MOTOROLA

Cellular Subscriber Sector

Dual Band ZAP

Europe, Middle East & Africa

Version 1.3 - 12th October 1998

The World's Leading Cellular Telephone Manufacturer

Product Service Preview

ZAP CD920   **Middle Tier**
INITIAL MARKETS   **South Afrika, Hong Kong, Switzerland (Stage I)**
FUTURE MARKETS   **Wordwide**
EARLIEST RELEASE DATES **June (Stage I)**

CD920 / flipped version   **CD930 flipless version**
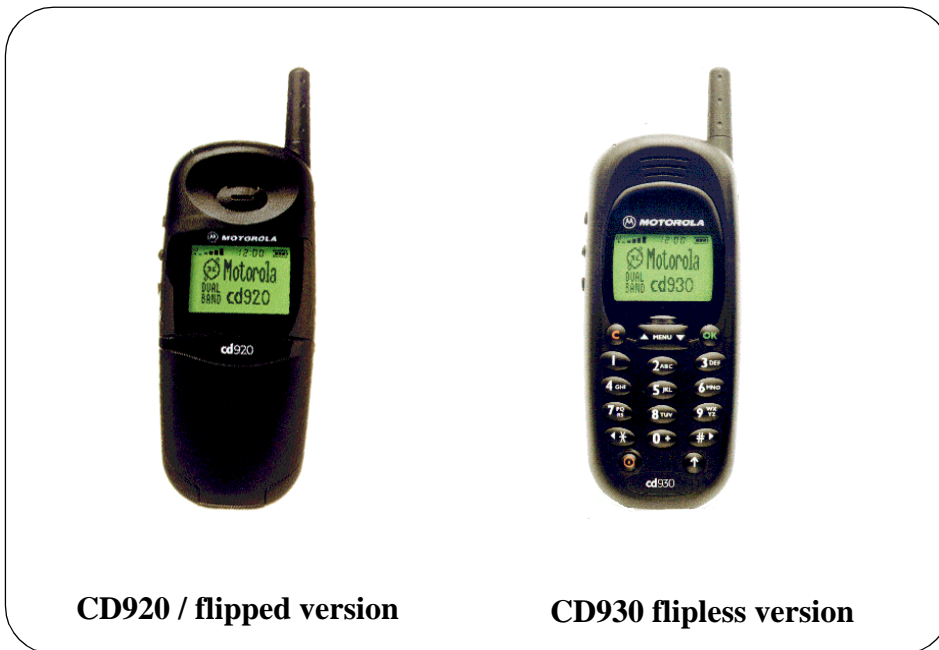
OVERVIEW

The ZAP is a new platform which uses the GSM Dual Band Standard.
The ZAP will replace the 8000 series and SlimLite products in the mid tier of the market.

The product introduction will take place in three main stages.

ZAP Launch Stages	EUROPE	ASIA
Stage1: No EFR, black flipped variant only	Test makets in South Afrika and Switzerland Limited launch in Nordicmarkets for June only	Test market in Hong Kong; Launch with Asian SMS and Chinese languages in Asian markets
Stage2: Fully featured flipped variant	Full launch in Europe	Will NOT ship in Asia
Stage3: Fully featured flipless variant	Full launch in Europe	Full launch in Asia with Asian SMS and Chinese languages

Refresh

A Zap Refresh product has been defined for launch in September '98 (Stages IV and V), when the following key changes will be added:
- MMI Enhancements to SMS
- SIM Application Toolkit upgraded to full Class II
- Tri-Rate Codec (Full Rate, EFR and Half Rate)

A further refresh of the product may be made in Q1-99, to include the Whitecap chipset; adding features such as internal data and enhanced performance.

The ZAP will include all of the data features as in the 8700 product.
That includes support for:
- Ergonomically designed for comfortable handling
- Lage, Optimax TM high contrast display
- VibraCall TM vibrating alert as standart
- 3 minute VoiceNote TM message recording feature
- Dual-Band technology; the quality capacity solution

ACCESSORIES

Batteries and Doors

The batteries to be available for ZAP and their standby and talk times will be:

Battery Types	Part Number	Standby Time (Hrs)	Talk Time (Min)	Availability Notes
Weight Leadership 400mAh Li Ion	SNN5089	30-40	60-90	June 98
650 mAh AAA Long NiMH	SNN5291	60-80	150-180	June 98
1000mAh LGQ8 Li Ion	SNN5360	90-105	210-270	June 98
1100mAh AA NiMH	SNN5307	90-120	210-270	June 98
Performance Leadership 2800mAh Li Ion	SNN5260	200-250	480-600	June 98
Extended AA battery door Black	SHN6618			June 98
Extended AA battery door Grey	SHN6829			June 98
Extended AA battery door Blue	SHN6944			June 98
Performance Leadership battey door Blk	SHN6975			June 98
Performance Leadership battey door Gry	SHN6827			June 98
Performance Leadership battey door Blu	SHN6945			June 98

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Chargers   The charger available for the ZAP will consist of a universal rapid travel charger with different plugs and a separate charger base which.
The part numbers for these will be:

Charger Type	Part Number	Availability Notes
Universal Rapid Travel Charger	SPN4278	As StarTac
Plug Euro	SYN4655	As StarTac
Plug UK	SYN4656	As StarTac
Plug Aus/ NZ	SYN4694	As StarTac
Plug Indian	SYN4696	As StarTac
Plug USA	SYN4657	As StarTac
Desktop Charger	SPN4523	June 98

Car Kits & Accessories

Car kits and accessories available for ZAP transceiver will be.

Car Kit or Accessory	Part Number	Availability Notes
Headset / Microphone	SYN6962	Same all products
Headset Adapter and Headset / Microphone	SLN3940<	June 98
Wireless Headset adapter and Earpiece	TBD	TBD
Cigarette Lighter Adapter	SYN4241	As StarTac
Hang Up Cup	SYN6911	June 98
Professional Car Kit with DSP	S8148	June 98
Professional Car Kit with DSP and VR	S8141	Q3, 98
Basic Car Kit	SLN3901	Q3, 98
Smart CELLect Data Cable & Soft Modem	CD1310	Aug 98

Carry Cases

The holsters and carry cases available for ZAP are as shown below:

Carry Case Type	Part Number	Availability Notes
Plastic Holster	SHN6851	June 98
Leather Holster with roting belt clip	SYN6913	Aug 98
Leather Pouch with flip top	SYN6913	June 98

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Data and Fax Modems / Connector Cable

Name	Part Number	Availability Notes
PC Card to Phone Connector Cable	SKN4821	As StarTac
CELLect TM 1 + German / English	S6112	As StarTac
CELLect TM + French	S6113	As StarTac
CELLect TM 1 + Italian / Spain	S6114	As StarTac
CELLect TM 3 Denmark	CD1181	As StarTac
CELLect TM 3 Germany	CD1177	As StarTac
CELLect TM 3 Finland	CD1183	As StarTac
CELLect TM 3 France	CD1179	As StarTac
CELLect TM 3 Italy	CD1175	As StarTac
CELLect TM 3 Norway	CD1182	As StarTac
CELLect TM 3 Sweden	CD1178	As StarTac
CELLect TM 3 Switzerland	CD1180	As StarTac
CELLect TM 3 UK	CD1176	As StarTac

SUPPLY POWER

The Power for the ZAP is supplied from the Batt or from an external
accessory via the butt plug. The output from the batt is between 3.2V and 5V.
This is stepped upvia a booster circuit (U900 & discretes) to give 5.6 Volt dc,
to supply the 5V regulator in the SIM interface and an input from U900 to generate
L500, R475. The R275, L275 and R275 are generated in the U900 from B+.

RF POWER

The Rf Power levels for ZAP are the same as for all previous GSM / DCS products.

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FREQUENCY OVERVIEW

GSM 900 Frequencies in MHz for ZAP are shown below:

CHANNEL	Tx	Rx	MAIN VCO	Rx I.F	Rx I.F L.O	Tx I.F	Tx I.F L.O
1-Low	890.2	935.2	720,2	215	430	170	340
62-Middle	**902.4**	**947.4**	**732,4**	**215**	**430**	**170**	**340**
124-High	914.8	959.8	744,8	215	430	170	340

GSM 1800 Frequencies in MHz for ZAP are shown below:

CHANNEL	Tx	Rx	MAIN VCO	Rx I.F	Rx I.F L.O	Tx I.F	Tx I.F L.O
512-Low	1710	1805	1590	215	430	120	240
700-Middle	**1747,8**	**1842,8**	**1627,8**	**215**	**430**	**120**	**240**
885-High	1785	1880	1665	215	430	120	240

OTHER NEW FEATURES

Real Time Clock

The ZAP comes with a real time clock which is shown on the display whenever the radio is on. This is powered by L275 when the radio is on, and by a Button Cell Battery located on the main PCB top of the shield SH1 near the antenna connector, when the radio is off. The clock uses a xtal as reference.

External Audio Digital / Analog

In ZAP audio speech to and from a hands free kit is passed digitally through the butt plug and is converted to and from analogue in the external DHFA box. The Audio In and Audio Out Lines are used for the analog Headset.

Full and Enhanced Full Codec support

The Zap supports in the version SUG1137A with *the SMOC* (Speechcoder and Modem) *the Full Rate and* the version SUG1165A / SUG1159A *with the Firestorm the Enhanced Full Rate*. **This feature depends on the Network Provider.**

DISASSEMBLY / ASSEMBLY TOOLS

Tools required for disassembly. Procedure to be included in Level 1 & 2 Service Manual.

Description	Part Number
T7 Torx Screw Driver (39Ncm)	-----------------

SERVICE SUPPORT

General

Schematics, component overlays, electrical and mechanical spare parts lists, and Level 1, 2, 3 and 4 Documentation will be available via CD described on following intranet page.

http://emeacs.fle.css.mot.com/

by April 1st 1998. Paper copies of diagrams are available by request to the responsible regional Hub Supporter. The documentation and diagrams available for the ZAP for each level are shown in the table overpage.

Documentation Content

Level 1&2	Available
Photographic Parts List	X
User Manual	X
Marketing Information Pack	X
Level 1 & 2 Service Manual	X
Model Accessories Catalogue	X

Level 3	Available
Product Service Preview	X
Colour Diagrams & Layouts	X
Charger Description	X
Battery Select Description	X
Debug Guides	X
Limited Parts List	X
Test Equipment Description	X
Full Board Layouts	X
Top Failure List	X

Level 4	Available
Product Description.	X
Interface Document	X
Full Schematics	X
Model Differences	X
Full Circuit Descriptions.	X
Troubleshooting Guide	X
Full Parts List	X

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TESTING AND PHASING

For testing and phasing the equipment listed overpage is available to order.
If there are any queries regarding ordering or specifications of this equipment,
please contact Axel Schneider or Claus Hinrichsen.

Part Description	Part Number	Contact
GSM Test Box	--------------------	Field Support Engineer
Spectrum Analyser	--------------------	Field Support Engineer
Oscilloscope	--------------------	Field Support Engineer
Power Supply	--------------------	Field Support Engineer
Mini Test SIM Card GSM / DCS	8102430Z04	Motorola
Emmi - Butt plug Cable	SKN4779A	Motorola (same as StarTac)
Charged Batteries -	700 mAh AAA Long NiMH	Motorola
Rf Connector for butt plug	--------------------	Field Support Engineer
Complete Gate 22 Cable	ZA1000	AMS (Flensburg)
Motorola Win Gate 22 System	--------------------	Field Support Engineer
Secured Emmi - **For Level 3 - Software 30.42**	--------------------	Field Support Engineer
Unsecure Emmi - **For Level 4 - Software 22.43**	SLN3577B	Easter Inch Distribution Then Software Upgraded

PARTS IDENTIFICATION

Main Parts

cd920 cd930

Antenna
Camp-Status LED
Phone Book
Volume Buttons
Speaker Cavity
Graphic Display
Keypad
Mic Cavity
Flip

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Main Battery Contacts

Backhousing

Screws

Alert Cavity

Latch for Battery Door

SIM Block

Screws

L_BATT+   NC   GND

BATT_SER_DATA   THERMISTOR

Butt Plug Configuration

15 ——————— 1
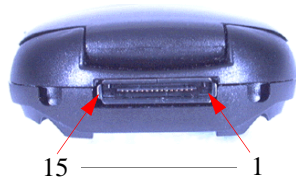
1 - Ground ——————
2 - RF In/Out
3 - Ground
4 - Battery Feedback
5 - Manual Test Line
6 - RS232 Tx
7- RS232 Rx
8 - Audio In / CHG_EN
9 - Audio Out / ON_OFF
10 - Ground
11 - Uplink
12 - Downlink
13 - DSC_EN_B
14 - EXT B+
15 - Ground

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Inside of the Front and Backhousing

Voice-Note-Key
Interface Board

Alert

Volume-Mute Key
Interface Board

Vibrator

Battery Connector
Clips

Keypad

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Main Board Top Side

CR710
Bicolour LED

Q460
Mixer

FL480
IF Filter
215MHz

J502-504
Volume- Mute Key
Connector

Main VCO

U340
PAC IC

U370
TIC IC

U500
SMOC or
Firestorm IC

U980
Voice Annotator

Mic. and
Mic.Grommet pos.
(Not assempled)

Loudspeaker position
(Not assempled)

U403
RF Switch driver

Q301
PA Power Switch

J803
LS Connector
PAC circuit

DS101-104
Display LEDs

TX VCO

U704
Flash

U702
SRAM

U701
Call Processor

Q111
Display LED Driver

J500
Keyboard Connector

Q604
Vibra Driver

U101
DC DC Conv.
-10V

Blue Text Description for Main Board Top Side:

CR710 Bipolar LED
3 Colour LED - Sign.: Red - No Service, Green - In Service, Orange - Camping or Roaming in other countrys

DS101 - 104 Display LEDs

FL480 IF Filter 215 MHz
215 MHz Saw Filter with GSM -4,5dB / DCS 4,5dB loss.

J500 Keyboard Connector
32 Pin Conncetor between Main Board and Keyboard.

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J502 - 504 Volume - Mute Key Connector
Four Pads, to connect the Switch Interface PCB to the main PCB.

J803 LS Connector
2 Pin SMD Connector to connect the Loudspeaker.

Q111 Display LED Driver
Driven by BL_CNTL. Part of the CPU backlight control Circuit - Switches DS101-104.

Q301 Pa Power Switch
Dual Transistor P- Chan.Mosfet used to switch the B+ supply for the PA.

Q460 Mixer
Mixer in Rx Signal Parth switched by RX_EN and supplyed by RX275 for mixing Rx Antenna Frequency and Main VCO Frequency to 215 MHz IF.

Q604 Vibra Driver
Power PNP Transistor switched by VIB_EN and supplyed by B+ to enable the Vibrator.

U101 DC DC Conv. -10V
Converts L500 to -10V to supply U403 (RF Switch) and the GSM_DCS Switch Circuit to generate FLTR_-10Vused in the IPA to switch the GSM_DCS Filter and the PA.

U340 Pac IC
Power Amplifier Control IC. Controlled by TX_EN.

U370 TIC IC
Mixer and phase detect to control the Tx VCO.

U403 RF Switch
Controlled by RX_EN and TX_EN. Used to select between internal and EXT Antenna, controlls the Antenna Switch U401 via V1 and V2 line.

U500 SMOC IC
High integrated mask programmed processor. Controls data exchange between the phone and the network and the digital audio process.

U701 Call Processor
Same as Modulus but now in Ball Grid Area technologie (chip sized reduced) .This is very difficult to change.

U702 SRAM
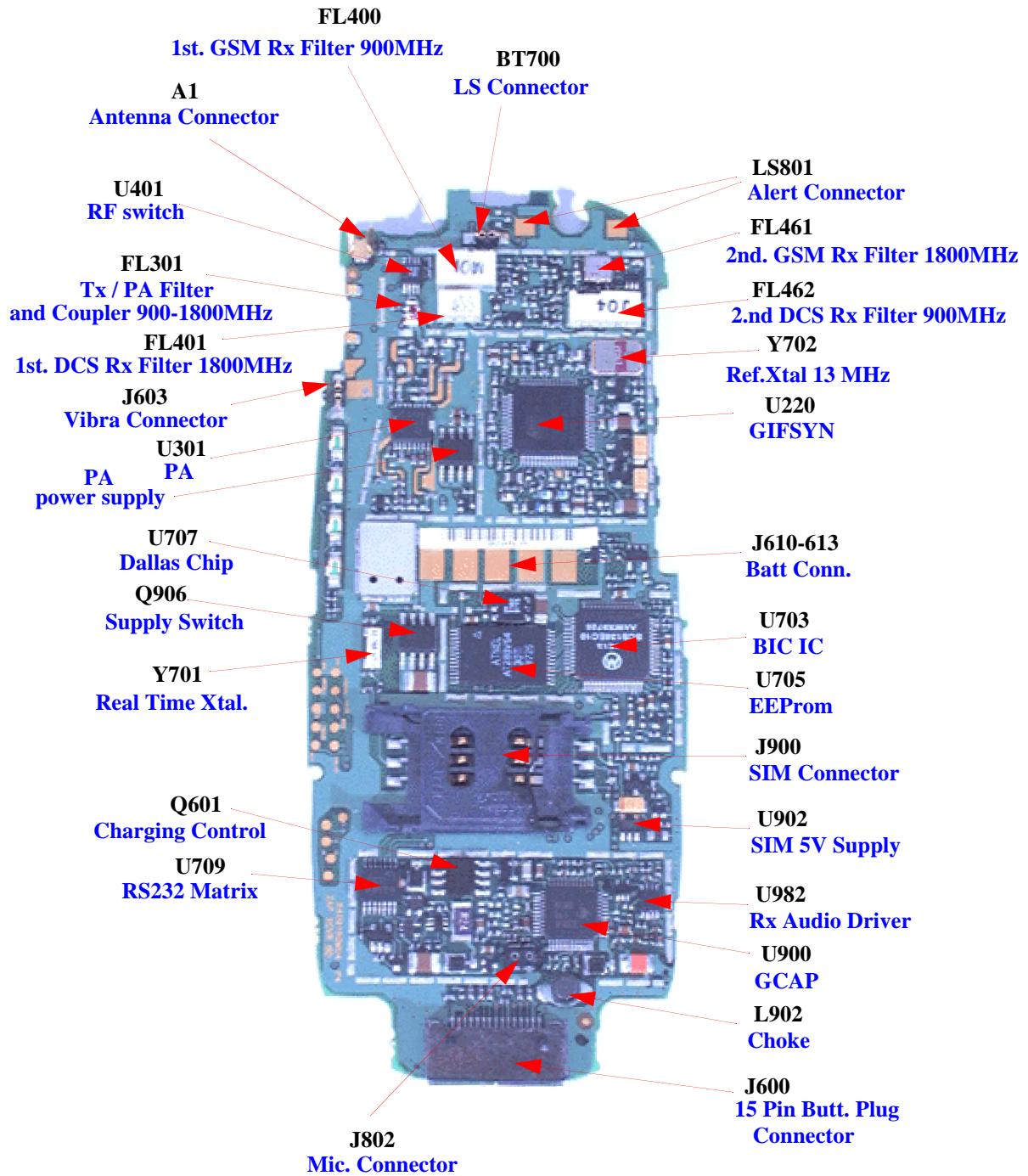Used as buffer storage for the Call Processor.

U704 Flash
Used to store the Software. Able to reflash for updates.

U980 Voice Annotator
New Chip for recording up to 180 seconds of receiving audio signals, or in stand by voice notes. Controlled from the CPU via Serial Data Bus.

Main Board Bottomside Side

FL400
1st. GSM Rx Filter 900MHz

BT700
LS Connector

A1
Antenna Connector

LS801
Alert Connector

U401
RF switch

FL461
2nd. GSM Rx Filter 1800MHz

FL301
Tx / PA Filter
and Coupler 900-1800MHz

FL462
2.nd DCS Rx Filter 900MHz

FL401
1st. DCS Rx Filter 1800MHz

Y702
Ref.Xtal 13 MHz

J603
Vibra Connector

U220
GIFSYN

U301
PA
PA
power supply

U707
Dallas Chip

J610-613
Batt Conn.

Q906
Supply Switch

U703
BIC IC

Y701
Real Time Xtal.

U705
EEProm

J900
SIM Connector

Q601
Charging Control

U902
SIM 5V Supply

U709
RS232 Matrix

U982
Rx Audio Driver

U900
GCAP

L902
Choke

J600
15 Pin Butt. Plug
Connector

J802
Mic. Connector

A1
Connects the antenna directly, not as in past products inductively.

BT700
2 Pin SMD Connector to connect the Buffer Battery for the Real Time Clock.

FL301 TX / PA Filter and Coupler
Bandpass Filter 900 / 1800Mhz with seperate output to to PAC IC for measuring the TX Power.
GSM -0,6dB / DCS -1,0dB loss.

FL400 1st. GSM Rx Filter 900 MHz
Pass-band filter (925-960 MHz) with -2,2dB loss.

FL401 1st. DCS Rx Filter 1800MHz
Pass-band filter (1805-1880 MHz) with -2,2dB loss.

FL461 2nd. GSM Rx Filter 900MHz
Pass-band filter (925-960 MHz) with -2,2dB loss.

Fl462 2.nd DCS Rx Filter 1800MHz
Pass-band filter (1805-1880 MHz) with -2,2dB loss.

J600 15 Pin Butt. Plug Connector
Main Lines - Provides an interface between board and any external device. Main lines - Uplink/Downlink Comms Lines, Audio IN/OUT Lines, DSC Enable Line, RF In/Out Line, Battery Feedback, Manual Test and external power line.

J603
2 Pin SMD Connector to connect the Vibra.

J610-613 Batt.Conn.
5 Print Pats to connect the clips in the Backhousing.

J802 Mic. Connoctor
2 Pin SMD Connector to connect the Microphone.

J900 SIM Connector
6 Pin Connector without SIM detect switch.

L902 Choke
Part of the Switch Mode Power Supply, boosting the supply voltage up to 5.6Vdc. Driven by U900.

LS801
Two Print Pats to connect the Alert.

Q601 Charging Control
Part of charger circuit and used as current control , adjusted by the CHRGC output from U900.

Q906 supply Switch
Dual Transistor P- Chan.Mosfet used to switch between L_BATT+ ans EXT_B+ in the Warm Switch Over Circuit.

U220 GIFSYN
Integrated Guss and IF. (modulation , demodulation, Main- and Reference PLL control).

U301 PA
GaAs Fet amplifier.

U703 BIC IC

Works as a data interface beween external accesories, and emmi box via the butt plug. It is also uses A/D Converters to provide DAC information to U701 on the level of the supply voltages.

U705 EE Prom

Stores all data such as phasing, serial numbers, EMEI, telephone numbers etc.

U707 Dallas Chip

Provides the Unit for copying the EE Prom. Each Dallas Chip and EEProm are a set. If only one is replaced the unit wont start.

U709RS232 Matrix

Part of the RS232 Switch Matrix.

U900 GCAP

Provides regulated output voltages for the board, drives a switch mode power supply, controls battery charging and audio logic circuitry.

U902 SIM 5V Supply

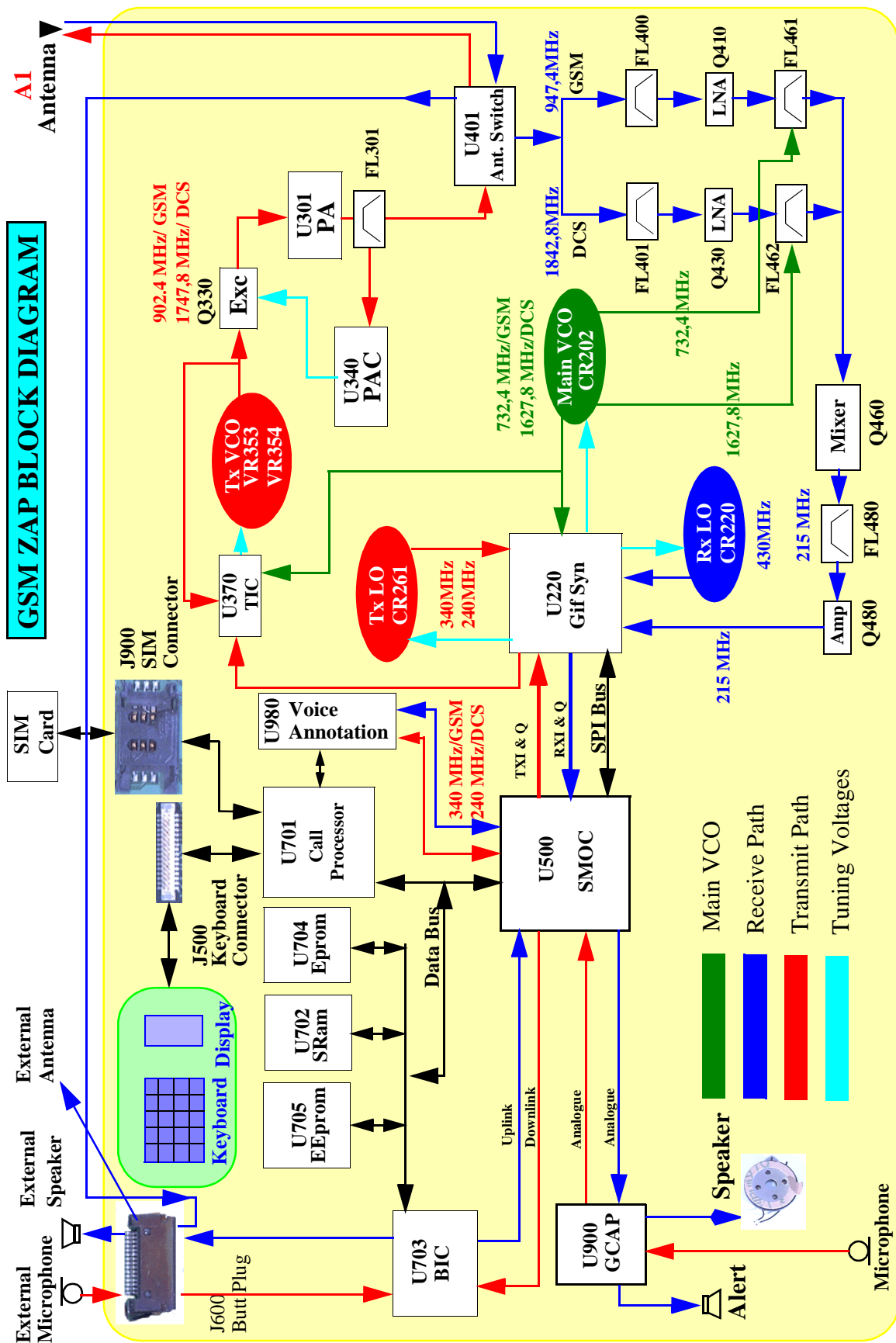Supplys the SIM Cip with 5V controled by VSWITCH.

U982 Rx audio Driver

This Dual Amlifier is Part of the Voice Annotation Circuit

Y702 Ref.Xtal 13MHz

Xtal. oscillator running on 13 Mhz and is taken as reference frequency for the whole radio.

Y701 Real Time Clock Xtal

This xtal is of a very high accuracy and provides 32.768KHz for the real time clock.

GSM ZAP BLOCK DIAGRAM

A1 Antenna

U401 Ant. Switch

FL301

U301 PA

U340 PAC

Exc Q330

902.4 MHz/ GSM
1747,8 MHz/ DCS

947,4MHz GSM

FL400

LNA Q410

FL461

1842,8MHz DCS

FL401

LNA Q430

FL462

Main VCO CR202

732,4 MHz/GSM
1627,8 MHz/DCS

732,4 MHz

1627,8MHz

Mixer Q460

FL480

Amp Q480

215 MHz

Tx VCO VR353 VR354

Rx LO CR220

430MHz

215 MHz

U370 TIC

Tx LO CR261

340MHz 240MHz

U220 Gif Syn

J900 SIM Connector

SIM Card

U980 Voice Annotation

340 MHz/GSM
240 MHz/DCS

TXI & Q

RXI & Q

SPI Bus

U701 Call Processor

U704 Eprom

U702 SRam

U705 EEprom

J500 Keyboard Connector

Keyboard Display

Data Bus

U500 SMOC

Uplink

Downlink

Analogue

Analogue

External Antenna

External Speaker

External Microphone

J600 Butt Plug

U703 BIC

U900 GCAP

Speaker

Alert

Microphone

Main VCO
Receive Path
Transmit Path
Tuning Voltages

Display Board

LCD
Graphic Display

Metal Dome
Keypad

DS1-6
Keypad LEDs

U100

**Display Driver
Direct Chip
Attachment**

J501

Keyboard Connector

Q100

Display Supply

S119

Hook Switch

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