Chapter 1

General Information and NAM Programming

AMENDMENT RECORD SHEET

Amendment Number	Date	Inserted By	Comments
	11/98		Original

CONTENTS

NHX-7 Introduction

The NHX–7 is a radio transceiver unit designed for the ETACS network. It is a power class 4 transceiver providing 6 power levels with a maximum output power of 0.45W. Nominal battery voltage is 3.6 V and operating voltage on logic chips is 2.82 V.

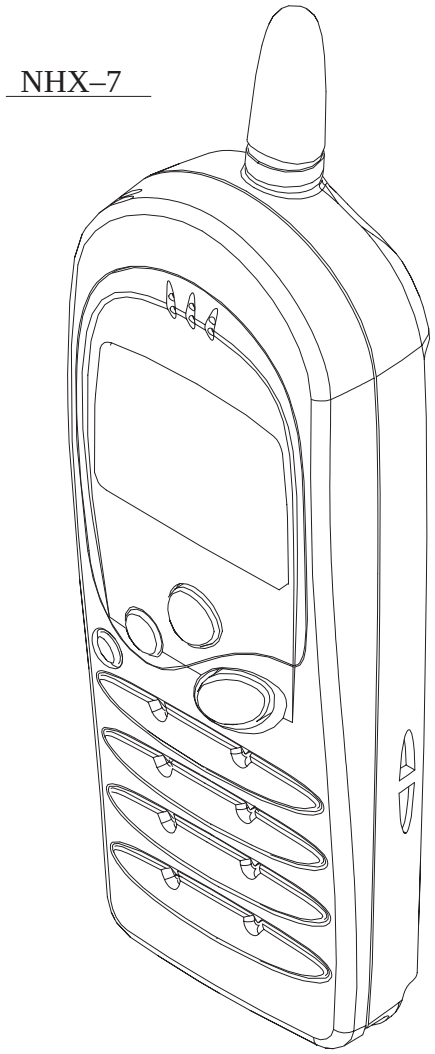
The transceiver consists of UIF module, system module, assembly parts and battery pack.

The antenna is fixed or retractable helix.

The user interface has LCD and keyboard.

The accessories are same as in other Nokia DCT3 products except the active car installation kit, CARKIT–91.

Design



List of Accessories

The transceiver accessories available are listed below and described fully in the section Non–serviceable accessories..

Unit	Type code	Material code
Transceiver	NHX–7	0501668
Standard Battery Pack, 900 mAh	BMS–2S	0670225
Vibrator Battery Pack, 900 mAh	BMS–2V	0670204
Extended Battery Pack, 1500 mAh	BLS–4	0670207
Slim Battery Pack, 900 mAh	BLS–2	0670206
Special Battery Pack, 1000 mAh	BLS–2H	0670235
AC Travel Charger (EUR), 207 – 253 Vac	ACP–7E	0675144
AC Travel Charger (US), 108 – 132 Vac	ACP–7U	0675143
AC Travel Charger (US), 207 – 253 Vac	ACP–7P	0675147
AC Travel Charger (US), 198 – 242 Vac	ACP–7C	0675158
AC Travel Charger (UK), 207 – 253 Vac	ACP–7X	0675145
AC Travel Charger (UK), 180 – 220 Vac	ACP–7H	0675146
Fast Travel Charger (EUR), 90 – 264 Vac	ACP–9E	0675149
Fast Travel Charger (US), 90 – 264 Vac	ACP–9U	0675151
Fast Travel Charger (UK), 90 – 264 Vac	ACP–9X	0675150
Cigarette Lighter Charger	LCH–9	0675120
Desktop Stand	DCH–9	0700049
Mobile Holder	MBC–1	0700060
Swivel Mount	HHS–9	0620037
Headset	HDC–9	0694053
Belt Clip	BCH–12	0720098

General Specifications of Transceiver NHX-7

Table 1. General Specifications

Parameter	Notes
Cellular system	ETACS
Temperature Range (Extreme conditions) – Specification fullfilled	–10 C ... +55 C
Operation times with BMS–2S standart battery	
– Talk time	1h30 ... 4h
– Standby time	30h ... 45h
Nominal battery voltage	3.6 V
Nominal current consumption	
– Standby mode (typical)	22 mA
– Call mode, 0.45W (typical)	500 mA
Dimensions (h x w x d)	145.3x47.7x29.7
– Tranceiver, inluding BMS–2S standart battery	
Weight	155g
Volume	130cm^3

Maximum Ratings

Table 2. Maximum ratings

Parameter	Value
Battery voltage, idle mode	–0.3 ...4.8 V
Charger input voltage	–5.0 ... 16 V
Operating temperature range	–10C to +55C
Battery charging temperature	+5 C to +45C

DC Characteristics

Table 3. Supply Voltages and Current Consumption

Line Symbol	Minimum	Typical / Nominal	Maximum	Unit
Supply battery voltage	3.1	3.6	4.8	V
Battery cut off voltage (HW)	2.7	2.8	2.9	V
Regulated logic supply voltage (VL)	2.73	2.82	2.90	V
– Supply current	0		40	mA

Table 3. Supply Voltages and Current Consumption (continued)

Line Symbol	Minimum	Typical / Nominal	Maximum	Unit
Regulated analog supply voltage (VA)	2.73	2.82	2.90	V
– Supply current	0		100	mA
Regulated RX supply voltage (VRX)	2.73	2.82	2.90	V
– Supply current	0		50	mA
Regulated TX supply voltage (VTX)	2.73	2.82	2.90	V
– Supply current	0		60	mA
Current consumption, idle mode		45		mA
Current consumption, standby mode		22		mA
Current consumption conversion mode, low power		150		mA
Current consumption conversion mode, high power		500		mA
Backlights current, white keymat		70		mA
Backlights current, black keymat		90		mA

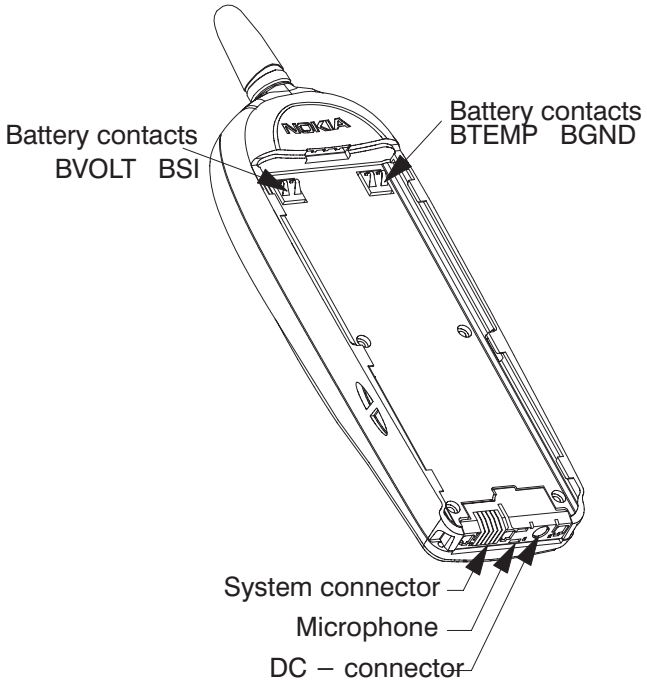
AC Characteristics

Table 4. General Specification of AC Characteristics

Parameter	Value
TX frequency band	872.0125 ... 904.9875 MHz
RX frequency band	917.0125 ... 949.9875 MHz
Number of RF channels	1320 duplex operation (ETACS)
Duplex spacing	45 MHz
Channel spacing	25 kHz
Frequency tolerance	+–2.5 ppm
Frequency control	synthesized
Compander	2:1
Data modulation	16 kbaud FSK, Manchester coded
Data speed	8 kbit/s
Word format	BCH encoded

External signals and Connections

This section describes the external electrical connection and interface levels on the baseband. The electrical interface specifications are collected-ed into tables that covers a connector or a defined interface each.



System Connector

The system connectors includes the following parts:

– DC connector for external plug–in charger and a desktop charger.

– System connector for accessories and intelligent battery packs.

– Internal microphone with spring contacts.

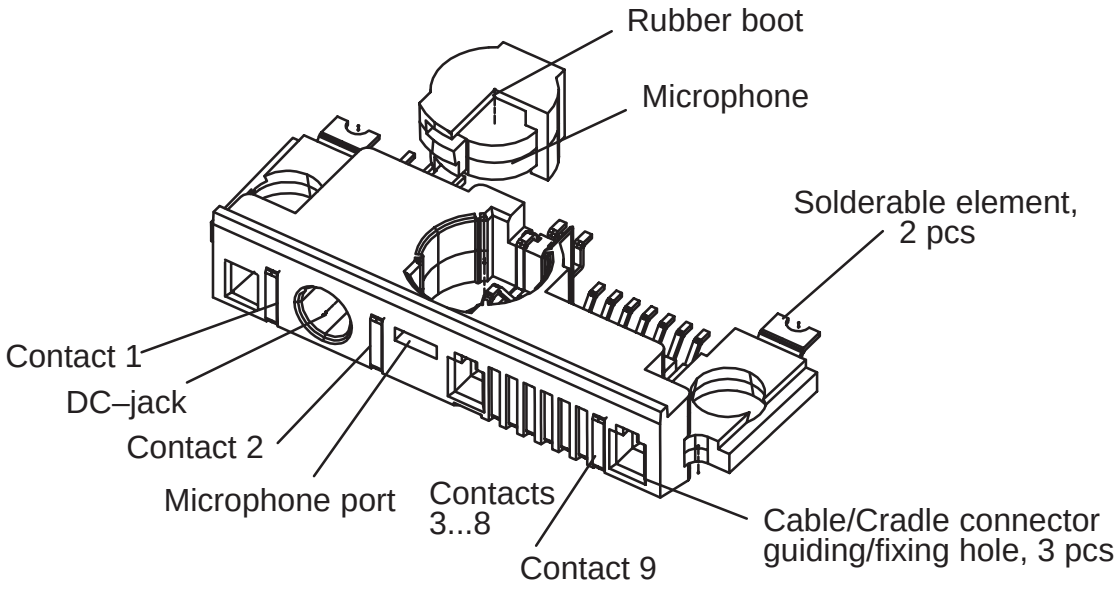


Figure 1. Bottom connector

Table 5. System connector contacts

Contact	Line Symbol	Function
1	VIN	Charger input voltage
DC–jack side contact (DC–plug ring)	L_GND	Charger ground
DC–jack center pin	VIN	Charger input voltage
DC–jack side contact (DC–plug jacket)	CHRG_CTRL	Charger control output (from phone)
2	CHRG_CTRL	Charger control output (from phone)
Microphone acoustic port		Acoustic signal (to phone)
3	XMIC	Accessory microphone signal input (to phone)
4	SGND	Accessory signal ground
5	XEAR	Accessory earphone signal output (from phone)
6	MBUS	MBUS, bidirectional serial data I/O
7		Not used
8		Not used
9	L_GND	Charger ground

The electrical specifications in the table below shows the bottom connector signals and levels in the baseband. The system connector is used to connect the transceiver to accessories. System connector pins can also be used to connect intelligent battery packs to the transceiver. The table gives the idle voltage produced by the acceptable chargers at the DC connector input. The absolute maximum input voltage is 30 V due to the transient suppressor that is protecting the charger input.

Table 6. Signals of the system connector

Pin	Name	Min	Typ	Max	Unit	Notes
1,3	VIN	7.25 320	7.6 370	7.95 420	V mA	Unloaded ACP–7 Charger Supply current
		7.1 720	8.4 800	9.3 850	V mA	Unloaded ACP–9 Charger Supply current
2	L_GND	0	0	0	V	Charger ground input
4,5	CHRG_ CTRL	0		0.5	V	Charger control PWM low
		2.0		2.90	V	Charger control PWM high
			32		Hz	PWM frequency for a fast charger
		1		99	%	PWM duty cycle
6	MICP	N/A	N/A	N/A		See Audio section
7	MICN		0		V	Internal microphone. Connected to GND
8	XMIC	2.0		2.2	kΩ	Input AC impedance, Headset detected
		100		600	µA	Bias current for headset microphone
		0	3.2	45	mV	Headset microphone signal Connected to NASTA Mic input
			60	3500	mV	Maximum signal level
		2.73	2.82	2.90	V	DC voltage (47 k pull–up to VL)
		2.0		2.90	V	Headset not detected
		0		2.0	V	Headset detected
9	SGND		0		mV	Signal ground
10	XEAR		130		Ω	Output AC impedance (ref. GND)
			10		µF	Series output capacitance
		16		300	Ω	Load AC impedance to SGND (Headset)
			1.6		Vpp	Maximum output level (no load)
			15	620	mV	Output signal level (Headset connected)
		16		1500	Ω	Load DC resistance to SGND (Headset)
		2.73	2.82	2.90	V	DC voltage (47k pull–up to VL)

Table 6. Signals of the system connector (continued)

Pin	Name	Min	Typ	Max	Unit	Notes
11	MBUS	0 2.0	logic low logic high	0.8 2.90	V	Serial bidirectional control bus. Baud rate 9600 Bit/s Phone has a 4k7 pullup resistor
12						Not connected
13						Not connected
14	L_GND	0	0	0	V	Charger ground input

An external headset device is connected to the system connector XMIC, SGND and XEAR lines, from which the signals are routed to NASTA microphone input via analog mux and external earphone output via buffer.

For protection against ESD spikes at the system connector, the data transmission line (MBUS), charger control (CHRG_CTRL), charger input (VIN), external microphone (XMIC) and external earphone (XEAR) lines are equipped with an ESD protection circuit.

Battery connector

The electrical specifications for the battery connector is shown in table 7.

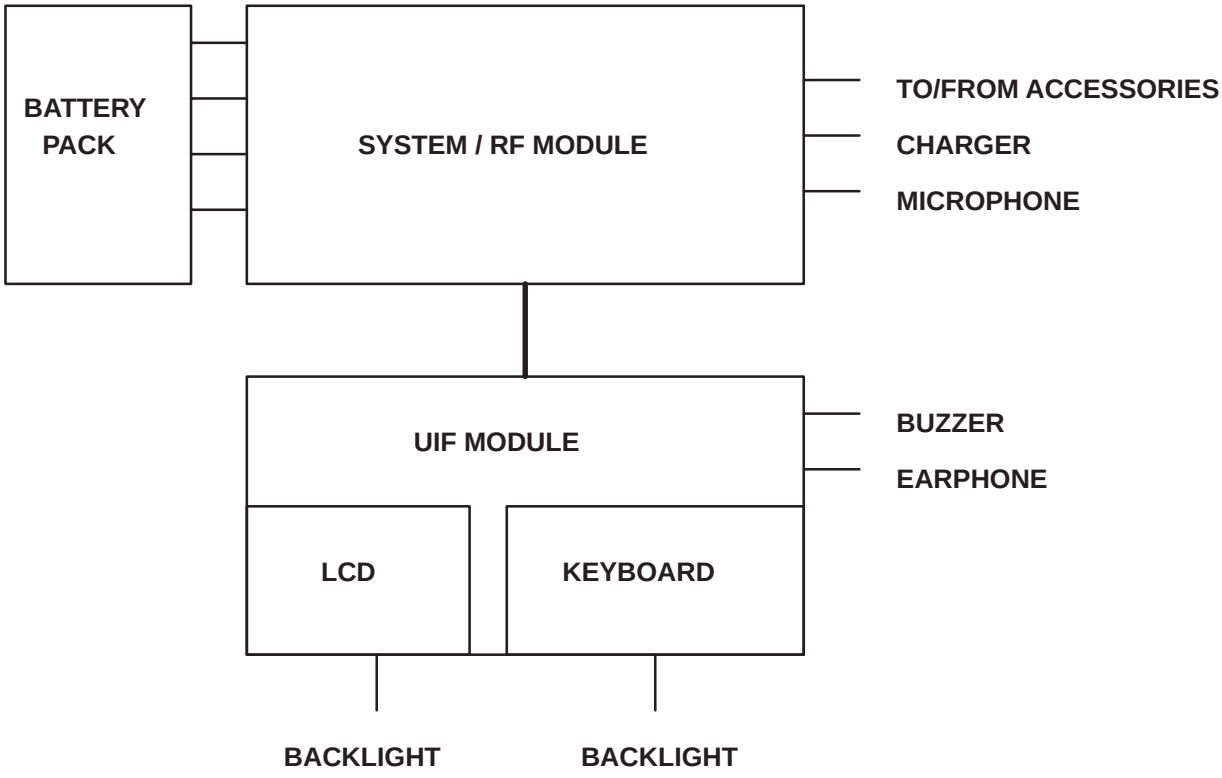
Table 7. Battery Connector Electrical Specifications

Pin	Name	Min	Typ	Max	Unit	Notes
1	BVOLT	3.1	3.6	4.8	V	Battery voltage
				4.8		Maximum voltage in call state with charger
				5.3		Maximum voltage in idle state with charger
2	BSI	0		2.90	V	Battery size indication Phone has 22kohm pull up resistor.
		2.2		18	kohm	Battery indication resistor (Ni battery)
		20		24	kohm	Battery indication resistor (service battery)
		25		57	kohm	Battery indication resistor (4.1V Lithium battery)
3	BTEMP	0		2.90	V	Battery temperature indication Phone has a 100k (+–5%) pullup resistor, Battery package has a NTC pulldown resistor: 47k+–5%@+25C , B=4050+–3%
		9	11	14	kHz	PWM control to VIBRA BATTERY
4	BGND	0		0	V	Battery ground

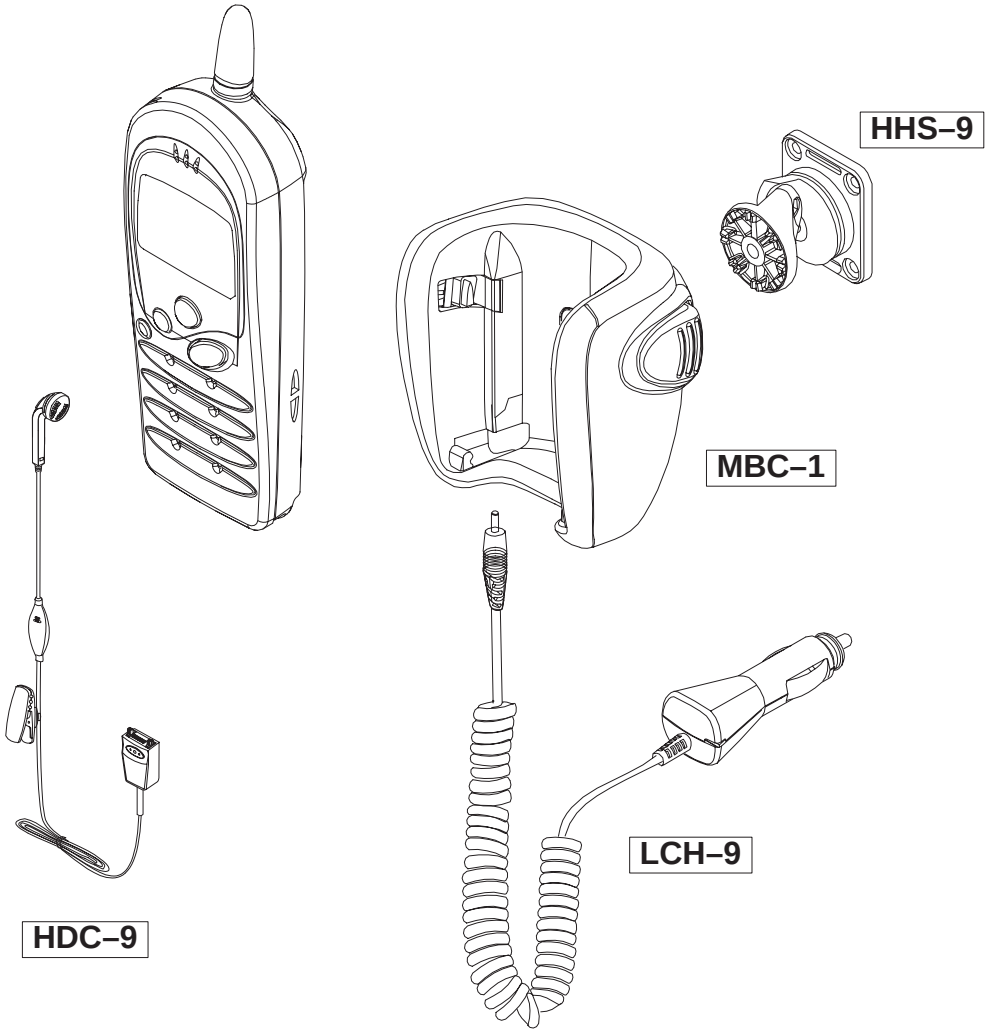
List of Modules NHX-7

Unit	Type code	Material code
User Interface Module	JE3	0201213
System/RF Module	JP3	0201185
Assembly parts	MNHX7N	0261696

NHX-7 Block Diagram



Car Kit CARK-64 Options



Item	Name:	Type code:	Material code:
1.	Transceiver	NHX–7	
2.	Mobile Holder	MBC–1	0700060
3.	Cigarette Lighter Charger	LCH–9	0657120
4.	Swivel Mount	HHS–9	0620037
5.	Headset	HDC–9	0694053

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NOKIA FAST NAM PROGRAMMING SOFTWARE USER GUIDE

1. Introduction

This document is the user guide to Fast Nam Programming software.

The Putsub program has been produced to perform batch programming of Nokia NHX–7 handportable telephones with the required subscriber (NAM) data and SCM data via the Mbus serial interface.

The program is capable of programming TACS telephones to user defined configurations, drawing information from pre–defined data files, which can also be generated and maintained using the program.

1.1 Material codes

Fast Nam Programming software v.1.30.	Diskette code	0774081
Programming Cable DAU–9P	code	0730109

2. Software Features

The program has a simple ‘Windows’ type user interface with operations selectable by softkeys. When in use, the program auto detects the next phone to be programmed and will not allow the same phone to be programmed twice in succession.

The minimum hardware requirements are a PC compatible 386 machine with VGA graphics and a serial COM port, running MS–DOS 5.0 (or later version).

Phone numbers can be allocated either from a file held on disc, allocated sequentially from a starting number or by prompting the operator to enter a number. If required, the phone number (NAM) programming can be disabled.

A report file is generated, logging the telephone ESN’s and phone numbers allocated.

Labels containing ESN/phone number information and barcodes can be automatically printed using a suitable printer.

If required the Short Code Memory (SCM) can be pre–programmed with numbers from a specified data file.

Language selection is also possible when programming multi–language telephones.

3. Getting started

3.1 Starting h6sub

Copy the files from the floppy disc onto your hard disc. At the DOS prompt type ‘H6SUB’. The program will run and prompt you to select a

configuration file. You will then be asked to select the number on one of three allocation methods.

1. Prompt: By selecting this alternative you can give numbers. The other numbers is taking from number prefix. The number prefix is described in configuration file.
2. Auto–generate: In this alternative start number is 1111. The user can change numbers too. If a new phone is connected the next phone number is 1112.
3. No number: In this alternative phone programming failed.

The program is now ready to program telephones using the configuration selected, or alternatively, if no telephone is connected, the configuration and/or data files may be modified using the softkeys provided.

3.2 Command Line Options

To view the available command line options type ‘h6sub –?’.

Command line format is ‘h6sub {options} {filename} options:

–P{1:2:3:4}	Selects COM port number (Default is COM1)
–E	Disables file editing function keys.
–Snnnnn	Sets default security/lock code (Default is 12345).
–? –H	Shows this help.
–Txxxx or Nxxxx:	Force h6sub to load product file Txxxx or Nxxxx.

filename: Name of configuration file to load on startup.

3.3 User Display

The main display (Configuration) shows the current configuration of the program in the upper left hand side of the window. If a telephone number file is being used its status is shown in the upper right hand corner of the window. There is name information, how many numbers is in the file, how many is used and how many is left.

The status of the program is shown at the bottom of the window in yellow, with error messages being displayed in red. Above the status box is shown the currently selected number allocation method.

The ESNs of the last telephone programmed and the currently connected telephone are shown at the left hand side of the window.

3.4 User Softkeys

The softkeys F1 to F9 can be used to configure the program to the users requirements and to modify various data files used by the program. Every dialog you can move with (Up–down–left–right) arrow buttons.

F1 Help

Not implemented yet.

F2 Load Config

Allows a pre–defined configuration file to be loaded.

F3 Edit Config

Allows the currently loaded configuration to be modified to suit the users requirements. If user want select phone numbers from file, select 'Read numbers from file' -field *Yes* and select file name.

F4 Save Config

Allows the currently loaded configuration to be stored to a file on disc.

F6 Set up Print

Allows the program to be configured to match the label stationary being used.

F7 Edit NAMs

Allows the NAM data file for the currently configured system to be modified.

F8 Edit Country

Allows the country data file to be modified.

F9 Exit

Exits the program and returns to DOS.

4 Program configuration files

4.1 Parameter Selection

Using function keys F2, F3 and F4 a selected configuration file '*.cfg' can be loaded, modified and stored for future use.

In the 'Edit Configuration' window the cursor position can be moved up and down the list of parameters using the 'cursor up', 'cursor down', 'tab' and '<shift>tab' keys.

Once the desired parameter is highlighted, the value/setting may be modified by using the 'cursor left' and 'cursor right' keys

If pre–defined options are available, or by simply entering a new value or name as required.

4.2 Security Code Allocation

The program can be configured to take the security/lock code from a plain text file '*.sec' held on disc by setting the 'Security code' field to '<FROM

FILE>' and providing a filename in the 'Security code file name' field. This file will contain a random list of numbers.

The security/lock code is selected from the file using the following algorithm:

1. Adds the last 6 digits of the phone number to the number of lines in the file.

2. Divides the result by the number of lines in the file.

3.The remainder is the line number in the file from which the code is selected.

The utility 'sec_gen.exe' may be used to generate a file of 450 random security codes.

If the 'Security code' field is set to '<FROM MIN>' the code programmed into the telephone will be the last 4/5 digits of the phone number in reverse order.

The third option allows a fixed code to be programmed into all phones. This number is defaulted to '12345', but can be set as desired using the –S command line option.

4.3 Phone Number Allocation

Phone numbers can be allocated from a plain text file '*.tel' held on disc by setting the 'Read numbers from file' field to YES (in configuration file) and providing a filename in the 'Input numbers file name' field.

The configuration is set by pressing the 'Enter' key.

If phone numbers are not being read from a file you will now be prompted to choose between automatic sequential numbering, manual entry of a number at programming time, or no number programming.

See section **3.1. Starting h6sub** for details.

4.4 NAM Verification

The edit configuration window provides an option for verification of the number programmed into the telephone, the 'Verify NAM' field.

If set to 'YES' the phone number will be read back from the telephone on completion of NAM programming and compared to the number allocated.

If required the field can be set to 'NO' in order to reduce the overall programming time.

5 INPUT FILES

5.1 Configuration File

The configuration file '*.cfg' is used to store the user's preferred settings

for h6sub. Many different configurations may be saved. The user is prompted to select a configuration file to load on startup. The configuration may be modified by selecting softkey F3. New configurations may be stored by selecting softkey F4.

NOTE ! If you modify '*.cfg' file, phone is not connected to m–bus. After modify stop the h6sub program, connect phone and start program again.

5.2 NAM Data and Country Data

In order to generate the required NAM data the program draws data from the 'country.dat' file and 'tacs.nam' files.

These files can be modified using softkeys F7 for the NAM data file, and F8 for the country data file. Modification of parameters is achieved using the same method as used in the 'Edit configuration' window.

The next and previous entries in the file can be viewed by moving the cursor to the 'Edit next entry'/'Edit previous entry' field and pressing 'Return'.

5.3 Software Version Files

In order to communicate with the telephone the program needs to load a 'software version file' for the telephone currently connected. These files have the extensions '*.nhx' for TACS telephones.

For NHX7* series telephones these files do not change with different issues of a particular software product. Therefore the filenames of the software version files take the format '{product}.nhx'. For example; 'nhx–7.nhx' for NHX–7 software, any version.

These files will be provided as required by NMP Ltd.

5.4 Telephone Number File

H6sub requires the '*.tel' telephone number file to be an ASCII text file with the following format:

nnnnnnnnnn<CR><LF>

where 'nnnnnnnnnn' is the 10 digit phone number, terminated with a carriage return, line feed.

Deviation from this format may result in phones being programmed with invalid NAM data.

It is NOT allowed to use a word processor to generate this file.

5.5 Security Code File

H6sub requires the '*.sec' security code file to be an ASCII text file with the following format:

nnnnn<CR><LF>

where ‘nnnnn’ is the 5 digit security code, terminated with a carriage return, line feed. Only 4 digits of them are used if phone has 4 digit security code.

Deviation from this format may result in phones being programmed with invalid NAM data.

It is NOT allowed to use a word processor to generate this file.

6 DATABASE FILES

6.1 Numbers Database

The ‘numbers’ database (*.nos) file is created from the specified telephone numbers file (*.tel). When programming telephones the next available number is taken from the *.nos file and the entry in the file is marked as ‘used’.

The status of the contents of the *.nos file is shown at the top right hand side of the display during programming. When the database is exhausted an error message is displayed. A new *.tel file must then be specified.

7 OUTPUT files

7.1 Report File

A ‘*.rpt’ report file is generated by the program and updated as each telephone is programmed. The file contains the ESN of the telephone (in decimal format), the phone number allocated and the security/lock code, all delimited by a single space character.

ee/ee/ee/eeeee<SP>nnnnnnnnnn<SP>sssss <CR><LF>

This is the file which would normally be used for dispatch to the customer.

7.2 ESN File (TACS only)

The file contains the ESN of the telephone (in decimal format, with no slashes) followed by the PIN ID associated with the PIN code programmed into the telephone, delimited by a single space character.

eeeeeeeeeee<SP>ddddddddddd<CR><LF>

This is the file which would normally be used for dispatch to the service provider.

8 Label printing

On successful programming of a telephone the program will automatically print two labels;

1. A user guide label :– containing the phone number and security/lock code,

2. A box label :– containing the ESN and a code 39 barcode representation of the phone number.

The program can be configured to work with various types of label stationary using the softkey F6. The printing of numbers can also be suppressed using this configuration window.

The recommended printer is the Canon BJ300 which offers sprocket feeding of continuous label stationery.

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