SERVICE MANUAL

BENEFON SIGMA GOLD
TDP-52-SN3

TDP-52-SN3

1.0 GENERAL

General

1.1 TECHNICAL INFORMATION

1.1.1 Operational System

NMT-450i

1.1.2 Dimensions

Size: 58 x 153 x 26 mm

Weight: 295 g

1.1.3 Power Consumption

- Batteries: 5 x 1.2 V NiCd (or NiMH)
- Sleep current: 2 mA
- Standby current: 60 mA
- Conversation mode, high power: app. 0.9 A
- Conversation mode, low power: app. 0.4 A

Charger:

- automatic 1 h rapid charging for NiCd or NiMH batteries

1.1.4 Accessories

- hands free car kit (carbox, holder, car-radio mute, external antenna, microphone, loudspeaker, external alert)
- light holder
- portable hands free
- line interface
- mains charger
- cigarette lighter charger
- office set
- branching unit
- external handset with holder
- BeneWin

- hand strap
- belt clip

1.1.5 Ringing Tones

Adjustable

- type, five fixed, one changeable with BeneWin
- volume
- progressive or fixed

Silent alert

- short tone and ‘call coming’ text in the display

1.1.6 Memory

Alphanumeric

- 99 memory locations, 23 characters, 16 alphanumeric / memory location
- memory scroll and recall in alphabetical or numerical order
- writing in memory during a call

Repeat: last dialled number or one of 6 numbers from the quick-memory locations

1.1.7 Clock

- time and date display
- real time alarm setting
- real time power on setting
- real time power off setting
- elapsed conversation time counter (both incoming and outgoing)
- received call counter and time display

1.1.8 Pager

- answers incoming calls and receives numeric messages
- 9 memory locations (23 characters / location)
- pre-set number of ring tones before answering (0...6)
- record own message (16 s max), optional feature

1.1.9 Other Functions

DTMF - receiver / transmitter

DTMF - key tones

Display and key illumination

Volume control

- 5 levels
- level indicator

Battery charge level indicator

- battery empty alarm tone and display
- used battery capacity display
- battery specific charge memory

Field strength indicator

Battery-saving function

Menu structure for user customisation

Automatic Prefix Management (APM)

Keys lockable to prevent accidental operation

Phone code to prevent unauthorised use

SIS protection function

CLIP, calling line identity presentation

‘+’ international prefix

1.1.10 Additional Exchange-Based Features

- R-function (Register recall)
- MFT-function (DTMF signal transmission)

1.1.11 Manufacturer

Benefon Oyj
P.O. Box 84
24101 Salo
Finland
Tel. +358 2 77400 Fax. +358 2 7332633

1.2 PRODUCT FAMILY

- BENEFON SIGMA GOLD HANDPORTABLE TDP-52-SN3

- MAINS CHARGER CMA-50-230

- CIGARETTE LIGHTER CHARGER CCS 50-12

- LIGHT HOLDER KDC-50

- HANDS FREE CAR KIT

This kit includes a charging holder KDS-50, carbox UDH-50, external antenna, loudspeaker and microphone for hands free function, car radio mute and external alert facility.

- EXTERNAL HANDSET WITH HOLDER HDS-50

This is an optional accessory for the hands free car kit.

- LINE INTERFACE LIF-40

To connect to the mobile phone any appliance using DTMF or MFT dialling such as the home telephone, wireless phone, answering machine, telefax or modem and microcomputer.

- BRANCHING UNIT DB-40

With a branching unit, two different accessories can be used simultaneously.

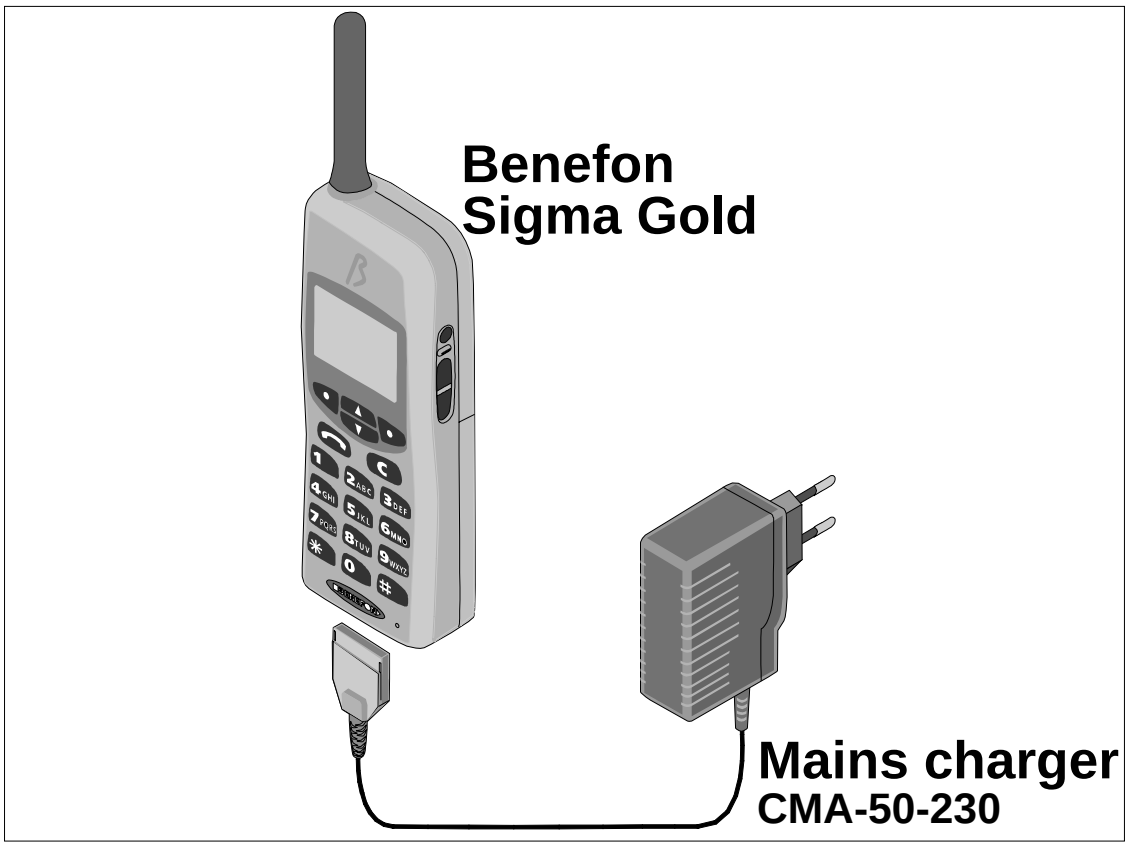
- BENEWIN

- OFFICE SET DDS-50

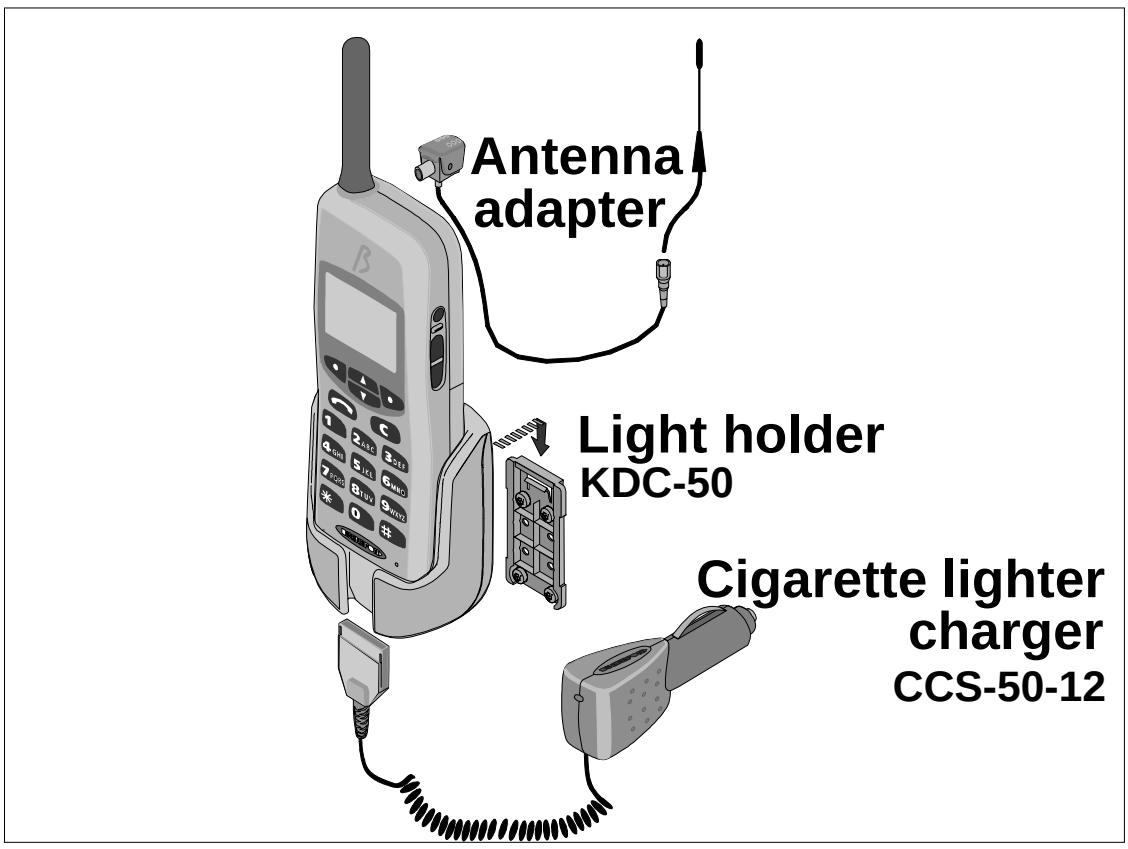
- PORTABLE HANDS FREE

- HAND STRAP

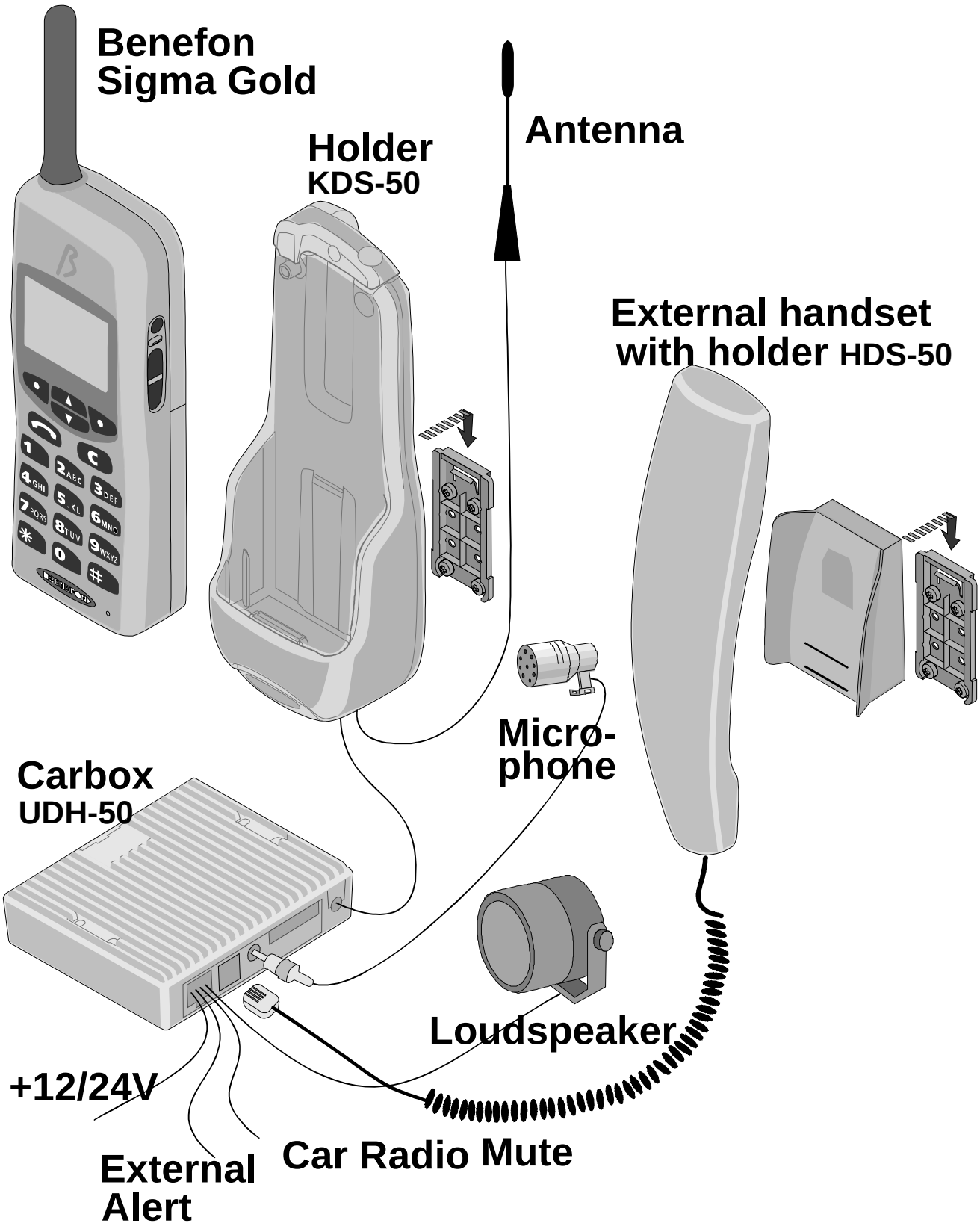
- BELT CLIP



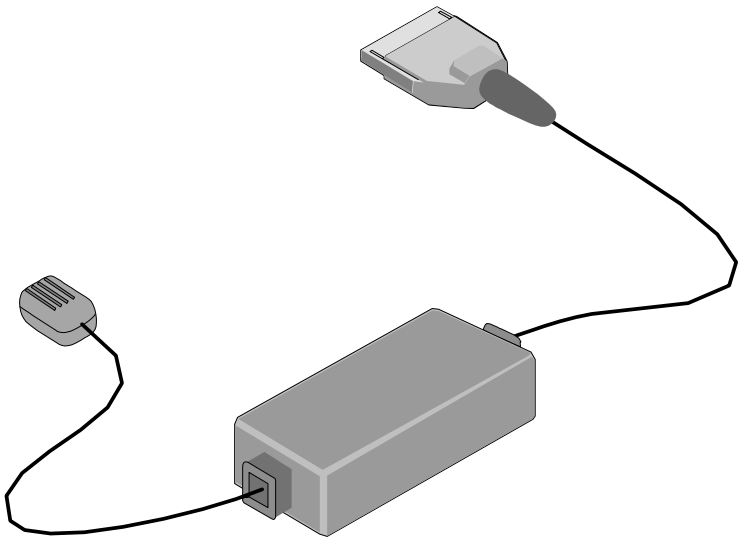
LIGHT CAR KIT



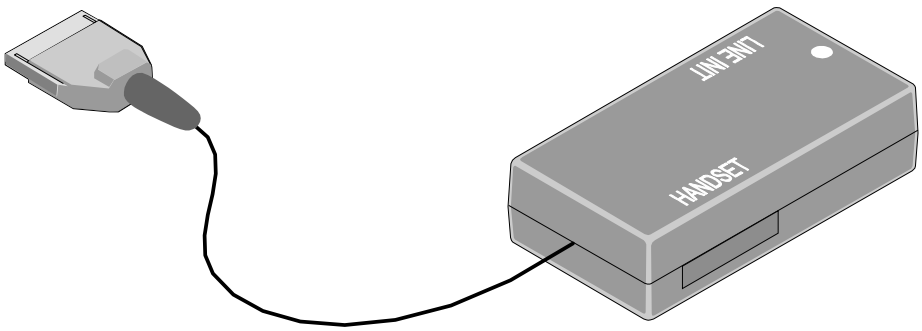
HANDS FREE CAR KIT



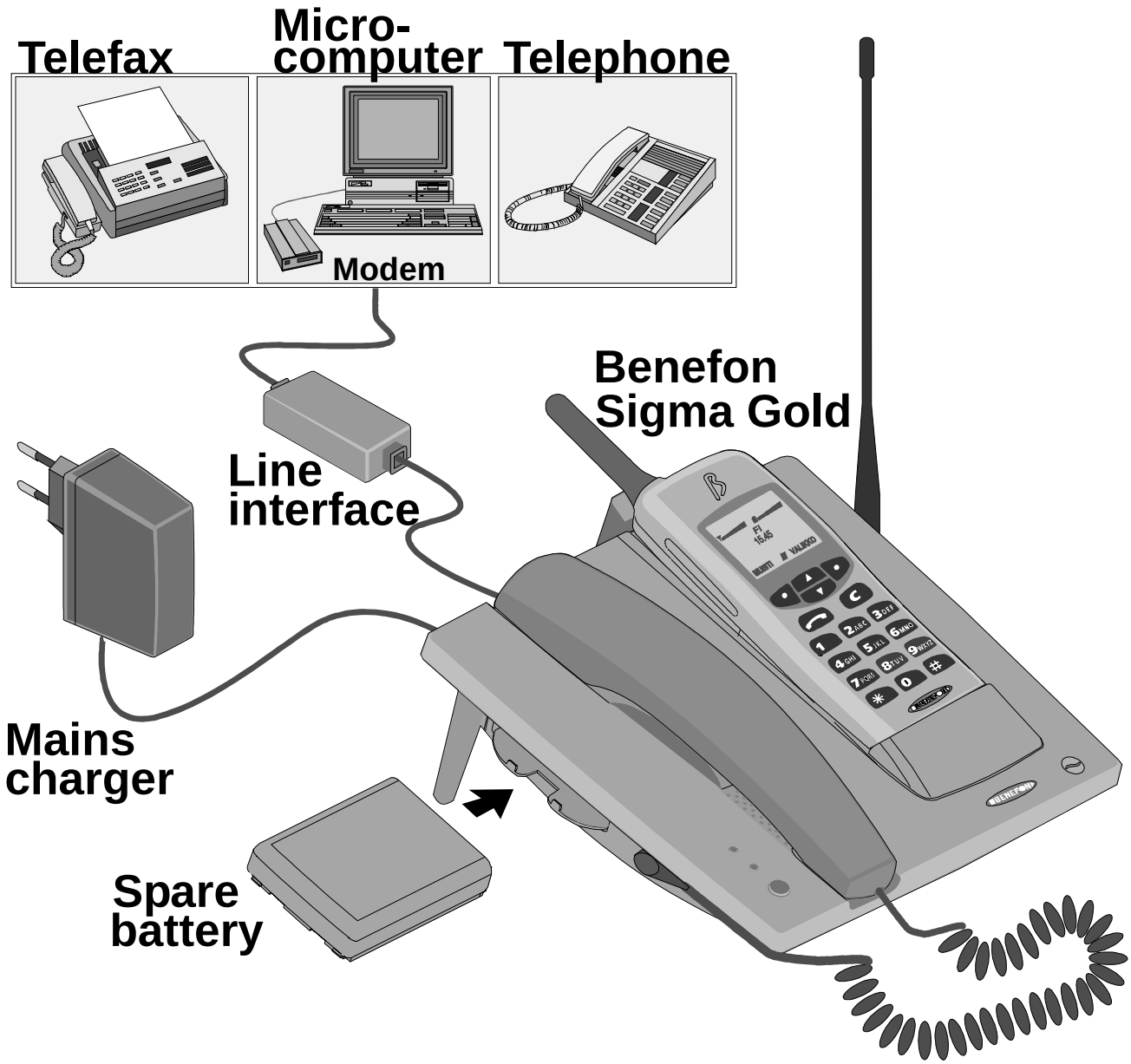
Line interface
LIF-40



Branching unit
DB-40

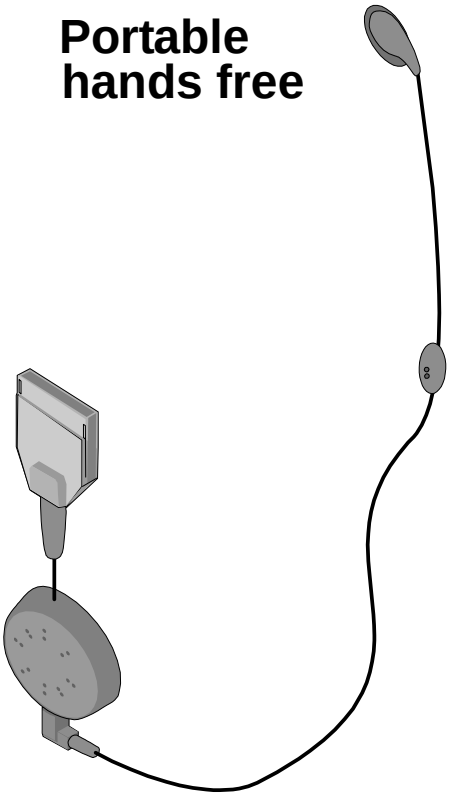


OFFICE SET

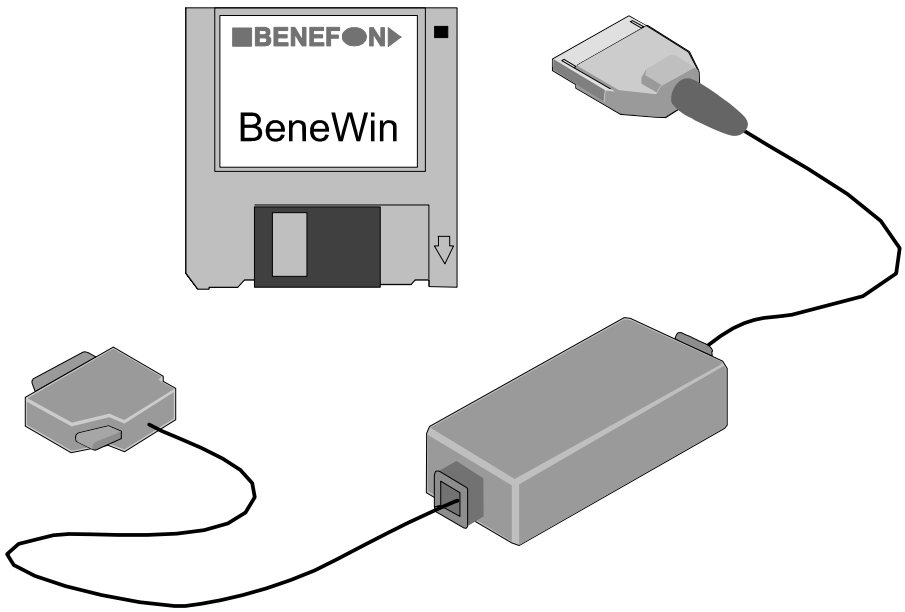


OFFICE SET
DDS-50

Portable hands free



BeneWin



2.0 OWNER’S MANUAL

3.0 INSTALLATION INSTRUCTIONS

3.1 Phone Programming

You can program Benefon Sigma Gold by using either the keys on your phone, or the BeneLoc computer program. In either case, you will need a localbox.

Programming Menu Commands:

- SALES DATE
- RADIO PATH ID
- PHONE CODE
- HF-FUNCTION

    CAR KIT TUNING (background noise tuning)
    CAR KIT SWING (MIC-ERP contrast tuning)
    OFFICE SET TUNING (background noise tuning)
    OFFICE SET SWING (MIC-ERP contrast tuning)

- SW VERSION
- SAK
- PRODUCT CODE
- UPDATE LOCALBOX
- BASE BAND
- RESET RAM

3.1.1 To program Using the Phone Keys

1. Connect the localbox to your phone, and turn the phone on.
2. Press and the following text will appear in the display: ***BENEFON***. will be flashing in the display.

3.1.1.1 Sales Date

1. Choose **SELECT**. The following text will appear in the display: **SALES DATE [XXXXXX]**.
2. Choose **CHANGE**. **[XXXXXX]** will be replaced by the date **[daydaymonthmonthyearyear]**. Remember to check that the date is correct. If the date is correct, choose **SAVE**. If the date is incorrect, delete it by choosing and enter the correct date (six digits in the following form: daydaymonthmonthyearyear). To save the date, choose **SAVE**.

It is possible to program the sales date ONLY ONCE, which means that you will not be able to change it again afterwards. If the sales date has not been programmed, your phone will not enter the normal stand-by mode.

3.1.1.2 Radio Path Identification

1. Press ▼, and the following text will appear in the display:
RADIO PATH ID [XXXXXXXXXX].

2. Choose **CHANGE**. Enter the radio path identification (ten digits), and save the identification by choosing **SAVE**. Remember to check that the radio path identification is correct.

3.1.1.3 Phone Code

1. Press ▼ ▼, and the following text will appear in the display:
PHONE CODE [XXXX].

2. Choose **CHANGE**. Enter the phone code (four digits), and save the code by choosing **SAVE**.

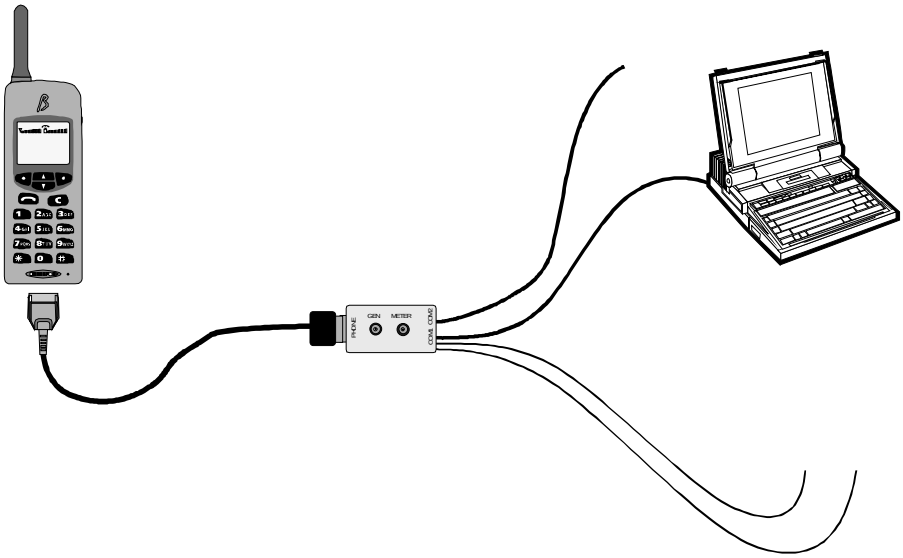
3.1.1.4 Closing Instructions

1. Having programmed the necessary information choose **QUIT**, and the following text will appear in the display: ***BENEFON***.

2. Turn off your phone, and disconnect the localbox.

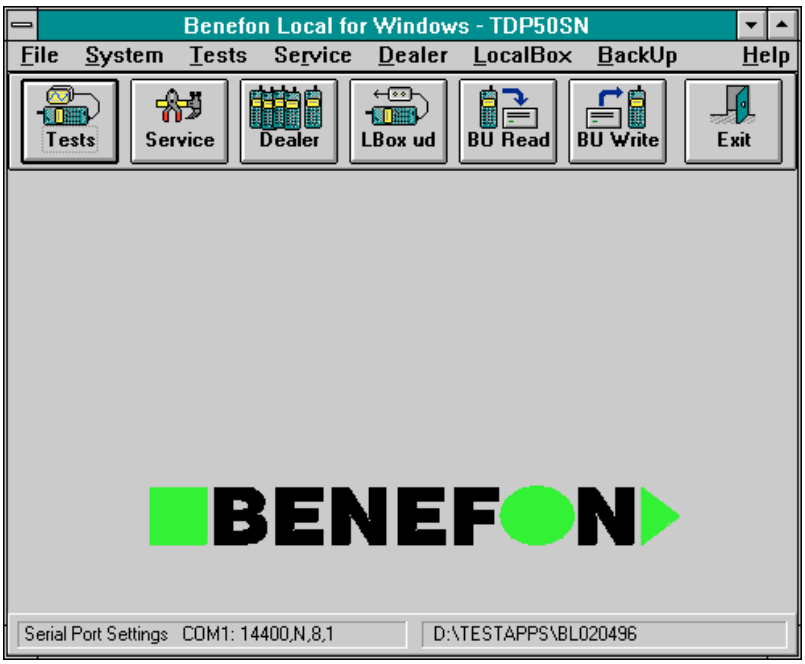
3. Turn the phone on once more, and make a test call.

3.1.2 To program Using the BeneLoc Program

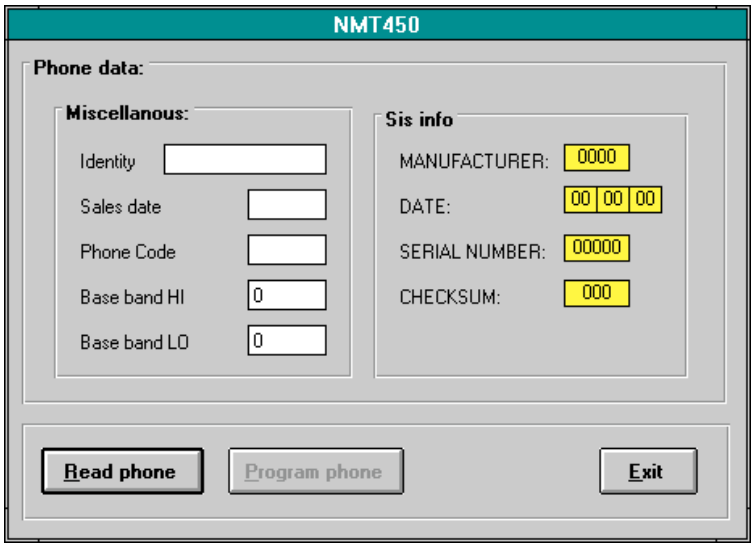


Start the installed program by clicking the icon. The phone must be connected to the system as discribed above.

Main window



Press Dealer-key to enter the programming window.



You can read the phone data by pressing the **Read phone** -key. You can change the miscellanous settings with the computer and transfer them to phone by pressing the **Program phone** -key.

BeneLoc includes **Help**-program for further information.

3.2 CAR KIT INSTALLATION

The Car Kit includes a phone holder (KDS-50), a car box (UDH-50), an antenna, an installation base, a hf speaker, a microphone and a cable. The Car Kit sales package also includes an installation material bag, which contains the necessary installation equipment. On page 7 you will find a diagram of connections explaining how to install the Car Kit.

3.2.1 Antenna

Choose a suitable place for the antenna. It is recommended that you place the antenna on the roof of the vehicle.

3.2.2 Phone Holder KDS-50

Choose such a place for the phone holder in the vehicle that will be both easy and safe when using the phone. Remember to leave enough space for the antenna plug behind the phone holder. First, fix the installation base to the place you have chosen, and then install the phone holder in the installation base.

3.2.3 Microphone

Install the microphone so that it is aimed directly at the user, and comes as close as possible to the user's mouth. A good place for the microphone is near the rearview mirror where the noise level is lower than, for example, beside a windshield pillar. It is also possible to install the microphone on a sun visor, but then it will be inconvenient to use the sun visor and microphone at the same time. One alternative would be a swan-neck microphone as it can be placed closest to the user's mouth.

3.2.4 Cable

Obtain the necessary +-electricity from a suitable place, preferably directly from the battery of the vehicle. Connect the fuse chamber to the +-wire. You will find the fuse chamber in the installation material bag. Connect the ground lead to the frame of the car with a short wire.

3.2.5 External Handset HDS-50

Install the external handset the same way as you installed the phone holder.

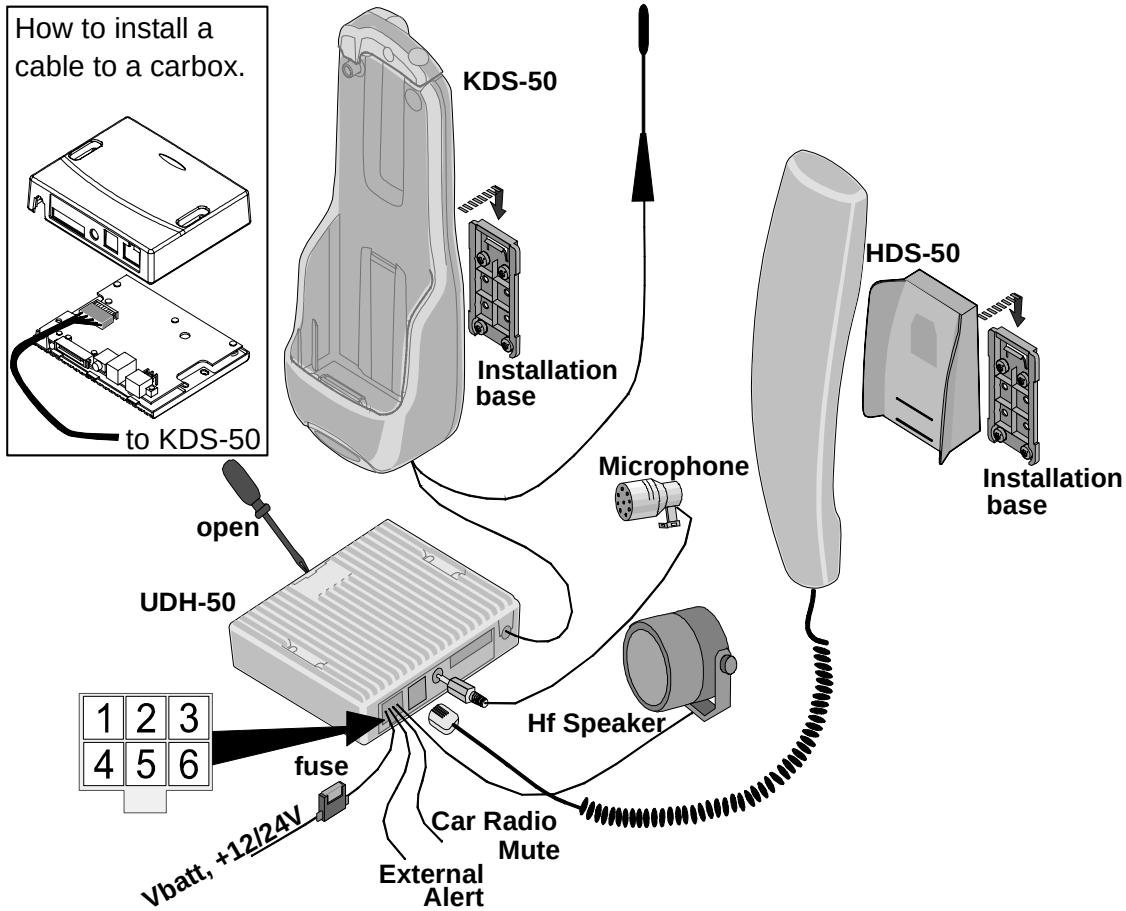
3.2.6 Car Box UDH-50

Place the car box out of sight inside the dashboard of the car or to another place. First, connect the wires to the car box. Install the car box so, that the heat sink has some space for cooling. The car box has holes which enable you to fasten the car box with a cable tie. The installation material bag also contains adhesive band fasteners.

3.2.7 Hf Speaker

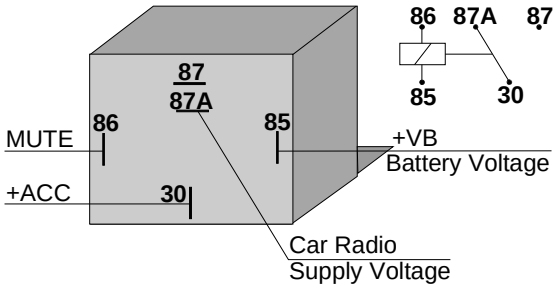
Install the speaker in a suitable place near the floor of the car.To avoid echo remember to pay attention to the position of the microphone as well.

A Diagram of Connections



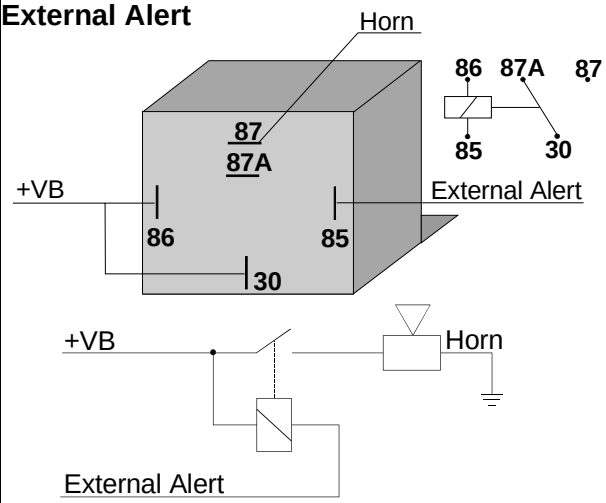
PIN	Name	Color
1	Car Radio Mute (active low)	Blue
2	Hf Speaker	Grey
3	Ground -	Black
4	External Alert (active low)	Brown
5	Hf Speaker	Grey
6	Vbatt, +12/24 V	Red

Car Radio Mute (See the installation instructions of your car radio)



+ACC: to the +12 V power terminal which is energized in the accessory position of the ignition key

External Alert



3.3 HF-FUNCTION

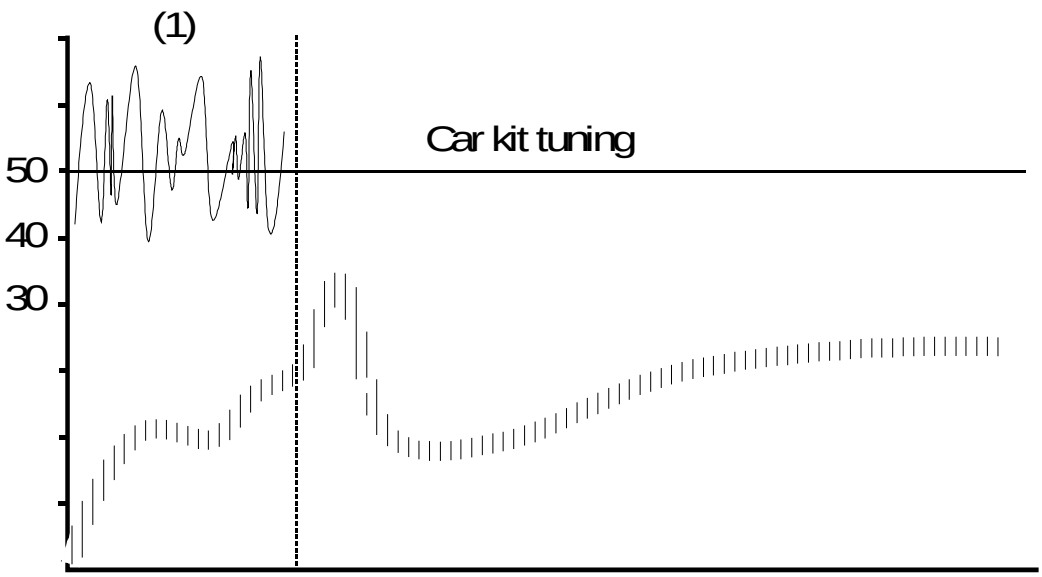
Benefon Sigma Gold offers you two different hands free -setups for the Car Kit and Office Set: the background noise tuning (CAR KIT/OFFICE SET TUNING) and MIC-ERP contrast tuning (CAR KIT/OFFICE SET SWING).

3.3.1 CAR KIT TUNING/OFFICE SET TUNING (theory)

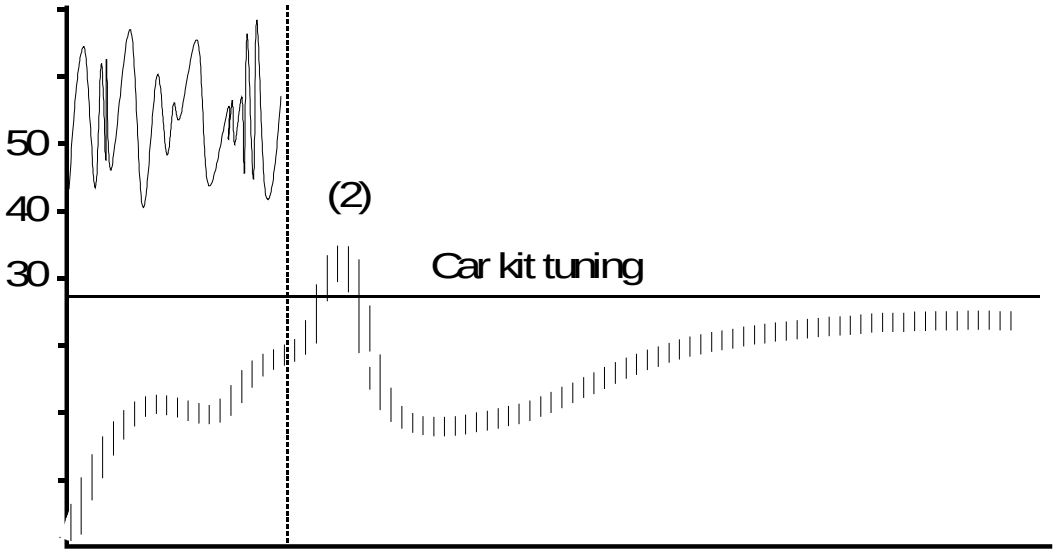
You can set up the activation level of the microphone by using the CAR KIT TUNING option. The level is correct when the microphone path is activated by voice alone, and not, for example, by background noise in your car or office.

The following figure shows you the CAR KIT TUNING setup process. You can set up the OFFICE SET TUNING following the same procedure.

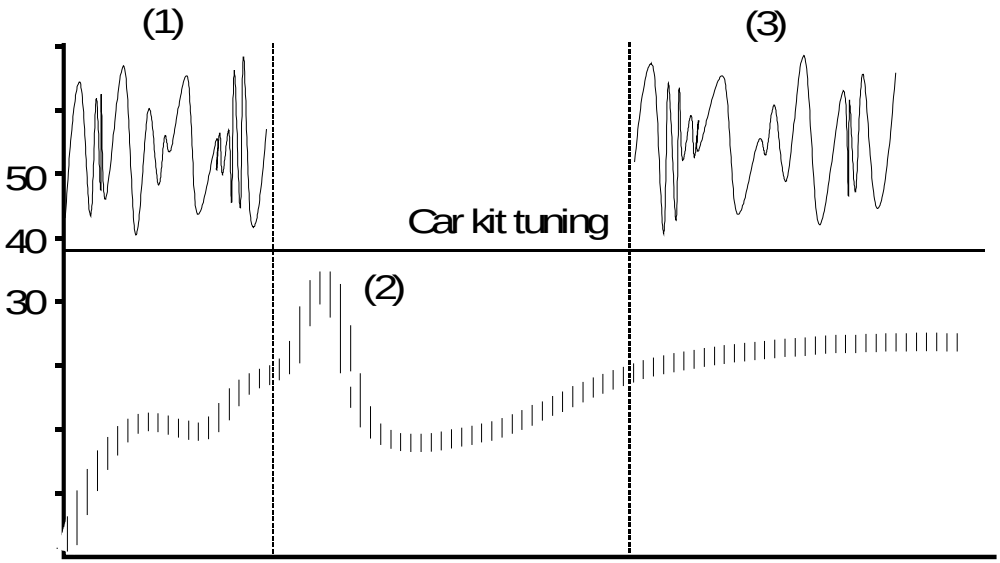
a. If the CAR KIT TUNING is set too high, your voice (1) will not activate the microphone path properly, and the person at the other end will only hear interrupted transmission of speech.



b. If the CAR KIT TUNING has been set up too low, the background noise in your car (2) will activate the microphone path, and the volume of the HF-speaker will be low.



c. When the CAR KIT TUNING has been set correctly only your voice (1 & 3) will open the microphone path.

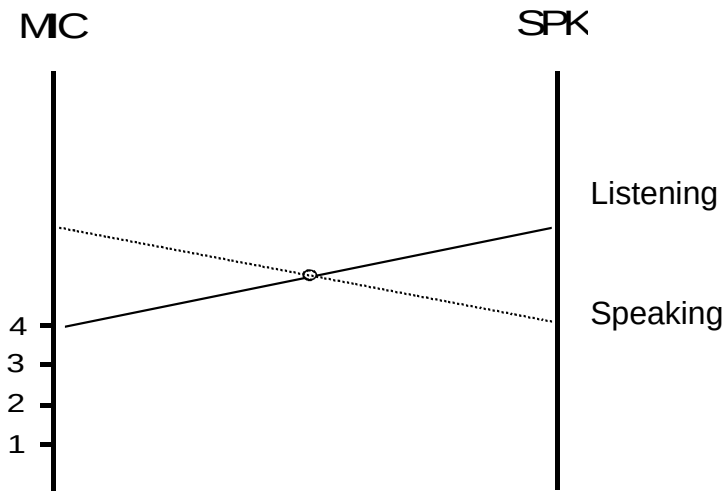


Benefon phones have been set in our factory so that they will function in most cars. The factory setting for the CAR KIT TUNING is 38, and for the OFFICE SET TUNING 42. The recommended adjustment range is +/- 5 units from the factory setting.

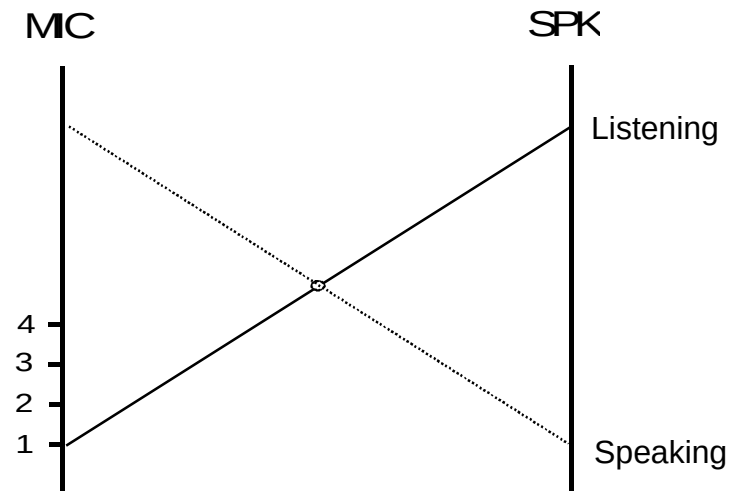
3.3.2 CAR KIT SWING/OFFICE SET SWING (theory)

The four-step CAR KIT SWING/OFFICE SET SWING tuning is used to set the contrast of the microphone amplification/speaker attenuation swing. In the following figures the swing position while listening to the Car Kit or Office Set is indicated by a solid line and the position while speaking into Car Kit or Office Set the indicated by a dotted line.

a. With a tuning value of 4 it is possible to obtain the smallest difference between the amplification and attenuation of the microphone and speaker. This means that the connection is almost bidirectional. If the HF-function easily creates feedback, decrease the value of the CAR KIT SWING/OFFICE SET SWING. By turning down the volume it is possible to reduce the occurance of feedback.



b. With a tuning value of 1 it is possible to obtain the greatest difference between the amplification and attenuation of the microphone and speaker. This means that the connection is almost unidirectional.



The factory setting for the CAR KIT SWING/OFFICE SET SWING is 3.

3.3.3 HF-function tuning in practice

You can tune HF-functions two ways: manually or with car kit.

Manual tuning

1. Connect the localbox to your phone, and turn the phone on.

2. Press ▼ and the following text will appear in the display: *****BENEFON*****. ✆ will be flashing in the display.

3. Press ▼ ▼ ▼, and the following text will appear in the display: HF-FUNCTION

4. Choose • SELECT, and the following text will appear in the display: CAR KIT TUNING [038]. (The figure can be different).

5. Choose • CHANGE, and the following text will appear in the display: CAR KIT TUNING [ ] (026). (The figure can be different).

6. Enter three digits and • SAVE. Yhe recommended value is between 033 and 043.

7. Choose ▼ SELECT, and the following text will appear in the display: CAR KIT SWING (1...4): [3]. (The figure can be different).

8. Choose ▼ SELECT, and the following text will appear in the display: CAR KIT SWING (1...4): [3]. (3 is blinking)

9. Enter one digit and • OK.

Tuning in car kit

1. Connect the localbox to your phone, and turn the phone on.

2. Press ▼ and the following text will appear in the display: *****BENEFON*****. ✆ will be flashing in the display.

3. Connect the hand portable to the car kit

4. Press ▼ ▼ ▼, and the following text will appear in the display: HF-FUNCTION

5. Choose • SELECT, and the following text will appear in the display: CAR KIT TUNING [038]. (The figure can be different).

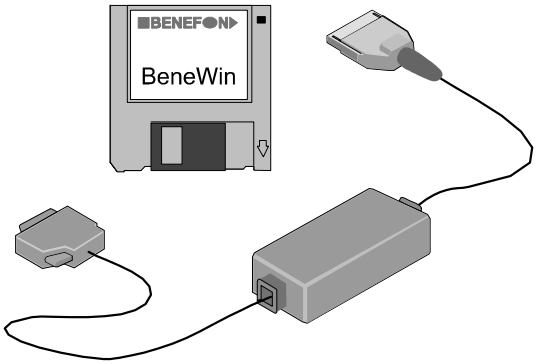
6. Choose • CHANGE, and the following text will appear in the display: CAR KIT TUNING [ ] (026). (The figure can be different).

7. Drive the car so that you can get a normal back ground noise level. The figure (026) will be changed according the back ground noice level.

8. Enter three digits (back by pressing C) shown in the figure (xxx) and • SAVE. The level will be stored.

4.0 SERVICE APPLICATIONS

4.1 BeneWin SCA-50



The BeneWin SCM Program for Windows is designed to facilitate maintenance of phone numbers and user settings on Benefon mobile phones. You can also use your phone to carry out the commands in the BeneWin Program, but it is handier to process data using your screen and keyboard - the advantage of the BeneWin Program. For example, all user settings are displayed in a single window, which enables you to check at a glance your current settings.

Your personal settings and phone numbers stored on the hard disk can be transferred to the mobile phone whenever necessary. When you travel or use a borrowed phone, your own settings make the phone feel like your own.

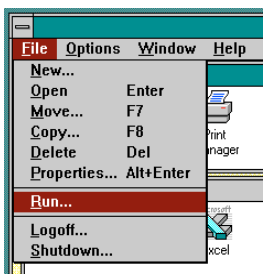
The main functions of the BeneWin Program are divided into two windows: the BeneWin SCM window, in which you can modify the phone numbers, and the User window, in which you can modify the phone's user settings.

4.1.1 Installation of BeneWin program

Start Windows.

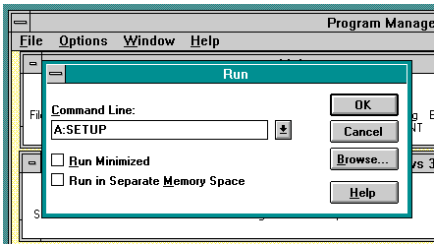
Insert the BeneWin installation disk in the floppy disk drive of your computer.

In the **Program Manager** window, choose **Run** from the **File** menu.



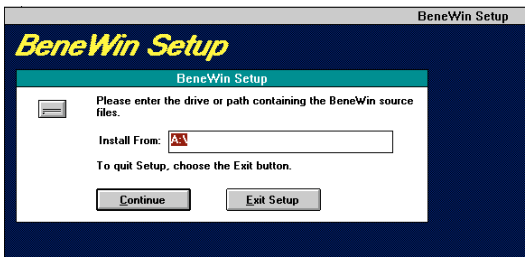
In the **Command Line** box, type the letter **A:** or **B:** to indicate your floppy disk drive, and then type **SETUP**. For example, **A:SETUP**.

Click the **OK** button, and follow the instructions displayed on your screen.

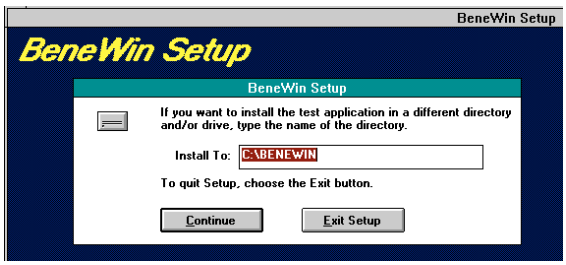


First, accept the location of the source files, which is the floppy disk drive you used for Setup.

To continue Setup, choose the **Continue** button. To quit Setup, choose the **Exit Setup** button.



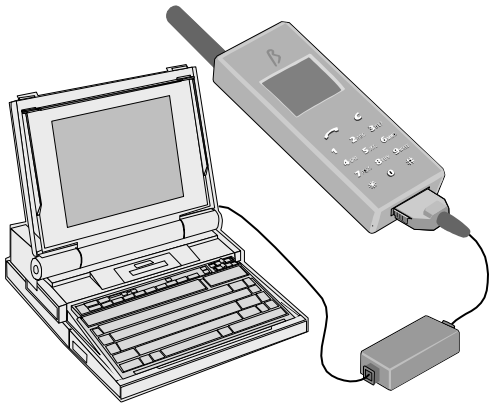
Next, the Setup Program will ask you to specify the drive and directory in which you want to install the BeneWin Program. The Program suggests the following: **C:\BENEWIN**. Accept the drive and directory by clicking the **Continue** button. You can quit Setup by clicking the **Exit Setup** button.



The Setup Program creates a **BENEWIN** directory and within it the necessary sub-directories in drive **C** of your computer. Setup also creates its own group window in Program Manager.

4.1.2 To start the BeneWin program

Connect your phone with a cable to the serial port of your computer, which is called COM1 or COM2. The serial ports are located in the back of your computer, and more precise instructions can be found in the manual accompanying the computer. Plug the flat end of the cable into the connector at the bottom of your phone. When the cable has been connected and the phone is functioning, you can start the BeneWin Program.



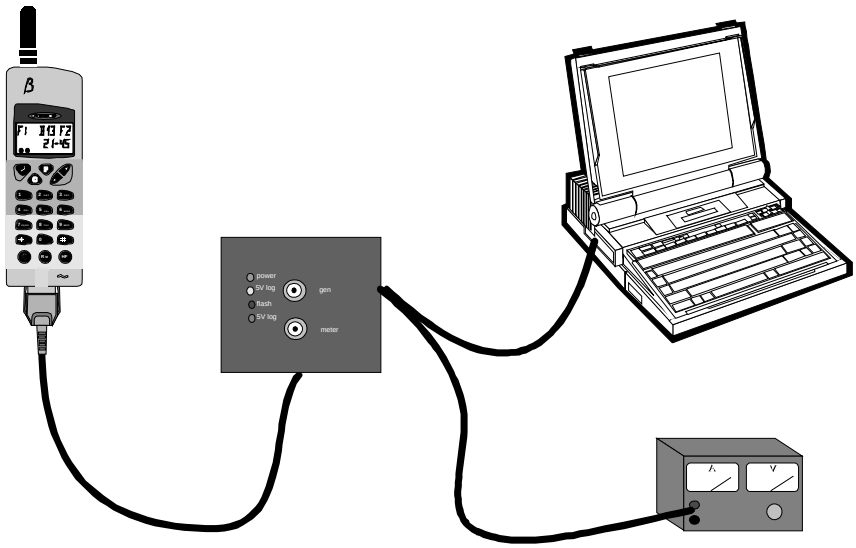
To start the BeneWin Program, double-click the BeneSCM icon.

If the phone has not been connected to the computer and you start the Program, the following error message will appear on the screen: **FATAL COMMUNICATION ERROR**. You will, however, be able to modify the data stored in your computer's memory locations by clicking the **OK** button.

If you use a laptop computer make sure that the computer is not in the energy saving mode. If so the energy saving mode may prevent the transfer of data from the phone to computer or vice versa.

After starting up the BeneWin program will guide you further with the help of an electric manual (**Online Help**).

4.2 Beneloc



BeneLoc program is designed to help service person on tuning and service purpose. With BeneLoc Program you will also get WinFlash Program. With WinFlash Program you can change the software to Benefon phones.

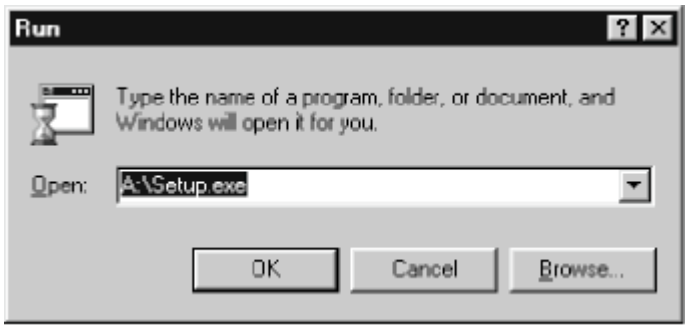
Both, BeneLoc and WinFlash program will need Local Box with service rights to work.

4.2.1 Installation of Beneloc program

Start Windows. Close all other programs except **Program Manager**.

Insert Beneloc Installation Disc 1 in the floppy disk drive of your computer. In the **Program Manager** window, choose **Run** from **File** menu.

Type the letter **A:** or **B:** to indicate your floppy disc drive, and then type **SETUP.EXE**. For example, **A:\SETUP.EXE**.



Click the **OK** button, and follow the instructions displayed on your screen.

The Setup Program will ask you to specify the drive and directory in which you want to install the Beneloc Program. The Program suggests the following: **C:\Bene-App\BeneLoc**. Accept the drive and directory by clicking **Next** button. You can also type your own directory for Beneloc Program.

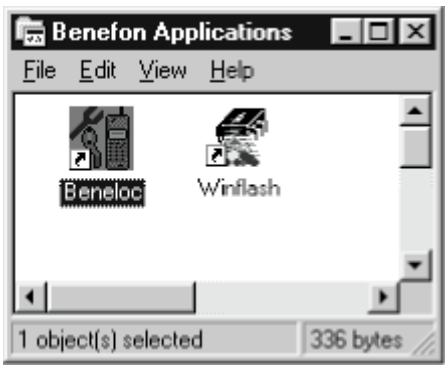
The Setup Program creates all necessary directories and subdirectories to your computer. Setup Program also creates its own group window in Program Manager. **WinFlash** Program will be installed automatically by Setup Program. You can find **WinFlash.exe** from the same directory as the Beneloc: e.g. **C:\BeneApp\Win-Flash**.

4.2.2 To start the BeneLoc program

Connect the Service LocalBox to serial port of your computer, which is called COM1 or COM2. The serial ports are usually located in the back of your computer, and more precise instructions can be found in the manual accompanying the computer.

Switch off the phone. Plug the cable with flat connector into the connector at the bottom of the phone. When the cable has been connected and the phone is switched on, the phone should be in LOCAL mode. You can test this by pressing arrow button. There should be ***BENEFON*** on the display, if not, clean connectors and try again. When phone is in LOCAL mode you can start the BeneLoc Program.

To start the BeneLoc Program, double click the **BeneLoc** icon.



In the BeneLoc Startup window, first select the correct serial port. Then, you have to select type of the phone. You can also use the **Autodetect** option. After selection click OK to start BeneLoc Program. When operating without external power supply the phone may be on sleep mode and registration fails. You can wake up the phone by pressing some buttons on the phone.

4.2.3 Using the BeneLoc program

In the main window of the BeneLoc, you will find submenus and buttons. Clicking the buttons you can go to the submenus.

Change

For changing phone to another similar you do not need to do more than enter into main menu. It means that this button is not needed. If you are going to change the tested phone to one having different software in, clicking Change will start the registration protocol again.

Help

About BeneLoc submenu will tell you version of the BeneLoc Program and also the state of memory.

About Cellular submenu will show you information of the phone. Type of phones software, sales date, date of the software, serial number and present tuning values of the phone. You can not change the tuning values from Help menu.

Dealer

From Dealer submenu you can make or check programming of the phone. You will also find the SIS information from Dealer submenu.

Service

You can control the audio lines (for example, switch Rx audio and compander on/off) in the Service main menu. It is also possible to control the phone to desired channel. There is also possible to change the power of transmitter.

In the **Ports** submenu is you can see the status of different digital ports. There is also possible to control some of the output ports.

You can read the status of the A/D converters from the **A/D** submenu. Select 8 different topics to view. By clicking **SCAN AD** button The Beneloc will scan A/D the state of converters continuously. Scanning can stopped by clicking **STOP AD**.

Memory submenu allows you to make **Ram** reset.

By clicking **Initialize** You can clear all LOCAL settings in service menu.

Home button will return you back to main menu.

Tunings

From Tunings main menu you can select different tunings to do. Every tuning have they own instruction window. Follow given instructions to do tunings. Clicking **START** will start tuning. The value will be stored only by clicking **SAVE**. Some of the tunings are chained and you can enter to next phase by clicking **NEXT**.

System

You select used mobile phone system from this submenu.

File

From **settings** submenu you can manually change settings of the communication port.

4.3 WinFlash

4.3.1 To start WinFlash

Connect the LocalBox to serial port of your computer, which is called COM1 or COM2. The serial ports are usually located in the back of your computer, and more precise instructions can be found in the manual accompanying the computer.

It is recommended to use external power supply when transferring software to phone with WinFlash. If it is impossible to use external power supply the battery of phone must be fully charged.

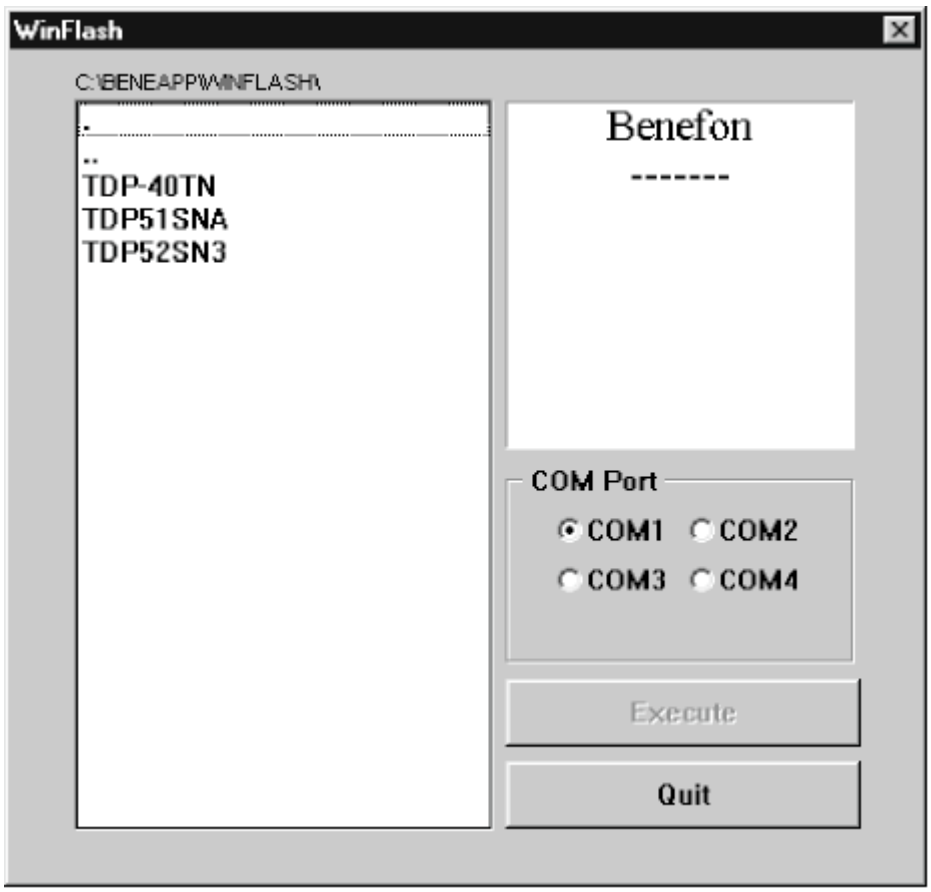
NOTE !

Before starting **WinFlash** save the short code memory places and settings of the phone to disc. You can use **Benewin** or **Beneserv** to save the SCM and settings.

Switch off the phone. Plug the cable with flat connector into the connector at the bottom of the phone. Start WinFlash by double clicking **WinFlash** icon. After opening the main window of the WinFlash select the correct communication port.

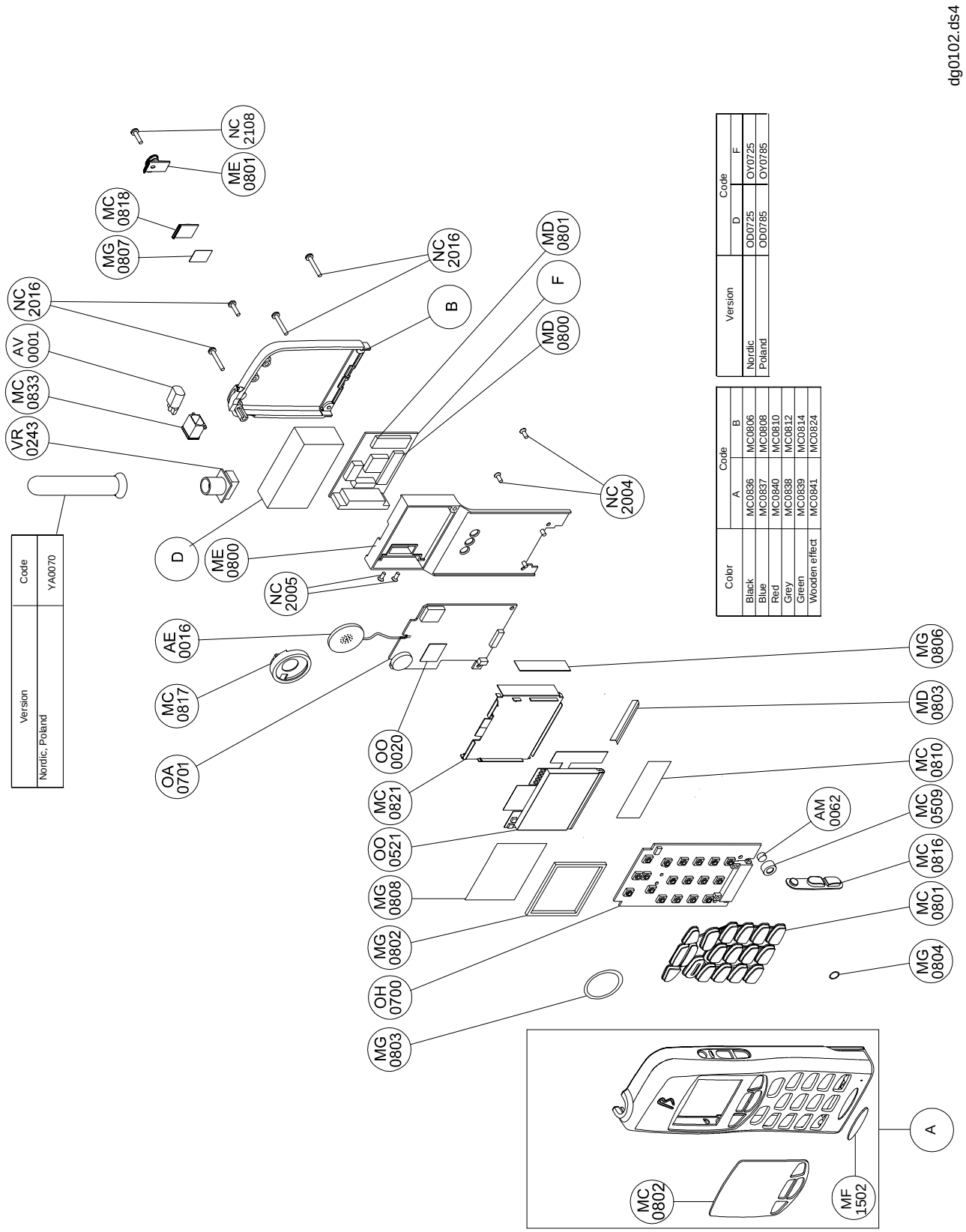
4.3.2 Using the WinFlash program

You will find all Benefon mobile phone softwares installed to your computer from window in the left side.



Select the software you want to transfer to phone by clicking it. In the right side window you will find some information of the selected software. Click Execute to start software transferring to phone. Follow the instructions shown in the screen. You can reset the phone by removing the flat connector from the phone and attaching it back again. Be sure that there are no marks on the display before pressing enter.

5.0 PHONE'S CONSTRUCTION



5.1 LOGIC / AUDIO

OA0701 Processor

Processor

5.1.1 General

The entire radio audio and processor functions are found within a single PA0700 board, through which all other modules are connected. Only the RF signals have a different path and the keyboard has a different unit.

The processor controls the audio and radio modules, internal devices and external accessories.

The processor includes:

CPU	68HC11A1	8-bit, 8 A/D, 512*8 EEPROM, 256*8 RAM, I/O
PROM	28F020	256*8 EEPROM, program memory
RAM	62256	8K*8 CMOS RAM, number memory
ASIC	IA8001	32 pcs out and 14 pcs inp, 3 series out, 3 analog out, frequency counter, clock
SIS	68HC11A8	SIS function, 8k ROM, 512*8 EEPROM, 256*8 RAM

5.1.2 Connectors:

5.1.2.1 RF-Module, V102 20 pin connector

1	SSDATA	RX and TX data to the splitter	0/5V
2	SSCLK	RX and TX data clock	0/5V
3	SSLE	RX and TX divider enable pulse	5V
4	SRX_REG	rx vco start up	5V
5	STX_REG	tx vco start up	5V
6	SAFC	frequency compensation control voltage	approx 2.5V
7	SSNTC	temperature data, analog	0-5V
8	SRXAUDIO	RX audio signal	220 mVrms
9	SRSSI	RX signal strength indicator, analog	0-5V
10	GND	ground	
11	S450K	450kHz for AFC measurement	approx 1Vpp
12	GND	ground	
13	SDTUNE	not function	
14	SSPARE	not function	
15	VB	power supply from the battery	6V
16	VB		
17	VB		
18	STXBIAS	TX initiate, 0V = TX OFF	0/5V
19	STXPWR	TX power control, analog	0-5V
20	STXAUDIO	TX audio signal	220 mVrms

5.1.2.2 Keyboard module + systemconnector lines

V101 40 pin connector

1	VB	power supply from battery	6V
2	VB		
3	VB		
4	VB		
5	VB		
6	EXTMIC	external audio from the microphone	400 mVrms
7	EXTERP	external audio to the speaker amplifier	220 mVrms
8	XCADET	carbox identification	0/5V
9	I2CINT	i2c interrupt, radio input	0/5V
10	SGL	i2c clock	0/5V
11	SDA	i2c data	0/5V
12	TXD	rs232 out	0/5V
13	RXD	rs232 in	0/5V
14	XEXTIO	reserve	0/5V
15	GND	ground	

16	GND		
17	GND		
18	GND		
19	GND		
20	GND		
21	XKEYINP0	key matrix input	0/5V
22	XKEYINP1		
23	XKEYINP2		
24	XKEYINP3		
25	XKEYINP3		
26	XKEYOUT0	key matrix output	0/5V
27	XKEYOUT1		
28	XKEYOUT2		
29	XKEYOUT3		
30	XCHGIND	charging voltage indicator	0/5V
31	XBMEM	input memory data-line from the battery	0/5V
32		nc	
33		nc	
34	MICINPUT	microphone-line	
35		nc	
36	XISIGN	battery voltage course indicator	0/5V
37	KEYLEDVB	voltage for the led of keyboard	6V
38	IVBDET	battery current indicator	0-5V
39	V-PROG	battery charging voltage	
40	V-PROG		

5.1.2.3 Display Module, A101

1	VCC	supply voltage	5V
2	RES	reset-line	0/5V
3	CSI	display data input	0/5V
4	AO		
5	SCL	clock line for data	0/5V
6	SI		
7	GND	ground	
8	CONT	not function	
9	GND		
10	LED	supply voltage for led of display	
11	KEYOUT1	key matrix output (volume key -)	0/5V
12	KEYINP4		
13	KEYINP4	key matrix input (volume keys+/-)	0/5V
14	KEYOUT0	key matrix output (volume key +)	0/5V
15	PWRKEY	powerkey	
16	GND		

5.1.2.4 Answer Module, I101

1	VCC	supply voltage	5V
2	REC	record control	0/5V
3	GND	ground	
4	PLAYE		5V
5	PLAYL	play control	0/5V
6	ANAIN	audio input	
7	GND1	ground	
8	VCCA	supply voltage	5V
9	SP+	audio output	
10	GND2	ground	

5.1.3 Circuit Diagram

The processor and audio circuit diagram is split into five parts. Signals in the circuit diagrams have been given names, and signals with the same name are connected between diagrams.

5.1.3.1 Circuit Diagram Contents

OA0701A	module connector pins
OA0701B	power supply
OA0701C	cpu, ASIC, RAM, EPROM
OA0701D	audio parts
OA0701E	SIS-function

5.1.4 Functions

5.1.4.1 CPU

I304 is itself a processor circuit. It is comprised of CPU, 512*8bit EEPROM, timers, A/D converters, and both series- and parallel I/O lines. The clock oscillator is located in the audio circuit and provides the CPU with a 7.2 MHz clock signal. The CPU divides this by 4 to get timing signal E.

When the processor is operating, RESET = 5V, VCC = 5V, E = 1.8 Mhz, AS, R/W and A0...A15 pulses should be 0/5V (no intermediate values, only 0 or 5V).

5.1.4.2 Memories

Memory and external I/O-circuit address coding is done with the ASIC circuit I305. The circuit options CSR, CSP, and OE are 0-active.

The program memory is in 256k*8 EPROM. The program uses the addresses 2100H...FFFFH. Page selection makes available another similar memory block.

RAM-memory is 8k*8 CMOS RAM at the addresses 0000H...1FFFH. RAM receives its power supply from its own regulator which is always operating, even when the radio is in the OFF state.

5.1.4.3 The Modem

The FFSK modem is located in the audio circuit. The modem is connected to the CPU by a series line, input to synchronised port, and transmission is controlled by an ASIC series output. The modem gives a 1200 Hz signal RXCLK to the processor and TXCLK to ASIC. There is a data detector within the modem, the speed of which is controlled by C438.The CPU A/D converter measures the level of acceptance from ERPDET line. The same detector also serves to control the HF function.

5.1.4.4 AFC

The AFC function is performed by an internal ASIC frequency counter. A 450 kHz intermediate frequency is amplified to a square-wave form by Q305. The frequency is adjusted by ASIC pulse frequency modulated signal D/A 0, which is integrated by C378. This approx. 2.5V DC voltage is fed to the synthesiser AFC pin.

5.1.4.5 Sleep Timer

The phone puts the central functions to sleep for a time. Although everything seems normal to the user, most of the functions are closed down. The radio and audio units are closed down completely. The processor still has a power supply, but the processor is halted and has minimal power consumption. Only the ASIC circuit sleep timer and its 32 kHz crystal oscillator remain in active mode. The phone is "woken up" by interrupting the sleep timer or by changing the keyboard state. The sleep timer 32 kHz clock freqency is produced by the oscillator made by crystal X305.

5.1.4.6 Warm Start

C352 and R352 measure the length of a voltage break. The voltage drops during a break, after which it is measured by the A/D convertor. The time constant is approx. 10 s . Thus a "warm start" is detected.

5.1.4.7 RESET

The processor voltage regulator ERROR output resets (stops) the processor and zeroes the controls when the battery voltage drops below 5V. When the voltage rises again, the processor restarts.

5.1.4.8 Power Switch

The power switch (PWRKEY) is grounded, and directs the regulator I201 to conduct when pressed. The program commences and checks the PWRSW line to ensure that the switch is being pressed, and sets hold on the regulator for the PWRON line. When the switch is depressed for a longer time, the program directs power to the PWROFF line. During a short voltage break, C211 and R211 remember the previous control, i.e. fet Q202 conducts again when the voltage is restored within 10 seconds. The switch-fet also serves as a watch-dog should the voltage drop or processor error-state continue; after 10 seconds, the radio will shut down completely.

Note! The RAM and ASIC circuits have their own regulator connected to the battery to ensure an uninterrupted power supply. RAM power supply is ensured during a battery-pack change by the battery B201.

5.1.4.9 Battery Voltage Measurement

The battery voltage is measured by an A/D converter. The converter 256 step conversion scale is not sufficient as it stands, so the measured range is restricted to 5...8V by the operational amplifier I303. The reference voltage for the measurement is provided by the processor regulator 5V supply. Calibration is done by the program against a precisely known battery voltage.

5.1.4.10 I/O ports

The ASIC I/O ports PA...PF are 8-bit hold circuits. DATA is fed to the addressed output. When the RESET line is down (0V) all the ASIC ports are zeroed (0V). As RESET rises again, all of the two-way I/O ports are inputs until the program sets them to the desired state. With the radio in OFF state, RESET is down so all of the controls are also down although ASIC is still provided with operational voltage (VRAM).

5.1.4.11 SIS

SIS functions are provided by a mask-programmed single chip processor I503 (68HC11A8). It communicates with the host processor via ASIC with an RS232 bus (5V levels). The circuit operation is not externally visible as it is a single-chip solution. User specific information is stored in EEPROM which CANNOT be read from outside the chip. All external attempts to read the information clear both EEPROM and RAM (fill with FF).

5.1.4.12 Power Adjustment

The transmitter control logic switches TX power and also adjusts it to the correct level. The STX_REG signal sets the transmitter to ready mode. Power is controlled by the ASIC analog output D/A 1. It is a pulse frequency modulated output which is converted to a DC voltage by integrating it with C379. 0V corresponds to "no power" state, and 5V to maximum transmitter power. The power levels are calibrated by the program at the source of measurement.

5.1.4.13 Charging Control

The charger is controlled by the program. The charger is detected by a voltage at the SV-CHG pin. The charging current (0...1,5A) is controlled by an analog (0...5V) CHGCONT signal which comes from the ASIC D/A 2 pulse frequency output. Charging is governed by the battery and radio temperatures, battery voltage, and time measurement.

5.1.4.14 Temperature Measurement

The radio has two separate temperature sensors, one within the battery pack, and the other within the radio module. Inside the radio the NTC resistor R316 voltage is measured by the processor A/D converter. This value is converted by a programmed table to a temperature reading.

5.1.4.15 Real-time Clock

A real-time clock is provided within ASIC to give the time and date. The alarm function can also be programmed to the ALARM pin. This will initiate the processor regulator and thus also the radio although it is in OFF state.

The ASIC circuit has a continuous power supply and the 32 kHz clock crystal runs constantly. Not even the RESET line stops the clock. If the power supply has dropped too low, the clock will need to be reset with the radio buttons (from the menu).

5.1.4.16 Answer Module

Answer module can save a maximum 16 second message. The message can be recorded from the microphone, external microphone or RX-audio. The message can be sent to the earphone, external earphone or TX-audio.

Audio

5.1.5 Function Description

OA0700 Audio

The audio module is comprised of the following functions:

1. TX-audio signal handling
2. RX-audio signal handling
3. Fii signal handling
4. FFSK modem
5. DTMF generator/receiver
6. Signal level detectors
7. Compander
8. Expander
9. Buzzer

The audio functions are mainly located in a single circuit AK2339. This chip from AKM is controlled by a serialbus. It is possible to shut down parts of the circuit, one block at a time to minimise power consumption.

5.1.6 TX-audio

The input from the microphone is fed to the audio circuit I405 pin 61, which is an operational amplifier (AMP1) inverting input. The operational amplifier gain is set by resistors R413 and R416. The amplifier is connected as a low pass filter. After the amplifier is the microphone switch and then summing junction of MIC input signal, EXTMIC input signal and transmit DTMF signal. VR1 is a programmable amplifier, which sets the microphone signal (sensitivity) to the correct level. After VR1 comes band-pass filter for transmitting the voice signal. After the TXBPF is the summing junction (AMP6) of the tx signal and transmit answer signal (ANAOUT). TXDET is the transmit voice signal detection circuit which works as a full wave rectifier. Next comes ATT1 which is an attenuate circuit to set the transmit signal level in the HF-mode. COMP is the compressor circuit. Compress the transmitting signal amplitude with square root law. It can be hypassed. The linearity is adjustable by the control register CVR. Next is VR2, normal deviation gain control circuit to set the signal level. The P/E & LIMIT pre-emphasis circuit and limiting circuit, emphasize the higher frequency component of the signal in order to improve the signal-to-noise ratio of modulated signal. This block includes a limiting circuit for signal amplitude in order to confine the maximum deviation of the transmit modulated signal. TXLPF is the low pass filter to reject the higher frequency component on the

transmit signal. VR3 is a maximum deviation gain control circuit to set the transmit signal level. After the VR3 comes switch TXAUDON, which mutes the tx-audio signal using the TXMUTE control. From the switch, the signal is fed to the summing junction (ADD3) of the tx-audio signal, FFSK signal and Fii-signal. Next comes VR4 gain control circuit to set. SMF1 is smoothing filter for tx-audio signal. The tx-audio signal is then fed to the V102 connector pin 20.

5.1.7 RX-Audio

The rx-audio signal coming from the receiver through the V102 pin 8 is fed to the audio circuit I405 pin 23. Inside the circuit, the signal is fed to the operational amplifier (AMP2) inverting input. The amplifier gain is set by resistors R440 and R441. The signal is next passed through an anti-aliasign filter. VR5 is a gain control circuit to set the rx-audio signal to the correct level. Next comes de-emphasis (D/E) circuit. Equalize the pre-empassized rx-audio signal. The signal passes from the D/E through the switch RXAUDON. RXBPF is the band-pass filter for the rx-audio signal. RXDET is the rx-audio signal detection circuit. This circuit works as a full wave rectifier. After the RXBPF comes expander circuit (EXP). Expand the rx-audio signal amplitude. It can be bypassed. The linearity is adjustable by the control register EVR. VR6 is a gain control circuit to set the rx-audio signal to the correct level. After VR6 comes the RXMUTE switch, which is operated by the RXMUTE control. ADD4 is the summing junction of the rx-audio signal, external signal (not used), DTMF signal and transmit signal. VR10 is the volume control circuit to set the level of earphone and external earphones. The rx-audio signal is connected through the receiver driver (RECAMP) to the earphone.

5.1.8 FII Signal

The NMT system uses the FII signal to check the radio path quality. This approx. 4kHz signal is split from the rx-audio signal after the VR5 and is filtered through the band-pass filter (FBPF). VR7 sets the FII signal to the correct level. Switch FILOOPON can be operated by the FIION control, to be summed with the tx-audio signal before the VR4.

5.1.9 FFSK Modem

The FFSK data signal from FFSK modulator to be transmitted is passed through the FFSK low-pass filter and pre-emphasis (FFSKP-EM) to the VR9, which adjusts its level. The data signal is switched using switch FFSKTXON. The data signal is summed with the tx-audio signal by the ADD3.

The received data signal is split from the rx-audio signal after the de-emphasis circuit. The data signal is fed through the FFSK band-pass filter to the FFSK demodulator and FFSK data detector.

FFSK DET block. The block works to judge the FFSK signal existence by comparing the amplitude of the noise reduced FFSK signal and the provided

detection level standard. Once the detector judges a valid FFSK signal, 'H' signal is put out on the FFSKDET pin (pin43). The data detector speed is determined by the external condensator C438.

FFSK DEMOD. To recover 1200bps receive data and clock from the FFSK signal fed on DEM1 pin.

The modem is connected to the CPU by series lines, the receiver to a synchronised gate, and transmission is directed to an ASIC series output. The modem provides a 1200 Hz clock signal RXCLK to the processor and TXCLK to ASIC.

5.1.10 The DTMF Generator/Receiver

The DTMF generator provides all sixteen standard DTMF tones, and each individual frequency separately. The generator is used to produce both key and alarm tones and enable numeric message transmission during a call.

Key and alarm tones are taken from the generator to switch DTMFRXON and is summed with the rx-audio signal. Key tones are connected to earphone and external earphones.

When transmitting a numeric message, the DTMF tones produced by the generator are fed through the VR8, which set the DTMF signal level to the switch DTMFTXON, and then the signal is summed with the tx-audio signal.

The DTMF receiver takes in numeric messages sent to the phone. The route to the DTMF receiver splits from the rx-audio signal after the summing junction ADD4.

5.1.11 Signal level detectors

Audio signal level detectors are required for the HF-function to measure the transmitted and received audio signal level, and to study the data signal level. Measurement is done by rectifying the signal, and the resultant DC voltage is read by a phone's prosessor A/D converter. TXDET is at the transmission side detector and RXDET is at the receiver side detector.

5.1.12 Compander/Expander

Compander and expander units are included in audio asic I405 and can be controlled by registers.

5.1.13 Alarm buzzer

Tones for the internal alarm tones are provided by the DTMF generator. The internal alarm tones path way is DTMF generator, VR8, switch DTMFRXON, summing junction ADD4, VR11, AMP5 and buzzer. The buzzer volume is controlled by the DA3.

5.1.14 Audio signals for answer module

The record signal comes from the tx side through the switch AUDLOOPON, ADD4, VR11 and AMP5 to answer module I101. The audio signal from the answer module comes to the summing junction AMP6.

5.1.15 The other in audio asic (I405)

OSC is the main oscillator and clock divider for the prosessor.

CLKBUF is clock buffer generate clock out from main clock.

INTERFACE & DATA REGISTER is a 16 bit address/data serial interface circuit.

BIAS is bias current generator for amplifiers.

TIMER is an 8 bit timer (not used).

DA1, DA2, DA3 are 8 bit linear DA converters.

5.1.16 Parts list OA0701

OA0701 Proc./Audio

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
OO0521	A101	Matrix display module	5V	Alps	LSU4Y4021A
AE0017	A400	Buzzer	13x11x3mm 1.5V/80mA	Primo	MB-11A-K
AE0016	A401	Earphone	Ceramic receiver	Primo	CR9II-35
AB0002	B201	Lithium battery	3V 39mAh	Rayovac	BR 1225SM-B
CF0223	C108	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C175	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C176	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C202	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C205	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU1106	C206	SMD tantal	10uF/16V	AVX	TAJB106M016R
CU1226	C208	SMD tantal	22uF/6.3V 20% 6x3.2mm	Matsushita	ECSTOJC 226R
CF0223	C209	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU1106	C211	SMD tantal	10uF/16V	AVX	TAJB106M016R
CF0101	C213	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C214	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CU1106	C215	SMD tantal	10uF/16V	AVX	TAJB106M016R
CF0223	C216	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C305	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0102	C306	SMD capasitor	1 nF 5 % NP0	Philips	
CF0223	C307	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C308	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C309	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C310	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C315	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C316	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C334	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C351	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU1106	C352	SMD tantal	10uF/16V	AVX	TAJB106M016R
CF0223	C353	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C360	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0103	C365	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0220	C367	SMD capasitor	22 pF 5% 50 V NP0	Philips	
CF0220	C368	SMD capasitor	22 pF 5% 50 V NP0	Philips	
CU1105	C378	SMD tantal	1uF/16V	AVX	TAJR105M016R
CU0334	C379	SMD tanlat	0.33uF/20V/10%	AVX/KYO-CER	TAJR334K020R
CU1105	C380	SMD tantal	1uF/16V	AVX	TAJR105M016R
CF0223	C403	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU3475	C411	SMD tantal	4.7uF/10V 20%	AVX	TAJA475M010R
CF0101	C412	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0473	C413	SMD capasitor	47 nF 10% 50 V X7R	Philips	
CF0222	C414	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CF0223	C420	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C422	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C424	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C425	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C426	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0473	C428	SMD capasitor	47 nF 10% 50 V X7R	Philips	
CH0105	C429	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CF0220	C431	SMD capasitor	22 pF 5% 50 V NP0	Philips	
CF0223	C432	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU1105	C434	SMD tantal	1uF/16V	AVX	TAJR105M016R
CU1105	C435	SMD tantal	1uF/16V	AVX	TAJR105M016R
CU1105	C436	SMD tantal	1uF/16V	AVX	TAJR105M016R
CD0473	C438	SMD capasitor	47 nF 10% 50 V X7R	Philips	

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CH0105	C440	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0104	C443	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0104	C444	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CH0105	C446	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CF0331	C447	SMD capasitor	330 pF 5% 50 V NP0	Philips	
CF0223	C451	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C452	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0220	C458	SMD capasitor	22 pF 5% 50 V NP0	Philips	
CF0220	C459	SMD capasitor	22 pF 5% 50 V NP0	Philips	
CF0221	C502	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0223	C510	SMD capasitor	22 nF 10% 50 V X7R	Philips	
DS1070	D201	SMD diode pair	70V/100mA common cathode	Philips	BAV 70W
DS1070	D202	SMD diode pair	70V/100mA common cathode	Philips	BAV 70W
DS1070	D203	SMD diode pair	70V/100mA common cathode	Philips	BAV 70W
DY0054	D205	Shottky diode		Philips	BAT 54
DS1070	D206	SMD diode pair	70V/100mA common cathode	Philips	BAV 70W
DS1056	D301	SMD diode pair	70V/100mA common anode	Philips	BAW 56W
DS1099	D401	SMD diode pair	70 V 200 mA	Philips	BAV 99W 115
OO0020	I101	Answer module		Elcoteq	
IR7250	I201	Regulator	5V /100mA	TexasInstr	TPS7250QDR
IR8850	I202	SMD regulator	5V/30mA	SeikoInstr	S-8850AF-TF
IM0256	I301	SRAM	CMOS 32kx8 5V	Samsung	KM62256CLTG-10L
IM2010	I302	Flash memory	2Mb	Intel	E28F020-150
IA7550	I303	Single op.amp.		Toshiba	TA 75S01F-TE85L
IP6810	I304	Prosessor (Peippo)	512 EEPROM, 8A/D, no ROM	Motorola	MC68HC11A1FU
IG8001	I305	ASIC		SeikoEpson	SLA919SF1V
IX2339	I405	Audio processor	CMOS base band pros	AsahiKasei	AK2339
IP6832	I503	Processor (SIS)	8k maskPROM,512EEPROM	Motorola	MC68HC11A8 FU
LF0003	L150	EMI filter	50MHz=65ohm +-40%	Murata	BLM11B141DPTM00-
LF0003	L151	EMI filter	50MHz=65ohm +-40%	Murata	BLM11B141DPTM00-
LF0003	L160	EMI filter	50MHz=65ohm +-40%	Murata	BLM11B141DPTM00-
QS0858	Q101	SMD transistor	PNP 0.1A/30V hFE 125-800	Philips	BC858BW
QS0848	Q102	SMD transistor	NPN 0.1A/30V hFE 110-800	Philips	BC848BW, 115
QS0858	Q105	SMD transistor	PNP 0.1A/30V hFE 125-800	Philips	BC858BW
QS0848	Q106	SMD transistor	NPN 0.1A/30V hFE 110-800	Philips	BC848BW, 115
QF7002	Q202	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QS0848	Q203	SMD transistor	NPN 0.1A/30V hFE 110-800	Philips	BC848BW, 115
QS0848	Q210	SMD transistor	NPN 0.1A/30V hFE 110-800	Philips	BC848BW, 115
QS0848	Q301	SMD transistor	NPN 0.1A/30V hFE 110-800	Philips	BC848BW, 115
QS0848	Q302	SMD transistor	NPN 0.1A/30V hFE 110-800	Philips	BC848BW, 115
QS0848	Q305	SMD transistor	NPN 0.1A/30V hFE 110-800	Philips	BC848BW, 115
QF7002	Q401	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
RF0103	R101	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R102	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0472	R103	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0472	R104	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0103	R105	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0104	R106	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R107	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R108	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0101	R109	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0103	R110	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0105	R111	SMD resistor	1 M 5% 0.125 W	Kamaya	
RF0102	R121	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R122	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R123	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R124	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R125	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R126	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R127	SMD resistor	1 k 5% 0.125 W	Kamaya	

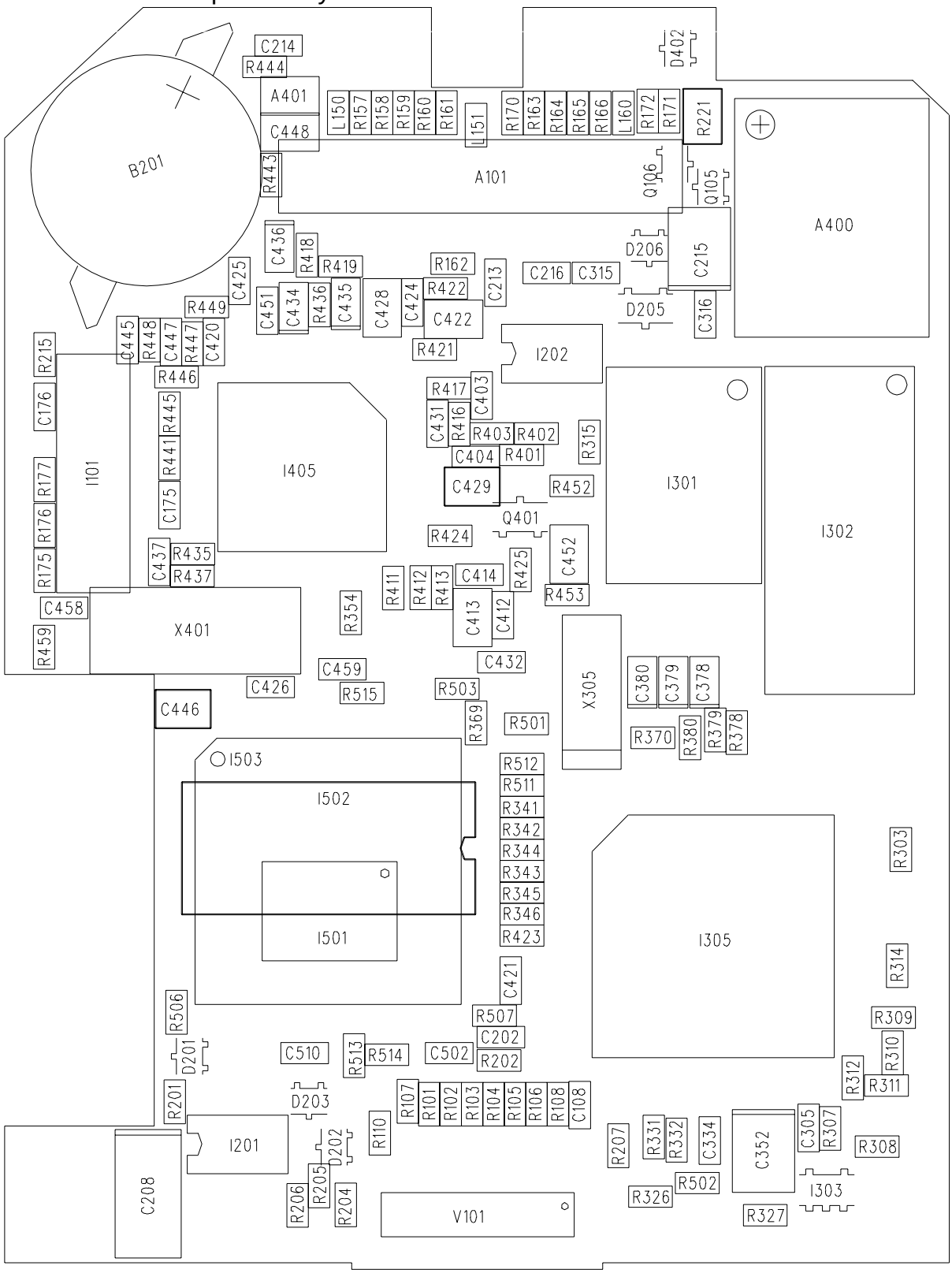
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RF0102	R128	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R129	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0101	R130	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R131	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R132	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0103	R135	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R136	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0102	R141	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R142	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R143	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R144	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R145	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R146	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R147	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R148	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R149	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R150	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R151	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0101	R154	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0222	R155	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0102	R157	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R158	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R159	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R160	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R161	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R163	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R164	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R165	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R166	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0331	R170	SMD resistor	330 R 5% 0.125 W	Kamaya	
RF0103	R171	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R172	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0104	R175	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R176	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R177	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0224	R201	SMD resistor	220 k 5% 0.125 W	Kamaya	
RF0103	R202	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0683	R203	SMD resistor	68 k 5% 0.125 W	Kamaya	
RF0102	R204	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0103	R205	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0473	R206	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0104	R207	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0223	R208	SMD resistor	22 k 5% 0.125 W	Kamaya	
RF0104	R210	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0105	R211	SMD resistor	1 M 5% 0.125 W	Kamaya	
RF0223	R212	SMD resistor	22 k 5% 0.125 W	Kamaya	
RF0101	R215	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0222	R220	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RD0470	R221	SMD resistor	47 R 5% 0.125 W	Kamaya	
RF0104	R301	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R302	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0103	R303	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R304	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R305	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0100	R307	SMD resistor	10 R 5% 0.125 W	Kamaya	
RF0392	R308	SMD resistor	3.9 k 5% 0.125 W	Kamaya	
RF0104	R309	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R310	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R311	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R312	SMD resistor	100 k 5% 0.125 W	Kamaya	

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RF0104	R313	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0224	R314	SMD resistor	220 k 5% 0.125 W	Kamaya	
RF0103	R315	SMD resistor	10 k 5% 0.125 W	Kamaya	
RTN154	R316	SMD NTC-resistor	150k 5% B=4100	Hokuriku	157-154-45001TP
RF0104	R325	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0224	R326	SMD resistor	220 k 5% 0.125 W	Kamaya	
RF0104	R327	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R328	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R329	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0103	R331	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R332	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R333	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R334	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0104	R341	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R342	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R343	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R344	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R345	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R346	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0105	R351	SMD resistor	1 M 5% 0.125 W	Kamaya	
RF0105	R352	SMD resistor	1 M 5% 0.125 W	Kamaya	
RF0104	R353	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0182	R354	SMD resistor	1.8 k 5% 0.125 W	Kamaya	
RF0104	R355	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0182	R357	SMD resistor	1.8 k 5% 0.125 W	Kamaya	
RF0104	R365	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0392	R366	SMD resistor	3.9 k 5% 0.125 W	Kamaya	
RF0106	R368	SMD resistor	10 M 5% 0.125 W	Kamaya	
RF0102	R375	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0104	R376	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0103	R378	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R379	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R380	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0223	R401	SMD resistor	22 k 5% 0.125 W	Kamaya	
RF0104	R402	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R403	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0103	R411	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0222	R412	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0153	R413	SMD resistor	15 k 5% 0.125 W	Kamaya	
RF0105	R416	SMD resistor	1 M 5% 0.125 W	Kamaya	
RF0153	R417	SMD resistor	15 k 5% 0.125 W	Kamaya	
RF0103	R418	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R419	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0563	R421	SMD resistor	56 k 5% 0.125 W	Kamaya	
RF0103	R423	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0104	R424	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0105	R425	SMD resistor	1 M 5% 0.125 W	Kamaya	
RF0104	R436	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0563	R440	SMD resistor	56 k 5% 0.125 W	Kamaya	
RF0224	R441	SMD resistor	220 k 5% 0.125 W	Kamaya	
RF0471	R443	SMD resistor	470 R 5% 0.125 W	Kamaya	
RF0471	R444	SMD resistor	470 R 5% 0.125 W	Kamaya	
RF0153	R445	SMD resistor	15 k 5% 0.125 W	Kamaya	
RF0222	R446	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0104	R447	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0103	R448	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0224	R449	SMD resistor	220 k 5% 0.125 W	Kamaya	
RF0563	R452	SMD resistor	56 k 5% 0.125 W	Kamaya	
RF0000	R456	SMD resistor	0 R	Kamaya	
RF0000	R458	SMD resistor	0 R	Kamaya	

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RF0105	R459	SMD resistor	1 M 5% 0.125 W	Kamaya	
RF0102	R501	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R502	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R503	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0104	R510	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0103	R511	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R512	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R513	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R514	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R515	SMD resistor	10 k 5% 0.125 W	Kamaya	
VN0017	V101	SMD B/B-connector	2x20 pin	JAE	IL312-40SB-VF30
VM0220	V102	SMD connector male	20pin	Suyin	12757A-20G2
X32765	X305	SMD Crystal	32.768kHz +/-20ppm	Citizen	CM200
X14400	X401	SMD crystal	14,4MHz +-50ppm	ThohokuCry	TQ3316SMD-14.400
PA0700	Y7	PCB for OA0700	51,8x64,0mm 6-layer		

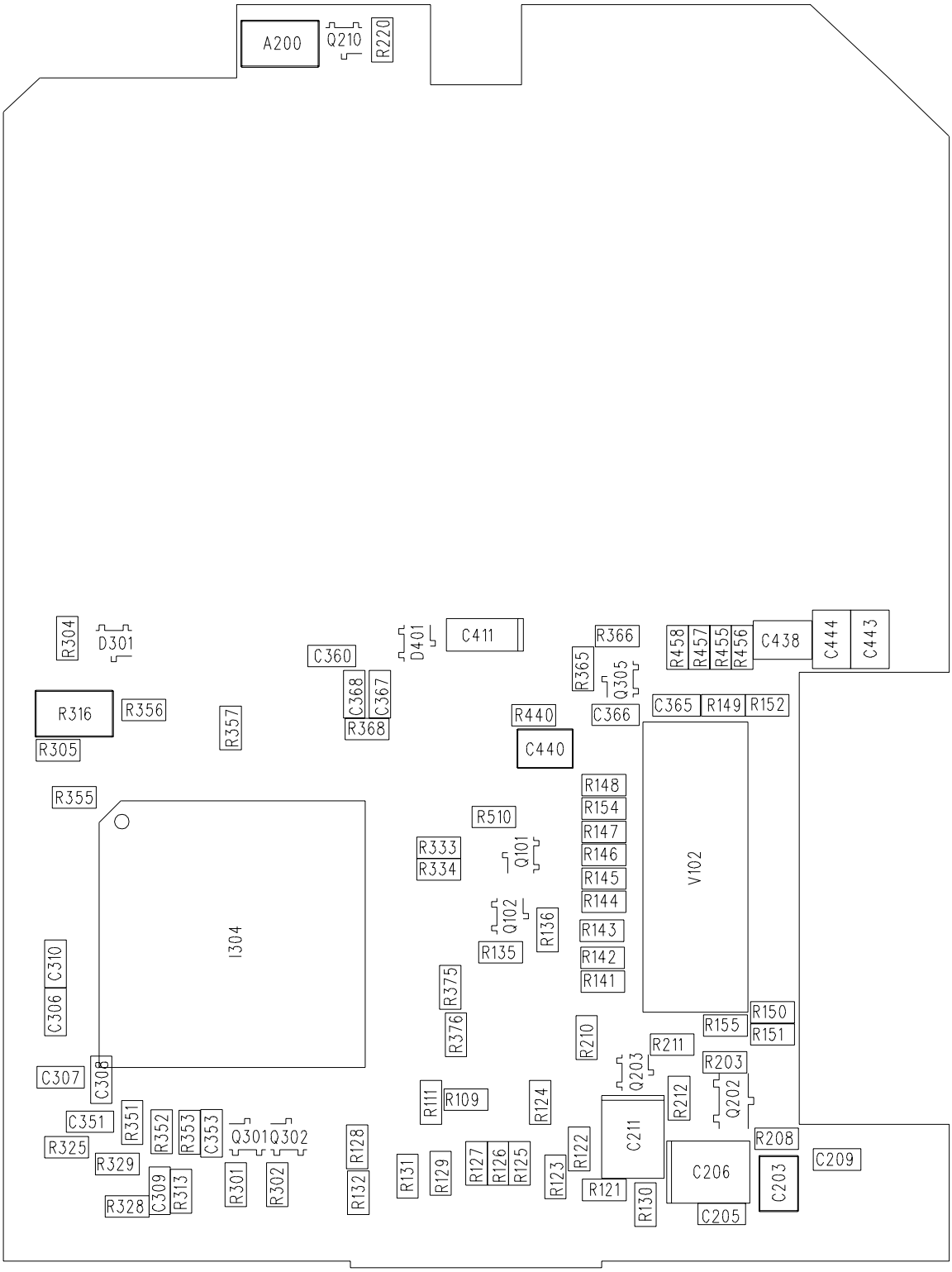
Last
update
27.01.97

The Top Side Layout PA0700 A5

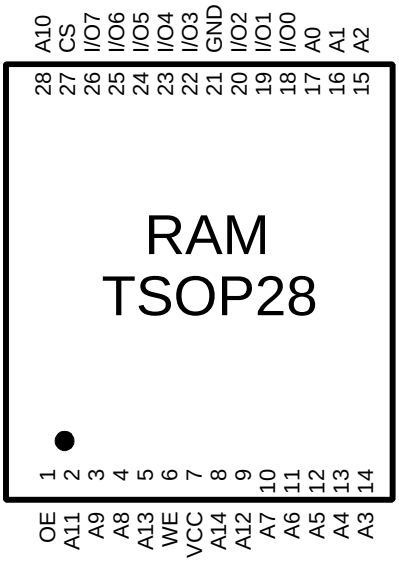


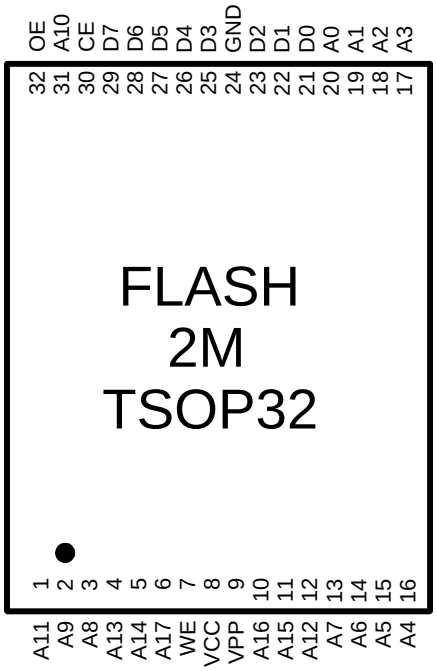
PA0700A5 645

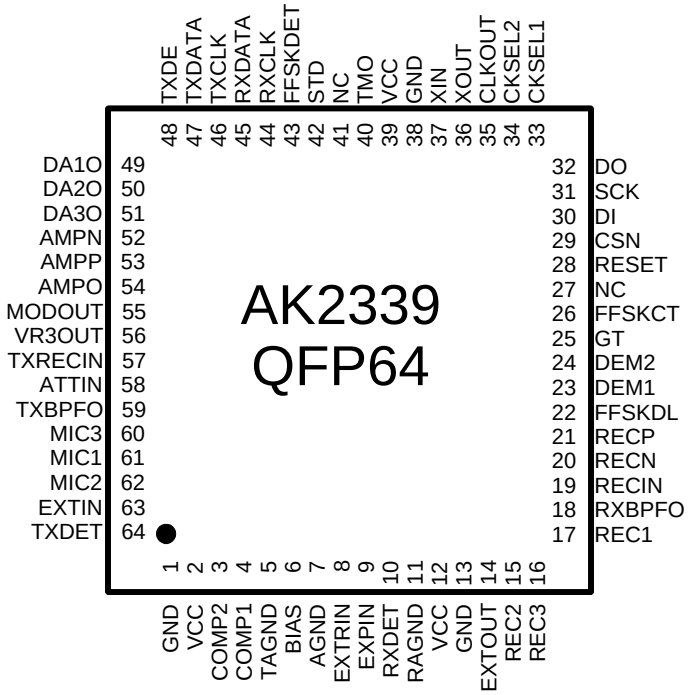
The Bottom Side Layout PA0700 A5

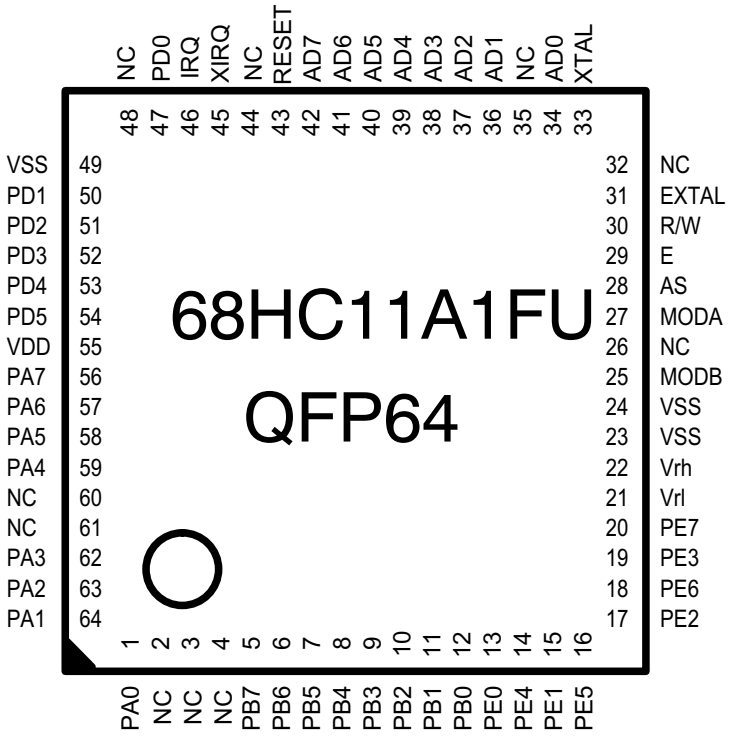


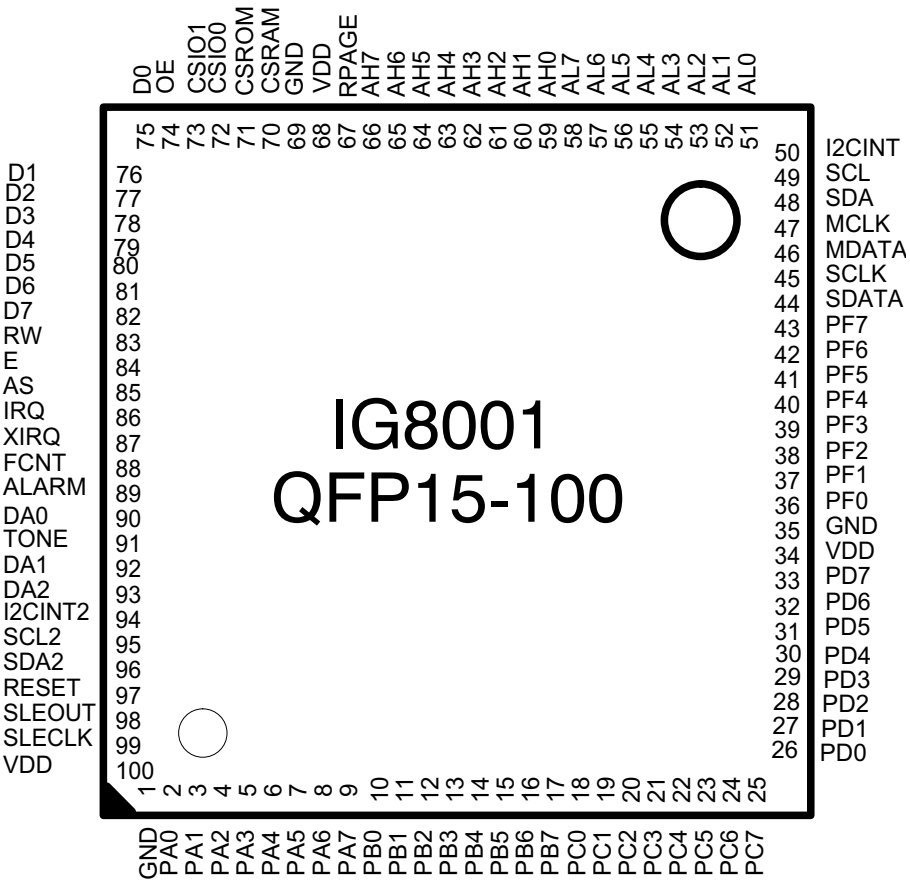
PA0700A5 645

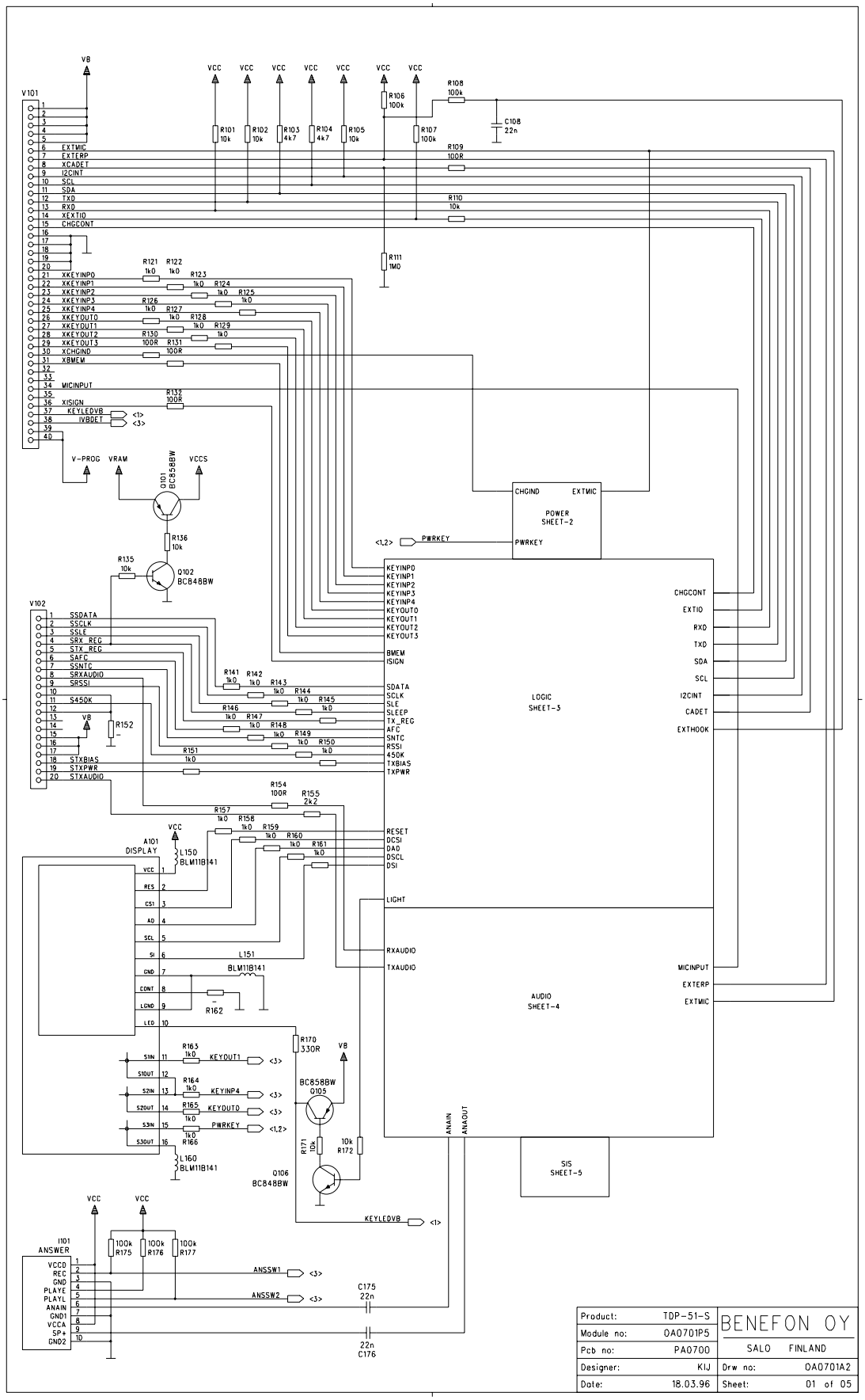

A10 CS I/O7 I/O6 I/O5 I/O4 I/O3 GND I/O2 I/O1 I/O0 A0 A1 A2
28 27 26 25 24 23 22 21 20 19 18 17 16 15
RAM
TSOP28
1 2 3 4 5 6 7 8 9 10 11 12 13 14
OE A11 A9 A8 A13 WE VCC A14 A12 A7 A6 A5 A4 A3


OE A10 CE D7 D6 D5 D4 D3 GND D2 D1 D0 A0 A1 A2 A3
32 31 30 29 28 27 26 25 24 23 22 21 20 19 18 17
FLASH
2M
TSOP32
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
A11 A9 A8 A13 A14 A17 WE VCC VPP A16 A15 A12 A7 A6 A5 A4


TXDE TXDATA TXCLK RXDATA RXCLK FFSKDET STD NC TMO VCC GND XIN XOUT CLKOUT CKSEL2 CKSEL1
48 47 46 45 44 43 42 41 40 39 38 37 36 35 34 33
DA1O 49
DA2O 50
DA3O 51
AMPN 52
AMPP 53
AMPO 54
MODOUT 55
VR3OUT 56
TXRECIN 57
ATTIN 58
TXBPFO 59
MIC3 60
MIC1 61
MIC2 62
EXTIN 63
TXDET 64
AK2339
QFP64
32 DO
31 SCK
30 DI
29 CSN
28 RESET
27 NC
26 FFSKCT
25 GT
24 DEM2
23 DEM1
22 FFSKDL
21 RECP
20 RECN
19 RECIN
18 RXBPFO
17 REC1
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16
GND VCC COMP2 COMP1 TAGND BIAS AGND EXTRIN EXPIN RXDET RAGND VCC GND EXTOUT REC2 REC3


NC 48
PD0 47
IRQ 46
XIRQ 45
NC 44
RESET 43
AD7 42
AD6 41
AD5 40
AD4 39
AD3 38
AD2 37
AD1 36
NC 35
AD0 34
XTAL 33
VSS 49
PD1 50
PD2 51
PD3 52
PD4 53
PD5 54
VDD 55
PA7 56
PA6 57
PA5 58
PA4 59
NC 60
NC 61
PA3 62
PA2 63
PA1 64
32 NC
31 EXTAL
30 R/W
29 E
28 AS
27 MODA
26 NC
25 MODB
24 VSS
23 VSS
22 Vrh
21 Vrl
20 PE7
19 PE3
18 PE6
17 PE2
68HC11A1FU
QFP64
1 PA0
2 NC
3 NC
4 NC
5 PB7
6 PB6
7 PB5
8 PB4
9 PB3
10 PB2
11 PB1
12 PB0
13 PE0
14 PE4
15 PE1
16 PE5


D0 75
OE 74
CSIO1 73
CSIO0 72
CSROM 71
CSRAM 70
GND 69
VDD 68
RPAGE 67
AH7 66
AH6 65
AH5 64
AH4 63
AH3 62
AH2 61
AH1 60
AH0 59
AL7 58
AL6 57
AL5 56
AL4 55
AL3 54
AL2 53
AL1 52
AL0 51
D1 76
D2 77
D3 78
D4 79
D5 80
D6 81
D7 82
RW 83
E 84
AS 85
IRQ 86
XIRQ 87
FCNT 88
ALARM 89
DA0 90
TONE 91
DA1 92
DA2 93
I2CINT2 94
SCL2 95
SDA2 96
RESET 97
SLEOUT 98
SLECLK 99
VDD 100
50 I2CINT
49 SCL
48 SDA
47 MCLK
46 MDATA
45 SCLK
44 SDATA
43 PF7
42 PF6
41 PF5
40 PF4
39 PF3
38 PF2
37 PF1
36 PF0
35 GND
34 VDD
33 PD7
32 PD6
31 PD5
30 PD4
29 PD3
28 PD2
27 PD1
26 PD0
IG8001
QFP15-100
1 GND
2 PA0
3 PA1
4 PA2
5 PA3
6 PA4
7 PA5
8 PA6
9 PA7
10 PB0
11 PB1
12 PB2
13 PB3
14 PB4
15 PB5
16 PB6
17 PB7
18 PC0
19 PC1
20 PC2
21 PC3
22 PC4
23 PC5
24 PC6
25 PC7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V102
A101 DISPLAY
I101 ANSWER
Q101 BC858BW
Q102 BC848BW
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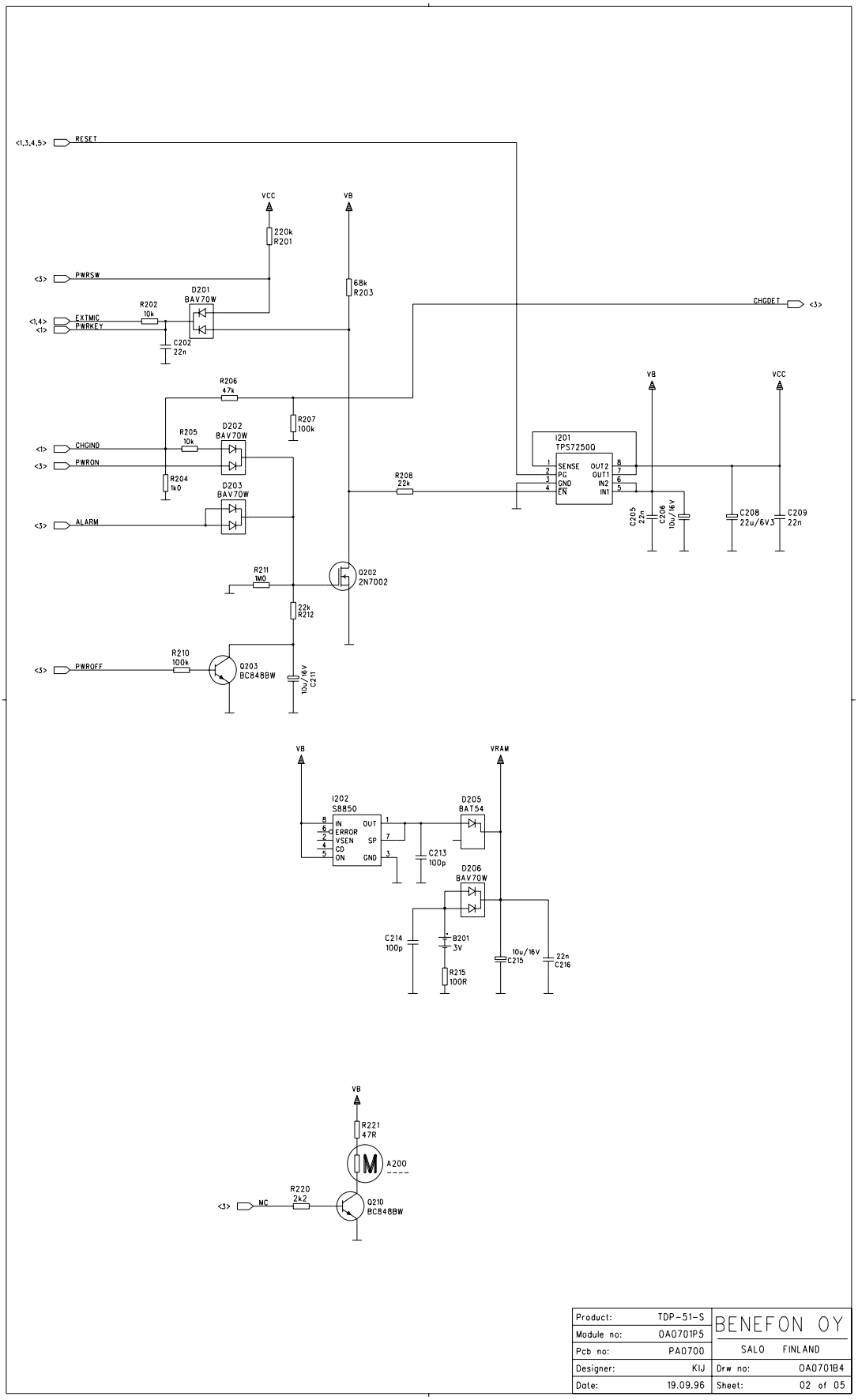
POWER SHEET-2
LOGIC SHEET-3
AUDIO SHEET-4
SIS SHEET-5
KEYINP0
KEYINP1
KEYINP2
KEYINP3
KEYINP4
KEYOUT0
KEYOUT1
KEYOUT2
KEYOUT3
BMEM
ISIGN
SDATA
SCLK
SLE
SLEEP
TX_REG
AFC
SNTC
RSSI
450K
TXBIAS
TXPWR
RESET
DCSI
DAD
DSCL
DSI
LIGHT
RXAUDIO
TXAUDIO
CHGCONT
EXTIO
RXD
TXD
SDA
SCL
I2CINT
CADET
EXTHOOK
MICINPUT
EXTERP
EXTMIC
PWRKEY
KEYLEDVB
ANSSW1
ANSSW2
ANAIN
ANAOUT
Product: TDP-51-S
Module no: OA0701P5
Pcb no: PA0700
Designer: KIJ
Date: 18.03.96
BENEFON OY
SALO FINLAND
Drw no: OA0701A2
Sheet: 01 of 05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VCC
VB
220k
R201
<3> PWRSW
68k
R203
D201
BAV70W
R202
10k
<1,4> EXTMIC
<1> PWRKEY
C202
22n
CHGDET <3>
R206
47k
R207
100k
D202
BAV70W
R205
10k
<1> CHGIND
<3> PWRON
R204
1k0
D203
BAV70W
<3> ALARM
R208
22k
I201
TPS7250Q
SENSE
PG
GND
EN
OUT2
OUT1
IN2
IN1
C205
22n
C206
10u/16V
C208
22u/6V3
C209
22n
R211
1M0
Q202
2N7002
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R212
R210
100k
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BC848BW
10u/16V
C211
VRAM
I202
SB850
IN
ERROR
VSEN
CD
ON
OUT
SP
GND
D205
BAT54
C213
100p
D206
BAV70W
C214
100p
B201
3V
10u/16V
C215
22n
C216
R215
100R
R221
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A200
R220
2k2
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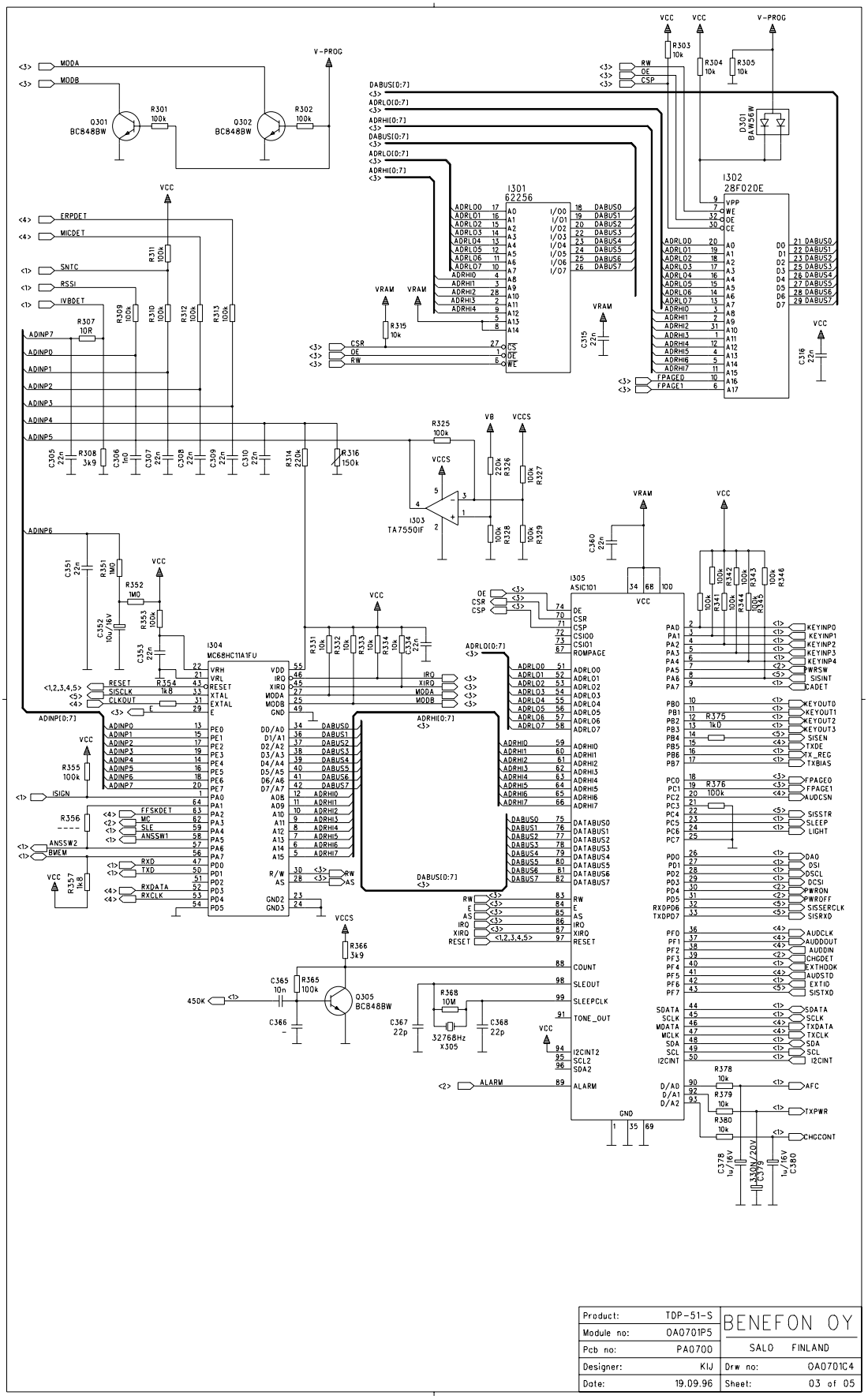
Product: TDP-51-S
Module no: OA0701P5
Pcb no: PA0700
Designer: KIJ
Date: 19.09.96
BENEFON OY
SALO FINLAND
Drw no: OA0701B4
Sheet: 02 of 05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Date: 19.09.96
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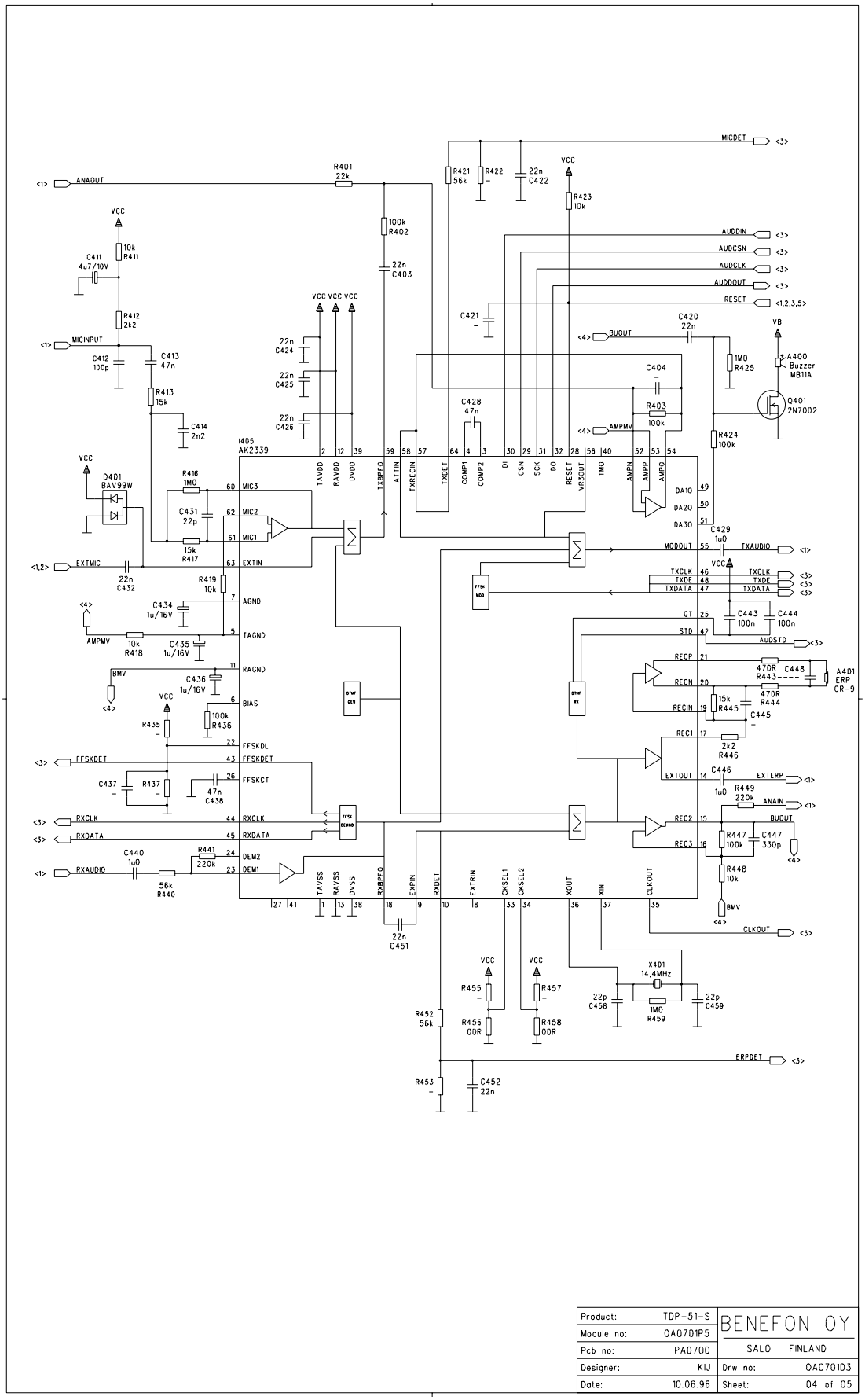
SALO FINLAND
Drw no: OA0701C4
Sheet: 03 of 05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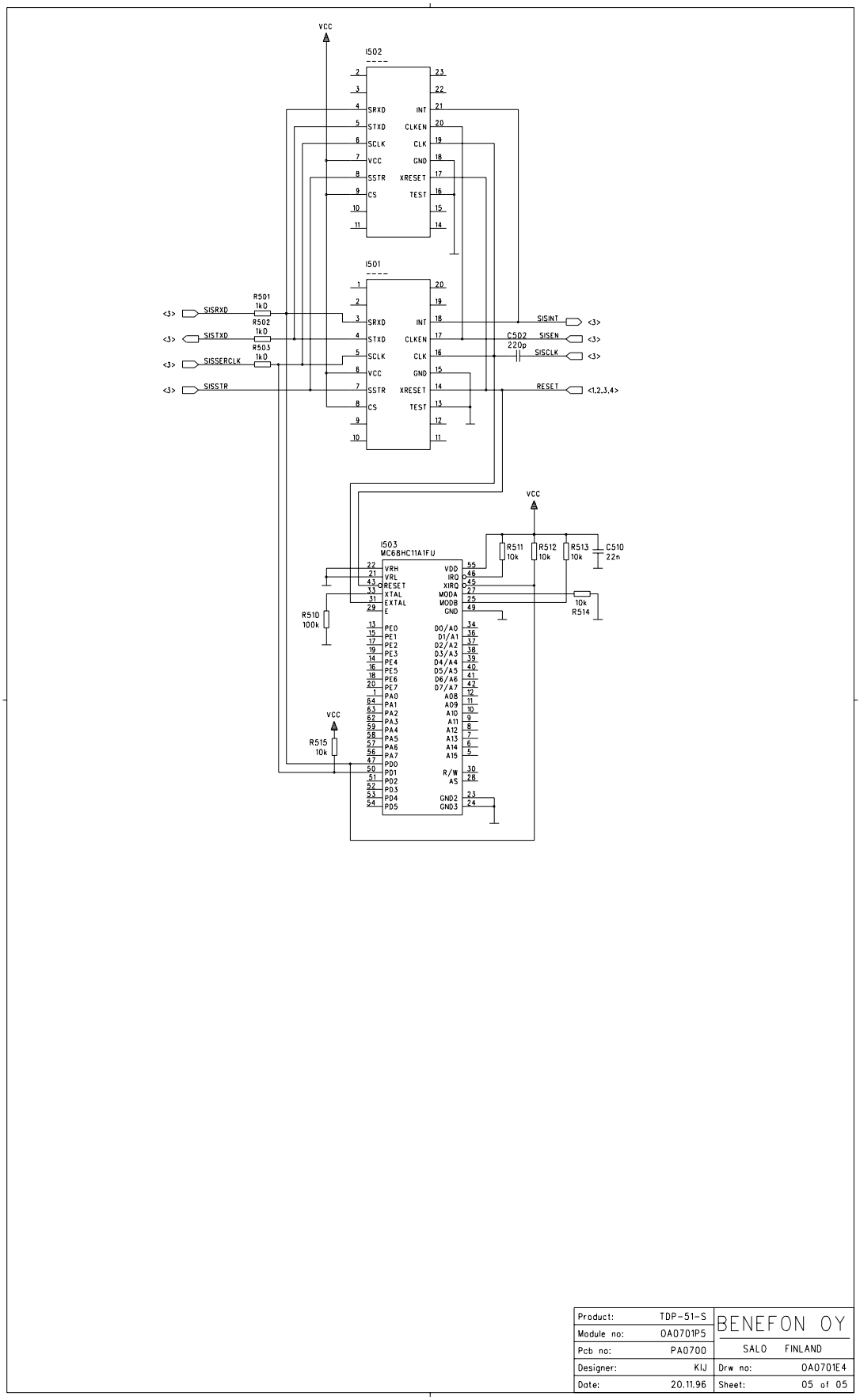
Date: 10.06.96
BENEFON OY
SALO FINLAND
Drw no: OA0701D3
Sheet: 04 of 05



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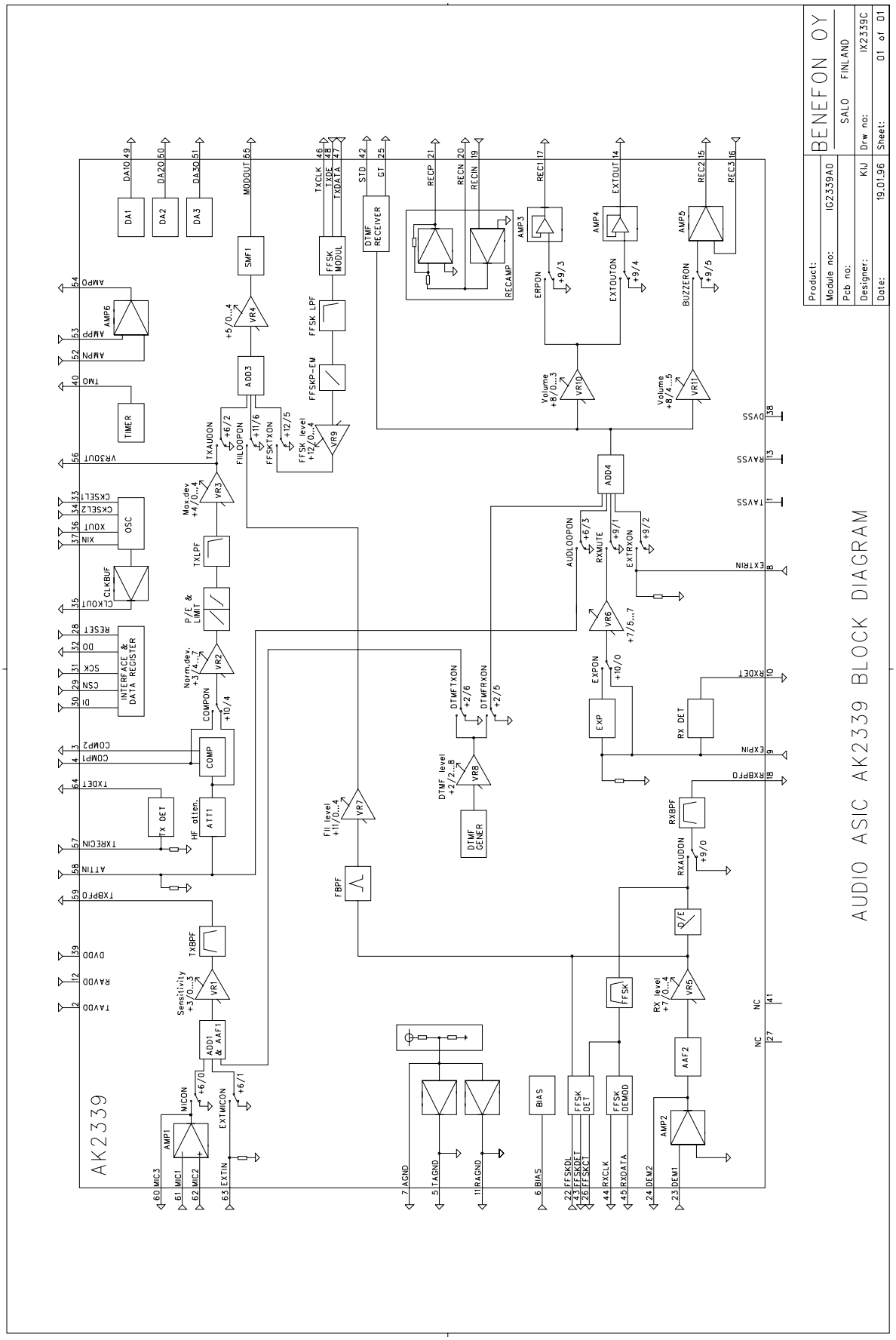
Module no:	OA0701P5		
Pcb no:	PA0700	SALO FINLAND	
Designer:	KIJ	Drw no:	OA0701E4
Date:	20.11.96	Sheet:	05 of 05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BENEFON OY
SALO FINLAND
Product:
Module no: IC2339A0
Pcb no:
Designer: KIJ
Date: 19.01.96
Drw no: IX2339C
Sheet: 01 of 01
AK2339
DA1
DA2
DA3
SMF1
FFSK MODUL
DTMF RECEIVER
AMP3
AMP4
AMP5
RECAMP
ERPON
EXTOUTON
BUZZERON
VR10
VR11
ADD4
AMP6
TIMER
VR4
ADD3
FFSK LPF
FFSKP-EN
VR9
TXAUDON
FILDOPON
FFSKTXON
VR3
OSC
CLKBUF
TXLPF
P/E & LIMIT
INTERFACE & DATA REGISTER
VR2
COMPON
COMP
TX DET
ATT1
HF atten.
TXBPF
VR1
ADD1 & AAF1
MICON
EXTMICON
AMP1
AUDLOOPON
RXMUTE
EXTRXON
VR6
EXPON
EXP
RX DET
DTMFTXON
DTMFRXON
DTMF level
VR8
DTMF GENER
FIL level
VR7
FBPF
RXBPF
RXAUDON
Q/E
FFSK
RX level
VR5
AAF2
AMP2
BIAS
FFSK DET
FFSK DEMOD
NC
DVSS
RAVSS
TAVSS
EXTRIN
RXDET
EXPIN
RXBPFO
DVDD
RAVDD
TAVDD
TXDET
TXRECIN
ATTIN
TXBPFO
COMP2
COMP1
RESET
DO
SCK
CSN
DI
CKSEL1
CKSEL2
XOUT
XIN
CLKOUT
VR3OUT
AMPO
AMPP
AMPN
TMO
MODOUT
TXCLK
TXDE
TXDATA
STD
GT
RECP
RECN
RECIN
REC1
EXTOUT
REC2
REC3
DA10
DA20
DA30
AGND
TAGND
IRAGND
BIAS
FFSKOL
FFSKOUT
FFSKCT
RXCLK
RXDATA
DEM2
DEM1
MIC3
MIC1
MIC2
EXTIN

5.2 KEYBOARD

OH0700 Keyboard

5.2.1 General

Keyboard unit includes: key matrix, battery current measuring components, radio base connector, battery connectors and microphone.

5.2.2 Connectors:

5.2.2.1 Processor / audio module, V101 40 pin connector

1	VB	power supply from battery	6V
2	VB		
3	VB		
4	VB		
5	VB		
6	EXTMIC	external audio from the microphone	400 mVrms
7	EXTERP	external audio to the speaker ampili-fier	220 mVrms
8	CADET	carbox identification	0/5V
9	I2CINT	i2c interrupt, radio input	0/5V
10	SGL	i2c clock	0/5V
11	SDA	i2c data	0/5V
12	TXD	rs232 out	0/5V
13	RXD	rs232 in	0/5V
14	EXTIO	reserve	0/5V
15	CHGCONT	charging control voltage	0...4.2V
16	GND	ground	
17	GND		
18	GND		
19	GND		
20	GND		
21	XKEYINP0	key matrix input	0/5V
22	XKEYINP1		
23	XKEYINP2		
24	XKEYINP3		
25	XKEYINP3		
26	XKEYOUT0	key matrix output	0/5V
27	XKEYOUT1		
28	XKEYOUT2		
29	XKEYOUT3		
30	CHGIND	charging voltage indicator	0/5V

31	BMEM	input memory data-line from the battery	0/5V
32		nc	
33		nc	
34	MICINPUT	microphone-line	
35		nc	
36	ISIGN	battery voltage course indicator	0/5V
37	KEYLEDVB	voltage for the led of keyboard	6V
38	IVBDET	battery current indicator	0-5V
39	V-PROG	battery charging voltage	
40	V-PROG		

5.2.2.2 Radio Base Connector (printed circuit)

1	SV-CHG	battery charging voltage IN	2A
2	SV-CHG	battery charging voltage IN	2A
3	VB	6 V output to accessories	0.5A
4	V-PROG	FLASH PROM programming voltage IN	0.5/12 VDC
5	SEXT-MIC+PWR	external audio from the microphone	400 mVrms
6	GND		
7	GND		
8	EXTERPX+ HOOK	external audio to the speaker amplifier	220 mVrms
9	SCADET	carbox identification	0/5V
10	SI2CINT	i2c interrupt, radio input	0/5V
11	SSCL	i2c clock	0/5V
12	SSDA	i2c data	0/5V
13	STXD	rs232 OUT	0/5V
14	SRXD	rs232 IN	0/5V
15	SEXTIO	reserve	0/5V
16	SCHGCONT	charging control voltage	0...5VDG analog

The Ext-hook switch is connected to the erp-line so that the erp-line dc level drops when the handset is in its holder.

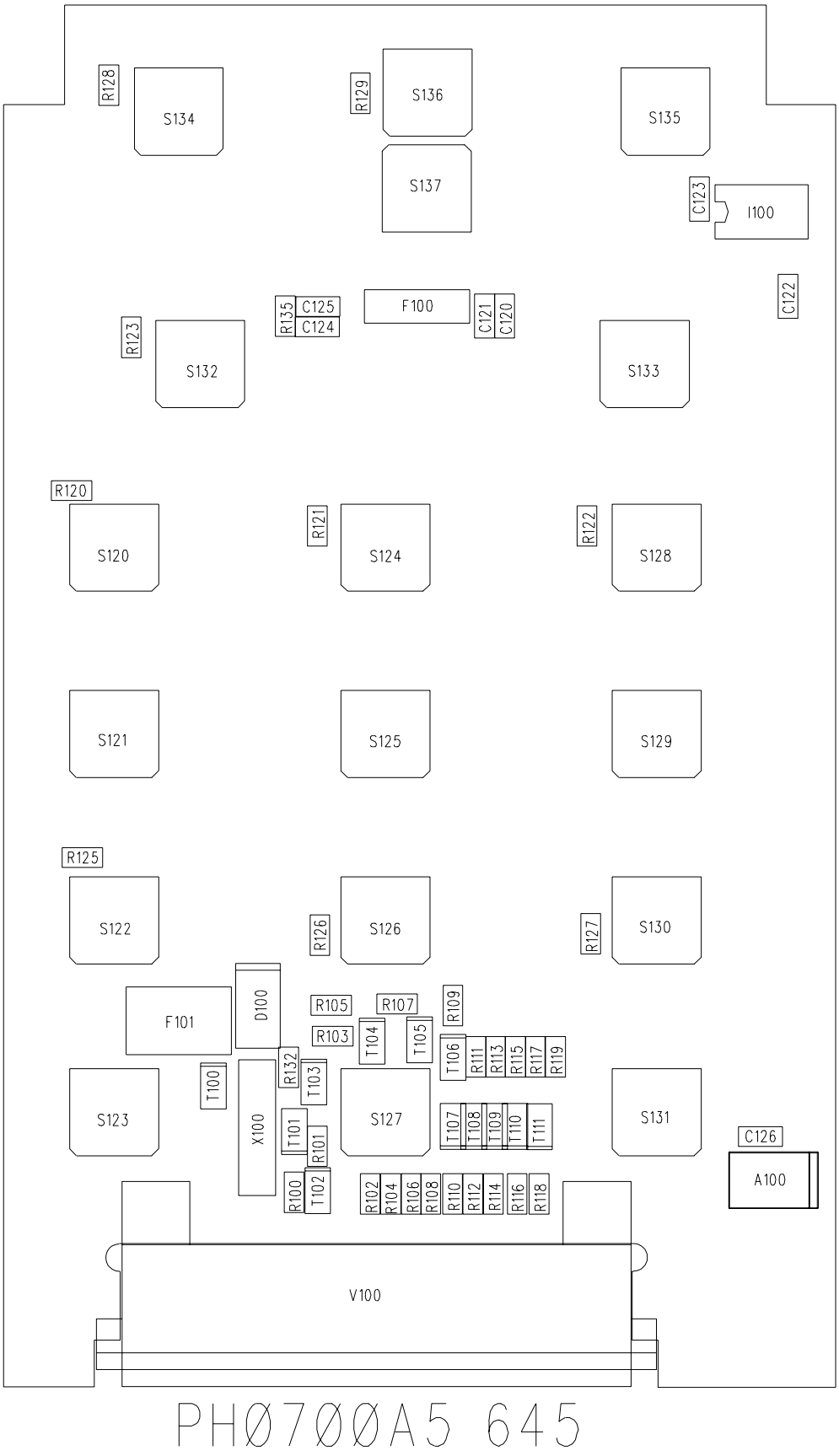
5.2.3 Parts list OH0700

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
AM0062	A100	Microphone	Electret condenser -65 -+4dB	Matsushita	WM-62A
CF0101	C120	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C121	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0102	C122	SMD capasitor	1 nF 5 % NP0	Philips	
CF0102	C123	SMD capasitor	1 nF 5 % NP0	Philips	
CF0101	C124	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C125	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C126	SMD capasitor	100 pF 5% 50 V NP0	Philips	
DY0014	D100	SMD diode	1,5A/40V	Shindengen	D1FS4A
AF1103	F100	SMD fuse	3.5A nanofuce	Littelfuse	R271 03.5
AF1005	F101	SMD PTC Fuse	0.5A	Raychem	miniSMD050-2
IA0471	I100	Current sense ampl.		MAXIM	MAX471ESA-T
RF0101	R100	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R101	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R102	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R103	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R104	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R105	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R106	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R107	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0470	R108	SMD resistor	47 R 5% 0.125 W	Kamaya	
RF0470	R109	SMD resistor	47 R 5% 0.125 W	Kamaya	
RF0470	R110	SMD resistor	47 R 5% 0.125 W	Kamaya	
RF0470	R111	SMD resistor	47 R 5% 0.125 W	Kamaya	
RF0101	R112	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R113	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R114	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R115	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R116	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R117	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R118	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0101	R119	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0222	R120	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0222	R121	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0222	R122	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0222	R123	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0222	R125	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0222	R126	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0222	R127	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0222	R128	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0222	R129	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0101	R130	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0000	R131	SMD resistor	0 R	Kamaya	
RF0470	R132	SMD resistor	47 R 5% 0.125 W	Kamaya	
RF0221	R135	SMD resistor	220 R 5% 0.125 W	Kamaya	
AS0115	S120	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S121	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S122	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S123	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S124	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S125	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S126	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S127	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S128	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S129	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S130	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S131	Switch with LED		Citizen	LS5J2M-1YG-T

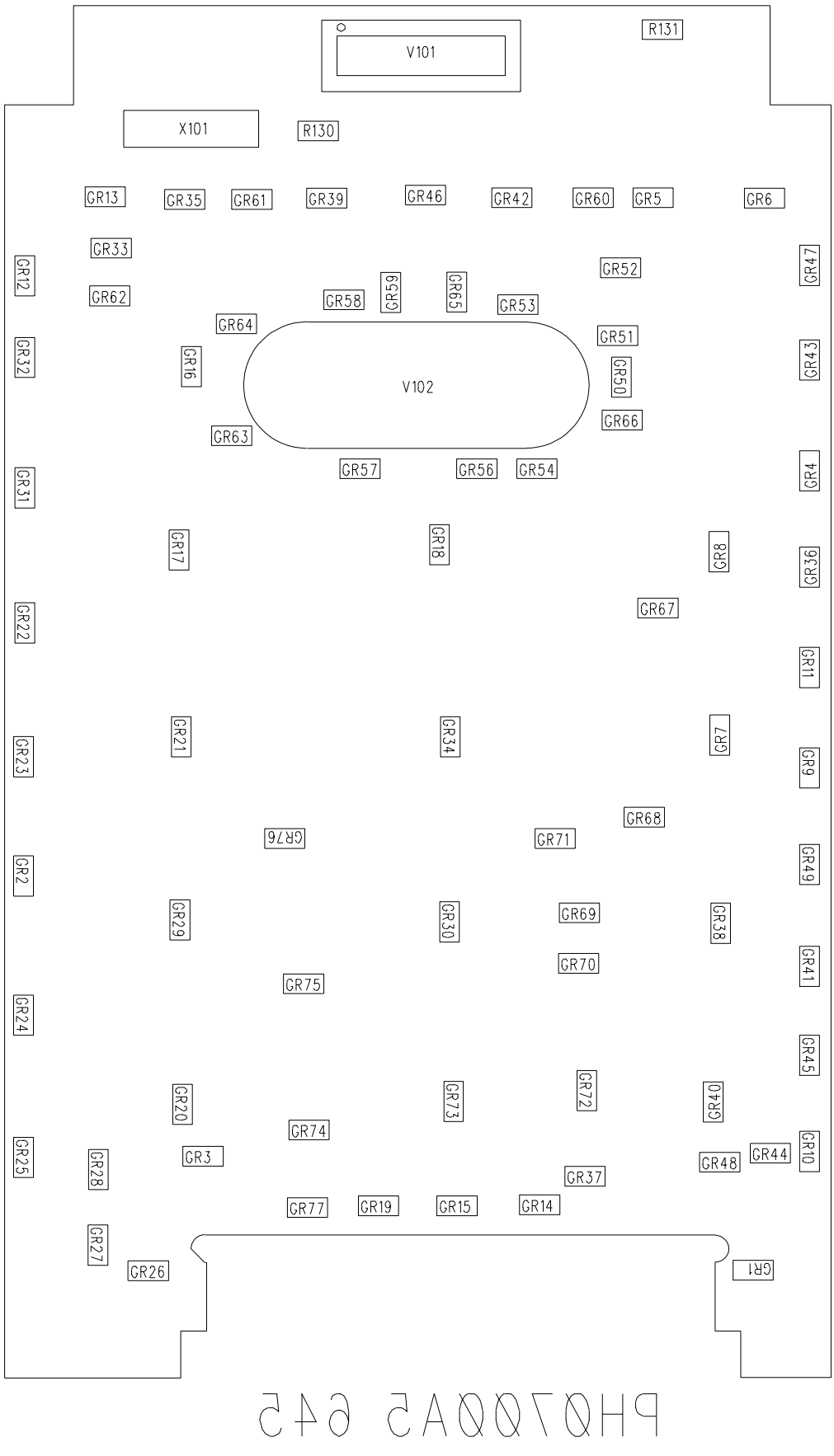
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
AS0115	S132	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S133	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S134	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S135	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S136	Switch with LED		Citizen	LS5J2M-1YG-T
AS0115	S137	Switch with LED		Citizen	LS5J2M-1YG-T
CF0221	T100	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0223	T101	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0221	T102	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	T103	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	T104	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	T105	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	T106	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	T107	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	T108	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	T109	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	T110	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	T111	SMD capasitor	220 pF 5% 50 V NP0	Philips	
VM0242	V100	SMD system connector	1x16 pin	AMP	188227-1
VM0017	V101	SMD B/B-connector	2x20 pin	JAE	IL312-40PB-VF30
VP0009	V102	Battery connector	3 pin	SMC	972396
LF0061	X100	SMD EMI suppression filt	4700pF/2A 1.6x6.8mm	Murata	NFM61R30T472
LF0061	X101	SMD EMI suppression filt	4700pF/2A 1.6x6.8mm	Murata	NFM61R30T472
PH0700	Y10	PCB for OH0700	49,8x82,3mm 4-layer		

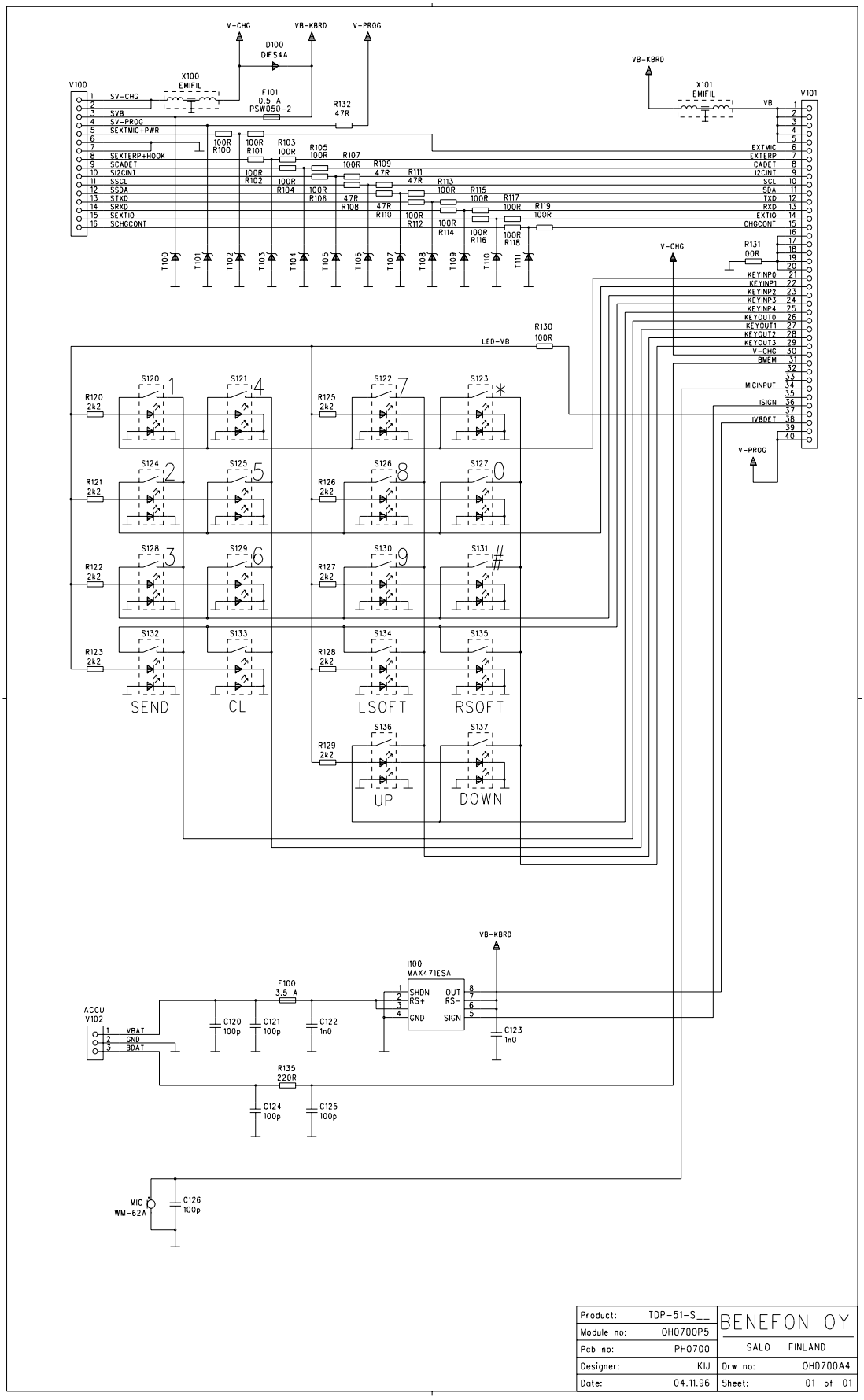
Last
update
30.01.97

The Top Side Layout PH0700 A5



The Bottom Side Layout PH0700 A5





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Module no:	OH0700P5		
Pcb no:	PH0700	SALO	FINLAND
Designer:	KIJ	Drw no:	OH0700A4
Date:	04.11.96	Sheet:	01 of 01

5.3 RF MODULE

RX Synthesizer

Synthesizer

5.3.1 General

The RX synthesizer generates an upper side injection frequency for the receiver. The injection frequency is fed to the receiver's first mixer.

Operating voltage	4.75VDC
Current consumption	14 mA
Output level to the receiver	+1 dBm
Frequency range	540,25...544,725 MHz

5.3.2 Functional Description

The RX injection frequency is generated with a phase locked loop. The VCO produces the injection frequency determined by the control voltage. After the VCO stage comes the amplifier stage Q320. After the amplifier stage, part of the signal is fed to the synthesizer circuits I300 divider. The synthesizer circuit contains a prescaler, programmable divider, reference frequency divider, and a phase detector.

The synthesizer circuit produces current pulses at output DO1 as controlled by the phase detector. The current pulses either charge or discharge the loop filter. The VCO control voltage is derived from the loop filter output.

The synthesizer 12.5 kHz reference frequency is made by dividing the 12.8 MHz signal from the temperature compensated oscillator (TCXO). The series-form signal which controls the channel frequency comes from the audio/processor-module via connector V600. SDATA, SCLK and SLE signals are common to both TX- and RX-synthesizers. A positive pulse in the SLE line loads the division ratio (corresponding to the frequency of the channel) fed to the SDATA line, to the synthesizer circuit I300.

5.3.3 Control- and Output-Signals

VRX	RX synthesizer operating voltage	4.75V
SCLK	Clock signal for the synthesizer control data	
SDATA	Synthesizer control data	
SLE	ENABLE pulse to the synthesizer	
RXINJ	RX synthesizer output to the receiver	+1 dBm
RX_REG	Control line for VRX-regulator	

TX-Synthesizer

5.3.4 General

The TX synthesizer generates the final modulated transmission frequency, which is fed to the transmitter.

Operating voltage	4.75VDC
Current consumption	<30 mA
Output level to the transmitter	+6 dBm
Frequency range	453.000...457.475 MHz

5.3.5 Function Description

The TX frequency is generated with a phase locked loop (PLL). The VCO produces the injection frequency determined by the control voltage, and the VCO also has a modulation input. After the VCO stage come two amplifier stages Q420 and Q430. These ensure separation between the VCO and transmitter, and also boost the injection level sufficiently. Part of the signal is fed from between the amplifier stages to the synthesizer circuit I300 pre-scaler input Fin2. The synthesizer circuit contains a pre-scaler, programmable divider, reference frequency divider, and a phase detector.

The synthesizer circuit produces current pulses at output DO2 as a result of the phase detection. The current pulses either charge or discharge the loop filter condensators. The VCO control voltage is derived from the loop filter output.

The synthesizer 12.5 kHz reference frequency is made by dividing the 12,8 MHz signal from the temperature compensated oscillator (TCXO). The series-form signal which controls the channel frequency comes from the audio/processor-modules via the V600 connector. SDATA and SCLK signals are common to both TX- and RX-synthesizers. A positive pulse in the SLE-line loads the division ratio (corresponding to the TX frequency of the channel) fed to the SDATA line, to the synthesizer circuit I300.

Modulation is fed to the TX synthesizer TX-AUDIO line. The frequency response is corrected by the components R463 - R465, C461 and C462. Modulation sensitivity is set by the resistor R460.

5.3.6 Control- and Output-Signals

VTXS	TX synthesizer operating voltage (4.75V)
TXAUDIO	Transmitter audio signal
12.8M	12.8 MHz signal to the receiver circuit.
SCLK	Clock signal for synthesizer control data
SDATA	Synthesizer control data
SLE	ENABLE pulse to the synthesizer
TXINJ	TX synthesizer output to the transmitter (+6 dBm)
AFC	AFC control voltage from AF/LOGIC-board
TXS_REG	Control line for VTXS-regulator

Receiver

OY0725 Receiver

5.3.7 General

The module contains all FM-receiver functional blocks.

RF-amplifier	CF 739
1. mixer	double-balanced mixer
1. IF-amplifier	CF 739
FM IF system	SA 607 includes the following blocks: 2. mixer IF limiter quadrature detector RSSI (received signal strength indicator)

When the RF signal isreceived it is brought through the duplex filter to the amplifier stage Q101. The amplified signal is passed through the attenuator to the double-balanced mixer X 102.

The upper side injection frequency is brought from the synthesizer through a small resistive attenuator to the mixer LO pin 1 (LO = local oscillator). The 77.25 MHz intermediate frequency from the mixer output is fed through the IF-SAW filter X102 to the FM IF-circuit I201.

RX injection frequency 540,250...544,725MHz

Injection-level/impedance +1 dBm / 50 ohm

The second intermediate-freqency local-oscillator-frequency required by the FM IF-circuit is generated by multiplying the 12.8 MHz reference-oscillator frequency by six. The multiplier circuit is made with transistor Q201.

The second intermediate frequency is 450 kHz. The phase-shift required by the quadrature detector is made with the parallel-circuit L203 and C226. The detected AF-signal temperature correction is done in the buffer amplifier stage.

5.3.8 Input- and Output-Signals

RF input from the duplex filter	463,000...467,475 MHz
RXINJ	RX injection signal to the double balanced mixer
12.8 MHz	12.8 MHz signal to the multiplier for the 2.mixer
VRX	RX operating voltage 4.75 V from the regulator
450 kHz	Output from 2. IF to the AFC detector
RXAUDIO	Receiver audio output 100mVrms
RSSI	Received signal strength indicator output 0,5...2V

SENSITIVITY CHECK

channel	RF input	SINAD psof.
001	-113 dBm	≥20 dB
180	-113 dBm	≥20 dB

Transmitter

OY0725Transmitter

5.3.9 General

Operating voltage	5,7...8,0 VDC
Current consumption	mid power max. 1.0 A
	low power max. 0.45 A
Input level from the synthesizer	+6 dBm
Output level to the duplex filter	mid power 33 dBm (2.0W)
	low power 24.7 dBm (0.3W)
Frequency range	453,000...457,475 MHz

5.3.10 Function Description

The transmitter unit is comprised of three amplifier stages and two attenuator stages. The pre-amplifier Q600 and power module I620 form the transmitter amplifier chain. The attenuators surrounding the pre-amplifier are included to enhance the electric separation between the TX synthesizer and the transmitter. C650 enhances power module efficiency.

The operational amplifier I610 and transistors Q610 and Q611 serve as a power regulator circuit, which adjusts the power level so that the voltage from the transmitter power detector (D610) and the control voltage TXPWR from the audio/processor unit are equal. The power-module power-control voltage must not exceed 4V.

I601 serves as voltage regulator for the power controller and also as the ON/OFF switch for RF output power.

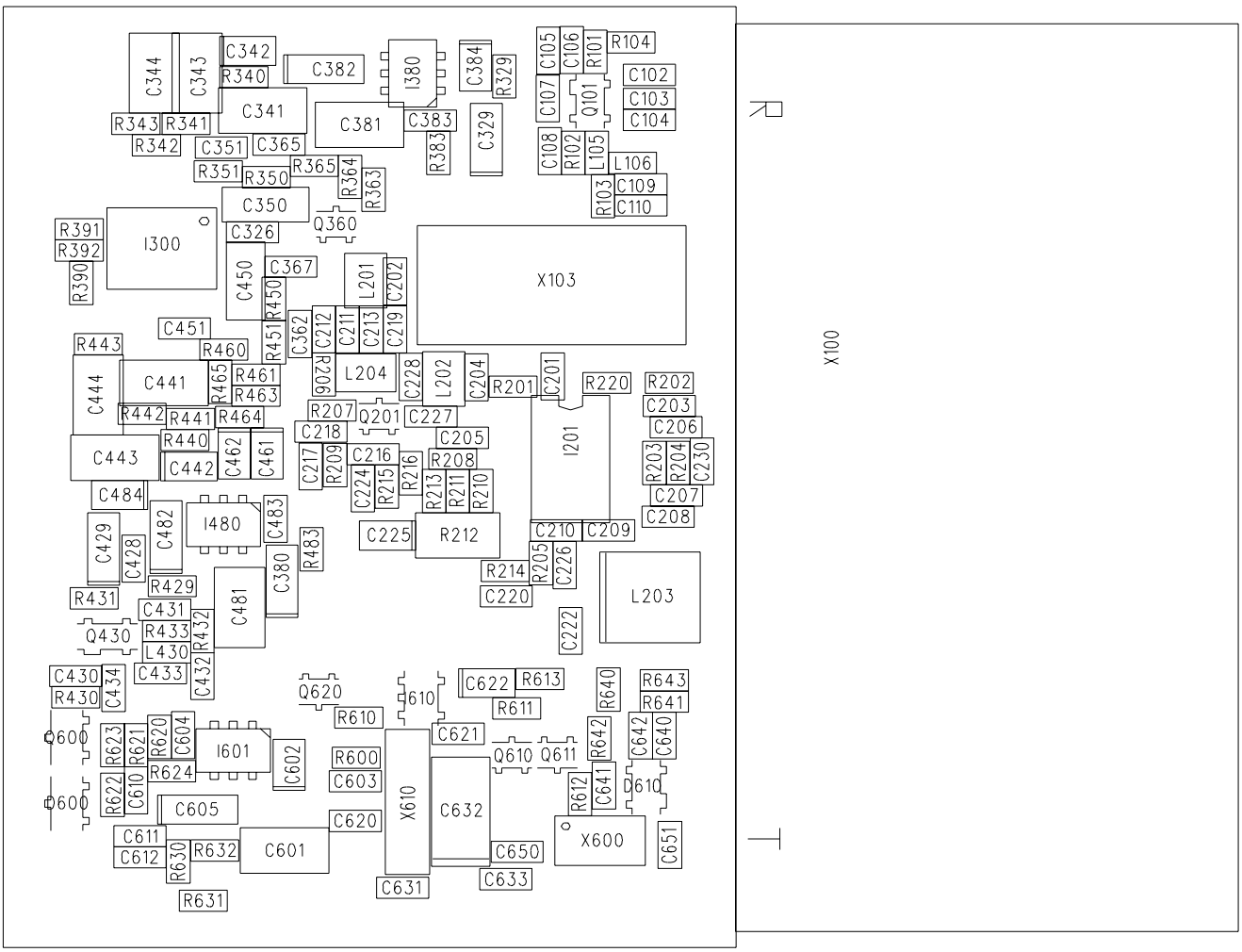
When the phone is connected to an external voltage supply, the audio/processor unit raises the transmitter power by approx 1.0 dB using the TXPWR control.

5.3.11 Control- and Output-Signals

VBAT	Transmitter operating voltage from the battery-pack (fused)	
TXBIAS	Power ON/OFF control	
TXPWR	Power level control signal from the D/A converter	0...5V
TXINJ	RF signal from the TX synthesizer	+6dBm
TXDUPLEX	Transmitter output to the duplex filter	

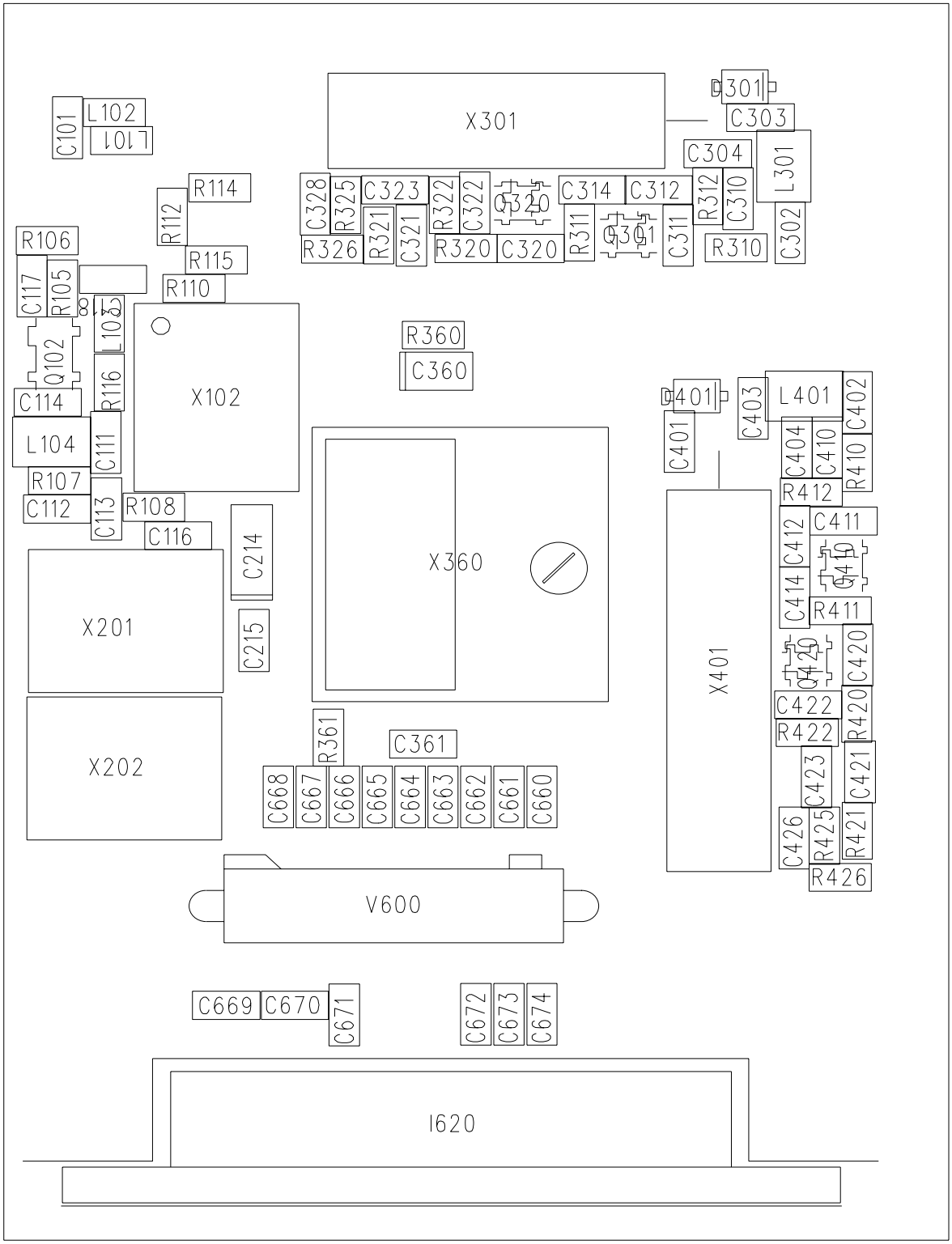
The Top Side Layout PY0700A3

OY0725-RF



PY0700A3 645

The Bottom Side Layout PY0700A3



5.3.12 Parts list OY0725

OY0725-RF

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CF0330	C101	SMD capasitor	33 pF 5% 50 V NP0	Philips	
CF0479	C102	SMD capasitor	4.7 pF/0.25pF 50 V NP0	Philips	
CF0101	C103	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0180	C104	SMD capasitor	18 pF 5% 50 V NPO	Philips	
CF0101	C105	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0180	C106	SMD capasitor	18 pF 5% 50 V NPO	Philips	
CF0279	C107	SMD capasitor	2.7 pF/0.25pF 50 V NP0	Philips	
CF0101	C108	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C109	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C110	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C111	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0829	C112	SMD capasitor	8p2/0.25pF 50V NP0	Philips	
CF0821	C113	SMD capasitor	820 pF 5% 50 V X7R	Philips	
CF0101	C114	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0821	C116	SMD capasitor	820 pF 5% 50 V X7R	Philips	
CF0103	C117	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0150	C118	SMD capasitor	15 pF 5% 50 V NP0	Philips	
CF0101	C201	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0689	C202	SMD capasitor	6.8 pF/0.25pF 50 V NP0	Philips	
CF0223	C203	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C204	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0399	C205	SMD capasitor	3.9pF 0.25 50V NP0	Philips	
CF0223	C206	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C207	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C208	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0100	C209	SMD capasitor	10 pF/0.25pF 50 V NP0	Philips	
CF0223	C210	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0103	C211	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0103	C212	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0102	C213	SMD capasitor	1 nF 5 % NP0	Philips	
CU3106	C214	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CF0102	C215	SMD capasitor	1 nF 5 % NP0	Philips	
CF0103	C216	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0150	C217	SMD capasitor	15 pF 5% 50 V NP0	Philips	
CF0101	C218	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0150	C219	SMD capasitor	15 pF 5% 50 V NP0	Philips	
CF0103	C220	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0103	C222	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0331	C224	SMD capasitor	330 pF 5% 50 V NP0	Philips	
CU2105	C225	SMD tantal	1uF/10V	AVX	TAJR105M010R
CF3471	C226	SMD capasitor	470pF+-2% 50V NPO	AVX	CM105CG471G50AB
CF0399	C227	SMD capasitor	3.9pF 0.25 50V NP0	Philips	
CF0390	C228	SMD capasitor	39pF 5% 50V NP0	Philips	
CF0223	C230	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0101	C302	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0150	C303	SMD capasitor	15 pF 5% 50 V NP0	Philips	
CF0479	C310	SMD capasitor	4.7 pF/0.25pF 50 V NP0	Philips	
CF0150	C311	SMD capasitor	15 pF 5% 50 V NP0	Philips	
CF0120	C312	SMD capasitor	12 pF 5% 50 V NP0	Philips	
CF0180	C314	SMD capasitor	18 pF 5% 50 V NPO	Philips	
CF0101	C320	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0223	C321	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0109	C322	SMD capasitor	1 pF/0.25pF 50 V NP0	Philips	
CF0479	C323	SMD capasitor	4.7 pF/0.25pF 50 V NP0	Philips	
CF0101	C326	SMD capasitor	100 pF 5% 50 V NP0	Philips	

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CF0101	C328	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CU3106	C329	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CC0223	C341	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU0334	C342	SMD tantalium capasitor	0.33uF/20V/20%	AVX/KYO-CER	TAJR334M020R
CC0103	C343	SMD capasitor	10 nF 10% 50V X7R	Philips	
CC0223	C344	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CH0105	C350	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CF0223	C351	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU2105	C360	SMD tantal	1uF/10V	AVX	TAJR105M010R
CF0103	C361	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0330	C362	SMD capasitor	33 pF 5% 50 V NP0	Philips	
CF0103	C365	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0101	C367	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CU0105	C380	SMD tantal	1uF/16V 20% 3.2x1.6mm	Matsushita	ECST1CY 105R
CC0104	C381	SMD capasitor	100 nF 10% 50V X7R	Philips	
CU3106	C382	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CF0102	C383	SMD capasitor	1 nF 5 % NP0	Philips	
CU2105	C384	SMD tantal	1uF/10V	AVX	TAJR105M010R
CF0101	C401	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C402	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0220	C403	SMD capasitor	22 pF 5% 50 V NP0	Philips	
CF0229	C404	SMD capasitor	2.2pF +-0.25pF 50V NPO	Philips	
CF0479	C410	SMD capasitor	4.7 pF/0.25pF 50 V NP0	Philips	
CF0150	C411	SMD capasitor	15 pF 5% 50 V NP0	Philips	
CF0120	C412	SMD capasitor	12 pF 5% 50 V NP0	Philips	
CF0390	C414	SMD capasitor	39pF 5% 50V NP0	Philips	
CF0101	C420	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0223	C421	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0109	C422	SMD capasitor	1 pF/0.25pF 50 V NP0	Philips	
CF0390	C423	SMD capasitor	39pF 5% 50V NP0	Philips	
CF0101	C426	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C428	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CU3106	C429	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CF0101	C430	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C431	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C432	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0109	C433	SMD capasitor	1 pF/0.25pF 50 V NP0	Philips	
CF0569	C434	SMD capasitor	5.6 pF/0.25pF 50 V NP0	Philips	
CC0473	C441	SMD capasitor	47 nF 10% 50 V X7R	Philips	
CU2105	C442	SMD tantal	1uF/10V	AVX	TAJR105M010R
CC0103	C443	SMD capasitor	10 nF 10% 50V X7R	Philips	
CC0223	C444	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CH0105	C450	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CF0223	C451	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU0334	C461	SMD tantalium capasitor	0.33uF/20V/20%	AVX/KYO-CER	TAJR334M020R
CU0334	C462	SMD tantalium capasitor	0.33uF/20V/20%	AVX/KYO-CER	TAJR334M020R
CC0104	C481	SMD capasitor	100 nF 10% 50V X7R	Philips	
CU3106	C482	SMD tantal	10uF / 6V +-20%	AVX	TAJA106M006R
CF0102	C483	SMD capasitor	1 nF 5 % NP0	Philips	
CU0224	C484	SMD tanlat	0.22uF/20V/10%	AVX/KYO-CER	TAJR224K020R
CC0104	C601	SMD capasitor	100 nF 10% 50V X7R	Philips	
CU1105	C602	SMD tantal	1uF/16V	AVX	TAJR105M016R
CF0102	C603	SMD capasitor	1 nF 5 % NP0	Philips	
CF0223	C604	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU3475	C605	SMD tantal	4.7uF/10V 20%	AVX	TAJA475M010R
CF0101	C610	SMD capasitor	100 pF 5% 50 V NP0	Philips	

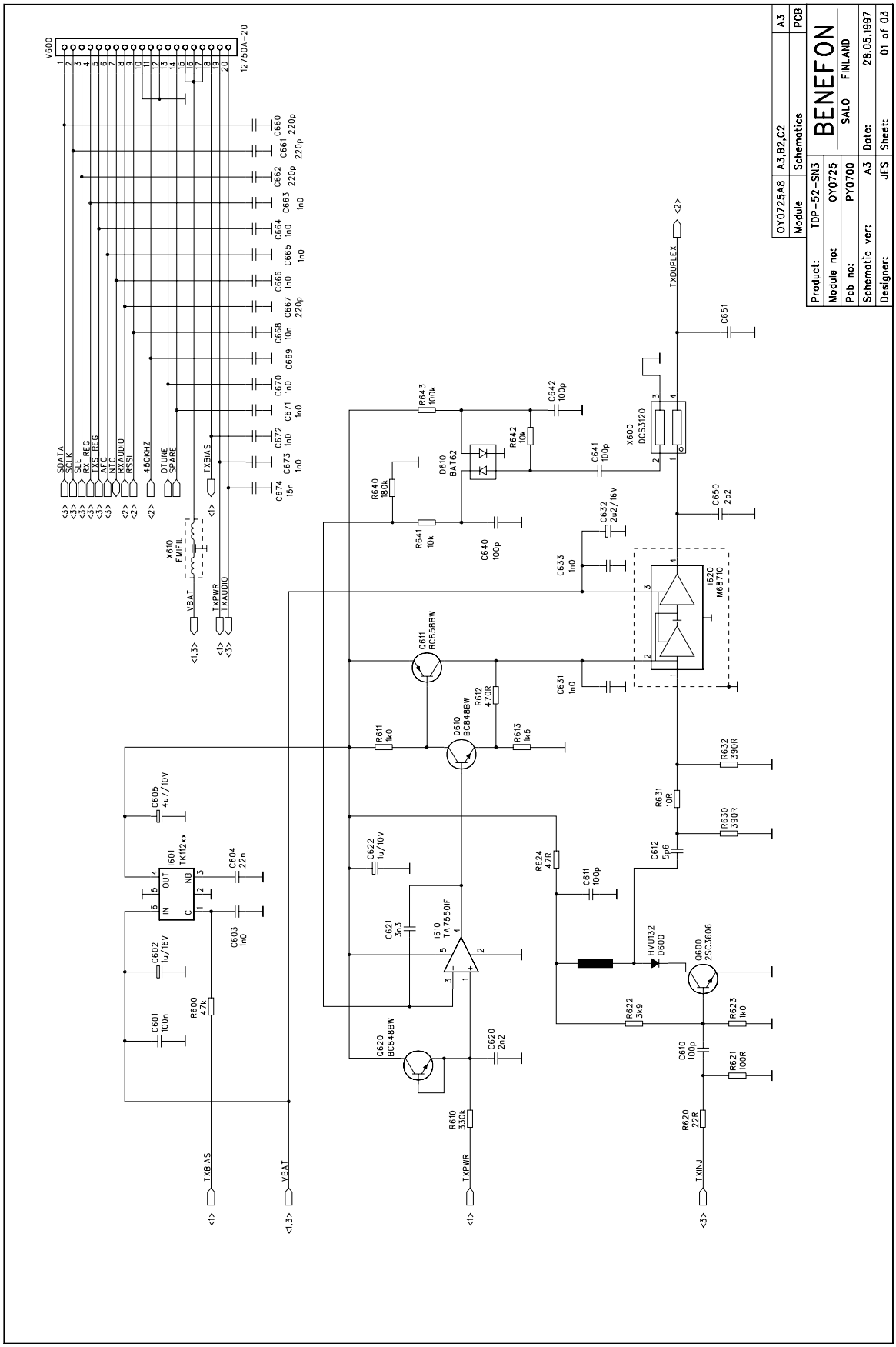
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CF0101	C611	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0569	C612	SMD capasitor	5.6 pF/0.25pF 50 V NP0	Philips	
CF0222	C620	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CF0332	C621	SMD capasitor	3.3 nF 5% 50 V NP0	Philips	
CU2105	C622	SMD tantal	1uF/10V	AVX	TAJR105M010R
CF0102	C631	SMD capasitor	1 nF 5 % NP0	Philips	
CU0225	C632	SMD tantal	2.2uF/16V 20% 4.7x2.6mm	Matsushita	ECST1CB 225R
CF0102	C633	SMD capasitor	1 nF 5 % NP0	Philips	
CF0101	C640	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C641	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0101	C642	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CF0229	C650	SMD capasitor	2.2pF +-0.25pF 50V NPO	Philips	
CF0221	C660	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	C661	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0221	C662	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0102	C663	SMD capasitor	1 nF 5 % NP0	Philips	
CF0102	C664	SMD capasitor	1 nF 5 % NP0	Philips	
CF0102	C665	SMD capasitor	1 nF 5 % NP0	Philips	
CF0102	C666	SMD capasitor	1 nF 5 % NP0	Philips	
CF0221	C667	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CF0103	C668	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CF0102	C670	SMD capasitor	1 nF 5 % NP0	Philips	
CF0102	C671	SMD capasitor	1 nF 5 % NP0	Philips	
CF0102	C672	SMD capasitor	1 nF 5 % NP0	Philips	
CF0102	C673	SMD capasitor	1 nF 5 % NP0	Philips	
CF0153	C674	SMD capasitor	15nF 10% 50V X7R	Philips	
DC0229	D301	SMD silicon tuning diode	1V/19pF...4V/11pF	Toshiba	1SV229
DC0229	D401	SMD silicon tuning diode	1V/19pF...4V/11pF	Toshiba	1SV229
DP0132	D600	SMD pin diode		Hitachi	HVC132
DY0062	D610	SMD shcottky diode	40V 20mA	Siemens	BAT 62
IV6070	I201	FM IF-system		Philips	SA607DK
IS2335	I300	Dual freg.synthesizer	PLL+prescaler 1.2GHz	NationalSe	LMX23352TMX
IR1248	I380	Regulator	4.8V/240mA +-2,4%	Toko	TK11248AM
IR1248	I480	Regulator	4.8V/240mA +-2,4%	Toko	TK11248AM
IR1248	I601	Regulator	4.8V/240mA +-2,4%	Toko	TK11248AM
IA7550	I610	Single op.amp.		Toshiba	TA 75S01F-TE85L
IW8710	I620	RF-power amplifier	430-460 MHz	Mitsubishi	M68710H
LC3392	L101	SMD inductor	3n9 -+2%	Panasonic	ELJRE3N9ZF2
LC3123	L102	SMD inductor	12n -+2%	PANA-SONIC	ELJRE12NGF2
LC3334	L103	SMD inductor	330nH +-10%	TDK	MLF1608DR33K
LC2334	L104	SMD inductor	330 nH/+-10%	TDK	MLF2012DR33KT
LC3223	L105	SMD inductor	22n -+2%	Panasonic	ELJRE22NGF2
LC3472	L106	SMD inductor	4n7 -+2%	Panasonic	ELJRE4N7ZF2
LC2334	L201	SMD inductor	330 nH/+-10%	TDK	MLF2012DR33KT
LC2104	L202	SMD inductor	100 nH/+-10%	TDK	MLF2012DR10KT
LI0450	L203	SMD Quad. coil	450kHz	Sagami	950997404
LC2224	L204	SMD inductor	220 nH/+-10%	TDK	MLF2012DR22KT
LC1224	L301	SMD inductor	220 nH/+-10%	Coilcraft	0805CS-221XKBC
LC1224	L401	SMD inductor	220 nH/+-10%	Coilcraft	0805CS-221XKBC
LC3183	L430	SMD inductor	18n -+2%	PANA-SONIC	ELJRE18NGF2
PY0700	PCB1	PCB for OY0720		Irlandus	
QFB739	Q101	GaAs MES FET	2 GHz 240mW N1.8dB/1.75GHz	Siemens	CF 739 B
QFB739	Q102	GaAs MES FET	2 GHz 240mW N1.8dB/1.75GHz	Siemens	CF 739 B
QAA193	Q201	SMD RF-transistor	6GHz/300mW F=1.9dB	Philips	BFR93AW
QA4995	Q301	SMD RF transistor	NPN 11GHZ 16dB/900MHz	Hitachi	2SC4995
QA4995	Q320	SMD RF transistor	NPN 11GHZ 16dB/900MHz	Hitachi	2SC4995
QAA193	Q360	SMD RF-transistor	6GHz/300mW F=1.9dB	Philips	BFR93AW
QA4995	Q410	SMD RF transistor	NPN 11GHZ 16dB/900MHz	Hitachi	2SC4995

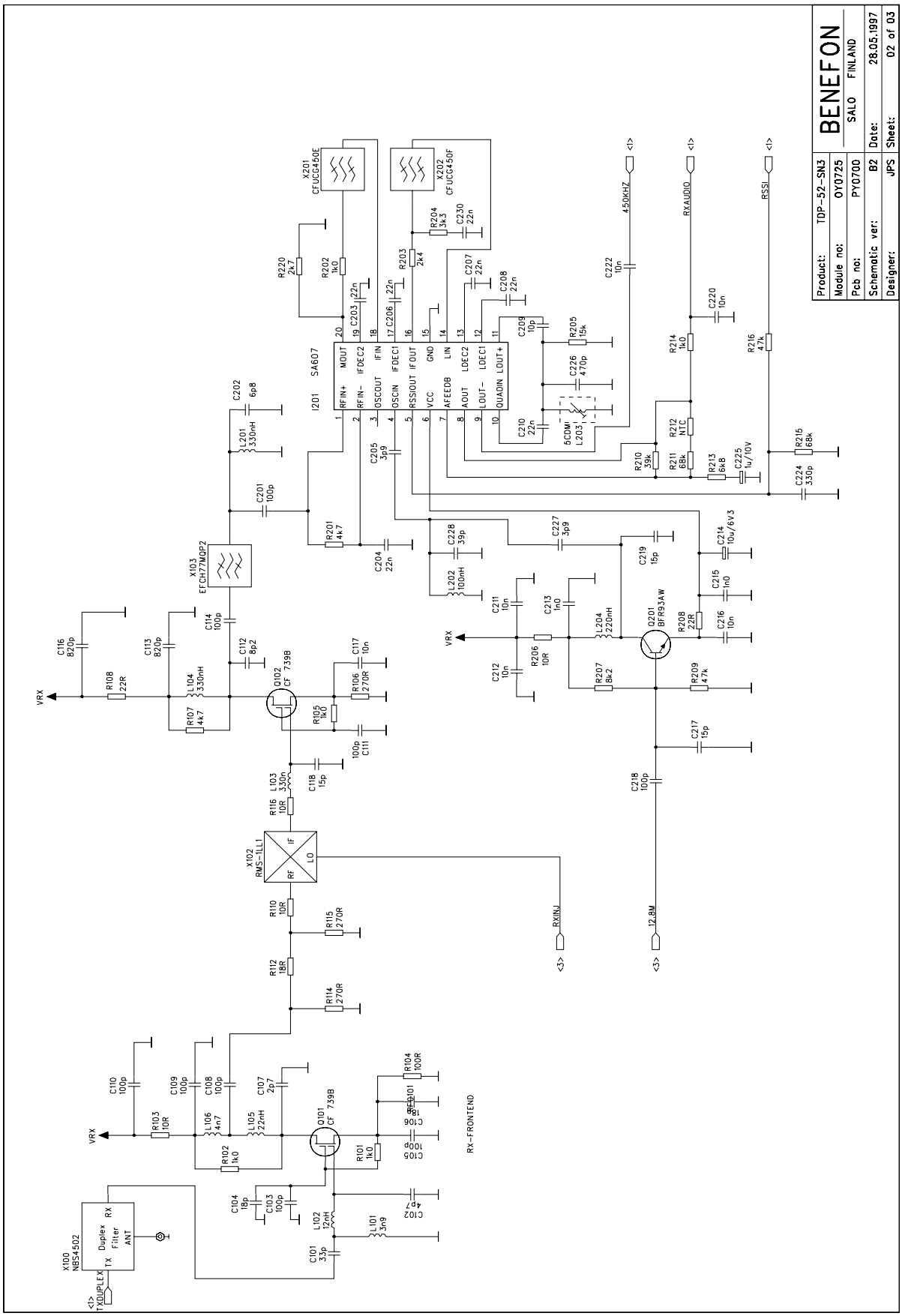
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
QA4995	Q420	SMD RF transistor	NPN 11GHZ 16dB/900MHz	Hitachi	2SC4995
QFA739	Q430	GaAs MES FET	2 GHz 240mW N1.8dB/1.75GHz	Siemens	CF 739 A
QA3606	Q600	SMD RF-transistor	NPN 7GHz NF=1.1dB	Toshiba	2SC3606
QS0848	Q610	SMD transistor	NPN 0.1A/30V hFE 110-800	Philips	BC848BW, 115
QS0858	Q611	SMD transistor	PNP 0.1A/30V hFE 125-800	Philips	BC858BW
QS0848	Q620	SMD transistor	NPN 0.1A/30V hFE 110-800	Philips	BC848BW, 115
RF0102	R101	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0102	R102	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0100	R103	SMD resistor	10 R 5% 0.125 W	Kamaya	
RF0101	R104	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0102	R105	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0271	R106	SMD resistor	270 R 5% 0.125 W	Kamaya	
RF0472	R107	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0220	R108	SMD resistor	22 R 5% 0.125 W	Kamaya	
RF0100	R110	SMD resistor	10 R 5% 0.125 W	Kamaya	
RF0180	R112	SMD resistor	18 R 5% 0.125 W	Kamaya	
RF0271	R114	SMD resistor	270 R 5% 0.125 W	Kamaya	
RF0271	R115	SMD resistor	270 R 5% 0.125 W	Kamaya	
RF0100	R116	SMD resistor	10 R 5% 0.125 W	Kamaya	
RF0472	R201	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0102	R202	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0242	R203	SMD resistor	2.4 k 5% 0.125 W	Kamaya	
RF0332	R204	SMD resistor	3.3 k 5% 0.125 W	Kamaya	
RF0153	R205	SMD resistor	15 k 5% 0.125 W	Kamaya	
RF0100	R206	SMD resistor	10 R 5% 0.125 W	Kamaya	
RF0822	R207	SMD resistor	8.2 k 5% 0.125 W	Kamaya	
RF0220	R208	SMD resistor	22 R 5% 0.125 W	Kamaya	
RF0473	R209	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0393	R210	SMD resistor	39 k 5% 0.125 W	Kamaya	
RF0683	R211	SMD resistor	68 k 5% 0.125 W	Kamaya	
RTN223	R212	SMD-NTC resistor	22k 10% B=3924	Hokuriku	157-223-45001TP
RF0682	R213	SMD resistor	6.8 k 5% 0.125 W	Kamaya	
RF0102	R214	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0683	R215	SMD resistor	68 k 5% 0.125 W	Kamaya	
RF0473	R216	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0272	R220	SMD resistor	2.7 k 5% 0.125 W	Kamaya	
RF0822	R310	SMD resistor	8.2 k 5% 0.125 W	Kamaya	
RF0222	R311	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0151	R312	SMD resistor	150 R 5% 0.125 W	Kamaya	
RF0220	R320	SMD resistor	22 R 5% 0.125 W	Kamaya	
RF0472	R321	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0152	R322	SMD resistor	1.5 k 5% 0.125 W	Kamaya	
RF0151	R325	SMD resistor	150 R 5% 0.125 W	Kamaya	
RF0151	R326	SMD resistor	150 R 5% 0.125 W	Kamaya	
RF0150	R329	SMD resistor	15 R 5% 0.125 W	Kamaya	
RF0392	R340	SMD resistor	3.9 k 5% 0.125 W	Kamaya	
RF0152	R341	SMD resistor	1.5 k 5% 0.125 W	Kamaya	
RF0152	R342	SMD resistor	1.5 k 5% 0.125 W	Kamaya	
RF0100	R343	SMD resistor	10 R 5% 0.125 W	Kamaya	
RF0221	R350	SMD resistor	220 R 5% 0.125 W	Kamaya	
RF0470	R351	SMD resistor	47 R 5% 0.125 W	Kamaya	
RF0150	R360	SMD resistor	15 R 5% 0.125 W	Kamaya	
RF0103	R361	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0473	R363	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0104	R364	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0103	R365	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0473	R383	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0472	R390	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0472	R391	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0472	R392	SMD resistor	4.7 k 5% 0.125 W	Kamaya	

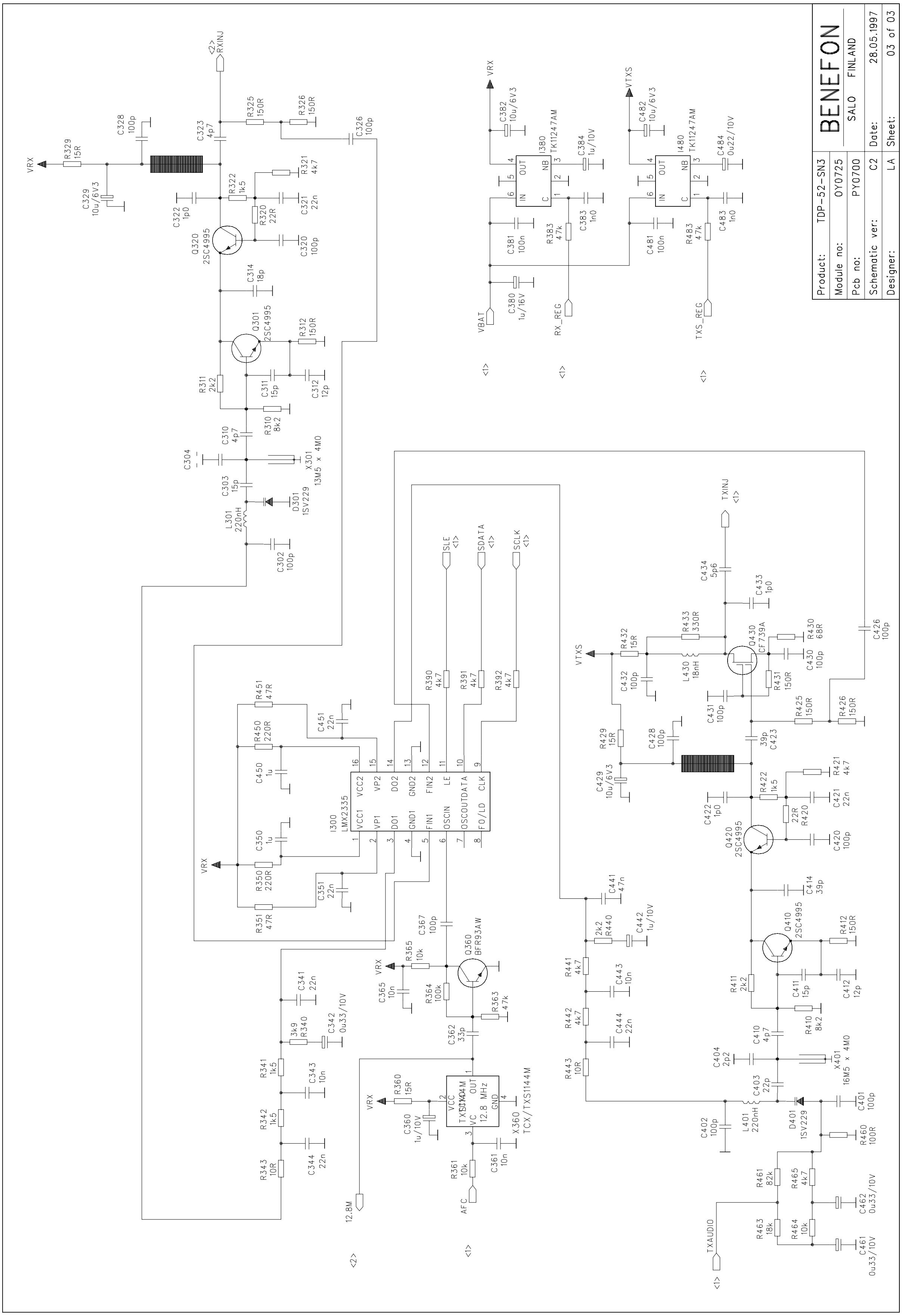
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RF0822	R410	SMD resistor	8.2 k 5% 0.125 W	Kamaya	
RF0222	R411	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0151	R412	SMD resistor	150 R 5% 0.125 W	Kamaya	
RF0220	R420	SMD resistor	22 R 5% 0.125 W	Kamaya	
RF0472	R421	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0152	R422	SMD resistor	1.5 k 5% 0.125 W	Kamaya	
RF0151	R425	SMD resistor	150 R 5% 0.125 W	Kamaya	
RF0151	R426	SMD resistor	150 R 5% 0.125 W	Kamaya	
RF0150	R429	SMD resistor	15 R 5% 0.125 W	Kamaya	
RF0680	R430	SMD resistor	68 R 5% 0.125 W	Kamaya	
RF0151	R431	SMD resistor	150 R 5% 0.125 W	Kamaya	
RF0150	R432	SMD resistor	15 R 5% 0.125 W	Kamaya	
RF0331	R433	SMD resistor	330 R 5% 0.125 W	Kamaya	
RF0222	R440	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0472	R441	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0472	R442	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0100	R443	SMD resistor	10 R 5% 0.125 W	Kamaya	
RF0221	R450	SMD resistor	220 R 5% 0.125 W	Kamaya	
RF0470	R451	SMD resistor	47 R 5% 0.125 W	Kamaya	
RF0101	R460	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0823	R461	SMD resistor	82 k 5% 0.125 W	Kamaya	
RF0183	R463	SMD resistor	18 k 5% 0.125 W	Kamaya	
RF0103	R464	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0472	R465	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0473	R483	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0473	R600	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0334	R610	SMD resistor	330 k 5% 0.125 W	Kamaya	
RF0102	R611	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0471	R612	SMD resistor	470 R 5% 0.125 W	Kamaya	
RF0152	R613	SMD resistor	1.5 k 5% 0.125 W	Kamaya	
RF0220	R620	SMD resistor	22 R 5% 0.125 W	Kamaya	
RF0101	R621	SMD resistor	100 R 5% 0.125 W	Kamaya	
RF0392	R622	SMD resistor	3.9 k 5% 0.125 W	Kamaya	
RF0102	R623	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0470	R624	SMD resistor	47 R 5% 0.125 W	Kamaya	
RF0391	R630	SMD resistor	390 R 5% 0.125 W	Kamaya	
RF0100	R631	SMD resistor	10 R 5% 0.125 W	Kamaya	
RF0391	R632	SMD resistor	390 R 5% 0.125 W	Kamaya	
RF0184	R640	SMD resistor	180 k 5% 0.125 W	Kamaya	
RF0103	R641	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R642	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0104	R643	SMD resistor	100 k 5% 0.125 W	Kamaya	
VN0220	V600	SMD connector female	20pin	Suyin	12750A-20
OD0720	X100	Duplexer Nord.	Rx 465Mhz, Tx 455MHz	Solitra	NBS 4502
XM0006	X102	Dual balanced mixcer	450 MHz	MiniCircui	RMS-1LL
XW7725	X103	SAW IF-filter	77.25MHZ, I/O 1.6K//2.3pF	Murata	SAFC77.250MA53X
XC3450	X201	Ceramic IF-filter	450Khz	Murata	CFUCG450E
XC4450	X202	Ceramic IF-filter	450kHz	Murata	CFUCG450F
XR1650	X301	Ceramic coaxial resonato	650MHz 4x4x13mm Q>250	Siemens	B69614-G0655-B42
XO3128	X360	SMD VCTCXO	12.8 MHZ	TEW	TXS 1144M
XR1550	X401	Ceramic coaxial resonato	550MHz 4x4x14,5mm Q>250	Siemens	B69614-G0550-BA4
XI0005	X600	Directional coupler	NMT450	MKT Taisei	DCS3120-09
LF0061	X610	SMD EMI suppression filt	4700pF/2A 1.6x6.8mm	Murata	NFM61R30T472
MD0306	Y1	Tx-fastening plate		Telemetall	931584 41
MD0800	Y133	Tx-VCO cover	10 x 23,3mm	SMC Ltd Oy	95194240
MD0801	Y135	Rx-VCO cover	21,3 x 9,8mm	SMC Ltd Oy	95194140
MD0305	Y2	Shield plate for Tx		Telemetall	931583 41
QA4931	Y302	SMD RF-tarnsistor	NPN 9GHz/NF1.2dB/G13dB	Sanyo	2SC4931-B2
QA4931	Y321	SMD RF-tarnsistor	NPN 9GHz/NF1.2dB/G13dB	Sanyo	2SC4931-B2
QA4931	Y411	SMD RF-tarnsistor	NPN 9GHz/NF1.2dB/G13dB	Sanyo	2SC4931-B2

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
QA4931	Y421	SMD RF-tarnsistor	NPN 9GHz/NF1.2dB/G13dB	Sanyo	2SC4931-B2

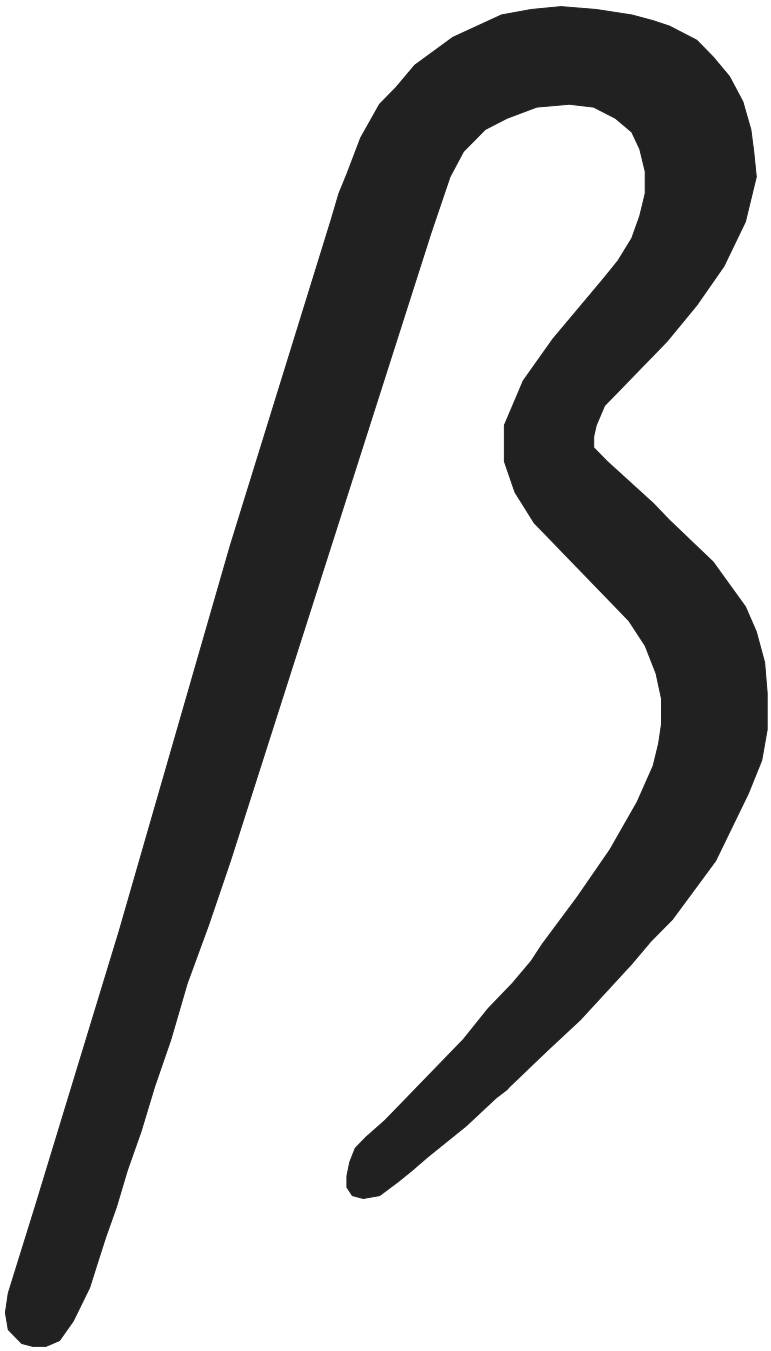
Last update
22.01.99


BENEFON
OY0725AB A3,B2,C2 A3
Module Schematics PCB
Product: TDP-52-SN3
Module no: OY0725
Pcb no: PY0700
Schematic ver: A3
Designer: JES
SALO FINLAND
Date: 28.05.1997
Sheet: 01 of 03
V600
12750A-20
SDATA
SCLK
SLE
RX_REG
TXS_REG
AFC
NTC
RXAUDIO
RSSI
450KHZ
DTUNE
SPARE
TXBIAS
VBAT
TXPWR
TXAUDIO
TXDUPLEX
X610 EMFIL
X600 DCS3120
I620 M68710
I601 TK112xx
I610 TA7550IF
Q610 BC848BW
Q611 BC858BW
Q620 BC848BW
Q600 2SC3606
D610 BAT62
D600 HVU132
TXINJ


BENEFON
Product: TDP-52-SN3
Module no: OY0725
Pcb no: PY0700
Schematic ver: B2
Designer: JPS
SALO FINLAND
Date: 28.05.1997
Sheet: 02 of 03
I201 SA607
X201 CFUCG450E
X202 CFUCG450F
X103 EFCH77MDP2
X102 RMS-1LL1
X100 NBS4502
Q101 CF 739B
Q102 CF 739B
Q201 BFR93AW
450KHZ
RXAUDIO
RSSI
VRX
RXINJ
12.8M
TXDUPLEX
RX-FRONTEND


BENEFON
SALO FINLAND
Product: TDP-52-SN3
Module no: OY0725
Pcb no: PY0700
Schematic ver: C2
Designer: LA
Date: 28.05.1997
Sheet: 03 of 03

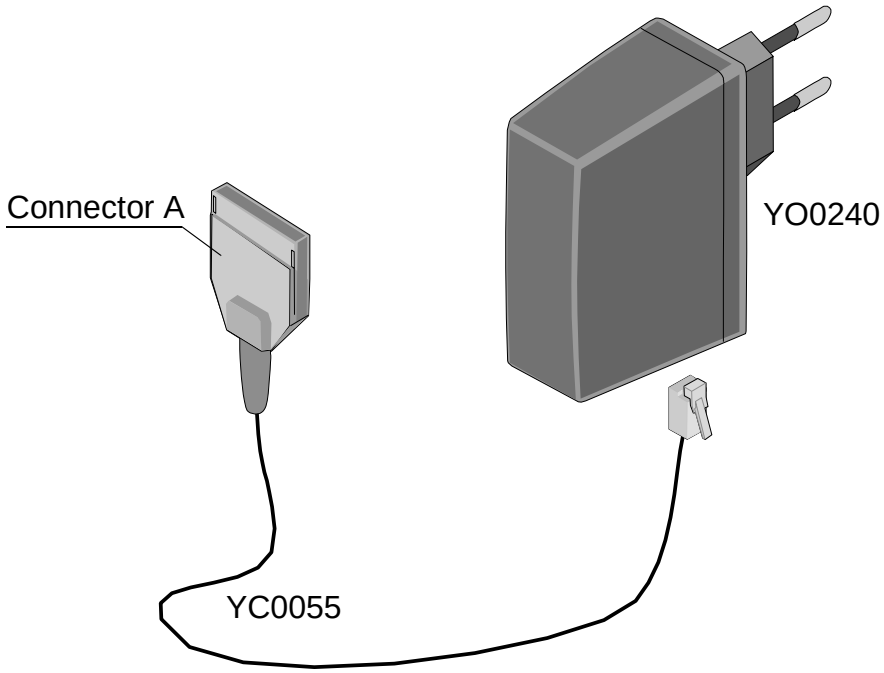
6.0 CHARGING



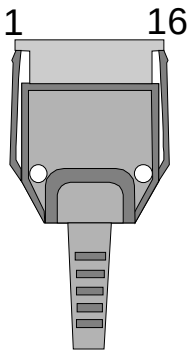
CHARGING

6.1 MAINS CHARGER CMA-50-230

The charger provides functions for charging Benefon brand mobile phones from a mains supply.



CONNECTOR A

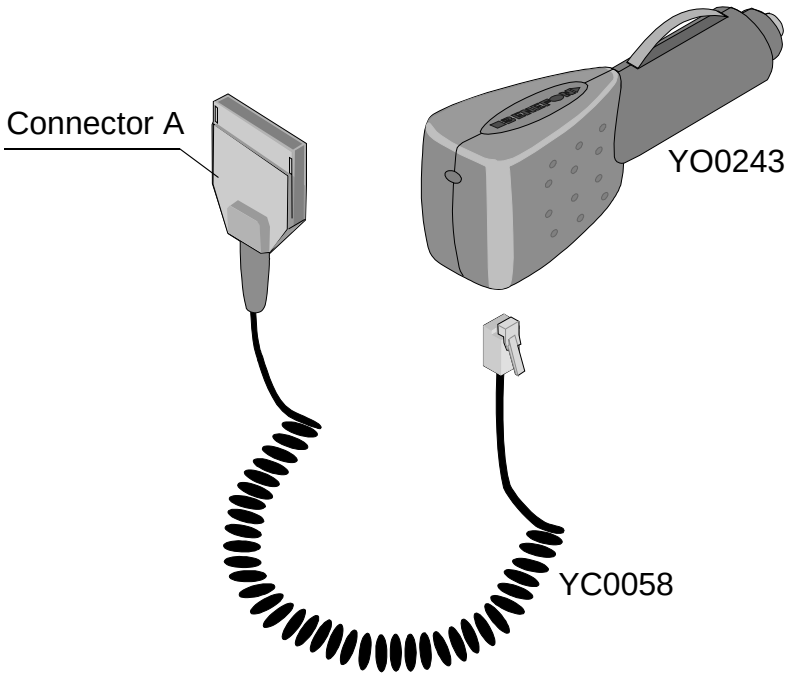


PIN CONFIGURATION:

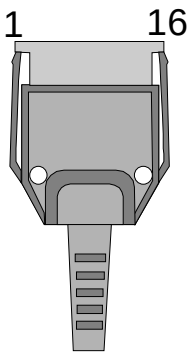
1,2	charge current	max. 10V, 1,5A
3 - 5	nc	
6,7	ground	
8 - 15	nc	
16	control voltage	0-5 VDC

6.2 LIGHTER SOCKET CHARGER CCS-50-12

The charger includes functions for using the handportable and for charging its batteries from the car battery.



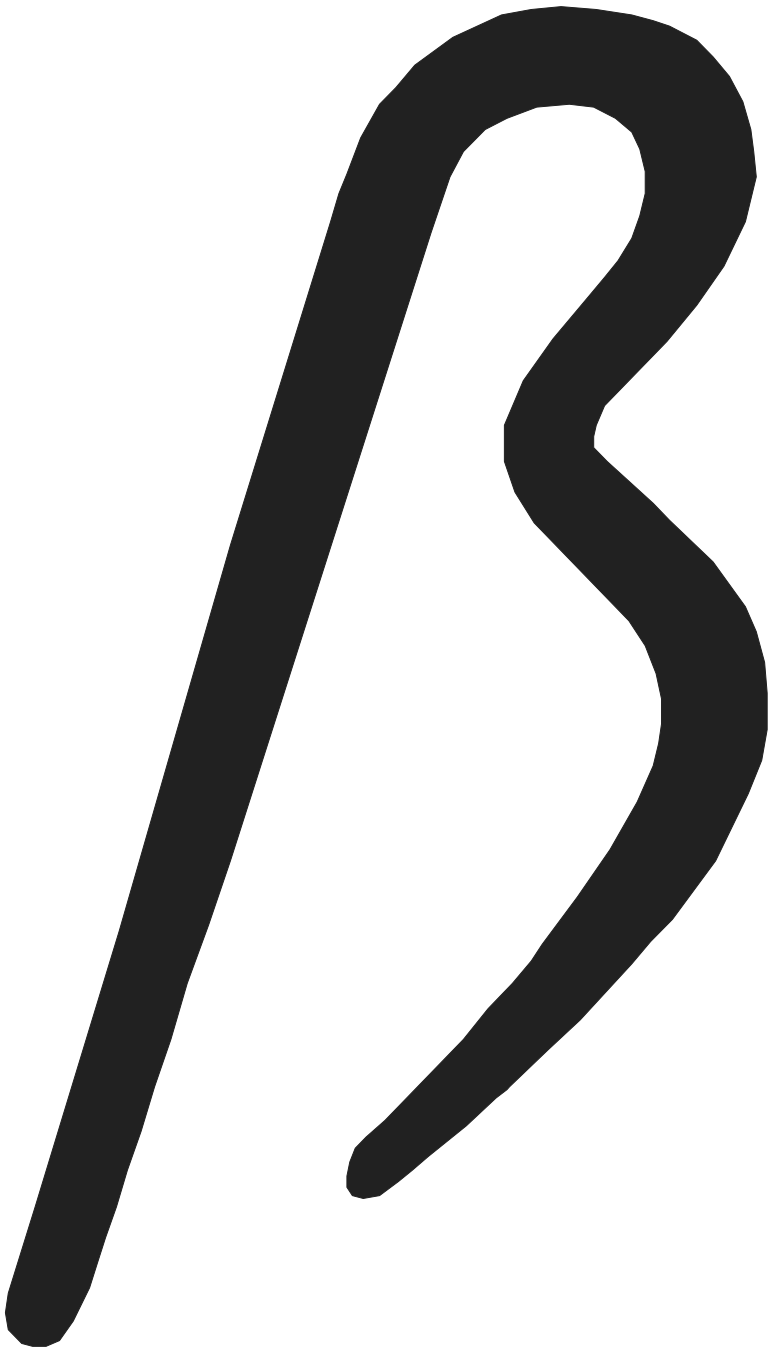
CONNECTOR A



PIN CONFIGURATION:

1,2	charge current	max. 10V, 1,5A
3 - 5	nc	
6,7	ground	
8 - 15	nc	
16	control voltage	0-5 VDC

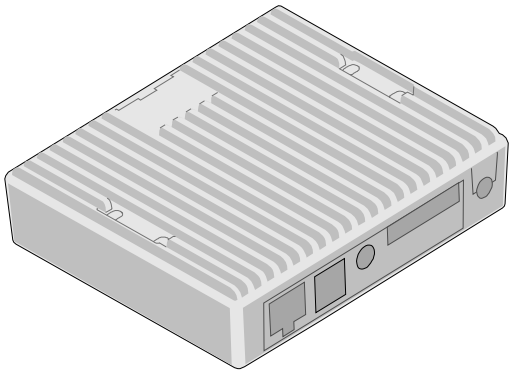
7.0 CAR ASSEMBLY KIT



CAR ASSEMBLY KIT

7.1 CARBOX UDH-50

YO0702



7.1.1 Including attached functions

- power supply filter
- voltage regulators
- processor controlled battery charger
- controls for external relays (AL, MUTE)
- handsfree amplifiers
- PC/AUX-connector
- handset connector
- integrated branching unit

7.1.2 Connector descriptions

7.1.2.1 EXTVB V100

1	MUTE	car radio mute	max. 500 mA
2	GND	speaker ground	
3	GND	ground	
4	AL	external alarm control	max 500 mA
5	HF_SPKR	HF-speaker	4 ohm 1.5 W
6	VBATT	operating voltage	10.8 - 31 V max 3A

7.1.2.2 HANDSET V102:

1	HS_ERP	Audio signal for earphone + HOOK-signal
2	EGND	
3	MGND	
4	HS_MIC	HS Microphone signal to carbox

7.1.2.3 EXTMIC V103

1	GND	ground
2	NC	not connected
3	HFMIC	HF Microphone signal to carbox
4	GND	ground
5	NC	not connected

7.1.2.4 PC/AUX V104

1	NC	not connected	
2	NC	not connected	
3	9V	PC	9V 500 mA
4	NC	not connected	
5	AUX_MIC	audio in	400 mV RMS
6	GND	ground	
7	GND	ground	
8	AUX_ERP	audio out	200 mV RMS
9	CADET	carbox detection	+5V
10	I2CINT	I2C interrupt	
11	SCL	I2C clock	
12	SDA	I2C data	
13	TXD	RS 232	
14	RXD	RS 232	
15	EXTIO	extra-IO	
16	NC	not connected	

7.1.2.5 BOX V105

1	V_CHARGE	battery charging current	max. 2A / 9V
2	V_CHARGE	battery charging current	
3	V-BAT	battery voltage	
4	NC	not connected	
5	EXTMIC	external microphone signal	400 mV RMS
6	GND	ground	
7	GND	ground	
8	EXTERP	external ERP-signal	200 mV RMS
9	CADET	carbox detection	+5V
10	I2CINT	I2C interrupt	
11	SCL	I2C clock	
12	SDA	I2C data	
13	TXD	RS 232	
14	RXD	RS 232	
15	EXTIO	extra-IO	
16	CHGCONT	charging control from the processor	

7.1.2.6 Operation

Operating voltage is fed to pin EXTVB/6. L100/C104 filters the power supply and D100 limits any voltage peaks. When the radio telephone is placed in its handset, a voltage is fed through the BOX/3 pin which triggers Q201 and Q200 open.

The regulator I200 feeds +9V to the audio stage and PC-connector pin 3 and I210 feeds +5V to other functions. External relay drivers Q231 and Q241 are controlled by I2C I/O-expander I220.

The HF microphone gets its bias voltage through resistors R330 and R331. I330 serves as the microphone amplifier and as a low-pass filter with a border frequency of 3.3 kHz.

The analog switch I320 connects the HF microphone or HS microphone signal to the EXTMIC-line.

The analog switch I322, controlled by AUX_MODE selects either microphone (HS or HF) or external signal source AUX_MIC to be connected to EXTMIC signal pin.

The analog switch I430 connects audio signal to handset earphone or HF-speaker.

The analog switch I431 connects audio signal to connector PC/AUX/8 or to HS erp / HF spkr.

When audio power amplifiers I410 and I460 are not in use, they are in mute-mode.

7.1.3 Parts list OO0700

OO0700

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CD0101	C100	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C101	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0223	C102	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C103	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CE0109	C104	Al-elko	1000uF/40V 12.5x30mm	Philips	2222 021 17102
CD0102	C110	SMD capasitor	1 nF 5 % NP0	Philips	
CD0102	C111	SMD capasitor	1 nF 5 % NP0	Philips	
CD0102	C112	SMD capasitor	1 nF 5 % NP0	Philips	
CD0101	C120	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C121	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C122	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C123	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C124	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C125	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C130	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C131	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C132	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C133	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C134	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C135	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C136	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C137	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C138	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C139	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C140	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C141	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0223	C200	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C201	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU1106	C202	SMD tantal	10uF/16V	AVX	TAJB106M016R
CH0105	C203	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C204	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0223	C205	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C210	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU1106	C211	SMD tantal	10uF/16V	AVX	TAJB106M016R
CD0223	C220	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0222	C230	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CD0222	C240	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CU0105	C300	SMD tantal	1uF/16V 20% 3.2x1.6mm	Matsushita	ECST1CY 105R
CD0223	C301	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0222	C302	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CD0223	C303	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0680	C304	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CD0101	C320	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0223	C321	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CH0105	C322	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CU0105	C330	SMD tantal	1uF/16V 20% 3.2x1.6mm	Matsushita	ECST1CY 105R
CD0104	C331	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0222	C332	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CD0680	C333	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CD0223	C334	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU0105	C340	SMD tantal	1uF/16V 20% 3.2x1.6mm	Matsushita	ECST1CY 105R
CD0223	C401	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU0226	C411	SMD tantal	22uF/16V 10% 7.3x4.3mm	Kyocera	TAJD226K016R
CU0226	C413	SMD tantal	22uF/16V 10% 7.3x4.3mm	Kyocera	TAJD226K016R
CD0104	C414	SMD capasitor	100 nF 10% 50 V X7R	Philips	

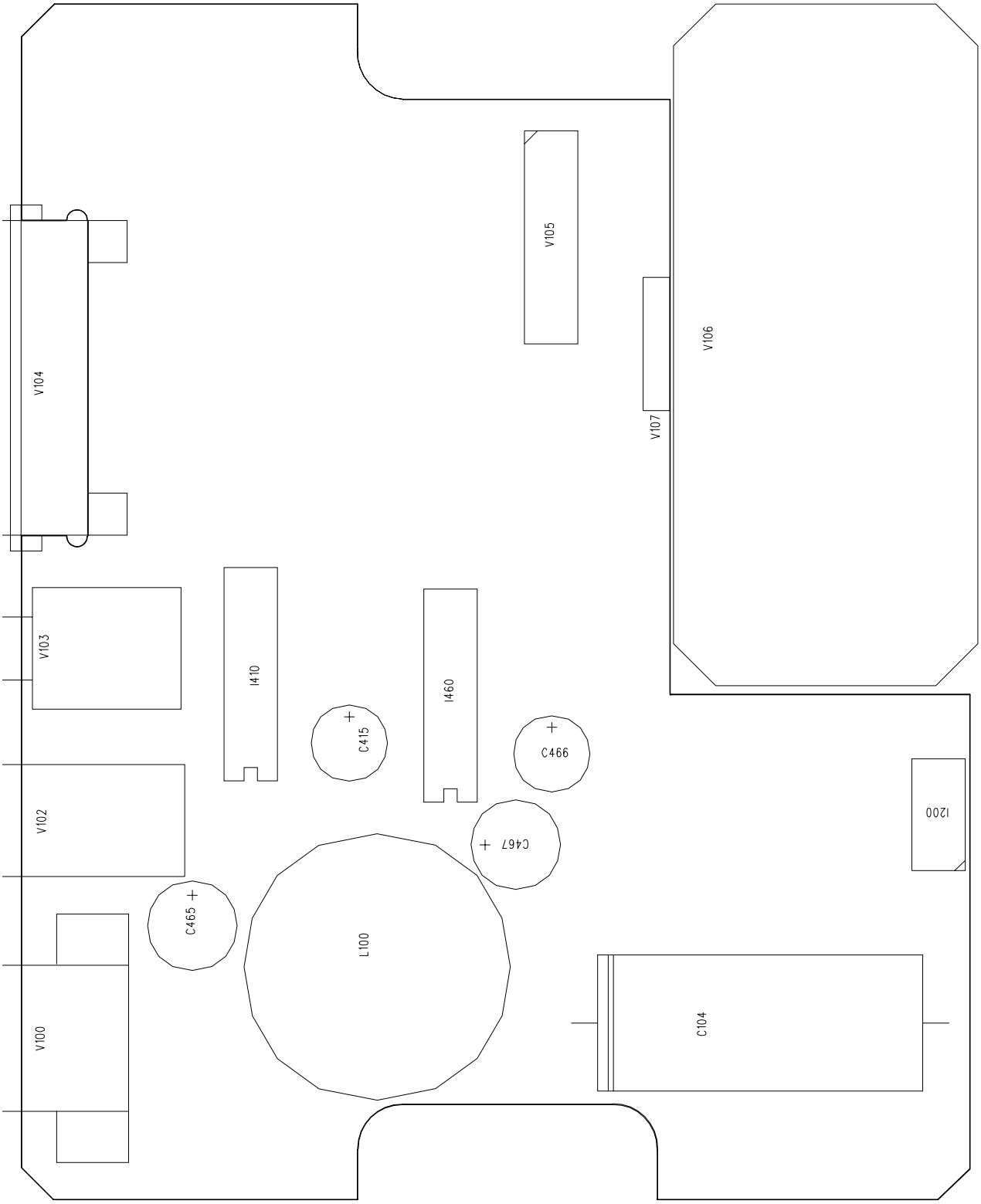
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CE0476	C415	Al elko	47 uF/25 V 7x7mm	Philips	2222 097 56479
CD0104	C416	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CU1106	C417	SMD tantal	10uF/16V	AVX	TAJB106M016R
CU0225	C418	SMD tantal	2.2uF/16V 20% 4.7x2.6mm	Matsushita	ECST1CB 225R
CH0105	C419	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C420	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C421	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C430	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C431	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0101	C440	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0104	C441	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CH0105	C460	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C461	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CU0225	C462	SMD tantal	2.2uF/16V 20% 4.7x2.6mm	Matsushita	ECST1CB 225R
CU1106	C463	SMD tantal	10uF/16V	AVX	TAJB106M016R
CD0104	C464	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CE0337	C465	Al elko	330uF/16V 20% 15x8mm	Philips	222213555331
CE0476	C466	Al elko	47 uF/25 V 7x7mm	Philips	2222 097 56479
CE0337	C467	Al elko	330uF/16V 20% 15x8mm	Philips	222213555331
CD0104	C468	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0103	C469	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CU0105	C480	SMD tantal	1uF/16V 20% 3.2x1.6mm	Matsushita	ECST1CY 105R
DT0033	D100	SMD Transil	33V71500W	SGS-Thomso	SM15T33A
DZ0180	D200	SMD zener	18V 5% 300mW	Philips	BZX84C18
DT0033	D230	SMD Transil	33V71500W	SGS-Thomso	SM15T33A
DT0033	D240	SMD Transil	33V71500W	SGS-Thomso	SM15T33A
IR1317	I200	Adjustable regulator	1.2-37V 1.5A	National S	LM317AT
IR2951	I210	Regulator	100mA 5V adj. 5%	National	LP2951CM
II8574	I220	8 bit I/O	I2C	Philips	PCF8574T
IA7550	I300	Single op.amp.		Toshiba	TA 75S01F-TE85L
IC0453	I320	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IA7550	I321	Single op.amp.		Toshiba	TA 75S01F-TE85L
IC0453	I322	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IA7550	I330	Single op.amp.		Toshiba	TA 75S01F-TE85L
IA1905	I410	Audio power amplifier	5W/20V/4ohm	SGS/ Thomso	TDA1905
IC0453	I430	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IC0453	I431	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IA7550	I440	Single op.amp.		Toshiba	TA 75S01F-TE85L
IA1905	I460	Audio power amplifier	5W/20V/4ohm	SGS/ Thomso	TDA1905
LA3117	L100	Inductor	110uH 3A R=0.07ohm	Fuji	SL03B111BE
QF9024	Q200	SMD p-channel FET	60V 9A Rds=0.28	I&R	IRFR9024TR
QF7002	Q201	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QSB858	Q230	SMD transistor	PNP 0.1A/30V F<10dB	Philips	BC 858 B
QS1054	Q231	SMD transistor	NPN 1.5A/45V	Philips	BCP 54
QSB858	Q240	SMD transistor	PNP 0.1A/30V F<10dB	Philips	BC 858 B
QS1054	Q241	SMD transistor	NPN 1.5A/45V	Philips	BCP 54
QSB848	Q400	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QF7002	Q401	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QSB848	Q402	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QSB848	Q450	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
RD0224	R200	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0103	R201	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0104	R202	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0103	R203	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0152	R204	SMD resistor	1.5 k 5% 0.125 W	Kamaya	
RD1241	R205	SMD resistor	240R 1% 0.125 W	Kamaya	RGC 1/10

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RD0103	R210	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0101	R220	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0101	R221	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0103	R230	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R231	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0103	R232	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R240	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R241	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0103	R242	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R300	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R301	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0103	R302	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0224	R303	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0153	R304	SMD resistor	15 k 5% 0.125 W	Kamaya	
RD0103	R305	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0333	R306	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0224	R320	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0103	R321	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0224	R322	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0103	R330	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R331	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0183	R332	SMD resistor	18 k 5% 0.125 W	Kamaya	
RD0224	R333	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0153	R334	SMD resistor	15 k 5% 0.125 W	Kamaya	
RD0103	R335	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0333	R336	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0104	R340	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0683	R341	SMD resistor	68 k 5% 0.125 W	Kamaya	
RD0473	R400	SMD resistor	47 k 5% 0.125 W	Kamaya	
RD0104	R401	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R402	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R403	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0333	R404	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0103	R405	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0101	R410	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0103	R411	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0339	R412	SMD resistor	3.3 R 5% 0.125 W	Kamaya	
RD0102	R413	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0102	R414	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0183	R415	SMD resistor	18 k 5% 0.125 W	Kamaya	
RD0104	R416	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0333	R430	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0333	R431	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0333	R432	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0104	R440	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R441	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0103	R442	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0224	R450	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0103	R451	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0223	R452	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0223	R460	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0102	R461	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0223	R462	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0101	R463	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0103	R464	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0561	R465	SMD resistor	560 R 5% 0.125 W	Kamaya	
RD0339	R466	SMD resistor	3.3 R 5% 0.125 W	Kamaya	
RD0104	R480	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0683	R481	SMD resistor	68 k 5% 0.125 W	Kamaya	
VW0106	V100	Connector	male 6-pin	Molex	5569-06-A1

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
VN0003	V102	Modular jack	4-pin	AMP	215875-1
VN0005	V103	Stereo jack	3.5mm	Zupami	3.5 EJW-C386
VM0242	V104	SMD system connector	1x16 pin	AMP	188227-1
VM0116	V105	Contact strip angle	2x8	NB-electr.	H4-6-16G
OW0022	V106	Charger module	6V/2A	Powerfinn	
LF0061	X100	SMD EMI suppression filt	4700pF/2A 1.6x6.8mm	Murata	NFM61R30T472
LF0061	X101	SMD EMI suppression filt	4700pF/2A 1.6x6.8mm	Murata	NFM61R30T472

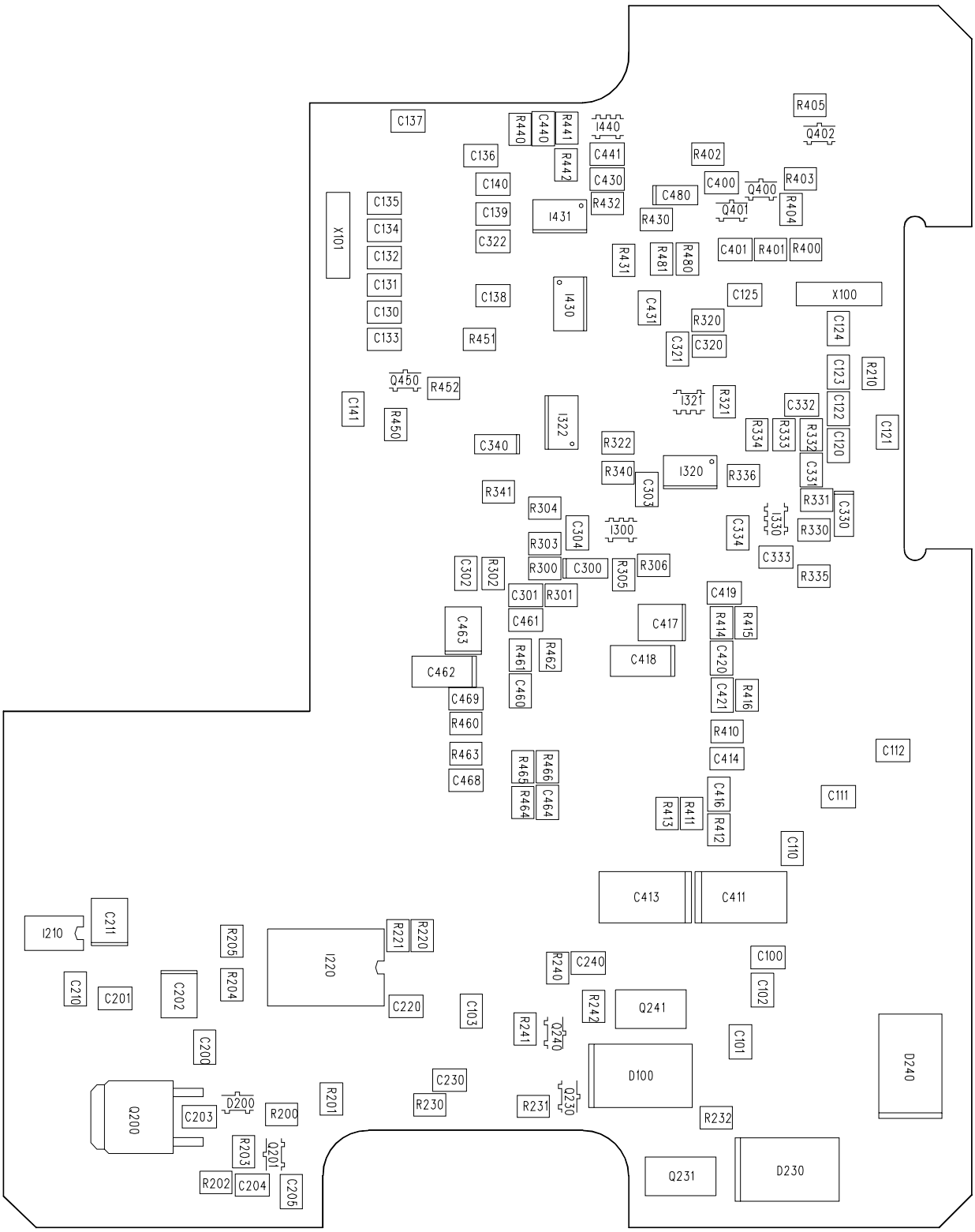
Last update 14.05.97

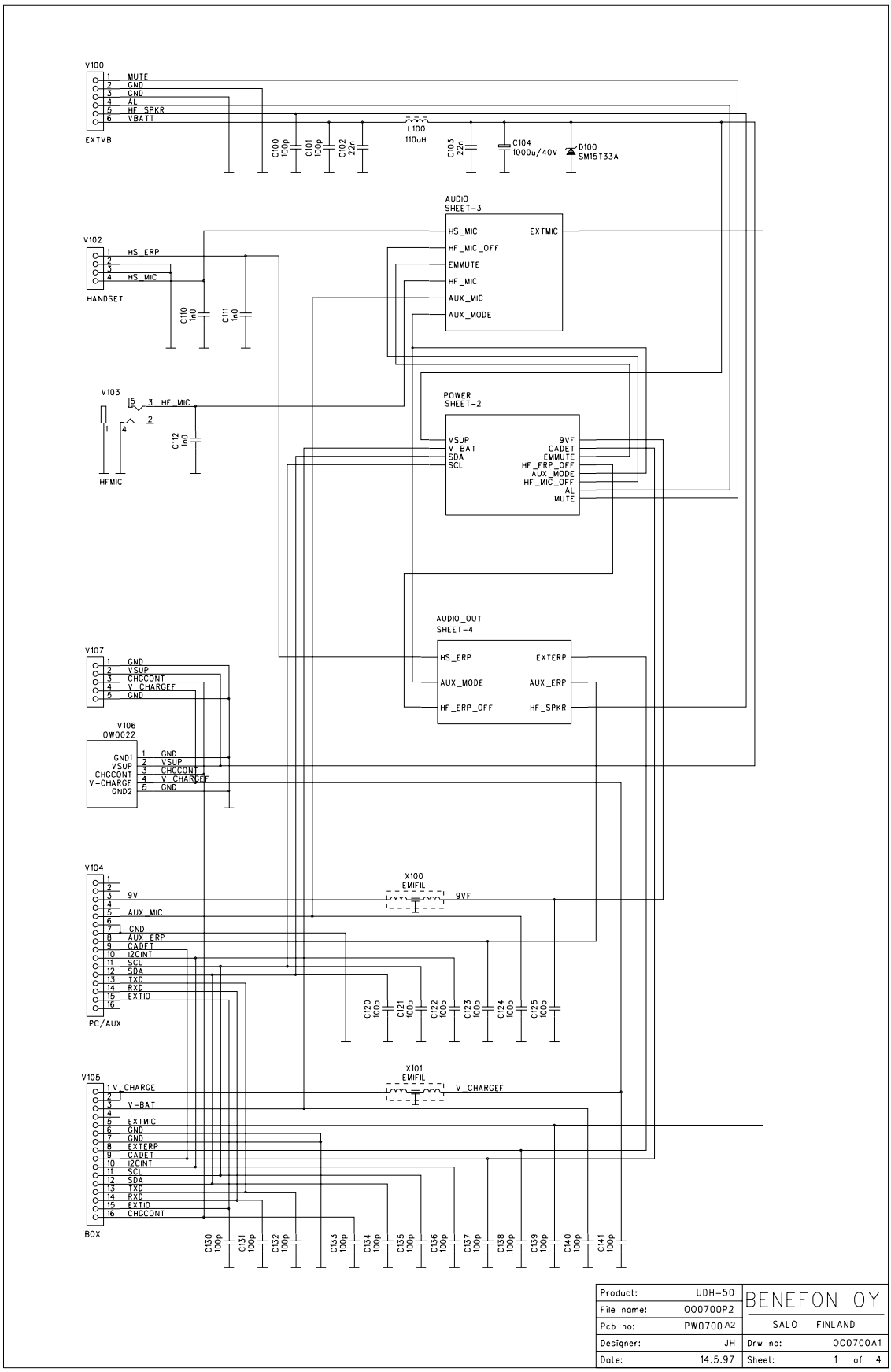
The Top Side Layout PW0700B2

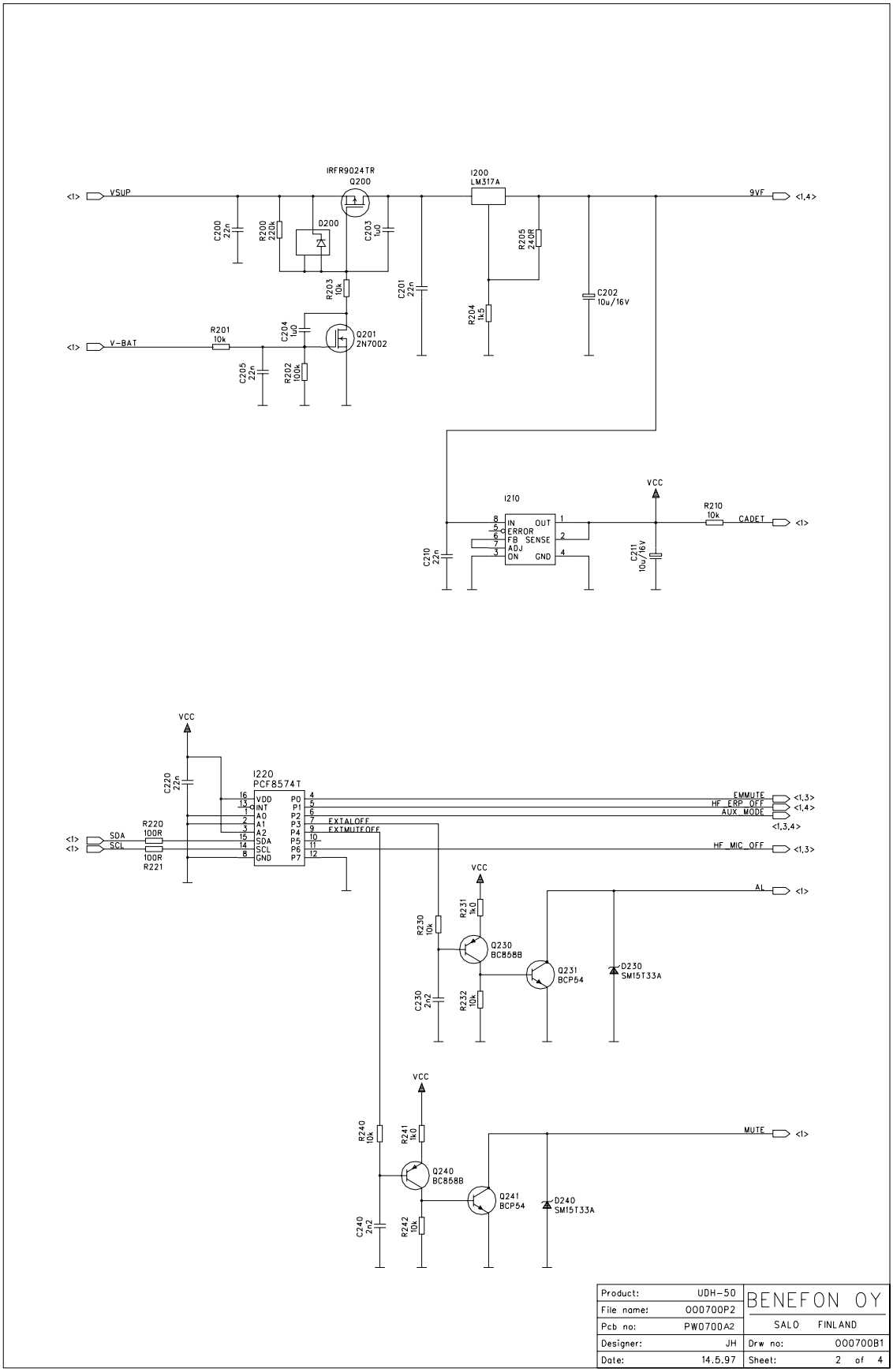


PW0700A2 605

The Bottom Side Layout PW0700B2




V100
1 MUTE
2 GND
3 GND
4 AL
5 HF_SPKR
6 VBATT
EXTVB
C100 100p
C101 100p
C102 22n
L100 110uH
C103 22n
C104 1000u/40V
D100 SM15T33A
AUDIO SHEET-3
HS_MIC
HF_MIC_OFF
EMMUTE
HF_MIC
AUX_MIC
AUX_MODE
EXTMIC
V102
1 HS_ERP
2
3
4 HS_MIC
HANDSET
C110 1n0
C111 1n0
V103
5 3 HF_MIC
1
2
4
C112 1n0
HFMIC
POWER SHEET-2
VSUP
V-BAT
SDA
SCL
9VF
CADET
EMMUTE
HF_ERP_OFF
AUX_MODE
HF_MIC_OFF
AL
MUTE
AUDIO_OUT SHEET-4
HS_ERP
AUX_MODE
HF_ERP_OFF
EXTERP
AUX_ERP
HF_SPKR
V107
1 GND
2 VSUP
3 CHGCONT
4 V_CHARGEF
5 GND
V106
OW0022
GND1
VSUP
CHGCONT
V-CHARGE
GND2
1 GND
2 VSUP
3 CHGCONT
4 V_CHARGEF
5 GND
V104
3 9V
5 AUX_MIC
7 GND
8 AUX_ERP
9 CADET
10 I2CINT
11 SCL
12 SDA
13 TXD
14 RXD
15 EXTIO
PC/AUX
X100 EMIFIL
9VF
C120 100p
C121 100p
C122 100p
C123 100p
C124 100p
C125 100p
X101 EMIFIL
V_CHARGEF
V105
1 V_CHARGE
3 V-BAT
5 EXTMIC
6 GND
7 GND
8 EXTERP
9 CADET
10 I2CINT
11 SCL
12 SDA
13 TXD
14 RXD
15 EXTIO
16 CHGCONT
BOX
C130 100p
C131 100p
C132 100p
C133 100p
C134 100p
C135 100p
C136 100p
C137 100p
C138 100p
C139 100p
C140 100p
C141 100p
Product: UDH-50
File name: OOO700P2
Pcb no: PWO700 A2
Designer: JH
Date: 14.5.97
BENEFON OY
SALO FINLAND
Drw no: OOO700A1
Sheet: 1 of 4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Q200
I200
LM317A
<1> VSUP
9VF <1,4>
C200 22n
R200 220k
D200
C203 1u0
R205 240R
R203 10k
C201 22n
R204 4k5
C202 10u/16V
<1> V-BAT
R201 10k
C204 1u0
Q201 2N7002
C205 22n
R202 100k
I210
VCC
R210 10k
CADET <1>
IN OUT
ERROR
FB SENSE
ADJ
ON GND
C210 22n
C211 10u/16V
I220
PCF8574T
VDD P0
INT P1
A0 P2
A1 P3
A2 P4
SDA P5
SCL P6
GND P7
C220 22n
R220 100R
R221 100R
<1> SDA
<1> SCL
EXTALOFF
EXTMUTEOFF
EMMUTE <1,3>
HF_ERP_OFF <1,4>
AUX_MODE <1,3,4>
HF_MIC_OFF <1,3>
AL <1>
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R231 1k0
R232 10k
C230 2n2
Q230 BC858B
Q231 BCP54
D230 SM15T33A
R240 10k
R241 1k0
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C240 2n2
Q240 BC858B
Q241 BCP54
D240 SM15T33A
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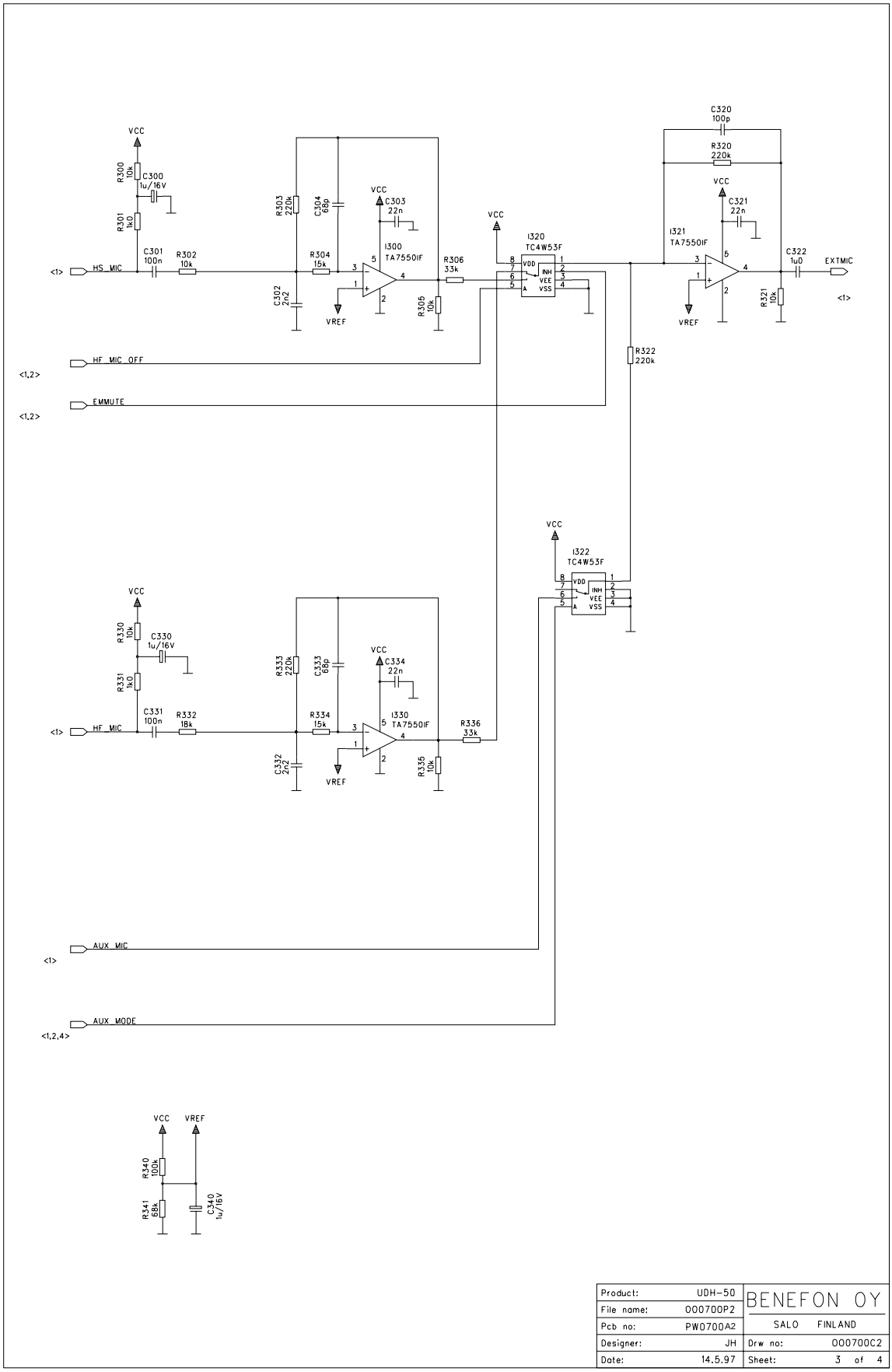
Pcb no: PW0700A2
Designer: JH
Date: 14.5.97
BENEFON OY
SALO FINLAND
Drw no: OO0700B1
Sheet: 2 of 4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R300 10k
C300 1u/16V
R301 1kO
C301 100n
R302 10k
HS_MIC
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R303 220k
C304 68p
C303 22n
I300 TA7550IF
R304 15k
C302 2n2
VREF
R305 10k
R306 33k
I320 TC4W53F
VDD
INH
VEE
VSS
C320 100p
R320 220k
I321 TA7550IF
C321 22n
C322 1u0
EXTMIC
R321 10k
R322 220k
HF_MIC_OFF
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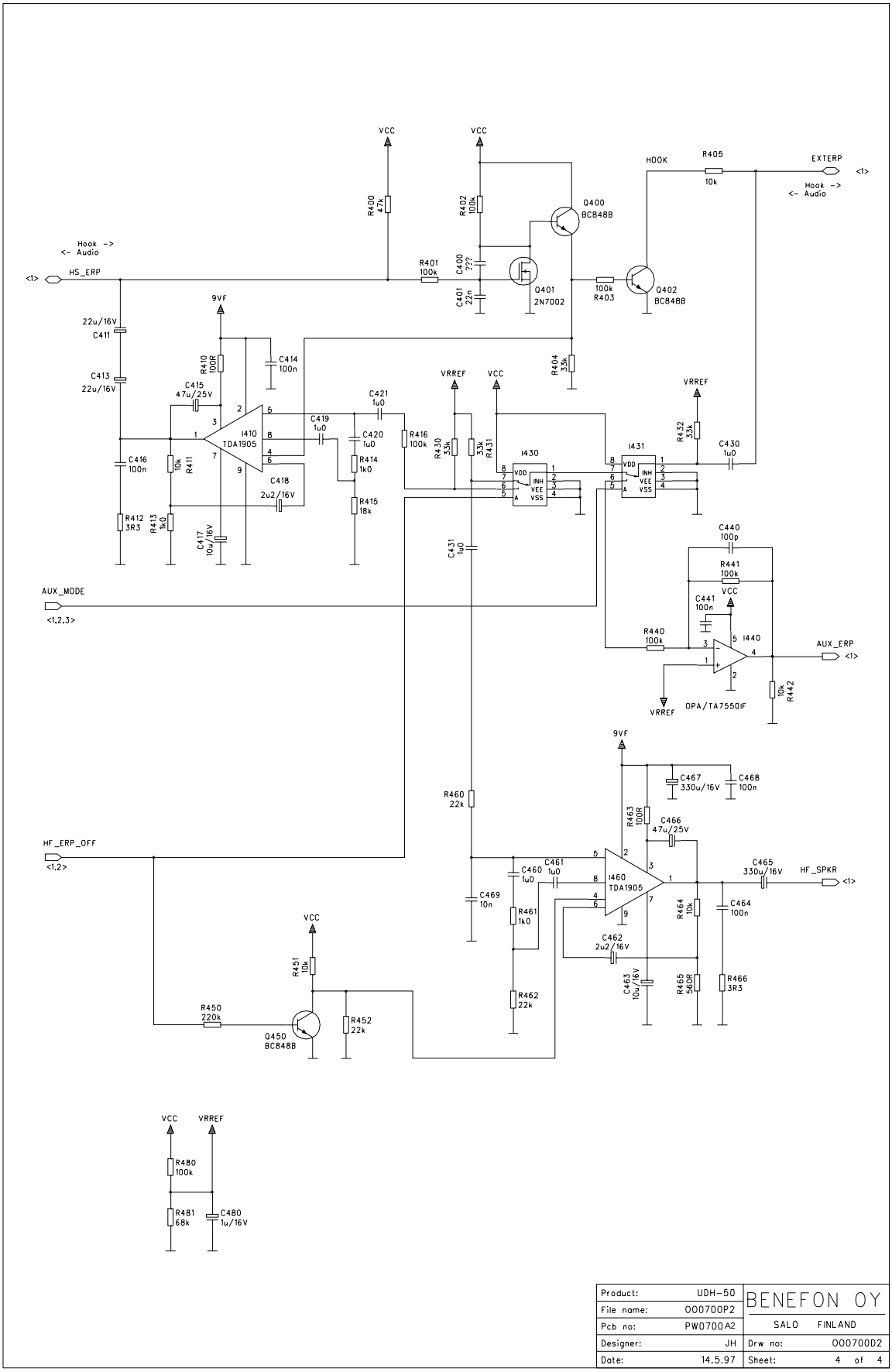
EMMUTE
<1,2>
I322 TC4W53F
R330 10k
C330 1u/16V
R331 1kO
C331 100n
R332 18k
HF_MIC
R333 220k
C333 68p
C334 22n
I330 TA7550IF
R334 15k
C332 2n2
R335 10k
R336 33k
AUX_MIC
AUX_MODE
<1,2,4>
VREF
R340 100k
R341 68k
C340 1u/16V
Product: UDH-50
File name: 000700P2
Pcb no: PW0700A2
Designer: JH
Date: 14.5.97
BENEFON OY
SALO FINLAND
Drw no: 000700C2
Sheet: 3 of 4



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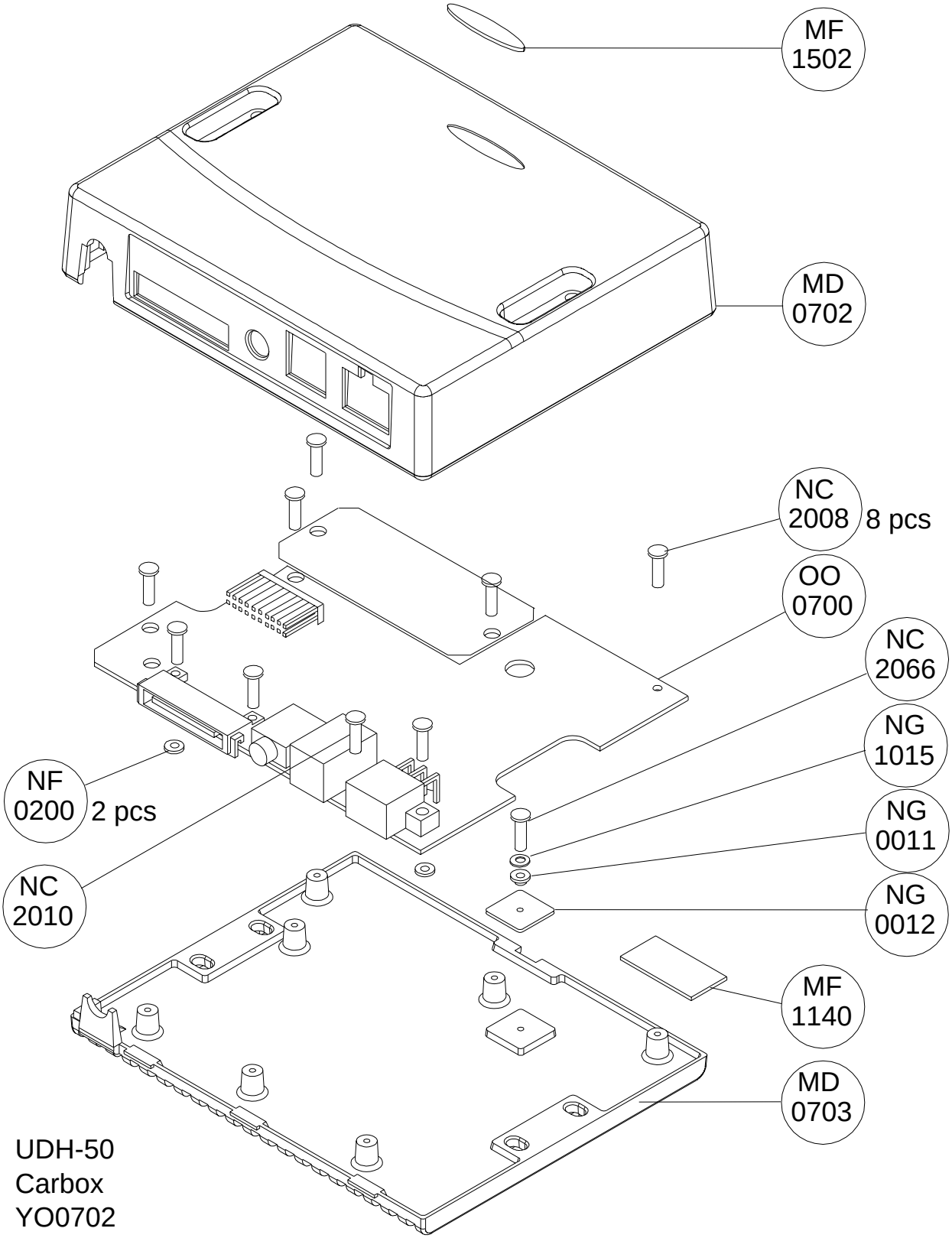
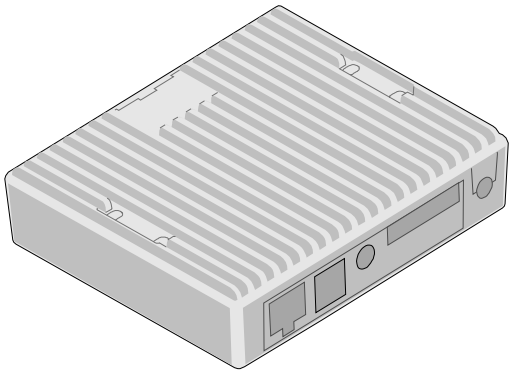
File name:	000700P2		
Pcb no:	PW0700A2	SALO	FINLAND
Designer:	JH	Drw no:	000700D2
Date:	14.5.97	Sheet:	4 of 4

YO0702 / Mechanics



7.2 CARBOX UDH-50

YO0704



7.2.1 Including attached functions

- power supply filter
- voltage regulators
- processor controlled battery charger
- controls for external relays (AL, MUTE)
- handsfree amplifiers
- PC/AUX-connector
- handset connector
- integrated branching unit

7.2.2 Connector descriptions

7.2.2.1 EXTVB V100

1	MUTE	car radio mute	max. 500 mA
2	GND	speaker ground	
3	GND	ground	
4	AL	external alarm control	max 500 mA
5	HF_SPKR	HF-speaker	4 ohm 1.5 W
6	VBATT	operating voltage	10.8 - 31 V max 3A

7.2.2.2 HANDSET V102:

1	HS_ERP	Audio signal for earphone + HOOK-signal
2	EGND	
3	MGND	
4	HS_MIC	HS Microphone signal to carbox

7.2.2.3 EXTMIC V103

1	GND	ground
2	NC	not connected
3	HFMIC	HF Microphone signal to carbox
4	GND	ground
5	NC	not connected

7.2.2.4 PC/AUX V104

1	NC	not connected	
2	NC	not connected	
3	9V	PC	9V 500 mA
4	NC	not connected	
5	AUX_MIC	audio in	400 mV RMS
6	GND	ground	
7	GND	ground	
8	AUX_ERP	audio out	200 mV RMS
9	CADET	carbox detection	+5V
10	I2CINT	I2C interrupt	
11	SCL	I2C clock	
12	SDA	I2C data	
13	TXD	RS 232	
14	RXD	RS 232	
15	EXTIO	extra-IO	
16	NC	not connected	

7.2.2.5 BOX V105

1	V_CHARGE	battery charging current	max. 2A / 9V
2	V_CHARGE	battery charging current	
3	V-BAT	battery voltage	
4	NC	not connected	
5	EXTMIC	external microphone signal	400 mV RMS
6	P_GND	ground	
7	GND	ground	
8	EXTERP	external ERP-signal	200 mV RMS
9	CADET	carbox detection	+5V
10	I2CINT	I2C interrupt	
11	SCL	I2C clock	
12	SDA	I2C data	
13	TXD	RS 232	
14	RXD	RS 232	
15	EXTIO	extra-IO	
16	CHGCONT	charging control from the processor	

7.2.2.6 Operation

Operating voltage is fed to pin EXTVB/6. L100/C104 filters the power supply and D100 limits any voltage peaks. When the radio telephone is placed in its handset, a voltage is fed through the BOX/3 pin which triggers Q201 and Q200 open.

The regulator I200 feeds +9V to the audio stage and PC-connector pin 3 and I210 feeds +5V to other functions. External relay drivers Q231 and Q241 are controlled by I2C I/O-expander I220.

The HF microphone gets its bias voltage through resistors R330 and R331. I330 serves as the microphone amplifier and as a low-pass filter with a border frequency of 3.3 kHz.

The analog switch I320 connects the HF microphone or HS microphone signal to the EXTMIC-line.

The analog switch I322, controlled by AUX_MODE selects either microphone (HS or HF) or external signal source AUX_MIC to be connected to EXTMIC signal pin.

The analog switch I430 connects audio signal to handset earphone or HF-speaker.

The analog switch I431 connects audio signal to connector PC/AUX/8 or to HS erp / HF spkr.

When audio power amplifiers I410 and I460 are not in use, they are in mute-mode.

7.2.3 Parts list OW0700

OW0700

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CD0101	C100	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C101	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0223	C102	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C103	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CE0109	C104	Al-elko	1000uF/40V 12.5x30mm	Philips	2222 021 17102
CD0101	C105	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C106	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0102	C110	SMD capasitor	1 nF 5 % NP0	Philips	
CD0102	C111	SMD capasitor	1 nF 5 % NP0	Philips	
CD0471	C112	SMD capasitor	470 pF 5% 50 V NP0	Philips	
CD0101	C120	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C121	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C122	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C123	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C124	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C125	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C130	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C131	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C132	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C133	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C134	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C135	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C136	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C137	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C138	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C139	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C140	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C141	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0223	C200	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C201	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU1106	C202	SMD tantal	10uF/16V	AVX	TAJB106M016R
CH0105	C203	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C204	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0223	C205	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C210	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU1106	C211	SMD tantal	10uF/16V	AVX	TAJB106M016R
CD0223	C220	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0222	C230	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CD0222	C240	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CU0105	C300	SMD tantal	1uF/16V 20% 3.2x1.6mm	Matsushita	ECST1CY 105R
CD0223	C301	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0222	C302	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CD0223	C303	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0680	C304	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CD0270	C306	SMD capasitor	27pF 5% 50V NPO	Philips	
CD0270	C307	SMD capasitor	27pF 5% 50V NPO	Philips	
CD0101	C320	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0223	C321	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CH0105	C322	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0471	C323	SMD capasitor	470 pF 5% 50 V NP0	Philips	
CD0270	C324	SMD capasitor	27pF 5% 50V NPO	Philips	
CD0270	C325	SMD capasitor	27pF 5% 50V NPO	Philips	
CD0270	C326	SMD capasitor	27pF 5% 50V NPO	Philips	
CD0270	C327	SMD capasitor	27pF 5% 50V NPO	Philips	
CU0105	C330	SMD tantal	1uF/16V 20% 3.2x1.6mm	Matsushita	ECST1CY 105R

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CD0104	C331	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0222	C332	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CD0680	C333	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CD0223	C334	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0221	C335	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CD0270	C336	SMD capasitor	27pF 5% 50V NPO	Philips	
CD0270	C337	SMD capasitor	27pF 5% 50V NPO	Philips	
CU0105	C340	SMD tantal	1uF/16V 20% 3.2x1.6mm	Matsushita	ECST1CY 105R
CD0223	C401	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU0226	C411	SMD tantal	22uF/16V 10% 7.3x4.3mm	Kyocera	TAJD226K016R
CU0226	C413	SMD tantal	22uF/16V 10% 7.3x4.3mm	Kyocera	TAJD226K016R
CD0104	C414	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CE0476	C415	Al elko	47 uF/25 V 7x7mm	Philips	2222 097 56479
CD0104	C416	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CU1106	C417	SMD tantal	10uF/16V	AVX	TAJB106M016R
CU0225	C418	SMD tantal	2.2uF/16V 20% 4.7x2.6mm	Matsushita	ECST1CB 225R
CH0105	C419	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C420	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C421	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C430	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C431	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0270	C432	SMD capasitor	27pF 5% 50V NPO	Philips	
CD0270	C433	SMD capasitor	27pF 5% 50V NPO	Philips	
CD0101	C440	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0104	C441	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0220	C443	SMD capasitor	22 pF 5% 50 V NP0	Philips	
CD0220	C444	SMD capasitor	22 pF 5% 50 V NP0	Philips	
CH0105	C460	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C461	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CU0225	C462	SMD tantal	2.2uF/16V 20% 4.7x2.6mm	Matsushita	ECST1CB 225R
CU1106	C463	SMD tantal	10uF/16V	AVX	TAJB106M016R
CD0104	C464	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CE0337	C465	Al elko	330uF/16V 20% 15x8mm	Philips	222213555331
CE0476	C466	Al elko	47 uF/25 V 7x7mm	Philips	2222 097 56479
CE0337	C467	Al elko	330uF/16V 20% 15x8mm	Philips	222213555331
CD0104	C468	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0103	C469	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CU0105	C480	SMD tantal	1uF/16V 20% 3.2x1.6mm	Matsushita	ECST1CY 105R
CE3106	C501	Al-elko	10uF/63V -+20% 11x5mm	Panasonic	ECEA1JU100
CD0101	C510	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0471	C511	SMD capasitor	470 pF 5% 50 V NP0	Philips	
CD0104	C512	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0473	C513	SMD capasitor	47 nF 10% 50 V X7R	Philips	
CP0155	C514	Polyester cap	1.5uF 20% 50V	Roeredstei	MKT 1826-515/05
CP0155	C515	Polyester cap	1.5uF 20% 50V	Roeredstei	MKT 1826-515/05
CE0476	C520	Al elko	47 uF/25 V 7x7mm	Philips	2222 097 56479
CD0471	C521	SMD capasitor	470 pF 5% 50 V NP0	Philips	
CD0101	C522	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CP0155	C530	Polyester cap	1.5uF 20% 50V	Roeredstei	MKT 1826-515/05
CE3106	C531	Al-elko	10uF/63V -+20% 11x5mm	Panasonic	ECEA1JU100
CD0101	C532	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C533	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CE0127	C534	Al elko	120uF/16V 6.3x11,5	NCC	SXE16VB120MJF11
CD0101	C535	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0104	C536	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0104	C540	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0101	C541	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C542	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0103	C543	SMD capasitor	10 nF 10% 50 V X7R	Philips	
CD0101	C544	SMD capasitor	100 pF 5% 50 V NP0	Philips	

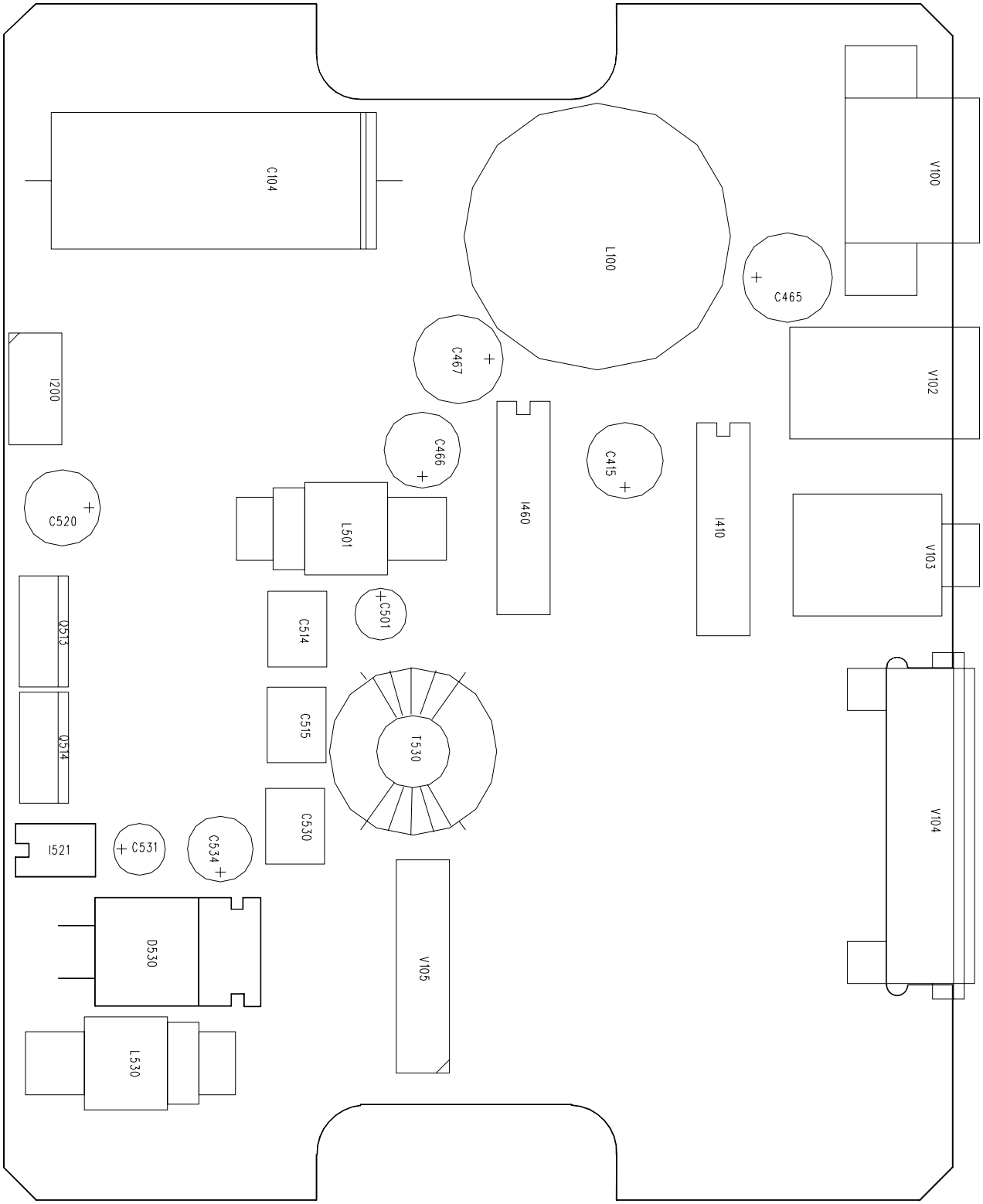
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
DT0033	D100	SMD Transil	33V71500W	SGS-Thomso	SM15T33A
DZ0180	D200	SMD zener	18V 5% 300mW	Philips	BZX84C18
DT0033	D230	SMD Transil	33V71500W	SGS-Thomso	SM15T33A
DT0033	D240	SMD Transil	33V71500W	SGS-Thomso	SM15T33A
DS0056	D510	SMD diode pair	70V/100mA common anode	Philips	BAW 56
DS0056	D511	SMD diode pair	70V/100mA common anode	Philips	BAW 56
DY0045	D530	Shottky diode	45V/10A	I&R	10TQ045
DS0099	D531	SMD diode	70 V 200 mA	Philips	BAV 99
DZ1569	D532	SMD zener	5V6 2% 300mW	Philips	BZX84B5V6
DT0010	D533	SMD Trans zorb	10V/35A/600W	Motorola	1SMB10AT3
IR1317	I200	Adjustable regulator	1.2-37V 1.5A	National S	LM317AT
IR2951	I210	Regulator	100mA 5V adj. 5%	National	LP2951CM
II8574	I220	8 bit I/O	I2C	Philips	PCF8574T
IA7550	I300	Single op.amp.		Toshiba	TA 75S01F-TE85L
IC0453	I320	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IA7550	I321	Single op.amp.		Toshiba	TA 75S01F-TE85L
IC0453	I322	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IA7550	I330	Single op.amp.		Toshiba	TA 75S01F-TE85L
IA1905	I410	Audio power amplifier	5W/20V/4ohm	SGS/ Thomso	TDA1905
IC0453	I430	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IC0453	I431	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IA7550	I440	Single op.amp.		Toshiba	TA 75S01F-TE85L
IA1905	I460	Audio power amplifier	5W/20V/4ohm	SGS/ Thomso	TDA1905
IX0555	I520	Timer	Pipolar	Philips	SA555D
IO0172	I521	Optocoupler		Siemens	CNY17-2
IA2902	I540	Low power quar op-amp.		NationalSe	LM2902M
LA3117	L100	Inductor	110uH 3A R=0.07ohm	Fuji	SL03B111BE
LA1391	L501	Choke horizintal	90uH +-10%	Trafocomp	TJ1391
LA1391	L530	Choke horizintal	90uH +-10%	Trafocomp	TJ1391
PW0700	PCB1	PCB for carbox		Aspocomp	
QF9024	Q200	SMD p-channel FET	60V 9A Rds=0.28	I&R	IRFR9024TR
QF7002	Q201	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QSB858	Q230	SMD transistor	PNP 0.1A/30V F<10dB	Philips	BC 858 B
QS1054	Q231	SMD transistor	NPN 1.5A/45V	Philips	BCP 54
QSB858	Q240	SMD transistor	PNP 0.1A/30V F<10dB	Philips	BC 858 B
QS1054	Q241	SMD transistor	NPN 1.5A/45V	Philips	BCP 54
QSB848	Q400	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QF7002	Q401	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QSB848	Q402	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QSB848	Q450	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QSB848	Q510	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QSB858	Q511	SMD transistor	PNP 0.1A/30V F<10dB	Philips	BC 858 B
QSB848	Q512	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QF0124	Q513	N-channel fet	55V/17A Rds=0.07	I&R	IRFZ24N
QF0124	Q514	N-channel fet	55V/17A Rds=0.07	I&R	IRFZ24N
RD0101	R100	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0101	R101	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0224	R200	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0103	R201	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0104	R202	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0103	R203	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0152	R204	SMD resistor	1.5 k 5% 0.125 W	Kamaya	
RD1241	R205	SMD resistor	240R 1% 0.125 W	Kamaya	RGC 1/10
RD0103	R210	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0101	R220	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0101	R221	SMD resistor	100 R 5% 0.125 W	Kamaya	

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RD0103	R230	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R231	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0103	R232	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R240	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R241	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0103	R242	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R300	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R301	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0103	R302	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0224	R303	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0153	R304	SMD resistor	15 k 5% 0.125 W	Kamaya	
RD0103	R305	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R306	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0333	R307	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0224	R320	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0103	R321	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0224	R322	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0103	R323	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R330	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R331	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0183	R332	SMD resistor	18 k 5% 0.125 W	Kamaya	
RD0224	R333	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0153	R334	SMD resistor	15 k 5% 0.125 W	Kamaya	
RD0103	R335	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R336	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0333	R337	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0104	R340	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0683	R341	SMD resistor	68 k 5% 0.125 W	Kamaya	
RD0473	R400	SMD resistor	47 k 5% 0.125 W	Kamaya	
RD0104	R401	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R402	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R403	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0333	R404	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0103	R405	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0101	R410	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0103	R411	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0339	R412	SMD resistor	3.3 R 5% 0.125 W	Kamaya	
RD0102	R413	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0102	R414	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0183	R415	SMD resistor	18 k 5% 0.125 W	Kamaya	
RD0104	R416	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0333	R430	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0333	R431	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0333	R432	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0104	R440	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R441	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0473	R442	SMD resistor	47 k 5% 0.125 W	Kamaya	
RD0103	R443	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0473	R450	SMD resistor	47 k 5% 0.125 W	Kamaya	
RD0103	R451	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0223	R452	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0223	R460	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0102	R461	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0223	R462	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0101	R463	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0103	R464	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0561	R465	SMD resistor	560 R 5% 0.125 W	Kamaya	
RD0339	R466	SMD resistor	3.3 R 5% 0.125 W	Kamaya	
RD0104	R480	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0683	R481	SMD resistor	68 k 5% 0.125 W	Kamaya	

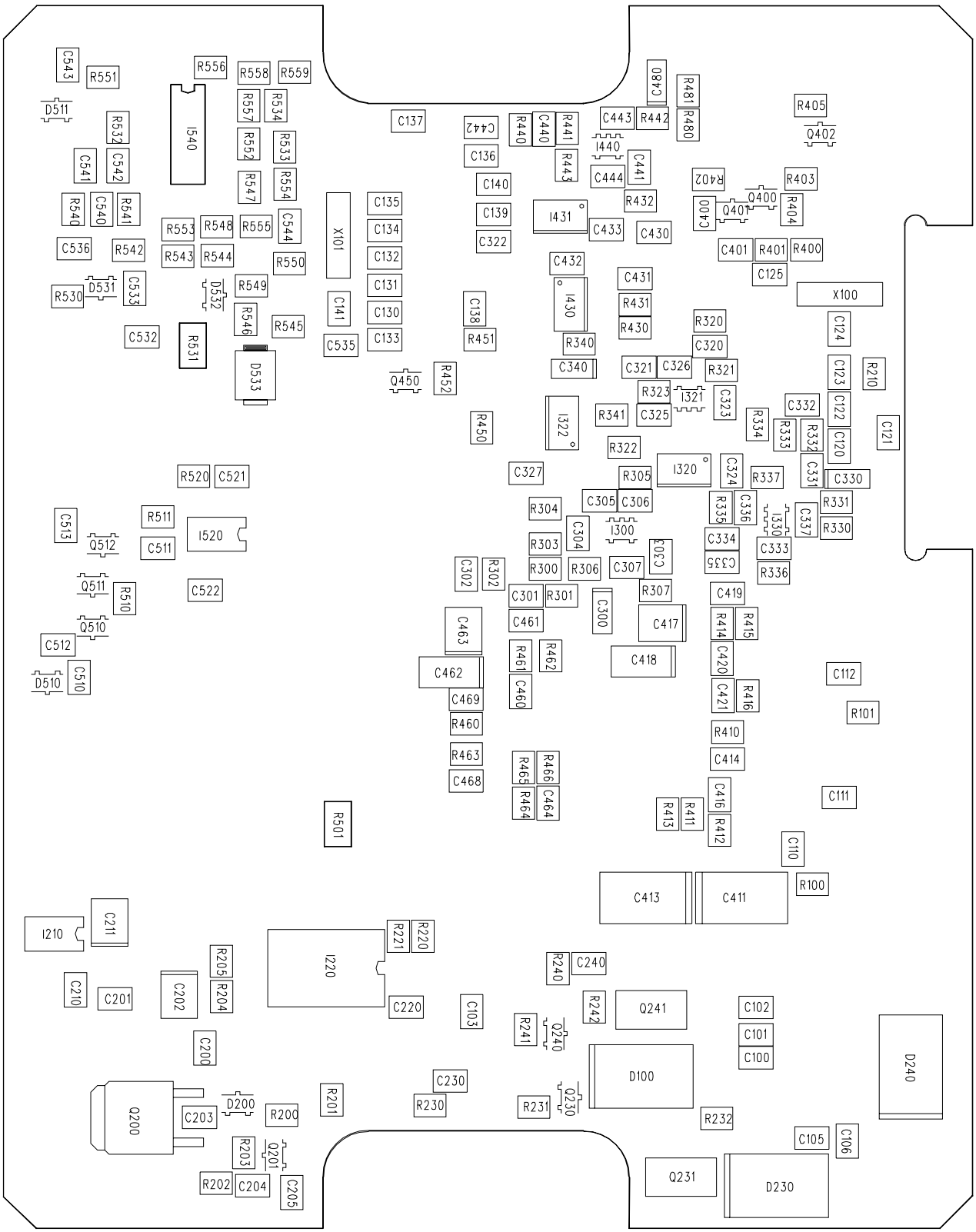
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RC0108	R501	SMD resistor	0.1 R 5% 0.25W	Philips	232272496002
RD0332	R510	SMD resistor	3.3 k 5% 0.125 W	Kamaya	
RD0103	R511	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0153	R520	SMD resistor	15 k 5% 0.125 W	Kamaya	
RD0150	R530	SMD resistor	15 R 5% 0.125 W	Kamaya	
RC0108	R531	SMD resistor	0.1 R 5% 0.25W	Philips	232272496002
RD0102	R532	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0104	R533	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0154	R534	SMD resistor	150 k 5% 0.125 W	Kamaya	
RD0471	R540	SMD resistor	470 R 5% 0.125 W	Kamaya	
RD0123	R541	SMD resistor	12 k 5% 0.125 W	Kamaya	
RD0103	R542	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R543	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0563	R544	SMD resistor	56 k 5% 0.125 W	Kamaya	
RD0103	R545	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0393	R546	SMD resistor	39 k 5% 0.125 W	Kamaya	
RD0104	R547	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0103	R548	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0685	R549	SMD resistor	6.8 M 5% 0.125 W	Kamaya	
RD0274	R550	SMD resistor	270 k 5% 0.125 W	Kamaya	
RD0105	R551	SMD resistor	1 M 5% 0.125 W	Kamaya	
RD0102	R552	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0104	R553	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0105	R554	SMD resistor	1 M 5% 0.125 W	Kamaya	
RD0105	R555	SMD resistor	1 M 5% 0.125 W	Kamaya	
RD0104	R556	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0102	R557	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0274	R558	SMD resistor	270 k 5% 0.125 W	Kamaya	
RD0683	R559	SMD resistor	68 k 5% 0.125 W	Kamaya	
LT0005	T530	Transformer			
VW0106	V100	Connector	male 6-pin	Molex	5569-06-A1
VN0003	V102	Modular jack	4-pin	AMP	215875-1
VN0005	V103	Stereo jack	3.5mm	Zupami	3.5 EJW-C386
VM0242	V104	SMD system connector	1x16 pin	AMP	188227-1
VM0116	V105	Contact strip angle	2x8	NB-electr.	H4-6-16G
LF0061	X100	SMD EMI suppression filt	4700pF/2A 1.6x6.8mm	Murata	NFM61R30T472
LF0061	X101	SMD EMI suppression filt	4700pF/2A 1.6x6.8mm	Murata	NFM61R30T472

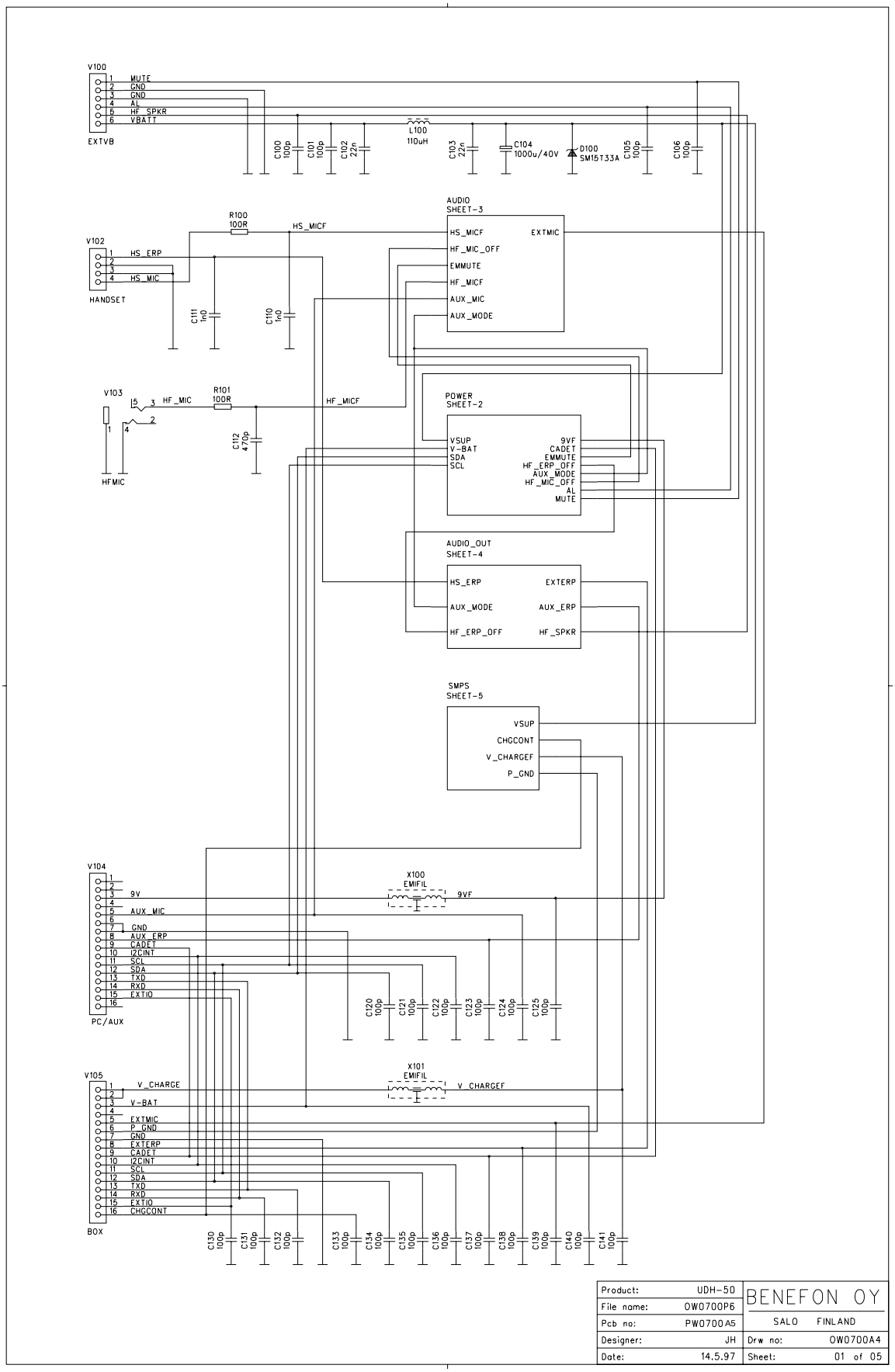
Last update 14.05.97

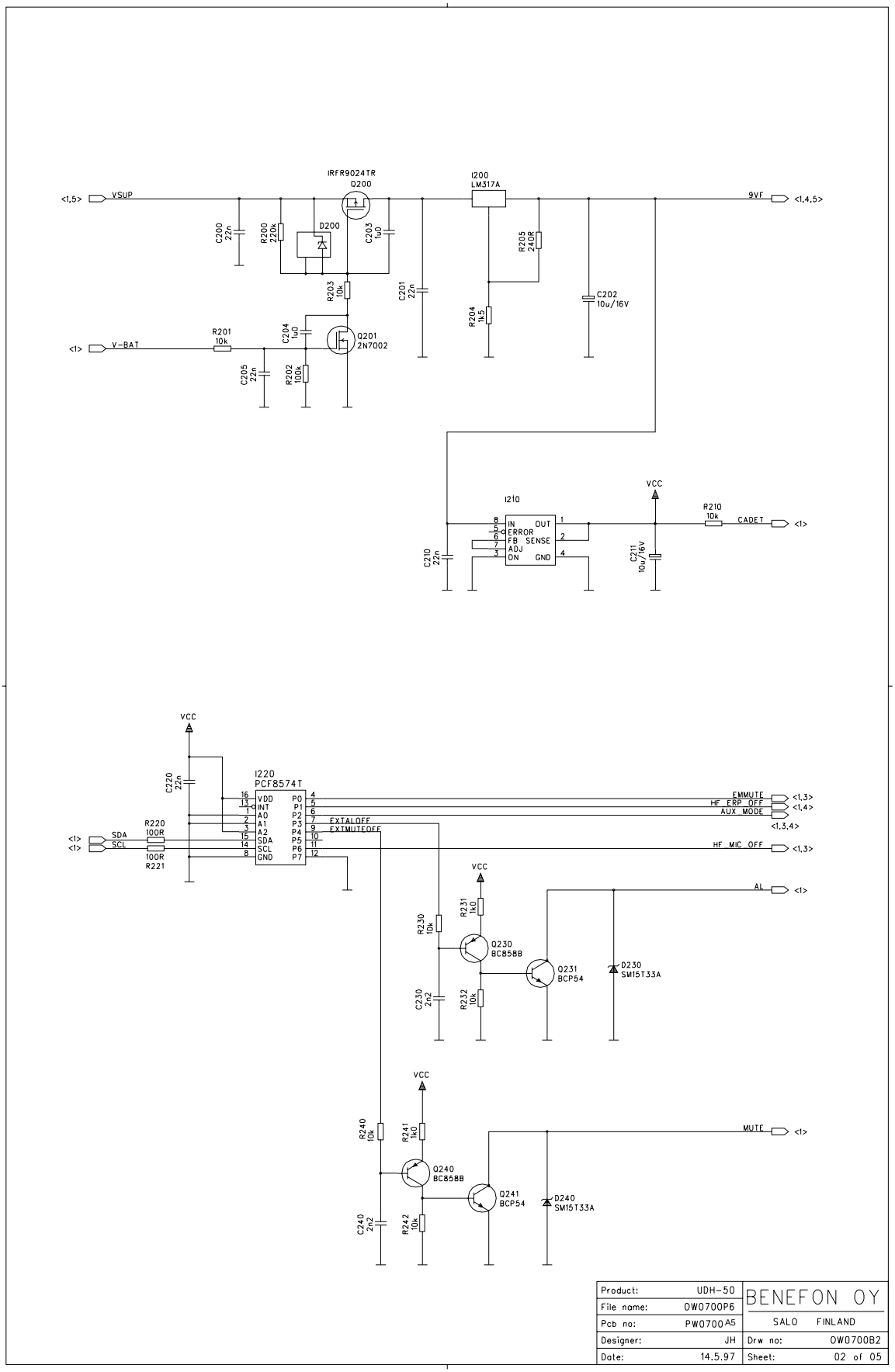
The Top Side Layout PW0700A5



The Bottom Side Layout PW0700A5




V100
MUTE
GND
GND
AL
HF_SPKR
VBATT
EXTVB
C100 100p
C101 100p
C102 22n
L100 110uH
C103 22n
C104 1000u/40V
D100 SM15T33A
C105 100p
C106 100p
AUDIO SHEET-3
HS_MICF
HF_MIC_OFF
EMMUTE
HF_MICF
AUX_MIC
AUX_MODE
EXTMIC
R100 100R
V102
HS_ERP
HS_MIC
HANDSET
C111 1n0
C110 1n0
V103
HF_MIC
R101 100R
C112 470p
HFMIC
POWER SHEET-2
VSUP
V-BAT
SDA
SCL
9VF
CADET
EMMUTE
HF_ERP_OFF
AUX_MODE
HF_MIC_OFF
AL
MUTE
AUDIO_OUT SHEET-4
HS_ERP
AUX_MODE
HF_ERP_OFF
EXTERP
AUX_ERP
HF_SPKR
SMPS SHEET-5
VSUP
CHGCONT
V_CHARGEF
P_GND
V104
9V
AUX_MIC
GND
AUX_ERP
CADET
I2CINT
SCL
SDA
TXD
RXD
EXTIO
PC/AUX
X100 EMIFIL
9VF
C120 100p
C121 100p
C122 100p
C123 100p
C124 100p
C125 100p
X101 EMIFIL
V_CHARGEF
V105
V_CHARGE
V-BAT
EXTMIC
P_GND
GND
EXTERP
CADET
I2CINT
SCL
SDA
TXD
RXD
EXTIO
CHGCONT
BOX
C130 100p
C131 100p
C132 100p
C133 100p
C134 100p
C135 100p
C136 100p
C137 100p
C138 100p
C139 100p
C140 100p
C141 100p
Product: UDH-50
File name: OW0700P6
Pcb no: PW0700A5
Designer: JH
Date: 14.5.97
BENEFON OY
SALO FINLAND
Drw no: OW0700A4
Sheet: 01 of 05


IRFR9024TR
Q200
I200
LM317A
<1,5> VSUP
9VF <1,4,5>
C200 22n
R200 220k
D200
C203 1u0
R205 240R
R203 10k
C201 22n
C202 10u/16V
R204 1K5
<1> V-BAT
R201 10k
C204 1u0
Q201 2N7002
C205 22n
R202 100k
I210
IN OUT
ERROR
FB SENSE
ADJ
ON GND
VCC
R210 10k
CADET <1>
C210 22n
C211 10u/16V
VCC
I220
PCF8574T
C220 22n
VDD P0
INT P1
A0 P2
A1 P3
A2 P4
SDA P5
SCL P6
GND P7
EXTALOFF
EXTMUTEOFF
EMMUTE <1,3>
HF_ERR_OFF <1,4>
AUX_MODE <1,3,4>
HF_MIC_OFF <1,3>
<1> SDA
<1> SCL
R220 100R
100R R221
VCC
AL <1>
R230 10k
R231 1k0
Q230 BC858B
Q231 BCP54
D230 SM15T33A
C230 2n2
R232 10k
VCC
MUTE <1>
R240 10k
R241 1k0
Q240 BC858B
Q241 BCP54
D240 SM15T33A
C240 2n2
R242 10k
Product: UDH-50
File name: OW0700P6
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Designer: JH
Date: 14.5.97
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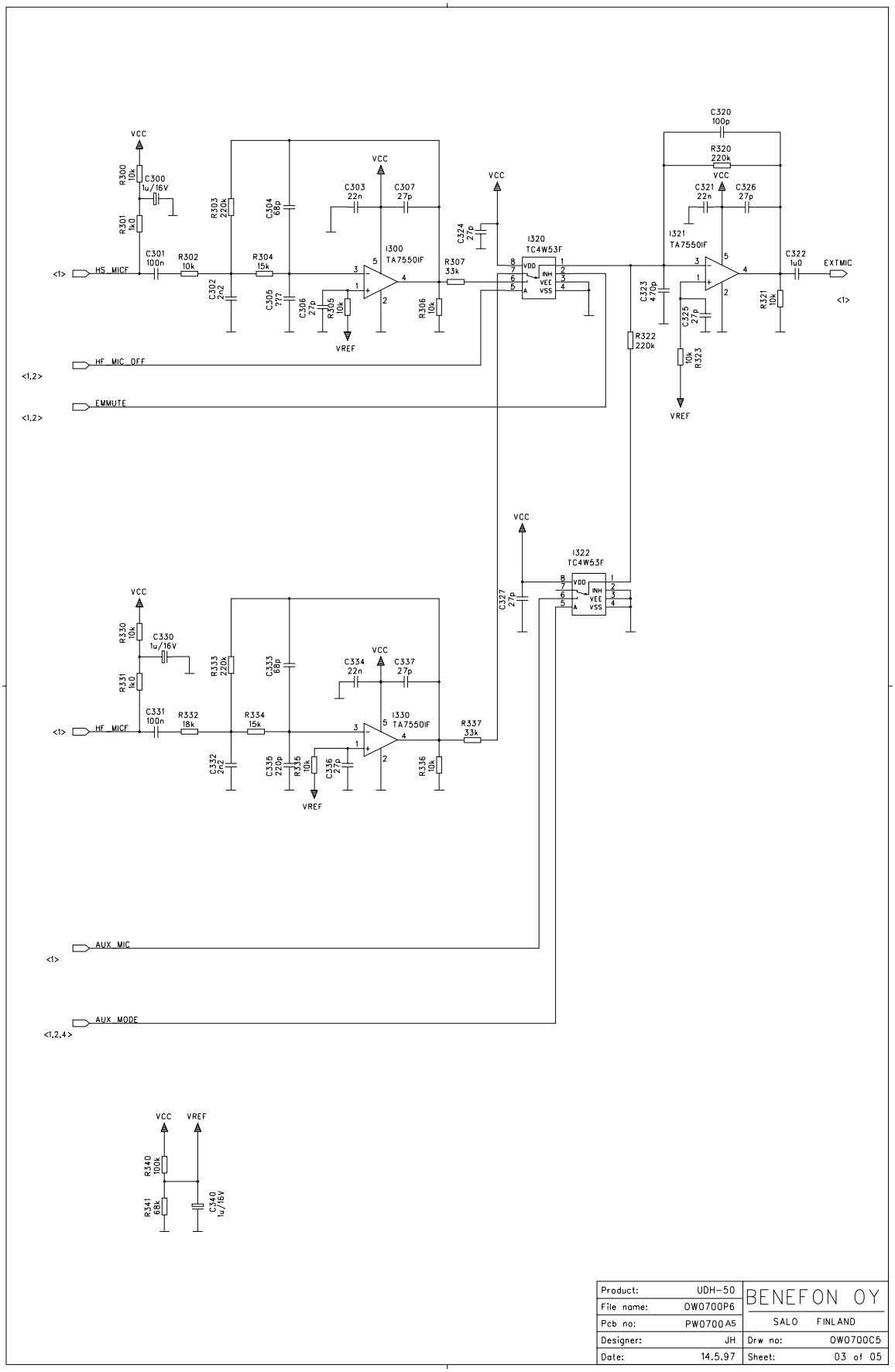
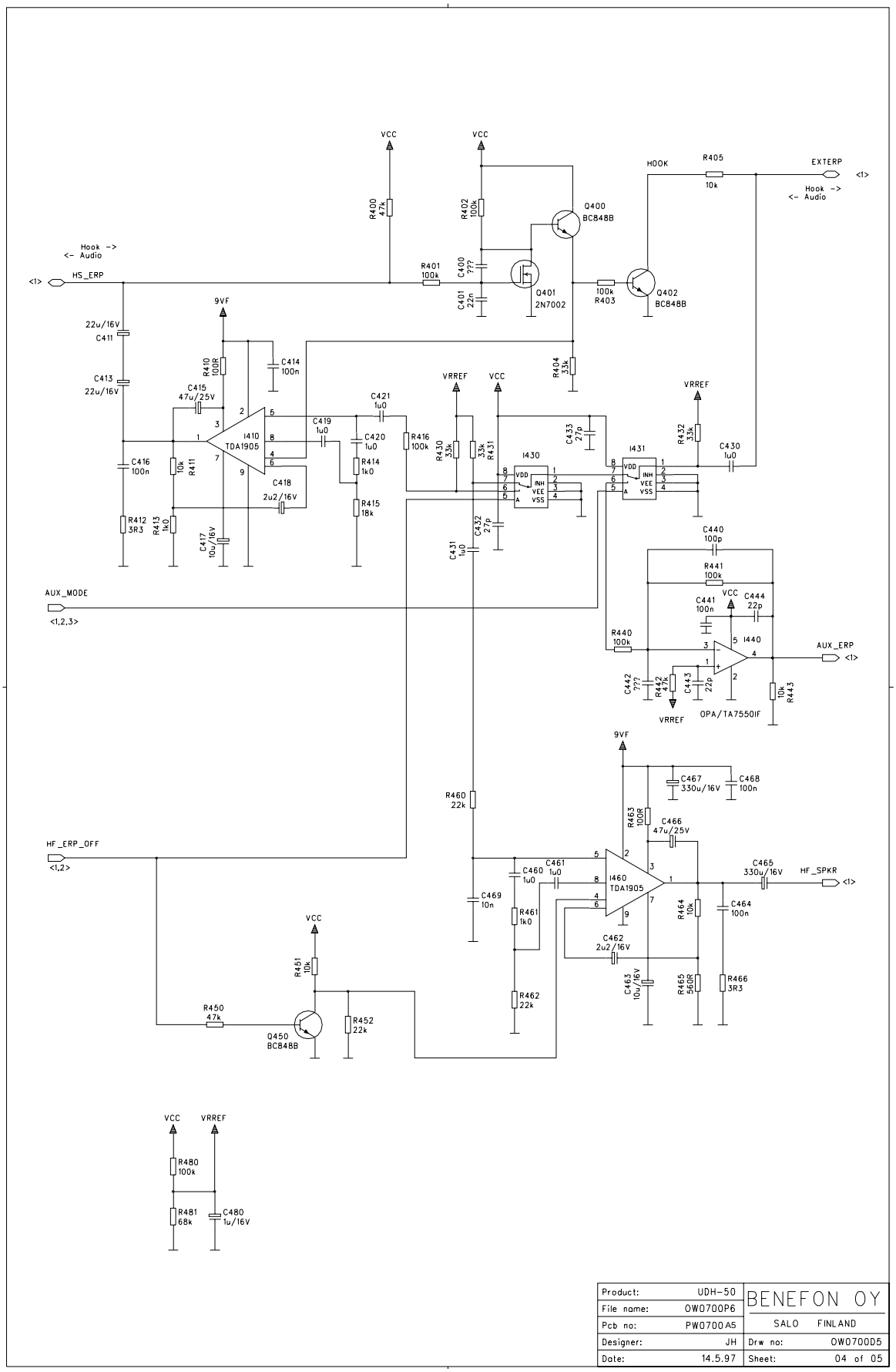
SALO FINLAND
Drw no: OW0700B2
Sheet: 02 of 05


VCC
R300 10k
C300 1u/16V
R301 1k0
C301 100n
R302 10k
R303 220k
C304 68p
C303 22n
C307 27p
I300 TA7550IF
R304 15k
C302 2n2
C305 ???
C306 27p
R305 10k
VREF
R306 10k
R307 33k
<1> HS_MICF
HF_MIC_OFF
<1,2>
EMMUTE
<1,2>
C324 27p
I320 TC4W53F
VDD
INH
VEE
VSS
C320 100p
R320 220k
C321 22n
C326 27p
I321 TA7550IF
C322 1u0
EXTMIC
<1>
C333 470p
C325 27p
R321 10k
R322 220k
10k R323
VREF
C327 27p
I322 TC4W53F
R330 10k
C330 1u/16V
R331 1k0
C331 100n
R332 18k
R333 220k
C333 68p
C334 22n
C337 27p
I330 TA7550IF
R334 15k
C332 2n2
C335 220p
R335 10k
C336 27p
R336 10k
R337 33k
<1> HF_MICF
AUX_MIC
<1>
AUX_MODE
<1,2,4>
VREF
R340 100k
R341 68k
C340 1u/16V
Product: UDH-50
File name: OW0700P6
Pcb no: PW0700A5
Designer: JH
Date: 14.5.97
BENEFON OY
SALO FINLAND
Drw no: OW0700C5
Sheet: 03 of 05



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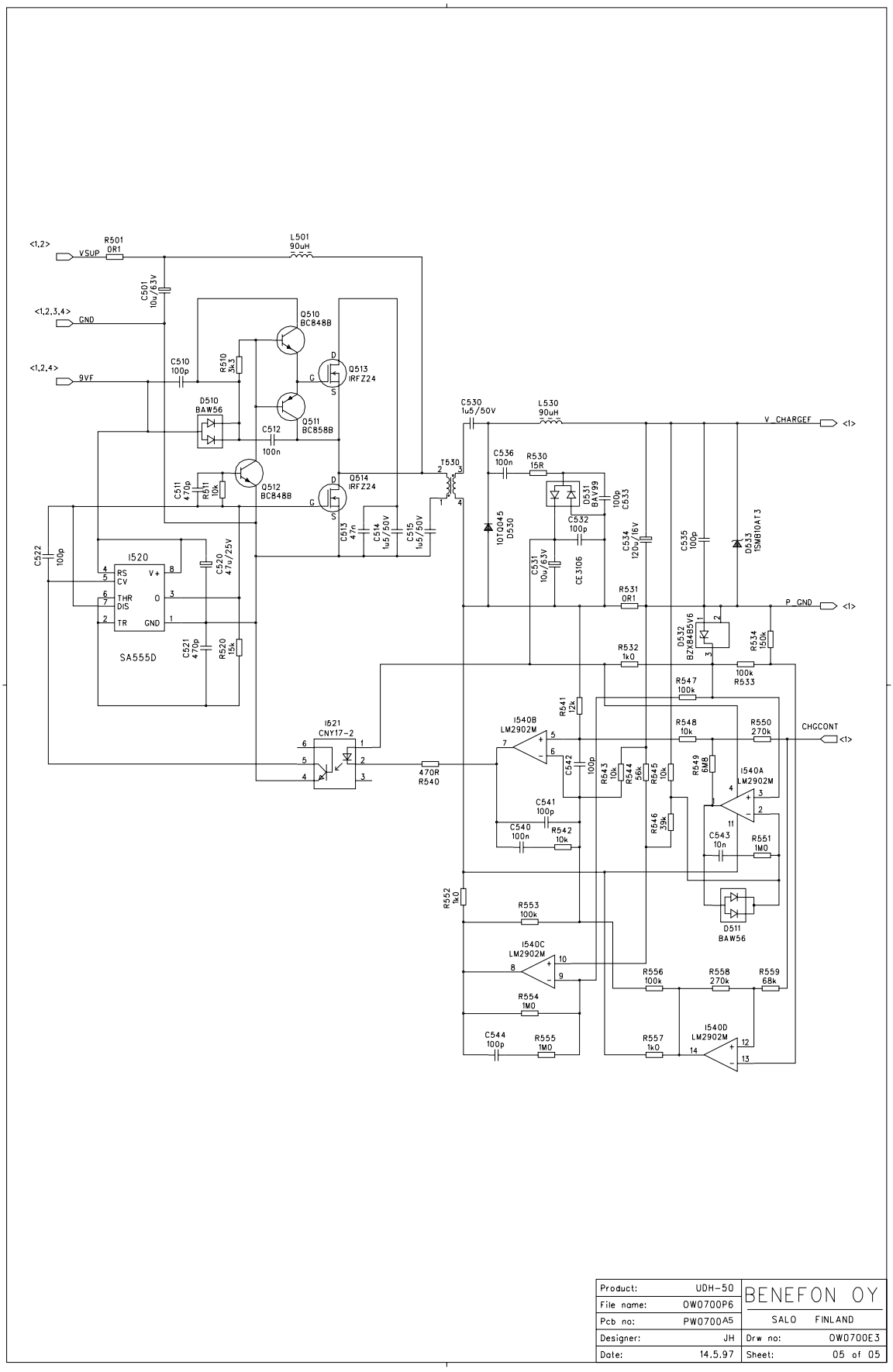
File name:	OW0700P6		
Pcb no:	PW0700A5	SALO	FINLAND
Designer:	JH	Drw no:	OW0700D5
Date:	14.5.97	Sheet:	04 of 05



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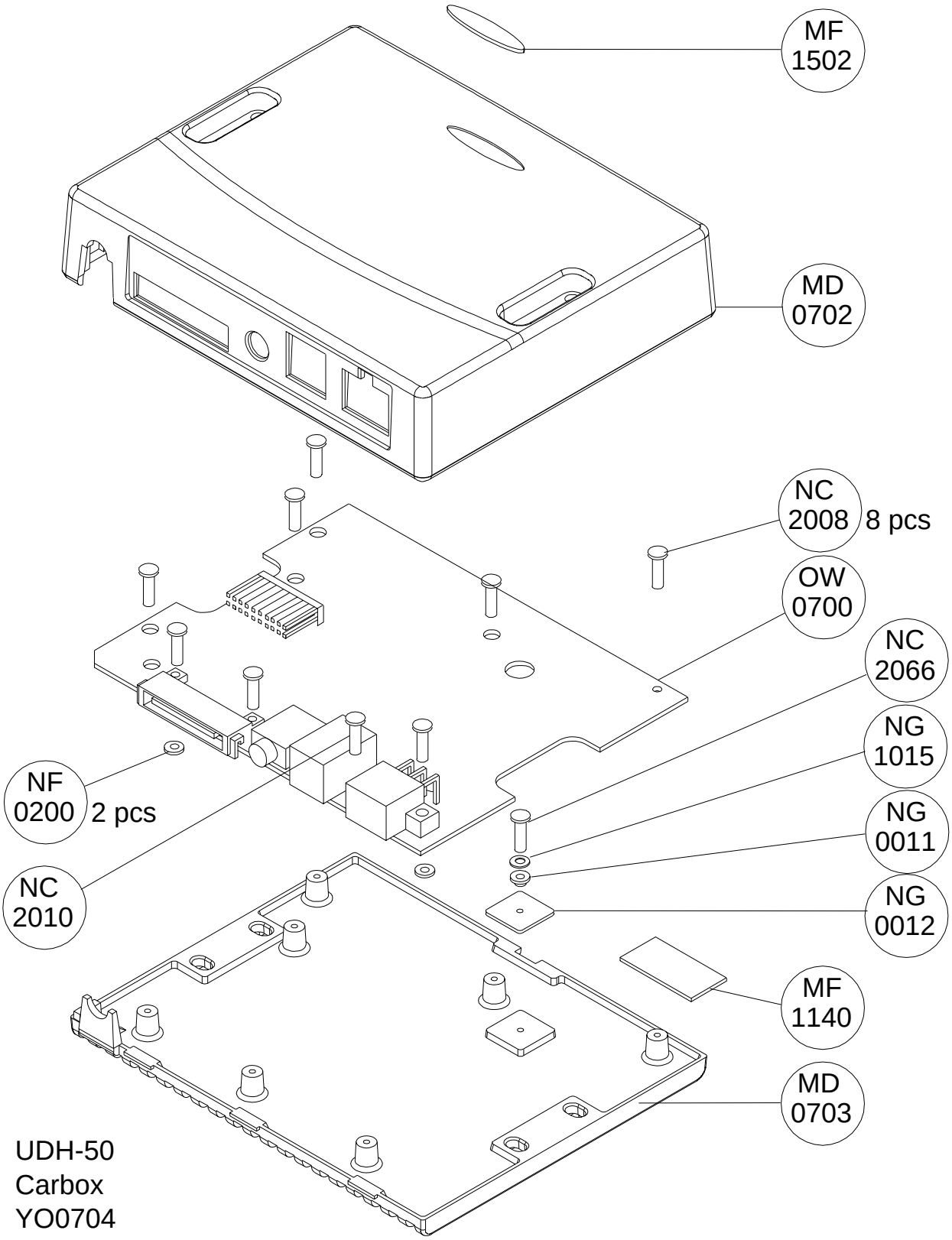
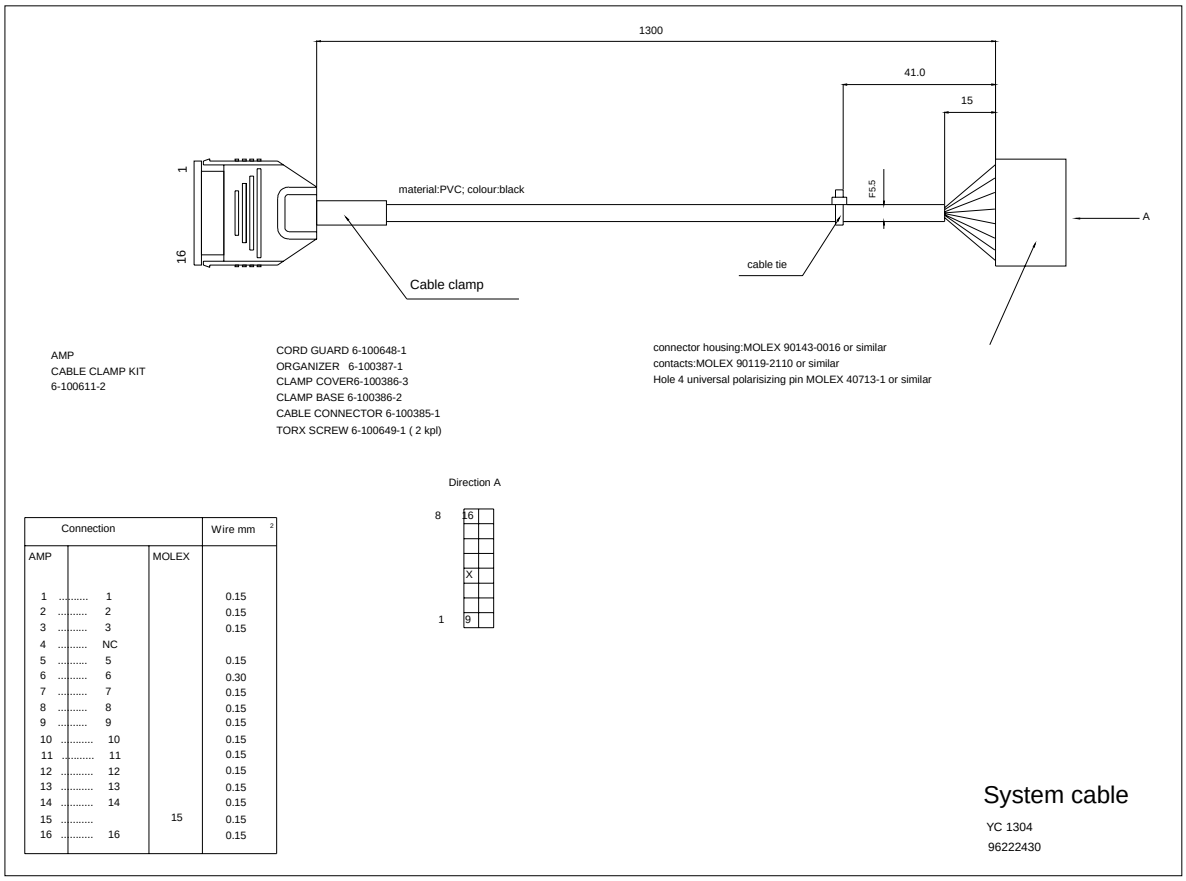
File name:	OW0700P6	SALO FINLAND	
Pcb no:	PW0700A5		
Designer:	JH	Drw no:	OW0700E3
Date:	14.5.97	Sheet:	05 of 05

YO0704 / Mechanics



7.2.4 System Cable

System cable YC1304

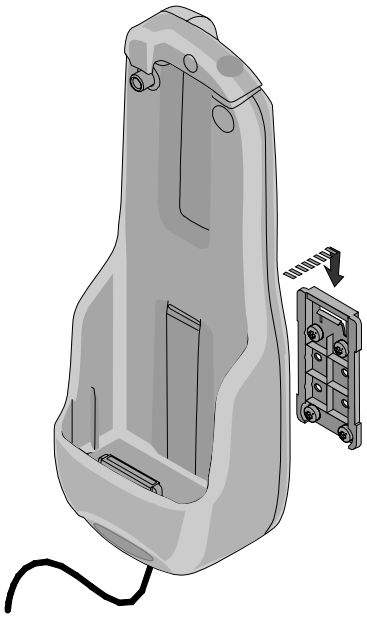


Connection AMP		Connection MOLEX	Wire mm²
1	1		0.15
2	2		0.15
3	3		0.15
4	NC		
5	5		0.15
6	6		0.30
7	7		0.15
8	8		0.15
9	9		0.15
10	10		0.15
11	11		0.15
12	12		0.15
13	13		0.15
14	14		0.15
15		15	0.15
16	16		0.15

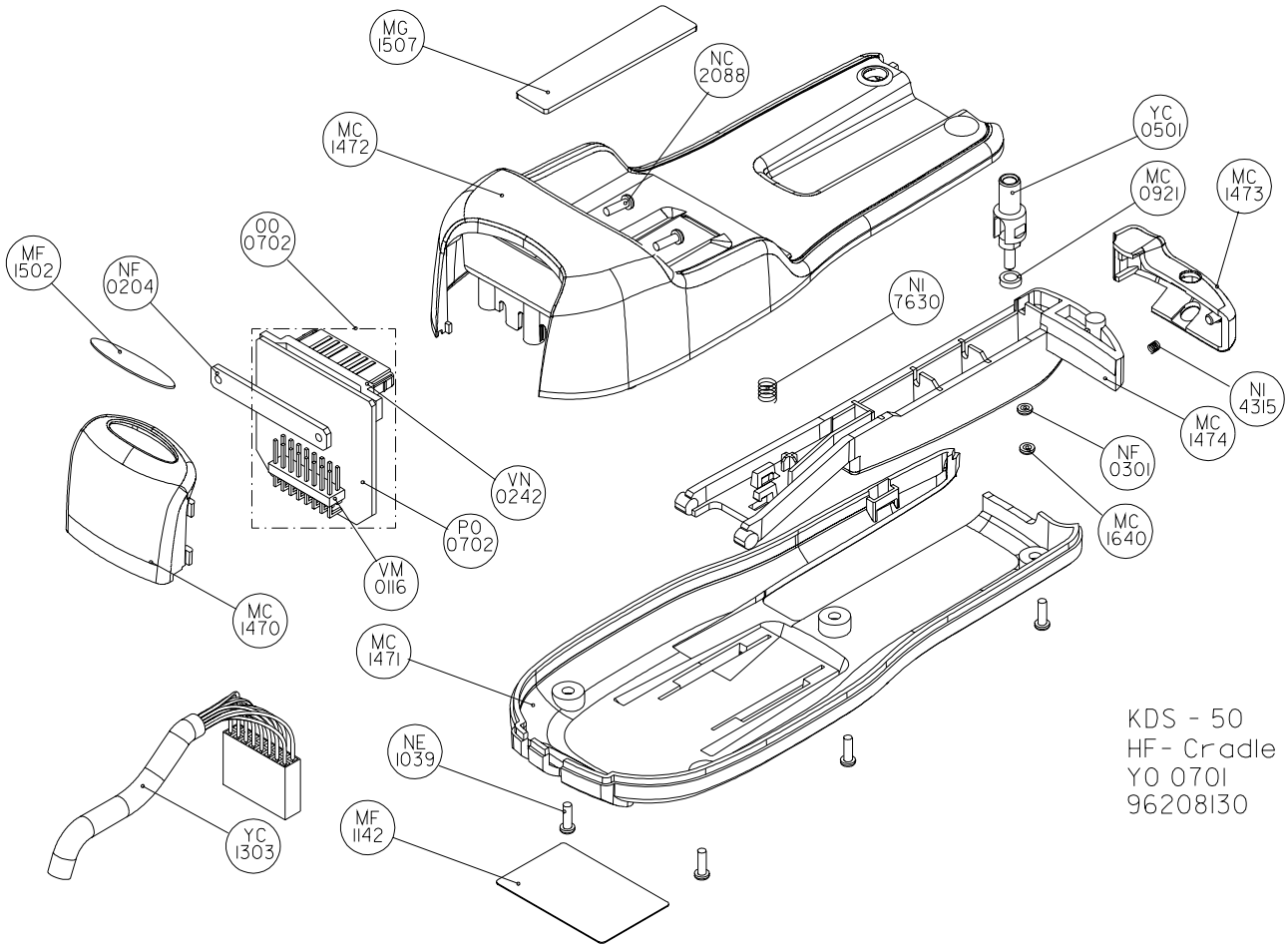
YC1304 is a system cable for the hands-free car kit of Gamma.

7.3 HANDS-FREE CRADLE KDS-50

YO0701

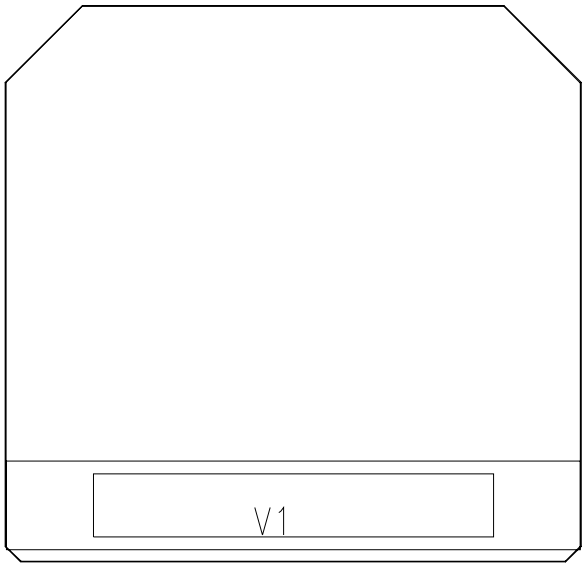


7.3.1 Mechanics

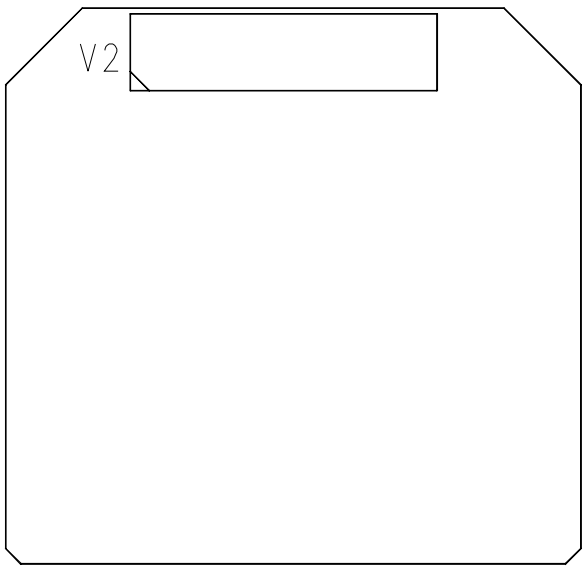


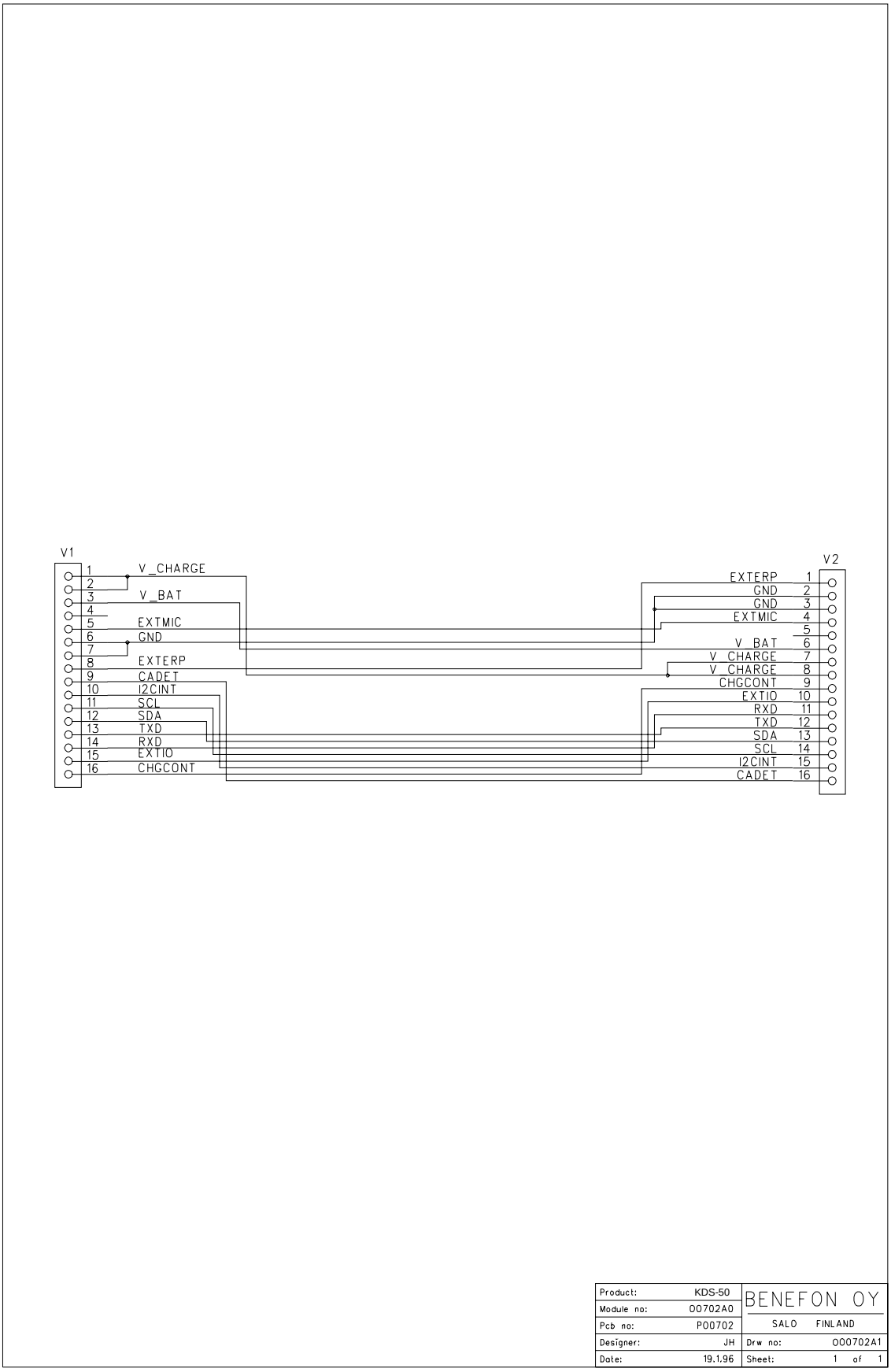
7.3.2 Module OO0702

The Top Side Layout PO0702A0



The Bottom Side Layout PO0702A0

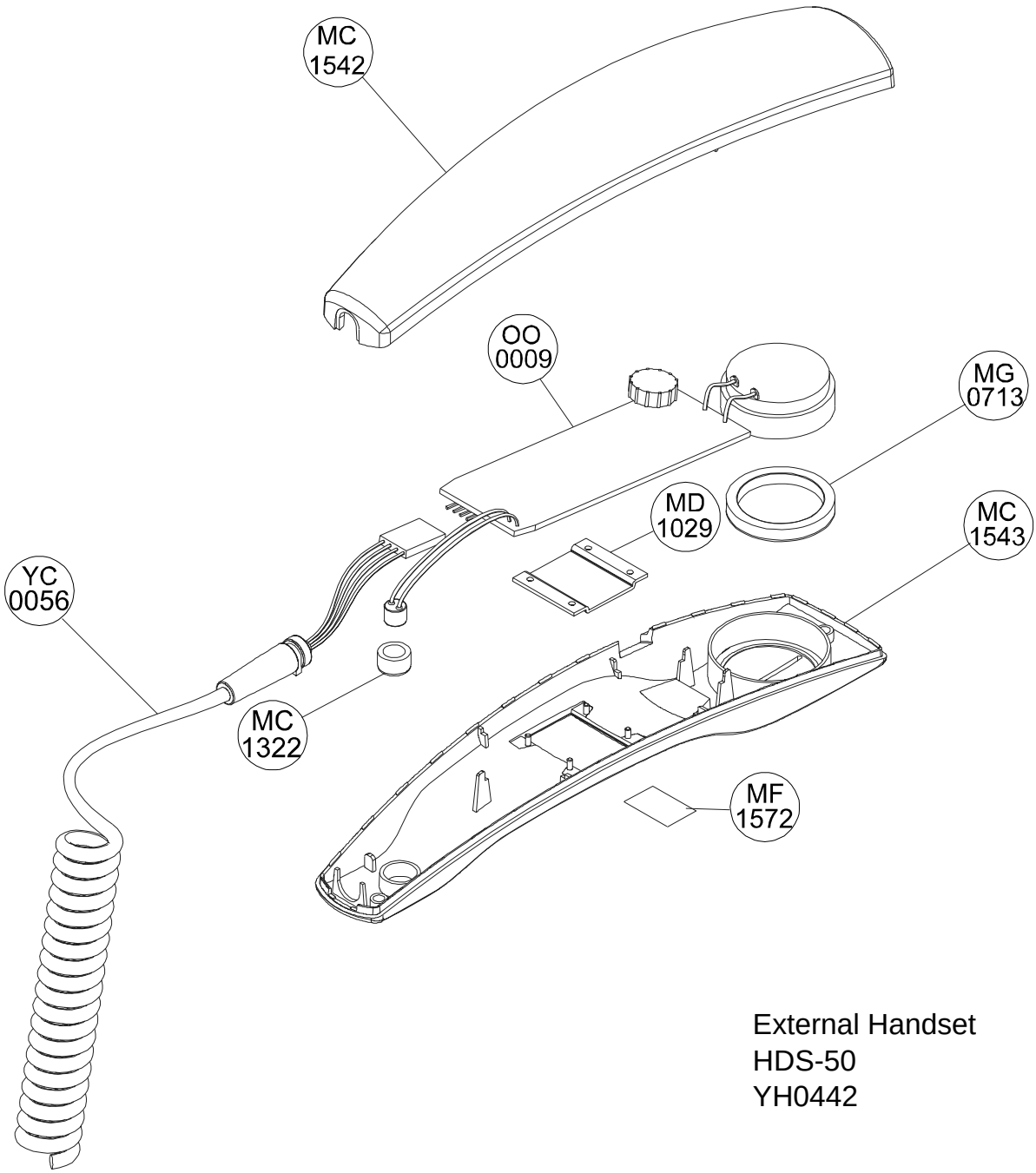



V1
1 V_CHARGE
2
3 V_BAT
4
5 EXTMIC
6 GND
7
8 EXTERP
9 CADET
10 I2CINT
11 SCL
12 SDA
13 TXD
14 RXD
15 EXTIO
16 CHGCONT
V2
EXTERP 1
GND 2
GND 3
EXTMIC 4
5
V_BAT 6
V_CHARGE 7
V_CHARGE 8
CHGCONT 9
EXTIO 10
RXD 11
TXD 12
SDA 13
SCL 14
I2CINT 15
CADET 16
Product: KDS-50
Module no: 00702A0
Pcb no: P00702
Designer: JH
Date: 19.1.96
BENEFON OY
SALO FINLAND
Drw no: 000702A1
Sheet: 1 of 1

7.4 EXTERNAL HANDSET WITH CRADLE HDS-50

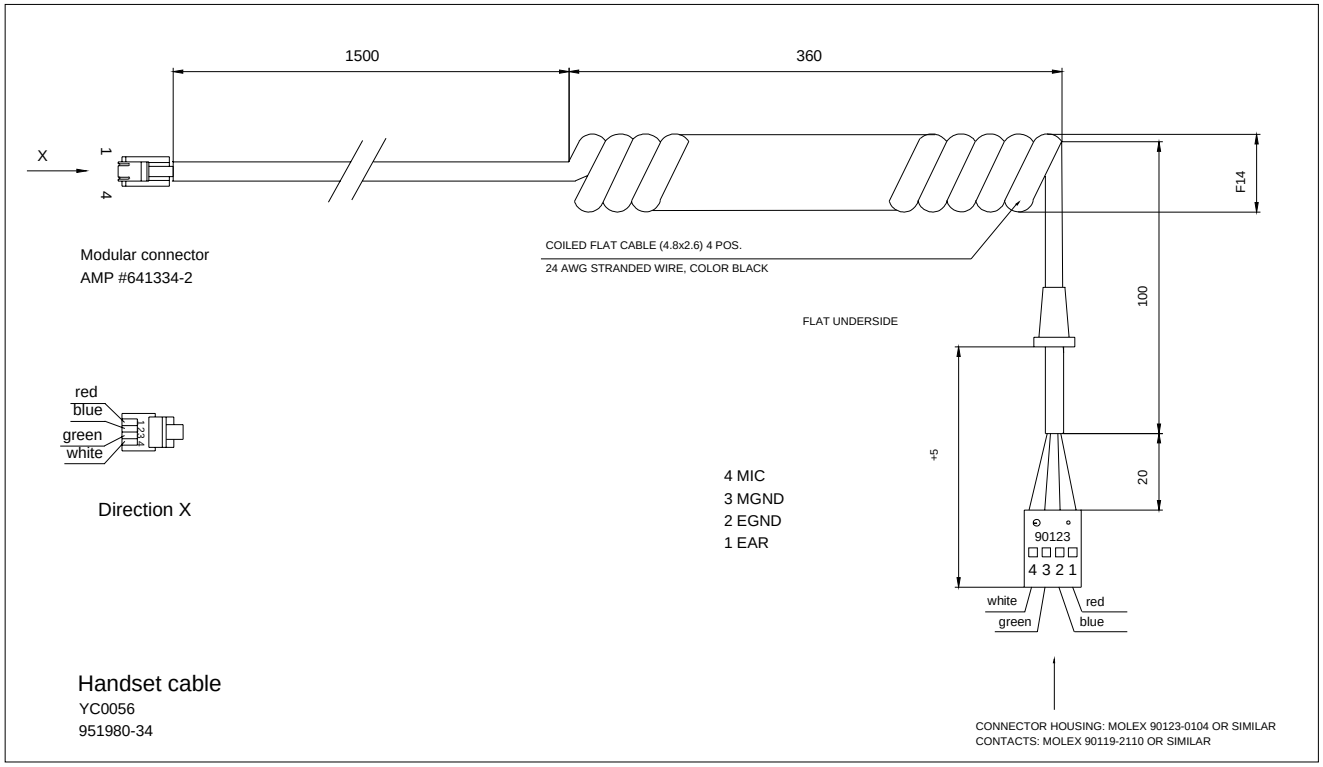
7.4.1 External Handset (not serviceable)

7.4.1.1 Mechanics



External Handset
HDS-50
YH0442

7.4.1.2 Cable



Outer Sheath	Material:	Coloured PVC
	Colour:	Black, BS 6748 TYPE TM2 and BT M140C
	Finnish:	Matt
Length:	Total:	5 ±0,2 m
	Coiled length:	3 ±0,2 m
Number of conductors:	4	
Size:	AWG 26 stranded wire	
Resistance:	< 100 mohm/m	
Number of strands	Multiwire (30 x 0.08 mm PCW)	
Insulation material:	Coloured polypropylene	
Strain relief:	Shall be firmly attached to the cable	

7.4.2 General

The external handset is designed for use together with the hands-free car kit. The external handset includes a microphone, an earphone and a reed switch. The handset kit contains a handset with a cable and a modular connector, a cradle, and mounting devices. A reed element shall be used to switch the audio signals to the handset when the handset is hooked off.

7.4.3 Connector XIN Signals

1	ERP	earphone input, HOOK state
2	GND	ground
3	GND	ground
4	MIC	microphone output

7.4.4 Microphone

Sensitivity:	-43 dB ± 6 dB
Vendor and part no:	Hosiden KUC2023 or KUB2023
RF decoupling capacitor:	33 pF; Size: 0805; Mounted on the microphone element.

7.4.5 Speaker

Sensitivity	95 dB ± 5 dB
Vendor and part no:	Hosiden KDR0928-IE-0030
Impedance:	min 120 ohm
Resistance (DC):	max 3 kohm

7.4.6 Hook

The hook operation is done by use of a reed switch. Hook operation is connected to the handset earphone terminal.

The operation is as follows:

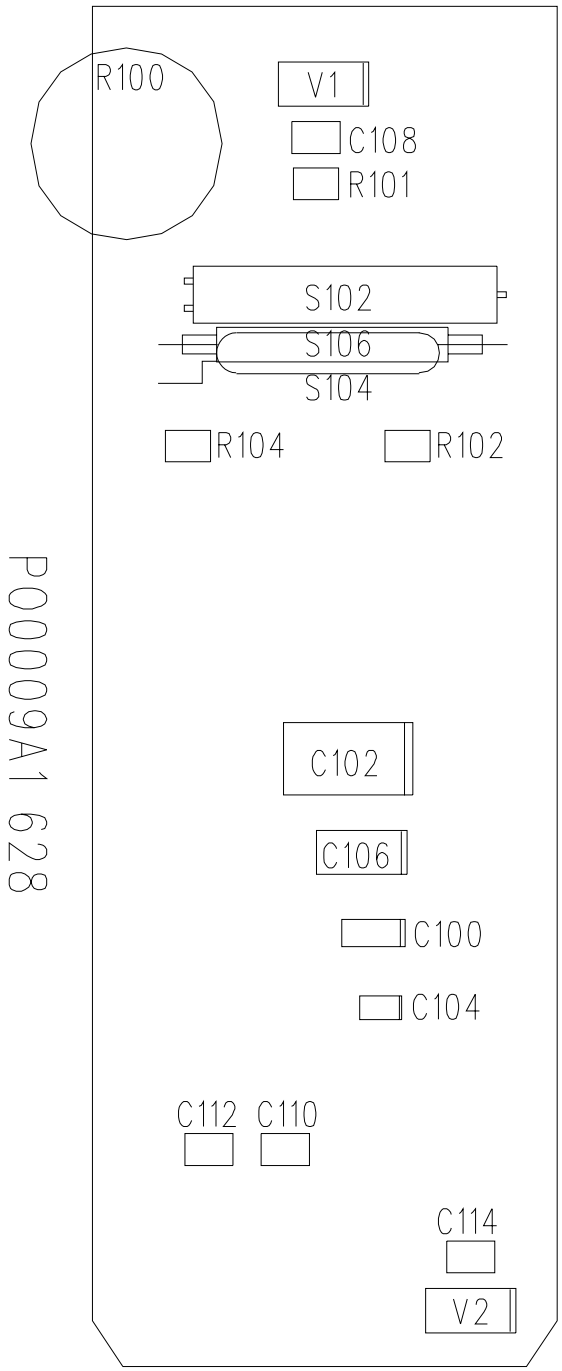
ON_HOOK	HIGH DC IMPEDANCE (SWITCH OPEN)
OFF_HOOK	LOW DC IMPEDANCE (SWITCH CLOSED), 2.2 KOHM RESISTANCE

7.4.7 Parts list OO0009

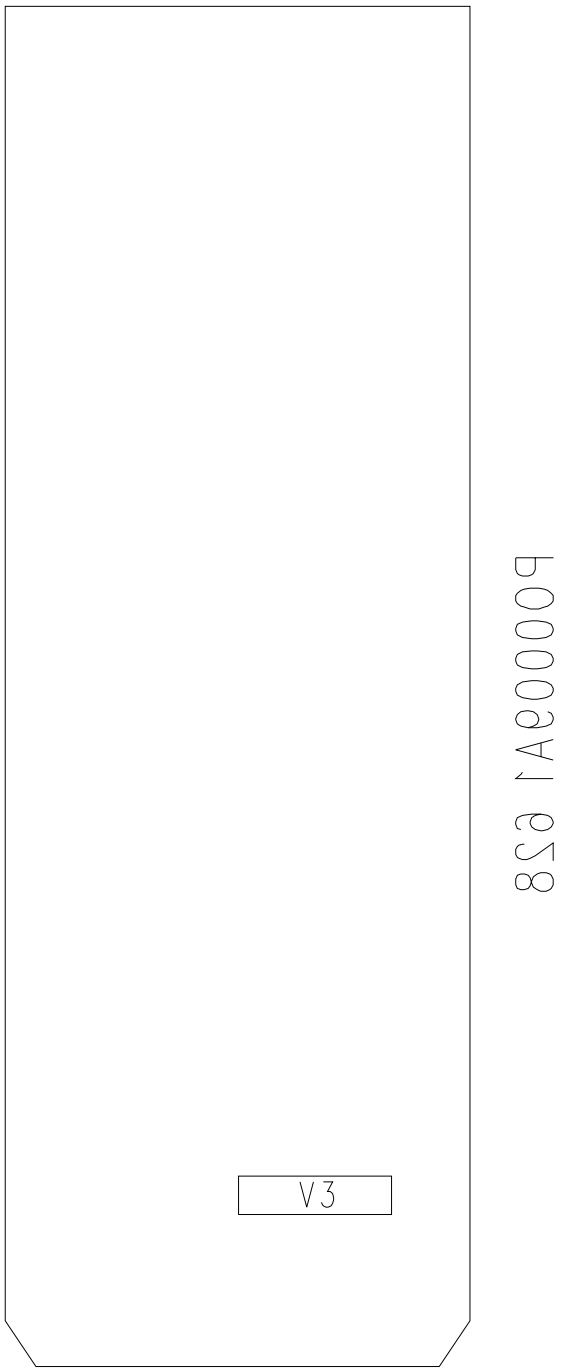
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CU0475	C106	SMD tantal	4.7uF/16V 20% 4.7X2.6MM	Matsushita	ECST1CB 475R
CD0221	C108	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CD0221	C110	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CD0221	C112	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CD0221	C114	SMD capasitor	220 pF 5% 50 V NP0	Philips	
PO0009	M100	PCB for OO0900			
RP0222	R100	Edge control pot.	2.2k 0.1W LOG.	Ruwido	0037-006 2k2 log
RD0222	R102	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
AR0016	S102	Reed-relay		Hamlin	59160-031
AE0018	XERP	Assembled earphone unit	150ohm/94-+3dB/60mW	Hoside	KDR0928-1E-0300
AM2024	XMIC	Assembled microphone unit	Electret condenser -43-+4dB	Hoside	KUB2023-030444SB
VM0204	XIN	Contact strip angle	1 x 4		

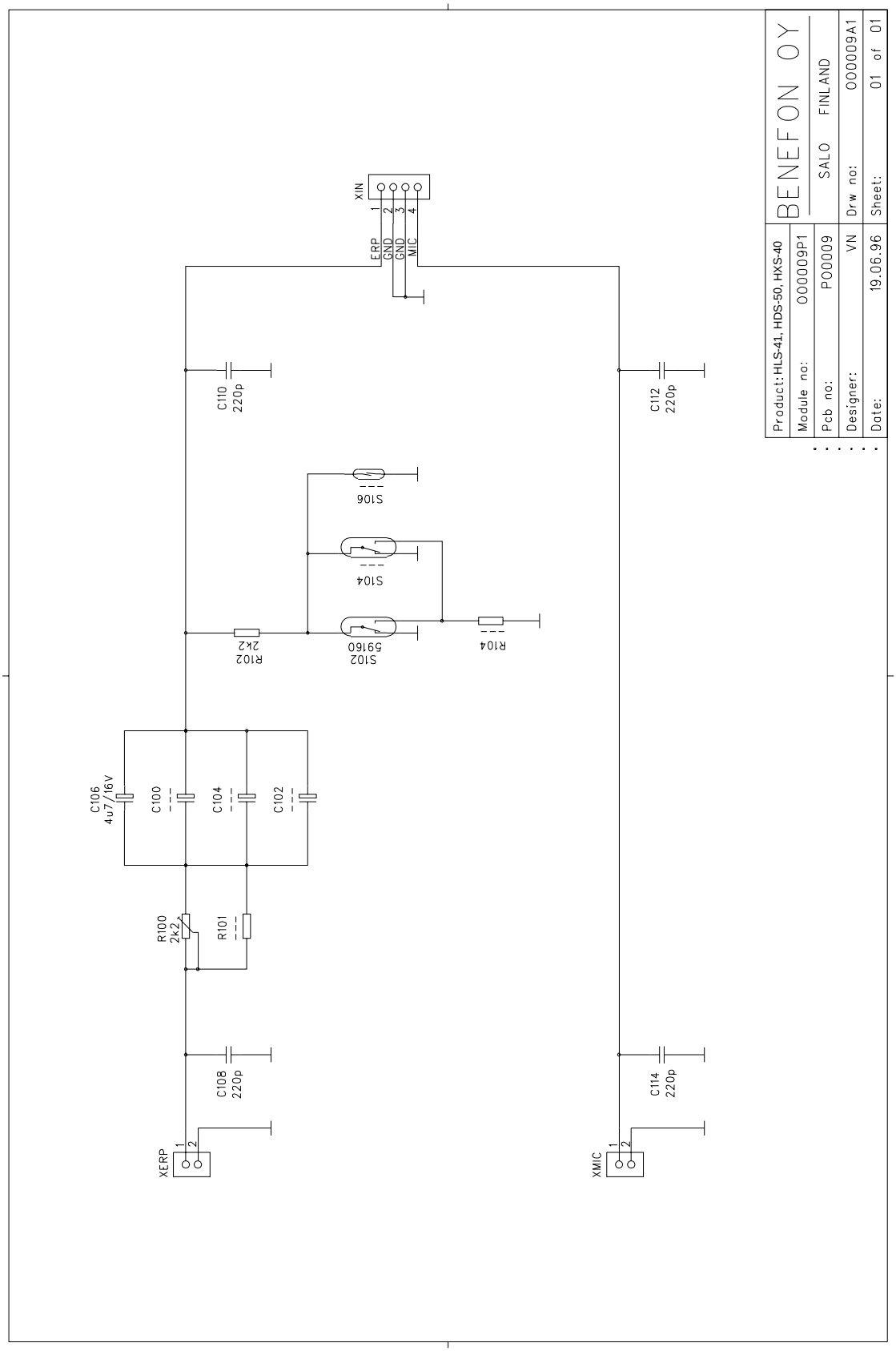
Last
update
16.05.97

The Top Side Layout PO0009A1 (Schematic OO0009A1)



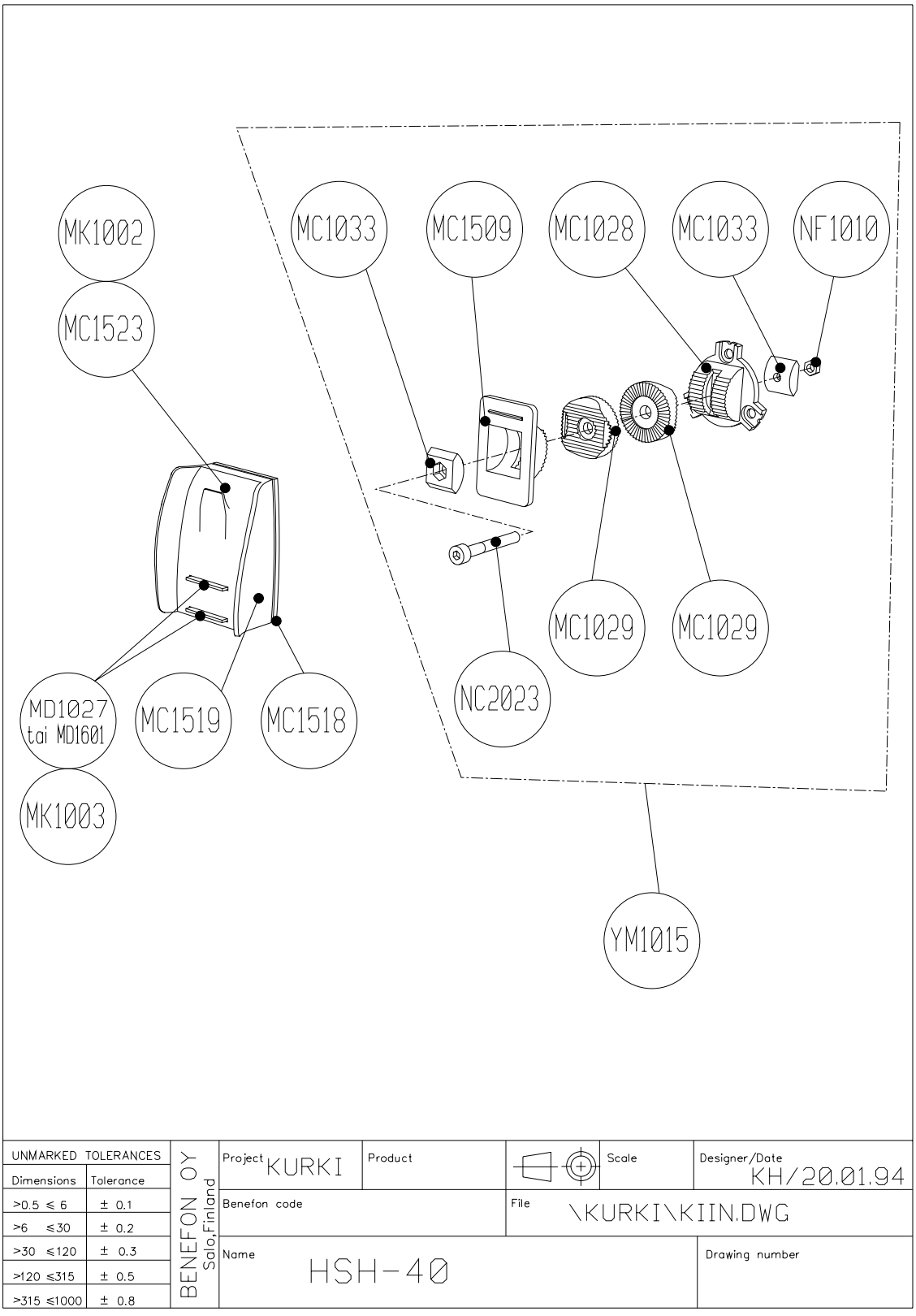
The Bottom Side Layout PO0009A1 (Schematic OO0009A1)



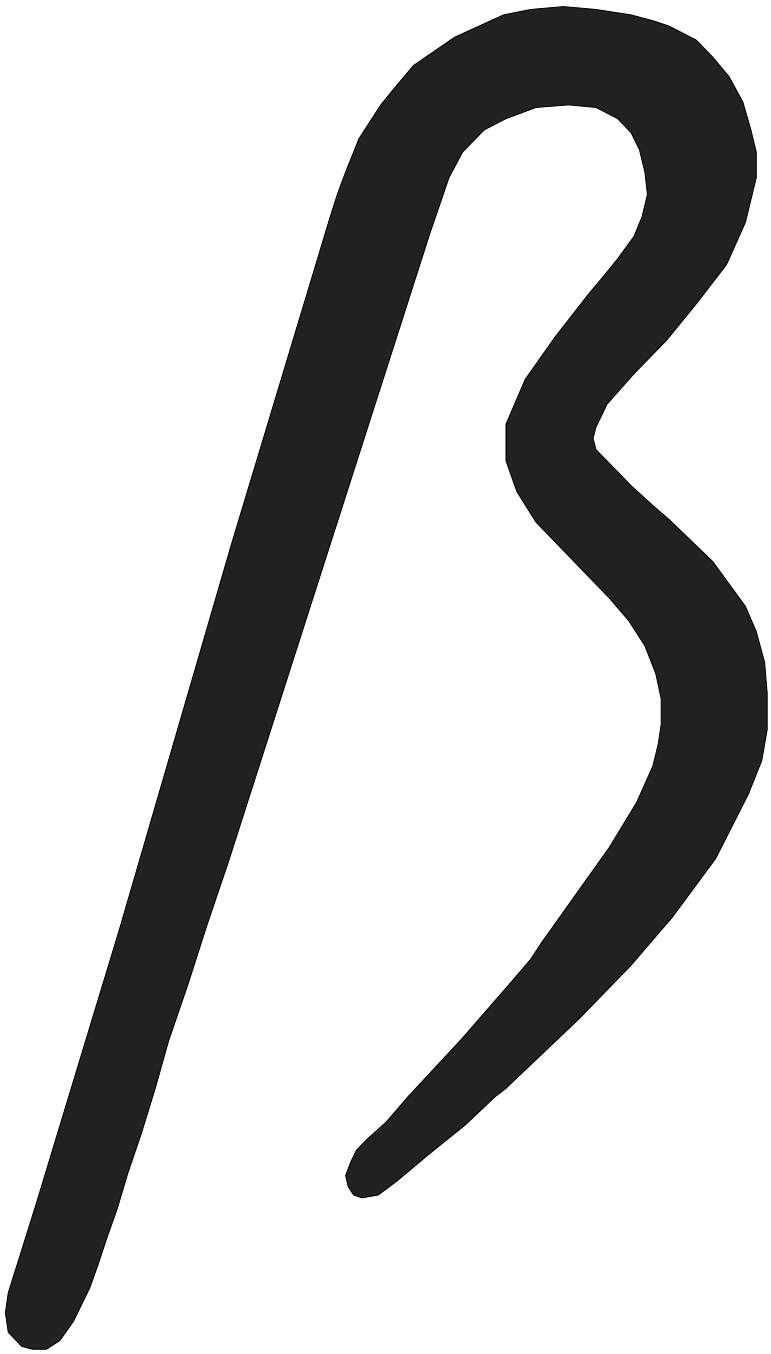

XIN
1
2
3
4
ERP
GND
GND
MIC
C110
220p
C112
220p
S106
S104
S102
59160
R102
2k2
R104
C106
4u7/16V
C100
C104
C102
R100
2k2
R101
C108
220p
C114
220p
XERP
XMIC
BENEFON OY
SALO FINLAND
Product: HLS-41, HDS-50, HXS-40
Module no: 0000009P1
Pcb no: P00009
Designer: VN
Date: 19.06.96
Drw no: 0000009A1
Sheet: 01 of 01

7.4.8 Cradle

7.4.8.1 Mechanics



8.0 OFFICE SET



OFFICE SET

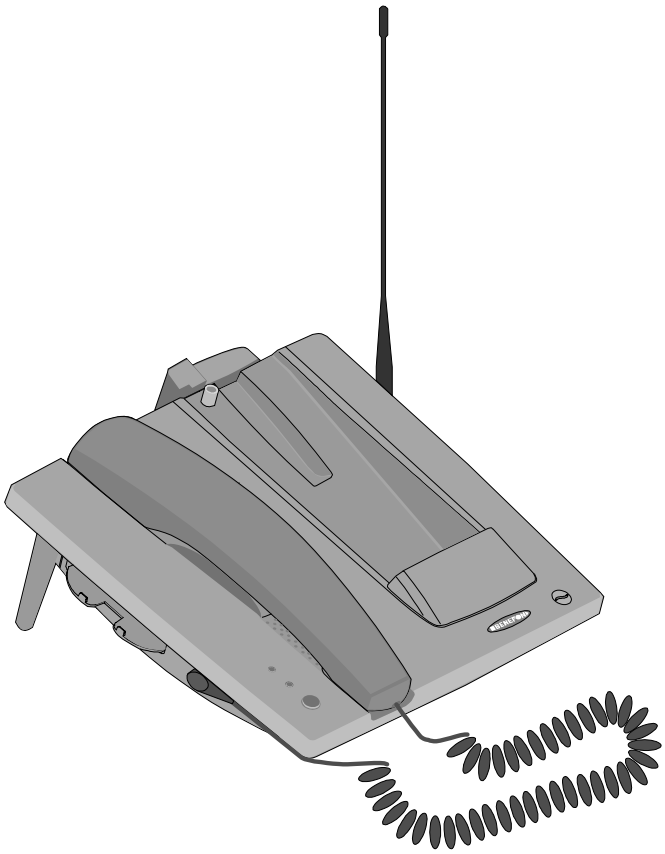
8.1 OFFICE SET DDS-50

YO0311

8.1.1 General

Main features of the office set are:

- Hands Free microphone and speaker
- Handset
- connection for external antenna
- intelligent charge functions for both the phone battery and the spare battery
- connection for additional accessories



Office set DDS-50

The office set is designed to make the use of the mobile phone easier and more effective both at home and at the workplace.

You can charge the phone battery and charge and discharge the spare battery in the desk top stand. The desk top stand also offers a fixed microphone and loudspeaker for a hands free function. An external antenna and various terminal appliances can also be connected to the desk top stand. A handset guarantees privacy for your conversation and improves audibility in a noisy environment.

8.1.2 Connectors

8.1.2.1 Main module OO0303

AUX/PWR_IN_1, AUX/PWR_IN_2

PIN #	NAME	DESCRIPTION	LEVEL
1,2	VB	power in	max. 10 V, 1,5 A
3	PH_VOLT	mobile battery voltage	
4	nc		
5	AUX_MIC	auxiliary microphone signal	
6,7	GND	ground	
8	AUX_ERP	auxiliary earphone signal	
9	nc		
10	I2CINT	I2C bus interrupt	
11	SCL	I2C bus clock	
12	SDA	I2C bus data	
13	TxD	RS-232 TxD	
14	RxD	RS-232 RxD	
15	nc		
16	VB_CTRL	power supply control	0 - 5 VDC

V2

PIN #	NAME	DESCRIPTION	LEVEL
1	GND	ground	
2	HS_MIC	Handset microphone signal	
3	HS_ERP	Handset earphone signal	
4	PH_R	phone charge indicator led, red	0 / 5 VDC
5	PH_G	phone charge indicator led, green	0 / 5 VDC
6	B_R	battery charge indicator led, red	0 / 5 VDC
7	B_G	battery charge indicator led, green	0 / 5 VDC
8	SWITCH	battery discharge switch	0/ 5 VDC

V4

PIN #	NAME	DESCRIPTION	LEVEL
1	V_CHG	charge current for phone	max. 10 V, 1.5 A
2	V_BATT	mobile battery voltage	
3	EXTMIC	microphone signal	
4	GND	ground	
5	EXTERP	earphone signal	
6	CADET	office kit indicator for phone	5 VDC
7	I2CINT		I2C bus interrupt
8	SCL		I2C bus clock
9	SDA		I2C bus data
10	TxD		RS-232 TxD
11	RxD		RS-232 RxD
12	PH_CTRL	charger control from phone	0 - 5 VDC

V5, V13

PIN #	NAME	DESCRIPTION	LEVEL
	I_BATT	charge current for battery	max. 10 V, 1.5 A

V6, V11

PIN #	NAME	DESCRIPTION	LEVEL
	BMEM	battery pack data	

V7

PIN #	NAME	DESCRIPTION	LEVEL
	B_TEMP	battery pack temperature	0 - 5 VDC

V8, V12

PIN #	NAME	DESCRIPTION	LEVEL
	GND	ground for battery pack	

V9

PIN #	NAME	DESCRIPTION	LEVEL
1	HF_MIC	Hands Free microphone	
2	GND	ground	

V10

PIN #	NAME	DESCRIPTION	LEVEL
1	HF_SPKR	Hands Free speaker	
2	GND	ground	

8.1.2.2 Led module OO0301

V1

PIN #	NAME	DESCRIPTION	LEVEL
1	GND	ground	
2	HS_MIC	Handset microphone signal	
3	HS_ERP	Handset earphone signal	
4	PH_R	phone charge indicator led, red	0 / 5 VDC
5	PH_G	phone charge indicator led, green	0 / 5 VDC
6	B_R	battery charge indicator led, red	0 / 5 VDC
7	B_G	battery charge indicator led, green	0 / 5 VDC
8	SWITCH	battery discharge switch	0 / 5 VDC

V2

PIN #	NAME	DESCRIPTION	
1	GND	ground	
2	HS_ERP	Handset earphone signal	
3	HS_MIC	Handset microphone signal	

8.1.2.3 Connector module OO0302

V1

PIN #	NAME	DESCRIPTION	LEVEL
1	V_CHG	charge current for phone	max. 10 V, 1.5 A
2	V_BATT	mobile battery voltage	
3	EXTMIC	microphone signal	
4	GND	ground	
5	EXTERP	earphone signal	
6	CADET	office kit indicator for phone	5 VDC
7	I2CINT	I2C bus interrupt	
8	SCL	I2C bus clock	
9	SDA	I2C bus data	
10	TxD	RS-232 TxD	
11	RxD	RS-232 RxD	
12	PH_CTRL	charger control from phone	0 - 5 VDC

V2

PIN #	NAME	DESCRIPTION	LEVEL
1,2	V_CHG	charge current for phone	max. 10 V, 1.5 A
3	V_BATT	mobile battery voltage	
4	nc		
5	EXTMIC	microphone signal	
6,7	GND	ground	
8	EXTERP	earphone signal	
9	CADET	office kit indicator for phone	5 VDC
10	I2CINT	I2C bus interrupt	
11	SCL	I2C bus clock	
12	SDA	I2C bus data	
13	TxD	RS-232 TxD	
14	RxD	RS-232 RxD	
15	nc		
16	PH_CTRL	power supply control	0 - 5 VDC

8.1.3 Operation

8.1.3.1 General

Power supply unit is connected to one of the connectors on the back of the unit. Connections on these two connectors are identical to each other. Supply voltage (VB) turns on regulator I124 which is used to generate +5 VDC supply (VCC) for processor and other electronics. Note that the power amplifiers of the earphone signal, I499 and I528 do not use VCC but VB instead. Once the VCC signal has risen, also signal CADET is activated. This causes the phone to communicate with the I2C circuit and register that office kit is present.

8.1.3.2 Processor / charging

The processor I264 is National Semiconductor COPCF888. Crystal frequency used is 8,00 MHz.

I/O pins/signals are as follows:

I/O SIGNALS		DIRECTION
C0	spare battery discharge switch	IN
C7	battery pack memory	IN / OUT
D0	phone charge fet control	OUT
D1	spare battery charge fet control	OUT
D2	spare battery discharge control	OUT
D3	phone detect current control	OUT
D4	phone charge indicator (red) controlOUT	
D5	phone charge indicator (green) control	OUT
D6	spare battery charge indicator (red) control	OUT
D7	spare battery charge indicator (green) control	OUT
G3	power supply control	OUT
I0	charger control from phone	IN
I1	spare battery temperature	IN
I2	phone battery voltage	IN
I3	spare battery voltage	IN
I4	PWM_CHK (not used)	IN

A/D input I3 is used to measure the voltage of the spare battery. Amplifier I277 converts the input voltage level into the new range which is suitable for A/D input. Output G3 is a PWM signal which is converted with R291 and C293 into analog DC signal. This signal is used to control the output current of the power supply unit. Outputs D0 and D1 are used to turn on charging current for the phone and spare battery. P-channel fets Q211 and Q221 are normally in non-conducting state (gate voltage tied to VB) and are turned on with fets Q212 and Q222 as the control signal has been activated. In normal operation fets Q211 and Q221 are never simultaneously in the conducting state.

Spare battery discharge is controlled with signal D2. High level on output switches transistors Q287 and Q285 into conducting state, which makes current flow through resistors R280-283 and transistor Q285. Nominal value of discharge current is ~ 180 mA.

Signal D3 is used to turn on/off the detect current supply I234. The logic high signal turns the regulator off and logic low on. When the phone is present, the state of this pin is usually low. Only when the charge control line I0 has a value greater than 4 VDC does it have a high output. Regulator I234 output is ~ 7 VDC, Imax 150 mA.

Charge indicator leds are turned on using the signals D4 to D7. Logic high signals switch transistors Q303, Q305, Q313 and Q315 into conducting state. The emitter pins of the transistors are directly connected to the anode pins of the leds.

8.1.3.3 Audio

The signal P1 (HF_OFF) of the I2C circuit I203 is used to control the analog switches I435 and I437. Q512 inverts this signal for switch I484. The inverted signal is also used for controlling the MUTE pin of the power amplifier I528. Low level signal turns MUTE on and high level signal (3 V) off respectively. Switch I481 and MUTE pin of the power amplifier I499 are controlled with signal HS_CTRL. This signal is inverted from the DC level of the handset earphone signal.

The HOOK signal is controlled with the handset. Whenever the handset has been placed on the holder, the DC level of the HS_ERP signal should be ~ 4,2 V. Removing the handset from the holder makes the voltage drop to a value of 0,4 VDC. This signal and the transistors Q474 and Q475 are used to control the DC level of the EXTERP signal. ON_HOOK level is ~ 5 VDC, OFF_HOOK ~ 0,6 VDC.

8.1.4 Parts list OO0303 (P3)

OO0303

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CD0101	C100	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C101	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C102	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C103	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C104	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C105	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C106	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C107	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C108	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C109	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C111	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C112	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C113	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C114	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C115	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C116	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C117	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C118	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C119	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0473	C120	SMD capasitor	47 nF 10% 50 V X7R	Philips	
CU0226	C121	SMD tantal	22uF/16V 10% 7.3x4.3mm	Kyocera	TAJD226K016R
CD0223	C123	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU0226	C125	SMD tantal	22uF/16V 10% 7.3x4.3mm	Kyocera	TAJD226K016R
CD0223	C126	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0104	C127	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0101	C130	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C131	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C140	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C141	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C142	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C143	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C144	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C145	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C146	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C147	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C148	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0101	C149	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0680	C160	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CD0680	C161	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CD0223	C202	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU1106	C232	SMD tantal	10uF/16V	AVX	TAJB106M016R
CD0223	C233	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU1106	C235	SMD tantal	10uF/16V	AVX	TAJB106M016R
CD0101	C242	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0223	C247	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C252	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C255	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C258	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0220	C260	SMD capasitor	22 pF 5% 50 V NP0	Philips	
CD0220	C263	SMD capasitor	22 pF 5% 50 V NP0	Philips	
CD0473	C265	SMD capasitor	47 nF 10% 50 V X7R	Philips	
CD0473	C267	SMD capasitor	47 nF 10% 50 V X7R	Philips	
CD0223	C272	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0101	C275	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0223	C279	SMD capasitor	22 nF 10% 50 V X7R	Philips	

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CD0223	C292	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CH0105	C293	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C402	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0104	C403	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0222	C406	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CD0680	C408	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CD0223	C409	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CH0105	C422	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0104	C423	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0222	C426	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CD0680	C428	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CD0223	C429	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0101	C441	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0223	C442	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0104	C445	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0104	C446	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CU2105	C452	SMD tantal	1uF/10V	AVX	TAJR105M010R
CU2105	C455	SMD tantal	1uF/10V	AVX	TAJR105M010R
CD0101	C461	SMD capasitor	100 pF 5% 50 V NP0	Philips	
CD0223	C463	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0223	C472	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CD0104	C477	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CH0105	C485	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CU0226	C490	SMD tantal	22uF/16V 10% 7.3x4.3mm	Kyocera	TAJD226K016R
CU0226	C491	SMD tantal	22uF/16V 10% 7.3x4.3mm	Kyocera	TAJD226K016R
CD0104	C492	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CD0104	C496	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CE0476	C498	Al elko	47 uF/25 V 7x7mm	Philips	2222 097 56479
CU1106	C500	SMD tantal	10uF/16V	AVX	TAJB106M016R
CU0225	C501	SMD tantal	2.2uF/16V 20% 4.7x2.6mm	Matsushita	ECST1CB 225R
CE0337	C502	Al elko	330uF/16V 20% 15x8mm	Philips	222213555331
CH0105	C503	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C506	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C507	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0222	C520	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CH0105	C523	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C526	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0104	C527	SMD capasitor	100 nF 10% 50 V X7R	Philips	
CU0225	C529	SMD tantal	2.2uF/16V 20% 4.7x2.6mm	Matsushita	ECST1CB 225R
CE0476	C531	Al elko	47 uF/25 V 7x7mm	Philips	2222 097 56479
CU1106	C532	SMD tantal	10uF/16V	AVX	TAJB106M016R
CE0337	C535	Al elko	330uF/16V 20% 15x8mm	Philips	222213555331
CE0337	C536	Al elko	330uF/16V 20% 15x8mm	Philips	222213555331
CD0104	C537	SMD capasitor	100 nF 10% 50 V X7R	Philips	
DY0006	D224	Shottky diode	60V/3.3A	I&R	30WQ06F
DS0070	D236	SMD diode pair	70V/100mA common cathode	Philips	BAV 70
IR2952	I124	Regulator	100mA 5V adj. 0.5%	Micrel	MIC2951-02BM
II8574	I203	8 bit I/O	I2C	Philips	PCF8574T
IR2952	I234	Regulator	100mA 5V adj. 0.5%	Micrel	MIC2951-02BM
IP8882	I264	Microcontr. for DDS-50	Single-Chip CMOS	NationalSe	COP888CF-XXX/V
IA7550	I277	Single op.amp.		Toshiba	TA 75S01F-TE85L
IA7550	I410	Single op.amp.		Toshiba	TA 75S01F-TE85L
IA7550	I430	Single op.amp.		Toshiba	TA 75S01F-TE85L
IC0453	I435	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IC0453	I437	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IA7550	I443	Single op.amp.		Toshiba	TA 75S01F-TE85L
IA7550	I464	Single op.amp.		Toshiba	TA 75S01F-TE85L
IC0453	I481	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IC0453	I484	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L

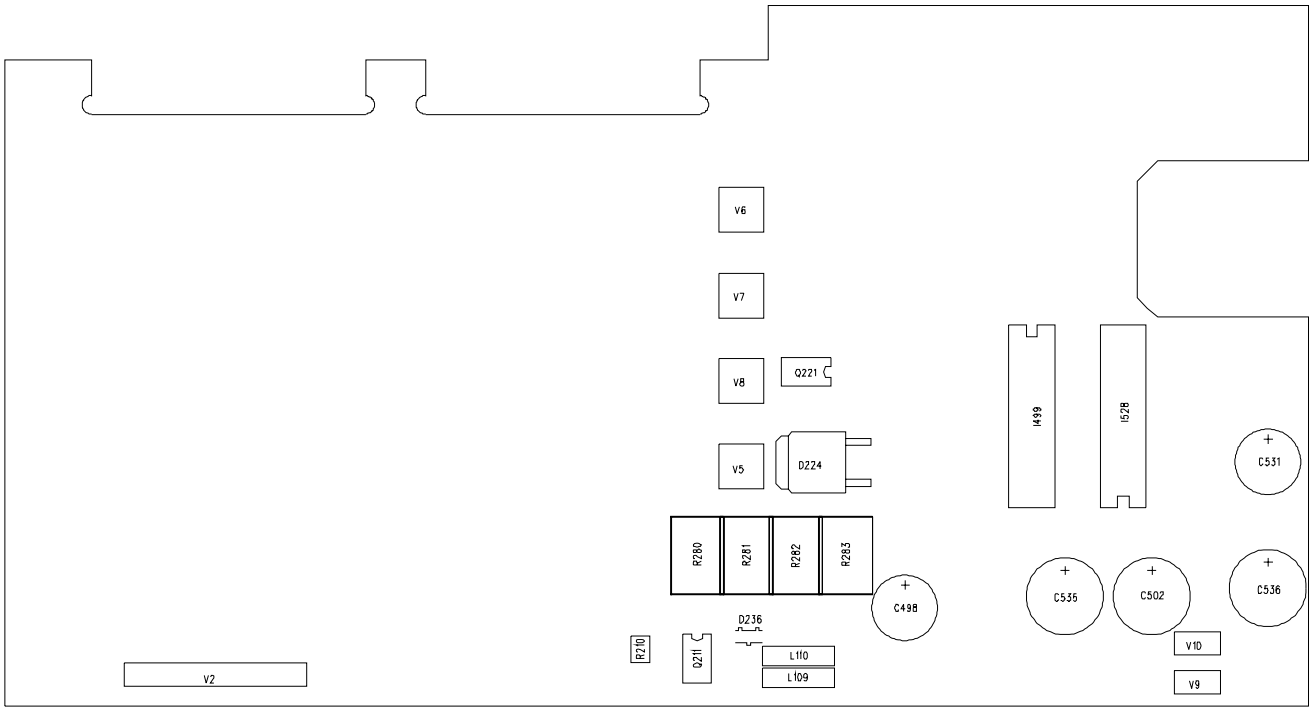
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
IA1905	I499	Audio power amplifier	5W/20V/4ohm	SGS/ Thomso	TDA1905
IA1905	I528	Audio power amplifier	5W/20V/4ohm	SGS/ Thomso	TDA1905
LF0061	L109	SMD EMI suppression filt	4700pF/2A 1.6x6.8mm	Murata	NFM61R30T472
LF0061	L110	SMD EMI suppression filt	4700pF/2A 1.6x6.8mm	Murata	NFM61R30T472
QF9430	Q211	SMD p-channel MOSFET	20V/4,8A/Rds=0.06	Siliconix	Si9430DY
QF7002	Q212	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QF9430	Q221	SMD p-channel MOSFET	20V/4,8A/Rds=0.06	Siliconix	Si9430DY
QF7002	Q222	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QS0054	Q285	SMD transistor	NPN 1.5A/45V	Philips	BCX 54
QSB848	Q287	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QSB848	Q303	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QSB848	Q305	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QSB848	Q313	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QSB848	Q315	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QF7002	Q474	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QSB848	Q475	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QSB848	Q479	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
QSB848	Q512	SMD transistor	NPN 0.1A/30V F=2dB	Philips	BC 848 B
RD0474	R100	SMD resistor	470 k 5% 0.125 W	Kamaya	
RD0103	R113	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0104	R119	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0103	R122	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0101	R200	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0101	R201	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0104	R210	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R213	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R220	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R223	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0473	R230	SMD resistor	47 k 5% 0.125 W	Kamaya	
RD0103	R231	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0100	R240	SMD resistor	10 R 5% 0.125 W	Kamaya	
RD0182	R241	SMD resistor	1.8 k 5% 0.125 W	Kamaya	
RD0104	R245	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0103	R246	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R251	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0104	R253	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R254	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0223	R256	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0103	R257	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0105	R262	SMD resistor	1 M 5% 0.125 W	Kamaya	
RD0104	R270	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0473	R271	SMD resistor	47 k 5% 0.125 W	Kamaya	
RD0104	R273	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0823	R274	SMD resistor	82 k 5% 0.125 W	Kamaya	
RD0473	R276	SMD resistor	47 k 5% 0.125 W	Kamaya	
RD0103	R278	SMD resistor	10 k 5% 0.125 W	Kamaya	
RK0131	R280	SMD resistor	130 ohm 1W 5%	Vitrohm	509-0
RK0131	R281	SMD resistor	130 ohm 1W 5%	Vitrohm	509-0
RK0131	R282	SMD resistor	130 ohm 1W 5%	Vitrohm	509-0
RK0131	R283	SMD resistor	130 ohm 1W 5%	Vitrohm	509-0
RD0102	R286	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0471	R288	SMD resistor	470 R 5% 0.125 W	Kamaya	
RD0103	R289	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R290	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R291	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R300	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R301	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0471	R302	SMD resistor	470 R 5% 0.125 W	Kamaya	

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RD0471	R304	SMD resistor	470 R 5% 0.125 W	Kamaya	
RD0103	R310	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R311	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0471	R312	SMD resistor	470 R 5% 0.125 W	Kamaya	
RD0471	R314	SMD resistor	470 R 5% 0.125 W	Kamaya	
RD0103	R400	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R401	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0183	R404	SMD resistor	18 k 5% 0.125 W	Kamaya	
RD0224	R405	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0153	R407	SMD resistor	15 k 5% 0.125 W	Kamaya	
RD0103	R411	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0223	R412	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0103	R420	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R421	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0183	R424	SMD resistor	18 k 5% 0.125 W	Kamaya	
RD0224	R425	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0153	R427	SMD resistor	15 k 5% 0.125 W	Kamaya	
RD0103	R431	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0333	R432	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0224	R436	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0224	R440	SMD resistor	220 k 5% 0.125 W	Kamaya	
RD0103	R444	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0104	R450	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0683	R451	SMD resistor	68 k 5% 0.125 W	Kamaya	
RD0104	R453	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0683	R454	SMD resistor	68 k 5% 0.125 W	Kamaya	
RD0103	R460	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0104	R462	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R465	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0333	R466	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0223	R470	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0104	R471	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0104	R473	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0103	R476	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0104	R477	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0223	R478	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0333	R480	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0333	R482	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0333	R483	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0333	R485	SMD resistor	33 k 5% 0.125 W	Kamaya	
RD0339	R493	SMD resistor	3.3 R 5% 0.125 W	Kamaya	
RD0103	R494	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R495	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0101	R497	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0104	R505	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0102	R508	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0183	R509	SMD resistor	18 k 5% 0.125 W	Kamaya	
RD0104	R510	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0103	R511	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0223	R513	SMD resistor	22 k 5% 0.125 W	Kamaya	
RD0104	R521	SMD resistor	100 k 5% 0.125 W	Kamaya	
RD0102	R524	SMD resistor	1 k 5% 0.125 W	Kamaya	
RD0474	R525	SMD resistor	470 k 5% 0.125 W	Kamaya	
RD0101	R530	SMD resistor	100 R 5% 0.125 W	Kamaya	
RD0103	R533	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0471	R534	SMD resistor	470 R 5% 0.125 W	Kamaya	
RD0339	R538	SMD resistor	3.3 R 5% 0.125 W	Kamaya	
VM0242	V1	SMD system connector	1x16 pin	AMP	188227-1
NI0508	V11	Battery contact spring	for DDS-40		95204240
NI0508	V12	Battery contact spring	for DDS-40		95204240

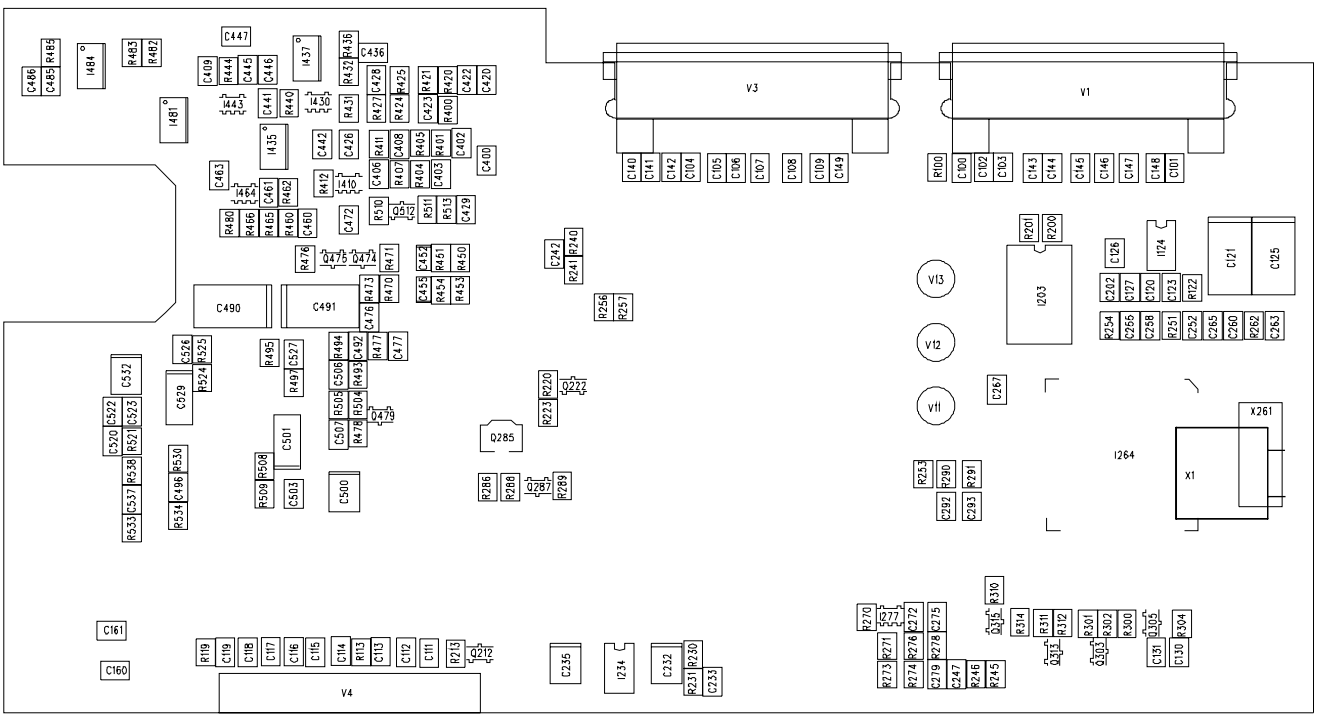
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
NI0508	V13	Battery contact spring	for DDS-40		95204240
VM0242	V3	SMD system connector	1x16 pin	AMP	188227-1
X80006	X1	Crystal	8.0000 MHz	Telequartz	8.00MHZ/B
X80007	X261	SMD crystal	8.000MHz Hold.HC-49/USMD-B	Toyocom	TQC-210C-6RB
PO0300	Y15	PCB for the office kit	Delta DDS-40		
NC2015	Y16	Cross recessed screw	M2x5 DIN7985A pozidrive	Ruuvitalo	
NC2015	Y17	Cross recessed screw	M2x5 DIN7985A pozidrive	Ruuvitalo	
NC2015	Y18	Cross recessed screw	M2x5 DIN7985A pozidrive	Ruuvitalo	
NC2015	Y19	Cross recessed screw	M2x5 DIN7985A pozidrive	Ruuvitalo	
NF0200	Y20	Nut	M2 SFS2067 / DIN943	Ruuvitalo	
NF0200	Y21	Nut	M2 SFS2067 / DIN943	Ruuvitalo	
NF0200	Y22	Nut	M2 SFS2067 / DIN943	Ruuvitalo	
NF0200	Y23	Nut	M2 SFS2067 / DIN943	Ruuvitalo	

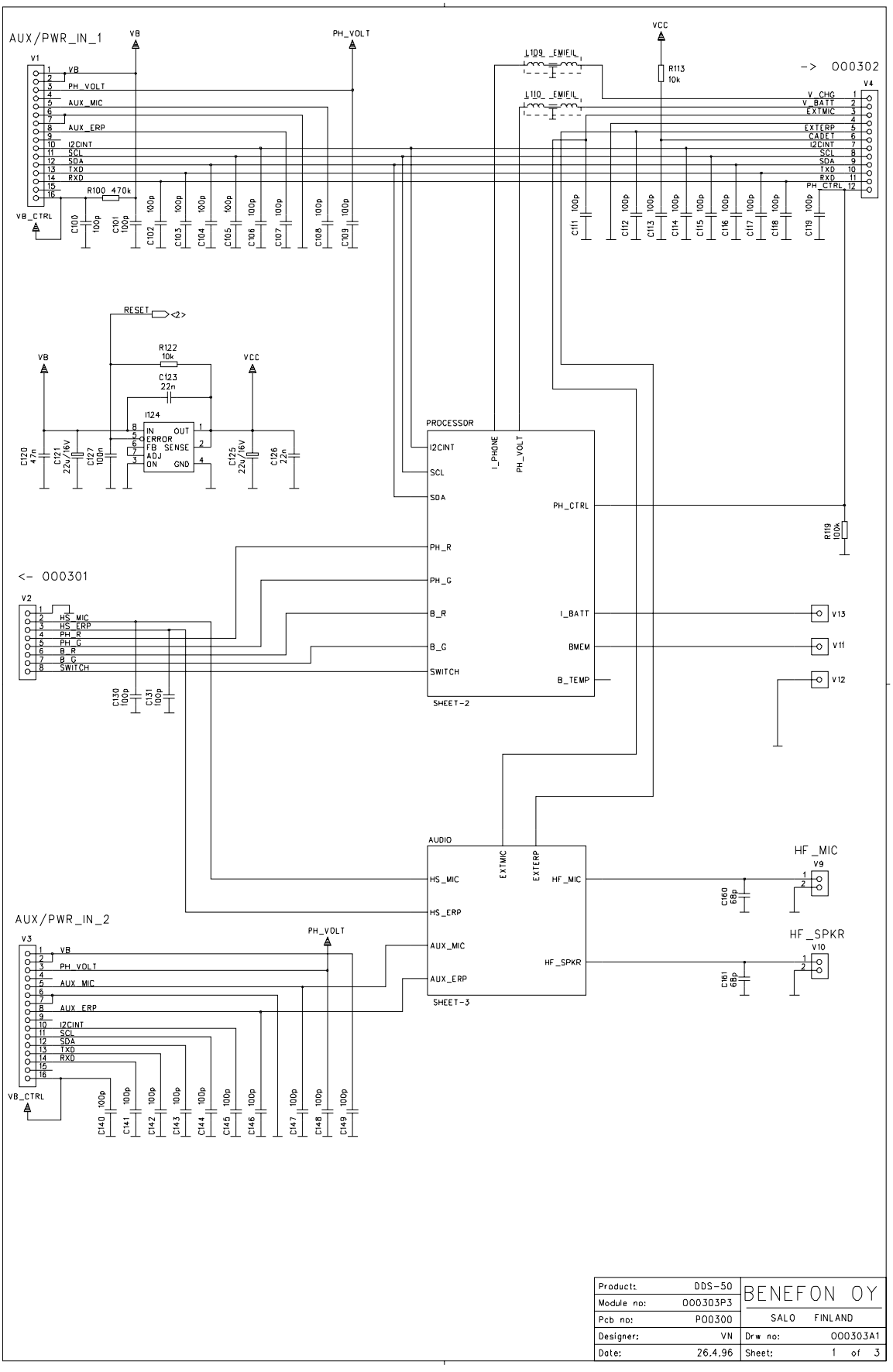
Last
update
13.11.96

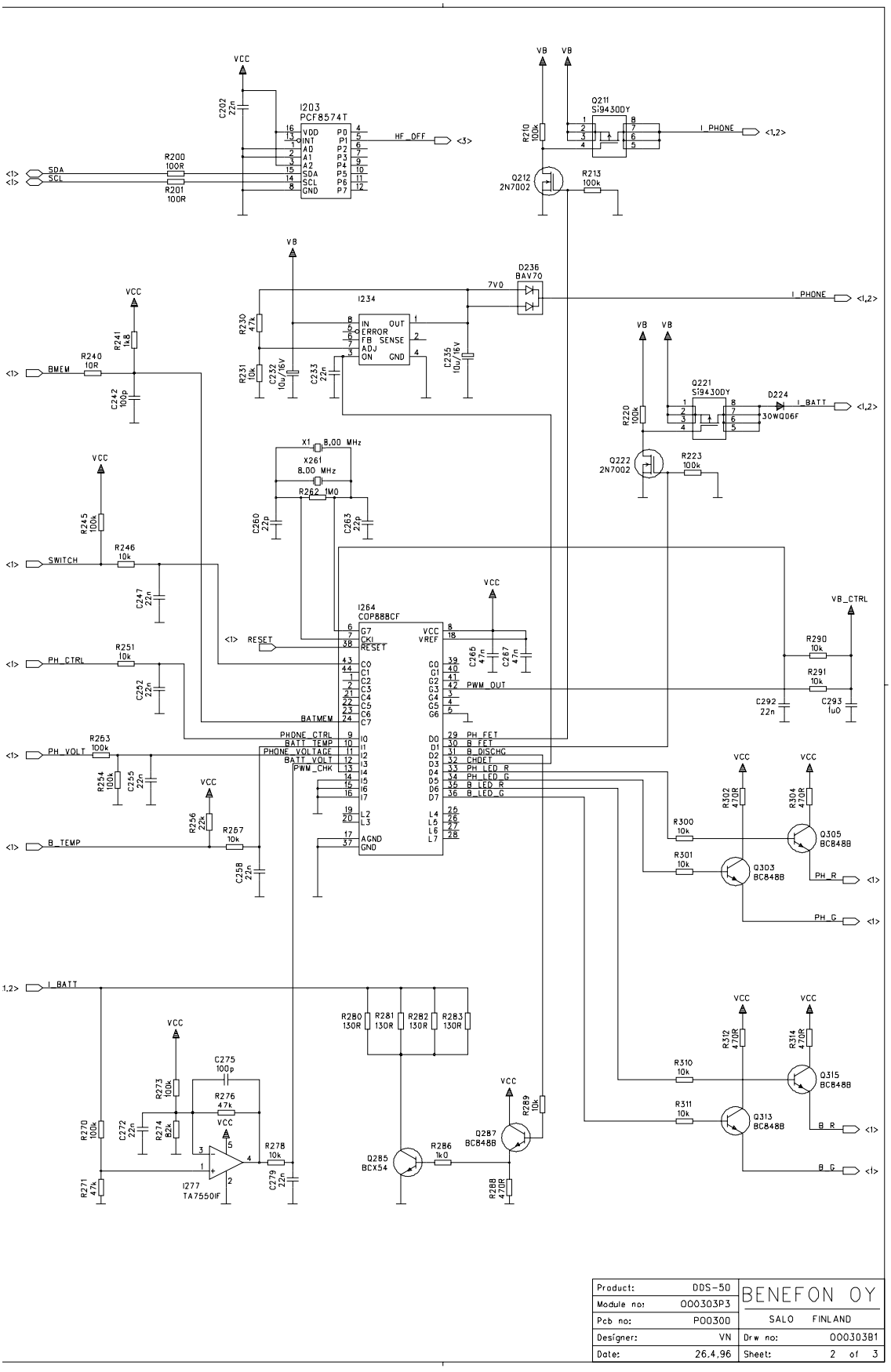
The Top Side Layout PO0300A0

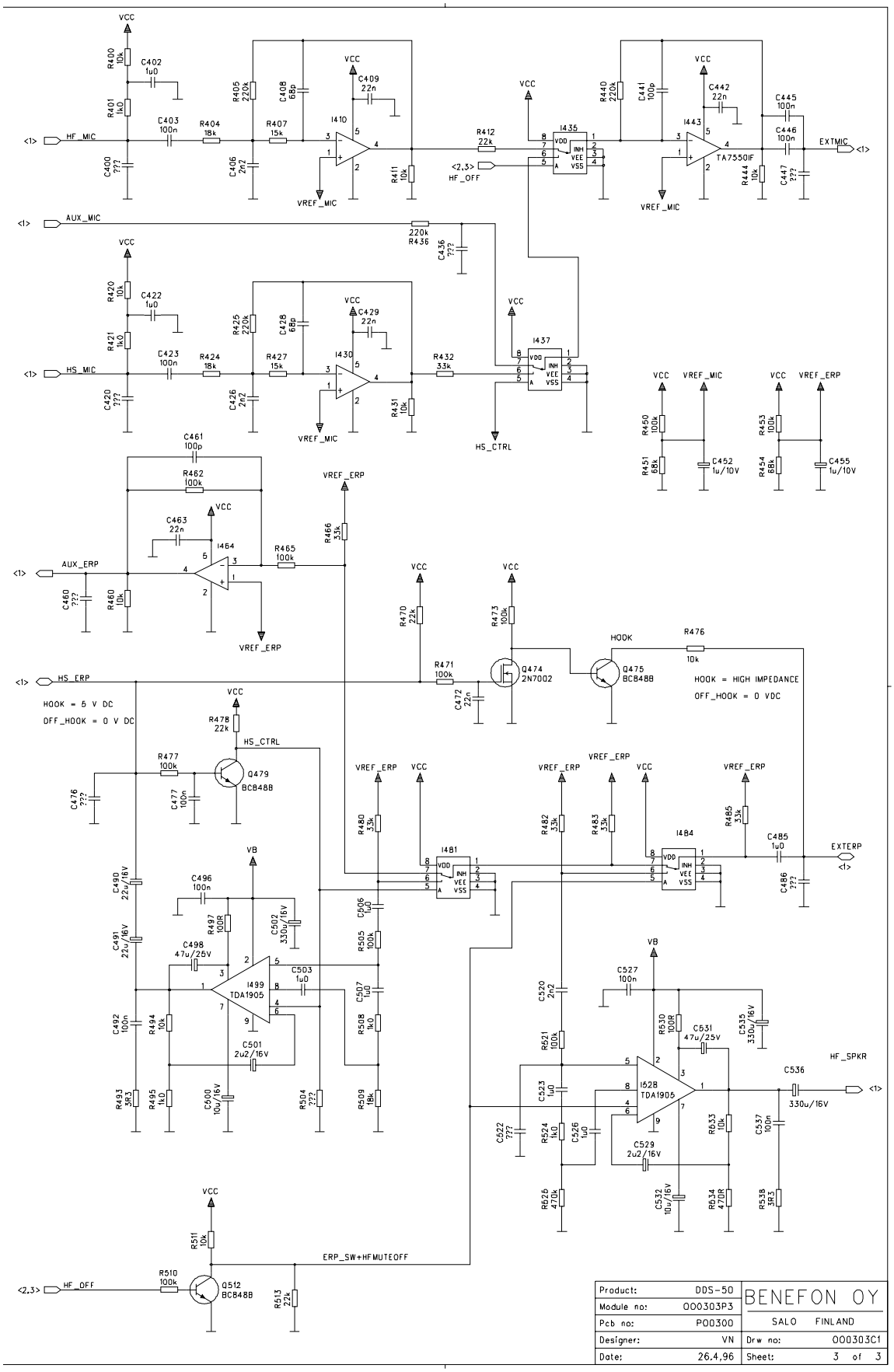


The Bottom Side Layout PO0300A0




AUX/PWR_IN_1
V1
VB
PH_VOLT
AUX_MIC
AUX_ERP
I2CINT
SCL
SDA
TXD
RXD
R100 470k
VB_CTRL
L109 _EMIFIL_
L110 _EMIFIL_
VCC
R113
10k
-> 000302
V4
V_CHG
V_BATT
EXTMIC
EXTERP
CADET
I2CINT
SCL
SDA
TXD
RXD
PH_CTRL
RESET
<2>
R122
10k
C123
22n
I124
IN
OUT
ERROR
FB SENSE
ADJ
ON
GND
PROCESSOR
I2CINT
SCL
SDA
I_PHONE
PH_VOLT
PH_CTRL
PH_R
PH_G
B_R
B_G
SWITCH
I_BATT
BMEM
B_TEMP
SHEET-2
<- 000301
V2
HS_MIC
HS_ERP
PH_R
PH_G
B_R
B_G
SWITCH
V13
V11
V12
AUDIO
EXTMIC
EXTERP
HS_MIC
HS_ERP
AUX_MIC
AUX_ERP
HF_MIC
HF_SPKR
SHEET-3
HF_MIC
V9
HF_SPKR
V10
AUX/PWR_IN_2
V3
VB
PH_VOLT
AUX_MIC
AUX_ERP
I2CINT
SCL
SDA
TXD
RXD
VB_CTRL
Product: DDS-50
Module no: 000303P3
Pcb no: P00300
Designer: VN
Date: 26.4.96
BENEFON OY
SALO FINLAND
Drw no: 000303A1
Sheet: 1 of 3


VCC
VB
I203
PCF8574T
HF_OFF
SDA
SCL
R200 100R
R201 100R
C202 22n
Q211 SI9430DY
Q212 2N7002
R210 100k
R213 100k
I_PHONE
D236 BAV70
7V0
I234
R230 47k
R231 10k
C232 10u/16V
C233 22n
C235 10u/16V
R240 10R
R241 1k8
C242 100p
BMEM
Q221 SI9430DY
D224 30WQ06F
I_BATT
R220 100k
Q222 2N7002
R223 100k
X1 8.00 MHz
X261 8.00 MHz
R262 1MO
C260 22p
C263 22p
R245 100k
R246 10k
C247 22n
SWITCH
I264
COP888CF
RESET
R251 10k
C252 22n
PH_CTRL
BATMEM
PHONE_CTRL
BATT_TEMP
PHONE_VOLTAGE
BATT_VOLT
PWM_CHK
PWM_OUT
PH_FET
B_FET
B_DISCHG
CHDET
PH_LED_R
PH_LED_G
B_LED_R
B_LED_G
C265 47n
C267 47n
VB_CTRL
R290 10k
R291 10k
C292 22n
C293 1u0
R253 100k
PH_VOLT
R254 100k
C255 22n
R256 22k
R257 10k
B_TEMP
C258 22n
R300 10k
R301 10k
Q303 BC848B
Q305 BC848B
R302 470R
R304 470R
PH_R
PH_G
I_BATT
R280 130R
R281 130R
R282 130R
R283 130R
C275 100p
R276 47k
R273 100k
R270 100k
C272 22n
R274 82k
R271 47k
I277 TA7550IF
R278 10k
C279 22n
Q285 BCX54
R286 1k0
Q287 BC848B
R289 10k
R288 470R
R310 10k
R311 10k
Q313 BC848B
Q315 BC848B
R312 470R
R314 470R
B_R
B_G
Product: DDS-50
Module no: 000303P3
Pcb no: P00300
Designer: VN
Date: 26.4.96
BENEFON OY
SALO FINLAND
Drw no: 00030381
Sheet: 2 of 3


HF_MIC
AUX_MIC
HS_MIC
AUX_ERP
HS_ERP
HF_OFF
EXTMIC
EXTERP
HF_SPKR
HS_CTRL
VREF_MIC
VREF_ERP
HOOK
HOOK = HIGH IMPEDANCE
OFF_HOOK = 0 VDC
HOOK = 5 V DC
OFF_HOOK = 0 V DC
ERP_SW+HFMUTEOFF
TA7550IF
TDA1905
BC848B
2N7002
Product: DDS-50
Module no: OOO303P3
Pcb no: POO300
Designer: VN
Date: 26.4.96
BENEFON OY
SALO FINLAND
Drw no: OOO303C1
Sheet: 3 of 3

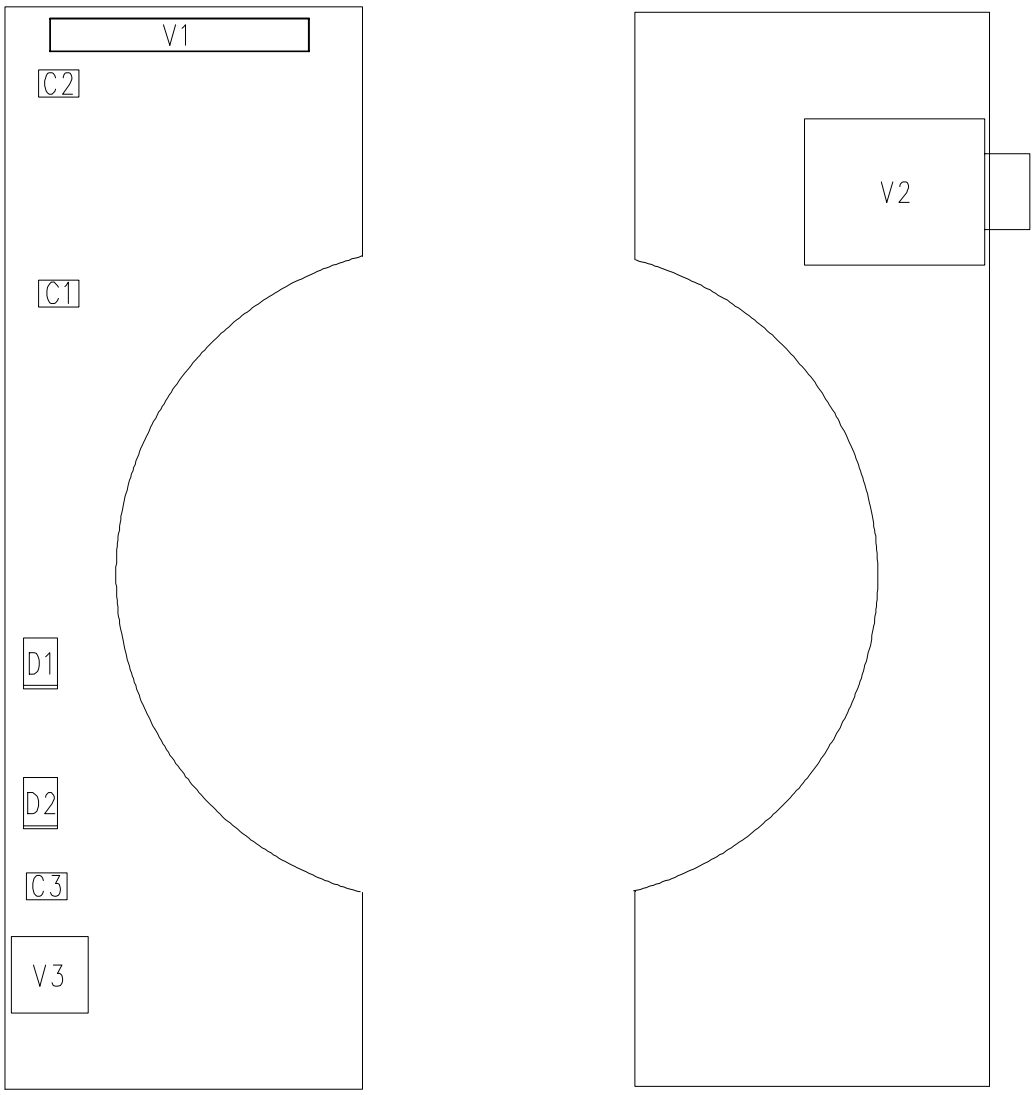
8.1.5 Parts list OO301

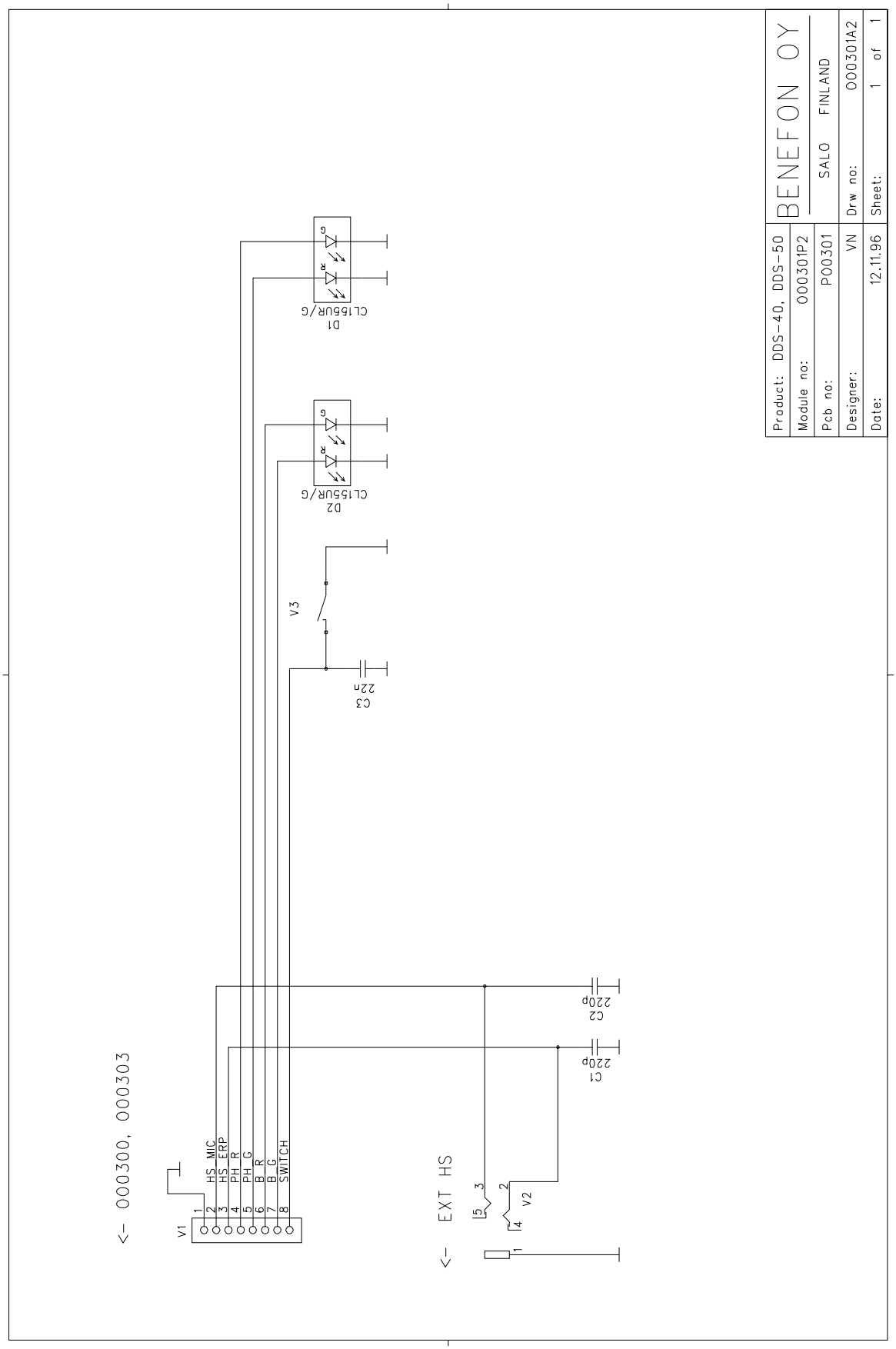
OO0301

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CD0221	C1	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CD0221	C2	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CD0223	C3	SMD capasitor	22 nF 10% 50 V X7R	Philips	
DLG155	D1	SMD bicolor	Green/red 25mcd/20mA	Citizen	CL-155UR/G
DLG155	D2	SMD bicolor	Green/red 25mcd/20mA	Citizen	CL-155UR/G
VN0005	V2	Stereo jack	3.5mm	Zupami	3.5 EJW-C386
AS0105	V3	Tact switch	h=9,5mm	Alps	SKHHAP
PO0301	Y8	Connector PCB for office	kit Delta DDS-40		

Last update 12.11.96

The Top Side and the Bottom Side Layouts PO0301A3




BENEFON OY
SALO FINLAND
Product: DDS-40, DDS-50
Module no: 000301P2
Pcb no: P00301
Designer: VN
Date: 12.11.96
Drw no: 000301A2
Sheet: 1 of 1
D1
CL155UR/G
D2
CL155UR/G
V3
C3
22n
C2
220p
C1
220p
V1
HS MIC
HS ERP
PH R
PH G
B R
B G
SWITCH
<- 000300, 000303
<- EXT HS
V2

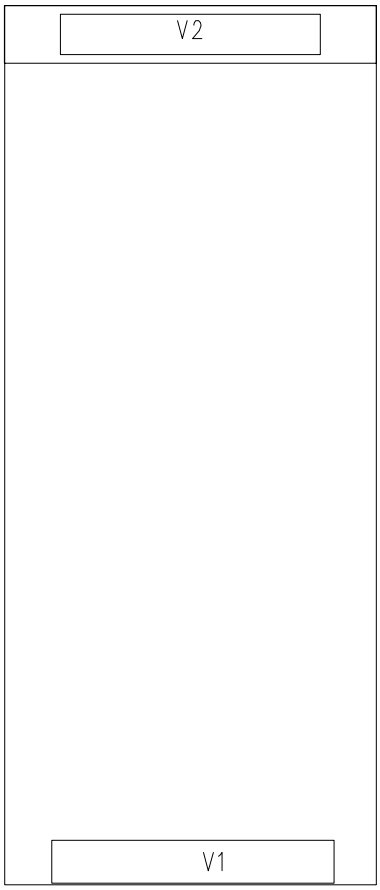
8.1.6 Part list OO0302

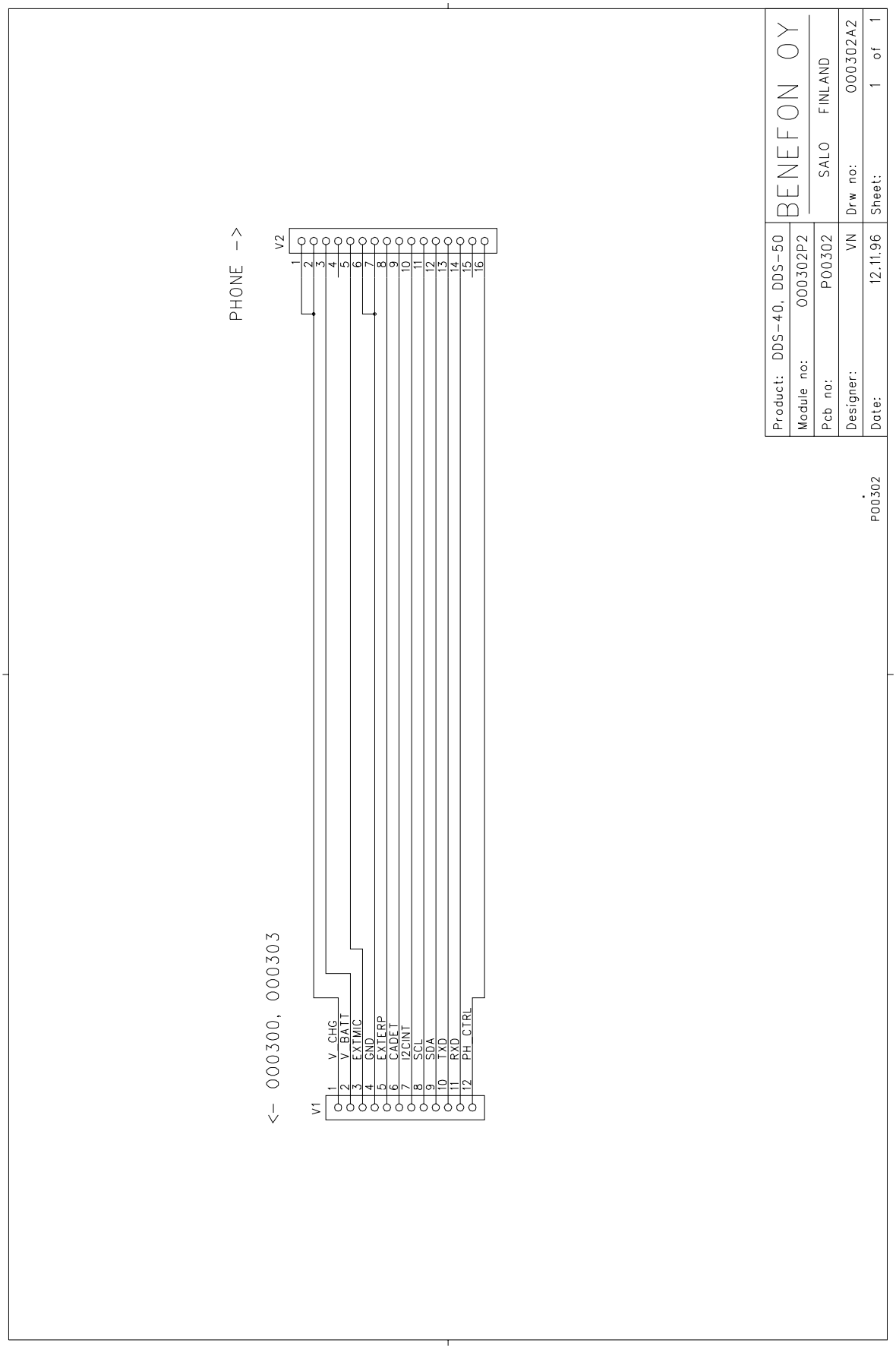
OO0302

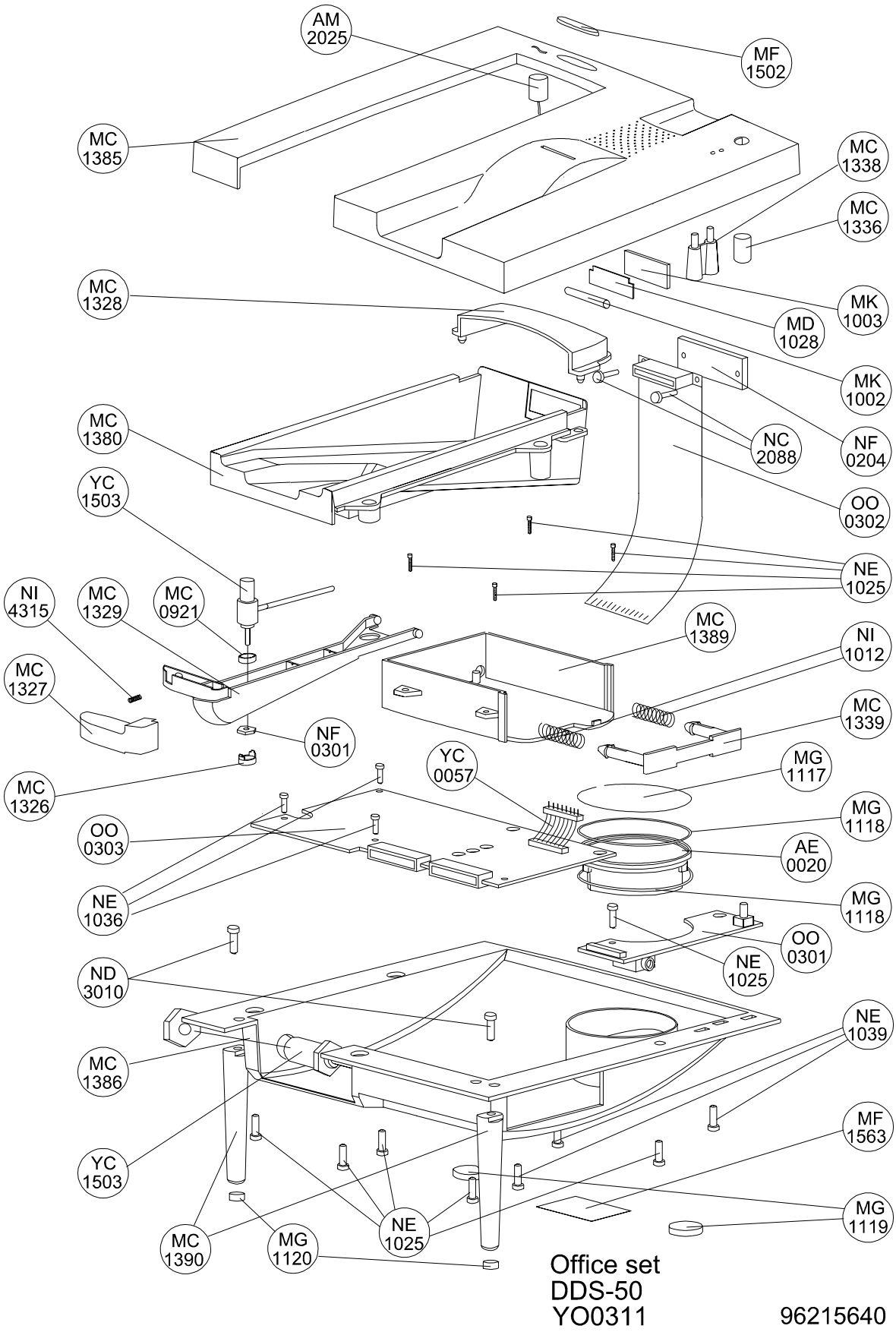
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
VN0242	V2	SMD system conn.	(holder)	AMP	
PO0302	Y1	Flexible PCB for OO0302	DDS-40	Simflex	

Last update 12.11.96

The Bottom Side Layout PO0302A1




PHONE ->
V2
1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
<- 000300, 000303
V1
1 V_CHG
2 V_BATT
3 EXTMIC
4 GND
5 EXTERP
6 CADET
7 I2CINT
8 SCL
9 SDA
10 TXD
11 RXD
12 PH_CTRL
BENEFON OY
SALO FINLAND
Product: DDS-40, DDS-50
Module no: 000302P2
Pcb no: P00302
Designer: VN
Date: 12.11.96
Drw no: 000302A2
Sheet: 1 of 1
P00302



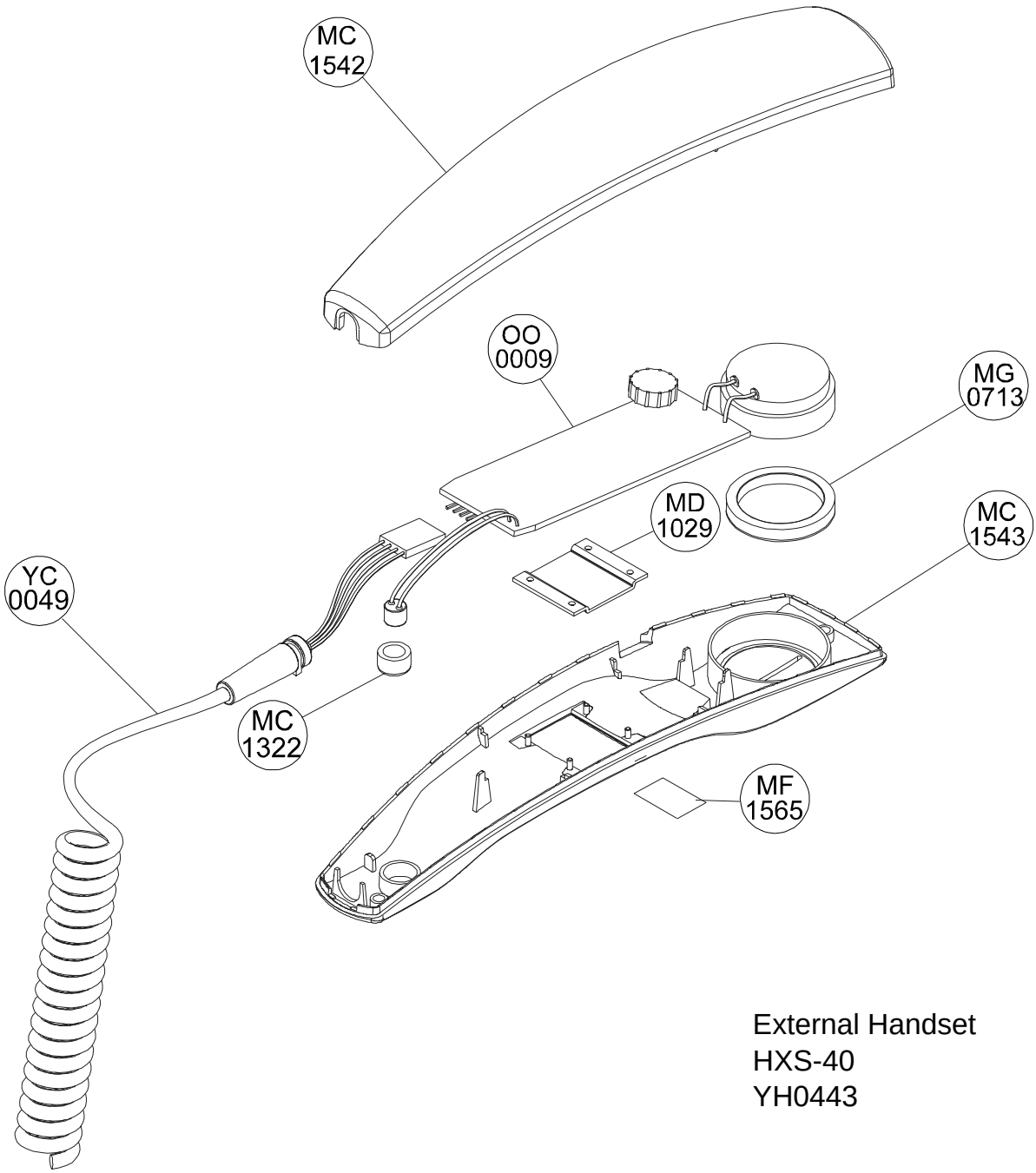
Office set
DDS-50
YO0311

96215640

8.2 EXTERNAL HANDSET HXS-40

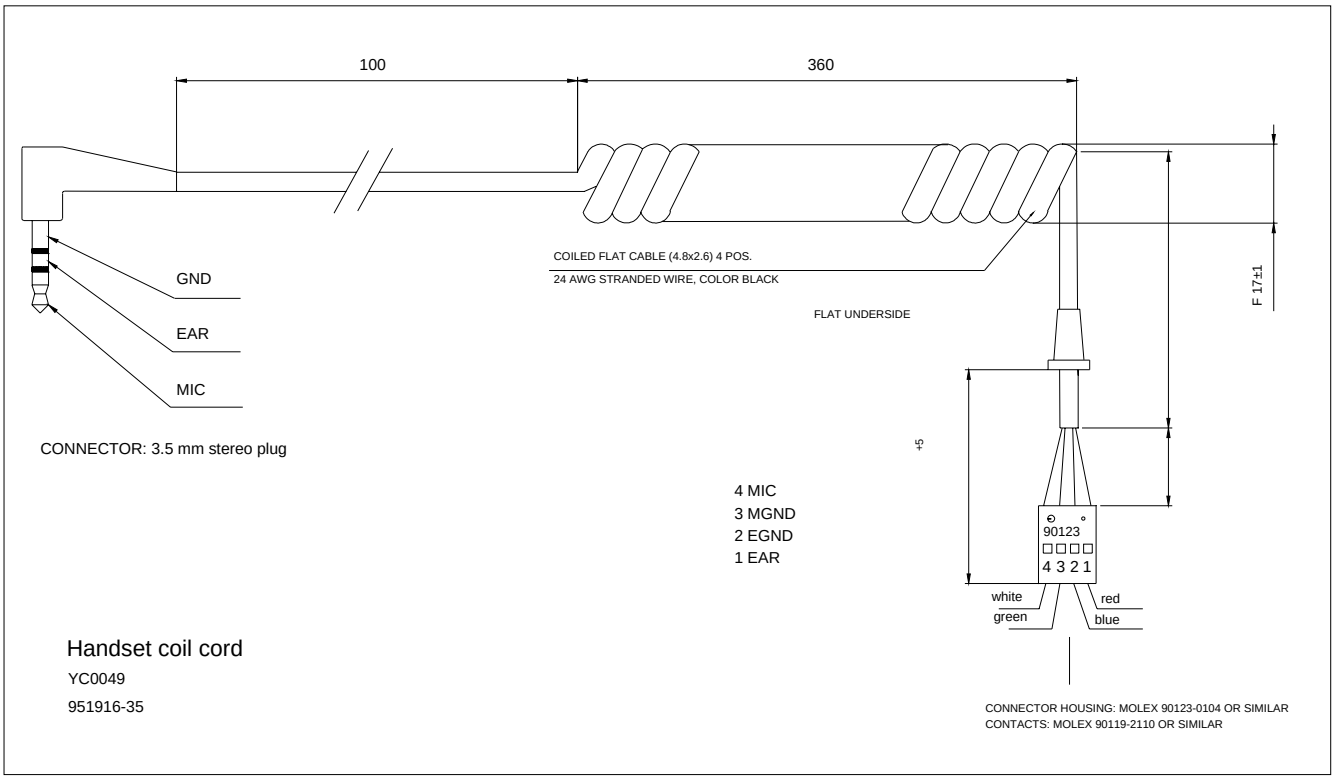
8.2.1 External Handset (not serviceable)

8.2.1.1 Mechanics



External Handset
HXS-40
YH0443

8.2.1.2 Cable



Outer Sheath	Material:	Coloured PVC
	Colour:	Black, BS 6748 TYPE TM2 and BT M140C
	Finnish:	Matt
Length:	Total:	5 ±0,2 m
	Coiled length:	3 ±0,2 m
Number of conductors:	4	
Size:	AWG 26 stranded wire	
Resistance:	< 100 mohm/m	
Number of strands	Multiwire (30 x 0.08 mm PCW)	
Insulation material:	Coloured polypropylene	
Strain relief:	Shall be firmly attached to the cable	

8.2.2 General

The external handset is designed for use together with the office set. The external handset includes a microphone, an earphone and a reed switch. A reed element shall be used to switch the audio signals to the handset when the handset is hooked off.

8.2.3 Connector XIN Signals

1	ERP	earphone input, HOOK state
2	GND	ground
3	GND	ground
4	MIC	microphone output

8.2.4 Microphone

Sensitivity:	-43 dB ± 6 dB
Vendor and part no:	Hosiden KUC2023 or KUB2023
RF decoupling capacitor:	33 pF; Size: 0805; Mounted on the microphone element.

8.2.5 Speaker

Sensitivity	95 dB ± 5 dB
Vendor and part no:	Hosiden KDR0928-IE-0030
Impedance:	min 120 ohm
Resistance (DC):	max 3 kohm

8.2.6 Hook

The hook operation is done by use of a reed switch. Hook operation is connected to the handset earphone terminal.

The operation is as follows:

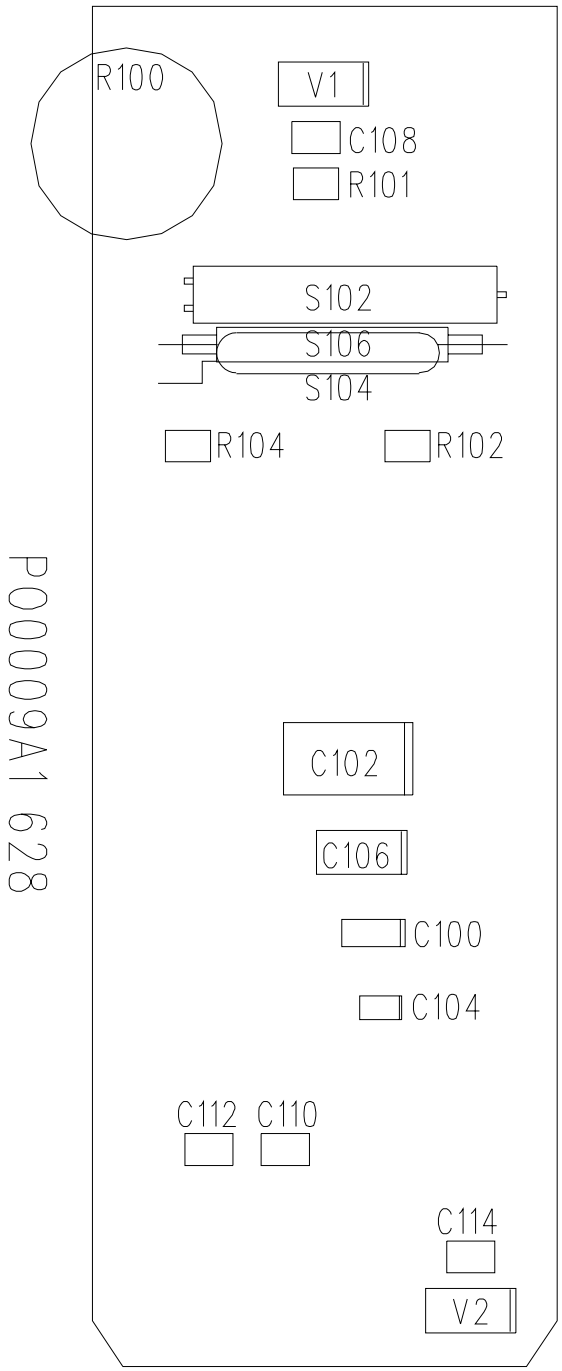
ON_HOOK	HIGH DC IMPEDANCE (SWITCH OPEN)
OFF_HOOK	LOW DC IMPEDANCE (SWITCH CLOSED), 2.2 KOHM RESISTANCE

8.2.7 Parts list OO0009

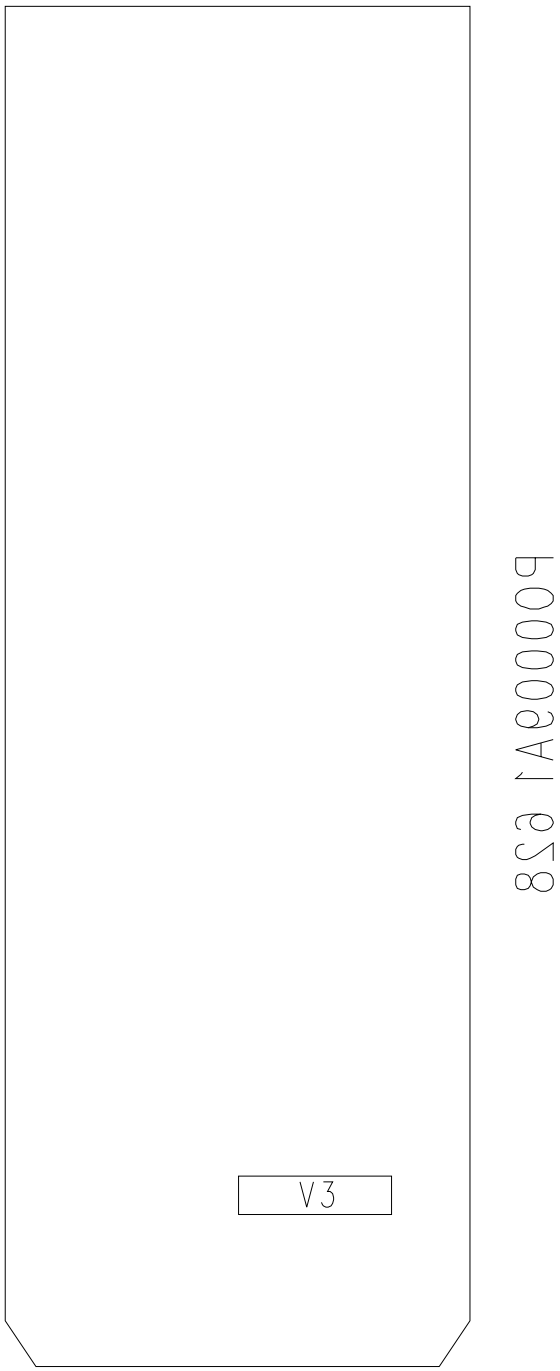
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CU0475	C106	SMD tantal	4.7uF/16V 20% 4.7X2.6MM	Matsushita	ECST1CB 475R
CD0221	C108	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CD0221	C110	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CD0221	C112	SMD capasitor	220 pF 5% 50 V NP0	Philips	
CD0221	C114	SMD capasitor	220 pF 5% 50 V NP0	Philips	
PO0009	M100	PCB for OO0900			
RP0222	R100	Edge control pot.	2.2k 0.1W LOG.	Ruwido	0037-006 2k2 log
RD0222	R102	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
AR0016	S102	Reed-relay		Hamlin	59160-031
AE0018	XERP	Assembled earphone unit	150ohm/94-+3dB/60mW	Hoside	KDR0928-1E-0300
AM2024	XMIC	Assembled microphone unit	Electret condenser -43-+4dB	Hoside	KUB2023-030444SB
VM0204	XIN	Contact strip angle	1 x 4		

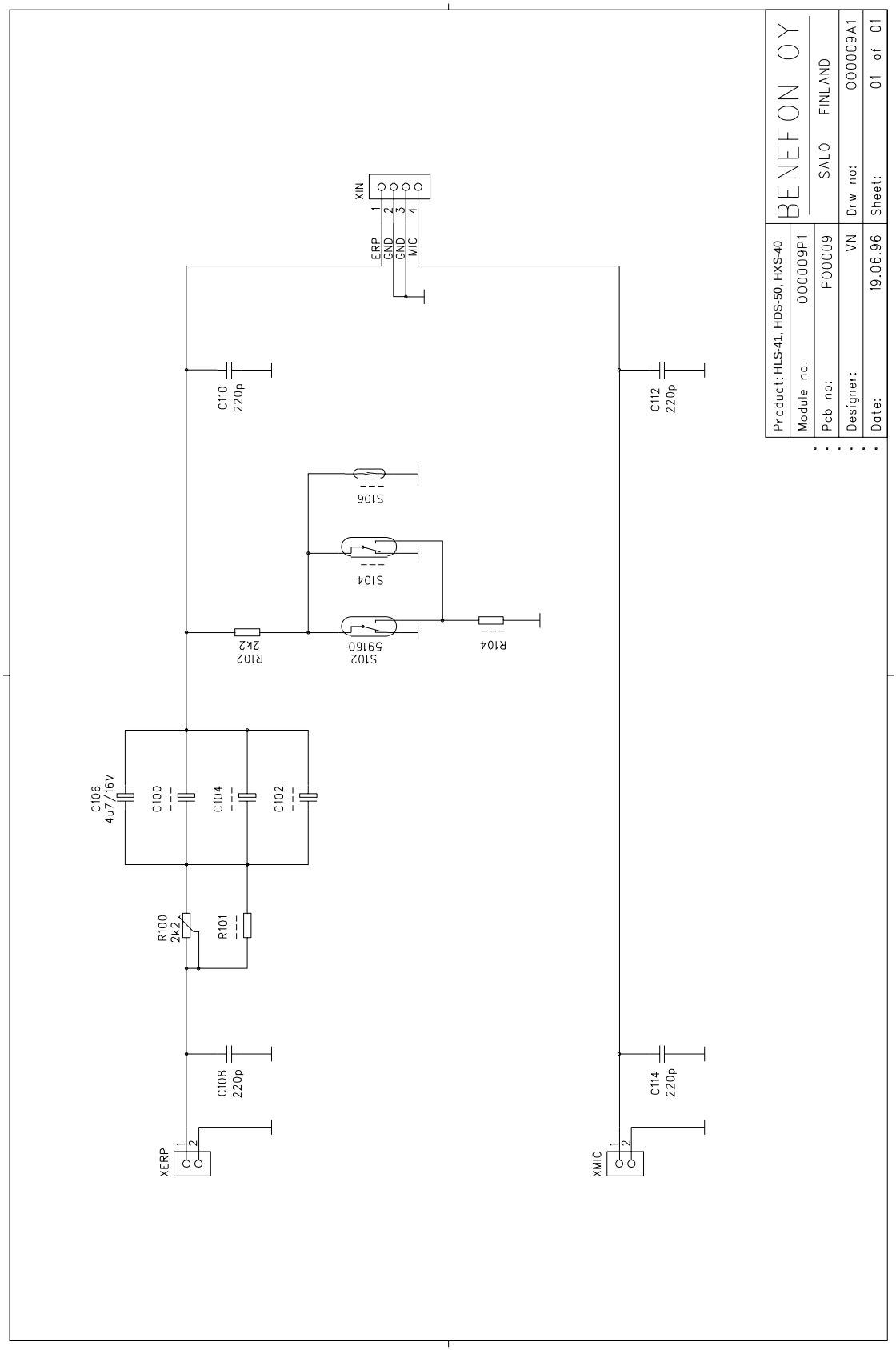
Last
update
16.05.97

The Top Side Layout PO0009A1 (Schematic OO0009A1)

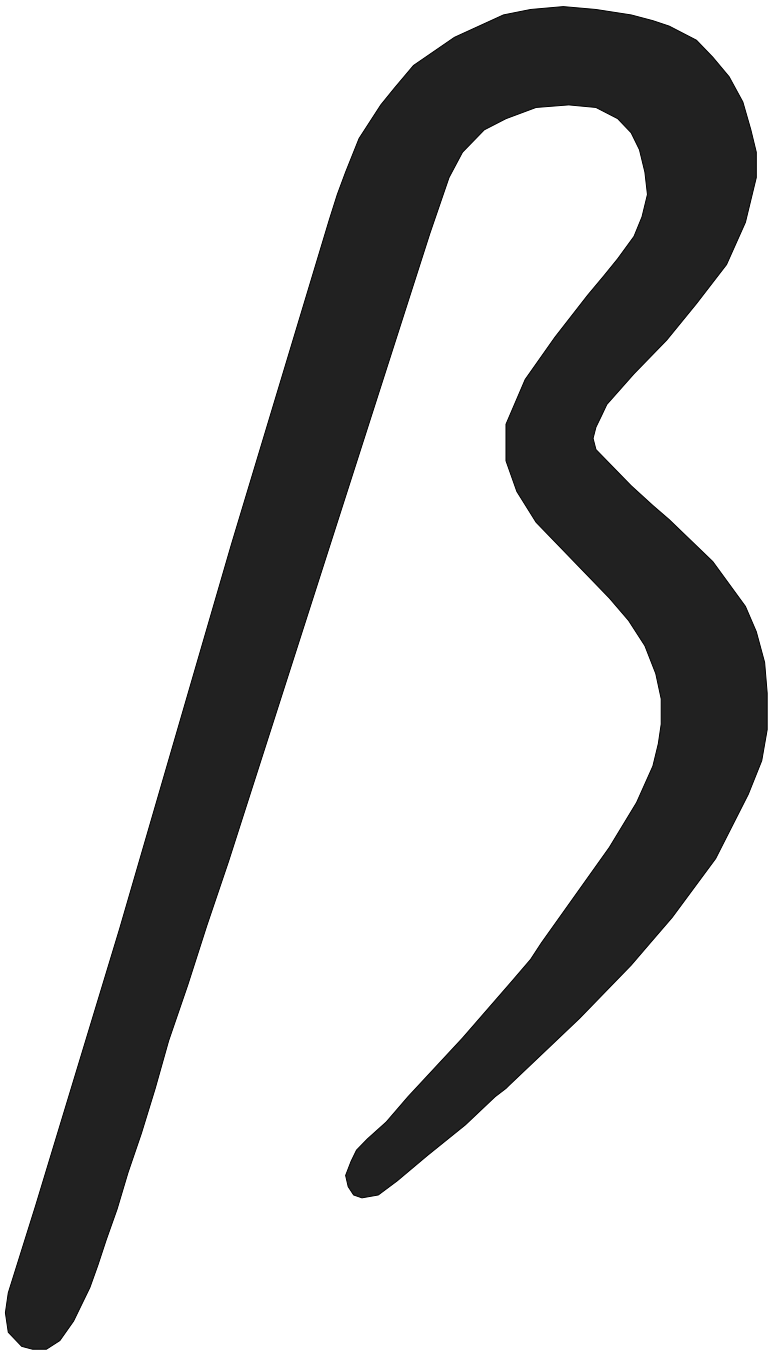


The Bottom Side Layout PO0009A1 (Schematic OO0009A1)




XIN
ERP
GND
GND
MIC
C110
220p
C112
220p
S106
S104
S102
59160
R102
2k2
R104
C106
4u7/16V
C100
C104
C102
R100
2k2
R101
C108
220p
C114
220p
XERP
XMIC
BENEFON OY
SALO FINLAND
Product: HLS-41, HDS-50, HXS-40
Module no: 0000009P1
Pcb no: P00009
Designer: VN
Date: 19.06.96
Drw no: 0000009A1
Sheet: 01 of 01

9.0 OTHER ACCESSORIES



OTHER ACCESSORIES

9.1 LINE INTERFACE LIF-40

YO0245

9.1.1 General

The line interface is an accessory for a Benefon phone to enable a tele-device approved for the general network to be connected to the handportable. The tele-device should be approved for connection to a fixed line network.

9.1.1.1 Telefax devices and modems

An error correcting modem (e.g. MNP, LAPM), and telefax (Level III or newer) are recommended for data transfer. Check that the recipient also uses an equivalent protocol, otherwise the error correction feature will not operate.

The data transfer speed will depend on the quality of the call. Whenever possible, use a fixed baud rate. An automatic baud rate selector does not necessarily work with a cellular phone.

The modem/telefax may suffer interference from a powerful radio field. Check this by testing with e.g. a magnetic antenna.

9.1.1.2 Fixed line telephones

Check that the telephone does not suffer interference from the handportable radio field. Connect the line interface to the desired tele-device. Make a call from the device and move the hand-phone antennna around the vicinity of the device.

9.1.1.3 Cordless telephones

These are not recommended for use with the line interface.

9.1.1.4 Other tele-devices

Before connecting the device to the line interface, make sure that the device has been type-approved and meets the standards required for connection to a fixed line network.

9.1.2 Using the line interface

9.1.2.1 Calling from the tele-device

When the dialling tone is heard through the tele-device handset, dial the area code and number (max.23digits). The number dialled will appear in the handportable display.

About 7 s. after the last entry, the hand-phone will initiate the call. If the call is unsuccessful, a busy tone will be heard from the handset.

When the dialling tone is heard, there is approx. 30 s. time to start dialling the number.

The number may also be dialled from the handportable keyboard.

9.1.2.2 Answering a call with the tele-device.

A call is answered normally by lifting the tele-device handset or allowing the device to answer automatically.

If the call has been answered by the handportable , it can be transferred to the tele-device as follows: Lift the tele-device handset (or press ON LINE from the telefax), and press the handportable HF key.

9.1.2.3 Terminating a call.

The call is terminated normally by returning the handset to its cradle.

The call may also be terminated by pressing the lightning key on the handportable. The busy signal will then be heard from the tele-device handset. Do not forget to replace the tele-device handset, as the line interface uses power from the handportable battery.

9.1.2.4 Making and receiving a call with the hand-phone

A call can be made and received normally from the handportable as long as the tele-device handset has not been lifted.

9.1.3 Technical information

The line interface only consumes power when the tele-device handset is lifted.

The phone battery can be charged and the line interface used simultaneously by connecting the charger and line interface to the handportable through a branching unit.

Performance values:

Current consumption	200 mA
Line current	25 mA
Line impedance	860 ohm / 39 nF
Dialling/busy tone	400 Hz
Frequency range	300...3400 Hz ± 1 dB
Ring voltage	60 VAC

9.1.3.1 TROUBLE SHOOTING

When moving about or in an area with poor reception, radio fade and changes between base stations will interrupt radio contact. Typical symptoms of data transfer errors are random characters, missing characters, loss of contact, drop in data transfer speed, missing lines and error lines in telefaxes.

The data transfer device and program should withstand momentary breaks.

An error correcting modem is only of value if it is available at both ends of the transmission.

It is recommended to stay in one place during data transfer, and to select a location with as strong field strength as possible.

The line interface takes its power from the hand-phone battery, so allow for the increased consumption by first charging the battery or by connecting the charger using the branching unit.

Use the cellular phone exchange data transfer service to eliminate problems caused by channel changing.

Modem settings:

- long elapsed time range for carrier wave control (ATS10=30)
- short data blocks (AT&BS0)
- error correction ON (AT&E2)
- speed select (AT$MB2400)

There are tele-devices that take their power from the telephone line, in which case the line interface supply of 25 mA will not be enough. These, generally non-approved devices are not recommended for use with the line interface.

Typically, problems arise from modem or telefax internal settings (see tele-device operating manual). Data transfer may function normally with a fixed telephone line, but not with the handportable. Frequently the settings for radio transmission have to be found by experimentation.

9.1.3.2 Functional Description

You can use the line converter for connecting your Benefon handportable to any two-wire data terminal approved for use in the public telephone network. The line converter receives its operation power from the handportable battery; a separate branching unit enables a charging device to be simultaneously connected to the handportable. The line converter consists of the following operations: ring voltage and line current generation, audio input and output, line current detection (HOOK), and low-power standby mode.

The line converter can be divided into seven different functional units: audio, frequency divider, chopper, current sink, I2C connection, free/reserved tone generation, line switches for ring signal, and HOOK detection.

9.1.3.3 Connectors

X120

1	EXTMIC	MIC input for hand-portable	400 mVrms
2	GND	Signal ground	
3	EXTERp	ERP output from hand-portable	200 mVrms
4	VBAT	NiCd battery voltage	7.2 V
5	I2CDAT	I2C-connection data line	0/5 V
6	I2CCLK	I2C-connection clock line	0/5 V
7	I2CINT	I2C-connection interrupt	0/5 V

X121

1	LB	Two-wire connection to data terminal
2	LA	

9.1.3.4 Audio

The audio unit consists of operation amplifiers I100C and I100D and their peripheral components. The low-frequency alternating current passing through the two-wire data terminal is formed by a current coming from the I100D output through resistor R109 (signal received by the data terminal) and by a current coming through resistor R109 to I100C (signal transmitted by the data terminal). R109/C111 is used for generating the line impedance appropriate to the data terminal.

The -3 dBm level (549 mVrms / 600 ohm) causes a 400 mVrms voltage in the EXTMIC line and a ±3 kHz deviation in the transmitter. Likewise, the ±3 kHz deviation in the receiver causes a 400 mVrms voltage in the EXTERP line and a -16 dBm level (123 mVrms / 600 ohm) in the data terminal.

9.1.3.5 Basic Frequencies

Components R114, R115, C109 and I105 form an oscillator vibrating at a frequency of approx 220 kHz. This frequency is divided within I105 into frequencies 430 Hz (free/reserved tone) and 26 Hz (ring frequency).

9.1.3.6 Switched Mode Voltage Converter

The basic chopper connection consists of operation amplifier I100A, quad NAND I101, MOSFET Q100, and coil L100. Saw wave to the I101A input pin 2 is generated from the basic frequency 220 kHz by using resistor R131 and capacitor C121. By changing the dc-level of the saw wave, the operation amplifier I100A controls the pulse width at gate Q100.

An extended width pulse from the basic frequency is brought to the I101A input pin 1 in order to make sure that the MOSFET is led to be momentarily non-conductive in every cycle.

While Q100 is conducting, the energy flows through resistor R108 to the coil L100. When the switch Q100 stops conducting, the energy received by L100 is discharged through the rectifier diode D100 to the capacitor C106. The fet is protected by C122 and C123 against excessive voltage peaks, while L101/C107 functions as a low-pass filter for filtering the ripple voltage. The output voltage in capacitor C107 pins depends on the RINGON signal mode, being approx 50V in the ring mode (RINGON=1) and 15 ±3 VDC in the normal mode (RINGON=0).

9.1.3.7 Current Sink

The current passing through the two-wire data terminal is kept constant by a constant-current load formed by I103A, Q101 and Q102. The closed-loop current is 25 ±5 mA.

9.1.3.8 Connection of I2C

The control connection is made with the I2C circuit I104, which controls the switching-on of the voltage, call and free/reserved tone according to the commands coming from the portable. Data received by the portable is a HOOK mode, the change of which is identified by the portable as interruption.

In addition, one of the I104 inputs (pin 7) has been connected to the ground so that the portable receives interruption every time the voltage is switched on.

9.1.3.9 Free/Reserved Tone

The free/reserved tone is connected by transistor Q106 to a filter consisting of the operation amplifier I100B. In this filter, the tone is reduced to a suitable level, and the square wave received from Q106 is made more gentle.

9.1.3.10 Line Switches

The double fet switches Q107/Q110 and Q109/Q108 form the line switches which switch on the ring voltage to the two-wire connection. While conducting, Q104 switches the double fet Q107/Q110 to conduct, whereby the current passes in line connection from pin LB to pin LA. While conducting, Q103 switches the double fet Q109/Q108 to conduct, whereby the current passes in line connection from pin LA to pin LB.

Q111 ensures that only one of the switches Q103 and Q104 is conducting and that R144/R145 form the voltage distribution which will prevent the VDD from overflowing through VCC 1102 in standby mode.

9.1.3.11 HOOK Detection

HOOK detection is carried out by operation amplifier I103B which controls the data terminal current coming from resistors R123/R124. The threshold level is changed according to the power mode in order to detect the OFF-HOOK mode using a low battery voltage and to make sure the OFF-HOOK mode is not switched on too easily during a call.

9.1.4 Manufacturers Declaration for BABT/SITS/85/22

a) The electrical conditions present at the terminal apparatus connector are as follows:

i) 5-10 VDC depending on the battery voltage of the portable

ii) as above

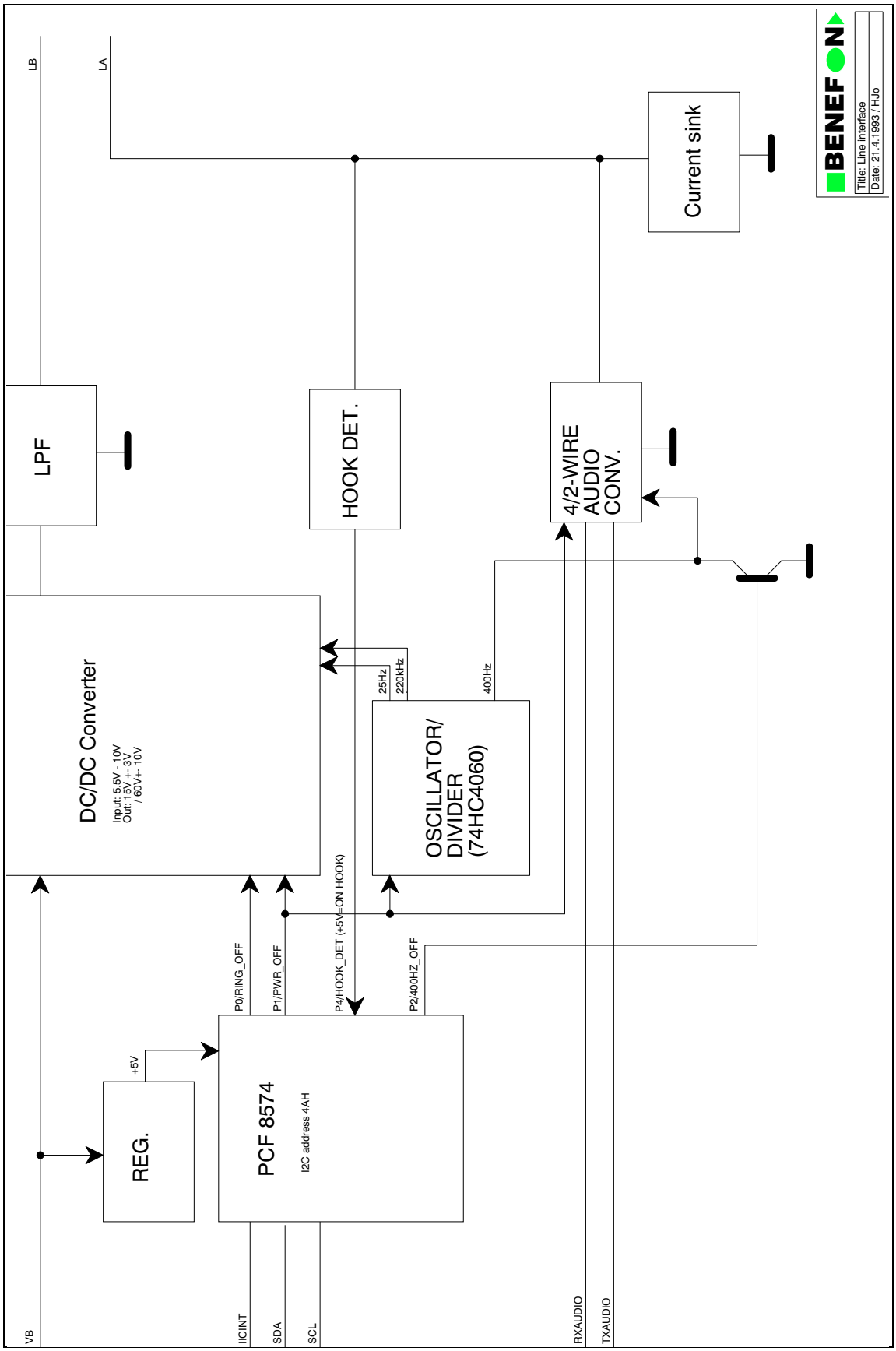
iii) ringing voltage 50 Vrms, f = 26 Hz

maximum REN driving capability = 1

iv) free/reserved tone 430 Hz, I = 25 ±5 mA

b) Maximum loop resistance of possible extension cable between line interface and terminal apparatus is 25 ohms.

c) This line interface apparatus does not cause the Mobile Station to operate contrary to the requirements of BABT/SITS/84/13.


LB
LA
Current sink
BENEFON
Title: Line interface
Date: 21.4.1993 / HJo
LPF
HOOK DET.
4/2-WIRE AUDIO CONV.
DC/DC Converter
Input: 5.5V - 10V
Out: 1.5V +- 3V
/ 60V+- 10V
25Hz
220kHz
400Hz
OSCILLATOR/ DIVIDER (74HC4060)
P0/RING_OFF
P1/PWR_OFF
P4/HOOK_DET (+5V=ON HOOK)
P2/400HZ_OFF
+5V
REG.
PCF 8574
I2C address 4AH
VB
IICINT
SDA
SCL
RXAUDIO
TXAUDIO

9.1.5 Parts list OO0245

OO0245

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CF0680	C100	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CF0680	C101	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CF0680	C102	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CF0223	C103	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C104	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CF0223	C105	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CP0105	C106	Polyester cap	1uF 20% 50V	Wima	MK5
CP0105	C107	Polyester cap	1uF 20% 50V	Wima	MK5
CB0224	C108	SMD capasitor	220 nF 20% 50 V X7R	Philips	
CF0151	C109	SMD capasitor	150pF 5% 50V NP0	Philips	
CF0222	C110	SMD capasitor	2.2 nF 5% 50 V NP0	Philips	
CC0393	C111	SMD capasitor	39 nF 10% 50V X7R	Philips	
CB0224	C112	SMD capasitor	220 nF 20% 50 V X7R	Philips	
CF0223	C113	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CE0105	C114	Al elko	1uF/63V 4x7mm	Philips	2222 097 58108
CU0106	C115	SMD tantal	10uF/16V 20% 6x3.2mm	Matsushita	ECST1CC 106R
CF0223	C116	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CU0106	C117	SMD tantal	10uF/16V 20% 6x3.2mm	Matsushita	ECST1CC 106R
CB0224	C118	SMD capasitor	220 nF 20% 50 V X7R	Philips	
CF0680	C119	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CC0473	C120	SMD capasitor	47 nF 10% 50 V X7R	Philips	
CF0151	C121	SMD capasitor	150pF 5% 50V NP0	Philips	
CK0680	C122	Cer capasitor	68pF 100V +-10%	Philips	
CK0680	C123	Cer capasitor	68pF 100V +-10%	Philips	
CU0106	C124	SMD tantal	10uF/16V 20% 6x3.2mm	Matsushita	ECST1CC 106R
CK0680	C125	Cer capasitor	68pF 100V +-10%	Philips	
CF0680	C126	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CF0680	C127	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CF0680	C128	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CF0680	C129	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CF0822	C130	SMD capasitor	8.2nF 10% 50V	Philips	
CF0680	C131	SMD capasitor	68 pF 5% 50 V NP0	Philips	
CF0223	C132	SMD capasitor	22 nF 10% 50 V X7R	Philips	
CC0103	C222	SMD capasitor	10 nF 10% 50V X7R	Philips	
DS0070	D100	SMD diode pair	70V/100mA common cathode	Philips	BAV 70
DS0032	D101	SMD diode	75V/0.45A	Philips	BAS32L
DS0032	D102	SMD diode	75V/0.45A	Philips	BAS32L
DS0032	D103	SMD diode	75V/0.45A	Philips	BAS32L
DS0032	D104	SMD diode	75V/0.45A	Philips	BAS32L
AF1103	F100	SMD fuse	3.5A nanofuce	Littelfuse	R271 03.5
IA0324	I100\	4 x opamp			LM324
IH0000	I101\	4x2-inp NAND	HCMOS		74HC00
IC7S08	I102\	2-input and	C2MOS	Toshiba	TC7S08F
IA0272	I103\	2 x op.amp.	LinCMOS Low noise,power	Texas	TLC27M2ID
II8574	I104	8 bit I/O	I2C	Philips	PCF8574T
IH4060	I105	14-bit bin.counter	Si-gate CMOS	Philips	74HC4060T
IR2951	I106	Regulator	100mA 5V adj. 5%	National	LP2951CM
YC0206	IN	Line converter cable	6-100611-2+cable		931549 30
LF0157	L100	RF-inductor	100uH/1.13A/0.221ohm/20Q	Toko	262LYF-0092K
LF0157	L101	RF-inductor	100uH/1.13A/0.221ohm/20Q	Toko	262LYF-0092K
PO0245	M100	PCB for OO0245	50x60mm/4-layer FR4	Metalex	
NE1014	M101	PT-screw	2,2x8 FeZnA	Konetuote	KB22x8 WN1442
NE1014	M102	PT-screw	2,2x8 FeZnA	Konetuote	KB22x8 WN1442
NE1014	M103	PT-screw	2,2x8 FeZnA	Konetuote	KB22x8 WN1442
NE1014	M104	PT-screw	2,2x8 FeZnA	Konetuote	KB22x8 WN1442

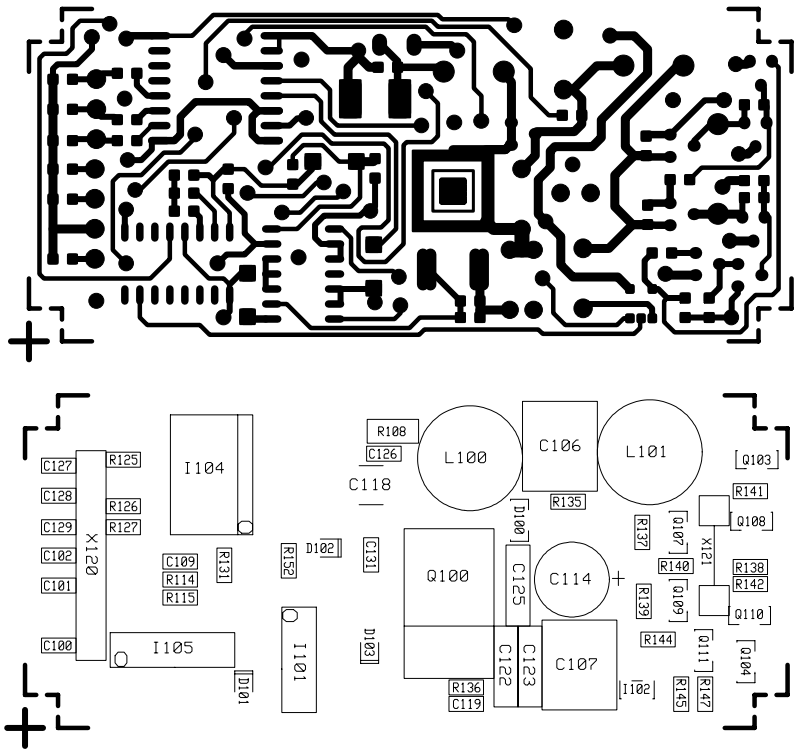
CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
MC1280	M105	Charger case		Tamplast	
MF1405	M108	Type plate	LIF-40	ScreenHous	931652 40
QF0024	Q100	SMD n-channel	60V/15A/Rds=0.1	I&R	IRFR024
QF7002	Q101	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QS1054	Q102	SMD transistor	NPN 1.5A/45V	Philips	BCP 54
QF7002	Q103	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QF7002	Q104	SMD n-channel FET	60V 0.115A Rds7.5	Siliconix	2N7002-T1
QF0610	Q105	SMD p-channel fet	Rds=10R max, IDmax=120mA	Siliconix	TP0610T
QSB858	Q106	SMD transistor	PNP 0.1A/30V F<10dB	Philips	BC 858 B
QF0610	Q107	SMD p-channel fet	Rds=10R max, IDmax=120mA	Siliconix	TP0610T
QF0610	Q108	SMD p-channel fet	Rds=10R max, IDmax=120mA	Siliconix	TP0610T
QF0610	Q109	SMD p-channel fet	Rds=10R max, IDmax=120mA	Siliconix	TP0610T
QF0610	Q110	SMD p-channel fet	Rds=10R max, IDmax=120mA	Siliconix	TP0610T
QSB858	Q111	SMD transistor	PNP 0.1A/30V F<10dB	Philips	BC 858 B
QSB858	Q112	SMD transistor	PNP 0.1A/30V F<10dB	Philips	BC 858 B
RF0103	R100	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R101	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0562	R102	SMD resistor	5.6 k 5% 0.125 W	Kamaya	
RF0103	R103	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R104	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R105	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R106	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R107	SMD resistor	10 k 5% 0.125 W	Kamaya	
RC0229	R108	SMD resistor	2R2 5% 0.125 W	Kamaya	
RF0102	R109	SMD resistor	1 k 5% 0.125 W	Kamaya	
RF0223	R110	SMD resistor	22 k 5% 0.125 W	Kamaya	
RF0103	R111	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0104	R112	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R113	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0123	R114	SMD resistor	12 k 5% 0.125 W	Kamaya	
RF0223	R115	SMD resistor	22 k 5% 0.125 W	Kamaya	
RF0472	R116	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0222	R117	SMD resistor	2.2 k 5% 0.125 W	Kamaya	
RF0104	R118	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0103	R119	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0563	R120	SMD resistor	56 k 5% 0.125 W	Kamaya	
RF0104	R121	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0103	R122	SMD resistor	10 k 5% 0.125 W	Kamaya	
RC0151	R123	SMD resistor	150 R 5% 0.125 W	Kamaya	
RC0151	R124	SMD resistor	150 R 5% 0.125 W	Kamaya	
RF0221	R125	SMD resistor	220 R 5% 0.125 W	Kamaya	
RF0221	R126	SMD resistor	220 R 5% 0.125 W	Kamaya	
RF0221	R127	SMD resistor	220 R 5% 0.125 W	Kamaya	
RF0153	R128	SMD resistor	15 k 5% 0.125 W	Kamaya	
RF0183	R129	SMD resistor	18 k 5% 0.125 W	Kamaya	
RF0473	R130	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0223	R131	SMD resistor	22 k 5% 0.125 W	Kamaya	
RF0103	R132	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0272	R133	SMD resistor	2.7 k 5% 0.125 W	Kamaya	
RF0473	R134	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0154	R135	SMD resistor	150 k 5% 0.125 W	Kamaya	
RF0104	R136	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R137	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R138	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R139	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0104	R140	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0473	R141	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0473	R142	SMD resistor	47 k 5% 0.125 W	Kamaya	
RF0472	R143	SMD resistor	4.7 k 5% 0.125 W	Kamaya	
RF0473	R144	SMD resistor	47 k 5% 0.125 W	Kamaya	

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
RF0103	R145	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0104	R146	SMD resistor	100 k 5% 0.125 W	Kamaya	
RF0103	R147	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R148	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0103	R149	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0223	R150	SMD resistor	22 k 5% 0.125 W	Kamaya	
RF0103	R151	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0223	R152	SMD resistor	22 k 5% 0.125 W	Kamaya	
RF0103	R153	SMD resistor	10 k 5% 0.125 W	Kamaya	
RF0275	R201	SMD resistor	2.7 M 5% 0.125 W	Kamaya	
RC0562	R203	SMD resistor	5.6 k 5% 0.125 W	Kamaya	
VR0407	TEL	Line conv.modular cable			

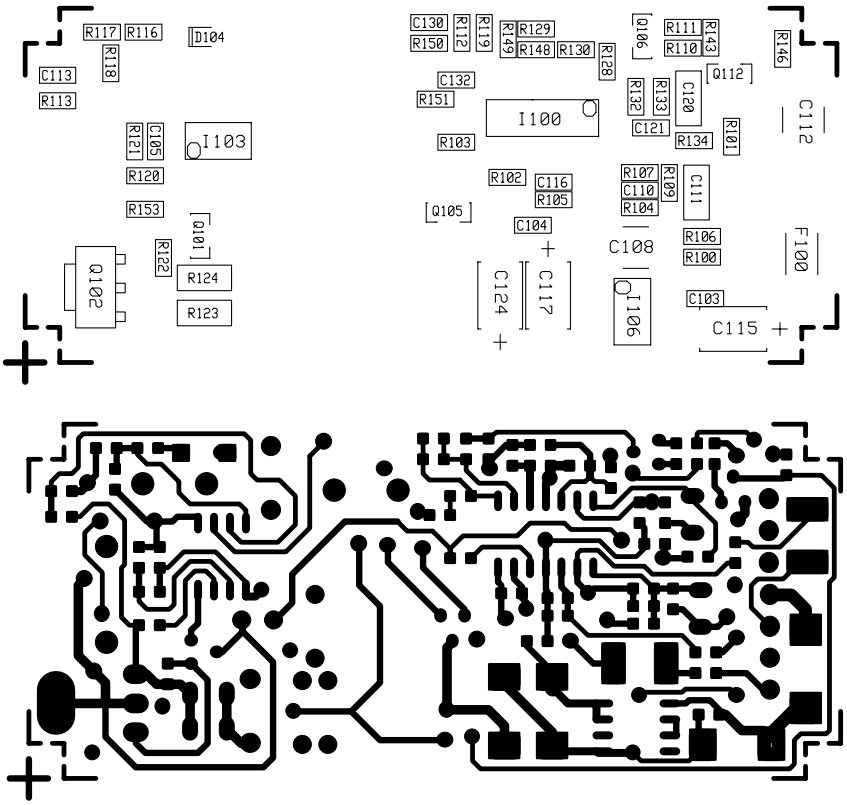
Last
update
07.03.96

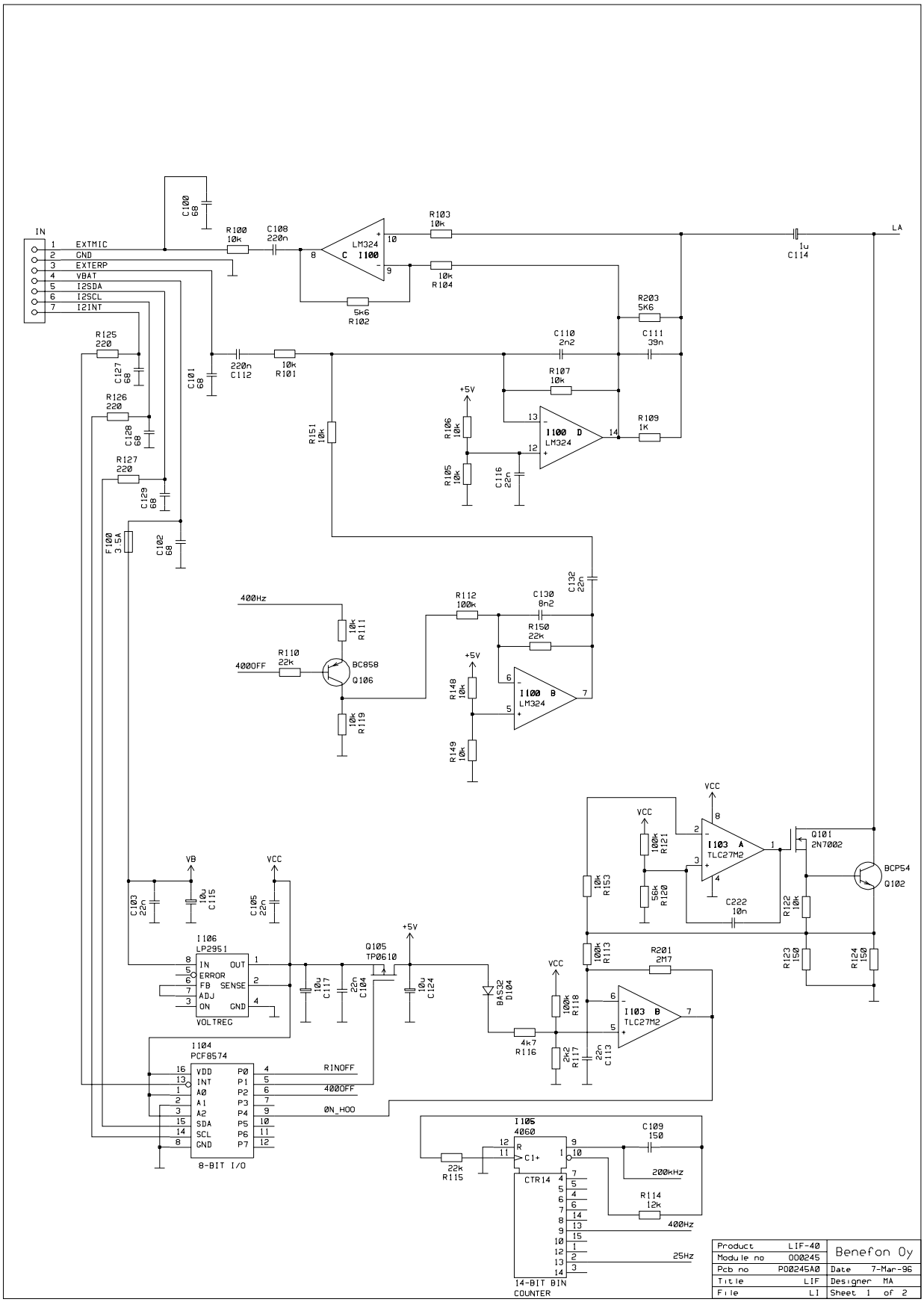
OO0245

Component Side Layout PO0245A0



Solder Side Layout PO0245A0

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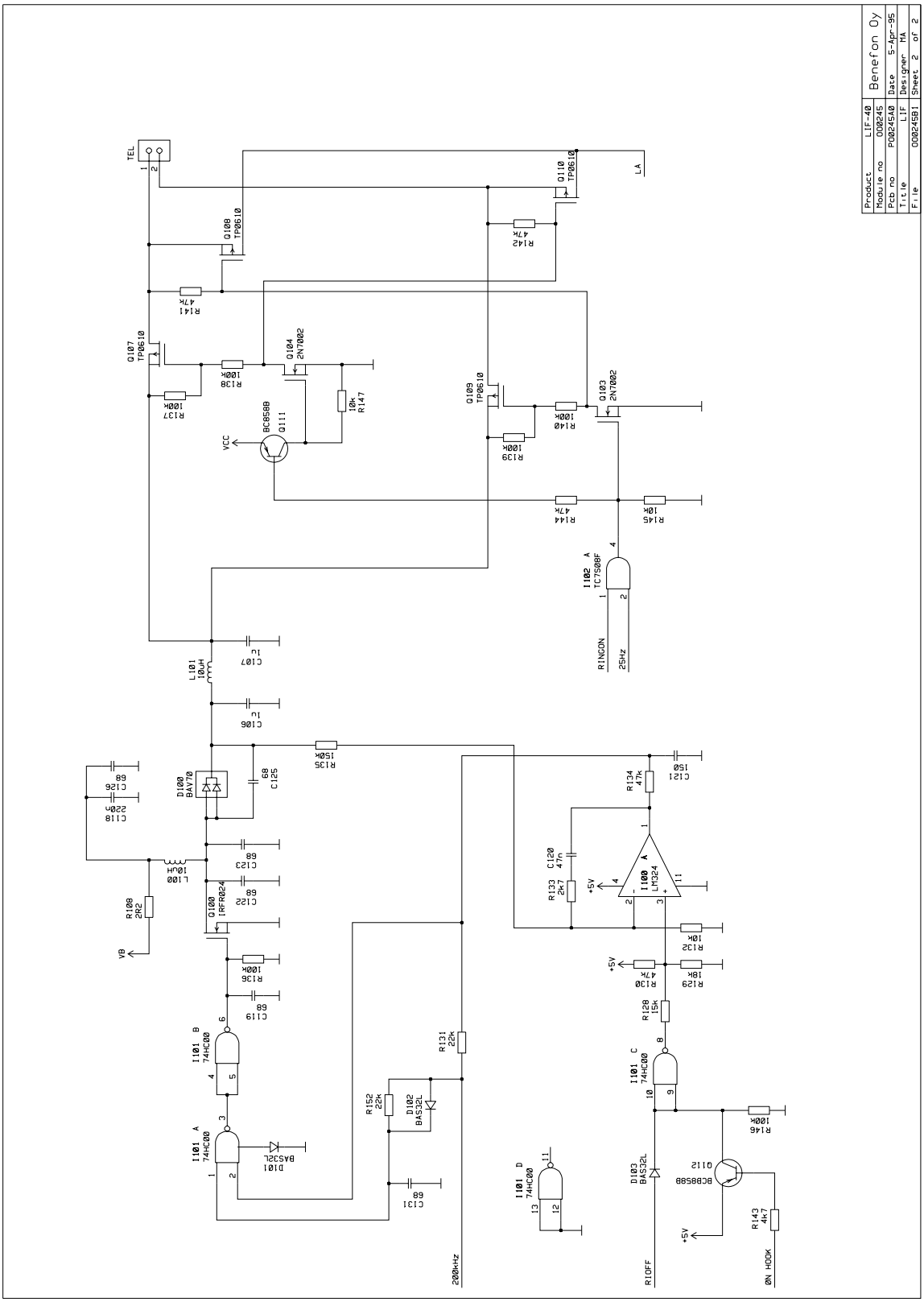
EXTERP
VBAT
I2SDA
I2SCL
I2INT
LA
LM324
TLC27M2
BC858
BCP54
2N7002
TP0610
LP2951
VOLTREG
PCF8574
8-BIT I/O
4060
CTR14
14-BIT BIN COUNTER
RINOFF
400OFF
0N_HOO
400Hz
200kHz
25Hz
VB
VCC
+5V
Product LIF-40
Module no 000245
Pcb no P00245A0
Title LIF
File LI
Benefon Oy
Date 7-Mar-96
Designer MA
Sheet 1 of 2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Module no O00245
Pcb no P00245A0
Title LIF
File O0024581
Date 5-Apr-95
Designer MA
Sheet 2 of 2
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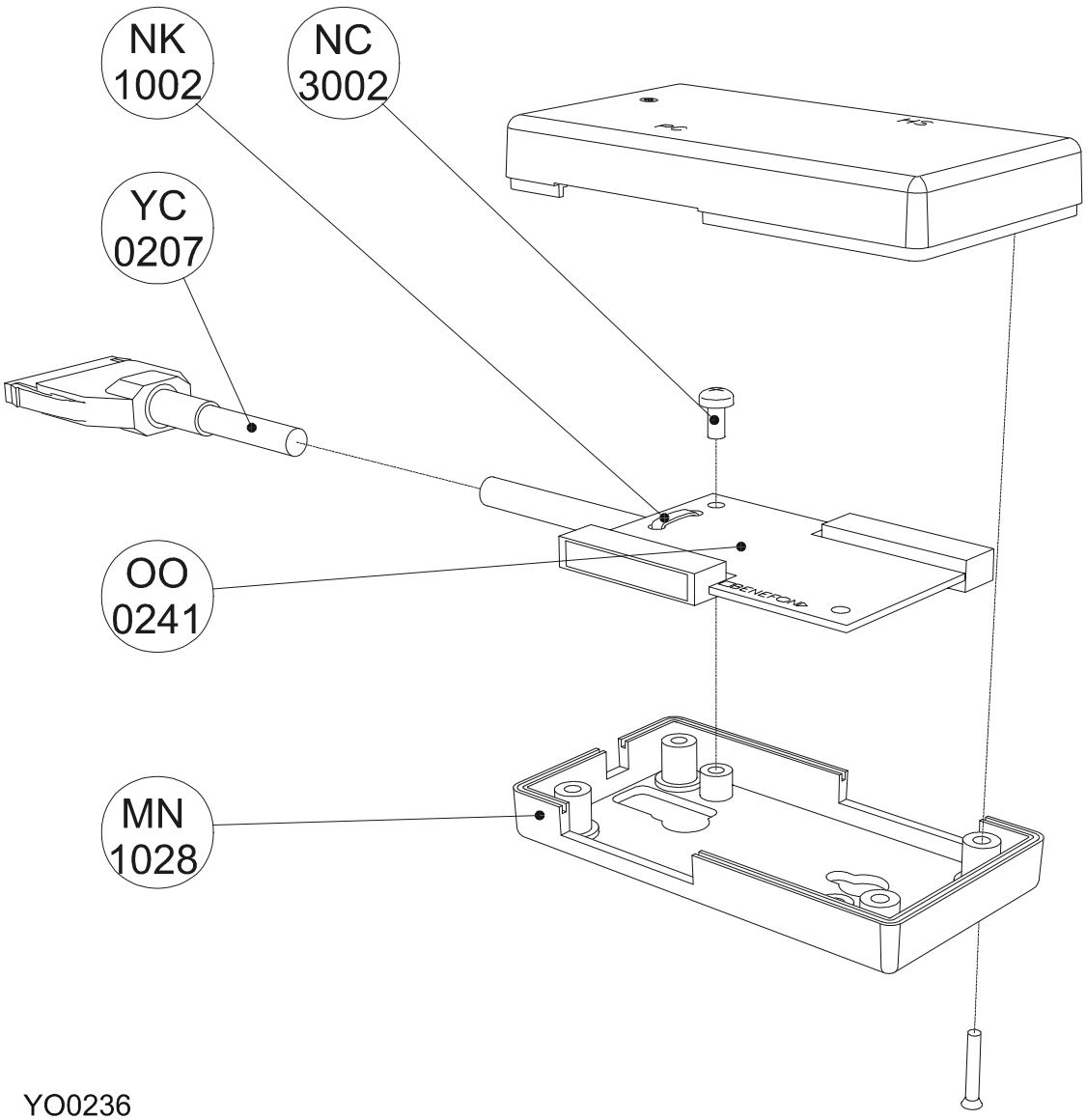
LA
Q110 TP0610
Q108 TP0610
R142 47k
R141 47k
Q107 TP0610
Q104 2N7002
R138 100k
R137 100k
R147 10k
VCC
BC858B Q111
Q109 TP0610
Q103 2N7002
R140 100k
R139 100k
R144 47k
R145 10k
I102 A TC7S08F
RINGON
25Hz
L101 10uH
C107 1u
C106 1u
R135 150k
D100 BAV70
C126 68
C118 220p
C125 68
C123 68
L100 10uH
C122 68
R108 2k2
Q100 IRFR024
VB
R136 100k
C119 68
I101 B 74HC00
I101 A 74HC00
D101 BAS32L
R131 22k
R152 22k
D102 BAS32L
C131 68
200kHz
C121 150
R134 47k
C120 47n
R133 2k7
+5V
I100 A LM324
R132 10k
R130 47k
R129 18k
R128 15k
I101 C 74HC00
R146 100k
I101 D 74HC00
D103 BAS32L
Q112 BC858B
R143 4k7
RIOFF
ON HOOK

9.2 BRANCHING UNIT

YO0236



YO0236
951898-40

9.2.1 General

With the branching box you can simultaneously connect several accessories, such as an external handset and a line converter, to the car installation kit and the hand-portable.

9.2.2 Connectors

9.2.2.1 Connector PC/HS Signals

1 and 2	V-CHARGE	Battery charging voltage 2 A in
3	+9V	Operation voltage for accessories 0.5 A in
4	TXD	Rs232 0/5V out
5	HSMIC	Ext audio from microphone 1 kHz/ 400 mVrms
6and 7	GND	Ground
8	HSERP	Ext audio for earphone 1 kHz/200 mVrms
9	RXD	Rs232 0/5 V in
10	I2CINT	I2c interruption, input to radio 0/5 V
11	SCL	I2c clock 0/5 V
12	SDA	I2c data 0/5 V
13	CHCONT	Voltage for controlling charger current 0...5 VDC analog
14	EXTIO	Extra-IO

9.2.2.2 CONNECTOR HS SIGNALS

1 and 2	V-CHARGE	Battery charging voltage 2A in
3	9V	Operation voltage for accessories 0.5 A out
5	HSMIC	Ext audio from microphone 1 kHz / 400 mVrms
6 and 7	GND	Ground
8	HSERP	Ext audio for loudspeaker amplifier 1 kHz / 200 mVrms
10	I2CINT	I2c interruption, input to radio 0/5 V
11	SCL	I2c clock 0/5 V
12	SDA	I2c data 0/5 V
13	TXD	Rs232 0/5 V out
14	RXD	Rs232 0/5 V in
16	CHCGONT	Voltage for controlling charger current 0...5 VDC analog

9.2.2.3 Connector PC Signals

1 and 2	V-CHARGE	Battery charging voltage 2 A in
3	9V	Operation voltage for accessories 0.5 A out
5	PCMIC	Ext audio from microphone1 kHz / 400 mVrms
6 and 7	GND	Ground
8	PCERP	Ext audio for loudspeaker amplifier 1 kHz / 200 mVrms
10	I2CINT	I2c interruption, input to radio 0/5 V
11	SCL	I2c clock 0/5 V
12	SDA	I2c data 0/5 V
13	TXD	Rs232 0/5 V out
14	RXD	Rs232 0/5 V in
16	CHCGONT	Voltage for controlling charger current 0...5 VDC analog

9.2.3 Operation

Audio routes for either an external handset or a line converter are selected using audio switches I201 (mic) and I202 (erp). The operation is controlled by the HOOK data coming from the XHSERP line. OFF HOOK audio signals have been routed to connector HS, and ON HOOK audio signals to connector PC. Voltage regulation is done by components R205, C207 and D201.

9.2.4 Parts list OO0241

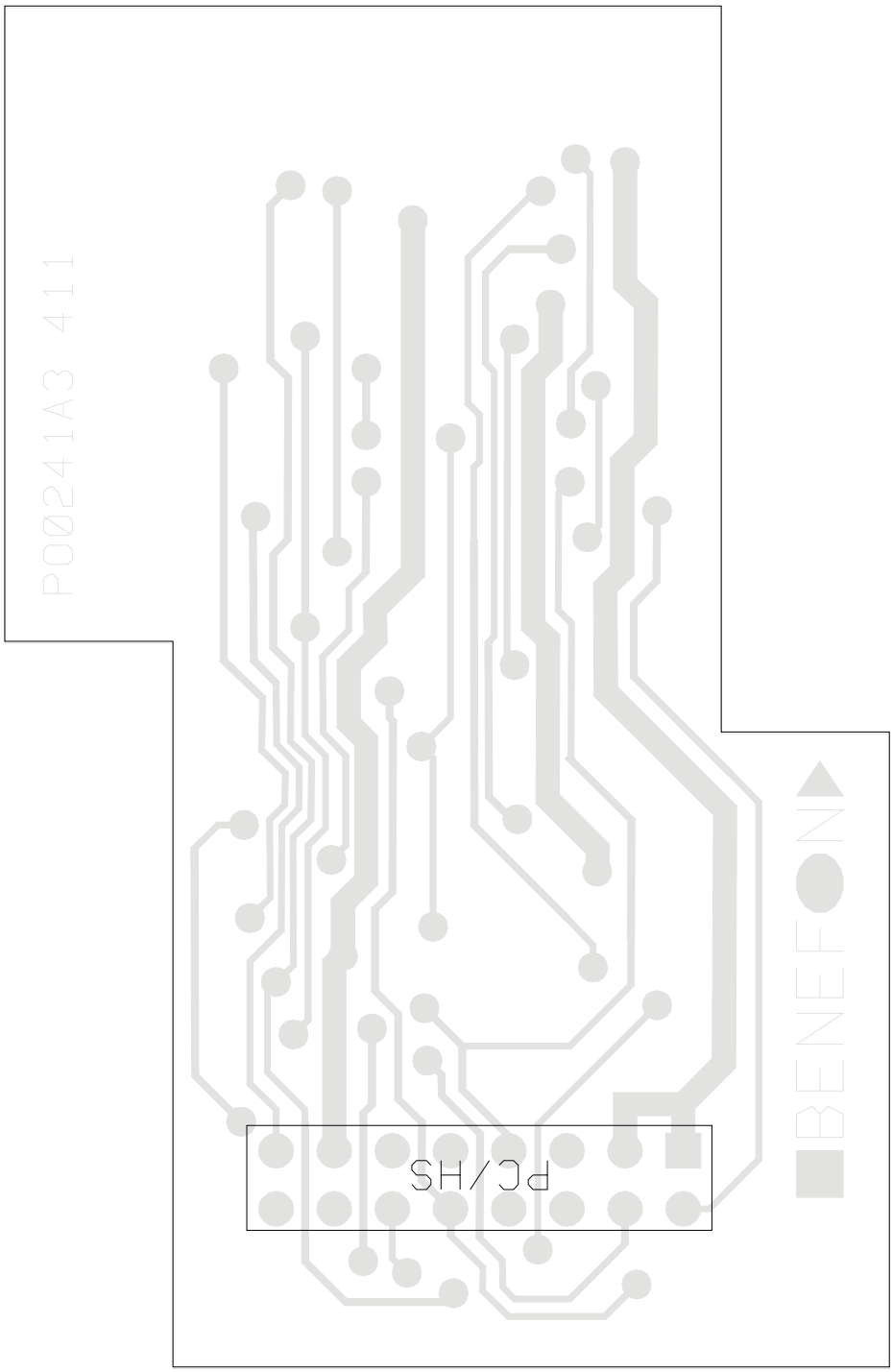
OO0241

CODE	PART	DESCRIPT.	VALUE	MANUF.	TYPE
CH0105	C201	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C202	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C203	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C204	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C205	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C206	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CH0105	C207	SMD capasitor	1uF/-20/+80%/16V	TaiyoYuden	EMK212 F105Z00T
CD0180	C208	SMD capasitor	18 pF 5% 50 V NPO	Philips	
CD0180	C209	SMD capasitor	18 pF 5% 50 V NPO	Philips	
CD0180	C210	SMD capasitor	18 pF 5% 50 V NPO	Philips	
DZ0519	D201	SMD zener	5V1 5% 300mW	Philips	BZX84C5V1
VM0242	HS	SMD system connector	1x16 pin	AMP	188227-1
IC0453	I201	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
IC0453	I202	SMD 2x multip./demultip.		Toshiba	TC4W53F-TE 12L
PO0241	M200	PCB for juction box	60x40mm FR4	Metalex	
NC2005	M201	Cross recessed screw	M2x5 SFS2977 DIN9652	Ruuvitalo	Pozidriv
NC2005	M202	Cross recessed screw	M2x5 SFS2977 DIN9652	Ruuvitalo	Pozidriv
NC2005	M203	Cross recessed screw	M2x5 SFS2977 DIN9652	Ruuvitalo	Pozidriv
NC2005	M204	Cross recessed screw	M2x5 SFS2977 DIN9652	Ruuvitalo	Pozidriv
NF0200	M205	Nut	M2 SFS2067 / DIN943	Ruuvitalo	
NF0200	M206	Nut	M2 SFS2067 / DIN943	Ruuvitalo	
NF0200	M207	Nut	M2 SFS2067 / DIN943	Ruuvitalo	
NF0200	M208	Nut	M2 SFS2067 / DIN943	Ruuvitalo	
VM0242	PC	SMD system connector	1x16 pin	AMP	188227-1
VM0116	PC/HS	Contact strip angle	2x8	NB-electr.	H4-6-16G
RD0103	R201	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R202	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R203	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0103	R204	SMD resistor	10 k 5% 0.125 W	Kamaya	
RD0102	R205	SMD resistor	1 k 5% 0.125 W	Kamaya	

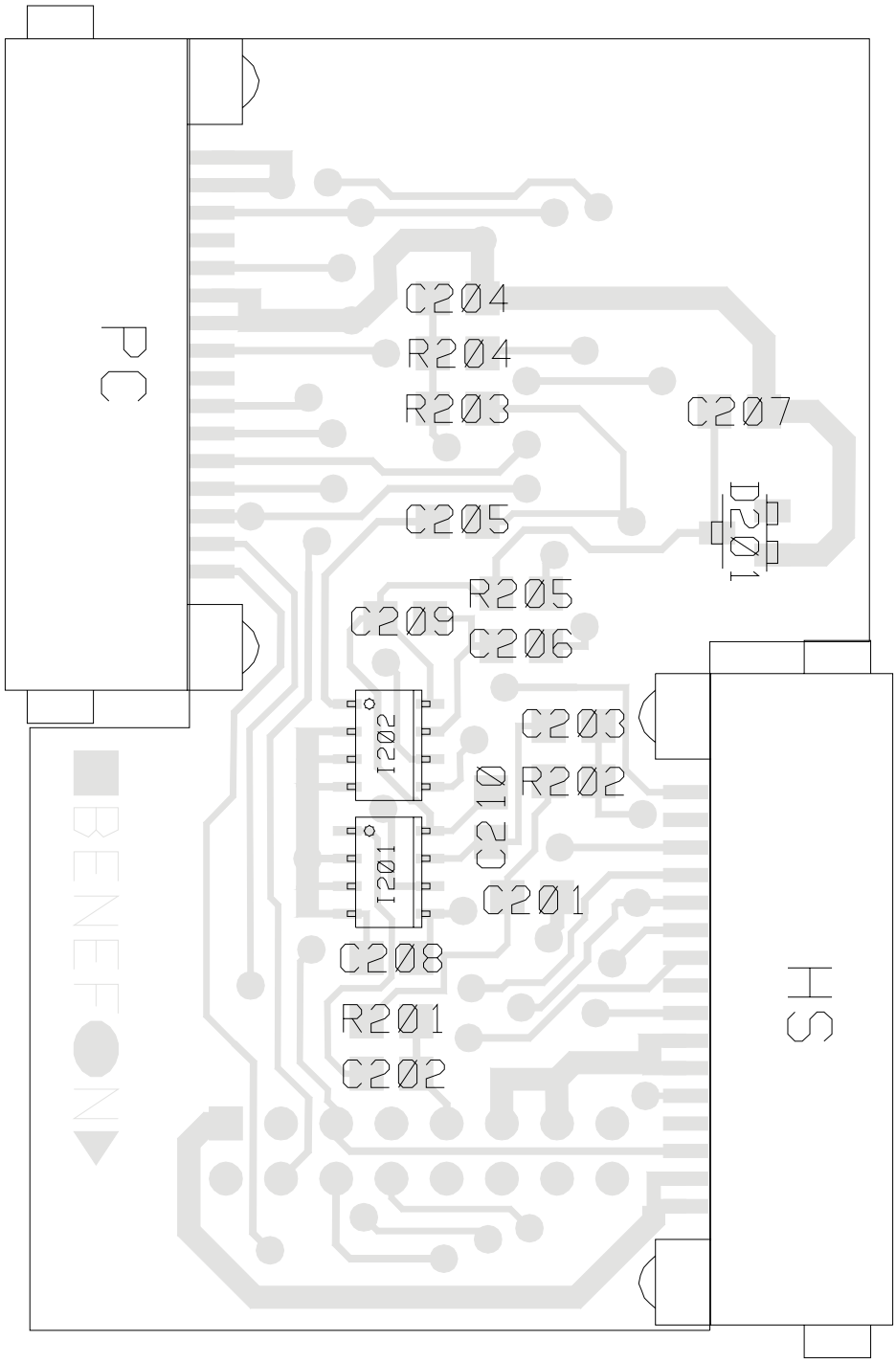
Last update 12.12.94

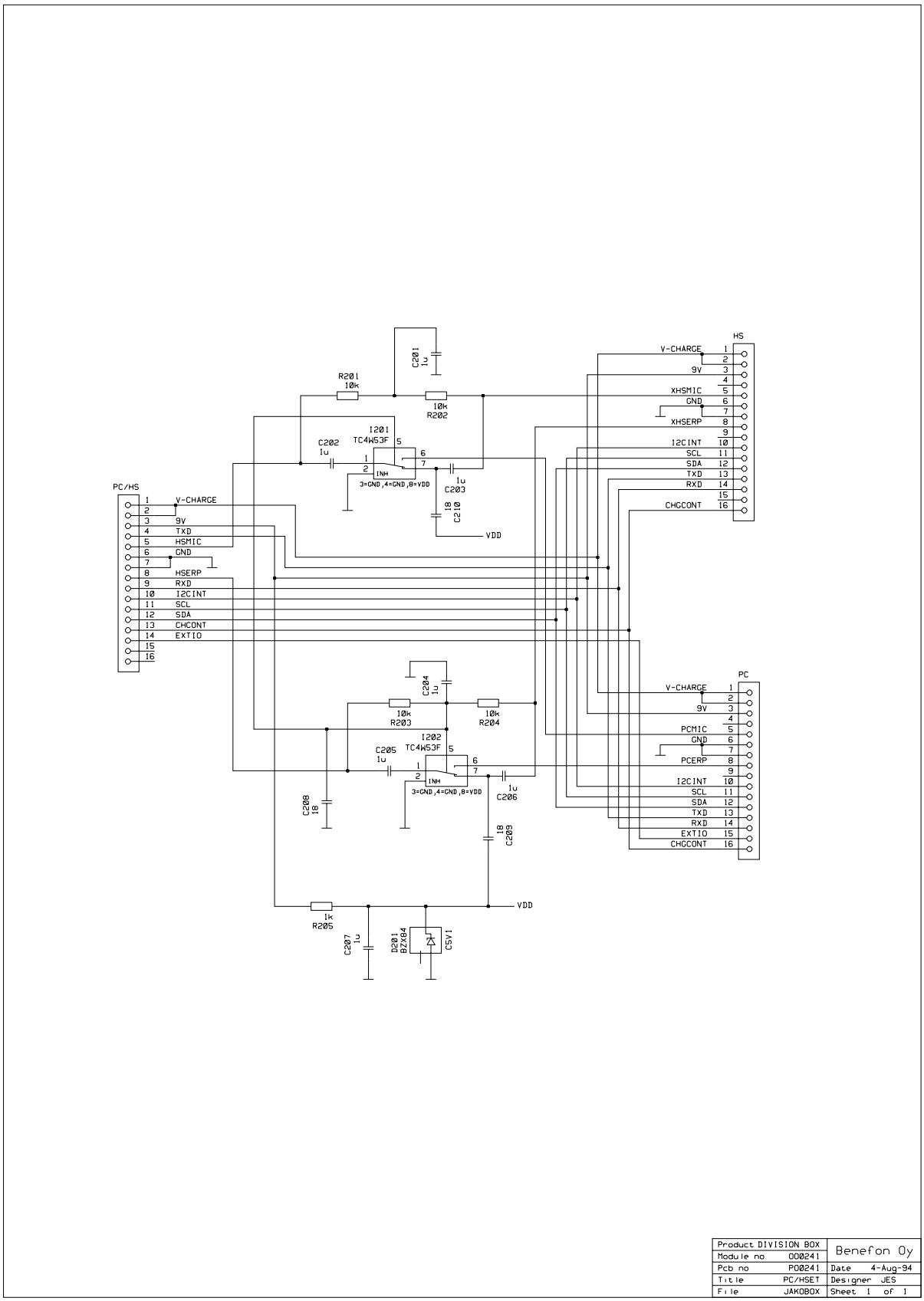
OO0241

Component Side Layout PO0241A3 (Schematic OO0241A3)



Solder Side Layout PO0241A3 (Schematic OO0241A3)

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9V
XHSMIC
GND
XHSERP
I2CINT
SCL
SDA
TXD
RXD
CHGCONT
PC
V-CHARGE
9V
PCMIC
GND
PCERP
I2CINT
SCL
SDA
TXD
RXD
EXTIO
CHGCONT
PC/HS
V-CHARGE
9V
TXD
HSMIC
GND
HSERP
RXD
I2CINT
SCL
SDA
CHCONT
EXTIO
R201 10k
C201 1u
R202 10k
I201 TC4W53F
C202 1u
INH
3=GND,4=GND,8=VDD
C203 1u
C210 18
VDD
C204 1u
R203 10k
R204 10k
I202 TC4W53F
C205 1u
C206 1u
C208 18
C209 18
R205 1k
C207 1u
D201 BZX84
C5V1
Product DIVISION BOX
Module no OO0241
Pcb no P00241
Title PC/HSET
File JAKOBOX
Benefon Oy
Date 4-Aug-94
Designer JES
Sheet 1 of 1