# WILDCAT

## Single Board Computer


## User Manual

# WILDCAT

# User Manual

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| | | | |

# COMPANY PROFILE

Blue Chip Technology Ltd is the leading specialist PC product manufacturer in UK/Europe.

Blue Chip Technology Ltd provides innovation with quality design and manufacturing from a single source.

Based in the North West of England, our purpose built complex contains one of the most advanced research and development facility, engineering workshop and production lines.

Specialising in the provision of industrial computing and electronic solutions for a wide range of UK and European organisations, Blue Chip Technology Ltd has one of the UK's largest portfolios of industrial PCs, peripherals and data acquisition cards. This extensive range of products, coupled with our experience and expertise, enables Blue Chip Technology Ltd to offer an industrial processing solution for any application. The WILDCAT Single Board PC is the latest addition to our portfolio, providing a cost effective product development and volume production tool for OEMs.

A unique customisation and specialised system integration service is also available, delivering innovative solutions to customers problems. The company's success and reputation in this area has led to a number of large design and manufacturing projects for companies such as BNFL and British Gas.

British Standards Institute approval (BS EN ISO9001) means that all of Blue Chip Technology Ltd’s design and manufacturing procedures are strictly controlled, ensuring the highest levels of quality, reliability and performance.

Blue Chip Technology are also committed to the single European market and continue to invest in the latest technology and skills to provide high performance computer and electronic solutions for a world-wide customer base.

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# INTRODUCTION

## MANUAL OBJECTIVES

This manual describes in detail the Blue Chip Technology WILDCAT Single Board processor card.

We have tried to include as much information as possible but we have not duplicated information that is provided in the standard IBM Technical References, unless it proved to be necessary to aid in the understanding of the WILDCAT Single Board PC.

The manual is divided into logical sections and includes a User Guide, which will help non-technical users get the unit up and running. We strongly recommend that you study this manual carefully before attempting to interface with WILDCAT or change the standard configurations. Whilst all the necessary information is available in this manual we would recommend that unless you are confident, you contact your supplier for guidance.

Please be aware that it is possible to create configurations within the CMOS RAM that make booting impossible. If this should happen, clear the CMOS settings; (see the description of the Jumper Settings for details).

If you have any suggestions or find any errors concerning this manual and want to inform us of these, please contact our Customer Support department with the relevant details.

## LIMITATIONS OF LIABILITY

In no event shall Blue Chip Technology be held liable for any loss, expenses or damages of any kind whatsoever, whether direct, indirect, incidental or consequential, arising from the design or use of this product or the support materials supplied with this product. If this product proves to be defective, Blue Chip Technology is only obliged to replace or refund the purchase price at Blue Chip Technology's discretion according to their Terms and Conditions of Sale.

## PRECAUTIONS

It is imperative that precautions are taken to avoid electro-static discharges, or any maltreatment of the on-board battery.

### *ELECTRO-STATIC DISCHARGES*

The devices on this card can be totally destroyed by static electricity. Ensure that you take necessary static precautions, ideally wear an approved wrist strap or touch a suitable ground to discharge any static build up. This should be repeated if the handling is for any length of time.

When carrying the board around, please place it into the anti-static bag in which it came. This will prevent any static electricity build up. Do not use the black conductive type of anti-static bag, as these will discharge the on-board battery.

### *ON-BOARD LITHIUM CELL*

This board is fitted with a Lithium cell (type CR2032). Great care should be taken with this type of cell. Under NO circumstances should:

- the outputs be shorted
- be exposed to temperatures in excess of 100°C
- be burnt
- be immersed in water
- be unsoldered
- be recharged
- be disassembled

If the battery is mistreated in any way there is a very real possibility of fire, explosion, and personal harm.

## RELATED PUBLICATIONS

The following publications will provide useful information related to the Standard Personal Computer and can be used in conjunction with this manual.

- IBM Personal Computer AT Technical Reference, 1502494, IBM, 1984.
- IBM Personal System/2 and Personal Computer BIOS Interface Technical Reference, 15F0306, IBM, 1987.
- The Programmers PC Sourcebook, Microsoft
- The Winn L. Rosch Hardware Bible, Brady
- PCI Specification 2.1

## TRADEMARKS

# USER GUIDE

## OVERVIEW

The Blue Chip Technology WILDCAT Single Board PC sets new standards for integration of the latest advances in processor, graphics, memory, and I/O technologies. The WILDCAT complies with the PICMG form factor providing ISA and PCI bus interfaces on a single PC/AT plug-in card. The PICMG single board PC is an ideal platform for the increasing requirements of today and tomorrow's embedded applications.

This compact and flexible two-thirds length PICMG design will accept Celeron® and Coppermine Pentium III® in a Socket 370 package operating at frequencies upto and beyond 800MHz. These Socket 370 processors are supported in a ZIF socket designed to reduce the overall board dimensions and thereby maximise the slot availability. The memory sub-system is designed to support up to 512MB of unbuffered SDRAM in standard 168-pin DIMM sockets. The memory modules must be PC100 compliant in order to operate at the increased 100MHz Front-Side-Bus (FSB) frequency. Non-PC100 should only be operated at 66MHz FSB.

The WILDCAT single board PC uses the Intel 69030 controller on board to provide outstanding graphics performance and increased integration over other single board PC designs. The WILDCAT supports simultaneous dual displays (CRT and flat panel) with both displays running at optimal timings, resolutions and refresh rates. 4Mbytes of SDRAM are supported.

The WILDCAT provides a PCI Bus Mastering IDE DMA Mode 2 controller with two high performance Enhanced IDE interfaces allowing up to four IDE devices (such as hard drives, CD-ROM readers, etc.). UltraDMA/33 PIO Modes 3 & 4 are also supported.

An on Board PCI Ultra2 SCSI II controller (16-bit differential or single ended) is fitted on board using the Industry standard Adaptec AIC7890 interface. This permits SCSI data rates of up to 80MB/s, and provides expansion for up to fifteen devices.

Networking capability is provided by an on-board PCI-based 100/10 Base-T Ethernet controller. This device can auto-negotiate network speeds and comes complete with drivers for most network environments

Two USB ports provide easy IO expansion to USB Specification Rev 1.0 compliant devices.

The SMC 37C675 Enhanced Super I/O controller provides all the standard PC I/O functions: floppy interface, two FIFO serial ports, one EPP/ECP capable parallel port, keyboard and mouse (PS/2) controller.

The WILDCAT also provides drive for up to four external PCI local bus non-bridged slots. These provide a high bandwidth data path for data-movement intensive functions such as frame grabbing or networking. A greater number of PCI slots can be supported through PCI bridged backplanes. The WILDCAT provides a buffered ISA bus. This permits up to twenty ISA slots to be driven to complete the I/O capability. The WILDCAT should only be used in PICMG-compliant back-planes. ISA only back-planes are not recommended for use with WILDCAT, as power for the board should be drawn from both the PCI and ISA connectors.

In addition to the superior hardware capabilities, a full set of software drivers and utilities are available to allow advanced operating systems such as Windows™ 95/ 98 to take full advantage of the hardware capabilities. Features such as bus mastering and UDMA33 EIDE, Windows™ 95-ready Plug and Play, Advanced Power Management (APM) are available for the WILDCAT.

### *BOARD LEVEL FEATURES*

- Compact 370 pin Processor socket supporting 233-800MHz operation, and future higher speeds.
- On-board jumperless CPU voltage regulator
- Intel 440BX AGPSet chipset:
  824440BX North Bridge
  PIIX4E South Bridge
- 128KB or 512 KB PipeLine Burst Level 2 cache provided on the Celeron/Pentium III processor.
- Phoenix BIOS, PnP Support
  - Flash 256K BIOS
  - Power Management
  - ISA PnP extensions
  - Y2K compatible
- Two DIMM sockets providing up to 512 Mbytes of unbuffered SDRAM
- Intel 69030 graphics controller providing
  4 Mbytes SDRAM
  Supports resolution up to 1600 x 1200 at 8 bpp
  Supports a wide range of mono, STN, DSTN and LCD panels
  Zoom video/ data port
- Adaptec PCI Ultra2 SCSI II adapter with on-board termination
- Realtek PCI 10/100 Base-T Ethernet controller
- PICMG compliant PCI and ISA expansion buses
- SMC 37C675 I/O controller providing:
  Dual floppy interface
  Dual 16C550 RS-232 serial interfaces
  EPP/ECP bi-directional parallel interface
  PS/2 mouse and keyboard
  IrDA interface
- Real-time clock with on-board battery
- Solid State Disk support for M-Systems Disk-on-Chip with 2 to 288MB capacity
- System monitoring of fans, system temperature and critical supply voltages are provided using the National Semiconductor LM87 hardware monitor.
- On-board status LEDs indicate POST , supplies status, network and disk activity
- Drive for up to 20 ISA and 4 PCI expansion slots

### *PROCESSOR*

The WILDCAT single board PC is designed to operate with Pentium III and Celeron Processors running at various voltages. An on-board voltage regulator circuit provides the required voltage for the processor core and automatically sets the voltage level to match the processor installed. No links or user intervention is required.

The Pentium III processor maintains full backward compatibility with the 8086, 80286, i386™, Intel486™ and Pentium ™ processors. It supports both read and write burst mode bus cycles, and includes both Level-1 and Level-2 caches on the processor. An advanced numeric co-processor is a lso integrated into the Pentium III processor that significantly increases the speed of floating point operations, whilst maintaining backward compatibility with i486DX math co-processor and complying to ANSI/IEEE standard 754-1985.

### *PROCESSOR UPGRADE*

The WILDCAT single board PC incorporates a 370-pin ZIF connector (Socket 370) that provides users with a processor upgrade path. Future, faster, lower power processors being developed for use with Skt 370 can provide performance beyond that delivered by the originally installed Pentium III Processor. The WILDCAT will support CPUs from 233 to 800MHz and beyond.

### *INTEL 69030 GRAPHICS CONTROLLER*

The WILDCAT single board PC is equipped with an Intel 69030 SVGA graphics controller with 4 MB of SDRAM graphics memory. The 69030 has a 64-bit graphics engine that provides acceleration for scaling the video display without compromising picture quality or frame rate. The on-chip RAMDAC / clock synthesiser is capable of outputting pixel data rates of 170 MHz, providing a 664MB/s Frame buffer bandwidth. Screen resolutions of up to 1600 x 1200 x 16 bpp at 60 Hz are possible. 3D- and 2D-Hardware Acceleration for graphics functions such as shading, texture colour keying, and 64 bit BitBLTs and cursor support provide high performance operation under Windows™ and other GUI environments. The 69030 is PCI Version 2.1compliant

In addition to the standard 15-way D-type VGA connector, the WILDCAT provides a 10-pin header for internal CRT VGA connections. WILDCAT supports VESA DPMS and DDC2B standards. The DPMS protocol allows WILDCAT to put a DPMS compliant monitor into power saving modes. The VESA Display Data Channel (DDC2B) identifies the monitor and permits transfer of monitor resolution data thereby simplifying monitor set-up.

Two LCD headers provide a flexible interface to TFT, DSTN, SSTN, EL, Plasma, colour and monochrome panels. Panels upto 36 bit can be supported

The WILDCAT also features a zoom video data port. This provides a means of displaying video capture data in either YUV or RGB formats.

*Note: In certain operating systems (such as Win 95/98), the use of non-DDC monitors may result in screen refresh resolutions beyond those supported by the monitor. In order to overcome this potential problem, the DDC option for the monitor should be disabled in the Display Setup screen.*

*RESOLUTIONS AVAILABLE*

| RESOLUTION | FREQUENCY (HZ) | | |
|---|---|---|---|
| | 8 BIT/PIXEL | 16 BIT/PIXEL | 24 BIT/PIXEL |
| 320 x 200 | 60,72,75,85 | 60,72,75,85 | 60,72,75,85 |
| 320 x 240 | 60,72,75,85 | 60,72,75,85 | 60,72,75,85 |
| 512 x 384 | 60,72,75,85 | 60,72,75,85 | 60,72,75,85 |
| 640 x 350 | 85 | 60,72,75,85 | 85 |
| 640 x 480 | 56,60,72,75,85 | 60,72,75,85 | 60, 72, 75,85 |
| 800 x 600 | 60,72,75,85 | 60,72,75,85 | 56, 60, 72,75,85 |
| 1024 x 768 | 60,72,75,85 | 60,72,75,85 | 60, 70, 75 |
| 1280 x 1024 | 60,72 | 60 | |

### *SYSTEM MEMORY*

The WILDCAT Single Board PC provides two 168-pin DIMM connectors for memory expansion. The sockets each support 8, 16, 32, 64, 128, 256MB unbuffered SDRAM modules giving a current maximum of upto 512MB of system memory. The minimum memory size is 8 MB. Memory timing requires PC100-compliant SDRAM modules when used with a 100MHz FSB CPU. There are no jumper settings required for the memory size, which is automatically detected by the system BIOS.

### *BUS EXPANSION SLOTS*

The WILDCAT is designed for use in a passive backplane providing expansion slots for add-in cards. There may be up to 20 ISA bus expansion connectors and four PCI expansion connectors. Both connector types share one slot, which is is reserved for the WILDCAT processor card. All PCI expansion slots accept PCI bus master cards, and fully support the PCI specification version 2.1.

*PCI 3.3 VOLT CAPABILITIES*

The WILDCAT incorporates an on-board voltage regulator to provide 3.3V to the on-board devices only. This is not available to provide power to 3.3V PCI expansion boards. To supply 3.3 Volts to the PCI expansion connectors, a power supply with a 3.3V DC output, such as an ATX supply is required.

### *ELECTROMAGNETIC COMPATIBILITY*

This product meets the requirements of the European EMC Directive (89/336/EEC) and is eligible to bear the CE mark.

It has been assessed operating in a Blue Chip Technology ICON industrial PC. However, because the board can be installed in a variety of computers, certain conditions have to be applied to ensure that the compatibility is maintained. Subject to those conditions, it meets the requirements for an industrial environment (Class A product).

- The board must be installed in a computer system chassis that provides screening suitable for the industrial environment.
- Any recommendations made by the computer system manufacturer/supplier must be complied with regarding earthing and the installation of boards.
- The board must be installed with the backplate securely screwed to the chassis of the computer to ensure good metal-to-metal (i.e. earth) contact.
- Most EMC problems are caused by the external cabling to boards. It is imperative that any external cabling to the board is totally screened, and that the screen of the cable connects to the metal end bracket of the board and hence to earth. It is recommended that round-screened cables with a braided wire screen are used in preference to those with a foil screen and drain wire. Use metal connector shells, which connect around the full circumference of the screen: they are far superior to those that earth the screen by a simple “pig-tail”.
- The keyboard will play an important part in the compatibility of the processor card since it is a port into the board. Similarly, it will affect the compatibility of the complete system. A fully compatible keyboard must be used otherwise the complete system could be degraded. The keyboard itself may radiate or behave as if keys are pressed when subject to interference. Under these circumstances it may be beneficial to add a ferrite clamp on the keyboard lead as close as possible to the connector. A suitable type is the Chomerics type H8FE-1004-AS.
- Ensure that the screens of any external cables are bonded to a good RF earth at the remote end of the cable.

Failure to observe these recommendations may invalidate the EMC compliance.

**Warning**
This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

# SPECIFICATION

| | | |
|---|---|---|
| WILDCAT Power Requirement | +5 V ± 5% | |
| | +12 V ± 5% | |
| | +3.3 V ± 5% | ⎫ |
| | -5 V ± 5% | ⎬ Not required for board operation. |
| | -12 V ± 5% | ⎭ |
| Typical System Consumption | 35 Watts (5V)<br><1 Watt (12V) | Pentium III Coppermine 450, 128 MB SDRAM,<br>3½" FDD, 8GB HDD |
| Temperature | Non-Operating<br>Operating | -40°C to +70°C<br>+0°C to +55°C<br>(min. airflow of 200 lpm) |
| EMC | Emissions<br>Immunity | EN55022 (A)<br>EN50082-1 in a Blue Chip ICON Industrial PC Chassis |
| MTBF | Calculated | 72,000 Hours |
| Dimensions | Board only | 338 x 122 mm |

Power Consumption figures given are for a typical configuration.

This information is preliminary and is provided only as a guide to calculating approximate total system power usage when additional resources are added.

# INSTALLATION

## *ELECTRO-STATIC DISCHARGE*

Your Single Board Computer is susceptible to damage by electrostatic discharges. In order to avoid damage, you should work at an anti-static bench and observe normal anti-static precautions. Wear an anti-static wrist strap connected to an earth point *before* opening any packaging.

Where a wrist strap is not available, discharge any static charge you may have built-up by touching an earth point. Avoid any further movement that could build up another static charge. Touch an earth point from time to time to avoid further build-up, and remove the items from their anti-static bags only when required.

## *CPU INSTALLATION*

The WILDCAT board supports a single PGA (pin grid array) Celeron or Pentium III Coppermine processor. The processor connects to the board using a 370 pin levered ZIF socket.

Before installing the processor, raise the lever on the side of ZIF socket 370, perpendicular to the board. Rotate the processor to the correct orientation and then insert it into the socket. When fully seated, lower the lever to secure the processor. Apply heatsink compound to the top of the CPU ensuring an even distribution. Fit the fan assembly to the CPU and secure using fan clips and the retaining lugs on the Socket 370 connector clips. Avoid squeezing against any components mounted on the lower edge of the board.

The WILDCAT supports the following processors: (Future CPUs will also be supported)

| Processor Type | CPU Speed (MHz) | Host Bus Speed (MHz) | Cache Size (Kbyte) |
|---|---|---|---|
| Pentium III | 233 | 66 | 256 |
| | 266 | 66 | 356 |
| | 300 | 66 | 256 |
| | 333 | 66 | 256 |
| | 350 | 100 | 256 |
| | 400 | 100 | 256 |
| | 450 | 100 | 256 |
| | 500 | 100 | 256 |
| | 550 | 100 | 256 |
| | 600 | 100 | 256 |
| | 650 | 100 | 256 |
| | 700 | 100 | 256 |
| | 750 | 100 | 256 |
| | 800 | 100 | 256 |
| | 850 | 100 | 256 |
| Celeron | 266 | 66 | 0 |
| | 300 | 66 | 0 |
| | 300A | 66 | 128 |
| | 333 | 66 | 128 |
| | 366 | 66 | 128 |
| | 400 | 66 | 128 |
| | 433 | 66 | 128 |
| | 466 | 66 | 128 |
| | 500 | 66 | 128 |

| | | | |
|---|---|---|---|
| | 533 | 66 | 128 |

## *MEMORY INSTALLATION*

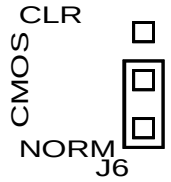
The WILDCAT supports two 168 pin SDRAM DIMMs providing upto 512MB of unbuffered SDRAM. Modules are available in 8,16,32,64, 128 and 256MB to both PC66 and PC100 specification. The WILDCAT supports both PC memory specifications but the PC100 modules must be used when running 100MHz FSB processors. When running a 66MHz FSB CPU PC66 or PC100 modules may be installed. All SDRAMs must be 3.3Volt, 5Volt modules are not supported.

## *JUMPER SETTINGS*

The WILDCAT has a number of jumpers to allow the user to configure the board to suit specific applications. The functions of these jumpers is listed below:

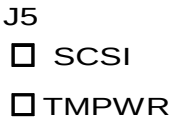
### J6: CMOS Clearing Link

This jumper is used to clear the contents of the battery backed CMOS memory. The CMOS memory retains the system settings such as drive information, boot sequence and certain peripheral device information. To clear the contents, move the jumper from the normal operating position "NORM" to the clear position "CLR". Wait 5 seconds, and then return the jumper to the "NORM" position.




### J5: SCSI Termination Power

This jumper is used to enable the on-board SCSI termination. Installing this jumper will permanently enable the termination and overrides the SCSI BIOS termination setting. The SCSI lines are unterminated if the jumper is removed.

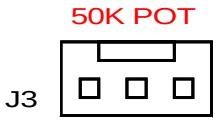



### J4: VEE Select

This jumper is used in conjunction with jumper J3. It is used to select either a positive or a negative LCD Bias voltage. (The legend shown in red, is printed on the reverse side of the board due to space constraints.)

### J3: VEE Adjust

This KK Molex header is used to connect an off-board potentiometer into circuit. The potentiometer should be 50K with the wiper arm of the pot connected to the centre pin of header J3. The potentiometer is used to adjust the VEE bias voltage required by some LCD panels. (The legend shown in red, is printed on the reverse side of the board due to space constraints.)

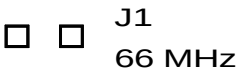



### J2: LCD Voltage Select

This jumper selects the VCC voltage for the LCD panel. It permits the use of 3V and 5 Volt panels. (The legend shown in red, is printed on the reverse side of the board due to space constraints.)


### J1: CPU Frequency Selector

This jumper can be used to force the processor to operate with a front side bus (FSB) of 66MHz regardless of the FSB processor capability. The possible FSB frequencies are 66MHz and 100MHz. The table shown under "*CPU INSTALLATION*" at the beginning of this section shows the FSB frequencies for the various processors. The internal frequency of the processor is automatically determined by the CPU and requires no user links or settings.

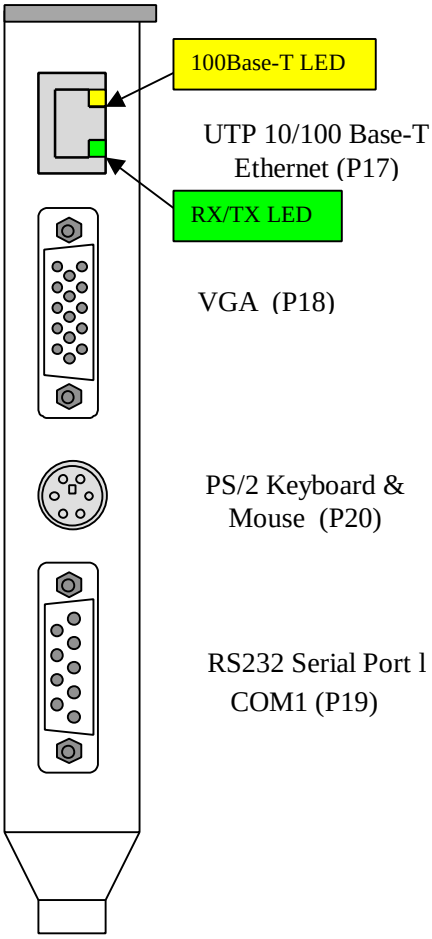


# CONNECTORS

There are three sets of connectors included on the WILDCAT PC board. These provide connections to standard external peripherals available through the back panel connectors (network, serial ports, monitor, keyboard, etc.), in-chassis peripherals (floppy disk, EIDE, etc.), and bus devices i.e. ISA and PCI.

### *BACK PANEL CONNECTORS*

The back panel provides external access to the UTP Ethernet, VGA, PS/2 keyboard/mouse, and the first serial communications port interfaces. All the connectors follow the industry standard. The diagram shows the general location of the connectors.



*100/10 BASE-T UTP ETHERNET,* ***P17***

*8-way RJ45 socket. Mating connector: 8-way RJ45 plug.*

| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| 1 | TX Data +ve | 2 | TX Data –ve |
| 3 | RX Data +ve | 4 | 75R to UTP ground |
| 5 | 75R to UTP ground | 6 | RX Data –ve |
| 7 | 75R to UTP ground | 8 | 75R to UTP ground |

*VIDEO CONNECTOR,* ***P18***

*15-way Condensed D-type. Mating connector: standard monitor D-type connector.*

| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| 1 | Analogue RED | 2 | Analogue GREEN |
| 3 | Analogue BLUE | 4 | 1K pull up |
| 5 | 0 Volts (Ground) | 6 | 0 Volts (Ground) |
| 7 | 0 Volts (Ground) | 8 | 0 Volts (Ground) |
| 9 | DDC +ve supply (SC protected) | 10 | 0 Volts (Ground) |
| 11 | 1K pull up | 12 | DDC Data |
| 13 | Horizontal Sync | 14 | Vertical Sync |
| 15 | DDC Clock | | |

*COMBINED PS/2 MOUSE AND KEYBOARD PORT,* ***P20***

*6-way mini-DIN socket. Mating connector: 6-way mini-DIN keyboard plug.*

| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| 1 | Keyboard Data | 2 | Mouse Data |
| 3 | Ground | 4 | +5 Volts (SC protected) |
| 5 | Keyboard Clock | 6 | Mouse Clock |

*RS232 SERIAL PORT 1,* ***P19***

*9-way D-type plug. Mating connector: 9-way D-type socket.*

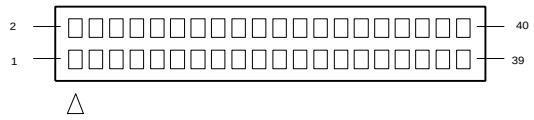
| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| 1 | Data Carrier Detect | 6 | -Data Set Ready |
| 2 | -Receive Data | 7 | -Ready To Send |
| 3 | -Transmit Data | 8 | -Clear To Send |
| 4 | -Data Terminal Ready | 9 | Ringing Indicator |
| 5 | Ground | | |

## *ON-BOARD CONNECTORS*

There are connectors on-board for LCD, dual EIDE, SCSI II, Floppy Disk Drive, a second serial port (RS232), a parallel port, USB, internal mouse header, utilities header, CMOS/RTC Lithium cell holder, and sensing fan connectors. See the PCB layout diagram at the end of the manual for the position of the connectors.

### *ZOOM VIDEO PORT CONNECTOR, **P3***

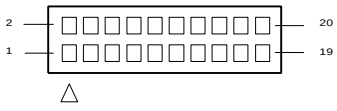
*40-way 2 mm pin header. Mating connector: 40-way 2 mm (IDC) socket.*




| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| 1 | Ground | 2 | VP data 0 |
| 3 | Ground | 4 | VP data 1 |
| 5 | Ground | 6 | VP data 2 |
| 7 | Ground | 8 | VP data 3 |
| 9 | Ground | 10 | VP data 4 |
| 11 | Ground | 12 | VP data 5 |
| 13 | Ground | 14 | VP data 6 |
| 15 | Ground | 16 | VP data 7 |
| 17 | Ground | 18 | VP data 8 |
| 19 | Ground | 20 | VP data 9 |
| 21 | Ground | 22 | VP data 10 |
| 23 | Ground | 24 | VP data 11 |
| 25 | Ground | 26 | VP data 12 |
| 27 | Ground | 28 | VP data 13 |
| 29 | Ground | 30 | VP data 14 |
| 31 | Ground | 32 | VP data 15 |
| 33 | Ground | 34 | Horizontal Reference |
| 35 | Ground | 36 | Vertical Reference |
| 37 | Ground | 38 | VCLK |
| 39 | Ground | 40 | Ground |

### *LCD CONNECTOR (36 BIT PANEL), **P4***

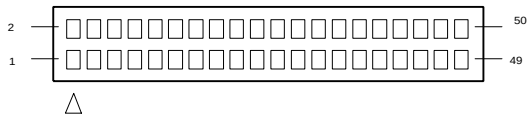
*36-way 2 mm pin header. Mating connector: 36-way 2 mm (IDC) socket.*




| PIN NO | SIGNAL | PIN NO | SIGNAL |
|---|---|---|---|
| 1 | Ground | 2 | Panel Data 35 |
| 3 | Panel Data 24 | 4 | Ground |
| 5 | Panel Data25 | 6 | Panel Data 34 |
| 7 | Ground | 8 | Panel Data 33 |
| 9 | Panel Data 26 | 10 | Ground |
| 11 | Panel Data 27 | 12 | Panel Data 32 |
| 13 | Ground | 14 | Panel Data 31 |
| 15 | Panel Data 28 | 16 | Ground |
| 17 | Panel Data 29 | 18 | Panel Data 30 |
| 19 | Ground | 20 | Ground |

*LCD CONNECTOR (24 BIT PANEL),* ***P5***

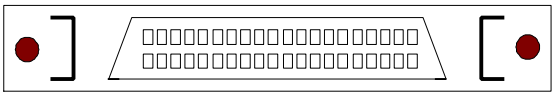
*50-way 2 mm pin header. Mating connector: 50-way 2 mm (IDC) socket.*




| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| 1 | Display supply | 2 | Vertical Sync |
| 3 | SW12 volts | 4 | Ground |
| 5 | Switched VEE (OCP) | 6 | Horizontal Sync |
| 7 | Switched VCC (3 or 5V) (OC protected) | 8 | Ground |
| 9 | Switched VCC (3 or 5V) (OC protected) | 10 | Enable Back light |
| 11 | Shift Clock | 12 | Ground |
| 13 | Latched Pulse (LP) | 14 | ACTI |
| 15 | Mod | 16 | Ground |
| 17 | First line marker (FLM) | 18 | Ground |
| 19 | Panel Data 0 | 20 | Ground |
| 21 | Panel Data 1 | 22 | Panel Data 23 |
| 23 | Panel Data 2 | 24 | Ground |
| 25 | Panel Data 3 | 26 | Panel Data 22 |
| 27 | Panel Data 4 | 28 | Ground |
| 29 | Panel Data 5 | 30 | Panel Data 21 |
| 31 | Panel Data 6 | 32 | Ground |
| 33 | Panel Data 7 | 34 | Panel Data 20 |
| 35 | Panel Data 8 | 36 | Ground |
| 37 | Panel Data 9 | 38 | Panel Data 19 |
| 39 | Panel Data 10 | 40 | Ground |
| 41 | Panel Data 11 | 42 | Panel Data 18 |
| 43 | Panel Data 12 | 44 | Ground |
| 45 | Panel Data 13 | 46 | Panel Data 17 |
| 47 | Panel Data 14 | 48 | Ground |
| 49 | Panel Data 15 | 50 | Panel Data 16 |

*WIDE SCSI 2 CONNECTOR,* ***P6***

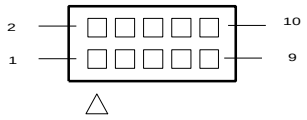
*68 way high density LVDS & SE SCSI-II connector.*



| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| 1 | +Data bit 12 | 35 | -Data bit 12 |
| 2 | +Data bit 13 | 36 | -Data bit 13 |
| 3 | +Data bit 14 | 37 | -Data bit 14 |
| 4 | +Data bit 15 | 38 | -Data bit 15 |
| 5 | +Data Parity P1 | 39 | -Data Parity P1 |
| 6 | +Data bit 0 | 40 | -Data bit 0 |
| 7 | +Data bit 1 | 41 | -Data bit 1 |
| 8 | +Data bit 2 | 42 | -Data bit 2 |
| 9 | +Data bit 3 | 43 | -Data bit 3 |
| 10 | +Data bit 4 | 44 | -Data bit 4 |
| 11 | +Data bit 5 | 45 | -Data bit 5 |
| 12 | +Data bit 6 | 46 | -Data bit 6 |
| 13 | +Data bit 7 | 47 | -Data bit 7 |
| 14 | +Data Parity P0 | 48 | -Data Parity P0 |
| 15 | Ground | 49 | Ground |
| 16 | Differential Sense | 50 | Ground |
| 17 | Termination Power | 51 | Termination Power (OCP) |
| 18 | Termination Power | 52 | Termination Power (OCP) |
| 19 | Not Used | 53 | Not Used |
| 20 | Ground | 54 | Ground |
| 21 | +ATTENTION | 55 | -ATTENTION |
| 22 | Ground | 56 | Ground |
| 23 | +BUSY | 57 | -BUSY |
| 24 | +ACKNOWLEDGE | 58 | -ACKNOWLEDGE |
| 25 | +RESET | 59 | -RESET |
| 26 | +MESSAGE | 60 | -MESSAGE |
| 27 | +SELECT | 61 | -SELECT |
| 28 | +COMMAND/DATA | 62 | -COMMAND/DATA |
| 29 | +REQUEST | 63 | -REQUEST |
| 30 | +IN/OUT | 64 | -IN/OUT |
| 31 | +Data bit 8 | 65 | -Data bit 8 |
| 32 | +Data bit 9 | 66 | -Data bit 9 |
| 33 | +Data bit 10 | 67 | -Data bit 10 |
| 34 | +Data bit 11 | 68 | -Data bit 11 |

*USB CONNECTOR,* ***P7***

*10-way boxed pin header. Mating connector: 10-way 0.1" (IDC) socket.*

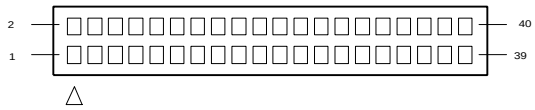



| PIN NO | SIGNAL | PIN NO | SIGNAL |
|---|---|---|---|
| 1 | +5V (OC protected) | 2 | Chassis |
| 3 | Port 0 -ve | 4 | Ground |
| 5 | Port 0 +ve | 6 | Port 1 +ve |
| 7 | Ground | 8 | Port 1 -ve |
| 9 | Chassis | 10 | +5v (OC protected) |

*PRIMARY EIDE CONNECTOR,* ***P8***

*40-way boxed pin header. Mating connector: 40-way 0.1" IDC socket.*

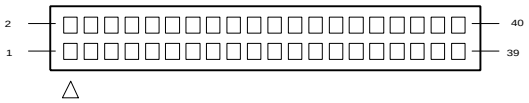
*A suitable cable is supplied in the optional standard cable kit.*




| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| 1 | -Reset | 2 | Ground |
| 3 | Data bit 7 (HD) | 4 | Data bit 8 (HD) |
| 5 | Data bit 6 (HD) | 6 | Data bit 9 (HD) |
| 7 | Data bit 5 (HD) | 8 | Data bit 10 (HD) |
| 9 | Data bit 4 (HD) | 10 | Data bit 11 (HD) |
| 11 | Data bit 3 (HD) | 12 | Data bit 12 (HD) |
| 13 | Data bit 2 (HD) | 14 | Data bit 13 (HD) |
| 15 | Data bit 1 (HD) | 16 | Data bit 14 (HD) |
| 17 | Data bit 0 (HD) | 18 | Data bit 15 (HD) |
| 19 | Ground | 20 | Key |
| 21 | Drive Request | 22 | Ground |
| 23 | -IO Write (HD) | 24 | Ground |
| 25 | -IO Read (HD) | 26 | Ground |
| 27 | Drive Ready | 28 | Cable select, 470R to gnd |
| 29 | Drive Acknowledge | 30 | Ground |
| 31 | IRQ14 | 32 | Not Used |
| 33 | Address 1 (HD) | 34 | Not Used |
| 35 | Address 0 (HD) | 36 | Address 2 (HD) |
| 37 | -Chip Select 0 (HD) | 38 | -Chip Select 1 (HD) |
| 39 | IDE LED Drive | 40 | Ground |

*SECONDARY IDE CONNECTOR,* ***P9***

*40-way boxed pin header. Mating connector: 40-way 0.1" IDC socket.*

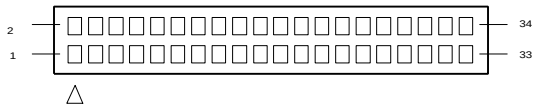



| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| 1 | -Reset | 2 | Ground |
| 3 | Data bit 7 (HD) | 4 | Data bit 8 (HD) |
| 5 | Data bit 6 (HD) | 6 | Data bit 9 (HD) |
| 7 | Data bit 5 (HD) | 8 | Data bit 10 (HD) |
| 9 | Data bit 4 (HD) | 10 | Data bit 11 (HD) |
| 11 | Data bit 3 (HD) | 12 | Data bit 12 (HD) |
| 13 | Data bit 2 (HD) | 14 | Data bit 13 (HD) |
| 15 | Data bit 1 (HD) | 16 | Data bit 14 (HD) |
| 17 | Data bit 0 (HD) | 18 | Data bit 15 (HD) |
| 19 | Ground | 20 | Key |
| 21 | Drive Request | 22 | Ground |
| 23 | -IO Write (HD) | 24 | Ground |
| 25 | -IO Read (HD) | 26 | Ground |
| 27 | Drive Ready | 28 | Cable select, 470R to gnd |
| 29 | Drive Acknowledge | 30 | Ground |
| 31 | IRQ15 | 32 | Not Used |
| 33 | Address 1 (HD) | 34 | Not used |
| 35 | Address 0 (HD) | 36 | Address 2 (HD) |
| 37 | -Chip Select 0 (HD) | 38 | -Chip Select 1 (HD) |
| 39 | IDE LED Drive | 40 | Ground |

*FLOPPY DISK DRIVE CONNECTOR,* ***P10***

*34-way boxed pin header. Mating connector: 34-way 0.1" (IDC) socket.*

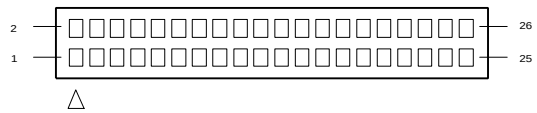
*A suitable cable is supplied in the optional standard cable kit.*




| PIN NO | SIGNAL | PIN NO | SIGNAL |
|---|---|---|---|
| 1 | Ground | 2 | RPM/Low Current |
| 3 | Ground | 4 | Key |
| 5 | Ground | 6 | +Rate |
| 7 | Ground | 8 | -Index |
| 9 | Ground | 10 | -Motor 0 |
| 11 | Ground | 12 | -Drive select 1 |
| 13 | Ground | 14 | -Drive select 0 |
| 15 | Ground | 16 | -Motor 1 |
| 17 | Ground | 18 | +Direction |
| 19 | Ground | 20 | -Step |
| 21 | Ground | 22 | -Write Data |
| 23 | Ground | 24 | -Write Gate |
| 25 | Ground | 26 | -Track 0 |
| 27 | Ground | 28 | -Write Protect |
| 29 | Ground | 30 | -Read Data |
| 31 | Ground | 32 | +Head Select |
| 33 | Ground | 34 | +Disk Change |

*ECP/EPP PARALLEL PORT,* ***P11***

*26-way boxed pin header. Mating connector: 26-way 0.1" (IDC) socket.*




| PIN NO | SIGNAL | PIN NO | SIGNAL |
|---|---|---|---|
| 1 | -Strobe | 2 | -Auto Feed |
| 3 | Data bit 0 | 4 | -Error |
| 5 | Data bit 1 | 6 | -Initialise |
| 7 | Data bit 2 | 8 | -Select (input) |
| 9 | Data bit 3 | 10 | Ground |
| 11 | Data bit 4 | 12 | Ground |
| 13 | Data bit 5 | 14 | Ground |
| 15 | Data bit 6 | 16 | Ground |
| 17 | Data bit 7 | 18 | Ground |
| 19 | -Acknowledge | 20 | Ground |
| 21 | Busy | 22 | Ground |
| 23 | Paper Empty | 24 | Ground |
| 25 | Select (Output) | 26 | Key |

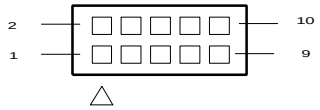
*INFRA-RED PORT,* ***P12***

*5-way 0.1"pin header. Mating connector: Harwin M20-106 series (housing M20-1060500, crimp M20-1180006, polarising pin M20-003)*

| PIN NO | SIGNAL |
|---|---|
| 1 | +5V (SC protected)) |
| 2 | key |
| 3 | IR Transmit |
| 4 | Ground |
| 5 | IR Receive |

*RS232 SERIAL PORT 2,* ***P13***

*10-way boxed pin header. Mating connector: 10-way 0.1" (IDC) socket.*

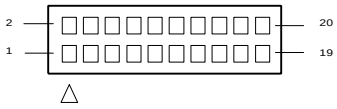



| PIN NO | SIGNAL | PIN NO | SIGNAL |
|---|---|---|---|
| 1 | -Data Carrier Detect | 2 | -Data Set Ready |
| 3 | -Receive Data | 4 | -Ready To Send |
| 5 | -Transmit Data | 6 | -Clear To Send |
| 7 | -Data Term Ready | 8 | -Ringing Indicator |
| 9 | Ground | 10 | key |

*UTILITY CONNECTOR* ***P14***

*20-way boxed pin header. Mating connector: 20-way 0.1" (IDC) socket.*

*A suitable cable is supplied in the optional standard cable kit, complete with speaker, reset switch and 6-way mini-DIN keyboard socket.*




| PIN NO | SIGNAL | PIN NO | SIGNAL |
|---|---|---|---|
| 1 | Speaker +ve | 2 | Speaker -ve |
| 3 | Reset +ve | 4 | Reset -ve (Ground) |
| 5 | SCSI LED +ve | 6 | SCSI LED -ve |
| 7 | Keylock +ve | 8 | Keylock -ve (Ground) |
| 9 | Power LED +ve | 10 | Power LED -ve (Ground) |
| 11 | Mouse Data | 12 | Mouse Clock |
| 13 | IDE LED +ve | 14 | IDE LED -ve |
| 15 | +5V (OC protected) | 16 | 0 Volts (Ground) |
| 17 | +3Volt Battery | 18 | 0 Volts Battery (Ground) |
| 19 | Keyboard Data | 20 | Keyboard Clock |

This connector provides support for functions that would normally be located within the enclosure, and also duplicate connections for some of the external interfaces. Details of the pin connections for the Utilities header are as follows:-

### SPEAKER (P14, pins 1 & 2)

An on-board Piezo speaker is provided on the WILDCAT. An off-board speaker may be connected to the connector. The speaker provides error beep code information during the Power-On Self Test, should the system be unable to use the video interface.

### RESET (P14, pins 3 & 4)

A reset input is supplied on the connector. The two pins may be connected to a momentary-action normally-open SPST switch. When the switch is closed and then opened the system will perform a hard reset and run the POST.

### SCSI LED (P14, pins 5 & 6)

These two pins are used to connect to an LED to provide an indication that a SCSI hard drive connected to the on-board SCSI controller is active. A current limiting resistor is fitted on the board and the user need only connect the LED with the Anode to pin 5 and Cathode to pin 6.

### KEYLOCK (P14, pins 7 & 8)

These pins can be connected to a key switch to inhibit the use of the keyboard. The keyboard is inhibited when the key lock switch contacts are closed.

### POWER LED (P14, pins 9 & 10)

An LED may be wired across these pins to provide a front panel indication that the Computer is powered on. A current limiting resistor is fitted on the board and the user need only connect the LED with the Anode to pin 9 and Cathode to pin 10.

### INTERNAL MOUSE (P14, pins 11, 12, 15, 16)

The mouse interface is also available on connector P18 combined with the keyboard port, for applications requiring front panel PS2 mouse or a mouse-compatible device. A 2 Amp resettable fuse protects the +5V supply.

### IDE LED (P14, pins 13 & 14)

These two pins connect to an LED to indicate that an IDE hard drive connected to the on-board IDE controller is active. This LED is shared by all the Primary and Secondary slave and master IDE devices. A current limiting resistor is fitted on the board and the user need only connect the LED with the Anode to pin 13 and Cathode to pin 14.

### INTERNAL KEYBOARD (P14, pins 15,16,19,20)

The keyboard interface is also available on connector P18 combined with the mouse port, for applications requiring front panel keyboard or a keyboard-compatible keypad. A 2 Amp resettable fuse protects the +5V supply.

### EXTERNAL BATTERY (P14, pins 17 & 18)

These connections allow the user to connect an external 3 to 3.7V lithium cell to supplement or replace the on-board CR2032 button Lithium cell (BT1). Exercise caution if using this facility (read the PRECAUTIONS section found earlier in this manual)

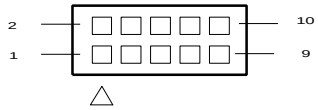
*MOUSE PORT,* ***P15***

*5-way 0.1"pin header. Mating connector: Harwin M20-106 series (housing M20-1060500, crimp M20-1180006, polarising pin M20-003)*

| PIN NO | SIGNAL |
|---|---|
| 1 | Data |
| 2 | Key |
| 3 | Ground |
| 4 | Clock |
| 5 | +5V ( SC protected) |

*INTERNAL SVGA CONNECTOR,* ***P16***

*10-way 0.1" pin header. Mating connector: 10-way 0.1" (IDC) socket.*




| PIN NO | SIGNAL | PIN NO | SIGNAL |
|---|---|---|---|
| 1 | Red | 2 | Ground |
| 3 | Green | 4 | Ground |
| 5 | Blue | 6 | key |
| 7 | Horizontal sync | 8 | Ground |
| 9 | Vertical sync | 10 | Ground |

## *BUS CONNECTORS*

The board incorporates the standard PC/AT 16-bit ISA bus, and PCI bus connectors to passive backplanes. See the appendices for the pin-out details. Note that the PCI connector details the signals at the WILDCAT processor connector. These are different for each PCI slot on a backplane.

### *ISA BUS XT CONNECTIONS*

A= Large gold fingers on **main** component side
B= Large gold fingers on reverse side

| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| A1 | -IOCHCK | B1 | Ground |
| A2 | SD7 | B2 | RESET |
| A3 | SD6 | B3 | +5 Volts |
| A4 | SD5 | B4 | IRQ9 |
| A5 | SD4 | B5 | -5 Volts |
| A6 | SD3 | B6 | DREQ2 |
| A7 | SD2 | B7 | -12 Volts |
| A8 | SD1 | B8 | -0WS |
| A9 | SD0 | B9 | +12 Volts |
| A10 | IOCHRDY | B10 | Ground |
| A11 | AEN | B11 | -SMEMW |
| A12 | SA19 | B12 | -SMEMR |
| A13 | SA18 | B13 | -IOW |
| A14 | SA17 | B14 | -IOR |
| A15 | SA16 | B15 | -DACK3 |
| A16 | SA15 | B16 | DREQ3 |
| A17 | SA14 | B17 | -DACK1 |
| A18 | SA13 | B18 | DREQ1 |
| A19 | SA12 | B19 | -REFRESH |
| A20 | SA11 | B20 | SYSCLK ( typ 8.3MHz) |
| A21 | SA10 | B21 | IRQ7 |
| A22 | SA9 | B22 | IRQ6 |
| A23 | SA8 | B23 | IRQ5 |
| A24 | SA7 | B24 | IRQ4 |
| A25 | SA6 | B25 | IRQ3 |
| A26 | SA5 | B26 | -DACK2 |
| A27 | SA4 | B27 | T/C |
| A28 | SA3 | B28 | BALE |
| A29 | SA2 | B29 | +5 Volts |
| A30 | SA1 | B30 | OSC (14MHz) |
| A31 | SA0 | B31 | Ground |

*ISA BUS AT CONNECTIONS*

C= Large gold fingers on **main** component side
D= Large gold fingers on reverse side

| PIN NO. | SIGNAL | PIN NO. | SIGNAL |
|---|---|---|---|
| C1 | -SBHE | D1 | -MEMCS16 |
| C2 | LA23 | D2 | -IOCS16 |
| C3 | LA22 | D3 | IRQ10 |
| C4 | LA21 | D4 | IRQ11 |
| C5 | LA20 | D5 | IRQ12 |
| C6 | LA19 | D6 | IRQ15 |
| C7 | LA18 | D7 | IRQ14 |
| C8 | LA17 | D8 | -DACK0 |
| C9 | -MEMR | D9 | DREQ0 |
| C10 | -MEMW | D10 | -DACK5 |
| C11 | SD8 | D11 | DREQ5 |
| C12 | SD9 | D12 | -DACK6 |
| C13 | SD10 | D13 | DREQ6 |
| C14 | SD11 | D14 | -DACK7 |
| C15 | SD12 | D15 | DREQ7 |
| C16 | SD13 | D16 | +5 Volts |
| C17 | SD14 | D17 | -Master |
| C18 | SD15 | D18 | Ground |

*PCI CONNECTORS*

| PIN | SIGNAL NAME | PIN | SIGNAL NAME |
|---|---|---|---|
| A1 | GND | B1 | -12V |
| A2 | +12V | B2 | No Connect |
| A3 | No Connect | B3 | GND |
| A4 | No Connect | B4 | No Connect |
| A5 | Vcc | B5 | Vcc |
| A6 | INTC# | B6 | Vcc |
| A7 | INTA# | B7 | INTB# |
| A8 | Vcc | B8 | INTD#- |
| A9 | CLK3 | B9 | REQ4# |
| A10 | Vcc | B10 | REQ2# |
| A11 | CLK4 | B11 | GNT4# |
| A12 | GND | B12 | GND |
| A13 | GND | B13 | GND |
| A14 | GNT2# | B14 | CLK1 |
| A15 | SPCIRST- | B15 | GND |
| A16 | Vcc | B16 | CLK2 |
| A17 | GNT1# | B17 | GND |
| A18 | GND | B18 | REQ1# |
| A19 | REQ3# | B19 | Vcc |
| A20 | AD30 | B20 | AD31 |
| A21 | 3.3V | B21 | AD29 |
| A22 | AD28 | B22 | GND |
| A23 | AD26 | B23 | AD27 |
| A24 | GND | B24 | AD25 |
| A25 | AD24 | B25 | 3.3V (NC) |
| A26 | GNT3# | B26 | CBE3- |
| A27 | 3.3V (NC) | B27 | AD23 |
| A28 | AD22 | B28 | GND |
| A29 | AD20 | B29 | AD21 |
| A30 | GND | B30 | AD19 |
| A31 | AD18 | B31 | 3.3V (NC) |
| A32 | AD16 | B32 | AD17 |
| A33 | 3.3V (NC) | B33 | CBE2- |
| A34 | FRAME- | B34 | GND |
| A35 | GND | B35 | IRDY- |
| A36 | TRDY- | B36 | 3.3V |
| A37 | GND | B37 | DEVSEL- |
| A38 | STOP- | B38 | GND |
| A39 | 3.3V | B39 | PLOCK- |
| A40 | SDONE | B40 | PERR- |
| A41 | SBO- | B41 | 3.3V |
| A42 | GND | B42 | SERR- |
| A43 | PAR | B43 | 3.3V |
| A44 | AD15 | B44 | CBE1- |
| A45 | 3.3V | B45 | AD14 |
| A46 | AD13 | B46 | GND |
| A47 | AD11 | B47 | AD12 |
| A48 | GND | B48 | AD10 |
| A49 | AD9 | B49 | GND |
| | KEY | | |
| A50 | CBEO- | B50 | AD8 |
| A51 | 3.3V | B51 | AD7 |
| A52 | AD6 | B52 | 3.3V |
| A53 | AD4 | B53 | AD5 |
| A54 | GND | B54 | AD3 |
| A55 | AD2 | B55 | GND |
| A56 | AD0 | B56 | AD1 |
| A57 | Vcc | B57 | Vcc |
| A58 | SREQ64- | B58 | SACK64- |
| A59 | Vcc | B59 | Vcc |
| A60 | Vcc | B60 | Vcc |

NOTE: The PCI connector details shown here are for the WILDCAT processor card. The PCI connectors of a backplane differ slightly, some pins having a position dependent signal.

## *STATUS LEDS*

On the underside of the WILDCAT PCB are clusters of LEDs. These are arranged in groups to indicate the status of various board functions:

### *P.O.S.T. DISPLAY*

Red LEDs D26 to D33 inclusive display the Power On Self Test (POST) data byte. Diode D26 (top) represent the MSB and D33 (bottom) the LSB. The LED is illuminated when the POST data bit is 1. See the ***bios-pos.pdf*** file for details of the error codes.

### *POWER SUPPLY INDICATORS*

Green LEDs show the presence of the power supplies. Each LED is illuminated when the appropriate voltage is present.

| | |
|---|---|
| D20 | + 12 Volt supply |
| D19 | - 12 Volt supply |
| D17 | - 5 Volt supply |
| D16 | 1.5 Volt supply VTT |
| D14 | CPU Core voltage (may glow dimly depending on CPU type fitted) |
| D13 | Host CPU IO and chip-set supply (3.3 Volts) |
| D21 | + 5 Volt (Vcc) supply |

### *IDE ACTIVITY DISPLAY*

LED D40 indicates primary and secondary IDE activity (Hard disk or CD-ROM) and is illuminated when active.

### *SYSTEM RESET STATUS*

LED D39 indicates the system reset status. The LED is illuminated when in held in reset.

### *SCSI STATUS*

LED D38 indicates SCSI Bus activity and is illuminated when active.

### *NETWORK STATUS*

The network LEDs are located on the rear panel RJ45 connector. The upper amber LED illuminates when the network is operating at 100Base-T rate. The lower green LED illuminates when the onboard Ethernet controller is receiving or transmitting data on the UTP cable.

# SOFTWARE DESCRIPTION

## BIOS

The WILDCAT single board PC uses a number of BIOS' to perform different functions:

System BIOS

Video BIOS

SCSI BIOS

Ethernet BIOS

The Phoenix System BIOS is used by the Operating System (OS) to access the onboard peripherals such as EIDE hard disks, floppy disks, USB devices, serial and parallel ports. In addition to providing this interface, the BIOS provides a setup utility to allow the end user to configure the card for a specific installation e.g. different drive configurations or boot sequences etc. During the boot up sequence, the BIOS also provides a Power-On Self Test (POST) to ensure system integrity. The status of this POST is displayed on a set of LEDs on the underside of the PCB. The meanings of which are described in the file ***bios-pos.pdf***.

The video BIOS provides an interface between the OS and the video controller, allowing applications to utilise both standard SVGA functions and the 69030 specific functions. The video BIOS resides in a Flash based EEPROM and can be upgraded in situ.

The Adaptec SCSI BIOS allows the user to configure the SCSI bus devices and their mode of operation such as termination, transfer rates and transmission protocols.

The Realtek Ethernet BIOS provides a means of remote booting from a network. Most major networking OS's are supported.

### *SETUP UTILITY*

The ROM-based Setup utility allows the configuration to be modified without opening the system for most basic changes. The Setup utility is accessible only during the Power-On Self Test (POST) by pressing the <F2> key after the POST memory test has started and before boot begins.

## BIOS SETUP

An outline describing the general features of the BIOS Setup facility may be found in the *Phoenix Setup Guide* -see file ***bios-set.pdf*** (*Adobe Acrobat* is required).

This section details the differences and describes the additional features of the *WILDCAT* Bios Setup.

### *MAIN MENU*

#### *SYSTEM DATE*

The System Date format is dd/mm/yyyy.

#### *MEMORY CACHE*

The Memory Cache menu has been moved to the Advanced Menu.

#### *SYSTEM SHADOW / VIDEO SHADOW*

System Shadow and Video Shadow are no longer optional. The System and Video BIOS are automatically shadowed when the BIOS is decompressed during POST.

#### *KEYBOARD FEATURES*

The keyboard features menu has been added to the Main Menu.

*DISPLAY BOOT-TIME DIAG INFO*

This provides the option to reveal or hide the screen output generated by the BIOS.

## *ADVANCED HARD DISK FEATURES*

*ULTRA DMA MODE*

Ultra DMA Mode is an additional feature added to the hard disk setup options. By setting drive type as ***USER***, the user may choose Disabled or UDMA Modes between 0 and 6. Selecting drive type as ***AUTO*** will let the BIOS interrogate the disk drive to determine the mode. If UDMA is supported, the mode returned by the drive will be chosen and displayed.

## *ADVANCED MENU*

The following sub-menus have been added to this page: -

*PCI CONFIGURATION*

Provides further menus to configure the embedded SCSI and Ethernet PCI devices.

*I/O DEVICE CONFIGURATION*

Provides setup options for the onboard Serial Ports, Parallel Port and Floppy Disk Controller

*ADVANCED CHIPSET CONTROL*

Provides setup options for miscellaneous features of the motherboard

*LEGACY USB SUPPORT*

Allows support for Legacy USB to be enabled or disabled.

## *POWER MENU*

This menu provides the BIOS Power Management options. See the 'Item Specific Help' column on the Setup display for information on the use of each option.

Note: these options may be overruled by the power management settings of the Operating System.

# BIOS EXTENSIONS SOFTWARE INTERFACE

The BIOS extensions provide the programmer with access to some of the additional functionality provided through the hardware. This is achieved through the use of a software interrupt (int 50h). A description of the functions available is described below.

### *ACCESSING INT 50H FUNCTIONS*

Most high level languages allow access to software interrupts through a particular function call. The user loads a particular function code into the AH register followed by a specific set of parameters in the other registers before executing the interrupt.

For example, in Quick Basic

```
' Read E2 Data via interrupt 50 call
$include:'QB.BI'

DIM INARY%(7),OUTARY%(7)
CONST AX=0,BX=1,CX=2,DX=3,BP=4,SI=5,DI=6,FL=7

INARY%(AX) = &H0400                    ' Read e2 data
INARY%(BX) = &H31                      ' address &H31
CALL INT86OLD(&H50,INARY%(),OUTARY%()) ' Call the APEX service
PRINT "E2 ADDRESS &H31 CONTAINS: ";OUTARY%(DX)
```

and similarly in C :-

```
#include <stdio.h>
#include <dos.h>

#define APEX 0x50

void main(void)
{
   union REGS regs;
   regs.x.ax = 0x0400;                 /* read e2 */
   regs.x.bx = 0x31;                   /* address 0x31 */
   int86(APEX, &regs, &regs);
   printf("e2 Address 0x31 contains %x\n",regs.x.dx);
}
```

### *INT 50H FUNCTION DEFINITIONS*

This covers the BIOS extensions supported by the Wildcat board.

All other functions are reserved. If any are called, INT 50h will return with register AH = 01 and the carry flag set.

#### *AH = 03H, WRITE TO E²PROM (SINGLE LOCATION)*

The Wildcat board supports an E²PROM that may be accessed via INT 50h calls.

The E²PROM does not require to be completely erased before writing to a single location. It is therefore useful for the storage of configuration information.

There are 64, 16-bit words of E²PROM available.

Input parameters:

AH = 03h
BL = Location to write to (0-63)
DX = Data to Write (16 bit value)

Return values:

Carry flag clear if successful.
Carry flag Set if unsuccessful.

### *AH = 04H, READ E²PROM (SINGLE LOCATION)*

Input parameters:

AH = 04h
BL = Location to read (0-63)

Return values:

DX = E²PROM Data

### *AH = 05H, WATCHDOG ENABLE/DISABLE*

This function enables the simple 500ms watchdog.

Input parameters:

AH = 05h
AL = 01h - Enable
AL = 00h - Disable

Return values:

Returns with the carry flag clear.

### *AH = 06H, WATCHDOG TICK*

When enabled, the watchdog will generate a hardware reset unless a WATCHDOG TICK function call is made at least once every 500 milliseconds.

This function will reset the watchdog count.

Input parameters:

AH =06h

Return values:

Returns with the carry flag clear

# DISK-ON-CHIP SUPPORT

The WILDCAT supports the use of M-Systems' DiskOnChip 2000 or DiskOnChip Millennium Flash Modules as solid-state disks. The notes below detail the use of the device with MS-DOS. If support is required for other operating systems, please consult Blue Chip Technology Technical Services, or M-Systems web-site at www.m-sys.com, for drivers and application notes.

The DiskOnChip 2000 and Millennium contain a built-in copy of the M-Systems industry-standard TrueFFS software, which allows the DiskOnChip to operate as a standard disk drive. The DiskOnChip may also contain the operating system thereby permitting systems to boot without a hard disk. The DiskOnChip may also be configured as the boot device in systems with a hard disk (see the section "Configuring the DiskOnChip as the First Drive").

The DiskOnChip is a self-contained device, the installation of which does not necessarily require any software installation. The basic design of the DiskOnChip allows for full upward and downward compatibility by supporting an unlimited capacity. Future DiskOnChip devices with higher densities will be fully compatible with today's capacities of 2 to 288 MBytes, and the standard DiskOnChip socket.

## *INSTALLING THE DISK-ON-CHIP*

Before installing or removing the DiskOnChip, please read the section on Electro-Static Discharges at the beginning of this manual. It is essential that you discharge any static electricity from your body before touching the board or DiskOnChip module. Use the following procedure to install the DiskOnChip:

- Align pin 1 on the DiskOnChip with pin 1 of the socket (adjacent to the battery).
- Push the DiskOnChip into the socket carefully until it is fully seated.
- Check that the DiskOnChip is installed securely, and that there are no bent pins.

**Caution: The DiskOnChip may be permanently damaged if installed incorrectly!**

To install the DiskOnChip as drive C on a system without a hard disk, set the CMOS setup of drive C to "not installed" (indicating that no physical magnetic disk is installed), and reboot the computer. The DiskOnChip will install as drive C. The DiskOnChip should then be formatted with the System files in order for it to be a bootable drive. See "*Configuring the DiskOnChip as the BOOT device*" below.

To install the DiskOnChip as drive D on a system with a hard disk, reboot the system, and the DiskOnChip will automatically install as drive D.

To install the DiskOnChip as Drive C on a system with a hard disk, see below "*Configuring the DiskOnChip as the First Drive*".

## *CONFIGURING THE DISK-ON-CHIP AS THE BOOT DEVICE*

To configure the DiskOnChip as the boot device, the operating system files have to be copied to it. Copying the operating system files into DiskOnChip is done in exactly the same way as any other hard disk. The following is an example of a typical initialisation process:

- Set the DiskOnChip as a regular drive in your system (not a boot drive).
- Install a bootable floppy diskette in drive A and boot the system.
- At the DOS prompt, type SYS `C:` to transfer the DOS system files to the DiskOnChip (assuming the DiskOnChip is installed as drive C).
- Copy any files needed into the DiskOnChip.
- Remove the floppy diskette and reboot the system.

The system will boot from the DiskOnChip, and will allow you to run and access any files that have been copied into the DiskOnChip.

### *CONFIGURING THE DISK-ON-CHIP AS THE FIRST DRIVE*

The DiskOnChip can be configured to be installed as the last drive (default), or as the first drive in the system. When configured as the last drive, the DiskOnChip is installed as disk D if there is one other hard drive installed, and as drive C if no other hard disk is installed. When configured as the first drive, the DiskOnChip is always installed as drive C. The DiskOnChip is shipped from the factory, configured to install as the last drive. To configure the DiskOnChip to be installed as the first drive, proceed as follows:

- Boot the system and make sure the DiskOnChip is installed correctly as drive D
- At the DOS prompt type: `DUPDATE D: /FIRST /S:DOC123.EXB`

After re-booting the system, the DiskOnChip will appear as drive C:

# APPENDICES

## ADDRESS MAPS

### *MEMORY MAP*

| ADDRESS RANGE (DECIMAL) | ADDRESS RANGE (HEX) | SIZE | DESCRIPTION |
|---|---|---|---|
| 1024K - 131072K | 100000 - 8000000 | 127M | Extended Memory |
| 896K - 1023K | E0000 - FFFFF | 128K | Phoenix System BIOS (not available for UMB) |
| 880K - 895K | DC000 - DFFFF | 16K | Solid State Disk Pages |
| 848K - 879K | D4000 - DBFFF | 32K | BIOS Extensions |
| 800K - 847K | C8000 - D3FFF | 48K | Available HI DOS memory (open to ISA and PCI bus) |
| 640K - 799K | A0000 - C7FFF | 160K | On-board video memory and BIOS |
| 639K | 9FC00 - 9FFFF | 1K | Extended BIOS Data (moveable by QEMM, 386MAX) |
| 512K - 638K | 80000 - 9FBFF | 127K | Extended conventional |
| 0K - 511K | 00000 - 7FFFF | 512K | Conventional |

### *I/O MAP*

The following table lists the I/O addresses used by single board PC devices. Some of these devices (e.g. graphics) may not be present in all configurations. Some devices (serial ports, parallel ports etc.) may be configured for various addresses or disabled. These I/O locations are listed in the Variable Resources column.

| ADDRESS (HEX) | SIZE Bytes | FIXED RESOURCES | VARIABLE RESOURCES |
|---|---|---|---|
| 0000 - 000F | 16 | PIIX - DMA 1 | |
| 0020 - 0021 | 2 | PIIX – Interrupt Controller 1 | |
| 002E - 002F | 2 | Ultra I/O configuration registers | |
| 0040 - 0043 | 4 | PIIX - Timer 1 | |
| 0060 | 1 | Keyboard Controller Data Byte | |
| 0061 | 1 | PIIX - NMI, speaker control | |
| 0064 | 1 | Kbd Controller, CMD/STAT Byte | |
| 0070, bit 7 | 1 bit | PIIX - Enable NMI | |
| 0070, bits 6:0 | 7 bits | 87C307PIIX RTC, Address | |
| 0071 | 1 | 87C307PIIX RTC, Data | |
| 0080 - 008F | 16 | PIIX - DMA Page Register | |
| 00A0 - 00A1 | 2 | PIIX – Interrupt Controller 2 | |
| 00B2 - 00B3 | 2 | PIIX - APM Control / Status | |
| | | Interrupt Controller 2 | |
| 00C0 - 00DE | 31 | PIIX - DMA 2 | |
| 00F0 | 1 | Reset Numeric Error | |
| 0100 - 0107 | 8 | Reserved for Board Confign. | |
| 0170 - 0177 | 8 | | Secondary IDE Channel |
| 01F0 - 01F7 | 8 | | Primary IDE Channel |
| 0200 - 0207 | 8 | | Gameport Joystick |
| 0278 - 027B | 4 | | Parallel Port 2 |
| 02E8 - 02EF | 8 | | Serial Port 4 |
| 02F8 - 02FF | 8 | | Serial Port 2 |

Continued:-

| ADDRESS (HEX) | SIZE Bytes | FIXED RESOURCES | VARIABLE RESOURCES |
|---|---|---|---|
| 0376 | 1 | | Sec IDE Chan Cmd Port |
| 0377 | 1 | | Sec IDE Chan Stat Port |
| 0378 - 037F | 8 | | Parallel Port 1 |
| 03B0 - 03BB | 4 | | 69030 |
| 03BC - 03BF | 4 | | Parallel Port 3 |
| 03C0 - 03DF | 16 | | 69030 |
| 03E8 - 03EF | 8 | | Serial Port 3 |
| 03F0 - 03F5 | 6 | | Floppy Channel 1 |
| 03F6 | 1 | | Pri IDE Chan Cmnd Port |
| 03F7 (Write) | 1 | | Floppy Chan 1 Cmd |
| 03F7, bit 7 | 1 bit | | Floppy Disk Chg Chan 1 |
| 03F7, bits 6:0 | 7 bits | | Pri IDE Chan Status Port |
| 03F8 - 03FF | 8 | | Serial Port 1 |
| LPT + 400h | 3 | | ECP regs, LPT base + 400h |
| 04D0 - 04D1 | 2 | Edge/Level INTR Control Reg. | |
| 0CF8 - 0CFC* | 4 | PCI Config Address Reg. | |
| 0CF9 | 1 | Turbo & Reset control Reg. | |
| 0CFC - 0CFF | 4 | PCI Config Data Reg | |
| FFA0 - FFA7 | 8 | | 1ary Bus MasterIDE regs |
| FFA8 - FFAF | 8 | | 2ary Bus Master IDE regs |
| FF00-FF07 | 8 | | IDE Bus Master Reg. |

*only accessible by DWORD accesses.

### *PCI CONFIGURATION SPACE MAP*

The Intel 440BX chipset uses Configuration Mechanism 1 to access the PCI configuration space. The PCI Configuration Address register is a 32-bit I/O register located at 0CF8h, the PCI Configuration Data register is a 32-bit I/O register located at 0CFCh. The PCI Configuration Address register is only accessible by a DWORD access, the PCI Configuration Data register is accessible by DWORD, WORD or BYTE accesses.

#### *ACCESS TO I/O CONFIGURATION SPACE USING MECHANISM #1*

1. Using a DWORD write command, output the required I/O configuration address to I/O port CF8h
2. Using a DWORD read or write command, read or write data from the I/O port CFCh

NOTE: Any address output to CF8h is always on a 4 byte (DWORD) boundary. You can read or write any BYTE, WORD or DWORD in the four-byte range by using the correct offset as follows:

DWORD @ CFCh

WORD @ CFCh or CFEh

BYTE @ CFCh, CFDh, CFEh or CFFh

#### *CONFIGURATION ADDRESS REGISTER BIT DEFINITION*

| BIT | FUNCTION / SETTING |
|---|---|
| 31 | 1 |
| 30 - 24 | RESERVED |
| 23 -16 | BUS NUMBER |
| 15 - 11 | DEVICE NUMBER |
| 10 - 8 | FUNCTION NUMBER |
| 7 - 2 | REGISTER NUMBER |
| 1 | 0 |

| | |
|---|---|
| 0 | 0 |

CONFIG SPACE ENABLE FLAG (Bit 31): Always 1 to indicate I/O access is to configuration space.

RESERVED (Bits 30-24): Always 00h

BUS NUMBER (Bits 23-16): Always 00h unless a bridge card is installed in a PCI slot

DEVICE NUMBER (Bits 15-11): Used to indicate a specific PCI device. The 443BX host has a predefined device number of 00000h. The PIIX4 and four PCI slots also have specific device numbers, that device number is determined by which PCI Address/Data line is connected to the device's ID SEL pin. The table below details the specific mapping information.

FUNCTION NUMBER (Bits 10-8): Used to indicate a specific function in multifunction PCI devices. The PIIX is the only multi-function device on WILDCAT located on the single board PC. Use 00h for the basic PIIX device and 01h for the PCI IDE BUS MASTER FUNCTION. For a multi-function PCI add-in card, refer to the card's documentation to determine the allowable function numbers.

REGISTER NUMBER (Bits 7-2): Defines one of 64 DWORD locations for a specific PCI device.

Note that Bits 1 and 0 must always be 0h for DWORD access.

The table below lists the PCI bus and device numbers used by the single board PC. It also lists the data range that must be written to the I/O Configuration Address register to access the device.

| DEVICE | BUS/DEVICE/ FUNCTION | ID SEL | I/O CONFIG ADDRESS REGISTER |
|---|---|---|---|
| 443BX Host controller | 00 / 00 / 0 | N/A | 8000 0000 - 8000 00FC |
| PIIX4 | 00 / 07 / 0 | AD18 | 8000 3800 - 8000 38FC |
| PIIX-IDE BUS MASTER | 00 / 07 / 1 | AD18 | 8000 3900 - 8000 39FC |
| Realtek Ethernet device | 00 / 09 / 0 | AD20 | 8000 4800 - 8000 48FC |
| Adaptec SCSI II device | 00 / 10 / 0 | AD21 | 8000 5000 - 8000 50FC |
| PCI SLOT 1 | 00 / 14 / 0 | AD31 | 8000 8800 - 8000 88FC |
| PCI SLOT 2 | 00 / 13 / 0 | AD30 | 8000 8600 - 8000 86FC |
| PCI SLOT 3 | 00 / 12 / 0 | AD29 | 8000 8400 - 8000 84FC |
| PCI SLOT 4 | 00 / 12 / 0 | AD28 | 8000 8000 - 8000 80FC |

### *INTERRUPTS & DMA CHANNELS*

The following tables list the Interrupt and DMA Channel configuration **options** for on-board devices. The serial ports, parallel ports, and IDE controller can be configured using SETUP, or any other Plug and Play resource manager (such as the Windows™ 95 Device Manager). The Graphics interrupt is assigned by the auto-configure utility during boot up.

| IRQ | RESERVED INTERRUPTS |
|---|---|
| NMI | I/O Channel Check |
| 0 | Interval Timer |
| 1 | Keyboard buffer full |
| 2 | Cascade interrupt from slave PIC |
| 3 | Serial 2 (COM2) |
| 4 | Serial 1 (COM1) |
| 5 | Parallel 2 (LPT2) |
| 6 | Floppy Controller |
| 7 | Parallel (LPT1) |
| 8 | Real time clock |
| 9 | |
| 10 | |
| 11 | |
| 12 | PS/2 Mouse (if present) |
| 13 | Math co-processor |
| 14 | Primary E-IDE |

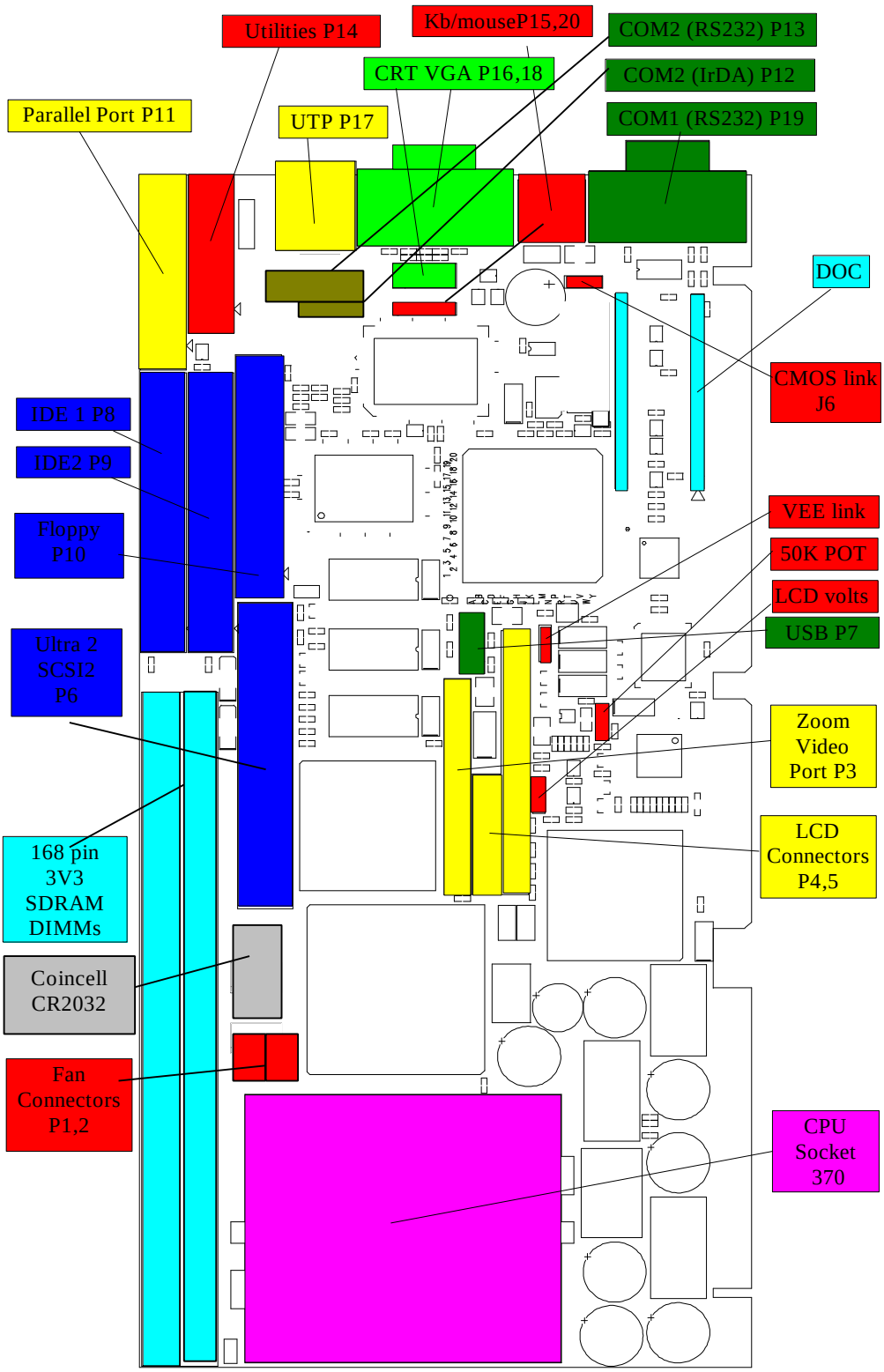
| | |
|---|---|
| 15 | Secondary E-IDE |

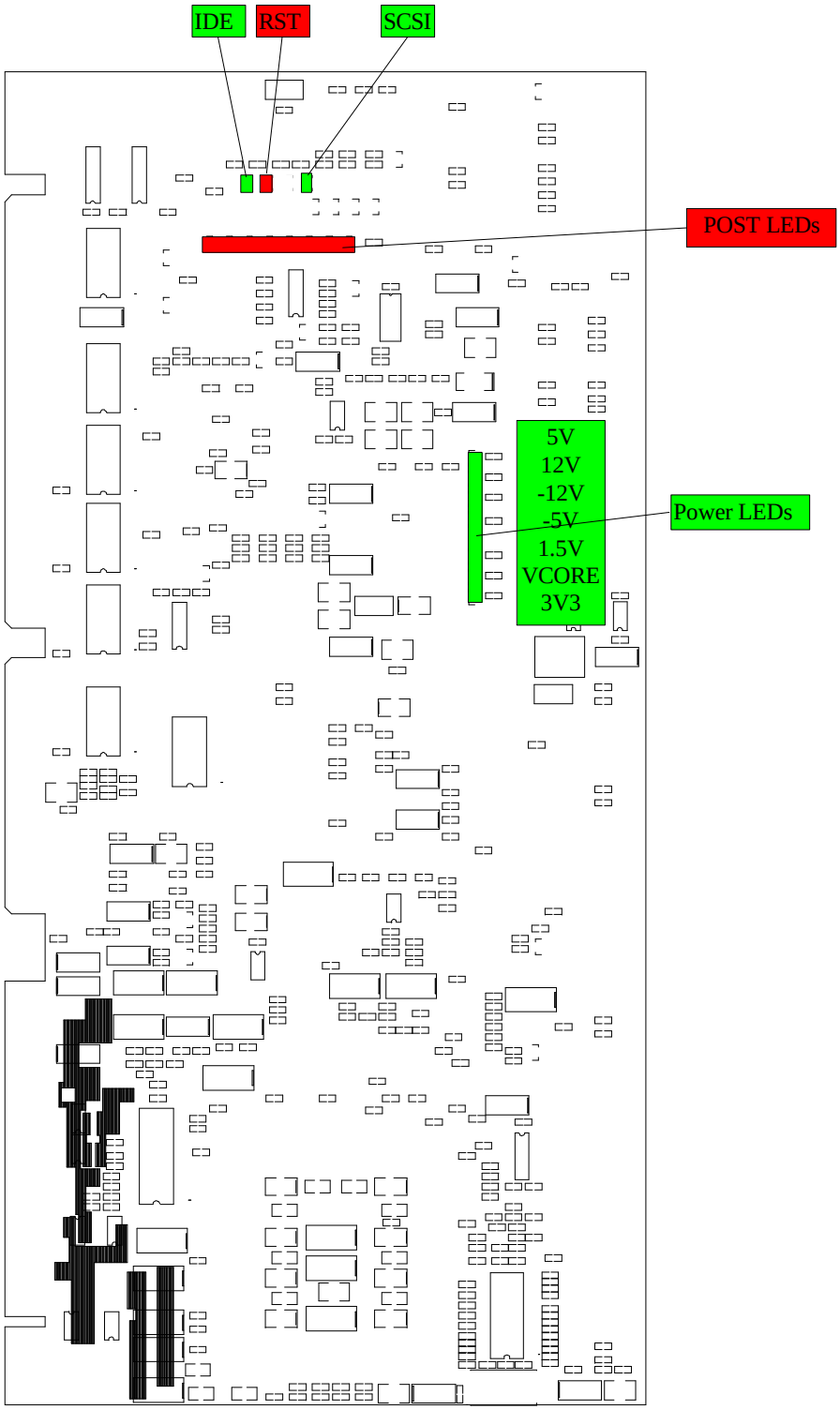
| DMA | RESERVED |
|---|---|
| 0 | |
| 1 | |
| 2 | Floppy |
| 3 | |
| 4 | Cascade channel |
| 5 | |
| 6 | |
| 7 | |

### *BIOS POST CODES, ERROR MESSAGES AND BEEPCODES*

See the file ***bios-pos.pdf*** - (*Adobe Acrobat* is required)

# BOARD LAYOUT




IDE
RST
SCSI
POST LEDs
5V
12V
-12V
-5V
1.5V
VCORE
3V3
Power LEDs