ARTISAN®
TECHNOLOGY GROUP

Your **definitive** source for quality pre-owned equipment.

Artisan Technology Group
(217) 352-9330 | sales@artisantg.com | artisantg.com

Full-service, independent repair center
with experienced engineers and technicians on staff.

We buy your excess, underutilized, and idle equipment
along with credit for buybacks and trade-ins.

Custom engineering
so your equipment works exactly as you specify.

- Critical and expedited services
- In stock / Ready-to-ship
- Leasing / Rentals / Demos
- ITAR-certified secure asset solutions

Expert team | Trust guarantee | 100% satisfaction

All trademarks, brand names, and brands appearing herein are the property of their respective owners.

Find the *Abaco Systems / SBS IFLASH2xxC* at our website: *Click HERE*

CR7

Celeron™ / Pentium® III
PC/AT Compatible 6U CompactPCI®

Single Board Computer

Hardware User's Manual

Revision 1.3

Copyright © 1999 by SBS Technologies
www.sbs.com

Revision	By	Date	Chapter	Comments
V0 prel.	PS	05/04/1999		First Draft
V1 prel.	PS	06/14/1999		Second Draft
V1	PS	09/02/1999		First Release
1.2	PS	04/26/2001		supports now also Board Version 3.x
			1.1	new CPUs added
			1.3	Power consumption updated
			1.2	Order information of board types removed
			2.2	Placement plan of actual version V3 inserted
			1.1/2.7	all LVDS notes removed
			2.7.2	IO connector L1_xx and L2_xx exchanged
			2.7.7	Parallel connector pin number of 'D1' corrected
			3.10.1	Temperature sensor MAX1617A added
1.3	GB MF	07/23/2002	All	Manual changed to new style

For Immediate Contact

Europe

Sales:

SBS Technologies GmbH & Co.KG
Memminger Str. 14
86159 Augsburg
Germany

Tel.: +49 821 5034-0
Fax.: +49 821 5034-119
Email sales@sbs-europe.com

Technical Support

Tel.: +49 821 5034-170
Fax.: +49 821 5034-119
Email support@sbs-europe.com

USA & Rest of World

SBS Technologies, Inc.
6301 Chapel Hill Road
Raleigh, NC 27607
USA

Phone (919) 851-1101
Fax (919) 851-2844
Email sales@sbs-ec.com

Phone (919) 851-1101
Fax (919) 851-2844
Email support@sbs-ec.com

Unpacking and Handling Instructions

1. Please read this manual carefully before unpacking the module or fitting it into your system. This will certainly save time and avoid trouble.
2. Please observe the precautions for electrostatic sensitive modules.
3. If the product contains batteries, please do not place the board on conductive surfaces or anti-static plastic or sponge, which can cause shorts and lead to battery or board trace damage.
4. Please do not exceed the specified operational temperatures. Please note that batteries might have temperature restrictions.
5. Keep all original packaging material for future storage or warranty shipments of the board.

Caution



Danger of explosion if battery is incorrectly replaced.
Replace only with the same or equivalent type recommended by SBS Technologies. Dispose of used batteries according to the instructions of SBS Technologies.



Vorsicht!
Explosionsgefahr bei unsachgemäßem Austausch der Batterie.
Ersatz nur durch denselben oder einen von SBS Technologies empfohlenen gleichwertigen Typ. Entsorgung gebrauchter Batterien nach Angaben des Herstellers.

Notes

Drain static electricity before you install or remove any parts. Installing or removing modules without observing this precaution could result in damage to this and/or other modules in your system.

Installation

Use the following steps to install your SBS Technologies hardware.

General Advisories

1. Before installing or removing any board, please ensure that the system power and external supplies have been turned off.
2. Check that the jumpers and piggybacks are correctly configured for your application.
3. Mount the board/piggyback/transition module very carefully. See also additional advisories for VMEbus and CompactPCI products below.
4. Connect all I/O cables.
5. Once you are certain that all modules are correctly fitted into the system and all connections have been made properly, restore the power.

Advisories for VMEbus products

On a standard VMEbus backplane, remove the jumpers on the IACKIN - IACKOUT interrupt daisy chain (1 jumper) and on the BGxIN - BGxOUT busgrant daisy chains (4 jumpers) for the slot where the board is to be mounted. The daisy chain jumpers on the VMEbus backplane should be mounted on all free slots.

Setting jumpers is not necessary for the SBS Technologies Auto-Daisy-Chain VMEbus backplane (order number: VBUSxxAD). Please read additional advisories within the manual.

A board with system controller functionality must be fitted at slot 1 (for SBS Technologies products, see additional notes within the manual).

Advisories for Compact PCI products

Mount the CPU board carefully on the first CPCIbus slot (called system slot). Note that on some boards connectors are used for I/O purposes which must not be inserted into a CPCIbus backplane. A transition module must be used instead.

Disclaimer

The information in this document has been carefully checked and is believed to be entirely reliable. However, no responsibility is assumed for inaccuracies.
SBS Technologies reserve the right to make changes without further notice to any products herein to improve reliability, function or design. SBS Technologies do not assume any liability arising out of the application or use of any product or circuit described herein; neither do they convey any license under their patent rights nor the rights of others. The software described herein will be provided on an "as is" basis and without warranty. SBS Technologies accept no liability for incidental or consequential damages arising from use of the software. This Disclaimer of warranty extends to SBS Technologies licensee, to licensee's transferees and to licensee's customers or users and is in lieu of all warranties whether expressed, implied or statutory, including implied warranties of salability or fitness for a particular purpose.
SBS Technologies do not accept any liability concerning the use of their products in life support systems.

Warranty

SBS Technologies grants the original purchaser of SBS Technologies products a warranty of 12 month from the date of delivery. For details refer to the "Allgemeine Geschäftsbedingungen".

In the event of repair, please return the product together with additional written information about

the kind of defect
is the defect restricted to certain environmental conditions
what was the hardware environment when the defect appeared
were there input signals; if yes which
warranty/no warranty repair

Please use the error report form sheet at the end of this manual and use the original packing material to avoid damage. Otherwise warranty may be lost.

Trademarks

Product and company names listed are trademarks or trade names of their respective companies owners.

Table of Contents

Unpacking and Handling Instructions....3
Notes....3
Installation....3
Disclaimer....4
Warranty....4
Trademarks....4
Table of Contents....5

1 General Information....7

1.1 Features....7
1.2 Board Types....9
1.3 Specification....9

2 Hardware Installation....13

2.1 Front Panel....14
2.2 Placement Plan Component side....15
2.3 Placement Plan Solder side....16
2.4 CTM6/CTM7 transition module placement plan....17
2.5 CTM6A/B/C transition module placement plan....17
2.6 Socket Installation....18
2.6.1 Serial Port Configuration for COM1 and COM2....18
2.6.2 Jumper Configuration....18
2.7 Connectors....18
2.7.1 CompactPCI bus Connector (P7201, P7202)....19
2.7.2 I/O Connector (P7204, P7205)....20
2.7.2.1 I/O Connector (P7204, P7205) optional configurations....21
2.7.3 I/O Connector2 (P7203)....22
2.7.4 Flashdisk Connector (P1800), IDE connector (CTM6-P6, CTM6A-P18)....23
2.7.5 Keyboard/PS-2 Mouse Interface (P2000, CTM6-P15, CTM6A-P27)....24
2.7.6 Ethernet Interface 10BaseT and 100BaseTX (P5000, CTM6-P3, CTM6A-P15)....24
2.7.7 Parallel Interface LPT1, 2 (CTM6-P2, CTM6-P13, CTM6A-P24, CTM6A-P13)....25
2.7.8 Serial Interfaces (P2200, CTM6-P5, 8, 11, 10, CTM6A-P16, P23, P26, P17)....25
2.7.9 VGA Interface (P4200, CTM6-P4, CTM6A-P12)....26
2.7.10 USB Interface (P1700, CTM6-P15, CTM6A-P27)....26
2.7.11 Floppy connector (CTM6-P7, CTM6A-P19, CTM6A-P21)....27
2.7.12 LCD/Panel connector (CTM6-P9, CTM6A-P11)....28
2.7.13 Flat Panel Display connector (CTM6A-P14)....28
2.7.14 Wide SCSI connector (CTM7-P14, CTM6B-P25)....29
2.7.15 SCSI connector (CTM6-P12, CTM6A-P22)....30
2.7.16 MIL 1553 connector (CTM6B-P10)....30
2.7.17 PMC connectors (P7001, P7002)....31
2.7.18 PMC-I/O connector (P7003, CTM6B-P20)....31
2.7.19 Misc. connector (CTM6-P15, CTM6A-P27)....32
2.8 Memory Map....33
2.9 Register Set....33
2.9.1 Standard Register Set....34
2.9.2 Extended Register Set....34
2.10 Interrupts....35
2.11 DMA....35

3 Function Blocks....36

3.1 EIDE/ATAPI Interface....36
3.2 Serial Interfaces....36

3.3 Parallel Interfaces 36
3.4 Floppy Controller 36
3.5 Graphics Controller 37
3.5.1 Features 37
3.5.2 Supported Panel Types 37
3.5.2.1 LCD Signal Mapping 38
3.5.3 Software Installation 39
3.6 PMC Slot 39
3.7 SCSI Interface 40
3.7.1 Software Installation 41
3.8 Ethernet Interface 42
3.8.1 Software Installation 42
3.9 MIL-STD-1553 Interface 43
3.9.1 1553 Control Registers 43
3.9.2 1553 Address Mapping 44
3.9.3 1553 I/O Connection 45
3.10 Additional devices 46
3.10.1 SMB bus devices 46
3.10.1.1 Temperature Sensor 46
3.10.1.2 Serial EEPROM 46
3.10.2 Watchdog, Powerfail Monitor 46
3.10.3 LED Output 47
3.10.4 NMI Timer 47
3.10.5 Reset Button 47
3.10.6 Speaker 47

Appendix 48

Software Guide 48

Error Report Form 49

1 General Information

1.1 Features

• Microprocessor	Intel®Celeron™ processor 300 - 500 MHz in PPGA package Version 3.0 and higher also supports following CPUs: Intel®Celeron™ processor 566 – 850 MHz in FCPGA package Intel®mobile Celeron™ processor 400 MHz in BGA2 package Intel®PentiumIII™ processor 600 – 850 MHz in FCPGA package Intel®mobile PentiumIII™ processor 400 – 700 MHz in BGA2 package
• Cache RAM	32 Kbytes instruction + 32 Kbytes data first level cache, 128 Kbytes (Celeron) /256 Kbytes (Pentium III) second level cache
• DRAM	64 - 256 Mbytes onboard ECC-SDRAM running at 66/100MHz
• Chipset	Intel®82443BX with 82371EB (PIIX4) ISA bridge
• Flash BIOS	Easy updating, In-system programmable AMI BIOS Symbios SCSI BIOS Intel (Chips&Tech) VGA BIOS AMD Ethernet BOOT module
• Flash Disk	1.8" ATA Flash drive onboard
• EEPROM	Serial EEPROM 512 Bytes for user purposes
• CMOS RAM	114 byte non-volatile RTC, MC146818 compatible RTC with onboard Lithium battery
• Keyboard/Mouse	IBM PC/AT compatible keyboard controller with PS/2 style connector
• USB	2 high-speed 12 Mbit/sec USB ports
• Watchdog	Watchdog activates reset under software control
• NMI-Timer	User programmable timer, allows "Real Time Functions" with Windows 3.11, Windows 95 and Windows NT
• LCD/VGA	PCI VGA with 64-bit Windows accelerator and LCD flat panel interface. Resolution up to 1600x1200 on CRT , 65536/16.7 Mio colors, 135MHz, 2MB RAM or 170 MHz, 4MB RAM, TFT or STN panel, supports SS and DD type with max. 24-bit interfaces
• Fast Ethernet	High speed PCIbus Ethernet controller (AMD 79C973) with 10BaseT and 100BaseTX interface and integrated FIFO buffer
• SCSI	PCI Wide SCSI-2 controller (SYM53C875) with up to 40 Mbytes/s transfer rate
• Floppy	Supported formats: 3.5 inch, 720 Kbyte - 1.44 Mbyte

- EIDE/ATAPI — PCI EIDE/ATAPI interface with up to 33 MB/s transfer rate, for two external devices and one onboard flash disk (not with I-style).
- Serial I/O — Up to four async. 16550 compatible channels with 16 byte FIFO, Transfer rates up to 115.2 Kbaud
- Parallel I/O — Two fully bi-directional IEEE 1284 enhanced parallel ports support ECP and EPP modes
- MIL-STD 1553 — dual-redundant MIL-STD 1553 data bus
- PMC slot — PCI mezzanine connector for standard PMC (CR7P) as well as for rugged PMC (CR7R)
- Compact PCI — PCI extension bus, 32-bit wide, 33 MHz, up to 132 MB/s, PCI-to-PCI bridge for minimum bus load
- Temperature Sensor — Shows temperatures of CPU on-die diode and system board, software readable in 1 °C increments from -55 to +125 °C,
- H110 Backplanes — When using the CR7 in backplanes providing H110 functionality at the CPCI-J4 connector, a optional version the CR7T is available, which is exactly the version CR7P but without the CPCI-J4 rear connector.
- I/O connections

function CR7	P	U	T	R
VGA, Keyboard, Mouse, COM1, USB1	f r	f r	f r	r
SCSI, Floppy, USB2, COM2-4, LPT1, Reset	r	r	r	r
MIL1553, PMC-IO	r	-	r	r
LCD, Wide SCSI, ext. IDE, LPT2	r	r	-	r
Ethernet	f	f	f	r
Reset switch	f	f	f	-
LED	f r	f r	f	r

'f' = front, 'r' = rear

- Styles available

CR7R	C	I	-	-	F	G	E	R	K	N
CR7P/T	C	I	F	G	-	-	-	-	-	-
Front panel	x	x	x	x			x	x		
Extended temp.		x		x		x		x	x	x
Parts soldered							x	x	x	x
Front stiffener bar					x	x			x	x
Middle stiffener bar			x	x	x	x	x	x	x	x
Wedge locks					x	x			x	x
Conf. coating								x	x	x
Conduction cooling										x
onboard battery	x	x	x	x	x	x				

1.2 Board Types

The CR7P is the standard version and supplies it's IO functions also via connectors at the front panel. The CR7U is exactly the same version, but contains no CPCI J3 connector (P7203). The CR7T has no CPCI J4 connector (P7204) for applications were a H110 backplane is used.
The CR7R has no connectors at the front and is available in different styles for the various customer needs. The styles are available from a standard, commercial C-Style up to a conduction cooled, rugged N-Style. For more information please check the table above in the chapter 'Features'.

1.3 Specification

- **PCB** FR4 Multilayer
- **Size** Total size: 1 board : 6U, 4 TE
- **Dimensions** PCB: 233.35 mm x 160 mm x 20 mm
- **Weight:** CR7P about 1100 g (with frontpanel, flashdrive, CPU, heatsink)
  CR7R conduction cooled N-Style about 850 g
- **Power Consumption**

The table below helps customers calculate the power consumption of each CR7 system. For measurement, the CR7 is mounted on a CPCI backplane, without keyboard and hard disk. The operating system (MSDOS) comes up from floppy disk. During measurement, the power consumption of the backplane and the floppy drive can be ignored.

Typical Current at +5.0V		Description	
With Power-management	Without Power-management	CR7 128MB ECC-SDRAM, Wide SCSI, Ethernet, 4MB VGA, COM1..4 RS232	Core voltage
1.5 A	3.5 A	Celeron 300 MHz	2.0 V
1.5 A	4.2 A	Celeron 400 MHz	2.0 V
1.5 A	3.5 A	Celeron FCPGA 566 MHz	1.5 V
1.5 A	4.9 A	Celeron FCPGA 733 MHz	1.7 V
1.5 A	2.4 A	mobile Celeron 400 MHz	1.35V
1.5 A	2.7 A	mobile Pentium III 500 MHz	1.35V
1.6 A	4.6 A	Pentium III 700 MHz	1.65V
1.7 A	5.4 A	Pentium III 850 MHz	1.65V

☞ For keyboard connected add 100 mA (typical)

☞ The connectors P1700, P2000 and P4200 provide a fused VCC voltage (+5V). The total current drawn from this VCC voltage may not exceed 1.0 Amperes.

The methods for measurements are defined as follows:

DOS prompt with power management :

BOOT disk with DOS 6.22
no autoexec.bat
config.sys: device=power.exe adv
wait until CPU enters HLT state
measure current on DOS prompt

DOS prompt without power management:

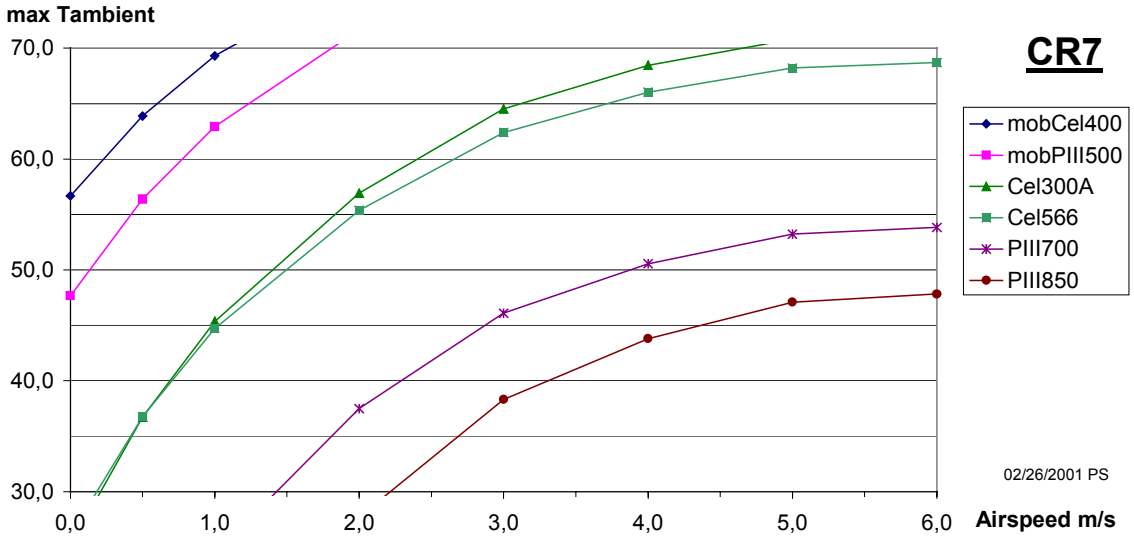
BOOT disk with DOS 6.22
no autoexec.bat
config.sys: device=power.exe off
measure current on DOS prompt

- **Onboard Lithium Battery** C,I,F,G style: CR2450, estimated life time >=10 years (45°C)
- **External Battery Input** K,R,N style: input range 2.7 – 4.5 V, max. current (3.0V) 2uA

High Temperature [°C]

Storage : +85°C +85°C

For the highest Operating temperature (C and I Style) please check following diagram:



☞ 0 m/s airflow means convection cooled only; **the highest operating temperature for the CR7 board is always +70°C**

☞ The core temperature of the CPU can be read out via the onboard temperature sensor and the value must keep to the limits from the table below under all operating conditions. This temperatures are already included in the airspeed diagram above.

CPU type/speed	max. Tcore
mobile Celeron 400MHz	100°C
mobile Pentium III 500MHz	100°C
Celeron 300A MHz	85°C
Celeron FCPGA 566MHz	90°C
Pentium III 700MHz	80°C
Pentium III 850MHz	80°C

☞ For even more detailed information, please check the thermal report document of the CR7.

Low Temperature

Storage -40°C -40°C

Operating +0°C -40°C

Temp. Shock

Storage +/-10°C/min +/-20°C/min

Operating +/-5°C/min +/-10°C/min

Rel. Humidity

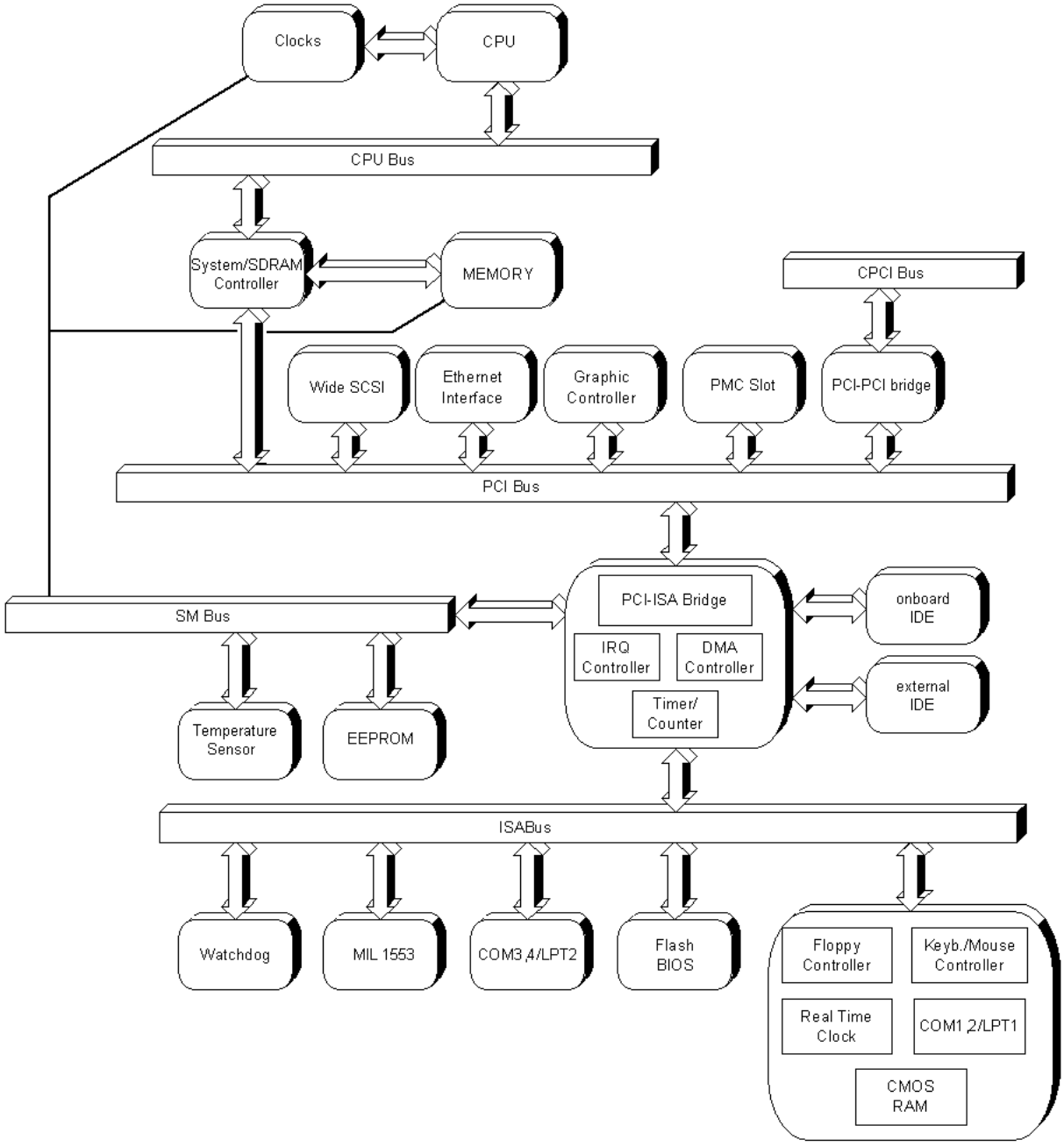
Storage up to 95%, non-condensing

Operating up to 95%, non-condensing

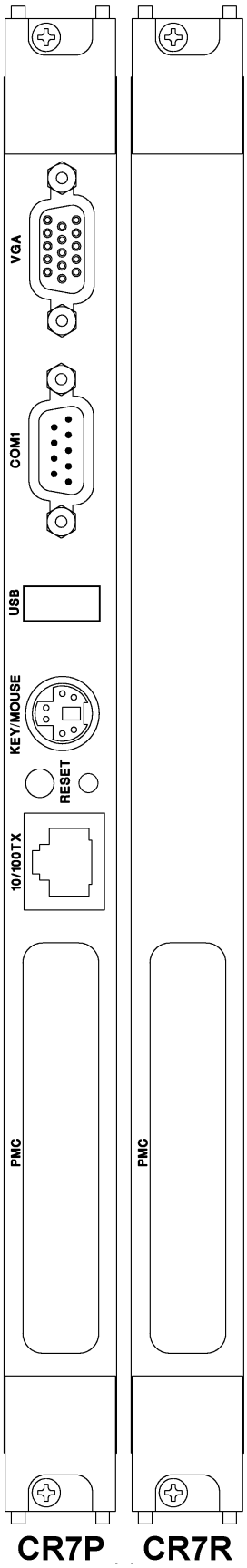
Environment	C,I,F,G,E,R-Style	K,N-Style
Vibration		
Spectrum	5 to 200 Hz	5 to 2000 Hz
Acceleration	2g	14g
Shock		
Amplitude	20g	40g/100g
Duration	6ms	11ms/6ms

2 Hardware Installation

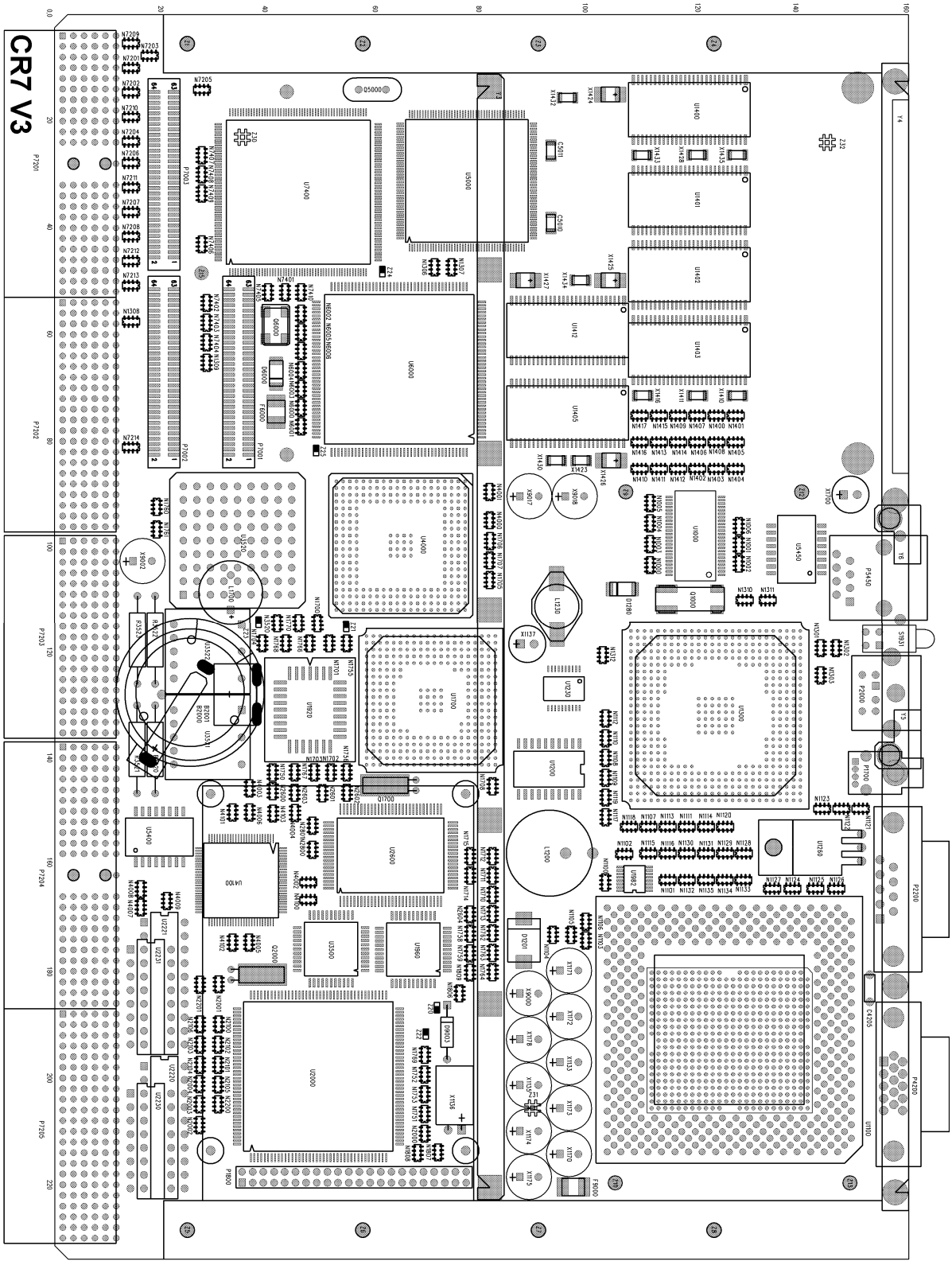
The CR7 is a fully IBM-AT compatible stand-alone PC. It is equipped with all functions a conventional Personal Computer can only offer with several add-on cards . Extension boards can be connected via the CPCI interface. The minimized board size and the large number of interfaces and functions enable the CR7 for use in many applications.



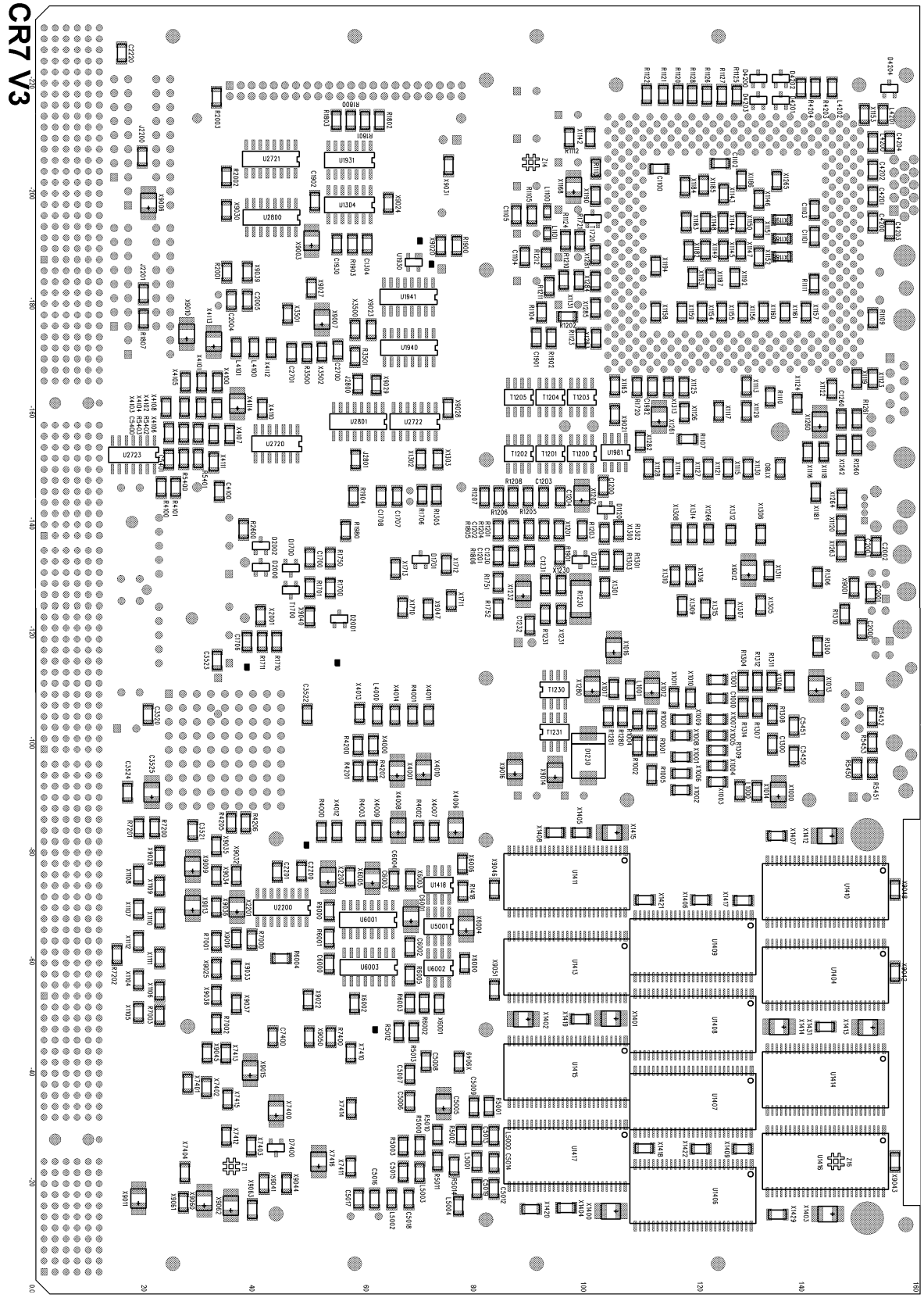
2.1 Front Panel



2.2 Placement Plan Component side

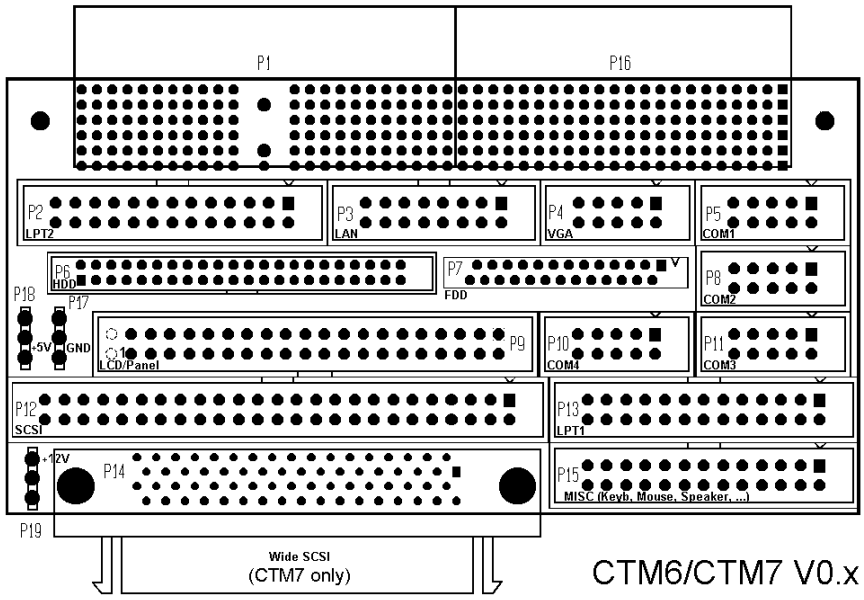


2.3 Placement Plan Solder side



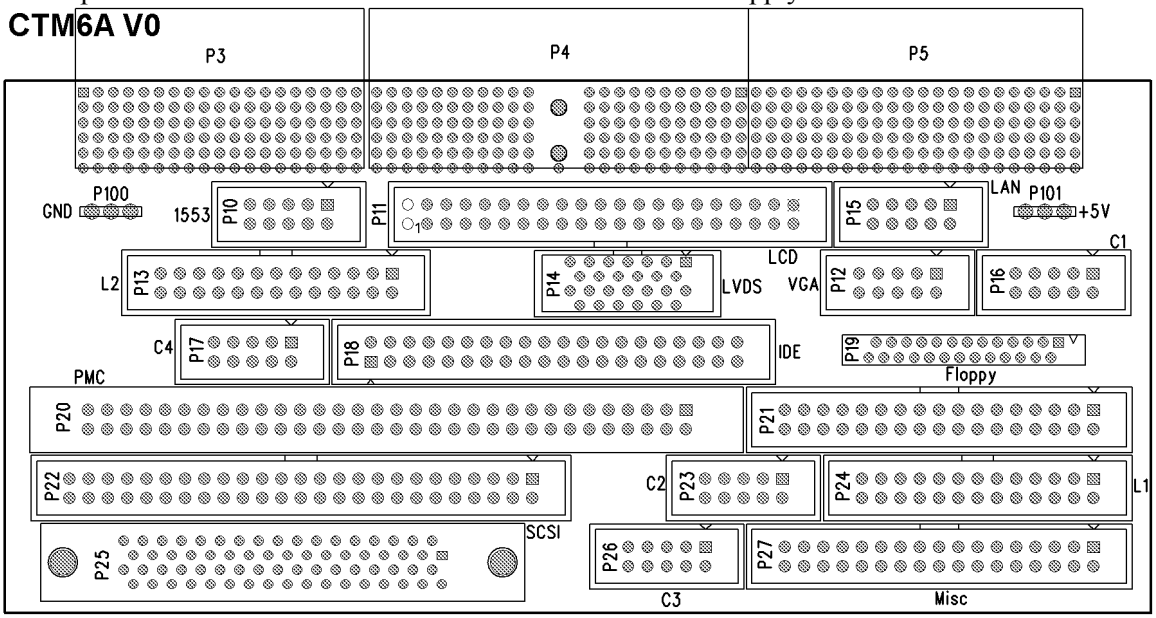
2.4 CTM6/CTM7 transition module placement plan

For easy connection of the I/O signals to standard connectors, a transition module CTM6 is available from SBS Technologies. The Wide SCSI connector is populated only on the version CTM7. Additional Power should be provided to the CTM6 via P18/P17 for better supply of the IDE. The +12V to P19 are not required when used with a CR7.



2.5 CTM6A/B/C transition module placement plan

When using the 1553 or the PMC IO signals, a different transition module CTM6A/B/C is available from SBS Technologies. The CTM6B offers also the Wide SCSI connector. The connectors P20 (PMC-I/O), P10 (MIL 1553) and P25 (Wide SCSI) are populated only on the version CTM6C. In difference to CTM6, the CTM6A/B/C offers the floppy connector for foil cable as well as for standard 34 pol flat cable and the IDE connector is a standard 40 pin connector with 2.54 mm pin spacing. Additional Power should be provided to the CTM6A/B/C via P100/P101 for better supply of the IDE.



2.6 Socket Installation

2.6.1 Serial Port Configuration for COM1 and COM2

The serial ports COM1 and COM2 are user configurable for either RS232 or RS422 operation (CR7P C-Style and I-Style boards only).

	COM1 RS232	COM1 RS422	COM2 RS232	COM2 RS422
U2220	X			
U2230		X		
U2221			X	
U2231				X

U2220, U2221 = SN75C185 default
U2230, U2231 = SN75C1167 = CPC-R422C from SBS Technologies

2.6.2 Jumper Configuration

There are no user accessible jumpers on the CR7.

2.7 Connectors

This chapter describes all connector pinouts on the CR7 and on the CTM6/CTM6A transition module. The rugged versions of the CR7 (CR7Rxxxxxx) do not have any front panel connector. The description of the rear connector is valid for the CR7P and CR7R versions as well.

☞ The Ethernet at the CR7P can only be used at the front connector and with the CR7R at the rear connector or at the transition module.

☞ CPCI connector reference: The CPCI specification numbers the CPCI connectors from bottom to top J1, J2, J3, J4, J5. The CPCI connectors on the CR7 are P7201, P7202, P7203, P7204, P7205 respectively.

2.7.1 CompactPCI bus Connector (P7201, P7202)

This connector is used for connection to a standard CPCI backplane. The signals shown here form the secondary PCI bus.

P7201	A	B	C	D	E	F
1	VCC	nc	nc	nc	VCC	GND
2	nc	VCC	nc	nc	nc	GND
3	\INTA	\INTB	\INTC	VCC	\INTD	GND
4	nc	GND	V_I/O	nc	nc	GND
5	nc	nc	\PCI_RST	GND	\GNT0	GND
6	\REQ0	GND	nc	PCICLK0	AD31	GND
7	AD30	AD29	AD28	GND	AD27	GND
8	AD26	GND	V_I/O	AD25	AD24	GND
9	\C/BE3	nc	AD23	GND	AD22	GND
10	AD21	GND	nc	AD20	AD19	GND
11	AD18	AD17	AD16	GND	\C/BE2	GND
12-14	KEY	KEY	KEY	KEY	KEY	KEY
15	nc	\FRAME	\IRDY	GND	\TRDY	GND
16	\DEVSEL	GND	V_I/O	\STOP	\LOCK	GND
17	nc	nc	nc	GND	\PERR	GND
18	\SERR	GND	nc	PAR	\C/BE1	GND
19	nc	AD15	AD14	GND	AD13	GND
20	AD12	GND	V_I/O	AD11	AD10	GND
21	nc	AD9	AD8	nc	\C/BE0	GND
22	AD7	GND	nc	AD6	AD5	GND
23	nc	AD4	AD3	VCC	AD2	GND
24	AD1	VCC	V_I/O	AD0	\ACK64	GND
25	VCC	\REQ64	nc	nc	VCC	GND
P7202	A	B	C	D	E	F
1	PCICLK1	GND	\REQ1	\GNT1	\REQ2	GND
2	PCICLK2	PCICLK3	nc	\GNT2	\REQ3	GND
3	PCICLK4	GND	\GNT3	\REQ4	\GNT4	GND
4	V_I/O	nc	nc	GND	nc	GND
5	nc	GND	V_I/O	nc	nc	GND
6	nc	nc	nc	GND	nc	GND
7	nc	GND	V_I/O	nc	nc	GND
8	nc	nc	nc	GND	nc	GND
9	nc	GND	V_I/O	nc	nc	GND
10	nc	nc	nc	GND	nc	GND
11	nc	GND	V_I/O	nc	nc	GND
12	nc	nc	nc	GND	nc	GND
13	nc	GND	V_I/O	nc	nc	GND
14	nc	nc	nc	GND	nc	GND
15	nc	GND	P.U.	\REQ5	\GNT5	GND
16	nc	nc	P.U.	GND	nc	GND
17	nc	GND	\RST_BUT	\REQ6	\GNT6	GND
18	nc	nc	nc	GND	nc	GND
19	GND	GND	nc	nc	nc	GND
20	PCICLK5	GND	nc	nc	nc	GND
21	PCICLK6	GND	nc	nc	nc	GND
22	nc	nc	nc	nc	nc	GND

2.7.2 I/O Connector (P7204, P7205)

The connector P7204 carries the signals for the I/O signals of the CR7. For easy connection to standard connectors, a transition module CTM6 or CTM6A is available from SBS Technologies.

P7204	A	B	C	D	E	F
1	L2_SLCT	L2_D7	GND	HD_D8	\HD_RST	GND
2	L2_PE	L2_D6	\S_IO	HD_D9	HD_D7	GND
3	L2_BUSY	L2_D5	\S_REQ	HD_D10	HD_D6	GND
4	\L2_ACK	L2_D4	\S_C/D	HD_D11	HD_D5	GND
5	GND	L2_D3	\S_SEL	HD_D12	HD_D4	GND
6	\L2_SLIN	L2_D2	\S_MSG	HD_D13	HD_D3	GND
7	\L2_INIT	L2_D1	\S_RST	HD_D14	HD_D2	GND
8	\L2_ERROR	L2_D0	\S_ACK	HD_D15	HD_D1	GND
9	\L2_AFEED	\L2_STROB	\S_BUSY	nc	HD_D0	GND
10	LC_VCC	LC_VEE	\S_ATN	HD_A2	\HD_IOW	GND
11	LC_BACKL	LC_DE	\S_DP0	\HD_CS3	\HD_IOR	GND
12-14	KEY	KEY	KEY	KEY	KEY	KEY
15	LC_P16	LC_P04	\S_D7	GND	HD_RDY	GND
16	LC_P03	LC_P02	VCC	\S_D11	HD_IRQ14	GND
17	LC_P01	LC_P00	\S_D6	\S_D10	HD_A1	GND
18	LC_P10	LC_P09	\S_D5	\S_D9	HD_A0	GND
19	LC_P08	LC_P07	\S_D4	\S_D8	\HD_CS1	GND
20	LC_P06	LC_P05	\S_D3	\S_DP1	GND	GND
21	LC_P17	LC_P15	\S_D2	\S_D15	\HD_DRQ	GND
22	LC_P14	LC_P13	\S_D1	\S_D14	S_TERMPW	GND
23	LC_P12	LC_P11	\S_D0	\S_D13	\LED	GND
24	GND	LC_VSYNC	GND	\S_D12	\HD_DACK	GND
25	LC_HSYNC	LC_CLK	nc	nc	GND	GND
P7205	A	B	C	D	E	F
1	LC_P18	LC_P19	ET_RX- *	ET_RX+ *	VBATIN *	GND
2	LC_P20	LC_P21	ET_BIAS45 *	ET_BIAS45 *	ET_BIAS78 *	GND
3	LC_P22	LC_P23	ET_TX- *	ET_TX+ *	ET_BIAS78 *	GND
4	VGA_VSYN	VGA_HSYN	\FD_HDSEL	GND	C4_RI	GND
5	VGA_BLUE	VGA_GREEN	\FD_RDAT	C4_DTR	C4_CTS	GND
6	VGA_RED	GND	\FD_WPRT	C4_TXD	C4_RTS	GND
7	L1_SLCT	L1_D7	\FD_TRK0	C4_RXD	C4_DSR	GND
8	L1_PE	L1_D6	\FD_WGATE	C4_DCD	GND	GND
9	L1_BUSY	L1_D5	\FD_WDATA	C3_RI	C3_DTR	GND
10	\L1_ACK	L1_D4	\FD_STEP	C3_CTS	C3_TXD	GND
11	GND	L1_D3	\FD_DIR	C3_RTS	C3_RXD	GND
12	\L1_SLIN	L1_D2	\FD_MTR0	C3_DSR	C3_DCD	GND
13	\L1_INIT	L1_D1	\FD_DCHG	GND	C2_RI	GND
14	\L1_ERROR	L1_D0	\FD_DRV0	C2_DTR	C2_CTS	GND
15	\L1_AFEED	\L1_STROB	\FD_INDX	C2_TXD	C2_RTS	GND
16	VCC	VCC	VCC	C2_RXD	C2_DSR	GND
17	GND	GND	GND	C2_DCD	GND	GND
18	USB1+	USB2+	KB_DATA	C1_DTR	C1_RI	GND
19	USB1-	USB2-	KB_CLK	C1_TXD	C1_CTS	GND
20	\SPEAKER	VCC	MS_DATA	C1_RXD	C1_RTS	GND
21	\WDG_REL	GND	MS_CLK	C1_DSR	C1_DCD	GND
22	\RST_BUT	nc	nc	nc	nc	GND

* with CR7R only

Signal groups:

floppy disk controller signals :	\FD....
hard disk controller signals :	HD.... and \HD....
Parallel port 1 signals:	L1... and \L1....
Parallel port 2 signals:	L2... and \L2....
COM1, COM2, COM3, COM4 signals:	C1....., C2....., C3....., C4.....
SCSI signals:	\S_... and S_....
Ethernet signals:	ET_…
VGA signals:	VGA_
Universal Serial Bus:	USB1-,USB1+,USB2-,USB2+
keyboard signals:	KB_...
mouse signals:	MS_...
LCD signals:	LC_...
LAN signals	RJ..(with CR7R only)
Misc signals:	\LED,\SPEAKER,\WDG_REL,\RST_BUT, VBATIN
nc:	not connected

☞ The high level of the LCD signals is 3.3V

2.7.2.1 I/O Connector (P7204, P7205) optional configurations

When configuring some/all serial ports from the standard RS232 to RS422 (please see section **Socket Installation** above), the signal changes to the function described by the table below:

P7205	D	E
4	GND	C4_-RXD
5	C4_+RXD	C4_-CTS
6	C4_+CTS	C4_+RTS
7	C4_-RTS	C4_+TXD
8	C4_-TXD	GND
9	C3_-RXD	C3_+RXD
10	C3_-CTS	C3_+CTS
11	C3_+RTS	C3_-RTS
12	C3_+TXD	C3_-TXD
13	GND	C2_-RXD
14	C2_+RXD	C2_-CTS
15	C2_+CTS	C2_+RTS
16	C2_-RTS	C2_+TXD
17	C2_-TXD	GND
18	C1_+RXD	C1_-RXD
19	C1_+CTS	C1_-CTS
20	C1_-RTS	C1_+RTS
21	C1_+TXD	C1_-TXD

2.7.3 I/O Connector2 (P7203)

The connector P7203 carries the signals for the PMC-I/O and MIL 1553 signals of the CR7

No.	A	B	C	D	E	F
1	+5V *	PMCIO_64	PMCIO_63	PMCIO_62	PMCIO_61	GND
2	PMCIO_60	PMCIO_59	PMCIO_58	PMCIO_57	PMCIO_56	GND
3	PMCIO_55	PMCIO_54	PMCIO_53	PMCIO_52	PMCIO_51	GND
4	PMCIO_50	PMCIO_49	PMCIO_48	PMCIO_47	PMCIO_46	GND
5	PMCIO_45	PMCIO_44	PMCIO_43	PMCIO_42	PMCIO_41	GND
6	PMCIO_40	PMCIO_39	PMCIO_38	PMCIO_37	PMCIO_36	GND
7	PMCIO_35	PMCIO_34	PMCIO_33	PMCIO_32	PMCIO_31	GND
8	PMCIO_30	PMCIO_29	PMCIO_28	PMCIO_27	PMCIO_26	GND
9	PMCIO_25	PMCIO_24	PMCIO_23	PMCIO_22	PMCIO_21	GND
10	PMCIO_20	PMCIO_19	PMCIO_18	PMCIO_17	PMCIO_16	GND
11	PMCIO_15	PMCIO_14	PMCIO_13	PMCIO_12	PMCIO_11	GND
12	PMCIO_10	PMCIO_9	PMCIO_8	PMCIO_7	PMCIO_6	KEY
13	PMCIO_5	PMCIO_4	PMCIO_3	PMCIO_2	PMCIO_1	
14	3.3 V	\S_D6	\S_BUSY	\S_MSG	\S_IO	
15	\S_D0	\S_D1	\S_D2	1553_SH1B+	1553_SH1A+	GND
16	\S_D3	\S_D4	\S_D5	1553_LG1B+	1553_LG1A+	GND
17	\S_D7	\S_DP0	S_TERMPW	1553_CEN1B	1553_CEN1A	GND
18	\S_ATN	\S_ACK	\S_RST	1553_LG1B-	1553_LG1A-	GND
19	\S_SEL	\S_C/D	\S_REQ	1553_SH1B-	1553_SH1A-	GND

* onboard VIO of the PMC slot

2.7.4 Flashdisk Connector (P1800), IDE connector (CTM6-P6, CTM6A-P18)

The Flash disk interface is designed as a 44-pin 2mm pitch female onboard connector P1800 to fit directly to a 1,8 inch IDE flash disk. The IDE connector P6 is available at the CTM6 to be used additional for 1 or 2 external hard disk drives. The cable length must not exceed 30 cm.

☞ Do not try to connect a HDD to the secondary EIDE interface connector P1800.
This connector is reserved for direct connection of a flash disk only.

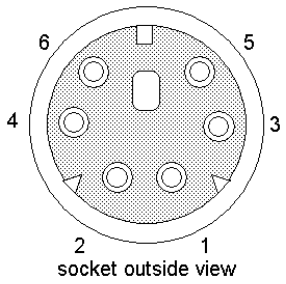
PIN at P1800	PIN at CTM6-P6	PIN at CTM6A-P18	SIGNAL	SIGNAL	PIN at CTM6A-P18	PIN at CTM6-P6	PIN at P1800
1	2	2	GND	\RST_DRV	1	1	2
3	4	4	HD_D8	HD_D7	3	3	4
5	6	6	HD_D9	HD_D6	5	5	6
7	8	8	HD_D10	HD_D5	7	7	8
9	10	10	HD_D11	HD_D4	9	9	10
11	12	12	HD_D12	HD_D3	11	11	12
13	14	14	HD_D13	HD_D2	13	13	14
15	16	16	HD_D14	HD_D1	15	15	16
17	18	18	HD_D15	HD_D0	17	17	18
19	20	20	n.c.	GND	19	19	20
21	22	22	GND	HD_DRQ0	21	21	22
23	24	24	GND	\HD_IOW	23	23	24
25	26	26	GND	\HD_IOR	25	25	26
27	28	28	n.c.	HD_RDY	27	27	28
29	30	30	GND	HD_DAK0	29	29	30
31	32	32	n.c.	HD_IRQ	31	31	32
33	34	34	n.c.	HD_A1	33	33	34
35	36	36	HD_A2	HD_A0	35	35	36
37	38	38	\HD_CS3	\HD_CS1	37	37	38
39	40	40	GND	n.c.	39	39	40
41	42		+5V	+5V		41	42
43	44		n.c.	GND		43	44

Please note that the IDE connector at CTM6A is a 40 pin header with 2.54mm spacing. Therefor external power has to be supplied to the IDE drive. For attaching a 2.5" harddisk, a transition module HD-ADAP1B is available from SBS Technologies.

2.7.5 Keyboard/PS-2 Mouse Interface (P2000, CTM6-P15, CTM6A-P27)

The CR7 allows an easy adaptation of a keyboard to a standard 6-pin MINI-DIN connector. Also a PS/2 mouse can be connected via a external cable splitter.

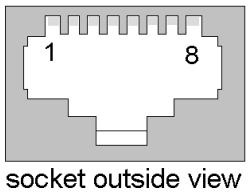
Name	P2000	CTM6-P15 CTM6A-P27
Keyb. Data	1	20
Mouse Data	2	16
GND	3	19
Fused +5V	4	-
+5V unfused	-	21
Keyb. Clk	5	18
Mouse Clk	6	14



2.7.6 Ethernet Interface 10BaseT and 100BaseTX (P5000, CTM6-P3, CTM6A-P15)

The Ethernet interface requires usage of CAT 5 cable which contains separate transmit and receive pairs for proper operation with 100BaseTX. For operation with 10BaseT, a CAT 3 cable or better is required. On all CR7P versions, Ethernet is only available via the front panel connector and on all CR7R versions at the rear connector.

Name	P5000	CTM6-P3	CTM6A-P15
TXD+ (ET_TX+)	1	1	1
TXD- (ET_TX-)	2	2	2
RXD+ (ET_RX+)	3	7	5
BIAS1 (ET_BIAS45)	4	3	3
BIAS1 (ET_BIAS45)	5	4	4
RXD- (ET_RX-)	6	8	6
BIAS2 (ET_BIAS78)	7	15	7
BIAS2 (ET_BIAS78)	8	16	8
nc			9,10



☞ BIAS1 and BIAS2 are connected via a resistor bridge to the center tabs of the input and output transformers.

2.7.7 Parallel Interface LPT1, 2 (CTM6-P2, CTM6-P13, CTM6A-P24, CTM6A-P13)

Both parallel ports are only available at the rear connector or at the transition module.

Name	LPT1: CTM6-P2, CTM6A-P24 LPT2: CTM6-P13, CTM6A-P13
\Strobe	1
D0	3
D1	5
D2	7
D3	9
D4	11
D5	13
D6	15
D7	17
\ACK	19
BUSY	21
PE	23
SLCT	25
\AUTOFEED	2
\ERROR	4
\INIT	6
\SLCTIN	8
GND	10,12,14,16,18,20,22,24
+5V unfused	26

2.7.8 Serial Interfaces (P2200, CTM6-P5, 8, 11, 10, CTM6A-P16, P23, P26, P17)

The CR7 offers four serial ports, two of them are optional (COM3 and COM4). COM1 and COM2 have socketed line drivers configured for RS232 and can be reconfigured for RS422 by the user (Please check the section **Socket Installation** above). COM3/4 can be ordered with RS232 or RS422 drivers. All COM ports are accessible via the transition module, additional COM1 is accessible via the front panel connector P2200.

Name (RS232)	Name (RS422)	CTM6 2x5-pin headers COM1..4	Front Panel P2200 COM1
\DCD	-TXD	1	1
\DSR	+TXD	2	6
RXD	-RTS	3	2
\RTS	+RTS	4	7
TXD	+CTS	5	3
\CTS	-CTS	6	8
\DTR	+RXD	7	4
\RI	-RXD	8	9
GND		9	5
+5V unfused		10	-

2.7.9 VGA Interface (P4200, CTM6-P4, CTM6A-P12)

The monitor signals are available at the front panel on a standard 15-pin female D-Sub connector or at the CTM6-P4.

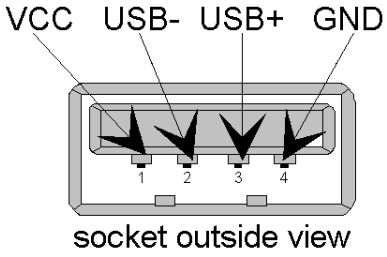
Name	P4200	CTM6-P4 CTM6A-P12
RED	1	2
GREEN	2	4
BLUE	3	6
HSYNC	13	8
VSYNC	14	10
DDC-Data	12	n.a.
DDC-Clock	15	n.a.
Fused +5V	9	n.a.
GND	5, 6, 7, 8, 10	1, 3, 5, 7, 9
Nc	4, 11	-

n.a. not available

2.7.10 USB Interface (P1700, CTM6-P15, CTM6A-P27)

One USB channel is available at the front panel and both can be connected at the CTM6.

Name	P1700	CTM6-P15 CTM6A-P27
Fused +5V	1	-
+5V unfused	-	21
USB1-	2	22
USB1+	3	23
USB2-	-	24
USB2+	-	25
GND	4	26



2.7.11 Floppy connector (CTM6-P7, CTM6A-P19, CTM6A-P21)

The CTM6 provides a connector for direct adaptation of floppy drives via a 26-pin foil cable. The CTM6A has a additional standard 2.54mm 34 pin connector.

Name	CTM6-P7 CTM6A-P19	CTM6A-P21
\INDEX	2	8
\DRVSEL	4	12
\DSKCHG	6	34
\MOTOR	10	16
\DIR	12	18
\STEP	14	20
\WRDATA	16	22
\WGATE	18	24
\TRACK0	20	26
\WRPROT	22	28
\RDDATA	24	30
\HDSEL	26	32
GND	15, 17, 19, 21, 23, 25	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33
+5V unfused	1, 3, 5	-
nc	7, 8, 9, 11, 13	2, 4, 6, 10, 14

2.7.12 LCD/Panel connector (CTM6-P9, CTM6A-P11)

A 40 pin header is mounted on the transition module to be used with LCD displays or for the connection to our external panel 'LCD1'. The high level of all LCD signals is 3.3V. For the function of the signals P00..P23 please check the chapter 3.5.2.1 LCD Signal Mapping.

Name	CTM6-P9 CTM6A-P11		Name
COM2-TXD	1	2	COM2-RXD
KBCLK	3	4	KBDAT
enableVCC	5	6	enableVEE
BACKL	7	8	DE
GND	9	10	P16
P04	11	12	P03
P02	13	14	P01
P00	15	16	GND
P10	17	18	P09
P08	19	20	P07
P06	21	22	P05
GND	23	24	P17
P15	25	26	P14
P13	27	28	P12
P11	29	30	GND
VSYNC	31	32	HSYNC
CLK	33	34	GND
P18	35	36	P19
P20	37	38	P21
P22	39	40	P23

2.7.13 Flat Panel Display connector (CTM6A-P14)

This connector is not supported with the CR7.

2.7.14 Wide SCSI connector (CTM7-P14, CTM6B-P25)

A standard 16-bit SCSI 68 pin connector is optional available on the transition modules. Please order CTM7 or CTM6B respectively.

Name	CTM7-P14 CTM6B-P25		Name
\D12	35	1	GND
\D13	36	2	GND
\D14	37	3	GND
\D15	38	4	GND
\DP1	39	5	GND
\D0	40	6	GND
\D1	41	7	GND
\D2	42	8	GND
\D3	43	9	GND
\D4	44	10	GND
\D5	45	11	GND
\D6	46	12	GND
\D7	47	13	GND
\DP0	48	14	GND
GND	49	15	GND
GND	50	16	GND
TERMPWR	51	17	TERMPWR
TERMPWR	52	18	TERMPWR
nc	53	19	nc
GND	54	20	GND
\ATN	55	21	GND
GND	56	22	GND
\BUSY	57	23	GND
\ACK	58	24	GND
\RST	59	25	GND
\MSG	60	26	GND
\SEL	61	27	GND
\C/D	62	28	GND
\REQ	63	29	GND
\IO	64	30	GND
\D8	65	31	GND
\D9	66	32	GND
\D10	67	33	GND
\D11	68	34	GND

2.7.15 SCSI connector (CTM6-P12, CTM6A-P22)

A standard 8-bit SCSI 50 pin connector is available on the transition module.

Name	CTM6-P12 CTM6A-P22		Name
\D0	2	1	GND
\D1	4	3	GND
\D2	6	5	GND
\D3	8	7	GND
\D4	10	9	GND
\D5	12	11	GND
\D6	14	13	GND
\D7	16	15	GND
\DP	18	17	GND
GND	20	19	GND
GND	22	21	GND
nc	24	23	nc
TERMPWR	26	25	nc
nc	28	27	nc
GND	30	29	GND
\ATN	32	31	GND
GND	34	33	GND
\BUSY	36	35	GND
\ACK	38	37	GND
\RST	40	39	GND
\MSG	42	41	GND
\SEL	44	43	GND
\C/D	46	45	GND
\REQ	48	47	GND
\IO	50	49	GND

2.7.16 MIL 1553 connector (CTM6B-P10)

The onboard 1553 interface can be connected at the transition module CTM6B via P10

Name	CTM6B-P10		Name
SHORT1A+	1	2	SHORT1A-
LONG1A+	3	4	LONG1A-
CENTERA	5	6	CENTERB
LONG1B+	7	8	LONG1B-
SHORT1B+	9	10	SHORT1B-

2.7.17 PMC connectors (P7001, P7002)

The following table lists the pin assignments of the PMC connector.

P7001	P7002	Pin	Pin	P7001	P7002
N.C.	+12V	01	02	-12V	NC
GND	NC	03	04	/INTD	NC
/INTA	NC	05	06	/INTB	GND
N.C.	GND	07	08	Vcc	RES.
/INTC	RES.	09	10	RES.	RES.
GND	Vcc	11	12	RES.	+3.3V
PCLK_PMC	/PCIRST	13	14	GND	GND
GND	+3.3V	15	16	/GNT0	GND
/REQ0	RES.	17	18	Vcc	GND
Vcc	AD30	19	20	AD31	AD29
AD28	GND	21	22	AD27	AD26
AD25	AD24	23	24	GND	+3.3V
GND	AD20	25	26	C/BE3	AD23
AD22	+3.3V	27	28	AD21	AD20
AD19	AD18	29	30	Vcc	GND
Vcc	AD16	31	32	AD17	C/BE2
/FRAME	GND	33	34	GND	RES.
GND	/TRDY	35	36	/IRDY	+3.3V
/DEVSEL	GND	37	38	Vcc	/STOP
GND	/PERR	39	40	/LOCK	GND
SDONE	+3.3V	41	42	/SBO	/SERR
PAR	C/BE1	43	44	GND	GND
Vcc	AD14	45	46	AD15	AD13
AD12	GND	47	48	AD11	AD10
AD9	AD8	49	50	Vcc	+3.3V
GND	AD7	51	52	C/BE0	RES.
AD6	+3.3V	53	54	AD5	RES.
AD4	RES.	55	56	GND	GND
Vcc	N.C.	57	58	AD3	N.C.
AD2	GND	59	60	AD1	GND
AD0	/ACK64	61	62	Vcc	+3.3V
GND	GND	63	64	/REQ64	RES.

☞ N.C. Not connected
RES. Reserved. Do not connect anything
+12V/-12V Only available if connected to CPCI backplane.

2.7.18 PMC-I/O connector (P7003, CTM6B-P20)

The I/O section of the PMC slot is available at a standard 68 pole header P20 at the CTM6B. Pin 1 of the I/O connector is Pin 1 of P20, Pin 2 is Pin 2 and so on. All traces are not connected to any signal onboard.

☞ **The connector P20 at the CTM6B is not counted normal, but counted like a D-SUB shell, first the row starting at Pin 1 to Pin 34, then the second row from Pin 35 to Pin 68.**

2.7.19 Misc. connector (CTM6-P15, CTM6A-P27)

Here follows the summary of the misc. connector pinout. At the CTM6 this connector is a 26 pole header and at the CTM6A a 34 pole header.

	CTM6B-P27	CTM6-P15			
nc	1	1	2	2	nc
nc	3	3	4	4	nc
GND	5	5	6	6	\RST_BUT
+5V unfused	7	7	8	8	\SPEAKER
+5V unfused	9	9	10	10	\WDG_REL
+5V unfused	11	11	12	12	\LED
+5V unfused	13	13	14	14	MOUSE_CLK
GND	15	15	16	16	MOUSE_DAT
+5V unfused	17	17	18	18	KBD_CLK
GND	19	19	20	20	KBD_DATA
+5V unfused	21	21	22	22	USB1-
USB1+	23	23	24	24	USB2-
USB2+	25	25	26	26	GND
GND	27	-	-	28	VBATIN①
nc	29	-	-	30	VIO②
+5V unfused	31	-	-	32	+5V unfused
+3.3V unfused	33	-	-	34	+3.3V unfused

① VBATIN is used for connection of an external battery with CR7R. On CTM6 this signal is available at P3 (Ethernet connector) pin 14. The corresponding ground is at P3 pin 13.

② VIO is the I/O voltage of the PMC slot and is connected on the CR7 to +5V

2.8 Memory Map

The table below shows the memory address area used by the CR7.

Address	Size	used by
$00000 - $9FFFF	640 Kbytes	System RAM
$A0000 - $BFFFF	128 Kbytes	Video RAM
$C0000 - $C9FFF	44 Kbytes	Video BIOS
$CA000 - $EFFFF	96 Kbytes	used by PCI ROMs (SCSI, Ethernet Boot ROM, ...)
$F0000 - $FFFFF	64 Kbytes	System BIOS
$100000 - $7FFFFFF	depends on avail. DRAM	Extended RAM
$FFF80000 - $FFFDFFFF	384 Kbytes	Extended BIOS
$FFFE0000 - $FFFFFFFF	128 Kbytes	System BIOS

2.9 Register Set

The following chapter provides an overview of the registers located in the I/O address area of the CR7.

☞ The address location of PCI devices such as SCSI or Ethernet are not described in the following tables because the System BIOS automatically configures (PnP, Plug and Play) each PCI device to avoid address conflicts. Many device drivers show the actual address locations after installation and loading.

2.9.1 Standard Register Set

The standard register set is equal to all standard PC/AT systems. The table below provides an overview of the address ranges occupied by these registers.

I/O Address Range (Hex)	Function
0000 – 000F	DMA Controller 1
0020 – 0021	Interrupt Controller 1
0040 – 0043	Counter/Timer
0060	Keyboard Controller
0061	NMI Status and Control
0064	Keyboard Controller
0070 - 0071	RTC, NMI Mask
0080 - 008F	DMA Page register
00A0 - 00A1	Interrupt Controller 2
00B2 - 00B3	Power Management
00C0 - 00DE	DMA Controller 2
00F0 - 00F1	Coprocessor
0160 – 016F	reserved; see below
0170 – 0177	secondary IDE
01F0 - 01F7	primary IDE
0278 - 027F	LPT [1)]
02E8 - 02EF	COM4 [2) 1)]
02F8 - 02FF	COM2 [1)]
0378 - 037F	LPT [1)]
03BC - 03BF	LPT [1)]
03E8 - 03EF	COM3 [2) 1)]
03F2 - 03F7	Floppy
03F8 - 03FF	COM1 [1)]

☞ 1) Via setup three address ranges can be defined for up to two parallel interfaces and four address ranges for four serial interfaces.

2) These I/O addresses are used by optional devices.

2.9.2 Extended Register Set

The extended register set is specific to the CR7. To protect the system against illegal register accesses, the extended register set can be locked by using the LOCKR register.

I/O Address Range (Hex)	Name	Function
0160	WCR	Watchdog Control Register
0161	NMITCR	NMI Timer Control Register
0168	LEDCR	LED Control Register
0169	LOCKR	Lock Register

A detailed description of the registers above can be found in the 'Programming Manual for SBS onboard I/O'.

2.10 Interrupts

The interrupt routing for standard components such as COM1/2, LPT1, ... is in compliance with standard PC/AT systems. Unused interrupts can be used for add-on cards or other board specific PCI devices such as SCSI and Ethernet. The CR7 BIOS setup allows manual routing for the PCI devices.

Hardware IRQ		IRQ Source
INTC1	IRQ00	System Timer
	IRQ01	Keyboard
	IRQ02	Cascade from INTC2
	IRQ03	COM2 [1)]
	IRQ04	COM1 [1)]
	IRQ05	LPT2 [1)]
	IRQ06	Floppy Disk Controller
	IRQ07	LPT1 [1)]
INTC2	IRQ08	Real Time Clock
	IRQ09	PCI devices
	IRQ10	COM4 [1)]
	IRQ11	COM3 [1)]
	IRQ12	PS/2 Mouse [2)]
	IRQ13	Numeric Coprocessor
	IRQ14	external IDE [3)]
	IRQ15	Flash disk [4)]
NMI	IOCHCK	NMI-Timer
	Parity Error, ECC Error, System Error	Memory Controller

☞ 1) This interrupt is available when no ISR (Interrupt Service Routine) is installed.
2) This interrupt is available when PS/2 mouse is not connected.
3) This interrupt is available when the primary IDE controller is disabled in SETUP.
4) This interrupt is available when the secondary IDE controller is disabled in SETUP.

2.11 DMA

The DMA routing for standard components such as floppy and parallel port is in compliance with other PC/AT systems.

DMA Channel		DMA Source
DMAC1	Channel 0	unused
	Channel 1	LPT2 in ECP mode
	Channel 2	Floppy Disk Controller
	Channel 3	LPT1 in ECP mode
DMAC2	Channel 4	Cascade from DMAC1
	Channel 5	unused
	Channel 6	unused
	Channel 7	unused

3 Function Blocks

3.1 EIDE/ATAPI Interface

The CR7 offers two independent EIDE/ATAPI interfaces. Both devices are logically connected to the primary PCI bus. Therefore a high data transfer rate is achievable. The signals of the primary EIDE interface are available at the backpanel IO connector only. The signals of the secondary EIDE interface are used for connection of a flash disk via connector P1800.

The CR7 System BIOS automatically detects a connected EIDE HDD or flash disk and enters the corresponding drive parameters into the BIOS setup. This feature allows faster and easier handling of varying types of EIDE hard disks. At the primary EIDE interface two hard disks can be connected. In this case one HDD must be configured as master and the other one as slave. Read the hard disk manual to find out where these jumpers are located on your drive. The optional flash disk is connected to an onboard EIDE connector (secondary EIDE interface).

Using EIDE and SCSI devices.
MS-DOS 6.22 can handle up to seven hard disks. The PC allows the simultaneous use of EIDE and SCSI hard disks. In BIOS setup, you can select whether to boot from the first EIDE or the first SCSI device.

☞ For correct operation of the EIDE interface, a maximum cable length of 8 inch (20 cm) must not be exceeded.

3.2 Serial Interfaces

The CR7 serial ports are fully compatible with the NS16450 and NS16550. This means that each serial interface provides a 16 byte FIFO and therefore offers a higher performance than earlier used standard serial interfaces. The UARTs have programmable baud rate generators capable of 50 to 115200 baud.

3.3 Parallel Interfaces

The parallel ports are fully compatible with the new IEEE 1284 standard, including level 2 support. The parallel port consists of an Enhanced Parallel Port (EPP1.7/1.9) and an Extended Capabilities Port (ECP 16Byte FIFO + DMA support). The new modes allow higher transfer rates up to 1 Mbytes/s. Via BIOS Setup, the operating modes of the parallel interface can be selected.

3.4 Floppy Controller

The CR7 floppy controller is fully compatible with the PC8477, containing a superset of the NEC uPD72065B and the N82077.

3.5 Graphics Controller

3.5.1 Features

Highly integrated Flat Panel and CRT GUI, max. pixel clock 135 MHz
Accelerator & Multimedia Engine, Palette/DAC, Clock Synthesizer, and integrated frame buffer
Integrated High Performance 2Mbytes 83MHz SDRAM memory
Hardware Windows Acceleration: 64-bit Graphics Engine with 2D acceleration

Following video modes are available:

Resolution	max. Colors	Pixel clock (MHz)	horizontal Freq. (kHz)	vertical Freq. (Hz)
640x480	16 Mio	25.175	31.5	60
		31.5	37.5	75
		36	43.3	85
800x600	16 Mio	36	35.5	56
		40	37.9	60
		49.5	46.9	75
		56.25	53.7	85
1024x768	65536	44.9	35.5	43(I)
		65	48.4	60
		78.75	60	75
		94.5	68.7	85
1280x1024	256	78.75	47	43(I)
		108	64	60
		135	80	75
1600x1200 ①	256	162/2	75	60

(I) denotes interlaced video display
① Flat panel only

3.5.2 Supported Panel Types

The following displays have been tested successfully with the CR7.

Manufacturer	Part Number	Resolution	Technology	Panel Drive	Interface
NEC	NL6448AC33-18	640x480	TFT	SS	18 Bit
Sharp	LQ10S21	800x600	TFT	SS	18 Bit

3.5.2.1 LCD Signal Mapping

Details for easy adaptation of EL, Plasma, monochrome, color STN and 9,12,18, 24 Bit TFTdisplays can be found in the data sheet of the C&T 69000. For a short overview see the following table for the assignment of the LCD-signals for the types available:

	Mono SS	Mono DD	Mono DD	Color TFT	Color TFT	Color TFT -HR	Color STN SS	Color STN SS	Color STN DD	Color STN DD
Pixels per CLK	8	8	16	1	1	1	5-1/3	2-2/3	5-1/3	2-2/3
	8 Bit	8 Bit	16 Bit	9/12/16	18/24	18/24	8 Bit	16 Bit	8 Bit	16 Bit
LC_P0	P0	UD3	UD7	B0	B0	FB0	R1	R1	UR1	UR0
LC_P1	P1	UD2	UD6	B1	B1	FB1	B1	G1	UG1	UG0
LC_P2	P2	UD1	UD5	B2	B2	FB2	G2	B1	UB1	UB0
LC_P3	P3	UD0	UD4	B3	B3	FB3	R3	R2	UR2	UR1
LC_P4	P4	LD3	UD3	B4	B4	SB0	B3	G2	LR1	LR0
LC_P5	P5	LD2	UD2	G0	B5	SB1	G4	B2	LG1	LG0
LC_P6	P6	LD1	UD1	G1	B6	SB2	R5	R3	LB1	LB0
LC_P7	P7	LD0	UD0	G2	B7	SB3	B5	G3	LR2	LR1
LC_P8			LD7	G3	G0	FG0	CLKU	B3		LG1
LC_P9			LD6	G4	G1	FG1		R4		UB1
LC_P10			LD5	G5	G2	FG2		G4		UR2
LC_P11			LD4	R0	G3	FG3		B4		UG2
LC_P12			LD3	R1	G4	SG0		R5		LG1
LC_P13			LD2	R2	G5	SG1		G5		LB1
LC_P14			LD1	R3	G6	SG2		B5		LR2
LC_P15			LD0	R4	G7	SG3		R6		LG2
LC_P16					R0	FR0				
LC_P17					R1	FR1				
LC_P18					R2	FR2				
LC_P19					R3	FR3				
LC_P20					R4	SR0				
LC_P21					R5	SR1				
LC_P22					R6	SR2				
LC_P23					R7	SR3				
LC_Backl	Backl									
LC_CLK	CLK									
LC_DE/M	DE/M									
LC_Hsync/LP	Hsync									
LC_Vsync/FLM	Vsync									

☞ Take care when using 9, 12 bit TFT displays: The high order output lines should be used when only 9 or 12 bits of the 9/12/16 bit TFT-interface are needed. The low order bits should be left unconnected.

☞ Take care when using 18 or 24 bit TFT displays with the 9/12/16 bit TFT-interface: The high order output lines should be connected to the high order lines of the display. The remaining low order inputs to the display should be connected to GND.

3.5.3 Software Installation

The following table provides an overview of the display drivers available for the Graphic Controller.

Program	Version
Windows 95	
WIN NT	3.51
WIN NT	4.0
OS2	3.0,4.0
Windows 98	

Since the Intel/Chips&Technologies 69000 is used on a large number of computers, many operating systems like OS/2 ,Windows NT, Windows 95 and Windows 98 already include high resolution drivers.

3.6 PMC Slot

The following table describes the compatibility between PMC (PCI mezzanine cards) and the CR7.

	Air cooled mezzanine cards with faceplate I/O	Air cooled mezzanine cards without faceplate I/O	Conduction cooled mezzanine cards without faceplate I/O	Conduction cooled mezzanine cards with faceplate I/O
Air cooled host card C, I style	fully compatible	fully compatible	fully compatible	fully compatible
Air cooled host card (removable ribs) F, G, E, R, K style	not compatible (note 3, 4)	not compatible (note 2, 4)	not compatible (note 2, 4)	not compatible (note 3, 4)
Conduction cooled host card (fixed rib) N style	not compatible	not compatible (note 1)	fully compatible	not compatible

Notes:
1. Air cooled mezzanine cards without faceplate I/O could be compatible if components on the mezzanine do not interfere with the stiffening ribs on the host card.
2. Conduction cooled mezzanine without faceplate I/O cards could be compatible, if the middle rib is removed.
3. Conduction cooled mezzanine with faceplate I/O cards could be compatible, if both ribs are removed.
4. Restriction for the middle rib does not apply when a special version is used (contact factory).

The PMC IO signals are available at the rear connector (pinning related to CPCI spec for single PMC)and on the CTM6B transition module (68 pin header)

3.7 SCSI Interface

SCSI is the abbreviation for Small Computer System Interface. The SCSI bus is a fast, bidirectional parallel bus for communication between computers and peripheral units. The SCSI bus defines two adapter types, the host adapter and the peripheral adapter. The host adapter controls the communication between the computer module and the SCSI bus. The peripheral adapter controls the data transfer between the peripheral units like hard disks, CD-ROM, laser printer or tape drives and the SCSI bus. Today in most cases the peripheral adapter is integrated in the applied devices, therefore only a 50-pin cable (68-pin for wide SCSI) from the SCSI host adapter to the peripheral devices is needed.

The SCSI interface on the CR7 is a host interface, consisting of the PCI Bus SCSI controller Symbios 53C875. This controller chip drives the SCSI protocol in accordance to the ANSI X3.131-1986 (SCSI-1) and ANSI X3.131-199x (SCSI-2) specification, with the following functions:

- Arbitration
- Selection
- Message Handling
- Disconnect/Reconnect
- Data Bus Parity Checking

- Termination of the SCSI Signals

  The SCSI interface is terminated on both sides of the connector cable. The terminator on the CR7 is an active terminator. The other, usually on the peripheral unit must also be an active type. If more than one unit is connected to the host adapter, all terminators on the peripheral units must be removed or disabled, except for the one at the far end of the SCSI cable chain.

- Number of SCSI Devices

  All units connected to the SCSI bus (including peripheral controller and the host adapter) must have an unique ID-number with which they may be accessed. 16 IDs total (0..15), named ID numbers, can be assigned on the SCSI bus. These ID numbers can be changed by jumpers or switches located on the device. The SCSI controller on the CR7 usually reserves the ID number 15, meaning that ID numbers 0 .. 14 can be assigned to the peripheral devices. The CR7 SCSI controller device ID can be altered by means of the SCSI BIOS configuration menu. When using more than two devices on the SCSI bus, make sure that they all have unique IDs. If there are more SCSI hard disks in the system, the hard disk with the lowest ID number is the first hard disk and is given the logical drive name "C:\". The CR7 tries to startup the operating system from the first hard disk. SCSI scan order can be changed within the SCSI BIOS configuration. EIDE versus SCSI scan order can be altered in the system BIOS Setup. Please see the SCSI specification for details on correct cabling.

- Cable characteristic

The characteristic impedance of the cable is shown below:

Characteristic impedance:	SCSI-2	90 ohms to 132 ohms
	Ultra Fast-20	90 +/-10 ohm
Signal attenuation:	0,095 dB maximum per meter at 5 MHz	
Pair-to-pair propagation delay delta:	0,20 ns maximum per meter	
DC resistance:	0,230 ohms maximum per meter	

For correct operation of the SCSI bus, the cable length shown in the table below must not be exceeded.

SCSI-Type	Mbyte/s	No. of devices	cable length
SCSI-2	≤5	8	6m
SCSI-2	10	8	3m
Ultra Fast-20	20	≤4	3m
Ultra Fast-20	20	8	1.5m

☞ Using cables within the specified characteristics is necessary for reliable system operation.

☞ The active Terminator on the CR7 can not be disabled.

☞ The minimum cable length is 20 cm.

☞ The devices should be evenly spaced on the SCSI cable.

3.7.1 Software Installation

The 53C875 SCSI controller provides a total SCSI solution in PC environments with the Symbios SCSI Device Management System (SDMS). SDMS provides driver support for hard disk, removable media and CD-ROM peripherals for the DOS, Windows 3.xx, Windows95/98/NT, OS/2 and Novell 3.x, 4.x and various UNIX environments.

The floppy disks or CDROM supplied with the CR7 include the most commonly used software drivers and utilities. More software is available from the Internet. For detailed information please refer to the Appendix chapter 'Update Information' of this manual.

3.8 Ethernet Interface

The Ethernet controller Am79C973 used with the CR7 is a high performance Fast Ethernet PCI controller compatible to the Novell NE2100 and NE1500 standard devices.

For registration and identification of a workstation in a LAN, a unique ID number is required. Each network card is assigned a unique ID number, which resides in an Ethernet address ROM on the CR7. An Ethernet boot option can be enabled in BIOS setup.

3.8.1 Software Installation

The drivers available for the Ethernet controller AM79C973 support a large number of operating systems. The CR7 BIOS also allows Ethernet remote boot from the following servers:

- IBM LAN SERVER 2.x/3.x
- IBM LAN SERVER 4.x
- Microsoft LAN SERVER
- Novell SERVER

Type	System
ODI	DOS, OS/2
NDIS	DOS, OS/2 2.01
NDIS	WfW3.11 Windows NT 3.1 Windows NT 3.5 Windows NT 3.51 , 4.0 Windows 95
SCO UNIX	SCO ODT 3.0 SCO Open Server 5.0
SUN Solaris	SUN Solaris Drive 2.4
Novell Unixware	Novell Unixware driver 1.2 Novell Unixware driver 2.0

The table shows operating systems supported by the available software.

The floppy disks or CDROM supplied with the CR7 include the most commonly used software drivers and utilities. More software is available from Internet or BBS. For detailed information, refer to the Appendix chapter 'Update Information' of this manual

3.9 MIL-STD-1553 Interface

The CR7 is prepared for a MIL-STD-1553 interface. The used controller is a ILC-DDC BU-61588 BC/RT/MT hybrid in a 81-pin PGA package with +5V single voltage supply. Please contact SBS Technologies for the available temperature/process grading.
The controller and interface is compliant to the MIL-STD-1553 specification and supports Bus Controller (BC), Remote Terminal (RT) and Monitor Terminal (MT) operation. The CR7 provides a 16bit wide ISA BUS interface to the BU-61588 internal 4k words of dual ported RAM and the 32 internal word registers. In case of concurrent access to the dual ported RAM from ISA bus and 1553 controller the ISA bus access will be delayed. RT address are software programmable and buffered in the controller.
The external interface supports long stub and short sub signals on the dual redundant 1553 bus (Bus A and Bus B).

3.9.1 1553 Control Registers

Two I/O addresses are used to enable and initialize the 1553 interface into the CR7 memory map. I/O write to address 16Ch buffers the RT-address into the 1553 controller and a write to I/O address 16Dh defines the memory area of the 1553 RAM and registers. The registers 16Ch and 16Dh are write only.

RT Address Register (I/O address 16Ch write only)

	7	6	5	4	3	2	1	0
16Ch	not used	not used	RTADP	RTAD4	RTAD3	RTAD2	RTAD1	RTAD0

RTAD4-0 Represent the RT address of the 1553 controller.
RTADP Represent the RT parity bit of the RTAD0-4. The parity bit is odd parity of the five RT address bits.

Memory Area Register 1553 (I/O address 16Dh write only)

	7	6	5	4	3	2	1	0
16Dh	not used	not used	not used	not used	1553EN	not used	1553M1	1553M0

1153M1-0 Define the base address of the 1553 controller memory and registers if bit 1555EN is set to 1.

1553M1	1553M0	Bas Address and Memory Map	
1	1	DC000h to DCFFFh DD000h to DD03Fh	Controller RAM area Controller register area
0	0	E0000h to E1FFFh E2000h to E203Fh	Controller RAM area Controller register area
0	1	E4000h to E5FFFh E6000h to E603Fh	Controller RAM area Controller register area
1	0	E8000h to E9FFFh EA000h to EA03Fh	Controller RAM area Controller register area

1553EN This bit enable or disable the 1553 controller. A ‘0’ disable the access to the 1553 controller that means the memory area is allocated the normal system memory. A ‘1’ enables the memory map to the 1553 controller according bits 1553M1-0.

After power-on-reset the memory area register is set to 00h. During initialization the system BIOS will enable the 1553 controller (1553EN bit =1) and will set the base address to D8000h.

3.9.2 1553 Address Mapping

It is important to note that with respect to the 1553 controller's address bus, A15 through A0, all address mapping is **word oriented**, rather than byte oriented. That means each access must be 16 bit wide. For interfacing the ISA bus A1 signal connects to the 1553 controller A0 pin, ISA bus A2 connects to the 1553 controller A1 pin, etc. That is, in terms of the CPU's memory map, the address of these data structures, relative to the 1553 controller base memory address, will be **double** the value of the pointer that is stored in the 1553 controller shared RAM.
The internal RAM and registers are memory mapped and located in a memory area which is defined by the 'Memory Area Register 1553'.

Internal RAM
The internal RAM has a size of 4kWords respectively 8kBytes.

Internal Registers
There are 32 registers each 16 bit wide, 17 registers for normal operation, and 8 test registers, the rest are reserved for future use.

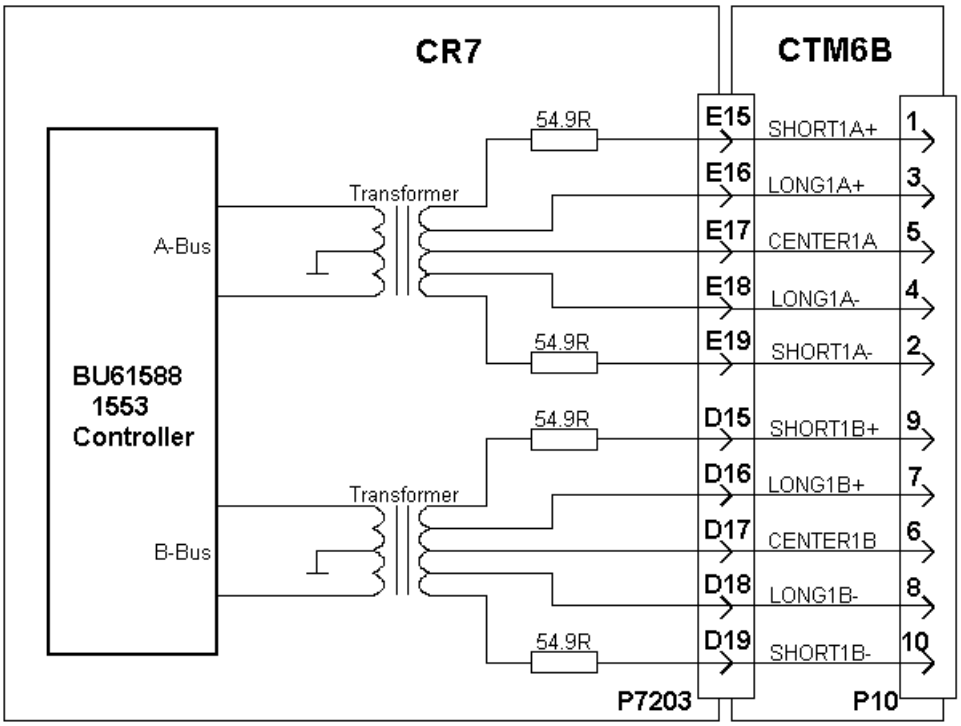
The address mapping and accessibility for the internal registers is defined as follows:

Address bits refer to the ISAbus address bits.					**DESCRIPTION/ACCESSIBILITY**
SA5	**SA4**	**SA3**	**SA2**	**SA1**	
0	0	0	0	0	Interrupt Mask Register (RD/WR)
0	0	0	0	1	Configuration Register # 1 (RD/WR)
0	0	0	1	0	Configuration Register # 2 (RD/WR)
0	0	0	1	1	Start/Reset Register (WR) Command Stack Pointer Register (RD)
0	0	1	0	0	BC Ctrl Word /RT Subaddr Control + Word Register (RD/WR)
0	0	1	0	1	Time Tag Register (RD/WR)
0	0	1	1	0	Interrupt Status Register (RD)
0	0	1	1	1	Configuration Register #3 (RD/WR)
0	1	0	0	0	Configuration Register #4 (RD/WR)
0	1	0	0	1	Configuration Register #5 (RD/WR)
0	1	0	1	0	RT/Monitor Data Stack Address Register (RD/WR)
0	1	0	1	1	BC Frame Time Remaining Register (RD)
0	1	1	0	0	BC Time Remaining to Next Message Register (RD)
0	1	1	0	1	BC Frame Time/RT Last Com./MT Trig.Word Reg (RD/WR)
0	1	1	1	0	RT Status Word Register (RD)
0	1	1	1	1	RT BIT Word Register (RD)
1	0	0	0	0	Test Mode Register 0
1	0	0	0	1	Test Mode Register 1
1	0	0	1	0	Test Mode Register 2
…					…
1	0	1	1	1	Test Mode Register 7
1	1	0	0	0	Reserved
…					…
1	1	1	1	1	Reserved

For detailed specification and description please refer to the ILC Data Device Corporation User Guide ”ACE Series BC/RT/MT” which is available via Internet http://www.ilcddc.com.

3.9.3 1553 I/O Connection

The 1553 transformers provide long and short stub terminals, these terminals are available the rear connector. If the transition module CTM6A is connected to the CR7, the 1553 signals are routed to the Header P10 as described in the section **Connectors**. For more information please see the sketch below.



3.10 Additional devices

3.10.1 SMB bus devices

The CR7 uses a serial 2-wire I2C bus to communicate with several onboard devices:

Device	Designator	SMB address
PIIX4 slave port (*)	U1700	0001000Xb
Clock synthesizer (*)	U1000	1101001Xb
Serial EEprom (24C04)	U1991	1010101Xb
SPD EEprom (*)	U1418	1010000Xb
Temperature sensor (MAX1617A)	U1982	0011000Xb

Access to devices marked by (*) is done by BIOS. It is strongly recommended not to access these devices by user software.

3.10.1.1 Temperature Sensor

A MAXIM MAX1617A temperature sensor is implemented on the CR7 board. Its interface is connected to the I2C control signals of the System Management Bus. The sensor is located close to the CPU and shows two temperatures: the CPU on-die diode temperature (+/-3°C) and the board temperature close to the CPU. The sensor has an over-temperature output integrated, which can be used to take actions like reducing the CPU speed. For programming information please see the 'Programming Manual for SBS onboard I/O'.
More information on the MAX1617A can be found in the datasheet from MAXIM.

3.10.1.2 Serial EEPROM

For storage of user data a serial EEPROM is implemented on the CR7 board. It is a standard 24C04 type EEPROM with 512 bytes. Please note that some operating systems may use the lower 256 bytes of this device for their own purposes. More information about writing and reading the contents can be found in the datasheets from the manufacturer (e.g. Microchip Technology, SGS Thomson, Atmel, Catalyst and many others).

3.10.2 Watchdog, Powerfail Monitor

For security of application software, the CR7 offers a software controlled hardware watchdog capable of issuing a reset signal if its time-out interval expires. To prevent the watchdog from generating a reset signal, it must be re-triggered within a 0.5 second interval by reading the Watchdog Control Register WCR.
Since standard software doesn't trigger the watchdog periodically, it is disabled after reset. The watchdog function can be enabled via the Watchdog Control Register WCR. If the watchdog is enabled, it must be reset periodically by reading WCR within 0.5 seconds. Otherwise, a reset pulse with a duration of 200 msec is generated to restart the system. For more information please see the 'Programming Manual for SBS onboard I/O'.

3.10.3 LED Output

The LED Output can be turned on and off via the LED Control Register LEDCR. After reset, the LED is turned on by hardware and turned off when running the first instructions of the system BIOS.. The LED can be used for any user-defined purpose. For more information please see the 'Programming Manual for SBS onboard I/O'.

3.10.4 NMI Timer

The CR7 features a timer which can trigger NMIs periodically. The timer is programmable in 7 steps from 0.28 ms up to 18 ms. The usage of the NMI timer is possible together with appropriate software available from your distributor, Windows 3.11, Windows 95 and Windows NT offer "Real Time Functions". For more information please see the 'Programming Manual for SBS onboard I/O'.
Following periods are programmable via T_SEL[ ] at the CR7:

T_SEL2..T_SEL0	NMI period
000	NMI-timer disabled
001	0.286 ms
010	0.572 ms
001	1.144 ms
100	2.289 ms
101	4.577 ms
110	9.154 ms
111	18.309 ms

3.10.5 Reset Button

The push button on the front panel will issue a hard power On reset. The reset signal is active for all subsystems of the CR7.

3.10.6 Speaker

A standard PC compatible speaker is onboard at the CR7P versions (except when ordering the 1553 option). An external standard PC compatible speaker may be connected between the appropriate IO connector at the back side and +5V.

Appendix

- Update Information

The CR7 is delivered with a software CDROM. It contains SCSI, Ethernet and VGA/LCD drivers for the most popular operating systems including Windows 95, Windows NT, OS/2 etc. For other drivers or updates use the www contact addresses from the table below.

Device	Internet
SCSI(Symbios)	www.symbios.com
Ethernet (AMD)	www.amd.com
VGA/LCD(Intel)	www.intel.com
System BIOS	www.sbs.com

The CDROM contains a utility program for system BIOS updates. The CR7 is equipped with an in-system programmable FLASH ROM device.

- Additional Software Tools

SBS Technologies provides a full set of DLLs (MSDOS, Windows 3.11, Windows 95, Windows NT) for their PC boards. Please contact your distributor or SBS Technologies.

- Setup

To enter system BIOS Setup, press < **DEL**> after power on or reset.

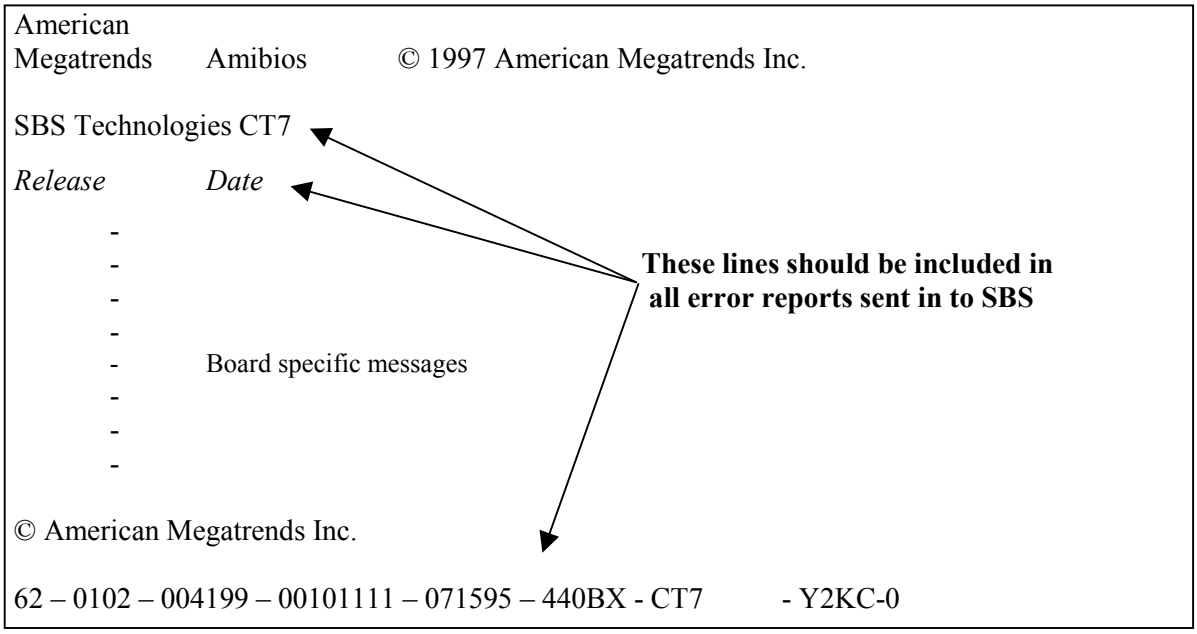
For further information read the help message displayed by BIOS setup.

If the system is reset or turned off while in BIOS Setup, all Setup information may be lost and the ROM defaults will be restored.

Error Report Form

When you are returning a product for repair, it is very important to include a written report which details the nature of the problem in order to expedite the repair.
Please always use the Error Report Form attached a the end of this maual or include the following information:

- RMA Number
- Product & Serial Number
- Part Number
- Version
- Contact: Name & Phone Number
- Detailed Description of the Problem/Defect



Example /coding of the ID line:

processor, flash ROM size	major & minor BIOS revisions	supplier ID	BIOS features	AMIBIOS core copyright date	chip set	project ID	year 2000 compliant
62 -	0102 -	004199 -	00101111 -	071595 -	440GX -	CT7/CE7 -	Y2KC-0

You can stop the video output for proper reading the three information lines as described: Simply press the “0 / Enter “ key during the start-up sequence. This key is located on the numeric keypad of your keyboard

Error Report Form

SBS Technologies GmbH & Co.KG	Company Name
Memminger Str. 14	Department
86159 Augsburg	Contact Person
	Mailing Address
Phone Number **+49 821 5034-116**	Phone Number
Fax Number **+49 821 5034-119**	Fax Number
	Email Address

Part. N. **CR7** Version: V _ . _ Date __ __ __ Serial N. _____

Error Description:
Hardware Environment:
Operating System/Software:
Warranty repair: ❑ YES ❑ NO (Please see section 'Warranty')

Error Report Form (US + Rest of World)

SBS Technologies, Inc.	Company Name
6301 Chapel Hill Road	Department
Raleigh, NC 27607-5115	Contact Person
	Mailing Address
Phone Number **+1 919 851-1101**	Phone Number
Fax Number **+1 919 851-2844**	Fax Number
	Email Address
Part. N. **CR7** Version: V _ . _ Date __ __ __ Serial N. _____	
Error Description:	
Hardware Environment:	
Operating System/Software:	
Warranty repair: ❑ YES ❑ NO	(Please see section 'Warranty')

Artisan Technology Group is an independent supplier of quality pre-owned equipment

Gold-standard solutions

Extend the life of your critical industrial, commercial, and military systems with our superior service and support.

We buy equipment

Planning to upgrade your current equipment? Have surplus equipment taking up shelf space? We'll give it a new home.

Learn more!

Visit us at **artisantg.com** for more info on price quotes, drivers, technical specifications, manuals, and documentation.

Artisan Scientific Corporation dba Artisan Technology Group is not an affiliate, representative, or authorized distributor for any manufacturer listed herein.

We're here to make your life easier. How can we help you today?

(217) 352-9330 | sales@artisantg.com | artisantg.com

ARTISAN® TECHNOLOGY GROUP