WINCOR NIXDORF

POS Motherboard

With Intel Pentium 4-M Processor /Intel Mobile Celeron Processor (E1-Basic CPU)

User Manual (Edition November 2005)

Contents

Introduction

This manual describes the features of the Central Processing Unit (CPU) for the BEETLE systems based on the Intel Celeron™ Processor family and the Intel Pentium 4-M™ processor. With a frequency of up to 1.2 GHz and 2.4 GHz (Celeron) and up to 2.2 GHz (Pentium 4), second level cache and many other features, these processors guarantee an increased performance of your Wincor Nixdorf BEETLE system.

The E1 Basic motherboard is designed for high performance. The motherboard is based on the INTEL chipset 845GV for Pentium®4 –M processors in the Micro- FCPGA 478 pin package.

This chipset contains the complete graphic user interface as well as the main part of the LAN- controller and a USB 2.0 controller with 6 ports.

The Celeron / Pentium 4 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.

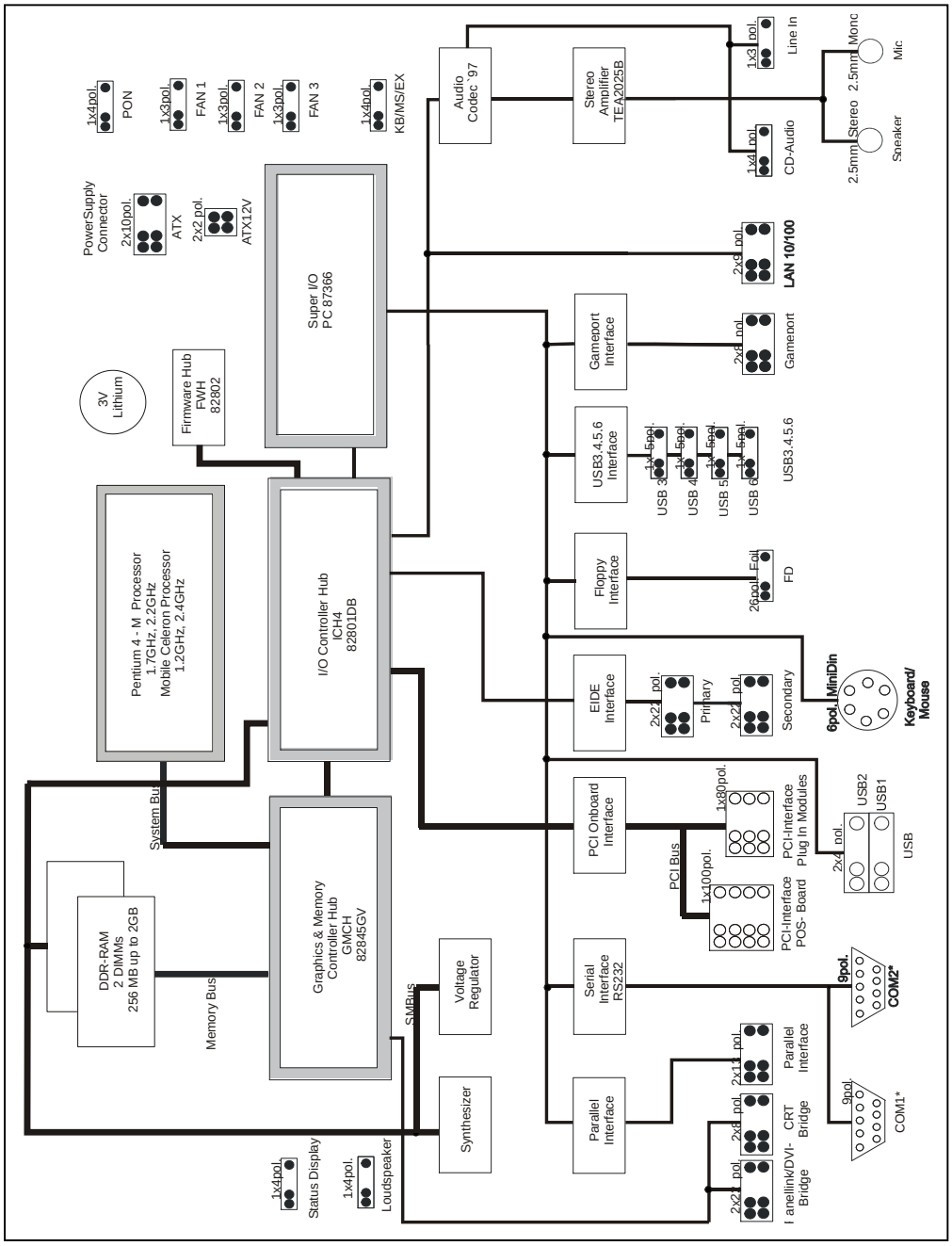
The section «BIOS Setup» in this manual explains the information contained in the Setup program and tells you how to modify the settings according to your system configuration.

Overview

Microprocessor	Support for the following processors: • Intel^{R} Pentium4 – M processor with 400 MHz host bus speed • Mobile Intel^{R} Celeron^{TM} processor with 400 MHz host bus speed
Main Memory	Two 184-pin dual in line memory module (DIMM) sockets Supports up to 2 GB of PC2700 Modules (DDR)
Chipset	Intel^{R} Chipset 845 GV, consisting of: • Intel^{R} 82845 GV (GMCH) • Intel^{R} 82801 DB (ICH4)
I/O Controller	Super I/O PC87366, consisting of: • Floppy controller • Parallel port • 2 Serial Ports • Keyboard Interface • PS/2 Mouse Interface • HW-Monitor • Game Port
Video system	Video Memory part of main memory (max. 8 MB Resolution) w/ Intel Embedded Graphics Driver max. 64 MB **CRT** resolution up to: 2048 x 1536 pixel / 32 bit @ 60 Hz **TFT** resolution up to: 1600 x 1200 pixel / 24 bit
Audio system	Chrystal Audio Codec CS4299 Mono Microphone Input Stereo Speaker Output (2 x 1,25W @ 8Ohm)
BIOS	Firmware Hub: 4 Mbit Flash Memory Phoenix BIOS w/ ACPI and DMI support
Peripheral Interfaces	• PS/2 keyboard and mouse shared interface • Two (Four) serial ports • One parallel port • Six Universal Serial (USB 2.0) ports • Two IDE interfaces with Ultra DMA support (UDMA/33) • One FD interface
PlugIn Modules	• CRT adapter • LAN adapter • Panellink Bridge • VGA/4 PCI controller • LAN PCI controller • DVI Bridge • WLAN Adapter • POS Board (Cashdraw Interface)
Additional Features	• Wake On LAN • Wake On time • 3 Fan Connectors

Block Diagram

The block diagram below shows all of the functional units of the E1 BASIC - CPU. The physical plug-in connections to the system and external peripherals are shown at the bottom of the diagram. Only the most important internal connectors are part of the block diagram.



Mainboard E1 BASIC-CPU

Technical Data

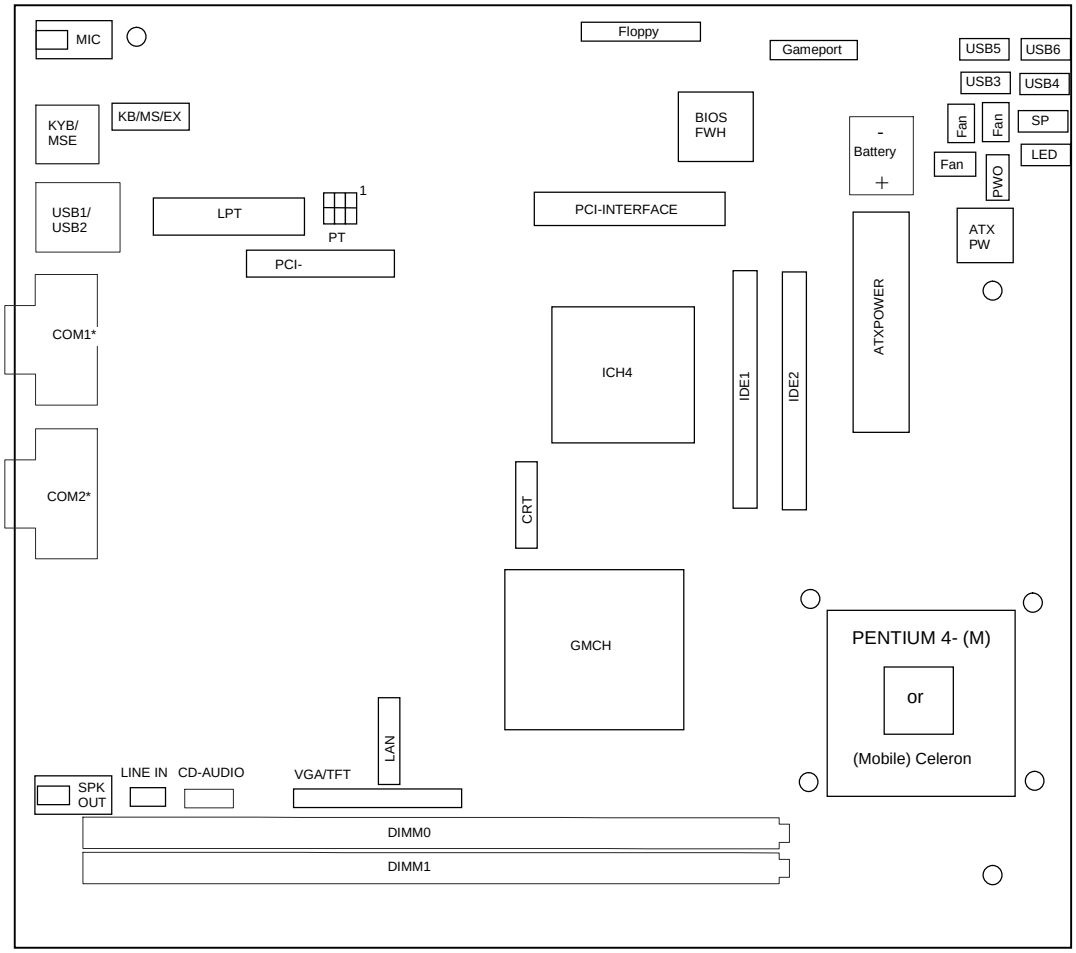
Supported Systems:	BEETLE/iPOS P4m
Architecture:	PC-AT compatible and POS - specific functional units
Technology:	TTL, CMOS, LVT; SMD + 5V, +3.3V, AGTL+ technology
Operating Modes:	Normal Mode, Power Save Mode
Power Management:	ACPI 1.0
Operating Systems:	WIN XP Embedded, WIN XP, LINUX
Microprocessor:	INTEL^{R} PENTIUM^{R} 4-M (478 Pin uFCPGA package, 0.13 u technology) *or* Mobile INTEL^{R} CELERONR (478 Pin uFCPGA package, 0.13 u technology) Frequencies from 1.2GHZ up to 2.4GHz, 8 KB L1 data cache, 12 KB L1 program cache, up to 512KB L2 cache (processor dependent)
Chipset:	INTEL chipset 845GV: Graphic and Memory Controller Hub (GMCH) with the follow ing functions: Memory Cntrl. supports DDR SDRAM with 266MHz System memory bus, Video memory part of main memory (UMA) Graphic Cntrl. supports 2D and 3D graphics and video streams, Video memory with Intel Embedded Graphics Driver max. 64MB
Max. Resolution CRT:	2048 x 1536 pixels @60Hz (32bit)
Max. Resolution Digital Output port (LCD):	1600 x 1200 pixel (24bit)
	I/O Controller Hub 4 (ICH4) with the following functions: LAN 10/100 Cntrl., IDE-Cntrl. w/ UDMA, USB Cntrl. UHCI and EHCI, AC97 Link for Audio and teleph ony CODEC, Interrupt-Cntrl., DMA-Cntrl., RTC, SMBus-Host interface
	Firmware Hub 82802 (FWH): = 512 KB Flash Memory
Super I/O:	PC87366 with the following functions: Floppy Cntrl., Parallelport, 2 Serial Ports, Keyboard Interface, PS/2 Mouse Interface, Gameport, and HW- Monitor

Audio-controller:	Audio Codec controller with the following AC`97 functions:
	20 Bit Stereo DAC and 18 Bit Stereo ADC Analog Line-Level Input (CD) Mono Mic Input (MIC) Stereo Line-Level Output
Audio-connection:	Mono Microphone Input, Stereo Speaker Output (2 x 1, 25 W@ 8 Ohm)
Main Memory:	256MB up to 2GB, 2 DIMM - sockets (184pin), 2.5 V
	DDR SDRAM technology, unbuffered nonECC, DDR266 - Standard DIMM Height up to 35 mm
PCI- Interface:	PCI Rev. 2.1 100 Pin connector for Retail specific POS- Board, 80 Pin connector for Plug In Modules
BIOS:	512 KB Flash Memory, Phoenix BIOS 4.06, PnP Rev. 1.0A, DMI Rev. 2.3
Battery:	3 V Lithium for RTC Type: CR1/3 N, 160 mAh
Processor System Bus:	400 MHz
RAM Bus Frequency:	266 MHz
PCI Bus Frequency:	33 MHz
Wake On feature:	Wake On LAN, Wake on Time
Keyboard connection:	PS/2 connection, 6 Pin Mini Din (Keyboard and Mouse Signals)
PS/2-Mouse connection:	via Y-cable together with Keyboard, additional 4 Pin connector Onboard
Serial interfaces:	COM1*, COM2*
Parallel interface:	IEEE1284 compatible (ECP, EPP, PS/2-compatible)
Loudspeaker:	PC-compatible, Volume control defined by BIOS Setup in 3 steps: high- , medium- , low volume
Floppy disk connection:	Standard interface CMOS, NEC 765 compatible, foil connector
Hard disk connection:	Local Bus IDE interface, Primary/Secondary for 4 drives, PIO Mode 0 - Mode 4, ULTRA DMA Mode 0 – Mode 2, 2mm connector for primary and secondary each

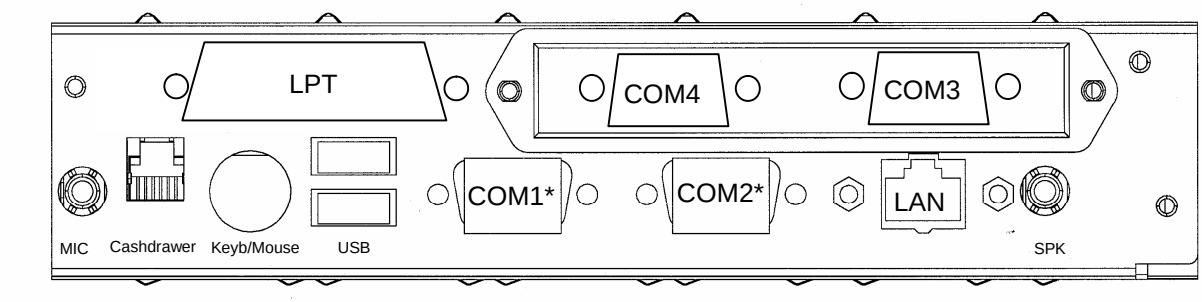
USB connection:	6 USB ports: USB2.0 USB1, 2: Standard 2 port connector, series A USB3, 4, 5, 6: 1 x 5 pin connector each
Status display connection:	Support for LEDs: Power On and HD activity
Current Consumption:	E1 BASIC with Mobile Celeron /1.2GHz and 2GB Ram, POSBoard +3,3 V ~ 3 A +5 V ~ 1,0 A +12 V ~ 2,2 A
	E1 BASIC with Mobile Celeron /2.4GHz and 2GB RAM, POSBoard +3, 3 V ~ 3 A +5 V ~ 1, 0 A +12 V ~ 3,5 A
Max. Current for keyboard	+5V: 500 mA
Max. Current per port (for COM1*, 2*)	+12V: 600 mA
Max. Current in total (for COM1*,2*)	+12V: 900 mA
Max. Current per port (for COM1*, 2*)	+5V: 300 mA
Max. Current in total (for COM1*, 2*)	+5V: 500 mA
Max. Current per port Standard USB1,USB2	+5V: 500 mA
Max. Current in total Standard USB1, USB2	+5V: 1, 0 A
Fuses (Polyswitches) +5V:	COM1*, COM2*, USB1, USB2
	Keyboard, Mouse (Fuses for +5V USB3, USB4, USB5, USB6 on seperate interface print)
+12V:	COM1*, COM2*
Board Dimensions:	192mm x 209mm

Mechanical Arrangement

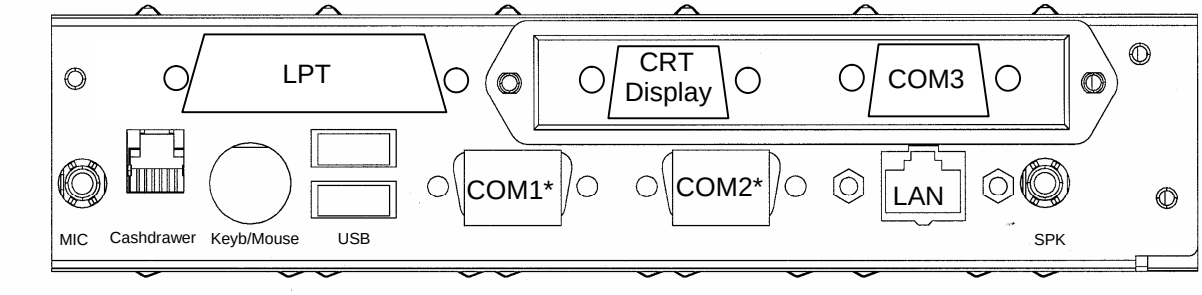
The CPU comprises the printed circuit board with connectors for all external peripheral connections and for installing the optional plug-in cards.



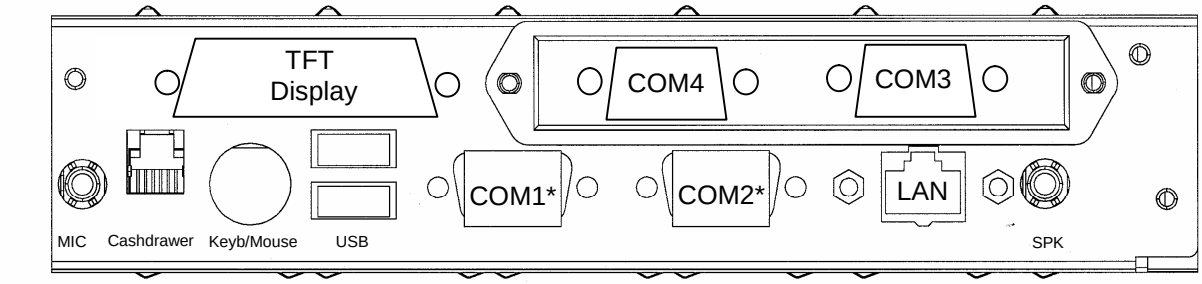
iPOS Configuration /w internal PLINK TFT connection, LPT1 and LAN adapter



iPOS Configuration /w internal PLINK TFT connection, LPT1, LAN adapter and secondary Display (balidoCRT) connection



iPOS Configuration /w internal PLINK TFT connection, LAN adapter and secondary Display (TFT) connection



In all configurations shown above the POS-Board is assembled and contains the logic for COM3, COM4, COM5, COM6 and the cashdrawer.

Onboard Components

Processors

The E1- CPU supports Pentium 4 M processors as well as Celeron 4 M. The released types are:

Processor type	Processor speed	Host Bus frequency	Cache size	Memory Bus frequency
Pentium 4 M	1,7 GHz	400 MHz	512 KB	266 Mhz
Pentium 4 M	2,2 GHz	400 MHz	512 KB	266 Mhz
Celeron M	1,2 MHz	400 MHz	256 KB	266 Mhz
Celeron M	2,4 MHz	400 MHz	256 KB	266 Mhz

The frequency is automatically selected. Also the core voltage – which depends on processor type and revision version – is defined automatically by the processors VID pins.

Attention:

- The passive heatsink has to be installed correctly.
- The heatsink paste is absolutely necessary.
- The processor fan – if installed – has to be checked whether it works properly.

Main Memory

On the E1 BASIC- CPU two DIMM(184 Pin) sockets are provided for connecting DDR modules in unbuffered SDRAM technology from 256MB (1 x 256MB) up to 2 Gbyte (2x 1GB). DDR DIMMs with different sizes can be used.

One or both DDR DIMM may be assembled. The DDR DIMMs are unbuffered 2.5V memory modules. PC2100 and PC2700 modules will be released for the E1 BASIC- CPU.

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 these three DIMMs are allowed.

Graphics System

The GMCH integrates a system memory DDR SDRAM controller that supports 256 MB up to 2GB memory (266MHz). 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 pixels with 32-bit at 60 Hz.

For connecting TFT LCDs the GMCH provides a Digital Video Out interface to implement a resolution up to 1600x1200 pixels with 24-bit. The DVO interface is driving the TFT Panellink Bridge and has 1.5 V highspeed signaling to allow operating at higher frequencies.

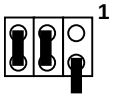
The GMCH has a core voltage of 1.5 V; the system memory operates with 2.5 V.

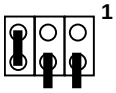
The GMCH is housed in a 760 pin BGA package.

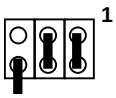
Jumper Settings

PT 3	PT 2	PT 1	VIDEO Mode	DISPLAY Size	Display Type / Clock Freq.
closed	closed	closed	SVGA	TFT 12"	BA 72A (30 MHz)
closed	closed	open	XGA	TFT 15"	BA 73A (65 MHz)
closed	open	open	SVGA	TFT 12"	BA 72A–1 (38 MHz)
open	closed	closed	VGA	TFT 10"	640 x 480 (PB Application)

12” Monitor BA72A PT:  **used in iPOS**

15” Monitor BA73A PT:  **used in iPOS**

12” Monitor BA72A-1 PT: 

10” Monitor 640 x 480 (special application) PT: 

Note: Using a “Plug and Display” TFT screen (BA7xA-2), the jumper setting is “don`t care”.

CRT-Bridge

A CRT- Bridge may be used for connecting CRT-Displays.

PANELLINK-Bridge

For connecting BA72A and BA73A the PLINK- Bridge may be used.

DVI-Bridge

For connecting TFT-Displays with DVI – Interface a new DVI-Bridge was developed.

I/O Controller Hub 82801DB (ICH4)

The ICH4 provides extensive I/O support. Functions and capabilities include:

- PCI support
- Enhanced DMA controller, Interrupt controller and Timer functions
- Integrated IDE controller supports Ultra ATA /33
- USB host interface (3 UHCI Controller with 2 ports each Vers. 1.1 and one EHCI Controller with 6 ports Vers. 2.0)
- Integrated LAN controller 10/100 Mbit/sec Ethernet
- System Management Bus (SMB)
- AC97 Vers. 2.3 support for audio and modem
- Low Pin Count (LPC) interface
- Firmware Hub (FWH) interface support

The ICH4 is housed in a 421 EBGA package.

LAN 10/100- Module

The Intel based Lan 10/100 Module may be used. It contains the physical Layer as well as an EEPROM for storing the MAC address.

Audio System

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 E1 BASIC- CPU uses one microphone mono input, a line stereo input and the line stereo output which will drive the stereo amplifier TEA2025B.

The CS4299 is housed in a 48 pin LQFP package.

The TEA2025B is a stereo audio power amplifier capable of delivering typically 1,25 Watt per channel of continous 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 REALTEK Clock Generator RTM660-109R is designed for the INTEL chipset 845 and provides all clocks for the chipset, microprocessor, DDR DIMMs, PCI interface, USB interface and Super I/O.

The RTM660-109R provides an I^2C 2 wire interface to program the internal registers. For EMI reduction the synthesizer provides programmable spread spectrum.

The RTM660-109R is housed in 56 pin SSOP package.

PCI Onboard Plug-In Modul Interface

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

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

Serial Interfaces COM1*, COM2*

The I/O assignments of the serial ports COM1* and COM2* deviate from the standard in the way it is equipped with system voltages of +5V and +12V instead of the signals RI (M3) and DCD (M5).

The channels are connected via 9-pin D-sub (female) sockets because of the additional system voltages.

Keyboard / PS/2 Mouse Interface

The keyboard controller is part of the SuperI/O. The keyboard interface - as well as the PS/2 – mouse interface - is available on the Mini DIN connector. To use both of them a Y- adapter-cable(introduced) is necessary.

USB Interface

The USB interface supplied by the ICH4 contains 6 downstream ports providing both data rates, 12 Mb/sec for full speed USB peripherals and 1.5 Mb/sec for low speed USB peripherals. Software protocol relates to UHCI Design guide (USB1.1). Additionally an EHCI Controller is implemented to support all 6 ports alternatively with high speed 480Mb/sec (USB2.0). Two USB ports (USB1 and USB2) are available on the mainboard. The USB connector is of type Stack A.

Ports USB3, USB4, USB5 and USB6 are available on a 1x5pin header each and may be connected via a special cable to the chassis.

Parallel Interface

The standard interface LPT1 is used for connecting the POS printer. There are several modes supported (PS/2 compatible, EPP and ECP). The connector on the CPU is a 2 x 13-pin header.

Hard-Disk Interface (IDE)

The CPU features a UDMA IDE interface for connecting up to 4 ATA compatible drives. The I/O addresses conform to the AT standard. The connectors on the CPU are 2 x 22-pin header (2-mm arrangement) for primary and secondary. All parameters of the drives are read by the BIOS automatically and stored in the BIOS setup parameter set.
The E1 BASIC- CPU supports IDE drives up to PIO-Mode 4 and Ultra DMA Mode 2.

Floppy Disk Interface

The E1 BASIC-CPU provides a foil connector to support ½“Floppy Disk Drives.

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.

Status Display Interface

To display system activities there are two interface signals available.

LED 1 green: Power On

LED 2 yellow: Hard Disk activity / Memory Card activity

Fans

Three fans are supported by the CPU, i.e. three tacho lines are monitored by hardware and may be reported via BIOS SETUP and DMI.

Changing the CPU Battery

The BEETLE POS systems are equipped with a lithium battery on the CPU board 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.

- 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 organisation where you purchased the new battery.

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

Plug In Modules

The following modules may be used with the E1 BASIC- CPU:

- CRT-Bridge
- Panellink-Bridge
- DVI-Bridge
- Secondary CRT-Controller
- POS-Board
- Intel LAN 10/100-Module
- WLAN-Module

PCI –Interface

Devices and Functions

The ICH4 incorporates a variety of PCI functions as shown in the table below. These functions are divided into four logical devices: (Bus 0, Device 29; Bus0, Device30; Bus0, Device31 and Bus1, Device 8).

Bus: Device: Function	**Function Description**
Bus 0: Device 29: Function 0	USB UHCI Controller # 1
Bus 0: Device 29: Function 1	USB UHCI Controller # 2
Bus 0: Device 29: Function 2	USB UHCI Controller # 3
Bus 0: Device 29: Function 7	USB 2.0 EHCI Controller
Bus 0: Device 30: Function 0	Hub Interface to PCI Bridge
Bus 0: Device 31: Function 0	PCI to LPC Bridge
Bus 0: Device 31: Function 1	IDE Controller
Bus 0: Device 31: Function 3	SMBus Controller
Bus 0: Device 31: Function 5	AC´97 Audio Controller
Bus 0: Device 31: Function 6	AC´97 Modem Controller
Bus 1: Device 8: Function 0	LAN Controller

Additional Onboard Components

There are two Onboard PCI connectors assembled on the E1 BASIC- CPU. A complete PCI –Bus is implemented on the Onboard PCI connector for assembling a POSboard.

The second Onboard PCI connector may be used to assemble alternatively one Plug In Module with up to two PCI-Slot functionalities (double sided).

A Wireless LAN (WLAN) module, a Secondary CRT- Controller and a new Secondary TFT- Controller are available.

Bus 1: Device 10: Function 0	Onboard LAN/WLAN- Submodule Onboard Secondary CRT- Submodule Onboard Secondary TFT- Submodule

Plug and Play

The BIOS supports PnP capabilities by managing the system resources. All I/O-addresses, IRQ-channels and DMA channels, which are used by the system are marked as reserved and the remaining resources are available for the PnP – OS. See also BIOS specification.

Operating Modes

The E1 BASIC STAR- CPU provides power management functions depending on the installed Operating System.

Normal Mode / Standby Mode

Switching on

Normal Flex ATX Power Supply will be used in E1 BASIC STAR- 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 the system on.

The “regular” way to switch on the system is to activate the temporary switch at the frontside of the system.

Short pressing the temporary switch will switch on the system.

For powering up the system via LAN the Onboard PCI connector is provided with the “Wake up” signal and the Standby voltage P5VSB.

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 temporary switch at the frontside of the system or under Software Control.

Pressing the temporary switch 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.

Connector Assignments

Connectors for External Connections

Serial Interfaces COM1*, COM2* (Onboard)

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

PIN #	COM1*	COM2*
1	P12VFS	P12VFS
2	RXD1	RXD2
3	TXD1	TXD2
4	DTR1	DTR2
5	GNDF	GNDF
6	DSR1	DSR2
7	RTS1	RTS2
8	CTS1	CTS2
9	P5VFS	P5VFS

Keyboard/Mouse Interface (External)

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

PIN #	SIGNALS KYB/E
1	KDF
2	MSDAF
3	GNDFKYHL
4	P5VFKYHL
5	KCF
6	MSCKF

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	GNDF1	GNDF2

CRT Connection

This connector is not part of the E1 BASIC-CPU. It is part of the CRT –Adapter and, if populated, available at the rearside 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 E1 BASIC-CPU. It is part of the Panellink Bridge and, if populated, available at the rearside 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	6	GND
7	TX1+	8	TX1 Shield
9	TX1-	10	GND
11	P12V	12	P12V Shield
13	P12V	14	TXD
15	Touch Shield	16	RXD
17	FPEN	18	TX0+
19	TX0 Shield	20	TX0-
21	P5V	22	P5V
23	TXC+	24	TXC Shield
25	TXC-	26	Speaker Out
27	NC	28	NC
29	NC	30	NC
31	NC	32	NC
33	NC	34	NC
35	NC	36	NC
37	NC	38	NC
39	NC	40	NC

LPT Connection

This connector is not part of the E1 BASIC-CPU. It is part of the LPT –Adapter-Cable and available at the rearside of the cabinet.

25-pin D-Sub connector (LPT), female

PIN #	SIGNALS LPT	PIN #	SIGNALS LPT
1	STRBEN	14	AUTOFN
2	CEN D0	15	ERRORN
3	CEN D1	16	INITN
4	CEN D2	17	SLCTIN
5	CEN D3	18	GND
6	CEN D4	19	GND
7	CEN D5	20	GND
8	CEN D6	21	GND
9	CEN D7	22	GND
10	ACKN	23	GND
11	PBUSY	24	GND
12	PE	25	GND
13	SLCT		

LAN Connection

This connector is not part of the E1 BASIC-CPU. It is part of the LAN –Adapter and, if populated, available at the rearside of the cabinet.

8 pin RJ45 (LAN), female

PIN #	SIGNALS
1	TD +
2	TD -
3	RD +
4	NC
5	NC
6	RD -
7	NC
8	NC

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

BIOS Setup

The Celeron / Pentium 4 mainboard 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 mainboard'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.

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 that you can scroll through the various sub-menus and make your selections among the predetermined choices.

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

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)	Function Description
<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>.

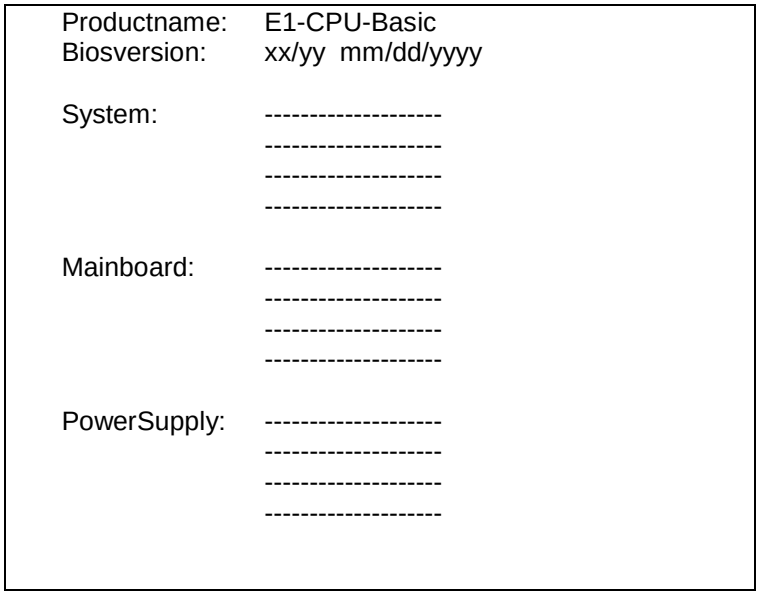
Sub-Menu

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:



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

Product name:

This text is fixed for your Celeron / Pentium 4 mainboard with standard BIOS. This board is also called “E1-CPU-Standard”.

Bios Version:

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

System, Mainboard, PowerSupply:

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]
	Legacy Diskette A:	[1.44 MB 31/2“]
➢	Primary Master	[1090MB]
➢	Primary Slave	[None]
➢	Secondary Master	[None]
➢	Secondary Slave	[None]
	Extended Memory:	125 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.

Legacy Diskette A [1.44M 3.5”]

These fields record the types of floppy disk drives installed in your system. Configuration options: [Disabled] [720K, 3.5 in.] [1.44M, 3.5in.]

Primary & Secondary Master/Slave

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	39102336
Maximum Capacity	20020MB
Multi-Sector Transfers:	[16 Sectors]
LBA Mode Control:	[Enabled]
32 Bit I/O:	[Disabled]
Transfer Mode:	[FPIO 4/DMA 2]
Ultra DMA Mode	[Mode 2]
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	[Low]
PS/2 Mouse:	[Enabled]
Large Disk Access Mode:	[DOS]
Legacy USB Support:	[Disabled]
USB TimeOut Value:	[High]
Onboard LAN BootProm:	[Enabled]
QuickBoot Mode:	[Disabled]
Video output to COM3:	[Disabled]

- 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].

PS/2 Mouse [Enabled]

With the default setting IRQ12 will be reserved for installed expansion cards. [Enabled] will always reserve IRQ12, regardless whether a PS/2 mouse is detected or not. Configuration options: [Disabled] [Enabled]

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.

USB TimeOut Value [High]

If Legacy USB Support [Enabled] you can select USB TimeOut Value [High], [Low]. Connecting an USB-Floppy or any other mechanical driven USB device to USB port needs [High] for proper function. Using a solid state device (i.e. USB CompactFlash) the entry [Low] might be selected, avoiding time delay during booting the system.

Onboard LAN BootProm [Enabled]

This point switches on or off the PXE PROM from the onboard LAN submodul if it is installed. Configuration Options: [Disabled] [Enabled]

QuickBoot Mode [Disabled]

This setup mode speeds up the progress of booting the system a lot.
Configuration Options: [Disabled] [Enabled]

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.

Chipset Configuration

Local Bus IDE adapter:	[Both]
SMART Device Monitoring:	[Disabled]
Boot-Video Device:	[Onboard]
PCI 2.1 Support	[Enabled]
USB 2.0 Support	[Disabled

Local Bus IDE adapter [Both]

You can select to enable the primary IDE channel, secondary IDE channel, both, or disable both channels.

Configuration options [Both] [Primary] [Secondary] [Disabled]

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 mainboard 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].

PCI 2.1 Support [Enabled]

This field only should be [Disabled], if any PCI card in your system does not work properly; this means running PCI cards with less performance.

USB 2.0 Support [Disabled]

Using USB devices complying 2.0 standard, you may switch this field [Enabled]. Due to lack of appropriate drivers you may let to [Disabled].

I/O Device Configuration

Seriall port A:	[Enabled]
Base I/O address:	[3F8]
Interrupt:	[IRQ 4]
Seriall port B:	[Enabled]
Base I/O address:	[2F8]
Interrupt:	[IRQ 3]
Parallel port:	[Enabled]
Mode:	[ECP]
Base I/O address:	[378]
Interrupt:	[IRQ 7]
DMA channel:	[DMA 1]
TouchScreen Routing:	[No Routing]
Game port:	[Disabled]

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]

Parallel port [Enabled]

Switch Parallel Port on or off. If selecting [Auto], the BIOS or Operating System will configure this port. Selecting [Enabled] you are able to define configuration by yourself. Configuration options: [Disabled] [Enabled] [Auto].

Mode [Bi-directional]

This field allows you to set the operation mode of the parallel port.
Configuration options: [Output only] [Bi-directional] [EPP] [ECP]

Base I/O address

This field sets the address for the onboard parallel connector in [Enabled] mode.
Configuration options: [378] [278].

Interrupt

Combine the Base I/O address with an interrupt in [Enabled] mode. Configuration options: [IRQ 5] [IRQ 7]

DMA channel

Combine the Base I/O address with an DMA channel in [Enabled] mode. Configuration options: [DMA 1] [DMA 3]

TouchScreen Routing [TFT Touch to COM2]

Using a TouchScreen 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] .

Game port [Disabled]

Switch Game port on or off. Selecting [Enabled] you are able to define configuration by yourself.
Configuration options: [Disabled] [Enabled].

Base I/O address

This field sets the address for the Game port in [Enabled] mode.
Configuration options: [200] [210] [220] [230].

DMI Event Logging

Event log capacity	Space available
Event log validy	Valid
View DMI event log	[Enter]
Clear all DMI event logs	[Nol]
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.

Power State:	[Stay Off]
Wake On LAN:	[Disabled]
Wake On Modem Ring:	[Disabled]
Wake On Time:	[Disabled]
Wake Time:	[00:00:00]
➢ HardWare Monitor:	

Power State [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 enabling or disabling 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	13.6 V
+12V	Voltage	12.6 V
+VCC	Voltage	5.2 V
+1.5V	Voltage	1.5 V
+2.5V	Voltage	2.6 V
+CpuVID	Voltage	1.3 V
+3.3V	Voltage	3.4 V
+VBatt	Voltage	3.13 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
	IBA FE Slot 0140 v4110

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-HardDrive is available.Thus you may use memorysticks formatted as HardDrive to boot from, temporary seeing the USB-HardDrive 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
Save 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.

Save Changes

This option saves your selections without exiting the Setup program. You can then return to other menus to make changes. After selecting this option, all selections are saved and a confirmation is requested. Select [Yes] to save all changes to the non-volatile RAM.

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:

Testpoint 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.

POST Code (Hex)	Name	Description

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

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.

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

POST Code (Hex)	Name	Description

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 successfule> 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.
5Bh	CPU_CACHE_OFF	Disable and WB invalidate CPU cache.

POST Code (Hex)	Name	Description
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 nondisposable (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

86h	IO_AFTER	IF <integrated super I/O exists> THEN
		Set integrated super I/O configuration to match setup.
		ENDIF

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 subsystem.

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 Steup.
		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.

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

IT Abbreviations

ACPI	Advanced Configuration and Power Interface
AGTL+	Assisted Gunning Transceiver Logic
APC	Advanced Power Control
APM	Advanced Power Management
ASYNC	Asynchronous interface RS232
AT	Advanced Technology
ATA	AT Attachment
BGA	Ball Grid Array
BIOS	Basic Input and Output System
COM	Communication Port
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit
CRT	Cathode Ray Tube
cUL	Canada Underwriters Laboratories
DIMM	Dual Inline Memory Module
ECP	Extended Capabilities Port
EEPROM	Electrical Erasable Programmable Read Only Memory
E-IDE	Enhanced Integrated Drive Electronics
EMS	Expanded Memory System
EPP	Enhanced Parallel Port
EPROM	Erasable Programmable Read Only Memory
FD	Floppy Disk
FSB	Front Side Bus
GS	Geprüfte Sicherheit (safety tested)
GTL	Gunning Transceiver Logic
HD	Hard Disk
HDD	see HD
IDE	Integrated Drive Electronics
IHSS	Inhouse Interface
ISA	Industrial Standard Architecture
ISO	International Standardization Organization
JEIDA	Japan Electronic Industry Development Association
LAN	Local Area Network
LBA	Logical Block Addressing
LCD	Liquid Crystal Display
LED	Light Emitting Diode)
LPT	Line System
MIDE	Master IDE
NA	Power failure
NVRAM	Non-volatile Random Access Memory
PCI	Peripheral Component Interconnect
PCMCIA	Personal Computer Memory Card International Association
PnP	Plug and Play
POS	Point of Sale
RAM	Random Access Memory
RDI	Retail Device Interface
RI	Ring Indicator

RS	Retail Systems
SDRAM	Synchronous Dynamic Random Access Memory
SIMM	Single In-Line Memory Module
SMI	System Management Interrupt
SMM	System Management Mode
SMRAM	System Management RAM
SPGA	Staggered Pin Grid Array
SRAM	Static Random Access Memory
SVGA	Super Video Graphics Array
TFT	Thin Film Transistor
UL	Underwriters Laboratories
UPS	Uninterruptible Power Supply
USB	Universal Serial Bus
USP	Uninterruptible Power Supply
VGA	Video Graphics Array
WOL	Wake On LAN
XMS	Extended Memory

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