WINCOR NIXDORF

BEETLE

POS Motherboard

INTEL PENTIUM M 760 2.0 GHz Processor
INTEL CELERON M 370 1.5 GHz Processor
(**F2-CPU Standard**)

User Manual *(Edition July 2007)*

Contents

Introduction

The «F2-CPU Standard» is the base to start the new class of BEETLE “Sealed Systems” like BEETLE /MX, /SX and /NetX.

The following leading edge technologies are supported:

Microprocessors:

INTEL PENTIUM M 760 2.0 GHz Processor
INTEL CELERON M 370 1.5 GHz Processor

Chipset:

- Platform with chipset 915GM Express
- Chipset with GMCH and ICH6M

Features:

- Frontside Bus 400/533 Mhz
- 2 SATA I Interfaces for Harddisks
- Enhanced internal graphic with new Graphic interface (SDVO)
- Improvement of System Performance by internal Graphics and SATA I Interfaces
- Max 8 USB ports (USB1.1 and 2.0)
- PCI Express x1 Interface (optional)
- LAN integrated on board

Highlights

- LAN integrated onboard
- Use of available DDR2 RAM 333 (PC2700), 256 and 512Mbit technology
- Min. Main Memory 256MB; Max Main Memory 2GB
- Use of existing PCI Slot cards
- Onboard PCI connector for PCI based Plug-in modules: Support of introduced Secondary CRT Controller and Secondary TFT Controller
- Use of available COM3,4 module
- Use of available Power USB Adapter
- Mobile Processor Celeron M ULV with about 5.5W power consumption allows the use of available PSU, Fan Technology and housings of the BEETLE family
- Jumperless motherboard
- Support of DVD (CD-ROM)
- New SDVO Bridges for Panellink Interface and for DVI Interface
- New Risercard with PCI Standard connectors, because of new motherboard onboard connector
- Optional Risercard with PCI Express x1 Interface
- CRT-Bridge with changed cable length
- Optional Sandwich Card with NVRAM
- Optional 7-segment-LED-display for BIOS debugging

- No support of LPT1
- No support of Gameport
- No support of DVD Audio
- No support of WLAN
- No support of Floppydisk
- No support of Line In

Attention: Only TFT- displays with DDC (like Wincor's BA72A-2 and BA73A-2) will be supported. As older displays are not supported anymore, no jumpers on the motherboard are needed.

Mechanical Dimensions

Mechanical dimensions of F2-CPU

The bracket/ connector outlets of the motherboard are similar to F1-ULV. The form factor of the bareboard is similar to the D2*- CPU. Therefore, the F2-CPU is able to support the systems BEETLE/MII, BEETLE/SII, BEETLE/iPOS and BEETLE/X family.

Long term availability

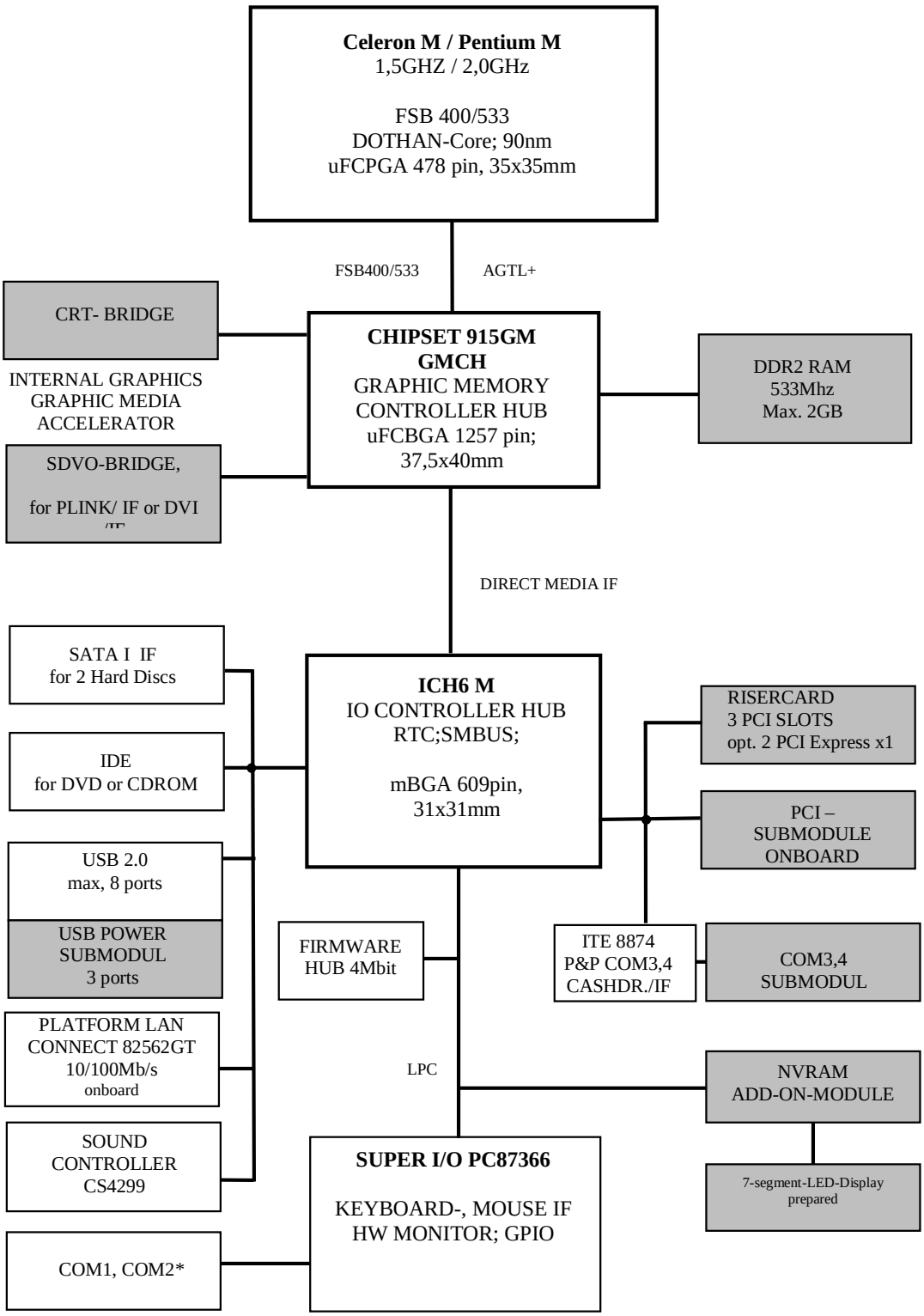
PENTIUM M / CELERON M and chipset 910GML are supported by the INTEL IPD (Infrastructure Processor Devision) “Embedded” Group. Thus, the longtime- availability is guaranteed.

Operating systems/BIOS

The F2-CPU has complete PC functionality and supports the following operating systems: WIN/XP, WIN/XP Embedded and Linux. Features of PnP, ACPI, DMI are implemented. The size of the firmware Hub is 4Mbit.

The BIOS is based on a Phoenix Core. Customized POS specific functions are implemented.

Functional Blocks



Technical Data

• Supported Systems:	BEETLE /M II, BEETLE /S II, BEETLE /X BEETLE /iPOS
• Architecture:	PC-AT compatible and POS - specific functional units
• Operating Modes:	Normal Mode, Power Save Mode
• Power Management	ACPI 1.0, APM 1.2
• Operating Systems:	WIN XP, WIN XP Embedded, LINUX,
• Microprocessor:	INTEL^{R} Celeron^{R} M 370 1.5 GHZ processor
•	(478 Pin uFCPGA package, 90 nm technology)
•	1 MB Cache
•	or
•	INTEL^{R} PENTIUM^{R} M 3760 processor
•	(478 Pin uFCPGA package,
•	90 nm technology)
•	2GHz, 2 MB Cache
• Chipset	INTEL chipset 915GM/ICH6M:
	Graphic and Memory Controller Hub (GMCH) with the following functions: Memory Cntrl. supports DDR2SDRAM with 400/533 MHz System memory bus, UMA (Unified Memory Architecture), Graphic supports 2D and 3D and video streams, Plug and Display Functionality Video memory with INTEL Embedded Graphics Driver max. 128MB (Dynamic Video Memory Technology) Max. Resolution CRT: 1600 x 1200 x 32 Bit@ 85Hz 2048 x 1536 x 32 Bit@ 75Hz Max. Resolution TFT: 1600 x 1200 x 24 Bit@ 60Hz
	I/O Controller Hub 6 (ICH6M) with the following functions: LAN 10/100 Cntrl., SATA – Cntrl., IDE-Cntrl. w/ UDMA, USB Cntrl. UHCI and EHCI, Interrupt-Cntrl., DMA-Cntrl., LPC-Interface, RTC, SMBus-Host interface
• Super I/O:	NS87366 with the following functions: Floppy Cntrl. 2 Serial Ports, Keybd. Interface, PS/2 Mouse Interface, HW- Monitor, Intrusion Logic

• Sound controller:	CS4299 Audio Codec controller with the following AC`97 functions: 20 Bit Stereo DAC and 18 Bit Stereo ADC Mono Mic Input (MIC) Stereo Line-Level Output
• Sound connection:	Mono Microphone Input, Stereo Speaker Output (2 x 1, 25 W@ 8 Ohm)
• Main Memory:	256 MB up to max. 2GB, 2 DIMM – sockets (184pin), 2.5 V DDR2 SDRAM technology based on 512Mb technologies, unbuffered nonECC, DDR2-400/533 Standard DIMM Height up to 35 mm
• Riser-Card Interface:	PCI Bus,(32 bit interface, 33MHz) PCI Express 1.0a, PCIe 1x
• BIOS:	Firmware Hub: 4MB 512 KB Flash Memory, Phoenix BIOS, PnP, PCI Rev.1.0A, DMI-support
• Battery:	3 V Lithium for RTC and SIO Type: Sanyo CR2032, 220 mAh
• System Bus Frequency	400/533MHz
• RAM Bus Frequency:	400/533 MHz
• PCI Bus Frequency:	PCI 2.1, 33 MHz
• Wake On feature:	Wake On LAN, Wake On MODEM, Wake On Time
• Keyboard connection:	PC-AT compatible
• PS/2-Mouse connection:	via Y-cable together with keyboard, optional internal connection
• Serial interfaces:	COM1, COM2* COM3*, COM4* - adapter optional and alternative to USB plus- adapter
• Loudspeaker:	AT-compatible, Volume control defined by BIOS Setup in three steps: high- , medium- , low volume compatible; foil connector
• DVD connection (IDE):	Local Bus IDE interface, for 2 drives, PIO Mode 0 - Mode 4, ULTRA DMA Mode 0 – Mode 3 2mm connector,
• Hard disk connection (SATA I):	2 ports , 1.5Gb/s

• USB connection:	general: USB1.1, USB 2.0 USB1, 2: Standard 2 port connector, series A USB3, 4, 5: Standard 1 port connector + power (i.e. BERG 74239-x00) (USBplus- adapter with +5V system voltage), Optional and alternative to COM3*, COM4*-adapter USB6, 7, 8: 1 x 6 pin header (USB6 used for uDoc, USB8 used for USB- Hub)	
• Cash Drawer connection:	up to 2 cash drawers can be connected, Connection via RJ12 connector at Power supply (only for one cash drawer)	
• PCI Plug-in card interface:	32 bit interface, 33 MHz	
• Status display connection:	support for LEDs: Power On and HD activity	
• Intrusion sensor logic:	dependent on BEETLE system, BIOS support	
• NVRAM:	128Kx8 bit, data retention 5 years	
• Current Consumption: (F2 ULV and 2GB Ram)	+3, 3 V + 5 V + 12 V	tdb tdb tdb
• Max. Current for keyboard	+5V:	500 mA
• Max. Current per port (for COM2*,3*,4*)	+12V:	600 mA
• Max. Current in total (for COM2*,3*,4*)	+12V:	900 mA
• Max. Current per port (for COM2*,3*,4*)	+ 5V:	300 mA
• Max. Current in total (for COM2*,3*,4*)	+ 5V:	500 mA
• Max. Current per port Standard USB1, USB2, USB6,USB7	+ 5V:	500 mA
• Max. Current in total Standard USB1,USB2, USB6,USB7	+ 5V:	2,0 A
• Max. Current per port Powered USB (USB3plus,USB4plus,USB5plus)	+ 5V: +12V: +24V:	500 mA 1,5 A 3,0 A
• Max. Current in total Powered USB (USB3plus, USB4plus, USB5plus)	+ 5V: +12V: +24V:	1,5 A 2,0 A 3,0 A

- Fuses (Polyswitches):
  +5V: COM2*, COM3*, COM4*, USB1, USB2, Keyboard, Mouse Powered USB (Fuse on adapter)
- +12V: COM2* COM3*, COM4* (Fuse on adapter) Powered USB (Fuse on adapter)
- +24V: Powered USB (Fuse on adapter)
- Board Dimensions: ca. 255mm x 210mm

Plugin Cards Risercard

The following Plug In modules may be used on the F2 ULV – CPU:

USBplus adapter (12V) (USB 2.0)

USBplus adapter (24V) (USB 2.0)

COM3*,COM4* adapter (PnP)

Secondary CRT Controller

Secondary TFT Controller

SDVO Bridge for plink IF and DVI

CRT Bridge with new cable length

Risercard with PCI Standard Interfaces

Optional Risercard with PCIe 1x

NVRAM Add-On-Module

Optional 7 segment LED display

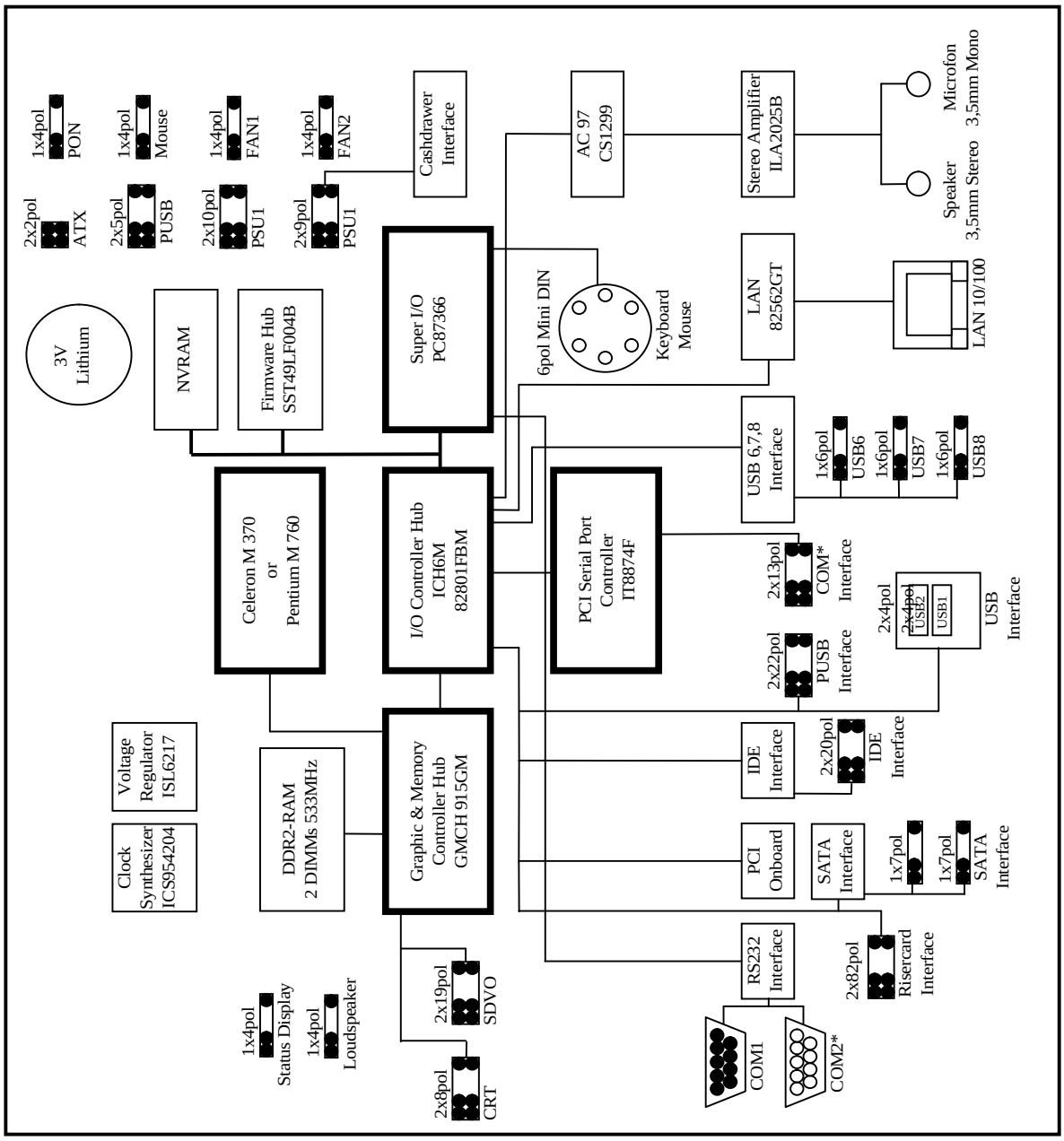
The following Plug In modules can not be used:

LAN module (INTEL)

LAN module (REALTEK)

WLAN module

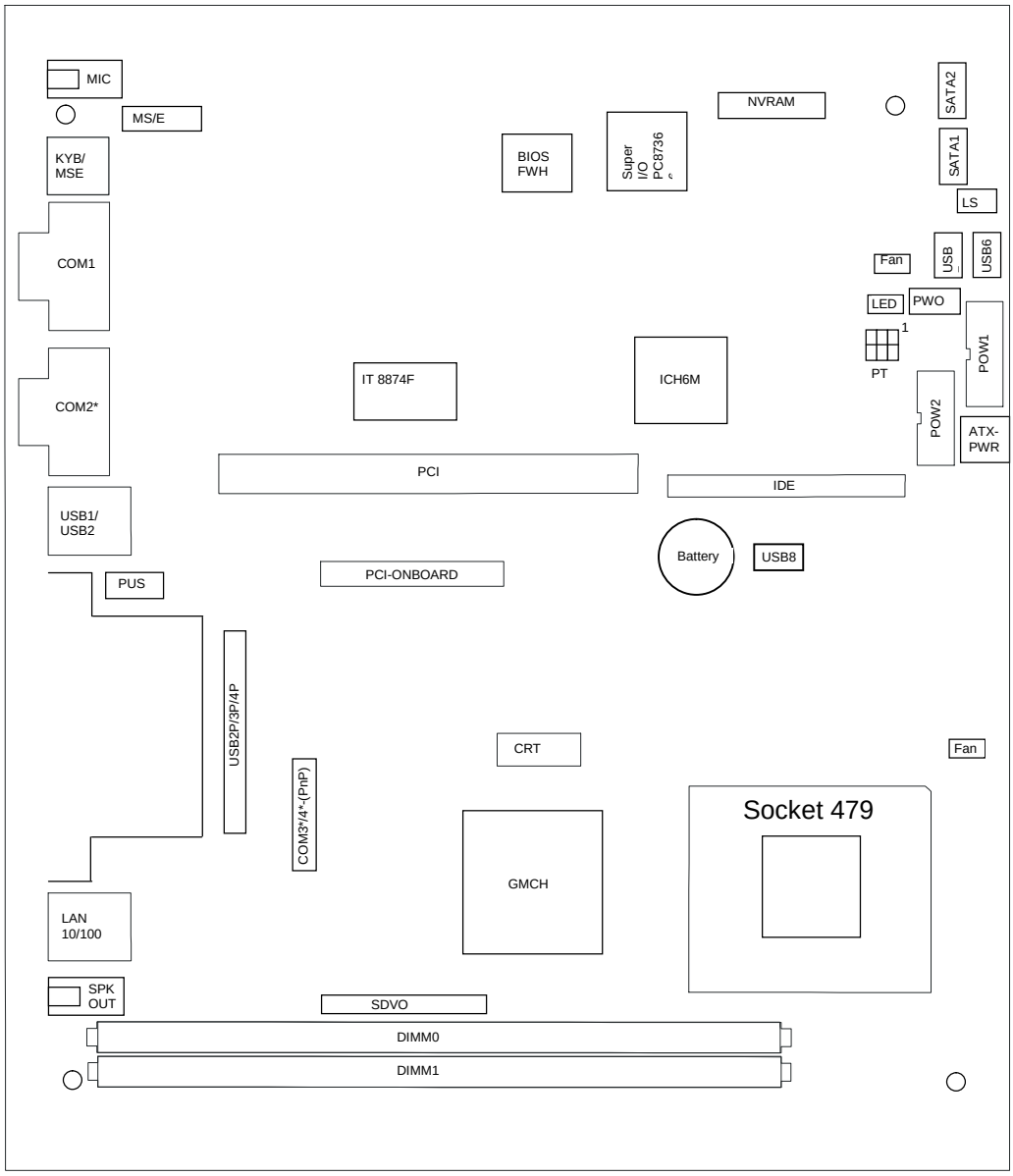
Block Diagram including connectors



Main board F2 CPU Standard

Mechanical Arrangement

The CPU comprises of the printed circuit board with connectors for all external peripheral connections and for installing the optional plug-in cards.



Onboard Components

Microprocessors:

INTEL PENTIUM M 760 2.0 GHz Processor
INTEL CELERON M 370 1.5 GHz Processor

Graphics System

The GMCH integrates a system memory DDR SDRAM controller that supports 256MB up to 2GB memory (400/533MHz). It also contains a graphic controller for enhanced integrated 2D and 3D graphics performance. The GMCH drives via a CRT Bridge a standard CRT monitor up to a resolution of 2048x1536 pixel with 32-bit at 60 Hz.

For connecting TFT LCDs the GMCH provides a Digital Video Out interface to implement a resolution up to 1600 x 1200 pixels with 24-bit. The DVO interface is driving the TFT Panellink Bridge and has low voltage high-speed signaling to allow operation at higher frequencies.

The GMCH has a core voltage of 1.05 V; the system memory operates with 2.5 V.

The GMCH is housed in a 1257 pin uFCBGA package.

I/O Controller

The ICH6M (82801FBM) provides extensive I/O support. Functions and capabilities include:

- PCI Interface
- PCI Express Interface
- Enhanced DMA controller, Interrupt controller and Timer functions
- Serial ATA Interface
- Integrated IDE controller supports Ultra ATA 100/66/33
- USB host interface (EHCI Controller with 8 ports Vers. 2.0,
  4 x UHCI Controller with 2 ports each Vers. 1.1)
- Integrated LAN controller 10/100 Mbit/sec
- System Management Bus (SMB)
- AC97 Vers. 2.3 support for audio and modem
- Low Pin Count (LPC) interface
- Firmware Hub (FWH) interface support

The ICH6M is housed in a 609 mBGA package.

Firmware HUB

This device is designed for BIOS applications and contains 1MB Flash memory organized in 8 x 1024Kb blocks. The hardware features of this device include a random number generator, five general purpose inputs, register based block locking and hardware based locking.
It operates under the LPC/FWH interface protocol. The Firmware Hub is housed in a 32pin PLCC.

Super I/O-Controller

The PC87366 is a Low Pin Count Interface-based highly integrated Super I/O and provides the following functions:

- Two 16C550 UARTs
- IEEE1284 Parallel Port
- Floppy Disk Controller
- Keyboard and PS/2 Mouse Controller
- Enhanced Hardware Monitor
- Fan Speed Controller
- 40 General Purpose I/O pins
- Intrusion sensor logic

The PC87366 is housed in a 128 pin QFP package.

PCI Serial Port Controller

The IT8874F provides a simple solution to build a serial port on PCI bus. The controller integrates two serial ports based on 16C550 UART function.

The IT8874F is housed in a 128 pin PQFP package.

Chrystalclear Sound fusion Audio Codec `97

The CS4299 is a Codec with AC´97 features. It is implemented as 20 bit stereo DAC and 18 bit stereo ADC with sample rate conversion. The F2- CPU uses one microphone mono input and the line stereo output which will drive the stereo amplifier TEA2025B.

The CS4299 is housed in a 48 pin LQFP package.

Stereo Amplifier

The TEA2025B is a stereo audio power amplifier capable of delivering typically 1.25 Watt per channel of continuous average power to an 8 Ohm load with 0.1% (THD) using a 12 V power supply. The TEA2025B is housed in a 16 pin DIL package.

Clock Generator

The ICS Clock Generator ICS954204 is designed for the INTEL “Alviso” chipset and provides all clocks for the chipset, microprocessor, PCI interface, SATA interface, USB interface and Super I/O. The RAM clocks are provided by the GMCH.

The ICS954204 provides an I^2C (2 wire) interface to program the internal registers. For EMI reduction the synthesizer provides integrated LCD spread spectrum.

The ICS954204 is housed in 56 pin TSSOP package.

Hardware Monitoring

The PC87366 contains an enhanced Hardware Monitor which will be used for sensing/ controlling the following signals:

- the temperature of the processor
- Core voltage of the processor
- 3.3V system voltage
- 1.8V system voltage for power management
- 1.5V core voltage
- 5V system voltage
- Battery voltage
- 12V system voltage
- -12V system voltage
- Fan tachometer signal of processor fan, system fan and PSU fan
- Fan PWM signal for processor fan and system fan

Main Memory

The F2- CPU provides two DIMM(184 Pin) sockets for connecting DDR2 modules in unbuffered SDRAM technology from 256MB (1 x 256MB) up to 2 Bytes (2x 1GB). DDR2 DIMMs with different sizes are usable.

One or both DDR2 DIMM may be assembled. The DDR2 DIMMs are unbuffered 1.8V memory modules.

	Main Memory	
Socket 1	Socket 2	Total Capacity
32MBx64	(32MBx64)	256 MB (512 MB)
64MBx64	(64MBx64)	512 MB (1 GB)
128MBx64	(128MBx64)	1 GB(2 GB)

Any combinations of the DIMMs are allowed.

32Bit PCI Onboard Plug-In Module Interface

The Onboard 32 bit PCI bus interface is provided to assemble PCI bus based Plug-In-Modules.

The PCI bus interface contains all signals necessary for a PCI Master module. Furthermore, the WOL interface is provided, i.e. the Standby Voltage and the Wake On signal are available.

LAN 10/100 Interface

The ICH6M contains the control logic for the LAN interface and together with the Platform LAN Connect (82562GT) it provides the LAN 10/100 interface. The connector is soldered onboard and provides two LEDs for traffic information.

Serial Interfaces COM1, COM2*

COM1 is the standard serial interface controlled by the Super I/O PC87366.
All signals incl. the modem signals RI and DCD are available on the 9 pin DSUB connector (male).

The I/O assignments of the serial port COM2* deviate from the standard in the way that it is equipped with system voltages of +5V and +12V instead of the signals RI (M3) and DCD (M5). The channel is connected via 9-pin D-sub (female) socket because of the additional system voltages.

Serial Interface COM3*, COM4*

The serial interfaces are controlled on the main board by the Serial Port Controller IT8874. The interface signals and the voltages +5V and +12V are routed to a 2 x 13 pin header (2 mm). This header serves as serial interface connector for the COM3*, COM4* interface adapter.

Keyboard / PS/2 MOUSE INTERFACE

The keyboard controller is part of the Super I/O. The keyboard interface - as well as the PS/2 – mouse interface - is available on the Mini DIN connector. Using both of them requires a Y- adapter-cable.

USB Interface

The USB interface supplied by the ICH6M contains one EHCI controller with 8 downstream ports providing high speed data rate (480Mb/sec, USB 2.0) and 4 UHCI controllers (2 ports each) for full and low speed data rate (12 Mb/sec and 1.5Mb/sec, USB1.1).

USB ports 1 and 2 are available on the main board.
The USB connector is type Stack A.

USB ports 3, 4 and 5 are available if one of the Power USB modules (12V or 24V) is used (USB3plus, USB4plus, and USB5plus).
Connectors (i.e. type BERG 74239-x00) are assembled on the Power USB modules.

USB ports 6 (for uDoc), 7 and 8 are available on 1 x 6 pin headers. Connection to the rear - or front side of the BEETLE- system requires a special cable.

Hard Disk Interface Serial ATA (SATA)

There are two Serial ATA Ports with 1.5 GB/s, (Type 1) available.

IDE Interface

The CPU features a UDMA IDE interface for connecting up to 2 ATA compatible drives. The I/O addresses meet the AT standard. The connector on the CPU is the Standard 22-pin header (2-mm arrangement) for connecting a CD-ROM or DVD drive. All parameters of the drives are read by the BIOS automatically and stored in the BIOS setup parameter set.
The F2- CPU supports IDE drives up to PIO-Mode 4 and UltraDMA Mode 2.

Speaker

The CPU is equipped with control logic circuitry for a speaker. The volume of the speaker may be defined in the BIOS Setup. It may be set to high, medium or low; the default setting is high. The speaker itself is located in the housing of the BEETLE system.

Cash Drawer Interface

The logic for controlling the cash drawers is placed on the F2- CPU. The I/O assignment is compatible to other CPU´s in BEETLE systems.

Input031x/ bit6	LAZU1N=0	Cash drawer 1 closed or not present
(x = 0 – 7)	LAZU1N=1	Cash drawer 1 open
Input031x/ bit7	LAZU2N=0	Cash drawer 2 closed or not present
(x = 0 – 7)	LAZU2N=1	Cash drawer 2 open

The output bit KLA1,2 unlocks the cash drawers.

Output 031x/ bit6	KLA1=0	No activity
(x = 0 – 7)	KLA1=1	Unlock cash drawer 1
Output 031x/ bit7	KLA2=0	No activity
(x = 0 – 7)	KLA2=1	Unlock cash drawer 2

Bit 6 and Bit 7 never may be set both. Only one of them must be activated at the same time. A driver has to be installed to prevent opening both cash drawers. The time delay between opening drawer 1 and drawer 2 must be about 0.5 – 1 second.

The length of the pulse for opening the cash drawer has to be nominal 130msec.There must be a time interval of 6 seconds between two outputs (charging time of capacitor in the cash-drawer electronic circuitry).

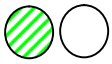
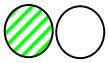
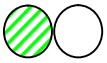
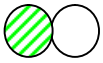
Fans

The F2- CPU supports Fan speed control by pulse width modulation (PWM).
Therefore, 2 connectors with additional PWM signal for each a system's fan are provided.
PWM will be done by BIOS depending of the measured temperature.

The tacho lines are monitored by Hardware and may be reported via BIOS SETUP and DMI.
In addition, the PSU fan speed is monitored. Depending on the temperature, speed control is done by the PSU itself.

FAN1	System Fan
FAN2	System Fan

Status Display Interface

STATUS OF SYS-TEM	POWER-LED at FRONT of B/MII for F2CPU	HD-LED at FRONT of B/MII for F2CPU	REMARKS
OFF			AC OFF
STANDBY AND SOFTOFF			AC ON
POWER ON			SYSTEM VOLTAGES 3,3V; 5V; 12V; 24V AVAILABLE
BIOS START			BIOS START IS WORKING PROPERLY
BIOS PREBOOT PHASE DONE			CONTROL OF THE LED WILL BE DONE BY HD ACCESS
HD -ACCESS			SHORT TIME ON DURING ACCESS OF HD DISK OR CDROM

Green

Yellow

Changing the CPU Battery

The BEETLE POS systems are equipped with a lithium battery on the CPU board (see page 9) to ensure data retention, the time and the setup parameters. The battery should be changed approximately every five years.

- ✔ When inserting the new battery, make sure the polarity is correct. This is marked in the socket. Incorrect replacement of the battery may lead to the danger of explosion.

The battery is located in a socket in the CPU. To gain access to the battery, proceed as described in the according chapters of your BEETLE **User Manual.**
See:
http://www.wincor-nixdorf.com/internet/uk/Services_26Support/Support/TechnicalSupport/POSSystems/Manuals/index.html

- ✔ The lithium battery must be replaced only by identical batteries or types recommended by Wincor Nixdorf International.

You can return the used batteries to your Wincor Nixdorf International sales outlet.

Batteries containing harmful substances are marked accordingly. The chemical denotations are as follows: CD = Cadmium; Pb = Lead, Li = Lithium.

This symbol on a battery tells you that batteries containing harmful substances must not be disposed of as household waste. Follow the country specific laws and regulations. Within the European Union you are legally bound to return these batteries to the service organization where you purchased the new battery.

The setup parameters must be reset each time the battery has been changed.

Operating Modes

General

The F2- CPU provides power management functions dependent on the installed Operating system. The BIOS supports ACPI 1.0 and APM 1.2. (for details see the BIOS description)

Normal Mode / Standby Mode

Switching on

Power Supplies w/ and w/o UPS functionality will be used in F2- CPU based systems. Connecting the PSU via AC line the Standby voltage P5VSB is supplied and the system is ready to be switched on (Standby mode). There are several possibilities to switch on the system.

- The “regular” way to switch on the system is to activate the pushbutton at the front side of the system.

  Shortly pressing the pushbutton will switch on the system.

- Wake On LAN is another possibility to switch on the system.

- Last not least the RTC can be used to switch on the system.

Switching off

The system may be switched off either by activating the pushbutton at the frontside of the system or under Software Control.

Pressing the pushbutton longer than 4 seconds will switch off the system.

Power Failure

If the main power fails (AC input) for longer than 20 msec, the loss of Standby Voltage results in powering down the system.

After the main power returns the system responds depending on the BIOS Setup setting. If in the BIOS Setup “Restore” is chosen, the system enters the state before Power failure. If in the BIOS Setup “Stay Off” is chosen, the system stays off. If “Follow A/C Power” is chosen in the BIOS Setup, the system enters the “On state” after the main power returned.
The power button is disabled.

Connector Assignments

Connectors for external Connections

Serial Interfaces COM1, COM2* (ONBOARD)

X15, 9-pin D-sub connector, male
X16 , 9-pin D-sub connector (voltages assigned), female

PIN #	COM1	COM2*
1	DCD1F	P12VFS
2	RXD1F	RXD2F
3	TXD1F	TXD2F
4	DTR1F	DTR2F
5	GNDF	GNDF
6	DSR1F	DSR2F
7	RTS1F	RTS2F
8	CTS1F	CTS2F
9	RI1F	P5VFS

Keyboard/Mouse Interface (external)

X35, 6-pin mini DIN connector (PS/2-compatible), female

PIN#	SIGNAL
1	KDF
2	MSDAF
3	GND
4	P5VFKY
5	KCF
6	MSCKF

Serial Interfaces COM3*, COM4*

These connectors are not part of the F2- CPU. They are part of the COM-Adapter and, if populated, available at the rear side of the cabinet.

9-pin D-sub connector (voltages assigned), female

PIN #	SIGNALS COM3*	SIGNALS COM4*
1	P12VFS	P12VFS
2	RXD3F	RXD4F
3	TXD3F	TXD4F
4	DTR3F	DTR4F
5	GNDF	GNDF
6	DSR3F	DSR4F
7	RTS3F	RTS4F
8	CTS3F	CTS4F
9	P5VFS	P5VFS

USB Interface USB1, USB2 (Onboard)

X36, 2 x 4 pin USB Standard connector, Series Stack A, male

PIN #	USB1	USB2
1	P5VFUS1F	P5VFUS2F
2	U1D-	U2D-
3	U1D+	U2D+
4	GND_U	GND_U

USB Interface USB3PLUS, USB4PLUS, USB5PLUS (USBPLUS ADAPTER)

These connectors are not part of the F2- CPU. They are part of the USB-Adapter and, if populated, available at the rear side of the cabinet.

3 x 2 x 4 pin USB, male

USB3plus, USB4plus type BERG 74239-100
USB5plus type BERG 74239-100 (12V version)
USB5plus type BERG 74239-200 (24V version)

PIN #	USB3plus	USB4plus	USB5plus
1	P5VF3F	P5VF4F	P5VF5F
2	USB3M	USB4M	USB5M
3	USB3P	USB4P	USB5P
4	GND_U3F	GND_U4F	GND_U5F
5	GND_U3F	GND_U4F	GND_U5F
6	P12VFUS3	P12VFUS4	P12VFUS5 (P24VFUS5)
7	P12VFUS3	P12VFUS4	P12VFUS5 (P24VFUS5)
8	GND_U3F	GND_U4F	GND_U5F

CRT Connection

This connector is not part of the F2- CPU. It is part of the CRT-Adapter and, if populated, available at the rear side of the cabinet.

15-pin HDD sub connector (CRT), female

PIN #	SIGNALS VID
1	RED
2	GREEN
3	BLUE
4	NC
5	GND
6	GND
7	GND
8	GND
9	5VFU
10	GND
11	NC
12	DDCSDA
13	FHSYNC
14	FVSYNC
15	DDCSCL

TFT Connection

This connector is not part of the F2- CPU. It is part of the SDVO Bridge and, if populated, available at the rear side of the cabinet.

40 pin Mini Delta Ribbon (TFT), female

PIN #	SIGNALS TFT	PIN #	SIGNALS TFT
1	GND	2	TX2+
3	TX2 Shield	4	TX2-
5	P12V LCD	6	GND
7	TX1+	8	GND
9	TX1-	10	GND
11	P12V LCD	12	P12V
13	P12V LCD	14	TXD
15	GND	16	RXD
17	NC	18	TX0+
19	GND	20	TX0-
21	P5V LCD	22	P5V LCD
23	TXC+	24	GND
25	TXC-	26	SP Out
27	SC DDC	28	SD DDC
29	NC	30	NC
31	NC	32	NC
33	NC	34	NC
35	NC	36	NC
37	NC	38	NC
39	NC	40	NC

LAN Connection

X26, 8 pin RJ45 (LAN), female

PIN #	SIGNALS
1	TX +
2	TX -
3	NC
4	NC
5	NC
6	NC
7	RX+
8	RX-

Speaker out

X39, 5-pin, 3.5mm female connector

PIN #	SIGNALS OUT
1	AGND
2	LOLAF
3	NC
4	LORAF
5	NC

Microphone

X38, 5-pin, 3.5mm female connector

PIN #	SIGNALS MIC
1	AGND
2	MICF
3	NC
4	VREFOUT
5	NC

Connectors for internal Connections

Main Memory

X1, X2, 2 x 84 pin micro edge connector

PIN #	SIGNALS DIMM0, 1	PIN #	SIGNALS DIMM0, 1
1	RAMREF	45	n.c.
2	GND	46	n.c.
3	DQ0	47	GND
4	DQ1	48	n.c.
5	GND	49	n.c.
6	DQS0#	50	GND
7	DQS0	51	P1V8
8	GND	52	CKE0
9	DQ2	53	P1V8
10	DQ3	54	BS2
11	GND	55	n.c.
12	DQ8	56	P1V8
13	DQ9	57	MA11
14	GND	58	MA7
15	DQS1#	59	P1V8
16	DQS1	60	MA5
17	GND	61	MA4
18	n.c.	62	P1V8
19	n.c.	63	MA2
20	GND	64	P1V8
21	DQ10	65	GND
22	DQ11	66	GND
23	GND	67	P1V8
24	DQ16	68	n.c.
25	DQ17	69	P1V8
26	GND	70	MA10
27	DQS2#	71	BS0
28	DQS2	72	P1V8
29	GND	73	WE#
30	DQ18	74	CAS#
31	DQ19	75	P1V8
32	GND	76	CS1#
33	DQ24	77	ODT1
34	DQ25	78	P1V8
35	GND	79	GND
36	DQS3#	80	DQ32
37	DQS3	81	DQ33
38	GND	82	GND
39	DQ26	83	DQS4#
40	DQ27	84	DQS4
41	GND	85	GND
42	n.c.	86	DQ34
43	n.c.	87	DQ35
44	GND	88	GND
		89	DQ40

PIN #	SIGNALS DIMM0, 1
90	DQ41
91	GND
92	DQS5#
93	DQS5
94	GND
95	DQ42
96	DQ43
97	GND
98	DQ48
99	DQ49
100	GND
101	GND
102	n.c.
103	GND
104	DQS6#
105	DQS6
106	GND
107	DQ50
108	DQ51
109	GND
110	DQ56
111	DQ57
112	GND
113	DQS7#
114	DQS7
115	GND
116	DQ58
117	DQ59
118	GND
119	SMBDA
120	SMBCL
121	GND
122	DQ4
123	DQ5
124	GND
125	DM0
126	n.c.
127	GND
128	DQ6
129	DQ7
130	GND

PIN #	SIGNALS DIMM0, 1
131	DQ12
132	DQ13
133	GND
134	DM1
135	n.c.
136	GND
137	CK0
138	CK0#
139	GND
140	DQ14
141	DQ15
142	GND
143	DQ20
144	DQ21
145	GND
146	DM2
147	n.c.
148	GND
149	DQ22
150	DQ23
151	GND
152	DQ28
153	DQ29
154	GND
155	DM3
156	n.c.
157	GND
158	DQ30
159	DQ31
160	GND
161	n.c.
162	n.c.
163	GND
164	n.c.
165	n.c.
166	GND
167	n.c.
168	n.c.
169	GND
170	P1V8
171	CKE1

PIN #	SIGNALS DIMM0, 1	PIN #	SIGNALS DIMM0, 1
172	P1V8	211	DM5
173	n.c.	212	n.c.
174	n.c.	213	GND
175	P1V8	214	DQ46
176	MA12	215	DQ47
177	MA9	216	GND
178	P1V8	217	DQ52
179	MA8	218	DQ53
180	MA6	219	GND
181	P1V8	220	CK1
182	MA3	221	CK1#
183	MA1	222	GND
184	P1V8	223	DM6
185	CK2	224	n.c.
186	CK2#	225	GND
187	P1V8	226	DQ54
188	MA0	227	DQ55
189	P1V8	228	GND
190	BS1	229	DQ60
191	P1V8	230	DQ61
192	RAS#	231	GND
193	CS0#	232	DM7
194	P1V8	233	n.c.
195	ODT0	234	GND
196	MA13	235	DQ62
197	P1V8	236	DQ63
198	GND	237	GND
199	DQ36	238	P3V3C
200	DQ37	239	GND
201	GND	240	GND
202	DM4		
203	n.c.		
204	GND		
205	DQ38		
206	DQ39		
207	GND		
208	DQ44		
209	DQ45		
210	GND		

SATA1, SATA2

X42, X43, 1 x 7 pin Header

PIN #	SIGNALS SATA1	PIN #	SIGNALS SATA2
1	GND	1	GND
2	SATA0TXP	2	SATA2TXP
3	SATA0TXN	3	SATA2TXN
4	GND	4	GND
5	SATA0RXN	5	SATA2RXN
6	SATA0RXP	6	SATA2RXP
7	GND	7	GND

Hard Disk (IDE)

X23, 2 x 22-pin header, 2mm

PIN #	SIGNALS IDE1	PIN #	SIGNALS IDE1
1	IDERESN	2	GND
3	IDE_DD7	4	IDE_DD8
5	IDE_DD6	6	IDE_DD9
7	IDE_DD5	8	IDE_DD10
9	IDE_DD4	10	IDE_DD11
11	IDE_DD3	12	IDE_DD12
13	IDE_DD2	14	IDE_DD13
15	IDE_DD1	16	IDE_DD14
17	IDE_DD0	18	IDE_DD15
19	GND	20	KEY
21	IDE_DDREQ	22	GND
23	IDE_DIOW#	24	GND
25	IDE_DIOR#	26	GND
27	IDE_IODRY	28	GND
29	IDE_DDACK#	30	GND
31	IDE_IRQ	32	HIGH
33	IDE_DA1	34	P66DET
35	IDE_DA0	36	IDE_DA2
37	IDE_DCS1N	38	IDE_DCS3N
39	IDE_LED	40	GND
41	VCC	42	VCC
43	GND	44	GND

CRT-Adapter

X72, 2 x 8 pin Berg Header

PIN #	SIGNALS CRT	PIN #	SIGNALS CRT
1	CRT_RED	2	VCC
3	CRT_GREEN	4	VCC
5	CRT_BLUE	6	KEY
7	GND	8	CRTPR#
9	DDCSDA	10	GND
11	HSYNC	12	CRT_RED#
13	VSYNC	14	CRT_GREEN#
15	DDCSCL	16	CRT_BLUE#

SDVO-Interface

X73, 2 x 19 pin Berg Header

PIN #	SIGNALS TFT	PIN #	SIGNALS TFT
1	PLTRST#	2	FPPR#
3	P12V	4	P12V
5	GND	6	GND
7	P12V	8	KEY
9	VCC	10	VCC
11	RXDT	12	SPK
13	TXD12	14	N12V
15	SDVOCTRL_DATA	16	SDVOCTRL_CLK
17	SDVOB_INT	18	GND
19	SDVOB_INT#	20	GND
21	SDVOB_RED	22	GND
23	SDVOB_RED#	24	GND
25	SDVOB_GREEN	26	GND
27	SDVOB_GREEN#	28	GND
29	SDVOB_CLKP	30	GND
31	SDVOB_CLKN	32	GND
33	SDVOB_BLUE	34	GND
35	SDVOB_BLUE#	36	GND
37	NC	38	NC

COM 3*, 4* Adapter

X22A, X22B 2 x 13 pin Berg Header

PIN #	SIGNALS	PIN #	SIGNALS
1	P12V	2	N12V
3	VCC	4	GND
5	DTR3N	6	RXD33
7	RI3N	8	DCD3N
9	TXD33	10	RTS3N
11	DSR3N	12	CTS3N
13	DTR4N	14	RXD44
15	NC	16	NC
17	RI4N	18	DCD4N
19	RTS4N	20	TXD44
21	CTS4N	22	DSR4N
23	NC	24	NC
25	NC	26	NC

PoweredUSB Adapter

X122, 2 x 22 pin Berg Header

PIN #	SIGNALS	PIN #	SIGNALS
1	P12V	2	P24V
3	P12V	4	P24V
5	P12V	6	P24V
7	P12V	8	P24V
9	P12V	10	P24V
11	P12V	12	P24V
13	P12V	14	P24V
15	P12V	16	P24V
17	VCC	18	NC
19	VCC	20	KEY
21	OVL3	22	NC
23	OVL4	24	USBP5
25	OVL5	26	USBM5
27	VCC	28	GND
29	VCC	30	GND
31	VCC	32	GND
33	USBP4	34	GND
35	USBM4	36	GND
37	VCC	38	GND
39	VCC	40	GND
41	USBP3	42	NC
43	USBM3	44	NC

USB 6, 7, 8

X17, X4, X40 1 x 6-pin header

PIN #	SIGNALS USB6	SIGNALS USB7	SIGNALS USB8
1	P5V_USB6	P5V_USB7	P5V_USB8
2	USBM6	USBM7	USBM8
3	USBP6	USBP7	USBP8
4	GND	GND	GND
5	GND	GND	GND
6	OVL6	OVL7	OVL8

PS/2 MOUSE

X12, 1 x 4-pin header

PIN #	SIGNALS PS/2
1	GND
2	MSCKF
3	MSDAF
4	P5VFKY

Riser Card

X3, 164 pin PCI Express connector

PIN #	SIGNALS A	SIGNALS B
1	GND	GND
2	PERn1	PETp2
3	PERp1	PETn2
4	GND	GND
5	GND	GND
6	PETp1	PERn2
7	PETn1	PERp2
8	GND	GND
9	PCIe1P	PCIe2P
10	PCIe1N	PCIe2N
11	GND	GND
12	GND	P12V
13	N12V	GND
14	N12V	P12V
15	P5VSB	P12V
16	P5VSB	P3V3
17	GND	P12V
18	GND	P3V3
19	GND	GND
20	AD0	P3V3
21	VCC	AD1
22	AD2	P3V3
23	VCC	AD3
24	AD4	P3V3
25	VCC	AD5
26	AD6	P3V3
27	GND	AD7

PIN”	SIGNALS A	SIGNALS B
28	CBE0#	P3V3
29	GND	AD8
30	AD9	P3V3
31	VCC	AD10
32	AD11	P3V3
33	VCC	AD12
34	AD13	P3V3
35	VCC	AD14
36	AD15	GND
37	GND	CBE1#
38	PAR	SMBCL#
39	GND	SERR#
40	PERR#	SMBDA
41	GND	STOP#
42	DEVSEL#	GND
43	GND	IRDY#
44	TRDY#	WAKE#
45	GND	FRAME#
46	CBE2#	PLT_RST#
47	GND	AD16
48	AD17	GND
49	GND	AD18
50	AD19	GND
51	VCC	AD20
52	AD22	GND
53	VCC	AD21
54	AD23	GND
55	VCC	CBE3#
56	AD24	GND
57	VCC	AD25
58	AD26	GND
59	VCC	AD27
60	AD28	GND
61	VCC	AD29
62	AD30	GND
63	VCC	AD31
64	GND	GND
65	GND	PIRQ1#
66	GND	GND
67	GND	PGNT2#
68	PIRQ0#	GND
69	GND	PIRQ2#
70	PIRQ3#	GND
71	GND	WOL#
72	PLOCK#	GND
73	GND	PREQ3#
74	PGNT1#	GND
75	GND	PREQ3#
76	PGNT3#	GND
77	GND	PCICLK1
78	PREQ1#	GND
79	GND	PCICLK2
80	GND	GND
81	GND	PCICLK3
82	PCIRSTN	GND

PCI-ONBOARD

X6, 80-pin board to board connector

PIN #	SIGNALS PCI	PIN #	SIGNALS PCI
1	12V	2	P12V
3	PV3C	4	WOLN
5	VCC	6	P5VSB
7	PCICLK4	8	PIRQ3N
9	PIRQ1N	10	PIRQ2N
11	PIRQ0N	12	PCIRNB
13	PREQ0N	14	PGNT0N
15	GND	16	GND
17	AD31	18	AD30
19	AD29	20	AD28
21	VCC	22	VCC
23	GND	24	GND
25	AD27	26	AD26
27	AD25	28	AD24
29	CBE3N	30	AD23
31	AD21	32	AD22
33	GND	34	GND
35	AD19	36	AD20
37	AD17	38	AD18
39	NC	40	AD16
41	FRAMEN	42	GND
43	GND	44	CBE2N
45	TRDYN	46	IRDYN
47	DEVSELN	48	STOPN
49	PERRN	50	VCC
51	VCC	52	GND
53	GND	54	SERRN
55	PAR	56	CBE1N
57	AD15	58	AD14
59	AD13	60	GND
61	GND	62	AD12
63	AD11	64	AD10
65	AD9	66	AD8
67	CBE0N	68	AD6
69	AD7	70	GND
71	RXDTP	72	AD4
73	AD5	74	AD2
75	AD3	76	AD0
77	AD1	78	TXDPCI12
79	SPK_PCI	80	VCC

Speaker

X9, 1 x 4-pin dubox header

PIN #	SIGNALS SP
1	SPK
2	GND
3	RSVB
4	VCC

NVRAM Adapter

X8, 2 x 13 pin Berg Header

PIN #	SIGNALS
1	P3V3C
2	VCC
3	P3V3C
4	VCC
5	VCCRTC
6	NC
7	LAD0FWH0
8	GND
9	LAD1FWH1
10	GND
11	LAD2FWH2
12	GND
13	LAD3FWH3
14	GND
15	LAD4FWH4
16	NC
17	PLTRST#
18	NVRAM_PR
19	NC
20	NVR_WP
21	GND
22	GND
23	PCICLK
24	GND
25	GND
26	GND

Power Supply Unit

X34, 2 x 10-pin header

PIN #	SIGNALS POW1	PIN #	SIGNALS POW1
1	PWGOOD	2	NC
3	P12V	4	P12V
5	GND	6	GND
7	N5V	8	N12V
9	DCFAILN	10	KEY
11	VCC	12	P5VSB
13	VCC	14	VCC
15	GND	16	GND
17	GND	18	PWRONN
19	NC	20	NC

X33, 2 x 9-pin header

PIN #	SIGNALS POW2	PIN #	SIGNALS POW2
1	GND	2	GND
3	GND	4	GND
5	KEY	6	P3V3C
7	P3V3C	8	P3V3C
9	P3V3C	10	P3V3C
11	KLA2N	12	KLA1N
13	KLE2N	14	KLE1N
15	FANCON	16	FANRPM
17	VCC	18	VCC

X119, 2 x 5 pin header

PIN #	SIGNALS PUSB	PIN #	SIGNALS PUSB
1	P5VSB	2	GND
3	P24V	4	P24V
5	P24V	6	GND
7	GND	8	GND
9	P12V	10	P12V

X13, 2 x 2 pin header

PIN #	SIGNALS POWC	PIN #	SIGNALS POWC
1	GND	2	GND
3	P12V	4	P12V

Power On

X11, 1 x 4-pin header

PIN #	SIGNALS PWON
1	GND
2	NC
3	PWRBTN
4	NC

Status Display

X10, 1 x 4-pin dubox header

PIN #	SIGNALS LED
1	LEDSTB
2	NC
3	LEDHD
4	VCC

FAN Connector 1 (System; e.g. BEETLE NetX or MX))

X21, 1 x 4-pin header

PIN #	SIGNALS FAN1
1	GND
2	P12V
3	FAN_RPM1
4	FAN_PWM1

FAN Connector 2 (System; e.g. BEETLE /SX)

X14, 1 x 4-pin header

PIN #	SIGNALS FAN2
1	GND
2	P12V
3	FAN_RPM2
4	FAN_PWM2

Intrusion

X18, 1 x 3-pin header

PIN #	**SIGNALS INT**
1	UBD
2	CHASSIS IN
3	GND

BIOS Setup

The Celeron M / Pentium M main board comes with a Phoenix BIOS chip that contains the ROM Setup information of your system. This chip serves as an interface between the processor and the rest of the main board's components. This section explains the information contained in the Setup program and tells you how to modify the settings according to your system configuration.

Even if you are not prompted to use the Setup program, you might want to change the configuration of your system in the future. For example, you may want to enable the Security Password Feature or make changes to the power management settings. It will then be necessary to reconfigure your system using the BIOS Setup program so that the system can recognize these changes and record them in the CMOS RAM or the FLASH ROM. All setup data is stored in a non volatile memory (CMOS RAM). If you remove the CMOS battery, all parameters will be lost.

Standard BIOS Version

The BIOS ROM of the system holds the Setup utility. When you turn on the system, it will provide you with the opportunity to run this program. This appears during the Power-On Self Test (POST). Press <F2> to call the Setup utility. If you are a little bit late pressing the mentioned key, POST will continue with its test routines, thus preventing you from calling Setup. If you still need to call Setup, reset the system by pressing <Ctrl> + <Alt> + <Delete>. You can also restart by turning the system off and then on again. But do so only if the first method fails.

The Setup program has been designed to make it as easy as possible. It is a menu-driven program, which means you can scroll through the various sub-menus and make your selections among the predetermined choices.

When you invoke Setup, the main program screen will appear. On the following pages you will read more information about the Setup entries.

Because the BIOS software is constantly being updated, the following BIOS screens and descriptions are for reference purposes only and may not reflect your BIOS screens exactly.

BIOS Menu Bar

The top of the screen has a menu bar with the following sections:

INFO	Use this menu for information only
MAIN	Use this menu to make changes to the basic system configuration.
ADVANCED	Use this menu to enable and make changes to the advanced features.
SECURITY	Use this menu to enable a supervisor password.
POWER	Use this menu to configure and enable Power Management features.
BOOT	Use this menu to configure the default system device used to locate and load the Operating System.
EXIT	Use this menu to exit the current menu or specify how to exit the Setup program.

To access the menu bar items, press the right or left arrow key on the keyboard until the desired item is highlighted.

Legend Bar

At the bottom of the Setup screen you will notice a legend bar. The keys in the legend bar allow you to navigate through the various setup menus. The following table lists the keys found in the legend bar with their corresponding alternates and functions.

Navigation Key(s)	**Description of Functions**
<F1>	Displays the General Help screen from anywhere in the BIOS Setup.
<Esc>	Jumps to the Exit menu or returns to the main menu from a submenu.
← or → (keypad arrows)	Select the menu item to the left or right.
↑ or ↓ (keypad arrows)	Moves the highlight up or down between fields.
- (minus key)	Scrolls backward through the values for the highlighted field.
+ (plus key) or spacebar	Scrolls forward through the values for the highlighted field.
<Enter>	Brings up a selection menu for the highlighted field.
<Home> or <PgUp>	Moves the cursor to the first field.
<End> or <PgDn>	Moves the cursor to the last field.
<F9>	Loads the default configuration into Setup.
<F10>	Saves changes and exits Setup.

General Help

In addition to the Item Specific Help window, the BIOS setup program also provides a General Help screen. This screen can be called from any menu by simply pressing <F1> or the <Alt> + <H> combination. The General Help screen lists the legend keys with their corresponding alternates and functions.

Scroll Bar

When a scroll bar appears to the right of a help window, it indicates that there is more information to be displayed that will not fit in the window. Use <PgUp> and <PgDn> or the up and down keys to scroll through the entire help document.

Press <Home> to display the first page, press <End> to go to the last page. To exit the help window, press <Enter> or <Esc>.

Sub-Menu

Note that a right pointer symbol appears to the left of certain fields. This pointer indicates that a sub-menu can be launched from this field. A sub-menu contains additional options for a field parameter. To call a sub-menu, simply move the highlight to the field and press <Enter>. The sub-menu then will appear immediately. Use the legend keys to enter values and move from field to field within a sub-menu just as you would do within a menu. Use the <Esc> key to return to the main menu.

Take some time to familiarize yourself with each of the legend keys and their corresponding functions. Practice navigating through the various menus and sub-menus. If you accidentally make unwanted changes to any of the fields, use the set default hot key <F9>. While moving around through the Setup program, note that explanations appear in the Item Specific Help window located to the right side of each menu. This window displays the help text for the currently highlighted field.

Info screen

When the Setup program is accessed, the following screen appears:

Product name:	F2-CPU-Standard
Bios version:	xx/yy mm/dd/yyyy
Ethernet MAC-Address:	00-03-56-xx-yy-zz
System:	----------

Main board:	----------

Power Supply:	----------

This screen is for information only. There is nothing that could be changed within Setup.
All information are intended to facilitate the support of your system.

Product name:

This text is fixed for your Celeron M / Pentium M main board with standard BIOS. This board is also called “F2-CPU-Standard”.

Bios version:

The Bios version is displayed in the release format xx/yy, followed by date of release in international format.

Ethernet MAC-Address:

The Ethernet MAC-Address of the Onboard LAN Controller is displayed at this line.

System, Main board, Power Supply:

The default placeholders may be replaced by specific data from factory, describing configuration, serial number etc. for each device.

Main Menu

	System Time:	[08:14:46]
	System Date:	[07/14/2004]
➢	IDE Channel 0 Master	[None]
➢	IDE Channel 0 Slave	[None]
➢	IDE Secondary/Master	[41174MB]
➢	IDE Secondary/Slave	[None]
	Extended Memory:	374 MB

System Time [XX: XX: XX]

Sets your system to the time that you specify (usually the current time). The format is hour, minute, second. Valid values for hour, minute, and second are: Hour: (00 to 23), Minute: (00 to 59), Second: (00 to 59). Use the <Tab> or <Shift> + <Tab> keys to move between the hour, minute, and second fields.

System Date [XX/XX/XXXX]

Sets your system to the date that you specify (usually the current date). The format is month, day, year. Valid values for month, day, and year are: Month: (1 to 12), Day (1 to 31), Year: (up to 2079).

Use the <Tab> or <Shift> + <Tab> keys to move between the month, day, and year fields.

Primary & Secondary Master/Slave

The first 2 lines are info lines about the attached S-ATA hard disks, while the next two are using for the older P_ATA disks.

Note: Before attempting to configure a hard disk drive, make sure you have the configuration information supplied by the manufacturer of the drive. Incorrect settings my cause your system not to recognize the installed hard disk. To allow the BIOS to detect the drive type automatically, select [Auto].

Type:	[Auto]
LBA Format	
Total Sectors	80418240
Maximum Capacity	41174MB
Multi-Sector Transfers:	[16 Sectors]
LBA Mode Control:	[Enabled]
32 Bit I/O:	[Disabled]
Transfer Mode:	[Fast PIO 4]
Ultra DMA Mode	[Mode 5]
SMART Monitoring	[Disabled]

Type [Auto]

Select [Auto] to automatically detect an IDE hard disk drive. If automatic detection is successful, the correct values will be filled in for the remaining fields on this sub-menu. If automatic detection fails, your hard disk drive may be too old or too new. You can try updating your BIOS or enter the IDE hard disk drive parameters manually.

After the IDE hard disk drive information has been entered into BIOS, new IDE hard disk drives must be partitioned (e.g. with FDISK) and then formatted before data can be read from and written to. Primary IDE hard disk drives must have its partition set to active (also possible with FDISK).

Other options for the Type field are: [None] to disable IDE devices.

IMPORTANT: If your hard disk was already formatted on an older previous system, incorrect parameters may be detected. You will need to enter the correct parameters manually or use low-level format if you do not need the data stored on the hard disk. If the parameters listed differ from those used when the disk was formatted, the disk will not be readable. If the auto detected parameters do not match those that should be used for your disk you should enter the correct ones manually by setting [User].

[User]

Manually enter the number of cylinders, heads and sectors per track for your drive. Refer to your drive documentation or to the label on the drive. If no drive is installed or if you are removing a drive and not replacing it, select [None].

Cylinders

This field configures the number of cylinders. Refer to your drive documentation to determine the correct value to enter into this field.

To make changes to this field, the Type field must be set to [User].

Heads

This field configures the number of read/write heads. Refer to your drive documentation to determine the correct value to enter into this field.

To make changes to this field, the Type field must be set to [User].

Sector

This field configures the number of sectors per track. Refer to your drive documentation to determine the correct value to enter into this field.

To make changes to this field, the Type field must be set to [User].

Maximum Capacity

This field shows the drive's maximum capacity calculated automatically by the BIOS from the drive information you entered.

Multi-Sector Transfers [Maximum]

This option automatically sets the number of sectors per block to the highest number supported by the drive. This field can also be configured manually. Note that when this field is configured automatically, the value set may not always be the fastest value for the drive. Refer to the documentation that came with your hard drive to determine the optimal value and set it manually.

To make changes to this field, the Type field must be set to [User]. Configuration options: [Disabled] [2 Sectors] [4 Sectors] [8 Sectors] [16 Sectors].

LBA Mode Control [Enabled]

Select the hard disk drive type in this field. When Logical Block Addressing is enabled, 28-bit addressing of the hard drive is used without regard to cylinders, heads, or sectors. Note that Logical Block Access may decrease the access

speed of the hard disk. However, LBA Mode is necessary for drives with more than 504MB of storage capacity. Configuration options: [Enabled] [Disabled].
32 Bit I/O [Disabled]

This field setting enables or disables the 32 Bit IDE data transfers. Configuration options: [Disabled] [Enabled].

Transfer Mode

This option lets you set a PIO (Programmed Input/Output) mode for the IDE device.
Modes 0 trough 4 provide successively increased performance. Configuration options:
[Standard] [Fast PIO 1] [Fast PIO 2] [Fast PIO 3] [Fast PIO 4] [FPIO 3 / DMA 1] [FPIO 4 / DMA 2].

Other options for Type are:

[CD-ROM] for IDE CD-ROM drives

After using the legend keys to make your selections in this sub-menu, press the <Esc> key to exit back to the Main menu. When the Main menu appears, you will notice that the drive size is indicated in the field for the hard disk drive that you just configured.

SMART Monitoring

This field informs about the enabling of the S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) system which utilizes internal hard disk drive monitoring technology. This field is read only.

Extended Memory: XXX MB

This field displays the amount of extended memory detected by the system during bootup. You do not need to make changes to this field. This is a display only field.

Advanced Menu

Reset Configuration Data:	[No]
Speaker Volume	[High]
Large Disk Access Mode:	[DOS]
Legacy USB Support:	[Enabled]
Internal LAN Controller:	[Enabled]
Onboard LAN Boot Prom:	[Disabled]
QuickBoot Mode	[Disabled]
Video output to COM3:	[Disabled]
Fan Control:	[Max Cooling]

- Chipset Configuration
- I/O Device Configuration
- DMI Event Logging

Reset Configuration Data [No]

[Yes] erases all configuration data in a section of memory for ESCD (Extended System Configuration Data) which stores the configuration settings for non-PnP Plug-in devices. Configuration options: [No] [Yes]

If you are facing problems after adding or removing any hardware components to the system it might be wise to select the [Yes] option once. This allows the BIOS to reconfigure available hardware resources.

Speaker Volume [High]

This field is for the volume control of the installed speaker. Configuration options [High] [Middle] [Low].

Large Disk Access Mode [DOS]

For UNIX, Novell Netware, or other operating systems you have to select [Other].
For DOS or Windows use the value of default [DOS].
Configuration options: [DOS] [Other].

Legacy USB Support [Disabled]

This motherboard supports Universal Serial Bus (USB) devices. The default of [Disabled] the USB controller is disabled no matter whether you are using a USB device or not. The enabling of the controller will run with the help of a USB compliant operating system like Windows XP or else. If the point stands on [Enabled] the legacy USB support from the BIOS is started. Now it is possible to use a USB keyboard to start this setup or with the standard DOS environment. If you like to use a USB-Floppy disk or a USB CD-ROM device for booting, you have to enable this setup point and after detecting of this USB device from the BIOS, you have to switch the boot order to the appropriate device. Configuration Options: [Disabled] [Enabled]

Note: Selecting Legacy USB Support [Disabled] has impact on “Boot Order” in “BOOT” Menu, resetting this field do its default value and locking it. See “Boot Order” description.

Internal LAN Controller [Enabled]

This point switches physical on or off the Onboard LAN Controller. Configuration Options: [Disabled] [Enabled]

Onboard LAN Boot Prom [Disabled]

This point switches on or off the PXE PROM from the onboard LAN Controller. Configuration Options: [Disabled] [Enabled]

QuickBoot Mode [Disabled]

Allows the system to skip certain tests while booting. This will decrease the time needed to boot the system. Configuration options: [Enabled] [Disabled]

Video output to COM3 [Disabled]

Some systems may be configured without a full screen display, just using a small display connected to the COM3 serial port. [Enabled] will redirect diagnostic information during PowerOnSelfTest to this serial port, giving control about the system to smaller displays as well.

Fan Control [Max Cooling]

This setup mode will control the rotating of the PWM-Fans due to actual CPU-Temperature if setting to Automatic. With Max Cooling is the speed of the fans always high. Configuration Options: [MAX Cooling] [Automatic]

Chipset Configuration

SMART Device Monitoring:	[Disabled]
Boot-Video Device:	[Onboard]
USB 2.0 Support	[Enabled]

SMART Device Monitoring [Disabled]

This field controls the enabling of the S.M.A.R.T. (Self-Monitoring, Analysis and Reporting Technology) system which utilizes internal hard disk drive monitoring technology. Configuration options: [Disabled] [Enabled].

Boot-Video device [Onboard]

The main board has an Onboard graphic adapter. If your computer has additionally installed a PCI VGA card additionally installed, this field allows you to select which of the cards will act as your primary display card. The default, [Onboard], allows your PCI card to take precedents only when no onboard bridge is detected. [PCI-Slot] uses the PCI VGA adapter card as primary card. Configuration options: [Onboard] [PCI-Slot].

USB 2.0 Support [Enabled]

Using USB devices complying 2.0 standard, let this field be Enabled. Due to lack of appropriate drivers you may switchback to Disabled. Configuration options: [Disabled] [Enabled].

I/O Device Configuration

Serial port A:	[Enabled]
Base I/O address:	[3F8]
Interrupt:	[IRQ 4]
Serial port B:	[Enabled]
Base I/O address:	[2F8]
Interrupt:	[IRQ 3]
Touch Screen Routing:	[TFT Touch to COM2]

Serial port A [Enabled], Serial port B [Enabled]

These fields don't configure the Serial ports directly. Both ports are always enable.

Base I/O address

This field sets the address for the onboard serial connectors.
Configuration options: [3F8] [3E8] [2F8] [2E8].

Interrupt

Combine the Base I/O address with an interrupt.
Configuration options: [IRQ 4] [IRQ 3]

Touch Screen Routing [TFT Touch to COM2]

Using a Touch Screen you may select routing it to a serial interface using hardware lines instead of COM1 or COM2.
Configuration Options: [No Routing] [TFT Touch to COM1] [TFT Touch to COM2] .

DMI Event Logging

Event log capacity	Space available
Event log validity	Valid
View DMI event log	[Enter]
Clear all DMI event logs	[No]
Event Logging	[Enabled]
Mark DMI events as read	[Enter]

Desktop Management Interface (DMI) is a method of managing computers in an enterprise. Using DMI, a system administrator can obtain the types, capabilities, operational status, installation date and other information about the system components. An event log is a fixed-length area within a non-volatile storage element.

View DMI event log [Enter]

This setup point is useful to display the recorded DMI events like a defect floppy disk controller or anything else. If there is an error stored, the BIOS will display a message every time the system is starting up.

Clear all DMI event logs [No]

With this point it is possible to clear all the recorded DMI events manually.

Event logging [Enabled]

If you do not use the DMI event logging, it is possible to shut off the recording mechanism of errors.

Mark DMI events as read [Enter]

If you dislike the BIOS message at system starting up but you like to have the errors recorded, mark all DMI events as read. With the next start up of the system, the BIOS would not display a message.

Security Menu

Supervisor Password Is:	Clear
Set Supervisor Password	[Enter]

Set Supervisor Password

This field allows you to set the password. Highlight the field and press <Enter>.

Type a password and press <Enter>, you can type up to eight alphanumeric characters. Symbols and other characters are ignored. To confirm the password, type the password again and press <Enter>. The password is now set to [Enabled]. This password allows full access to the BIOS Setup menu.

To clear the password, highlight this field and press <Enter>. The same dialog box as above will appear. Press <Enter> and the password will be set to

[Disabled].

Power Menu

The Power menu allows you to reduce power consumption. This feature turns off the video display and shuts down the hard disk after a period of inactivity.

After Power Failure:	[Stay Off]
Wake On LAN:	[Disabled]
Wake On Modem Ring:	[Disabled]
Wake On Time:	[Disabled]
➢ Hardware Monitor:	

After Power Failure [Stay off]

Select whether you want your system to be rebooted after power has been interrupted. [Stay off] leaves your system off and [Restore] reboots your system if it was active before power loss. Is the key [Follow AC/Power] selected, the system will startup anytime power is available. Configuration options: [Stay off] [Restore] [Follow AC/Power].

In mode [Follow AC/Power] the front button is disabled. This means that there is no way to force down the system pressing the front button more than 4 seconds, avoiding accidental shutdown.

Wake-on Modes

Please note that the Soft-Off mode is necessary for all Wake-on modes.

Wake-On-LAN [Disabled]

Wake-On-LAN allows your BEETLE to be powered up from Soft-Off Mode. This may be done from another system via a network by sending a wake-up frame or signal. Configuration options: [Disabled] [Enabled].

Wake-On-Modem Ring [Disabled]

This allows to enable or disable powering up the BEETLE when the modem receives a call while the BEETLE is in Soft-Off mode.

NOTE: The BEETLE cannot receive or transmit data until the system and applications are fully running, thus connection cannot be made on the first try. Turning an external modem off and then back on while the BEETLE is off causes an initialization string that will cause the system to power on. Configuration options: [Disabled] [Enabled].

Wake-On-Time [Disabled]

This allows an unattended or automatic system power up from Soft-Off mode. You may configure your system to power up at a certain time. The wake-up time is to be set in the next field below this field. Configuration options: [Disabled] [Enabled]

Hardware Monitor

CPU Temperature:		44 ˚C
Fan #1 Speed		4448 rpm
Fan #2 Speed		5480 rpm
Fan #3 Speed		2790 rpm
-12V	Voltage	11.2 V
+12V	Voltage	12.5 V
+VCC	Voltage	5.2 V
+1.5V	Voltage	1.5 V
+2.5V	Voltage	2.5 V
+CpuVID	Voltage	0.9 V
+3.3V	Voltage	3.3 V
+VBatt	Voltage	3.0 V

CPU Temperature [xxC]

The onboard hardware monitor is able to detect the motherboard and CPU temperatures (for supported processors only).

CPU Fan#x Speed (xxxxrpm)

The onboard hardware monitor is able to detect the CPU fan speed and power supply fan speed in rotations per minute (rpm). The presence of the fans is automatically detected.

Several Voltages [xx.xV]

The onboard hardware monitor is able to detect the voltage output by the onboard voltage regulators.

Boot Menu

Boot Order	[Follow Setup Order]
	+Removable Devices
	+Hard Drive
	CD-ROM Drive
	Network Boot

The Boot menu allows you to select from the four possible types of boot devices listed using the up and down arrow keys. By using the <+> or <Space> key, you can promote devices and by using the <-> key, you can demote devices. Promotion or demotion of devices alters the priority which the system uses to search for a boot device on system power up.

Boot Order [Follow Setup Order]

The Option [Follow Setup Order] defines the boot order as seen in Setup. Selecting [Override Setup Order] will rearrange the boot order within “+Hard Drive”. as long as any USB-Hard Drive is available. Thus you may use memory sticks formatted as Hard Drive to boot from, temporary seeing the USB-Hard Drive to be placed on the top of boot order in “+Hard Drive”

NOTE: Disabling “Legacy USB Support” in Advanced Menu will reset “Boot Order” to [Follow Setup Order] and lock this field. So, if you want to select [Override Setup Order] you must first select [Enabled] for “Legacy USB Support” in Advanced Menu.

Exit Menu

Exit Saving Changes
Exit Discarding Changes
Load Setup Defaults
Discard Changes

Once you have made all your selections from the various menus in the Setup program, you should save your changes and exit Setup. Select Exit from the menu bar to display the following menu.

<Esc> does not exit this menu. You must select one of the options from this menu or <F10> from the legend bar to exit this menu.

Exit Saving Changes

Once you have finished making selections, choose this option from the Exit menu to ensure the values you selected are saved to the CMOS RAM. The CMOS RAM is sustained by an onboard backup battery and stays on even when the BEETLE is turned off. Once this option is selected, a confirmation is asked. Select [Yes] to save changes and exit.

Exit Discarding Changes

This option should only be used if you do not want to save the changes you have made to the Setup program. If you have made changes to fields other than

system date, system time, and password, the system will ask for confirmation before exiting.

Load Setup Defaults

This option allows you to load the default values for each of the parameters on the Setup menu. When this option is selected or if <F9> is pressed, a confirmation is requested. Select [Yes] to load default values. You can now select Exit Saving Changes or make other changes before saving the values to the non-volatile RAM.

Discard Changes

This option allows you to discard the selections you made and restore the values you previously saved. After selecting this option, a confirmation is requested. Select [Yes] to discard an changes and load the previously saved values.

Test points codes

At the beginning of each POST routine, the BIOS outputs the test point error code to I/O port address 80h. Use this code during trouble shooting to establish where the system failed and what routine has been performed.

If the BIOS detects a terminal error condition, it halts POST after issuing a terminal error beep code and attempting to display the error code on the port 80h LED display (diagnostic card). If the system hangs before the BIOS can process the error, the value displayed at the port 80h is the last test performed. In this case, the screen does not display the error code.

The routine derives the beep code from the test point error as follows:

1. The 8-bit error code is broken down to four 2-bit groups.

2. Each group is made one-based (1 through 4) by adding 1.

3. Short beeps are generated for the number in each group.

Example:

Test point 1Ah = 00 01 10 10 = 1-2-3-3 beeps

The following is a list of the checkpoint codes written out to the diagnostic port at the start of each test.

The first beep code inside of the BIOS has 1-long and 2-short beeps. This means that there is a problem with the graphic adapter.

POST Code (Hex)	Name	Description

02h	VERIFY_REAL	IF <in port mode> THEN
		Turn on A20
		Reset Processor
		ENDIF

03h	DISABLE_NMI	Disable non-maskable Interrupts

04h	GET_CPU_TYPE	IF <cold boot> THEN
		Store reset DX value in CMOS
		Determine CPU manufacturer and type
		Store CPU manufacturer and type in CMOS
		ENDIF

06h	HW_INIT	Reset all DMA controllers. Disable all video controllers. Clear any pending interrupts from the RTC Set up port 61h to speaker off and timer gate enabled.
08h	CS_INIT	Set DRAM controller registers to values that are needed for DRAM discovery and testing.
09h	SET_IN_POST	Set bit in CMOS indicating that POST is in progress. Not cleared until Post Code Aeh.
0Ah	CPU_INIT	Set CPU configuration registers.
0Bh	CPU_CACHE_ON	Turns on the CPU cache.
0Ch	CACHE_INIT	Set L2 cache controller registers to values needed for SRAM discovery and testing.

0Eh	IO_INIT	IF <onboard super I/O exists> THEN
		Turn Off LPT and COM ports in super I/O.
		Set I/O controller registers to default values.
		ENDIF

0Fh	FDISK_INIT	IF <secondary IDE controllers exists> THEN
		Set secondary IDE controller configura-
		tion registers to default values.
		ENDIF

10h	PM_INIT	IF <power management enabled> THEN
		Set the power management configuration registers
		to default values.
		ENDIF

11h	REG_INIT	Set Cx5520 configuration registers to default values. Set any other configuration registers to default values.
12h	RESTORE_CR0	Return to real mode.
13h	PCI_BM_RESET	Early reset of PCI devices required to disable bus masters. Assumes the presence of a stack and running from decompressed shadow memory.
14h	8742_INIT	Verify 8742 (keyboard controller) is responding. Improper connections/timing to the 8742. Send self test command to 8742.

16h	CHECKSUM	Checksum the system BIOS ROM
		IF <checksum is incorrect> THEN
		Halt.
		ENDIF

17h	PRE_SIZE_RAM	Initialize external cache before autosizing memory.
18h	TIMER_INIT	Initialize all three of the 8254 timers.
1Ah	DMA_INIT	Initialize the DMA command register and all 8 DMA channels.
1Ch	RESET_PIC	Initialize the 8259 interrupt controller.

20h	REFRESH	Copy test code to RAM and execute that code looking for refresh bit in port 61h to toggle.
		IF <refresh test failed> THEN
		Halt.
		ENDIF

POST Code (Hex)	Name	Description

22h	8742_TEST	Read 8742 self-test results.
		IF <self-test failed> THEN
		Halt.
		ELSE
		Read system info from 8742
		Set 8742 command byte.
		ENDIF

24h	SET_HUGE_ES	Go into protected mode. Set ES, DS, SS, FS, and GS to 4Gb.
28h	SIZE_RAM	Determine the size of each DRAM bank. Set DRAM controller configuration registers to enable DRAM.
29h	MEM_MGR_INIT	Initialize the POST Memory manager.
2Ah	ZERO_BASE_RAM	Clear the 512k of DRAM.

2Ch	ADDR_TEST	Test for stuck address line in lower 1M of address space,
		IF <test failed> THEN
		Halt.
		ENDIF

2Eh	BASERAML	Test for stuck DRAM data line by walking a 1 through all bit locations of address 0 and then walking a 0 through.
		IF <test failed> THEN
		Halt.
		ENDIF

2Fh	PRE_SYS_SHADOW	Clears the cache before shadowing the system.
32h	COMPUTE_SPEED	Determine the CPU core speed by timing the execution of a loop.
33h	PDM_INIT	Initialize the Phoenix Dispatch Manager.

34h	CMOS_TEST	Clear CMOS diagnostic byte.
		IF <CMOS battery is dead> THEN
		Set “bad battery” flag in CMOS
		IF <CMOS checksum is bad> THEN
		Set “bad CMOS check” flag in CMOS
		Checksum CMOS
		ENDIF
		ENDIF

36h	CHK_SHUTDOWN	Vector to proper shutdown routine (reset).
38h	SYS_SHADOW	Copy system BIOS ROM to shadow RAM.
3Ah	CACHE_AUTO	Detect the amount of SRAM for the L2 cache. Set L2 cache controller configuration registers to enable SRAM.

POST Code (Hex)	Name	Description

3Ch	ADV_CS_CONFIG	IF <CMOS is valid (checksum good and battery good) THEN
		Load DRAM controller configuration registers with values from CMOS fields.
		ENDIF

3Dh	ADV_REG_CONFIG	IF <CMOS is valid> THEN
		Load ISA controller configuration registers with values from CMOS fields and load any other configuration registers with values from CMOS fields.
		ENDIF

42h	VECTOR_INIT	Set interrupt vectors 0-77h to BIOS general interrupt handler.
44h	SET_BIOS_INT	Set interrupt vectors 0-20h to correct BIOS interrupt handlers.
45h	CORE_DEVICE_INIT	Initialize all motherboard devices.
46h	COPYRIGHT	Verify that the Phoenix BIOS copyright message is correct.
47h	PCI_OP_INIT	Initialize PCI option ROM manager.
48h	CONFIG	Determine video type to be used and store.
49h	PCI_INIT	Initialize PCI to PCI bridges. Reset all PCI devices. Send self test command to all PCI devices. Configure base registers of all PCI devices.
4Ah	VIDEO	Initialize all MDA video adapters. Initialize all CGA video adapters. Execute VGA option ROMs to initialize VGA adapter. Initialize VSA.
4Bh	QUIETBOOT_START	Initialize Quietboot if installed. Enable IRQ0 and IRQ1.

4Ch	VID_SHADOW	IF <video shadow enabled in setup> THEN
		IF <CMOS valid and last boot successful> THEN
		Shadow video BIOS ROM.
		ENDIF
		ENDIF

4Eh	CR_DISPLAY	Display the CPU type and speed on the screen.

51h	EISA_INIT	IF <EISA support is enabled> THEN
		Checksum EISA data NVRAM locations.
		IF <checksum good> THEN
		Initialize each slot.
		ELSE
		Display bad config message.
		ENDIF
		ENDIF

52h	KB_TEST	Check for return code of AA from keyboard self-test,
		IF <return code not AA> THEN
		Set keyboard error flag
		ENDIF

54h	KEY_CLICK	IF <keyclick enabled and keyboard good> THEN
		Initialize key stroke clicker
		ENDIF

56h	ENABLE_KB	Send command to keyboard controller to enable the keyboard.
58h	HOT_INT	Check for unexpected interrupts. Check for unexpected NMI. Enable parity checkers and check for unexpected NMI.
59h	PDS_INIT	Register POST display services with POST Dispatch Manager.

POST Code (Hex)	Name	Description
5Bh	CPU_CACHE_OFF	Disable and WB invalidate CPU cache.
5Ch	MEMORY_TEST	Determine amount of memory below 1M. Walk a1 through data bus at 80000h. walk a 0 through data bus at 80000h. Check for stuck address line from 80000h to 8FFFFh.
60h	EXT_MEMORY	Determine total amount of memory by doing a read/write test. For each 1M block oh memory: Walk a 1 through data bus at first location of block. Walk a 0 through data bus at first location of block. Check for stuck address line in the block.
62h	EXT_ADDR	Do an extended address line test on the entire memory range.
64h	USERPATCH	Code that is patched into the ROM can be set up to execute at this point.
66h	CACHE_ADVNCD	Load L2 cache controller configuration registers with values from setup screens.
68h	CACHE_CONFIG	Set non-cacheable regions. Enable L1 and L2 caches.

6AH	DISP_CACHE	IF <cache RAM size not zero> THEN
		Display L2 cache RAM size on screen.
		ENDIF

6Ch	DISP_SHADOW	IF <system BIOS ROM shadowed> THEN
		Display message indicating that the system BIOS ROM is shadowed.
		ENDIF
		IF <video BIOS ROM shadowed> THEN
		Display message indicating that the video BIOS ROM is shadowed.
		ENDIF

6Eh	DISP_NONDISP	Display the starting address of the no disposable (run time) BIOS.
70h	ERROR_MSGS	Display error messages for any errors found.

72h	TEST_CONFIG	IF <system configuration error found> THEN
		Display message indicating configuration error detected.
		ENDIF

74h	RTC_TEST	Verify that the RTC is running.
		IF <RTC not running> THEN
		Set bit in RTC indicating that the time is invalid.
		ENDIF

76h	KEYBOARD	IF <keyboard failure detected> THEN
		Display message indicating keyboard failure.
		ENDIF

7Ch	HW_INTS	Initialize hardware interrupt vectors 08h-0Fh
7Dh	ISM_INIT	Initialize Intelligent System Monitoring Support.
80h	IO_BEFORE	IF <integrated super I/O exists> THEN Disable LPT and COM ports on integrated super I/O. ENDIF.
81h	CORE_LATE_INIT	Late initialization of devices.
82h	RS232	Identify and test all COM ports.
83h	CONFIG_IDE	Configure Fdisk controller.
84h	LPT	Test and ID parallel ports.
85h	PCI_PCC	Initialize PnP ISA devices.

POST Code (Hex)	Name	Description
87h	POST_CONFIG_MCD	Initialize Mother Board Configurable devices.
88h	BIOS_INIT	Initialize timeouts, key buffer, soft reset flag.
89h	ENABLE_NMI	Enable NMI.
8Ah	INIT_EXT_BDA	Initialize the extended BIOS data area.

8Bh	MOUSE	IF <mouse support enabled> THEN
		Setup interrupt vector for mouse.
		Add mouse support to equipment installed flag.
		ENDIF

8Ch	FLOPPY	Test both floppy drives.
		IF <error detected> THEN
		Display floppy error message.
		ENDIF

8Fh	FDISK_FAST_PREINIT	Count and store the number of ATA drives in the sub-system.

90h	FDISK	Initialize the hard disk subsystem and test.
		IF <error detected> THEN
		Display hard disk error message.
		ENDIF

91h	FDISK_FAST_INIT	Set timing based on drives attached.
92h	USERPATCH2	Code that is patched into the ROM can be setup to execute at this point.
93h	MP_INIT	Create the CPU feature table.
94h	DISABLE_A20	Disable the A20 address line.
95h	CD	Validate bootable CD ROM. Prepare CD for CD ROM boot.
96h	CLEAR_HUGE_ES	Store an 8 in the shutdown code byte in CMOS. Reset the processor.
97h	MP_FIXUP	Create pointer to MP table in Extended BDA.
98h	ROM_SCAN	Scan through the ISA option ROM space and jump to each option ROM found. Shadow PCI option ROMs and initialize cards.
9Ah	MISC_SHADOW	Shadow expansion ROM areas that are enabled from setup.
9Ch	PM_SETUP	Setup power management if enabled.
9Dh	SECURITY	Initialize Security Engine.
9Eh	IRQS	Enable IRQ 0, 1, 2, and 6.
9Fh	FDISK_FAST_INIT2	Check and store the total number of Fast Disks (ATA and SCSI).
A0h	TIME_OF_DAY	Verify that the system clock interrupts are occuring.

A2h	KEYBOARD_TEST	Set NumLock indicator.
		IF <keylock set> THEN
		Print error message on screen.
		ENDIF

POST Code (Hex)	Name	Description
A4h	KEY_RATE	Initialize keyboard typematic rate.

AAh	SCAN_FOR_F2	IF <2 key was pressed during POST> THEN
		Set flag indicating key press.
		Display “Entering Setup” message.
		ENDIF

ACh	SETUP_CHECK	IF <2 was pressed> THEN
		Enter Setup.
		ELSE IF <errors were found> THEN
		Display “Press 7 or 2” prompt.
		IF <2 is pressed> THEN
		Enter Setup.
		ELSE IF <7 is pressed> THEN
		Boot.
		ENDIF
		ELSE
		Boot.
		ENDIF

AEh	CLEAR_BOOT	Clear CMOS bit indicating POST is in progress.

B0h	ERROR_CHECK	IF <error were found> THEN
		Beep twice.
		Display “Press 7 or 2” message.
		IF <2 is pressed> THEN
		Enter Setup.
		ELSE IF <7 is pressed> THEN
		Boot.
		ENDIF
		ENDIF

B2h	POST_DONE	Change BIOS data areas flag to indicate POST is complete.
B4h	ONE_BEEP	Beep once.
B5h	QUIETBOOT_END	Reset video: Clear screen, reset cursor, reload DAC.

B6h	PASSWORD	IF <password enabled> THEN
		Print message requesting password.
		IF <password incorrect> THEN
		Halt.
		ENDIF
		ENDIF

B8h	SYSTEM_INIT	Clear the GDT.
B9h	PREPARE_BOOT	Prepare to boot, clear the screen.
BAh	DMI	Initialize DMI header and substructures.
C0h	INT19	Do INT 19h to load OS.

Additional Test points codes

These test points are only available if the memory has some malfunction.

POST Code [Hex]	Description
E0h	Unsupported RAM detected / No RAM installed
E1h – EFh	RAM specification not valid

POS Motherboard - user manual beep codes

#	hex code	beep code	#	hex code	beep code	#	hex code	beep code	#	hex code	beep code	#	hex code	beep code	#	hex code	beep code
1	01	1-1-1-2	33	21	1-3-1-2	65	41	2-1-1-2	97	61	2-3-1-2	129	81	3-1-1-2	161	A1	3-3-1-2
2	02	1-1-1-3	34	22	1-3-1-3	66	42	2-1-1-3	98	62	2-3-1-3	130	82	3-1-1-3	162	A2	3-3-1-3
3	03	1-1-1-4	35	23	1-3-1-4	67	43	2-1-1-4	99	63	2-3-1-4	131	83	3-1-1-4	163	A3	3-3-1-4
4	04	1-1-2-1	36	24	1-3-2-1	68	44	2-1-2-1	100	64	2-3-2-1	132	84	3-1-2-1	164	A4	3-3-2-1
5	05	1-1-2-2	37	25	1-3-2-2	69	45	2-1-2-2	101	65	2-3-2-2	133	85	3-1-2-2	165	A5	3-3-2-2
6	06	1-1-2-3	38	26	1-3-2-3	70	46	2-1-2-3	102	66	2-3-2-3	134	86	3-1-2-3	166	A6	3-3-2-3
7	07	1-1-2-4	39	27	1-3-2-4	71	47	2-1-2-4	103	67	2-3-2-4	135	87	3-1-2-4	167	A7	3-3-2-4
8	08	1-1-3-1	40	28	1-3-3-1	72	48	2-1-3-1	104	68	2-3-3-1	136	88	3-1-3-1	168	A8	3-3-3-1
9	09	1-1-3-2	41	29	1-3-3-2	73	49	2-1-3-2	105	69	2-3-3-2	137	89	3-1-3-2	169	A9	3-3-3-2
10	0A	1-1-3-3	42	2A	1-3-3-3	74	4A	2-1-3-3	106	6A	2-3-3-3	138	8A	3-1-3-3	170	AA	3-3-3-3
11	0B	1-1-3-4	43	2B	1-3-3-4	75	4B	2-1-3-4	107	6B	2-3-3-4	139	8B	3-1-3-4	171	AB	3-3-3-4
12	0C	1-1-4-1	44	2C	1-3-4-1	76	4C	2-1-4-1	108	6C	2-3-4-1	140	8C	3-1-4-1	172	AC	3-3-4-1
13	0D	1-1-4-2	45	2D	1-3-4-2	77	4D	2-1-4-2	109	6D	2-3-4-2	141	8D	3-1-4-2	173	AD	3-3-4-2
14	0E	1-1-4-3	46	2E	1-3-4-3	78	4E	2-1-4-3	110	6E	2-3-4-3	142	8E	3-1-4-3	174	AE	3-3-4-3
15	0F	1-1-4-4	47	2F	1-3-4-4	79	4F	2-1-4-4	111	6F	2-3-4-4	143	8F	3-1-4-4	175	AF	3-3-4-4
16	10	1-2-1-1	48	30	1-4-1-1	80	50	2-2-1-1	112	70	2-4-1-1	144	90	3-2-1-1	176	B0	3-4-1-1
17	11	1-2-1-2	49	31	1-4-1-2	81	51	2-2-1-2	113	71	2-4-1-2	145	91	3-2-1-2	177	B1	3-4-1-2
18	12	1-2-1-3	50	32	1-4-1-3	82	52	2-2-1-3	114	72	2-4-1-3	146	92	3-2-1-3	178	B2	3-4-1-3
19	13	1-2-1-4	51	33	1-4-1-4	83	53	2-2-1-4	115	73	2-4-1-4	147	93	3-2-1-4	179	B3	3-4-1-4
20	14	1-2-2-1	52	34	1-4-2-1	84	54	2-2-2-1	116	74	2-4-2-1	148	94	3-2-2-1	180	B4	3-4-2-1
21	15	1-2-2-2	53	35	1-4-2-2	85	55	2-2-2-2	117	75	2-4-2-2	149	95	3-2-2-2	181	B5	3-4-2-2
22	16	1-2-2-3	54	36	1-4-2-3	86	56	2-2-2-3	118	76	2-4-2-3	150	96	3-2-2-3	182	B6	3-4-2-3
23	17	1-2-2-4	55	37	1-4-2-4	87	57	2-2-2-4	119	77	2-4-2-4	151	97	3-2-2-4	183	B7	3-4-2-4
24	18	1-2-3-1	56	38	1-4-3-1	88	58	2-2-3-1	120	78	2-4-3-1	152	98	3-2-3-1	184	B8	3-4-3-1
25	19	1-2-3-2	57	39	1-4-3-2	89	59	2-2-3-2	121	79	2-4-3-2	153	99	3-2-3-2	185	B9	3-4-3-2
26	1A	1-2-3-3	58	3A	1-4-3-3	90	5A	2-2-3-3	122	7A	2-4-3-3	154	9A	3-2-3-3	186	BA	3-4-3-3
27	1B	1-2-3-4	59	3B	1-4-3-4	91	5B	2-2-3-4	123	7B	2-4-3-4	155	9B	3-2-3-4	187	BB	3-4-3-4
28	1C	1-2-4-1	60	3C	1-4-4-1	92	5C	2-2-4-1	124	7C	2-4-4-1	156	9C	3-2-4-1	188	BC	3-4-4-1
29	1D	1-2-4-2	61	3D	1-4-4-2	93	5D	2-2-4-2	125	7D	2-4-4-2	157	9D	3-2-4-2	189	BD	3-4-4-2
30	1E	1-2-4-3	62	3E	1-4-4-3	94	5E	2-2-4-3	126	7E	2-4-4-3	158	9E	3-2-4-3	190	BE	3-4-4-3
31	1F	1-2-4-4	63	3F	1-4-4-4	95	5F	2-2-4-4	127	7F	2-4-4-4	159	9F	3-2-4-4	191	BF	3-4-4-4
32	20	1-3-1-1	64	40	2-1-1-1	96	60	2-3-1-1	128	80	3-1-1-1	160	A0	3-3-1-1	192	C0	4-1-1-1

NOTE: A faulty or missing Random Access Memory (RAM) is reported by an acoustic signal.

Abbreviations

AGTL+	Assisted Gunning Transceiver Logic
APC	Advanced Power Control
PM	Advanced Power Management
AT	Advanced Technology
ATA	AT Attachment
BGA	Ball Grid Array
BIOS	Basic Input and Output System
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit
CRT	Cathode-ray Tube
DIMM	Dual Inline Memory Module
DVI	Digital Video Interface
ECP	Extended Capabilities Port
EEPROM	Electrical Erasable Read Only Memory
E-IDE	Enhanced Integrated Drive Electronics
EMS	Expanded Memory System
EPP	Enhanced Parallel Port
FSB	Front Side Bus
GTL	Gunning Transceiver Logic
IDE	Integrated Drive Electronics
LAN	Local Area Network
LCD	Liquid Crystal Display
NA	Power failure
NVRAM	Non-volatile Random Access Memory
P-ATA	Parallel AT Attachment (old version of hard disk interface)
POS	Point of Sales
PCI	Peripheral Component Interconnect
PnP	Plug and Play
RI	Ring Indicator
RS	Retail Systems
S-ATA	Serial AT Attachment (new version of hard disk interface)
SMI	System Management Interrupt
SMM	System Management Mode
SMRAM	System Management RAM
SPGA	Staggered Pin Grid Array
TFT	Thin-film transistor
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
VGA	Video Graphics Array
WOL	Wake On LAN
WOM	Wake On Modem

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