

ELECTRON



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 ELECTRON 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, Aston Martin, JaguarSport 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.

INTRODUCTION

MANUAL OBJECTIVES

This manual describes in detail the Blue Chip Technology ELECTRON 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 ELECTRON 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. A Troubleshooting Guide is also included to help should things go wrong.

We strongly recommend that you study this manual carefully before attempting to interface with ELECTRON 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 (BT1: CR2032)

This board is fitted with a Lithium cell(BT1). 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
- AGP Specification 1.1
- PCI Specification 2.1

TRADEMARKS

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USER GUIDE

OVERVIEW

The Blue Chip Technology ELECTRON Single Board PC sets new standards for integration of the latest advances in processor, graphics, memory, and I/O technologies. The ELECTRON 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's and tomorrow's embedded applications.

This flexible PICMG design will accept Pentium II® and Pentium III® processors operating at 233 - 700 MHz as well as the SECC (slot 1) Celeron® processors. These Slot 1 processors are supported in a flush mounting Slot 1 connector designed to reduce the overall board dimensions and thereby maximising the slot availability. The Intel 440BX chipset supports 100MHz front side bus (FSB) which provides increased performance over traditional 66MHz bus speeds. The memory sub-system is designed to support up to 256MB of unbuffered SDRAM in standard 168-pin DIMM sockets. The memory modules must be PC100 compliant in order to operate at the increased 100MHz FSB. Non PC100 should only be operated at 66MHz FSB.

The ELECTRON single board PC uses the Intel i740 AGP controller on board to provide outstanding graphics performance and increased integration over other single board PC designs. The Electron supports AGPx2 (133MHz) data rates and up to 8Mbytes of SGRAM.

The ELECTRON provides PCI Bus Mastering IDE DMA Mode2 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 Mode 3 & 4 are also supported.

An on Board PCI Ultra SCSI II controller (16 bit single ended) is fitted on board using the Industry standard Adaptec AIC7880. This produces SCSI data rates of up to 40MB/s, and provides expansion for up to sixteen 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.

A 16 bit quality Sound Blaster compatible audio device is available on board. This provides for mono microphone input, and stereo line in and line out. The codec is Soundblaster™ compatible.

The SMC 37C675 Enhanced Super I/O controller integrates 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 ELECTRON also provides for driving 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. Larger numbers of PCI slots can be supported through PCI bridged backplanes. The ELECTRON provides a buffered ISA bus. This permits up to twenty ISA slots to be driven to complete the I/O capability. The ELECTRON should only be used in PICMG back-planes. ISA only back-planes are not recommended for use with ELECTRON as power should be drawn from both the PCI and ISA connectors of the PICMG 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 ELECTRON.

BOARD LEVEL FEATURES

- Low Profile Pentium II/III™ Processor socket supporting Coppermine & Celeron processors 233-700MHz operation and above
- 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 II/III module.
- Phoenix BIOS, PnP Support
 - Flash 256K BIOS
 - Power Management
 - ISA PnP extensions
 - Y2K compatible
- Two DIMM sockets providing up to 256 MByte of unbuffered SDRAM
- Intel i740 AGP graphics controller with:
 - 4/8 MByte SGRAM
 - Supports resolution upto 1600 x 1200 at 8bpp
- Adaptec PCI Ultra SCSI II adapter with on-board termination
- Realtek PCI 10/100 base T Ethernet controller
- ESS 1869 16 bit stereo audio codec
- PICMG compliant PCI and ISA expansion buses
- SMC 37C675 I/O controller providing:
 - Dual floppy interface
 - Dual 16C550 RS-232/422/485 serial interfaces
 - EPP/ECP bi-directional parallel interface
 - PS/2 mouse and keyboard
- Real-time clock with on-board battery
- Solid State Disk support for M-Systems Disk on Chip with 2- 288MB capacity System monitoring of fans, system temperature and critical supply voltages are provided using the National Semiconductor LM79 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 ELECTRON single board PC is designed to operate with Pentium II/III 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 II 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 L1 and L2 caches on the slot module. Also integrated into the Pentium II/III processor is an advanced numeric co-processor which 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 ELECTRON single board PC has a 242 SECC connector (Slot 1) that provides users with a processor upgrade path. Future, faster, lower power processors being developed for use with Slot 1 can provide performance beyond that delivered by the originally installed Pentium II/III Processor. The ELECTRON will support CPUs from 233- 700MHz and beyond.

SYSTEM MEMORY

The ELECTRON single board PC provides two 168-pin DIMM sites for memory expansion. The sockets support 8, 16, 32, 64, 128MB unbuffered SDRAM modules giving a current maximum of upto 256MB of system memory. 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 ELECTRON 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. One slot is shared by both types of connector - this is reserved for the ELECTRON 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

Support for 3.3 Volts to the PCI connectors requires a power supply with a 3.3V DC output. The PICMG power connector definition has 3 pins reserved for 3.3V. The ELECTRON on-board voltage regulator only provides 3.3V to the onboard devices and is not available to supply 3.3V PCI expansion boards. 3.3 Volt PCI boards require a 3.3Volt external PSU such as an ATX supply.

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 which 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 which 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

ELECTRON Power Requirement	+5 V \pm 5%	} Not required for board operation.
	+12 V \pm 5%	
	+3.3 V \pm 5%	
	-5 V \pm 5%	
	-12 V \pm 5%	
Typical System Consumption	35 Watts (5V) <1 Watt (12V)	Pentium II 450, 128 MB SDRAM, 3½" FDD, 8GB HDD
Temperature	Non-Operating Operating	-40°C to +70°C +0°C to +55°C (min. airflow of 200 lpm)
EMC	Emissions Immunity	EN55022 (A) 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 which 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 ELECTRON board supports a single Slot 1 Celeron or Pentium II/III processor. The processor connects to the board using a 242 pin right angled Slot 1 connector.

Before installing the Pentium II processor, the SDRAM modules should be removed. The CPU fan and/or heatsink assembly must be fitted to the processor prior to installation onto the Electron board. The processor should then be located on the white support bracket and then carefully inserted into the Slot 1 connector. Avoid squeezing against any components mounted on the lower edge of the board. The processor is fully located when the two retaining clips on the processor module click and lock into the retaining holes of the white support bracket.

To remove the processor press the retaining locks on the processor and simultaneously remove the processor.

The Electron 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
Celeron	550	100	256
	600	100	256
	650	100	256
	700	100	256
	750	100	256
	800	100	256
	850	100	256
	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

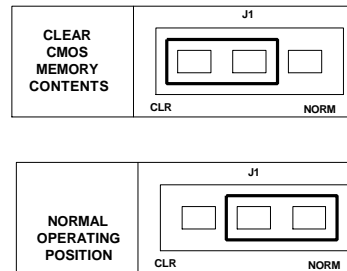
The ELECTRON supports two 168 pin SDRAM DIMMs providing upto 256MB of unbuffered SDRAM. Modules are available in 8,16,32,64 and 128MB to both PC66 and PC100 specification. The ELECTRON supports both PC memory specifications but the PC100 modules must be used when running 100MHz FSB processors. When running 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 ELECTRON 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:

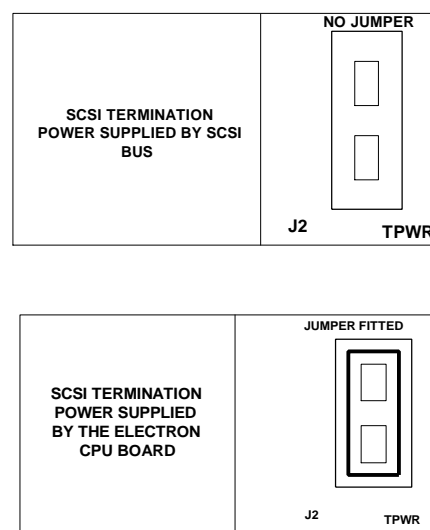
J1: CMOS Clearing link:

This jumper is used to clear the contents of the battery backed CMOS memory. This memory is used to retain the system settings such as drive information, boot sequence and certain peripheral device information.



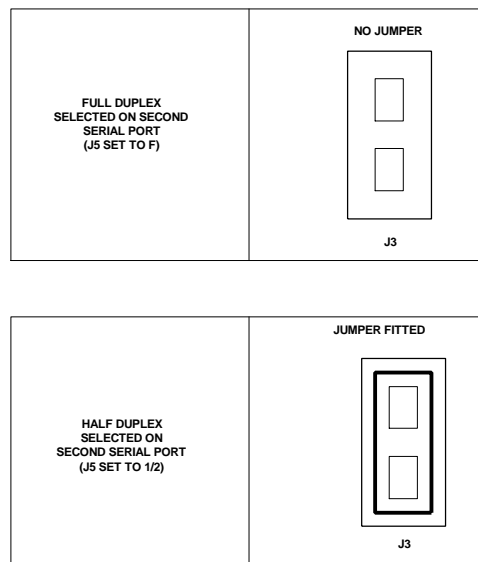
J2: SCSI Termination power:

This jumper is used to select the power source for the on board SCSI termination. It may be supplied either from the CPU board or from the SCSI bus.

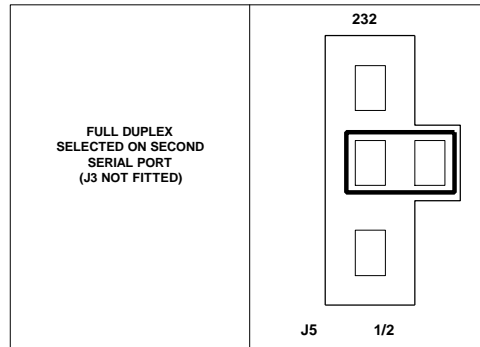
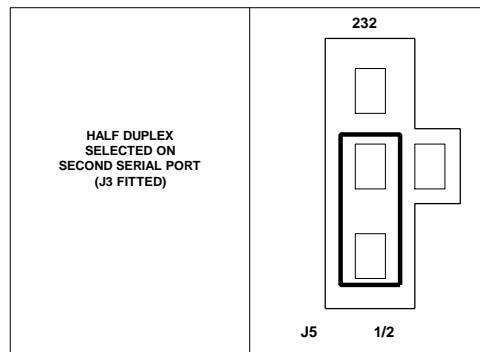
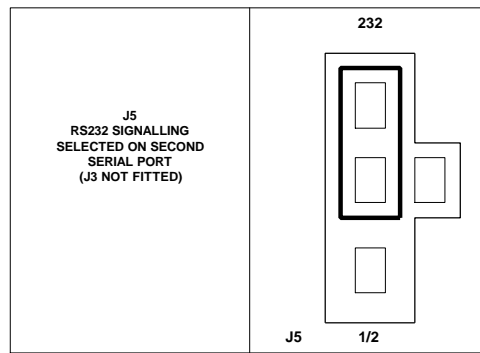


J3: Half/full duplex:

This jumper is used in conjunction with jumper J5. It is used to select between a half Duplex RS485 operation on the second on board serial port. When jumper J5 is set to 1/2, the J3 jumper should be installed in order to select ½ duplex RS485 operation on COM2. When jumper J5 is set to F, J3 jumper should be removed, thereby selecting RS485 full duplex operation on COM2. When J5 is set to 232 i.e. RS232 on COM2, the J3 jumper should be removed.


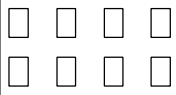

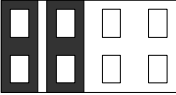
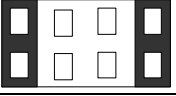

**J5: RS232/RS485 Full and Half Duplex:**

This jumper is used to select between RS232, RS485 full duplex and RS485 half duplex on the second serial port. It is used in conjunction with J3 in order to select between full and half duplex.(see above)



J4: CPU frequency selector

This four position jumper is used to select the CPU internal frequency. The jumpers set the ratio of the CPU front side bus (FSB) to CPU internal frequency. The FSB is automatically determined by the ELECTRON and there are no user jumper settings for this values. The possible FSB frequencies are 66MHz and 100MHz. Given below are the current supported frequency settings

FSB/CPU Ratio	CPU Type/speed	J4 setting
1 / 2	FSB: 66MHz, CPU 133MHz FSB: 100MHz, CPU 200MHz	J4  4-1
1 / 2	FSB: 66MHz, CPU 133MHz FSB: 100MHz, CPU 200MHz	J4  4-1
1 / 4	FSB: 66MHz, CPU 266MHz FSB: 100MHz, CPU 400MHz	J4  4-1
1 / 5	FSB: 66MHz, CPU 333MHz FSB: 100MHz, CPU 500MHz	J4  4-1
2 / 7	FSB: 66MHz, CPU 233MHz FSB: 100MHz, CPU 350MHz	J4  4-1
2 / 9	FSB: 66MHz, CPU 300MHz FSB: 100MHz, CPU 450MHz	J4  4-1

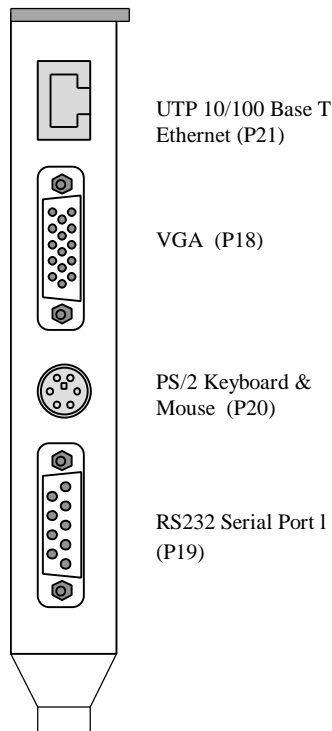
Note:- Later Intel CPU's has the frequency auto selected, it is recommended that J4 is set to Auto detect the CPU frequency. To do this remove all the jumper links from J4.

Connectors

There are three sets of connectors incorporated on the ELECTRON PC board. These provide connectivity 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 P21 (RJ45)

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)

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	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)

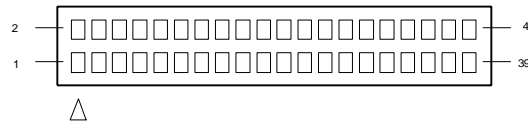
PIN NO.	SIGNAL	PIN NO.	SIGNAL
1	Keyboard Data	2	Mouse Data
3	Ground	4	+5 Volts (fused)
5	Keyboard Clock	6	Mouse Clock

RS232 SERIAL PORT 1 P19 (9 WAY D-TYPE)

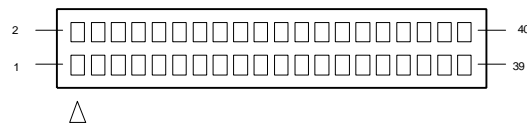
PIN NO.	SIGNAL	PIN NO.	SIGNAL
1	Data Carrier Detect	2	-Receive Data
3	-Transmit Data	4	-Data Terminal Ready
5	Ground	6	-Data Set Ready
7	-Ready To Send	8	-Clear To Send
9	Ringing Indicator		

ON-BOARD CONNECTORS

There are connectors on-board for dual EIDE, SCSI II, Floppy Disk Drive, a second serial port (RS232 and RS485), a parallel port, USB, Audio, 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.

PRIMARY EIDE CONNECTOR P6 (40 WAY HEADER)

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

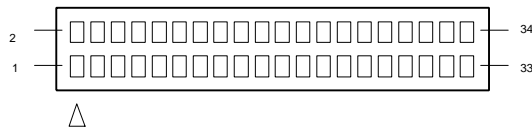
SECONDARY IDE CONNECTOR P7 (40 WAY HEADER)

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

WIDE SCSI 2 CONNECTOR P4 (68 WAY HIGH DENSITY SINGLE ENDED)

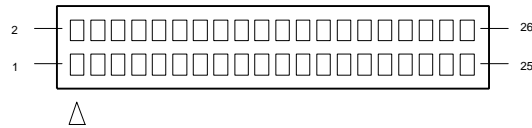
PIN NO.	SIGNAL	PIN NO.	SIGNAL
1	Ground	35	Data bit 12
2	Ground	36	Data bit 13
3	Ground	37	Data bit 14
4	Ground	38	Data bit 15
5	Ground	39	Data Parity P1
6	Ground	40	Data bit 0
7	Ground	41	Data bit 1
8	Ground	42	Data bit 2
9	Ground	43	Data bit 3
10	Ground	44	Data bit 4
11	Ground	45	Data bit 5
12	Ground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

FLOPPY DISK DRIVE CONNECTOR P8 (34 WAY HEADER)

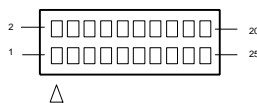


PIN N°	SIGNAL	PIN N°	SIGNAL
1	Ground	2	RPM/Low Current
3	Ground	4	Key
5	Ground	6	+Rate
7	Ground	8	-Index
9	Ground	10	-Motor 0
11	Ground	12	-Drive select 1
13	Ground	14	-Drive select 0
15	Ground	16	-Motor 1
17	Ground	18	+Direction
19	Ground	20	-Step
21	Ground	22	-Write Data
23	Ground	24	-Write Gate
25	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 P6 (26 WAY HEADER)



PIN N°	SIGNAL	PIN N°	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

UTILITY CONNECTOR P10 (20 WAY HEADER)

PIN N°	SIGNAL	PIN N°	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	Sleep Switch +ve	12	Sleep Switch -ve (Ground)
13	IDE LED +ve	14	IDE LED -ve
15	+5V (fused)	16	0 Volts (Ground)
17	+3Volt Battery	18	0 Volts Battery (Ground)
19	Keyboard Data	20	Keyboard Clock

This connector provide support for functions which would normally be located within the enclosure, and also duplicate connections for some of the external interfaces.

SPEAKER (P10 pins 1 & 2)

An on-board Piezo speaker is provided on the ELECTRON. An off-board speaker may be connected to the connector. The speaker provides error beep code information during the Power-On Self Test if the system cannot use the video interface.

RESET(P10 pins 3 & 4)

A reset input is supplied on the connector. The two pins (3 & 4) 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 (P10 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; Anode to pin 5 Cathode to pin 6.

KEYLOCK (P10 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 (P10 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; Anode to pin 9 Cathode to pin 10.

SLEEP/RESUME SWITCH (P10 pins 11 & 12)

These pins may be connected to a momentary-action, normally-open SPST switch. The switch may be used to toggle the PC in and out of SMM modes (i.e. Sleep / Resume). The resultant Sleep mode is a power saving mode.

IDE LED (P10 pins 13 & 14)

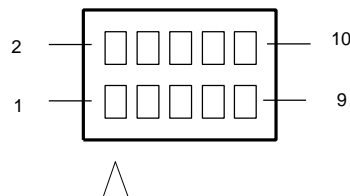
These two pins are used to connect to an LED to provide an indication that an IDE hard drive connected to the on-board IDE controller is active. This LED is shared by all the Primary and Secondary slave and master IDE devices. A current limiting resistor is fitted on the board and the user need only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

INTERNAL KEYBOARD (P10 pins 15,16,19,20)

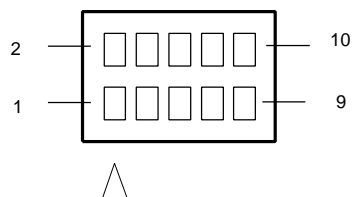
The keyboard interface is available on connector P10 for applications requiring front panel keyboard or a keyboard compatible keypad. The +5v supply is protected by a 2 Amp resettable fuse.

EXTERNAL BATTERY (P10 pins 17 & 18)

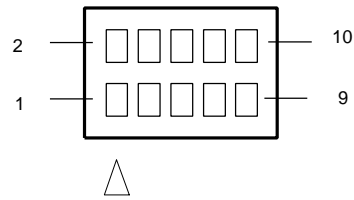
These connections allow the user to connect an external 3 to 3.7V lithium cell to supplement or replace the on-board CR2032 button Lithium cell (BT1). Exercise caution if using this facility (read the PRECAUTIONS section found earlier in this manual)

RS485 SERIAL PORT 2 P9 (10 WAY HEADER)

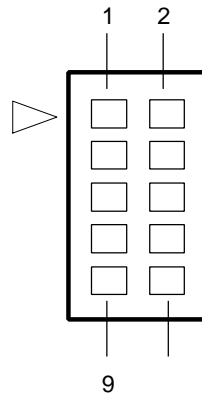
PIN NO.	SIGNAL	PIN NO.	SIGNAL
1	+Rx FDX	2	+Term. 10 K to +5V
3	-Rx FDX	4	No Connect
5	+Tx FDX, +Rx/+Tx HDX	6	No Connect
7	-Tx FDX, -RX/-Tx HDX	8	key
9	-Term. 10 K to Gnd	10	No Connect

RS232 SERIAL PORT 2 P13 (10 WAY HEADER)

Pin N°	Signal	Pin N°	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

USB CONNECTOR P11 (10 WAY HEADER)

Pin N°	Signal	Pin N°	Signal
1	+5V	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

INTERNAL SVGA CONNECTOR P15 (10 WAY HEADER)

Pin N°	Signal	Pin N°	Signal
1	Red	2	Ground
3	Green	4	Ground
5	Blue	6	key
7	Horizontal sync	8	Ground
9	Vertical sync	10	Ground

AUDIO CONNECTOR P15 (10 WAY HEADER 2mm)

Pin N°	Signal	Pin N°	Signal
1	Line Left In	2	Line Right In
3	Ground	4	Ground
5	Microphone in	6	NC
7	Ground	8	Ground
9	Line Left Out	10	Line Right Out

CD AUDIO CONNECTOR P16 (4 WAY JST HEADER)

Pin N°	Signal
1	CD Left In
2	Ground
3	CD Right In
4	Ground

INTERNAL MOUSE CONNECTOR P14 (5 WAY HEADER)

Pin N°	Signal
1	Mouse Data
2	key
3	Ground
4	+5V (thermal fuse)
5	Mouse Clock

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 ELECTRON 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	Resetdrv
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	-REF
A20	SA11	B20	CLK
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
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	CBE0-	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 ELECTRON processor card. The PCI connectors of a backplane differ slightly, some pins having a position dependent signal.

STATUS LEDS

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

P.O.S.T. DISPLAY

Red LEDs D17 to D24 inclusive display the Power On Self Test (POST) data byte. Diode D17(top) represent the LSB and D24 (bottom) the MSB. The LED is illuminated when the POST data bit is 1. See the **POSTCODE.PDF** file for details of the error codes.

POWER SUPPLY INDICATORS

Green LEDs D5-D9 inclusive show the presence of the power supplies. Each LED is illuminated when the appropriate voltage is present.

D12	+ 12 Volt supply
D10	- 12 Volt supply
D8	- 5 Volt supply
D13	2.7 Volt supply Video chip-set core voltage
D11	CPU Core voltage (may glow dimly depending on CPU type fitted)
D9	Host CPU IO and chip-set supply (3.3 Volts)
D7	+ 5 Volt (Vcc) supply

IDE ACTIVITY DISPLAY

LED D25 indicates primary and secondary IDE activity (Hard disk or CD-ROM) and is illuminated when active.

SYSTEM RESET STATUS

LED D27 indicates the system reset status. The LED is illuminated when in held in reset.

SCSI STATUS

LED D29 indicates SCSI Bus activity and is illuminated when active.

NETWORK STATUS

LED D29 indicates when the onboard ethernet controller is receiving or transmitting data on the UTP cable.

INTEL I740 AGP GRAPHICS CONTROLLER

The ELECTRON single board PC is equipped with an Intel i740 SVGA graphics controller with 4/8 MB of graphics memory. The Trio64V 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 output pixel data rates of 220 MHz providing screen resolutions of up to 1600 x 1200 x 256 colours at 75 Hz. 3D and 2D Hardware acceleration for graphics functions such as Shading, Mip-mapping, Z-buffering, Texture colour keying, BitBLTs with ROPs, 2-point line draws, trapezoidal and polygon fills, clipping and cursor support provide high performance operation under Windows™ and other GUI environments. AGP x2 support ensures maximum data throughput by performing parallel data processing from both local dedicated Graphics memory and AGP system memory

The ELECTRON single board PC supports a 10 pin header for internal VGA connections. ELECTRON also supports VESA standards such as the VESA DPMS protocol to put a DPMS compliant monitor into power saving modes and the VESA Display Data Channel (DDC2B) which permits transfer of monitor identification and resolution support data for ease of use.

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

RESOLUTIONS SUPPORTED

RESOLUTION	BITS PER PIXEL (FREQ: HZ)		
	8 BIT	16 BIT	24 BIT
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, 75,85
1280 x 1024	60,72,75,85	60,72,75,85	
1600 x1200	60,75		

BIOS

The ELECTRON 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 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 set up the card for a specific installation eg different drive configurations or boot sequences etc. During the boot up sequence, the BIOS also provides a Power-On Self Tests (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-postcode.pdf*.

The Intel video BIOS provides an interface between the OS and the video controller, allowing applications to utilise both standard SVGA functions and the i740 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.

SOFTWARE DESCRIPTION

BIOS SETUP

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

This section details the differences and describes the additional features of the *Electron* 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 .

AUDIO OPTIONS MENU

Provides setup options for the onboard Sound utility.

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 Electron 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 - 9BFFF	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

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		I740
03BC - 03BF	4		Parallel Port 3
03C0 - 03DF	16		I740
03E8 - 03EF	8		Serial Port 3
03F0 - 03F5	6		Floppy Channel 1
03F6	1		Pri IDE Chan Cmd 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 Master/IDE 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 ELECTRON 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/DEVIC E/ 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	

IRQ	RESERVED INTERRUPTS
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 BIOSERR.PDF - (*Adobe Acrobat* is required).

