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DEAR USER OF THE NOKIA H85 HANDPORTABLE RADIO

The Nokia H85 - a handportable radio with plenty of functions for system networks - is ready and willing to serve you. Please read this instruction manual carefully in order to learn to utilize all the properties of the radio.

A number of features included in this guide are called Network Services. They are special services provided by wireless service providers. Before you can take advantage of any of these Networks Services, you must subscribe to these service(s) from your home service provider and obtain instructions for their use.

These functions are marked with a * in the text.

We wish you successful connections.

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CONNECTING PEOPLE

www.nokia.com

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Nokia Mobile Phones operates a policy of continuous development. Therefore, we reserve the right to make changes and improvements to any of the products described in this guide without prior notice.

IMPORTANT INFORMATION



For your safety, follow these instructions. Exceptions may be made only by trained personnel (police, firefighters and others) who determine that special use is appropriate. Further detailed information is given in this manual.



ROAD SAFETY COME FIRST

Don't use a hand-held phone while driving; park the vehicle first.



INTERFERENCE

All wireless phones may get interference which could affect performance.



SWITCH OFF IN HOSPITALS

Follow any regulations or rules. Switch phone off near medical equipment.



SWITCH OFF IN AIRCRAFT

Wireless phones can cause interference. Using them on aircraft is illegal.



SWITCH OFF WHEN REFUELLING

Don't use phone at a refuelling point. Don't use near fuel or chemicals.



SWITCH OFF NEAR BLASTING

Don't use phone when blasting is in progress. Observe restrictions, and follow any regulations or rules.



USE SENSIBLY

Use only in the normal position (to ear). Don't touch the antenna unnecessarily.

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USE QUALIFIED SERVICE

Only qualified service personnel should install or repair the radio.



ACCESSORIES AND BATTERIES

Use only approved accessories and batteries. Do not connect incompatible products.



EMERGENCY CALLS

Ensure the phone is switched on and in service. Hold C for several seconds to clear the display. Enter the emergency number, then press HANDSET button. Give your location. Do not end the call until told to do so.

It is recommended to use a leather case in rainy and windy circumstances to protect the radio against water and dust.

Adjust the loudspeaker volume to the correct level. Do not put the loudspeaker close to your ear before you are sure that the volume level is low enough.

All Nokia products are subject to continuous research and development. We therefore reserve the right to make changes and improvements to this manual without prior notice.

NOTE: Your phone is NOT water resistant.

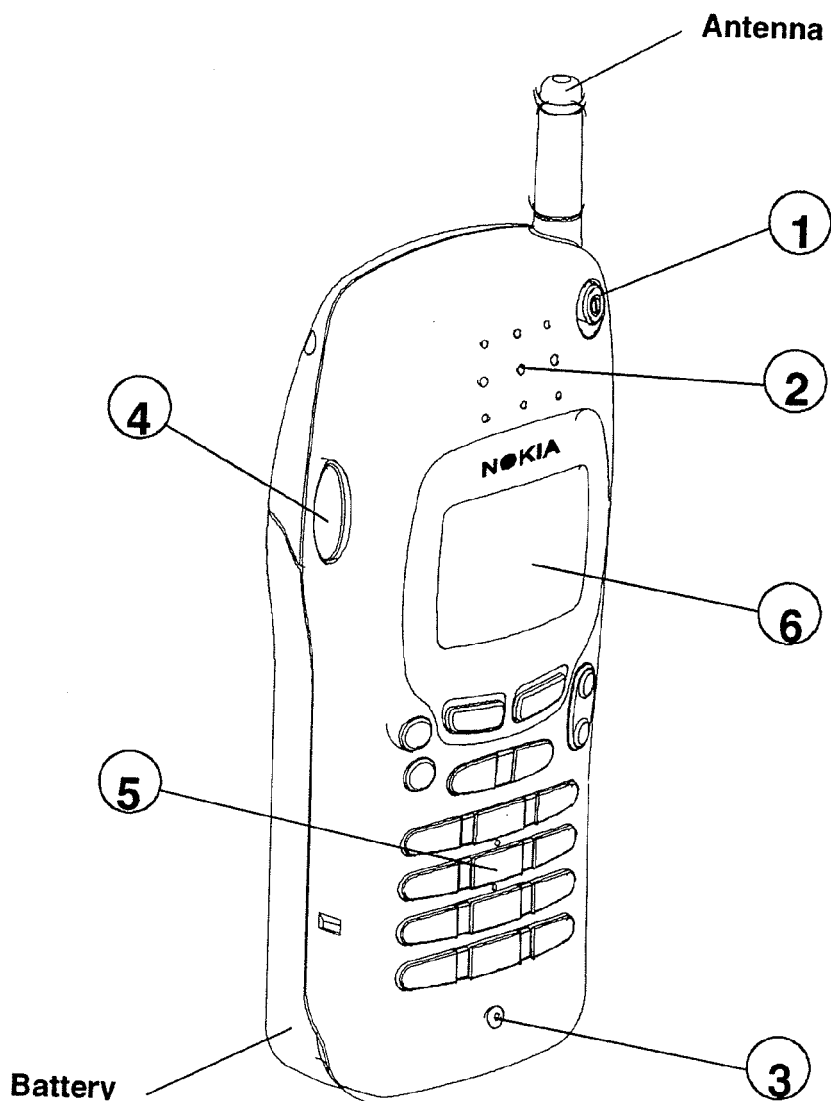
The phone is not covered under warranty for damage by any liquid.

- This handportable radio is not designed for use in an explosive atmosphere observe the sign "Turn off two-way radios".
- Use of the handportable radio is strictly forbidden in an airplane. Switch your radio off before boarding. The use of a handportable radio in an airplane may interfere with the operation of the instruments onboard.
- Use of the handportable radio should be avoided close to sensitive electronic monitoring systems such as medical instrumentation systems and pacemakers.
- Do not discard batteries in a fire, they may explode.
- Do not use the charger if it is wet or in any way damaged.
- It is recommended to use a leather case in rainy and windy circumstances to protect the radio against water and dust.
- Adjust the loudspeaker volume to the correct level to avoid hearing injuries. Do not put the loudspeaker close to your ear before you are sure that the volume level is low enough.

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HANDPORTABLE H85



1. Power switch

The H85 radio is switched on and off with the power switch. When switching off hold the switch down for a moment.

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trying to decrease/increase the volume level though the level is at the minimum/maximum value.

Alphanumeric buttons

The buttons 0...9 are used to dial the receiving subscriber's number. The # button is used to terminate a queue of numbers or characters that have been pressed. The * button is used to invoke special features.

Number buttons are also used for dialing characters A...Z. The alpha mode must be selected first by pressing the ABC-button. After that the ABC indicator will appear on the display.

After that the alpha characters can be selected by number buttons as follows. Press key 2 once, the character 2 is shown in the display. If the key 2 is pressed again within 1 second, the character is changed to A and then to B and then to C and then to 2 again. If there is more than a 1 second pause between keying then a new character is shown in the display.

MENU button

The **MENU** button activates the menu of functions.

ABC button

The **ABC** button has a shift function between numeric and alphanumeric mode e.g. in the abbreviated number memory.

Handset button ()

With the handset button you can initiate and terminate the call.

C button

The clear button clears the display digit by digit. Longer pressing of the button clears the whole display and returns to the IDLE state.

F button

This button performs a call to a pre-programmed number (memory location 92 in abbreviated number memory).

OK button

The OK button is used to accept selections in the MENU and to store numbers in the abbreviated number memory.

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Display

The H85 display contains three 10 digit lines which can be used for numeric and alphanumeric information. There are also several indicators for special purposes:

SERV The SERV text is on when the handportable radio has found a control channel.



The ROAM indicator is on when the handportable radio is not registered and is looking for a control channel.



The  indicator is on when the handportable radio receives a call.  indicator blinks during the ringing tone of an incoming call and if the handportable radio has received a call but it has not been answered.



Bar displays for the field strength and the battery capacity.

ABC The ABC indicator is on when the handportable radio is in the alphanumeric mode.

Keypad and display backlight control

The keypad and display backlights can be selected to be continuously off or controlled by the backlight timer. The selection of the backlight control is made in the menu - user settings.

If the backlight has been turned off, the display and the keypad lights are always off.

If backlight time controlling is selected, then the backlights will be on for 10 seconds if the user presses a button or if there is a call coming. If the user does not press any key during this time-out the lights are turned off.

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ERROR MESSAGES

When the power is switched on to the handportable radio all display segments will be displayed for a while and the equipment activates the self-test. The "Error" text and a number on the display give information about the state of the equipment if the self-test discovers some software problems.

Meanings of error messages:

No.	Meaning
Error 2	Some radio adjustment parameters are lost.
Error 3	Audio tuning values are lost.
Error 4	Some system parameters are lost.
Error 6	Audio hardware faulty
Error 7	Undefined parameters

Errors make the mobile radio unusable; the Err text and number stay on the display and other functions are impossible. The mobile radio has to be serviced immediately.

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OPERATION

Switch the power on. All symbols and your subscriber number will be displayed for a while and the equipment will activate the self-test. The ON indicator will turn on.

The SERV text will appear on the display when the handportable radio is within the coverage area of the base station and ready to operate. The ROAM indicator will be on when the handportable radio is not registered in the system and thus no calls can be made.

HOW TO MAKE A CALL

When the handportable radio is within the coverage area of the base station and ready to operate you can make a call. Select the desired subscriber number from the number keypad or from the abbreviated number memory with the arrow button.

Press the #, PTT or  button to initiate the call.

If the B-subscriber is busy, the call will be automatically placed in a queue.

HOW TO ANSWER THE RADIO

The  indicator will turn on and the signal tone for an incoming call is heard.

The A-subscriber's number will appear on the B-subscriber's display if the call is coming from another radio in the same system. If the number and the name are stored in the abbreviated memory, the user can toggle between the calling partner's name/number by using **ABC** button during the ringing tone for an incoming call.

Example:



Press the #, PTT or  button and start the conversation.

HOW TO CLEAR DOWN A CALL

Press the * # or  button.

A time limit for the call can be set into the handportable radio or the system exchange. When the time expires, the call will be cleared down automatically. You will hear a warning tone 10 seconds before the clear down.

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NUMBERING

Add 0 in front of the number when you are calling from the H85 to a PSTN
When you call from one vehicle to vehicle within your own group, you only have to select the 2 or 3 last digits of the H85 number.

Some system networks have a system service number of their own. When calling from a PSTN to the H85, first select the Actionnet service number and thereafter the H85 number. If you are calling from another service area, first select the trunk code number, thereafter the Actionnet service number and finally the H85 number.

CALL TYPES

CALL BETWEEN HANDPORTABLE RADIOS

or

Call between handportable radios within your own fleet

or

* Call to public network (PSTN)

or

* Call from PSTN to the handportable radio

Actionnet service no.	H85 No.
-----------------------	---------

If needed, first the trunk code number of the area where the H85 is situated. As a signal for an incoming call text "Call from: public net" will be displayed.

* Call to PABX

or

Where E is 3, 4, 5 or 6 and XXXX is called PABX subscriber number (3 to 8 digits).

Calling to the PABX is related to network settings. In some cases the numbering can be different than it is described above. The system operator will give more detailed information about calling to PABX.

Emergency call

Call to the public emergency number or

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or can be used also instead of .

Group call

Group call to your own fleet

or or PTT switch

Group call to another fleet

or or PTT switch

* Group call from PSTN

Functions in group call

The A-subscriber of the group call can clear down the call by selecting * # or . An individual B-subscriber can disconnect from the call by selecting * # or .

Automatic answering to calls

If you want that the audio path will open immediately and the loudspeaker will switch on by the incoming call select,

Individual and Group calls

When automatic answering to the incoming individual and group calls is selected, there will be a text indicator **AUTO ALL** on the display.

Automatic answering is removed with keying sequence:

Automatic answering for individual calls is set on:

#511# Display **AUTO IND**

It is set off:

***511#**

Automatic answering for group calls is set on:

#512# Display **AUTO GRP**

It is set off:

***512#**

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• Broadcast group call

or  or PTT switch

The broadcast group call is an announcement call where the B-subscribers cannot transmit.

The text "**Bcast grp**" on the display will turn on as a signal for an incoming broadcast group call

Status calls

The terminal equipment can transmit 30 (1..30) status messages as digital codes. The mobile radios can transmit and receive status calls. The received messages will be stored in the memory, where they can be read. The memory will store the first 5 received status messages.

Transmitting a status message

or  or PTT switch.

A status call transmission takes place with the code *0nn, where nn = status number (1 ... 30). The status messages can be transmitted also via MENU (see MENU function/Setup special calls).

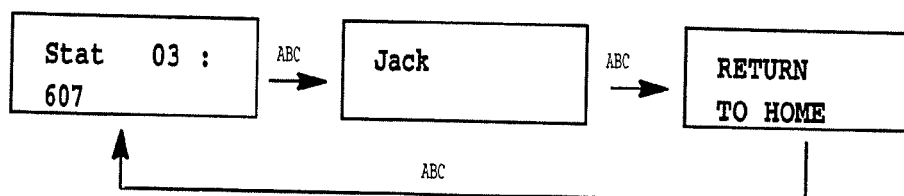
Messages 0 and 31 are also allowed although they have specific, fixed meanings (0 Call request, 31 Cancel call request). After another * dial the subscriber number to who you are sending the message.

If no subscriber number is dialled (e.g. *011#), the call is sent to the number programmed into the radio unit's memory (abbreviated dialling memory location 95).

Receiving a status message

When the H85 receives a status call the received status code (**Status nn**) and the number of the sender is seen on the display. The name of the sender can be also seen if it is stored in the abbreviated memory. If the status code has a pre-defined text, it can also be displayed.

Toggling of different displays is done with the ABC button.



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If you press #,  or PTT while the received status is on the display a call is initiated to the calling party.

The received status messages are stored in the memory. If you have status messages in the status buffer an indicator text **NEW STAT** is displayed when the radio is in the idle state. The status buffer can be browsed via the MENU (Received calls / Received status calls). The status messages are deleted by dialing * #, when the message is on the display.

* Data call

Data messages can be sent from the handportable. A message can include max. 100 characters (digits or letters). Data messages are sent by

*	2	*	NNNNNN	*	XXXX	#
---	---	---	--------	---	------	---

or data message from memory

*	:	*	:	*	:	XXXX	:
---	---	---	---	---	---	------	---

Where XXXX is called subscriber number, NNNNNNNN the message (max 100 characters) and Z is data slot number 0 ...4.

The pre-programmed data message can be sent to the default data number (memory slot 95 in the abbreviated number memory) by pressing # or  or PTT switch when the desired message is on the display. Data calls can be sent also through the MENU (see MENU functions/Setup special calls).

Data writing into memory

There are 5 text slots available for pre-defined data messages, 100 characters can be stored in each by the user. The storage is done via the MENU. Select menu mode by pressing MENU. Browse the menu with the   button, select **"Status/ data txt storing"** and accept the selection by pressing OK. Browse the submenu with the   button and select **"Store data texts"**, press OK and select the data location (0..4) with the   button or by keying the location number from the keypad. Type the desired text when the **"Text?"** is on the display, and accept the text by pressing OK.

Reading stored data

You can browse stored data messages via the MENU. Browse the menu with   button and select **"Status/ data txt storing"** accept the selection by pressing OK. Browse the submenu with   button and select **"Store data texts"**, press OK and select the data location (0..4) with   button. Other locations can be read by pressing   button after you have read the first slot as told above.

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If the message is longer than 30 characters, the rest of the data message can be scrolled by pressing the ABC button so many times that the message's end is reached.

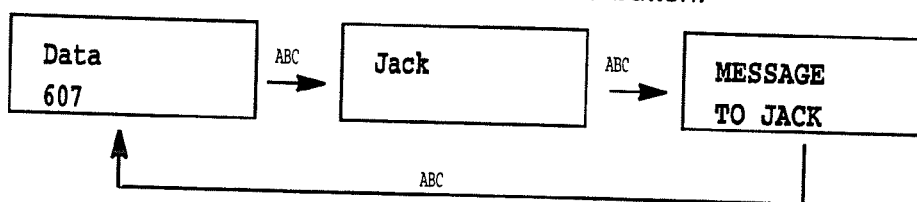
A 10-seconds delay during key presses will abort the function. Reading can also abort by pressing C.

Short and extended data call reception

When the data message is received, there is the text "Data " and the subscriber number of the sender on the display. The name of the sender can be also seen if it is stored in the abbreviated memory. The received data message appears on the display by pressing ABC.

If the message is longer than 30 characters, the rest of the data message can be scrolled by pressing the ABC button so many times that the message's end is reached.

Toggling of different displays is done with the ABC button.



If you press #,  or PPT while the received data message is on the display a call is initiated to the calling party.

The received data messages are stored in the memory. If you have a data message in the data buffer an indicator text **NEW DATA** is displayed when the radio is in the idle state. The data buffer can be browsed via the MENU (Received calls / Received data calls). The data messages are deleted by dialing * #, when the message is on the display.

Browsing received short and extended data calls

The mobile radio stores received data messages in the memory. There is space for 500 characters in the memory, you can store at least five data messages (100 characters to a message) and maximum 20 messages (25 characters to a message). The data message buffer can be browsed through the menu (Received calls / Received data calls)

Select menu mode by pressing MENU. You can browse the menu with the   button. Select the submenu "Received calls" with the OK button and from there the function "Received data calls" again with the OK button. The last received data message and the subscriber number of the sender will appear on the display. The name of the sender can be also seen if it is stored in the abbreviated memory. The received data message

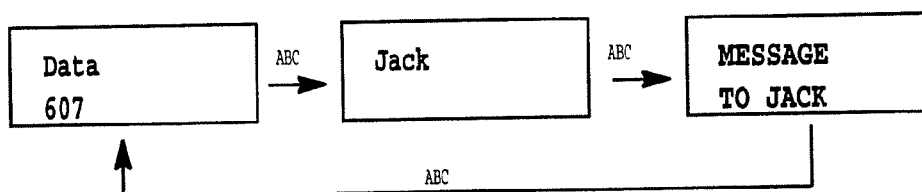
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appears on the display by pressing ABC.

If the message is longer than 30 characters, the rest of the data message can be scrolled by pressing the ABC button so many times that the message's end is reached.

Toggling of different displays is done with the ABC button.



You will get the next message on the display by pressing the ▲▼ button. A data message (and its sender) can be deleted from the data buffer one by one by keying * # when the message is on the display. The memories are emptied when the power is turned off.

If the data buffer is empty when you try to read it, the text "No calls in stack" appears on the display.

* Call diversion

You can make a call diversion to an Actionet subscriber number, PABX number and public network number. Diversion can't be made to a group number or the different mobile exchange.

* 41n * Diversion no. #

n = 1

speech calls are diverted
 (including call back requests and
 cancelling of the call back request)

n = 2

data and status calls are diverted
 all calls are diverted.

n not defined

When the call diversion is activated
 the display will show:

DIV ALL

The informative text will be:

"DIV ALL" if all calls are diverted

"DIV CALL" if only speech calls are diverted

"DIV DATA" if only data calls are diverted

The function will be cancelled by selecting # 41n #

* Conference call

No. #

You can include a new subscriber in the call by selecting the number of

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the new subscriber during the call. A conference call is possible during an individual call.

Call back request

You can transmit a call request by selecting

The call request is cancelled by selecting

Call back

If you are unobtainable and you want to inform the A-subscriber that you will call back in a minute, press the OK button during the incoming call. The following text will appear on the A-subscriber's display for a while

Call you
back

This function is possible only when you receive an individual call from the same system. If you want the function to operate automatically, program it by selecting

When call back has been programmed the display will show

CALLBACK

The function can be cancelled by selecting

Default number

The default number means a number which you most frequently call and the selection of which is the easiest. The default number is stored in memory location 1.

You can call the default number in the IDLE state just by pressing the PTT-switch when the display is empty or selecting

OR



OR

PTT.

Abbreviated numbers

There are 99 memory locations at your disposal. You can store a subscriber number with 32 digits in each memory location. The names up to 16 characters can be stored to the handportable radio with parametrization software in service or with the keypad in the ABC mode. There are some special memory locations which have predetermined functions like memory location 1 (default number).

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The memory locations are available as follows:

0	the last number used
1	default number for speech calls
2 - 91	user numbers and names
92	number which can be called by pressing the F button
93 - 94	additional group numbers
95	default number for data and status messages
96 - 97	reserved for future use
98	emergency number
99	Ownnumber readonly
101-164	Group numbers read only (programmed)
165-172	Dynamic group numbers read only

Browsing of the abbreviated number memory starts from the IDLE location. In this location no number or name is displayed during browsing. By typing 99 ▼ or ▲ the handportable's own number is displayed.

The user can browse the memory by pressing the arrow button. Arrowing down (▼) from the IDLE location gives the contents of the first memory location which includes a number of the last used number if you have made a call after the power has been switched on. By pressing ▼ again you give the next memory location. Arrow up (▲) from the IDLE location gives the highest location in which you have stored a number, and the next ▲ gives the previous memory location.

The last used number (redialling)

You can easily select the last used number again by pressing the  or ▲ button once when the handportable radio is in the IDLE state and the display is empty.

When the number is on the display, the call can be initiated by pressing the #, PTT or  button.

If you don't want to read the number before initiating a call the call can be made just by pressing the 0 # or PTT or  button.

NOTE! The default number is not stored as a last used number.

Quick calls

You can make a quick call to numbers which are stored to the abbreviated number memory locations 1...9.

The quick call can be made by selecting

memory location no. # or  or PTT switch.

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Simplex Traffic

H85(duplex) handportables can communicate directly with each other by using the simplex channels(available only in some frequency ranges), a repeater has to be used for the simplex function.

The simplex mode can be set manually from the keyboard.

The simplex traffic is activated by selecting:

*	55	*	CCC	#
---	----	---	-----	---

, handset key or PTT, CCC= channel number

Before using the simplex mode, the simplex frequency must be programmed in the handportable. For this purpose please contact your nearest distributor.

The simplex mode is deactivated by pressing

#	55	#
---	----	---

The simplex can be also entered from the menu:

1. Press the menu key
2. With the arrow key go to submenu Setup Special Calls
3. With the arrow key choose the simplex mode and press OK
4. Press the arrow key and choose OK
5. Enter the channel number(from 1- 9) and press OK
6. Press PTT when you want to talk and release it when listening

The deactivation of the simplex mode is done by repeating steps above from 1-3 and then with the arrow key choose off and the simplex call is ended.

Keypad lock

The handportable radio is fitted with a keypad lock, which prevents accidental key presses e.g. when the radio is in your pocket. When the keypad lock is activated, no key beeps are heard and no key presses are accepted, except keypad lock release keying.

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To activate the keypad lock press **MENU ***. The "**Keypad locked**" message appears on the display. When any key is pressed the "**Press menu ***" message is shown for a while.

To deactivate the keypad lock press **MENU *** again. The text "**Keypad released**" appears and the radio starts to operate in the usual way.

* DTMF tone sending

DTMF tones can be sent to the PSTN after a PSTN call is activated. Sending is made by pressing the desired buttons and pressing PTT at the same time. The H85 will send the DTMF tone as long as you press the buttons.

All numbers, # and * are possible to send.

Display of SW version

With this feature the SW version of the handportable radio can be identified. Pressing 00 and ▲▼ just after the power has switched on will show the SW version and a release date on the display.

Data Mailbox

It is used when the called unit is out of reach or engaged.

- Automatic message sending to mailbox

When a status or data sending fails the user is asked to send the status or data message to data mailbox:

Send MSG
To Mailbox

By pressing the OK button the message is sent to the data mailbox.

If the message is not wanted to be sent to the data mailbox, it is then cleared by pressing the C button.

- Manual message sending to data mailbox:

The user can also send status or data message directly to the data mailbox, this can be done by pressing menu key and # key before sending the message.

Press

Menu and # keys

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Automatic message storing to memory

The H85 handportable is able to store received calls to memory over power off condition.

- For speech call: The calling party number is stored to the memory (up to 5 received calls)
- For status call: The calling party number and the status number are stored to the memory (up to 5 status)
- For the data message call: the calling party number and the data message are stored to the memory (at least 500 characters, 5 data messages)

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MENU FUNCTIONS

Menu functions are activated by pressing the **MENU** button.

The menu includes options or settings which the user can activate through the keypad. When you have pressed the **MENU** button, the following text will appear on the display.

Use < >
to view

You can browse the menu with the arrow button or pressing **MENU** and number (0...8). Press **OK** to move to the submenu (e.g. Alert volume), browse the submenu with the arrow button and accept the selection with the **OK** button. At the same time you will exit the menu and return to the **IDLE** state. If you want to exit the menu without changes press the **C** button.

By pressing **MENU** button in submenu level you can return to the main menu level.

In the main menu level there are the following sections:

**Shortcode
storing**

**Received
calls**

**Setup
special calls**

**Call
settings**

**Status/ data
txt storing**

**User
settings**

**Alert
volume**

**Identity
change**

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INSTRUCTION MANUAL

Speaker Modes

Features in the menu

The menu contains the following settings and options:

Shortcode storing - add a number to the memory

The user can store subscriber numbers to the memory via the MENU.

The storage is done by dialling:

Number, **MENU** (Shortcode storing), **OK**

After the first press of the **OK** button the display will show:

Store ?
loc:

Press the **OK** button again and the number will be stored in the first available memory location. The number of the memory location will be shown on the display for a while. If you want to store into a certain memory location, enter the number of the desired location.

After you have stored a number to a memory location, the display will show:

Stored ?
loc: NN

, where nn = 01 ... 98.

If the memory location already contains a number, the display will show the text:

Replace ?
loc:

The new number can be stored by pressing **OK** and the old number will be deleted. If you want to interrupt the function press the **C** button, and on the display will be shown

Storing
not done

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INSTRUCTION MANUAL

Storage by name

The numbers can be stored to the abbreviated number memory also with a name. The storage with name is done the following way:

1. Give a number, which you want to store
2. Put the ABC mode on (start typing within 10 seconds or the ABC mode is canceled)
3. Type the desired name
4. Go to the MENU by pressing the MENU button
5. Select the "Shortcode storing" submenu with ▼ and accept it by the OK button, Text "Store ? loc:" will appear. The rest of the storage is done as mentioned in "Shortcode storing".

If you want to edit the name which is in the memory search the desired location, put the ABC mode on and clear the whole name or part of it with the C button. Type the new name and store it to the same memory location as told the in section "Storage to the memory - shortcode storing".

Reading the memory

You can easily call the numbers which are stored in the memory by reading the number from the shortcode memory and pressing the #, PTT or  button.

You can read the abbreviated memory in several ways:

1. Press the arrow button (▲ or ▼) until the desired number is on the display.
2. If you want to start browsing from a certain memory location, dial the desired location number and use the arrow buttons after that. When the number is read from the memory you can start browsing from that memory location by pressing the arrow button.

If you want to read the abbreviated memory by name, press first the ABC button and then in the following ways:

1. Press the arrow button (▲ or ▼) until the desired number is on the display.
2. If you want to start browsing from a certain letter dial, the desired letter and the use arrow buttons after that.
You can read the handportable's own number by keying 99 and ▲ or ▼.

Deleting a number from the memory

Clearing of the memory location is done by storing no number to the selected location.

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Go to the MENU (Shortcode storing) when the display is empty and give the memory slot number which you are clearing. After you have given the memory location, the display be show:

Replace ?
loc:

Press the **OK** button again and the location is cleared. The function is canceled by pressing **C**. If you don't press the OK button during 6 seconds the clearing is automatically canceled.

Received calls

In the received calls submenu you can browse received calls which are stored to the buffers in the radios memory.

Received
speech
calls

Received
data
calls

Received
status
calls

There is space for the first five status calls, the last five speech calls and at least five (100 characters to a message) and maximum 20 (25 characters to a message) data calls. The buffers can be browsed with the **▲ ▼** button after the desired buffer has been selected with the **OK** button. A currently visible call can be removed from the buffer by pressing ***#**. After that the next call will be shown.

A currently visible call can be removed from the buffer also by initiating a call to the number with the **#**, **PTT** or **☎** button.

Setup special calls

Through this submenu you can initiate special calls like status calls, data calls and activate the simplex operation.

Setup
status
call

Setup
data
call

When sending a status call or data call select the call type with the **▲ ▼** button and accept the selection with the **OK** button. After that the desired status number (**Status? number:**) or pre-programmed data message (**Data? loc:**) can be given either by browsing with the **▲ ▼** button or by typing the number.

The text "**Number ?**" appears on the display and you can dial it from the

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INSTRUCTION MANUAL

keypad or select it from the abbreviated number memory. Accept the number with the OK key and the status/data call is initiated.

Call settings

In the call settings submenu you can set up the automatic call back and call diversion functions. Select the function with the ▲▼ button and accept it with the OK button.

Callback
setting

Call back function On/Off

Call back can be set on or off with the ▲▼ button and accepted with the OK button. When the call back is on, the text "**CALLBACK**" will be on the display.

Divert
calls

Diversion On/Off

If diversion setting is selected the function can be set on or off with the  button and accepted with the OK button. The number where the calls are diverted can be entered from the keypad or from the abbreviated number memory. When the diversion is on the text "**DIV ALL**" will be on the display.

Status / data txt storing

Texts for the status codes and five data texts can be written to the memory in the Status/ data texts submenu.

Store
status
texts

Store
data
texts

There can be up to 30 status texts (max. 30 characters for each) and up to five data messages (max. 100 characters). Select either status text or data text and accept the selection with the OK button. After that enter the desired status number (1...30) or data message location number (0...4) and accept the number with the OK button. The desired number can be selected with the ▲▼ button as well.

When the number is selected, the ALPHA mode turns on and you can type the text to the memory. Accept the text with the OK button and text "**Stored status: n**" or "**Stored data: n**" will be displayed briefly, confirming that the storage has been completed. If you want to change the texts, clear the old one with the C button and store a new one as told earlier.

User settings

The user can select the type of display backlight and set the PTT-switch operation on/off (in duplex mode).

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INSTRUCTION MANUAL

**Back-
lights**

Backlight On/Off

The radios keypad and display are fitted with lights to make them easy to read. If the backlights are OFF, they are always off. If the lights are ON they are on for 10 seconds after each key press. After this time-out the lights are turned off.

**PTT
usag**

PTT in use On/Off

In the duplex H85 it is possible to have the PTT in use or not in use. If you have PTT in use you have to press PTT when you are speaking. If the PTT is not in use the transmitter is always on during the call.

**Key
tones**

The keypad tones can be set on and off

Alert volume

The user can adjust the alert volume within five levels:

Alerts:
Silen

Alerts:
Lc

Alerts:
Medium

Alerts:
High

In the silent mode incoming calls are indicated with a short beep and blinking  indicator, and the indicator tones for key pressings are off. As an indication of the silent mode there is the text **Silent** on the display if the display is empty. If the High mode has been selected, the alerts from incoming calls come from the loudspeaker. In other modes alert tones come from the buzzer.

Identity Change

In the identity change sub-menu you can change the identity of the radio by selecting with the arrow keys the desired (and preprogrammed) network operator settings. Accepting is done with the handset key.

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Speaker modes

The user can select the speaker level

**Handset
mode on**

**Speaker
mode on**

When the handset mode is selected, the speaker volume is set on a low level and the radio can be used as a handset by setting the loudspeaker on next to your ear.

When the speaker mode is selected, the speaker volume is set on a high level and the radio can be used like a conventional PMR radio. The speaker mode is effective only in semiduplex calls.

WARNING! If the radio is in the speaker mode do NOT use it as a handset, because of the high volume level.

MAP27

The MAP27 software implemented (from 10.05-0 software release or higher) in the H85 makes the Handportable capable of sending continues data from DTE via the trunk network.

Indications on the H85 display when using the MAP27:

Indication is continuously in display when MAP27 link is in ready state.

serv

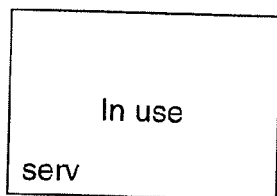
When there is on going call (or other transaction) in MAP27 port.

IN USE
serv

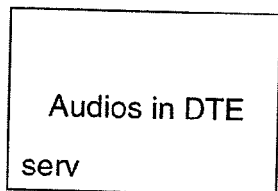
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When the user tries to terminate on going MAP27 call or user tries to initiate call.



When audios are routed to DTE(MAP27 port)



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FITTING THE ANTENNA

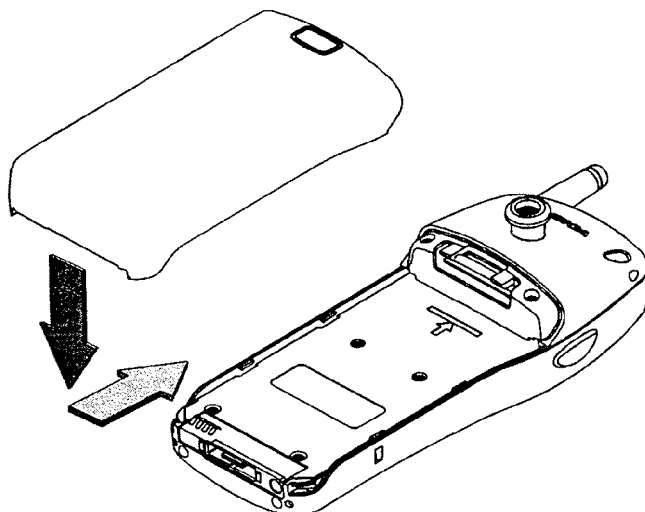
Install the antenna by pushing it in its place and winding clockwise until it is firmly seated in place. Do not over tighten. Do not remove the antenna if it is not necessary.

USING THE BATTERIES

Installing the battery

Before you can use your radio you must charge the battery.

To install:

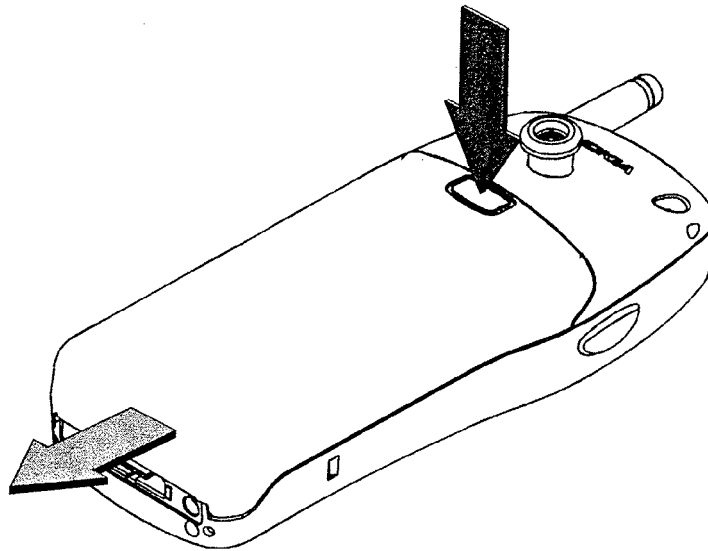


To install the battery pack line up the top edge of the battery with the white line on the back of the handportable radio and then push the battery pack until you hear a click. Make sure that the battery is properly fastened.

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To remove:



Ease the locking catch on the base of the battery pack backwards (see the arrow) and slide the battery away from the receiver and lift it off. Remember to always turn the power off before removing the battery.

Battery charge indication

The bars at the right hand side of the display screen indicate the battery charge rate (voltage) - the more bars, the higher battery charge. When the charge falls under 10%, the radio displays the **BATTERY LOW** warning message and gives a warning tone. The warning will be repeated.

When the battery is fully discharged, a tone is given, the message **RECHARGE BATTERY** is displayed and the radio turns off.

Recharging the battery

Connect the AC travel charger to the base of the radio.

Whilst charging is in progress, the battery charge indicator bars on the display will scroll. When the battery is fully charged, the scrolling will stop and all bars are displayed.

A new battery should be charged for at least 16 hours before being used for the first time. Always fully charge the battery.

Recharging the standard battery (BH85S) with the AC travel charger (e.g. ACH-4E) takes about 90 minutes and the extended (BH85H) battery 200 minutes.

You can use the radio during recharging (not when the battery is totally exhausted), but the charging process will be interrupted for the duration of the call.

Batteries last longer and perform better if allowed to discharge fully at least once a week. You can do this by leaving the radio switched on until the message **RECHARGE BATTERY** is displayed and the radio turns off.

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Then switch on the radio again and start recharging the battery when **RECHARGE BATTERY** reappears. An incompletely discharged battery will have a reduced capacity.

If the battery temperature is above 40° C or below 5° C the radio will not recharge its battery.

DO NOT ever put a full charged battery to the charger. The charger will start charging again, and the temperature of the battery will increase, which will reduce the battery life.

ACCESSORIES

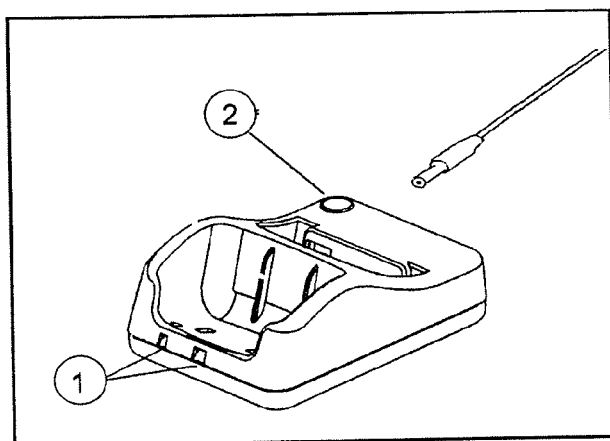
CHARGERS

Fast travel charger (ACH-4E)

This light weight AC travel charger can be used with all battery options. The charging time for each of the batteries (BH85S/BH85H) is about 90/200 minutes. The charger can also be used in connection with the desktop charger.

Desktop charging stand (CHH-80)

When a spare battery is fitted into the charging stand, it will be charged after the radios battery has been fully charged.



1. Indicator lights

2. Discharging switch

The charging stand is provided with a discharge switch for the **spare battery**. Discharging is needed time to time for NiCd and NiMH batteries to obtain the maximum life time.

Press the switch on the top of charging stand two seconds to start the discharging. The red indicator flashes continuously during the discharging. If the battery is full the discharging time is several hours.

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The desktop charging stand makes recharging easier and allows you to charge a spare battery separately. To use the charging stand, connect the travel charger to the stand and plug it into the mains. Place the radio in the charging stand. The charging time depends on the battery type. The indicator is red during the charging and turns green when the battery is fully charged. The spare battery has the its indicator light.

If the red and green blinks the battery is broken. If all the leds are on when the stand is empty the input voltage is too high.

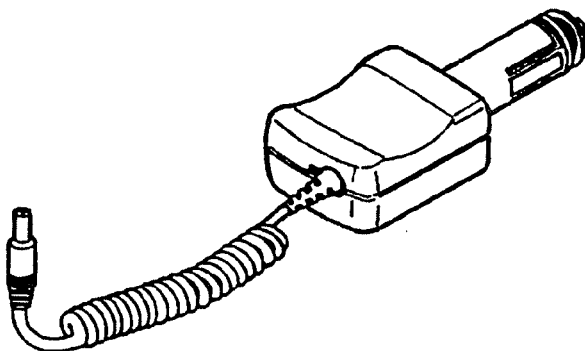
Cigarette lighter charger (LCH-2)

You can also charge the battery from your vehicle battery, using the LCH-2 cigarette lighter charger. The charger should be connected to the radio in the same way as the travel charger. You can connect the cigarette lighter charger to the desktop charger stand, too.

During charging, the radio can still be used, even with empty batteries.

Note that the input voltage range is from 10 to 30V DC, negative grounding.

The charging time for each of the batteries is about 90/200 minutes.



Charging indicators (CHH-80 and LCH-2)

The red charging indicator light on the AC charger is on while charging is taking place. When the battery is charged the green indicator light will come on.

A red indicator on the charger and the scrolling battery bars on the radio's display show that charging is in progress. When the radio's battery is fully charged, the battery indicator on the display will constantly show all bars and the indicator on the charger will be green.

If the indicator is green but the bars on the display are scrolling, the charging is temporarily disabled (e.g. battery is too hot or cold).

When the discharging of the spare battery is in process the red indicator light is flashing.

The spare battery in the desktop charging stand is fully charged when the green indicator is on.

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BATTERIES

Standard 1200mAh, NiMH battery
High capacity 1850mAh, NiMH battery

PRECAUTIONS

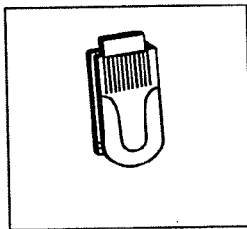
Do not discard batteries in a fire, they may explode

Do not use the charger if it is wet or in any way damaged.

It is recommended to use a leather case in rainy and windy circumstances to protect the radio against water and dust.

Belt clip

You have the possibility to carry your handportable radio on your belt with the belt clip.

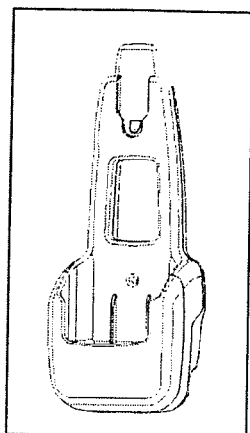


Light mobile car holder (MCH-8L)

It is possible to safely carry your Nokia H80 in a vehicle with the mobile car holder. You can also recharge the radio in the holder with the cigarette charger.

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Handsfree Car Kit

The use of the Handsfree car kit gives you safety when you are driving a vehicle while making or answering a call.

How to make a call

When using the Handportable in handsfree mode, you can initial a call by dialing a number from the keypad or browsing from the memory the number you want to call and then press the mode key from the Handportable, or HF PTT.

In the HF(handsfree) mode the microphone and the loudspeaker of the handportable are muted and only the handsfree microphone and the loudspeaker are in use.

How to answer a call

In the HF mode you can answer a call by pressing the Mode key from the handportable or

HF PTT. To clear down a call , only press the handset key or HFPTT.

Handset use

When the Handset is installed with the handsfree car kit, a call can be initialed by dialing a number or by browsing from the memory the number you want to call and then off-hook the handset. Only the handset earphone and microphone are then in use.

To clear down a call only un-hook the handset.

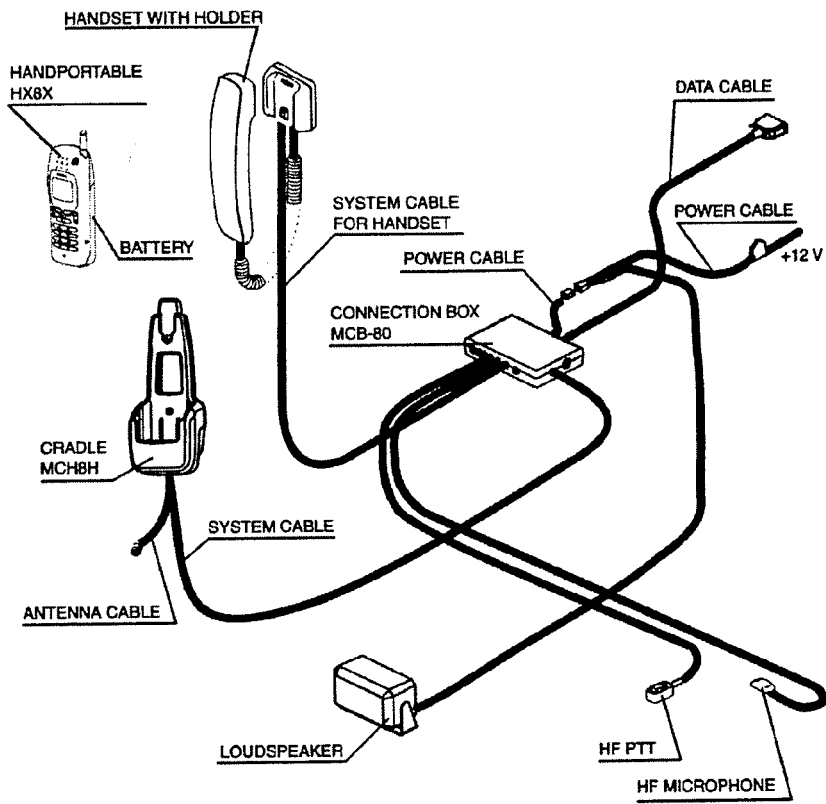
If you want to change a call to HF mode while using the handset, press the mode key and then un-hook the handset.

Handsfree Car Installation Kit

For the installation of the Handsfree car kit, please refer to your nearest vendor

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INSTRUCTION MANUAL



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6. CARE AND MAINTENANCE

Your phone is a product of superior design and craftsmanship and should be treated with care. The suggestions below will help you to fulfill any warranty obligations and to enjoy this product for many years. When using your phone, battery, charger or any accessory:

Keep it and all its parts and accessories out of small children's reach.

Keep it dry. Precipitation, humidity and liquids contain minerals that will corrode electronic circuits.

Do not use or store it in dusty, dirty areas. Its moving parts can be damaged.

Do not store it in hot areas. High temperatures can shorten the life of electronic devices, damage batteries, and warp or melt certain plastics.

Do not attempt to open it. Non-expert handling of the device may damage it.

Do not drop, knock or shake it. Rough handling can break internal circuit boards.

Do not use harsh chemicals, cleaning solvents, or strong detergents to clean it. Wipe it with a soft cloth slightly dampened in a mild soap-and-water solution.

Do not paint it. Paint can clog the device's moving parts and prevent proper operation.

Use only the supplied or an approved replacement antenna. Unauthorised antennas, modifications or attachments could damage the phone and may violate regulations governing radio devices.

If the phone, battery, charger or any accessory is not working properly, take it to your nearest qualified service facility. The personnel there will assist you and, if necessary, arrange for service.

7. IMPORTANT SAFETY INFORMATION

For your safety, follow these instructions. Exceptions may be made only by trained personnel (police, firefighters and others) who determine that special use is appropriate.

Traffic Safety

Do not use a hand-held telephone while driving a vehicle. If using a hand-held phone park the vehicle before conversing. Always secure the phone in its holder; do not place the phone on the passenger seat or where it can break loose in a collision or sudden stop.

The use of an alert device to operate a vehicle's lights or horn on public roads is not permitted.

Remember road safety always comes first!

Operating Environment

Remember to follow any special regulations in force in any area and always switch off your phone whenever it is forbidden to use it, or when it may cause interference or danger.

When connecting the phone or any accessory to another device, read its user's guide for detailed safety instructions. Do not connect incompatible products.

As with other mobile radio transmitting equipment, users are advised that for the satisfactory operation of the equipment and for the safety of personnel, it is recommended that the equipment should only be used in the normal operating position (Held to your ear with the antenna pointing over your shoulder.).



INSTRUCTION MANUAL

Electronic Devices

Most modern electronic equipment is shielded from radio frequency (RF) signals. However, certain electronic equipment may not be shielded against the RF signals from your wireless phone.

Pacemakers Pacemaker manufacturers recommend that a minimum separation of 20 cm (6 inches) be maintained between a handheld wireless phone and a pacemaker to avoid potential interference with the pacemaker. These recommendations are consistent with the independent research by and recommendations of Wireless Technology Research. Persons with pacemakers:

- Should always keep the phone more than 20 cm (6 inches) from their pacemaker when the phone is switched on;
- Should not carry the phone in a breast pocket;
- Should use the ear opposite the pacemaker to minimize the potential for interference.
- If you have any reason to suspect that interference is taking place, switch off your phone immediately.

Other Medical Devices Operation of any radio transmitting equipment, including cellular phones, may interfere with the functionality of inadequately protected medical devices. Consult a physician or the manufacturer of the medical device to determine if they are adequately shielded from external RF energy or if you have any questions. Switch off your phone in health care facilities when any regulations posted in these areas instruct you to do so. Hospitals or health care facilities may be using equipment that could be sensitive to external RF energy.

Vehicles RF signals may affect improperly installed or inadequately shielded electronic systems in motor vehicles (e.g. electronic fuel injection systems, electronic anti-skid (anti-lock) braking systems, electronic speed control systems, air bag systems). Check with the manufacturer or its representative regarding your vehicle. You should also consult the manufacturer of any equipment that has been added to your vehicle.

Posted Facilities Switch your phone off in any facility where posted notices so require.

Potentially Explosive Atmospheres

Switch off your phone when in any area with a potentially explosive atmosphere and obey all signs and instructions. Sparks in such areas could cause an explosion or fire resulting in bodily injury or even death.

Users are advised to switch off the phone when at a refuelling point (service station). Users are reminded of the need to observe restrictions on the use of radio equipment in fuel depots (fuel storage and distribution areas), chemical plants or where blasting operations are in progress.

Areas with a potentially explosive atmosphere are often but not always clearly marked. They include below deck on boats; chemical transfer or storage facilities; vehicles using liquified petroleum gas (such as propane or butane); areas where the air contains chemicals or particles, such as grain, dust or metal powders; and any other area where you would normally be advised to turn off your vehicle engine.

Vehicles

Only qualified personnel should service the phone, or install the phone in a vehicle. Faulty installation or service may be dangerous and may invalidate any warranty which may apply to the unit.

Check regularly that all wireless phone equipment in your vehicle is mounted and operating properly.

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Do not store or carry flammable liquids, gases or explosive materials in the same compartment as the phone, its parts or accessories.

For vehicles equipped with an air bag, remember that an air bag inflates with great force. Do not place objects, including both installed or portable wireless equipment in the area over the air bag or in the air bag deployment area. If in-vehicle wireless equipment is improperly installed and the air bag inflates, serious injury could result.

Switch off your phone before boarding an aircraft. The use of wireless telephones in an aircraft may be dangerous to the operation of the aircraft, disrupt the wireless telephone network and may be illegal.

Failure to observe these instructions may lead to suspension or denial of telephone services to the offender, or legal action or both.

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NOKIA
CONNECTING PEOPLE

9352677 v.2.1.

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TYPE KEY

H85

THE PRODUCT TYPE KEY OF NOKIA H85

HE 85 DBAG1/Y

H Terminal type
H = Handportable radio

E Frequency band
B = 65...130 MHz
C = 130...260 MHz
D = 260...550 MHz
E = 550...1020 MHz

85 Product generation
85 = H 85

D Traffic mode
S = Simplex or semiduplex
D = Duplex

B Frequency band TX and RX
B TX = 806-824MHz , RX = 851-869MHz
C TX = 417.5-419.6MHz , RX = 427.5-429.6MHz
E TX = 300-308 MHz , RX = 336-334MHz
F TX = 806-824 MHz , RX = 851-869MHz
G TX = 410-415 MHz , RX = 420-425MHz

A Logic version
A = normal

G Channel spacing
Y = 6.25 kHz
G = 12.5 kHz
F = 20 kHz
J = 25 kHz

1 Output power (optional)
1 = 1 W
2 = 2 W
3 = 3 W

y .. Frequency shift
Y = + 6.25 kHz
G = +12.5 kHz

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TECHNICAL SPECIFICATIONS HD85

HD85 TECHNICAL SPECIFICATIONS

TECHNICAL SPECIFICATIONS HD85

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Model	Type	Channel spacing [kHz]	TX Freq [MHz]	RX Freq [MHz]	Power level [W]	Operating mode	HD85 product	max. spacing between channels
HD85	DCBG	12.5	417.5-419.6	427.5-429.6	0.1 to 1	DUPLEX	H0363CB	2.1 MHz
HD85	DGAG	12.5	410-415	420-425	0.1 to 1	DUPLEX	H0367GA	5.0 MHz
HD85	DEEG	12.5	300-308	336-344	0.1 to 1	DUPLEX	H0364ED	8.0 MHz
HD85	DHAJ	25	460.050-461.975	450.350-452.275	0.1 to 1	DUPLEX	H0368HA	1.925 MHz

Type	Duplex Spacing	Current consumption stby	Current consumption RX	Current consumption TX 0.1W	Current consumption TX 1.0 W
DCBG	10 MHz	50 mA	70 mA	0.6 A	1.1 A
DGAG	10 MHz	60 mA	70 mA	0.4 A	1.0 A
DEEG	36 MHz	70 mA	70 mA	0.75 A	1.5 A
DHAJ	9.7 MHz	60 mA	70 mA	0.4 A	1.0 A

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TECHNICAL SPECIFICATIONS HD85

TECHNICAL SPECIFICATIONS HD85

Radiotelephone Hd85 fulfills all the ETS 300 086— radio technical specifications, between the temperature range -25°C ... $+55^{\circ}\text{C}$. Operating temperature range is -30°C ... $+65^{\circ}\text{C}$. Storage temperature range is -40°C ... $+70^{\circ}\text{C}$.

General specifications

Use	Trunked handheld radio		
Operation mode	Duplex		
Frequency band	see the table in page 2		
Transmitting mode	G3E (FM, pre-emphasis 6dB/oct)		
Channel control	see the table in page 2		
Channel spacing	see the table in page 2		
Signalling	1200 baud FFSK		
Supply voltage	6.3 V ... 8.5 V, nominal 7.5 V (negative ground)		
Current consumption	see the table in page 6		
Antenna connector	50 Ω		
MTBF	7 years 10h/day (-25°C ... $+55^{\circ}\text{C}$)		
Dimensions	152(H) x 54(W) x 34(D)		
Weight	345 g (including 900 mAh battery)		
Battery packs	900 mAh	7.2 V	NiCd
	1200 mAh	7.2 V	NiMH
	1850 mAh	7.2 V	NiMH
Battery life	see the table in page 6		

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Receiver

Frequency band	see the table in page 2
Sensitivity	≤ -113 dBm 20 dB SINAD Psof.
Max. distance between ch.	see the table in page 2
Signal level detection	Adjustable between -120 dBm ... -70 dBm
Signal level detection time	≤ 10 ms
Co-channel rejection	≤ 12 ... 0 dB
Adjacent channel selectivity	≥ 60 dB
Spurious response rejection	≥ 70 dB
Intermodulation rejection	≥ 65 dB
Blocking	≥ 84 dB
Amplitude characteristics	≤ 3 dB
Spurious emissions	
conducted 9 kHz ... 1 GHz	≤ 2 nW
1 ... 4 GHz	≤ 20 nW
radiated 30 ... 1 GHz	≤ 2 nW
1 ... 4 GHz	≤ 20 nW
Audio output power	nom. 1 mW (handset mode)
Audio frequency response	300 ... 2550 Hz +1 ... -3 dB
Harmonic distortion	≤ 10 %
Noise and hum. psofom.	≥ 40 dB

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TECHNICAL SPECIFICATIONS HD85

Transmitter

Frequency band	see the table in page 2	
Output power (software controlled)	0.1 – 1.0W	duplex
Max. distance between ch.	see the table in page 2	
Adjacent channel power	≥ -60 dBc	
Spurious emissions		
conducted 9 kHz...1 GHz	≤ 0.25 μ W (transmitting)	
	≤ 2 nW (standby)	
1 ... 4 GHz	≤ 1 μ W (transmitting)	
	≤ 20 nW (standby)	
radiated 30 MHz...1 GHz	≤ 0.25 μ W (transmitting)	
	≤ 2 nW (standby)	
1 ... 4 GHz	≤ 1 μ W (transmitting)	
	≤ 20 nW (standby)	
Modulation:	speech	FM pre-emphasis 6db/octave
	FFSK	FM
Deviation:	nominal	± 1.5 kHz
	maximum	± 2.5 kHz
Audio frequency response	300 ... 2550 Hz +1 ... -3 dB	
Harmonic distortion	≤ 10 %	
Residual modulation psofom.	≤ -40 dB	
Audio muting	≥ 40 dB (during the data transmitting)	
Modulator sensitivity	1.3 ... 2.25 kHz	

TECHNICAL SPECIFICATIONS HD85

NOKIA

Battery life

Measured with 900 mAh battery. Relation is [stby / TX] and [stby / RX / TX].

Radio type	Operation mode	Output power [W]	Operating time [h]
DHAJ	Duplex, 90/10 relations	0.1	12
DHAJ	Duplex, 90/10 relations	1.0	10
DGAG, DEDG	Duplex, 90/10 relations	0.1	8
DGAG, DEDG	Duplex, 90/10 relations	1.0	5.3
DCBG	Duplex, 90/5/5 relations	0.1	12
DCBG	Duplex, 90/5/5 relations	1.0	8

Nokia Telecommunications

BILL OF MATERIAL
18.04.2000

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 05.01.2000

Material: Material description:
0504027.1 HD 85DGAG T410-415 R420-425 12.5

Basic data text:

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. CIF Internal comment	Issue Quantity	Unit
1	0010			0312899.A08 HD 85 DGAG LOG.+RF			1 PC
1	0020			0311912.A05 ASSEMBLY PARTS HD85 mutos 1326			1 PC
1	0030			0311679.A01 UI-FOIL H85			1 PC

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BILL OF MATERIAL
23.11.1999

Status: 01 Approved
Usage: 3
Plant: FI02
Alt: 1
Valid: 25.03.1999

Material description:
6004 HD85 DGAG HANDY T410-415 R420-425 12,5

Basic data text:

Item Alt Part number

Component number
Component description
Component basic data text

Document no. Issue
CIF
Internal comment

Quantity Unit

0010	H0367GA HD 85DGAG T410-415 R420-425 12.5 TX410-415;RX420-425MHz;12.5kHz		1 PC
0010	H0367GA.1 HD 85DGAG T410-415 R420-425 12.5 TX410-415;RX420-425MHz;12.5kHz		1 PC
0010	0312899.A01 HD 85 DGAG LOG.+RF TX410-415MHz,Rx420-425MHz,12.5		1 PC
0020	0311912.A01 ASSEMBLY PARTS HD 85 400MHz		1 PC
0030	0311679.A01 UI-FOIL H85		1 PC
0020	4670934 PORT. ANTENNA H85 420MHz		1 PC
0030	4671339 BATTERY PACK BH85M STAND. NiMH		1 PC
0040	0720005. WRIST STRAP		1 PC
0050	4670931 BELT CLIP BCH85		1 PC

STATUS: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia ecommunications
 Material: Material description:
 0312899.A08 HD 85 DGAG LOG.+RF

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1000			9883128.1 PCB HL DGAG		1 PC
1	1010			4670447 DUPLEX TX410-415 RX420-425		1 PC
1	1020		Q701	4212200 TRANSISTO BFP183 N 6GHz 12V 6 SOT143		1 PC
1	1030		IC101,102	4340164 ANALOG IC TK11247BMC REG. 4.7V SSO6		2 PC
1	1040		IC100	4370084 CUSTOM IC MUUMI POWER SUPPLY		1 PC
1	1050		XF704	4514500 CERFILTER 450+-4kHz/6dB 1500R 12X8X4		1 PC
1	1060		IC500	4374034 CUSTOM IC NIP43 AUDIO/SIGNALING TQPP64		1 PC
1	1070		Q605,606	4213738 MOSFET BF998WR N 12V 30mA SOT323R		2 PC
1	1080		D1,101,103	4100189 SCHOTTKY DIODE 70V 70mA 0,41V/1mA		3 PC
1	1090		Q608,704,814	4212232 TRANSISTO UHXIN-T N X2 50V 100 UM6		3 PC
1	1100		Q602	4210702 TRANSISTO DTA144EE P 50V 30mA 1 SC75		1 PC
1	1110		Q603,610,812	4210674 TRANSISTO DTC144EE N 50V 30mA 1 SC75		3 PC
1	1120		IC301	4346228 MEMORY IC CXK5T8257B SRAM 32KX8 TSOP28		1 PC
1	1130		IC302	4348266 MEMORY IC AT24C02N-1 EEPROM 256 S08		1 PC
1	1140		XF702	4510480 XTAL FILT 45+-7,5MHz/3dB 650R// 12X8X3		1 PC
1	1150		R114	1430085 RESISTOR 82K 0.063W 5% 0603		1 PC
1	1160		R17,125,127,130,420,508,517,725,753,817	1430690 RESISTOR 0R 5% 0.063W 0402		10 PC
1	1170		R752,829,830	1430700 RESISTOR 10R 0.063W 5% 0402 0402		3 PC

Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia Telecommunications
 Material: Material description:
 0312899.A08 HD 85 DGAG LOG.+RF

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. CIF	Issue Internal comment	Quantity	Unit
1	1180		R523,524,552,628,713,723,741,824,	1430710 RESISTOR 22R 0.063W 5% 0402 0402			8	PC
1	1190		R888,740	1430714 RESISTOR 33R 0.063W 5% 0402 0402			2	PC
1	1200		R602,603,605,626,636	1430718 RESISTOR 47R 0.063W 5% 0402 0402			5	PC
1	1210		R31,50,57,59,60,107,119,124,600,748,751,	1430726 RESISTOR 100R 0.063W 5% 0402 0402			11	PC
1	1220		R818	1430730 RESISTOR 150R 0.063W 5% 0402 0402			1	PC
1	1230		R712,726,848	1430734 RESISTOR 220R 0.063W 5% 0402 0402			3	PC
1	1240		R728,820,847	1430740 RESISTOR 330R 0.063W 5% 0402 0402			3	PC
1	1250		R106,629,631	1430744 RESISTOR 470R 0.063W 5% 0402 0402			3	PC
1	1260		R722	1430748 RESISTOR 680R 0.063W 5% 0402 0402			1	PC
1	1270		R715	1430752 RESISTOR 820R 0.063W 5% 0402 0402			1	PC
1	1280		R1-16,18-22,30,32-35,53-56,109,128, R129,526,721,812,814,826,836,843,844	1430754 RESISTOR 1K 0.063W 5% 0402 0402			41	PC
1	1290		R737	1430758 RESISTOR 1.5K 0.063W 5% 0402 0402			1	PC
1	1300		R608	1430760 RESISTOR 1.8K 0.063W 5% 0402 0402			1	PC
1	1310		R810	1430764 RESISTOR 3.3K 0.063W 5% 0402 0402			1	PC
1	1320		R122,510,518,615,622,632,742,743,892,893	1430762 RESISTOR 2.2K 0.063W 5% 0402 0402			10	PC
1	1330		R521,811,835	1430764 RESISTOR 3.3K 0.063W 5% 0402 0402			3	PC
1	1340		R110,113,118,200,610,634,717, R735,807,815,821,837,837	1430770 RESISTOR 4.7K 0.063W 5% 0402 0402			13	PC
1	1350		R730,747	1430772 RESISTOR 5.6K 0.063W 5% 0402 0402			2	PC

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 14.04.2000

BILL OF MATERIAL
18.04.2000

Material: Material description:
0312899.A08 HD 85 DGAG LOG+RF

Basic data text:

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1360		R111,619,750,800	1430774 RESISTOR 6.8K 0.063W 5% 0402 0402		4 PC
1	1370		R58,700,736	1430776 RESISTOR 8.2K 0.063W 5% 0402 0402		3 PC
1	1380		R101,108,123,410,504,505,612,618,620,621 R635,711,716,719,727,734,809,816,823, R860#	1430778 RESISTOR 10K 0.063W 5% 0402 0402		20 PC
1	1390		R827	1430784 RESISTOR 15K 0.063W 5% 0402 0402		1 PC
1	1400		R131,408,421,505,616,710,732,739	1430788 RESISTOR 22K 0.063W 5% 0402 0402		8 PC
1	1410		R51,52,103,104,117,121,132,404-407,409, R411-418,520,522,633,720,733,808,822, R825,301	1430792 RESISTOR 33K 0.063W 5% 0402 0402		29 PC
1	1420		R102,502,514,831	1430796 RESISTOR 47K 0.063W 5% 0402 0402		4 PC
1	1430		R613	1430800 RESISTOR 68K 0.063W 5% 0402 0402		1 PC
1	1440		R100,115,116,126,300,500,501,503,507, R509,511,513,515,516,519,525,527,738, R512,614,729	1430804 RESISTOR 100K 0.063W 5% 0402		18 PC
1	1450		R731	1430808 RESISTOR 150K 0.063W 5% 0402 0402		3 PC
1	1460		C503,508,510,511,526	1430812 RESISTOR 220K 0.063W 5% 0402 0402		1 PC
1	1470		C501,528,529,532	2307816 CERCAP 47NF X7R 20% 25V 0805		5 PC
1	1480		C766	2310376 CERCAP 100NF X7R 10% 25V 0805		4 PC
1	1490		C115,500,506	2310490 CERAMIC CHIP CAPACIT 360pF 2 % 50V NPO C		1 PC
1	1500		C531,778	2311834 CERCAP 33NF X7R K 50V 0805	NESS 231B1	3 PC
1	1510		C760,761	2320028 CERCAP 10nF 50V X7R 20% 0603		2 PC
1	1520			2320256 CERCAP 220PF NPO J 50V 0603	NESS 231	2 PC

Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia Telecommunications
 Material: Material description:
 0312899.A08 HD 85 DGAG LOG.+RF

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1530		C755	2320274 CERCAP 1.0nF 20% 50V X7R 0603		1 PC
1	1540		C509	2320298 CERAMIC CHIP CAPACIT 6.8nF 20% 50V X7R C		1 PC
1	1550		C654,656	2320508 CERAMIC CHIP CAPACIT 1pF +-0.25pF 50V NP		2 PC
1	1570		C659,823,868	2320526 KONDENSATTORI PALA 3.9pF +-0.25pF 50V		3 PC
1	1580		C658,774,742,534	2320530 KONDENSATTORI PALA 5.6pF +-0.25pF 50V		4 PC
1	1590		C603,636,741	2320532 CERAMIC CHIP CAPASIT 6.8pF +-0.25pF 50V		3 PC
1	1600		C832	2320534 CERAMIC CHIP CAPACIT 8.2pF +-0.25pF 50V		1 PC
1	1610		C710,749,776	2320536 CERAMIC CHIP CAPACIT 10pF 5% 50V NP0		3 PC
1	1620		C516,517	2320540 CERAMIC CHIP CAPACIT 15pF 5% 50V NP0		2 PC
1	1630		C758,779	2320546 CERAMIC CHIP CAPACIT 27pF 5% 50V NP0		2 PC
1	1640		C717,753,764	2320548 CERAMIC CHIP CAPACIT 33pF 5% 50V NP0		3 PC
1	1650		C619	2320552 CERAMIC CHIP CAPACIT 47pF 5% 50V NP0		1 PC
1	1660		C1-17,22-24,28,32,38,57,59,502,507,515, C601,607,608,617,624,627,635,640-542, C645,721,723,724,739,740,743,745,746, 772,780,812,814,816,822,824,826, C827-829,840,851,870-872,880,899	2320560 CERAMIC CHIP CAPACIT 100pF 5% 50V NP0		65 PC
1	1670		C18-21,114	2320738 CERAMIC CHIP CAPACIT 470pF 10% 50V X7R		5 PC
1	1680		C25-27,30,31,33-37,50-53,55,56,58,60, C61,62,116,527,628,646,653,657,701,718, C720,722,736,738,765,771,775,825,869,	2320744 CERAMIC CHIP CAPACIT 1nF 10% 50V X7R		37 PC
1	1690		C54,100,101,103,104,106,108,109,200,300, C301,404-411,505,512,513,520-524,602, C630,632,727,750,757,759,767,773,811, C820,821,831,833-835,842,859,875-879	2320778 CERAMIC CHIP CAPACIT 10nF 10% 16V X7R		50 PC

Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL 18.04.2000

Material: Material description:
 0312899.A08 HD 85 DGAG LOG.+RF

Basic data text:

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue Cif Internal comment	Quantity Unit
1	1700		C752	23211162 CERCAP 6.8PF NP0 B 50 0603		1 PC
1	1710		C518,519,533	2321420 CERCAP 1UF Y5V Z 10V 0603		3 PC
1	1720		C758,770	2604022 TANTCAP 100nF IEC 20% 35V CASE A	NESS M260/2	2 PC
1	1730		C102,110,504,525,735,813,817,818,830, C838,839,841,898	2604209 TANTCAP 1UF IEC 20% 16V CASE A	NESS M260/2	13 PC
1	1740		C530	2604431 TANTCAP 10UF IEC 20% 16V CASE C	NESS M260/2	1 PC
1	1750		C751	2610126 TANTCAP 47UF 47u M 6.3V 6.0x3		1 PC
1	1760		C111,112,514	2611666 TANTCAP 2.2UF M 10V 3216	NESS 261A1	3 PC
1	1770		C105,107,113,643,734,756,836,837,867,	2611858 TANTCAP 4.7UF M 10V 3528	NESS 261A1	9 PC
1	1780		C623,631,819,843	2612701 TANTCAP 47nF 20% 35V 3216		4 PC
1	1790		C629,634,648,650,737,815	2613538 TANTCAP 10UF CAS M 16V 3528		6 PC
1	1800		L707,708	3640383 INDUCTOR 1uH J FR>430MHz 1206	NESS 364A2	2 PC
1	1810		T701	3640402 TRANSFORMER CHIP 0.5-800 MHz 4:1		1 PC
1	1820		L602	3641116 INDUCTOR 6.8nH 5% Q50/250MHz 0805		1 PC
1	1830		L6,8-10,50,605	3641262 FE BEAD FERRITE BEAD 25R/100MHz 2A		6 PC
1	1840		L721	3641572 INDUCTOR 22nH 5% Q45/250MHz 0805		1 PC
1	1850		L801,807	3641744 INDUCTOR 33nH 5% Q40/250MHz FR>1800 0805		2 PC
1	1860		L720	3641800 INDUCTOR 18nH 5% Q45/250MHz FR>2400 0805		1 PC
1	1870		L7,51	3642926 FE BEAD Z40/100MHz 1.5A 0805		2 PC

Document number:

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STATUS: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 14.04.2000

BILL OF MATERIAL
18.04.2000
Basic data text:

Material: Material description:
0312899.A08 HD 85 DGAG LOG.+RF

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1880		L1-5	3643108 INDUCTOR 100nH 10% Q15/100MHz FR>800M		5 PC
1	1890		L710	3643122 INDUCTOR 12nH 5% Q45/800MHz FR>2700		1 PC
1	1900		L601	3643276 INDUCTOR 27nH 5% Q43/800MHz FR>1400		1 PC
1	1910		L705,706,709	3645178 INDUCTOR 470nH 5% 1.3R Q30/50MHz 1206		3 PC
1	1920		L704	3660102 VARIABLE CHIP INDUCT 320uH 2% Q80/796kHz		1 PC
1	1930		D500	4110018 DIODECAP BB134 30V 2pF/28V SOD323		1 PC
1	1940		D502	4110072 DIO PAIR BAV99W 70V 200mA 2X SOT323		1 PC
1	1950		D604	4110117 DIODEZEN BZX84C3V9 3.9V 5% 0.3W SOT23		1 PC
1	1960		D501,601,701,801	4110752 DIODESCHO BAS70-04 70V 70mA 410 SOT323		4 PC
1	1970		D102	4115804 DIODESCHO PRL5817 20V 1A SOD87		1 PC
1	1980		D100	4118144 DIODETVS P6SMB15A 14.4/16.5V 4 403A03		1 PC
1	1990		Q103	4210020 TRANSISTO BCP69-25 P 60MHz 20VI SOT223		1 PC
1	2000		Q611,705,706,811,813	4210066 TRANSISTO BFR93AW N 5GHz 12V 3 SOT323		5 PC
1	2010		Q100,101,500,810,815	4210120 TRANSISTO BC847AW N 45V 100mA SOT323		5 PC
1	2020		Q104,105	4210846 TRANSISTO BCV27 N DARL. 220M SOT23		2 PC
1	2030		Q102,107,109,604,607,703	4210910 TRANSISTO BC857W P 45V 100mA SOT323		6 PC
1	2040		Q1,2,106,108,502	4211808 TRANSISTO UMH11N N 2XTR 50V 0 SC88		5 PC
1	2050		Q501	4212256 FET PAIR NDS9947 P 2XMOSEFET - SO8S		1 PC

STATUS: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 14.04.2000

BILL OF MATERIAL
18.04.2000

Nokia 1 ecommunications
Material: Material description:
0312899.A08 HD 85 DGAG LOG.+RF

Basic data text:

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	2060		IC200	4309382 PROCESSOR IC I/O EXPAND 8BIT FOR		1 PC
1	2070		IC400	4344074 PROCES IC HD6433044S MCU 16/8BI TQFP100		1 PC
1	2080		IC300	4344320 MEMORY IC AT29LV432- FLASH/EEP TSOP40.		1 PC
1	2090		IC502	4345290 ANALOG IC TDA7052AT AMP AF 500 S08S		1 PC
1	2100		IC501	4349088 ANALOG IC AD822AR OP.AMP 2X S08		1 PC
1	2110		IC800	4349616 ANALOG IC UMA1015M E FREQ.SYNTH SSO20		1 PC
1	2120		IC701	4349694 ANALOG IC TA31136F E IF AMP + F SSO16?		1 PC
1	2130		IC601	4354428 TX MODULE M69710L 2W 6V 30X10X6		1 PC
1	2140		X0801	4359204 OSCILLATO 14.85MHz 2.5ppm TCXO 12X10X4		1 PC
1	2150		G802	4359380 VCO VCO 376-385MHz 4.5V/1 15X10X3,		1 PC
1	2160		G801	4359472 VCO VCO 406-423MHz 4V/10m 12X10X4		1 PC
1	2170		X500	4510036 CRYSTAL 7.3728MHz+-50ppm TSTA 12X6X3mm		1 PC
1	2180		XF701	4511030 SAW-FILTR 420-425MHz IL<3dB 8PIN		1 PC
1	2190		PP1	5431718 FLEXFOIL 1X30 PITCH0.5mm UPP		1 PC
1	2200		PP2	5459720 CONNECTOR 16AF+1RF+4DC+JACK PITCH 1.0mm		1 PC
1	2210		P600	9211461 ANTENNA CLIP H85		1 PC
1	2220		ML601	9213162.1 COAXIAL SEMI-RIGID H80		1 PC
1	2230			9211214 PROM FRAME H70, H75, R72, H8X		1 PC

Document number:

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Nokia : communications

BILL OF MATERIAL
18.04.2000

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 05.01.2000

Material: Material description:
0504029.1 HD 85 DCBG T417.5-419.6 R427.5-429.6

Basic data text:

Lv	Item	Alt	Part number	Component number	Component description	Component basic data text	Document no.	Issue	Quantity	Unit
1	1000			0311905.A04	LOGIC+RF-PARTS HL DCBG		CIF		1	PC
1	1010			0311912.A05	ASSEMBLY PARTS HD85				1	PC
1	1020			0311679.A01	UI-FOIL				1	PC

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 10.04.2000

BILL OF MATERIAL
18.04.2000
Basic data text:

Nokia Telecommunications
Material: Material description:
0311905.A04 LOGIC+RF-PARTS HL DCBG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1000			9882621.2 PCB HL420 1,0MM		1 PC
1	1010			4671515 DUPLXER T417.500-419.600 R437.500-42		1 PC
1	1020		Q701	4212200 TRANSISTO BFP183 N 6GHz 12V 6 SOT143		1 PC
1	1030		IC101,102	4340164 ANALOG IC TK11247BMC REG. 4.7V SSO6		2 PC
1	1040		IC100	4370084 CUSTOM IC MUUMI POWER SUPPLY		1 PC
1	1050		XF704	4514500 CERFILTER 450+-4kHz/6dB 1500R 12X8X4		1 PC
1	1060		IC500	4374034 CUSTOM IC NIPAS AUDIO/SIGNALING TQPB64		1 PC
1	1070		Q605,606	4213738 MOSFET BF998WR N 12V 30mA SOT323R		2 PC
1	1080		D1,101,103	4100189 SCHOTTKY DIODE 70V 70mA 0,41V/1mA		3 PC
1	1090		Q608,704,814	4212232 TRANSISTO UMXIN-T N X2 50V 100 UM6		3 PC
1	1100		Q602	4210702 TRANSISTO DTA144EE P 50V 30mA 1 SC75		1 PC
1	1110		Q603,610,812	4210674 TRANSISTO DTC144EE N 50V 30mA 1 SC75		3 PC
1	1120		IC301	4346228 MEMORY IC CXK5T8257B SRAM 32KX8 TSOP28		1 PC
1	1130		IC302	4348266 MEMORY IC AT24C02N-1 EEPROM 256 S08		1 PC
1	1140		XF702	4510480 XTAL FILT 45+-7,5MHz/3dB 650R// 12X8X3		1 PC
1	1150		R114	1430085 RESISTOR 82K 0.063W 5% 0603		1 PC
1	1160		R17,125,127,130,420,508,517,725,753,817	1430690 RESISTOR 0R 5% 0.063W 0402		10 PC
1	1170		R752,829,830	1430700 RESISTOR 10R 0.063W 5% 0402 0402		3 PC

STATUS: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 10.04.2000

BILL OF MATERIAL
13.04.2000
Basic data text:

Material: Material description:
0311905.A04 LOGIC+RF-PARTS HL DCBG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1360		R111,619,750,800	1430774 RESISTOR 6.8K 0.063W 5% 0402 0402		4 PC
1	1370		R58,700,736	1430776 RESISTOR 8.2K 0.063W 5% 0402 0402		3 PC
1	1380		R101,108,410,504,505,612,618,620,621, R635,711,716,719,727,734,809,816,823, R860,123	1430778 RESISTOR 10K 0.063W 5% 0402 0402		20 PC
1	1390		R827	1430784 RESISTOR 15K 0.063W 5% 0402 0402		1 PC
1	1400		R131,408,421,505,616,710,732,739	1430788 RESISTOR 22K 0.063W 5% 0402 0402		8 PC
1	1410		R51,52,103,104,117,121,132,404-407,409, R411-418,520,522,633,720,733,808,822, R825	1430792 RESISTOR 33K 0.063W 5% 0402 0402		28 PC
1	1420		R102,502,514,831	1430796 RESISTOR 47K 0.063W 5% 0402 0402		4 PC
1	1430		R613	1430800 RESISTOR 68K 0.063W 5% 0402 0402		1 PC
1	1440		R100,115,116,126,300,500,501,503,507, R509,511,513,515,516,519,525,527,738,	1430804 RESISTOR 100K 0.063W 5% 0402 0402		18 PC
1	1450		R512,614,729	1430808 RESISTOR 150K 0.063W 5% 0402 0402		3 PC
1	1460		R731	1430812 RESISTOR 220K 0.063W 5% 0402 0402		1 PC
1	1470		C503,508,510,511,526	2307816 CERCAP 47nF X7R 20% 25V 0805		5 PC
1	1480		C501,528,529,532	2310376 CERCAP 100nF X7R 10% 25V 0805		4 PC
1	1490		C766	2310490 CERAMIC CHIP CAPACIT 360pF 2 % 50V NPO C		1 PC
1	1500		C115,500,506	2311834 CERCAP 33nF X7R K 50V 0805	NESS 231B1	3 PC
1	1510		C531,778	2320028 CERCAP 10nF 50V X7R 20% 0603		2 PC
1	1520		C760,761	2320256 CERCAP 220pF NPO J 50V 0603	NESS 231	2 PC

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 10.04.2000

BILL OF MATERIAL
18.04.2000
Basic data text:

Nokia ecommunications
Material: Material description:
0311905.A04 LOGIC+RF-PARTS HL DCBG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1530		C755	2320274 CERCAP 1.0nF 20% 50V X7R 0603		1 PC
1	1540		C509	2320298 CERAMIC CHIP CAPACIT 6.8nF 20% 50V X7R C		1 PC
1	1550		C654,656	2320508 CERAMIC CHIP CAPACIT 1pF +-0.25pF 50V NP		2 PC
1	1560		C742	2320524 CERAMIC CHIP CAPASIT 3.3pF +-0.25pF 50V		1 PC
1	1570		C659,823,868	2320526 KONDENSAATTORI PALA 3.9pF +-0.25pF 50V		3 PC
1	1580		C658,774	2320530 KONDENSAATTORI PALA 5.6pF +-0.25pF 50V		2 PC
1	1590		C603,636,741	2320532 CERAMIC CHIP CAPASIT 6.8pF +-0.25pF 50V		3 PC
1	1600		C832	2320534 CERAMIC CHIP CAPACIT 8.2pF +-0.25pF 50V		1 PC
1	1610		C710,749,776	2320536 CERAMIC CHIP CAPACIT 10pF 5% 50V NP0		3 PC
1	1620		C516,517	2320540 CERAMIC CHIP CAPACIT 15pF 5% 50V NP0		2 PC
1	1630		C758,779	2320546 CERAMIC CHIP CAPACIT 27pF 5% 50V NP0		2 PC
1	1640		C717,753,764	2320548 CERAMIC CHIP CAPACIT 33pF 5% 50V NP0		3 PC
1	1650		C619	2320552 CERAMIC CHIP CAPACIT 47pF 5% 50V NP0		1 PC
1	1660		C1-17,22-24,28,32,38,57,59,502,507,515, C601,607,608,617,624,627,635,640-642, C645,721,723,724,739,740,743,745,746, C753,772,780,812,814,816,822,824,826, C827-829,840,851,870-872,880,899	2320560 CERAMIC CHIP CAPACIT 100pF 5% 50V NP0		66 PC
1	1670		C18-21,114	2320738 CERAMIC CHIP CAPACIT 470pF 10% 50V X7R		5 PC
1	1680		C25-27,30,31,33-37,50-53,55,56,58,60, C61,62,116,527,628,646,653,657,701,718, C720,722,736,738,765,771,775,825,869,	2320744 CERAMIC CHIP CAPACIT 1nF 10% 50V X7R		37 PC
1	1690		C54,100,101,103,104,106,108,109,200,300,	2320778		50 PC

Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 10.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia Telecommunications
 Material: Material description:
 0311905.A04 LOGIC+RF-PARTS HL DCBG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
				CERAMIC CHIP CAPACIT 10nF 10% 16V X7R		
1	1700		C752	2321162 CERCAP 6.8PF NPO B 50 0603		1 PC
1	1710		C518, 519, 533	2321420 CERCAP 1UF Y5V Z 10V 0603		3 PC
1	1720		C768, 770	2604022 TANTCAP 100nF IEC 20% 35V CASE A	NESS M260/2	2 PC
1	1730		C102, 110, 504, 525, 735, 813, 817, 818, 830, 838, 839, 841, 898	2604209 TANTCAP 1UF IEC 20% 15V CASE A	NESS M260/2	13 PC
1	1740		C530	2604431 TANTCAP 10UF IEC 20% 15V CASE C	NESS M260/2	1 PC
1	1750		C751	2610126 TANTCAP 47UF 47u M 6.3V 6.0x3		1 PC
1	1760		C111, 112, 514	2611666 TANTCAP 2.2UF M 10V 3216	NESS 261A1	3 PC
1	1770		C105, 107, 113, 643, 734, 756, 836, 837, 867,	2611858 TANTCAP 4.7UF M 10V 3528	NESS 261A1	9 PC
1	1780		C623, 631, 819, 843	2612701 TANTCAP 47nF 20% 35V 3216		4 PC
1	1790		C629, 634, 648, 650, 737, 815	2613538 TANTCAP 10UF CAS M 16V 3528		6 PC
1	1800		L707, 708	3640383 INDUCTOR 1uH J FR>430MHz 1206	NESS 364A2	2 PC
1	1810		T701	3640402 TRANSFORMER CHIP 0.5-800 MHz 4:1		1 PC
1	1820		L602	3641116 INDUCTOR 6.8nH 5% Q50/250MHz 0805		1 PC
1	1830		L6, 8-10, 50, 605	3641262 PE BEAD FERRITE BEAD 25R/100MHZ 2A		6 PC
1	1840		L721	3641572 INDUCTOR 22nH 5% Q45/250MHz 0805		1 PC
1	1850		L801, 807	3641744 INDUCTOR 33nH 5% Q40/250MHz FR>1800 0805		2 PC
1	1860		L720	3641800		1 PC

Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 10.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia ecommunications
 Material: Material description:
 0311905.A04 LOGIC+RF-PARTS HL DCBG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1870		L7,51	INDUCTOR 18nH 5% Q45/250MHz FR>2400 0805		
			3642926			2 PC
1	1880		L1-5	FE BRAD Z40/100MHz 1.5A 0805		
			3643108			5 PC
1	1890		L710	INDUCTOR 100nH 10% Q15/100MHz FR>800M		
			3643122			1 PC
1	1900		L601	INDUCTOR 12nH 5% Q45/800MHz FR>2700		
			3643276			1 PC
1	1910		L705,706,709	INDUCTOR 27nH 5% Q43/800MHz FR>1400		
			3645178			3 PC
1	1920		L704	INDUCTOR 470nH 5% 1.3R Q30/50MHz 1206		
			3660102			1 PC
1	1930		D500	VARIABLE CHIP INDUCT 320uH 2% Q80/796kHz		
			4110018			1 PC
1	1940		D502	DIODECAP BB134 30V 2pF/38V SOD323		
			4110072			1 PC
1	1950		D604	DIO PAIR BAV99W 70V 200mA 2X SOT323		
			4110117			1 PC
1	1960		D501,601,701,801	DIODEZEN BZX84C3V9 3.9V 5% 0.3W SOT23		
			4110752			4 PC
1	1970		D102	DIODESCHO BAS70-04 70V 70mA 410 SOT323		
			4115804			1 PC
1	1980		D100	DIODESCHO FRL15817 20V 1A SOD87		
			4118144			1 PC
1	1990		Q103	DIODETVS P6SMB15A 14.4/16.5V 4 403A03		
			4210020			1 PC
1	2000		Q611,705,706,811,813	TRANSISTO ECP69-25 P 60MHz 20VI SOT223		
			4210066			5 PC
1	2010		Q100,101,500,810,815	TRANSISTO EPR93AW N 5GHz 12V 3 SOT323		
			4210120			5 PC
1	2020		Q104,105	TRANSISTO BC847AW N 45V 100mA SOT323		
			4210846			2 PC
1	2030		Q102,107,109,604,607,703	TRANSISTO BCV27 N DARL. 220M SOT23		
			4210910			6 PC
				TRANSISTO BC857W P 45V 100mA SOT323		

STATUS: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 10.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Material: Material description:
 0311905.A04 LOGIC+RF-PARTS HL DCBG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	2040		Q1,2,106,108,502	4211808 TRANSISTO UMH11N N 2XTR 50V 0 SC88		5 PC
1	2050		Q501	4212256 FET PAIR NDS9947 P 2XMOSFET - S08S		1 PC
1	2060		IC200	4309382 PROCESSOR IC I/O EXPAND 8BIT FOR		1 PC
1	2070		IC400	4344074 PROCES IC HD6433044S MCU 16/8BI TQFP100		1 PC
1	2080		IC300	4344320 MEMORY IC AT29LV432- FLASH/EEPROM TSOP40		1 PC
1	2090		IC502	4345290 ANALOG IC TDA7052AT AMP AF 500 S08S		1 PC
1	2100		IC501	4349088 ANALOG IC AD822AR OP.AMP 2X S08		1 PC
1	2110		IC800	4349616 ANALOG IC UMA1015M E FREQ.SYNTH SSO20		1 PC
1	2120		IC701	4349694 ANALOG IC TA31136F E IF AMP + F SSO16?		1 PC
1	2130		IC601	4354428 TX MODULE M69710L 2W 6V 30X10X6		1 PC
1	2140		X0801	4359204 OSCILLATO 14.85MHz 2.5ppm TCXO 12X10X4		1 PC
1	2150		G802	4359380 VCO VCO 376-385MHz 4,5V/1 15X10X3,		1 PC
1	2160		G801	4359472 VCO VCO 406-423MHz 4V/10m 12X10X4		1 PC
1	2170		X500	4510036 CRYSTAL 7.3728MHz+-50ppm TSTA 12X6X3mm		1 PC
1	2180		XF701	4511070 SAW-FILTR 427.75+-2.25MHz -40/+ 8PIN		1 PC
1	2190		PP1	5431718 FLEXFOIL 1X30 PITCH0.5mm UPP		1 PC
1	2200		PP2	5469720 CONNECTOR 16AF+1RF+4DC+JACK PITCH 1.0mm		1 PC
1	2210		P600	9211461 ANTENNA CLIP H85		1 PC

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BILL OF MATERIAL
18.04.2000

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 10.04.2000

Material: Material description:
0311905.A04 LOGIC+RF-PARTS HL DCBG

Lv	Item	Alt	Part number	Component number	Component description	Component basic data text	Document no.	Issue	Quantity	Unit
1	2220		ML601	9213162.1	COAXIAL SEMI-RIGID H80		CIF		1	PC
1	2230			9211214	PROM FRAME H70, H75, R72, H8X		Internal comment		1	PC

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BILL OF MATERIAL
18.04.2000

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 05.01.2000

Material: Material description:
0504040.1 HD 85 DHAJ T460.05-461.975 R450.35-452.2

Basic data text:

Lv	Item	Alt	Part number	Component number	Component description	Component basic data text	Document no.	Issue	Quantity	Unit
1	0010			0312909.A08	DHAJ LOG.+RF				1	PC
1	0020			0311912.A05	ASSEMBLY PARTS HD85	muutos 1326			1	PC
1	0030			0311679.A01	UI-FOIL	H85			1	PC

STATUS: 01 Approved
 Usage: 2
 Plant: FIO2
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia Telecommunications
 Material: Material description:
 0312909.A08 DHAJ LOG.+RF

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1000			9883054.1 PCB HL430 FOR HD 85 DHAJ		1 PC
1	1010			4670448 DUPLEX Tx460.050-461.975 Rx450.350-452.2 Tx 460.050-461.975 Rx 450.350-452.275		1 PC
1	1020		Q701	4212300 TRANSISTO BFP183 N 6GHz 12V 6 SOT143		1 PC
1	1030		ICI01,102	4340164 ANALOG IC TK11247BNC REG. 4.7V SSO6		2 PC
1	1040		ICI00	4370084 CUSTOM IC MUUMI POWER SUPPLY		1 PC
1	1060		IC500	4374034 CUSTOM IC NIP3 AUDIO/SIGNALING TQFP64		1 PC
1	1070		Q605,606	4213738 MOSFET BF998WR N 12V 30mA SOT323R		2 PC
1	1080		DL101,103	4100189 SCHOTTKY DIODE 70V 70mA 0.41V/1mA		3 PC
1	1090		Q608,704,814	4212232 TRANSISTO UMX1N-T N X2 50V 100 UM6		3 PC
1	1100		Q602	4210702 TRANSISTO DTA144EE P 50V 30mA 1 SC75		1 PC
1	1110		Q603,610,812	4210674 TRANSISTO DTC144EE N 50V 30mA 1 SC75		3 PC
1	1120		IC301	4346228 MEMORY IC CXX5T8257B SRAM 32KX8 TSOP28		1 PC
1	1130		IC302	4348266 MEMORY IC AT24C02N-1 EEPROM 256 S08		1 PC
1	1140		XF702	4510480 XTAL FILT 45+-7.5MHz/3dB 650R// 12X8X3		1 PC
1	1150		R114	1430085 RESISTOR 82K 0.063W 5% 0603		1 PC
1	1160		R17,125,127,130,420,508,517,725,753,817	1430690 RESISTOR 0R 5% 0.063W 0402		10 PC
1	1170		R752,829,830	1430700 RESISTOR 10R 0.063W 5% 0402 0402		3 PC
1	1180		R523,524,552,628,713,723,740,741,824,	1430710		9 PC

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BILL OF MATERIAL
18.04.2000

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 14.04.2000

Material: Material description:
0312909.A08 DHAJ LOG.+RF

Basic data text:

Lv	Item	Alt	Part number	Component number	Component description	Component basic data text	Component number	Document no.	Issue	Quantity	Unit
								CIF	Internal comment		
1	1190		R888		RESISTOR 22R	0.063W 5%	0402 0402			1	PC
				1430714							
1	1200		R602,603,605,626,636		RESISTOR 33R	0.063W 5%	0402 0402			5	PC
				1430718							
1	1210		R31,50,57,59,60,107,119,124,600,748,751, #		RESISTOR 47R	0.063W 5%	0402 0402			11	PC
				1430726							
1	1220		R818		RESISTOR 100R	0.063W 5%	0402 0402			1	PC
				1430730							
1	1230		R712,726,848		RESISTOR 150R	0.063W 5%	0402 0402			3	PC
				1430734							
1	1240		R728,820,847		RESISTOR 220R	0.063W 5%	0402 0402			3	PC
				1430740							
1	1250		R106,629,631		RESISTOR 330R	0.063W 5%	0402 0402			3	PC
				1430744							
1	1260		R722		RESISTOR 470R	0.063W 5%	0402 0402			1	PC
				1430748							
1	1270		R715		RESISTOR 680R	0.063W 5%	0402 0402			1	PC
				1430752							
1	1280		R1-16,18-22,30,32-35,53-56,109,128, R129,526,721,812,814,826,836,843,844		RESISTOR 820R	0.063W 5%	0402 0402			41	PC
				1430754							
1	1290		R737		RESISTOR 1K	0.063W 5%	0402 0402			1	PC
				1430758							
1	1300		R608		RESISTOR 1.5K	0.063W 5%	0402 0402			1	PC
				1430760							
1	1310		R810		RESISTOR 1.8K	0.063W 5%	0402 0402			1	PC
				1430764							
1	1320		R122,510,518,615,622,632,742,743,892,893		RESISTOR 3.3K	0.063W 5%	0402 0402			10	PC
				1430762							
1	1330		R521,811,835		RESISTOR 2.2K	0.063W 5%	0402 0402			3	PC
				1430764							
1	1340		R110,113,118,200,607,610,634,717, R807,815,821,837		RESISTOR 3.3K	0.063W 5%	0402 0402			12	PC
				1430770							
1	1350		R730,747		RESISTOR 4.7K	0.063W 5%	0402 0402			2	PC
				1430772							
				RESISTOR 5.6K	0.063W 5%	0402 0402					

Document number:

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STATUS: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 14.04.2000

BILL OF MATERIAL
18.04.2000
Basic data text:

Nokia Telecommunications

Material: Material description:
0312909.A08 DHAJ LOG.+RF

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1360		R111,619,750,800	1430774 RESISTOR 6.8K 0.063W 5% 0402 0402		4 PC
1	1370		R58,700,736	1430776 RESISTOR 8.2K 0.063W 5% 0402 0402		3 PC
1	1380		R101,108,123,410,504,506,612,618,620,621 R635,711,716,719,727,734,809,816,823, R860#	1430778 RESISTOR 10K 0.063W 5% 0402 0402		20 PC
1	1390		R827	1430784 RESISTOR 15K 0.063W 5% 0402 0402		1 PC
1	1400		R131,408,421,505,616,710,732,739	1430788 RESISTOR 22K 0.063W 5% 0402 0402		8 PC
1	1410		R51,52,103,104,117,121,132,404-407,409, R411-418,520,522,633,720,733,808,822,301 R825	1430792 RESISTOR 33K 0.063W 5% 0402 0402		29 PC
1	1420		R102,502,514,831	1430796 RESISTOR 47K 0.063W 5% 0402 0402		4 PC
1	1430		R613,735	1430800 RESISTOR 68K 0.063W 5% 0402 0402		2 PC
1	1440		R100,115,116,126,300,500,501,503,507, R509,511,513,515,516,519,525,527,738, R512,614,729	1430804 RESISTOR 100K 0.063W 5% 0402		18 PC
1	1460		R731	1430808 RESISTOR 150K 0.063W 5% 0402 0402		3 PC
1	1470		C503,508,510,511,526	1430812 RESISTOR 220K 0.063W 5% 0402 0402		1 PC
1	1480		C501,528,529,532	2307816 CERCAP 47NF X7R 20% 25V 0805		5 PC
1	1490		C766	2310376 CERCAP 100NF X7R 10% 25V 0805		4 PC
1	1500		C115,500,506	2310490 CERAMIC CHIP CAPACIT 360pF 2 & 50V NP0 C	NESS 231B1	1 PC
1	1510		C531,778	2311834 CERCAP 33NF X7R K 50V 0805		3 PC
1	1520		C760,761	2320028 CERCAP 10nF 50V X7R 20% 0603		2 PC
				2320256 CERCAP 220PF NP0 J 50V 0603	NESS 231	2 PC

Document number:

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Nokia Telecommunications

Material: Material description:
 0312909.A08 DHAJ LOG.+RF

BILL OF MATERIAL
 18.04.2000

Basic data text:

Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1530		C755	2320274 CERCAP 1.0nF 20% 50V X7R 0603		1 PC
1	1540		C509	2320298 CERAMIC CHIP CAPACIT 6.8nF 20% 50V X7R C		1 PC
1	1550		C654,656	2320508 CERAMIC CHIP CAPACIT 1pF +-0.25pF 50V NP		2 PC
1	1560		C742	2320524 CERAMIC CHIP CAPASIT 3.3pF +-0.25pF 50V		1 PC
1	1570		C659,823,868	2320526 KONDENSAATTORI PALA 3.9pF +-0.25pF 50V		3 PC
1	1580		C658,774,534	2320530 KONDENSAATTORI PALA 5.6pF +-0.25pF 50V		3 PC
1	1590		C603,636,741	2320532 CERAMIC CHIP CAPASIT 6.8pF +-0.25pF 50V		3 PC
1	1600		C832	2320534 CERAMIC CHIP CAPACIT 8.2pF +-0.25pF 50V		1 PC
1	1610		C710,749,776	2320536 CERAMIC CHIP CAPACIT 10pF 5% 50V NP0		3 PC
1	1620		C516,517	2320540 CERAMIC CHIP CAPACIT 15pF 5% 50V NP0		2 PC
1	1630		C758,779	2320546 CERAMIC CHIP CAPACIT 27pF 5% 50V NP0		2 PC
1	1640		C717,753,764	2320548 CERAMIC CHIP CAPACIT 33pF 5% 50V NP0		3 PC
1	1650		C619	2320552 CERAMIC CHIP CAPACIT 47pF 5% 50V NP0		1 PC
1	1660		C1-17,22-24,28,32,38,57,59,502,507,515, C601,607,608,617,624,627,635,640-642, C645,721,723,724,739,740,743,745,746, C 772,780,812,814,816,822,824,826, C827-829,840,851,870-872,880,899	2320560 CERAMIC CHIP CAPACIT 100pF 5% 50V NP0		65 PC
1	1670		C18-21,114	2320738 CERAMIC CHIP CAPACIT 470pF 10% 50V X7R		5 PC
1	1680		C25-27,30,31,33-37,50-53,55,56,58,60, C61,62,116,527,628,646,653,657,701,718, C720,722,736,738,765,771,775,825,869,	2320744 CERAMIC CHIP CAPACIT 1nF 10% 50V X7R		37 PC

Document number:

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Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia Telecommunications
 Material: Material description:
 0312908.A08 DHAJ LOG.+RF

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1690		C54,100,101,103,104,106,108,109,200,300, C301,404-411,505,512,513,520-524,602, C630,632,727,750,757,759,767,773,811, C820,821,831,833-835,842,859,875-879	2320778 CERAMIC CHIP CAPACIT 10nF 10% 16V X7R		50 PC
1	1700	C752		2321162 CERCAP 6.8PF NP0 B 50 0603		1 PC
1	1710	C518,519,533		2321420 CERCAP 10F Y5V Z 10V 0603		3 PC
1	1720	C768,770		2604022 TANTCAP 100nF IEC 20% 35V CASE A	NESS M260/2	2 PC
1	1730	C102,110,504,525,735,813,817,818,830, C838,839,841,898		2604209 TANTCAP 10F IEC 20% 16V CASE A	NESS M260/2	13 PC
1	1740	C530		2604431 TANTCAP 100F IEC 20% 16V CASE C	NESS M260/2	1 PC
1	1750	C751		2610126 TANTCAP 47UF 47u M 6.3V 6.0x3		1 PC
1	1760	C111,112,514		2611666 TANTCAP 2.2UF M 10V 3216	NESS 261A1	3 PC
1	1770	C105,107,113,643,734,756,836,837,867,		2611858 TANTCAP 4.7UF M 10V 3528	NESS 261A1	9 PC
1	1780	C623,631,819,843		2612701 TANTCAP 47nF 20% 35V 3216		4 PC
1	1790	C629,634,648,650,737,815		2613538 TANTCAP 10UF CAS M 16V 3528		6 PC
1	1800	L707,708		3640383 INDUCTOR 1uH J FR>430MHz 1205	NESS 364A2	2 PC
1	1810	T701		3640402 TRANSFORMER CHIP 0.5-800 MHz 4:1		1 PC
1	1820	L602		3641116 INDUCTOR 6.8nH 5% Q50/250MHz 0805		1 PC
1	1830	L6,8-10,50,605		3641262 FE BEAD FERRITE BEAD 25R/100MHZ 2A		6 PC
1	1840	L721		3641572 INDUCTOR 22nH 5% Q45/250MHz 0805		1 PC

Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia .communications
 Material: Material description:
 0312909.A08 DHAJ LOG.+RF

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1850		L801,807	3641744 INDUCTOR 33nH 5% Q40/250MHz FR>1800 0805		2 PC
1	1860		L720	3641800 INDUCTOR 18nH 5% Q45/250MHz FR>2400 0805		1 PC
1	1870		L7,51	3642926 PE BEAD Z40/100MHz 1.5A 0805		2 PC
1	1880		L1-5	3643108 INDUCTOR 100nH 10% Q15/100MHz FR>800M		5 PC
1	1890		L710	3643122 INDUCTOR 12nH 5% Q45/800MHz FR>2700		1 PC
1	1900		L601	3643276 INDUCTOR 27nH 5% Q43/800MHz FR>1400		1 PC
1	1910		L705,706,709	3645178 INDUCTOR 470nH 5% 1.3R Q30/50MHz 1206		3 PC
1	1920		L704	3660102 VARIABLE CHIP INDUCT 320uH 2% Q80/796kHz		1 PC
1	1930		D500	4110018 DIODECAP BB134 30V 2pF/28V SOD323		1 PC
1	1940		D502	4110072 DIO PAIR BAV99W 70V 200mA 2X SOT323		1 PC
1	1950		D604	4110117 DIODEZEN BZX84C3V9 3.9V 5% 0.3W SOT23		1 PC
1	1960		D501,601,701,801	4110752 DIODESCHO BAS70-04 70V 70mA 410 SOT323		4 PC
1	1970		D102	4115804 DIODESCHO PRL5817 20V 1A SOD87		1 PC
1	1980		D100	4118144 DIODETVS P6SMB15A 14.4/16.5V 4 403A03		1 PC
1	1990		Q103	4210020 TRANSISTO BCP69-25 P 60MHz 20VI SOT223		1 PC
1	2000		Q611,705,706,811,813	4210066 TRANSISTO BFR93AW N 5GHz 12V 3 SOT323		5 PC
1	2010		Q100,101,500,810,815	4210120 TRANSISTO BC847AW N 45V 100mA SOT323		5 PC
1	2020		Q104,105	4210846 TRANSISTO BCV27 N DARL. 220M SOT23		2 PC

STATUS: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 14.04.2000

BILL OF MATERIAL
18.04.2000
Basic data text:

Nokia Telecommunications
Material: Material description:
0312909.A08 DHAJ LOG.4RF

Lv Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	2030	Q102,107,109,604,607,703	4210910 TRANSISTO BC857W P 45V 100mA SOT323		6 PC
1	2040	Q1,2,106,108,502	4211808 TRANSISTO UMH11N N 2XTR 50V 0 SC88		5 PC
1	2050	Q501	4212256 FET PAIR NDS9947 P 2XMOSFET - S08S		1 PC
1	2060	IC200	4309382 PROCESSOR IC I/O EXPAND 8BIT FOR		1 PC
1	2070	IC400	4344074 PROCES IC HD6433044S MCV 16/8BI TQFP100		1 PC
1	2080	IC300	4344320 MEMORY IC AT29LV432- FLASH/EEPROM TSOP40		1 PC
1	2090	IC502	4345290 ANALOG IC TDA7052AT AMP AF 500 S08S		1 PC
1	2100	IC501	4349088 ANALOG IC AD822AR OP.AMP 2X S08		1 PC
1	2110	IC800	4349616 ANALOG IC UMA1015M E FREQ.SYNTH SSO20		1 PC
1	2120	IC701	4349694 ANALOG IC TA31136F E IF AMP + F SSO167		1 PC
1	2140	X0801	4359204 OSCILLATO 14.85MHz 2.5ppm TCXO 12X10X4		1 PC
1	2170	X500	4510036 CRYSTAL 7.3728MHz+-50ppm TSTA 12X6X3mm		1 PC
1	2190	PP1	5431718 FLEXFOIL 1X30 PITCH0.5mm UPP		1 PC
1	2200	PP2	5469720 CONNECTOR 16AF+1RF+4DC+JACK PITCH 1.0mm		1 PC
1	2210	P600	9211461 ANTENNA CLIP H85		1 PC
1	2220	ML601	9213162.1 COAXIAL SEMI-RIGID H80		1 PC
1	2230		9211214 PROM FRAME H70, H75, R72, H8X		1 PC
1	2240	XF704	4511280 CER. FILTER 450KHz 6dB+-6KHz 15		1 PC

Nokia ecommunications

BILL OF MATERIAL
 18.04.2000

Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

Material: Material description:
 0312909.A08 DHAF LOG..RF

Basic data text:

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	2250		IC601	4355454 TX MODULE M68710H 2W 6V 30X10X6		1 PC
1	2260		G802	4359652 VCO 420+-4MHz 4.5V/10mA RX 15X9.5X3.3		1 PC
1	2270		XF701	4511450 SAW-FILTR 448.7-453.3MHz 5X5X1.5		1 PC
1	2280		G801	4359710 VCO VCO 455 +-14MHz 4.5V/12mA 15X9.5X3.3		1 PC

Nokia 1 Communications

BILL OF MATERIAL
 18.04.2000

Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 05.01.2000

Material: Material description:
 0504028.1 HD 85 DEDG T300-308 R336-344 12.5

Basic data text:

Lv	Item	Alt	Part number	Component number	Component description	Component basic data text	Document no.	Issue	Quantity	Unit
1	1000			0312313.A03	LOGIC-HF-PARTS HL DEDG				1	PC
1	1010			0311912.A05	ASSEMBLY PARTS HD85	muutos 1326			1	PC
1	1020			0311679.A01	UI-FOIL	H85			1	PC

STATUS: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia 7 Communications
 Material: Material description:
 0312313.A03 LOGIC+RF-PARTS HL DEDG

Lv	Item	Alt	Part number	Component number	Component description	Component basic data text	Document no.	Issue	Quantity	Unit
1	1000			9882773.1	PCB HL303 1,0MM 2/alhio				1	PC
1	1010		Q701	4212200	TRANSISTO BFP183	N 6GHz 12V 6 SOT143			1	PC
1	1020		IC101.102	4340164	ANALOG IC TK11247BMC REG.	4.7V SS06			2	PC
1	1030		L601	3643248	INDUCTOR 39nH 5%	Q37/500MHz FR1400MHz			1	PC
1	1040		IC301	4346228	MEMORY IC CXK5T8257B SRAM	32Kx8 TSOP28			1	PC
1	1050		R114	1430085	RESISTOR 82K	0.063W 5%			1	PC
1	1060		R17,125,127,130,420,508,517,725,753,830,894,895	1430690	RESISTOR 0R 5%	0.063W 0402			12	PC
1	1070		R761	1430696	RESISTOR 5.6R	0.063W 5%			1	PC
1	1080		R726,740,752	1430700	RESISTOR 10R	0.063W 5%			3	PC
1	1090		R523,524,552,628,713,723,741,824	1430710	RESISTOR 22R	0.063W 5%			8	PC
1	1100		R888,893	1430714	RESISTOR 33R	0.063W 5%			2	PC
1	1110		R602,603,605,626,636,762	1430718	RESISTOR 47R	0.063W 5%			6	PC
1	1120		R31,50,57,59,60,107,119,124,600,712,748,751,829	1430726	RESISTOR 100R	0.063W 5%			13	PC
1	1130		R818	1430730	RESISTOR 150R	0.063W 5%			1	PC
1	1140		R848	1430734	RESISTOR 220R	0.063W 5%			1	PC
1	1150		R728,820,847	1430740	RESISTOR 330R	0.063W 5%			3	PC
1	1160		R106,629,631,637,892	1430744	RESISTOR 470R	0.063W 5%			5	PC
1	1170		R722	1430748	RESISTOR 680R	0.063W 5%			1	PC

18.04.2000

Status: 01 Approved

Usage: 2

Plant: FI02

Alt: 1

Valid: 14.04.2000

Material: Material description:

0312313.A03 LOGIC-+RF-PARTS HL DEDG

Basic data text:

Lv	Item	Alt	Part number	Component number	Component description	Component basic data text	Document no.	Issue	Quantity	Unit
1	1180		R715	1430752	RESISTOR 820R	0.063W 5%	0402	0402	1	PC
1	1190		R1-16, 18-22, 30, 32-35, 53-56, 109, 128, R129, 526, 638, 721, 760, 812, 814, 826, 836, R843, 844	1430754	RESISTOR 1K	0.063W 5%	0402	0402	43	PC
1	1200		R737	1430758	RESISTOR 1.5K	0.063W 5%	0402	0402	1	PC
1	1210		R608	1430760	RESISTOR 1.8K	0.063W 5%	0402	0402	1	PC
1	1220		R122, 510, 518, 615, 622, 632, 742	1430762	RESISTOR 2.2K	0.063W 5%	0402	0402	6	PC
1	1230		R521, 811, 835	1430764	RESISTOR 3.3K	0.063W 5%	0402	0402	3	PC
1	1240		R110, 113, 118, 200, 607, 610, 634, 717, 735, R807, 815, 821, 837	1430770	RESISTOR 4.7K	0.063W 5%	0402	0402	13	PC
1	1250		R730, 747	1430772	RESISTOR 5.6K	0.063W 5%	0402	0402	2	PC
1	1260		R111, 619, 750, 810	1430774	RESISTOR 5.8K	0.063W 5%	0402	0402	4	PC
1	1270		R58, 700, 736, 800	1430776	RESISTOR 8.2K	0.063W 5%	0402	0402	4	PC
1	1280		R101, 108, 123, 410, 504, 506, 612, 618, R620, 621, 635, 711, 716, 719, 727, 734, 816, R823, 860	1430778	RESISTOR 10K	0.063W 5%	0402	0402	19	PC
1	1290		R827	1430784	RESISTOR 15K	0.063W 5%	0402	0402	1	PC
1	1300		R131, 408, 421, 505, 616, 710, 732, 739, 809,	1430788	RESISTOR 22K	0.063W 5%	0402	0402	9	PC
1	1310		R51, 52, 103, 104, 117, 121, 132, 404-407, 409, R411-418, 520, 522, 633, 720, 733, 808, 822, R825	1430792	RESISTOR 33K	0.063W 5%	0402	0402	28	PC
1	1320		R102, 502, 514, 831	1430796	RESISTOR 47K	0.063W 5%	0402	0402	4	PC
1	1330		R613	1430800	RESISTOR 68K	0.063W 5%	0402	0402	1	PC
1	1340		R100, 115, 116, 126, 300, 500, 501, 503, 507, R509, 511, 513, 515, 516, 519, 525, 527, 738,	1430804	RESISTOR 100K	0.063W 5%	0402	0402	18	PC

Document number:

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STATUS: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia T ommunications
 Material: Material description:
 0312313.A03 LOGIC+RF-PARTS HL DEDG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1350		R512,614,729	1430808 RESISTOR 150K 0.063W 5% 0402 0402		3 PC
1	1360		R731	1430812 RESISTOR 220K 0.063W 5% 0402 0402		1 PC
1	1380		C503,508,510,511,526	2307816 CERCAP 47NF X7R 20% 25V 0805		5 PC
1	1390		C501,528,529,532	2310376 CERCAP 100NF X7R 10% 25V 0805		4 PC
1	1400		C766	2310490 CERAMIC CHIP CAPACIT 360pF 2 % 50V NP0 C		1 PC
1	1410		C115,500,506	2311834 CERCAP 33NF X7R K 50V 0805	NESS 231B1	3 PC
1	1420		C531,778,811	2320028 CERCAP 10nF 50V X7R 20% 0603		3 PC
1	1430		C760,761	2320256 CERCAP 220PF NP0 J 50V 0603	NESS 231	2 PC
1	1440		C775	2320262 KONDENSATTORI PALA 330pF 5% 50V NP0		1 PC
1	1450		C755	2320274 CERCAP 1.0nF 20% 50V X7R 0603		1 PC
1	1460		C509,859	2320298 CERAMIC CHIP CAPACIT 6.8nF 20% 50V X7R C		2 PC
1	1470		C792	2320508 CERAMIC CHIP CAPACIT 1pF +-0.25pF 50V NP		1 PC
1	1480		C660,742	2320524 CERAMIC CHIP CAPASIT 3.3pF +-0.25pF 50V		2 PC
1	1490		C758,776	2320530 KONDENSATTORI PALA 5.6pF +-0.25pF 50V		2 PC
1	1500		C741,793,823,868	2320532 CERAMIC CHIP CAPASIT 6.8pF +-0.25pF 50V		4 PC
1	1510		C658,791,832	2320534 CERAMIC CHIP CAPACIT 8.2pF +-0.25pF 50V		3 PC
1	1520		C603,636,774	2320536 CERAMIC CHIP CAPACIT 10pF 5% 50V NP0		3 PC
1	1530		C710	2320538 CERAMIC CHIP CAPACIT 12pF 5% 50V NP0		1 PC

STATUS: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 14.04.2000

BILL OF MATERIAL
18.04.2000
Basic data text:

Nokia communications

Material: Material description:
0312313.A03 LOGIC-+RF-PARTS HL DEDG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1540		C516,517,749	2320540 CERAMIC CHIP CAPACIT 15pF 5% 50V NP0		3 PC
1	1550		C779	2320546 CERAMIC CHIP CAPACIT 27pF 5% 50V NP0		1 PC
1	1560		C764	2320548 CERAMIC CHIP CAPACIT 33pF 5% 50V NP0		1 PC
1	1570		C745,746	2320556 CERAMIC CHIP CAPACIT 68pF 5% 50V NP0		2 PC
1	1580		C1-17,22-24,28,32,38,57,59,502,507,515, C607,619,635,717,720,721,739,740,743, C772,780,816,822,824,826-829,840,851, C870-872,880	2320560 CERAMIC CHIP CAPACIT 100pF 5% 50V NP0		52 PC
1	1590		C601,608,617,624,627,640-642,645,659, C812,814,899	2320564 KONDENSATTORI PALA 150pF 5% 50V NP0		13 PC
1	1600		C723,752	2320604 CERAMIC CHIP CAPACIT 18pF 5% 50V NP0		2 PC
1	1610		C18-21,114,724	2320738 CERAMIC CHIP CAPACIT 470pF 10% 50V X7R		6 PC
1	1620		C25-27,30,31,33-37,50-53,55,56,58,60, C61,62,116,537,628,646,653,657,701,718, C722,736,738,753,771,825,869	2320744 CERAMIC CHIP CAPACIT 1nF 10% 50V X7R		35 PC
1	1630		C54,100,101,103,104,106,108,109,200,300, C301,404-411,505,512,513,520-524,602, C630,632,727,750,757,759,767,773,820, C821,831,833-835,842,875-879	2320778 CERAMIC CHIP CAPACIT 10nF 10% 16V X7R		48 PC
1	1640		C518,519,533	2321420 CERCAP 1uF Y5V Z 10V 0603		3 PC
1	1650		C768,770	2604022 TANTCAP 100nF IEC 20% 35V CASE A	NESS M260/2	2 PC
1	1660		C102,110,504,525,735,813,817,818,830, C841,898	2604209 TANTCAP 1uF IEC 20% 16V CASE A	NESS M260/2	11 PC
1	1670		C530	2604431 TANTCAP 10uF IEC 20% 16V CASE C	NESS M260/2	1 PC
1	1680		C751	2610126 TANTCAP 47uF 47u M 6.3V 6.0x3		1 PC
1	1690		C111,112,514	2611666 TANTCAP 2.2uF M 10V 3216	NESS 261A1	3 PC

Document number:

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Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Nokia : communications
 Material: Material description:
 0312313.A03 LOGIC-+RF-PARTS HL DEDG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1700		C105,107,113,643,734,756,836-838,867,	2611858 TANTCAP 4.7UF M 10V 3528	NESS 261A1	10 PC
1	1710		C623,631,819,843	2612701 TANTCAP 47nF 20% 35V 3216		4 PC
1	1720		C629,634,648,650,737,815	2613538 TANTCAP 10UF CAS M 16V 3528		6 PC
1	1730		XF701	3618862 HELX FLTR 340MHz B>8MHz A<4.5dB		1 PC
1	1740		T701	3640402 TRANSFORMER CHIP 0.5-800 MHz 4:1		1 PC
1	1750		L602	3641208 INDUCTOR 12nH 5% Q45/250MHz FR>2750 0805		1 PC
1	1760		L6,8-10,50,605	3641262 FE BEAD FERRITE BEAD 25R/100MHZ 2A		6 PC
1	1770		L721	3641572 INDUCTOR 22nH 5% Q45/250MHz 0805		1 PC
1	1780		L705,706	3641622 INDUCTOR 220nH 5% Q30/100MHz FR>630 0805		2 PC
1	1790		L801,807	3641744 INDUCTOR 33nH 5% Q40/250MHz FR>1800 0805		2 PC
1	1800		L710,720	3641800 INDUCTOR 18nH 5% Q45/250MHz FR>2400 0805		2 PC
1	1810		L730	3641872 INDUCTOR 8.2n 5% Q50/250MHz FR>3000 0805		1 PC
1	1820		L7,51	3642926 FE BEAD Z40/100MHz 1.5A 0805		2 PC
1	1830		L1-5	3643108 INDUCTOR 100nH 10% Q15/100MHz FR>800M		5 PC
1	1840		L709	3645484 INDUCTOR 680nH 5% Q30/50MHz 1206		1 PC
1	1850		L707,708	3645178 INDUCTOR 470nH 5% 1.3R Q30/50MHz 1206		2 PC
1	1860		L704	3650102 VARIABLE CHIP INDUCT 320nH 2% Q80/796KHz		1 PC
1	1870		D1,101,103	4100189 SCHOTTKY DIODE 70V 70mA 0.41V/1mA		3 PC

Nokia Communications

BILL OF MATERIAL
18.04.2000

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 14.04.2000

Material: Material description:
0312313.A03 LOGIC-REF-PARTS HL DEDG

Basic data text:

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1880		D500	4110018 DIODECAP BB134 30V 2pF/28V SOD323		1 PC
1	1890		D502	4110072 DIO PAIR BAV99W 70V 200mA 2X SOT323		1 PC
1	1900		D604	4110117 DIODEZEN BZX84C3V9 3.9V 5% 0.3W SOT23		1 PC
1	1910		D501,601,701,801	4110752 DIODESCHO BAS70-04 70V 70mA 410 SOT323		4 PC
1	1920		D102	4115804 DIODESCHO PRL5817 20V 1A SOD87		1 PC
1	1930		D100	4118144 DIODETVS P6SMB15A 14.4/16.5V 4 403A03		1 PC
1	1940		Q103	4210020 TRANSISTO BCP69-25 P 60MHz 20VI SOT223		1 PC
1	1950		Q611,705,706,811,813	4210066 TRANSISTO BFR93AW N 5GHz 12V 3 SOT323		5 PC
1	1960		Q100,101,500,810	4210120 TRANSISTO BC847AW N 45V 100mA SOT323		4 PC
1	1970		Q603,610,812	4210674 TRANSISTO DTC144EE N 50V 30mA 1 SC75		3 PC
1	1980		Q602	4210702 TRANSISTO DTA144EE P 50V 30mA 1 SC75		1 PC
1	1990		Q104,105	4210846 TRANSISTO BCV27 N DARL. 230M SOT23		2 PC
1	2000		Q102,107,109,604,607,703	4210910 TRANSISTO BC857W P 45V 100mA SOT323		6 PC
1	2010		Q1,2,106,108,502	4211808 TRANSISTO UMH11N N 2XTR 50V 0 SC88		5 PC
1	2020		Q608,704	4212232 TRANSISTO UMXIN-T N X2 50V 100 UM6		2 PC
1	2030		Q501	4212256 FET PAIR NDS9947 P 2XMOSFET - S08S		1 PC
1	2040		Q605,606	4213738 MOSFET BF998WR N 12V 30mA SOT323R		2 PC
1	2050		Q814	4219922 TRANSISTO UMZ1NTR N&P 2XTR 50V UM6		1 PC

STATUS: 01 Approved
 Usage: 2
 Plant: F102
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 18.04.2000
 Basic data text:

Material: Material description:
 0312313.A03 LOGIC+RF-PARTS HL DEDG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	2060		IC200	4309382 PROCESSOR IC I/O EXPAND 8BIT FOR		1 PC
1	2070		IC400	4344074 PROCES IC HD6433044S MCU 16/8BI TQFP100		1 PC
1	2080		IC300	4344320 MEMORY IC AT29LV432- FLASH/EEP TSOP40		1 PC
1	2090		IC502	4345290 ANALOG IC TDA7052AT AMP AF 500 SO8S		1 PC
1	2100		IC302	4348266 MEMORY IC AT24C02N-1 EEPROM 256 SO8		1 PC
1	2110		IC501	4349088 ANALOG IC AD822AR OP.AMP 2X SO8		1 PC
1	2120		IC800	4349616 ANALOG IC UMA1015M E FREQ.SYNTH SSO20		1 PC
1	2130		IC701	4349694 ANALOG IC TA31136F E IF AMP + F SSO16?		1 PC
1	2140		G801	4352124 VCO VCO 304+-4MHz 4.5V/10 15X11X4		1 PC
1	2150		IC601	4354302 TX MODULE M68710EL 2W 6V 30X10X6		1 PC
1	2160		X0801	4359204 OSCILLATO 14.85MHz 2.5ppm TCXO 12X10X4		1 PC
1	2170		G802	4359422 VCO VCO 411-420MHz 4.5V/1 15X10X3,		1 PC
1	2180		IC100	4370084 CUSTOM IC MUUMI POWER SUPPLY		1 PC
1	2190		IC500	4374034 CUSTOM IC NIP3 AUDIO/SIGNALING TQFP64		1 PC
1	2200		X500	4510036 CRYSTAL 7.3728MHz+-50ppm TSTA 12X6X3mm		1 PC
1	2210		XF704	4514500 CERFILTER 450+-4kHz/6dB 1500R 12X8X4		1 PC
1	2220		IC602	4671516 DUPLEXER T300-308 R336-344		1 PC
1	2230		X700	0004716. CRYSTAL		1 PC

Document number:

Page: 7 (8)

Nokia Communications

BILL OF MATERIAL
18.04.2000

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 14.04.2000

Material: Material description:
0312313.A03 LOGIC+RF-PARTS HL DEDG

Basic data text:

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	2240		XF702	0004717. CRYSTAL FILTER 70MHz +-7.5kHz/3dB 250R 4	.0PF	1 PC
1	2250		PP1	5431718 FLEXFOIL 1X30 PITCH0.5mm UPP		1 PC
1	2260		PP2	5469720 CONNECTOR 16AF+1RF+4DC+JACK PITCH 1.0mm		1 PC
1	2270		P600	9211461 ANTENNA CLIP H85		1 PC
1	2280		ML601	9213162.1 COAXIAL SEMI-RIGID H80		1 PC
1	2290			9211214 PROM FRAME H70, H75, R72, H8X		1 PC

Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 23.11.1999

BILL OF MATERIAL
 25.11.1999
 Basic data text:
 muutokset 1345

Nokia communications
 Material: Material description:
 0311687.C08 LOGIC+RF-PARTS HL DBAG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	2230		PP1	5431718 FLEXFOIL 1X30 PITCH0.5mm UPP		1 PC
1	2240		P600	9211461 ANTENNA CLIP H85		1 PC
1	2250			9211214 FROM FRAME H70, H75, R72		1 PC
1	2260		c534	2320530 KONDENSATTORI PALA 5.6pF +-0.25pF 50V		1 PC

STATUS: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 23.11.1999

BILL OF MATERIAL
25.11.1999
Basic data text:
muutos 1345

Nokia ecommunications
Material: Material description:
0311687.C08 LOGIC+RF-PARTS HL DBAG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	2050		D102	4115804 DIODESCHO PRL15817 20V 1A SOD87		1 PC
1	2060		D100	4118144 DIODETVS P6SMB15A 14.4/16.5V 4 403A03		1 PC
1	2070		Q103	4210020 TRANSISTO BCP69-25 P 60MHz 20VI SOT223		1 PC
1	2080		Q705,706,811,813	4210066 TRANSISTO BFR93AW N 5GHz 12V 3 SOT323		4 PC
1	2090		Q100,101,500,810	4210120 TRANSISTO BC847AW N 45V 100mA SOT323		4 PC
1	2100		Q104,105	4210846 TRANSISTO BCV27 N DARL. 220M SOT23		2 PC
1	2110		Q102,107,109,604,607,703	4210910 TRANSISTO BC857W P 45V 100mA SOT323		6 PC
1	2120		Q1,2,106,108,502	4211808 TRANSISTO UMH11N N 2XTR 50V 0 SC88		5 PC
1	2130		Q501	4212256 FET PAIR NDS9947 P 2XMOSFET - S08S		1 PC
1	2140		IC200	4309382 PROCESSOR IC I/O EXPAND 8BIT FOR		1 PC
1	2150		IC501	4349088 ANALOG IC AD822AR OP.AMP 2X S08		1 PC
1	2160		IC800	4349616 ANALOG IC UMA1015M E FREQ.SYNTH S5020		1 PC
1	2170		IC701	4349694 ANALOG IC TA31136P E IF AMP + F S5016?		1 PC
1	2180		X0801	4352204 OSCILLATO 14.85MHz 2.5ppm TCXO 12X10X4		1 PC
1	2190		G801	4352822 VCO VCO 813.5+-7.5MHz 4.0 12X10X4		1 PC
1	2200		G802	4359840 VCO VCO 903.5+-7.5MHz 4.0 12X10X4		1 PC
1	2210		X500	4510036 CRYSTAL 7.3728MHz+-50ppm TSTA 12X6X3mm		1 PC
1	2220			4670445 DUPLEXER T806-824 R851-869		1 PC

STATUS: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 23.11.1999

BILL OF MATERIAL
 25.11.1999
 Basic data text:
 muutos 1345

Nokia ecommunications
 Material: Material description:
 0311687.C08 LOGIC+RF-PARTS HL DBAG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1880		C811	2320760 KONDENSATTORI PALA 4.7nF 10% 25V X7R		1 PC
1	1890		C54,100,101,103,104,106,108,109,200,300, C301,404-411,505,512,513,520-524,602, C620,530,532,647,727,750,755,757,759, C767,820,821,831,833-835,842,875-879	2320778 CERAMIC CHIP CAPACIT 10nF 10% 16V X7R		50 PC
1	1900		C768,770	2604022 TANTCAP 100nF IEC 20% 35V CASE A	NESS M260/2	2 PC
1	1910		C102,110,504,525,619,629,735,813,817, C818,825,830,841,898	2604209 TANTCAP 10UF IEC 20% 16V CASE A	NESS M360/2	14 PC
1	1920		C530,644	2604431 TANTCAP 100UF IEC 20% 16V CASE C	NESS M260/2	2 PC
1	1930		C648-650	2610010 TANTALUM CHIP CAPACIT 1.0 uF 20% 35V CHIP		3 PC
1	1940		C751	2610126 TANTCAP 47UF 47u M 6.3V 6.0x3		1 PC
1	1950		C111,112,514	2611666 TANTCAP 2.2UF M 10V 3216	NESS 261A1	3 PC
1	1960		C105,107,113,643,734,756,836-838,867,	2611858 TANTCAP 4.7UF M 10V 3528	NESS 261A1	10 PC
1	1970		C623,631,819,843	2612701 TANTCAP 47nF 20% 35V 3216		4 PC
1	1980		L707	3640383 INDUCTOR 1uH J FR>430MHZ 1206	NESS 364A2	1 PC
1	1990		L6,8-10,50,605	3641262 FE BEAD FERRITE BEAD 25R/100MHZ 2A		6 PC
1	2000		L7,51,606	3642926 FE BEAD 240/100MHZ 1.5A 0805		3 PC
1	2010		L705,706,709	3645178 INDUCTOR 470nH 5% 1.3R Q30/50MHZ 1206		3 PC
1	2020		L704	3660102 VARIABLE CHIP INDUCT 320uH 2% Q80/796kHz		1 PC
1	2030		D500	4110018 DIODECAP BB134 30V 2pF/28V SOD323		1 PC
1	2040		D502,603	4110072 DIO PAIR BAV99W 70V 200mA 2X SOT323		2 PC

STATUS: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 23.11.1999

BILL OF MATERIAL
25.11.1999
Basic data text:
muutos 1345

Nokia Communications
Material: Material description:
0311687.C08 LOGIC+RF-PARTS HL DBAG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1710		C760,761	2320256 CERCAP 220PF NPO J 50V 0603	NESS 231	2 PC
1	1720		C859	2320280 KONDENSATTORI PALA 1.5nF 20% 50V X7R		1 PC
1	1730		C509	2320298 CERAMIC CHIP CAPACIT 6.8nF 20% 50V X7R C		1 PC
1	1740		C654,655,823	2320508 CERAMIC CHIP CAPACIT 1pF +-0.25pF 50V NP		3 PC
1	1750		C655	2320516 CERAMIC CHIP CAPACIT 1.5pF +-0.25pF 50V		1 PC
1	1760		C635	2320520 CERAMIC CHIP CAPASIT 2.2pF +-0.25pF 50V		1 PC
1	1770		C793	2320522 CERAMIC CHIP CAPACIT 2.7pF +-0.25pF 50V		1 PC
1	1780		C794	2320524 CERAMIC CHIP CAPASIT 3.3pF +-0.25pF 50V		1 PC
1	1790		C741	2320526 KONDENSATTORI PALA 3.9pF +-0.25pF 50V		1 PC
1	1800		C832	2320534 CERAMIC CHIP CAPACIT 8.2pF +-0.25pF 50V		1 PC
1	1810		C721,754	2320536 CERAMIC CHIP CAPACIT 10pF 5% 50V NPO		2 PC
1	1820		C516,517,753	2320540 CERAMIC CHIP CAPACIT 15pF 5% 50V NPO		3 PC
1	1830		C758,773	2320546 CERAMIC CHIP CAPACIT 27pF 5% 50V NPO		2 PC
1	1840		C601,603,604,606-608,614,617,624,640, C641,642,645,710,717,720,723,739,740, C743,764,772,812,814,816,822,824,826, C827-829,840,851,870-872,899	2320548 CERAMIC CHIP CAPACIT 33pF 5% 50V NPO		37 PC
1	1850		C1-17,22-24,28,32,38,57,59,502,507,515, C745,746	2320560 CERAMIC CHIP CAPACIT 100pF 5% 50V NPO		30 PC
1	1860		C18-21,114	2320738 CERAMIC CHIP CAPACIT 470pF 10% 50V X7R		5 PC
1	1870		C25-27,30,31,33-37,50-53,55,56,58,60, C61,62,116,527,627,628,633,646,653,701, C718,719,722,736,738,749,765,771,869,	2320744 CERAMIC CHIP CAPACIT 1nF 10% 50V X7R		37 PC

Document number:

Page: 5 (8)

Material: 0311687.C08
Material description: LOGIC+RF-PARTS HL DBAG

Basic data text:
muutos 1345

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
			R837	RESISTOR 4.7K 0.063W 5% 0402 0402		
1	1540		R123,730	1430772 RESISTOR 5.6K 0.063W 5% 0402 0402		2 PC
1	1550		R111,604,608,619,750,800	1430774 RESISTOR 6.8K 0.063W 5% 0402 0402		6 PC
1	1560		R58,736	1430776 RESISTOR 8.2K 0.063W 5% 0402 0402		2 PC
1	1570		R101,108,410,504,506,610,612,618,620, R631,711,716,719,734,809,816,823,860,	1430778 RESISTOR 10K 0.063W 5% 0402 0402		18 PC
1	1580		R827	1430784 RESISTOR 15K 0.063W 5% 0402 0402		1 PC
1	1590		R131,408,421,505,611,614,710,732,739,	1430788 RESISTOR 22K 0.063W 5% 0402 0402		9 PC
1	1600		R51,52,103,104,117,121,132,404-407, R409,411-418,520,522,720,727,733,808,301 R822,825	1430792 RESISTOR 33K 0.063W 5% 0402 0402		29 PC
1	1610		R102,502,514,616,831	1430796 RESISTOR 47K 0.063W 5% 0402 0402		5 PC
1	1620		R613	1430800 RESISTOR 68K 0.063W 5% 0402 0402		1 PC
1	1630		R100,115,116,126,300,500,501,503,507, R509,511,513,515,516,519,525,527,738,	1430804 RESISTOR 100K 0.063W 5% 0402		18 PC
1	1640		R512,729	1430808 RESISTOR 150K 0.063W 5% 0402 0402		2 PC
1	1650		R731	1430812 RESISTOR 220K 0.063W 5% 0402 0402		1 PC
1	1660		C503,508,510,511,526	2307816 CERCAP 47NF X7R 20% 25V 0805		5 PC
1	1670		C501,528,529,532	2310376 CERCAP 100NF X7R 10% 25V 0805		4 PC
1	1680		C766	2310490 CERAMIC CHIP CAPACIT 360pF 2 % 50V NPO C		1 PC
1	1690		C115,500,506	2311834 CERCAP 33NF X7R K 50V 0805	NESS 231B1	3 PC
1	1700		C531	2320028 CERCAP 10nF 50V X7R 20% 0603		1 PC

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 23.11.1999

BILL OF MATERIAL
25.11.1999
Basic data text:
muutos 1345

Nokia ecommunications
Material: Material description:
0311687.C08 LOGIC+RF-PARTS HL DBAG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1360		R741	1430700 RESISTOR 10R 0.063W 5% 0402 0402		1 PC
1	1370		R523,524,713,723,824	1430710 RESISTOR 22R 0.063W 5% 0402 0402		5 PC
1	1380		R740,888,893	1430714 RESISTOR 33R 0.063W 5% 0402 0402		3 PC
1	1390		R125,127,602,626	1430718 RESISTOR 47R 0.063W 5% 0402 0402		4 PC
1	1400		R600	1430724 RESISTOR 82R 0.063W 5% 0402 0402		1 PC
1	1410		R31,50,57,59,60,107,119,124,712,829	1430726 RESISTOR 100R 0.063W 5% 0402 0402		10 PC
1	1420		R818	1430730 RESISTOR 150R 0.063W 5% 0402 0402		1 PC
1	1430		R848	1430734 RESISTOR 220R 0.063W 5% 0402 0402		1 PC
1	1440		R605,625,726,820,847	1430740 RESISTOR 330R 0.063W 5% 0402 0402		5 PC
1	1450		R106,714,892	1430744 RESISTOR 470R 0.063W 5% 0402 0402		3 PC
1	1460		R722	1430748 RESISTOR 680R 0.063W 5% 0402 0402		1 PC
1	1470		R715	1430752 RESISTOR 820R 0.063W 5% 0402 0402		1 PC
1	1480		R1-16,18-22,30,32-35,53-56,109,122,128, R129,526,615,721,728,812,814,826,836,129 R843	1430754 RESISTOR 1K 0.063W 5% 0402 0402		44 PC
1	1490		R737	1430758 RESISTOR 1.5K 0.063W 5% 0402 0402		1 PC
1	1500		R700,810	1430760 RESISTOR 1.8K 0.063W 5% 0402 0402		2 PC
1	1510		R510,518,603,607,617,622	1430762 RESISTOR 2.2K 0.063W 5% 0402 0402		6 PC
1	1520		R521,811,835	1430764 RESISTOR 3.3K 0.063W 5% 0402 0402		3 PC
1	1530		R110,113,118,200,717,735,807,815,821, 1430770			10 PC

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 23.11.1999

BILL OF MATERIAL
25.11.1999
Basic data text:
muutos 1345

Nokia ecommunications,
Material: Material description:
0311687.C08 LOGIC+RF-PARTS HL DBAG

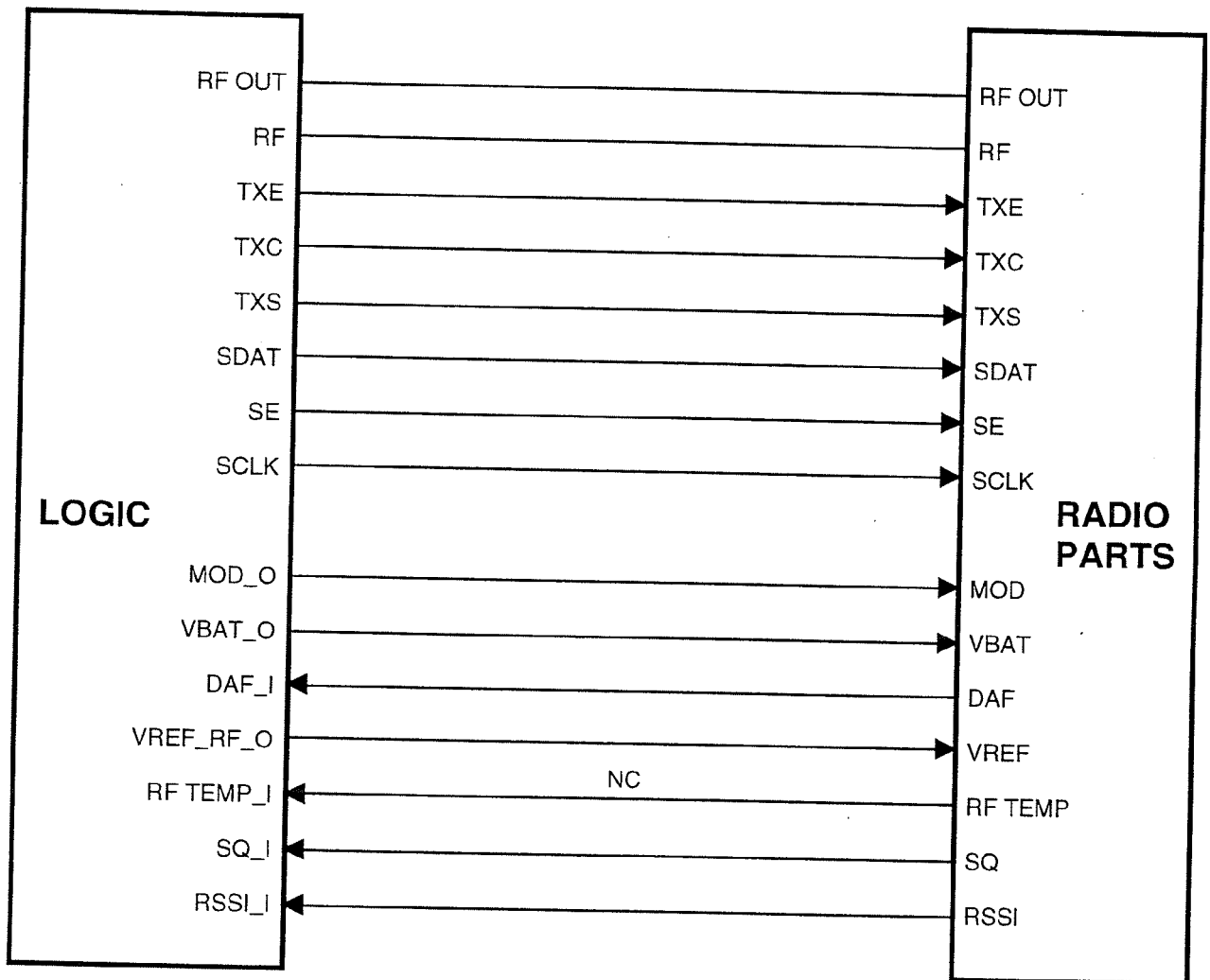
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1	1180		C518,519,533	2321420 CERCAP 10V Y5V Z 10V 0603		3 PC
1	1190		C636	2320438 CERCAP 3.9PF NP0 B 50V 0603		1 PC
1	1200		L602	3643152 INDUCTOR 15nH 10% Q10/100MHz FR>2000M		1 PC
1	1210		L603	3643118 INDUCTOR 18nH 10% Q10/100MHz FR>2000M		1 PC
1	1220		L601,710,801,807	3643220 INDUCTOR 22nH 10% Q10/100MHz FR>1800M		4 PC
1	1230		L1-5	3643108 INDUCTOR 100nH 10% Q15/100MHz FR>800M		5 PC
1	1240		L720	3643558 INDUCTOR 5,6+-0,3nH Q42/800MHz FR>4000M		1 PC
1	1250		Q608,704	4212232 TRANSISTO UMKIN-T N X2 50V 100 UM6		2 PC
1	1260		Q814	4219922 TRANSISTO UMKINTR N&P 2XTR 50V UM6		1 PC
1	1270		Q602	4210702 TRANSISTO DTA144EE P 50V 30mA 1 SC75		1 PC
1	1280		Q603,610,812	4210674 TRANSISTO DTC144EE N 50V 30mA 1 SC75		3 PC
1	1290		IC502	4345290 ANALOG IC TDA7052AT AMP AF 500 SO8S		1 PC
1	1300		IC301	4340744 MEMORY IC 128KX8 SRAM 85NS 3.3V TSOP32		1 PC
1	1310		IC302	4348266 MEMORY IC AT24C02N-1 EEPROM 256 SO8		1 PC
1	1320		IC601	4354842 TX MODULE M68745L 3,8W 7,2V 45X12X6		1 PC
1	1330		XF702	4510544 XTAL FILT 45MHz +-6kHz/3dB 500R 12X7.5X3		1 PC
1	1340		R114	1430085 RESISTOR 82K 0.063W 5% 0603		1 PC
1	1350		R17,130,420,508,517,624,725,817,830	1430690 RESISTOR 0R 5% 0.063W 0402		9 PC

STATUS: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 23.11.1999

BILL OF MATERIAL
 25.11.1999
 Basic data text:
 muutokset 1345

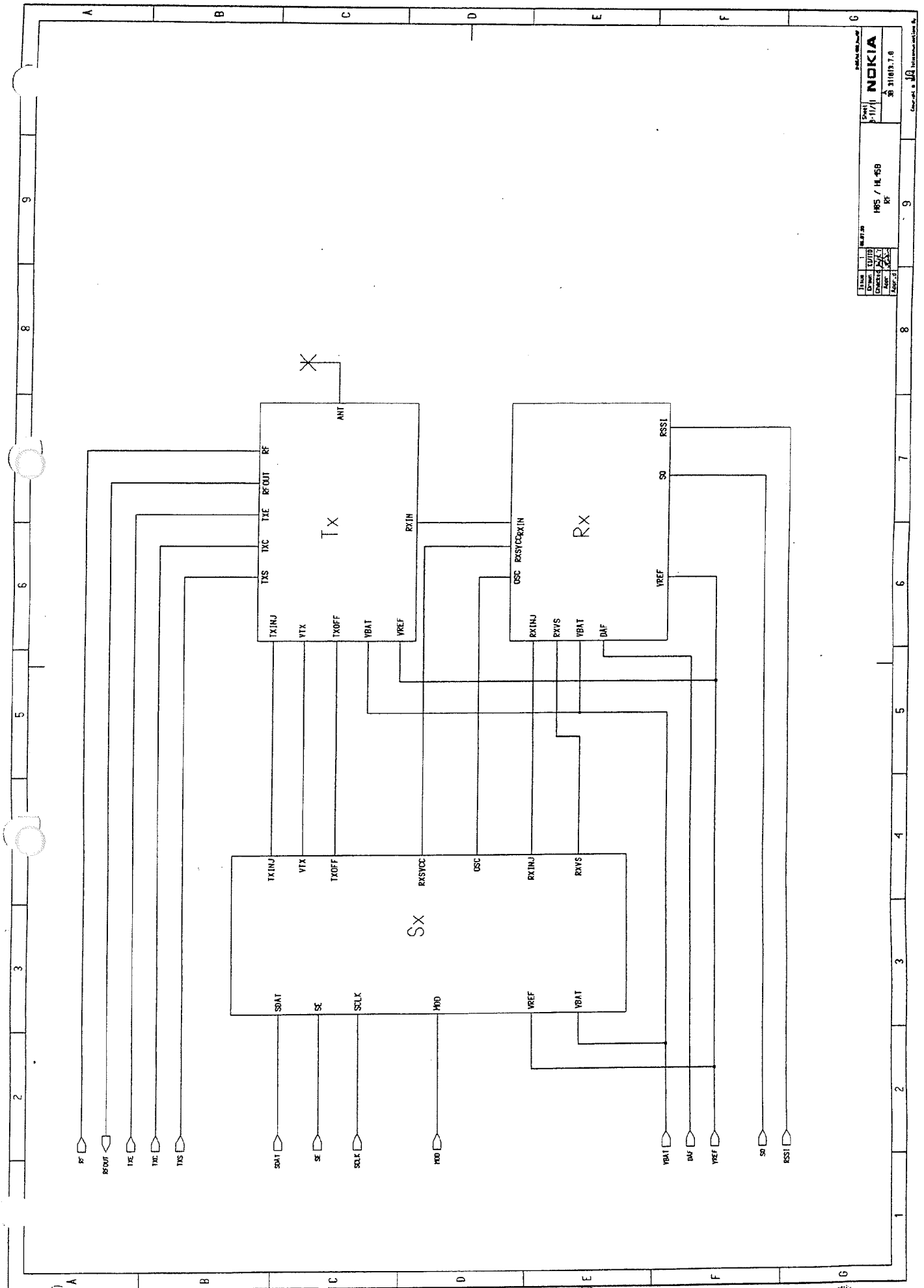
Material: Material description:
 0311687.C08 LOGIC+RF-PARTS HL DBAG

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1000			9882491.7 PCB HL450 1,0MM		1 PC
1	1010		C634,737,815	2613538 TANTCAP 10UF CAS M 16V 3528		3 PC
1	1020		T701	3640404 TRANSFORMER CHIP 500-2500MHZ 4:1		1 PC
1	1030		D701	4115802 SCHOTTKY DIODE 4V 30mA <1pF PAIR I		1 PC
1	1040		Q701	4210074 TRANSISTOR N 20GHz 4,5V 35mA 1		1 PC
1	1050		XF701	4511804 SAW-FILTER 858,5+-7,5MHz 3,8X3,8		1 PC
1	1060		IC101,102	4340164 ANALOG IC TK11247EMC REG. 4.7V SSO6		2 PC
1	1070		IC100	4370084 CUSTOM IC MUUMI POWER SUPPLY		1 PC
1	1080		XF704	4514500 CERFILTER 450+-4kHz/6dB 1500R 12X8X4		1 PC
1	1090		IC500	4374034 CUSTOM IC NIP3 AUDIO/SIGNALING TQFP64		1 PC
1	1100		Q601	4213246 MOSFET BF904WR N 7V 30mA SOT323R		1 PC
1	1110		Q605,606	4213738 MOSFET BF998WR N 12V 30mA SOT323R		2 PC
1	1120		D501,504,601,801	4110752 DIODESCHO BAS70-04 70V 70mA 410 SOT323		4 PC
1	1130		IC400	4344074 PROCES IC HD6433044S MCV 16/8BI TQFP100		1 PC
1	1140		IC300	4344132 MEMORY IC M39432-15V FLASH/EEPROM TSOP40		1 PC
1	1150		D1,101,103	4100189 SCHOTTKY DIODE 70V 70mA 0,41V/1mA		3 PC
1	1160		PF2	5469720 CONNECTOR 16AF+IRF+4DC+JACK PITCH 1.0mm		1 PC
1	1170		ML601	9212264.1 SEMI-RIGID COAXIAL H80		1 PC

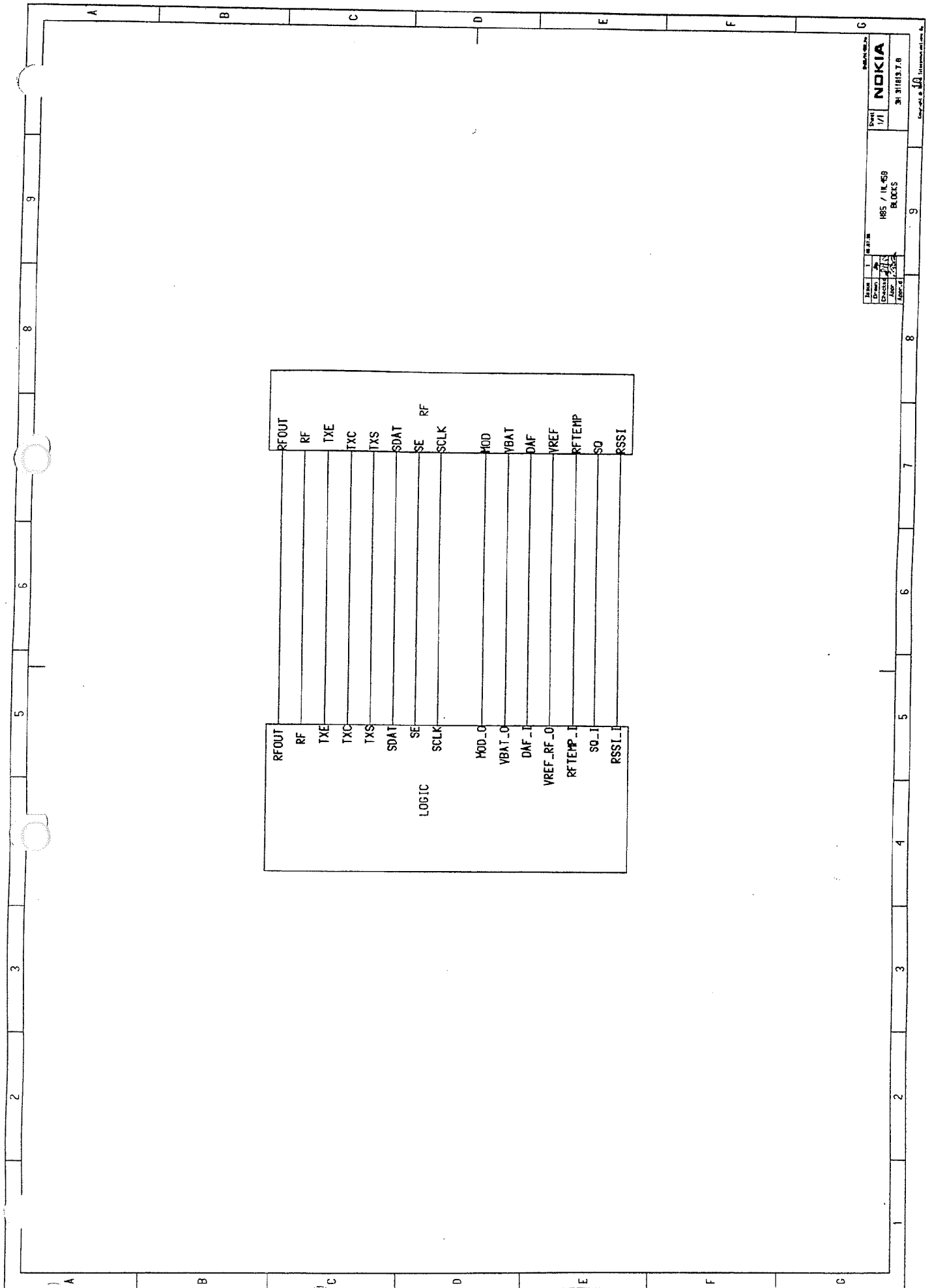


NC = NOT CONNECTED

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								PREPD	HE
				H85				CHKD	
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								ARCHVD	
REV.				DATE		PREPD		APPRD	
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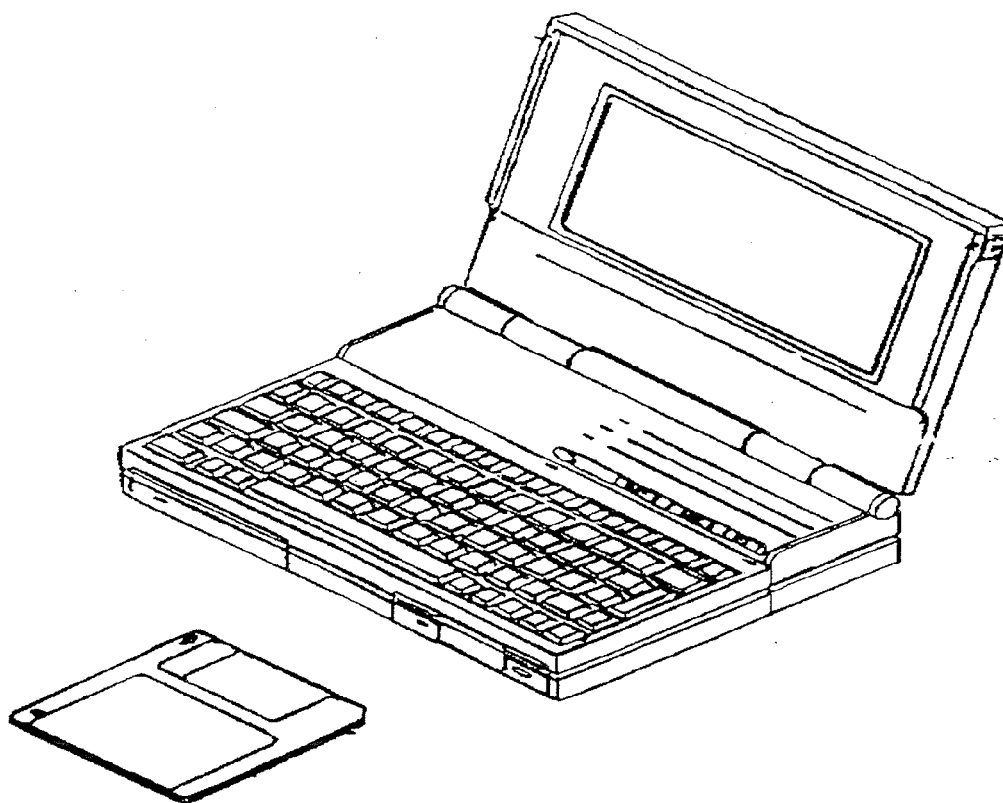
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Rev.	1.0	311013.1.0
Doc. No.	HL 458	RF
Doc. Rev.	1.0	311013.1.0
Doc. Date	1997.12	
Doc. Author		
Doc. Checker		
Doc. Approver		



Nokia	
Part	1/1
Doc No	185 / 11459
Doc Title	BLOCKS
Doc Rev	1.0
Doc Date	2001/03/08
Doc Size	311813.7 B

NOKIA

PCLOCALS H85



INSTRUCTION MANUAL for PCLOCALS PROGRAM

NOKIA H85 HANDPORTABLE

PCLOCALS H85

NOKIA

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1 GENERAL

The PCLocals software is servicing and tuning program for PMR radios of Nokia Cellular Systems. The software replaces the separate service control units, which were earlier used to test and tune mobile radio's functions.

1.1 Main functions

The PCLocals software consists following functions:

- * browsing of the radio parameters
- * setting of the default parameters to the radio
- * initialization of an EEPROM
- * initialization of the radio to the Local Mode
- * radio power control
- * channel control
- * transmitter power control
- * audio path control
- * microphone gain control
- * single tone & DTMF control
- * D/A converter testing
- * A/D converter reading
- * FFSK data sending control
- * monitoring of received FFSK frame status
- * display and light control
- * testing of a call set up
- * error code reading
- * software version and identification code reading
- * reading and writing of the EEPROM
- * tuning of the transmitter power levels
- * tuning of the FFSK modem deviation
- * tuning of the transmitter deviation
- * tuning of the audio path
- * measuring and setting of the battery voltage reference value
- * measuring and setting of the charge voltage reference value
- * measuring and setting of the signal strength measurement compensation value
- * counting and setting of the interference channel values
- * counting and setting of the reference levels of L0, L1 and L2

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1.2 Abbreviations

AGC	Automatic Gain Control
AMAN	Software for parametrization of mobile radios
A/D Converter	Analog/Digital Converter
BIOS	Basic Input/Output System
DOS	Operating system for PC by Microsoft
DTMF	Dual Tone Multi Frequency
D/A Converter	Digital/Analog Converter
EEPROM	Electrically Erasable Programmable Read Only Memory
FFSK	Fast Frequency Shift Keying
COMPANDER	Includes both Compressor and Expander
MBUS	Connection Bus between PC and Mobile Radio
MDA	Monochrome Display Adapter
NIPA	Audiofrequency/modem circuit
PC/AT	Personal Computer
PMR	Private Mobile Radio
PWM	Pulse Width Modulation
RS232	Serial Connection Standard
VGA	Video Graphics Array

1.3 Equipment configuration

With the PCLocals program user will get following equipment seen in picture1. This configuration is used for example to measure and tune the whole handportable.

1.4 Connection to the PC

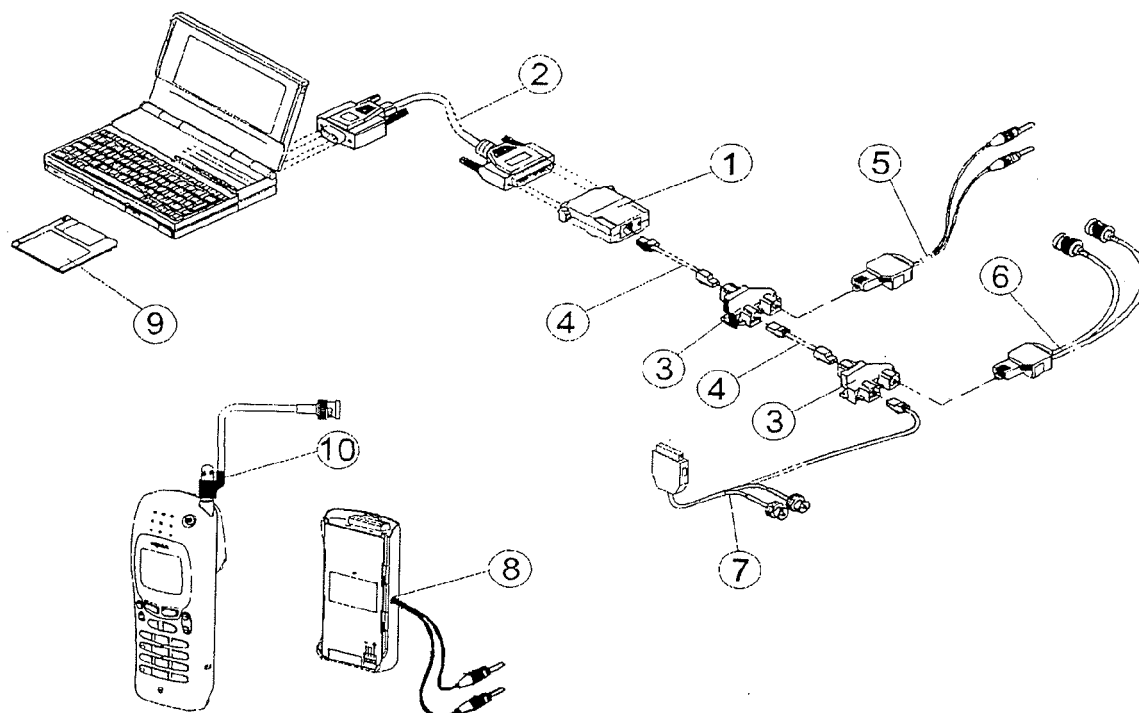
Switch off the PC when you make the connections, so that the PC's serial port or RS232/MBUS adapter won't get damaged.

Attach the PC/MBUS DAU-2 adapter (1) to the serial port COM1 or COM2 (D25 or D9 male connector). Check the position of the serial port from the manual of your PC if necessary. Use RS-232 adapter (2) if you are going to connect PC/MBUS adapter to 9 pin D-connector.

NOTE! Make sure that you have switched off the PC also when you detach the equipment from the PC.

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Picture 1
Tuning set

Part	Name
1	0750006 PC/M2BUS adapter, DAU-2T
2	4626170 RS-232 adapter (9-pin / 25-pin)
3	4626134 Modular T-connector
4	4671645 Modular cable XCM-1S
5	0770036 Modular power connector SCF-6M
6	0730011 Audio cable ADS-1
7	4671666 RF-service cable SCF-80
8	4671338 Dummy battery pack
9	4670668 PCLOCALS software (3.5" disk)
10	4671667 Antenna RF-cable

2 PCLOCALS PROGRAM

2.1 Hardware requirements

The minimum hardware requirements which your computer (PC) needs to run PCLocals are in the following list:

- IBM PC/AT compatible PC
- operating system DOS 3.3 or later
- 512 kB of free conventional memory (RAM)
- 80*25 display (MDA, CGA, EGA, VGA, SVGA)
- 2 MB of free hard disk space
- a free serial port (COM1 or COM2)

2.2 Installing the program

The program disk consists an installation program, which copies all required files to the desired directory in your PC's hard disk. Insert the PCLocals diskette into drive A and start the program with command

A: INSTALL drive name:\directory

In the command A: describes the source drive, where the diskette is (can be also B:). Through this command you give the directory path where the PCLocals program will be installed. If the given directory does not exist, the program will create it.

NOTE! If you do not give any directory name, the installing program will set the PCLocals program to the hard disk C: in directory \PCLOCALS.

At the beginning the installing program shows the directory, where the PCLocals will be installed. If you want to interrupt the installation in this point (nothing has been done yet), press Ctrl and C buttons at the same time and answer to the question "Terminate batch job (Y/N)" Y. Pressing of any other button will start the installation. Finally the installation program will start the PCLocals program.

For example installing the program to the hard disk C: to the directory \SERVICE

A:INSTALL C:\SERVICE

2.3 Starting the program

When the PCLocals program has been installed and the equipments are mounted and connected to the serial port of the PC, the program can be started. The program is started (from the directory where it has been installed) with command

PCLOC system [textmode][video control][com port]

where:

- system = HE85DBAG
(type of the radio, see type plate)

- [textmode] = CO80 (80x25 color display) or
BW80 (80x25 black and white display) or
MONO80 (80x25 monochrome display) or CURRENT
- [video control] = HWV (hardware display driver) or
BIOSV (BIOS display drive)
- [COM PORT] = COM1 or COM2 (serial port where
RS232/MBUS adapter is connected)

For example to change the serial port to COM2 the command is:

PCLOC HE85DBAG COM2

There is no need to take care of the other settings of the serial port (like speed, parity etc.), because the program set those automatically with the handportable. The format of the command and parameter alternatives can be seen by command **PCLOC ?** or **PCLOC /h**.

The PCLocals program can be started also without parameters (by command **PCLOC**) with default parameters, which are in file PCLOC.DAT. If some parameters are given, the type of the handportable (system parameter), should always be given as first parameter. The other parameters are optional. So those are not compulsory and only the desired parameters can be given (one alternative for each parameter).

Hint: Each time you start the PCLocals program with the command PCLOC without parameters the PCLocals works with parameters which were set last time. So when you have once set the correct parameters, there is no need to be worry from those after that.

2.4 User interface

In the PCLocals program there is a window based, menu controlled user interface. The functions are started from the menu either with corresponding number key or with arrow keys and ENTER. The selection of the function and starting of it is always advised in current menu. You can return back in menu structure by pressing ESC. The program gives all the time advices from the use of the program, how to continue or what should be done next. In addition to that, at the beginning of some tests, there is told, how the tuning should be done, or when the handportable is tuned in correct way (e.g. when the measured power from antenna connector is 2 W). The program prints the testing and measuring results to the display in own window. If the selected test can not be done (e.g. the transmitter is not ON), it is mentioned in the window which appears to the middle of the display.

To make the use of PCLocals easier some keys have always the same meaning all over the program.

- | | |
|------------|---|
| F1 | pass the selection |
| F2 | save or write the settings to the handportable |
| F3 | set predefined or default values |
| F5 | sets same value to all subbands |
| ESC | interrupt the function or return back in menu structure |

3 FUNCTIONS OF THE PCLOCALS

3.1 Main menu

The functions of the program is divided to three groups, which are chosen from the main menu with corresponding number key 0-2 like follows:

- * **0** - Parametering
- * **1** - Local Commands
- * **2** - Tuning

By selecting 0 you can either examine current parameters of the handportable or write default parameters to the handportable. Selection 1 enables the testing of the various handportable functions. Selection 2 is for tuning and adjusting of the handportable. Prior to starting the functions put the handportable to the mounting bracket and switch power on by pressing power switch.

You can exit from the PCLocals program by pressing **Q** (Quit) in the main menu.

3.2 Parametering

The selection of the Parametering (0) function from the main menu gives the tuning parameter menu to the display. There can be chosen either viewing of current tuning parameters (1) or writing of default parameters (2) to the handportables non-volatile EEPROM memory. Also (3) initialization of an EEPROM to factory settings can be chosen. The selection of the function is done according to corresponding numbers like in the main menu. The return to the main menu is done by pressing ESC.

NOTE! The system parameters, like subscriber number, can not be changed with this program. Use AMAN software for this purpose.

3.2.1 View phones current parameters

Viewing of the handportable parameters shows current value of the parameters and their default values. The default values which is seen on the display, can be written to the handportable by pressing F2 key. You can exit the function (and return to the parametering menu) by pressing ESC.

3.2.2 Write default phone parameters

This function is used to set all tuning parameters of the handportable to the default values. (The parameter default values are read from a disk, where is default tuning information).

NOTE! The tuning of the handportable is done with functions of Tuning submenu.

Important! If the EEPROM memory has been reset (e.g. in fault situation), the default parameters should be written to the handportable before making any other test functions. Otherwise the functions of the handportable might be unpredictable, if there are undefined parameters.

3.3 Local commands

The Local Commands includes functions, through which functions of the handportable can be tested and controlled manually. When using Local Commands the signalling of the handportable should be stopped e.g. with function Initialize Local Mode. This is done automatically, when some function is chosen from the main menu.

The desired function can be selected with arrow keys (the selected function is lighted) and started by pressing ENTER. You can return from the Local Commands submenu to the main menu by pressing ESC.

3.3.1 Initialize local mode

This function sets the handportable to the local mode. The calling of the function switches power off for a while, the display and the lights get dark, and then power is switched on again. When the handportable goes to the local mode, the text "Local" appears on the display, and receiver's audio signal is connected to the speaker. When the initialization is over, the program returns automatically to the Local Commands submenu. When the handportable is in the Local Mode, the signalling is stopped and peripheral devices are set for testing and tuning.

3.3.2 Device power control

The Device Power Control function brings to the display of the PC a submenu, where the power of the handportable can be switched either on (1) or off (2). Return to the Local Commands menu is done by pressing ESC. When the power is switched off the display and lights get dark. When the power of the handportable is switched on, the lights will turn on, battery indicator and field strength indicator will appear to the display and the handportable goes to the local mode.

NOTE! The condition for starting is that the charger should be connected to the equipment.

3.3.3 Channel control

Channel Control test enables setting the transmitter and receiver to the desired channel. The transmitter and the receiver can be set directly either low (1), middle (2) or high channel (3). The handportable can be set to any channel (observe channel and frequency range restrictions) by entering either logic number of the channel (4) or frequency of the channel (5) in the Channel Window. The frequency of the channel is entered in MHz and the frequency should be divisible by channel spacing. The entering is stopped by pressing ENTER. With number 6 can be selected whether the transmitter or the receiver is on. If the radio is a duplex type, the receiver is on even if the transmitter is on. The status of transmitter and receiver can be seen in Rx/Tx Window (Receiving if receiver is on and Transmitting if transmitter is on). Number 7 selects the transmitter power, number 8 the microphone signal connected to the transmitter, number 9 the earphone used and 0 selects what signal is connected to the selected earphone. You can exit the test to the Local Commands menu by pressing ESC.

3.3.4 Audio control

This test enables the testing of the audio frequency parts. With letters a–c is selected the sound source which is connected to the speaker amplifier.

- * **a** receiver directly (DAF line from NIPA)
- * **b** DTMF signal generator
- * **c** earphone is muted

With letters d–g is selected the sound source which is connected to the microphone amplifier.

- * **d** microphone of the handportable
- * **e** external microphone
- * **f** DTMF signal generator
- * **g** mute

With letter **h** you can select if the handportable's speaker or external speaker is used. Letter **i** selects if the compander is used or not. With the letter **j** AGC is set on and off. With the letter **k** volume can be adjusted. The volume level can be changed with arrow keys from steps 1 to 5 (arrow up increases and arrow down decreases). With the letter **l** the speaker amplifier is switched on and off. With the letter **m** the level of speaker signal can be changed (silent or loud). You can exit the test by pressing ESC.

3.3.5 Mic gain control

This test is used to test the microphone gain control. If the microphone amplifier is muted in test 5 (Audio Control), the Microphone Gain Control test can not start and an error message is given. In that case remove the muting of the microphone amplifier in test 4. The microphone gain is controlled with arrow keys between 0–15 (arrow up increases by 1, arrow down decreases by 1, arrow right increases by 2 and arrow left decreases by 2). In addition the letter **m** selects 0 or 15 dB gain for microphone preamplifier. You can exit the test by pressing ESC.

3.3.6 Single tone & DTMF control

This test enables checking the function of sound generators. The sound can be selected with letters **A–H** (single frequencies), or with numbers **0–9** and characters ***** and **#** (DTMF signals). The frequency of the generated sound can be seen next to the corresponding letter, number or character. In addition to that the route, where the sound is connected, can be selected (**L** to transmitter, **M** to receiver = speaker or **N** to buzzer). Function key **F3** is used to mute sounds. You can exit the test by pressing ESC.

3.3.7 D/A converter testing

This test enables testing the function of the D/A converter by changing the pulse ratio of PWM outputs. With the number 1 the transmitter power level

control (PWM0/TXC duty cycle) is tested and number 2 battery charge control (CSW). In all tests the pulse ratio can be changed with arrow keys (arrow up increases by 1, arrow down decreases by 1, arrow right increases by 5 and arrow left decreases by 5). You can exit the test by pressing ESC.

3.3.8 A/D converter reading

A/D converter reading test reads charge voltage, battery voltage, temperature, type and received signal strength all the time and shows the results on the display. Also squelch information and accessories detection values are displayed. You can exit the test by pressing ESC.

3.3.9 FFSK data sending control

This command is used to test FFSK modem transmission functions in different channels. The transmitter channel can be selected by typing either logic channel number (1) or frequency (2) of the desired channel. When the channel is selected, observe channel and frequency range restrictions. The frequency of the channel is entered in MHz and the frequency should be divisible by channel spacing. The entering is stopped either with ENTER or ESC. With the number 3 the transmitter power level can be adjusted either low or high, and number 4 starts the transmission of bits. Transmission function starts automatically the transmitter (it is not necessary to put transmitter on e.g. in test 3), and bits 0101010... is transmitted as long as some key is pressed. You can exit the test by pressing ESC.

3.3.10 Display test & light control

The display and light control test consists 5 different tests, which can be chosen with numbers 1–4 and 6. Number 1 fills the hole display; all pixels are lighted. The selection 2 clears the display and also the field strength and battery capacity indicators disappear. Selections 3 and 4 are for testing the lighting of the handportable. The selection 3 switches the lights on (if the lights were already on, nothing happens on the display). The lights are turned off by selecting 4. At the same time the display will turn off, but the contents of the display is kept in the memory.

The function of the display can be tested by typing a desired message to the display. With the selection 5 the default message can be edited (ABC-DEFH0123456789). The editing of the message can be done with standard editing keys (arrow keys, space bar etc.). The editing is stopped by pressing ENTER. The message from the PC's display can be written to the display of handportable by selection 6. You can return to the Local Commands menu level by pressing ESC.

3.3.11 Call control

This test is used to create and answer call. The test sets the handportable automatically to SERV mode. With the selection 1 you enter a number to call. The entering of the number is stopped by pressing ENTER. Dialling to the number, which is entered in selection 1, starts by selecting 2. Selection 3 changes the state of call initiate/terminate button. When you exit the test by pressing ESC, the handportable returns automatically to the Local mode.

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3.3.12 Reading error codes

This test prints all error codes, which are in the handportables memory, to the display. You can return to the Local Commands menu by pressing any key.

3.3.13 SW version, identification codes

This test enables printing, changing and saving of the handportable identification codes. The test prints also software version and date and time, when the software has been load. The selections 1–4 changes identification codes (1 product version, 2 handportable serial number, 3 customer identification code and 4 lock code). The entering of the codes is stopped by pressing ENTER. The identification codes can be stored to the handportable memory by pressing function key F2. By pressing function key F3 identification codes get the default values. You can exit the test by pressing ESC.

3.3.14 EEPROM control

The EEPROM Control test enables either reading of handportable EEPROM memory contents to a file (1) or moving contents of the file to EEPROM memory (2). Before reading or writing of EEPROM memory the default name of the file is shown. Name of the file can be changed to desired one (the name has to be according to DOS rules). The reading or writing starts when ENTER key is pressed. If there is found a file with the same name during the reading of the EEPROM, the program asks if you want to over write it. If the answer is N (No) the reading of the memory is interrupted. In the same way if the given file name is not found during memory writing, the function is aborted and an error message is given. The reading and writing can be interrupted any time by pressing ESC. You can exit the test also by pressing ESC.

3.4 Tuning

The selection of Tuning function (2) from the main menu brings a submenu with 13 different tuning and control functions to the display. The handportable is tuned by changing tuning parameters which are stored in the EEPROM memory. If necessary, all tuning parameters can be changed to default values with Parametering – Write Default Phone Parameters function. The desired function is selected with arrow keys and ENTER as in Local Commands submenu.

The parameter values can be changed with arrow keys in different tuning situations. Function key F2 stores currently handled parameter value to the handportable's memory. In some functions function keys F1 (accept the value, but it won't be stored), F3 (accepts the same value than in previous selection to the parameter) and F5 (stores same value for all parameters in same function to the handportable's memory) can be used also. You can return from each tuning function to the Tuning submenu by pressing ESC.

At the beginning of most tuning function there is an introduction window, where is told how the tuning is done. In this window is given also exact values for test signals and how the measurements are done in this case.

3.4.1 Initialize local mode

This function is similar to Local Commands test 1, see 5.3.1 Initialize Local Mode.

3.4.2 Tx Low level tuning

This function enables tuning of the low power level in different sub-bands. The power level of transmitter is tuned to a defined value in the introduction window by changing tuning parameter. The proper tuning starts when any key is pressed and introduction window disappears. The tuning window appears and there the tuning value of power level can be changed one sub-band at the time starting from sub-band 1. In the tuning window is seen both current sub-band and channel, as well as current and new tuning value of the power level. The power level is changed with arrow keys (arrow up increases by 1, arrow down decreases by 1, arrow right increases by 5 and arrow left decreases by 5). Besides the channel which is tuned can be changed with PC's dedicated number keys (in the right side of the keypad). Number 8 increases the channel by 1, number 2 decreases the channel by 1, number 6 increases the channel by 5 and number 4 decreases the channel by 5.

When the handled sub-band is tuned to right value pressing of function key F1 accepts the new value for power level and moves to next sub-band. With the function key F2 the sub-band's tuning value can be stored to the EE-PROM memory of handportable and move to next sub-band.

With the function key F3 the same tuning value can be given as in earlier radio/sub-band. The equal tuning values of all sub-bands can be stored to the memory of handportable at once by pressing function key F5. You can exit the test by pressing ESC.

3.4.3 Tx high power level tuning

This function is similar to Tx Low Level Tuning. In this case the power level has different value, which is defined in the introduction window.

3.4.4 FFSK deviation tuning

This function enables tuning of FFSK modem deviation to right value in different sub-bands. FFSK deviation is tuned by changing the tuning parameter, which is in the introduction window, to defined value. The tuning of the FFSK modem deviation is similar to transmitters power level tuning (Tx Low/High Level Tuning). If necessary look instructions from section 5.4.2.

3.4.5 Nominal deviation tuning

This function enables tuning of transmitter nominal deviation to right value in different sub-bands. Nominal deviation is tuned by changing the tuning parameter, which is in the introduction window, to defined value. In the introduction window there is defined also the test signal which is used in tuning. The tuning of the nominal deviation works similar to tuning of the transmitter

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power level (Tx Low/High Level Tuning). If necessary look instructions from section 5.4.2.

3.4.6 Maximum deviation tuning

The Maximum Deviation Tuning works similar to Nominal Deviation Tuning. The test signals and deviation levels are mentioned in the introduction window.

3.4.7 Audio tuning values

This test enables tuning and controlling of handportable audio part. The tuning target is selected from the list with number keys as follows:

- * **Q** – microphone sensitivity in headset use
- * **W** – microphone sensitivity in speaker use
- * **E** – external microphone sensitivity
- * **R** – DTMF tone sensitivity
- * **T** – earphone medium level volume in handset use
- * **Y** – earphone medium level volume in speaker use
- * **U** – external speaker medium level volume
- * **I** – buzzer volume
- * **O** – DTMF tone volume (when call is not going on)
- * **P** – DTMF tone volume (during a call)
- * **A** – receiver volume compensation
- * **S** – earphone level in handset use
- * **D** – earphone level in speaker use

The selection of the tuning target brings to PC's display a window, where is seen what is going to be tuned, tuning value limits, current and new value. The tuning values is changed with arrow keys (arrow up increases by 1, arrow down decreases by 1, arrow right increases by 2 and arrow decreases by 2). To return to back to tuning target list, is done either by pressing ESC (new tuning value is not stored) or F2 when the new tuning value is stored to the EEPROM memory of the handportable. You can exit Audio Tuning Values test by pressing ESC.

3.4.8 Battery voltage reference value

This test enables setting of battery charge reference value. After starting the test to PC's display appears an announcement that a reference voltage has to be connected to the handportable's VBAT connector from external power supply. If necessary check the position of the VBAT connector from service manual. When the reference voltage is connected to the connector, press any key and A/D conversion value of reference voltage is read from the handportable. At the same time is shown also the reference value which is stored to the EEPROM memory of the handportable. The A/D conversion can be repeated by pressing ENTER. Measurement value can vary a little bit case by case. A new reference value can be stored to the EEPROM memory by pressing function key F2. You can exit the test by pressing ESC.

3.4.9 Charge voltage reference value

Setting of the Charge Voltage Reference Value works similar to setting of Battery Voltage Reference Value in section 3.28, but reference value from external power supply is connected to handportable's VCS connector. If necessary check the position of the VCS connector from picture 1, page 7 (power cable of T-connector).

3.4.10 RSSI compensation value

This test enables setting of compensation value for signal strength measurement. The signal, which is fed to the antenna connector in the measurement of the compensation value is defined exactly in the introduction window. The measurement of the compensation value starts when any key is pressed, the introduction window disappears and instead of it compensation value measurement window appears. A/D conversion value is read several times so that mean value of compensation value is found. In that way inaccuracy caused by coincidence is avoided. The measurement can be repeated by pressing ENTER. The measured value can vary a little bit case by case. A new compensation value can be stored to the EEPROM memory by pressing function key F2. You can exit the test by pressing ESC.

3.4.11 Interference channel values

This test enables moving the frequency of microprocessor crystal in defined channels, so that harmonic frequencies are not in receiver's channel frequency.

At the beginning of the test software reads automatically frequency of the crystal from the memory of handportable (it is measured and stored into the memory in factory). The frequency of the crystal can be moved 20 channels at most. The channels which needs moving can be defined either with software (1) or manually (2). If the channels are defined with software, exact frequency of the crystal has to be given (factory value as a default). This is a basic information when the software calculates interference channel. If the interference channels are defined manually, type the channel numbers one by one and store those to the memory by pressing F2. The typing of the channels is stopped by pressing ESC. You can exit the test by pressing ESC.

3.4.12 Level L0, L1 and L2 tuning

This test is used to adjust the reference levels L0, L1 and L2, which the phone is using when in trunkin mode. The current reference values are shown in a window, with corresponding dBm-values. The reference level to be adjusted is selected by entering first the corresponding number. The adjustment is done by cursor keys: up arrow increases the dBm-value by one, down decreases by one. Arrow right increases the value by two, left decreases by two. New value is stored in to an EEPROM by function key F2 or ESC returns back to the selection window. ESC also exits the test.

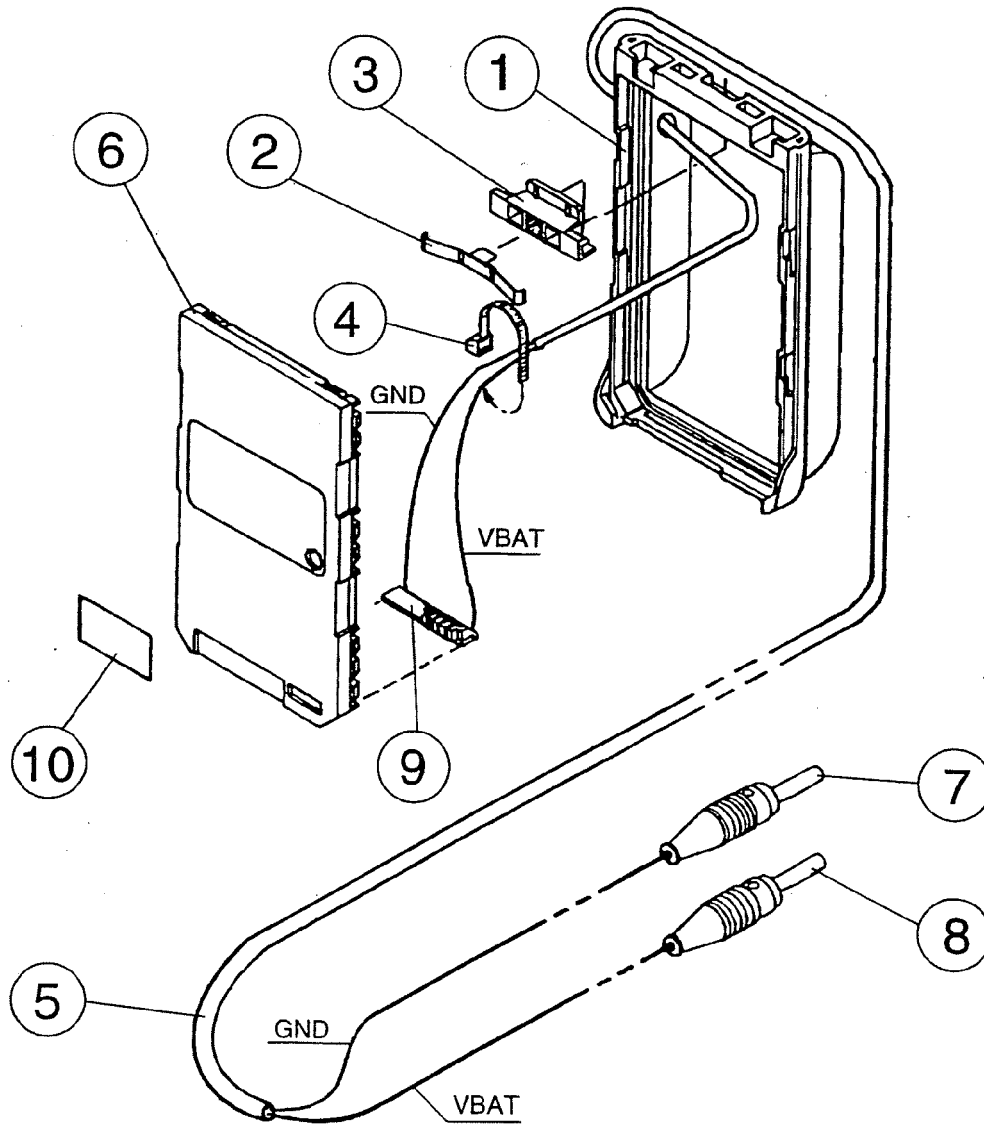
Status: 01 Approved
 Usage: 2
 Plant: FI02
 Alt: 1
 Valid: 14.04.2000

BILL OF MATERIAL
 17.04.2000

Material: Material description:
 0610174.1 DUMMY BATTERY BTF-80

Basic data text:

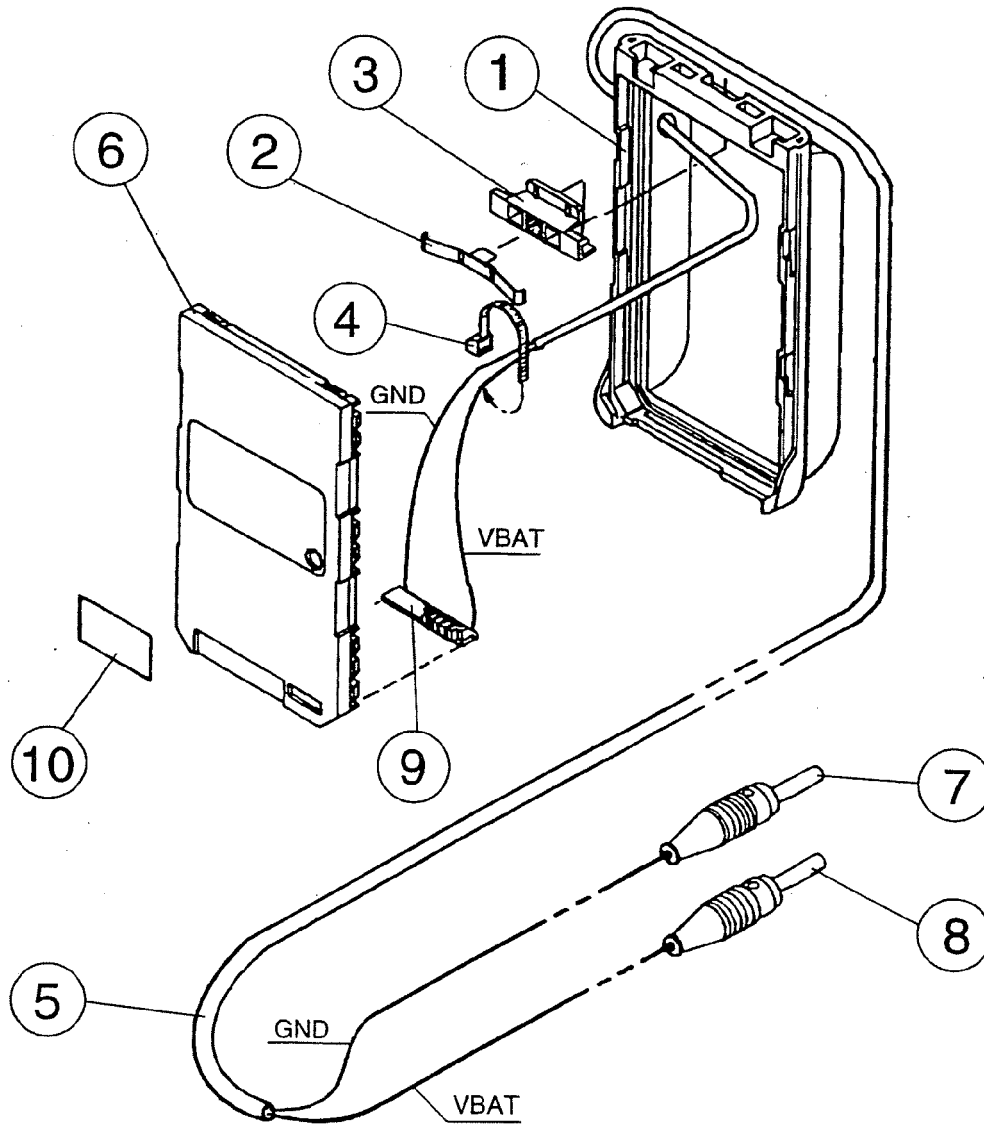
Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1000			0311768.A01 DA-85D H85 BTF-80 DUMMY BATTERY		1 PC
1	1010			9212296.3 BATTERY COVER DUMMY BATT. BTF80		1 PC
1	1020			9214479.1 BATTERY LID		1 PC
1	1030			9211694.2 BATTERY LOCK		1 PC
1	1040			9510250 PLATE SPRING		1 PC
1	1050			5444105 BANANA PLUG D4mm BLK		1 PC
1	1060			5444112 BANANA PLUG D4mm RED		1 PC
1	1070			6400929 CABLE TIE 98mmX2.4mm BLK		1 PC
1	1080			7132136 CABLE 2x0.75MM2 BLACK		0,80 M
1	1090			9380535 TYPE LABEL (40.0x22.0)		1 PC



Old NTC Code 4671338

\\H85\DRAWING\0610174.DS4

NOKIA H85 / HRU600 BTF-80 Dummy battery				SCALE	PREPD	HE	17.04.00
					CHKD	<i>TH</i>	18.4.00
					APPRD	<i>KTC</i>	18.4.00
					ARCHVD		
REV.	DATE	PREPD	APPRD	4C 0610174.1			



Old NTC Code 4671338

\\H85\DRAWING\0610174.DS4

NOKIA H85 / HRU600 BTF-80 Dummy battery				SCALE	PREPD	HE	17.04.00
					CHKD	<i>TH</i>	18.4.00
					APPRD	<i>KTC</i>	18.4.00
					ARCHVD		
REV.	DATE	PREPD	APPRD	4C 0610174.1			

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H85 UI foil



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1 H85 UI-foil

1.1 General

1.1.1 Related documentation

H85 UI-foil 4R311679.4

1.1.2 Introduction

The UIF module is connected with 30 pin flex connector to the logic board and 24 pin connector to the LCD module. The UIF module includes following main blocks:

- Keyboard
- Illumination
- Audio block
- LCD module interface



Note

The flexible circuits are constructed from a lamination of three layers of polyimide and two layers of copper tracks. The polyimide has almost unlimited bending capability, but the copper tracks cannot be bent to tight radii very often. At all times before the flexi circuit is installed into a phone, bending of the circuit should be avoided if possible. If the flexi circuit has already been installed into the phone, then care should be taken not to continuously fold the flexi circuit out flat and then back to its resting position too often.

1.2 Technical specifications

The UIF module has two connectors, display module connector X1 and UIF connector PP1.

1.2.1 External signals and connectors

UIF Connector PP1

Pin	Name	Description
1	VL1	Logic supply voltage 4.7V
2,28,29		Ground
3,30	VBAT	Battery voltage
4	BACKLIGHT	Backlights on /off
5...8	UIF(0:3)	Parallel data for LCD driver
9	LCD_RW	LCD driver read/write selection input
10	LCD_RS	LCD driver register selection input
11	XLCDEN_E	LCD driver chip select
12	ROW2	Lines for keyboard read
13...16	COL(0:3)	Lines for keyboard write
17	NC	Not connected
18	MIC+	Microphone (positive node)
19	MIC-	Microphone (negative node)
20	EAR+	Earpiece (positive node)
21	EAR-	Earpiece (negative node)
22	BUZZER	PWM signal buzzer control
23	XPWRON	Power on control from keyboard

24	ROW0	Lines for keyboard read
25	LCDCLK	Clock signal for display
26	ROW1	Line for keyboard read
27	ROW3	Line for keyboard read

1.2.2 Supply voltages and power consumption

Symbol	Description	Values
VL1	Logic voltage 4.7V	1.5mA
VBAT	Battery voltage 7.5V: *Buzzer max volume typical/nominal max current * Display illumination typical/nominal *Keyboard illumination typical/nominal	85mA 115mA 40mA 40mA

1.3 Functional description

The module consists of the following main blocks:

- Keyboard
- Illumination
- Audio block
- LCD Module Interface

1.3.1 Keyboard Scanning

COL(0-4) are used as column lines in keyboard. ROW(0-3) and UIF(4_5) are used as row lines. UIF(4-5) are also multiplexed with display driver control signals.

Row lines and UIF6 are used for display driver control. UIF(0-3) are used as 4 bit parallel data bus for the driver. UIF4 is used as read/write strobe, UIF5 to select data or instruction register and UIF6 as enable strobe.

1.3.2 Keyboard and Display illumination

The keyboard illumination is achieved by using two transistors wired as simple constant current sinks. Each transistor supplies eight leds. The bases of the transistors are all wired together and supplied by emitter follower V40. The led current is fixed by the values of R44 and R45 and ratio of R51 to R52.

The display illumination operates in a similar way to keyboard drivers, two transistors are used to drive eighty leds. The current in this case is defined by the value of R46, R47 and the ratio of R51 to R52.

1.3.3 Audio Circuitry

The earpiece is routed directly to the connector. The earpiece is dynamic type and impedance is 8 ohm.

Microphone is of the electret type and needs a voltage supply for operation. The sensitivity of the microphone is -62dB (0dB=1V/ybar).

The buzzer is dynamic one and the impedance is 25 ohm. Buzzer is driven from two transistor switch which acts as a buffer for a CMOS output signal applied at buzzer. The ringing volume is controlled by pulse width modulation. The diode V37 prevents damage to the transistor when switched off, absorbing the stored energy in the buzzer inductance and suppressing large positive going spikes on the transistor collectors.

Small value capacitors are fitted at critical points in the circuit to avoid problems with rf interference. One is placed directly across the microphone (C17). There is also capacitors in earphone nodes (C15 and C16).

1.3.4 LCD Module Interface

The LCD module includes the LCD and display driver. The driver TAB is connected with heat seal connection to the LCD. The LCD is FSTN type. The Duty ratio is 1/32 and the bias ratio 1/6.7. Viewing direction is 6 o'clock. The display driver is NJU6406-02 from JRC. It is used with external clock oscillator ($f=230.6\text{kHz}$). It has 9600 bit character generator ROM and 64×8 bits character RAM. The display module is connected to the UIF module with 24 pin soldered connection.

The display module contains an oscillator to generate a negative voltage required for operation. The negative going pulses appear at pin 9 of X1 where they are smoothed by C1 to give a voltage which is nominally equal but opposite to VL3.

For correct operation of the display, d.c. voltages between -VL3 and VL3 need to be generated and fed back to the driver chip, at pins 4 to 8 inclusive (of X1). The exact voltages depend on the relative values of the resistors R21, R37, R38, R39, R40 and R33.

The display driver is connected to the radio module with a 4 bit data bus. Data transfer is controlled with the following signals:
R/W selects read or write operation ("0"=write, "1"=read),
Enable activates read/write operations and RS selects the register ("0": instruction register(writing) or busy flag (reading), "1": data register).

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H85 UI foil



H85 UI-foil

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1 H85 UI-foil

1.1 General

1.1.1 Related documentation

H85 UI-foil 4R311679.4

1.1.2 Introduction

The UIF module is connected with 30 pin flex connector to the logic board and 24 pin connector to the LCD module. The UIF module includes following main blocks:

- Keyboard
- Illumination
- Audio block
- LCD module interface



Note

The flexible circuits are constructed from a laminaton of three layers of polyimide and two layers of copper tracks. The polyimide has almost unlimited bending capability, but the copper tracks cannot be bent to tight radii very often. At all times before the flexi circuit is installed into a phone, bending of the circuit should be avoided if possible. If the flexi circuit has already been installed into the phone, then care should be taken not to continuously fold the flexi circuit out flat and then back to its resting position too often.

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Small value capacitors are fitted at critical points in the circuit to avoid problems with rf interference. One is placed directly across the microphone (C17). There is also capacitors in earphone nodes (C15 and C16).

1.3.4 LCD Module Interface

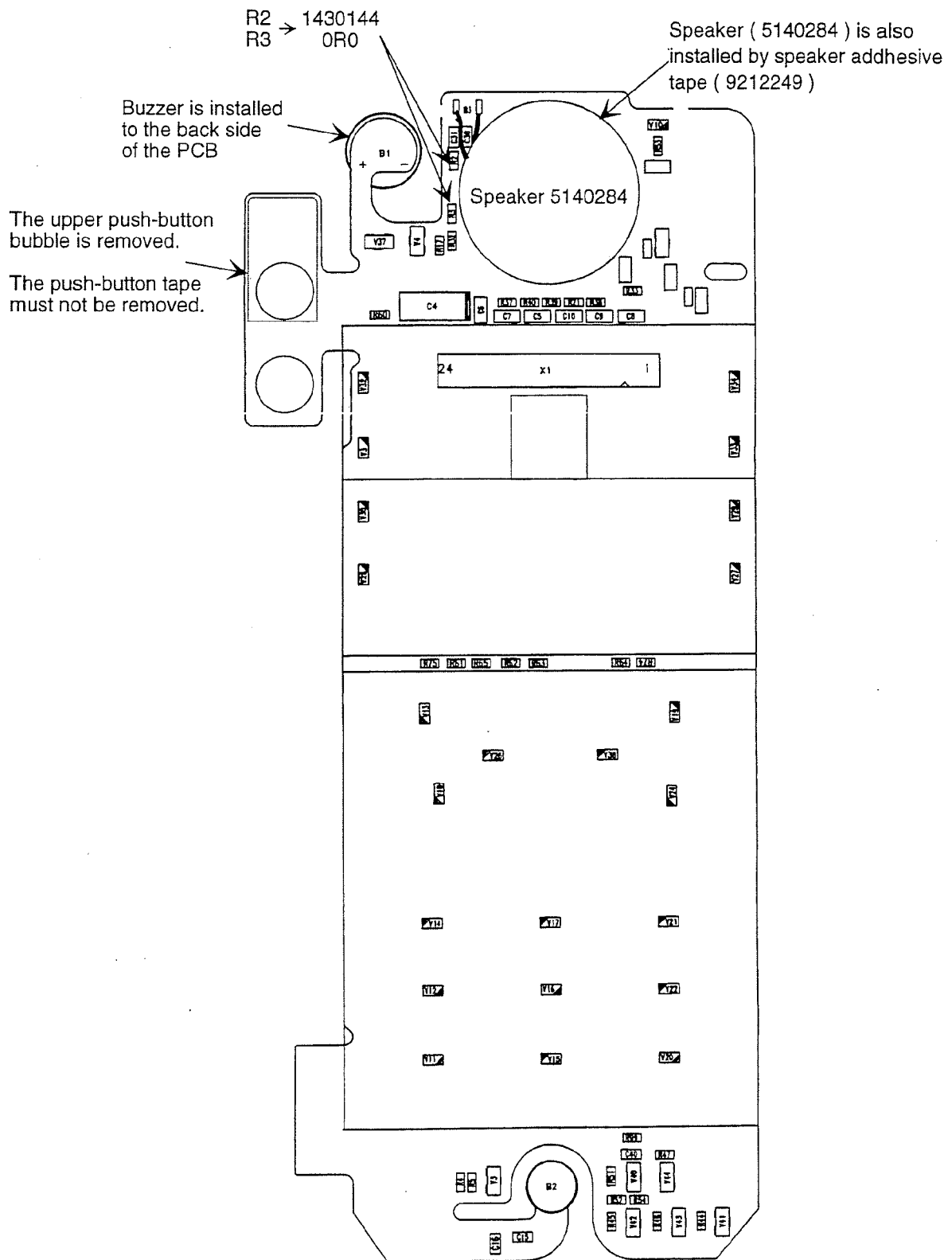
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The display module contains an oscillator to generate a negative voltage required for operation. The negative going pulses appear at pin 9 of X1 where they are smoothed by C1 to give a voltage which is nominally equal but opposite to VL3.

For correct operation of the display, d.c. voltages between -VL3 and VL3 need to be generated and fed back to the driver chip, at pins 4 to 8 inclusive (of X1). The exact voltages depend on the relative values of the resistors R21, R37, R38, R39, R40 and R33.

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4	6.10.97	HE		H85				
3	5.9.97	HE	MMä	UI-foil				
REV	DATE	PREPD	APPRD					4R 311679.4

kia

BILL OF MATERIAL
28.12.1999

Status: 01 Approved
Usage: 2
Plant: FI02
Alt: 1
Valid: 04.10.1999

Serial: Material description:
11679.A02 UI-FOIL

Basic data text:

Item	Alt	Part number	Component number	Component description	Component basic data text	Document no.	Issue	Quantity	Unit
1000			9855029	UI-FOIL (GU3F)				1	PC
1010			5140284	SPEAKER 8R 0.5W D28 H4.5				1	PC
1020			1430144	RESISTOR 0R 0.063W Rmax.=50mohm 0603				2	PC
1030			9212249.1	SPEAKER ADHESIVE TAPE H85				1	PC
1040			9795004	KEYDOME FUJIKURA EUROPE NKA-016C				1	PC
1050			9795006	KEYDOME SIDE FUJIKURA EUROPE NKA-016B				1	PC

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H85 CONNECTIONS

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1 CONNECTIONS BETWEEN UNITS

1.1 General

The handportable has been built from two units, logic (HL450) and UI-foil (GU3F). The logic unit has two connector, internal UI-foil connector (PP1) and external bottom connector (PP2).

This document is a description of signals in logic board connectors PP1 and PP2. Further descriptions can be found from each unit documents, as shown later.

1.2 Associated drawings

Following drawings are included to describe the structure of the H85 hand-portable:

Internal/external connectors	4X 8192
Block diagram	3H 311013

1.3 Terminology

TXC	Transmitter power control.
VBAT	Battery voltage.
TXS	Transmitter and synthesizer voltage control.
SCLK	Synthesizer clock and speeding in semiduplex radio. Synthesizer clock and duplex filter channel specific control in duplex radio.
SDAT	Synthesizer data.
SE	Synthesizer enable (semiduplex), TX enable (duplex).
RLE	RX synthesizer enable, duplex radio only.
RXDUP	Duplex filter channel specific control.
RXSVCC	Regulated voltage
AFC	Transmitter frequency control (VCTCXO).
DAF	Detected Audio to the logic.
VREF	ON/OFF–facility and reference voltage to RF–part voltage regulators.
RFTEMP	RF–part temperature.
MOD	Modulating signal to synthesizer.
GND	Ground.
RXFIL	Receiver front end tuning.
TXE	Transmitter power control.
RSSI	Received field strength level signal.
SQ	Receiver squelcher signal.
VDOUB	Synthesizer loop filter supply voltage.

H85 CONNECTIONS

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1.4 UIF Connector PP1

PIN	DIRECTION	NAME	DESCRIPTION
1	LOG->UI	VL1	Logic supply voltage 4,75V I _{max} 40mA
2		GND	Ground(-).
3,30	LOG->UI	VBAT	Battery voltage, nom. 7,5V
4	LOG->UI	LIGHTS	Backlight control 3,3V.
5-8	LOG->UI	UIF0-UIF3	LCD data. LCD controller 4-bit databus. Low max 0,4V/high min 2,4V.
9	UI->LOG	LCD_R/W	LCD driver read/write selection. Low max 0,4V/high min 2,4V.
10	LOG<->UI	LCD_RS	LCD driver register selection. Low max 0,4V/high min 2,4V.
11	LOG->UI	XLCDEN_E	LCD driver chip selec. Enable control. Low max 0,4V/high min 2,4V.
12	UI->LOG	ROW2	Line for keyboard read.
13	UI->LOG	COL0	Line for keyboard write.
14-16	LOG->UI	COL(1:3)	Lines for keyboard write.
17		NC	Not connected.
18-19	UI->LOG	MIC+/-	Microphone signal line/ground(-). Levels 5-19 mVrms
20-21	LOG->UI	EAR+/-	Earpiece line/ground(-). EAR-line level 1-200 mW
22	LOG->UI	BUZZER	Buzzer control. Low = ON, high = OFF, Low max 0,4V/high min 2,8V.
23	UI->LOG	XPWRON	Power on control from keyboard.
24	UI->LOG	ROW0	Line for keyboard read.
25	LOG->UI	LCDCLK	Clock signal for display. 230,4kHz. Min/Max 0/3,5V.
26-27	UI-LOG	ROW1/3	Lines for keyboard read.
28-29		GND	Ground

1.5 SYSTEM Connector PP2 (pin 1-16)

PP2 is located between accessories and logic unit. Same connector includes also battery, charger and external antenna .

PIN	DIRECTION	NAME	DESCRIPTION
1,3,9		GND	Ground(-).
2	SYS->LOG	XMIC	External audio input, nom. 200 mVrms, max. 500 mVrms. DC-level 0...3,0 V
4		NC	Not connected
5	LOG<->SYS	M2BUS	Serial bidirectional data and control between the handportable and accessories (0...3,0 V)
6	LOG->SYS	MAPTX	TX data (0...3,0 V)
7	SYS->LOG	MAPRX	RX data (0...3,0 V)
8,16	SYS->LOG	VCS	Battery charging voltage, (11.0-13.0 V), nom. 12,0 V (730-870 mA), nom. 800mA
10	LOG->SYS	XEAR	External audio output, nom. 200 mVrms. DC level min 2,0 V.
11,14		NC	Not connected.
12	LOG->SYS	XOUTPUT	To accessories (0...3,3 V)
13	SYS->LOG	XINPUT	From accessories (0...3,3 V)
15	LOG->SYS	VOUT	Accessories supply voltage. VBAT nom. 7,5 V

Battery connector PP2 (pin 21-24)

Battery connectors connecting the battery voltage, battery temperature measurement and battery type identification to the logic unit.

NO	Direction	Name	Direction
21		BGND	Battery connector, ground (-)
22	BAT->LOG	BTEMP	Battery temperature measurement, analogy voltage 0...3,3 VDC
23	BAT->LOG	BTYPE	Battery type identification
24	BAT->LOG	VBAT	Battery voltage 6.0...10.2 V nominal 7.5 V

H85 CONNECTIONS

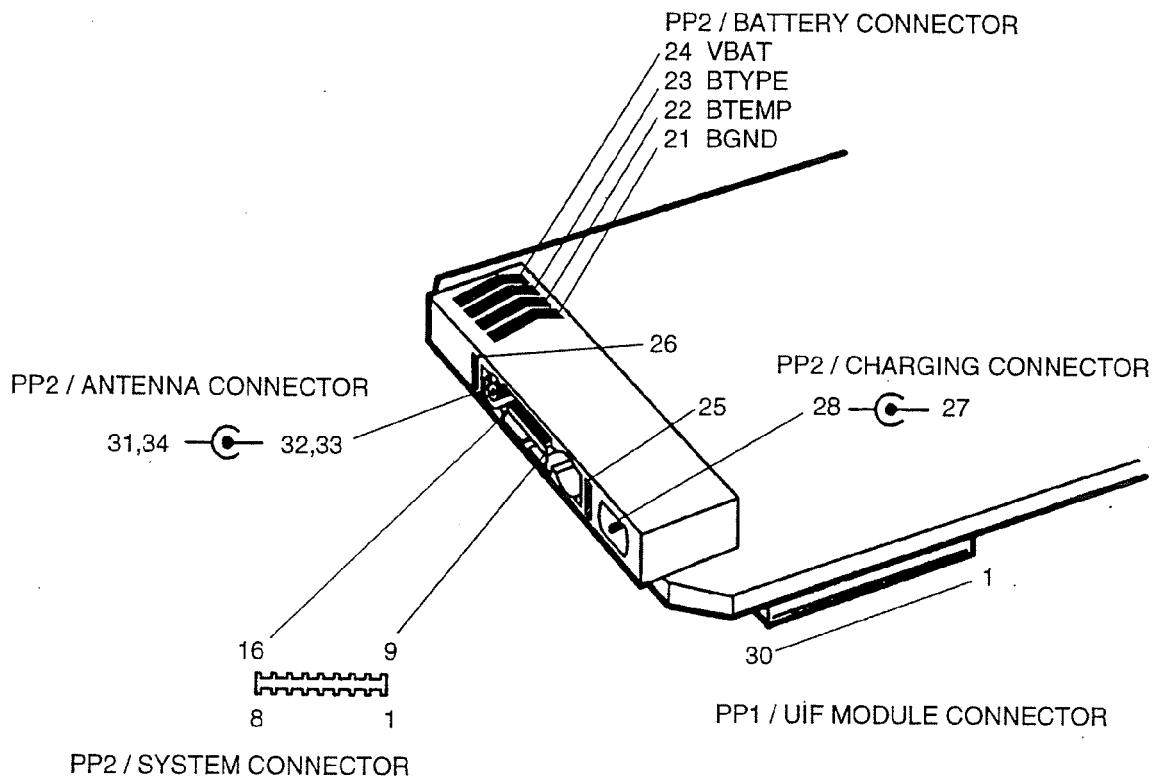
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Charging connector PP2 (pin 25-28)

NO	Direction	Name	Direction
25,27	SYS->LOG	VCS	Charger supply voltage 11.0-13.0 V nom. 12.0 V. 730-870 mA, nom. 800 mA
26,28		GND	Ground

Antenna connector PP2 (pin 31-34)

NO	Direction	Name	Direction
31,34		RFGND	Ground
32	SYS->RF	RFOUT	External antenna
33		RF	Fixed antenna



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						CHKD		
						APPRD		
				Internal / External Connectors PP1 / PP2		ARCHVD		
						4X 8192.1		
REV.	DATE	PREPD	APPRD					

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Audio and logic of HD85



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1 **HL420 and HL303 logic units**

1.1 **Introduction**

1.1.1 **Associated documents**

Block diagram 4H 311013 1/1

Block diagram 3A 311013 1/3

1.1.2 **The purpose of the document**

This document is the functional description of the logic modules HL420 and HL303. It describes both the environment of the processor function and realization and the control signals which deals with processor environment.

1.1.3 **Abstract**

The logic module HL420 / HL303 is important part of the HD85 handportable and it consist of the processor- and audio- parts. The tasks of the logic module belong functional control line handling and control of the user interface. The system program which operates in the processor environment, controls the interface between the system network and the radio.

The processor environment functions are supporting the power supply part, reset logic and voltage control part. From the point of view of the user interface and system software important blocks are the logic of memory control and display-/keypad- control. From the

point of view of the user necessary function is the charging control of the battery and charger. It simplifies and makes more effective the use of batteries.

All functional blocks of the logic module are mounted on a single multi layer printed circuit board. This board contains also RF-parts. The chassis of the radio unit contains separating walls for logic and RF. All components of the logic are surface mountable. They are soldered using reflow. The connections to accesories are fed throught the bottom connector of the radio unit. The connections to user interface-module (UIF) are fed throught board to board connector. There is no physical connector between RF and logic. The logic module has two connectors, external bottom connector (PP2) and internal UIF-module connector (PP1) . External and internal connectors PP1 and PP2 are shown section 4.

1.1.4 Terminology

The used abbreviations and terminology in the text:

MUUMI 3.3 V Power Asic

MCUMicrocontroller Unit

OTEPROM One-Time Programmable Read Only Memory

ROMRead Only Memory

SRAM Static Random Access Memory

EEPROM Electrically Erasable Programmable ROM

PWM Pulse-Width Modulation

LCD Liquid Crystal Display

TNC Twisted Nematic Crystal

I²C Bi-directional databus

MBUS Databus used for connecting accessories via RS232-bus

SQ Squelcher

RSSI Received Signal Strenght Indication

CMOS Complementary Metal Oxide Semiconductor

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HL420 and HL303 logic units

NTC Negative Temperature Coefficient

FFSK Fast Frequency Shift Keying

FET Field Effect Transistor

A/D Analog to Digital (converter)

1.2 Power

1.2.1 General

The Power-Asic Muumi includes the necessary power supplies, reset-logic, on/off logic, voltage control, alarm circuits and a accurate reference voltage. Muumi includes also watchdog -facility, which reset-delay length is set by external capacitors.

The Muumi-circuit input voltage is nom. 4.7V.

Power signals, Inputs

Signal	Direction ->	Description
CSW	MCU -PWRU	Charger control from MCU
MBUSOUT	MCU-PWRU	MBUS from MCU
XPWRON	KEYBOARD-PWRU	Power on control from keyboard
XPWROFF	MCU-PWRU	Power off control from controller (Watchdog)
VBAT	SYSTEM-PWRU	Battery voltage input
VCS	SYSTEM-PWRU	Charging supply voltage from charger

Power signals, Outputs

Signal	Direction	Description
XRES	PWRU-MCU	Master reset
PWRON	PWRU-MCU	PWRON signal for MCU
VL	PWRU-MCU	Logic supply voltage
VA	PWRU- AUDIO	Audio supply voltage

VREF	PWRU-MCU/RF	Reference voltage for MCU and RF
VL1	PWRU-DISPLAY	Operating voltage for display controller
VOUT	PWRU-HEADSET	Operating voltage for accesories
VBATSW	PWRU-MCU	Battery voltage to A/Dconverter
VCHARSW	PWRU-MCU	Charger voltage for A/D converter
M2BUS	PWRU-SYSTEM	M2BUS

VL 3.3 V / 40 mA is supplying logic parts

VA 3.3 V / 20 mA, is supplying audio parts

VREF 3.3 V $\pm$ 3% / 5mA reference voltage for prosessor and RF-parts

VL1 4.7 V operating voltage for display controller

VOUT VBAT, operating voltage for accessories

Muumi has three different operational state, where it can go and where it can recover by different terms. These operating modes are power-off-, reset-, power-on and separate protection mode.

Different states of the power supplies and control signals can be seen in the following table:

Table 1. TABLE 1. Muumi states

MODE	VL	VA	VREF	VL1	XRES	XPWROFF	PWRON
Power-off	Z	Z	Z	Z	Z	Z	LOW
Reset	3.3V	3.3V	3.3V	4.7V	LOW	LOW	LOW
Power-on	3.3V	3.3V	3.3V	4.7V	HIGH	HIGH	HIGH

Z = high impedance state

1.2.2 Reset logic

After swishing on the logic it is necessary to reserve enough time to stabilize IC-circuits before starting the software. Muumi has the necessary reset logic and it gives during start up a reset pulse to the pin XRES. The pulse length is set by external capacitors. XRES is connected to the corresponding pins of processor, audioprocessor and display controller.

Reset mode is activated after power-off state, when

- battery voltage detected (master reset)
- logical '0' -state detected in the XPWRON -line
- charging voltage of battery detected
- recover from the protection mode

Muumi goes to the reset mode from power-on mode, when battery voltage VBAT drops below 4.1 V.

In the reset mode VL, VA, VREF and VL1 outputs are activated by the Muumi internal ENABLE-line. (logically similar to external XSTBY-signal).

Muumi exits from reset mode after delay T_{off} if $VBAT > 4.1$ V.

After reset 0 → 1 processor starts the program by reading first memory locations, where is a command to start the real system program. If the user has pressed the power switch, start up can be seen and heard normally pip -mark tone and all marks are displayed for a moment. If a battery or a charger is connector to the radio, the user can't see the start up, even processor starts controlling of the battery charging. After charging it goes to the power-off state.

1.2.3 Voltage supply logic

The logic doesn't have any physical power on/off switch. Muumi has a internal on/off logic which controls switching of the power supply. It controls the changes of different operating states (power-off, reset and power-on) according to internal status- and external- signals and makes control signals XRES and XSTBY.

The voltage are switched on (power-on) when logical '0' is detected in XPWRON -input. Then the Muumi regulators and reset state are activated. When reset is over, processor must generate a pulse (positive rising edge) to the XPWROFF-line before time T_{off} has expired (1.5s. after XRESET has risen to the logical '1'). In the

power on mode processor must generate these pulses all the time, which means that it can be used as a watch-dog of processor.

Voltages are switched off (power-off), if any pulse (positive rising edge) is detected in XPWROFF-line during T_{off} .

1.2.3.1 Power-off mode

In the power-off mode Muumi's parts are in a high impedance state or low state. Muumi goes to the PWRON state to press to PWRON button or it goes to the RESET state if the VBAT is falling below 4.1V.

PWRON is in low, logical '0' -state to keep processor in hardware standby state.

VL, VA, VREF, VL1, XRES and XBWROFF are in a high impedance state.

Muumi goes to the power-off state from power-on state after delay T_{off} if any rising edge is not detected in XPWROFF-line during T_{off} .

Muumi goes to power-off state also from reset state, if Muumi can't go to the power-on state after normal reset delay, because $V_{\text{DETIN}} < V_{\text{DETINth}}$. This is because of processor was not able to make a pulse to XPWROFF-line during T_{off} . If battery charging is active ($V_{\text{CHRGDET}} > V_{\text{CHRGDETth}}$) change from reset mode to power-off state is not possible. Muumi will stay in reset state until battery is charged to $V_{\text{DETIN}} > V_{\text{DETINth}}$. Then Muumi goes to the power-on state.

1.2.3.2 Power-on mode

In Power off state Muumi's regulator outputs are disabled. Muumi goes through short Reset state to Power on state, if PWR-button is pressed or charger voltage input is connected.

When the key is pressed, Muumi XPWRON-line is grounded.

Muumi removes XSTBY-control, when processor can recover from the hardware standby state, but keeps XRES-line active during time T_{rd} . After reset delay processor must be able to give pulses to XPWROFF-line in time T_{off} , to carry on program.

During power-on state all Muumi functions are active and it's regulators supply voltage to the radio. To carry on operation, Muumi watchdog timer must receive pulses in minimum interval. To stay in power-on state, Muumi must detect a rising edge in this pin minimum interval time T_{off} .

If the program is executed because of faulty function, pulses to XPWROFF-line stops and Muumi is driven to power-off state.

In the normal situation, when the user wants to switch off the radio by pressing power switch key, processor detects it and stops given pulses to this line.

1.2.4 Voltage control

Muumi voltage control is used controlling the incoming and outgoing battery voltage and the charger voltage. The threshold voltage is set by external resistor connection.

In the power-on state Muumi controls battery voltage VBAT from the DETIN input and resets the circuit if voltage decrease below the internal band-gap reference voltage VDETIN. Hysteresis prevents the possible oscillation between different states.

Voltage control circuit activates XERROR-output when VBAT drops below 4.1 V.

1.2.5 Charging detector

Charger is detected by controlling the charging voltage from CHRGDET input. Charger is detected to be connected when the voltage in CHRGDET-pin is more than internal band-gap reference voltage VCHGRDET. Charger voltage limit is set by external resistor connection.

If the charger is connected when Muumi is in power-off state, it goes to reset state automatically. If $VDETIN < VDETIN_{th}$, it stays in reset state and when $VDETIN > VDETIN_{th}$ is achieved, it goes to power-on state after reset delay Trd . Then processor keeps the display clear, because start up was generated by connection of the charger nor power -key pressing.

If the charger is connected when Muumi is in power-on state, reset is not activated. It confirms that processor is started properly to control charging procedure.

1.2.6 Protection state

Muumi circuit has an internal temperature protection. It measures the internal temperature and switches off the outputs if temperature rises too high. Output states are equal to power-off state. When temperature decrease to accepted level, it will return to normal state and activate reset. Temperature control has some hysteresis to prevent oscillation in protection state.

1.3 Charging control

1.3.1 General

Processor controls the switch by CSW-line. Different operating states are:

- CSW = 1, constant current during rapid charging
- CSW = 0, charging disabled
- CSW chopping, maintain charging state

Processor controls the charging operation by controlling battery voltage from the A/D -converter input VBATSW, measuring battery temperature from BTEMP-line and measuring charging time.

Necessary controls are made by CSW-line.

1.3.2 Constant current state

Darlington transistors makes a differential connection, which makes output voltage limit.

1.3.3 Maintain charging

Maintain charging is made by modulating CSW-line pulse length about 1.8Hz frequency. The constant current coming from charger is set to about 800 mA, when average charging current can be calculated by multiplying the pulse ratio by current. An example: 50% pulse ratio, current would be $0.5 \times 800 \text{ mA} = 400 \text{ mA}$. Pulse ratio is adjusted according to battery temperature and time.

1.4 Processor

Microcontroller is in the 100-pin TQFP-chip. It's task is to control all radio functions according to the system software which is in the

In the normal situation, when the user wants to switch off the radio by pressing power switch key, processor detects it and stops given pulses to this line.

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1.4 Processor

Microcontroller is in the 100-pin TQFP-chip. It's task is to control all radio functions according to the system software which is in the

external memory circuit. Software is located in the FLASH and EEPROM.

MCU has its own internal clock generator, which needs only external crystal. MCU generates all necessary clock pulses by dividing further the main clock. Different frequencies are needed to serial port, internal timers and calculators and PWM-generators.

1.4.1 Crystal frequency

Crystal frequency is 7.3728MHz and its divided results harmonic components can make disturbance for some receiver channels. To get rid of these harmonics from receiver channel, processor can control crystal to shift frequency, when the harmonics also shift.

1.4.2 I/O -ports signals

MCU has totally 8 pcs I/O-ports. They can be programmed either inputs or outputs. Some ports have overlap with special functions.

1.5 Memory control

1.5.1 General

The whole memory space of the logic is 16 Mbyte . Lower part of the memory space is reserved for program memory by connecting address line as chip select signal. Higher part of the memory is divided between SRAM and EEPROM .

Serial mode EEPROM memory is used to store radio identification data, as a safety code memory. All control is done via I2C bus.

1.5.2 I²C bus

I²C- bus is a bidirectional synchronized serial bus. Table 5 shows those circuit which are using the I²C-bus

2.1.3 Abbreviations

ACCID	Accessories identification
AGC	Automatic Gain Control
DAC	Digital-to-analog converter
DAF	Demodulated Audio Frequency
DTMF	Dual Tone Multi Frequency
EAR	Earphone
FFSK	Fast Frequency Shift Keying
FFSK_IN	FFSK-signalling input to modem
FFSK_OUT	FFSK-signalling output from modem
LSP_POWER	Loadspeaker power
MCU	Microcontroller unit
MOD	Modulation line, audio signal which will be modulated
NIPA3	Audio and signalling circuit
STMF	Single Tone Multi Frequency
SYS	System connector
UI	User Interface
XEAR	External earphone
XMIC	External Microphone

NOKIA

HL420 and HL303 audio units

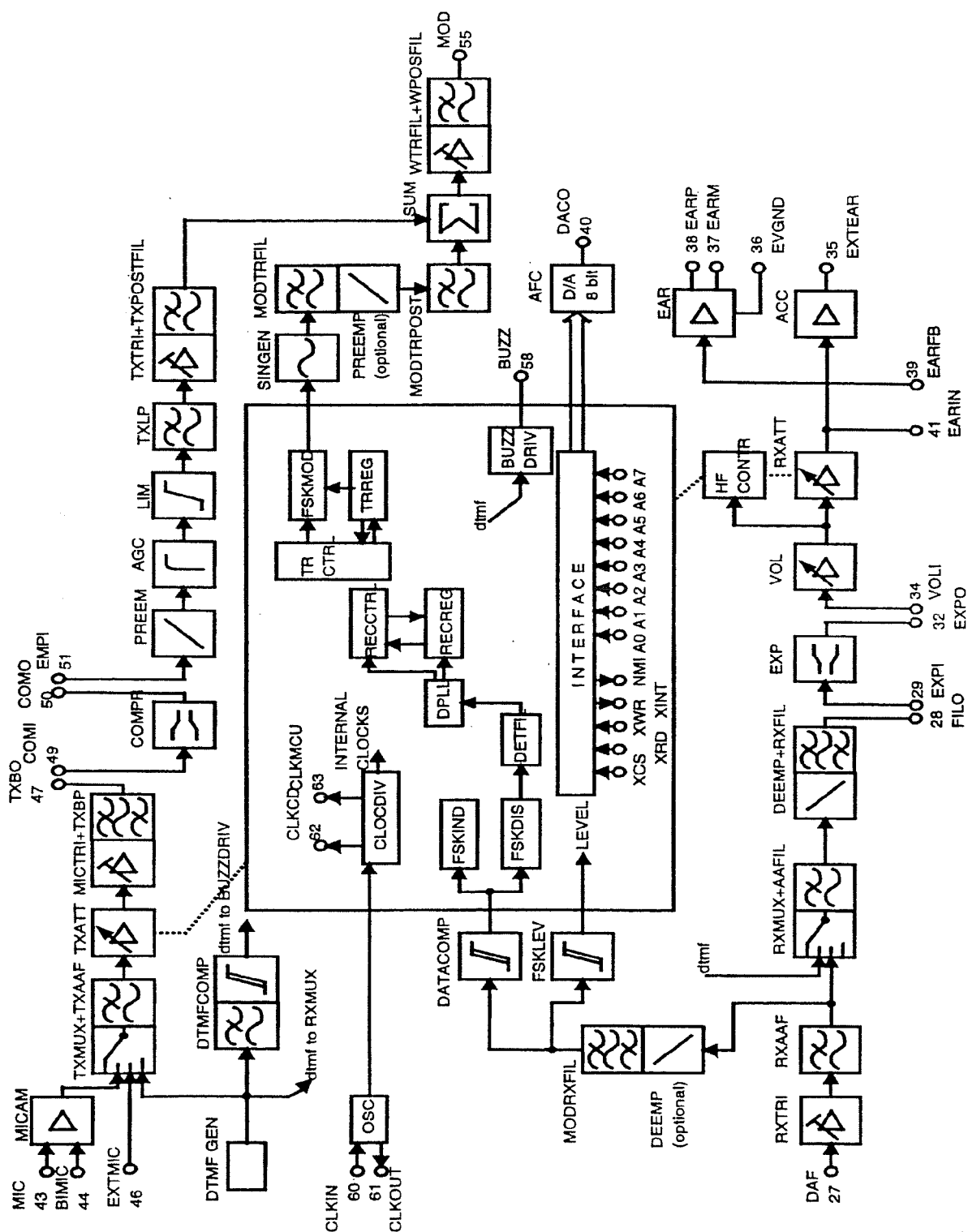
2.2 Technical data

Audio response	300 - 3000 Hz +1 ... -3 dB
Signalling	FFSK (no pre-emphasis) and DTMF/CCIR (+6 dB/oct)
Input levels:	
XMIC	nominal level: 200 mV _{RMS} input-impedance: 30 k Ω (min.)
DAF	nominal level: 50 mV _{RMS} input-impedance: 47 k Ω (min.)
MIC+	nominal level: 10 mV _{RMS} input-impedance: 30 k Ω
Output levels:	
MOD	nominal levels: 300 mV _{RMS} output-impedance: 5 k Ω (max.)
Speaker	nomin. output: 0.2 W (8 Ω load min.)
Earphone	nomin. output: 1.0 mW (8 Ω load min.)
XEAR	nomin. level: 200 mV _{rms} (10 k Ω load min.)

2.2.1 Audio signals

Direction	Name	Description	Level
MCU →	CLKSHIFT	Clock shift	PWM
MCU ↔	ADDRESSBUS (19:0)	Address bus	
MCU →	NIPA_CS	Selection signal of the audiopross.	0V/3.3V, activ low
MCU →	WR	Write selection	0V/3.3V, activ low
MCU →	RD	Read selection	0V/3.3V, activ low
MCU →	XRES	Reset signal	0V/3.3V, activ low
MCU ↔	DATABUS(7:0)	Databus	
RF →	DAF	Audio signal	50mV _{RMS} , Ri=47kΩ
→ UI	MIC+	Mic input	5...19mV _{RMS}
→ UI	MIC-	Mic GND	
SYS →	XMIC	External audio input from accessories and accessories DC-identification	200mV _{RMS} , Ri=30kΩ 0...3.3VDC
MCU →	LSP_POWER	Voltage control of the output amplifier	0V/3.3V, activ high
→ MCU	NIPA_IRQ	IQR-interrupt	0V/3.3V, activ low
→ MCU	NIPA_NMI	NMI-interrupt	0V/3.3V, activ high
→ MCU	MCUCLK	Clock for MCU	7.3728 MHz
→ UI	LCDCLK	Clock for LCD	230.5 kHz
→ RF	MOD	Audio signal to radiounit	300mV _{RMS} , Ro _{max} =5kΩ
→ UI	BUZZER	Buzzer control	PWM-output, 0V/3.3V
→ SYS	XEAR	Audio output to accessories	200mV _{RMS} , RL _{min} =10kΩ
→ UI	EAR +/-	Audio output	1mW/200mW, RL=8kΩ
→ MCU	ACCID	Identification of the accessories	0...3.3VDC

2.2.2 Block diagram of Nipa



2.3 Transmitter audio parts

The TX audio signal is processed in the NIPA circuit and fed via the MOD line to the synthesizer.

TX-Blocks

MICAM	Microphone amplifier
TXMUX	TX source selection
TXAAF	Lowpass filter
TXAAT	Hands Free attenuator
MICTRI	Microphone sensitivity compensation and tones level controls. Gain 16 levels, 1.0 dB/ steps.
TXBP	TX band-pass filter, 300 Hz - 3600 Hz
COMPR	Compressor
PREEM	Pre-emphasis
AGC	Automatic Gain Control
LIM	Limiter
TXLP	TX lowpass filter
TXTRI	TX nominal deviation tuning, Gain 8 levels, 0.5 dB/ steps.
TXPOSTFIL	TX lowpass filter for filter internal clock, upper frequency limit 20 kHz
SUM	Speech and signalling are summed to the modulation line
WTRFIL	Lowpass filter and signalling level control, gain 16 levels, 0.5 dB/ steps.
WPOSFIL	Filter out for WTRFIL clock frequency and its harmonics

2.3.1 Microphone signals

Internal microphone is on UI-foil (CU3F) and it is done by transistor connection. Microphone signal is amplified by audioprocessor microphone amplifier. External microphone lines XMIC is connected to the same line in integrator amplifier.

External microphone line XMIC level must be $200 \text{ mV}_{\text{rms}}$ in the pin XMIC (2). External microphone signal transient limiting is done with diode pair, which is connected between gain limiter and pre-emphasis. Level (gain) control and pre-emphasis are audioprocessor internal functions.

2.3.2 FFSK-signalling

FFSK-signalling comes from audioprocessor's MPT modem .

2.3.3 Other audio parts

All other output audio functions are internal functions of audioprocessor. Nominal-, maximum- and FFSK- deviation adjustment is done by program. Audio signal pre-emphasis, AGC, bandpass- and lowpass- filters are internal block, which can be passed by software if necessary for testing.

2.3.4 Mark tones

Mark tones (STMF and DTMF) are made by internal mark tone generator (DTMFGEN). Mark tones (STMF) control through via internal buffer DTMFCOMP to GU3F-unit (in the UI-foil), where is buzzer. DTMF tones are connected through transmitting chain to transmitter and /or through receiver chain to the loudspeaker. Mark tone settings are made by audioprocessor internal control lines.

2.4 Receiver audio parts

NIPA contains the following stages for signal processing:

RX-Blocks

RXTRI	Demodulation sensitivity compensation. Gain 16 levels, 1.0dB / steps
RXAAF	Lowpass filter, upper frequency limit 20 kHz
RXMUX	Signal source selection
AAFIL	Lowpass filter
DEEMP	De-emphasis
RXFIL	Band-pass filter, 300Hz-3400 Hz
EXP	Expander
VOL	Volume control, Gain 16 levels, 2.5 dB/steps
RXATT	Hands Free attenuator
EAR	Earphone Amplifier for ceramic earpiece (NOT IN USE)
ACC	Buffer for accessory lines, 0dB
AFC	D/A converter, audio output stage gain control

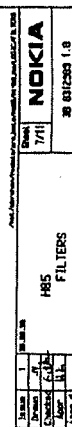
2.4.1 Gain

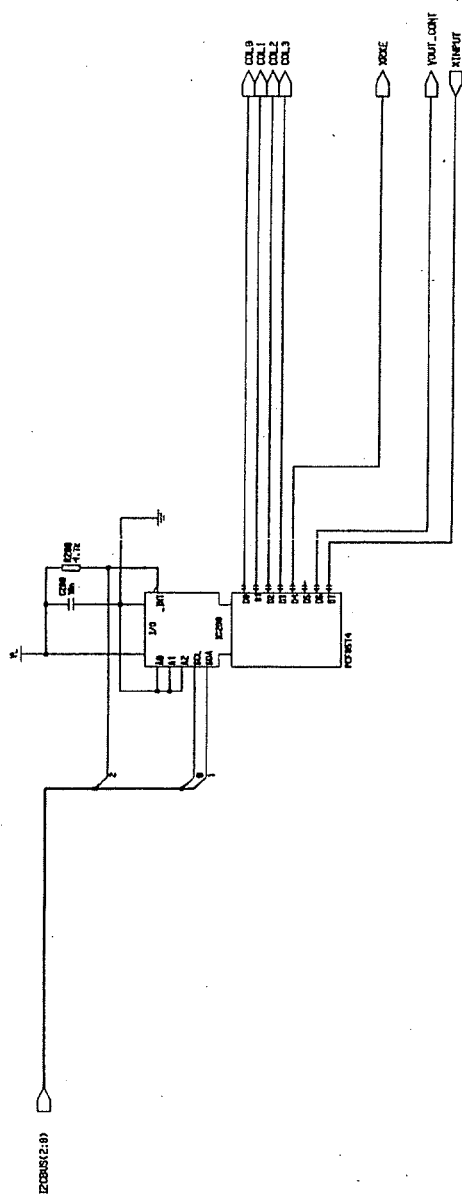
Detected audio signal DAF, nominal level 50 mV_{rms}. Upper frequency limit is 4 kHz. Amplifier output level is about 100mV_{rms} (nom.). Signal goes to the audioasic pin DAF (27).

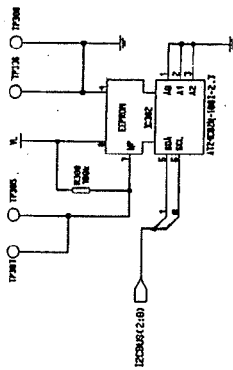
2.4.2 Audio output amplifier

Detected audio signal comes out from pin EARIN (41). Output signal level is about 200 mV_{rms} (nom.). Power supply to amplifier is connected by FET-switch, which is controlled by LSP_POWER-line .

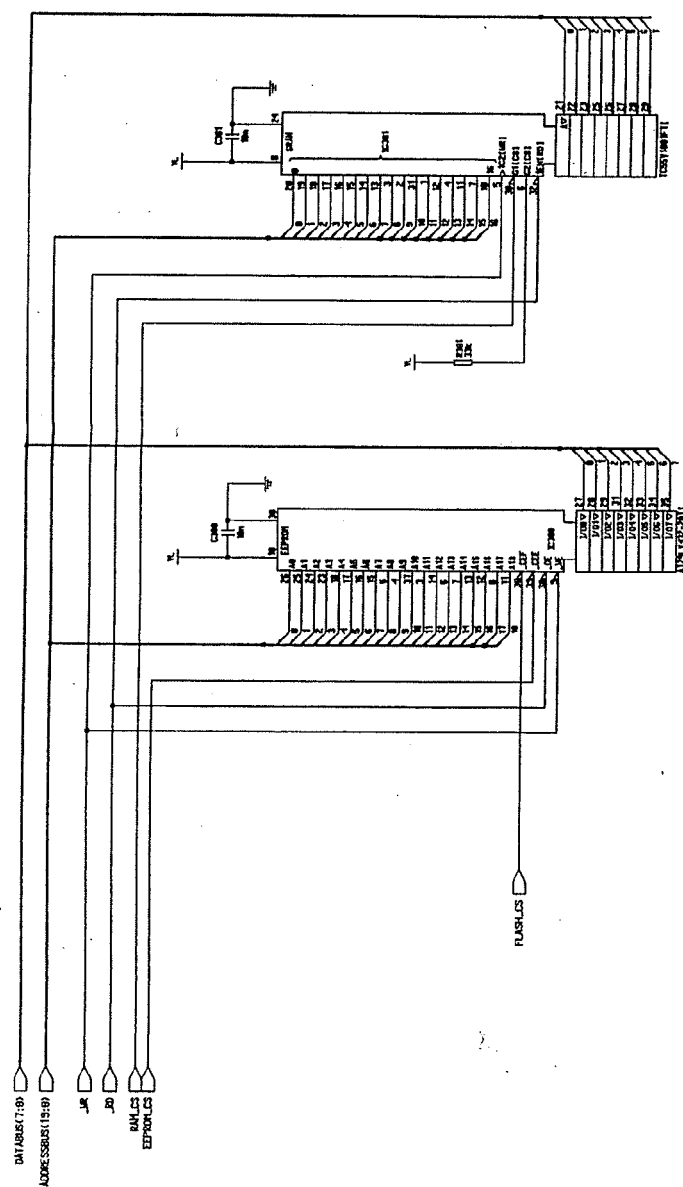
Output amplifier gain can be set stepless to -44dB...+36dB .







NOKIA		3411		185		EEPROM		30 612593 1.0		Copyright © 1991	
Part No.	1	Rev.	1.0	Part No.	185	Rev.	1.0	Part No.	30 612593 1.0	Rev.	1.0
Doc. No.	1	Doc. No.	1	Doc. No.	1	Doc. No.	1	Doc. No.	1	Doc. No.	1



NOKIA

RF parts of HD85

**Synthesizer
Transmitter
Receiver**



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1 Receiver

The receiver receives and demodulates the received antenna signal and generates the Received Signal Strength Information (RSSI). The receiver has been designed to fulfill the ETS300 086, CEPT T/R 24-01 radio technical specifications in the temperature range -25...+55°C. The operational temperature range is -25...+55°C and the storage temperature range -30...+65°C.

In H85 radio, receiver, transmitter, synthesizer and logic are all in HL420 and HL303 modules. Different parts are separated with mechanical structure of chassis.

1.1 Technical specifications

Frequency band	
HL 420	427.500...429.600 MHz
HL 303	336.000...344.000 MHz
Basic tuning band	
HL 420	2.1 MHz max
HL 303	8.0 MHz max
Demodulator	FM demodulating
Channel spacing	12.5 kHz
Operating voltage	6.3V...10.35V (nominal 7.5V)
Current consumption	~28mA max (RX and SX together)
Sensitivity	better than -113 dBm 20dB SINAD psof.
first intermediate freq.	HL 420 45MHz, HL 300 70MHz
second intermediate freq.	HL 420 450kHz, HL 300 450kHz

1.2 Receiver

Receiver consists of the following parts:

- Voltage regulator Q703, Q704
- Duplex filter IC602
- RF pre-amplifier Q701
- SAW band pass filter XF701
- First mixer and injection signal RXINJ T701, D701
- First intermediate frequency amplifier Q705
- Intermediate frequency filter XF702
- Second intermediate frequency amplifier Q706
- Intermediate frequency circuit IC701

1.3 Connections

RXIN	RX antenna signal
RXINJ	RX injection signal +3 dBm
RXVS	Operating voltage 4.6V
VBAT	Battery voltage 6.3...10.35 VDC (7.5V nominal)
RXSVCC	5.85 VDC $\pm 0.1V$
DAF	Detected audio frequency, ~50 mVrms with nominal deviation
VREF	Reference voltage 3.3 VDC $\pm 0.1V$
RSSI	Received Signal Strength Indicator
SQ	DC voltage, inversely to RSSI

1.4 Operation of receiver

1.4.1 Voltage regulation

Transistors Q703 and Q704 forms a voltage regulator of the receiver. Regulator can be switched on and off with voltage VREF. The output voltage of the regulator is $5.85V \pm 0.1V$ and it is biased with resistors R715, R716 and R750.

1.4.2 High frequency part

The high frequency antenna signal is brought through the TX-low pass filter to the receivers low-noise HF-amplifier Q701. The Q701 is biased and stabilized by the resistors R700, R710, R712 and R742. The Q701's emitter is connected to the ground by the by-pass capacitors C722. The Q701's current is conducted through the resistor R713 to the intermediate frequency circuit IC701 and before Q701 to the intermediate frequency amplifier Q706.

Next the signal is filtered by the low pass filter XF701, which in HL 420 is SAW filter, and in HL 303 tunable HELIX filter. The filter's main function is to attenuate the first mirror frequency, and first intermediate frequency. After the filter, the signal is brought to the balanced diode mixer which is formed by the components T701 and D701. The injection signal RXINJ from the RX VCO part is matched by the components C741, C780, C742 and L720 to transformer T701.

After the mixer the first intermediate frequency is amplified by the Q705 connection. The amplifier Q705 is biased and stabilized by the components R720, R721 and R722. The amplifier is negative-feedback amplifier, which makes it's signal processing ability better.

Synthesizer gets it operating voltage from Q705's emitter.

The LCR connection on the base of the Q705 matches impedances between the amplifier and XF702.

The intermediate frequency is filtered by the crystal filter (monolithic circuit pair) XF702. The filter's main function is to attenuate the second mirror frequency. The output impedance of the crystal filter is matched for the intermediate frequency circuit by the connection of the Q706.

1.4.3 Intermediate frequency circuit

The intermediate frequency circuit IC701 includes the following functions: mixer, oscillator, intermediate frequency amplifier, limiting amplifier, quadrature detector, audio amplifier, noise amplifier and noise rectifier.

In HL 300, where the second intermediate frequency is 70 MHz, the second injection signal is made with internal oscillator, and it is based on the crystal X01 (69.550 MHz).

In HL 420, the second local oscillator signal 44.55 MHz has been formed by the components L709, C758 from synthesizer's 14.85 MHz signal OSC. (Third harmonic component of TCXO, $3 \times 14.85 = 44.55$ MHz).

After the mixer the 450 kHz intermediate frequency signal is filtered by the crystal filter XF704 after which the signal is brought to the limiting amplifier.

The limiting amplifier's output signal is brought to the quadrature detector through the phase shifting components C764, R736, C766 and L704, and also directly to the pin 16 (MIXIN).

After the detector the low frequency audio signal is buffered and filtered in the intermediate frequency circuit IC701. The level adjustment of the audio signal DAF is done by the components R734 and R735. So the audio signal DAF from the receiver is constant in spite of the used channel spacing.

The audio signal is connected also to the noise amplifier through band-pass filter which consists of the components R729, R730, R731, R732, R733, C760 and C761 and also of the internal amplifier of the circuit IC701. After this the amplified and band pass filtered noise is rectified and filtered by the components C768, R738, R739 and C770.

2 Synthesizer

The synthesizer generates the injection signal to receiver, and it also generates the speech or data modulated transmission signal to transmitter.

In HL420 is used 45 MHz intermediate frequency. The injection signal is below the receiving signal by an increment equal to the intermediate frequency.

In HL303 is used 70 MHz intermediate frequency. The injection signal is above the receiving signal by an increment equal to the intermediate frequency.

Synthesizator is made to one circuit board, which contains synthesizators logic and analog parts.

The operation of the synthesizer is based on a digital phase locked loop.

The modulation of the transmitter is based on the deviation of the VCO's control voltage by a low frequency modulating signal.

2.1 Technical specifications

Frequency band TX

HL420	417.500...419.600 MHz
HL303	300.000...308.000 MHz

Frequency band RX

HL420	382.500...384.600 MHz
HL303	406.000...414.000 MHz

Channel spacing 12.5, 25 kHz (programmable)

Temperature range -25°C...+55°C

Frequency response 0.3...3.0 kHz +1...-3dB (25 kHz)
0.3...2.55 kHz +1...-3dB (12.5 kHz)

2.2 Synthesizer blocks

Synthesizer consists of the following parts:

- Voltage regulator (5.0 V) Q810
- Reference oscillator TXCO XO801
- Synthesizer circuit IC800
- Loop filter C875,C818,R811,R551
- Phase comparison frequency filter
R814,R815,R816,C819,C876,C820,C821
- Voltage controlled oscillator VCO, RX and TX G802 and
G801
- Isolating amplifiers RX and TX Q813 and Q811
- Blocking circuit to TX power Q812

2.3 Connections

RXVS	RXVS operating voltage 4.6 V $\pm$ 0.1V
RXINJ	RX first injection signal +3 dBm
SCLK	Data clock signal to synthesizer
VBAT	Battery voltage 7.5V
RXSVCC	Regulated 5.85 VDC $\pm$ 0.1V
SDAT	Synthesizer data
VREF	Reference voltage 3.3 VDC $\pm$ 0.1V
SE	Synthesizer enable
MOD	Modulating signal to synthesizer
TXOFF	TX power control
VTX	Regulated 5.7 V $\pm$ 0.1V
OSC	RX second injection signal
TXINJ	TX injection signal

2.4 Operation of synthesizer

2.4.1 Operating voltages

The VTX voltage is generated in transmitters voltage regulator. Voltage is further filtered with Q810, thus the voltage from transistor is 5.0 V. TX isolating amplifier uses 5.0 voltage.

TXVCO gets operating voltage from TX isolating amplifier Q811. These parts are connected together with a cascade connection.

Voltage VREF goes to reference oscillator XO801.

2.4.2 Synthesizer circuits

The synthesizer circuit is IC800. The synthesizer circuit contains two programmable RF-dividers and a programmable reference frequency divider.

The reference frequency is brought to pin 8 through the isolating capacitor C831. Reference frequency is divided with the value inside the circuit's reference register, and the result is a phase comparison frequency. In this synthesizer, the reference frequency with 12.5kHz channel spacing is 12.5kHz.

The output from the VCO is brought to synthesizer's pins 6 and 15. Synthesizer's output pin CPA is connected to TX loop filter, and CPB is connected to RX loop filter (pins 3 and 17). When the synthesizer is locked, those pins are in a high impedance state.

The control pulses of the loop filter are obtained from the synthesizer circuit (pins 3 and 17). The integrator is done by the components C875, R811 and C818 (TX part) and by the components C879, C841 and R835 (RX part). In case the VCO's frequency is lower than the reference frequency the synthesizer circuit's pin CPx will go to higher state which will cause rising of the output voltage and further rising of the frequency. When the frequency is higher than the reference frequency the pin CPx will go to lower state which will cause decreasing of the output voltage and dropping of the frequency in the VCO.

Phase comparison filter is needed to attenuate the control pulses from the pins 3 and 17 of synthesizer. If the control pulses are not attenuated, there will be side bands in both side of carrier at the distance equal to the comparison frequency. The filter is made with components R814, C819, R815, C876, C820, R816 and C821.

2.4.3 Transmitter's start-up control

In case the TX synthesizer is not locked the '0'-state is got from the pin 19 (at otherwise +3 V). The Q812 stops to conduct whereupon the '1' at the collector of the transistor is fed to transmitter via the TXOFF line. This causes that the transmitter doesn't turn on for example in faulty situations.

2.4.4 TXVCO and amplifier

The control voltage is brought to the pin VC of the VCO module G801. The supply voltage is brought to the pin VCC of the VCO module. The modulating audio frequency signal is brought to pin MOD of the VCO.

The VCO signal from the pin OUT is connected to the isolating amplifier implemented by Q811 which will amplify the 0 dBm level signal to the level of +3 dBm (TXINJ). The signal is fed to the transmitter to be amplified. The feedback from the VCO to the synthesizer circuit is brought through R818, R843 and C826.

2.4.5 RXVCO and amplifier

The control voltage is brought to the pin VC of the VCO module G802. The 4 V supply voltage is brought to the pin VCC of the VCO module. The VCO signal from the pin OUT is connected to the isolating amplifier implemented by Q813 which amplifies the 0 dBm level signal to the level of +3 dBm (RXINJ). The signal is fed to the mixer of the receiver. The feedback from the VCO to the synthesizer circuit is brought through R848, R844 and C870.

2.4.6 Start-up

The RX synthesizer gets the supply voltage at the same time when the radio part is switched on. The synthesizer must be initialized always after a power break. The channel spacing information is fed first to the synthesizer. The channel spacing is set only once when the device is started. After this the synthesizer is controlled to the default channel of the selected frequency band. When operating in a system the default channel is one of the system channels.

2.4.7 Channel change

The channel change is done in the RX mode by bringing the new channel information to the synthesizer.

In the TX mode the channel change is started by controlling the synthesizer circuit away from the power save mode. Next the required data is brought to the synthesizer via the SDAT line and the used channel's deviation correction value is updated. The channel's

deviation correction information has been stored into the memory in the maintenance mode.

2.4.8 Channel control

The channel control of the synthesizer is done using serial data control. Three lines are needed for the controlling: data SDAT, clock SCLK and enable line SE. These signals are used to store the information in the synthesizer circuits' memory.

The synthesizer circuit includes four programmable registers. One of these is used to set the channel spacing. The two registers are used to set the channel frequency according to the two base division method. One register is used to control the states of the ports of the synthesizer circuit.

3 Transmitter

3.1 Purpose of the transmitter

The transmitter part amplifies modulated signal, which comes from the transmit VCO, to adjusted level, and filters harmonic frequencies, which were born in amplification, from the signal with LP-filter after the transmitter.

The transmitter has been designed to fulfill the ETS300 086 and CEPT T/R 24-01 radio technical specifications in the temperature range -25...+55°C.

3.2 The blocks of transmitter

Front amplifier	Q611
RF-hydride	IC601
RF-power adjustment circuit	Q604, Q605, Q606
RF-power sample circuit	D601
Regulator	Q607, Q608, Q610
TX start up control	Q602, Q603

3.3 Technical specifications

Frequency band	HL 420	417.500...419.600 MHz
	HL 303	300.000...308.000 MHz
Traffic mode	Duplex / Semiduplex	
Output power	0.1 W and 1.0 W (measured from antenna)	
Max. separation of TX/RX channels	HL 420	2.1 MHz
	HL 303	8.0 MHz
Channel spacing	12.5 kHz	
Operating voltage	6.3 V...8.5 V (nominal 7.5 V)	
Current consumption	< 1.0 A (1 W)	

3.4 Connections

TXINJ	Injection signal from the VCO approximately + 3 dBm, frequency = f_{TX}
TXC	PWM - signal (transmitter power adjustment)
TXE	The start of the transmitter
TXOFF	Locking information of the TX - synthesizer "0" = the synthesizer is locked "1" = the synthesizer is not locked
VTX	The control of the TX - sythesizer's supply voltage
RXIN	Antenna signal to the receiver
VREF	Reference voltage 3.3 V
TXS	Transmitters start-up control

3.5 Operation of the transmitter

The RF-part of the transmitter mainly consist of hybride circuit IC601. It is controlled by the Q611, which increases the RF-level about +3 dBm $\rightarrow$ +12 dBm. In TX-off mode the attenuating is more than 30 dB, which ensures that TXVCO signal will not leak out before the TXE is connected and the synthesizer is locked. The output power of the RF-hybride is controlled via the voltage in pin 2 of the hybride (V_{gg}).

3.5.1 Voltage regulator and power supply

Transmitter's voltage regulators are made with components Q608 and Q607.

The reference voltage ($\sim 3.3\text{VDC}$) from the logic is brought through the filtering to another base of the Q608. The sample from the output voltage is taken to the other base of the Q608 (pin 5). The series element Q607 tries to keep the output voltage constant.

Q610 acts as a switch of the regulator. When logic controls the transmitter ON with TXS signal, Q610 starts to conduct and regulator will supply voltage, if V_{REF} is active. If there is no V_{REF} , the regulator will not supply voltage at all.

The output voltage of the regulator is $5.7 \pm 0.1 \text{ V}_{DC}$ and it depends on how stabile the V_{REF} will be.

With transistors Q602 and Q603, amplifier Q611 and the power adjustment cicuits are controlled ON / OFF. When the logic gives a TXE "1" control, Q603 starts to conduct and the base of the Q602 will be grounded. Thus the Q611 will begin to conduct, and the modulated signal will be supplied to the RF-hybride. Q602 connects also the regulated voltage forward. RF-hybride gets operating voltage directly from the battery through the filtering.

3.5.2 Power adjustment

The control voltage of RF-hybride varies between $0.8...2.5 \text{ V}_{DC}$.

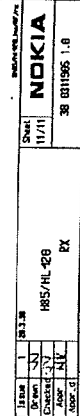
From the output power of RF-hybride is rectified a sample to the gate of Q606. This DC voltage is comparable to the output power. The TXC from the logic is brought to the gates of the Q605. As long as the voltage rectified after the hybride is less than the PWM voltage TXC, the Q604 tries to rise the control voltage V_{gg} , that is to rise the output power.

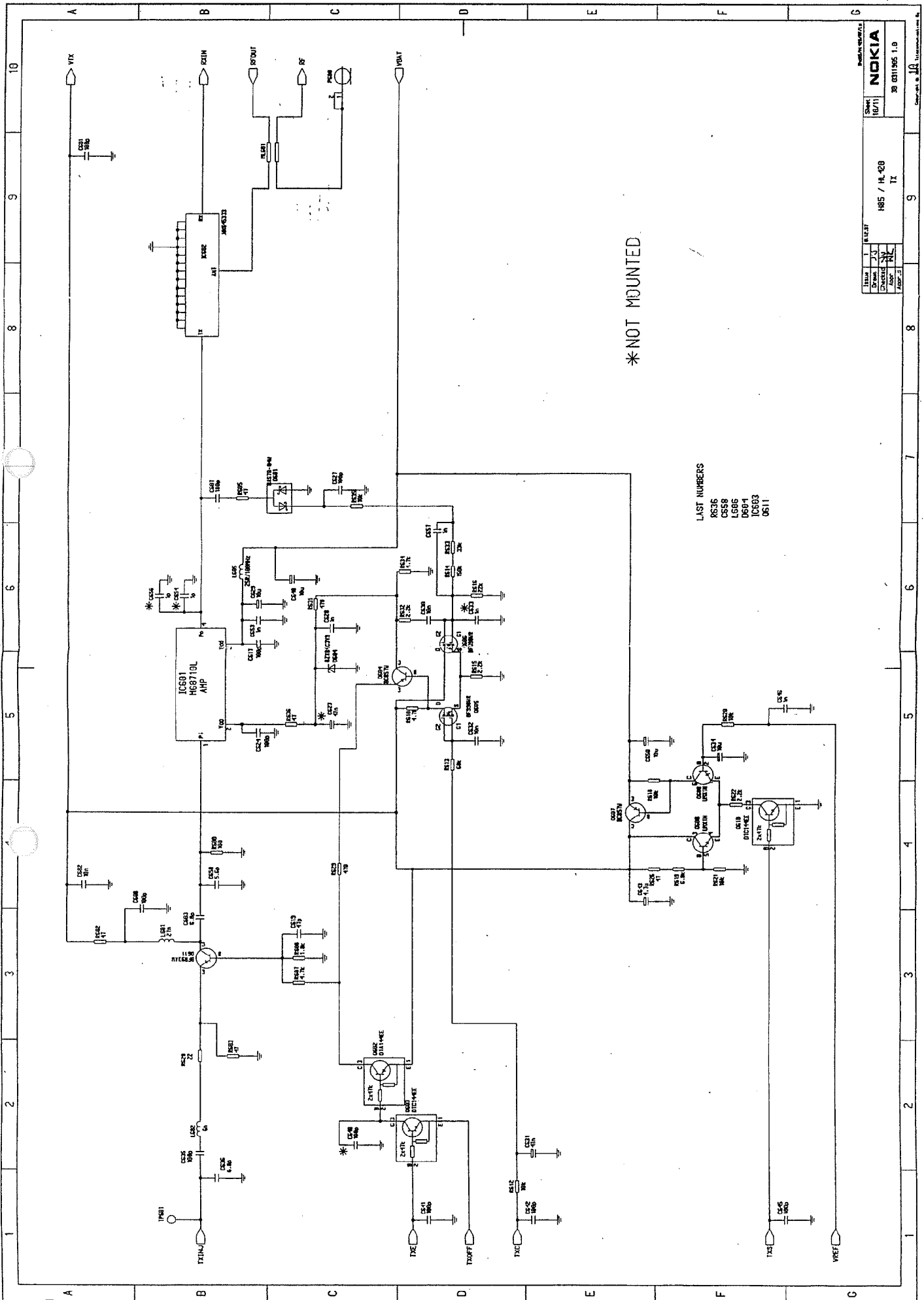
A numerical value, related to PWM-voltage, is stored into the memory of the radio in different power levels with 0.5 MHz steps in the whole used frequency range. The first storage point is 0.25 MHz up from the lowest frequency of the TX -band and after that in 0.5 MHz steps at the end of the band, so that the last storage point is 0.25 MHz down from the highest frequency.

This has to be made in normal room temperature and with V_{BAT} voltage 7.5 V.

3.5.3 Antenna switch

The antenna will be switched automatically between radio's own antenna and external antenna, when the radio is placed (or replaced from) to the car installation set.





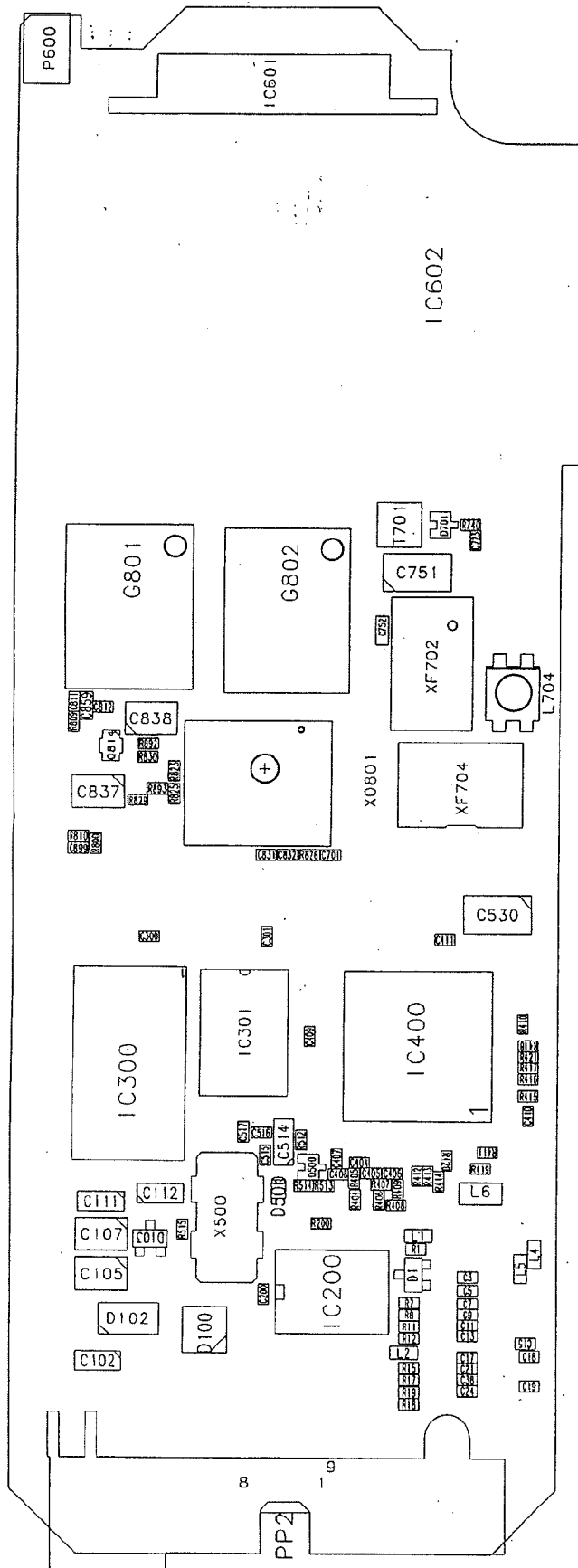
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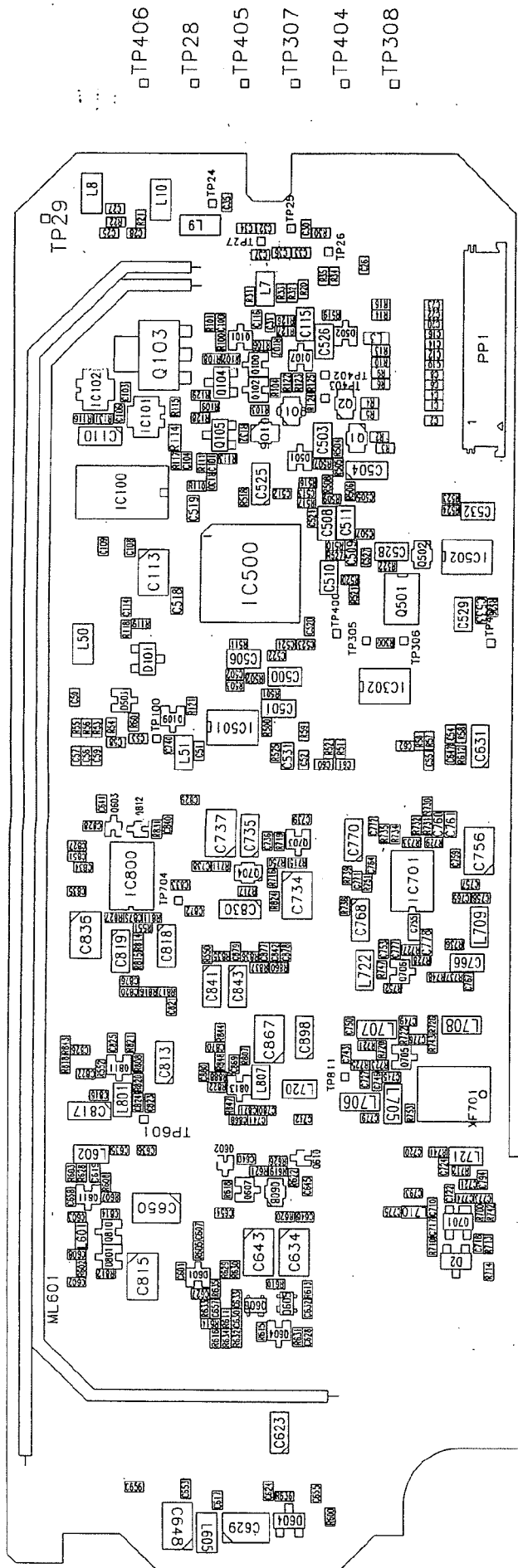
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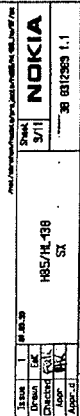
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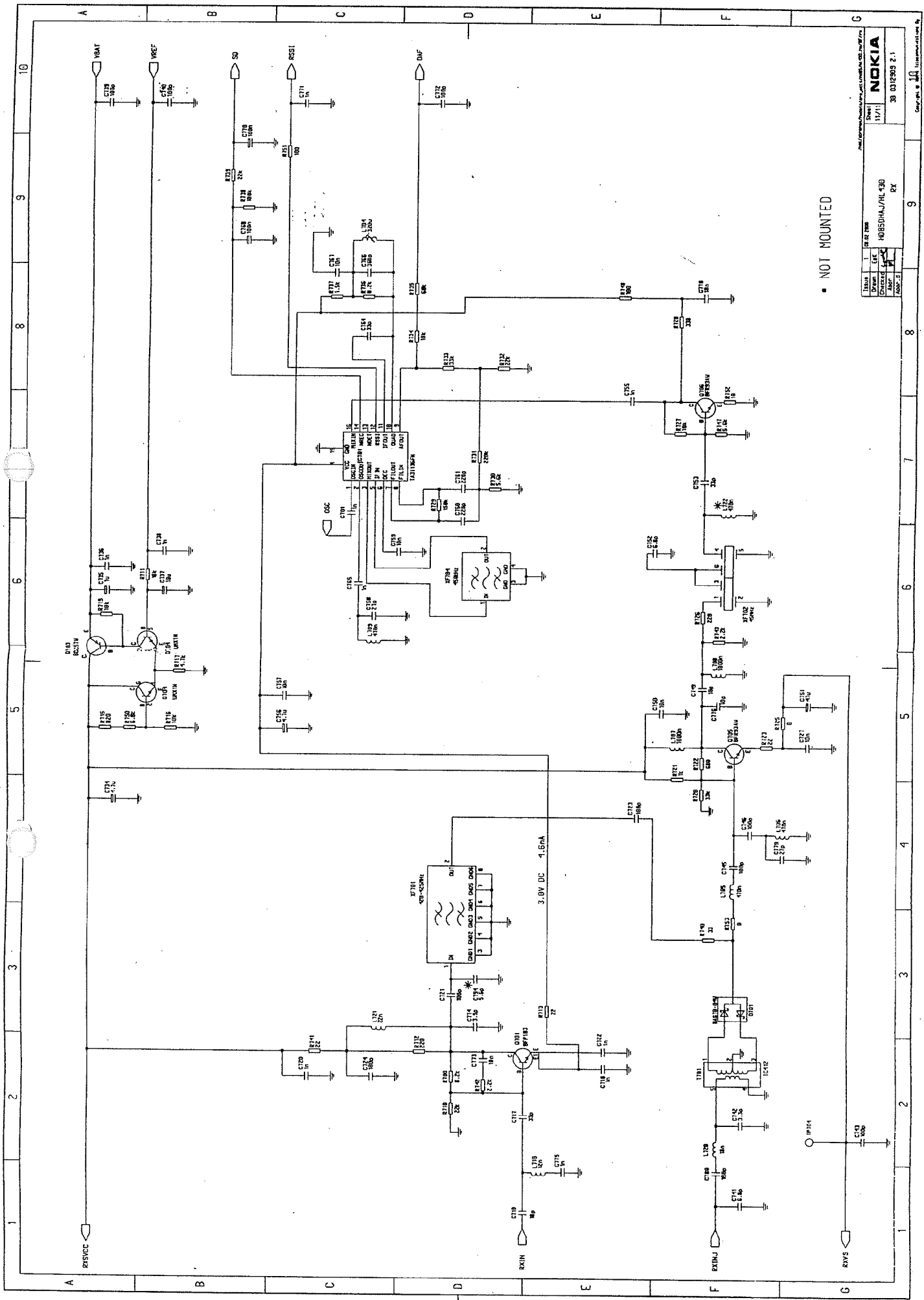
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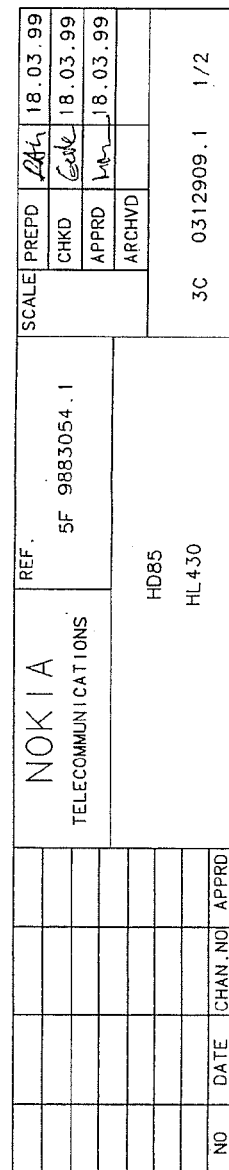


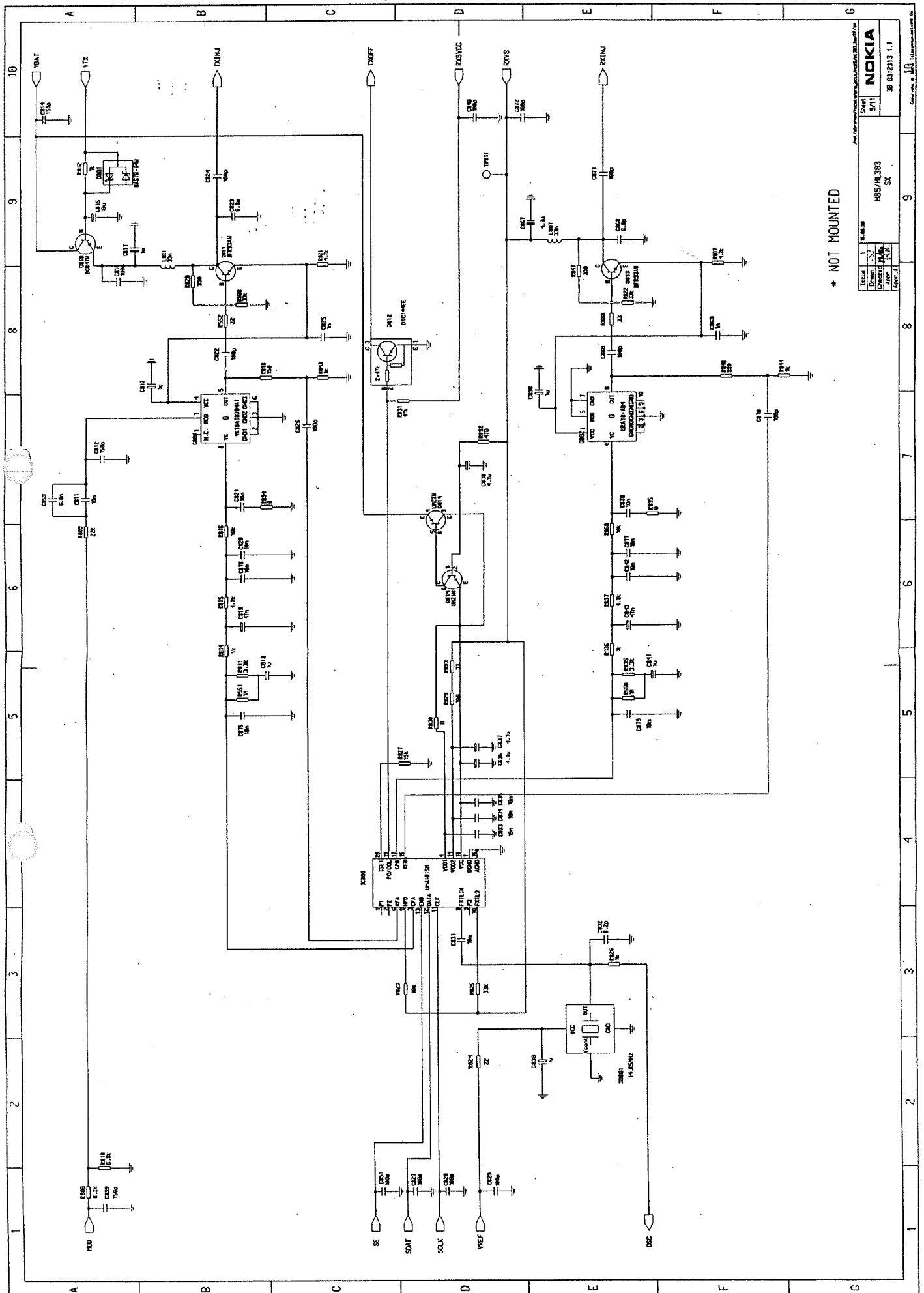
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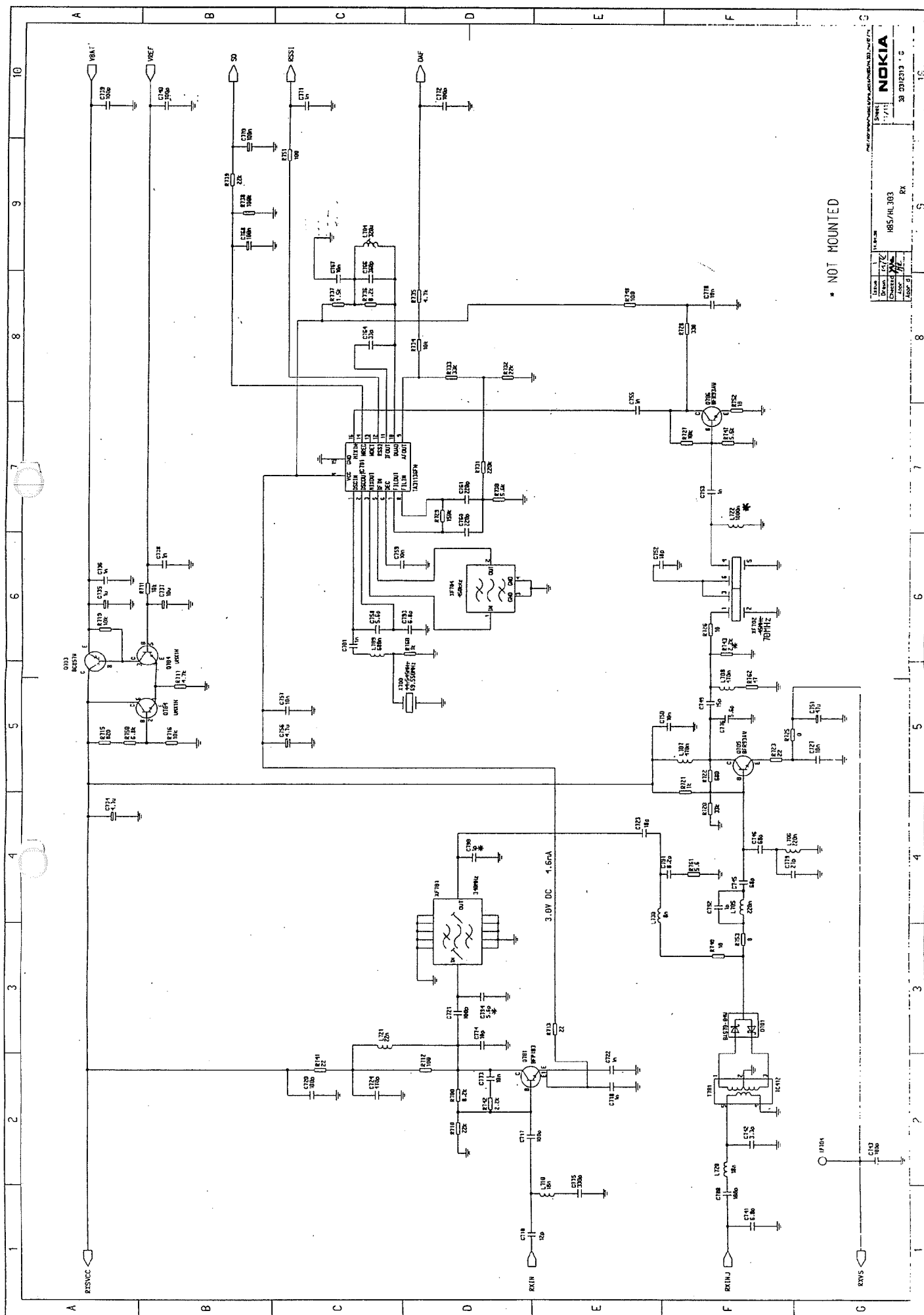
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Issue	1
Drawn	10/11
Quoted	10/11
Accepted	10/11
Age	10

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H85 / H303

FX

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H8X ACCESSORIES

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H8X ACCESSORIES

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NON SERVICEABLE ACCESSORIES

1 BATTERIES FOR H8X

There are two different physical sizes of battery packs for H8x portable phones, slim standard capacity and thick high capacity battery packs. Standart slim battery can be 900 mAh or 1200 mAh of capacity. High capacity battery pack is 1850 mAh NiMH battery.

The battery pack contains a cell pack (cell pack consist of 6 x 1.2 V cells and protection components), NTC resistor for battery temperature sensing and a fixed resistor for indicating the nominal capacity of the battery (the battery type). This temperature and capacity information is needed for the control of charging. These resistors are pull-up resistors for these lines so that can be read by MCU A/D inputs.

Also dummy-battery is included for service purposes. In the dummy battery the cell has been replaced with the power cable.

Description	Capacity	Product type	Material code
DUMMY-battery	ext. power cables	BTF-80	4671338
Standart NiCd	900 mAh	BH85S NiCd	4671331
Standart NiMH	1200 mAh	BH85S NiMH	4671339
Extented NiMH	1850 mAh	BH85H NiMH	4671333

Battery packs has a 4-pin connector X100:

pin number	Signal name	Function
1	VBAT	Positive battery terminal
2	BTYPE	Battery capacity sensing; (fixed resistor inside the battery pack)
3	BTEMP	Battery temperature sensing; (sensed by NTC resistor inside the pack)
4	GND	Negative/common battery terminal

Figure 1. shows pin numbering of this connector X100 in battery pack

1.1 Battery Pack BH85S NiCd

The BH85S is a NiCd slim standard battery pack. The package (i.e. including phone and battery) weights 495 g.

Specification

Product Code	4671331
Dimensions (h x w x d)	106 x 59 x 21 mm
Weight	150 g
Capacity	900 mAh
Cells:	6
Quick charging temperature:	+7...40 C

1.2 Battery Pack BH85S NiMH

The BH85S is a NiCd slim battery pack. The package (i.e. including phone and battery) weights 495 g.

Specification

Product Code	4671339
Dimensions (h x w x d)	106 x 59 x 21 mm
Weight	150 g
Capacity	1200 mAh
Cells	6
Quick charging temperature	+7...40 C

1.3 Battery Pack BH85H NiMH

The BH85H NiMH is high capacity battery. The package (i.e. including phone and battery) weights 580 g.

Specification

Product Code	4671331
Dimensions (h x w x d)	106 x 59 x 24 mm
Weight	235 g
Capacity	1850 mAh
Cells	6
Quick charging temperature	+7...40 C

H8X ACCESSORIES

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2 CHARGERS FOR H8X

2.1 Fast Travel Charger ACH-4E

This light weight AC travel charger can be used with all battery options. The charging time for each of the batteries (BH85S, BH85H) is about 80/160 minutes. The charger can also be used in connection with the desktop charger.

Specification

Product Code	0675008
Dimensions (h x w x d)	75 x 32 x 50 mm
Weight	80 g
Output cable lenght	2m $\pm$ 10%
Input voltage	180 - 264 VAC, 50Hz
Output voltage	12.0 $\pm$ 1 V
Output current	780 $\pm$ 50 mA
Charging time (discharged -> 80 % full)	
BH85S NiCd (900mAh)	1.5 h
BH85S NiMH (1200mAh)	2.0 h
BH85H NiMH (1850mAh)	3.1 h

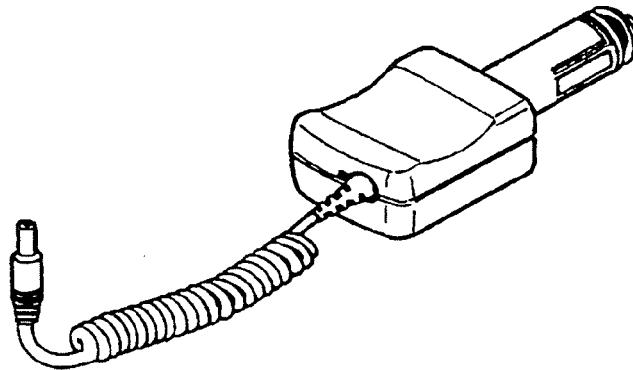
2.2 Cigarette lighter charger LCH-2

Introduction

The LCH-2 cigarette lighter charger is used for charging the battery of the handportable phone from 12 or 24V cigarette lighter socket of a motor vehicle. The cigarette lighter charger includes a step-down type power supply. It is controlled by the telephone unit. Charging mode is indicated by a two coloured LED.

Led indicator:

RED	charging
GREEN	standby charging
OFF	no charging



H8X ACCESSORIES

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States of charge and charge control

The LCH-2 cigarette lighter charger is used for charging a handportable phone from a car battery. A constant current or constant voltage output is provided depending on the operating state of the phone.

Charge current is supplied through a series switch transistor located in the phone. When the transistor is on the charger supplies a constant current to the phone. The phone is then in the rapid charge mode.

When the transistor is off, no current is supplied to the phone and the charge is in the constant voltage mode.

Once fully charged in the rapid charge mode, the battery is kept full by means of pulsed charging. Current is switched on and off at a variable duty cycle and a frequency of a few herz.

Charge Indication

Charger states are indicated with a dual-color LED located in the cigarette lighter charger unit.

In addition, the phone LCD contains a three-bar battery status display, operative when power for the phone is on.

'Charging sequence active' (state A) is indicated by the bars being lit sequentially, starting from the bottom one.

'Battery full' (state B) is indicated by all three bars steadily lit.

Phone operating status	LED	Display
Cigarette lighter charger connected to vehicle, phone disconnected	green	
Phone connected to charger, charging disabled due to battery temperature	green	state A
Rapid charge	red	state A
Battery full - trickle charge	green	state B
		red*)

*) Battery charging level is maintained during a phone call by occasional rapid charge cycles. Consequently, the LED can indicate either red or green.

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H8X ACCESSORIES

Specification

Product Code	0675005
Dimensions (h x w x d)	28 x 44 x110 mm
Weight	120 g
Length of spiral cable	2 m
Operating input voltage	9...32 VDC
Input current without phone	60 mA
Max. input current	1.8 A
Output voltage:	
constant voltage	$12.5 \pm 1 \text{ V} / 0...400 \text{ mA}$
constant current	$800 \pm 70 \text{ mA} / 5.0...10 \text{ V}$

H8X ACCESSORIES

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SERVICEABLE ACCESSORIES

3 DESKTOP CHARGER CHH-80

3.1 Related documents

4A	311729	block diagram DC80
4C	4670380	assembly instruction
	4670380	assembly parts

3.2 Introduction

The CHH-80 desktop charger is designed for the charging of the handportable phone and a spare battery. Rapid charging is possible by connecting the desktop charger to an AC power outlet via a suitable constant current charger (ACH-4E). This must be connected to DC connector S100.

Any NiCd, NiMH or Li-Ion type batteries specified for the phone can be used. The CHH-80 is also equipped with the discharge option of spare NiCd and NiMH battery.

3.3 Modes of operation

3.3.1 Charge states and charge control

The desktop charger indicates phone charging states. The desktop charger is also provided with control logic for spare battery charging, which is allowed when no phone is connected or the phone is in the pulse charge mode.

3.3.2 Charge Indication for the User

The desktop charger has dualcolour LEDs to indicate the charge of the phone and the spare battery.

The liquid-crystal display of the phone also contains a three-bar battery charge display, operative when power for the phone is on.

'Charging sequence active' (state A) is indicated by the bars lit sequentially, starting from the bottom bar (each bar is on for a period of 1 s).

'Battery full' (state B) is indicated by all five bars steadily lit.

Phone operating status	LED	Display
Desktop charger connected to mains through AC adapter, phone disconnected	—	—
Phone connected to charger, charging disabled due to battery temperature	green	state A
Rapid charge	red	state A
Battery full → trickle charge	green	state B

Spare battery operating status	LED	Display
Desktop charger connected to mains through AC adapter, spare battery disconnected	—	
Spare battery connected to charger, charging disabled either due to battery temperature, or due to rapid charge mode of the phone	red	
Rapid charge of spare battery	red	
Spare battery full → trickle charge	green	
Discharge of spare battery	flashing red	
Defective battery	flashing red and green	

3.3.3 External signals and connections

The module has two external connectors: the phone connector, the spare battery connector.

Phone connector PP120

Pin/ PP120	Pin/ OUT	Name	Description
1,2	1	VCHARGE / PDET	charge voltage output / phone detect input
3,4	2	PDET / GND	charge detect input/phone common ground

H8X ACCESSORIES

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Spare battery connector PP140

Pin/ PP140	Pin/ OUT	Name	Description
6,7,8	1	VBAT	positive terminal of battery
5	2	BTYPE	battery type indicator
4	3	BTEMP	battery temperature sensing input
1,2,3	4	GND	common ground

3.4 Electrical specifications

Operating input voltage: 12.0 VDC

Max. input voltage: 12.5 VDC

Max. input current: 850 mA

Output voltage:

- constant voltage 8.2 ± 0.05 V/0...800 mA
- constant current 800 ± 50 mA/(max) 12 V

3.5 Charging time

Battery type/capacity	Charging time (minutes)
900 mAh	90
1200 mAh	120
1850 mAh	190
Li-Ion	120

3.6 Functional description

3.6.1 General

The desktop charger module consists of one functional block as follows:

- a microcontroller based control logic for spare battery charging and discharging

3.6.2 Control logic

Charging is controlled by processor IC100. It is a single-chip type microcontroller.

3.6.3 Processor output signals

Name	Description
PA0	phone LED control, green: '1'
PA1	phone LED control, red: '1'
PA2	spare battery LED control, green: '1'
PA3	spare battery LED control, red: '1'
PC6/ BSW	spare battery charge control • '0': charge disabled • '1': rapid charge • PWM: pulsed mode
PC7	watchdog reset output

3.6.4 Processor A/D inputs

Name	Description
AN0/VBATL	battery voltage • range 0 to 11 V • resolution 43 mV/bit
AN1/VBATH	high resolution battery voltage • range 7.0 to 11 V • resolution 16 mV/bit
AN2/PDET	phone current detect • PDET='1' for A/D value higher than 5 • PDET='0' for A/D value 5 or less
AN3/BTEMP	battery temperature • 27 kΩ pull-up resistor to +5 V reference supply
AN4/BSI	battery size • 100 kΩ pull-up resistor to +5 V reference supply
AN5/CHVOL	charger voltage

3.7 Charging the spare battery

Charging current for the spare battery is fed through a switching transistor Q220 and diode D130. The transistor is controlled by the processor (Charging Control line). When the transistor is on, a constant current is supplied to the battery. This is the rapid charging mode. In the pulsed charging mode, charging current is adjusted by pulsing this rapid charge current.

Charging of the Lithium-Ion type batteries is constant voltage charging. Li-Ion mode is controlled by processor Li-Ion ON/OFF line which controls the transistor Q134. Li-Ion mode is on if transistor is off. The constant voltage is done by IC103, Q130 and Q131.

H8X ACCESSORIES

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Battery voltage is measured through resistor divider R140,R141, R142/R143. The range of measuring is 0 to 13.2 V; a voltage variation of 13 mV can be detected. For improved resolution operational amplifier IC104 is added. The first amplifier measures voltage of range 5.7 to 8.3 V and second from 8.0 to 10.5 V. With these amplifiers the resolution of 3 mV is achieved.

Temperature is measured over the BTEMP line. This line is pulled to +3.3 V reference voltage by R145. In the battery pack an NTC resistor is connected between BTEMP and GND.

The type of battery is measured over the BTYPE line. This line is pulled to +3.3 V reference voltage by R144. In the battery pack an ID resistor is connected between BTYPE and GND.

Because the phone and the spare battery cannot be charged simultaneously the charging current of the phone must be detected. This is done by operational amplifier IC 103 and resistor R120. When current flows to the phone gives amplifier interrupts to the processor through transistors Q120 and Q110. This information is used to switch off charging current of spare battery. This is done first by CHRG_OFF line through transistor Q222 and later by processor Charging Control line.

The CHH-80 desktop charger has two dual-colour LEDs to indicate the charging states of the phone (slot 1) and the spare battery (slot 0).

3.8 Discharging the spare battery

The desktop charger CHH-80 is also provided with a discharge function for Ni-batteries. This is activated by pressing a discharge switch on the right side of the charger. The spare battery is then discharged before charging. The flashing red led indicates discharging. Discharging is controlled by processor through switching transistor Q170. The battery is discharged to 6 V and after that charged normally. Discharging can be stopped by pressing discharge button again.

3.9 Watchdog circuit

The processor generates positive pulses to watchdog input WDI. Watchdog also monitors the regulated voltage of 3.3 V (Vcc). The reset is done if processor stops giving those pulses or Vcc voltage drops under 2.93 V.

3.10 Overvoltage indication

The voltage coming from DC power jack S100 is measured through resistor divider R114 and R113. If voltage goes over 12.6 V all leds are turned on and charging is stopped.

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DESKTOP CHARGER CHH-80

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DESKTOP CHARGER CHH-80

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DESKTOP CHARGER CHH-80

1 RELATED DOCUMENTATION

4A	311729	block diagram DC80
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4C	4670380	assembly instruction
	4670380	assembly parts

2 INTRODUCTION

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3 MODES OF OPERATION

3.1 Charge states and charge control

The desktop charger indicates phone charging states. The desktop charger is also provided with control logic for spare battery charging, which is allowed when no phone is connected or the phone is in the pulse charge mode.

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'Charging sequence active' (state A) is indicated by the bars lit sequentially, starting from the bottom bar (each bar is on for a period of 1 s).

'Battery full' (state B) is indicated by all five bars steadily lit.

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DESKTOP CHARGER CHH-80

Phone operating status	LED	Display
Desktop charger connected to mains through AC adapter, phone disconnected	—	—
Phone connected to charger, charging disabled due to battery temperature	green	state A
Rapid charge	red	state A
Battery full → trickle charge	green	state B

Spare battery operating status	LED	Display
Desktop charger connected to mains through AC adapter, spare battery disconnected	—	
Spare battery connected to charger, charging disabled either due to battery temperature, or due to rapid charge mode of the phone	red	
Rapid charge of spare battery	red	
Spare battery full → trickle charge	green	
Discharge of spare battery	flashing red	
Defective battery	flashing red and green	

3.3 External signals and connections

The module has two external connectors: the phone connector, the spare battery connector.

3.3.1 Phone charging connector PP120

Pin/ PP120	Pin/ OUT	Name	Description
1,2	1	VCHARGE / PDET	charge voltage output / phone detect input
3,4	2	PDET / GND	charge detect input/phone common ground

DESKTOP CHARGER CHH-80

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3.3.2 Spare battery connector PP140

Pin/ PP140	Pin/ OUT	Name	Description
6,7,8	1	VBAT	positive terminal of battery
5	2	BTYPE	battery type indicator
4	3	BTEMP	battery temperature sensing input
1,2,3	4	GND	common ground

3.3.3. Fast travel charger connector S100

Pin	Name	Description
1	VC	supply voltage input
2	GND	common ground

3.4 Electrical specifications

Operating input voltage: 12.0 VDC

Max. input voltage: 12.5 VDC

Max. input current: 850 mA

Output voltage:

- constant voltage 8.2 ± 0.05 V/0...800 mA

- constant current 800 ± 50 mA/(max) 12 V

3.5 Charging and discharging times

Battery type/capacity	Charging time (minutes)
900 mAh	90
1200 mAh	120
1850 mAh	190
Li-Ion	120

4 FUNCTIONAL DESCRIPTION

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The desktop charger module consists of one functional block as follows:

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4.1.4 Processor A/D inputs

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AN3/BTEMP	battery temperature • 27 kΩ pull-up resistor to +5 V reference supply
AN4/BSI	battery size • 100 kΩ pull-up resistor to +5 V reference supply
AN5/CHVOL	charger voltage

DESKTOP CHARGER CHH-80

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4.2 Charging the spare battery

Charging current for the spare battery is fed through a switching transistor Q220 and diode D130. The transistor is controlled by the processor (Charging Control line). When the transistor is on, a constant current is supplied to the battery. This is the rapid charging mode. In the pulsed charging mode, charging current is adjusted by pulsing this rapid charge current.

Charging of the Lithium-Ion type batteries is constant voltage charging. Li-Ion mode is controlled by processor Li-Ion ON/OFF line which controls the transistor Q134. Li-Ion mode is on if transistor is off. The constant voltage is done by IC103, Q130 and Q131.

Battery voltage is measured through resistor divider R140, R141, R142/R143 (47/141 k Ω). The range of measuring is 0 to 13.2 V; a voltage variation of 13 mV can be detected. For improved resolution operational amplifier IC104 is added. The first amplifier measures voltage of range 5.7 to 8.3 V and second from 8.0 to 10.5 V. With these amplifiers the resolution of 3 mV is achieved.

Temperature is measured over the BTEMP line. This line is pulled to +3.3 V reference voltage by R145 (47.5 k Ω). In the battery pack an NTC resistor is connected between BTEMP and GND.

The type of battery is measured over the BTYPE line. This line is pulled to +3.3 V reference voltage by R144 (47.5 k Ω). In the battery pack an ID resistor is connected between BTYPE and GND.

Because the phone and the spare battery cannot be charged simultaneously the charging current of the phone must be detected. This is done by operational amplifier IC 103 and resistor R120. When current flows to the phone gives amplifier interrupts to the processor through transistors Q120 and Q110. This information is used to switch off charging current of spare battery. This is done first by CHRG_OFF line through transistor Q222 and later by processor Charging Control line.

The CHH-80 desktop charger has two dual-colour LEDs to indicate the charging states of the phone (slot 1) and the spare battery (slot 0).

4.3 Discharging the spare battery

The desktop charger CHH-80 is also provided with a discharge function for Ni-batteries. This is activated by pressing a discharge switch on the right side of the charger. The spare battery is then discharged before charging. The flashing red led indicates discharging. Discharging is controlled by processor through switching transistor Q170. The battery is discharged to 6 V and after that charged normally. Discharging can be stopped by pressing discharge button again.

4.4 Watchdog circuit

The processor generates positive pulses to watchdog input WDi. Watchdog also monitors the regulated voltage of 3.3 V (Vcc). The reset is done if processor stops giving those pulses or Vcc voltage drops under 2.93 V.

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DESKTOP CHARGER CHH-80

4.5 Overvoltage indication

The voltage coming from DC power jack S100 is measured through resistor divider R114 and R113. If voltage goes over 12.6 V all leds are turned on and charging is stopped.

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Installation Manual for NOKIA H85 with car installation set



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Summary of changes

Summary of changes

The following changes have been made since the previous issue of this document, DC47514 (issued 01.10.1999):

- New document

1 About this document

This document describes Nokia H8x radio car kit installation packages.

We welcome any suggestions for further improvement of this document. Also, should you find any errors or omissions in this document, please forward your comments to the local Nokia representative.

1.1 How to use this document

This guide assumes that the end user should never attempt to install telephone by himself, but you should have some knowledge of telecommunications.

- Chapter 1 introduces the structure of the document and explains the typographical conventions used.
- Chapter 2 introduces the general information for installation packages of Nokia H8x car kit.
- Chapter 3 contains detailed information about the MCB 80.
- Chapter 4 contains general installation instructions.

1.2 Typographic conventions

The following typographic conventions are used in this document:

Convention	Item
Title Capitals	File and directory names, icon names, programs and applications, window names
Title Capitals in Bold	Dialog box titles
Bold text	Menu names and commands, buttons
<i>Title Capitals in Italics</i>	Referenced document titles
<i>Text in italics</i>	Emphasized text, new terms
SMALL CAPITALS	Key names, key combinations, key sequences
Monospace font	Output from the computer, user names, parameter names, passwords, database table names and counters, samples of code
Monospace in bold	Input that the user types
< >	Variable information to be supplied by the user is given between angle brackets < >
[]	Optional information in a command is indicated within brackets []
Click File → Exit	On the File menu, click Exit

Notes (including cautions, tips, warnings and general notes) call your attention to information. The following symbols are used in the notes in our documentation:



Warning symbol. Warnings alert to dangers which may cause loss of life, physical injury or ill health in any form.



Caution symbol. Cautions indicate possible damage to equipment or a possibility of loss of data.

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About this document



Note symbol. Notes indicate additional information such as recommendations or tips.



Task sequence symbol. Indicates the start of a procedure.

2 H85/80/81 Installation packages

2.1 Product list

2.1.1 H85/80/81 accessories for car installation

Description	Name alias
Power cable	MUC 400-02
Power cable	MUC 400-03
Handset with holder	HHS 600-01
System cable for HS	
Cradle	MCH8H
System cable for cradle	
Antenna Cable for cradles	
Loudspeaker	MLS 400-01
Mobile connection box	MCB 80
Handsfree microphone	MMIH 400-01
Handsfree PTT	MFP 400-01
Data cable	XSCC 400-01

2.1.2 Full installation set

In Figure 1 there is described all accessories that can be used in vehicle installation.

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Installation manual for H8x car kit

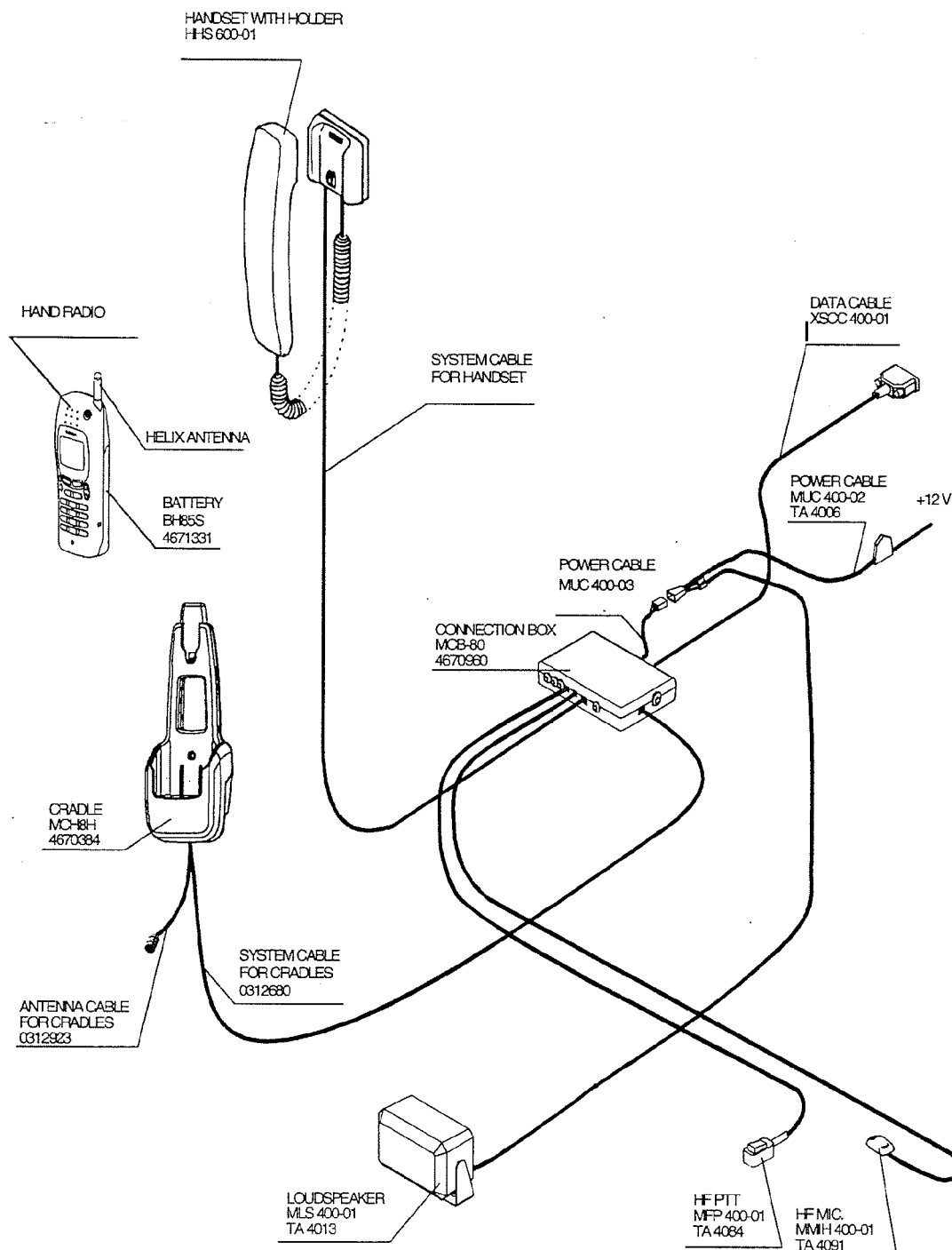


Figure 1. H85/80/81 with installation package.

2.1.3 Loudspeaker MLS 400-01

The Loudspeaker MLS400-01 is used in the car and it is connected to the LSP-connectors of the power cable MUC400-02.

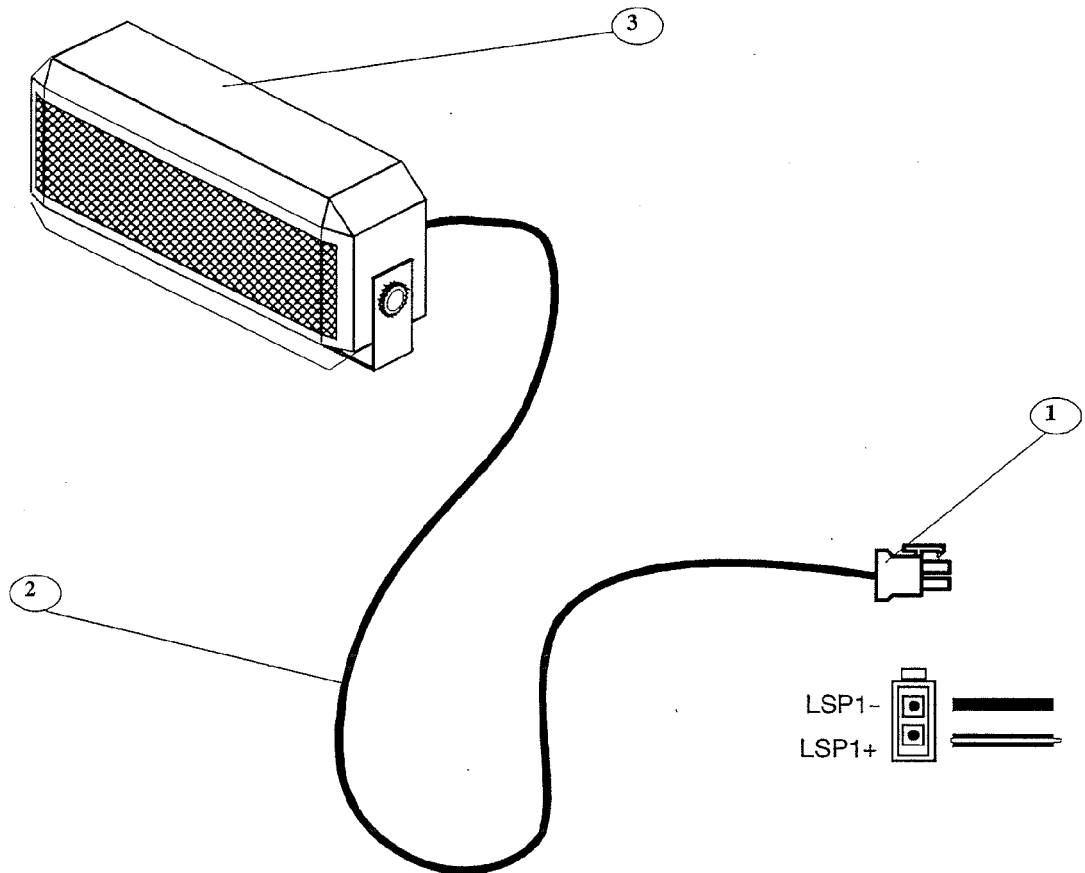


Figure 2. Loudspeaker MLS 400-01.

Part	Description
1	Connector Molex, LSP1- is black and LSP1+ is black/white
2	Cable, length 6.5 m
3	Speaker, Foster

2.2 MCB 80 technical data

Temperature range:

-25°C ... +55°C
-30°C ... +70°C

fully operational
operational

Supply voltage:

10.8 - 15.6 V

MCB 80 is used with H8x

Current consumption:

60 mA
1100 mA

standby
maximum

Charging voltage:

12 V / 0.8 A

H8x

2.2.1 MCB 80 assembly parts

In Figure 3 is shown assembly parts of MCB 80.

Part	Description
1	Lid A
2	Gasket
3	Gasket ring
4	Printed board
5	Lid B
6	Cover plug A, 7 pcs
7	Cover plug B, 5 pcs
8	Low roundheaded cross rec. screw M3x16, 6 pcs
9	Installation sticker
10	Low roundheaded cross rec. screw M4x30
11	Tapping screw 4.2x13, 6 pcs
12	Installation plate
13	Type sign
14	Star washer A4.3/8
15	EMC-cover

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H85/80/81 Installation packages

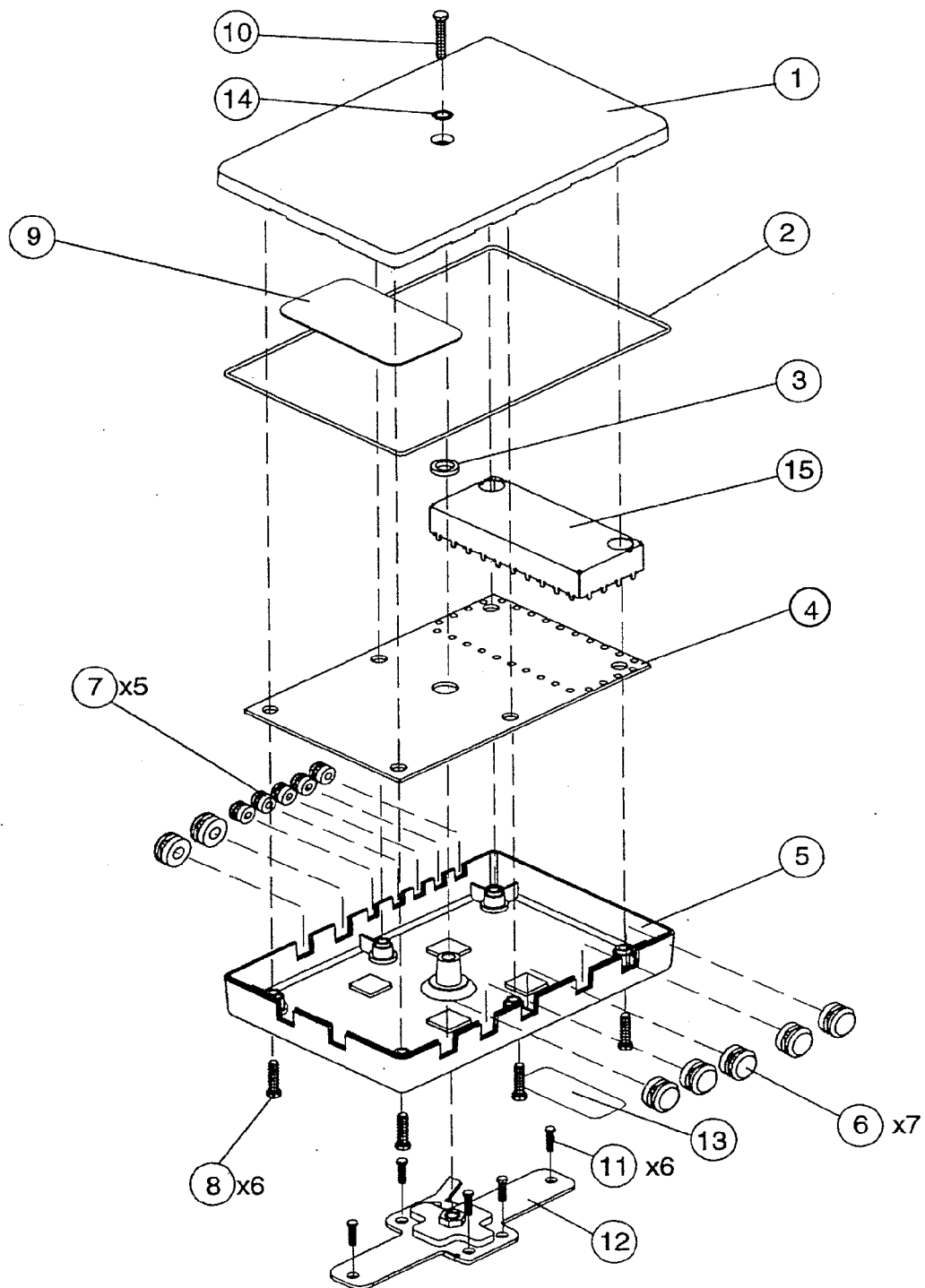


Figure 3. MCB 80 assembly instruction.

2.2.2 Data cable

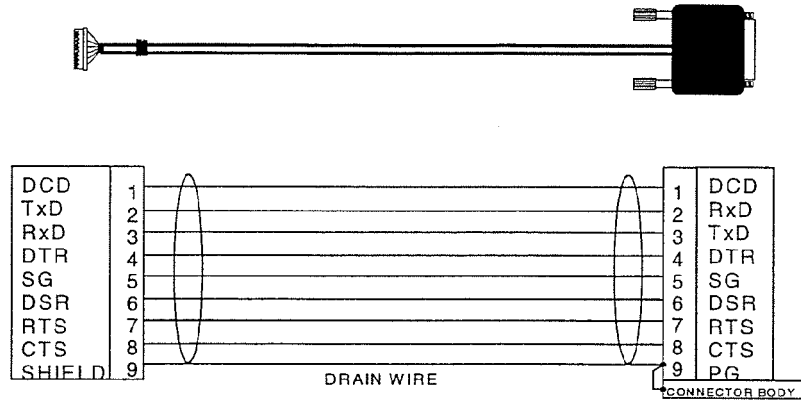


Figure 4. The data cable XSCC 400-01.

2.2.3 System cable

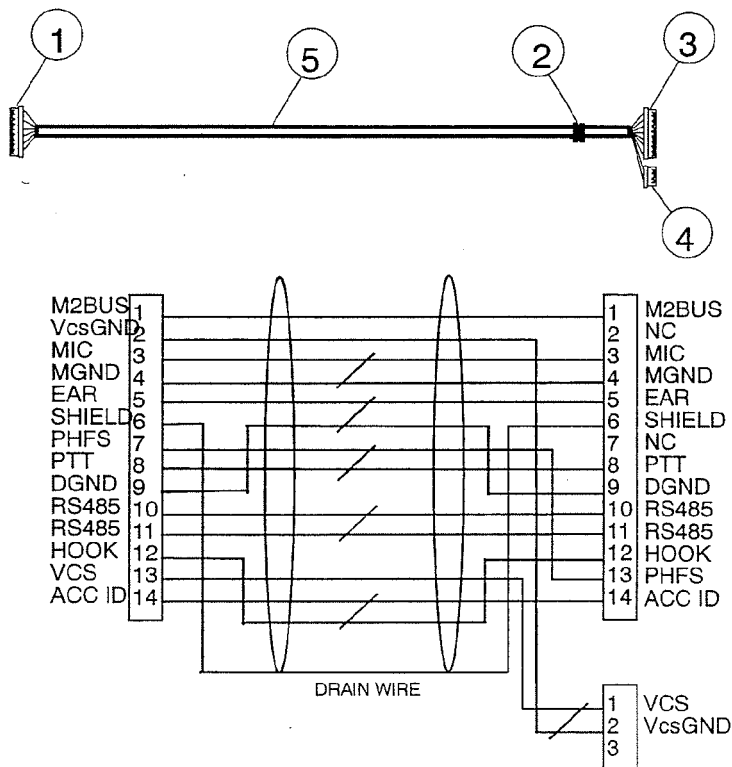


Figure 5. The system cable 4R 0312680.

2.2.4 Power cable MUC 400-03

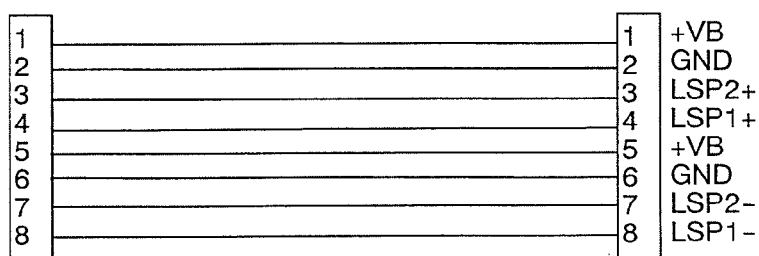
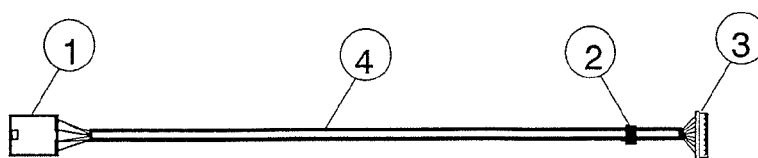


Figure 6. The power cable MUC 400-03.

2.2.5 Handsfree microphone



Figure 7. Handsfree microphone MMIH 400-01.

2.2.6 Cable for handset

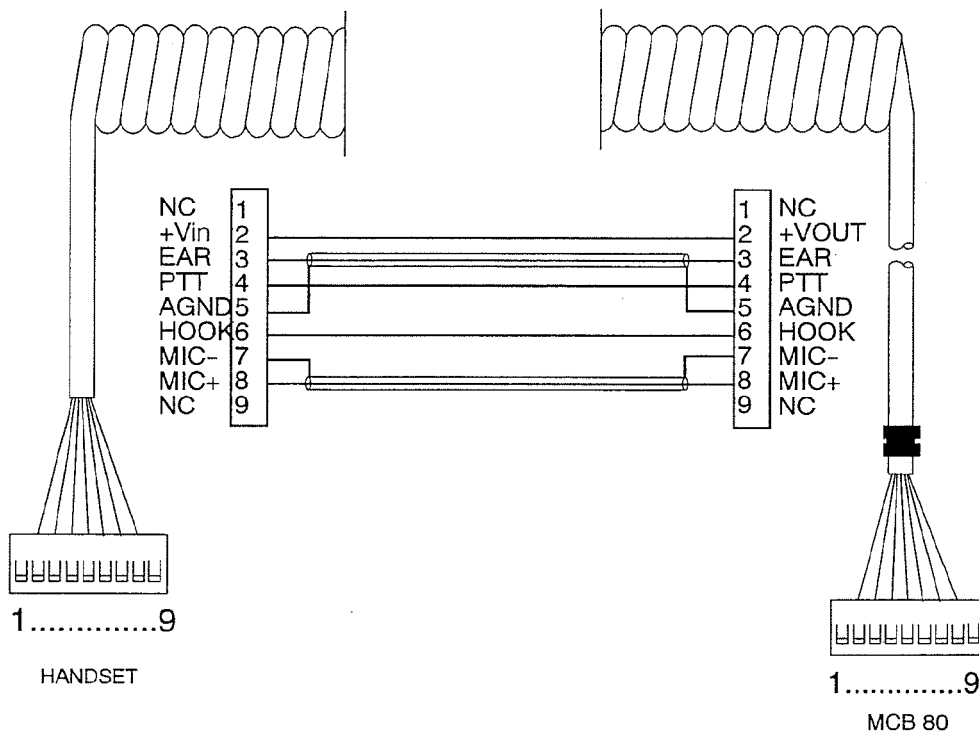


Figure 8. The cable for handset HHS600-01.

2.2.7 Handsfree PTT



Figure 9. The handsfree PTT cable MFP400-01.

2.2.6 Cable for handset

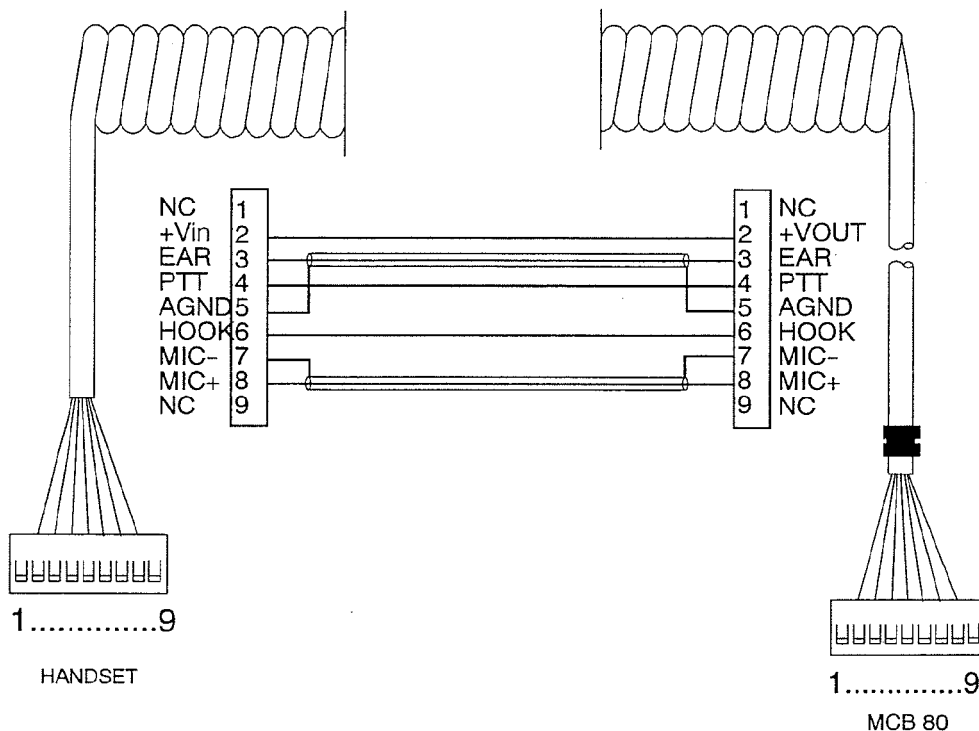


Figure 8. The cable for handset HHS600-01.

2.2.7 Handsfree PTT



Figure 9. The handsfree PTT cable MFP400-01.

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H85/80/81 Installation packages

2.2.8 Power cable MUC400-02

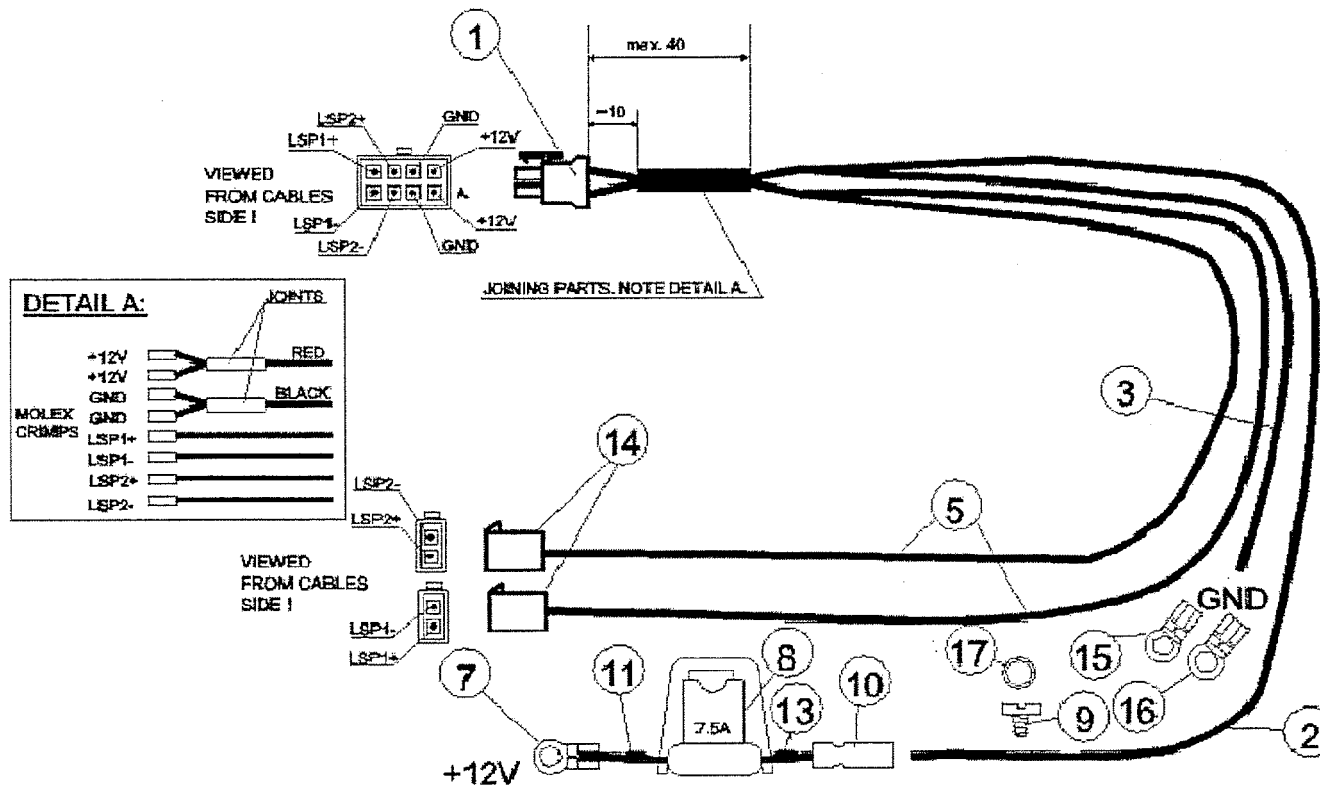


Figure 10. The power cable MUC400-02.

Part:	Description:
1	Connector housing / crimps
2	Conductor 1*2.5 mm ² red, length 6.5m
3	Conductor 1*2.5 mm ² black, length 1m
5	Cable 2*0.5 mm ² black, length 0.3m, 2 pcs
7	Ring terminal M8
8	Fuse holder and fuse, size 7.5 amps
9	Screw 6,3*16
10	Butt splice, insulated
11	Conductor 1*2,5mm ² red, length 0.3m
13	Conductor 1*2,5mm ² red, length 0.2m
14	Connector housing/crimps/seals, 2 pcs
15	Ring terminal M6
16	Ring terminal M8

The power cable MUC400-02 includes supply wires. The red cable is connected directly to the vehicles battery positive (+) pole,

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Installation manual for H8x car kit

via 7.5 A fuse. The positive power cable should be connected directly to the car battery terminal, and no other appliances must be connected to this cable. A fuse must be installed in the positive battery lead as close to the battery as possible. The power cables must be cut to suitable length. The black negative cable is connected to car chassis close to the radio unit. The length of the negative cable should be as short as possible.

3 The connection box MCB 80

3.1 General

The mobile connection box MCB 80 is an accessory device for hand radio unit H80/81/85. This chapter aims at giving the required information for installing the mobile connection box MCB 80 into a vehicle. Read this chapter carefully in order to minimize the problems and malfunctions.

The installer should rely on his/her own skills and common sense when choosing the locations. The end user should never attempt to install the mobile connection box MCB 80 by himself, as the work requires special tools and knowledge. The terms of warranty also demand that the mobile connection box MCB 80 is installed by an authorized installation company.

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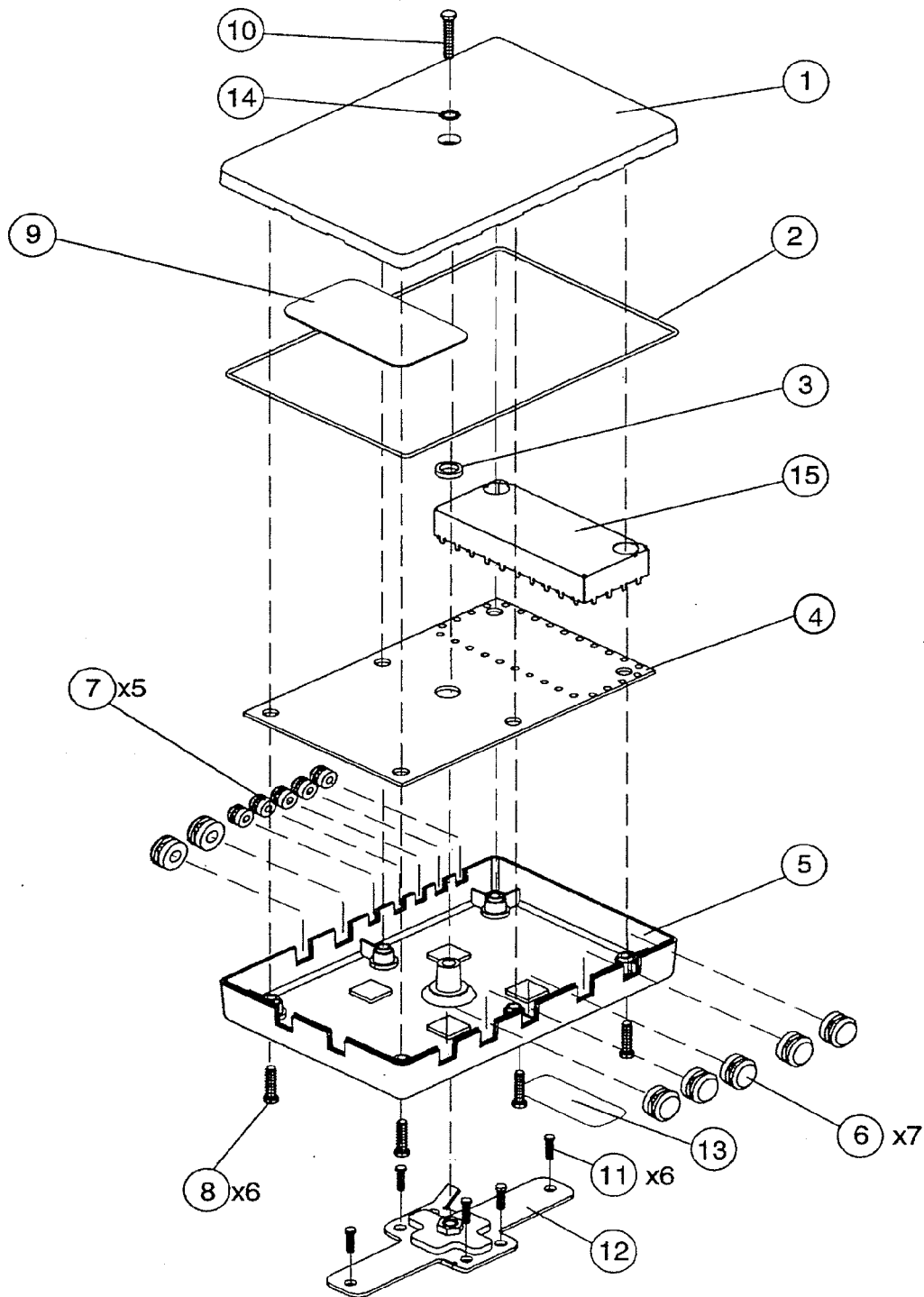


Figure 11. MCB 80 assembly instruction.

3.2 Introduction

The mobile connection box MCB 80 is designed to operate as a junction box in the H85 and H80/81.

The connection box consists of the two types of speech equipments (hands free and handset), RS232 interface, power supply logic, charging interface and cradle interface.

The connection box MCB 80 provides and controls supply voltages to the HF-equipments, speech equipment interface, charging interface and power on/off logic.

The connection box MCB 80 controls the audio paths between HF-equipments and speech equipments. MCB 80 communicates with radio unit using MBUS interface.

The mobile connection box is installed between the radio unit in cradle, handset and hands free equipments.

The user can install the connection box in a hidden location, since usually there is no need to detach cables in normal operation. The user have to open lid A from lid B, when he/she connects the cables to the MCB 80. The MCB 80 is attached to the vehicle with the installation plate. The installation plate can be connected to the vehicle horizontal or vertical plane.



WARNING

If the user does not use all possible cables, he/she must use cover plugs A or B to avoid moisture and dust in the MCB 80.

The user must install the gasket and the gasket ring very carefully into MCB 80, otherwise the MCB 80 does not fulfil the protection class IP 54. Do not stretch the gasket, because it's shape can be changed very easily.



Note

The EMC-cover is already soldered in the circuit board. The electromagnetic disturbances of the charger block are eliminated by the EMC-cover.

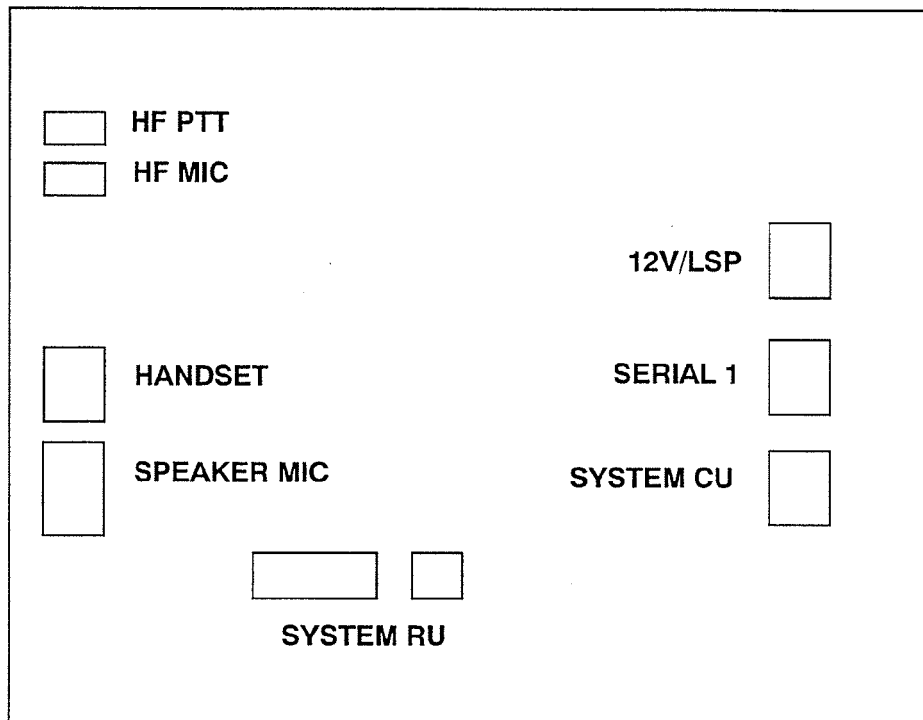


Figure 12. The assembly label printing.

HF-equipments (HF MIC and HF PTT) are connected to the 3-pin connectors located in the edge of the junction box. Data cable (SERIAL 1), speech equipment (HANDSET) is connected to the 9-pin connectors located in the edge of the junction box. The power cable (12V/LSP) is connected to the 8-pin connector in the edge of the junction box. The system cable from cradle (SYSTEM RU) is connected to the 14-pin connector in the edge of the junction box. The locations of the cables is shown in the assembly label printing (above).



Note

The printed board is not attached to MCB 80. This makes possible to take the printed board away from MCB 80, when you are connecting cables to MCB 80. After you have connected the cables to the MCB 80, you should put the printed board back to MCB 80.

3.3 H8x installation with MCB 80

MCB 80 can be used with H8x. MCB 80 is connected to the hand radio unit H8x with cradle. **The following issues should be noticed in the H8x installation:**

- When H8x is connected to the MCB 80, the identification resistor value is noted.
- Rx and Tx audios are routed to the system connector of the H8x
- The LSP and MIC of the H8x are muted.
- When handset is in holder, the loudspeaker is active and H8x's volume adjusts Rx audio level which is routed to the system cable.
- When handset is in holder, the HF MIC is active and the MIC of the handset is muted.
- When handset is picked up, the loudspeaker will be muted and Rx audio level in the system cable is adjusted in 200 mV_{RMS}.
- When handset is picked up, the HF MIC is muted and the MIC of the handset is active.
- When handset is picked up, the HF MIC can not be activated even with HF PTT.
- Starting and ending call will be controlled in normal way by H8x's keypad and also by HOOK line.
- Charging current is 800 mA. When H8x is connected to the MCB 80, the maximum voltage must be limited to 12V.
- The MCB 80 must be connected to the power cable MUC400-02, which is connected to the electric system of the vehicle by the power cable MUC 400-02, when MCB 80 is used with H8x.

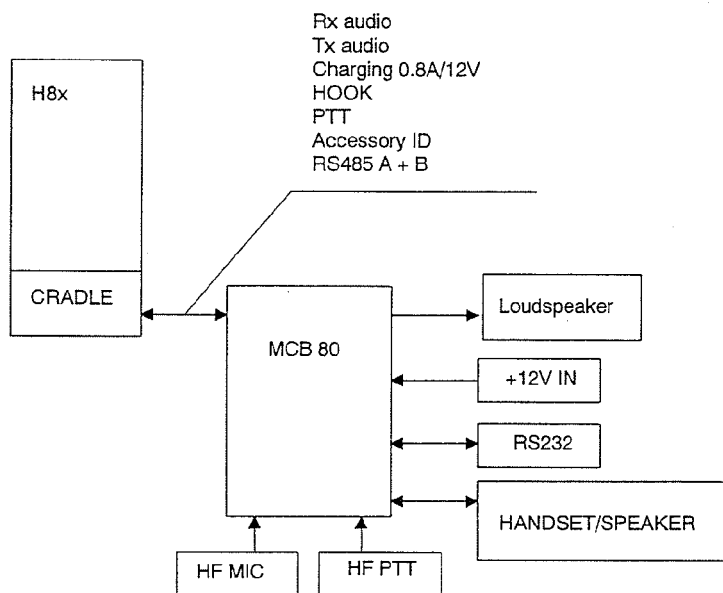


Figure 13. MCB 80 in H8x installation.

3.4 Connectors and cables

There are 9 different connectors in the mobile connection box MCB 80. Table 1 describes the connectors of the MCB 80.

Table 1. The connectors of the MCB 80.

Connector	Table	Pins	Name alias
Charger connector	P100	3	
Data connector (Serial 1)	P101	9	XSCC 400-01
System connector (RU)	P102	14	MSC 410-07
not in use	P103	11	
Power connector (12V/LSP)	P104	8	MUC 400-03
Speech Equipment (Handset)	P105	9	HHS600-1
HF MIC	P106	3	MMIH 400-01
HF PTT	P107	3	MFP 400-01
not in use			

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The connection box MCB 80

3.4.1 Connector P100

The charger connector P100 connects the cradle through the system cable 0312680 to the MCB 80. Table 2 describes signals between cradle and MCB 80.

Table 2. Pin order of the connector P100.

Pin	Name	Description	Nominal level	Impedance
1	V_CHAR	Charging voltage	12 V / 0.8 A	
2	GND_CHAR	Charging ground		
3	VBAT		not in use	

3.4.2 Connector P101 (Serial 1)

Serial 1 connector P101 connects data device through the data cable XSCC 400-01 to the mobile connection box MCB 80. Table 3 describes signals between data device and MCB 80.

Table 3. Pin order of the connector P101.

Pin	Name	Description	Nominal level	Impedance
1	NC	No connection		
2	TxD	Transmitted Data	'0' = +9V and '1' = -9V	300 Ω
3	RxD	Received Data	'0' = +3..+15V and '1' = -3..-15V	5 kΩ
4	DTR	Data Terminal Ready		
5	GND	Signal Ground	GND	
6	NC	No connection		
7	NC	No connection		
8	CTS	Clear to Send	'0' = -9V and '1' = +9V	300 Ω
9	PG	Protection Ground		



Note

Data device can be for example personal computer or printer. The user can use a program in the personal computer. The program and radio unit can communicate through the connection box in the MBUS line. The user can connect data cable XSCC 400-01 to the connector P101.

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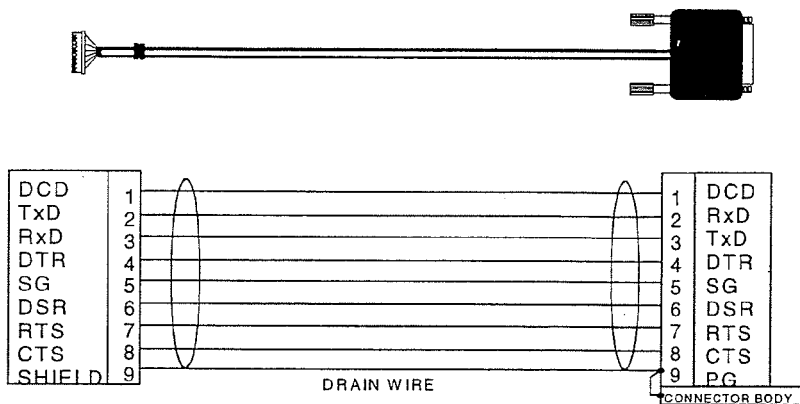


Figure 14. The data cable XSCC 400-01.

3.4.3 Connector P102 (System RU)

Radio unit connector P102 connects the cradle to the mobile connection box MCB 80. Table 4 describes signals between cradle and MCB 80.

Table 4. Pin order of the connector P102.

Pin	Name	Description	Nominal level	Impedance
1	MBUS	Data connection	'0' < 0,4V ja '1' > 3,5V	
2	NC			
3	MIC	Microphone signal for RU	200 mV _{RMS}	13 kΩ
4	SGND	Signal ground		
5	EAR / HFPWR	Earphone signal from RU The starting line of the MCB80	200 mV _{RMS} DC 13 V	
6	SHIELD	Cable shield	GND	
7	NC			
8	PTT	PTT information for RU	'0' < 0.5 V and '1' > 3.5 V	
9	DGND	Digital ground	GND	
10	TxD	Data line	'0' = +9 V and '1' = -9 V	1.5 kΩ
11	RxD	Data line	'0' = +3V...15 V and '1' = -3...-15V	1.5 kΩ
12	HOOK	HOOK identification '0' Handset is picked up '1' Handset is on hanger	'0' < 1 V and '1' > 3 V	

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The connection box MCB 80

Pin	Name	Description	Nominal level	Impedance
13	PWHFS	HF Power Switch	'0' and '1'	
14	NC			



Note

The nominal levels of the PTT and HOOK are depended by the radio type.

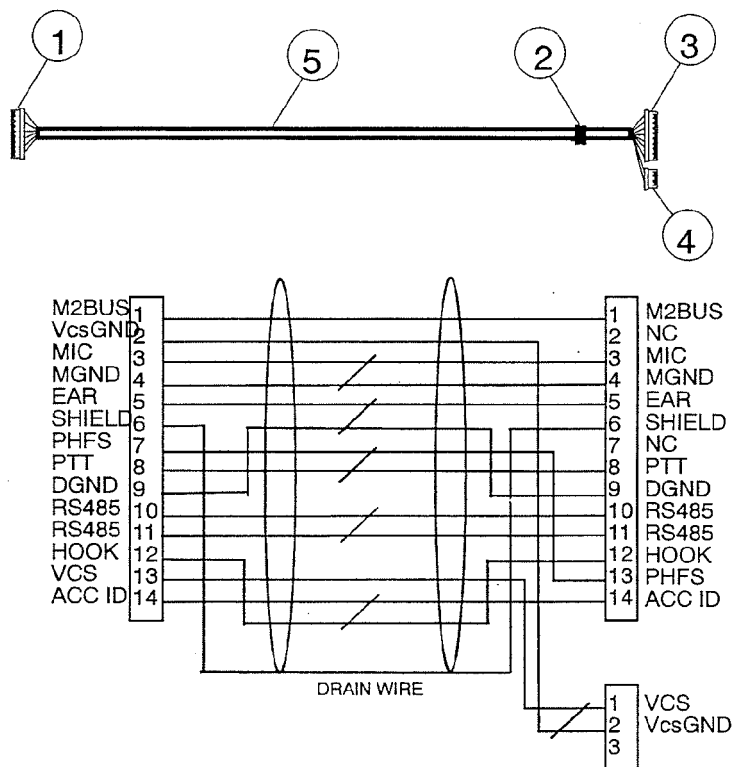


Figure 15. The system cable 4R 0312680.

Part:	Description:
1	Connector, housing and crimps
2	Strain relief, black
3	Connector, housing and crimps
4	Connector, housing and crimps
5	Twisted pair cable, length 2.0 m

3.4.4 Connector P103 (not in use)

3.4.5 Connector P104 (12V/LSP)

Power connector P104 connects mobile connection box MCB 80 to the power cable MUC400-03. The power cable MUC400-03 is connected to the power cable MUC400-02. The power cable MUC400-02 is connected to the electric system of the vehicle. Table 5 describes signals between MCB 80 and power cable MUC400-03.

Table 5. Pin order of the connector P104.

Pin	Name	Description	Nominal level	Impedance
1	+VB	Supply voltage	13.2 V	
2	GND	Ground for power supply		
3	LSP 2+	The output of the LSP 2	3 W / 4Ω ; 1.5 W / 8Ω	
4	LSP 1+	The output of the LSP 1	3 W / 4Ω ; 1.5 W / 8Ω	
5	+VB	Supply voltage	13.2 V	
6	GND	Ground for power supply		
7	LSP 2-	The output of the LSP 2	3 W / 4Ω ; 1.5 W / 8Ω	
8	LSP 1-	The output of the LSP 1	3 W / 4Ω ; 1.5 W / 8Ω	



WARNING

It is possible to connect only one 4Ω loudspeaker at the same time.

It is possible to connect two 8Ω loudspeakers at the same time.



Note

The user can connect the power cable MUC 400-03 between the connector P104 and power cable MUC400-02.

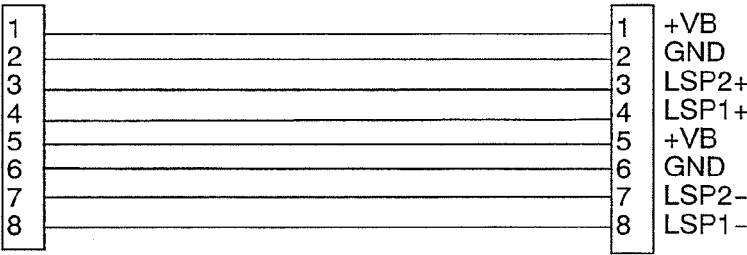
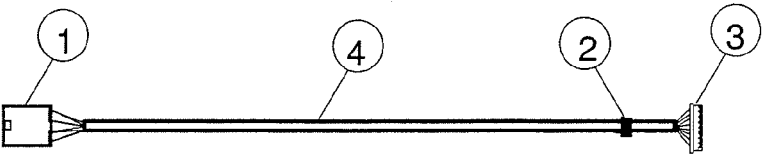


Figure 16. The power cable MUC 400-03.

Part:	Description:
1	Connector, housing and crimps (molex)
2	Strain relief, black
3	Connector, housing and crimps
4	Cable, length 0.5 m



WARNING
There is no strain relief in power cable TA4123 in the molex (1) end. Be carefully, when you are handling the power cable. The crimps of the molex connector might be loosen.

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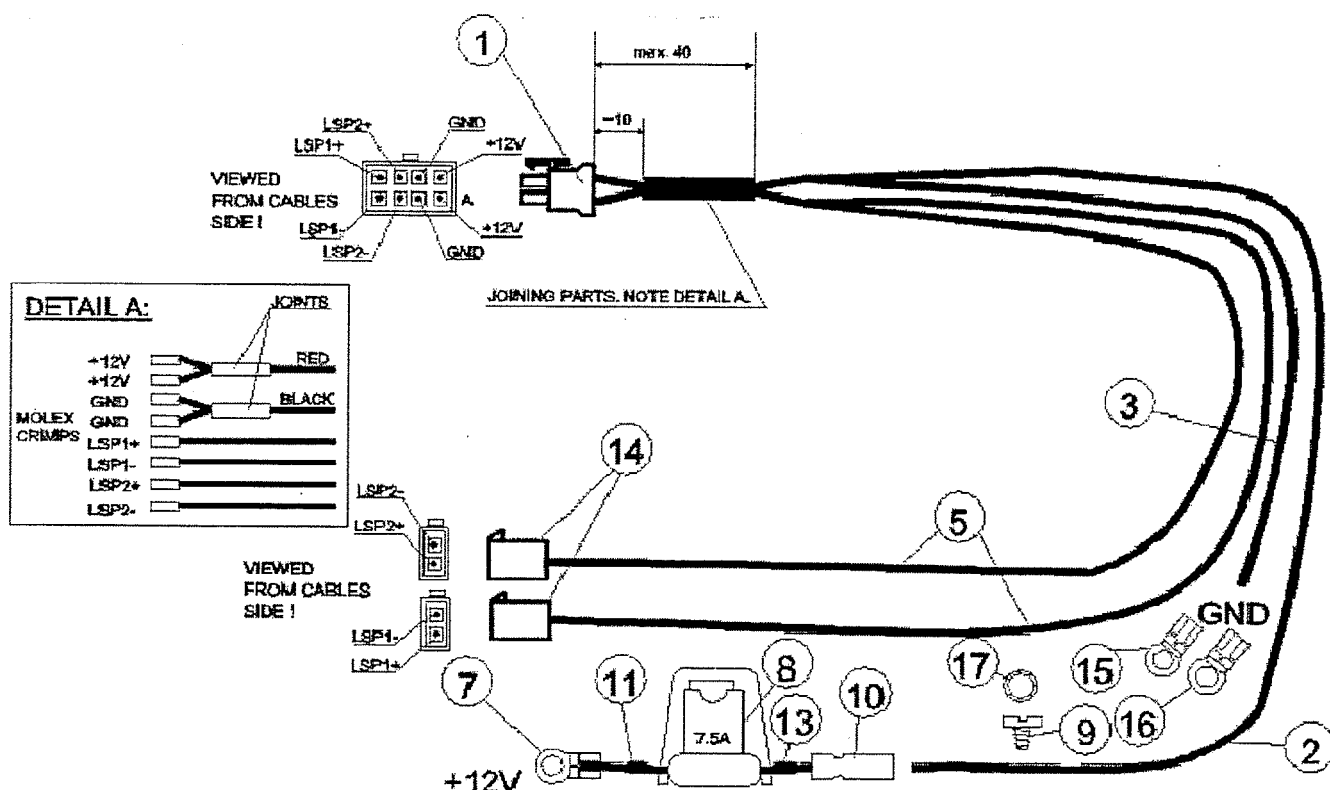


Figure 17. The power cable MUC400-02.

Part:	Description:
1	Connector housing and crimps
2	Conductor 1*2.5 mm ² red, length 6.5 m
3	Conductor 1*2.5 mm ² black, length 1.0 m
5	Cable 2*0.5 mm ² black, length 0.3 m
7	Ring terminal M8
8	Fuse holder and fuse, size 7.5 A
9	Screw 6.3*16
10	Butt splice, insulated
11	Conductor 1*2.5 mm ² red, length 0.3 m
13	Conductor 1*2.5 mm ² red, length 0.2 m
14	Connector housing, crimps and seals, 2 pcs
15	Ring terminal M6
16	Ring terminal M8
17	Washer

3.4.6 Connector P105 (HANDSET)

Handset connector P105 connects handset to the mobile connection box MCB 80. Table 6 describes signals between handset and MCB 80.

Table 6. Pin order of the connector P105.

Pin	Name	Description	Nominal level	Impedance
1	LSP	Loudspeaker signal	0,2 W / 8 Ω	8 Ω
2	+Vout	Supply voltage for external speech devices	+ 8 V $\pm$ 10% / 200 mA	
3	EAR	Earphone signal	200 mV _{RMS} Max. = 500 mV	32 Ω +1 k Ω
4	PTT	PTT information for MIC+	'0' < 0.5 V and '1' > 3.5 V	
5	AGND	Analog ground		
6	HOOK	HOOK identification	'0' < 1 V and '1' > 3 V	
7	MIC-	Analog ground		
8	MIC +	Microphone signal	1.5 mV _{RMS}	2 k Ω
9	SHIELD	Cable shield		



Note

The user can connect the handset to the connector P105.
 The maximum voltage for the microphone of the handset is 1 V_{RMS}.

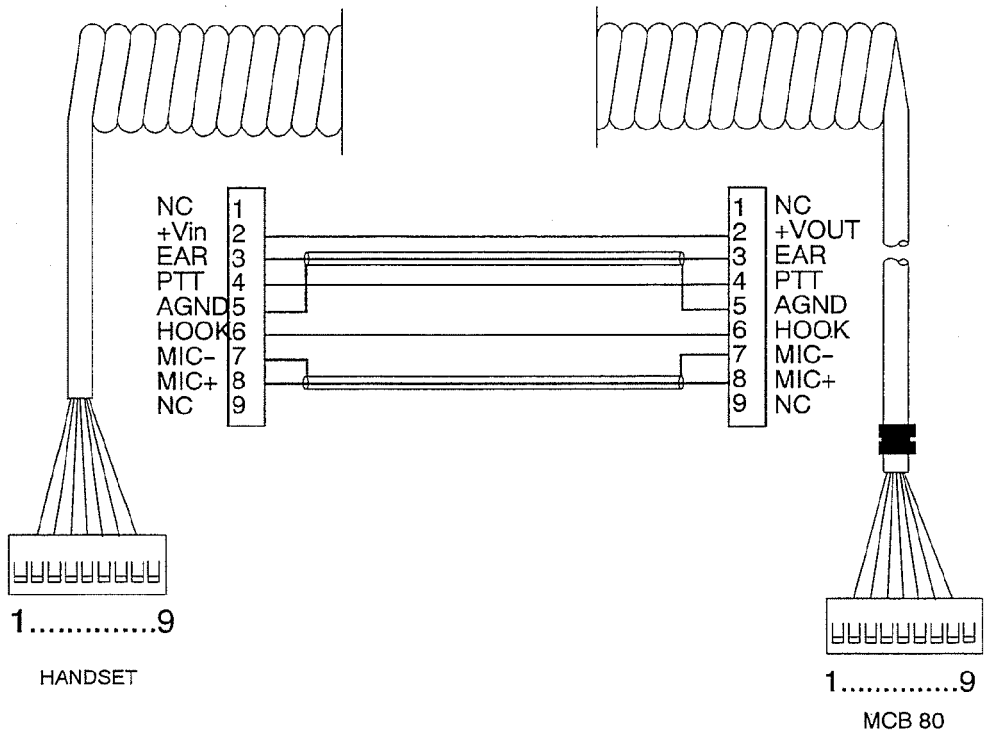


Figure 18. The cable for handset HHS600-01.

3.4.7 Connector P106 (HF MIC)

HF-microphone connector P106 connects handsfree microphone to the mobile connection box MCB 80. Table 7 describes signals between handsfree microphone and MCB 80.

Table 7. Pin order of the connector P109.

Pin	Name	Description	Nominal level	Impedance
1	HFMIC	Handsfree microphone	1.5 mV _{RMS}	2 kΩ
2	HFPTT	PTT information for HFMIC	'0' < 0.5V and '1' > 3.5V	33 kΩ
3	AGND	Analog ground		



Note

The user can connect handsfree microphone (HF_MIC) cable MMIH400-01 to the connector PP106. The handsfree press to talk (HF_PTT) information is included in the connector P109, because it makes possible to use handsfree microphone with inline PTT-button. The 33 kΩ impedance is used for internal pull-up resistance.



Figure 19. Handsfree microphone MMIH 400-01.

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Installation manual for H8x car kit

3.4.8 Connector P107 (HF PTT)

HF-PTT connector PP107 connects handsfree PTT information to the mobile connection box MCB 80. Table 8 describes signals between handsfree PTT and MCB 80.

Table 8. Pin order of the connector P107.

Pin	Name	Description	Nominal level	Impedance
1	HFPTT	PTT information for HFMIC	'0' < 0.5V and '1' > 3.5V	33 k Ω
2				
3	DGND	Digital ground		



Note

The user can connect handsfree PTT information (HF_PTT) cable MFP400-01 to the connector P107. The 33 k Ω impedance is used for internal pull-up.



Figure 20. The handsfree PTT cable MFP400-01.

3.4.9 Connector P108 (not in use)

4 Vehicle installation

4.1 General

This chapter describes the general information for installing the H80/81 into a vehicle.

This manual aims at giving the required information for installing the H80/81 into a vehicle. Read this manual carefully in order to minimize the problems and malfunctions.

The suggested installation concepts give only general ideas about the positioning of the units. The installer should rely to his/her own skills and common sense when choosing the locations.

The end user should never attempt to install the telephone by himself, as the work requires special tools and knowledge. The terms of warranty also demand that the telephone is installed by an authorized installation company.

4.2 Introduction of the vehicle installation

Start the installation by selecting mounting locations for all separate units and the antenna. This must be done in co-operation with the customer. The customer has the right not to accept a recommended antenna location. The installer should, however, explain the effect of an unsuitable installation. The customer has the right to choose that installation combination he needs. The necessary cable runs should also be planned with care. The time spent on proper planning of the job will be repaid by making the actual installation job much quicker and by reducing the risk of incorrect installation. Correct antenna location is particularly important. Best results are achieved by mounting the antenna on the roof. Ease and safety of use must be taken into account when selecting the location of the control unit.

4.2.1 Vehicles fitted with electronic devices

An additional precaution is necessary in relation to vehicles fitted with Electronic Ignition, Fuel Injection, Anti-skid Brake System or any other electronic device where temporary loss of service could be hazardous.



WARNING

In theory, any of the above systems could be affected by the presence of an RF field of sufficient intensity which, when detected, may cause the device to malfunction. The source of RF may be a mobile radio installed in the vehicle itself or a transmitter operating in another vehicle alongside. If interaction occurs, loss of control could happen during the mobile transmission.

System and antenna cables should be run on the opposite side of the vehicle to the other electronic cables of the car. In the interests of safety, the user must be asked to test the vehicle when the installation is complete.

4.2.2 Specialized vehicles

The installation on certain specialized vehicles, such as fuel tankers and fire-fighting vehicles, may be subject to additional safety regulations which must be closely observed. Prior to commencing an installation on such a vehicle, be sure that any relevant safety regulations are fully understood.

4.2.3 Petrol powered vehicles

Ensure that there are no petrol leaks before commencing an installation involving the use of electronic tools, as these can produce sparks. Ensure that no damage to petrol tank or fuel lines occurs when drilling holes.

4.2.4 Gas powered vehicles

Before installation, establish that there are no gas leaks. Don't use a flame. Butane and propane are heavier than air, so if there is a leak, the gas may lay on the floor of the boot. The gas is detectable by its characteristic smell. The point of escaping gas may show signs of frosting. The vehicle owner should arrange for the leak to be repaired before installation is commenced. Ensure that no damage to petrol tank or fuel lines occurs when drilling holes.

System and antenna cables should be run on the opposite side of the vehicle to the gas fuel pipe.

4.3 Selecting locations

The best guide for positioning the units is your own experience, skills and common sense. However, some aspects requiring special attention will be discussed here.

The positioning of the control unit is the most important factor when trying to achieve the most comfortable usage for the user. The location should be selected so that the visibility of the display is good in every lighting condition, but not so that the drivers attention gets too easily stolen from the driving itself. The radio should be located so that the driver can easily reach the keypad. Under no circumstances should the unit obstruct the driver from operating car controls (e.g. handbrake).

Junction boxes etc. can also be installed in a hidden location, since usually there is no need to detach cables in normal operation. However, remember that the radio parts does not like moisture or mechanical pressure.

Handsfree microphone can usually be installed in the sun visor of the driver, or in the A-pillar. The main idea is to get the microphone quite close to the drivers mouth, and also to attach the microphone on a surface that does not carry the mechanical vibrations of the car body, since these will increase the background noise when using handsfree.

The loudspeaker is not so sensitive to vibration, thus it can be located more freely. The main idea is to optimize two requirements:

- The driver should hear the signal from the loudspeaker without any special efforts.
- The attenuation between loudspeaker and microphone should be as high as possible, i.e. they must point to different directions in order to minimize the acoustic feedback.

The routing of the cable between mounting bracket and junction box isn't usually critical, as long two things are kept in mind:

- Do not route cable close to any car computers, ABS-systems, and the like in order to minimize the risk for interferences.
- Take also care not to run the cable so that it gets under any mechanical stress e.g. under seats or against sharp edges of car chassis.

The customer is paying for the installation and expects to get good return for his/her money. Therefore installers first duty is to discuss all the locations with him/her. Sometimes the customers may have strange ideas of the locations. Then it is your job to point out politely why these solutions will not work.

4.4 Installation of cables

Cable paths should be chosen in such a way as to allow the cables to be laid under mats and mouldings for protection against mechanical damage. Installation must be made without dismantling cable connectors. Beware of sharp metal edges and hot engine parts that may damage the cable insulation. Cables must not be mounted on moving parts of the engine or car body, e.g. in hinged lorry cabins.

Cables should always be laid well away from high-voltage ignition leads and other cable harnessings in order to prevent noise from being induced into the radiotelephone cables.

4.4.1 Power distribution

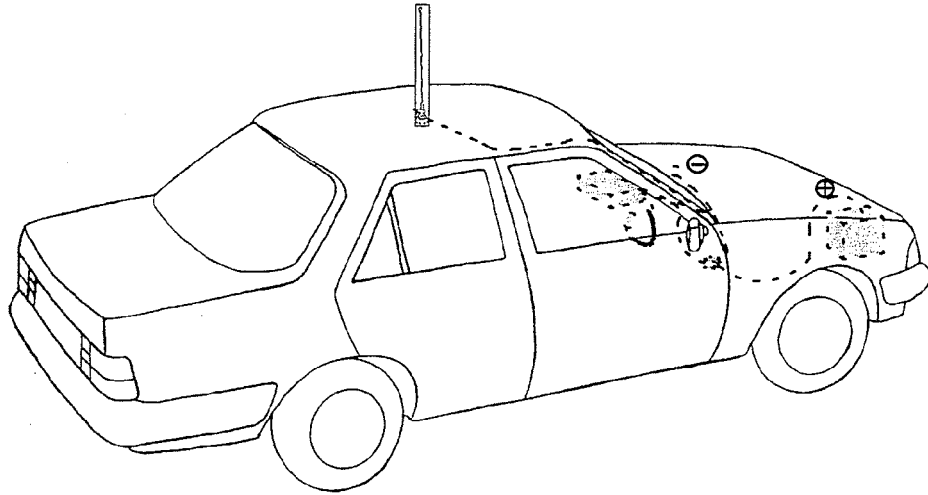


Figure 21. Power distribution.

The main supply for the car kit is obtained from the vehicle battery. **The supply voltage may vary between 9 and 16 volts.** The positive voltage are taken directly from the battery, unless the vehicle has other main voltage than +12 V. This minimizes the risk of disturbances from or to the radio unit as well as guarantees loss-free power distribution. The grounding are taken from the car chassis.

The connections to the battery should be carried out with care. The positive lead has a 7.5 A fuse, which must always be used. If a fuse blows, replace it only with the same type and size fuse.

The power cables should be routed so that possible sources of disturbances are avoided. Also ABS sensors and the like should be avoided as far as possible.

4.4.2 Vehicles with 24 V DC system

If the vehicle has + 24 V electrical system (trucks, all-terrain vehicles , etc.), an external voltage converter must be used. That converter must have good protections against transients produced by the vehicle's electrical system and it must also be capable of maintaining stable output during rapid changes in load current.

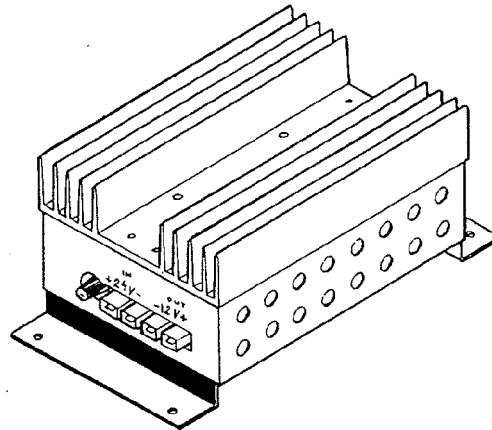


Figure 22. The voltage converter.

Some vehicles e.g. gas trucks, have a main switch which separates the vehicles chassis from the negative lead of the battery. Do not pass this switch under any circumstances, i.e. the grounding of the converter must be taken from the body of the vehicle, NOT directly from the battery. The user can install the voltage converter to the vehicle as in figure 17, (below).

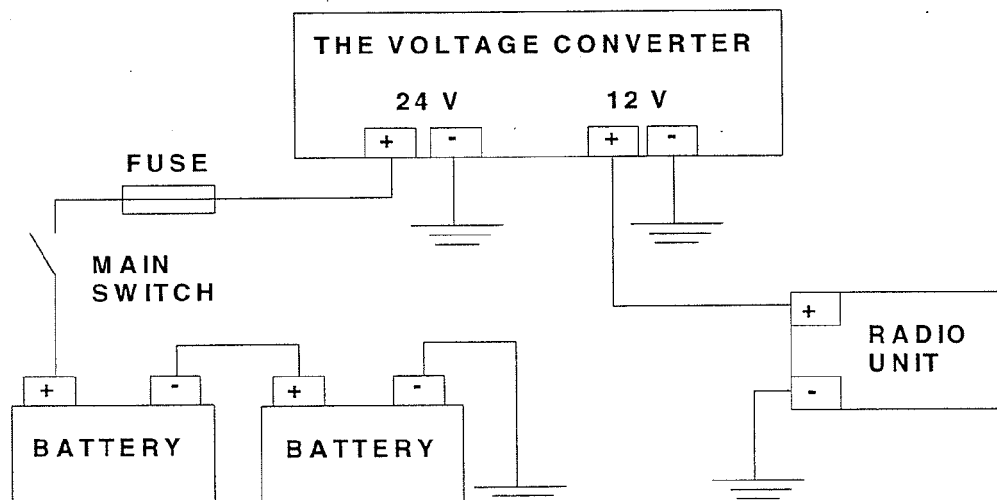


Figure 23. The installation of the voltage converter.

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Installation manual for H8x car kit

DO NOT INSTALL THE CONVERTER:



Caution

- to the engine compartment
- where there is not adequate amount of air for cooling
- where there is risk of moisture (condensated water etc.)
- under the carpet.

4.4.3 Grounding

Good grounding is the basic requirement to achieve a good installation and to prevent noise disturbance. Here is a list of points that must be observed:



1. Grounding should be done separately and not to the cars existing screw connections
2. Grounding place must be firm (e.g. lap joint of metal plates) so that the screw connection is reliable in the long term
3. Grounding place must be cleaned carefully of paint and it should be given rust prevention with vaseline or some suitable chemical
4. Grounding cable must be as short as possible to reduce noise coupling and placed as close to the connection box as possible
5. Bad system grounding can be detected by reduced noise level when the car antenna is removed or the car starts up



WARNING

If the user does not use all possible cables, he/she must use cover plugs A or B to avoid moisture and dust in the MCB410. The user must install the gasket and the gasket ring very carefully into MCB410, otherwise the MCB410 does not fulfil the protection class IP 54. Do not stretch the gasket, because it's shape can be changed very easily.



Note

The EMC-cover is already soldered in the circuit board. The electromagnetic disturbances of the charger block are eliminated by the EMC-cover.

4.5 The antenna

4.5.1 Antenna at the centre of roof

The best quality of communication is achieved by installing the radiotelephone antenna at the centre of the car roof. This is true with all radiotelephones, irrespective of brand or type.



Note

In H80 and H81 there is no antenna connector in the bottom connector! Thus it is impossible to connect external antenna via the cradle to the H80/H81.

The highest radiation power and sensitivity of reception and the most uniform radiation pattern is obtained with the antenna at the center of the roof: the communication quality will then be independent of the vehicle's direction with respect to the base station, and the greatest effective height is obtained. This makes possible the best quality of communication particularly in hilly terrain or to when distant from the base station.

When installing the antenna at the edge of the roof, there may be very little ground plane. However, it is worth installing the antenna on the roof, even if the radius of the ground plane is as small as 15 centimetres. The center line of the vehicle is the best place even if there were more ground plane available at the body edges. Height variations less than 5 centimetres in the ground plane do not have any decisive effect on the radiation pattern of the antenna.

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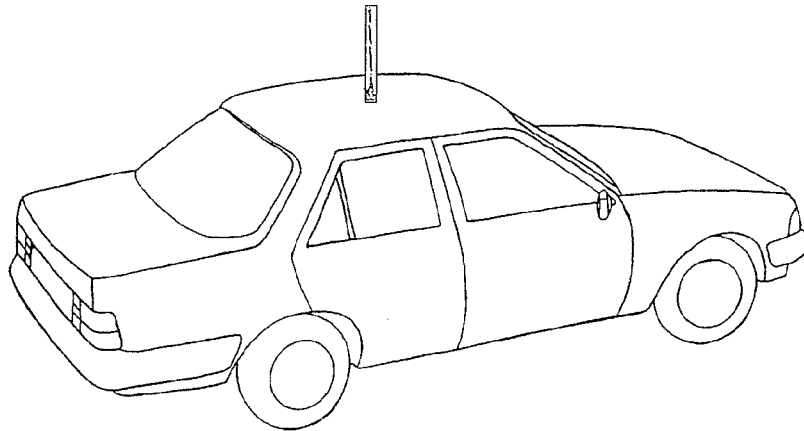


Figure 24. Antenna at the centre of roof.

4.5.2 Other antenna locations

The rear wing is an alternative place for the antenna, but is not as effective as the center of the roof. The radiation pattern will be uneven and the communication quality of the mobile telephone will be more dependent on the orientation of the car with respect to the base station. When the antenna is installed on the rear wing, it should not be mounted in the corner between the boot and the rear window. For best results, it should be located halfway out on the wing and it should be vertical.

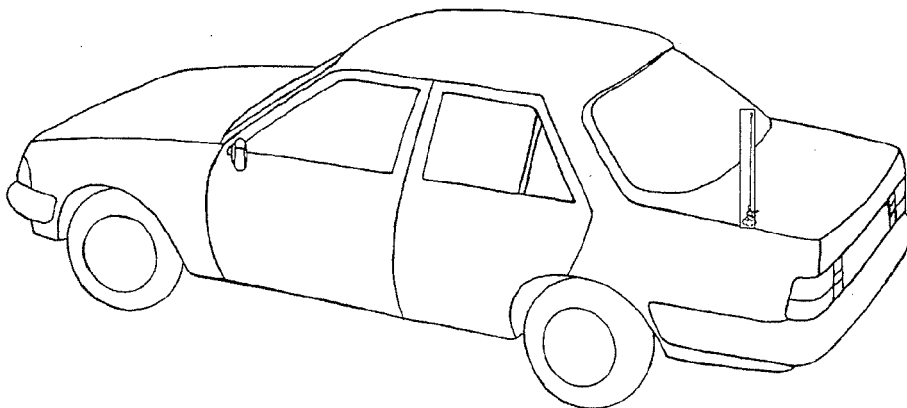


Figure 25. The second best place for the antenna.

The boot lid is the worst place for the antenna. Although the installation is quick and easy, severe problems will occur with

interference. With a new car, the grounding of the boot lid is usually good via hinges and the lock, but very soon these connections will loosen and significant interference will occur. Prevention of this interference has been shown to be difficult although earthing braids and springs are available. If the engine is located at the rear of the car, the antenna must not be installed on the lid due to ignition interference.



Figure 26. Not recommended antenna locations.

4.5.3 Temporary installation

For temporary installation, the best choice is a magnet-mounted antenna on the roof. When installing the radiotelephone antenna on a roof where there are other antennas, the location must first be checked with a magnet antenna in order to avoid mutual effect or interference with the other antennas.

If the vehicle has a microprocessor for e.g. brake control, the antenna and cables should be installed as far as possible from the processor to avoid malfunctions caused by the RF field.

4.5.4 Car-radio antenna

Broadcast FM transmissions are often horizontally polarized. For that reason, the BC radio whip antenna is often installed at the body edge, near the side windows, where the polarization angle turns suitable for the whip antenna. Vertical polarization is usually used in radiotelephone networks. Consequently, the installation of a BC radio whip cannot be used as a model for the installation of the radiotelephone antenna. Radiotelephone antennas should never be installed on vertical planes.

In some cases two antennas on the roof may cause mutual interference. In order to avoid problematic installations, check different possibilities in advance with a magnet-mounted antenna.

4.5.5 Antenna installations on non-metallic surfaces

In any antenna installation, it should be kept in mind that the antenna needs an earth plane to operate properly. Thus the antenna cannot be mounted on a glassfibre roof such as those used on some vehicles or boats. If the antenna must be mounted on a glassfibre roof, an earth plane made of metal sheet must be provided. The diameter of the earth plane should be at least half wavelength, and the antenna should be mounted in the center. Another solution is to use a special antenna that does not need an earth plane.

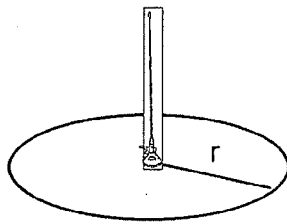


Figure 27. The antenna with metallic surface.

4.5.6 Installation

A proper antenna installation is very important to the operation of a radiotelephone. Select the best place and carry out the installation with care. A metal plate or box should be inserted below the drill hole in order to collect metal chips and to protect the upholstery against damage. The remaining drill dust and metal chips must be removed with a vacuum cleaner because they would colour the ceiling upholstery after getting rusty.

Remember also to clean the hole on the bottom side from the drilling swarf, so that surface is even. This is needed in order to ensure proper and reliable connection between the ground plane and the antenna.

The antenna base must be properly earthed. The base contains grounding spikes that break through the paint from below when the mounting nut is tightened. The base should be slightly rotated back and forth before final tightening in order to provide reliable grounding. In some cases the grounding must be secured by grinding off the paint to expose the bare metal surface under the base mounting nut.

The bare metal surface should then be protected against rust by applying rust preventer. The base mounting nut must be tightened very securely to prevent any movement in use.

Most of the antennas today have adapted the minicrimp connector system which eliminates the need for special crimping tools and connectors. If, however the purchased antenna has traditional connectors, use only proper connectors and tools. The radio unit uses TNC female type antenna connector for reasons of reliability and attenuation.

4.6 RF compatibility checks

The following checks should be carried out if the vehicle is equipped with electronic anti-skid, ignition or engine management systems.



1. With the vehicle stationary and the engine running at fast idle, key the transmitter. Check that the brake lights do not illuminate and that the engine continues to run normally.
2. Operate the brake pedal, key the transmitter and check that the brake lights do not extinguish.
3. Drive the vehicle slowly, at about 20 km/h, and check that the brakes are working normally and that the engine does not surge or cut out.

4.6.1 Caution



Caution

In the event of an apparent malfunction in the braking and/or ignition systems during driving, the radio installation must be rendered inoperative and the vehicle manufacturer should be contacted before any further steps are made in the installation.

Unqualified persons should not attempt to modify these units in any way!.

4.6.2 Safety first



1. The use of mobile radio while driving may be in breach of traffic regulations in some countries. Check with your local Traffic Authority for further details.
2. DON'T operate the mobile radio in an explosive atmosphere. Obey the "Turn Off Two Way Radios" signs where these are posted.

3. To avoid radio frequency injury **don't touch the antenna** whilst the transmitter is on.
4. If the use of a mobile radio result in the altered operation of electronic systems (Eg. fuel injection and braking systems) **turn off the mobile radio immediately**, and contact your service organization for advice.
5. Fans, power accessories, window defrosters or radios may alter the operation of the mobile radio. Consult the accessory manufacturer for details regarding the elimination of radio interference from such accessories.

4.7 Call tests, interference supression

When the installation and antenna tuning are completed, test calls must be made to ensure proper performance of the equipment. Test calls are first of all necessary to verify that the mobile telephone itself works properly.

There are two kinds of interference: outside interference and interference from the vehicle. Little can be done about outside interference during installation, but much more can be done with interference created by the vehicle.

The most common type of interference generated by the electrical system of the car is spark noise from the ignition system. This high-frequency noise couples into the radiotelephone via the antenna.

Ignition noise can be attenuated by using resistor cables to spark plugs. Suppression resistors can be used at the spark plugs and at the cable between the coil and the distributor. The resistor must be mounted near the distributor, 5 k Ω wire resistor is recommended. All connectors and cables of the ignition system must be clean and unbroken.

Electronic ignition systems are used in many cars. Before any steps are taken to suppress ignition noise in such systems, the service of the ignition system dealer should be contacted, in order to avoid reducing the performance of the ignition system or even damaging it.

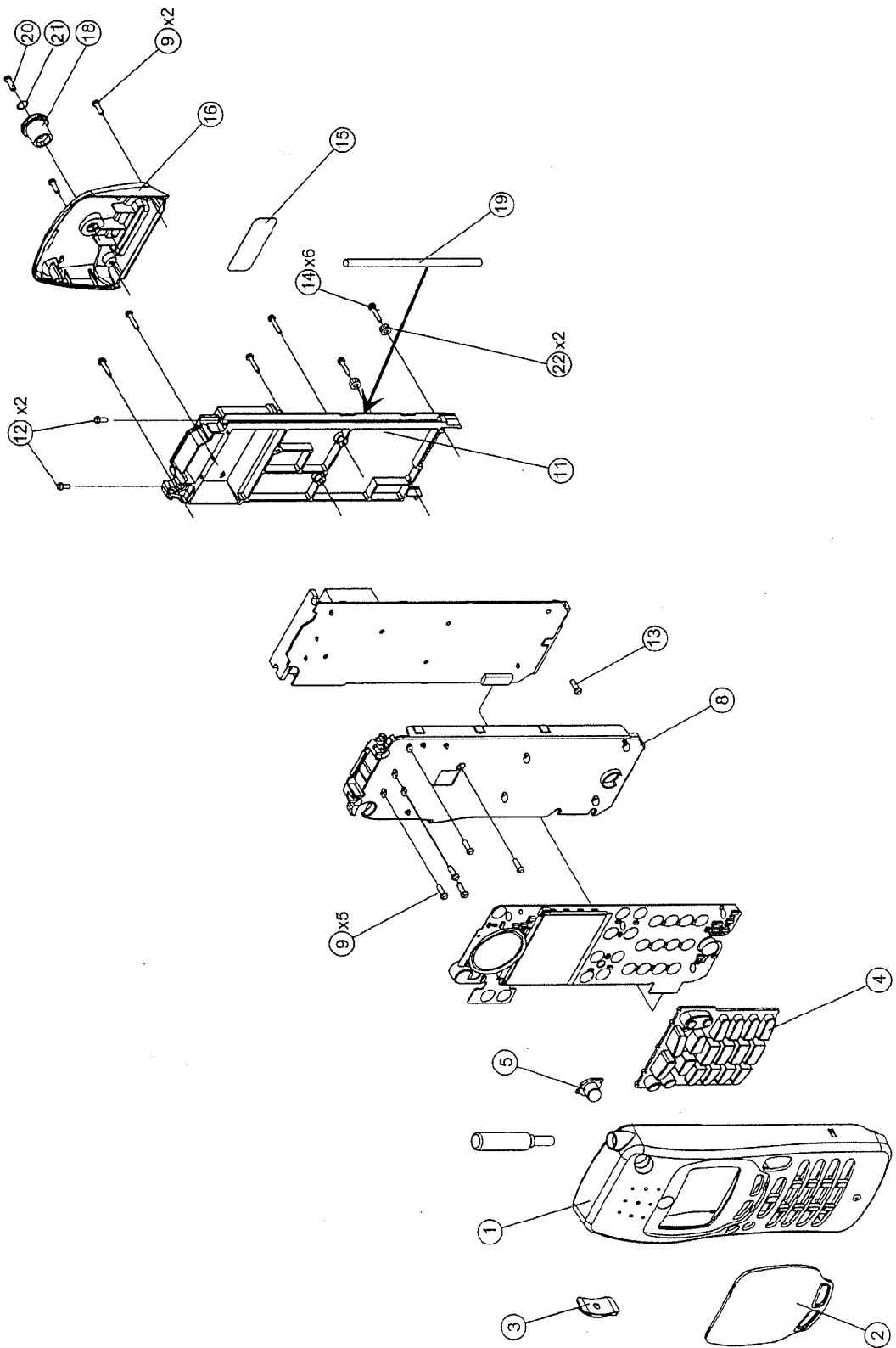
NOKIA

Installation manual for H8x car kit

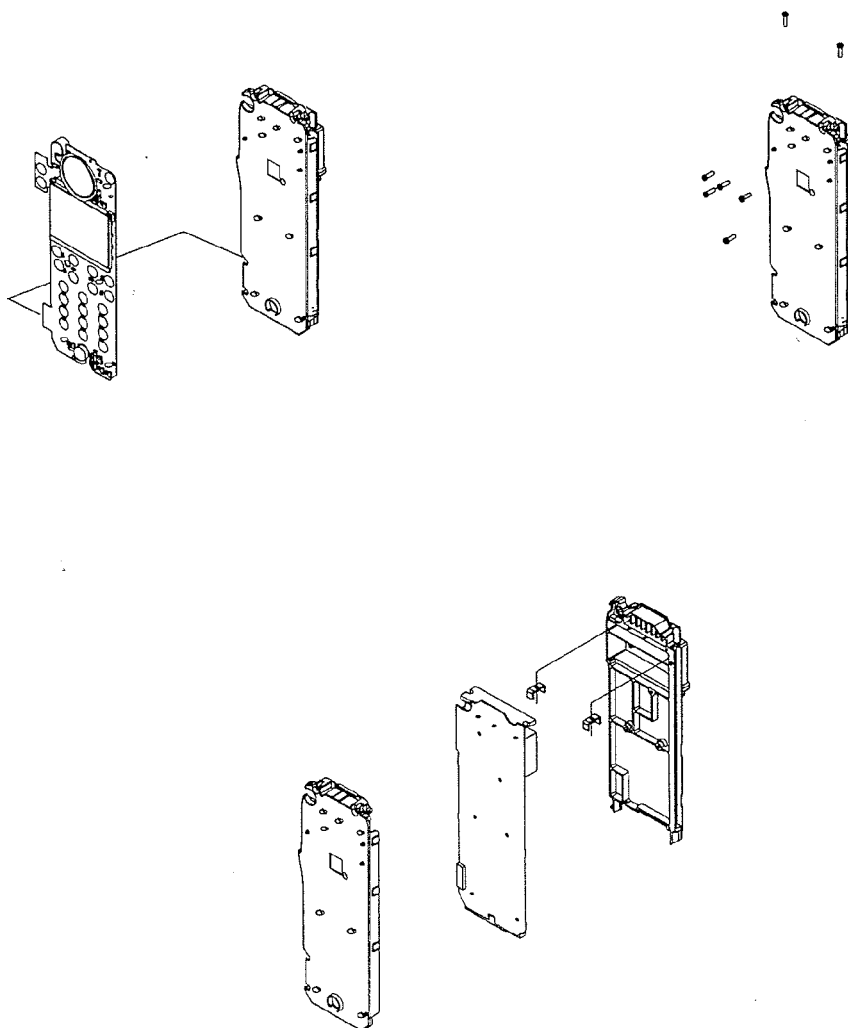
In some cases, spark noise can be suppressed by earthing the bonnet with a sufficiently thick, short copper braid.

Noise entering through the battery cable is of low-frequency type from the alternator or various electric motors and can be heard as a whining noise in the loudspeaker and the earphone.

Alternator noise is often strong and of the broad-band type. Due to this fact, alternator noise is difficult to prevent. Usually this noise is filtered from the supply voltage by a choke. Noise from electrical motors can be suppressed by adding a capacitor between their ground and the supply voltage.



NOKIA									
HD 85									
Assembly parts									
REV.	DATE	PREP	CHKD	ITD	HE	SCALE	3C 311912.3		
3	15.5.00	1469							
2	30.6.99	1326							
							PREP	HE	
							CHKD	ITD	
							APPRO	MIMB	
							ARCHNO		
\\H85\DRAWING\311912.DS									



					SCALE	PREPD		
						CHKD		
						APPRD		
						ARCHVD		
REV.	DATE	PREPD	APPRD					

Status: 01 Approved
 Usage: 2
 Plant: FIO2
 Alt: 1
 Valid: 15.05.2000

BILL OF MATERIAL
 15.05.2000
 Basic data text:

Nok. -communications
 Material: Material description:
 0311912.A06 ASSEMBLY PARTS HD85

Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1010	1		9211630.3 A-COVER H85		1 PC
1	1020	16		9211648.2 BACK COVER H85		1 PC
1	1030	18		9211655.5 PHONE HOLDER H85		1 PC
1	1040	8		921187.1 SHIELD (MACHINED) HD85		1 PC
1	1050	11		9211179.2 CHASSIS (MACHINED) HD85		1 PC
1	1060	4		9211750.2 KEYPAD PRINTING FILM		1 PC
1	1070	3		9211929.2 PTT-BUTTON H85		1 PC
1	1080	15		9209624 TYPE PLATE BLANCO PRINT 33.0X12.7(X2)+68.0X20.0		1 PC
1	1090	5		9790124 POWER KEYPAD		1 PC
1	1100	2		9450777 WINDOW		1 PC
1	1110			9211937.2 SPEAKER GASKET H85		1 PC
1	1120			9211951.2 SPEAKER GASKET SHIELD H85		1 PC
1	1130			9211969.2 SCREEN GASKET (BLACK)		1 PC
1	1140	19		9213772.1 Protective Tube for Anten		1 PC
1	1150			9480303 WINDOW ADHESIVE		1 PC
1	1160			9480151 DAMPER TAPE H85		1 PC
1	1170	9		6151230 TORX M2X6 "DIN7985" TX FeZn BLK		7 PC
1	1180			6291643		1 PC

Nokia Telecommunications			BILL OF MATERIAL		Status: 01 Approved	
			15.05.2000		Usage: 2	
Material: 0311912.A06 ASSEMBLY PARTS HD85			Basic data text:		Plant: F102	
					Alt: 1	
					Valid: 15.05.2000	
Lv	Item	Alt	Part number	Component number Component description Component basic data text	Document no. Issue CIF Internal comment	Quantity Unit
1	1190	14		CROSS REC. SCREW FOR 1.6X4 FOR PLASTIC P		
			6150410			6 PC
			TORX M1.6X10 DIN7985 TX FeZn CRL			
1	1200	20		6150060		1 PC
			CR SCREW M2X6 DIN7985 5.8 PZ FeZn BLK			
1	1210	12		6150054		2 PC
			CROSS REC. SCREW M2ZX4 PZ FEZN YEL			
1	1220	21		6350089		1 PC
			HAMMASALUSLAATTA A2.2/4.5 S0.3 DIN67			
1	1230	22		9214448.1		2 PC
			H80/81 RUUVIHOLEKKI			

NOKIA**Spare parts list****H8x series****Special Products/AMS****1(4)**

Code	Description	PG	Note
0004716	CRYSTAL	37	
0004717	CRYSTAL FILTER 70MHz ± 7.5 kHz/3d	42	
0200921	LCD MODULE	44	
1430085	RESISTOR 82K 0.063W 5%	11	
1430144	RESISTOR 0R 0.063W Rmax.=50m	11	
1430622	RESISTOR 2.2R 0.063W 5%	11	
1430690	RESISTOR 0R 5% 0.063W 0402	11	
1430696	RESISTOR 5.6R 0.063W 5% 5.6R	11	
1430700	RESISTOR 10R 0.063W 5% 0402	11	
1430710	RESISTOR 22R 0.063W 5% 0402	11	
1430714	RESISTOR 33R 0.063W 5% 0402	11	
1430716	RESISTOR 39R 0.063W 5% 0402	11	
1430718	RESISTOR 47R 0.063W 5% 0402	11	
1430724	RESISTOR 82R 0.063W 5% 0402	11	
1430726	RESISTOR 100R 0.063W 5% 0402	11	
1430730	RESISTOR 150R 0.063W 5% 0402	11	
1430734	RESISTOR 220R 0.063W 5% 0402	11	
1430740	RESISTOR 330R 0.063W 5% 0402	11	
1430744	RESISTOR 470R 0.063W 5% 0402	11	
1430748	RESISTOR 680R 0.063W 5% 0402	11	
1430752	RESISTOR 820R 0.063W 5% 0402	11	
1430754	RESISTOR 1K 0.063W 5% 0402	11	
1430756	RESISTOR 1.2K 0.063W 5% 0402	11	
1430758	RESISTOR 1.5K 0.063W 5% 0402	11	
1430760	RESISTOR 1.8K 0.063W 5% 0402	11	
1430762	RESISTOR 2.2K 0.063W 5% 0402	11	
1430764	RESISTOR 3.3K 0.063W 5% 0402	11	
1430766	RESISTOR 3.9K 0.063W 5% 0402	11	
1430770	RESISTOR 4.7K 0.063W 5% 0402	11	
1430772	RESISTOR 5.6K 0.063W 5% 0402	11	
1430774	RESISTOR 6.8K 0.063W 5% 0402	11	
1430776	RESISTOR 8.2K 0.063W 5% 0402	11	
1430778	RESISTOR 10K 0.063W 5% 0402	11	
1430780	RESISTOR 12K 0.063W 5% 0402	11	
1430784	RESISTOR 15K 0.063W 5% 0402	11	
1430788	RESISTOR 22K 0.063W 5% 0402	11	
1430792	RESISTOR 33K 0.063W 5% 0402	11	
1430796	RESISTOR 47K 0.063W 5% 0402	11	
1430800	RESISTOR 68K 0.063W 5% 0402	11	
1430802	RESISTOR 82K 0.063W 5% 0402	11	
1430804	RESISTOR 100K 0.063W 5% 04	11	
1430808	RESISTOR 150K 0.063W 5% 0402	11	
1430812	RESISTOR 220K 0.063W 5% 0402	11	
1430832	RESISTOR 2.7K 0.063W 5% 0402	11	
1820024	THERMISTO 47K 0.2W 5% B=4	15	
2307816	CERCAP 47NF X7R 20% 25V 0805	11	
2310376	CERCAP 100NF X7R 10% 25V 0805	11	
2310490	CERAMIC CHIP CAPACIT 360pF 2 % 5	11	
2311834	CERCAP 33NF X7R K 50V 0805	11	
2313100	CERCAP 100PF HQ J 200V 1.4X	24	
2313118	CERCAP 1.8PF HQ B 200V 1.4X	11	
2313220	CERCAP 2.2UF Y5V Z 10V 0805	11	
2313304	CERCAP 3.3PF HQ B 200V 1.4X	11	
2313828	CERCAP 8.2PF HQ B 200V 1.4X	24	
2320150	CERCAP 3.3PF NP0 B 50V 0603	11	
2320256	CERCAP 220PF NP0 J 50V 0603	11	
2320262	KONDENSAATTORI PALA 330pF 5% 50	11	
2320274	CERCAP 1.0nF 20% 50V X7R 06	11	
2320280	KONDENSAATTORI PALA 1.5nF 20% 5	11	
2320298	CERAMIC CHIP CAPACIT 6.8nF 20% 5	11	
2320438	CERCAP 3.9PF NP0 B 50V 0603	11	
2320508	CERAMIC CHIP CAPACIT 1pF ± 0.25 p	11	
2320516	CERAMIC CHIP CAPACIT 1.5pF ± 0.2	11	
2320520	CERAMIC CHIP CAPASIT 2.2pF ± 0.2	11	
2320522	CERAMIC CHIP CAPACIT 2.7pF ± 0.2	11	
2320524	CERAMIC CHIP CAPASIT 3.3pF ± 0.2	11	
2320526	KONDENSAATTORI PALA 3.9pF ± 0.2	11	
2320530	KONDENSAATTORI PALA 5.6pF ± 0.2	11	
2320532	CERAMIC CHIP CAPASIT 6.8pF ± 0.2	11	
2320534	CERAMIC CHIP CAPACIT 8.2pF ± 0.2	11	
2320536	CERAMIC CHIP CAPACIT 10pF 5% 50V	11	
2320538	CERAMIC CHIP CAPACIT 12pF 5% 50V	11	
2320540	CERAMIC CHIP CAPACIT 15pF 5% 50V	11	

NOKIA**Spare parts list****H8x series****2(4)****Special Products/AMS**

Code	Description	PG	Note
2320544	CERAMIC CHIP CAPACIT 22pF 5% 50V	11	
2320546	CERAMIC CHIP CAPACIT 27pF 5% 50V	11	
2320548	CERAMIC CHIP CAPACIT 33pF 5% 50V	11	
2320552	CERAMIC CHIP CAPACIT 47pF 5% 50V	11	
2320556	CERAMIC CHIP CAPACIT 68pF 5% 50V	11	
2320560	CERAMIC CHIP CAPACIT 100pF 5%	11	
2320564	KONDENSAATTORI PALA 150pF 5% 50	11	
2320602	CERAMIC CHIP CAPACIT 4.7pF +0.2	11	
2320604	CERAMIC CHIP CAPACIT 18pF 5% 50V	11	
2320738	CERAMIC CHIP CAPACIT 470pF 10% 5	11	
2320744	CERAMIC CHIP CAPACIT 1nF 10% 50V	11	
2320760	KONDENSAATTORI PALA 4.7nF 10% 2	11	
2320778	CERAMIC CHIP CAPACIT 10nF 10%	11	
2320924	CERCAP 5.6PF NP0 B 50 0603	12	
2321162	CERCAP 6.8PF NP0 B 50 0603	11	
2321234	CERCAP 12PF NP0 B 50V 0603	11	
2321410	CERCAP 100nF X7R 10% 16V 0	11	
2321420	CERCAP 1UF Y5V Z 10V 0603	11	
2604022	TANTCAP 100nF IEC 20% 35V CAS	11	
2604209	TANTCAP 1UF IEC 20% 16V CAS	11	
2604431	TANTCAP 10UF IEC 20% 16V CAS	14	
2610006	TANTALUM CHIP CAPACI 470 nF 20%	12	
2610010	TANTALUM CHIP CAPACI 1.0 uF 20%	11	
2610126	TANTCAP 47UF 47u M 6.3V 6.0	19	
2610230	TANTCAP 10UF M 10V 321	12	
2610686	TANTCAP 220NF M 35V 321	11	
2611666	TANTCAP 2.2UF M 10V 321	11	
2611858	TANTCAP 4.7UF M 10V 352	11	
2611882	TANTCAP 470NF M 25V 321	11	
2612701	TANTCAP 47nF 20% 35V 3216	11	
2613538	TANTCAP 10UF CAS M 16V 352	13	
3618862	HELX FLTR 340MHz B>8MHz A<4.5dB	37	
3640383	INDUCTOR 1uH J FR>430MHz 1206	18	
3640402	TRANSFORMER CHIP 0.5-800 MHz 4:1	27	
3640404	TRANSFORMER CHIP 500-2500MHz 4:1	35	
3641116	INDUCTOR 6.8nH 5% Q50/250MHz 08	15	
3641208	INDUCTOR 12nH 5% Q45/250MHz FR>2	13	
3641262	FE BEAD FERRITE BEAD 25R/100MHZ	11	
3641460	INDUCTOR 150nH 5% Q35/100MHz FR>	15	
3641572	INDUCTOR 22nH 5% Q45/250MHz 0	13	
3641622	INDUCTOR 220nH 5% Q30/100MHz FR>	13	
3641744	INDUCTOR 33nH 5% Q40/250MHz FR>1	14	
3641800	INDUCTOR 18nH 5% Q45/250MHz FR>2	13	
3641872	INDUCTOR 8.2n 5% Q50/250MHz FR>3	14	
3642456	COIL 18.5nH 5% Q132/150MHz FR>30	17	
3642926	FE BEAD Z40/100MHz 1.5A 0805	11	
3643108	INDUCTOR 100nH 10% Q15/100MHz FR	11	
3643108	INDUCTOR 100nH 10% Q15/100MHz FR	11	
3643116	INDUCTOR 10nH 5% Q43/800MHz FR>2	11	
3643118	INDUCTOR 18nH 10% Q10/100MHz FR>	14	
3643122	INDUCTOR 12nH 5% Q45/800MHz FR>2	11	
3643152	INDUCTOR 15nH 10% Q10/100MHz FR>	14	
3643184	INDUCTOR 18nH 5% Q45/800MHz FR>2	11	
3643220	INDUCTOR 22nH 10% Q10/100MHz FR>	12	
3643276	INDUCTOR 27nH 5% Q43/800MHz FR>1	15	
3643558	INDUCTOR 5.6+-0.3nH Q42/800MHz F	11	
3645178	INDUCTOR 470nH 5% 1.3R Q30/50MH	15	
3645484	INDUCTOR 680nH 5% Q30/50MHz 1	15	
3649258	T-FILTER 1.5nF 43dB 450MHz 6A	16	
3660102	VARIABLE CHIP INDUCT 320uH 2% Q8	21	
4100189	SCHOTTKY DIODE 70V 70mA 0.41V/1m	21	
4110018	DIODECAP BB134 30V 2pF/28V S	11	
4110072	DIO PAIR BAV99W 70V 200mA 2X S	11	
4110117	DIODEZEN BZX84C3V9 3.9V 5% 0.3W	11	
4110752	DIODESCHO BAS70-04 70V 70mA 410	19	
4114246	DIODETVS ESDA6V1S 6.1V 20% 500 S	18	
4114842	DIODE PIN BA682S 35V10MA0.5R1	12	
4115802	SCHOTTKY DIODE 4V 30mA <1pF PAIR	27	
4115804	DIODESCHO PRLL5817 20V 1A	18	
4118144	DIODETVS P6SMB15A 14.4/16.5V 4 4	20	
4210020	TRANSISTO BCP69-25 P 60MHz 20VI	17	
4210066	TRANSISTO BFR93AW N 5GHz 12V 3	14	
4210074	TRANSISTOR N 20GHz 4.5V 35mA 1	25	

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Code	Description	PG	Note
4210120	TRANSISTO BC847AW N 45V 100mA	11	
4210674	TRANSISTO DTC144EE N 50V 30mA 1	11	
4210702	TRANSISTO DTA144EE P 50V 30mA 1	11	
4210846	TRANSISTO BCV27 N DARL. 220M	14	
4210910	TRANSISTO BC857W P 45V 100mA	11	
4211808	TRANSISTO UMH11N N 2XTR 50V 0	11	
4212200	TRANSISTO BFP183 N 6GHz 12V 6	20	
4212232	TRANSISTO UMX1N-T N X2 50V 100	11	
4212256	FET PAIR NDS9947 P 2XMOSFET - S	27	
4213246	MOSFET BF904WR N 7V 30mA SOT	21	
4213738	MOSFET BF998WR N 12V 30mA SOT	18	
4216408	TRANSISTO BFG135A N 6GHz 15V 1	33	
4219922	TRANSISTO UMZ1NTR N&P 2XTR 50V	11	
4309382	PROCESSOR IC I/O EXPAND 8BIT FOR	33	
4325322	ANALOG IC TDA7052A AMP AF 1W/	26	
4340164	ANALOG IC TK11247BMC REG. 4.7V	21	
4340744	MEMORY IC 128KX8 SRAM 85NS 3.3V	34	
4341572	LOGIC IC SN74AHC1G3 OR 2 INPUT S	19	
4344074	PROCES IC HD6433044S.MCU 16/8BI	49	
4344132	MEMORY IC M39432-15V FLASH/EEPROM	45	
4344320	MEMORY IC AT29LV432- FLASH/EEPROM	48	
4345290	ANALOG IC TDA7052AT AMP AF 500	27	
4346228	MEMORY IC CXK5T8257B SRAM 32KX8	32	
4346744	PROCES IC PCF8574TS I/O-EXPAND	33	
4348266	MEMORY IC AT24C02N-1 EEPROM 256	23	
4349088	ANALOG IC AD822AR OP.AMP 2X	34	
4349616	ANALOG IC UMA1015M E FREQ.SYNTH	32	
4349694	ANALOG IC TA31136F E IF AMP + F	26	
4352124	VCO VCO 304+-4MHz 4.5V/10 15X11X	42	
4354302	TX MODULE M68710EL 2W 6V 30X10X6	50	
4354428	TX MODULE M69710L 2W 6V 30X10X6	46	
4354842	TX MODULE M68745L 3,8W 7,2V 45X1	52	
4355394	TX MODULE PF0349 7W 7.5V 30X10	49	
4355454	TX MODULE M68710H 2W 6V 30X10	48	
4359204	OSCILLATO 14.85MHz 2.5ppm TCXO	45	
4359248	OSCILLATOR 14.850108 2.5ppm TC	42	
4359380	VCO VCO 376-385MHz 4.5V/1 15X10X	34	
4359422	VCO VCO 411-420MHz 4.5V/1 15X10X	35	
4359472	VCO VCO 406-423MHz 4V/10m 12X10X	37	
4359646	VCO VCO 465+-10MHz 4.0V/1 15X11X	34	
4359652	VCO 420+-4MHz 4.5V/10mA RX 15X9.	33	
4359710	VCO VCO 455 +-14MHz 4.5V/12mA 15	33	
4359822	VCO VCO 813.5+-7.5MHz 4.0 12X10X	35	
4359840	VCO VCO 903.5+-7.5MHz 4.0 12X10X	34	
4370084	CUSTOM IC MUUMI POWER SUPPLY	30	
4374034	CUSTOM IC NIPA3 AUDIO/SIGNALING	45	
4510036	CRYSTAL 7.3728MHz+-50ppm TSTA 12	25	
4510480	XTAL FILT 45+-7.5MHz/3dB 650R/	39	
4510544	XTAL FILT 45MHz +-6kHz/3dB 500R	45	
4511030	SAW-FILTR 420-425MHz IL<3dB	38	
4511070	SAW-FILTR 427.75+-2.25MHz -40/+	38	
4511280	CER. FILTER 450KHz 6dB+-6KHz 15	40	
4511450	SAW-FILTR 448.7-453.3MHz 5X	43	
4511804	SAW-FILTR 858,5+-7.5MHz	34	
4514500	CERFILTER 450+-4kHz/6dB 1500R	41	
4670445	DUPLEXER T806-824 R851-869	53	
4670447	DUPLEX Tx410-415 Rx420-425	60	
4670448	DUPLEX Tx460.050-461.975 Rx450.3	62	
4670937	SD FILTER T806-824 R851-869	64	
4671515	DUPLEXER T417.500-419.600 R427.5	60	
4671516	DUPLEXER T300-308 R336-344	60	
4862240	LED YEL/GRN 18mcd/20mA 2. 0603	11	
4864386	LED YEL/GRN 10/35mcd/20mA 0603	11	
5140036	SPEAKER 8R 3,0W d40mm h10mm	40	
5140284	SPEAKER 8R 0.5W D28 H4.5	36	
5140622	MICPHONE ELECTRET -45dB/Pa 2,2k	26	
5219042	SWITCH 1A 12V 50mA HOR SMD	11	
5219118	SWITCH 1A 50mA 12V SMD	11	
5219190	SWITCH 1A 50mA 12VDC 5,2X5,2X1,5	13	
5431718	FLEXFOIL 1X30 PITCH0.5mm UPP	21	
5449506	CONNECTOR 2-POLE-M ANGLE PCB	12	
5469296	CONNECTOR 2X16-POLE-M P0.5 VER S	24	
5469416	CONNECTOR 2X16-POLE-F P0.5 VER S	24	

NOKIA**Spare parts list****H8x series
4(4)****Special Products/AMS**

Code	Description	PG	Note
5469720	CONNECTOR 16AF+1RF+4DC+JACK PITC	32	
6150054	CROSS REC. SCREW M2ZX4 PZ FEZN Y	14	
6150060	CR SCREW M2X6 DIN7985 5.8 PZ FeZ	14	
6150264	TORX M2X4 "DIN7985" TX FeZn CRL	14	
6150410	TORX M1.6X10 DIN7985 TX FeZn CRL	14	
6151230	TORX M2X6 "DIN7985" TX FeZn BLK	14	
6152108	TORX M2X20 "DIN7985" TX FeZn BLK	14	
6153520	CROSS REC. SCREW M2X8 PZ FEZN BL	14	
6291643	CROSS REC. SCREW FOR 1.8X4 FOR P	14	
6350089	HAMMASALUSLAATTA A2.2/4.5 S0.3 D	14	
7332188	EMI SEAL 4.78X7.11MM ADHESIVE CO	N/A	
9209624	TYPE PLATE BLANCO PRINT	18	
9211214	PROM FRAME H70, H75, R72	18	
9211461	ANTENNA CLIP H85	27	
9211535	MODULE BRACKET H85,H80,H81	28	
9211630	A-COVER H85	50	
9211648	BACK COVER H85	28	
9211656	PHONE HOLDER H85	15	
9211729	SHIELD H85	40	
9211736	CHASSIS H85	44	
9211736	CHASSIS H85	44	
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