SIEMENS

SIMATIC

PC BI45/FI45 PII

Technical Description

Contents

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Release 03

Safety Guidelines

This manual contains notices which you should observe to ensure your own personal safety, as well as to protect the product and connected equipment. These notices are highlighted in the manual by a warning triangle and are marked as follows according to the level of danger:

Danger

indicates that death, severe personal injury or substantial property damage will result if proper precautions are not taken.

Warning

indicates that death, severe personal injury or substantial property damage can result if proper precautions are not taken.

Caution

indicates that minor personal injury or property damage can result if proper precautions are not taken.

Note

draws your attention to particularly important information on the product, handling the product, or to a particular part of the documentation.

Qualified Personnel

The device/system may only be set up and operated in conjunction with this manual.

Only **qualified personnel** should be allowed to install and work on this equipment. Qualified persons are defined as persons who are authorized to commission, to ground, and to tag circuits, equipment, and systems in accordance with established safety practices and standards.

Correct Usage

Note the following:

Warning

This device and its components may only be used for the applications described in the catalog or the technical description, and only in connection with devices or components from other manufacturers which have been approved or recommended by Siemens.

This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

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Disclaimer of Liability

We have checked the contents of this manual for agreement with the hardware and software described. Since deviations cannot be precluded entirely, we cannot guarantee full agreement. However, the data in this manual are reviewed regularly and any necessary corrections included in subsequent editions. Suggestions for improvement are welcomed.

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Motherboard

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Chapter Overview

2.1 Components and Interfaces

Component/ Interface	Description	Parameters
Pentium II - base	Slot 1 for micro processor card, up to 333 MHz	• Can be upgraded via SLOT 1 • Multimedia support • On-board L2 cache with 512K • ECC
Memory	DIMM module up to max. 128 Mbytes/DIMM	• Data width 64 Bit + ECC • possible with ECC • 3.3 V • SDRAM and EDO • 66MHz bus clock • 3 DIMMs can be inserted • easy to replace • variable from 16-128 Mbytes/DIMM
Chipset	Single chip set 440LX	• DRAM and SDRAM • ECC support
Hard Disk	ATA-33 mode	• Ultra DMA capable
DP12	Communication port SIMATIC S7	• optically isolated DP12 (CP 5611 compatible) • 12Mbps
TTY	Communication with SIMATIC S5-CPUs	• Range up to 1000 m
Floppy	Standard port for 34-pin ribbon cable	• 1.44 Mbytes
Keyboard	Port for PS2 keyboard	• Standard • Trackball supported (only with BI45)
Mouse	PS2 mouse port	• Standard
Serial	COM1/25-pin COM2/9-pin	• TTY and V24 • Standard
Parallel	Standard-, bidirectional, EPP and ECP mode	• 25-pin sub-D
BIOS	Update via software	• 512K in 4 pages
CD-ROM		• 20 times speed

2.2 Processor

Which Processor Type can be Used?

Pentium II 266/300/333 MHz in slot 1.

Clock Setting S2, S3

S2(4)	S3(4)	S3(3)	S3(2)	S3(1)	ISA Bus Frequency	PCI Bus Frequency	CPU Bus Frequency	CPU Core Frequency (CPU-Internal)
off	**off**	**off**	**on**	**off**	**8.25MHz**	**33MHz**	**66MHz**	**266MHz**
off	on	on	off	off	8.25MHz	33MHz	66MHz	300MHz
off	off	on	on	off	8.25MHz	33MHz	66MHz	333MHz

Attention

If you change the CPU type, you must also update the appropriate BIOS for the CPU type. Information on suitable combinations can be found in the Product Information Bulletin or obtained from the relevant hotline.

Standard Settings

Figure 2-1 Standard Setting of the Switches S2 (1 to 4) and S3 (1 to 4) for 266 MHz Pentium PII CPU

2.3 Memory

If ECC submodules are not mixed up with ECC submodules, the memory will work without ECC fuse or correction.

Organization	Size in Mbytes	Type	Access Time/ Frequency
4Mx64	32	EDO	60ns
8Mx64	64	EDO	60ns
16Mx64	128	EDO	60ns
4Mx72	32	EDO with ECC	60ns
8Mx72	64	EDO with ECC	60ns
16Mx72	128	EDO with ECC	60ns
4Mx64	32	SDRAM	>=83MHz
8Mx64	64	SDRAM	>=83MHz
16Mx64	128	SDRAM with ECC	>=83MHz
4Mx72	32	SDRAM with ECC	>=83MHz
8Mx72	64	SDRAM with ECC	>=83MHz
16Mx72	128	SDRAM with ECC	>=83MHz

Replacing/ Upgrading Memory Cards

How to Proceed

Please refer to the notes in Chapter 1 of the User's Guide supplied and read carefully the ESD guidelines.

1. Switch off the device and separate from the mains.
2. Unscrew the housing and remove the cover.
3. Plug or unplug the DIMM submodules. The submodules can easily be removed by pressing down the levers on the left and right of the base.
4. Make sure that the modules are correctly plugged in.
5. Reassemble the unit in reverse order.

Caution

Risk of short circuit!

The cards must be installed correctly, otherwise the motherboard or the card might be destroyed.

Make sure that the contacts of the card and socket are on top of each other.

2.4 Graphics Interface Module

Brief Description

The graphics interface module of the motherboard is a planar PCI implementation i.e. the XGA-LCD-controller C&T 65555 is located on the board and connected to the PCI bus. Its refresh memory has a back-up capacity of 2 Mbytes which cannot be upgraded.

Supported Resolutions

Two modes are supported:

- Standard mode and
- Extended mode.

Standard Modes

The VGA BIOS supports all standard VGA modes listed in the table below:

Mode No. (hex)	VESA No.	Colors	Characters x line	Characters per cell	Pixels	Display mode	Horizontal scan frequency kHz	Vertical scan frequency Hz
00/01	—	16/256K	40x25	8x8	320x200	text	31.5	70
00*/01*	—	16/256K	40x25	8x14	320x350	text	31.5	70
00+/01+	—	16/256K	40x25	9x16	360x400	text	31.5	70
02/03	—	16/256K	80x25	8x8	640x200	text	31.5	70
02*/03*	—	16/256K	80x25	8x14	640x350	text	31.5	70
02+/03+	—	16/256K	80x25	9x16	720x400	text	31.5	70
04/05	—	4/256K	40x25	8x8	320x200	graphics	31.5	70
6	—	2/256K	80x25	8x8	640x200	graphics	31.5	70
07*	—	mono	80x25	9x14	720x350	text	31.5	70
07+	—	mono	80x25	9x16	720x400	text	31.5	70
0D	—	16/256K	40x25	8x8	320x200	graphics	31.5	70
0E	—	16/256K	80x25	8x8	640x200	graphics	31.5	70
0F	—	mono	80x25	8x14	640x350	graphics	31.5	70
10	—	16/256K	80x25	8x14	640x350	graphics	31.5	70
11	—	2/256K	80x30	8x16	640x480	graphics	31.5	60
12	—	16/256K	80x30	8x16	640x480	graphics	31.5	60
13	—	256/256 K	40x25	8x8	320x200	graphics	31.5	60

*EGA compatible modes

CRT Extended Modes

The CL-GD754X VGA Bios supports standard VESA and extended modes listed in the table below:

Mode no. (hex)	VESA no. (hex)	Screen format	Colors	Characters per cell	Characters x line	Dot clock (MHz)	Horiz. frequency (kHz)	Vert. frequency (Hz)
20h	120h	640x480	16	8x16	80x30	25.175	31.5	60
						31.5	37.5	75
						36	43.3	85
22h	122h	800x600	16	8x16	100x37	36	35.1	56
						40	37.9	60
						49.5	46.9	75
						56.25	53.7	85
24h	124h	1024x768	16	8x16	128x48	44.9	35.5	43(I)
						65	48.4	60
						78.75	60	75
						94.5	68.7	85
28h	128h	1280x1024	16	8x16	160x64	78.75	47	43(I)
						108	64	60
						135	79.98	75
2Ah*	–	1600x1200	16	8x16	200x75	135	79.98	75
30h	101h	640x480	256	8x16	80x30	25.175	31.5	60
						31.5	37.5	75
						36	43.3	85
31h	100h	640x400	256	8x16	80x25	25.175	31.5	70
32h	103h	800x600	256	8x16	100x37	36	35.1	56
						40	37.9	60
						49.5	46.9	75
						56.25	53.7	85
34h	105h	1024x768	256	8x16	128x48	44.9	35.5	43(I)
						65	48.4	60
						78.75	60	75
						94.5	68.7	85
38h	107h	1280x1024	256	8x16	160x64	78.75	47	43(I)
						108	64	60
						135	79.98	75
3Ah*	–	1600x1200	256	8x16	200x75	135	79.98	75
40h	110h	640x480	32K	8x16	80x30	25.175	31.5	60
						31.5	37.5	75
						36	43.3	85
41h	111h	640x480	64K	8x16	80x30	25.175	31.5	60
						31.5	37.5	75
						36	43.3	85

Mode no. (hex)	VESA no. (hex)	Screen format	Colors	Characters per cell	Characters x line	Dot clock (MHz)	Horiz. frequency (kHz)	Vert. frequency (Hz)
42h	113h	800x600	32K	8x16	100x37	36	35.1	56
						40	37.9	60
						49.5	46.9	75
						56.25	53.7	85
43h	114h	800x600	64K	8x16	100x37	36	35.1	56
						40	37.9	60
						49.5	46.9	75
						56.25	53.7	85
44h	116h	1024x768	32K	8x16	128x48	44.9	35.5	43(I)
						65	48.4	60
						78.75	60	75
						94.5	68.7	85
45h	117h	1024x768	64K	8x16	128x48	44.9	35.5	43(I)
						65	48.4	60
						78.75	60	75
						94.5	68.7	85
50h	112h	640x480	16M	8x16	80x30	25.175	31.5	60
						31.5	37.5	75
						36	43.3	85
52h	115h	800x600	16M	8x16	100x37	36	35.5	56
						40	37.9	60
						49.5	46.9	75
						56.25	53.7	85
6Ah	102h	800x600	16	8x16	100x37	36	35.1	56
						40	37.8	60
						49.5	46.9	75
						56.25	53.7	85
64h	104h	1024x768	16	8x16	128x48	44.9	35.5	43(I)
						65	48.4	60
						78.75	60	75
						94.5	68.7	85
68h	106h	1280x1024	16	8x16	160x64	78.75	47	43(I)
						108	64	60
						135	79.98	75
70h	101h	640x480	256	8x16	80x30	25.175	31.5	60
						31.5	37.5	75
						36	43.3	85
71h	100h	640x400	256	8x16	80x25	25.175	31.5	70
72h	103h	800x600	256	8x16	100x37	36	35.1	56
						40	37.9	60
						49.5	46.9	75
						56.25	53.7	85

Mode no. (hex)	VESA no. (hex)	Screen format	Colors	Characters per cell	Characters x line	Dot clock (MHz)	Horiz. frequency (kHz)	Vert. frequency (Hz)
74h	105h	1024x768	256	8x16	128x48	44.9	35.5	43(I)
						65	48.4	60
						78.75	60	75
						94.5	68.7	85
78h	107h	1280x1024	256	8x16	160x64	78.75	47	43(I)
						108	64	60
						135	79.98	75

Notes: (I) = Interlaced, (L) = Linear, *=Modes 2Ah and 3Ah are for flat panel only

Note

Some modes are not supported by all monitors. The highest vertical frequency of the monitor is automatically used.

2.5 Changing the Backup Battery

Battery Power Supply for Real-Time Clock and Configuration

A backup battery powers the real-time clock even after the PC is switched off. In addition to the time of day, all information about the SIMATIC PC (configuration) is stored. If the backup battery fails or is removed, these data are lost.

Because of the clock's low power consumption and the lithium battery's high capacity, the battery can provide backup power for the real-time clock for several years. Therefore, changing the battery is only seldom required.

Battery Voltage Too Low

If the battery voltage is too low, the current time setting is lost and a correct configuration can no longer be guaranteed.

Changing the Battery

In this case, you must replace the battery. The battery is located underneath the bus board.

To change the battery, proceed as follows:

1. Switch off your PC and unplug all connecting cables.
2. Open the unit as described in Section 1.4.
3. Remove the drive support and bus module.
4. Now replace the backup battery, which is attached to the motherboard by a short length of a cable.
5. Reassemble drive support and bus module and close the unit.

Caution

You may only replace the lithium battery with an identical battery or a battery type recommended by the manufacturer.

Dispose of used batteries in keeping with local regulations (special waste). If returned to the manufacturer, the battery materials can be recycled (Order No.:W79070-G13212-S2).

Resetting SETUP

After having changed the backup battery, you have to reset the configuration data of your PC using the SETUP program.

2.6 Block Diagram of the Motherboard

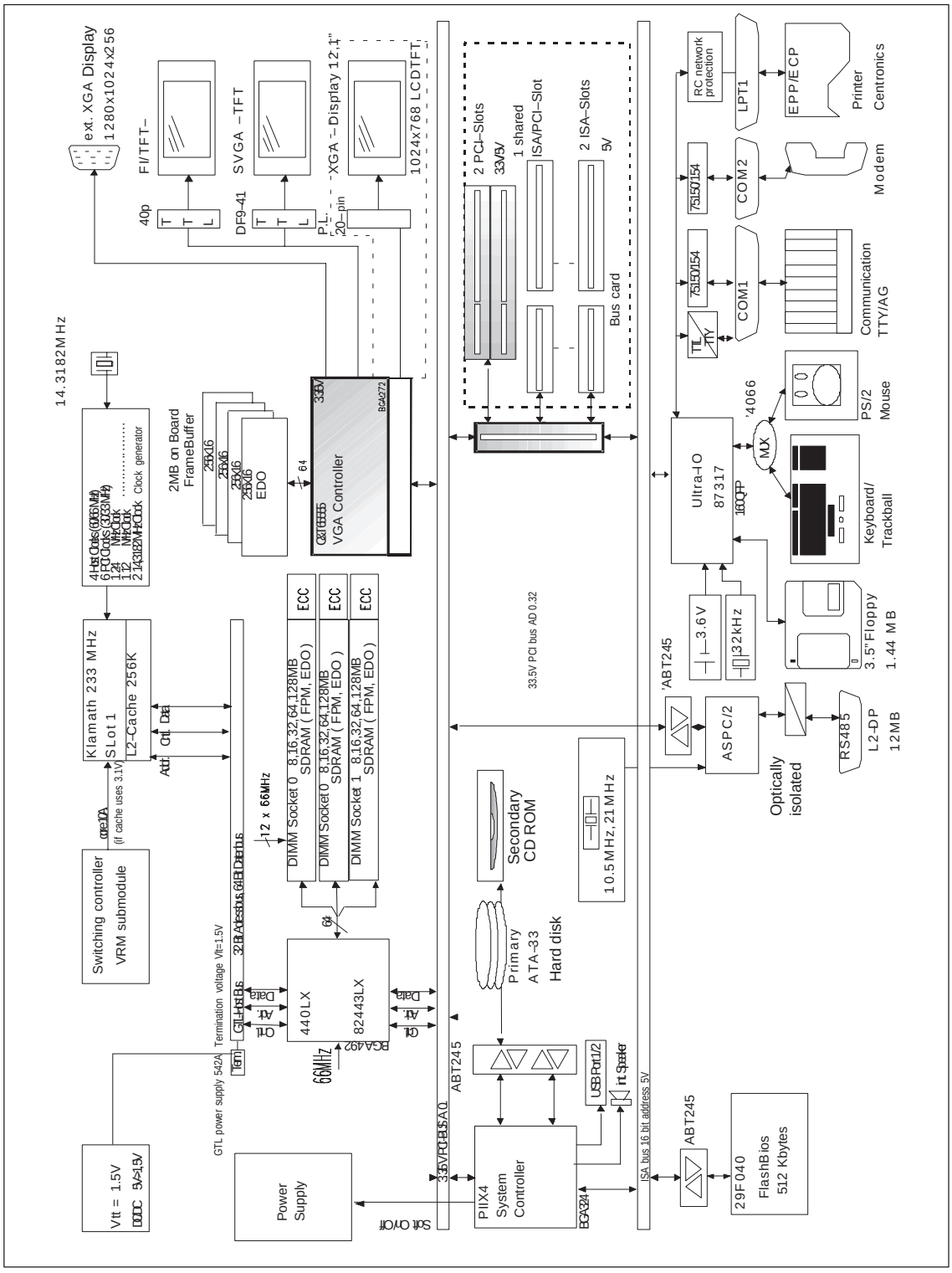


Figure 2-2 Motherboard

2.7 Hardware Ports

Position of Connectors and Switches

The following figure illustrates the connector and switch positions of the components on the motherboard. The plug connectors X3 and X4 (secondary, primary IDE) have been interchanged in the current module C79458-L8003-B87, in relation to the previous module.

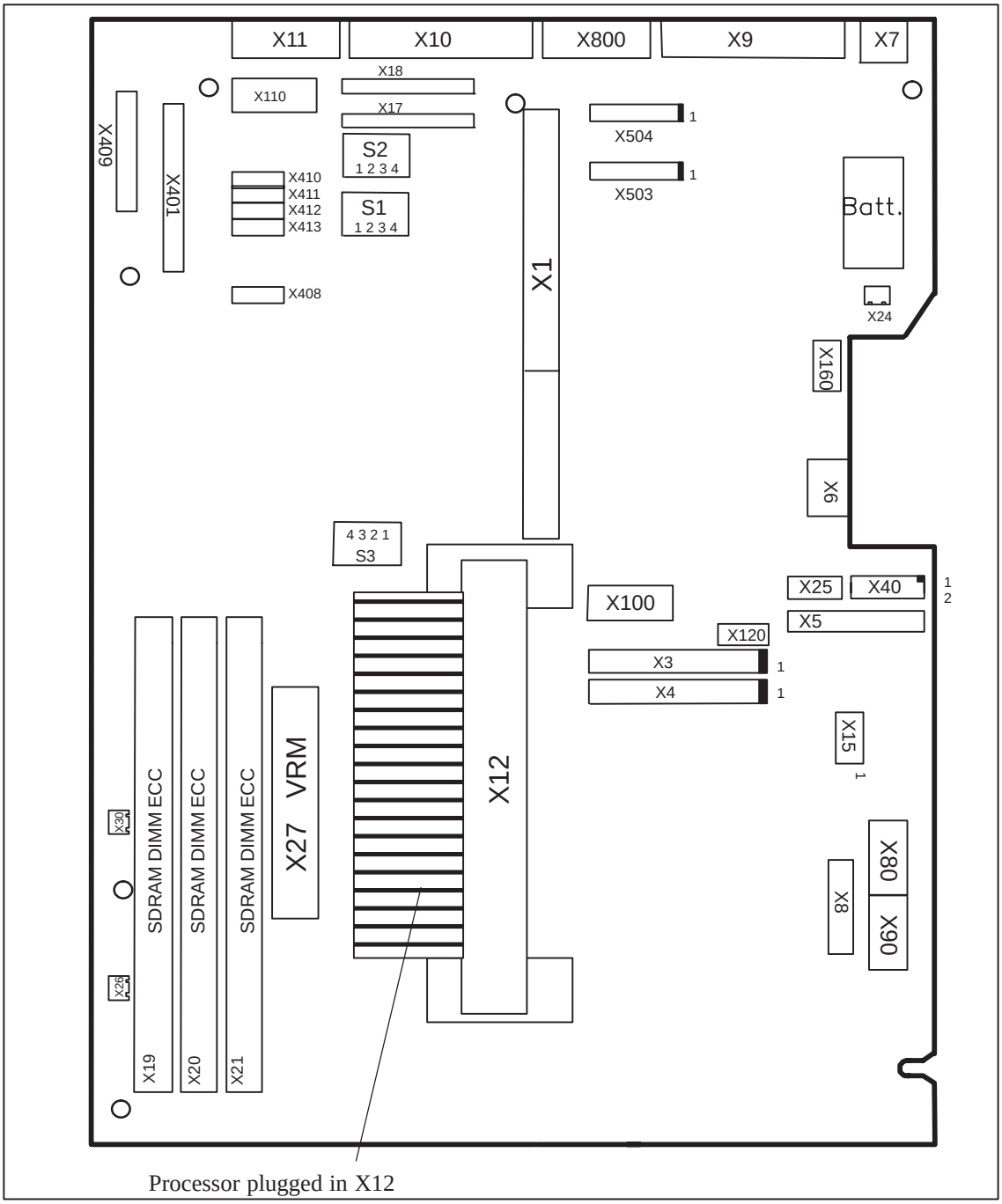


Figure 2-3 Motherboard

Ports		
Floppy X50	internal	Two-drive capacity 360 Kbytes, 720 Kbytes, 1.2 Mbytes, 1.44 Mbytes 3F0h-3F7h, 370h-377h, disconnectable IRQ 6, edge triggered 34-pin, standard connector
Hard disks X4 CD-ROM X3 120 Mbytes floppy	internal	170h-177h, 1F0h-1F7h, disconnectable IRQ14, IRQ15, edge triggered 2*39-pin in standard connector, 4 drives are possible
COM1 X10	at rear	3F8h-3FFh, disconnectable IRQ4, edge triggered 25-pin, socket connector, V24/V28 and 20mA (TTY)
COM2 X11	at rear	2F8h-2FFh, disconnectable IRQ3, edge triggered 9-pin, standard connector
LPT1 X9	at rear	378h-37Fh, disconnectable IRQ7, edge triggered 25-pin, standard socket connector
MPI/DP X800	at rear	disconnectable PCI PNP supported 9-pin, standard socket connector (CP 5611 compatible)
Keyboard, trackball integrated X6	internal	060h-064h IRQ1, edge triggered 6-pin, mini Din socket Trackball connection integrated (only with BI45)
Mouse X7	at rear	060h-064h IRQ12, edge triggered 6-pin, mini Din socket
Power supply X80,90,100,120	internal	PS/2 connector (P8, P9, P10), 6-pin 3-pin connector for auxiliary voltage 5 V
Display X409	internal	LVDS display interface, 20-pin, plug connector
Display X401	internal	CMOS display interface, 40-pin, plug connector

Special Connector		
X1	internal	EISA socket connector for direct connector (ISA; PCI signals)
X12	internal	Slot 1 for Pentium II
X15	internal	Status bar indicators (only SafeCard option)
X17	internal	Socket for TTY send submodule
X18	internal	Socket for TTY receive submodule
X19, X20, X21	internal	3 DIMM sockets, 64bit + 8 bit ECC
X24	internal	Connector for lithium battery
X26, X30	internal	Fan supply, 2 connectors (2-pin)
X27	internal	Voltage regulator submodule for Slot 1, 40-pin plug connector
X160	internal	Reset key, speaker, status bar indicator, power supply, front connections 8-pin socket connector
X503	internal	MPI submodule 10-pin socket
X504	internal	MPI submodule 10-pin plug connector

2.8 Assignment of Connectors and Ports

2.8.1 Assignment of the Slot VRM, X27

Pin No.	Description	Pin No.	Description
A1	5V	B1	5V
A2	5V	B2	5V
A3	5V	B3	Reserved
A4	12V	B4	12Vin
A5	Reserved	B5	UP_N
A6	Reserved	B6	OUTEN
A7	VI0	B7	VID1
A8	VID2	B8	VID3
A9	VID4	B9	PWRGOOD
A10	VCCp	B10	VSS
A11	VSS	B11	VCCp
A12	VCCp	B12	VSS
A13	VSS	B13	VCCp
A14	VCCp	B14	VSS
A15	VSS	B15	VCCp
A16	VCCp	B16	VSS
A17	VSS	B17	VCCp
A18	VCCp	B18	VSS
A19	VSS	B19	VCCp
A20	VCCp	B20	VSS

2.8.2 Assignment of the IDE Ports, X3 Secondary, X4 Primary

Pin No.	Description	Pin No.	Description
1	D7	1	PDREQ
2	Ground	2	Ground
3	D6	3	IOW_N
4	D8	4	Ground
5	D5	5	IOR_N
6	D9	6	Ground
7	D4	7	IORDY
8	D10	8	
9	D4	9	DACK_N
10	D11	10	Ground
11	D3	11	ISAD7
12	D12	12	NC
13	D2	13	AD_1
14	D13	14	Reserved
15	D1	15	AD_0
16	D14	16	AD_2
17	D0	17	CS1_N
18	D15	18	CS3_N
19	Ground	19	HDACT_N
20	Key	20	Ground

2.8.3 Assignment of the EISA Riser X1 on the Motherboard

ISA Bus Signals								PCI Bus Signals							
	Signal		Signal		Signal		Signal		Signal		Signal		Signal		Signal
A	name	**B**	name	**C**	name	**D**	name	**E**	name	**F**	name	**G**	name	**H**	name
1	iochk#	1	gnd	1	sbhe#	1	memcs #	1	gnd	1	clk (slot3)	1	sdone	1	serr#
2	sd7	2	rstdrv	2	la23	2	iocs16#	2	gnd	2	gnd	2	sbo#	2	ad15
3	sd6	3	+5V	3	la22	3	irq10	3	inta#	3	intc#	3	c/be1#	3	ad14
4	sd5	4	irq9	4	la21	4	irq11	4	intb#	4	intd#	4	par	4	ad12
5	sd4	5	-5V	5	la20	5	irq12	5	+5V	5	+5V	5	gnd	5	gnd
6	sd3	6	drq2	6	la19	6	irq15								
7	sd2	7	-12V	7	la18	7	irq14	7	+5V	7	+5V	7	gnd	7	gnd
8	sd1	8	Ows#	8	la17	8	dack0#	8	rst#	8	clk (slot1)	8	ad13	8	ad10
9	sd0	9	+12V	9	memr#	9	drq0	9	gnt# (slot1)	9	gnd	9	ad11	9	ad8
10	iochrdy	10	gnd	10	menw#	10	dack5#	10	req# (slot1)	10	gnt# (slot2)	10	ad9	10	ad7
11	aen	11	smemw#	11	sd8	11	drq5	11	gnd	11	gnd	11	c7be0#	11	ad5
12	sa19	12	smemr#	12	sd9	12	dack6#	12	clk (slot2)	12	req# (slot2)	12	ad6	12	ad3
13	sa18	13	iow#	13	sd10	13	drq6	13	gnd	13	ad31	13	ad4	13	ad1
14	sa17	14	ior#	14	sd11	14	dack7#	14	ad30	14	ad29	14	ad2	14	ad0
15	sa16	15	dack3#	15	sd12	15	drq7	15	Req# (slot3)	15	GNT_# Slot3				
16	sa15	16	drq3	16	sd13	16	+5V					16	+5V	16	+5V
17	sa14	17	dack1#	17	sd14	17	master#	17	NC	17	NC	17	+5	17	-5V
18	sa13	18	drq1	18	sd15	18	gnd	18	ad28	18	ad27	18	gnd	18	gnd
19	sa12	19	refresh#					19	ad26	19	ad25	19	gnd	19	gnd
20	sa11	20	sysclk					20	ad24	20	c/be3#				
21	sa10	21	irq7					21	ad22	21	ad23				
22	sa9	22	irq6					22	ad20	22	ad21				
23	sa8	23	irq5					23	ad18	23	ad19				
24	sa7	24	irq4					24	NC	24	NC				
25	sa6	25	irq3												
26	sa5	26	dack2#					26	NC	26	NC				
27	sa4	27	t/c					27	ad16	27	ad17				
28	sa3	28	bale					28	frame#	28	irdy#				
29	sa2	29	+5V					29	c/be#	29	devsel#				
30	sa1	30	osc					30	trdy#	30	plock#				
31	sa0	31	gnd					31	stop#	31	perr#				

2.8.4 Battery Connection, X24

Pin No.	Description
1	+
2	–

2.8.5 Internal Keyboard / Mouse / Inverter Connection for FI45, X8

Pin no.	Signal	Description	Pin no.	Signal	Description
1	VCC	+5V (with multifuse)	2	GND	
3	KBD_CLK	Keyboard clock line	4	GND	
5	KBD_DATA	Keyboard data line	6	GND	
7	VCC	+5V (with multifuse)	8	n.c.	Coding
9	MOUSE_DATA	PS/2 mouse data line	10	MOUSE_CLK	PS/2 mouse clock line
11	V_{in}	12V power supply for inverter	12	ON/OFF	On/Off signal (TTL), ‘1’ = ON, ‘0’ = OFF
13	BL_CTRL1	Backlight brightness 1	14	BL_CTRL2	Backlight brightness 2
15	BL_CTRL3	Backlight brightness 3	16	GND	GND

2.8.6 Internal Keyboard Connection for BI45, X6

Pin no.	Signal	Description
1	KBD_DATA	Keyboard data line
2	MOUSE_DATA	PS/2 mouse data line
3	GND	
4	VCC	+5V (with multifuse)
5	KBD_CLK	Keyboard clock line
6	MOUSE_CLK	PS/2 mouse clock line

2.8.7 Internal COM2 Interface, X110

Pin no.	Signal	Description
1	DCD	data carrier detect
2	DSR	data set ready
3	RxD	receive data
4	RTS	request zo send
5	TxD	transmit data
6	CTS	
7	DTR	data terminal ready
8	RI	ring indicator
9	GND	GND
10	+5V	+5V supply voltage

2.8.8 Internal USB Interface, X40

Pin no.	Signal	Description
1	USBV0	red
3	USBD0M	white
5	USBD0P	green
7	USBG0	black
9	Ground	shield
10	USBV1	red
8	USBD1M	white
6	USBD1P	green
4	USBG1	black
2	Ground	shield

2.8.9 Additional Power Supply for the Front Panel Electronics, X15

Pin no.	Description
1	FRESET_N
2	SPEAKER
3	NC (coding)
4	5V
5	GND
6	MPI LED (anode) over 1kΩ
7	FD LED (anode) over 1kΩ
8	EXTSMI_N
9	Power LED (anode) over 1kΩ
10	HD LED (anode) over 1kΩ

2.8.10 Voltage Supply for CD-ROM Drive, X25

Pin no.	Description
1	+12V
2	GND
3	GND
4	+5V

2.8.11 Setting the Power Supply for the Display, X408

Plug-in Jumper	Description
1–2	5V voltage supply
2–3	3.3V voltage supply

2.8.12 CMOS (Universal) Interface for TFT Displays, X401

Pin no.	Signal	Description	Pin no.	Signal	Description
1	GND		2	CK	Clock signal for scanning the data signals
3	GND		4	GND	
5	Hsync	Horizontal synchronous pulse	6	Vsync	Vertical synchronous pulse
7	GND		8	R0	Data signal for RED (LSB)
9	R1	Data signal for RED)	10	R2	Data signal for RED)
11	R3	Data signal for RED)	12	R4	Data signal for RED)
13	R5	Data signal for RED) (MSB)	14	GND	
15	GND		16	GND	
17	G0	Data signal for GREEN)	18	G1	Data signal for GREEN
19	G2	Data signal for GREEN	20	G3	Data signal for GREEN
21	G4	Data signal for GREEN	22	G5	Data signal for GREEN (MSB)
23	GND		24	GND	
25	GND		26	B0	Data signal for BLUE (LSB)
27	B1	Data signal for BLUE	28	B2	Data signal for BLUE
29	B3	Data signal for BLUE	30	B4	Data signal for BLUE
31	B5	Data signal for BLUE (MSB)	32	GND	
33	GND		34	GND	
35	ENAB	Enable data signal	36	VCC	Voltage supply (3.3V / 5V)
37	VCC	Voltage supply (3.3V / 5V)	38	n.c.	
39	DISPON	Display On	40	reserved	Standard: n.c.)*

)* When fitted with R458, there is a +5V power supply at pin 40.

2.8.13 CMOS (Universal) Interface for STN Displays, X401

Pin no.	Signal	Description	Pin no.	Signal	Description
1	GND		2	CK	Clock signal for scanning the data signals
3	GND		4	GND	
5	LP/Hsync	Horizontal synchronous pulse	6	FP/Vsync	Vertical synchronous pulse
7	GND		8	-	Data signal for RED (LSB)
9	-		10	UD6	Upper Data Bit 6
11	UD7	Upper Data Bit 7	12	UD2	Upper Data Bit 2
13	UD3	Upper Data Bit 3	14	GND	
15	GND		16	GND	
17	UD1	Upper Data Bit 1	18	UD0	Upper Data Bit 0
19	LD3	Lower Data Bit 3	20	LD2	Lower Data Bit 2
21	LD1	Lower Data Bit 1	22	LD0	Lower Data Bit 0
23	GND		24	GND	
25	GND		26	UD5	Upper Data Bit 5
27	UD4	Upper Data Bit 4	28	LD7	Lower Data Bit 7
29	LD6	Lower Data Bit 6	30	LD5	Lower Data Bit 5
31	LD4	Lower Data Bit 4	32	GND	
33	GND		34	GND	
35	M/ENAB	Enable data signal	36	VCC	Voltage supply (3.3V / 5V)
37	VCC	Voltage supply (3.3V / 5V)	38	n.c.	
39	DISPON	Display On	40	reserved	Standard: n.c.)*

)* When fitted with R458, there is a +5V power supply at pin 40.

2.8.14 Signal Allocation of the CMOS (Universal) Interface, X410-X413

Plug-in Jumpers	1-2 closed	2-3 closed
X410	TFT (signal R2)	STN (signal UD6)
X411	TFT (signal R3)	STN (signal UD7)
X412	TFT (signal R4)	STN (signal UD2)
X413	TFT (signal R5)	STN (signal UD3)

2.8.15 LVDS Interface (Single Chip LVDS), X409

Pin no.	Signal	Description
1	VCC	3.3V / 5V voltage supply
2	VCC	3.3V / 5V voltage supply
3	GND	GND
4	GND	GND
5	RXIN0–	LVDS input signal bit 0 (–)
6	RXIN0+	LVDS input signal bit 0 (+)
7	GND	GND
8	RXIN1–	LVDS input signal bit 1 (–)
9	RXIN1+	LVDS input signal bit 1 (+)
10	GND	GND
11	RXIN2–	LVDS input signal bit 2 (–)
12	RXIN2+	LVDS input signal bit 2 (+)
13	GND	GND
14	RXCLKIN–	LVDS clock signal (–)
15	RXCLKIN+	LVDS clock signal (+)
16	GND	GND
17	Res.	Not connected (reserved)
18	Res.	Not connected (reserved)
19	GND	GND
20	GND	GND

2.8.16 Selection of Display Type / Polarity of Backlight-On Signal

S1-4	S1-3	S1-2	S1-1	Display type
	on	on	on	1024 x 768, DSTN
	on	on	off	1280 x 1024, TFT
	on	off	on	640 x 480, DSTN
	on	off	off	800 x 600, DSTN
	off	on	on	640 x 480, TFT (Sharp)
	off	on	off	640 x 480, TFT (non Sharp)
	off	off	on	1024 x 768, TFT (standard setting)
	off	off	off	800 x 600, TFT
on				Backlight signal ‘0’ active
off				Backlight signal ‘1’ active (standard setting)

VGA

The VGA socket connector has the following pinout:

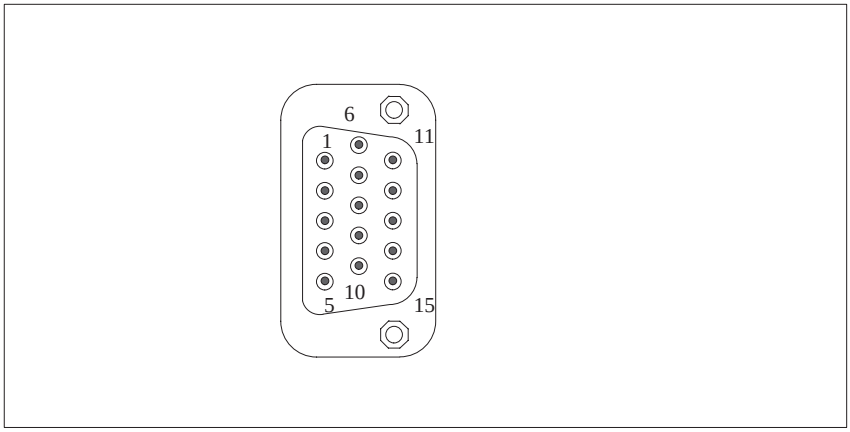


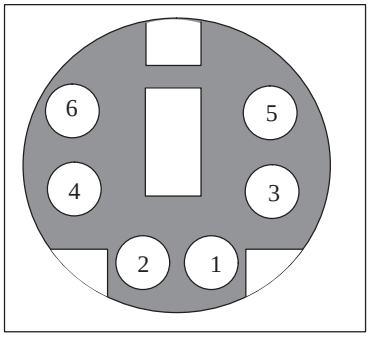
Figure 2-4 VGA Socket Connector

Pinout

Pin	Description	Pin	Description
1	Video signal red	9	Code (no pin)
2	Video signal green	10	Ground synchronisation
3	Video signal blue	11	Display ID Bit 0
4	Display ID Bit 2	12	Display ID Bit 1
5	Ground	13	Horizontal synchronisation
6	Ground red	14	Vertical synchronisation
7	Ground green	15	Display ID Bit 3
8	Ground blue		

2.8.17 PS/2 Mouse Connection, X7

Pin No.	Description
1	Trackball data
2	NC
3	Ground
4	+5V, fused
5	Trackball clock
6	NC



View of socket connector

Figure 2-5 Connecting Cable for the Mouse

2.8.18 Keyboard-Mouse Connection, X6

Pin No.	Description
1	Keyboard data
2	Trackball data
3	Ground
4	+5V, fused
5	Keyboard clock
6	Trackball clock

2.8.19 Assignment of the COM 1 Port, X10

Pin No.	Description	Direction	Pin No.	Description	Direction
1	Shield	Ground	14	unassigned	
2	Transfer data (TxD/D1)	Output	15	unassigned	
3	Receive data (RxD/D2)		16	unassigned	
4	Request to send (RTS/S2)	Output	17	unassigned	
5	Clear to send (CTS/M2)	Input	18	+TTY Transfer data (TxD)	Output
6	Data set ready (DSR/M1)	Input	19	Current source, isolated	positive potential
7	Functional ground (GND/E2)	Ground	20	Data terminal ready (DTR/S1)	Output
8	Data carrier detect (DCD/M5)	Input	21	-TTY Transfer data (TxD)	Output
9	+TTY Receive data (RxD)	Input	22	Incoming call (RI/M3)	Output
10	-TTY Receive data (RxD)	Input	23	unassigned	
11	unassigned		24	unassigned	
12	unassigned		25	unassigned	
13	unassigned		Housing	Ground	

2.8.20 Assignment for the Floppy, X50

Pin No.	Description	Pin No.	Description
1	Ground	2	DENSEL
3	Ground	4	NC
5	Ground	6	DRAME0
7	Ground	8	INDEX_N
9	Ground	10	MOT_N0
11	Ground	12	DS_N1
13	Ground	14	DS_N0
15	Ground	16	MOT_N0
17	Ground	18	DIR_SL_N
19	Ground	20	STEP_N
21	Ground	22	WR_DAT_N
23	Ground	24	WR_GAT_N
25	Ground	26	TRACK_N0
27	Ground	28	WR_PRT_N
29	MED_IDO	30	RD_DAT_N
31	Ground	32	SIDE_1_N
33	MED_ID1	34	DCHG_N

2.8.21 Assignment of the COM 2 Port, X11

Pin No.	Description
1	DCD
2	RxD
3	TxD
4	DTR
5	Ground
6	DSR
7	RTS
8	CTS
9	R1
Housing	Ground

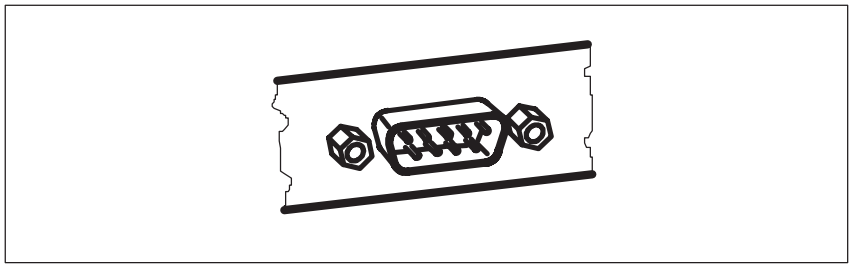


Figure 2-6 Serial COM 2 Port

2.8.22 Assignment of the Parallel Port, X9

Pin No.	Description
1	CLK_N
2	DAT0
3	DAT1
4	DAT2
5	DAT3
6	DAT4
7	DAT5
8	DAT6
9	DAT7
10	ACK_N
11	BUSY
12	PE
13	SLCT
14	Auto Feed
15	ERR_N
16	INI_N
17	Select in
18-25	Ground
Housing	Ground

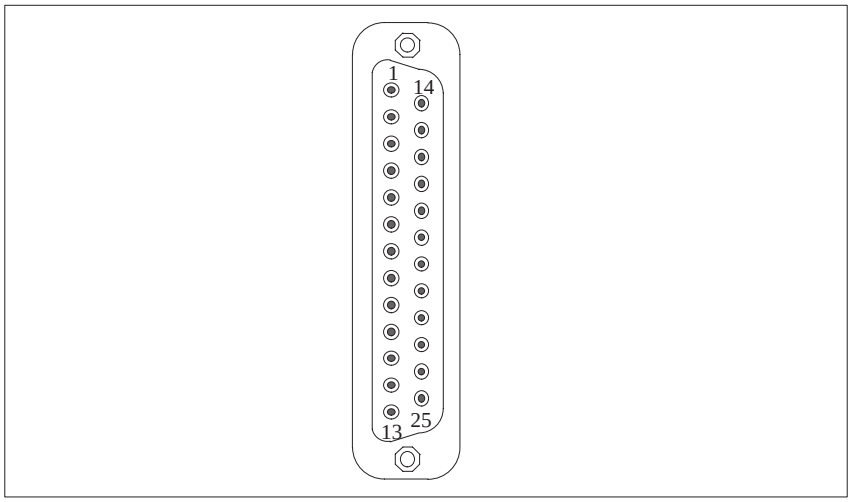


Figure 2-7 LPT 1 Parallel Port

2.8.23 Assignment of the PS/2 Power Connector, X80

Pin No.	Description
1	PowerGood
2	5V
3	12V
4	-12V
5	Ground
6	Ground

2.8.24 Assignment of the PS/2 Power Connector, X90

Pin No.	Description
1	Ground
2	Ground
3	-5V
4	5V
5	5V
6	5V

2.8.25 Assignment of the PS/2 Power Connector, X100

Pin No.	Description
1	Ground
2	Ground
3	Ground
4	3V
5	3V
6	3V

2.8.26 Assignment of the PS/2 Power Connector, X120

Pin No.	Description
1	AUX-5V
2	PSOFF
3	Ground

2.8.27 Assignment of the Fan Supply, X26, X30

Pin No.	Description
1	12V
2	0V Fan, switched

2.8.28 Assignment of the MPI/DP D Sub-Socket Connector, X800

Pin No.	Description
1	NC
2	NC
3	LTG_B
4	RTSAS
5	Ground isolated
6	5V isolated
7	NC
8	LTG_A
9	RTS_PG

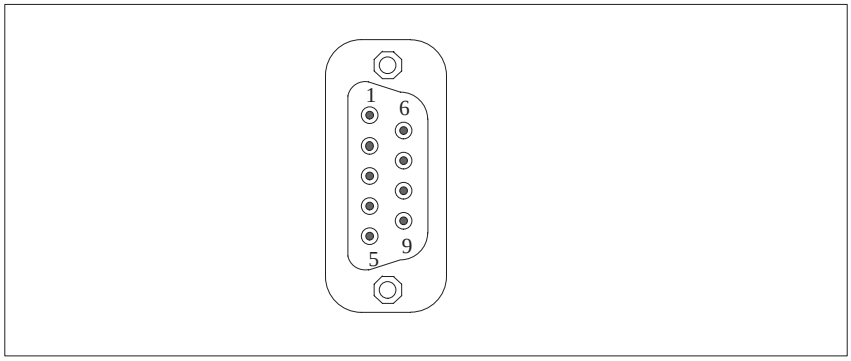


Figure 2-8 MPI/DP Socket Connector

2.8.29 Description of the Switch Positions S2 (TTY, BIOS)

Switch Settings

The following switch settings are for your information only. They are set in the factory and may not be changed.

x means that this switch is irrelevant for the funtion described.

BIOS Source File

S2 (3)	Function
off	Boot EPROM activated (standard setting)
on	Boot EPROM not activated (boot module required)

TTY Setting S2

S2 (1)	S2 (2)	Function
on	on	active TTY interface (standard setting)
off	x	TTY transmit loop, isolated from power source (passive setting)
x	off	TTY receive loop, isolated from power source (passive setting)

2.9 Interrupt Assignments

Interrupt Assignments

Two integral interrupt controllers of the type 82C59 handle the 16 hardware interrupts (IRQ 0 to IRQ 15).

The INT output of the slave controller is connected to the IRQ 2 input of the master controller. Interrupt 9 (IRQ 9) can be used on the bus for the assigned interrupt 2 (IRQ 2). In the initialization phase, IRQ 9 is programmed for the software interrupt vector 0A H (IRQ 2) by the ROM-BIOS.

Priority

The interrupts are priority-scheduled in reverse number order. Interrupt IRQ 0 has the highest priority and interrupt IRQ 7 the lowest. For triggering IRQ 2, interrupt IRQ 8 has the highest priority and interrupt IRQ15 the lowest.

Interrupts IRQ 8 to IRQ 15 therefore have priority over interrupts IRQ 3 to IRQ 7. The interrupt vectors are initialized and masked when the PC is powered up.

I/O Addresses of the Interrupt Controllers

Interrupt	Assignment	Remark	Vector
SMI	System management interrupt, cannot be masked	-	-
NMI	Signal IO channel check 2	Fixed	INT2H
IRQ 0	Timer output 0	Fixed	INT8H
IRQ 1	Keyboard	Fixed	INT9H
IRQ 2	Cascaded (slave interrupt controller)	Fixed	INTAH
IRQ 3	Serial port 2	Can be switched off *)	INTBH
IRQ 4	Serial port 1	Can be switched off *)	INTCH
IRQ 5	Sound	Vacant	INTDH
IRQ 6	FD controller	Can be switched off *)	INTEH
IRQ 7	Parallel port 1	Can be switched off *)	INTFH
IRQ 8	Real-time clock (RTC)	Fixed	INT70H
IRQ 9	VGA (generally not used)	Vacant (AT 9 = XT 2)	INT71H
IRQ 10	MPI/DP	P&P **)	INT72H
IRQ 11	Vacant	Vacant	INT73H
IRQ 12	PS/2 mouse	Can be switched off *)	INT74H
IRQ 13	Numeric processor	Fixed	INT75H
IRQ 14	1st HD controller (primary)	Fixed	INT76H
IRQ 15	2nd HD controller (secondary)	Can be switched off *)	INT77H

Do not use interrupts already assigned in the system.

*) These components can be disabled via the BIOS SETUP. The functions are then no longer available and the resources are released for other components.

**) The Onboard MPI/DP interface is Plug&Play capable, the occupied resources are managed by the BIOS.

2.10 Hardware Addresses

2.10.1 I/O Address Assignment

Table 2-1 I/O Address Assignment

Address From	To	Assignment	Remark
0000	000F	DMA controller 1	
0020	0021	Interrupt controller 1	
002E	002E	Configuration port Ultra I/O Index	
002F	002F	Configuration port Ultra I/O Data	
0040	0043	Timer 1	
0048	004B	Timer 2	
0060	0060	Keyboard controller, data	
0061	0061	NMI, loudspeaker settings	
0064	0064	Keyboard controller, command, status	
0063	0063	Reserved	
0070	0070	NMI-enable, real-time clock index	
0071	0071	Real-time clock date	
0078	0079	Reserved, board configuration	
0080	008F	DMA page register	
00A0	00A1	Interrupt controller 2	
00C0	00DE	DMA controller 2	
00E8	00E8	PM port Ultra IO index	
00E9	00E9	PM port Ultra IO data	
00F0	00F0	Reset numeric error	
00F8	00FF	Numeric processor	
0100	010F	Generally not used (alternative for CP 1413)	
0120	0127	Sound control	Reserved / vacant
0170	0177	Second IDE channel	Can be switched off
01F0	01F7	First IDE channel	
0200	020F	Reserved for game port, otherwise vacant	Reserved / vacant
0220	022F	Sound Blaster Pro	Reserved / vacant
0240	0243	Reserved for SINEC L2 (5412(A2)), otherwise vacant	Reserved / vacant
0278	027B	Reserved for LPT 2, otherwise vacant	Reserved / vacant
02E8	02EF	Reserved for COM4, otherwise vacant	Reserved / vacant
02F0	02F8	Reserved for GBIP	Reserved / vacant
02F8	02FF	COM2	Can be switched off

Table 2-1 I/O Address Assignment

Address From	To	Assignment	Remark
0300	031F	Vacant	
0320	032F	Reserved for SafeCard	Reserved / vacant
0330	033F	Generally not used	Vacant
0340	035F	Reserved for HIGRAPH Host interface, otherwise vacant	Reserved / vacant
0360	036F	Generally not used	Vacant
0376	0376	Second IDE channel command	Can be switched off
0377	0377	Second IDE channel status	Can be switched off
0378	037F	LPT 1	Can be switched off
0380	0387	Generally not used	Vacant
0388	038C	Sound synthesizer	Reserved / vacant
03A0	03AF	Generally not used	Vacant
03B0	03BB	Monochrome video or EGA/VGA	
03BC	03BF	Reserved for LPTn, otherwise vacant	Reserved / vacant
03C0	03CF	VGA control register	
03D0	03DF	CGA / VGA control-register	
03E8	03EF	Reserved for COM 3, otherwise vacant	Reserved / vacant
03F0	03F5	FD controller	
03F6	03F6	First IDE channel, command	
03F7	03F7	First IDE channel, status	
03F8	03FF	COM 1	Can be switched off
0390	0397	Reserved for SINEC H1 (CP1413), otherwise vacant	Reserved / vacant
0400	+LPT	ECP LPT	PCI BUS
0CF8	0CFB	PCI config index	PCI BUS
0CFC	0CFF	PCI config data	PCI BUS
FF00	FF07	IDE bus master register	PCI BUS

2.10.2 Assignment of the Memory Addresses

There are two kinds of address areas:

- Memory address area
- I/O address area.

Different read/write signals (I/O WR, I/O RD, MEMR, MEMW) are used to reference these areas. The following tables provide you with an overview of the address areas used. Please refer to the descriptions of the individual functional groups for more details.

Table 2-2 Assignments of the Memory Addresses

From Address	To Address	Size	Assignment	Remark
0000 0000	0007 FFFF	512k	Conventional system memory	
0008 0000	0009 FBFF	127k	Conventional system memory extended	
0009 FC00	0009 FFFF	1k	Conventional system memory extended BIOS data	
000A 0000	000A FFFF	64k	Graphics refresh memory	VGA
000B 0000	000B 7FFF	32k	SE graphics interface module	Vacant
000B 8000	000B FFFF	32k	Graphics refresh memory	VGA/CGA
000C 0000	000C C7FF	32k	VGA BIOS expansion	VGA
000C 8000	000D FFFF	96k	Vacant	
000E 0000	000F FFFF	64k	System BIOS	Can be used by HIMEM (up to E C000)
000F 0000	000F FFFF	64k	System BIOS	
0010 0000	00EF FFFF	14M	Extended system memory	
00F0 0000	00FF FFFF	1M	Extended system memory or Memory hole	Can be set via BIOS SETUP
0100 0000	17FF FFFF	368M	Extended system memory	
1800 0000	FFEF FFFF	4G-128M-1023k	PCI expansion	
FFF0 0000	FFFD FFFF	1023k-128k	ISA memory, reserved for dual-port RAM	Vacant
FFFE 0000	FFFF FFFF	128k	Shadow of System BIOS (000E 0000 .. 000F FFFF)	

2.11 Interrupt Assignment (Hardware)

Interrupt	Description
NMI	Expansion slots signal I/O channel
IRQ 0	Internal timer (system clock)
IRQ 1	Keyboard buffer full
IRQ 2	Cascading of interrupt controller 2
IRQ 3	Serial port 2 (COM2) can be enabled via Setup
IRQ 4	Serial port 1 (COM1/TTY) can be enabled via Setup
IRQ 5	
IRQ 6	Floppy
IRQ 7	Parallel port 1 /printer port LPT1/EPP/ECP) can be enabled via Setup
IRQ 8	Battery-backed real-time clock
IRQ 9	VGA controller usually unassigned
IRQ 10	MPI (recommended for Plug & Play), can be enabled via Setup
IRQ 11	unassigned
IRQ 12	S/2 Mouse/keyboard trackball can be enabled via Setup if no need for mouse or trackball function.
IRQ 13	Arithmet. coprocessor error
IRQ 14	Primary IDE interface
IRQ 15	Secondary IDE interface

2.12 DMA Channels

DMA Channel	Data Transfer	Description
0	8/16 bit	
1	8/16 bit	
2	8/16 bit	Floppy
3	8/16 bit	
4		Cascading of DMA controller
5	16 bit	free
6	16 bit	free
7	16 bit	free

2.13 Changing the System Configuration with BIOS SETUP

Changing the Configuration

The configuration of your PC is set for working with the software supplied with the unit. You should only change the preset values if you have modified your PC BI45/FI45 PII in any way, or if a fault occurs when the unit is powered up.

The **changes** you make **will not become effective until the device is restarted. When you exit the setup program, the device is automatically rebooted.**

SETUP Program

The SETUP program is in the ROM-BIOS. Information on the system configuration is stored in the battery-backed RAM of the PC BI45/FI45 PII.

You can use SETUP to set the hardware configuration (for example, type of hard disk) and define the system characteristics. You can also use SETUP to set the time and date.

Incorrect SETUP Data

If incorrect SETUP data are recognized when booting the system, the BIOS prompts you to:

- Start SETUP by pressing **F2** or
- Continue booting by pressing **F1**.

Starting SETUP

On completion of the startup test, the BIOS requests you to start the SETUP program with the following screen prompt:

```
PRESS < F2 > to enter SETUP
```

Start SETUP as follows:

1. Reset your PC BI45/FI45 PII (warm or cold restart).
2. Press the **F2** key as long as the BIOS prompt is on the screen.

Default Setting

The **F9** key or “Set Default Values” command in the exit menu sets the default parameters in the screen forms.

SETUP Menus

The various menus and submenus are listed on the following pages. You can obtain information on the SETUP entry selected from the **Item Specific Help** part of the relevant menu.

Screen Display Following Power-On

With the standard setting of your PC, the display shown below appears following power-on:

```
PhoenixBIOS Release 6.0 - G849-A901
Copyright 1985-1995 Phoenix Technologies Ltd., All Rights
Reserved.


SIEMENS PC BI45/FI45 Pentium II V06

CPU = Pentium  133 MHz
0000640K System RAM Passed
0064512K Extended RAM Passed
0512K Cache SRAM Passed
System BIOS shadowed
Video BIOS shadowed
UMB upper limit segment address: F1xx
Fixed Disk 0: [name of installed disk drive]
ATAPI CD-ROM: [name of installed CD-ROM drive]

Press F2> to enter SETUP
```

If you press the F2 key when the above display is shown, you select the ROM-based BIOS setup program. In this program you can set a number of system functions and hardware configurations of your PC.

The standard settings are effective on delivery. You can change these settings using the BIOS setup. The modified settings become effective when you have saved them and terminated the BIOS setup.

The following screen form appears when you start the BIOS setup:

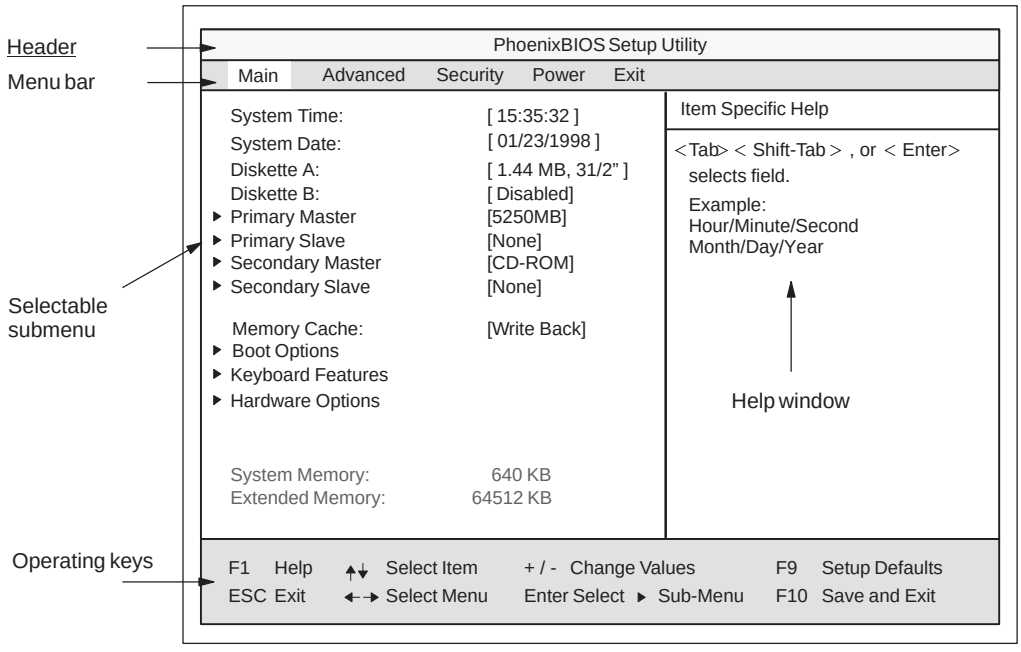


Figure 2-9 Main SETUP Menu

Menu Structure

The screen is divided into four parts. In the top part, you can select the menu forms [Main], [Advanced], [Security], [Power], [Exit]. In the left of the center part you can select various settings or submenus. Brief help texts appear on the right for the currently selected menu entry. The bottom part contains information for operator inputs.

Yellow stars to the left of the interface designation (for example, Internal COM 1) indicate a resource conflict between the interfaces managed by the BIOS. In this case you should select the default settings (F9) or eliminate the conflict.

You can move between the menu forms using the cursor keys [←] and [→].

Menu	Meaning
Main	System functions are set here
Advanced	An extended system configuration can be set here
Security	Security functions are set here, for example, a password
Power	Power saving functions can be selected here
Exit	Used for terminating and saving

ENTER Key

Press the Enter key to open a pop-down menu in which you can use the cursor keys to move and make selections. To exit one of these menus, press either ESC (exit without changes) or Return (selected setting becomes effective when device is rebooted).

If a line is marked with a triangle it contains a submenu. You can exit a submenu by pressing ESC. The changes you have selected will become effective when the device is rebooted.

2.13.1 The Main Menu

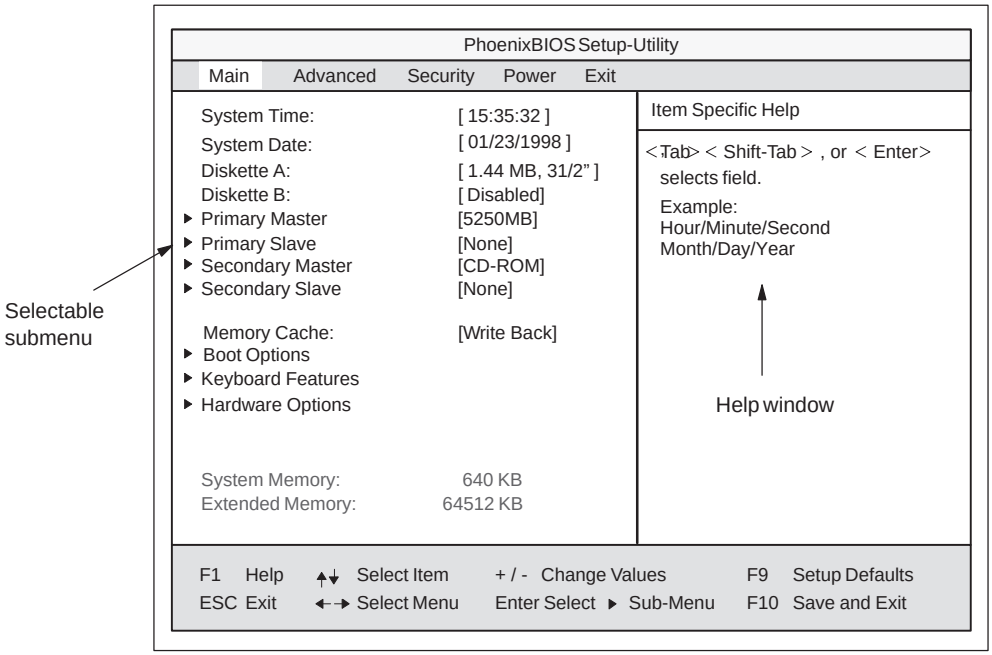


Figure 2-10 Main SETUP Menu

Settings in the Main Menu

In the **Main** menu you can move upwards and downwards using the cursor keys [↑] and [↓] to select the following system parameters:

Menu Item	Function
System Time	Used to display and set the current time
System Date	Used to display and set the current date
Diskette A	Name of installed diskette drive
Diskette B	Name of installed diskette drive
Memory Cache	For setting of memory options
Via submenus	
Primary Secondary	Name of installed EIDE drive Name of installed EIDE drive
Memory Cache	For setting of memory options
Boot Options	For setting of boot options
Keyboard Features	For setting of keyboard interface (for instance, NUM-LOCK, auto report rate)
Hardware Options	For setting of PC BI45/FI45 hardware options

System Time and System Date
Time and Date

System Time and System Date indicate the current values. Once you have selected the appropriate option, you can use the [+] and [-] keys to modify the time setting

`Hour:Minute:Second` and the date

`Month/Day/Year`.

You can move between the entries in the date and time options (for example, from hour to minute) using the tabulator key.

Diskette A/ Diskette B
Floppy Disk Drive

The names of the installed diskette drives in the PC are set here. The following entries are possible:

[Disabled]	If a diskette drive is not fitted (standard setting for diskette drive B)
[360 Kbytes,5 1/4”]	
[1.2 Mbytes,5 1/4”]	
[720 Kbytes,3 1/2”]	
[1.44 Mbytes, 3 1/2”]	Standard setting for installed diskette drive A
[2.88 Mbytes, 3 1/2”]	

Option "Primary / Secondary"

A branch is made to the following submenu when you select this type of menu option:

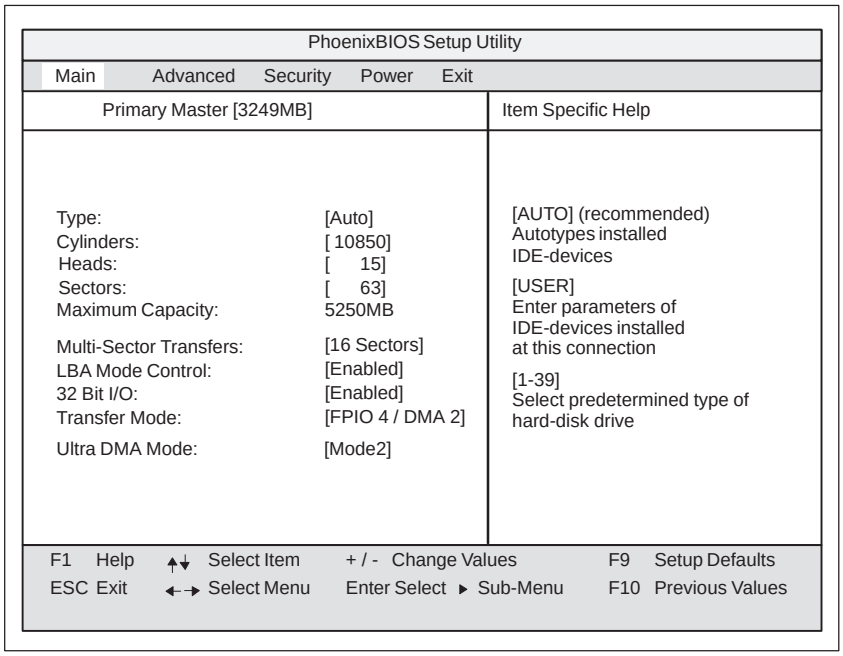


Figure 2-11 Example: "Primary Master"

The parameters which you can select here are usually saved on the respective IDE drive, and are read from the drive and entered into the form when you select the option "Autodetect Hard Disk."

Option "Type"

If you select the option "Type" for a drive which does not exist, an abort is executed after approximately one minute as a result of a timeout and the existing entries remain unchanged. It is therefore only meaningful to carry out an autodetect for interfaces to which drives are connected.

Under certain circumstances it may be necessary to deviate from the proposed hard disk parameters. In this case, select the corresponding menu option and then the desired value using the [+] and [-] keys. Enter "none" in the option "Type" if no drive is connected, or a number from 1 to 39 if a predefined type of hard disk is to be used.

Select "User" if you wish to define your own type of hard disk; you must then additionally enter the hard disk-specific parameters in the options "Cylinders," "Heads," "Sectors/Track," "Write Precomp."

Option "Multi-Sector Transfers"

The number of sectors which are transmitted per interrupt are transferred in the option "Multi-Sector Transfers." The value depends on the drive and should only be set using the autodetect function.

```
Disabled
2,4,6,8,16  sectors
```

Option "LBA Mode Control"

"Enabled" in the option "LBA Mode Control" (enabled, disabled) means that hard disk capacities greater than 528 MB are supported. The value depends on the drive and should only be set using the autodetect function.

Option "32 Bit I/O"

The type of access to the drive is defined in the option "32 Bit I/O":

```
Disabled    16-bit access
Enabled     32-bit access
```

Option "Transfer Mode" or Ultra DMA Mode

The interface transmission rate is set in the option "Transfer Mode." The value depends on the drive and should only be set using the autodetect function.

You leave the submenu using the ESC key.

Option “Memory Cache”

The following pop-up menu appears when you select the option “Memory cache” in the main menu:

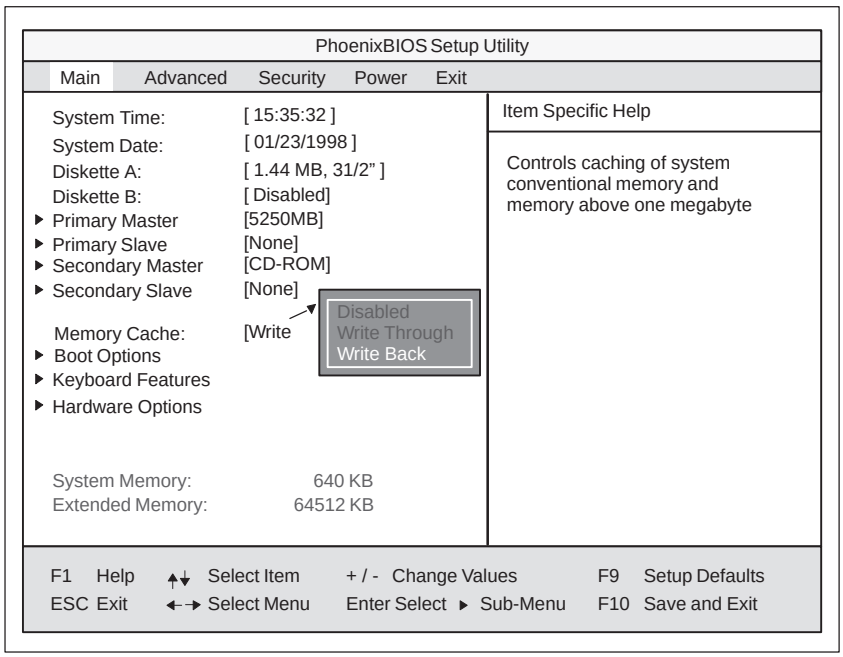


Figure 2-12 “Memory Cache” Submenu

A cache is a fast intermediate memory located between the CPU and the memory (DRAM). Repeated memory access operations are executed in the fast cache, and not in the main memory, provided the feature is enabled. It may be necessary to disable the cache with certain hardware and software because intentional program runtimes or delay times are prevented by the fast cache.

[Disabled]	Cache is disabled.
[Write Through]	Write access is only concluded when an entry is made in the main memory.
[Write Back]	Write access is concluded immediately, the entry in the RAM takes place in the background.

Option “Boot Options”

The following submenu appears when you select the option “Boot Options” in the main menu:

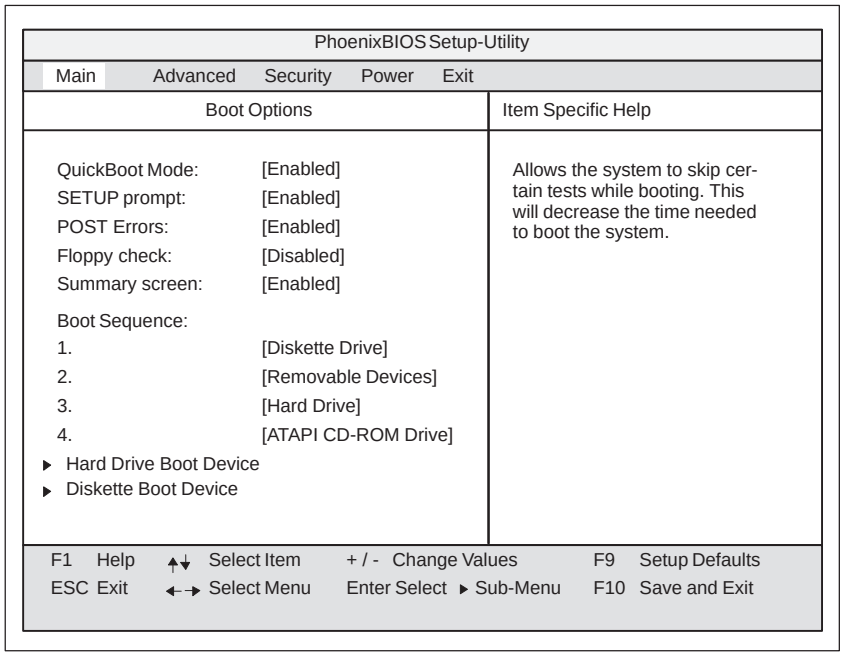


Figure 2-13 “Boot Options” Submenu

Quick Boot Mode	Allows the system to skip certain tests while booting. This will decrease the time needed to boot the system.
SETUP prompt	During the system loading phase, the following SETUP prompt is output at the bottom of the screen: *PRESS <F2> to enter Setup.*
POST Errors	The loading procedure is aborted if an error is detected during the system loading phase.
Floppy check	During the system loading phase, the floppy head is moved by a number of steppings to the inside, and then returned again. This test is useful because the drive is initialized again in the process.
Summary screen	The most important system parameters are output on the display at the end of the system loading phase.
Boot Sequence	Here you can define the device sequence from which a system start (boot attempt) is to be carried out first. Removable devices: allows you to designate future ATAPI drives such as LS120, for instance.

Submenu Hard Drive Boot Device

In this form you can determine whether the device should be booted from the IDE primary master first. The hard disk is connected to this interface at the factory.

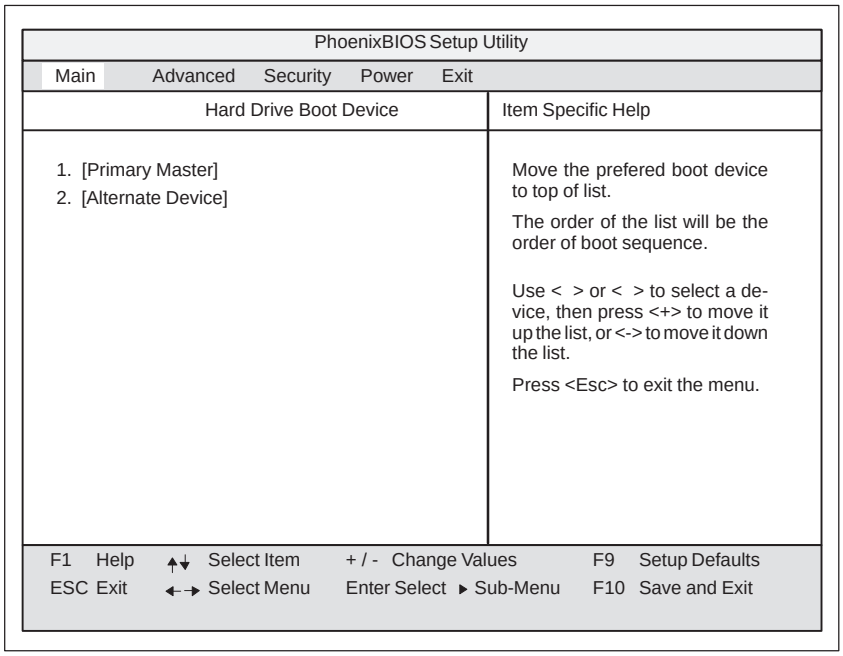


Figure 2-14 “Hard Drive Boot Device” Submenu

Submenu Diskette Boot Device

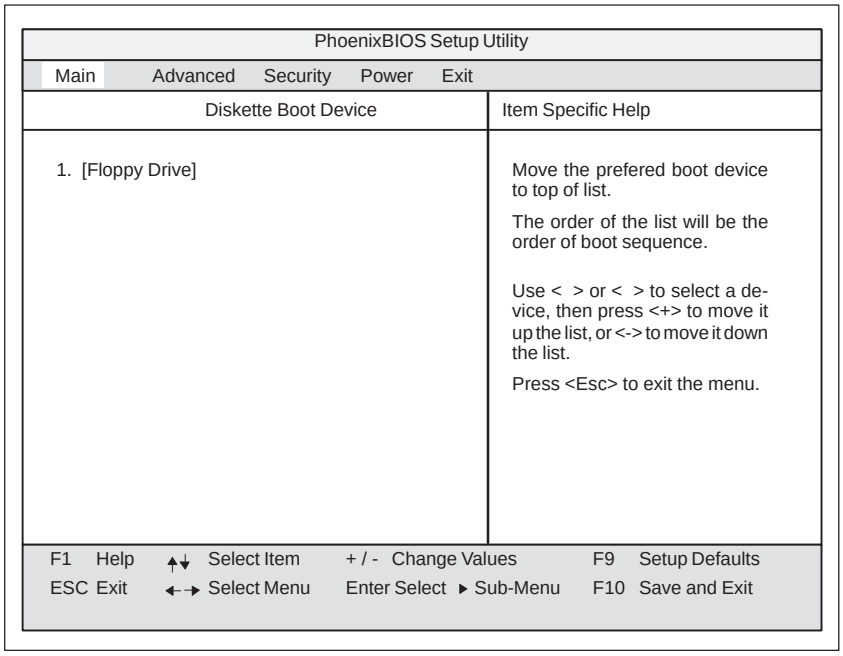


Figure 2-15 “Diskette Boot Device” Submenu

Option “Keyboard Features”

The following Submenu appears if you select the option “Keyboard Features” in the main menu:

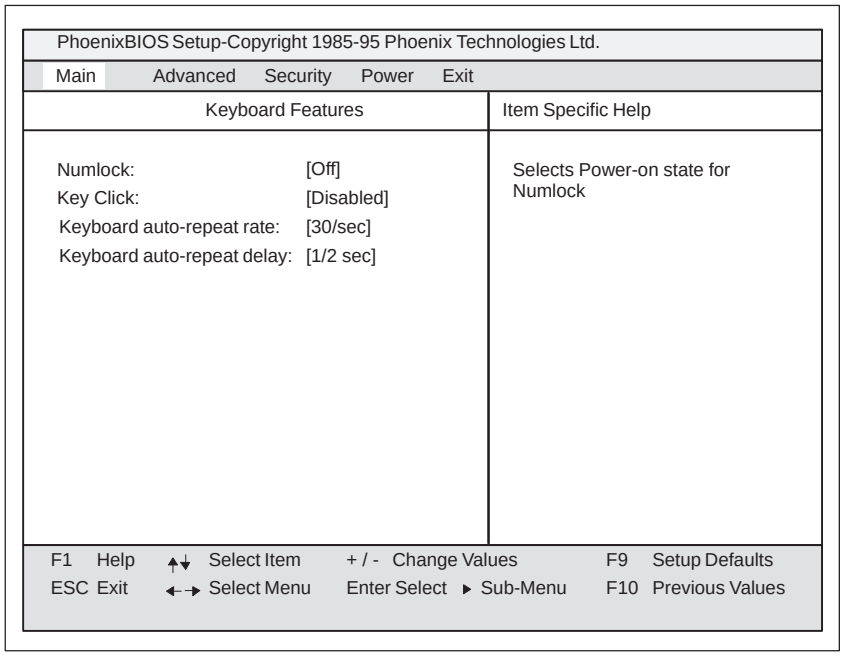


Figure 2-16 “Keyboard Features” Submenu

Numlock	Switches Numlock on or off following power on
Key Click	A keystroke can be heard
Keyboard auto-repeat rate	Increase in automatic key repeat rate
Keyboard auto-repeat delay	Switch-on delay in automatic key repeat

Option “Hardware Options”

The following submenu appears when you select the option “Hardware Options” in the main menu:

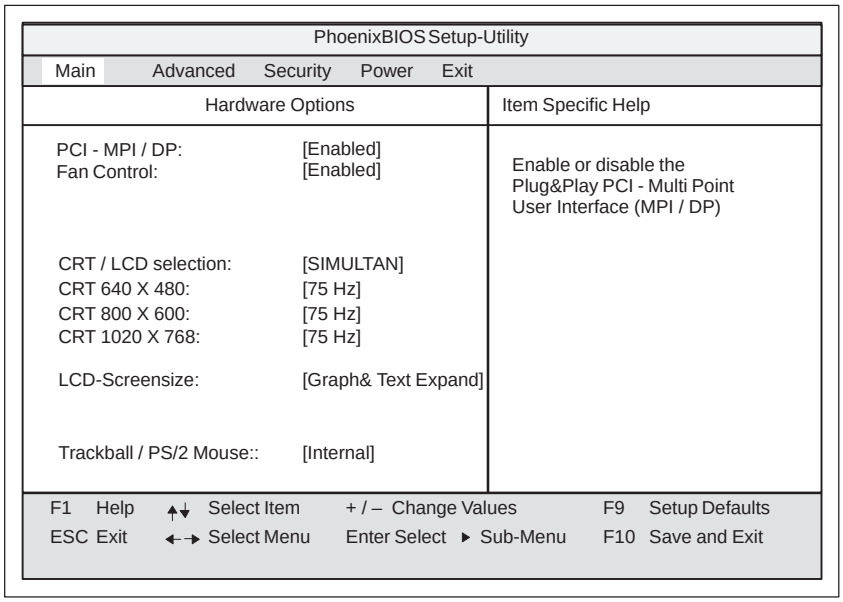


Figure 2-17 “Hardware Options” Submenu

The parameters of the interfaces present on the motherboard are set here.

Entry	Function	
PCI-MPI/DP	Enables the CP5611-compatible MPI/DP interface. The resources are managed by the BIOS PCI Plug & Play mechanism.	
CRT / LCD selection	LCD [Enabled]	All data are only output on the internal LCD, the 15-way VGA interface is disabled.
	CRT [Enabled]	For the highest resolution the display signals are only output to the 15-way VGA interface, the LCD interface of the VGA controller is disabled.
	[SIMULTAN]	Both display interfaces are run simultaneously. Not all resolutions are then possible on the LCD.
CRT 640 x 480	Picture refresh rate with a resolution of 640 x 480 pixels	
CRT 800 x 600	Picture refresh rate with a resolution of 800 x 600 pixels	
CRT 1024 x 768	Picture refresh rate with a resolution of 1024 x 768 pixels	
Fan control	[Disabled]	Fan rotates at full speed
	[Enabled]	Fan is temperature controlled

Entry	Function	
LCD Screensize	[Normal]	The representation in Text and Graphic modes is not expanded to the full screen size.
	[Text expand]	Only the Text modes are expanded to the full screen size.
	[Graph&Text expand]	The Graphic+Text modes are expanded to full screen size.
Trackball / PS/2 mouse	Internal	The PS/2 interface is active. The IRQ 12 is occupied.
	External	The PS/2 interface is active. The IRQ 12 is occupied. The keyboard trackball is disabled.
	Disabled	The PS/2 interface is inactive, IRQ12 is available.

2.13.2 The Advanced Menu

Menu Structure

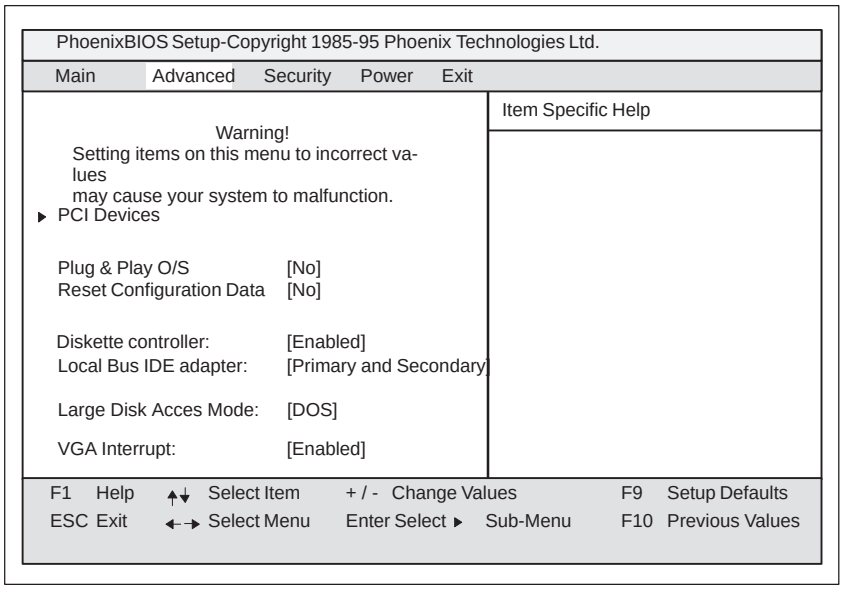


Figure 2-18 "Advanced" Menu

Settings in the Advanced Menu

Plug & Play O/S	Plug & Play means that fitted modules are automatically recognized and installed provided they support Plug & Play functions.	
	[No]	The BIOS handles the complete Plug & Play facilities
	[Yes]	The operating system handles some of the Plug & Play functions
Reset Configuration Data	[Yes]	All previous functions under Plug & Play are deleted, and the configuration is retriggered the next time the system is loaded. The entry is then set to [No]. System components which have no Plug & Play facilities must be entered manually.
	[No]	The system components with Plug & Play facilities are initialized the next time the system is loaded.
Diskette controller	Enable or disable the floppy controller of the basic module.	
Local Bus IDE adapter	[Primary] [Secondary]	One IDE interface for up to two drives.
	[Primary and Secondary]	Two IDE interfaces for up to four drives.
	[Disabled]	No local IDE interface
Large Disk Access Mode	[DOS]	The drive tables are designed according to DOS drive access operations compatible with enhanced IDE.
	[OTHER]	The tables are not adapted.
Hard Disk Delay	[Disabled]	No additional startup time for hard disk
	3 to 30	Additional startup time for the hard disk can be selected

Memory Gap at 15 MByte	[Disabled] [Enabled]	The area from 15 to 16 Mbytes is not available for ISA RAM The area from 15 to 16 Mbytes is enabled for the ISA memory.
Enable memory ECC	[Disable] [Enable]	No “Error checking and correction” “Error checking and correction” are active Only meaningful in connection with DIMM cards with ECC

Submenu COM/LPT Configuration

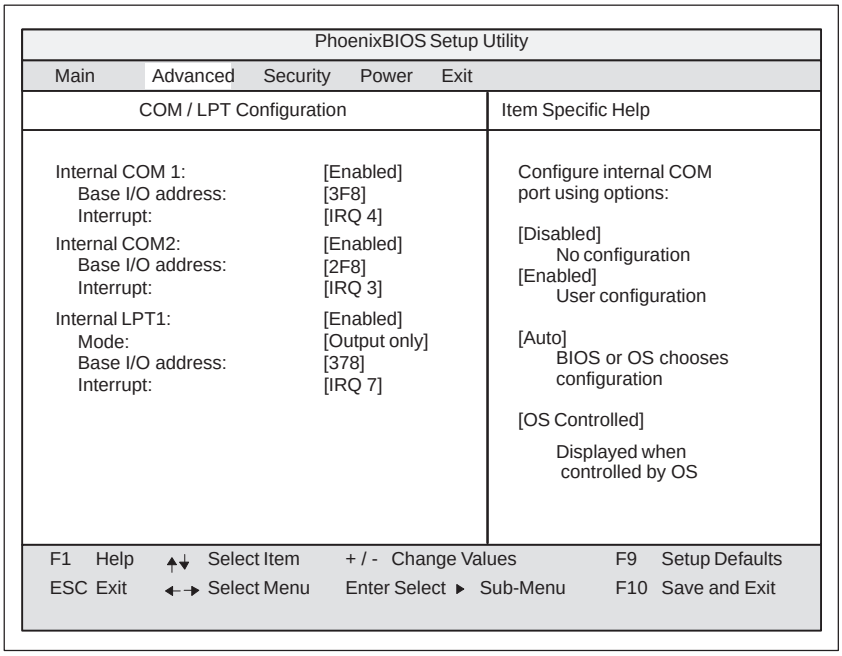


Figure 2-19 “COM / LPT Configuration” Submenu

If you set an interface to Disabled, the resources occupied by it are released.

Printer Port Internal LPT1

Mode:	You can use this setting to select the operating mode of the printer interface. You must adapt this setting to match the data terminal device which you have connected. You can find the setting in the corresponding device documentation.

Submenu PCI Configuration

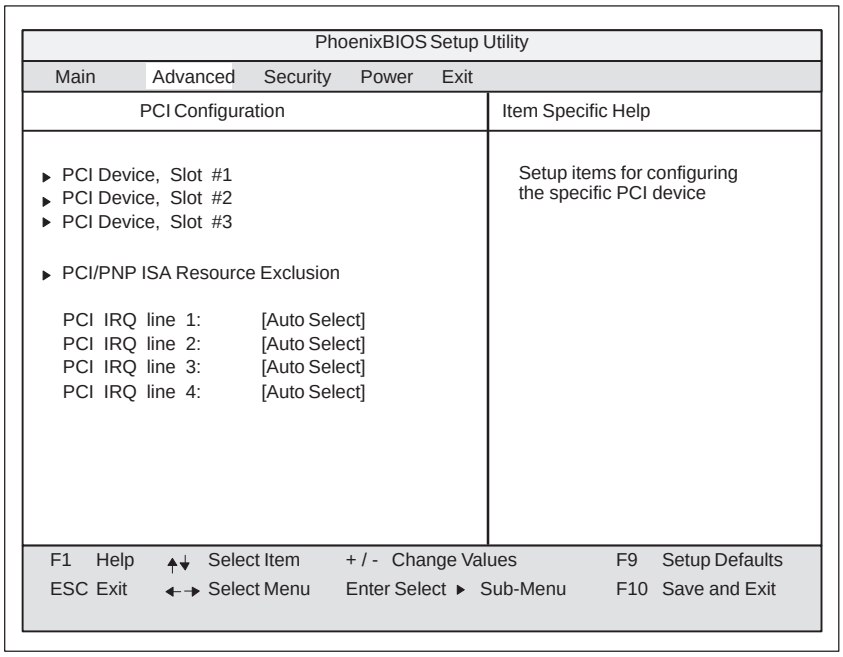


Figure 2-20 “PCI Configuration” Submenu

Option “PCI Devices”

The following submenu appears when you select the option “PCI Devices” in the advanced menu:

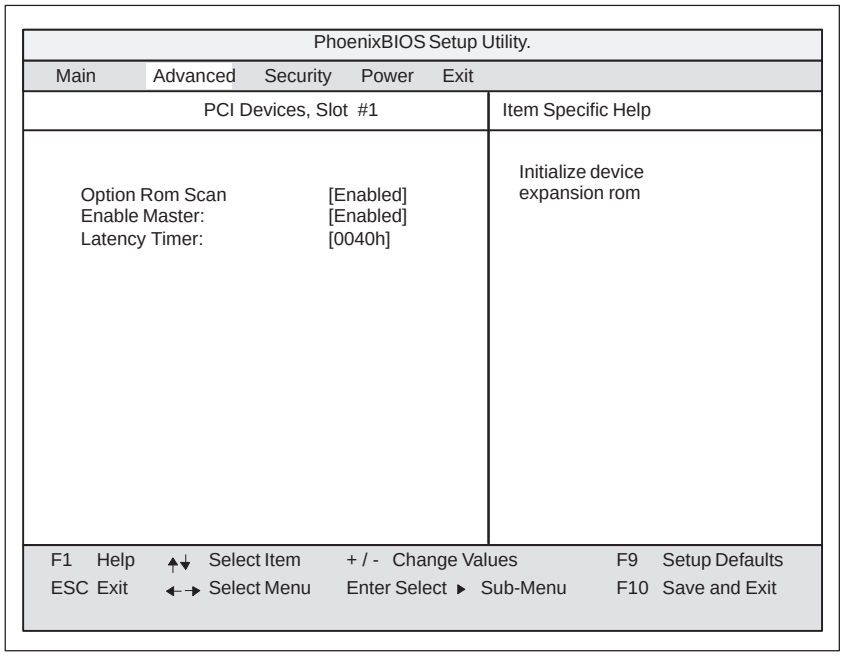


Figure 2-21 “PCI Devices, Slot #1” Submenu

Option ROM Scan:	[Enabled]	The ROM option of the PCI module (if present) is enabled.
	[Disabled]	The ROM option of a PCI module is disabled.
Enable Master:	[Enabled]	This slot can assume the PCI master function.
	[Disabled]	This slot can only work as a PCI slave.
Latency Timer	[Default]	The number of active PCI clock cycles of the master modules are determined by the module.
	[0020H to 00E0H]	You can use these settings to set the maximum number of active PCI clock cycles to the chosen value.

Submenu PCI/PNP ISA IRQ Resource Exclusion

Available means that the IRQ can be allocated to Plug and Play modules or given a motherboard function by the Plug and Play mechanism of the BIOS.

You should only use the Reserved setting if the interrupt does not have to be assigned to Plug and Play ISA modules in the application software.

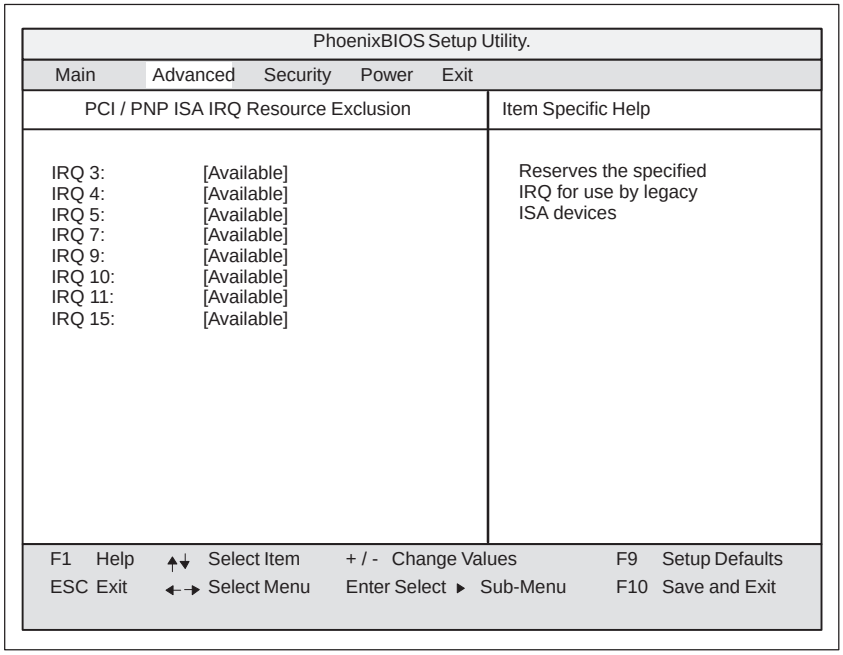


Figure 2-22 “PCI / PNP ISA IRQ Resource Exclusion” Submenu

Option "PCI IRQ Line"

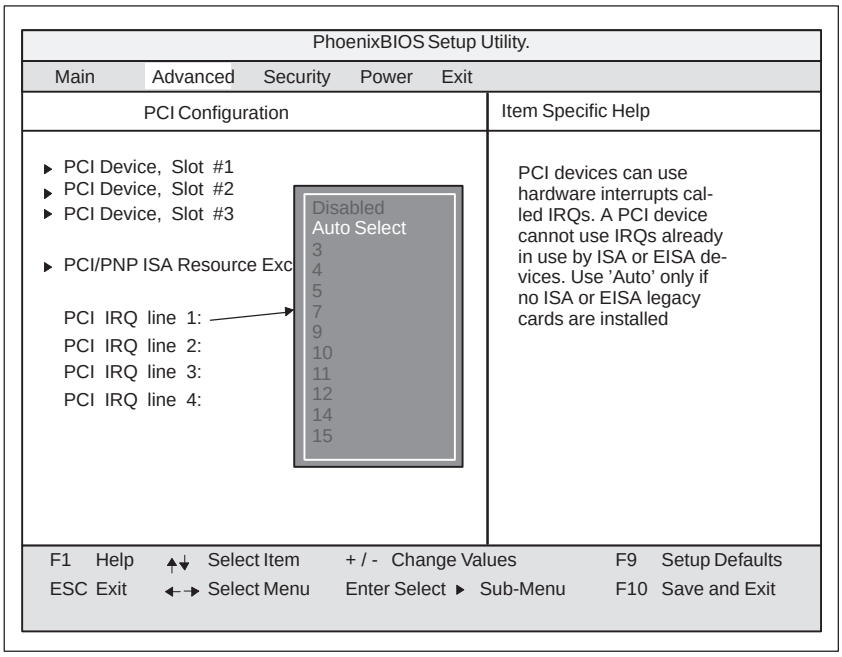


Figure 2-23 "PCI Configuration" Submenu

Disabled 1	No interrupt possible for the selected PCI IRQ line
AutoSelect	Plug & Play mechanism of the BIOS selects free interrupts and assigns them to the PCI module.
3 to 15	The selected PCI IRQ line is assigned to the selected interrupt. You should only select this setting if it is specifically required in the documentation for your PCI module or application.

Assignment of the PCI IRQ Line to the PCI Slots.

Slot 1	PCI module interrupt
PCI IRQ Line 1	INT - A
PCI IRQ Line 2	INT - B
PCI IRQ Line 3	INT - C
PCI IRQ Line 4	INT - D
Slot 2	PCI module interrupt
PCI IRQ Line 1	INT - B
PCI IRQ Line 2	INT - C
PCI IRQ Line 3	INT - D
PCI IRQ Line 4	INT - A

2.13.3 The Security Menu

Summary

You can only edit the options enclosed in square brackets. Two passwords are assigned to protect your PC from unauthorized use. You can use the supervisor password to prevent use of diskettes for the normal user and to limit use of the hard disk.

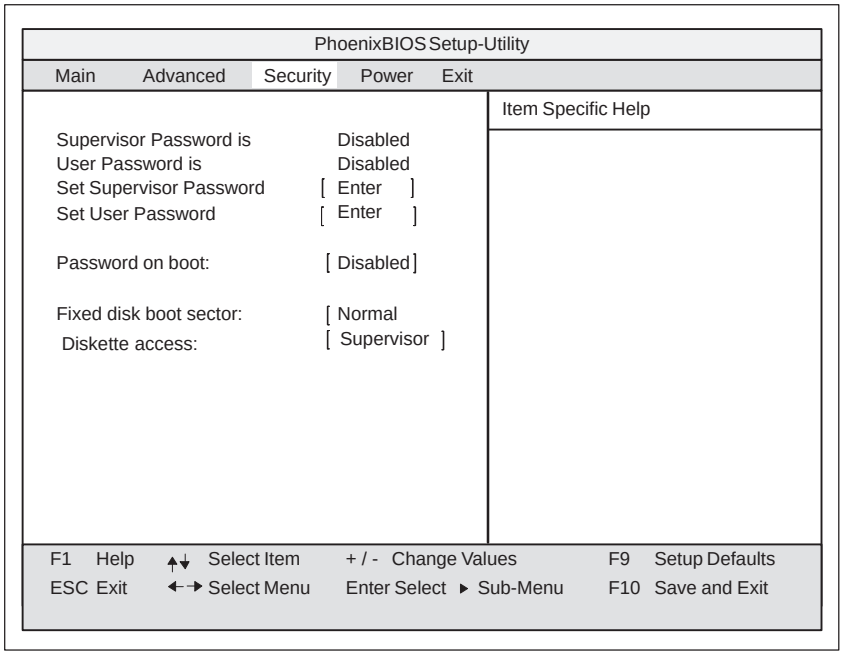


Figure 2-24 “Security” Submenu

2.13.4 The Power Menu

Summary

This menu has the following structure:

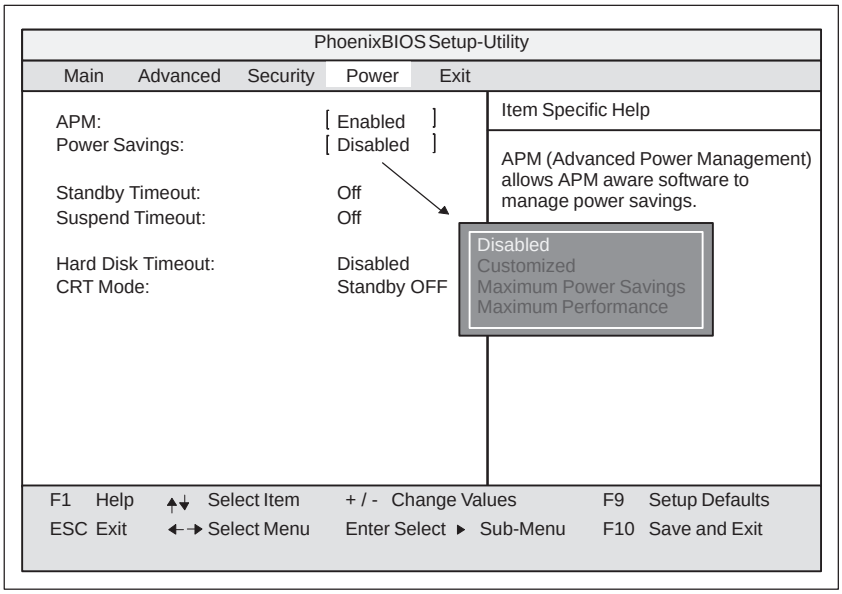


Figure 2-25 “Power” Submenu

In accordance with “Green PC” considerations, the following power saving modes can be set using the power menu:

APM	[Enabled]	Permits the switching off of system resources not required by the operating system.
	[Disabled]	APM (advanced power management) access not permissible for operating system.
Power Savings	[Disabled]	No power saving functions
	[Customize, Maximum Power Savings, Maximum Performance]	Customized or preset power saving functions by maximum and minimum amounts. The settings for Standby/Suspend Timeout, and Fixed Disk Timeout can be customized or are set accordingly.
Standby Timeout	[Off]	No standby mode
	[5, 10, 15, 20, 30, 40, 60]	...minutes after your PC goes to standby mode
Suspend Timeout	[Off]	No suspend mode
	[5, 10, 15, 20, 30, 40, 60]	...minutes after your PC goes to suspend mode

In suspend mode, the CPU is stopped and can only be restarted by an interrupt, for example, keyboard, mouse, COM 1/2, hard disk.

Hard Disk Timeout	[Disabled]	Hard disks are not switched off.
	[10, 15, 30, 60]	Minutes after which the hard disk drive is switched off, provided it is not being accessed. If you attempt to access the hard disk after it has been switched off, there will be an access delay while the disk is run up again.

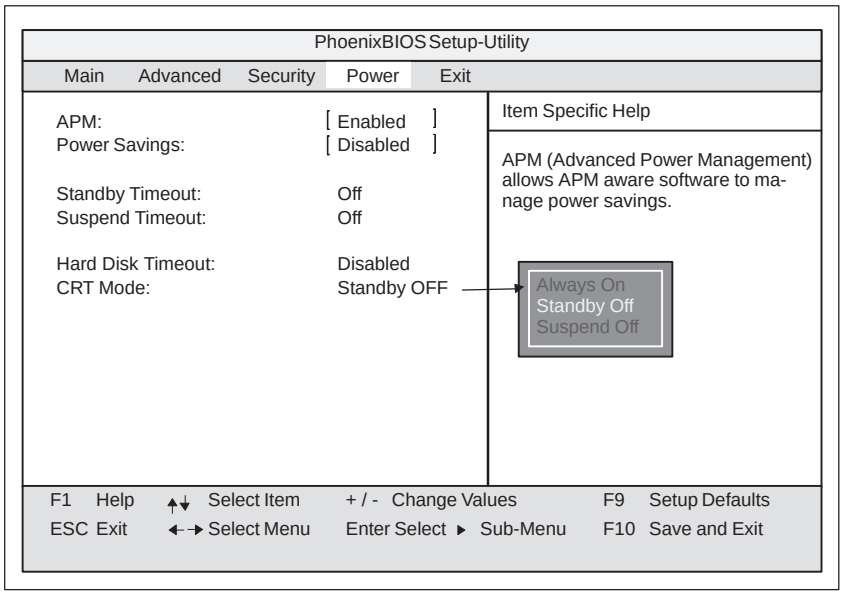


Figure 2-26 “Power” Submenu

CRT	[Standby Off]	This means that the sync signals to the VGA interface are switched off in standby mode, causing the monitor itself to enter standby mode.
	[Suspend Off]	This means that the sync signals to the VGA interface are switched off in suspend mode.
	[Always On]	Monitor always remains in operation.

2.13.5 The Exit Menu

Summary

The setup program is always terminated using this menu.

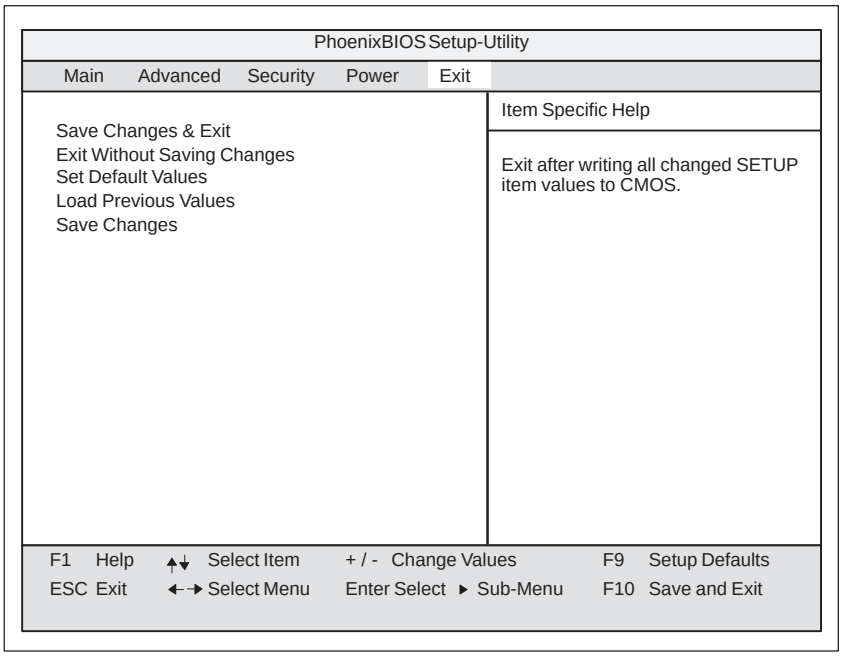


Figure 2-27 “Exit” Submenu

Save Changes & Exit	All changes are saved; a system restart is carried out with the new parameters.
Exit Without Saving Changes	All changes are rejected; a system restart is carried out with the old parameters.
Set Default Values	All parameters are set to safe values.
Load Previous Values	The last saved values are loaded again.
Save Changes	Saving of all setup entries.

Documenting your System Configuration

If you have made any modifications to your standard SETUP settings, you can enter them in the following table. You therefore have easy access to the values you have set if you have to make any hardware modifications later.

System Parameter	Standard Settings	Your Entries
Diskette A	3.5 in., 1.44 Mbytes	
Diskette B	Not installed	
Hard Disk 1	Submenu: Autotype Fixed Disk user xxx Mbytes	
Hard Disk 2	Not installed	
Memory Cache	Submenu: Enabled Cache: Enabled	
Memory Shadow	Submenu: Enabled System: Enabled Video Enabled:	
Boot Sequence	A: then C:	
Numlock	On	
FI Hardware Options PCI-MPI/DP Internal COM1: Internal COM2: Internal LPT1: LPT Mode: CRT resolution: CRT 640 x 480: CRT 800 x 600: CRT 1024 x 768: Internal mouse:	**Submenu** Enabled 3F8, IRQ4 2F8, IRQ3 378, IRQ7 output only 75 Hz 75 Hz 75 Hz Internal	

2.14 Diagnostic Messages (Port 80)

When the SIMATIC PC is powered up, it runs a self–test (POST = Power On Self Test). If the POST detects a fault, it outputs the sequence of beeps (beep code) assigned for the fault. Each beep code consists of 2 x 2 sequences.

In addition, the individual self-test steps are output at I/O port 80h. The optional SafeCard allows these outputs to be displayed in hex code at the front of the device.

Conversion table for the beep codes to hexadecimal representation:

Beeps		Hex Code
B	B	0
B	BB	1
B	BBB	2
B	BBBB	3
BB	B	4
BB	BB	5
BB	BBB	6
BB	BBBB	7
BBB	B	8
BBB	BB	9
BBB	BBB	A
BBB	BBBB	B
BBBB	B	C
BBBB	BB	D
BBBB	BBB	E
BBBB	BBBB	F

Example:

B	BBBB	BBB	BBB	Beeps
3		6		Hex Code
Check shutdown code				Meaning

The POST Codes in order of occurrence:

Display (hex)	Meaning	Description
02	TP_VERIFY_REAL	Test whether the CPU is in real mode
1C	TP_RESET_PIC	Reset the interrupt controller
12	TP_RESTORE_CRO	Restore the controller register
13	TP_PCI_BM_RESET	Reset the PCI bus master
36	TP_CHK_SUTDOWN	Check the shutdown code
24	TP_SET_HUGE_ES	Switch the ES to special mode
03	TP_DISABLE_NMI	Switch off the NMI
0A	TP_CPU_INIT	Initialize the CPU
04	TP_GET_CPU_TYPE	Determine the CPU type
AE	TP_CLEAR_BOOT	Edit the boot flag
06	TP_HW_INIT	Initialize the main hardware
18	TP_TIMER_INIT	Initialize the timer
08	TP_CS_INIT	Initialize the chip set
C4	TP_PEM_SIZER_INIT	Reset system error
0E	TP_IO_INIT	Initialize IO
0C	TP_CACHE_INIT	Initialize the cache
16	TP_CHECKSUM	EPROM checksum test
28	TP_SIZE_RAM	Determine the RAM size
3A	TP_CACHE_AUTO	Determine the cache size
2A	TP_ZERO_BASE	Set 512k base RAM to 0
2C	TP_ADDR_TEST	Test the base RAM address cables
2E	TP_BASERAML	Check the 1.64k base RAM
38	TP_SYS_SHADOW	BIOS shadow
20	TP_REFRESH	Refresh circuit test
29	TP_PMM_INIT	Initialize the post memory manager
33	TP_PDM_INIT	Initialize the dispatch manager
C1	TP_7xx_INIT	Initialize the PG 7xx I/Os
09	TP_SET_IN_POST	Start power ON self-test
0A	TP_CPU_INIT	Initialize the CPU
0B	TP_CPU_CACHE_ON	Switch on the cache
0F	TP_FDISK_INIT	Initialize the hard disk
10	TP_PM_INIT	Initialize the power management
14	TP_8742_INIT	Initialize the 8742 circuit
1A	TP_DMA_INIT	Initialize the DMA circuits
1C	TP_RESET_PIC	Reset the interrupt controller
32	TP_COMPUTE_SPEED	Determine the clock pulse speed
C1	TP_740_INIT	Initialize the PG 740 I/Os
34	TP_CMOS_TEST	Test the CMOS RAM
3C	TP_ADV_CS_CONFIG	Configure the advanced chip set
42	TP_VECTOR_INIT	Initialize the interrupt vectors
46	TP_COPYRIGHT	Test the copyright
49	TP_PCI_INIT	Initialize the PCI interface
48	TP_CONFIG	Check the configuration
4A	TP_VIDEO	Initialize the video interface

Display (hex)	Meaning	Description
4C	TP_VID_SHADOW	Copy the video BIOS to RAM
24	TP_SET_HUGE_ES	Switch the ES to special mode
22	TP_8742_TEST	Test circuit 8742
52	TP_KB_TEST	Keyboard available?
54	TP_KEY_CLICK	Switch the keyboard click on/off
76	TP_KEYBOARD	Check the keyboard
58	TP_HOT_INT	Test for unexpected interrupts
4B	TP_QUIETBOOT_START	Switch off any boot messages
4E	TP_CR_DISPLAY	Display the copyright notice
50	TP_CPU_DISPLAY	Display the CPU type
5A	TP_DISPLAY_F2	Display the F2 message for “SETUP”
5B	TP_CPU_CACHE_OFF	Switch off the cache if applicable (SETUP setting)
5C	TP_MEMORY_TEST	Test the system memory
60	TP_EXT_MEMORY	Test the extended memory
62	TP_EXT_ADDR	Test the A20 address line
64	TP_USERPATCH1	Area for own initializations
66	TP_CACHE_ADVNCD	Determine and enable the cache size
68	TP_CACHE_CONFIG	Configure and test the cache
6A	TP_DISP_CACHE	Display the cache configuration
6C	TP_DISP_SHADOWS	Configuration and size of the shadow Display RAM
6E	TP_DISP_NONDISP	Display nondisposable segment
70	TP_ERROR_MSGS	Display post error
72	TP_TEST_CONFIG	Check SETUP irregularities
7C	TP_HW_INTS	Set the IRQ vectors
7E	TP_COPROC	Check whether the CO processor is present
96	TP_CLEAR_HUGE_ES	Switch the ES back
80	TP_IO_BEFORE	Disable IO circuits
88	TP_BIOS_INIT	Initialize the BIOS data area
8A	TP_INIT_EXT_BDA	Initialize the external BIOS data area
85	TP_PCI_PCC	Determine the PCI circuits
82	TP_RS232	Determine the serial interfaces
84	TP_LPT	Determine the parallel interface
86	TP_IO_AFTER	Reenable the IO circuits
83	TP_FDISK_CFG_IDE_CTRLR	Configure the IDE controller
89	TP_ENABLE_NMI	Enable the NMI
8C	TP_FLOPPY	Initialize the floppy controller
90	TP_FDISK	Initialize the hard disk controller
8B	TP_MOUSE	Test the internal mouse interface
95	TP_CD	Test the CP
92	TP_USERPATCH2	Area for own initializations
98	TP_ROM_SCAN	Search for BIOS expansions
69	TP_PM_SETUP	Initialize the power management
9E	TP_IRQS	Enable the hardware IRQ
A0	TP_TIME_OF_DAY	Set the clock time and date
A2	TP_KEYLOCK_TEST	Preset the keylock

Display (hex)	Meaning	Description
C2	TP_PEM_LOCK	Stop the error manager
C3	TP_PEM_DISPLAY	Display any possible errors
A8	TP_ERASE_F2	Delete the F2 message
AA	TP_SCAN_FOR_F2	Check whether to activate setup
AC	TP_SETUP_CHEK	Output any F1/F2 message
AE	TP_CLEAR_BOOT	Cancel the self-test flag
B0	TP_ERROR_CHECK	Check for any possible errors
B2	TP_POST_DONE	End of the self-test
BE	TP_CLEAR_SCREEN	Clear the screen
B6	TP_PASSWORD	Password query (option)
BC	TP_PARITY	Cancel the parity memory bit
BD	TP_BOOT_MENU	Display the boot menu (option)
B9	TP_PREPARE_BOOT	Prepare the boot
C0	TP_INT19	Boot via Interrupt 19
00		Message after startup is complete

Keyboard Controller (FI45)

3

Chapter Overview

3.1 Overview

The keyboard controller checks the 10 x 8 keyboard matrix of the SIMATIC PC. In this matrix the functions of a standard AT keyboard can be assigned to any key. An additional standard AT-MF II keyboard can be connected (to the front or back of the unit).

The key assignment, which is exclusively determined by software, can be modified at any time without requiring any further technical means. Programming the keyboard is executed via the common link between AT and keyboard controller. All settings are saved in the controller integrated EEPROM. The controller is backed up by a hardware watchdog circuit.

The key assignment can be re-defined by the programming software (which is included with the PC and installed under C:\KEYBOARD).

The programming software is independent on the operating system. To carry out the programming, you must first create a boot diskette. To do this, follow the instructions in the file C:\Keyboard\readme.txt.

3.2 Syntax and Structure of the Configuration File

In order to assign parameters to the keyboard controller, you must first create a configuration file (text file). ****.key*** must be selected as the file type. The easiest method is to copy and then adapt the configuration file for standard parameter assignment. This configuration file is located under C:\KEYBOARD\KBDDATA. A printout of this file can be found in Section 3.5.

The configuration file consists of lines of text. In order to set a particular function, you must enter a keyword followed by other parameters. The keyword must always be located at the beginning of a line. Any number of blanks can be entered between the keyword and the parameters. It is also possible to enter space lines to make the text easier to read. A comment is introduced by a ‘;’ and can begin at any position in the line.

3.2.1 Description of the Keywords

The following nomenclature applies to the description of the keywords and their syntax below:

KEY	**Keyword is printed in bold**
param[n]	Parameter, a hexadecimal number from 00 to FF
TEXT	Any sequence of characters (e.g. comment)
<	Introductory character for direct key parameter
>	End character for direct key parameter
[ ]	Optional entry

SYSTEM FLAG param [; TEXT]

Global settings. This enables you, for example, to lock the auto-repeat function. The following functions can be set via param:

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Internal, must be 0	1: only one key must be pressed at the same time	Internal, must be 0	1: ESC after RESET	Internal, must be 0	1: Auto-repeat locked	1: LED outputs for control purposes	Internal, must be 0
	0: N-Key Rollover		0: no ESC after RESET		0: Auto-repeat possible	0: LED for CPS, NUM, SCROLL	

BEEPLEN param [; TEXT]

Duration of beep sound in 1/60 of a second. Value range from param: 00 to 3F hex. param=00: no beep sound

ENTPRELL param [; TEXT]

Duration of debounce time in 1/60 of a second. Value range from param: 00 to 3F hex.

EXTENDPRELL param [; TEXT]

Duration of additional debounce time in 1/60 of a second. Value range from param: 00 to 3F hex. If bit 7 is in the IO attribute =0 (when KEY is the keyword), EXTENDPRELL is taken as the basis for the total debounce time.

SPEZBREAK param [; TEXT]

Special break code. Value range from param: 00 to 7F hex. If bit 6 is in attribute 1 or attribute 2 =0 (when KEY is the keyword), the special break code is sent instead of the normal break code.

KEY	param1 Matrix no.	param2 AT code1	param3 Attribute1	param4 IO attribute	[param5 param6] [AT code2 attribute 2]	[<param7>] [<DK code>]	[; TEXT]

param1 (Matrix no.) specifies the position in the key matrix or the number of the input switch. The input switches are not wired and cannot therefore be used by the user. The first param1 digit is the X matrix node of the key, the second param1 digit is the Y matrix node of the key (see Figure 3.3).

param2/5 (AT code1 / AT code2) specifies the running number of the key (see Figure 3.2). For normal keys, the value range is from param2/5: 00 to 7F hex. If no key code is to be sent, for example if the key is to be assigned parameters as a shift key or a direct key, param2/5 is set to FF hex.

param3/6 (Attribute1 / Attribute2) controls the key function individually. This means that you can, for example, specify whether the auto-repeat key is to be executed. For individual functions, see the following table:

The function is active when the corresponding bit is set.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Key with auto-repeat	Special break code	Send no break code	Send ESC before key code	Send AltGr before key code	Send Alt before key code	Send Strg before key code	Send Shift before key code

param4 (IO Attribute) controls the key function individually. This means that you can, for example, specify whether the key switches to the second level (param4=7F hex). Port functions cannot be used by the user; this means that Bit 0 to Bit 5 must always be =1. For individual functions, see the following table:

The function is active when the corresponding bit is set.

Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Key uses internal debounce time	Key switches to second level	1	1	1	1	1	1

param7 (DK code) With SIMATIC PCs a maximum of 32 keys on the membrane keyboard can be configured as direct keys. Up to 2 direct keys can be operated simultaneously.

In principle, every key on the membrane keyboard of the SIMATIC PC can be programmed as a direct key. The special keys (S1 to S16, to the left and right of the screen) and/or the function keys (F1 to F20, at the bottom of the screen) are used as direct keys. A direct key can also be configured as a PC key.

The function (properties) and the key (direct key number) to which the direct key function is assigned, are represented in a byte (**DK code**) (within <.....>.

The DK code:

DK-code (in hex) = function code + number of direct key –1 or for the special function.

DK-code (in hex) = special function code

In the case of special functions, no direct key number must be added to the special function, as with special functions all the direct keys are always addressed at the same time.

Function	Function code	Description
On	40 hex	Pressing a key sets digital input, state remains when key is released
Off	00 hex	Pressing a key resets digital input, state remains when key is released
Touch	C0 hex	Pressing a key sets digital input, releasing the key resets digital input
Toggle	80 hex	Every time a key is pressed and then released, the state of the digital input is inverted.

The following special functions can be configured:

Function	Special Function Code	Description
All on	20 hex	Pressing a key sets **all** digital inputs, state remains when key is released
All off	60 hex	Pressing a key resets **all** digital inputs, state remains when key is released
All touch	E0 hex	Pressing a key sets **all** digital inputs, releasing the key resets **all** digital inputs
All toggle	A0 hex	Every time a key is pressed and then released, the state of **all** digital inputs is inverted.

The special keys and function keys of the SIMATIC PC have the following default assignments:

Membrane key	Direct key no.	Digital I/O (byte bit)	PC AT key	Remarks
F1 to F8	1 to 8	DI 0.0 to DI 0.7	F1 to F8	PC key without-repeat
F9 to F12	9 to 12	DI 1.0 to DI 1.3	F9 to F12	PC key without auto-repeat
F13 to F16	13 to 16	DI 1.4 to DI 1.7	–	–
S1 to S8	17 to 24	DI 4.0 to DI 4.7	–	–
S9 to S16	25 to 32	DI 5.0 to DI 5.7	–	–
F17–F20	–	–	–	–

Note

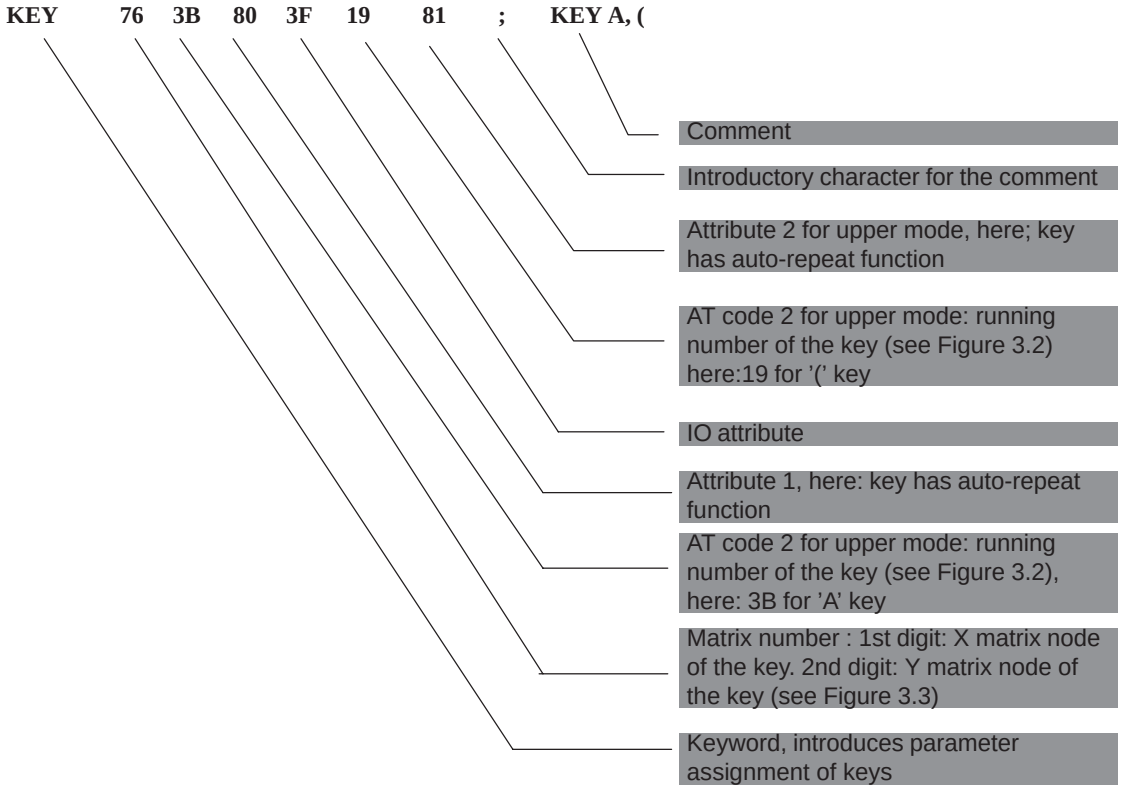
The direct keys can only be used in conjunction with the direct key module (optional).

Examples for Configuring a Key

Example 1 (FI45, Upper mode):

Function: Key is to send the character code for the character ‘A’ and, when used in combination with the shift key, the character code for the character ‘(’.

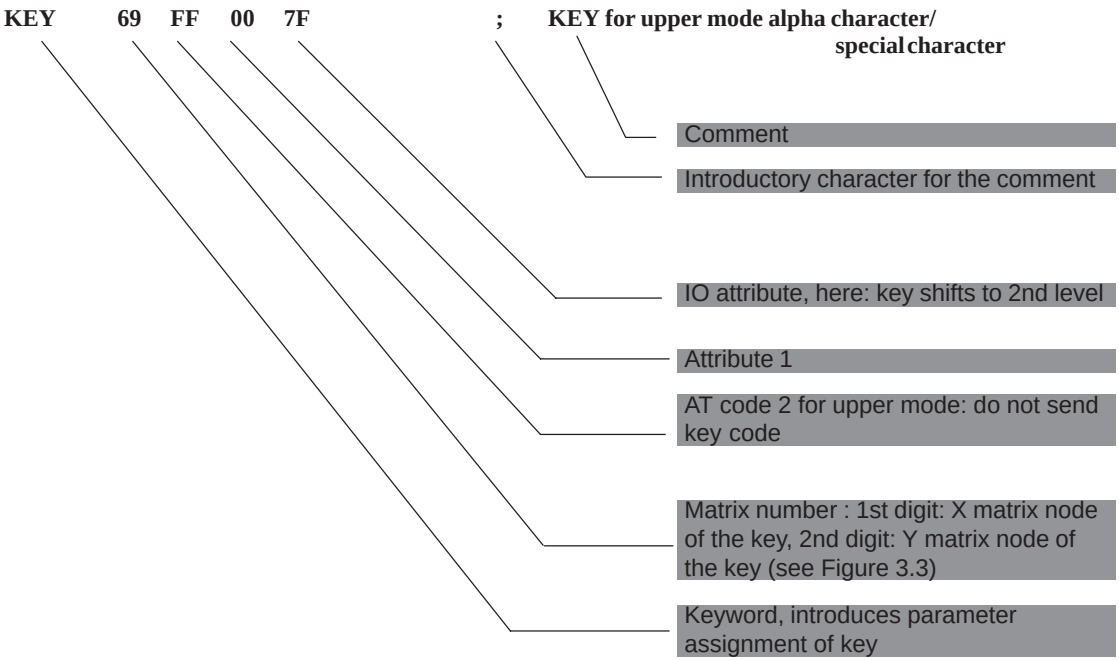
Parameter Assignment



Example 2: (FI45, Shift key):

Function: Key is to be configured as a shift key.

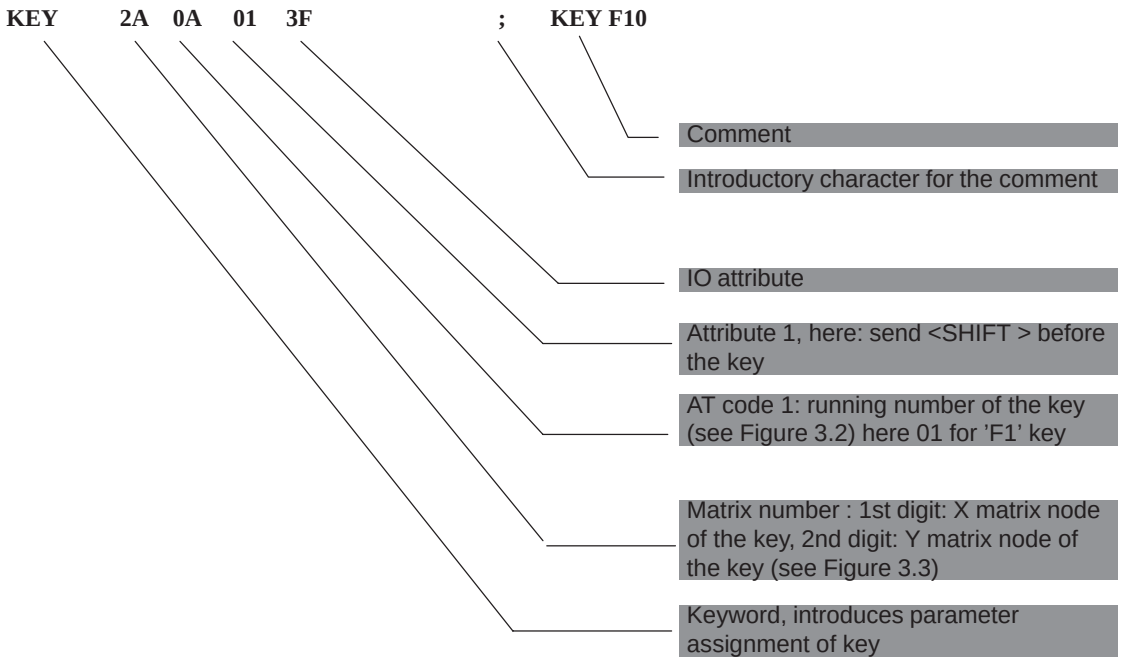
Parameter Assignment



Example 3 (Hotkey function, e.g. for SIMATIC WinCC)

Function: Function key F10 is to send the character codes for <SHIFT F1>.

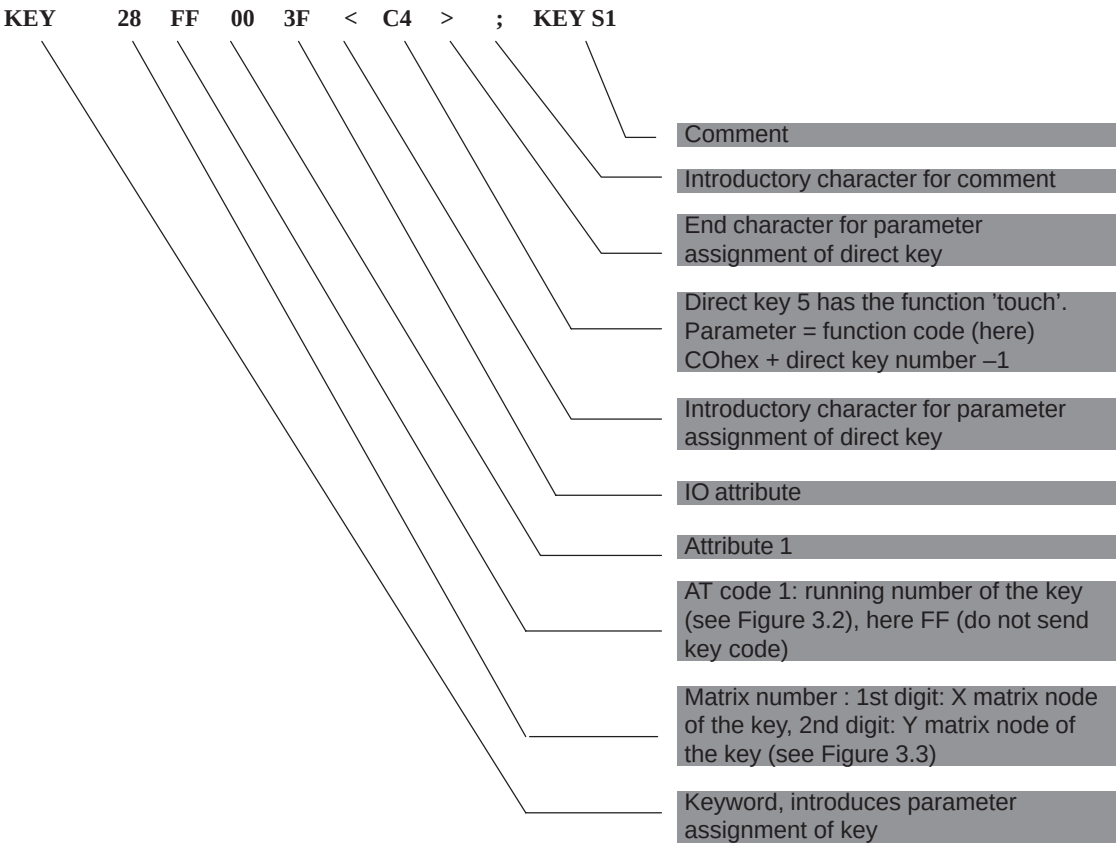
Parameter Assignment



Example 4 (Direct keys in connection with the direct key module)

Function: Special key S1 is not to send any key code, but instead serve as a direct key with the number 5 and the function ‘touch.’

Parameter Assignment



3.3 Connector Assignment of Keyboard Controller

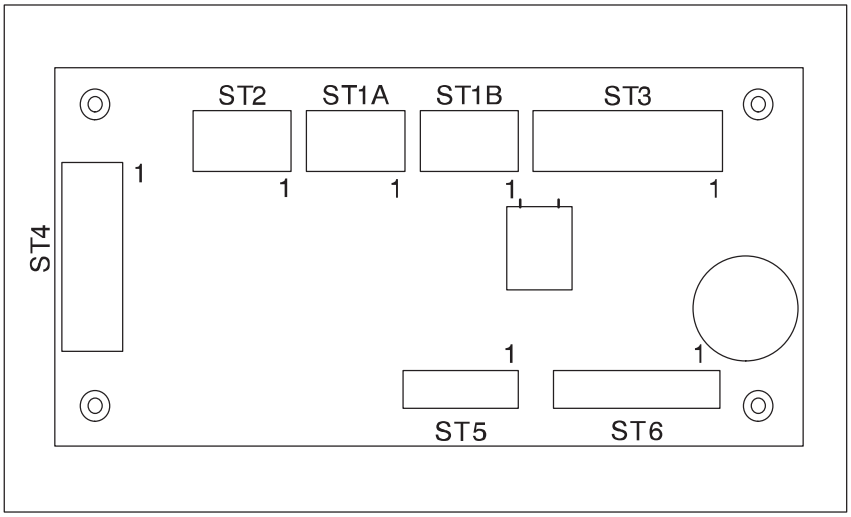
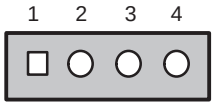


Figure 3-1 Location of the Plug Connectors on the Controller Board

Connector for External Keyboard

Pin	Description
1	CLOCK
2	+5 V
3	GND
4	DATA

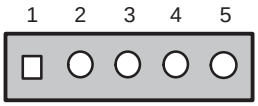
4-pin plug connector: ST1A/ST1B



Connector for Keyboard Port on CPU

Pin	Description
1	GND
2	+5 V
3	CLOCK
4	DATA
5	unassigned

5-pin plug connector: ST2



Connector for LED (not Assigned) Plug Connector ST3

Pin	Description
1	LED Power (anode)
2	V_{CC}
3	GND
4	Beeper
5	LED3 (direct, o.k.)
6	LED3 cathode
7	LED2 (direct, o.k.)
8	LED2 cathode
9	LED1 (direct, o.k.)
10	LED1 cathode

Connector for Input Switches and Direct Key Outputs (Standard Setting: Unassigned) Plug Connector ST4

Pin	Description
1	Switch1
2	Switch2
3	Switch3
4	Switch4
5	GND
6	D-Dat
7	D-Latch
8	D–CLK
9	GND
10	GND

Output Keyboard Matrix X Socket Connector ST5

Pin	Description
1	X0
2	X1
3	X2
4	X3
5	X4
6	X5
7	X6
8	X7

Input Keyboard Matrix Y Socket Connector ST6

Pin	Description
1	Y0
2	Y1
3	Y2
4	Y3
5	Y4
6	Y5
7	Y6
8	Y7
9	Y8
10	Y9
11	Y10
12	Y11
13 to 16	unassigned

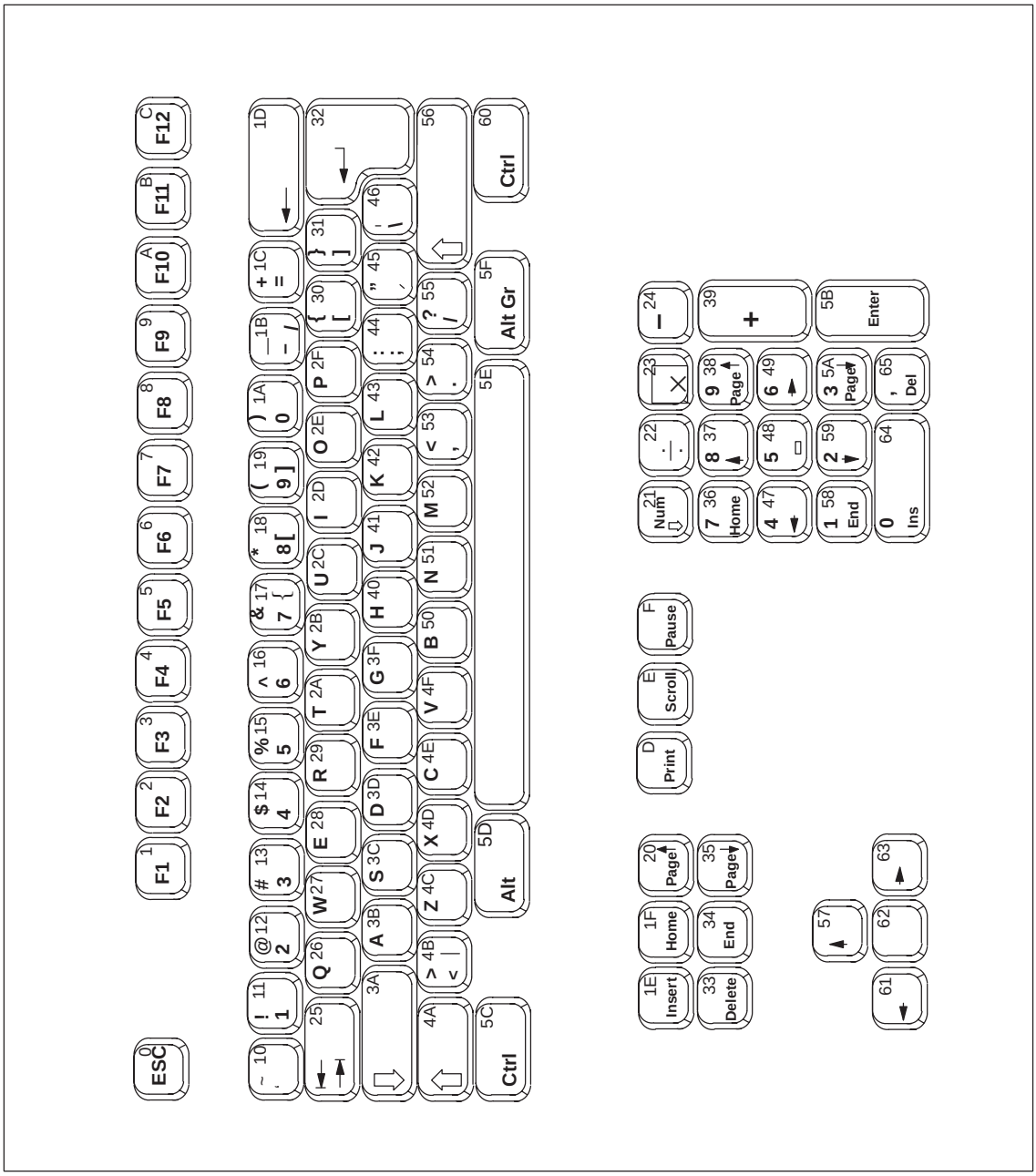


Figure 3-2 Serial Numbers of Keys

3.4 Matrix Configuration PC FI45

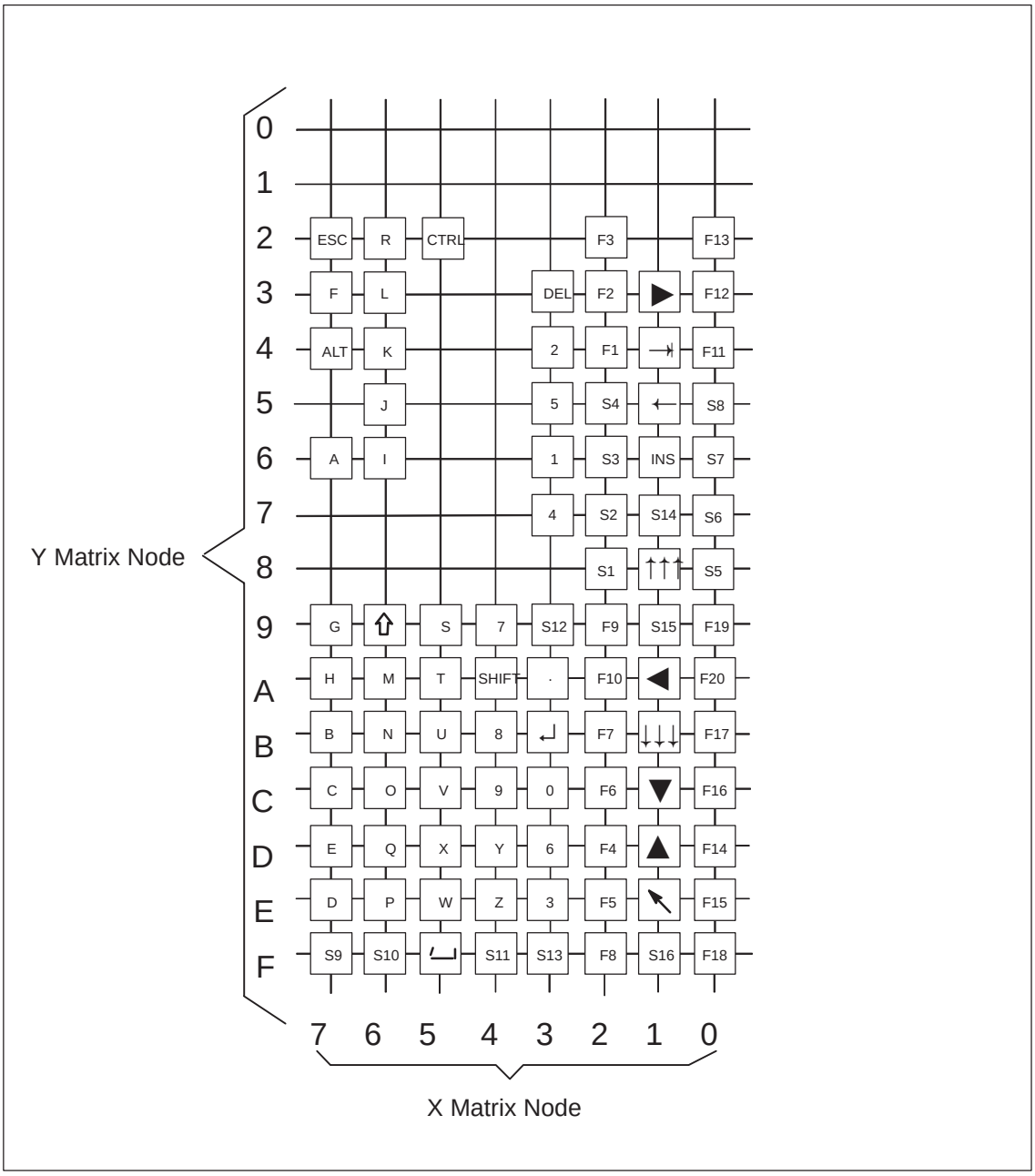


Figure 3-3 Matrix Configuration of the Membrane Keyboard

3.5 Configuration File for Keyboard Controller

```
Configuration file for keyboard controller SIMATIC PC FI45 with direct key fea-
ture

Function keys F1 to F12 are PC keys as well (no auto-repeat)
Direct keys 1 to 16 : as F1 to F16
Direct keys 17 to 32 : as S1 to S16



;========================Configuration=======================

System Flag  04                ; Send no ESC after RESET
Beep Len     02                ; Beep length
Entprell     00                ; Normal debounce time
Extend Prell 00                ; Extended debounce time
Spez Break   AA                ; Special break code $AA


KEY4A FF 00 7F              ; Alpha/special characters
KEY69 4A 00 3F              ; Capital letters/small letters

KEY76 3B 80 3F 19 81     ; a/A, (
KEY7B 50 80 3F lA 81     ; b/B, )
KEY7C 4E 80 3F 17 81     ; c/C, &
KEY7E 3D 80 3F 14 81     ; d/D, $
KEY7D 28 80 3F 55 81     ; e/E, ?

KEY73 3E 80 3F 30 80     ; f/F, [
KEY79 3F 80 3F 31 80     ; g/G, ]
KEY7A 40 80 3F 12 81     ; h/H, @
KEY66 2D 80 3F 15 81     ; i/I, %
KEY65 41 80 3F 11 81     ; j/J, !

KEY64 42 80 3F 30 81     ; k/K, {
KEY63 43 80 3F 31 81     ; l/L, }
KEY6A 52 80 3F 13 81     ; m/M, #
KEY6B 51 80 3F 45 81     ; n/N, ”
KEY6C 2E 80 3F 45 80     ; o/O, ’

KEY6E 2F 80 3F 53 81     ; p/P, C
KEY6D 26 80 3F 54 81     ; q/Q, “
KEY62 29 80 3F 10 81     ; z/R, “
KEY59 3C 80 3F 1B 81     ; s/S,
KEY5A 2A 80 3F 53 80     ; t/T, ,


KEY5B 2C 80 3F 16 81     ; u/U, “
KEY5C 4F 80 3F 55 80     ; v/V, /
KEY5E 27 80 3F 46 80     ; w/W, \
KEY5D 4D 80 3F 46 81     ; x/X, “
KEY4D 2B 80 3F 44 81     ; y/Y, .
KEY4E 4C 80 3F 44 80     ; z/Z, ;
```

```
KEY3C 1A 80 3F           ; 0
KEY36 11 80 3F           ; 1
KEY34 12 80 3F           ; 2
KEY3E 13 80 3F           ; 3
KEY37 14 80 3F 23 80     ; 4, *
KEY35 15 80 3F           ; 5
KEY3D 16 80 3F 22 80     ; 6, /
KEY49 17 80 3F 39 80     ; 7, +
KEY4B 18 80 3F 1C 80     ; 8, =
KEY4C 19 80 3F 24 80     ; 9, –

KEY24 01 00 3F <C0>   ; Function key F1 = Direct key 00hex
KEY23 02 00 3F <C1>   ; Function key F2 = Direct key 01hex
KEY22 03 00 3F <C2>   ; Function key F3 = Direct key 02hex
KEY2D 04 00 3F <C3>   ; Function key F4 = Direct key 03hex
KEY2E 05 00 3F <C4>   ; Function key F5 = Direct key 04hex
KEY2C 06 00 3F <C5>   ; Function key F6 = Direct key 05hex
KEY2B 07 00 3F <C6>   ; Function key F7 = Direct key 06hex
KEY2F 08 00 3F <C7>   ; Function key F8 = Direct key 07hex
KEY29 09 00 3F <C8>   ; Function key F9 = Direct key 08hex
KEY2A 0A 00 3F <C9>   ; Function key F10 = Direct key 09hex
KEY04 0B 00 3F <CA>   ; Function key F11 = Direct key 0Ahex
KEY03 0C 00 3F <CB>   ; Function key F12 = Direct key 0Bhex
KEY02 FF 00 3F <CC>   ; Function key F13 = Direct key 0Chex
KEY0D FF 00 3F <CD>   ; Function key F14 = Direct key 0Dhex
KEY0E FF 00 3F <CE>   ; Function key F15 = Direct key 0Ehex
KEY0C FF 00 3F <CF>   ; Function key F16 = Direct key 0Fhex
KEY0B FF 00 3F        ; Function key F17
KEY0F FF 00 3F        ; Function key F18
KEY09 FF 00 3F        ; Function key F19
KEY0A FF 00 3F        ; Function key F20
KEY28 FF 00 3F <D0>   ; Softkey S1 = Direct key 10hex
KEY27 FF 00 3F <D1>   ; Softkey S2 = Direct key 11hex
KEY26 FF 00 3F <D2>   ; Softkey S3 = Direct key 12hex
KEY25 FF 00 3F <D3>   ; Softkey S4 = Direct key 13hex
KEY08 FF 00 3F <D4>   ; Softkey S5 = Direct key 14hex
KEY07 FF 00 3F <D5>   ; Softkey S6 = Direct key 15hex
KEY06 FF 00 3F <D6>   ; Softkey S7 = Direct key 16hex
KEY05 FF 00 3F <D7>   ; Softkey S8 = Direct key 17hex
KEY7F FF 00 3F <D8>   ; Softkey S9 = Direct key 18hex
KEY6F FF 00 3F <D9>   ; Softkey S10 = Direct key 19hex
KEY4F FF 00 3F <DA>   ; Softkey S11 = Direct key 1Ahex
KEY39 FF 00 3F <DB>   ; Softkey S12 = Direct key 1Bhex
KEY3F FF 00 3F <DC>   ; Softkey S13 = Direct key 1Chex
KEY17 FF 00 3F <DD>   ; Softkey S14 = Direct key 1Dhex
KEY19 FF 00 3F <DE>   ; Softkey S15 = Direct key 1Ehex
KEY1F FF 00 3F <DF>   ; Softkey S16 = Direct key 1Fhex
```

```
KEY1D 57 80 3F           ; 'up'
KEY1A 61 80 3F           ; 'left'
KEY1E 1F 80 3F 34 80     ; 'Home / End'
KEY13 63 80 3F           ; 'right'
KEY1C 62 80 3F           ; 'down'
KEY18 20 80 3F           ; 'Page up'
KEY1B 35 80 3F           ; 'Page down'

KEY5F 5E 80 3F           ; 'Space'
KEY3A 54 80 3F           ;  .

KEY52 5C 80 3F           ; <CTRL>
KEY16 1E 80 3F           ; <INS>
KEY74 5D 80 3F           ; <ALT>
KEY33 33 80 3F           ; <DEL>
KEY15 1D 80 3F           ; 'Backspace'
KEY72 00 80 3F           ; <ESC>
KEY14 25 80 3F           ; 'Tab right'
                           'Tab left'
KEY3B 32 80 3F           ; <CR>


; End of key file
```

Direct Key Module (Optional with FI45)

4

Chapter Overview

4.1 General Information

As a plug-in board, the direct key module is designed to be implemented in the SIMATIC industrial PCs.

The module allows you to assign digital events to individual keys on the membrane keyboard. Thus the direct control of a PLC's digital input becomes possible by pressing a key. As the module is configured as slave on the PROFIBUS, data can be transferred via a standard field bus.

The direct key module enriches the SIMATIC Industrial PCs with the following functions:

- The PROFIBUS scans up to 32 keys on the SIMATIC PC's membrane keyboard as direct keys.
- An external panel with up to 16 additional keys can be connected, if necessary.
- 16 digital outputs to trigger check-back indicators of connected panels (PLC via PROFIBUS DP) are provided.
- The PLC scans all direct keys via the PROFIBUS DP.
- The PROFIBUS DP port has been developed for transmission rates of 9.6 Kbps – 12 Mbps.

4.2 Functional Description

The direct key module is employed to scan keys via the PROFIBUS DP within a defined time-slot pattern. The module as such is configured as a PROFIBUS norm slave on PROFIBUS DP. PROFIBUS reaction time guarantees a scanning of the keyboard within the time limit defined for PROFIBUS.

The direct key module always serves as a slave on the PROFIBUS DP. Triggering or scanning the direct key module is always executed by a DP master, which operates the direct key modules via layer two of the seven-layer module. After having received a trouble-free PROFIBUS message, the direct key module independently generates the requested response messages (acc. to DIN standard E19245 T3). Default setting of the slave provides the structuring of the digital inputs and outputs as well as the data transfer modes. Data transfer to and from the direct key module is always consistent and determined by a default setting.

With this module it is possible to scan for 32 direct keys (assigned to the digital inputs DI 0.0-0.7, DI 1.0-1.7, DI 4.0-4.7 and DI 5.0-5.7) as well as to scan for or control 16 digital outputs (DO 0.0-0.7 and DO 1.0-1.7) with 24V/100mA and 16 digital inputs (DI 2.0-2.7 and DI 3.0-3.7) with 24V levels via PROFIBUS DP.

The direct key module supports transmission rates of 9.6 Kbps to 12 Mbps.

To set the PROFIBUS address (node address) of the direct module via PROFIBUS use either the ET200 hand held device or a programming device/PC (with an MPI-/DP port) with STEP 7 software installed (see Hardware Config) or COMPROFIBUS software.

Once the PROFIBUS address (node address) is set, it is stored in the direct key module. Even after disconnecting your Industrial PC from the power supply, the settings remain saved.

Note

On delivery, the PROFIBUS address (node address) is set to 126. A direct key module supplied with the default address 126 in accordance with DP regulations, can be assigned a different address by the user after installation. It is essential that this address setting is carried out because otherwise no data can be exchanged with the direct key module (DP nodes with the address 126 do not by definition participate in data exchange).

You do not need to open the device in order to set the address. The address of the direct key module is set by the PROFIBUS. One of the following devices with DP access software must, however, be available:

- ET200 hand-held device,
- Programming device/PC with MPI-/DP port, or
- the SIMATIC PC, in which the direct key module but no SlotPLC is installed.

Either

- the STEP 7 software (Hardware Config.), or
- the COMPROFIBUS software

must be installed on the device.

To ensure that the address is set successfully, a point-to-point connection must be created between the direct key module and the device being used. Some devices are supplied with a suitable connection cable in the consignment.

PC with integrated SlotPLC (WinAC FI Station Pro):

The DP connection of the direct key module is linked to the SlotPLC inside the device. Before you can carry out the address setting, the SlotPLC must be cleared and reset. This isolates the SlotPLC from the DP bus. Connect the DP connection (9-pin D-sub socket) of the SlotPLC to the DP port of the device on which the access software is installed.

PC without integrated SlotPLC:

Connect the DP connection (9-pin D-sub socket) of the direct key module to the MPI-/DP port of the device on which the DP access software is installed. To do this, you may have to remove the covering on the DP connection of the direct key module.

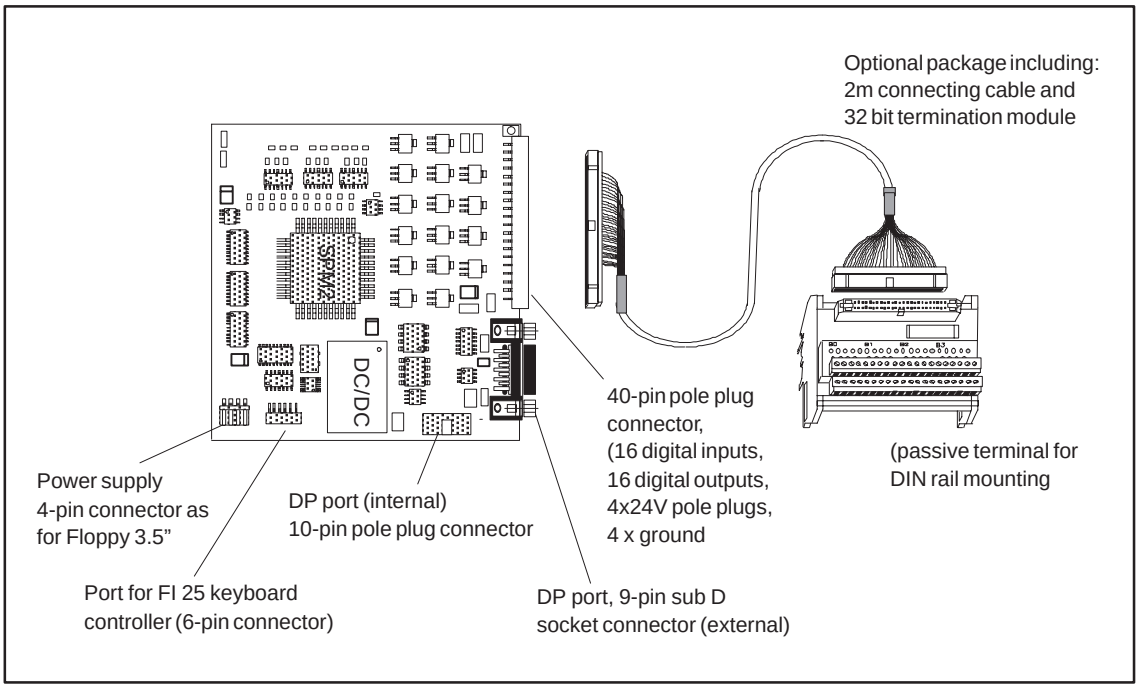
Use the STEP 7 software and proceed as follows:

- Start the SIMATIC Manager
- Select the function **"Assign PROFIBUS Address"** in the **PLC** menu of the SIMATIC Manager. The SIMATIC Manager then contacts the direct key module. A dialog box appears. This dialog box both displays the currently set address of the direct key module and allows you to enter a new address (1, 3 to 125).
- Set the required address. Once the new address has been set, it is stored in the direct key module and is retained even after the power supply has been switched off.
- Close the SIMATIC Manager.

If you are using other PROFIBUS tools, you require the device database file (DDB file). This file is supplied with the SIMATIC PC and stored in the directory C:\KEYBOARD\KBDDATA.

4.3 Direct Key Module Ports

- 16 digital inputs (DI) non-isolated with a 24V level (external port) to connect drive controllers (external port)
- 16 digital outputs (DO) with non-isolated 24V DC/100mA and protected against short circuit (external port) to connect indicator lamps (external port)
- Optically isolated DP port based on RS485 (external port)
- Non-isolated DP port based on TTL (internal port)
- Keyboard port (serial) for 32 direct keys (internal port)
- Power supply connection (internal port)



4.4 Logical Organisation of Digital Inputs and Outputs

Due to the slave controller block used, the digital inputs DI 0.0 - 5.7 are defined as a block (permanently preset as slave). This block consists of 32 direct keys (DI 0.0–0.7, DI 1.0–1.7, DI 4.0–4.7 and DI 5.0–5.7) of the SIMATIC PC membrane keyboard and 16 digital inputs of the external connector (40-pin plug connector) at the rear sheet metal terminal of the direct key module (DI 2.0–2.7 and DI 3.0–3.7)

The digital outputs (DO 0.0 –0.7 and DO 1.0–1.7) are also defined as a block and can be connected to the external connector (40-pin plug connector).

4.5 Assignment of Direct Keys to Digital Inputs

Direct key no.	Digital input (DI)	SIMATIC PC)* function keys	Direct key no.	Digital input (DI)	SIMATIC PC)* function keys
Direct key 1	DI 0.0	F1	Direct key 17	DI 4.0	S1
Direct key 2	DI 0.1	F2	Direct key 18	DI 4.1	S2
Direct key 3	DI 0.2	F3	Direct key 19	DI 4.2	S3
Direct key 4	DI 0.3	F4	Direct key 20	DI 4.3	S4
Direct key 5	DI 0.4	F5	Direct key 21	DI 4.4	S5
Direct key 6	DI 0.5	F6	Direct key 22	DI 4.5	S6
Direct key 7	DI 0.6	F7	Direct key 23	DI 4.6	S7
Direct key 8	DI 0.7	F8	Direct key 24	DI 4.7	S8
Direct key 9	DI 1.0	F9	Direct key 25	DI 5.0	S9
Direct key 10	DI 1.1	F10	Direct key 26	DI 5.1	S10
Direct key 11	DI 1.2	F11	Direct key 27	DI 5.2	S11
Direct key 12	DI 1.3	F12	Direct key 28	DI 5.3	S12
Direct key 13	DI 1.4	F13	Direct key 29	DI 5.4	S13
Direct key 14	DI 1.5	F14	Direct key 30	DI 5.5	S14
Direct key 15	DI 1.6	F15	Direct key 31	DI 5.6	S15
Direct key 16	DI 1.7	F16	Direct key 32	DI 5.7	S16

)* factory presetting

The direct key number is determined by the parameter assignment of the keyboard controller (see chapter ‘Keyboard Controller’) and can be modified at any time. All settings are stored in the keyboard controller and are saved even after disconnecting your PC from the power supply.

4.6 Description of Ports

4.6.1 Ports

I/O Port

40-pin pole plug connector for 16 digital inputs (DI) with a 24V level, 16 digital outputs (DO) with a driver performance of 24V/100mA and an external 24V power feed-in. The outputs are protected against short-circuit.

Pinout

Pin no.	Signal	Description	Pin no.	Signal	Description
Pin 1	DI 2.0	Input byte 2, bit 0	Pin 2	DI 2.1	Input byte 2, bit 1
Pin 3	DI 2.2	Input byte 2, bit 2	Pin 4	DI 2.3	Input byte 2, bit 3
Pin 5	DI 2.4	Input byte 2, bit 4	Pin 6	DI 2.5	Input byte 2, bit 5
Pin 7	DI 2.6	Input byte 2, bit 6	Pin 8	DI 2.7	Input byte 2, bit 7
Pin 9	DI 3.0	Input byte 3, bit 0	Pin 10	DI 3.1	Input byte 3, bit 1
Pin 11	DI 3.2	Input byte 3, bit 2	Pin 12	DI 3.3	Input byte 3, bit 3
Pin 13	DI 3.4	Input byte 3, bit 4	Pin 14	DI 3.5	Input byte 3, bit 5
Pin 15	DI 3.6	Input byte 3, bit 6	Pin 16	DI 3.7	Input byte 3, bit 7
Pin 17	Ground	Ground	Pin 18	Ground	Ground
Pin 19	+24V	External 24V power feed-in	Pin 20	+24V	External 24V power feed-in
Pin 21	DO 0.0	Output byte 0, bit 0	Pin 22	DO 0.1	Output byte 0, bit 1
Pin 23	DO 0.2	Output byte 0, bit 2	Pin 24	DO 0.3	Output byte 0, bit 3
Pin 25	DO 0.4	Output byte 0, bit 4	Pin 26	DO 0.5	Output byte 0, bit 5
Pin 27	DO 0.6	Output byte 0, bit 6	Pin 28	DO 0.7	Output byte 0, bit 7
Pin 29	Ground	Ground	Pin 30	Ground	Ground
Pin 31	+24V	External 24V power feed-in	Pin 32	+24V	External 24V power feed-in
Pin 33	DO 1.0	Output byte 1, bit 0	Pin 34	DO 1.1	Output byte 1, bit 1
Pin 35	DO 1.2	Output byte 1, bit 2	Pin 36	DO 1.3	Output byte 1, bit 3
Pin 37	DO 1.4	Output byte 1, bit 4	Pin 38	DO 1.5	Output byte 1, bit 5
Pin 39	DO 1.6	Output byte 1, bit 6	Pin 40	DO 1.7	Output byte 1, bit 7

DP Port (9 -Pin Sub D Socket Connector)

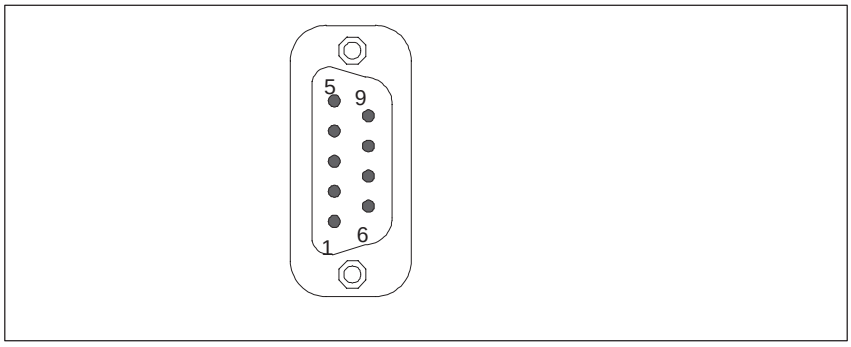


Figure 4-1 DP Port

The port pinout conforms to PROFIBUS requirements

Pinout:

Pin no.	Signal designation	Description	Input/ Output
Pin 1	n.c.	not assigned	–
Pin 2	n.c.	not assigned	–
Pin 3	LTG_B	Signal line B of direct key module	Input/output
Pin 4	RTS	TTL output signal of direct key module. Signal ‘1’ is active when direct access key module transfers data.	Output
Pin 5	M5EXT	M5EXT ground of 5V isolated power supply The current load of an external consumer connected between P5EXT and M5EXT must not exceed a max. of 90mA.	Output
Pin 6	P5EXT	P5EXT supply (+5V) of isolated 5V power supply. The current load of an external consumer connected between P5EXT and M5EXT must not exceed a max. of 90mA.	Output
Pin 7	n.c.	not assigned	–
Pin 8	LTG_A	Signal line A of direct module	Input/output
Pin 9	n.c.	not assigned	

4.6.2 Internal Ports

4-Pin Power Supply Connector

4-pin male connector

Pinout:

Pin no.	Signal designation
1	+5V
2	Ground
3	Ground
4	not assigned

DP Port

10-pin pole plug

Pinout:

Pin no.	Signal designation	Pin no.	Signal designation
1	not assigned	2	Disable power (control signal)
3	Disable (control signal)	4	not assigned
5	Ground	6	TTL_RXD (TTL level)
7	Ground	8	TTL_TXD (TTL level)
9	Ground	10	TTL_RTS (TTL level)

Keyboard Port

6-pin pole plug connector

Pinout:

Pin no.	Signal designation	Description
Pin 1	Ground	Ground
Pin 2	SLK	Clock signal for transmission of serial data from the keyboard controller
Pin 3	Ground	Ground
Pin 4	LATCH	Memory signal for data package from keyboard controller
Pin 5	Ground	Ground
Pin 6	DATA	Serial data from keyboard controller

4.7 Technical Specifications of Direct Key Modules

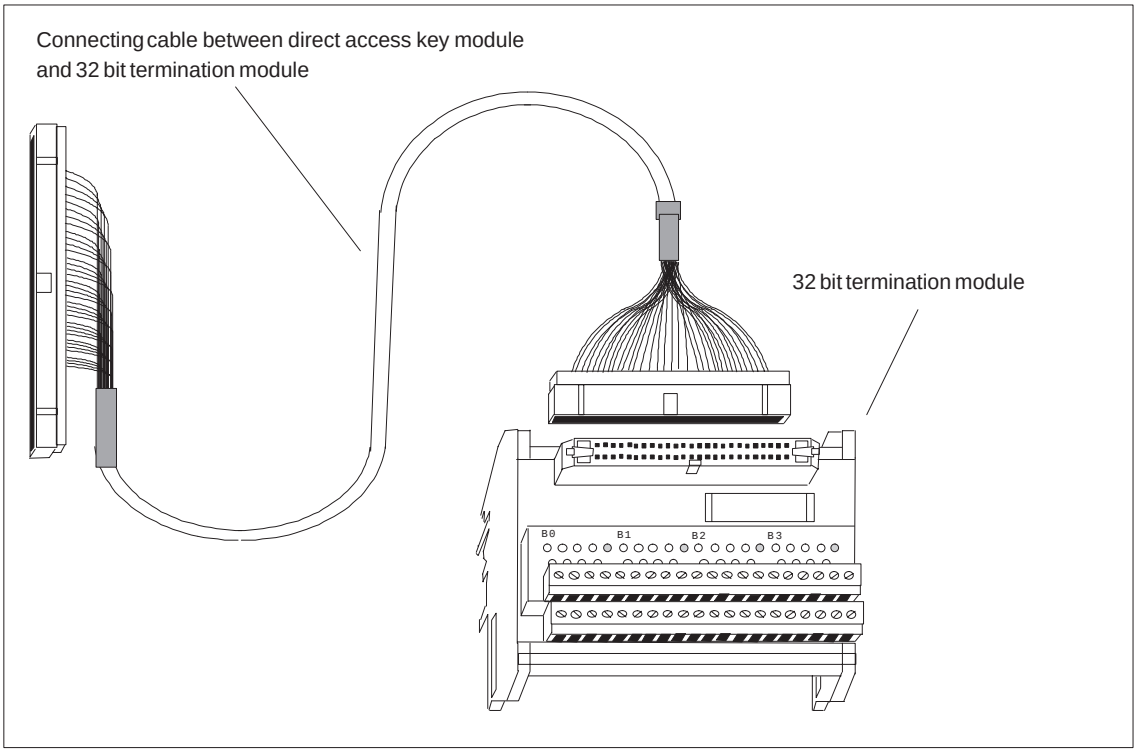
Order number	C79458–L7000–B418
Dimensions	(B x H x T in mm) 110 x 110 x 20
Electrical parameters	
Line voltage	5V DC
Current consumption to 5V	approx. 400 mA
Power output at 9-pin sub D socket connector (5V isolated)	max. 90 mA
Module connector (external)	
DP port	9-pin sub D socket connector
I/O port (16xDO 24V/100mA, 16xDI 24V)	40-pin tangent-bend male connector
Module connector (internal)	
Keyboard port	6-pin tangent-bend male connector
DP port	10-pin tangent-bend male connector
Power supply connector	4-pin male connector (pins as for Floppy 3.5'')
DP port (external)	
Controller block	Siemens slave-PROFIBUS controller SPM2
Transmission rate	9.6 Kbps – 12 Mbps
Transmission mode	RS485 optically isolated *
Input for 24V power supply	
Requirements of external power supply	24V / 1,6A permanent current, 4A max. transient, SELV
Keyboard port (internal)	
Signal level	CMOS
Key code transmission	serial
Ambient conditions	
Temperature – operation – storage/transport – gradient	**Tested to DIN EN 60068–2–2:1994,DIN IEC 68–2–1** DIN IEC 68–2–14, + 0°C to +55°C – 20°C to +60°C max. speed of temperature speed 10°C/h, no condensation
Relative humidity – operation – storage/transport	**Tested to DIN IEC 68–2–3, DIN IEC 68–2–30,DIN IEC 68–2–56** 5% to 85% at 25°C (no condensation) 5% to 95% at 25°C (no condensation)
Mechanical specifications	
Vibration – operation – transport	**Tested to DIN IEC 68–2–6** 10 to 58 Hz: 0.075 mm, 58 to 500 Hz: 10 m/s^2 5 to 9 Hz: 3.5 mm, 9 to 500 Hz: 10 m/s^2
Shock – operation – storage	**Tested to DIN IEC 68–2–29** 50 m/s2, 30 ms, 100 shocks 250 m/s2, 6 ms, 1000 shocks

*) Isolation within the low voltage safety circuit (SELV).

4.8 Optional Package for Direct Key Modules

Order Number 6ES7 648–0AA00–0XA0

Delivery Contents Connecting cable (2m long) 32 bit termination module for DIN rail mounting



4.9 Assignment of Termination Module Terminals to Digital Inputs and Outputs (DI 2.0-2.7, DI 3.0-3.7 and DO 0.0-0.7, DO 1.0-1.7)

The termination module bears the labels B0(0..7), + , –, B1 (0..7), + , – , B2 (0..7), +, –, B3 (0..7), +, –. The 24V digital inputs/outputs of the direct key module are assigned to the termination module as follows:

Direct key module40-pin connectors	Designation inputs/outputs	Termination modules 32 bit terminal
Digital inputs		
Pin 1	DI 2.0	B0 (0)
Pin 2	DI 2.1	B0 (1)
Pin 3	DI 2.2	B0 (2)
Pin 4	DI 2.3	B0 (3)
Pin 5	DI 2.4	B0 (4)
Pin 6	DI 2.5	B0 (5)
Pin 7	DI 2.6	B0 (6)
Pin 8	DI 2.7	B0 (7)
Pin 9	DI 3.0	B1 (0)
Pin 10	DI 3.1	B1 (1)
Pin 11	DI 3.2	B1 (2)
Pin 12	DI 3.3	B1 (3)
Pin 13	DI 3.4	B1 (4)
Pin 14	DI 3.5	B1 (5)
Pin 15	DI 3.6	B1 (6)
Pin 16	DI 3.7	B1 (7)
Digital outputs		
Pin 21	DO 0.0	B2 (0)
Pin 22	DO 0.1	B2 (1)
Pin 23	DO 0.2	B2 (2)
Pin 24	DO 0.3	B2 (3)
Pin 25	DO 0.4	B2 (4)
Pin 26	DO 0.5	B2 (5)
Pin 27	DO 0.6	B2 (6)
Pin 28	DO 0.7	B2 (7)
Pin 33	DO 1.0	B3 (0)
Pin 34	DO 1.1	B3 (1)
Pin 35	DO 1.2	B3 (2)
Pin 36	DO 1.3	B3 (3)
Pin 37	DO 1.4	B3 (4)
Pin 38	DO 1.5	B3 (5)
Pin 39	DO 1.6	B3 (6)
Pin 40	DO 1.7	B3 (7)
40-pin plug connector	24V power supply	Terminal
Pin 17,18,29,30	GND	- at terminal module
Pin 19,20,31,32	+24V	+ at terminal module

The termination modules power supply has to be connected to all terminals labeled + or -. Terminals labeled + are connected to the +21V supply whereas terminals labeled with - are connected to ground.

Note

The optional package contains a shielded connecting cable. The shield has to be connected to the SIMATIC PC and grounded at the terminal block.

Bus Board

5

Chapter Overview

5.1 Technical Specifications

Slots	2 x PCI short (max. 175 mm) 1x ISA short (max. 175 mm) 1x ISA long 1x shared ISA/PCI long	
Ambient temperature during operation	max. 60 °C	
Dimensions	L x W Mounting holes	150 x 160 mm 3.2 mm

5.2 Design and Mode of Operation

The bus board is designed as a passive link between the motherboard and the expansion modules. It is mounted by means of two screws.

The bus board has two ISA slots and two PCI slots, as well as a shared ISA/ PCI slot. The expansion modules are powered via the link between the bus board and the motherboard. An external power supply (+5V and +12V) is provided.

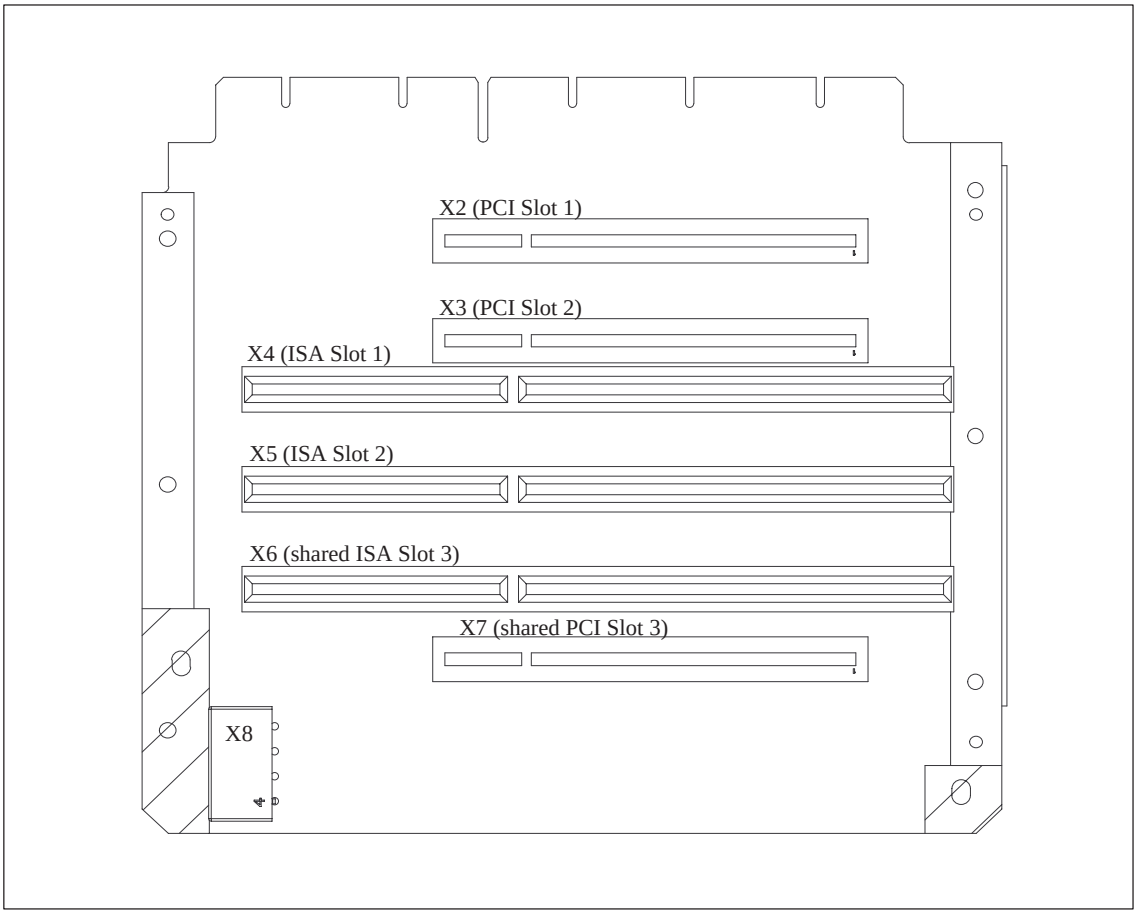


Figure 5-1 Bus Board

5.3 Pin Assignments

5.3.1 Interface to the Motherboard

The connection to the motherboard is established by a gold-colored EISA indirect connector. All the required bus signals (ISA and PCI) are present on this connector. The following table shows the pin assignments.

ISA bus signals									PCI bus signals							
	Signal		Signal		Signal		Signal		Signal		Signal		Signal		Signal
A	name	**B**	name	**C**	name	**D**	name	**E**	name	**F**	name	**G**	name	**H**	name
1	iochk#	1	gnd	1	sbhe#	1	memcs #	1	gnd	1	clk (slot3)	1	sdone	1	serr#
2	sd7	2	rstdrv	2	la23	2	iocs16#	2	gnd	2	gnd	2	sbo#	2	ad15
3	sd6	3	+5V	3	la22	3	irq10	3	inta#	3	intc#	3	c/be1#	3	ad14
4	sd5	4	irq9	4	la21	4	irq11	4	intb#	4	intd#	4	par	4	ad12
5	sd4	5	–5V	5	la20	5	irq12	5	+5V	5	+5	5	gnd	5	gnd
6	sd3	6	drq2	6	la19	6	irq15								
7	sd2	7	–12V	7	la18	7	irq14	7	+5V	7	+5V	7	gnd	7	gnd
8	sd1	8	Ows#	8	la17	8	dack0#	8	rst#	8	clk (slot1)	8	ad13	8	ad10
9	sd0	9	+12V	9	memr#	9	drq0	9	gnt# (slot1)	9	gnd	9	ad11	9	ad8
10	iochrdy	10	gnd	10	menw#	10	dack5#	10	req# (slot1)	10	gnt# (slot2)	10	ad9	10	ad7
11	aen	11	smemw#	11	sd8	11	drq5	11	gnd	11	gnd	11	c7be0#	11	ad5
12	sa19	12	smemr#	12	sd9	12	dack6#	12	clk (slot2)	12	req# (slot2)	12	ad6	12	ad3
13	sa18	13	iow#	13	sd10	13	drq6	13	gnd	13	ad31	13	ad4	13	ad1
14	sa17	14	ior#	14	sd11	14	dack7#	14	ad30	14	ad29	14	ad2	14	ad0
15	sa16	15	dack3#	15	sd12	15	drq7	15	Req# (slot3)	15	GNT_# Slot3				
16	sa15	16	drq3	16	sd13	16	+5V					16	+5V	16	+5V
17	sa14	17	dack1#	17	sd14	17	master#	17	NC	17	NC	17	+5	17	–5V
18	sa13	18	drq1	18	sd15	18	gnd	18	ad28	18	ad27	18	gnd	18	gnd
19	sa12	19	refresh#					19	ad26	19	ad25	19	gnd	19	gnd
20	sa11	20	sysclk					20	ad24	20	c/be3#				
21	sa10	21	irq7					21	ad22	21	ad23				
22	sa9	22	irq6					22	ad20	22	ad21				
23	sa8	23	irq5					23	ad18	23	ad19				
24	sa7	24	irq4					24	NC	24	NC				
25	sa6	25	irq3												
26	sa5	26	dack2#					26	NC	26	NC				
27	sa4	27	t/c					27	ad16	27	ad17				
28	sa3	28	bale					28	frame#	28	irdy#				
29	sa2	29	+5V					29	c/be#	29	devsel#				
30	sa1	30	osc					30	trdy#	30	plock#				
31	sa0	31	gnd					31	stop#	31	perr#				

5.3.2 ISA Slot Pin Assignment

Pin	Signal name	Type*	Pin	Signal name	Type
A1	–IOCHCK	I	B1	0 V	GND
A2	SD 07	I/O	B2	RESET DRV	O
A3	SD 06	I/O	B3	+ 5V	V_{CC}
A4	SD 05	I/O	B4	IRQ 9	I
A5	SD 04	I/O	B5	– 5V	V_{CC}
A6	SD 03	I/O	B6	DRQ 2	I
A7	SD 02	I/O	B7	– 12V	V_{CC}
A8	SD 01	I/O	B8	–OWA	I
A9	SD 00	I/O	B9	+ 12V	V_{CC}
A10	–IOCHRDY	I	B10	0 V	GND
A11	AEN	O	B11	–SMEMW	O
A12	SA 19	I/O	B12	–SMEMR	O
A13	SA 18	I/O	B13	–IOW	I/O
A14	SA 17	I/O	B14	–IOR	I/O
A15	SA 16	I/O	B15	–DACK3	O
A16	SA 15	I/O	B16	DRQ 3	I
A17	SA 14	I/O	B17	–DACK1	O
A18	SA 13	I/O	B18	DRQ 1	I
A19	SA 12	I/O	B19	–REFRESH	I/O
A20	SA 11	I/O	B20	CLK	O
A21	SA 10	I/O	B21	IRQ 7	O
A22	SA 09	I/O	B22	IRQ 6	O
A23	SA 08	I/O	B23	IRQ 5	O
A24	SA 07	I/O	B24	IRQ 4	O
A25	SA 06	I/O	B25	IRQ 3	O
A26	SA 05	I/O	B26	–DACK2	O
A27	SA 04	I/O	B27	TC	O
A28	SA 03	I/O	B28	BALE	O
A29	SA 02	I/O	B29	+ 5V	V_{CC}
A30	SA 01	I/O	B30	OSC	O
A31	SA 00	I/O	B31	0 V	GND

*) I/O determines the direction of the signals for the CPU board.

Pin	Signal name	Type *	Pin	Signal name	Type
C1	–SBHE	O	D1	–MEMCS16	I
C2	LA 23	I/O	D2	–IOCS16	I
C3	LA 22	I/O	D3	IRQ 10	I
C4	LA 21	I/O	D4	IRQ 11	I
C5	LA 20	I/O	D5	IRQ 12	I
C6	LA 19	I/O	D6	IRQ 13	I
C7	LA 18	I/O	D7	IRQ 14	I
C8	LA 17	I/O	D8	–DACK0	O

Pin	Signal name	Type *	Pin	Signal name	Type
C9	–MEMR	I/O	D9	DRQ 0	I
C10	–MEMW	I/O	D10	–DACK5	O
C11	SD 08	I/O	D11	DRQ 5	I
C12	SD 09	I/O	D12	–DACK6	O
C13	SD 10	I/O	D13	DRQ 6	I
C14	SD 11	I/O	D14	–DACK7	O
C15	SD 12	I/O	D15	DRQ 7	I
C16	SD 13	I/O	D16	+ 5V	V_{CC}
C17	SD 14	I/O	D17	–MASTER	I
C18	SD 15	I/O	D18	0 V	GND

Under normal conditions, the signals –SBHE, LA17 – LA23, –MEMR and MEMW are operated as outputs (sending from the CPU). Only CPU boards which are suitable for use as a master CPU for system bus access send and receive these signals. A minus sign “–” in front of the signal name shows that the signal is LOW active.

5.3.3 PCI Slot Pin Assignment

	5V System Environment	
	Side B	**Side A**
1	-12V	TRST#
2	TCK	+12V
3	Ground	TMS
4	TDO	TDI
5	+5V	+5V
6	+5V	INTA#
7	INTB#	INTC#
8	INTD#	+5V
9	PRSNT1#	Reserved
10	Reserved	+5V (I/O)
11	PRSNT2#	Reserved
12	Ground	Ground
13	Ground	Ground
14	Reserved	Reserved
15	Ground	RST#
16	CLK	+5V (I/O)
17	Ground	GNT#
18	REQ#	Ground
19	+5V (I/O)	Reserved
20	AD[31]	AD[30]
21	AD[29]	+3.3V
22	Ground	AD[28]
23	AD[27]	AD[26]
24	AD[25]	Ground
25	+3.3V	AD[24]
26	C/BE[3]#	IDSEL
27	AD[23]	+3.3V
28	Ground	AD[22]
29	AD[21]	AD[20]
30	AD[19]	Ground
31	+3.3V	AD[18]
32	AD[17]	AD[16]
33	C/BE[2]#	+3.3V
34	Ground	FRAME#
35	IRDY#	Ground
36	+3.3V	TRDY#
37	DEVSEL#	Ground
38	Ground	STOP#
39	LOCK#	+3.3V
40	PERR#	SDONE
41	+3.3V	SBO#
42	SERR#	Ground
43	+3.3V	PAR
44	C/BE[1]#	AD[15]
45	AD[14]	+3.3V
46	Ground	AD[13]
47	AD[12]	AD[11]
48	AD[10]	Ground

	5V System Environment	
	Side B	**Side A**
49	Ground	AD[09]
50	CONNECTOR KEY	
51	CONNECTOR KEY	
52	AD[08]	C/BE[0]#
53	AD[07]	+3.3V
54	+3.3V	AD[06]
55	AD[05]	AD[04]
56	AD[03]	Ground
57	Ground	AD[02]
58	AD[01]	AD[00]
59	+5V (I/O)	+5V (I/O)
60	ACK64#	REQ64#
61	+5V	+5V
62	+5V	+5V
	CONNECTOR KEY	
	CONNECTOR KEY	
63	Reserved	Ground
64	Ground	C/BE[7]#
65	C/BE[6]#	C/BE[5]#
66	C/BE[4]#	+5V (I/O)
67	Ground	PAR64
68	AD[63]	AD[62]
69	AD[61]	Ground
70	+5V (I/O)	AD[60]
71	AD[59]	AD[58]
72	AD[57]	Ground
73	Ground	AD[56]
74	AD[55]	AD[54]
75	AD[53]	+5V (I/O)
76	Ground	AD[52]
77	AD[51]	AD[50]
78	AD[49]	Ground
79	+5V (I/O)	AD[48]
80	AD[47]	AD[46]
81	AD[45]	Ground
82	Ground	AD[44]
83	AD[43]	AD[42]
84	AD[41]	+5V (I/O)
85	Ground	AD[40]
86	AD[39]	AD[38]
87	AD[37]	Ground
88	+5V (I/O)	AD[36]
89	AD[35]	AD[34]
90	AD[33]	Ground
91	Ground	AD[32]
92	Reserved	Reserved
93	Reserved	Ground
94	Ground	Reserved

The following table shows the assignment of the slot-specific PCI bus signals.

PCI Socket Pin No.	FI45 PCI Slot 1 (X2)	FI45 PCI Slot 1 (X2)	FI45 shared ISA PCI Slot (X6/X7)
B16	PCLKG	PCLKE	PCLKF
A6	INTA	INTB	INTC
A7	INTC	INTD	INTB
B7	INTB	INTC	INTD
B8	INTD	INTA	INTB
B18	REQ0	REQ1	REQ3
A17	GNT0	GNT1	GNT3
A26	AD29	AD30	AD31

5.3.4 External Voltage Supply

Pin	Description
1	+ 12V
2	GND
3	GND
4	+ 5V

Front Adapter Module (FI45)

6

Chapter Overview

6.1 Overview

Function

The front adapter module makes the central interface available to the system and distributes the specific interface signals for the front panel components of the FI45.

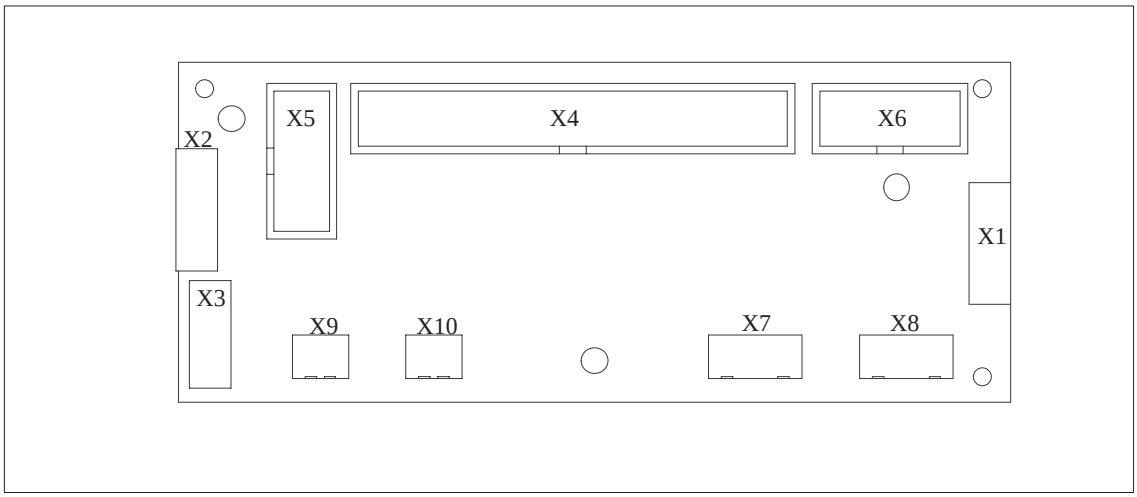


Figure 6-1 Front Adapter Module (FI45)

6.2 Pin Assignment

Socket Connector X1 Connection to the LEDs of the membrane keyboard.

Pin No.	Connection to	Signal Name	Remarks
1	GND	GND	
2	X4-20	TEMP_R	Red temperature LED
3	X4-21	TEMP_G	Green temperature LED
4	X4-22	RUN_R	Red RUN LED
5	X4-23	RUN_G	Green RUN LED
6	X4-18, X4-36	DP_LED	DP LED
7	X4-40	HD_LED	HD LED
8	X4-23	RUN_G	POWER LED

Socket Connector X2 Connection to the mouse buttons of the membrane keyboard.

Pin No.	Connection to	Signal Name	Remarks
1	GND	GND	
2	X3-4	MOUSE_L	Left mouse button
3	GND	GND	
4	GND	GND	
5	X3-5	MOUSE_R	Right mouse button
6	GND	GND	
7	–	–	Not connected
8	–	–	Not connected

Socket Connector X3 Connection to the touch pad, inverse counting due to ribbon cable.

Pin No.	Connection to	Signal Name	Remarks
1	–	–	Not connected
2	–	–	Not connected
3	GND	GND	
4	X2-2	MOUSE_L	Left mouse button
5	X2-5	MOUSE_R	Right mouse button
6	X4-10	MOUSE_CLK	Touch pad mouse clock
7	X4-9	MOUSE_DAT	Touch pad mouse data
8	P5V	P5V	

Socket Connector X3 Connection to the Pentium II motherboard.

Pin No.	Connection to	Signal Name	Remarks
1	1P5V	1P5V	+5V via multifuse to motherboard
2	GND	GND	
3	X5-6	KBD_CLK_I	Keyboard clock, connection to motherboard
4	GND	GND	
5	X5-7	KBD_DAT_I	Keyboard data, connection to motherboard
6	GND	GND	
7	1P5V	1P5V	+5V via multifuse to motherboard
8	–	–	Coding
9	X3-7	MOUSE_DAT	Touch pad mouse data
10	X3-6	MOUSE_CLK	Touch pad mouse clock
11	P12V	P12V	Power supply for inverter
12	X6-2	BL_ON	Switch on signal for back light
13	X6-3	BL_CTRL_1	Brightness adjustment
14	X6-4	BL_CTRL_2	Brightness adjustment
15	X6-5	BL_CTRL_3	Brightness adjustment
16	GND	GND	
17	X9-1, X10-1, X4-31	RESET_N	Reset signal (low active)
18	X1-6, X4-36	DP_LED	
19	–	–	Not connected
20	X1-2	TEMP_R	
21	X1-3	TEMP_G	
22	X1-4	RUN_R	
23	X1-5	RUN_G	
24	X5-8	DTAST_DAT	Direct keys data signal
25	X5-9	DTAST_LATCH	Direct keys latch signal
26	X5-10	DTAST_CLK	Direct keys clock signal
27	X5-1	KBD_CLK_E	Keyboard clock, external keyboard
28	1P5V	1P5V	+5V via multifuse to motherboard
29	GND	GND	
30	X5-4	KBD_DAT_E	Keyboard data, external keyboard
31	X9-1, X10-1, X4-17	RESET_N	Reset signal (low active)
32	–	–	Not connected
33	–	–	Not connected
34	P5V	P5V	
35	GND	GND	

Pin No.	Connection to	Signal Name	Remarks
36	X1-6, X4-18	DP_LED	
37	–	–	Not connected
38	–	–	Not connected
39	X1-8	POWER_LED	
40	X1-7	HD_LED	

Socket Connector X5 Connection to the keyboard controller.

Pin No.	Connection to	Signal Name	Remarks
1	X4-27	KBD_CLK_E	Keyboard clock, external keyboard
2	1P5V	1P5V	+5V via multifuse to motherboard
3	GND	GND	
4	X4-30	KBD_DAT_E	Keyboard data, external keyboard
5	GND	GND	
6	X4-3	KBD_CLK_I	Keyboard clock, connection to motherboard
7	X4-5	KBD_DAT_I	Keyboard data, connection to motherboard
8	X4-24	DTAST_DAT	Direct keys data signal
9	X4-25	DTAST_LATCH	Direct keys latch signal
10	X4-26	DTAST_CLK	Direct keys clock signal

Socket Connector X6 Connection to the inverter module.

Pin No.	Connection to	Signal Name	Remarks
1	P12V	P12V	Power supply for inverter
2	X6-2	BL_ON	Switch on signal for back light
3	X6-3	BL_CTRL_1	Brightness adjustment
4	X6-4	BL_CTRL_2	Brightness adjustment
5	X6-5	BL_CTRL_3	Brightness adjustment
6	GND	GND	
7	GND	GND	
8	P5V	P5V	
9	P5V	P5V	
10	P12V	P12V	

Socket Voltage supply 5V/12V, not fitted.
Connector X7, X8

Pin No.	Connection to	Signal Name	Remarks
1	P12V	P12V	Derived from power supply to inverter
2	GND	GND	
3	GND	GND	
4	P5V	P5V	

Socket Connection for reset key.
Connector X9

Pin No.	Connection to	Signal Name	Remarks
1	X10-1, X4-17, X4-31	RESET-	Reset signal (low active)
2	GND	GND	

Socket Connection for reset, not fitted.
Connector X10

Pin No.	Connection to	Signal Name	Remarks
1	X9-1, X4-17, X4-31	RESET-	Reset signal (low active)
2	GND	GND	

Monitoring Module (Optional with FI45)

7

Chapter Overview

7.1 Overview

Function

The SafeCard is a short ISA module. It is used as a monitoring module in SIMATIC PCs. It monitors the ambient conditions and the operating mode of the PC and indicates operating modes, fail-state characteristics and controls the fans.

The SafeCard fulfills the following individual functions:

- Displaying status
- Monitoring temperature and indicating excess or insufficient temperature
- Controlling fans
- Serving as watchdog
- Serving as relay interface
- Backing up the optional RAM 64 Kbytes by battery

SafeCard messages can be forwarded to applications using the SafeCard driver. To install the SafeCard driver for different operating systems, see the **ReadMe.TXT** file in the **C:\SAFECARD** directory.

Functional Block Diagram

Figure 7-1 shows the basic block diagram of a SafeCard. Depending on the individual type of PC, the components that can be part of the PC's equipment are marked as cross hatched blocks.

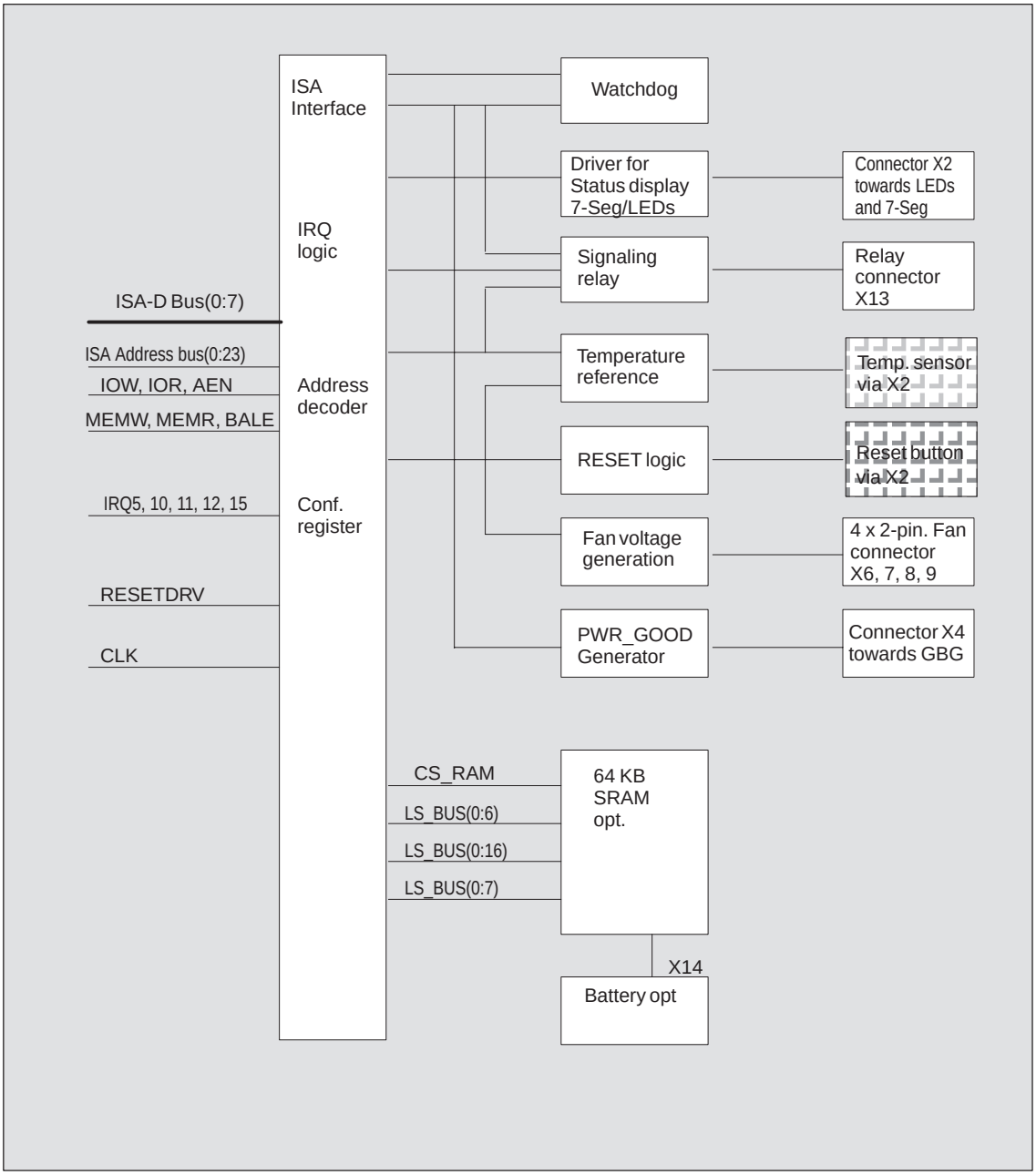


Figure 7-1 Functional Block Diagram of a SafeCard

Connector and Switch Position

Figure 7-2 illustrates the position of connectors and switches on the monitoring module.

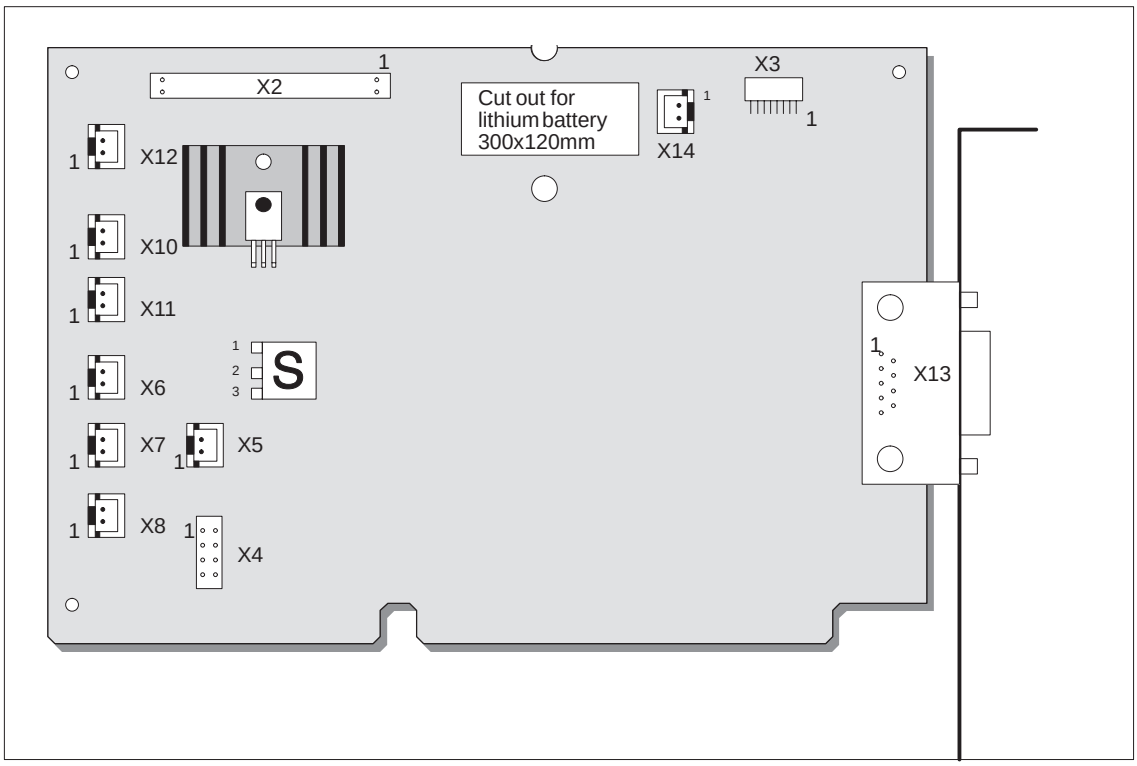


Figure 7-2 Connector and Switch Positions on the SafeCard

7.2 Status and Diagnostics Displays

Overview

The diagnostics display for SIMATIC PCs is triggered by the SafeCard and realized in the form of LEDs and a seven-segment display which are visible on the control panel mounted on the front side of the device (different for inidividual PCs). Monitoring features are thus controlled and the current status of the PC is indicated.

The control panel is a separate component and only connected to the SafeCard via a cable (see Section “Control Panel” in Technical Description).

7-Segment Display

Diagnostics port 80H- Output via 7-segment display:

Any writing access to IO port 80 is latched and its value indicated on the two-digit 7-segment display.

Every cold restart of the system (switch ON/OFF) causes a detailed Power Onself Test (**POST** = **P**ower **O**n **S**elf **T**est). The POST controlling steps are displayed as so called POST codes on the 7-segment display of the PC. The POST code descriptions are listed in Section 2.14, “Diagnostic Messages” of the motherboard description.

LED Indicators

The LEDs have the following significations:

LED	OFF	GREEN	RED
Power	System OFF	System ON	—
Disk	Inactive	Active	—
Run	Watchdog inactive	Watchdog active	Watchdog executed
Temp	System OFF	Normal internal temperature	internal temperature beyond acceptance level or cable towards temperature sensor unplugged or interrupted.

7.3 Temperature Monitoring /Temperature Display and Fan Control

Temperature Monitoring

The temperature is measured via a sensor (NTC) and its status is indicated via a green LED for normal temperature and via a red LED for errors. The following conditions may cause errors:

- Overrange of the acceptance limit of excess temperature
- Underflow of the acceptance limit of insufficient temperature
- Line break or temperature sensor unplugged.

The temperature status can be checked at bit 0 of the IO cell base address + 0Eh.

An error causes one of the following reactions:

Reaction	Option
TempLED from GREEN to RED	Always
Canceling of TempBit in IO cell base address + 0Eh	Always
Relay output falls in quiet state	Always
Initiate IRQ	Can be set

Note

The NTC is a separate component and only connected to the monitoring module via a plug connector. The NTC is equipped with cable and connector and is part of the list of components. In order to guarantee a correct temperature monitoring, an NTC with a resistance of 10 kOhm is required (SBS Order No. B57703-M103-G).

Monitoring Line Break

The NTC resistance is conducted to a SafeCard connector via a twisted pair cable. The errors “line break” and “connector unplugged” are additionally monitored by the open-circuit monitoring. A line break is signaled by a temperature error.

7.4 Watchdog (WD)

Function

The Watchdog monitors the program execution. The purpose of the Watchdog is to inform the user by different reactions about a program crash.

When you switch on your PC or you execute a cold restart (hardware reset), the Watchdog remains in its quiet state, that means that it does not cause any reaction and the RUN LEDs remain dark. The description of the IO cell base address +0Eh triggers the Watchdog. This is indicated by the green RUN LED The Watchdog status can be checked in bit 1 of the IO cell base address + 0Eh.

Watchdog Reactions

If the Watchdog is not triggered with the description of the cell base address + 0Eh within a preset time interval, the following reactions occur:

Reaction	Option
RUN LED changes from GREEN to RED	always
Canceling WD bit in cell base address + 0Eh	always
Relay output falls in quiet state	always
Initiating of PC reset	can be set
Transmitting IRQ to PC	can be set

If an executed Watchdog is retriggered the green LED is again illuminated. Options are set via the configuration register bits 6 and 7.

Watchdog Monitoring Times TWD

Monitoring times are set in 4 steps in the configuration register.

	Time	Contents of Register Base Address + 0Eh	
		Bit 3	Bit 4
TWD1	1s	0	0
TWD2	2s	0	1
TWD3	8s	1	0
TWD4	16s	1	1

Note

If you modify the WD time after the Watchdog has been activated (that is, during Watchdog execution), the Watchdog is retriggered!

Marginal Conditions

In order to secure the recognition of a fail-state through an alarm evaluating unit which is connected to the relay interface, the SafeCard guarantees an error hold time of a minimum of 500 ms. This is also valid if the PC is, for example, reset after the Watchdog has been executed.

7.5 Relay Output

Switching ON/OFF Conditions

An external unit (for example, a call device, a horn, or a signal lamp) can be informed about the PC's current system status via the relay output.

After switching on or resetting the PC, the relay output starts operating (no error), that is the relay coil is energized and the switch makes contact and changes into working position.

The relay is deactivated if the Watchdog has been executed or an excess temperature occured. The coil is then de-energized and the switch breaks contact (fail-state), that is, it changes into the de-energized position.

Open circuit and break circuit working of the relay output can also be controlled via bit 1 in the IO cell base address + 0Dh.

Note

Commuting the relay from fail-state to error-free status by software is impossible if a fail-state occurs (temperature error or Watchdog executed).

State Diagram

The following table informs you about the possible states and the corresponding switch positions.

State	Switch Position
Normal operation	Working position
Watchdog executed	De-energized position
User cancels bit 1 in register base address + 0Dh	De-energized position
User sets bit 1 in register base address+ 0Eh	Working position
Temperature error	De-energized position
Power failure	De-energized position

In order to secure the recognition of a fail-state through an alarm evaluating unit which is connected to the relay interface, the SafeCard guarantees an error hold time of a minimum of 500 ms. This is also valid if the PC is, for example, reset after the Watchdog has been executed.

Technical Specifications of the Relays

The following table lists the technical specifications of the relays:

Switching voltage DC	max. 60V
Switching current DC	max. 1 A
Switching capacity DC	max. 30 W
Limiting continuous current DC	max. 1 A

7.6 Backed-Up RAM (Optional)

Size

The maximum capacity of the backed-up RAM is limited to **64 Kbytes** because the PC's memory area for ADD-ON components is very limited and the addressing of the RAM should be located in the memory mapped area.

Addressing

The address area listed below is determined to the programmer. The motherboard mirrors the address areas FFF80000h to FFFFFFFFh onto the 16th Mbyte of the AT bus that is, onto the addresses 00F80000h to 00FFFFFFh.

The base address is set via address switch S1 (on = Switch closed).

Address Settings

Address Switch S1	RAM Address Area
on	000D0000 to 000DFFFF (standard setting)
off	00FD0000 to 00FDFFFF

Backup

A lithium battery provides the RAM back-up power.

Battery: lithium battery 3.6V type SL-750 Manufacturer: Fa. Sonnenschein Lithium GmbH

7.7 Software Interfaces

Overview

The module is addressed via an IO register. Four IO addresses are occupied (xxCh, xxDh, xxEh, xxFh). Only the backed-up RAM is located in the memory-mapped area.

In order to avoid address overlaps, alternative addresses are available. These are set by two address switches S2 and S3 (on = Switch closed).

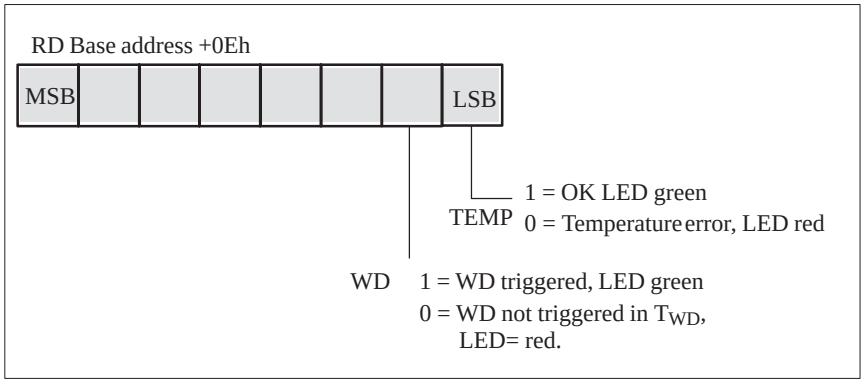
Base Addresses

Address Switch S3	Address Switch S2	Base Addresses	Notes
on	on	220h	
on	off	2A0h	
off	on	320h	Standard setting
off	off	3A0h	

Reading Register Base Address + 0Eh

The monitoring features WD and Temp are provided by the register base address + 0Eh.

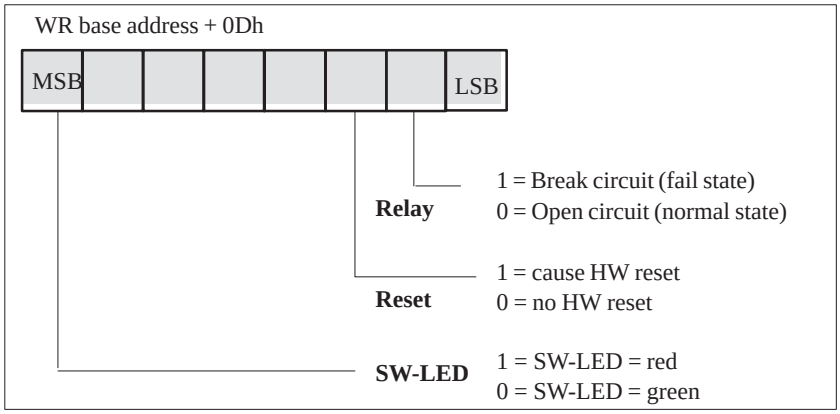
Contents of IO cell base address + 0Eh while reading out.



If Watchdog is reset or not used (LED OFF) the number 1 is also indicated in this bit.

Writing Register Base Address + 0Dh

Via register base address + 0Dh the relay output can be distinctly set to open-circuit and break circuit. It also sets the status of the software LED or causes a hardware reset of the PC.



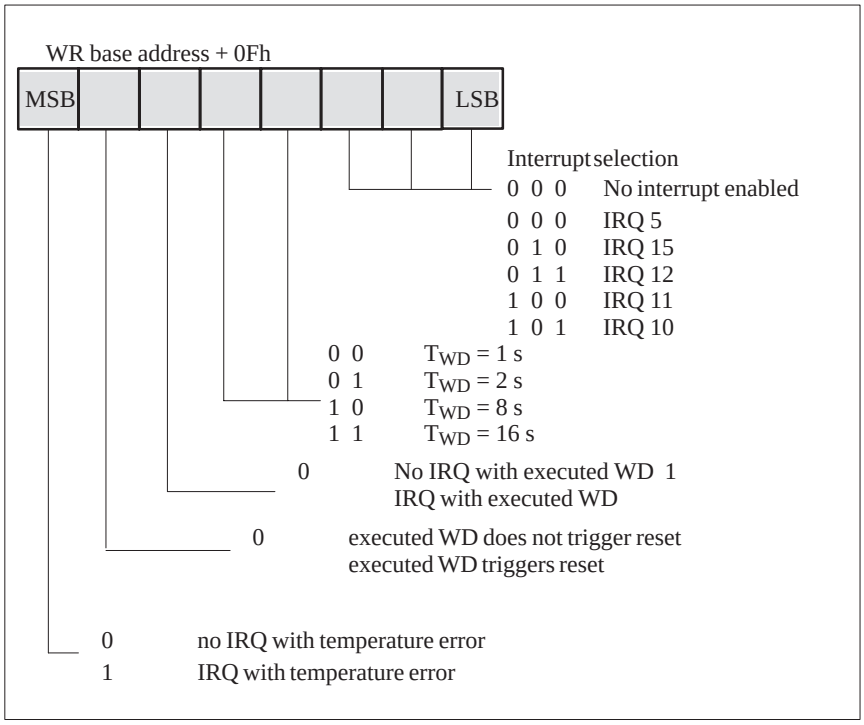
Writing Register Base Address + 0Eh

The first writing access to this register enables the Watchdog, WD LED (also called RUN LED) is set green.

The Watchdog is retriggered by additional writing access. At the end of the Watchdog execution time the Watchdog is retriggered by another writing access.

Writing Register Base Address + 0Fh

The register base address + 0Fh defines parameters for interrupts and Watchdog times, as well as reactions concerning excess temperature and the Watchdog.



Note

If you modify the Watchdog time after the Watchdog has been activated (that is, during Watchdog execution), the Watchdog is retriggered!

7.8 Hardware Ports

Signal Output Towards Display Panel (X2)

Standard design: 2-row, 40-pin plug connector

Signal Assignments

Pin	Signal	Type
1	Reset	E
2	Signal	A
3	NC (coding)	
4	+5V	V
5	GND	V
6	Power LED/green	A
7	NC	
8	Keyboard Lock	E
9	HD-LED/+ (VCC via 330)	A
10	HD-LED/green (o.C.)	A
11	Display 2 Segment 0	A
12	Display 1 Segment 0	A
13	Display 2 Segment 1	A
14	Display 1 Segment 1	A
15	Display 2 Segment 2	A
16	Display 1 Segment 2	A
17	Display 2 Segment 3	A
18	Display 1 Segment 3	A
19	Display 2 Segment 4	A
20	Display 1 Segment 4	A
21	Display 2 Segment 5	A
22	Display 1 Segment 5	A
23	Display 2 Segment 6	A
24	Display 1 Segment 6	A
25	NC	
26	NC	
27	NC	
28	NC	
29	NC	
30	LED Temp, red	A
31	LED Temp, green	A
32	LED Run, red	A
33	LED Run, green	A
34	LED SW, red	
35	LED SW, green	A

Pin	Signal	Type
36	NC	
37	NC	
38	NC	
39	NC	
40	NC	

Signal Input for Diagnostic LEDs from CPU Board (X3)

Standard design: 8-pin sheet insulated socket connector, type JST '08FM-1.0SP-1.9'

Signal Assignments

Pin	Signal	Type
1	GND	V
2	NC	
3	MPI (not used)	NC
4	Module (not used)	NC
5	FDD	E
6	HD	E
7	Power	NC
8	Battery (not used)	NC

Connector for RESET and HD-ACTIVE from CPU Board (X4)

Standard design: 2-row. 10-pin plug connector

Signal Assignments

Pin	Signal	Type
1	RESET# = PWR_GD_OUT	A
2	SPK_DATA	E
3	NC	
4	+5V	V
5	GND	V
6	NC	
7	NC	
8	KEYLOCK	A
9	P5V330	E
10	HD (o.c.)	E

PWR_GD Connector (X5)

Standard design: 2-pin plug connector, type JST 'B2B-XH-A'

Signal Assignments

Pin	Signal	Type
1	PWR_GD (from PS)	E
2	PWR_GD_OUT	A

Connector for External HD-LED e.g. from SCSI Controller (X10, 11)

Standard design: 2-pin plug connector, type JST 'B2B-XH-A'

Signal Assignments

Pin	Signal	Type
1	+5V via pull-up (towards HD controller)	E
2	HD-LED (o.c.)	E

Fan Connector (X6,7,8)

Standard design: 2-pin cable connector, type JST 'B2B-XH-A'

Signal Assignments

Pin	Signal
1	Fan voltage
2	GND

Connector for Temperature Sensors (X12)

Standard design: 2-pin cable connector, type JST 'B2B-XH-A'

Signal Assignments

Pin	Signal
1	Sensor input
2	Sensor output

Relay Output Connector at Slot Sheet Metal(X13)

Standard design: 9-pin D-SUB female socket connector

Signal Assignments

Pin	Signal
1	NC
2	Break contact (normally closed contact)
3	NC
4	Middle position
5	Make contact (normally open contact)
6	GND
7	+5V (fused)
8	NC
9	NC

Battery Cable Connector (X14)

Standard design: 2-pin cable connector, type JST 'B2B-XH-A'

Only fitted optionally for battery backed-up RAM versions!

Signal Assignments

Pin	Signal
1	Battery voltage
2	GND

Touch Screen (Optional with FI45)

8

Chapter Overview

8.1 General Information

The touch screen consists of a pressure-sensitive resistance array that is continuously monitored by a controller. When the screen is touched, the coordinates of the position affected are computed based on the screen resolution used and forwarded to the controller. Since the touch screen function is based on resistance, users can operate it using an appropriate object such as the blunt end of a pen or pencil or when wearing gloves.

Note

Do not use pointed objects to operate the screen, since these can damage the polyester membrane surface.

This screen surface is waterproof and can be cleaned with a mild, non-abrasive cleaner.

The touch screen system consists of the touch screen sensor and the touch screen controller. The FI25 uses the built-in touch controller E271-2210 which is connected to the RS232 interface of the basic module. The external cable (already plugged in) connects the touch controller to the external COM2 port.

The plug-in jumpers on the mini circuit board of the touch controller are preset by the manufacturer; these connections must not be changed.

8.2 Installing the Software

The directory **C:\Touch** contains the driver software for the touch screen. Drivers for the operating systems MS-DOS, Windows 3.x, Windows 95, Windows NT, and OS/2 are located in corresponding subdirectories.

```
C:\Touch
        |——— DOS
        |——— Win311
        |——— Win95
        |——— WinNT
        |——— OS/2
```

During installation, the directory C:\Touch is suggested (installation under MS-DOS or Windows 3.1). However, none of the subdirectories mentioned above is created and written so that the source files in these directories can be clearly distinguished from the software installed.

8.3 Installation under MS-DOS

If you have already installed a DOS mouse driver (MOUSE.COM) for your mouse, you can continue to use it with the touch screen under DOS.

To install the software under MS-DOS, proceed as follows:

- Enter the command **Install** in the directory **C:\TOUCH\DOS**.
- Follow the user prompts and instructions that appear on the screen. You will be asked to choose between DOS Express, Windows Express or Selective. Select DOS Express.
- You will then be asked to indicate what types of hardware are present. Select the serial port and then the COM2 port.
- The installation is complete when you are informed that *Autoexec.bat* has been changed and the previous batch file has been renamed to *Autoexec.old*.

Calibrating the Touch Screen

The touch screen must be calibrated after installation. To calibrate the screen, proceed as follows:

- Enter the command **Go** as soon as the installation is complete; then enter the command **Elocalib** in the directory **C:\Touch**.
- Follow the instructions displayed on the screen and touch the appropriate locations on the screen with a with a suitable object made of wood or plastic, such as the blunt end of a pen or pencil.
- Enter the command **Elocalib –h** to determine the additional parameters that can be used as options for the calibration.
- Restart the computer so that the calibration with take effect. If an installation diskette is still in the drive, remove it first.

Demonstration Program for DOS

The demonstration program contains self-explanatory tasks and games that can be completed or played by touching the screen. To use this program, proceed as follows:

- Enter the command **Elodemo** in the directory **C:\Touch**.
- Enter the command **Elodemo –h** to specify additional parameters for this demonstration program.

8.4 Installation under Windows 3.x

To install the software under Windows 3.x, proceed as follows:

- Enter the command **Install** in the directory **C:\Touch\Win311**.
- The directory C:\Touch will be suggested as the location for the installation of the touch driver. If you accept this suggestion but have already installed the touch driver under MS-DOS, a message will be displayed saying that this directory already exists; nevertheless, continue by installing the driver in the suggested directory.
- Follow the user prompts and instructions that appear on the screen. You will be asked to choose between DOS Express, Windows Express or Selective. Select Windows Express.

If you have already installed the touch driver under MS-DOS, you will be informed that entries for the touch screen are already present in *Autoexec.bat*.

- You will asked if you want to keep the current setting or change it; select **Change**.
- You will then be asked to indicate what types of hardware are present. Select the serial port and then the COM2 port.
- The installation is complete when you are informed that *Autoexec.bat* has been changed and the previous batch file has been renamed to *Autoexcec.old*.

Calibrating the Touch Screen

The screen is calibrated using the procedure already described in Section 7.3.

Simultaneous Operation of Touch Screen and Mouse

If you have not previously loaded a mouse driver under MS-DOS, your mouse will no longer function after installing the touch screen under Windows 3.x. To restore the mouse function, you must install a DOS mouse driver such as MOUSE.COM and enter it in *Autoexec.bat* along with its access path.

8.5 Installation under Windows 95

To install the software under Windows 95, proceed as follows:

- Click the button **Start**; then select **Run**.
- Enter **C:\Touch\Win95\setup**.
- Confirm the suggested directory **C:\ELO**.
- Select the type of installation **Typical**. The original *System.ini* is renamed to *System.elo*.
- The Elo setup wizard configures the touch controller. Select **Serial** under "Controller Type" and **COM2** under "COM Port."
- Restart the computer so that the changes will take effect.

Calibrating the Touch Screen

The touch screen must be calibrated after installation. To calibrate the screen, proceed as follows:

- Click the **Start** button; then select "Settings" followed by "Control Panel."
- Double-click the **Elo Touchscreen** button to activate the touch screen control window.
- Click the **Calibrate** button. Then touch each of the three targets that appear on the screen as precisely as possible with an a suitable object made of wood or plastic, such as the blunt end of a pen or pencil.
- Confirm with "Yes" and "OK" to conclude the calibration procedure.
- Restart the computer so that the calibration will take effect.

Double Touch (Similar to a Mouse Click)

Although the double-click speed of the mouse can be set using the sequence Start/Settings/Control Panel/Mouse, it is also necessary to define the size of the double touch field for the touch screen. This is necessary, because the second touch made in a double touch sequence will not occur in exactly the same location as the first one.

To set a field size of 25 x 25, proceed as follows:

- Navigate to **C:\Touch\Win95**.
- Select the file **doublecl.reg**; then press [Enter].
- Acknowledge the message that appears confirming that the registration has been entered.

To set a field size other than 25 x 25, proceed as follows:

- Select the file **doublecl.reg**.
- Open the editor with the menu command **File > Edit**.
- Enter the field size value desired (values <100 are recommended).
- Select the menu command **File > Save As**. You can now exit the editor.
- Select the file **doublecl.reg** and press [Enter].
- Acknowledge the message that appears confirming that the registration has been entered.
- Restart the computer so that the changes will take effect.

The full-screen mode is not supported; however, the Windowed DOS mode is supported fully. If you turn on the full-screen mode via the touch screen, the system will immediately return to the Windows desktop. However, you can operate programs with the mouse in full-screen mode.

Note

The touch screen will not function if it is touched while Windows 95 is starting up.

Removing the Mouse Cursor

If you want to remove the mouse cursor, you must replace it with the No-Cursor File **Null.cur** contained in the package **Elo Touch**.

To install the No-Cursor File, proceed as follows:

- Click the **Start** button; then select “Settings” followed by “Control Panel.”
- Select the properties of the mouse.
- Select the **Cursor** tab.
- Select the line **Normal Selection**.
- Go to **Browse**.
- Go into the field **Search in** and set the path **C:\touch\Win95**.
- Enter **Null.cur** as the file name; then select “Open.”
- Confirm with “OK.”
- Select “OK” to leave the field “Properties of the Mouse.”

After this, the normal mouse cursor no longer appears, but all other cursors continue to function as before.

Tips for Touch Screen Applications

To facilitate windows operation with the touch screen, it is a good idea to increase the **window frame width** in order to make changing the window size easier. You can use the menu command **Display > Size** in the Control Panel to change the width of the window frame.

The **scroll bar** can be operated as usual. You can scroll through some data fields by simply touching the screen within the field and then maintaining contact with it while dragging until you are outside the data field.

Touch the window maximizing button or double-click the window title bar to **maximize the window size**. Similarly, you can double-touch the window title bar to restore the window to its previous size.

8.6 Installation under Windows NT

To install the software under Windows 95, proceed as follows:

- Select **Run** in the **Start** menu.
- Copy the required files into the directory C:\WinNT\System32\Drivers with the command **C:\Touch\WinNT\Install**
- Select **Run** in the **Start** menu once again.
- Enter the command C:\WinNT\Systems\Drivers\Regini monmouse.ini
- Restart the computer.

Calibrating the Touch Screen

The touch screen must be calibrated after installation. To calibrate the screen, proceed as follows:

- Click the **Start** button; then select “Settings” followed by “Control Panel.”
- Double-click the **Elo Touchscreen** button to activate the touch screen control window.
- Click the **Calibrate** button. Then touch each of the three targets that appear on the screen as precisely as possible with a suitable object made of wood or plastic, such as the blunt end of a pen or pencil.
- Confirm with “Yes” and “OK” to conclude the calibration procedure.
- Restart the computer so that the calibration will take effect.

Double Touch (Similar to a Mouse Double Click)

Although the double-click speed of the mouse can be set using the sequence Start/Settings/Control Panel/Mouse, it is also necessary to define the size of the double touch field for the touch screen. This is necessary, because the second touch made in a double-touch sequence will not occur in exactly the same location as the first one.

To set a field size of 25 x 25, proceed as follows:

- Navigate to **C:\Touch\WinNT**
- Select the file **doublecl.reg**; then press [Enter].
- Acknowledge the message that appears confirming that the registration has been entered.

To set a field size other than 25 x 25, proceed as follows:

- Select the file **doublecl.reg**.
- Open the editor with the menu command **File > Edit**.
- Enter the field size value desired (values <100 are recommended).
- Select the menu command **File > Save As**. You can now exit the editor.
- Select the file **doublecl.reg** and press [Enter].
- Acknowledge the message that appears confirming that the registration has been entered.
- Restart the computer so that the changes will take effect.

Removing the Mouse Cursor

To remove the mouse cursor, proceed as described for Windows 95 in Section 8.5

Tips for Touch Screen Applications

The same conditions described for Windows 95 also apply here (see Section 8.5).

8.7 Installation under OS/2

To install the software under OS/2, proceed as follows:

- Enter the command **MD ELO** directly under C:\ to create a new directory.
- Copy all files including their subdirectories from the directory **C:\Touch\OS2** to the directory **ELO** with the command **Xcopy C:\Touch\OS2*.* ELO /S /E**.
- Change your config.sys as described below.
- Search in config.sys for the following line; then enter REM before it.

  DEVICE=C:\OS2\BOOT\MOUSE.SYS
- Enter the following texts after the line now preceded by REM:

  Device=C:\Elo\Monmou01.sys 2210,2,9600
  Device=C:\Os2\Boot\mouse.sys stype=elomou$
- Now search below the texts entered in step 2 for the following two lines of text:

  DEVICE=C:\OS2\BOOT\COM.SYS and
  DEVICE=C:\OS2\BOOT\VCOM.SYS
- Move these two lines **above** the new line you wrote.
  Device=C:\Elo\Monmou01.sys 2210,2,9600
- Enter the parameters (2,0,0) at the end of the line DEVICE=C:\OS2\BOOT\COM.SYS so that it now reads

  DEVICE=C:\OS2\BOOT\COM.SYS **(2,0,0)**
- Save these changes made in Config.sys.
- Restart the computer.
- If you **do not** want to connect a mouse, swap the command **stype=elomous$** with the command **type=elomou$** in the line **Device=Mouse.sys**.

Installing the Touch Screen Control Panel

The touch screen control panel is needed to calibrate the touch screen and to set important options.

- Copy the files ELOCAL2.DLL and ELOCAL2.HLP from the directory **C:\Elo\German** into the main directory **ELO** with the following command:

  Copy C:\Elo\German*.*C:\Elo

- Open the system catalog **OS\2**.
- Open the folder **Templates** in this catalog.
- Drag the program **Template** into the catalog **System Setup** with the right mouse button. A field for making settings opens.
- Input the command C:\Elo\Elocal2.exe and enter it in the working directory **C:\Elo**.
- Then select the field **Icon**.
- Select the title **Touchscreen** in the field with the name “Tit.”
- Close the setting field.

Calibrating the Touch Screen

The touch screen must be calibrated after installation. To calibrate the screen, proceed as follows:

- Go into the System Setup.
- Double-click the **Elo Touchscreen** button to activate the touch screen control panel.
- Click the **Calibrate** button. Then touch each of the three targets that appear on the screen as precisely as possible with a suitable object made of wood or plastic, such as the blunt end of a pen or pencil.
- Follow the remaining instructions which appear on the screen; then click on “Yes” and “OK” to conclude the calibration procedure.
- Restart the computer so that the calibration will take effect.

Double Touch (Similar to a Mouse Double Click)

Although the double-click speed of the mouse can be set using the sequence Start/Settings/Control Panel/Mouse, it is also necessary to define the size of the double touch field for the touch screen. This is necessary, because the second touch made in a double touch sequence will not occur in exactly the same location as the first one.

To set another field size, proceed as follows:

- Go into the System Setup.
- Double-click the **Elo Touchscreen** button to activate the touch screen control panel.
- Here you find the double-click field defined by X and Y coordinates. The values of both these coordinates should be <100.
- Select “OK” to exit the touch screen control panel.

Changing the Window Frame Width

To change the width of the window frame, you must go into the touch screen control panel again (see *Calibration*).

- Enter a value of less than 26 in the field for setting the frame width. Values greater than 26 are not recommended.
- Restart the computer so that the changes will take effect.

Display

9

Chapter Overview

9.1 TFT Display (XGA)

Note

The backlight tube of the TFT display is subjected to wear and hence a guarantee against a defective tube cannot be granted. Depending on its operating temperature, the tube's half-life period is typically 15000 operating hours, i.e. your display has then dimmed to 50% of its original brightness. Under unfavorable operating conditions, we recommend you replace the tube after the half-life period has elapsed. The backlight tube is available as a spare part.

Technical specifications

Screen (visible effective surface)	Diagonal: 13.3 inches Width: 270.3 mm Heigth: 202.8 mm
Resolution	1024 x (RGB) x 768 pixels
Interface	1 chip LVDS
Size of pixels	0.264 mm vertical 0.264 mm horizontal
Faulty spots permitted	High-Level < 12 spots Low-Level < 25 spots Green-High-Level < 5 spots
Order of pixels	RGB vertical strips
Display mode	white characters on black background
Dimensions	Width: 296.5 mm Height: 214.0 mm Depth: 7.8 mm
Weight	approx. 595 g

Hard Disk Drive

10

Chapter Overview

10.1 Technical Specifications

Capacity		See ordering information
Manufacturer		
Manufacturer's designation		
Power requirements	representative value (startup) 5V representative value (startup) 12V	0.41 A (0.3 A) 0.21 A (1.3 A)
Parameters	Cylinders Sectors Heads	
Jumpers	Single * Master Slave	J8-1 = 0 J8-3 = 0 J8-5 = 0 J8-1 = 0 J8-3 = 0 J8-5 = 1 J8-1 = 0 J8-3 = 1 J8-5 = 0
Fast - IDE Highspeed		yes

1 = Jumper inserted
0 = Jumper not inserted
* = Standard setting
all other jumpers should remain as originally delivered

Floppy Disk Drive

11

Chapter Overview

11.1 Technical Specifications

Capacity		1.44 MBytes
Manufacturer		TEAC
Manufacturer's designation		FD-05 HF 4644-U
Power requirements	representative value (startup) 5V representative value (startup) 12V	0.40 A (0.70 A)
Parameters	Cylinders Sectors Heads	80 18 2
Jumpers	Single *	None

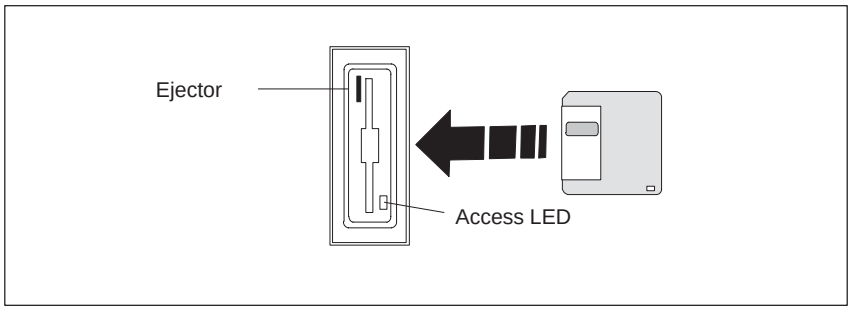


Figure 11-1 Floppy Disk Drive

CD-ROM Drive

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Chapter Overview

12.1 CD-ROM Drive

CD-ROM Drive

The CD-ROM drive enables you to update your STEP 5, STEP 7 and Windows 95 software easily. The drive is operated via the secondary IDE interface.

Opening the Drawer

By briefly pressing the eject button, the drawer springs out slightly. Now pull the drawer out until it clicks into position.

Inserting / Removing CDs

Now insert the CD in the drawer with the label face up (BI45) or to the left (FI45), and press it firmly down into the center of the turntable. To remove the CD, hold it by the edges and pull upwards.

Caution

To avoid too much pressure on the open drawer, **always** hold the drawer at the front with one hand when inserting or removing a CD.

Closing the Drawer

Push in the drawer until it closes completely. Do **not** press the eject button.

Note

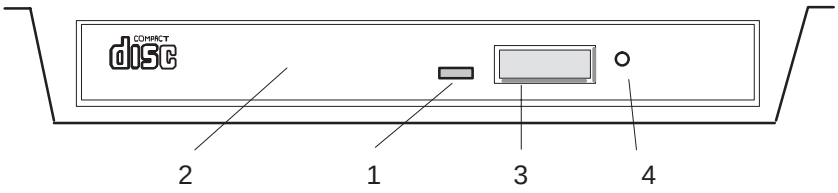
The EJECT function offered by various applications for opening the CD-ROM drawer does not work with this drive.

After the drawer has been closed, the CD is tested and the access display light on the drive starts to flash:

– If the display flashes continually, the CD is faulty but can still be read.

– If the display flashes several times and then remains lit, the CD you have inserted is defective and cannot be read.

CD-ROM Front

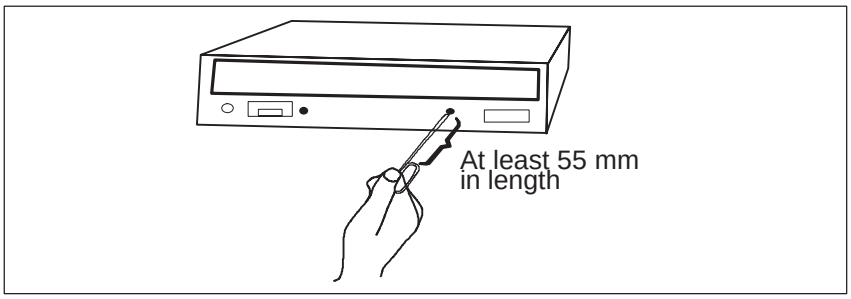


1 Access display
2 Drawer
3 Eject button
4 Emergency eject

Emergency Eject

The procedure described below can be used to remove a disc from the CD-ROM reader if the Open/Close button is disabled by software or a power failure occurs. In this case, the CD tray cannot be opened automatically.

1. Turn off the power to the CD-ROM reader (switch off your device if necessary).
2. Insert a steel rod or a stiff paper clip (with a maximum diameter of 1.3 mm and a minimum length of 55 mm) into the emergency eject hole at the front of the drive and push lightly. The CD tray is ejected by about 10 mm. Pull it all the way open by hand and lift the disc out carefully.



Caution

Risk of data loss and damage to the drive!

CD-ROM drives are sensitive to vibrations and shock. Any vibrations occuring during operation can lead to damage to the drive or CD.

Power Supply

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Chapter Overview

Section	Description	Page
13.1	Technical Specifications	13-2

13.1 Technical Specifications

Voltage

Voltage	Max. Current	Voltage Stability
+ 12 V	8.5 A	± 4 %
– 12 V	0.5 A	± 6 %
+ 5 V	22 A	± 3 %
– 5 V	0.5 A	± 5 %
+ 3.3 V	10.0 A	± 5 %

Voltage

Input voltage	115/230 VAC, ± ×10 %
Line voltage frequency	47 – 63 Hz
Power consumption	≤ 320 Watt
Jumpering on power failure	20 ms at 175 W
Output power	220 W DC to T_U = 32°C / 180 W DC to T_U = 45°C
Degree of protection	IP20
Protection class	VDE 0106
Certification	EN 60950/IEC 950, UL

Power-Good Signal

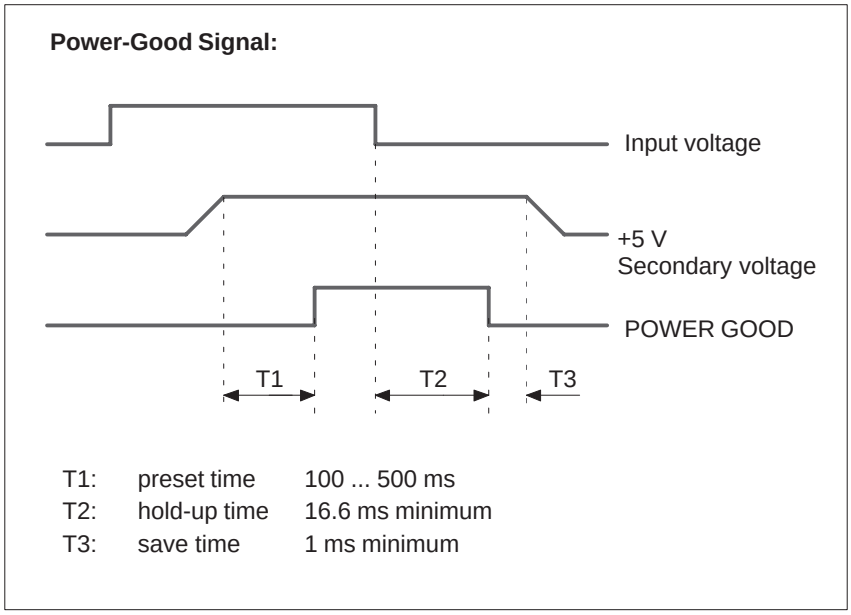

Figure 13-1 Time Characteristics of the Power-Good Signal

Connecting Cables

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Chapter Overview

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14.1	Connecting Cables	14-2

14.1 Connecting Cables

Overview

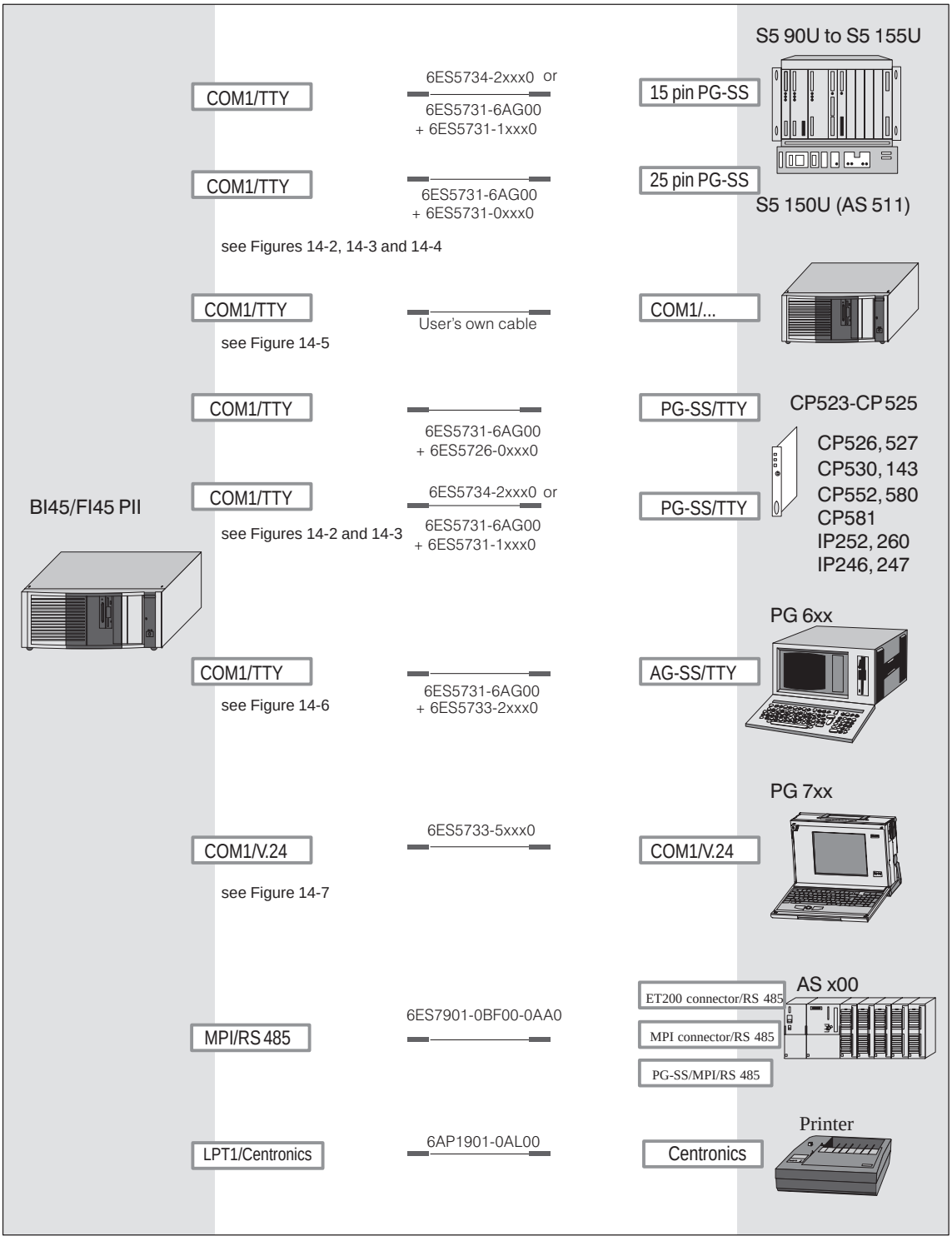


Figure 14-1 Connecting Cables

BIxx/FIxx - PLC Standard Connection

You can use the standard connecting cable to connect your device to a Siemens programmable controller. Please read the notes in Chapter 1.4.

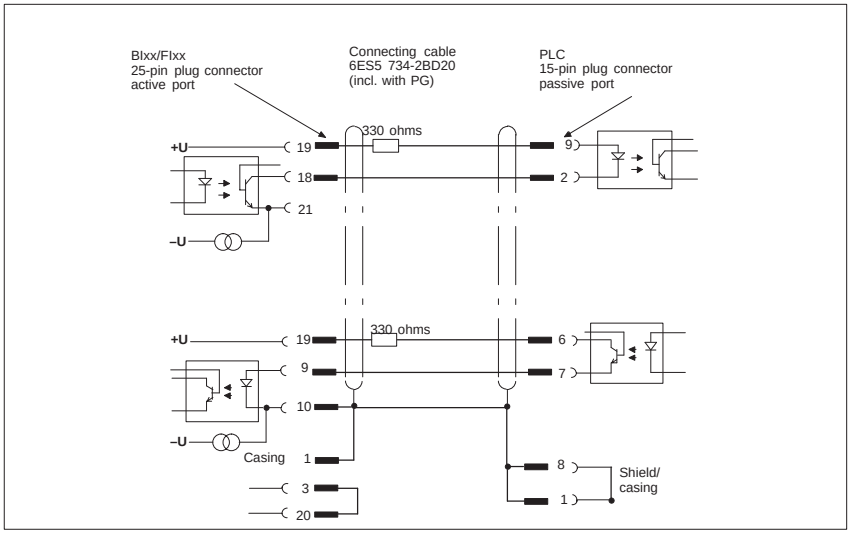


Figure 14-2BIxx/FIxx - PLC Standard Connection

BIxx/FIxx-PLC Connection to PG 6xx 15-pin Connecting Cable

If you want to connect your device to a programmable controller with the standard connecting cable of a PG 6xx programming device, you will need an adapter.

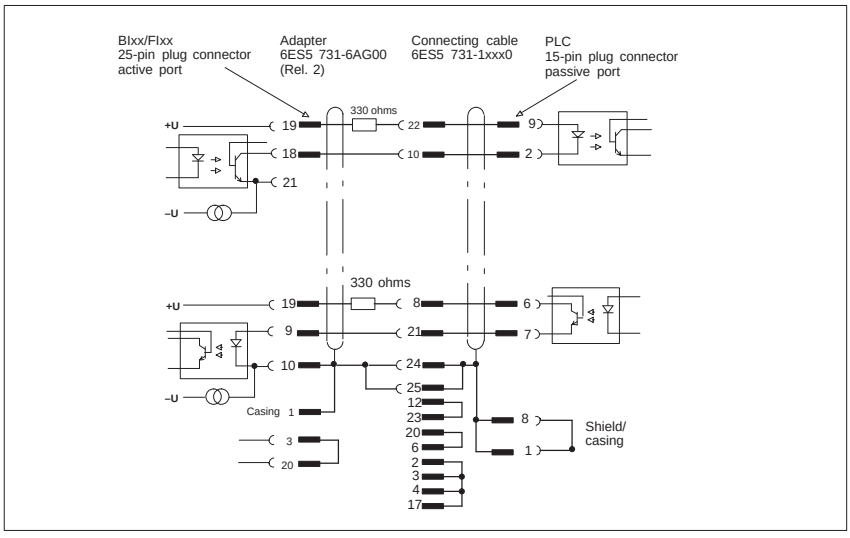


Figure 14-3BIxx/FIxx-PLC Connection to PG 6xx 15-pin Connecting Cable

BIxx/FIxx - PLC Connection via PG 6xx Connecting Cable with 25-Pin Socket Connector

With the 25-pin plug connecting cable, you can connect your device via an adapter to a PLC, for example PLC 150U (AS 511).

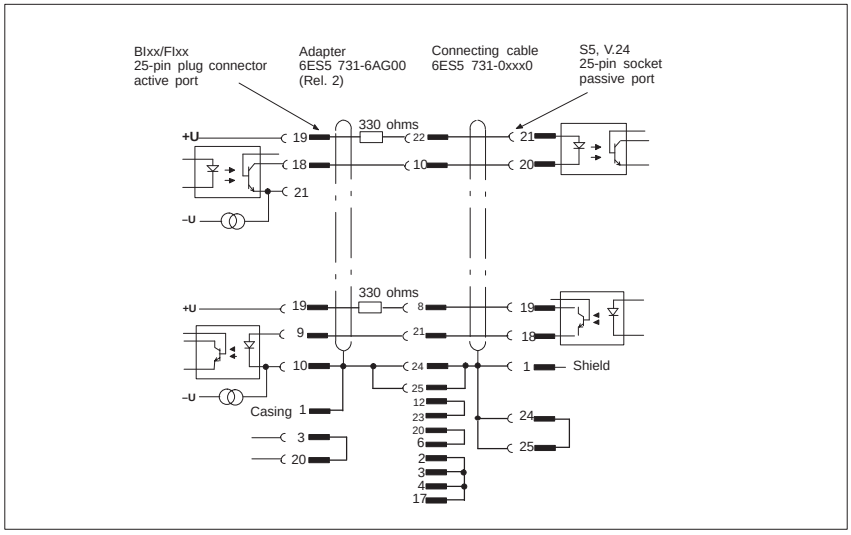


Figure 14-4 BIxx/FIxx - PLC Connection via PG 6xx Connecting Cable with 25-pin Socket Connector

Cable for Interconnecting Programming Devices

You can connect your device to programming devices via the TTY/COM 1 interface with this cable. This cable does not have an order number. Please read the notes in Chapter 1.4.11.

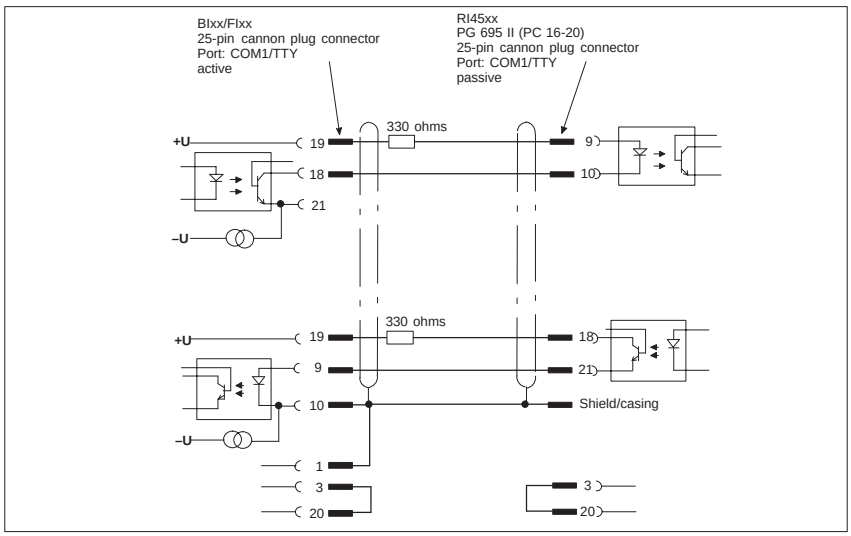


Figure 14-5 Cable for Interconnecting Programming Devices

BIxx/FIxx - PG 6xx Connection to PLC-S5 Port

If you want to connect your device to the PLC-S5 port of a PG 6xx programming device, you will need an adapter. In this case, the BIxx/FIxx must be switched to active. Please read the notes on changing over the TTY/COM 1 port to active in Chapter 1.4.

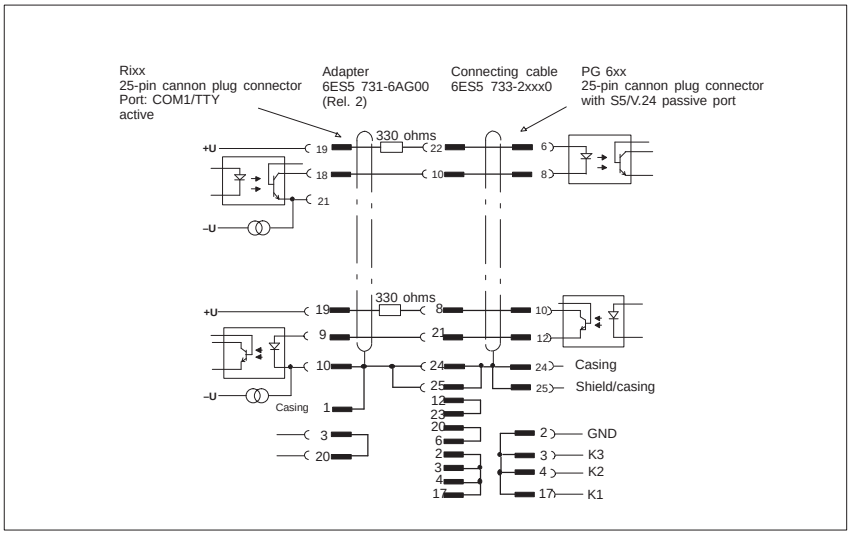


Figure 14-6BIxx/FIxx - PG 6xx Connection to PLC-S5 Port

BIxx/FIxx - PG 7xx Connection in V.24 Operation

With this connecting cable you can connect your device to any PG 7xx.

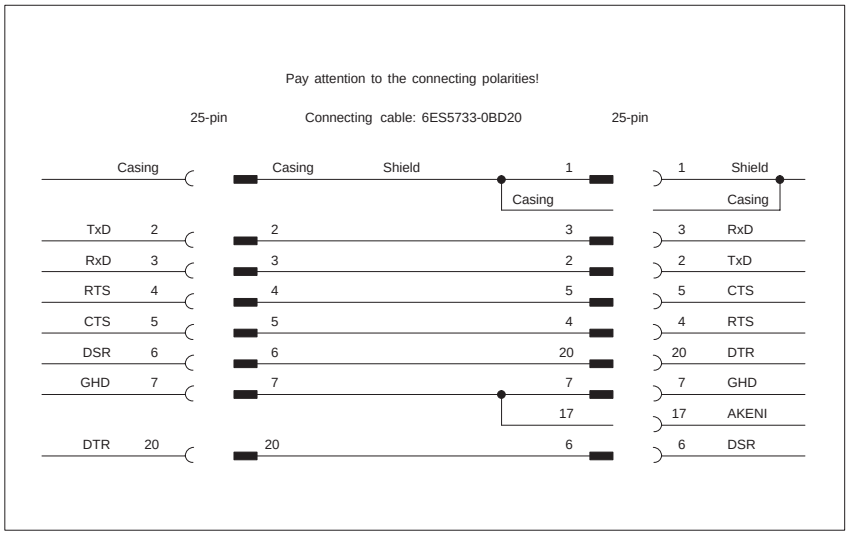


Figure 14-7BIxxFIxx - PG 7xx Connection in V.24 Operation

Guidelines for Handling Electrostatically-Sensitive Devices (ESD)

A

Chapter Overview

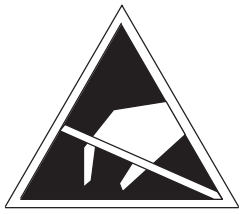
A.1 What is ESD?

Definition

All electronic modules are equipped with large-scale integrated ICs or components. Due to their design, these electronic elements are very sensitive to overvoltages and thus to any electrostatic discharge.

These **E**lectrostatically-**S**ensitive **D**evices are commonly referred to by the abbreviation **ESD**.

Electrostatically-sensitive devices are labeled with the following symbol:



Caution

Electrostatically-sensitive devices are subject to voltages that are far below the voltage values that can still be perceived by human beings. These voltages are present if you touch a component or the electrical connections of a module without previously being electrostatically discharged. In most cases, the damage caused by an overvoltage is not immediately noticeable and results in total damage only after a prolonged period of operation.

A.2 Electrostatic Charging of Persons

Charging

Every person with a non-conductive connection to the electrical potential of its surroundings can be charged electrostatically.

Figure A-1 shows you the maximum values for electrostatic voltages which can build up on a person coming into contact with the materials indicated in the figure. These values are in conformity with the specifications of IEC 801-2.

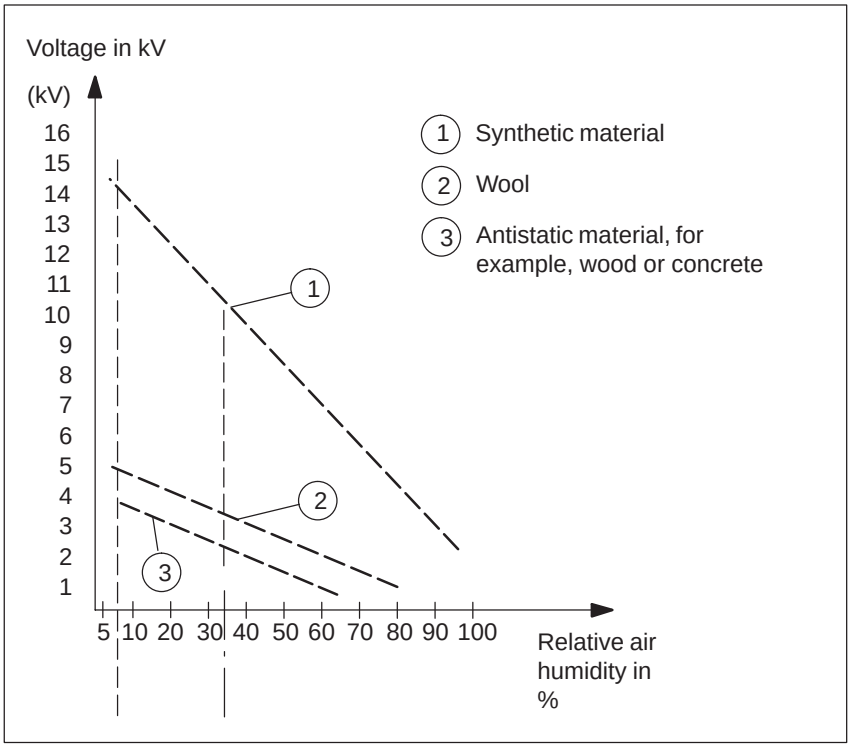


Figure A-1 Electrostatic Voltages which can Build up on a Person

A.3 General Protective Measures Against Electrostatic Discharge Damage

Ensure Sufficient Grounding

Make sure that the personnel, working surfaces, and packaging are sufficiently grounded when handling electrostatically-sensitive devices. You thus avoid electrostatic charging.

Avoid Direct Contact

You should touch electrostatically-sensitive devices only if it is unavoidable (for example, during maintenance work). Hold modules without touching the pins of components or printed conductors. In this way, the discharged energy cannot affect the sensitive devices.

If you have to carry out measurements on a module, you must discharge your body before you start the measurement by touching grounded metallic parts. Use grounded measuring devices only.

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