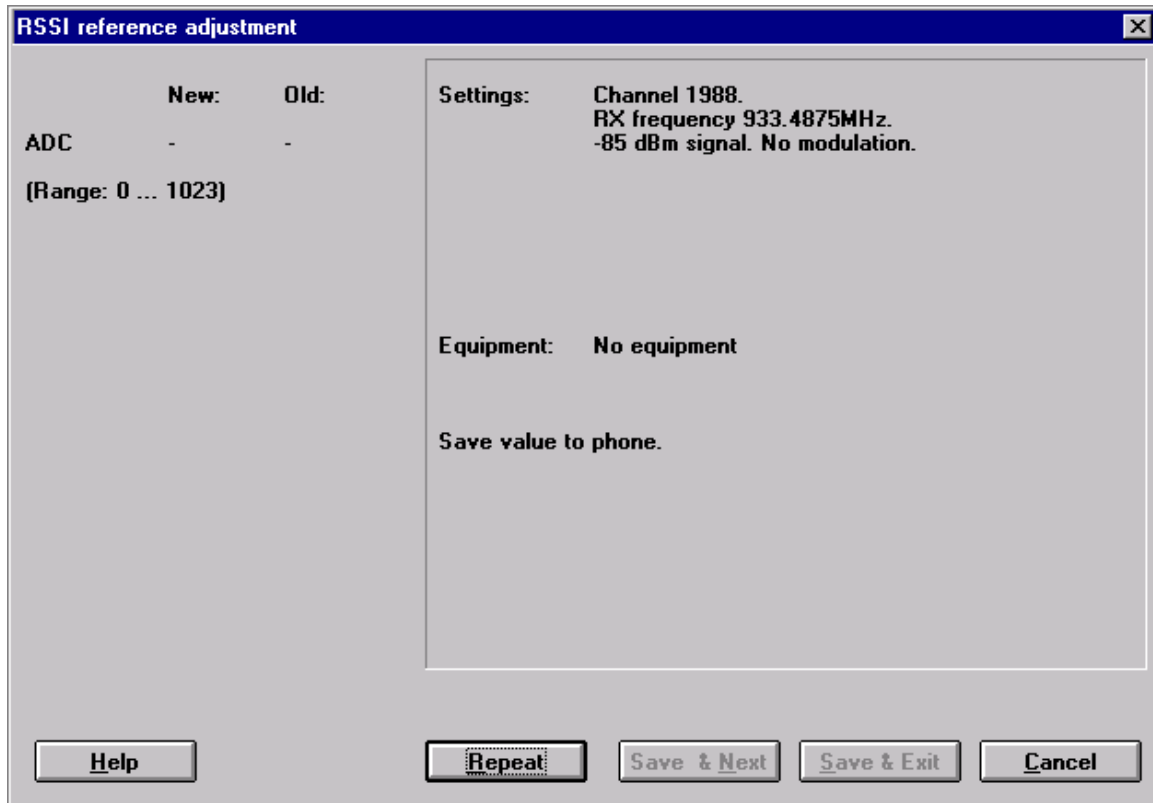
The **RSSI reference Adjustment** dialog box contains the following items:

Repeat button (Alt+R):

Read AD converter value (average of 10 readings).

Save & Next button (Alt+N):

Button is not used, always disabled.

Save & Exit button (Alt+S):

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

Cancel button (Esc):

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

LCD Contrast Tuning/Keymat color

Activation   Status Bar Text

Alt, T, N   Tune LCD contrast value

This consists of tuning the reference value for the LCD contrast.
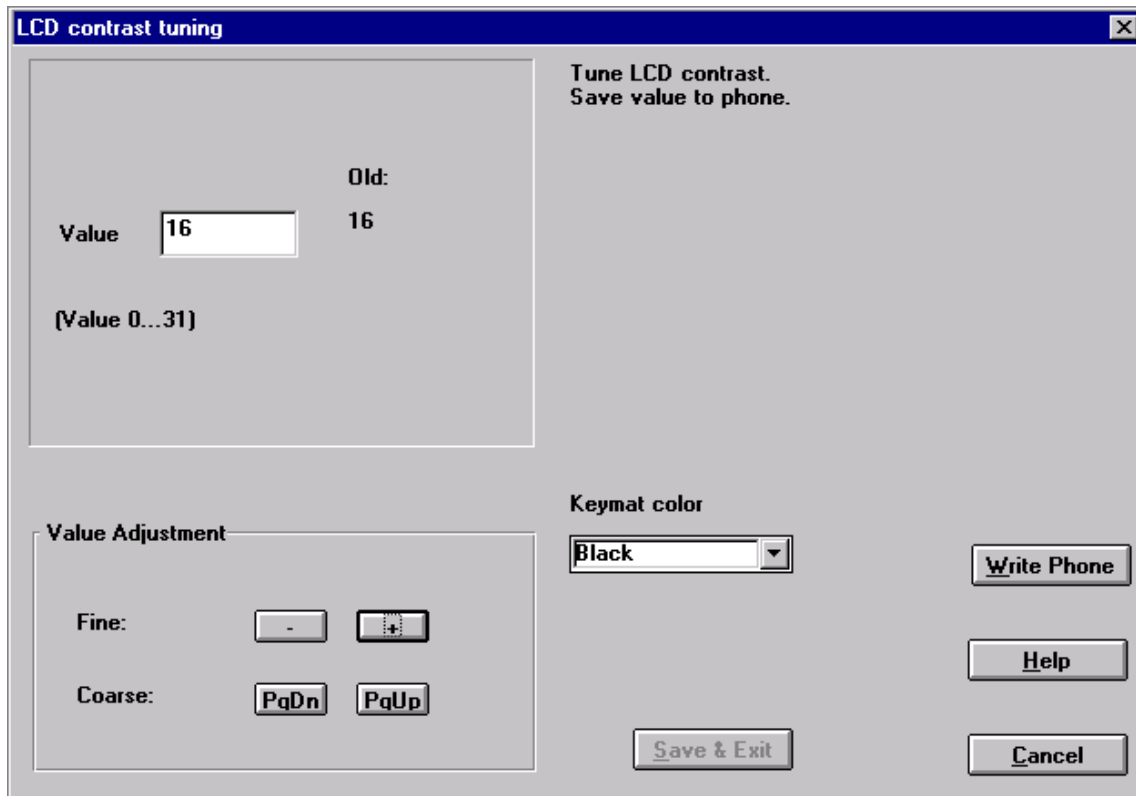
The **LCD Co<u>n</u>trast Tuning** dialog box contains the following items:

Fine buttons (Alt++/–):

Increase/decrease DAC value by 1.

<u>S</u>ave & Exit button (Alt+S):

Tuning value is saved to the phone.

Cancel button (Esc):

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

Technical Documentation   Service Software and Tuning Instructions

Tuning Values

Activation	Status Bar Text
Alt, T, A	Activate Tuning Values and Tuning Default command

With this command you can save the read Tuning Data from the EEPROM, and save factory default tuning values to phone. You can read/save those values from/to file as well.

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

Cancel button (Esc):

> The dialog box is closed.

Default button (Alt+D):

> The dialog box is closed, and the default tuning values are saved to the phone.

Write Phone button (Alt+W):

> The dialog box is closed, and the tuning values from the selected file are saved to the phone.

Read Phone button (Alt+R):

> Tuning values are read from the phone.

S̲ave File button (Alt+S):

> Tuning values are saved as a file, the name of which is requested.

Testing Menu

The Testing Menu allows the Service Technician to switch a phone to Local mode in order to attempt to simulate a reported fault or configure a phone to test a certain parameter. It allows the technician complete control over internal and external audio, and the RF settings.

When Testing is selected, the phone is placed into Service mode automatically.

This is known as Local mode. Unless the user changes this configuration, using File, the phone receiver is tuned to Channel 1988; the Transmitter synthesizer is also tuned to Channel 1988 but with the PA switched off.

Quick Testing

Activation   Status Bar Text

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

This command opens a Window allowing the user full control over the channel the phone is tuned to; the transmit power state; and access to some simple audio routing and signal switching.

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

R̲x Path button (Alt+R):

Select Rx path (Mute/Ear/XEar/Headset)

Tx Path button (Alt+T):

Select Tx path (Mute/Mic/XMic/Headset)

Volume button (Alt+V):

Select volume level (1–5)

Loop button:

Audio loop On/Off.

Tx Synthesizer button (Alt+Y):

Tx synthesizer On/Off.

Tx Power Level button (Alt+E):

Tx power level (Off, 0–7)

Compander button (Alt+O):

Compander On/Off.

Signal Tone button (Alt+G):

Signalling tone On/Off.

Supervisory Tone button (Alt+P):

Supervisory tone (Off, 5970 Hz, 6000 Hz, 6030 Hz)

Wide Band Data button (Alt+W):

Wide Band Data On/Off.

Buzzer button (Alt+B):

Buzzer On/Off.

Channel edit box (Alt+C):

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.

Close button (Alt+Esc):

Close dialog box.

High Channel button (Alt+H):

Select High channel (600)

Mid Channel button (Alt+I):

Select Middle channel (1988)

Low Channel button (Alt+L):

Select Low channel (1329)

Channel Up button (Alt++):

Increase channel number by 1.

Channel Dn button (Alt+–):

Decrease channel number by 1.

ADC Readings

Activation	Status Bar Text

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

This displays a table showing the following readings of the A/D converters.
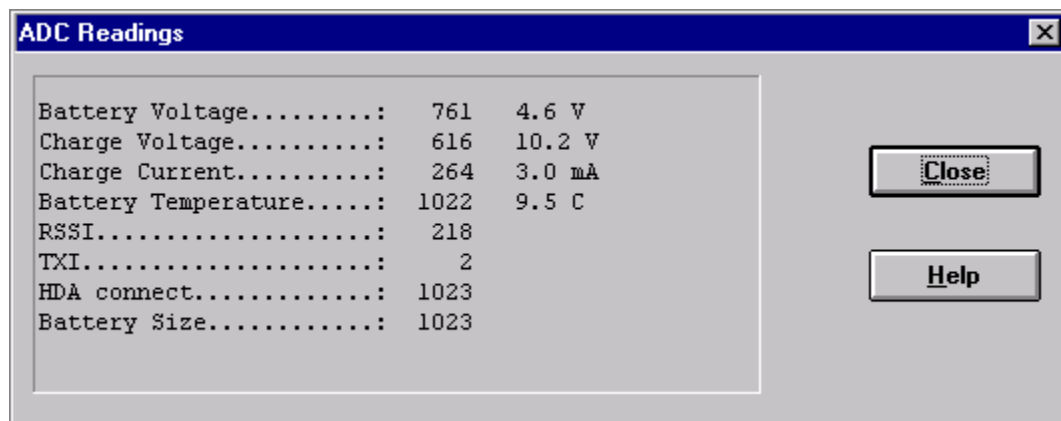
Item:	Name:	Function:
0	VBATSW	Battery voltage
1	CHRGMON	Charge voltage
2	CHRGMON	Charge current
3	BTEMP	Battery temperature
4	RSSI	Received Signal Strength
5	TXI	Transmit power monitor
6	HDACON	Headset connection
7	BSI	Battery size indication

The **ADC Readings** dialog box contains the following items:

Close button (Alt+Esc):

The dialog box is closed.

Help button (Alt+H):

Not implemented.

Display Tests

Activation	Status Bar Text

| Alt, E, D | Open the **Display Tests** dialog box |

This enables checking of the operation of the display segments.
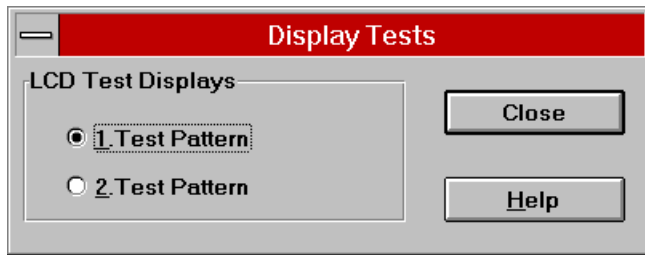
The **Display Tests** dialog box contains the following items:

Close button (Alt+Esc):

       The dialog box is closed.

Help button (Alt+H):

SINAD

Activation	Status Bar Text

Alt, E, S	Open the **RX <u>S</u>INAD and XEAR level** dialog box

This command is used to test SINAD and XEAR level.
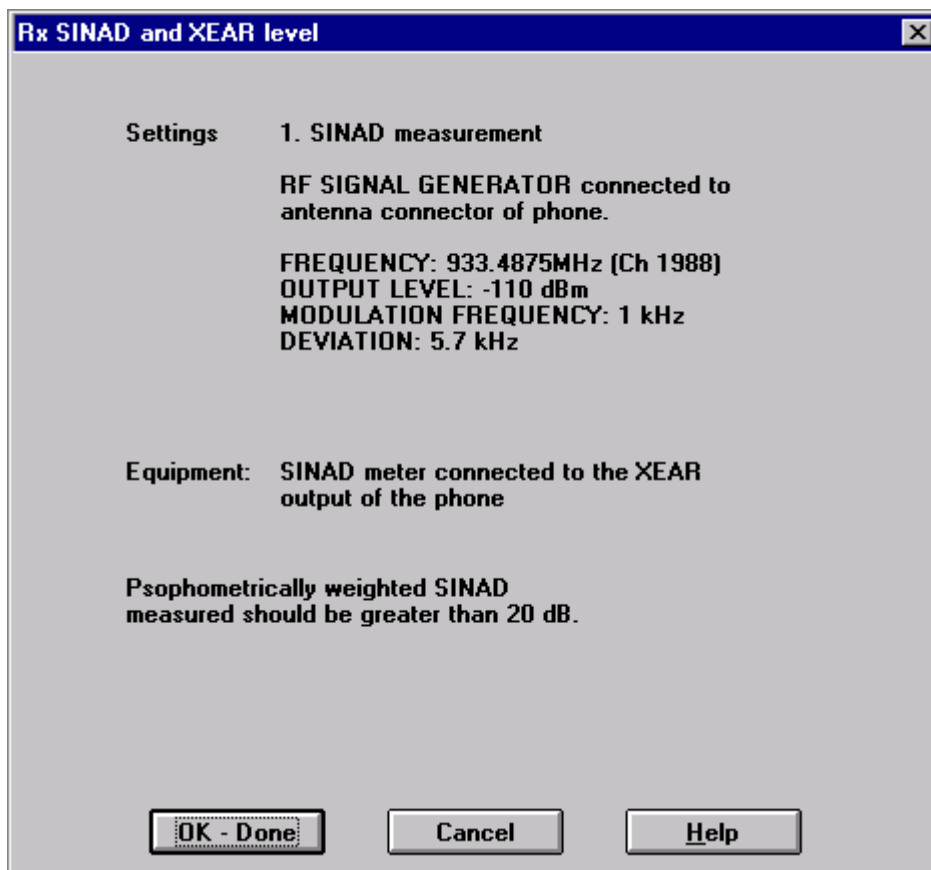
The **RX SINAD and XEAR level** dialog box contains the following items:

OK–Done button (Enter):

> Enter XEAR measurement.

Cancel button (Alt+Esc):

> The dialog box is closed.

```
┌─────────────────────────────────────────────────────────────┐
│ Rx SINAD and XEAR level                                  [X] │
├─────────────────────────────────────────────────────────────┤
│                                                              │
│     Settings      2. XEAR measurement                        │
│                                                              │
│                   RF SIGNAL GENERATOR connected to           │
│                   antenna connector of phone. RF signal level│
│                   increased to -50 dBm and                   │
│                   deviation changed to 5.7 kHz.              │
│                                                              │
│                   FREQUENCY: 933.4875MHz (Ch 1988)           │
│                   OUTPUT LEVEL: -50 dBm                       │
│                   MODULATION FREQUENCY: 1 kHz                 │
│                   DEVIATION: 5.7 kHz                          │
│                                                              │
│                                                              │
│     Equipment:    Signal level measured at XEAR              │
│                                                              │
│                                                              │
│                                                              │
│     Check that Audio Signal Level measured at XEAR           │
│     is in the range 95...250 mV rms                          │
│                                                              │
│                                                              │
│                                                              │
│       [ OK - Done ]      [  Cancel  ]      [   Help   ]       │
│                                                              │
└─────────────────────────────────────────────────────────────┘
```

OK–Done button (Enter):

> The dialog box is closed.

Cancel button (Alt+Esc):

> The dialog box is closed.

Help button (Alt+H):

> Not implemented.

Dealer Menu

Selecting Dealer will bring up a sub–menu as shown below:

- – Subscriber Data
- – Short Code Memory
- – Set Default Values
- – User Settings
- – Warranty information

Subscriber (NAM) Data

Activation	Status Bar Text
Alt, D, S	Open the **Subscriber Data** dialog box

This can be used to program all the Subscriber Data and Common NAM Data information into a telephone. This can also be programmed through the phone's keypad.

Note: *If you wish to only view and not change the NAM information, press Esc to exit the screen.*

Any NAM in the phone can be read from/written to by selecting 1. When a selection is made, all the NAM information displayed on the PC is updated. Basic information displayed next to 1/2 is operator name (if the phone has been programmed using the customization feature), and Subscriber Number (MIN–P).

From this example it can be seen that NAM 1 has been programmed. The ESN of the phone is also clearly displayed.

Dealers are strongly advised to use the customization feature. For any operator they could store, as a default, the following parameters:

Number (MIN–P)

– This option allows the entry of the subscriber's number, the network code and the country code.

Wake up

– At this point you can define for example the phone owner's name to appear in the wake up display. In case no entry is made, the subscriber number will be show in the wakeup display.

Emergency

– Emergency phone numbers, one or more emergency numbers can be defined, each number should be separated with the ,–mark. The maximum number of emergency numbers depends on the length of the numbers. The total size of the special parameters is limited by the display size (32 characters). these numbers can be called even if the phone is locked. Default numbers are 999,112 for UK and 112,113,115,116,118 for Italy.

Lock Code

– Lock code option enables defining an individual lock code for the user.

Programming Date

– Purchasing date is used for warranty purposes. This location must be programmed when the phone is delivered to the customer. This loca-

Technical Documentation

Service Software and Tuning Instructions

tion can be programmed only once, when the contents of the location is 0000. After it is programmed, it can be read but not changed any more.

Mobile Country & network Code (MCC & MNC)

– MCC; This number is used to define the country code of the phone, for example: UK= 234.

– MNC; Enables selection of the system (operator) used; e.g. in the UK, 0 stands for VODAFONE and 2 for CELLNET.

Home Area (AID)

– This number entered defines the home traffic area of the phone. The number contains information on the country code (bits 14–11), the system bit (bit 10) and the traffic area (bits 9–0).

Initial Paging Channel (IPCH)

– This number is used to define the first channel to be searched in the home traffic area. For example in the UK, 323 means CELLNET and 23 VODAFONE.

Access Overload Class (ACCOLC)

– This number is used to identify which overload class the phone belongs to. Numbers 0–9 corresponds to normal phone class (typically 0 + last digit of MIN).

SCM

– Station Class Mark: 2 digits. In TACS this is always 19 and cannot be changed by the PC.

First & Last DCCA and First & Last DCCB

– At this command you can define DCC channels for certain TACS systems (not needed in UK).

Access Method

– This is used to determine whether the phone must respond to local control messages sent from exchange.

ROAM Enable

– This is used to enable/disable ROAM function.

Country Check

– This option enables/disables Country check.

China ROAM Indicator

– This is used to enable/disable China ROAM indicator.

Language

– Five languages can be selected (English, Italian, Spanish, Deutsch or Malaysian).

CLI

– Tree CLI mode can be selected (No CLI, Singapore CLI or TACS CLI).

NAM Programming

The process for programming a NAM with this method is as follows:

1. Select NAM 1. (TACS only NAM1)

2. Select Operator
   scroll through the available defaults using the arrow keys
   until you find the desired default. All the default information will be displayed
   on the PC screen

3. Select Number and program the new subscriber number using the normal
   text editing keys

4. Select Wake up and program the new Wake up message using the normal
   text editing keys. To help with the message alignment, the phone's display
   will constantly be updated during this process

5. Select lock code and program the new lock code using the normal text
   editing keys

6. Select *Write Phone* button to save to EEPROM.

Alternatively, the user is able to program each individual parameter if they choose not to use the customization feature.

Short Code Memory

Activation	Status Bar Text
Alt, D, C	Short Code Memory

Selecting Dealer/Short Code Memory opens the short code memory dialog box. In this box, you can view and edit all memory locations of the phone. The number of memory locations is 60. You can also store the information to a file and read information from a file. It is also possible to read short code memory files generated by other products' service software. The following Service Software supports this general file format.

The **Edit S<u>C</u>M** dialog box is shown below:

```
┌──────────────────────────────────────────────────────────────────────┐
│ ▭                            Edit SCM                                   │
├──────────────────────────────────────────────────────────────────────┤
│ ┌─Edit entry:──────────────────────────────────────────────┐           │
│ │ Loc:  Name:            Number:                           │           │
│ │ 16    ┌──────────────┐ ┌──────────────────────────────┐  │           │
│ │       │Julie         │ │6543421                       │  │           │
│ │       └──────────────┘ └──────────────────────────────┘  │           │
│ └──────────────────────────────────────────────────────────┘           │
│                                                    ┌──────────────┐     │
│ ┌─SCM:─────────────────────────────────────────┐  │   Cancel     │     │
│ │ Loc:  Name:            Number:                │  └──────────────┘     │
│ │ ┌───────────────────────────────────────┐▲   │  ┌──────────────┐     │
│ │ │  1:                                    │    │  │ Write Phone  │     │
│ │ │  2: THOMAS        6785321              │    │  └──────────────┘     │
│ │ │  3: JILL          8765431              │    │  ┌──────────────┐     │
│ │ │  4:                                    │    │  │ Read Phone   │     │
│ │ │  5:                                    │    │  └──────────────┘     │
│ │ │  6:                                    │    │                       │
│ │ │  7:                                    │    │  ┌──────────────┐     │
│ │ │  8:                                    │    │  │ Save File... │     │
│ │ │  9:                                    │    │  └──────────────┘     │
│ │ │ 10: BILL          040234321            │    │  ┌──────────────┐     │
│ │ │ 11:                                    │    │  │ Load File... │     │
│ │ │ 12:                                    │    │  └──────────────┘     │
│ │ │ 13:                                    │    │                       │
│ │ │ 14:                                    │    │                       │
│ │ │ 15:                                    │    │                       │
│ │ │ 16: JULIE         6543421              │    │                       │
│ │ │ 17:                                    │    │                       │
│ │ │ 18:                                    │    │                       │
│ │ │ 19:                                    │    │                       │
│ │ │ 20:                                    │    │                       │
│ │ │ 21:                                    │▼   │                       │
│ │ └───────────────────────────────────────┘    │                       │
│ └──────────────────────────────────────────────┘                       │
└──────────────────────────────────────────────────────────────────────┘
```

In the editing dialog box, edit or type in a new name and number. You can change the field with the *Tab* key or clicking with a mouse. When this is complete you are able to accept the new values and return to the full SCM dialog box by pressing *Enter* or by clicking the corresponding button. *Esc* will cancel the operation.

The **Edit S<u>C</u>M** dialog box contains the following items:

Cancel button (Alt+Esc):

> The dialog box is closed.

<u>W</u>rite Phone (ALT+W):

> Writes SID data to the phone. Before writing the user is asked to confirm the writing.

<u>R</u>ead Phone (ALT+R):

> Reads SID data from the phone and updates it to the display

<u>S</u>ave File (ALT+S):

> Writes SID data to file. You can select the file to write to from the File selection dialog box.

<u>L</u>oad File (ALT+L):

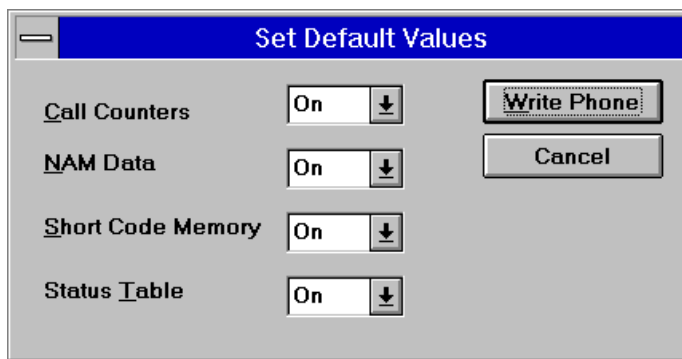> Reads SID data from file. You can select a file to be loaded from the File selection dialog box.

Set Default Values

Activation	Status Bar Text
Alt, D, V	Open **Set Default Values** dialog box.

The **Set Default Values** dialog box contains the following items:

Write Phone (ALT+W):

Writes default values to the phone, and closes the dialog box..

Cancel button (Alt+Esc):

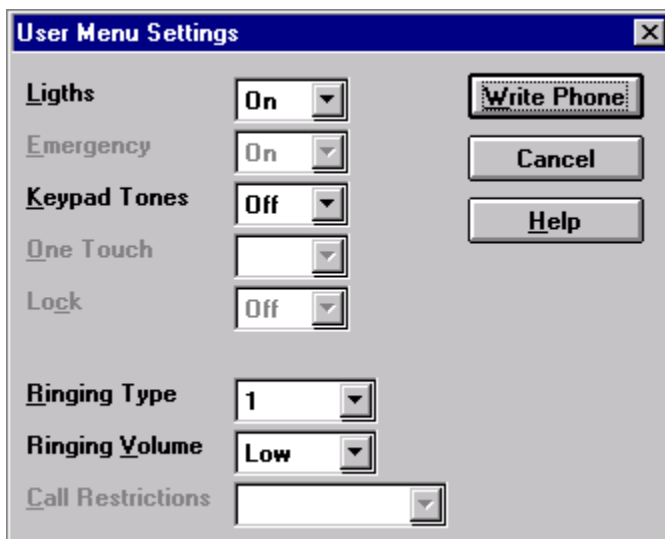The dialog box is closed.

User Settings

Activation	Status Bar Text
Alt, D, U	Open **User Menu Settings** dialog box.

By selecting Dealer/User Menu Settings you can view and change the following User Menu parameters:

- <u>L</u>ights
- <u>E</u>mergency (always ON)
- <u>K</u>eypad Tones
- <u>O</u>ne Touch Dial
- <u>L</u>ock (always OFF)
- <u>R</u>inging Type
- Ringing <u>V</u>olume
- <u>C</u>all Restrictions (Not in NHX–7)

You can move between these groups by using the *Tab* key and select a new setting using the arrow keys. Alternatively, you can click on the desired value with the mouse. Press *Enter* or click on the corresponding button with the mouse to save the new settings to the EEPROM or press *Esc* to exit the dialog box without altering the original values.

<u>W</u>rite Phone (ALT+W):

Writes user menu settings to the phone, and closes the dialog box.

Cancel button (Alt+Esc):

The dialog box is closed.

Warranty Information

Activation	Status Bar Text
Alt, D, W	Open **Warranty Information** dialog box.

NOTE!   *Command Warranty Information contains also editing repair month though it is not transferred to other phone.*

If phone is not Warranty Defective Phone, the command asks if repair month is edited or warranty information transferred.

If phone is warranty defective phone, the command automatically activates the repair month editing.

The **Warranty Information** dialog box contains the following items:

Cancel button (Alt+Esc):

> The dialog box is closed.

Transfer Warranty Information button (Alt+T):

> Transfers warranty information to another phone, and closes the dialog box.

Repair Month To Phone button (Alt+Esc):

> Closes the dialog box, and saves the repair date to the phone.

1) Warranty Information contains

> the contents of the NAM (except the NAM password),
> Short Code Memory,
> User Menu Settings,
> manufacturing month,
> purchasing month
> warranty serial number.

Warranty serial number of the exchange phone is:

> a) serial number of the original phone if warranty serial number of the original phone is empty.

> b) warranty serial number of the original phone if the warranty serial number of the original phone is NOT empty.

2) Original phone will be made warranty defective phone when warranty information is transferred.

3) Warranty information will not be transferred to other phone if

> a) Original phone is warranty defective phone.

> b) NAM password of original phone differs from that of exchange phone.

> c) The Exchange phone is a warranty defective phone.

> NOTE!   In cases b) and c) you must immediately return the original phone to the jig, to avoid making it a warranty defective phone!

NAM Programming from the keypad

NHX–7 phones are equipped with one NAM. The NAM parameters have to be programmed by the dealer before the phone can be used. This can be done in two ways, either by using the keypad or by using a special Service Software. If you are using the Service Software, refer to the respective user manual for further details.

Activating the NAM Programming Mode

The NAM programming from the keypad is done by using a special NAM programming.

The NAM programming mode is turned on by entering special password code.

Preactivation Navi (Menu) and 8

*, 6, 0, 3, 1, 2, #, 1, 2, 3, 4, 5, Navi (Call)

This password is supplied to each dealer individually. If the phone is equipped with the unchurnable software feature, this password has to be preprogrammed to the dealer (or operator) specific password, otherwise the factory preprogrammed password can be used. Changing the password requires a special PCLocals software. The password is programmed by the PC to the EEPROM. It cannot be changed from the keypad.

If the password entered was correct the NAM programming mode is switched on.

Programming the NAM

When the NAM programming mode is on, the short code memory is replaced with six special locations for the NAM parameters

Location:	Contents:
1	Special parameters
2	Own number + name for NAM1
3	Parameters for NAM1
4	Not in use
5	Not in use
6	Purchasing date

Location 2 ; Own Number and Name (NAM1)

In the NAM programming mode these locations can be used as any other short code memory locations. E.g. the number 813 448 4111 for NAM1 would be programmed as:

C for long

Recall 2#(long)

*8, 1, 3, 4, 4, 8, 4, 1, 1, 1, *2(Long)*

save in 2? Navi (Menu)

Note that the own number is entered as a normal phone number, i.e. in TACS as STD+MSIN (Subscriber Trunk Dialling + Mobile Station Identification Number). The own number will be displayed to the user exactly in the same format as stored to the memory location in startup.

You can program the NAMs in any order.

The recall function also works as normally, e.g. the above own number programming could be checked by recalling the location 2 in the nam programming mode:

2# (Long)

The name part of the NAM location 2 can be used to give the name of the network operator, dealer etc. If the name part is programmed, it will be shown on the display each time the phone is switched on as the so called wake–up message. If the name part is not programmed own number is used in the message. The name part is available only for the location 2. The name part is given in the ALPHA mode after the own number:

*8, 1, 3, 4, 4, 8, 4, 1, 1, 1, scroll down, N, A, M, E, ABC, *2,(Long)*

save in 2? Navi (Menu)

The new programmed NAM info is in effect after you have turned the power off and back on and selected the just programmed NAM from the menu. If the NAM info is erroneous, the NAM ERROR note will appear and the phone will not operate. Check that all parameters are given and do not exceed their range. At least one of the NAMs and the special parameters have to be correct.

The NAM programming mode is cleared by turning the power off. The date of the NAM programming is not saved.

Normal short code memory operations for other locations (above 6) are not available during the NAM programming mode.

Location 3 . TACS Parameters (NAM1)

For each NAM, two locations have to be programmed, one for the own number told above and one for the parameters (3 for NAM1). The contents of the parameter locations are of the form:

*MCC+MNC*AID*EX*IPCH*ACCOLC*LC*

Where:

Notes	Function
*	separator: press * on keypad
MCC+MNC	Mobile Country + Network Code: 4 digits (e.g. UK/VODAFONE = 2340, UK/CELLNET = 2342), range 0 – 9999.
AID	Area ID (SIDH equivalent), range 0 – 32767
EX	Access method: 1 = country code used 0 = country code not used
IPCH	Initial Paging Channel: 3–4 digits (typically 323 for B and 23 for A system), range 0 – 2047.
ACCOLC	Access Overload Class: 2 digits (typically 0 +last digit of MIN), range 0 – 15
LC	Lock Code: 4 digits, range 0 – 9999. Default:1234

Note that all the parameters are stored to a single location and the upper part (first 16 digits) is only visible while the *SND* key is pressed. An example grouping of these fields is shown below:

Display	Meaning	Obtained by
2340*	MCC+MNC*	upper part: press *SND* key
2051*1*2	AID*EX*IPC	lower part:
3*2*1234	H*ACCOLC*LC	normal display

Location 1; Common Parameters

A common NAM location 1 is used to store some special parameters. All these parameters have a default factory setting and programming of these parameters is not mandatory.

The format of these parameters are:

EMER#ALRTSEQ*2DIGITCALL*LAN*CC*RE

Where:

Notes	Function
# , *	separator: use # –key for emergency numbers, use * –key for others entries
EMER	Emergency numbers, default 911,*911. One or more emergency numbers can be defined, The numbers must be separated by the # character. **EMER1#EMER2#EMER3#EMER4#EMER5** The maximum number of emergency numbers depends on the length of the numbers. The total size of the special parameters is limited by the display size (32 characters). These numbers can be called even if the phone is locked. Default: 999#112 for UK, 112#113#115#116#118 for Italy
ALRTSEQ	Alert sequence: 1 = UK Default: 1 for UK, 0 for Italy
2DIGITCALL	Two digit service call: 0 = CLI off 2 for Singapore CLI, 4 for TACS CLI
LAN	Language, 1 digit: 0 = English 1 = Italian 2 = Spanish 3 = Deutsch 4 = Malaysian
CC	Country check: 0 = no country check, no auto redial 1 = country check, no auto redial Typically: 1
RE	Roam Enable (1 = enable, 0 = disabled), default: 0

Location 6; Purchasing Date

Location 6 in NAM programming mode is reserved for the purchasing date. Purchasing date is used for warranty purposes. This location should be programmed when the phone is delivered to the customer.

The content of the locations is:

MMYY,

Notes	Function
MM	month
YY	year (e.g. 0898 is August 1998)

This location can be programmed only once, when the contents of the location is 0000. After it is programmed, it can be read but not changed any more.

Default Parameters

Default values are used for the following parameters and they cannot be changed by the keypad NAM programming mode.

SCM =   Station Class Mark: 2 digits (In TACS default is 19.)

DCC =   Dedicated Control Channel: 4 digits. (TACS only, defaults are: First DCC A 23, B 323, Last DCC A 43, B 343)

PSM =   (Preferred System Mark) is derived from the AID/SIDH and cannot be changed.

The factory preprogrammed default values for the NAM locations are:

```
Location:          TACS/UK:
0                  *60312#12345
1                  999#112#1*0*0*1*0
2                  1111111111
3                  1111*2051*0*23*1*1234
4
5
6                  0000
```

Note that these factory presettings can be modified without notice. Also the whole short code memory including the last called number location (0) is cleared by the factory preprogramming.

Table of NAM Programming Commands

Own number (NAM1):   Function:

Notes	Function
Menu +8	Preactivation
Password, *0(Long)	Enter NAM programming mode
number,*2(Long) or 2 +Navi	Store only own number for NAM1

Notes	Function
number,*scroll down-* name, *scroll down,* NAM1. *2(Long) or 2 +Navi*	Store both name and number for NAM1.
number,*scroll down-* name, *scroll down *2(Long) or 2 +Navi*	Store both name and number for name, NAM1.
mcc+mnc,*,aid,*,ex, *,ipch,*,accolc,*,lc, *3(Long) or 3 +Navi*	Store parameters for NAM1.

Checking of the NAM:

Notes	Function
2#	Check NAM1 number
scroll down	and name
hold *C*	Clear display
3#	Check NAM1 parameters
SND	Check upper part of NAM1 parameters.
hold *C*	Clear display
4#	Location empty
hold *C*	Clear display
5#	Location empty
hold *C*	Clear display

Lock code:

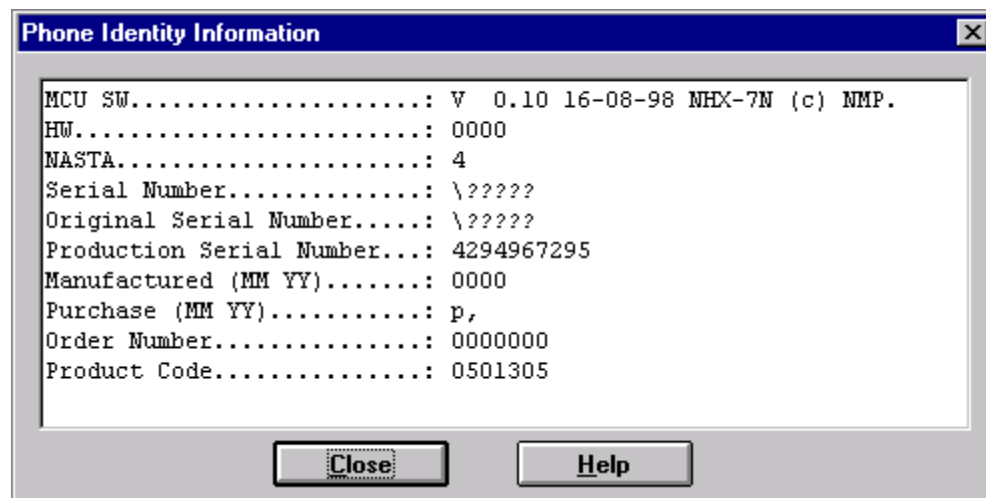| Notes	Function
#	Check special parameters
0,8,9,5,,6(Long)*	Set purchasing date to August 1995
# 6 long C long, scroll up PWR	Exit NAM programming mode by switching power off
PWR	Switch power on, check operation of NAMs programmed:

View

Phone Identity

Activation	Status Bar Text
Alt, V, P	Open **P**hone Identity Information dialog box.

By selecting this option you can see phone type and version.

```
Phone Identity Information                                    ×

  MCU SW....................: V  0.10 16-08-98 NHX-7N (c) NMP.
  HW........................: 0000
  NASTA.....................: 4
  Serial Number.............: \?????
  Original Serial Number....: \?????
  Production Serial Number..: 4294967295
  Manufactured (MM YY).......: 0000
  Purchase (MM YY)..........: p,
  Order Number..............: 0000000
  Product Code..............: 0501305


          [ Close ]              [ Help ]
```

The **P**hone Identity Information dialog box contains the following items:

Close button :

The dialog box is closed.

Help Menu

Choose Help/Using Help to obtain information on how to use the help facilities.

About WinTesla

Activation	Status Bar Text
Alt, H, A face, supporting DLL versions.	Shows the WinTesla software version, user interface, M2BUS support, and NHX–7

Tuning Instructions for NHX-7

In contrast to earlier second-generation analog cellular phones tuning operations of the NHX-7 are carried out using the Service Software software. The Service Software program turns the phone into the Locals mode, in which the phone can be outwardly controlled via the M2BUS interface.

Tuning is based on the Service Software software communicating with the D/A and A/D converters of the phone.

The calibration data of the phone resides on the EEPROM. The contents of the EEPROM can be read by the Service Software software. The program also enables writing of the factory preset calibration data to the EEPROM, after which the whole tuning process should be carried out.

If a repair has been carried out on the RF section of a system module then

the appropriate tunings should be performed as described in the following section and using the on-screen help menus as a guide. Spare system modules will be delivered pre-tuned from the factory and will not require re-tuning.

N.B. During tuning, proceed as follows:

- Take care not to damage sensitive measuring instruments with excessive RF power.

- Carry out all tuning steps in the shortest possible time to avoid excessive heating of RF units.

- Perform all tuning steps in the order presented.

- Never try to mask a fault by tuning it out!

Required Equipment

- PC/AT computer with Service Software software; see Sect. Service Software instructions on installation and use.

- M2BUS cable DAU–9P and other service accessories; see equipment set–up pictures.

- Audio analyzer

- RF power meter, power measurement sensitivity -10 dBm.

- RF generator

- Device to provide the specified test modulation to modulate RF generator.

- Multimeter or DVM.

- Attenuator and branching unit.

- Power supply, nom. voltage 4.1V (with service battery BBD–3 voltage is 8.4 V).

Equipment Setup

Turn off the computer before connecting to avoid possible damage to the serial port.

Connect the MBUS cable SCH-5 (item 3) to the phone. Connect 9-pin male D-connector in your PC serial port.

Then connect SCH-5 audio lines to the measurement station by using the audio cables.

For transmit and audio measuring and adjustment connect ADS-1 EAR/ MIC breakout cables as follows:

- EAR line to test equipment (Marconi 2960) AF INPUT

- MIC line to test equipment (Marconi 2955) AF GEN OUTPUT

Connect BBD-3 service battery connectors to the supply voltage. Power supply must be set to 8.4 V, when the phone is tuned.

Note: The supply voltage must be set to 8.4 V, when battery references are tuned and 10.4 V, when charger references are tuned (with service battery).

Equipment Setup For Tuning A Phone Without Removing Covers
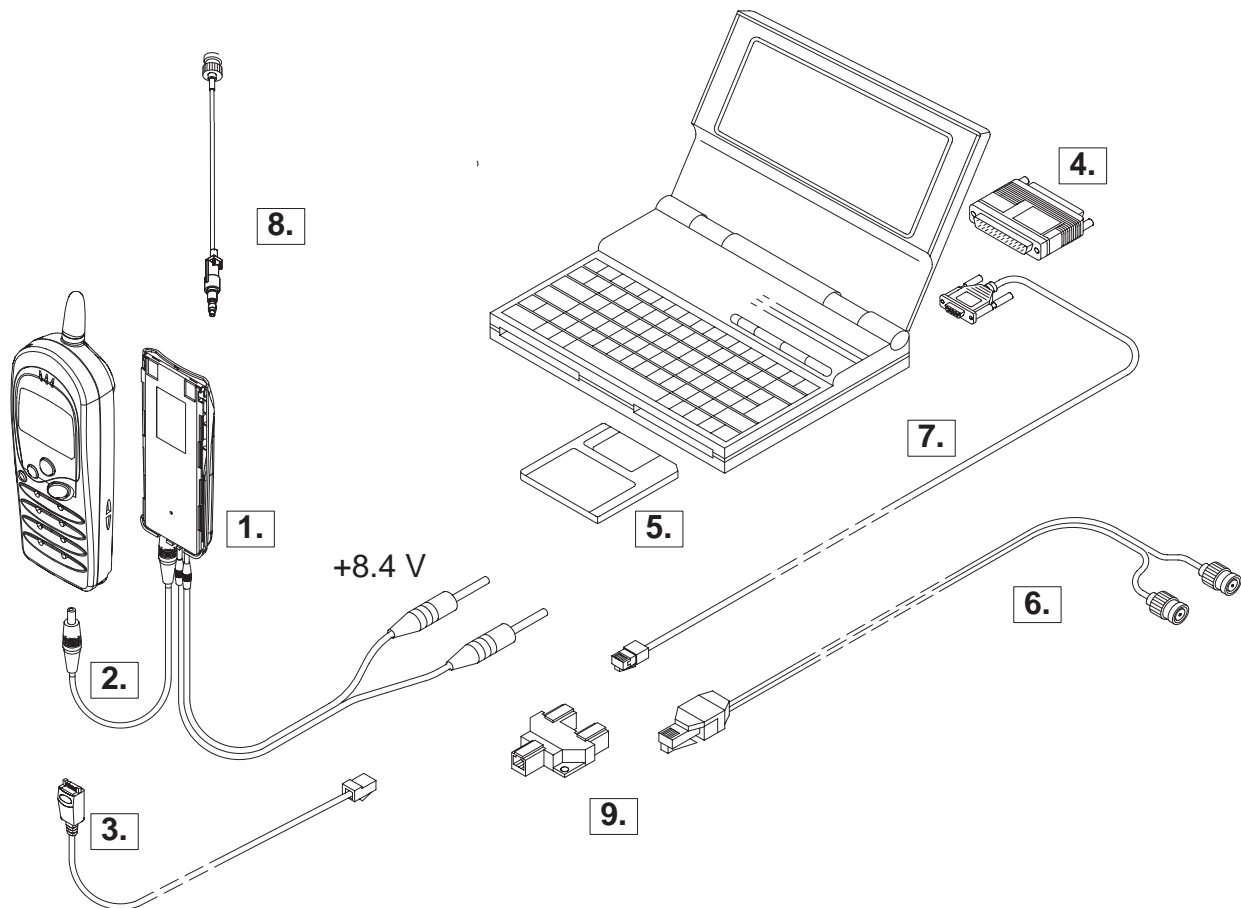
Item	Service Accessory	Type	Code
1	Service Battery	BBD–3	0775071
2	DC cable	SCB–3	0740113
3	Service Cable	SCH-5	0730098
4	Software protection key	PKD-1	0750018
5	Service Software diskette 3.5"		0774106
6	Audio Cable	ADS-1	0730011
7	Service MBUS Cable	DAU–9S	0730108
8	RF Adapter	AAT-7X	0770162
9	Modular T-Connector		4626134
10	WinTesla Service application		0774046

Equipment Setup For Tuning A Phone With Covers Removed

+4.1 V

3.

4.

8.

9.

1.

6.

S0001236

7.

5.

2.
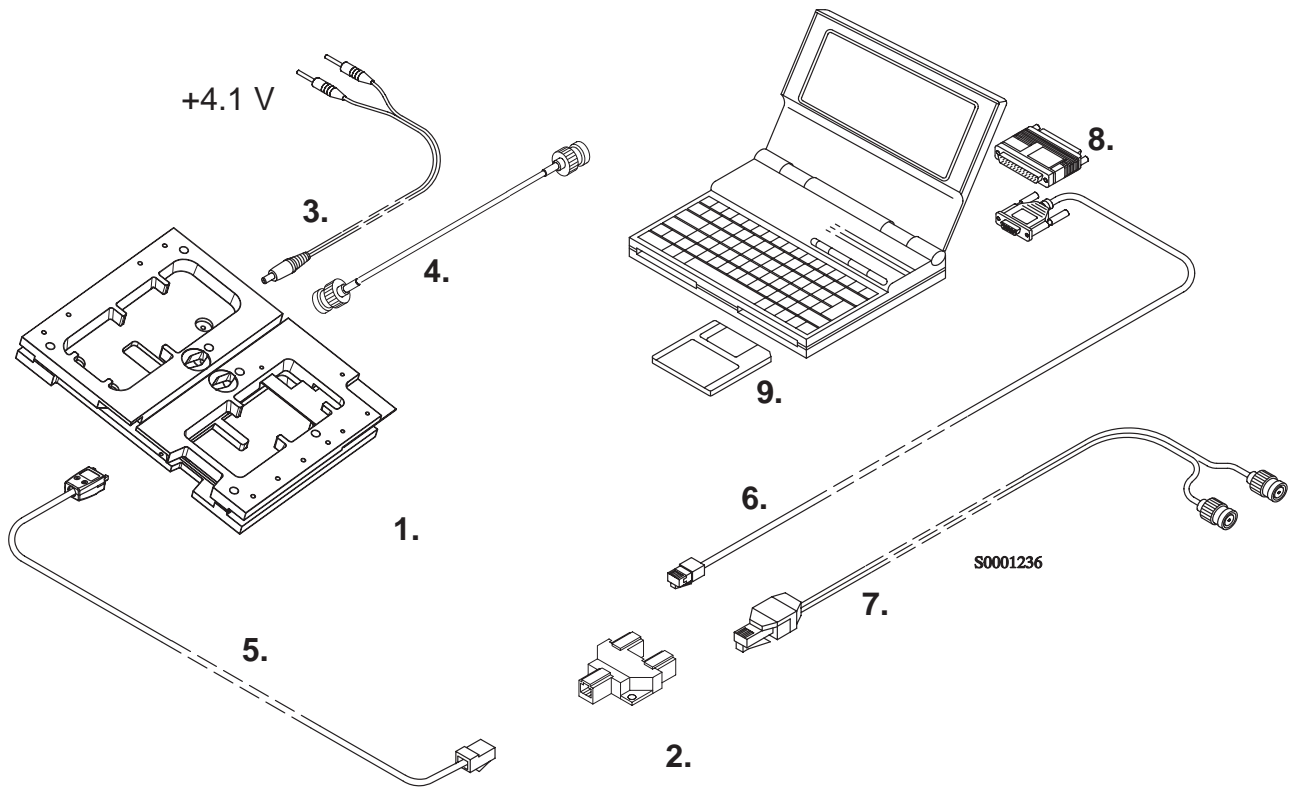
Item:	Service accessory:	Type	Code:
1	Test frame *	JSU-7	0770159
2	Modular T-Connector **		4626134
3	DC Cable PCS–1		0730012
4	Coaxial Cable BNC/BNC	SCX–7	0730161
5	Service Cable **	SCH-5	0730098
6	Service MBUS Cable **	DAU–9S	0730108
7	Audio Cable	ADS-1	0730011
8	Software protection key	PKD-1	0750018
9	Service Software diskette 3.5"		0774106
	WinTesla Service application		0774046

*)   The nominal operating voltage for JSU–7 is 4.1 V.

**)   SCH–5, T–Connector and DAU–9S can be replaced with DAU–9P.

Tuning Steps

Battery Reference

This consists of tuning the reference value for the battery.

Tuning Procedure

- Select Tuning / Battery Reference

- Connect 8.4 V to service battery connector. Press Enter.

- The program displays the reference value stored in the phone together with the value read from the A/D converter. The A/D value can be re-read by pressing the spacebar.

- Enter new value to EEPROM by pressing Enter on the keyboard or clicking on the corresponding button with the mouse.

Reference Charge Voltage

This consists of tuning the reference charge voltage.

Tuning Procedure

- Select Tuning / Reference Charge Voltage

- Connect 10.5 V to service battery connector.

- Connect DC–cable SCB–3 to service battery connector. Press Enter.

- The program displays the reference value stored in the phone together with the value read from the A/D convertor. The A/D value can be re-read by pressing the spacebar.

- Enter new value to EEPROM by pressing Enter on the keyboard or clicking on the corresponding button with the mouse.

Reference Charge Current

This consists of tuning the reference charge current.

Tuning Procedure is same like Charge voltage.

TX Power Level Tuning

This command is used to tune the phone's TX power levels. When selected, the transmitter will be switched on at power level 7 on Channel 380 ±50.

Tuning Procedure

- Connect power meter to the phone's antenna connector via antenna cable

- Select Tuning / TX Power Level Tuning

- To tune a Power Level select the level you wish to tune from the list. The target value will appear to the left of the cursor. Use the Coarse and Fine buttons until the target value is reached. Recommended tuning order 7 -> 0.

Channel	Power level	Power level of band 1 dBm	Example value D/A converter
mid	7	6.5 (4.47 mW)	38
high	7	6.5 (4.47 mW)	38
mid	6	10.5 (11.2 mW)	40
high	6	10.5 (11.2 mW)	42
mid	5	14.5 (28.2 mW)	48
high	5	14.5 (28.2 mW)	50
mid	4	18.5 (70.8 mW)	62
high	4	18.5 (70.8 mW)	68
mid	3	22.5 (178 mW)	86
high	3	22.5 (178 mW)	94
mid	0, 1, 2	26.5 (446 mW)	126
high	0, 1, 2	26.5 (446 mW)	136

- Enter new values to EEPROM using Enter.

Deviation Tuning

A number of deviation tunings are grouped together in this command. They must be tuned in the order ST, Maximum, Nominal.

Tuning Procedure

- Select Tuning / Deviation Tuning

- Select Signal Tone Deviation Tuning to move cursor and show the relevant on-screen information for that particular tuning parameter

- Adjust deviation to 6.45 kHz $\pm$250 Hz by changing the D/A converter value with the Fine button.

- Once deviation is correct, press O key.

- When O is pressed, the value is saved to EEPROM and Maximum deviation tuning is started.

- Use external low-frequency generator to feed a frequency of 2.3 kHz/1 V to XMIC connector.

- Adjust maximum deviation to 8.25 $\pm$0.4 kHz by changing the D/A converter value with the Fine button.

- Once deviation is correct, press O key.

- When O is pressed, the value is saved to EEPROM and Nominal Deviation Tuning is started.

- Use external low-frequency generator to feed a frequency of 1 kHz/40 mV to XMIC connector.

- Adjust nominal deviation to 2.3 kHz ±100 Hz by changing the D/A converter value with the Fine button.

- Enter new value to EEPROM by pressing Enter on the keyboard or clicking on the corresponding button with the mouse.

RSSI Reference Value

This consists of tuning the reference value for the RSSI meter. It is carried out with an external signal.

Tuning Procedure

- Select Tuning / RSSI Reference Value

- Connect a 933.4875 MHz –85 dBm signal to the phone's external antenna and press Enter

- The program displays the reference value stored in the phone together with the value read from the A/D converter. The A/D value can be re-read by pressing the Spacebar.

- Enter new value in the EEPROM by pressing Enter on the keyboard or clicking on the corresponding button with the mouse.

Tuning Values

With this command you can save the read Tuning Data from the EEPROM and save factory default tuning values to phone. You can read/save those values from/to file as well.

Use PgUp/ PgDown keys to print pages of the EEPROM values to screen.

Use Default button to save the factory default tuning values to EEPROM.

Note! Default does not contain VCTCXO values.

LCD Contrast Tuning/Keymat color

With this command you can tune LCD contrast. When contrast is fine save the tuning value in the phone. Select keymat color (black or white).

VCTXCO

This command is used to tune the VCTCXO frequency of the phone.

Note ! VCTCXO tuning is used ONLY if EEPROM or VCTCX is changed.

Tuning Procedure

- Select Tuning/VCTCXO

- Press OK to continue until the program displays message: CONNECT RF-GENERATOR TO ANTENNA. FREQUENCY 933.4875 MHz +/-100Hz AND AMPLITUDE LEVEL-53 dBm.

- Press OK to continue

Vocabulary

Abbreviation Description

Abbreviation	Description
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
SCN–3	M2BUS – RS–232 adapter
DLL	Dynamic Link Library
EEPROM	Memory for adjustment parameters (Electrically Erasable and Programmable Read Only Memory)
M2BUS	Serial communication bus which can be connected to accessory devices and test PC
MCU	Master Control Unit processor
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
SW	Software
UI	User Interface