SIEMENS

SIMATIC

PC BI10/FI10/FI15

Technical Description

Contents

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

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.

Contents

Mother Board

2

Chapter Overview

2.1 Overview of the Components

Features of Performance

The following table lists the components of the mother board and their features:

Components	Features of Components
Processor	Mobil Pentium 133, 166 and 200 MHz with integrated cooling unit in LIF socket (166 MHz and above, with active cooling unit)
Processor upgrade	Socket 7
Memory	64 Bit, 4 S0-DIMM sockets, uni/bilateral, Fast Page Mode or Extended Data Out (EDO). Usable cards: 8 MB (2* 1MB*32 cards) 16 MB (2* 2MB*32 cards or 4* 1MB*32 cards) 24 MB (2* 1MB*32 cards + 2* 2MB*32 cards) 32 MB (2* 4MB*32 cards or 4* 2MB*32 cards) 40 MB (2* 4MB*32 cards + 2* 1MB*32 cards) 48 MB (2* 4MB*32 cards + 2* 2MB*32 cards) 64 MB (2* 8MB*32 cards or 4* 4MB*32 cards) 72 MB (2* 8MB*32 cards + 2* 1MB*32 cards) 80 MB (2* 8MB*32 cards + 2* 2MB*32 cards) 96 MB (2* 8MB*32 cards + 2* 4MB*32 cards) 128 MB (4* 8MB*32 cards) Pairs can be combined
EPROM	256 Kbytes flash
CMOS	242 Byte CMOS-RAM with battery backup
Chipset	Opti Viper N+ Chipset, NSC Super I/O PC87306
Graphics card	SVGA-LCD controller Cirrus GD7543 with Windows accelerator on PCI bus, 1 Mbyte RAM with LCD up to 800x600/256 colors, with CRT up to 1024x768/72Hz/256 colors possible
IDE	PCI bus EIDE interface with IO mode 4 for max. 2 drives
Floppy disk drive	1 drive [1], 44 Mbytes
Expansion slots	1 ISA (short), 1 shared ISA/PCI (290 mm long)
Keyboard	Membrane keyboard, port for external PS/2 keyboard (at one side of the unit). A keyboard with a trackball can also be connected to the PS/2 port.
Mouse	PS2 touchpad, port for external PS/2 mouse (at one side of the unit).
Serial	1 x V.24/TTY, 1 x V.24 internal or external
Parallel	Standard, bidirectional, EPP and ECP mode
MPI	Multipoint Interface for external SIMATIC S7 (at one side of the unit) or for internal slot module
PCMCIA interface	PCMCIA 2.1/JEIDA 4.1 compatible

[1] In the case of an installed direct key module, only a short ISA module can be fitted.

2.2 Processor

Recommended Processors

Pentium 133, 166 and 200 MHz with integrated cooling unit in LIF socket. (166 MHz processors and above, with active cooling unit).

Replacing the Processor

To replace the processor, proceed as follows:

1. First remove the cooling unit which is fixed with a lifting lever. If the CPU has an active cooling unit, pull out the connector for the fan (39).
2. The processor must be extracted and inserted using a special tool. The tool can be obtained from your service partner.
3. Fix the cooling unit using the lifting lever.
4. Modify the processor frequency setting if necessary (switch S1).
5. Put the new processor in its socket and make sure that the marking on top of the processor corresponds to the coding on the socket (A).

Caution

If a processor is operated at a frequency that exceeds its maximum frequency, destruction of the processor, data loss, or data corruption may result.

The marks on top of the processor could be covered by the cooling unit. In this case the marks between the pin rows on the outside of the processor will help you.

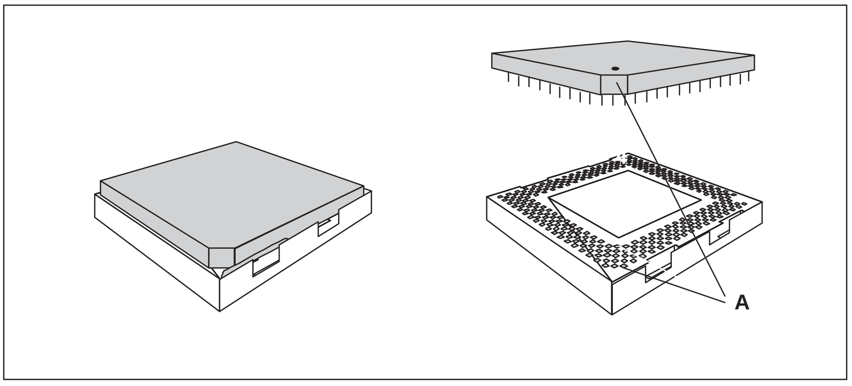


Figure 2-1 Upgrading the Processor

2.3 Graphics Interface Module

Brief Description

The graphics interface module of the mother board is a plane PCI implementation; that is, the SVGA-LCD controller Cirrus Logic GD7543 is located on the board and connected to the PCI bus. Its refresh memory has a backup capacity of 1 Mbyte which cannot be upgraded.

Supported Resolutions

Two modes are supported:

- standard mode and
- extended mode

Standard Modes

The CL-GD754X VGA BIOS supports all standard VGA modes listed in the table below:

Mode No. (hex)	VESA No.	Colors	Char. x Line	Char. 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	—	256/256K	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)	Colors	Char. x Line	Char. per Cell	Display Format	Dot Clock MHz	Horizontal Scan Frequency kHz	Vertical Scan Frequency Hz
Text Modes								
14	—	16/256K	135x25	8x16	1056x400	41.5	31.5	70
54	10A	16/256K	135x43	8x8	1056x350	41.5	31.5	70
55	109	16/256K	135x25	8x14	1056x350	41.5	31.5	70
Graphic Modes								
11	—	2/256K	80x30	8x16	640x480	31.5	37.9	72
11’	—	2/256K	80x30	8x16	640x480	31.5	37.5	75
12	—	16/256K	80x30	8x16	640x480	31.5	37.9	72
12’	—	16/256K	80x30	8x16	640x480	31.5	37.5	75
58, 6A	102	16/256K	100x37	8x16	800x600	36	35.2	56
58, 6A	102	16/256K	100x37	8x16	800x600	40	37.8	60
58, 6A	102	16/256K	100x37	8x16	800x600	50	48.1	72
58, 6A	102	16/256K	100x37	8x16	800x600	50	46.875	75
5C	103	256/256K	100x37	8x16	800x600	36	35.2	56
5C	103	256/256K	100x37	8x16	800x600	40	37.9	60
5C	103	256/256K	100x37	8x16	800x600	50	48.1	72
5C	103	256/256K	100x37	8x16	800x600	50	46.875	75
5D†	104	16/256K	128x48	8x16	1024x768	44.9	45.5	43†
5D	104	16/256K	128x48	8x16	1024x768	65	48.3	60
5D	104	16/256K	128x48	8x16	1024x768	75	56	70
5D	104	16/256K	128x48	8x16	1024x768	77	58	72
5E	100	256/256K	80x25	8x16	640x400	25	31.5	70
5F	101	256/256K	80x30	8x16	640x480	25	31.5	60
5F	101	256/256K	80x30	8x16	640x480	31.5	37.9	72
5F	101	256/256K	80x30	8x16	640x480	31.5	37.5	75
60†	105	256/256K	128x48	8x16	1024x768	44.9	35.5	43†
60	105	256/256K	128x48	8x16	1024x768	65	48.3	60
60	105	256/256K	128x48	8x16	1024x768	75	56	70
60	105	256/256K	128x48	8x16	1024x768	77	58	72
64	111	64K	—	—	640x480	25	31.5	60
64	111	64K	—	—	640x480	31.5	37.9	72
64	111	64K	—	—	640x480	31.5	37.5	75
65	114	64K	—	—	800x600	36	35.2	56
65	114	64K	—	—	800x600	40	37.8	60

Mode No. (hex)	VESA No. (hex)	Colors	Char. x Line	Char. per Cell	Display Format	Dot Clock MHz	Horizontal Scan Frequency kHz	Vertical Scan Frequency Hz
66	110	32K†	—	—	640x480	25	31.5	60
66	110	32K†	—	—	640x480	31.5	37.9	72
66	110	32K†	—	—	640x480	31.5	37.5	75
67	113	32K†	—	—	800x600	40	37.8	60
6C†	106	16/256K	160x64	8x16	1280x1024	75	48	43†
6D†	—	256/256K	160x64	8x16	1280x1024	75	48	43†
71	112	16M	80x30	8x16	640x480	25	31.5	60
74†	—	64K	—	—	1024x768	44.9	35.5	43†

Note

Some displays do not support all possible modes. Your display automatically uses the highest vertical scan frequency. † signifies interlaced mode. 43.5 Hz or 87 Hz interlaced ‡ signifies 32K direct or packed-pixel mode (Sierra).

The two graphics modes 11’ and 12’ are based on the standard modes 11 and 12 but have both a higher refresh rate.

Mode 54 is a text mode with 1056x344 addressable pixels using a 1056x350 timing.

Extended Modes for Operating a Flat Screen

The CL-GD754X VGA BIOS supports standard VGA modes and the following extended modes on the flat screens listed below.

640x480 (VGA) Flat screens

Mode No. (hex)	VESA No. (hex)	Colors	Char. x Line	Char. per Cell	Display Format	Type of Flat Screen	Dot Clock MHz	Min. MCLK MHz	VCC in Volt
5E	100	256/256K	80x25	8x16	640x400	STN/TFT	25	45	3.3
5F	101	256/256K	80x30	8x16	640x480	STN/TFT	25	45	3.3
64	111	64K	—	—	640x480	STN/TFT	25	45	3.3
66	110	32K†	—	—	640x480	STN/TFT	25	45	3.3
71	112	16M	80x30	8x16	640x480	TFT	25	50	5.0

800x600 (SVGA) Flat screens

Mode No. (hex)	VESA No. (hex)	Colors	Char. x Line	Char. per Cell	Display Format	Expan-sion of 640x480 to 800x600	Type of Flat Screen	Dot Clock MHz	Min. MCLK MHz	VCC in Volt
58, 6A	102	16/256K	100x37	8x16	800x600	—	DSTN/ TFT	31.5	45	3.3
5C	103	256/256K	100x37	8x16	800x600	—	DSTN/ TFT	31.5	45	3.3
5E	100	256/256K	80x25	8x16	640x400	Yes	DSTN/ TFT	31.5	45	3.3
5F	101	256/256K	80x30	8x16	640x400	Yes	DSTN/ TFT	31.5	45	3.3
64	111	64K	—	—	640x480	No	DSTN/ TFT	31.5	45	3.3
65	114	64K	—	—	800x600	—	TFT	31.5	45	3.3
66	110	32K†	—	—	640x480	No	TFT	31.5	45	3.3
67	113	32K†	—	—	800x600	—	TFT	31.5	45	3.3

1. Note: † signifies 32K direct-color packed-pixel mode (Sierra)

Extended Modes Working Simultaneously (CRT and Flat Screen)

The CL-GD754X VGA BIOS supports the simultaneous operation of the standard VGA modes and the following extended modes on the flat screens listed below.

640x480 (VGA) Flat screens

Mode No. (hex)	VESA No. (hex)	Colors	Char. x Line	Char. per Cell	Display Format	Type of Flat Screen	Dot Clock MHz	Min. MCLK MHz
5E	100	256/256K	80x25	8x16	640x400	DSTN/TFT	25	45
5F	101	256/256K	80x30	8x16	640x480	DSTN/TFT	25	45
64	111	64K	—	—	640x480	DSTN/TFT	25	45
66	110	32K†	—	—	640x480	DSTN/TFT	25	45
71	112	16M	80x30	8x16	640x480	TFT	25	50

800x600 (SVGA) Flat screens

Mode No. (hex)	VESA No. (hex)	Colors	Char. x Line	Char. per Cell	Display Format	Expansion of 640x480 to 800x600	Type of Flat Screen	Dot Clock MHz	Min. MCLK MHz
58, 6A	102	16/256K	100x37	8x16	800x600	—	DSTN/TFT	36	53/45
5C	103	256/256K	100x37	8x16	800x600	—	TFT	50	45
5E	100	256/256K	80x25	8x16	640x400	Yes	DSTN/TFT	25	53/40
5F	101	256/256K	80x30	8x16	640x400	Yes	DSTN/TFT	25	53/40
64	111	64K	—	—	640x480	No	TFT	25	45
65	114	64K	—	—	800x600	—	TFT	36	50
66	110	32K†	—	—	640x480	No	TFT	25	40
67	113	32K†	—	—	800x600	—	TFT	36	50

1. Note: † signifies 32K direct-color packed-pixel mode (Sierra)

2.4 Memory

Memory Configuration

64 Bit, 4 uni/bilateral S0-DIMM sockets, Fast Page Mode or Extended Data Out (EDO) are provided. Only use S0-DIMM cards with an access time of 70 ns or lower!

Do not operate your system with both Fast page and EDO cards.

Only use memory cards recommended for SIMATIC PCs or programming devices. Your dealer will help you to find out which card you can use.

Recommended memory expansion cards:

- 8 MB (2*4MB cards)
- 16 MB (2*8MB cards)
- 32 MB (2*16MB cards)
- 64 MB (2*32MB cards)
- 128 MB (4*32MB cards) pairs can be combined

Banks 1 and 2 are located in the lower level of the S0 DIMM socket and banks 3 and 4 are in the upper level.

Only plug memory cards of the same type and brand into a bank!

Memory Configuration	Memory Cards in Banks 1/2	Memory Cards in Banks 3/4
8 Mbytes	2 * 4 Mbytes	empty
16 Mbytes	2 * 8 Mbytes	empty
16 Mbytes	2 * 4 Mbytes	2 * 4 Mbytes
24 Mbytes	2 * 4 Mbytes	2 * 8 Mbytes
32 Mbytes	2 * 16 Mbytes	empty
32 Mbytes	2 * 8 Mbytes	2 * 8 Mbytes
40 Mbytes	2 * 4 Mbytes	2 * 16 Mbytes
48 Mbytes	2 * 8 Mbytes	2 * 16 Mbytes
64 Mbytes	2 * 32 Mbytes	empty
64 Mbytes	2 * 16 Mbytes	2 * 16 Mbytes
72 Mbytes	2 * 4 Mbytes	2 * 32 Mbytes
80 Mbytes	2 * 8 Mbytes	2 * 32 Mbytes
96 Mbytes	2 * 8 Mbytes	2 * 32 Mbytes
128 Mbytes	2 * 16 Mbytes	2 * 32 Mbytes

Replacing/ Upgrading Memory Cards

First remove the bus module before you start to upgrade the main memory.

How to Proceed

Please refer to the notes in chapter 1 of the User's Guide included and read carefully the ESD guidelines!

1. Switch off the device.
2. Unscrew the housing and remove the cover.
3. Remove all plugged ISA and PCI modules.
4. Remove the floppy disk drive, if applicable.
5. Remove the disk drive support.
6. Remove the power supply.
7. Plug or unplug the SIMM cards as described below. Plug in from the right to the left slot, unplug in reverse order.
8. Make sure that the cards are correctly plugged in.
9. Reassemble the unit in reverse order.

Caution

Risk of short circuit!

The SIMM cards have to be installed properly, otherwise the mother board or the card might be destroyed.

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

Install Memory Card

Proceed as follows to install a memory card:

1. Plug the card diagonally into the corresponding slot. Make sure that the marked slot and the two holes on the card engage properly with the centering pivot of the carrying device.
2. Press the card lightly down until it locks into place.

Remove Memory Card

Proceed as follows to remove a memory card:

1. Press the holding clips on the left and right side carefully outwards.
2. Tilt the memory card forward and pull it diagonally out of the slot.

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 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 have to replace the battery. The battery is located underneath the bus board.

Proceed as follows:

1. Unplug from the mains supply.
2. Unscrew and remove the cover of the housing.
3. Remove all plugged in ISA and PCI modules.
4. Remove the floppy disk drive, if applicable.
5. Remove the drive support.
6. Now replace the backup battery, which is attached to the mother board by a short length of a cable.
7. Reassemble the drive support 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 your PC's configuration data using the SETUP program.

Note

A list of the SETUP parameters is provided at the end of Section 2.10. You can also document your own entries there.

2.6 Block Diagram of the Mother Board

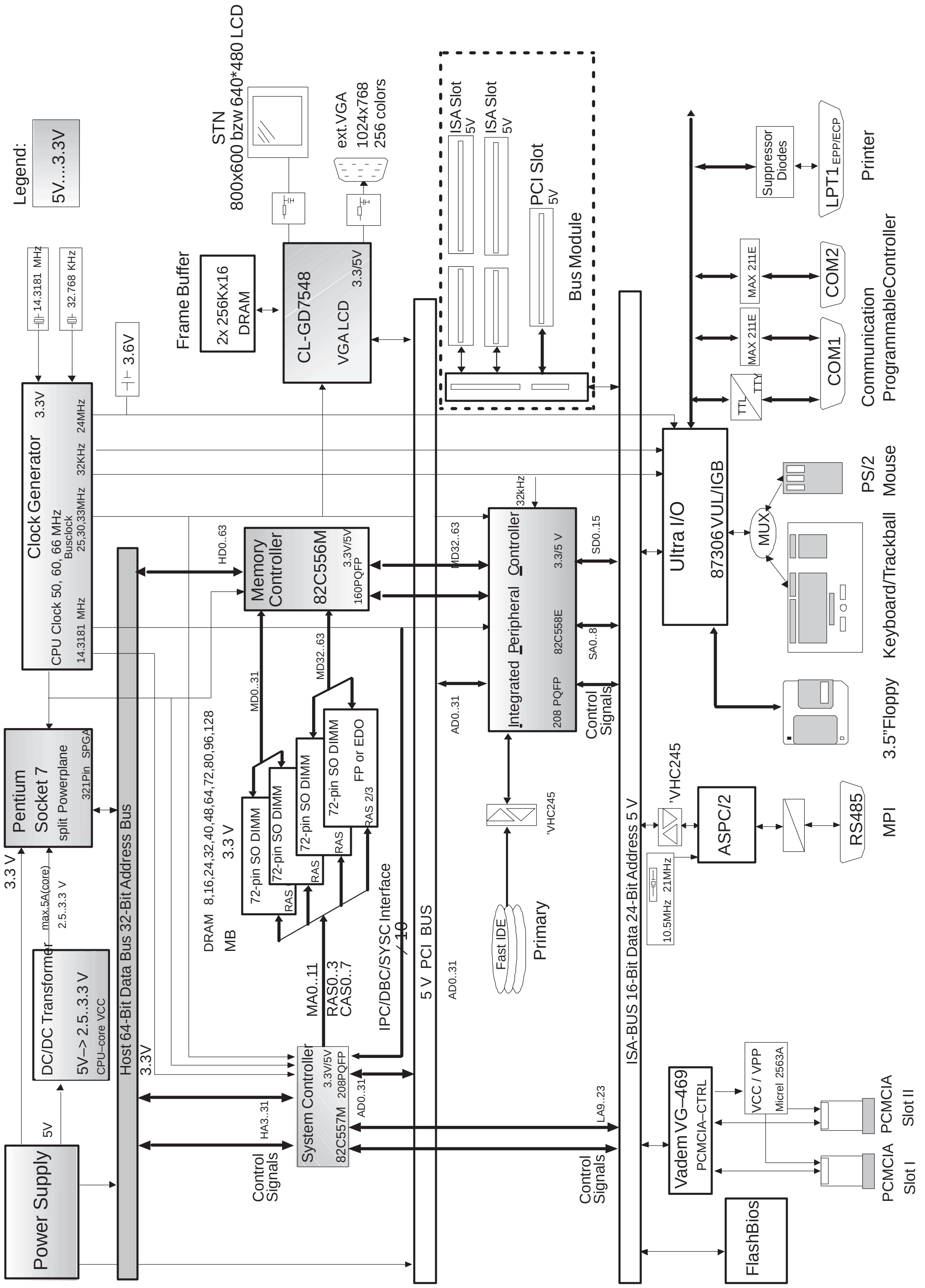


Figure 2-2 Mother Board

2.7 Hardware Ports

Position of Connectors and Switches

The following figure illustrates connector and switch positions of the mother board components.

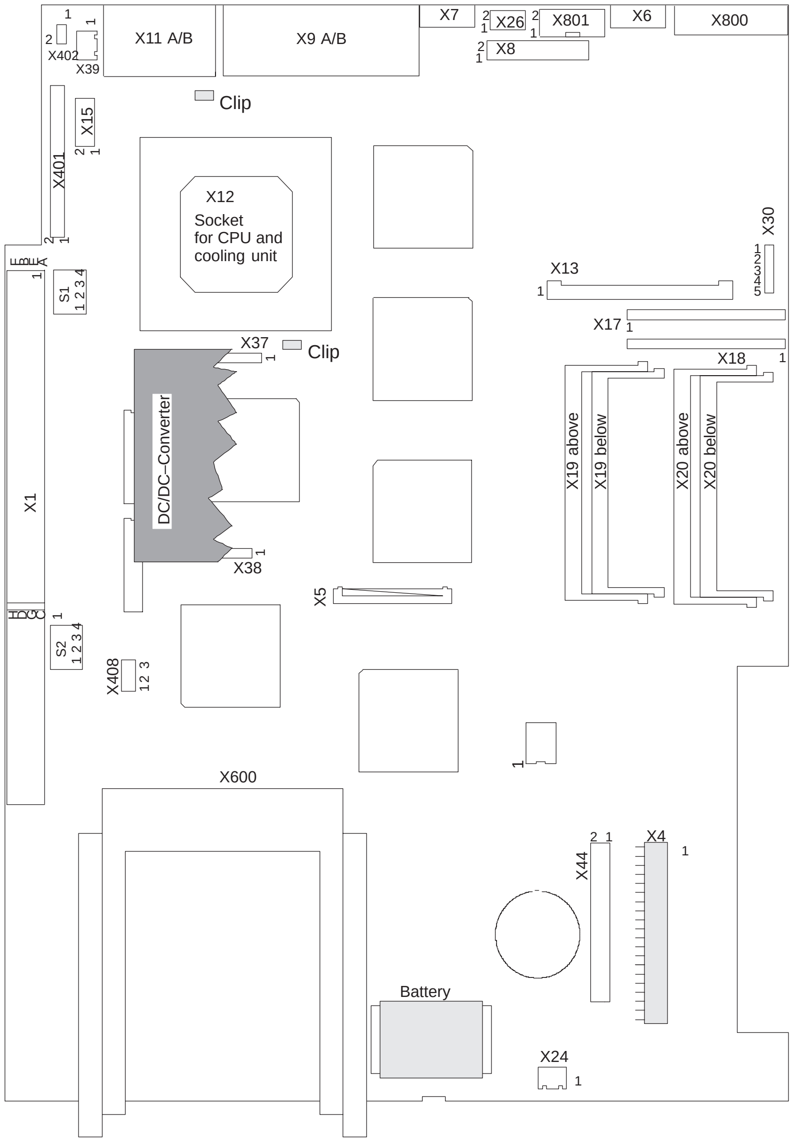


Figure 2-3 Mother Board

Connectors/ Jumpers on the Mother Board

The following connectors are located on the mother board of the IPC:

Designa-tion	Name	Description
X1	Slotbus	ISA/PCI connector linking mother board (GBG) and bus module (BBG)
X4	IDE primary	Primary IDE port standard ribbon cable for 3.5” floppy disk drive
X5	Floppy disk	Floppy disk port
X6	External keyboard port	MINI DIN PS/2 keyboard connector, also suitable for keyboards with trackballs
X7	Mouse port	MINI DIN PS/2 mouse connector
X8	Multi-port, internal	Port for keyboard controller, touchpad, inverter
X9	LPT/COM1	Parallel port LPT1/printer port (25-pin Centronics) / Serial port 1 (25-pin / female connector)
X11	Com2/VGA	Serial port 2 (standard 9-pin), VGA interface (standard 15-pin)
X12	CPU	Processor with cooling unit (Pentium Socket 7)
X13	Power	20-pin power supply connection of the mother board
X15	Display module	Port for display module cable / SafeCard
X17	Socket	Socket for TTY sender module
X18	Socket	Socket for TTY receiver module
X19 below	RAM bank 1,2 low	Socket for RAM
X20 below	RAM bank 1,2 high	Socket for RAM
X19 above	RAM bank 3,4 low	Socket for RAM
X20 above	RAM bank 3,4 high	Socket for RAM
X24	Battery	Connector for lithium battery
X26	COM 2 internal	Connector for touchscreen controller
X30	TTY mode	All pins unconnected, no significance
X37,X38	DC/DC converter	Socket for CPU DC/DC converter submodule
X39	Fan	Fan port +12V
X44	IDE primary	Primary IDE interface, 2 mm ribbon cable for 2.5” drive
X401	Display	Port for flat screen
X402	P5V	PIN 1-2 connected (P5V for display adapter supply)
X408	VCC display	Jumper on 1-2 for 5V display supply, 2-3 for 3.3V display supply
X600	PCMCIA	PCMCIA port, 2 slots type II cards, shared 1 slot type III cards
X800	MPI	MPI port
X801	MPI internal	MPI port for slot module
S1	Switch 1	CPU clock
S2	Switch 2	Display type

Description of Ports and Switches

The following table describes ports and switches.

Ports	Pin Designation	Description of Ports
Floppy disk	X5	One drive possible (82078 compatible) 360 Kbytes, 720 Kbytes, 1.2 Mbytes, 1.44 Mbytes 3F0h-3F7h, 370h-377h, disconnectable IRQ 6, edge triggered 26-pin,
IDE hard disks	X4 X44	One drive possible 170h-177h, 1F0h-1F7h, disconnectable IRQ14, IRQ15, edge triggered 40-pin standard connector for 3.5" hard disks 44 PIN 2mm connector for 2.5" disk drives X4 and X44 cannot be operated simultaneously.
COM1	X9A	3F8h-3FFh, disconnectable IRQ4, edge triggered 25-pin, socket connector, V24/V28 (TTY can be retrofitted)
COM2	X11A X26	2F8h-2FFh, disconnectable IRQ3, edge triggered 9-pin, standard connector 10-pin male connector X11 and X26 cannot be operated simultaneously
LPT1/PRINTER	X9B	378h-37Fh, disconnectable IRQ7, edge triggered 25-pin, standard socket connector
VGA	X11B	3B0h-3BFh, 3C0h-3CFh, 3D0h-3DFh, disconnectable IRQ9, edge triggered 15-pin, standard connector
Keyboard	X6 X8	060h - 064h IRQ1, edge triggered 6-pin, mini Din socket connector 20-pin connector (combi connector for linking to a membrane keyboard controller).
Mouse	X7 X8	060h-064h, IRQ12 edge triggered 6-pin, mini Din socket 20-pin connector (combi connector) When a touchpad is connected, the mouse can no longer be operated on X7
PCMCIA	X800	3E0h-3E1h 2 68-pin plug connectors Memory and I/O addresses as well as IRQs have card-specificassignments
MPI/DP	X800 X801	0CC000h-0CC7FFn or 0DC000h-0DC7FFh IRQ5, edge triggered 9-pin, sub D socket connector 10-pin male connector X800 and X801 cannot be operated simultaneously

Switches and Jumpers

The switches and jumpers on the mother board are explained in the following tables.

S1 clock setting

S1 (1)	S1 (2)	S1 (3)	S1 (4)	Function
on	off	off	on	CPU 200MHz CPU BUS/CORE ratio 1/3
on	off	on	on	CPU 166MHz CPU BUS/CORE ratio 2/5
off	off	on	on	CPU 150MHz CPU BUS/CORE ratio 2/5
on	off	on	off	CPU 133MHz CPU BUS/CORE ratio 1/2
off	off	on	off	CPU 120MHz CPU BUS/CORE ratio 2/5
on	off	off	off	CPU 100MHz CPU BUS/CORE ratio 2/3

With all settings, the PCI bus is operated at 33MHz and the ISA bus is operated at 8.25 MHz.

S2 display type

S2 (1)	S2 (2)	S2 (3)	Function
on	on	on	800 x 600 DSTN Sanyo full depth of color
off	on	on	800 x 600 TFT non Sharp
on	off	on	640 x 480 DSTN Sanyo full depth of color
off	off	on	640 x 480 TFT non Sharp
on	on	off	800 x 600 DSTN Sanyo reduced depth of color
off	on	off	640 x 480 TFT Sharp
on	off	off	640 x 480 DSTN Sanyo reduced depth of color
off	off	off	800 x 600 TFT Sharp

S2 (4)	Function
on	Backlight on with high level
off	Backlight on with low level

Jumper X408: Display voltage

X408 1-2	2-3	Function
connected	disconnected	VCC Display 5V (VGA-TFT display)
disconnected	connected	VCC Display 3.3V (SVGA-TFT display)

Jumper X30: TTY setting (only with installed TTY ports)

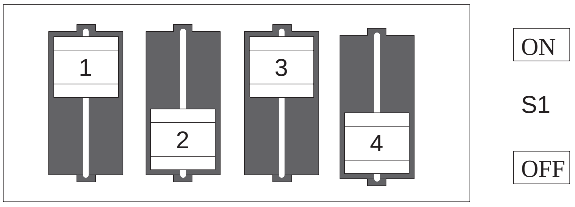
X30 1-2	2-3	4-5	Function
x	x	connected	active TTY Send loop
x	x	disconnect.	passive TTY Send loop (send loop from current source is separate)
disconnect.	connected	x	active TTY Receive loop
connected	disconnect.	x	passive TTY Receive loop (receive loop from current source is separate)

Manufacturer Settings for BI10, FI10, FI15

The manufacturer settings for the jumpers and switches on the module are shown below. The manufacturer settings for a module supplied as a spare part correspond to those of the BI10.

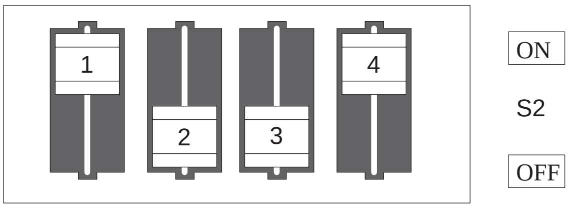
Switch S1

Switch setting for Pentium 166, CPU bus 66 MHz, PCI bus 33 MHz, ISA bus 8.25 MHz.



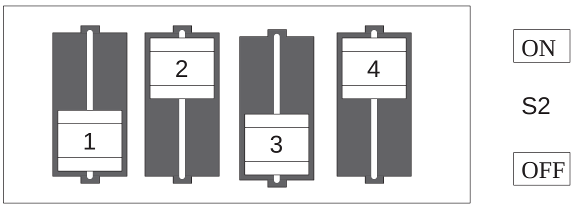
Switch S2

Switch setting for BI10, FI10
640 x 480 DSTN Sanyo display with reduced depth of color, inverter with backlight on high.



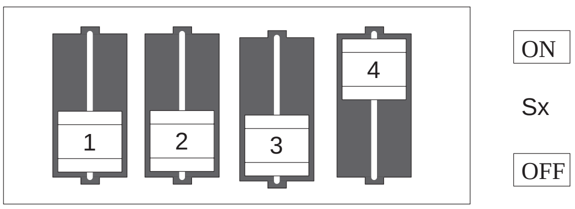
Switch S2

Switch setting for FI15
640 x 480 VGA-TFT Sharp display, inverter with backlight on high.



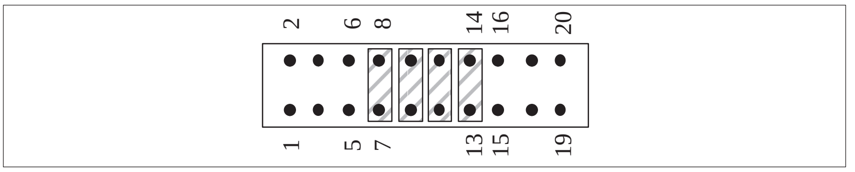
Switch S2

Switch setting for FI15
800 x 600 SVGA-TFT Sharp display, inverter with backlight on high



X408 PINS 1-2 linked; that is, 5V VCC display.

X8 PINS 7-8, 9-10, 11-12, 13-14 linked; that is, a keyboard on X6 is operated directly.



X30 No coding jumper.

COM1 Port (AG/V24/Modem) The port is designed for V.24/TTY.

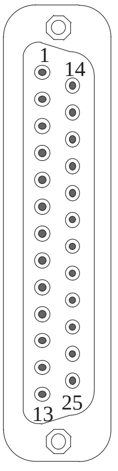


Figure 2-4 Serial Port COM1

Pin	Description	Input/Output
1	Shield	
2	Transmit data (TxD/D1)	Output
3	Receive data (RxD/D2)	Input
4	Request to send (RTS/S2)	Output
5	Clear to send (CTS/M2)	Input
6	Data set ready (DSR/M1)	Input
7	Signal ground (GND/E2)	
8	Data carrier detect (DCD/M5)	Input
9	+TTY Receive data (RxD) *	Input
10	-TTY Receive data (RxD) *	Input
11	Unassigned	
12	Unassigned	
13	Unassigned	
14	Unassigned	

Pin	Description	Input/Output
15	Unassigned	
16	Unassigned	
17	Unassigned	
18	+TTY Transmit data (TxD)	Output
19	Current source, isolated	
20	Data terminal ready (DTR/S1)	Output
21	-TTY Transmit data (TxD)	Output
22	Incoming call (RI/M3)	Input
23	Unassigned	
24	Unassigned	
25	Unassigned	

COM2 Port (RS232)

The module has both an external and an internal COM2 port. You can only use one or the other.

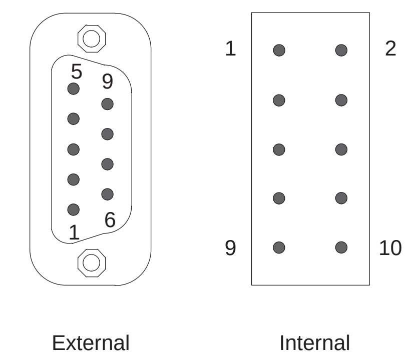


Figure 2-5 Serial Port COM 2

Signal Designation / Pinout

Pin		Signal Designation	Description
External	Intern.		
1	1	DCD (Data Carrier Detect)	Data Carrier Detect
2	3	RxD (Receive Data)	Receive Data
3	5	TxD (Transmit Data)	Transmit Data
4	7	DTR (Data Terminal Ready)	Data Terminal Ready
5	9	Signal Ground	Signal Ground
6	2	DSR (Data Set Ready)	Data Set Ready
7	4	RTS (Request to Send)	Request to Send
8	6	CTS (Clear to Send)	Clear to Send
9	8	Ri (Ring Indicator)	Incoming call
–	10	P5V	Supply voltage

LPT1 / Printer Port

The parallel port offers three transmission modes: unidirectional, bidirectional and EPP. Unidirectional is the standard mode with which most printers operate. Some devices require bidirectional operation. EPP (Enhanced Parallel Port) is a transmission mode which permits data transfer rates of 2 up to 2.4 Mbps. Such rates demand I/O devices which support these new modes.

The new modes are applied in cases such as the conversion of a parallel port to an SCSI or to an IDE port.

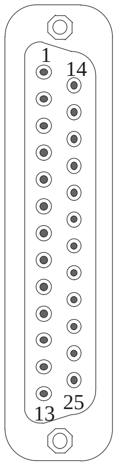


Figure 2-6 LPT 1 Parallel Port

Signal Description SPP Mode

Pin	Description	Input/Output
1	/ Strobe	Output (open collector)
2	Data - Bit 0	Output (TTL-level)
3	Data - Bit 1	Output (TTL-level)
4	Data - Bit 2	Output (TTL-level)
5	Data - Bit 3	Output (TTL-level)
6	Data - Bit 4	Output (TTL-level)
7	Data - Bit 5	Output (TTL-level)
8	Data - Bit 6	Output (TTL-level)
9	Data - Bit 7	Output (TTL-level)
10	/ACK (Acknowledge)	Input (4.7 kΩ pull up)
11	BUSY	Input (4.7 kΩ pull up)
12	P.E.	Input (4.7 kΩ pull up)
13	SELECT	Input (4.7 kΩ pull up)
14	/AUTO FD	Output (open collector)
15	/ERROR	Input (4.7 kΩ pull up)
16	/INIT	Output (open collector)
17	/SELCET IN	Output (open collector)
18 : 25	GND	–

VGA

The VGA socket connector has the following pinout:

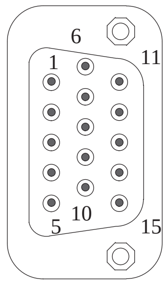


Figure 2-7 VGA Socket Connector

Pinout

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

Connecting an External Keyboard

You can connect an external PS/2 keyboard to the front of your IPC. Keyboards with integral trackballs can also be connected to the port on the side of the box.

A touchpad with a PS/2 port, the keyboard controller for the front panel and the display inverter can be supplied via the internal connector. In the BI10, pins 7-8, 9-10, 11-12, 13-14 are short-circuited via jumpers. Therefore, the BI10 also has a PS/2 port on the side of the box. Keyboards with integral trackballs can also be operated via this connector.

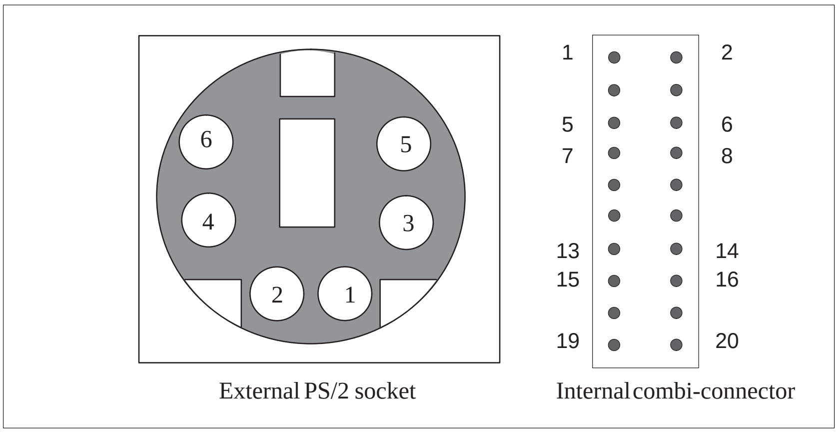


Figure 2-8 Connecting Cable for External Keyboard

intern

Pinout for External PS/2

Pin	Description	
	Front Plate	**Side Port**
1	Keyboard data line	Keyboard data line
2	open	Trackball data line
3	0 V	0 V
4	+5 V *)	+5 V *)
5	Keyboard clock line	Keyboard clock line
6	open	Trackball clock line

*) 1A current limit

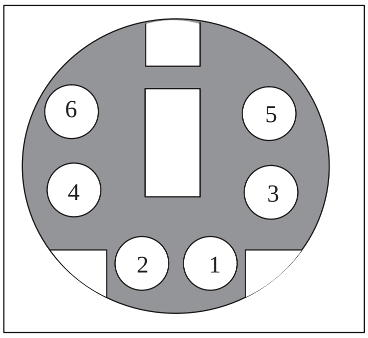
Combi-Connector Pinout

Pin	Description
1	0 V
2	Touchpad data line
3	0 V
4	Touchpad clock line
5	0 V
6	+5 V *)
7	Keyboard controller clock line
8	Keyboard clock line PS/2 socket on the side
9	+5 V * for keyboard controller
10	+5 V * for PS/2 socket on the side
11	0 V for keyboard controller
12	0 V for PS/2 socket on the side
13	Keyboard controller data
14	Keyboard data line for PS/2 socket on the side
15	P12V for display
16	0 V for display
17	STN OV brightness setting
18	Display on/off
19	TFT brightness setting (180 kΩ)
20	TFT brightness setting (180 kΩ)

* 1A current limit

Connecting PS/2 Mouse

You can connect an external PS/2 mouse to your IPC. This port can only be used instead of the internal touchpad port. In the FI15, you must disconnect the PS/2 connection at the touchpad if you want to use this port.



View of the socket connector

Figure 2-9 Connecting PS/2 Mouse

Pinout

Pin	Description
1	Mouse data line
2	Open
3	0 V
4*	+5 V
5	Mouse clock line
6	Open

* 1A current limit

MPI/DP Port

An external and an internal MPI/DP port are available on the mother board. Only one of these ports can be used.

The MPI/DP socket connector has the following pinout:

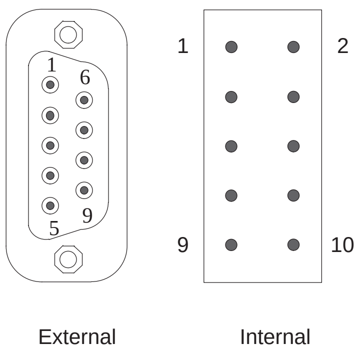


Figure 2-10 MPI/DP Socket Connector

Pinout

Pin No. External	Pin No. Intern.	Abbreviation	Description	Input/ Output
1	1	NC	Pin 1 is unassigned	–
2	2	NC	Pin 2 is unassigned	–
3	7	LTG_B	Data line B	Input/Out- put
4	9	RTSAS	RTSAS control signal for receive data current. Signal ’1’ is active when directly linked PLC transmits data.	Input
5	5 8	M5EXT	M5EXT Ground (GND) of 5 V supply. The current load of an external consumer connected between P5EXT and M5EXT must not exceed a maximum of 90 mA.	Output
6	4	P5 EXT	P5EXT supply (+5 V) of 5V supply. The current load of an external consumer connected between P5EXT and M5EXT must not ex- ceed a maximum of 90 mA.	Output
7	3	NC	Pin 7 is unassigned	–
8	6	LTG_A	Data line A	Input/Out- put
9	10	RTS_PG	RTS output signal. The signal is ’1’ when your IPC starts transmitting.	Output
Shield	–		On connector shell	

2.8 Hardware Addresses

How Memory Decoding Works

The memory address area of a Pentium CPU has a capacity of 4 Gbytes. Together with the 64 bit large CPU data bus the CPU is equipped with 29 address lines (A3...A31) and 8 bus enable lines (BE0...BE7) which encode the non-existent byte address lines A0, A1 and A2. The CPU address bus is mapped via the system controller (TSC) on the PCI address bus. Memory addresses from 0000 0000h to 0009 FFFFh (640 Kbytes) and from 0010 0000h to 07FF FFFFh (127 Mbytes) are not included.

The ISA bridge maps the ISA address bus exactly once on the PCI address bus via the PIIX (PCI ISA IDE Xcellerator) block. The ISA address bus for 8 bit modules covers the address area from A0 to A19 which corresponds to the CPU addresses from 0000 0000h to 000F FFFh (1 Mbyte). For 16 bit ISA modules, the address bus has been extended by the address lines A20...A23 and it therefore addresses from 0000 0000h to 00FF FFFFh (16 Mbytes).

Special memory read/write signals, which are only activated in case of a logic zero level of the address lines A20, A21, A22 and A23, draw the distinction between the 1 Mbyte and the 16 Mbytes ISA address area.
If the CPU references address areas which are occupied by the main memory, ISA bus control signals do not occur; that is, ISA bus modules within this memory area are not referenced. In the reverse case an ISA bus master cannot reach addresses higher than 16 Mbytes. Different decoding holes in the Pentium PG mother board are provided for Dualport RAM extensions in order to gain a larger address area than the memory address area with a maximum range from 640 kbytes to 1 Mbyte:

- The CPU address area from FFF8 0000h to FFFD FFFFh (512 k to 128 k BIOS = 384 Kbytes) is mapped in the ISA address area from 00F8 0000h to 00FD FFFFh and is always referenced in the CPU address area. Decoding of the address lines A24 to A 31 which do not exist on the ISA bus is fulfilled by special hardware located on the mother board.
- Within the 16th Mbyte, a 1Mbyte area of the memory address area can be allocated for the ISA bus. This option can be switched on and off in SETUP.

During the division of the address areas distinction is made between:

- Memory address area and
- 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 will give you an overview of the occupied address areas. Please refer to the description of the individual functional groups for more details.

I/O Address Assignments

The following table shows the I/O address assignments.

I/O Address (hex)		Size	Description	
From	To	Bytes	Basic Function	Additional Functions
0000	000F	16	82C558E —> DMA 1 Control register	
0010	001F	16	reserved	
0020	0021	2	82C558E —> Interrupt controller 1 control register	
0022		1	Integrated 82C206 and chipset configuration index register (SYSCFG)	
0023		1	82C558E —> Integrated 82C206 configuration data register	
0024		1	Chipset configuration data register (SYSCFG)	
0025	002D	9	reserved	
002E	002F	2	Configuration port Ultra I/O	
0030	003F	16	reserved	
0040	0042	3	82C558E —> Timer channel 0, 1, 2 (clock, refresh, speaker)	
0043		1	82C558E —> Timer control register	
0044	005F	28	reserved	
0060		1	Keyboard controller date	
0061		1	82C558E —> System control port B (timer, speaker control, NMI, parity)	
0063	0063	2	reserved	
0064		1	Keyboard controller CMD/STATUS	
0065	006F	11	reserved	
0070		1	NMI enable, RTC index	
0071		1	RTC date	
0072	0080	15	reserved	
0081	0083	3	82C558E —> DMA page register CH2, 3, 1	
0084	0086	3	reserved	
0087		1	82C558E —> DMA page register CH0	
0088		1	reserved	
0089	008B	3	82C558E —> DMA page register CH6, 7, 5	
008C	008E	3	reserved	
008F		1	82C558E —> DMA page register CH4	
0090	0091	2	reserved	
0092		1	82C558E —> System control port A (fast reset, fast A20)	
0093	009F	13	82C558E —> DMA page register Ch4	
00A0	00A1	2	82C558E —> Interrupt controller 2 Control register	
00A2	00BF	30	reserved	
00C0	00DF	32	82C558E —> DMA controller 2 Control register	
00E0	00E1	2	Configuration register for MPI, COM, VGA, Progas, trackball, etc	
00E2	00EF	14	reserved	
00F0	00F1	2	Arithmetic processor	
00F2	00F7	6	reserved	

IO Address (hex)		Size	Description	
From	**To**	**Bytes**	**Basic Function**	**Additional Functions**
00F8	00FF	8	Arithmetic processor	
0100	010F	16	**Not used**	
0110	016F	96	**Not used**	
0170	0177	8	**Not used**	
0178	01EF	120	**Not used**	
01F0	01F7	8	Primary on-board IDE channel	Free if switched off in SETUP
01F8	01FF	8	**Not used**	
0200	020F	16	Reserved for game port	Usually free
0210	0277	104	**Not used**	
0278	027B	4	Reserved for LPT 2	
027C	02E7	108	**Not used**	
02E8	02EF	8	Reserved for COM 4	
02F0	02F7	8	**Not used**	
02F8	02FF	8	COM2 (/IRDA)	Free if switched off in SETUP
0300	031F	32	Not used	
0320	032F	16	Reserved for SafeCard	Usually free
0330	033F	16	**Not used**	
0340	035F	32	Reserved for Higraph (CPU) host interface expansion card	SCSI adapter e.g. AHA1542C
0360	0367	8	Reserved for PC-E-S5 (H1 expansion card)	Usually free
0368	036F	8	**Not used**	
0370	0377	8	Reserved for floppy 2	Not used
0378	037F	8	LPT 1	Free if switched off in SETUP
0380	038F	16	**Not used**	
0390	0397	8	Reserved for CP1413 (H1 expansion card)	Usually free
0398	039F	8	**Not used**	
03A0	03AF	16	**Not used**	
03B0	03BB	12	SW monitor interface or EGA / VGA	
03BC	03BF	4	Reserved for LPT x	
03C0	03CF	16	VGA control register	
03D0	03DF	16	CGA / VGA control register	
03E0	03E1	2	PCMCIA controller	Free if switched off in SETUP
03E2	03E7	6	Not used	
03E8	03EF	8	Reserved for COM 3	
03F0	03F5	6	Onboard floppy	
03F6		1	Primary IDE command	
03F7		1	Primary IDE status / Floppy change	
03F8	03FF	8	COM 1	Free if switched off in SETUP
0400	040A	11	Not used	
040B		1	EISA DMA Extended Mode Register	
040C	04D5	202	Not used	
04D6		1	EISA DMA Extended Mode Register	
04D7	0777	673	**Not used**	
0778	077A	3	ECP LPT 1	
077B	0CF7	1405	**Not used**	
0CF8	0CFB	4	PCI config index (82C558E) PCIDV0,1	
0CFC	0CFF	4	PCI config data (82C558E) PCIDV0,1	
0D00	FEFF	61951	**Not used**	
FF00	FF0F	16	IDE bus master register	

Assignment of Memory Addresses

The following table shows the assignment of memory addresses:

From Address	To Address	Size	Description of Basic Function	Additional Functions
0000 0000	0007 FFFF	512k	Conventional system memory	
0008 0000	0009 FBFF	127k	Conventional system memory extended	
0009 FC00	0009 FFFF	1k	PS/2 mouse (BIOS) but only loaded as far as the mouse driver	
000A 0000	000A FFFF	64k	VGA graphics refresh memory	shared SMM for power management
000B 0000	000B 7FFF	32k	Monochrome graphics/text refresh memory	
000B 8000	000B FFFF	32k	VGA graphics/text refresh memory	
000C 0000	000C BFFF	48k	VGA-BIOS expansion	
000C C000	000C C7FF	2k	MPI	via EMM High Dos Memory
000C C800	000C FFFF	14k	**Not used** (device driver, e.g. PCMCIA driver)	via EMM High Dos Memory
000D 0000	000D 7FFF	32k	**Not used** (device driver, e.g. PCMCIA driver)	via EMM High Dos Memory
000D 8000	000D FFFF	32k	**Not used** (device driver, e.g. PCMCIA driver)	via EMM High Dos Memory
000E 0000	000E BFFF	48k	System BIOS	via EMM High Dos Memory
000E C000	000E CFFF	4k	System BIOS BootMessageLogo	via EMM High Dos Memory
000E D000	000E DFFF	4k	System BIOS ECSD (plug & play configurations area)	via EMM High Dos Memory
000E E000	000E FFFF	8k	Setup	via EMM High Dos Memory
000F 0000	000F FFFF	64k	System BIOS	
0010 0000	00EF FFFF	14M	Extended system memory	
00F0 0000	00FF FFFF	16M-15M =1M	Extended system memory	via Setup ISA Memory (Memory Hole or Memory Space Gap)
0100 0000	07FF FFFF	112M	Extended system memory	
0800 0000	FFF7 FFFF	4G-128M-512k	PCI address area or mirrored ISA address area	
FFF8 0000	FFFD FFFF	384k	Mirrored ISA address area	
FFFE 0000	FFFF FFFF	128k	System BIOS (mirrored from 000E 0000 to 000F FFFF)	

2.9 Interrupt and DMA Assignments

Interrupt Assignments

Interrupt	Description
NMI	Expansion slots signal IO Channel Check 2
IRQ 0	Internal Timer (system clock)
IRQ 1	Keyboard buffer full
IRQ 2	Cascading of Interrupt controller 2
IRQ 3	Serial port 2 (COM 2) can be enabled via Setup
IRQ 4	Serial port 1 (COM 1/TTY) can be enabled via Setup
IRQ 5	MPI port can be enabled via Setup
IRQ 6	Floppy
IRQ 7	Parallel Port 1 (Printer port LPT 1/EPP) can be enabled via Setup
IRQ 8	Battery backed-up real time clock
IRQ 9	VGA controller usually unassigned
IRQ 10	Unassigned
IRQ 11	Unassigned
IRQ 12	PS/2 mouse/ keyboard trackball can be enabled via Setup if no need for mouse or trackball function
IRQ 13	Arithmetic coprocessor
IRQ 14	primary IDE interface can be enabled via Setup
IRQ 15	Not used

DMA Assignments

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

2.10 Setup

Setup Settings

Press <F2> key if you want to enter SETUP while booting. The following table lists the settings:

Menu Item	Standard	Optional
Main		
System time		
System Date		
Diskette A	1.44 Mbytes, 31/2	1.2 Mbytes; 720 Kbytes; 360 Kbytes;
Diskette B	Not installed	1.2 Mbytes; 720 Kbytes; 360 Kbytes; 1.44 Mbytes;
IDE Adapter O Master	C: 1624 Mbytes	User, 1 - 14, RSRV, 16 - 39, Auto
IDE Adapter O Slave	None	User, 1 - 14, RSRV, 16 - 39, Auto
Video System	EGA/VGA	
Memory Cache		
Cache system BIOS area	Enabled	Disabled
Cache video BIOS area	Enabled	Disabled
Boot sequence		
Boot sequence	A: then C:	C: only, C: then A:
SETUP prompt	Enabled	Disabled
POST errors	Enabled	Disabled
Floppy check	Enabled	Disabled
Summary Screen	Enabled	Disabled
Numlock		
Numlock	Off	ON
Key click	Disabled	Enabled
Keyboard auto repeat time	30/s	2/s, 6/s, 10/s, 13,3/s, 18,5/s, 21,8/s, 26,7/s, 30/s
Keyboard auto repeat delay	1/2s	1/4s, 3/4s, 1s
Hardware Options		
Configure MPI address range	Adr-CC00	Adr-DC00, Disabled
PCMCIA Slot	Enabled	Disabled
Internal COM1	3F8, IRQ 4	Disabled
Internal COM2	2F8, IRQ 3	Disabled
Internal LPT1	378, IRQ 7	Disabled
LPT-Mode	Output Only	Bi-directional, EPP, ECP
CRT/LCD selection	SIMULTAN	LCD enabled / CRT enabled
CRT 640 x 480	75	72, 60
CRT 800 x 600	75	72, 60, 50
CRT 1024 x 768	72	Interlaced, 60, 70, 72
LCD Screensize	EXPANDED	Normal
Trackball / PS2 Mouse	External	Internal , Disabled

Menu Item	Standard	Optional
Advanced		
PCI devices		
PCI device slot#1		
Enable Master	Enabled	Disabled
Default Latency Timer	Yes	No
Latency Timer	0040	0 - 280H in steps of 8
PCI IRQ line 1	Auto select	5, 9, 10, 11, 12, 15 disabled
PCI IRQ line 2	Auto select	5, 9, 10, 11, 12, 15 disabled
PCI IRQ line 3	Auto select	5, 9, 10, 11, 12, 15 disabled
PCI IRQ line 4	Auto select	5, 9, 10, 11, 12, 15 disabled
Plug & Play O/S	No	Yes
Reset Configuration Data	No	Yes
Diskette controller	Enabled	Disabled
Local Bus IDE Adapter	Enabled	Disabled
VGA Interrupt	Disabled	Enabled
Memory gap at 15 Mbytes	Disabled	Enabled
Large Disk Access Mode	DOS	Other
Security		
Supervisor Password is	Disabled	
User Password is	Disabled	
Set Supervisor Password	Press Enter	Input
Set User Password		Only after supervisor password
Password on boot	Disabled	Enabled
Diskette Access	Supervisor	User
Fixed disk boot sector	Normal	Write protected
Power		
APM	Enabled	Disabled
Power Savings	Disabled	Customize, Maximum Powersaving, Maximum Performance
Power Saving with customize		
Standby Timeout	Disabled	1, 2, 4, 6, 8, 12, 16 Minutes, Disabled
Suspend Timeout	Disabled	5, 10, 15, 20, 40, 60 Minutes, Disabled
Fixed Disk Timeout	Disabled	1, 2, 3, 4, 5, 10, 15 min
LCD/CRT Standby Mode	Always on	Suspend off, Always on
Additional Powersaving Options		
Resume on Modem Ring	Disabled	Enabled
Exit		
Save Changes & Exit		
Exit Without Saving Changes		
Get Default Values		
Load Previous Values		
Save Changes		

Display After Switching ON

Once your PC has been switched on, the following standard settings appears on the screen:

```
PhoenixBIOS NoteBIOS 4.0 - G705-A901-X, Copyright 1985-1995
Phoenix Technologies Ltd., All Rights Reserved.

SIMATIC PC BI/FI

CPU 133 MHz
0000640K System RAM Passed
0007360K Extended RAM Passed
System BIOS shadowed
Video BIOS shadowed
UMB upper limit segment address: F2xx

Press <F2> to enter SETUP
```

Change to BIOS Setup

If you press <F2> while the BIOS prompt is on the screen, the Setup program in the ROM BIOS is started. This program helps you to set system characteristics and the hardware configuration of your PC.

Preset values have already been determined before the PC is delivered. You can alter these default values in the BIOS Setup. After having stored the current settings and after exiting the BIOS Setup your alterations become valid.

Once you have started up BIOS Setup, the main Setup menu appears on your screen:

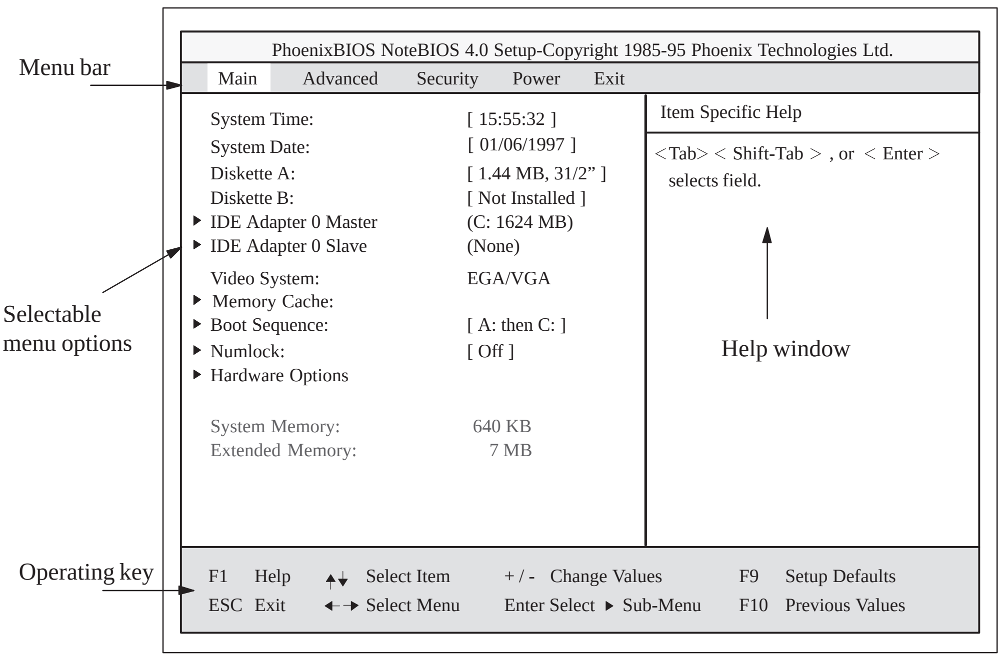


Figure 2-11 SETUP Main Menu

Menu Structure

The screen form is divided into 4 parts. In the upper part the menu bar offers the selection of the menu titles [Main] [Advanced] [Security] [Power] [Exit]. In the middle part, on the left side, you can select different settings or submenus. The right side offers short help texts referring to the currently selected menu command. The lower part indicates operating keys.

You can jump from one menu to another using the left or right arrow key: [←] or [→].

Menu	Description
Main	Set system characteristics
Advanced	Define expanded system configuration
Security	Define access rights; for example, password
Power	Define power management functions
Exit	Save settings and exit SETUP

2.10.1 Main Menu

Overview

The main menu has the following structure:

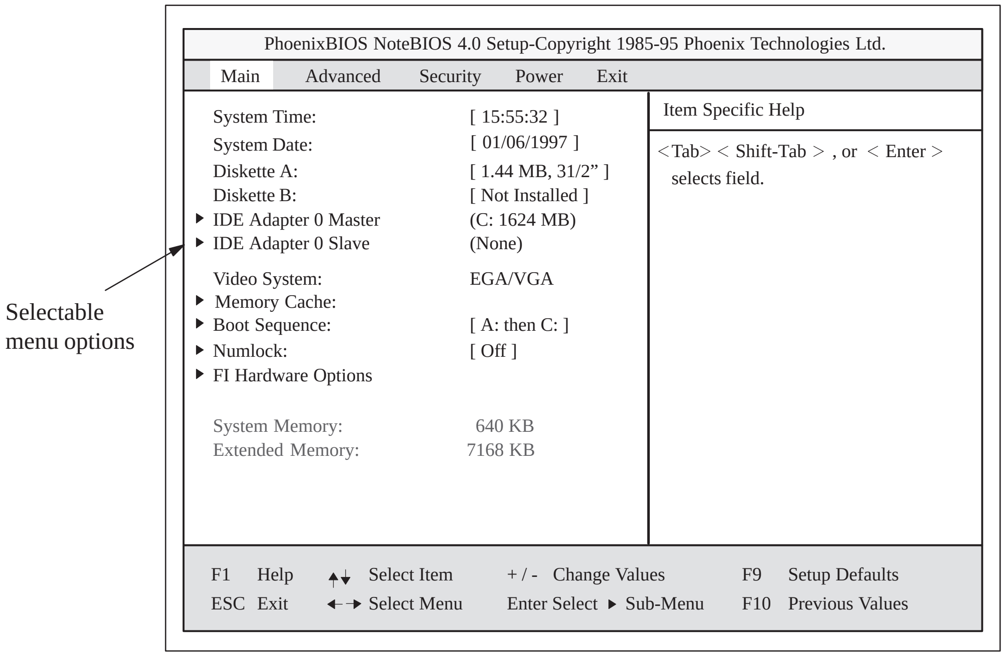


Figure 2-12 SETUP Main Menu

Settings in the Main Menu

Use the arrow keys [↑] and [↓] to select one of the following menu options in the **main** menu:

Menu option	Description
System Time	Sets or displays the current time
System Date	Sets or displays the current date
Diskette A	Sets type of installed floppy disk drive
Diskette B	Sets type of second drive, disabled
Video system	Displays video system settings
Submenus	
IDE Adapter	Sets type of installed hard disk drives
Memory cache/ shadow	Sets memory options
Boot sequence/ Numlock	Sets boot options
Hardware Options	Sets BI/FI special characteristics

System Time and System Date
(Time and Date)

System Time and System Date show the current time and day. After having selected the corresponding menu option you can set the System Time with the [+] and [-] keys starting with

`hour: Minute: seconds` and the system date in the order

`month/day/year`.

Use the tabulator key to jump from one setting to another (for example, from hour to minute, etc.) within the menu option Time or Date.

Diskette A / Diskette B
Floppy Disk Drive

This menu option helps you to set the installed type of floppy disk drive. The following settings are possible:

[Not installed]	Only if disk drive has not been installed. (Standard setting for floppy disk 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 floppy disk drive A

IDE Adapter
Hard Disk Drive

After having selected one of the menu options described, the following submenu appears:

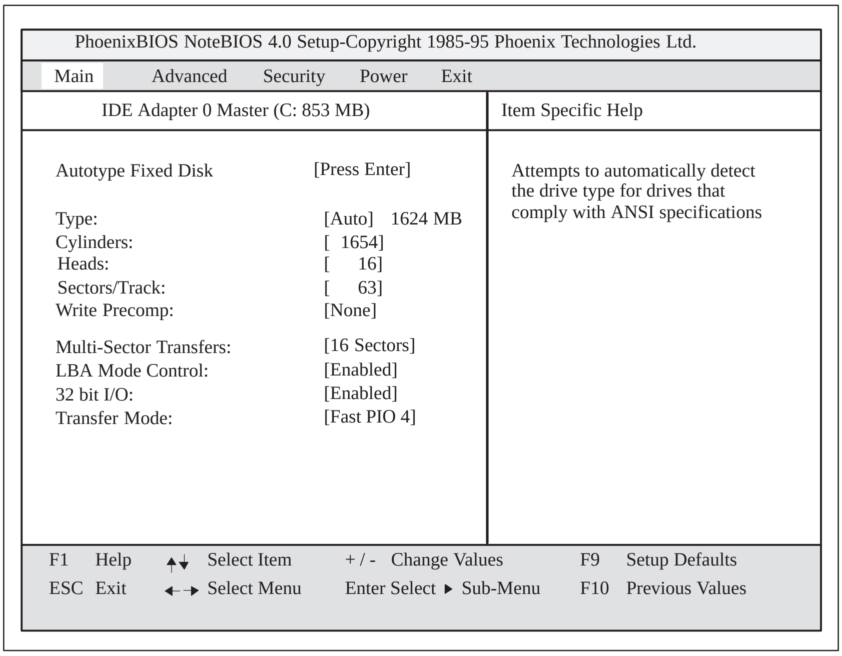


Figure 2-13 “Hard Disk Drive IDE Adapter” Submenu

The system parameters you can select under this submenu are usually stored on the corresponding IDE drive and are read out of the IDE drive and written in the screen form after you have selected the option Autotype Hard Disk. **CD-ROM drives with IDE interface (ATAPI) are not entered in this option.**

Autotype Hard Disk

If the option Autotype Hard Disk has been selected for a non-existent hard disk, abortion occurs after max. 5 minutes because of time-out. The current settings remain unchanged. It is therefore useful to execute an Autotype only for existing system hard disks.

Only one hard disk drive connected to IDE adapter 0 is set as master.

In some cases it might be necessary to deviate from the suggested hard disk parameters. Select the corresponding menu option for this purpose and choose the desired value using the keys [+] and [-]. Enter [none] as Type if an IDE hard disk or an IDE CD-ROM has not been installed. Enter a number from 1 to 39 to use a predefined hard disk type.

For user-defined hard disk types enter “user” and set the parameters for the options Cylinders, Heads, Sectors/Track, Write-Precomp.

Multi-Sector Transfer Field

The option Multi-Sector Transfers defines the number of sectors transferred per interrupt. This value depends on the drive and should only be set using the Autotype function.

```
Disabled         1 sector
2, 4, 6, 8, 16   sectors
```

LBA Mode Control Field

A hard disk capacity higher than 528 Mbytes is supported with the setting “enabled” under menu option LBA Mode control (which can be enabled or disabled). This value depends on the drive and should only be set using the Autotype function.

In the 32 Bit-IO Field

Define the access mode for the drive under menu option 32-bit IO.

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

Transfer Mode Field

Set the transfer speed to the IDE drive under menu option Transfer Mode. This value depends on the drive and should only be set using the Autotype function.

The following settings are available:

Standard, fast PIOI, fast PIO2, fast PIO3, fast PIO4.

A higher fast PIO mode must not be set than that which the Autotype function uses.

We recommend you use the Autotype function.

Depending on the operating system used; for example, SCO OOT3.0, SORIX etc., it might be necessary to disable the “LBA Mode” in some cases. Press <ESC> to exit the submenu.

Memory Cache Field

If you call up the menu option Memory Cache, the following submenu appears:

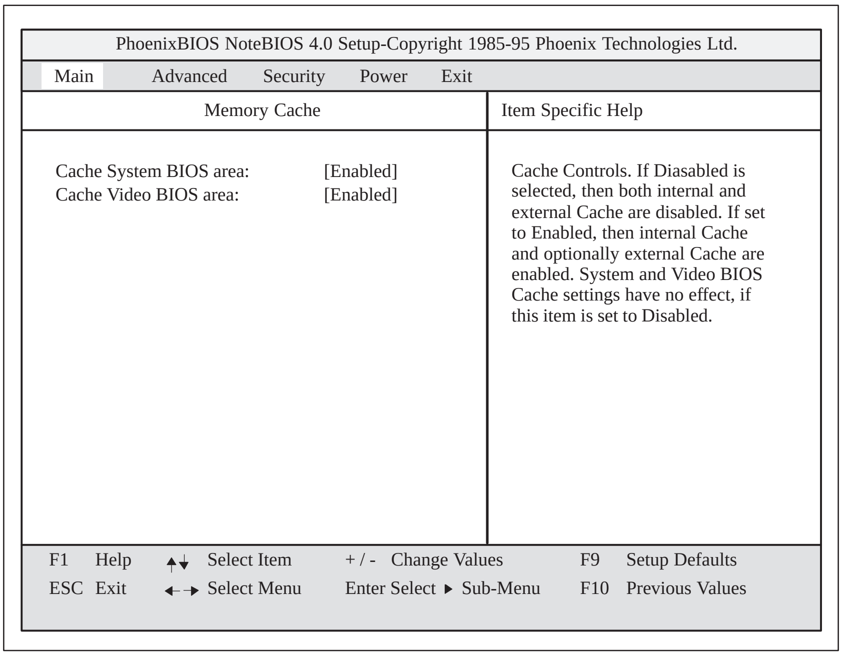


Figure 2-14 “Memory Cache” Submenu

The cache memory is a fast intermediate memory located between CPU and main memory (dRAM). If the feature has been enabled, repeated memory access is not performed in the main memory but in the faster cache memory. Some hardware or software might require to disable your cache memory because the necessary program execution or waiting times become too short using the fast cache memory.

Boot Sequence Field

When you call up the menu option Boot Sequence in the main menu, the following submenu appears:

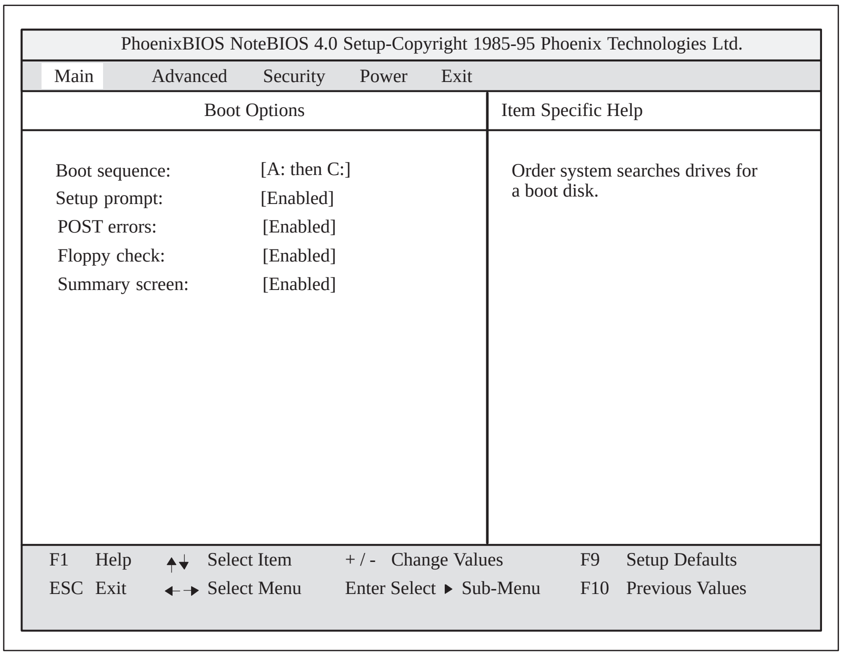


Figure 2-15 “Boot Options” Submenu

Boot sequence	This specifies in which sequence the devices for the system start (boot attempt) should be called. A: then C: first boot Floppy A: then Drive C: C: then A: first boot Drive C: then Floppy A: C: only: only boot Drive C:
SETUP prompt	A SETUP prompt appears at the bottom of the screen during system startup.
POST errors	If an error is detected during the system startup period, startup is canceled.
Floppy check	The floppy head is moved some steppings back and then forth again during the startup period. This test is required to reinitialize the drive.
Summary screen	After the startup period the most important system parameters are displayed on the screen.

The entry “enabled” releases the corresponding feature, “disabled” blocks it.

Example of a Summary Screen:

PhoenixBIOS NoteBIOS 4.0 Copyright 1985-95 Phoenix Technologies Ltd.

CPU [100MHz]:	Pentium	System ROM:	F28C - FFFF
Coprocessor:	Installed	BIOS Date:	01/06/97
System RAM:	640 KB	COM Ports:	03F8, 02F8
Extended RAM:	15360 KB	LPT Ports:	0378
Shadow RAM:	384 KB	Display Type:	EGA / VGA
Cache RAM:	None	PS/2 Mouse:	Installed
Hard Disk 0:	1624 MB	Diskette A:	1.44 MB, 31/2 ”
Hard Disk 1:	None	Diskette B:	None

Numlock Field

When you call up the menu option Numlock in the main menu, the following submenu appears:

PhoenixBIOS NoteBIOS 4.0 Copyright 1985-95 Phoenix Technologies Ltd.

Main Advanced Security Power Exit

Keyboard Features		Item Specific Help
Numlock:	[Off]	Selects Power-on state for Numlock
Key Click:	[Disabled]	
Keyboard auto-repeat rate:	[30/sec]	
Keyboard auto-repeat delay:	[1/2 sec]	

F1 Help	↑↓ Select Item	+ / - Change Values	F9 Setup Defaults
ESC Exit	←→ Select Menu	Enter Select ▸ Sub-Menu	F10 Previous Values

Figure 2-16 “Keyboard Features” Submenu

Numlock	Numlock is switched on/off after PowerOn
Key click	Pressing a key can be perceived by a “click”
Keyboard auto-repeat rate	Increase of the automatic-repeat rate of the keyboard
Keyboard auto-repeat delay	On-delay of the automatic-repeat feature

Hardware Options Field

When you call up the menu option Hardware Options in the main menu, the following submenu appears:

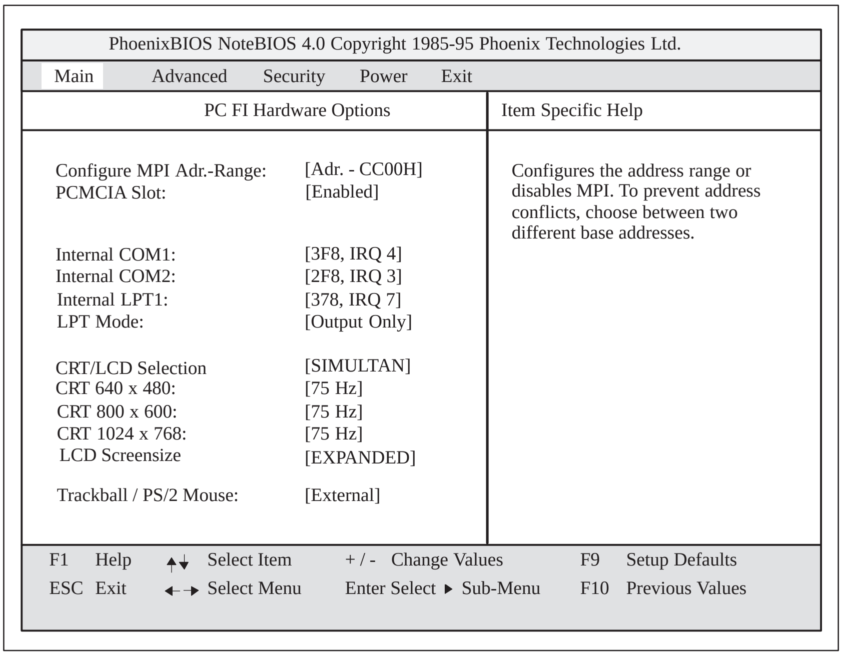


Figure 2-17 “PC FI Hardware Options” Submenu

In this submenu you assign parameters to the ports located on the mother board.

Configure MPI Addr. Range	Address area of the MPI which is referenced. “0CC00H” “0DC00H” are memory addresses. MPI covers an address area of 2 Kbytes. “Disabled” releases the address area.
PCMCIA Slot:	Here, the resources for the PCMCIA slot are enabled. The I/O area from 3EOH to 3E1H is assigned. “Disabled” releases the address area. Note: PCMCIA cards require additional card-specific system resources.
Internal COM1	Enables or disables the COM1/TTY port
Internal COM2	Enables or disables the COM2 port
Internal LPT1	Enables or disables the printer port
LPT Mode	If the LPT1 port has been enabled you can set the operating mode using this option Output Only — standard operating mode Bi-directional — printer port can also be used as, input port EPP — EPP support

CRT/LCD Selection	Monitor selection SIMULTAN LCD and external monitor enabled LCD enabled only LCD enabled CRT enabled only external monitor enabled
CRT 640 x 480	Refresh rate with a resolution of 640 x 480 dots*
CRT 800 x 600	Refresh rate with a resolution of 800 x 600 dots*
CRT 1024 x 768	Refresh rate with a resolution of 1024 x 768 dots*
LCD Screensize	EXPANDED: With a TFT display, the 640x480 pixel resolution is expanded to fill the screen. Normal: With a TFT, 640 x 480 pixels are displayed; that is, a smaller picture
Trackball / PS/2 Mouse	Internal PS/2 port is enabled. IRQ 12 is occupied. A keyboard with integrated trackball can be connected in this mode Disabled PS/2 port is disabled. IRQ12 is available External PS/2 port is enabled IRQ 12 is occupied. The keyboard trackball is blocked.

* only valid for external monitor

2.10.2 Advanced Menu

Menu Structure

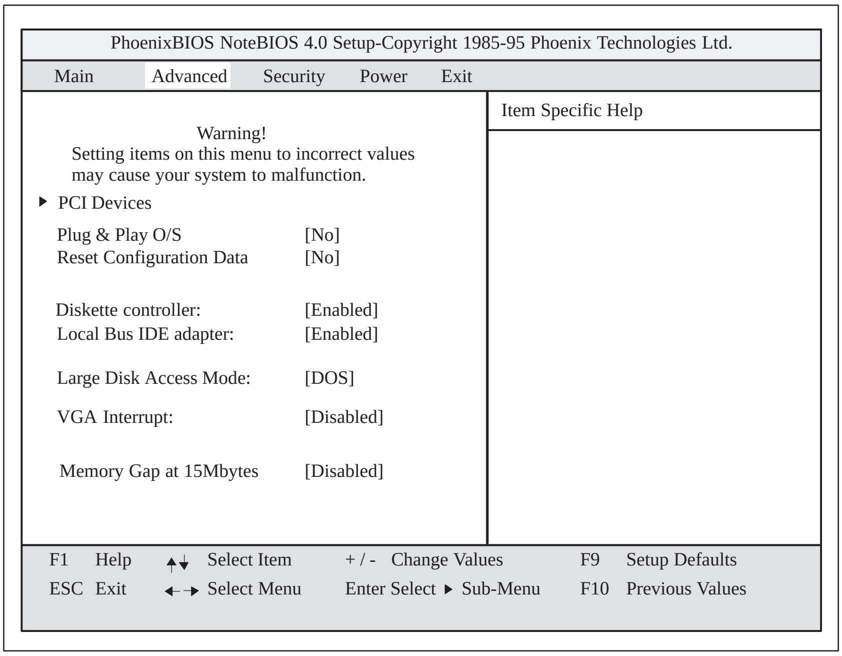


Figure 2-18 “Advanced” Menu

Settings

Plug & Play O/S	Plug & Play signifies that built-in modules are automatically recognized and installed if they support Plug & Play features. [No] BIOS provides all Plug & Play features. [Yes] The operating system provides a part of the Plug & Play features.
Reset Configuration Data	[Yes] signifies that any previous installation of Plug & Play is canceled. The configuration is reinitiated after the next system startup. The entry is then reset to [No]. System components that do not support Plug & Play have to be defined manually. [No] After the next system startup, system components with Plug & Play features are initialized.
Diskette Controller	Enables or disables the Floppy controller of the mother board.
Local Bus IDE Adapter	[Enabled] One IDE interface for a maximum of two drives [Disabled] No local IDE interface
Large Disk Access Mode	[DOS] The drive tables are configured according to Enhanced IDE compatible DOS drive access. [OTHER] The tables are not adapted.
VGA Interrupt:	[Enabled] IRQ 9 is reserved for the VGA card. [Disabled] IRQ 9 is reserved for other devices.

Memory Gap at 15 Mbytes	[Disabled]	The complete “on-board RAM” is available.
	[Enabled]	A 1 Mbyte area of the main memory address space starting at 15 Mbytes (address F0 0000 - FF FFFF) can be allocated to additional ISA modules.

PCI Devices Field

When the “PCI devices” field is selected in the Advanced menu, the following submenu is displayed:

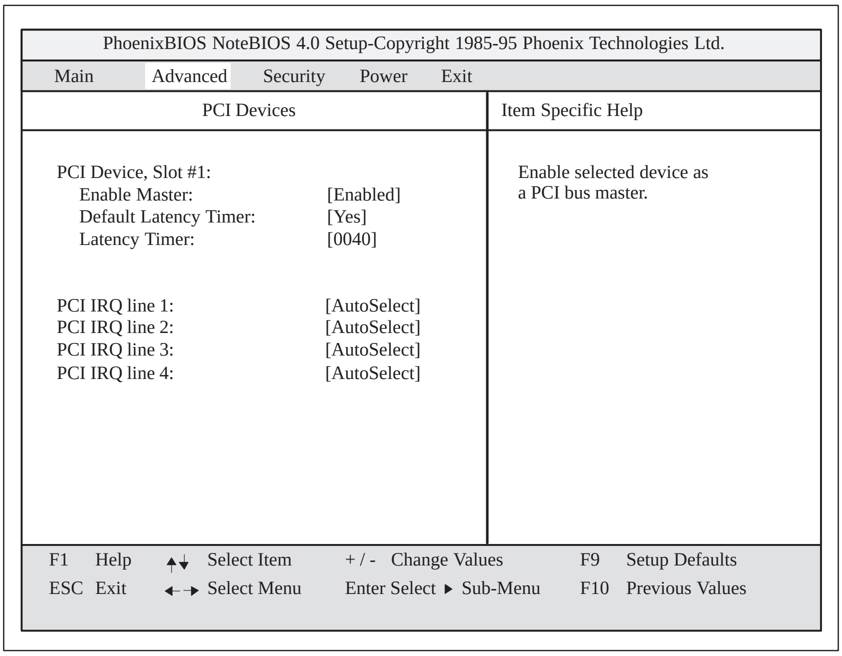


Figure 2-19 “PCI Devices” Submenu

PCI Device, Slot#1		
Enable Master:	[Enable]	PCI Master mode is permitted for this slot.
	[Disable]	Master mode is not permitted for this slot.
Default Latency Timer	[Yes]	PCI master module determines the number of active PCI clock cycles.
	[No]	The set Latency Timer value specifies the number of active PCI clock cycles.
Latency Timer	[0040]	Number of active PCI clock cycles
PCI IRQ Line 1, 2, 3, 4	[AutoSelect]	Plug&Play specifies the interrupt used.
	[5, 9, 10, 11, 12, 15]	The respective PCI interrupt line is permanently assigned to the ISA interrupt [5, 9, 10, 11, 12, 15]
	[Disabled]	Interrupts [5, 9, 10, 11, 12, 15] are used by the ISA bus.

2.10.3 Security Menu

Overview

Only system parameters in brackets can be edited. In order to prevent unauthorized use of your PC, you can define two passwords. The supervisor's password prevents the use of the floppy disk drive by any other user.

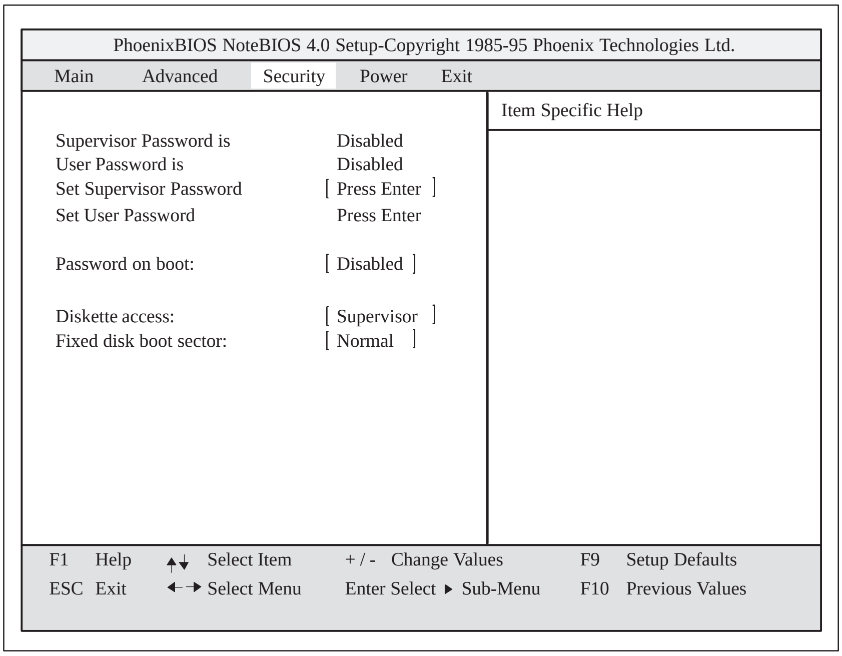


Figure 2-20 "Security" Submenu

2.10.4 Power Menu

Overview

This menu has the following structure:

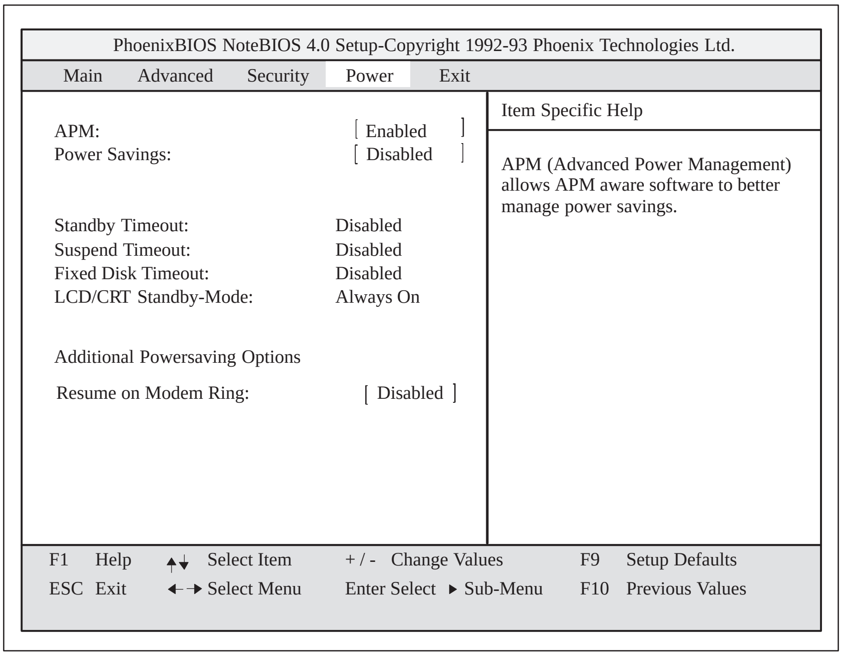


Figure 2-21 “Power” Submenu

The power management menu of your “green PC” offers you a range of power saving modes:

APM	[Enabled]	The operating system can switch off any superfluous system resources.
	[Disabled]	Disables the APM (Advanced Power Management) access of the operating system.
Power Savings	[Disabled]	No power-saving functions
	[MaximumPerformance],[MaximumPowersaving],[Customize]	Preset power-saving functions for maximum and minimum powersaving features. The parameters for Standby Timeout/Suspend Timeout, Fixed Disk Timeout and LCD/CRT Mode are set correspondingly. User-defined parameters are set with Customize.
Standby Timeout	[Disabled]	No standby mode.
	[1, 2, 4, 6, 8, 12, 16]	Minutes after which your PC goes into standby mode if the mouse is not moved, or if you do not make any keyboard entries.
Suspend Timeout	[Disabled]	No suspend mode.
	[5, 10, 15, 20, 30, 40, 60]	Minutes after which your PC goes into suspend mode.

When the system goes into suspend mode the CPU is deactivated and can only be restarted by an interrupt; for example, keyboard, mouse, COM1/2, hard disk.

Fixed Disk Timeout	[Disabled]	Hard disk runs continuously.
	[1min][2min] [3min][4min] [6min][8min] [10min][15min]	Minutes causing the hard disk drive to switch-off if there are no disk read/write operations. If any access to the hard disk is made after it has been switched off, an access delay occurs during which the hard disk is rebooted.
LCD/CRT Standby Mode	[Always On]	Monitor or display always remains in operation.
	[Suspend Off]	Signifies that the synchronous signals to the VGA interface are shut off in standby mode. The connected monitor also enters standby mode.
	[Standby Off]	Signifies that the synchronous signals to the VGA interface are shut off in standby mode. The connected monitor also enters standby mode.

Resume on Modem Ring	[Disabled]	If this function is enabled, the PC can be called out of the suspend mode by the “RING” signal of a modem. The corresponding hardware and software are required.
	[Enabled]	Monitor or display always remains in operation.

2.10.5 Exit Menu

Overview

Always exit the setup program via the following submenu.

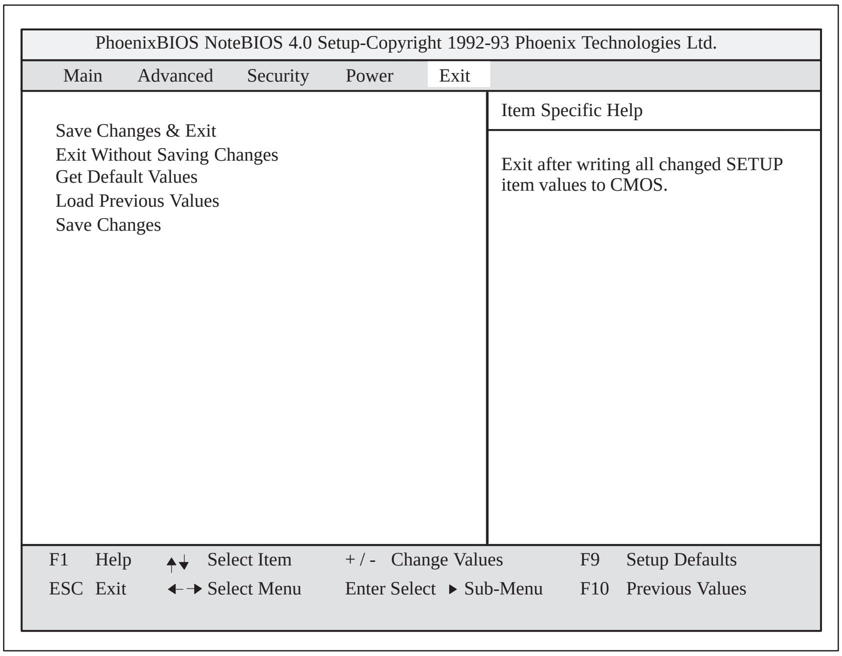


Figure 2-22 “Exit” Submenu

Save Changes & Exit	All modifications are saved, and a system restart with the current parameters is performed.
Exit Without Saving Changes	All modifications are abandoned and a system restart with the preset parameters is performed.
Get Default Values	All parameters are saved as default settings. The hard disk has to be set explicitly.
Load Previous Values	Previously saved parameters are restored.
Save Changes	All Setup entries are stored in the intermediate memory.

Documenting your System Configuration

If you have made any modifications to your standard SETUP settings, you can enter them in the following table. Thus, you gain ready access to the values you have set, in case you want to make any hardware modifications at a later moment.

System Parameter	Standard Settings	Your Entries
Main		
System time		
System Date		
Diskette A	1.44 Mbytes, 31/2	
Diskette B	Not installed	
IDE Adapter O Master	C: 1624 Mbytes	
IDE Adapter O Slave	None	
Video System	EGA/VGA	
Memory Cache		
Cache system BIOS area	Enabled	
Cache video BIOS area	Enabled	
Boot sequence		
Boot sequence	A: then C:	
SETUP prompt	Enabled	
POST errors	Enabled	
Floppy check	Enabled	
Summary Screen	Enabled	
Numlock		
Numlock	Off	
Key click	Disabled	
Keyboard auto repeat time	30/s	
Keyboard auto repeat delay	1/2s	
Hardware Options		
Configure MPI address range	Adr-CC00	
PCMCIA Slot	Enabled	
Internal COM1	3F8, IRQ 4	
Internal COM2	2F8, IRQ 3	
Internal LPT1	378, IRQ 7	
LPT-Mode	Output Only	
CRT/LCD selection	SIMULTAN	
CRT 640 x 480	75	
CRT 800 x 600	75	
CRT 1024 x 768	72	
LCD Screensize	EXPANDED	
Trackball / PS2 Mouse	External	

System Parameter	Standard Settings	Your Entries
Advanced		
PCI-Devices		
PCI device Slot#1		
Enable Master	Enabled	
Default Latency Timer	Yes	
Latency Timer	0040	
PCI IRQ line 1	Auto select	
PCI IRQ line 2	Auto select	
PCI IRQ line 3	Auto select	
PCI IRQ line 4	Auto select	
Plug & Play O/S	No	
Reset Configuration Data	No	
Diskette controller	Enabled	
Local Bus IDE Adapter	Enabled	
VGA Interrupt	Disabled	
Memory gap at 15 Mbytes	Disabled	
Large Disk Access Mode	DOS	
Security		
Supervisor Password is	Disabled	
User Password is	Disabled	
Set Supervisor Password	Press Enter	
Set User Password		
Password on boot	Disabled	
Diskette Acces	Supervisor	
Fixed disk boot sector	Normal	
Power		
APM	Enabled	
Power Savings	Disabled	
Power Saving with customize		
Standby Timeout	Disabled	
Suspend Timeout	Disabled	
Fixed Disk Timeout	Disabled	
LCD/CRT Standby Mode	Always On	
Additional Powersaving Options		
Resume on Modem Ring	Disabled	
Exit		
Save Changes & Exit		
Exit Without Saving Changes		
Get Default Values		
Load Previous Values		
Save Changes		

2.11 Configuring the PCMCIA Interface

You can order the following software required for operating PCMCIA cards under MS-DOS from your SIEMENS representative.

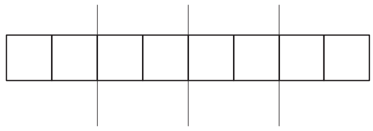
- Socket services
- Card services
- Client services
- Flash file system

You can operate the PCMCIA interface under WINDOWS 95.

2.12 Diagnostic Messages (Port 80)

In order of occurrence.

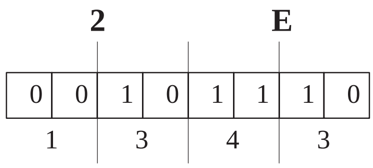
Any errors are also output as sound sequences up to the test for the video controller (codes 01 to 4A). The tone generation mode is structured as follows:



Division of the bytes into 2-bit combinations

Output of this combination as a sound sequence, that is
0 → one tone
1 → two tones
2 → three tones
3 → four tones
There is a brief pause as a separation

Example:



Error during the RAM basic test

Sequence of tones

Display (hex)	Signification	Description
02	TP_VERFY_REAL	Test whether CPU is in the real mode
04	TP_GET_CPU_TYPE	Determine the CPU type
06	TP_HW_INIT	Initialize the main hardware (DMA, IRQ)
18	TP_TIMER_INIT	Initialize the timer
08	TP_CS_INIT	Initialize the chip set
0C	TP_CACHE_INIT	Initialize the cache
16	TP_CHECKSUM	EPROM checksum test
28	TP_SIZE_RAM	Determine RAM size
3A	TP_CACHE_AUTO	Determine 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
09	TP_SET_IN_POST	Start Power on self-test
0A	TP_CPU_INIT	Initialize CPU
0B	TP_CPU_CACHE_ON	Switch on cache
0F	TP_FDISK_INIT	Initialize hard disk
14	TP_8742_INIT	Initialize 8742 circuit
1A	TP_DMA_INIT	Initialize DMA circuit
1C	TP_RESET_PIC	Reset interrupt controller
22	TP_8742_TEST	Test circuit 8742
32	TP_COMPUTE_SPEED	Determine clock pulse speed

Display (hex)	Signification	Description
34	TP_CMOS_TEST	Test CMOS RAM
C1	TP_740_INIT	Initialize PG 740 I/O
3C	TP_ADV_CS_CONFIG	Configure the advanced chip set
42	TP_VECTOR_INIT	Initialize interrupt vectors
46	TP_COPYRIGHT	Test copyright
47	TP_PCI_OP_INIT	Initialize PCI interface
49	TP_PCI_INIT	Initialize PCII interface
48	TP_CONFIG	Check configuration
4A	TP_VIDEO	Initialize video interface
4C	TP_VID_SHADOW	Copy video BIOS into RAM
52	TP_KB_TEST	Keyboard available?
54	TP_KEY_CLICK	Switch on/off the keyboard click
76	TP_KEYBOARD	Check keyboard
58	TP_HOT_INT	Test for unexpected interrupts
4B	TP_QUIETBOOT_START	Switch off any boot messages
4E	TP_CR_DISPLAY	Display copyright notice
50	TP_CPU_DISPLAY	Display CPU type
5A	TP_DISPLAY_F2	Display the F2 message for “SETUP”
5B	TP_CPU_CACHE_OFF	Switch off cache (SETUP settings) if necessary
5C	TP_MEMORY_TEST	Test system memory
60	TP_EXT_MEMORY	Test extended system memory
62	TP_EXT_ADDR	Test A20 address line
66	TP_CACHE_ADVNCD	Determine and enable cache size
68	TP_CACHE_CONFIG	Configure and test cache
6A	TP_DISP_CACHE	Display cache configuration
6C	TP_DISP_SHADOWS	Display configuration and size of the shadow RAM
72	TP_TEST_CONFIG	Check SETUP irregularities
74	TP_RTC_TEST	Test REAL TIME Clock
7C	TP_HW_INTS	Set IRQ vectors
7E	TP_COPROC	Check whether the coprocessor is present or not
94	TP_DISABLE_A20	Disable A20 line
80	TP_IO_BEFORE	Disable IO circuit
85	TP_PCI_PCC	Determine PCI circuit
82	TP_RS232	Determine serial ports
84	TP_LPT	Determine parallel ports
86	TO_IO_AFTER	Re-enable IO circuit
88	TP_BIOS_INIT	Initialize BIOS data area
8C	TP_FLOPPY	Initialize floppy controller
90	TP_FDISK	Initialize hard disk controller
8A	TP_INIT_EXT_BDA	Initialize external BIOS data area
8B	TP_MOUSE	Test internal mouse port
98	TP_ROM_SCAN	Search for BIOS expansions

Display (hex)	Signification	Description
69	TP_PM_SETUP	Initialize power management
9E	TP_IRQS	Enable the hardware IRQ
A0	TP_TIME_OF_DAY	Set clock time and date
A2	TP_KEYLOCK_TEST	Preset keylock
A8	TP_ERASE_F2	Delete F2 message
AA	TP_SCAN_FOR_F2	Check whether to activate setup or not
AC	TP_SETUP_CHECK	Output any F1 / F2 message
AE	TP_CLEAR_BOOT	Cancel self test flag
B0	TP_ERROR_CHECK	Check for any possible errors
B2	TP_POST DONE	End of self test
B6	TP_PASSWORD	Password query (option)
BC	TP_PARITY	Cancel parity memory
BA	TP_DMI	
BD	TP_BOOT_MENU	Display boot menu (option)
BE	TP_CLEAR_SCREEN	Clear screen
C0	TP_INIT19	Boot via interrupt 19

Keyboard Controller (FI15)

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 3.6.

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. 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.

EXTENDPRELL param [; TEXT]

Duration of additional debounce time in 1/60 of a second. Value range from param: 00 to 3F. 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. 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	param2	param3	param4	[param5 param6]	[<param7>]	[; TEXT]
	Matrix no.	AT code1	Attribute1	IO attribute	[AT code2 attribute 2]	[<DK code>]	

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. 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.

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). 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	Pressing a key sets digital input, state remains when key is released
Off	00	Pressing a key resets digital input, state remains when key is released
Touch	C0	Pressing a key sets digital input, releasing the key resets digital input
Toggle	80	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	Pressing a key sets **all** digital inputs, state remains when key is released
All off	60	Pressing a key resets **all** digital inputs, state remains when key is released
All touch	E0	Pressing a key sets **all** digital inputs, releasing the key resets **all** digital inputs
All toggle	A0	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).

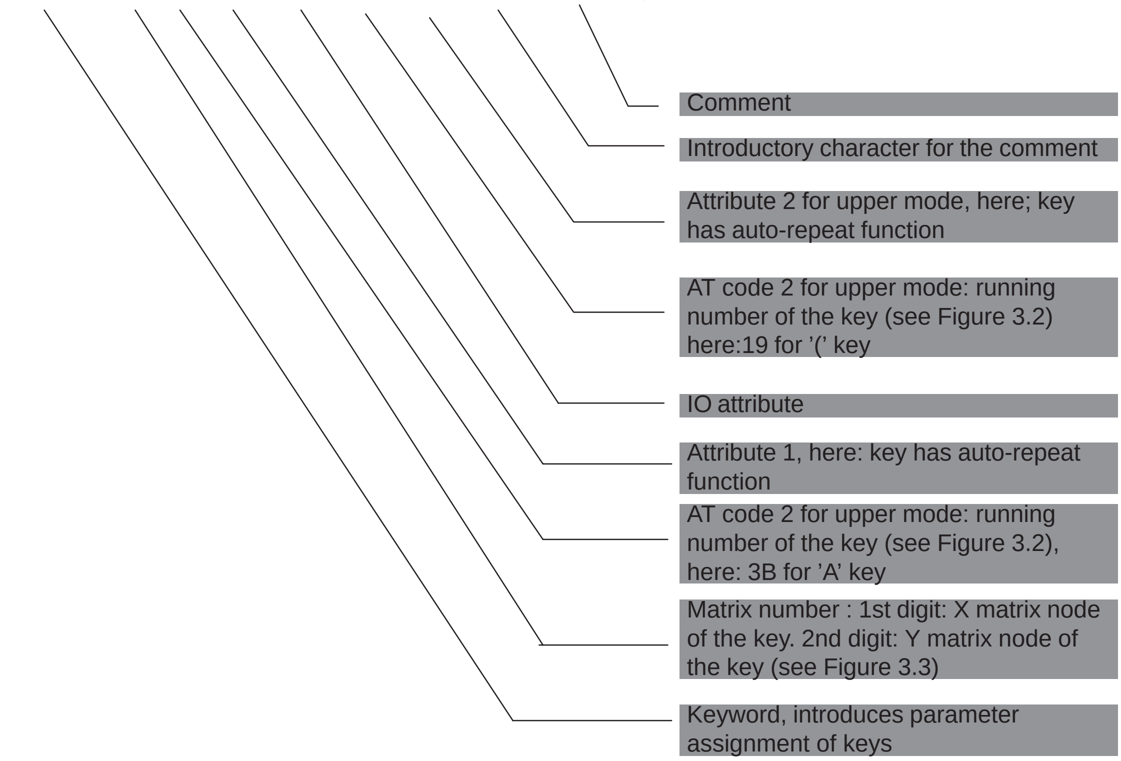
Examples for Configuring a Key

Example 1 (FI15, 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

```
KEY    14  3B  80  3F  19   81   ;   KEY A, (
```



Example 2: (FI15, Shift key):

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

Parameter Assignment

KEY 1B FF 00 7F ; KEY for upper mode alpha character/ special character

Comment

Introductory character for the comment

IO attribute, here: key shifts to 2nd level

Attribute 1

AT code 2 for upper mode: do not send key code

Matrix number : 1st digit: X matrix node of the key, 2nd digit: Y matrix node of the key (see Figure 3.3)

Keyword, introduces parameter assignment of key

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

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

Parameter Assignment

KEY 64 0A 01 3F ; KEY F10

Comment

Introductory character for the comment

IO attribute

Attribute 1, here: send <SHIFT > before the key

AT code 1: running number of the key (see Figure 3.2) here 0A for 'F10' key

Matrix number : 1st digit: X matrix node of the key, 2nd digit: Y matrix node of the key (see Figure 3.3)

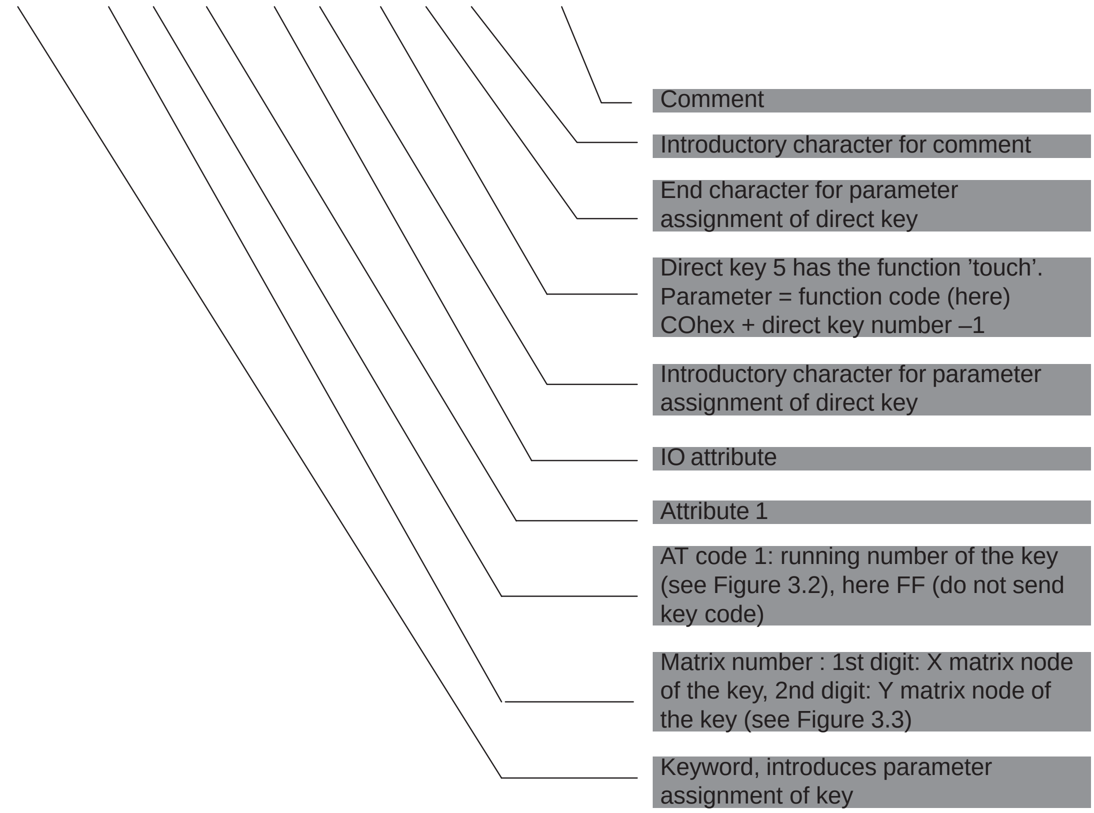
Keyword, introduces parameter assignment of key

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

KEY 2A FF 00 3F < C4 > ; KEY S1



3.3 Connector Assignment of Keyboard Controller

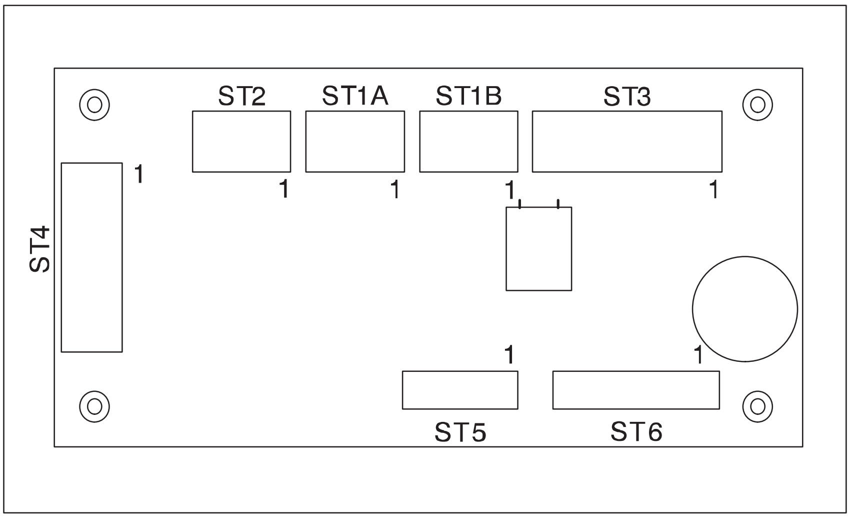
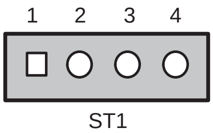


Figure 3-1 Location of the Plug Connectors on the Controller Board

Connector for External Keyboard

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

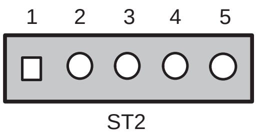
4-pin plug connector: ST1A/ST1B



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

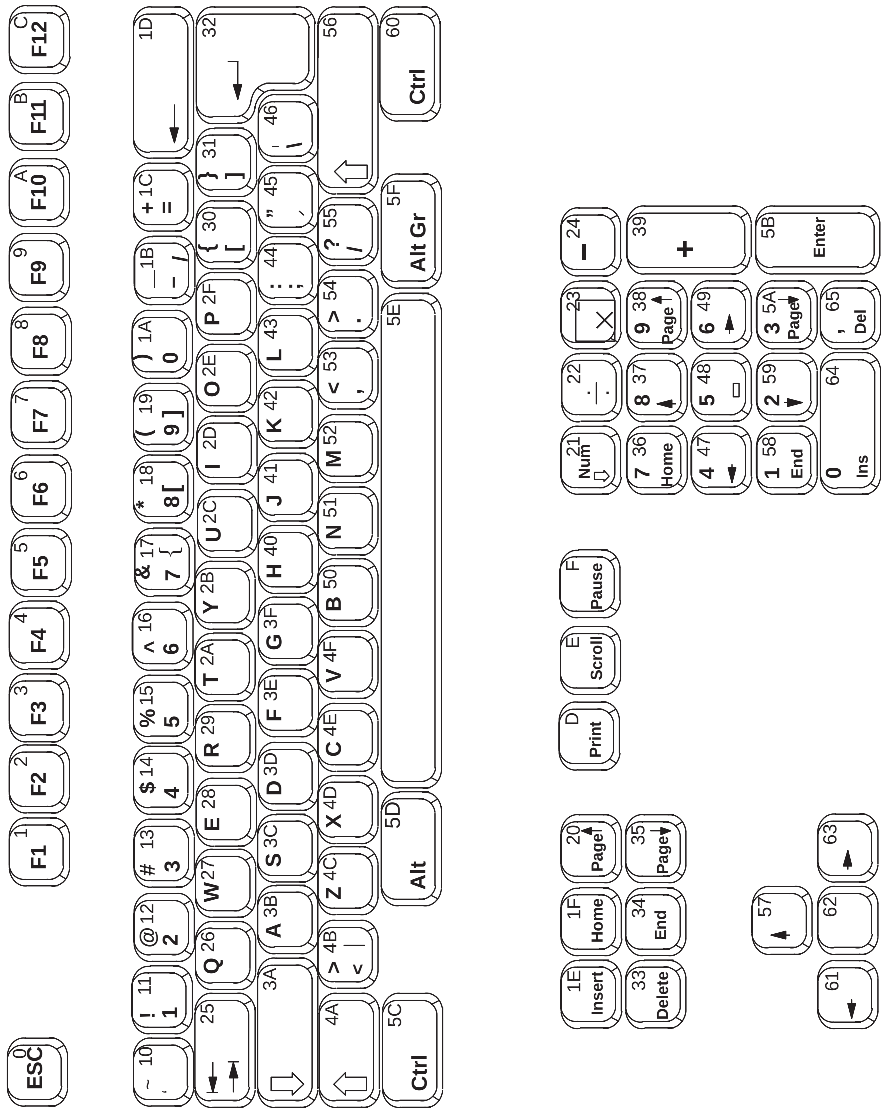


Figure 3-2 Serial Numbers of Keys

3.4 Matrix Configuration PC FI10

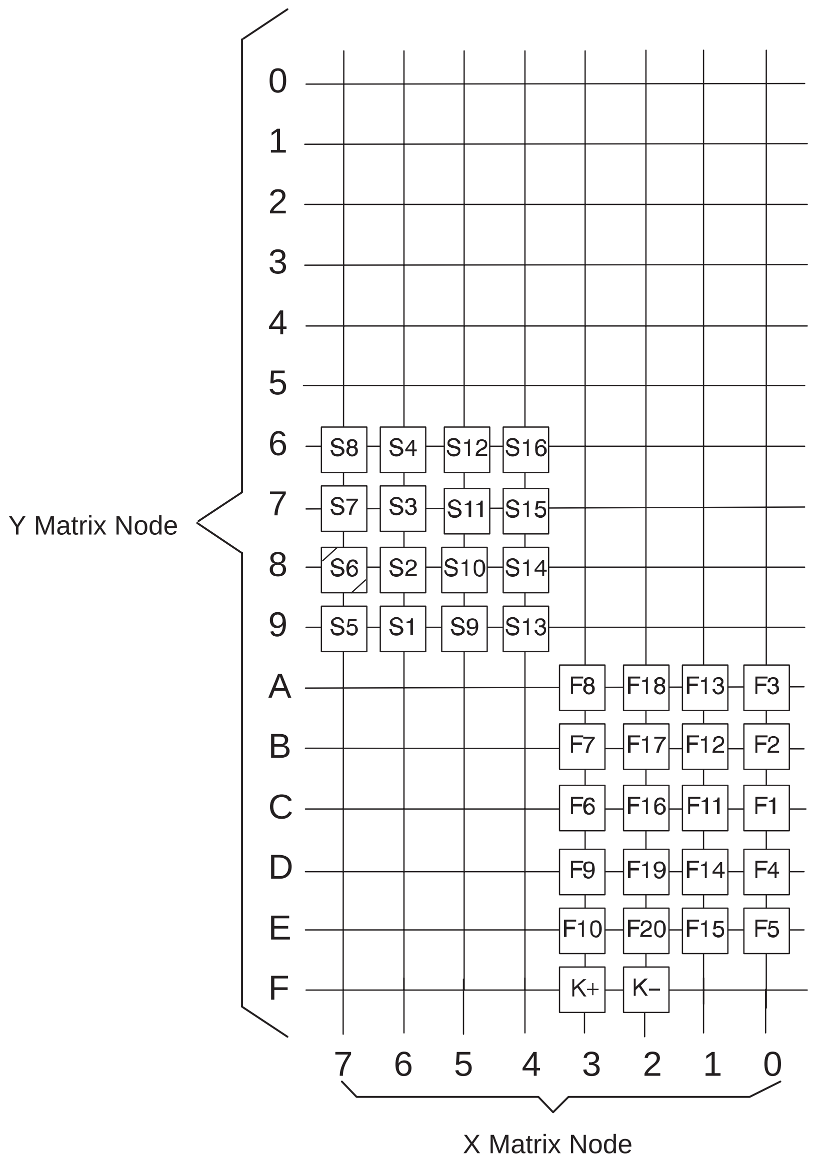


Figure 3-3 Matrix Configuration of the Membrane Keyboard

3.5 Matrix Configuration PC FI15

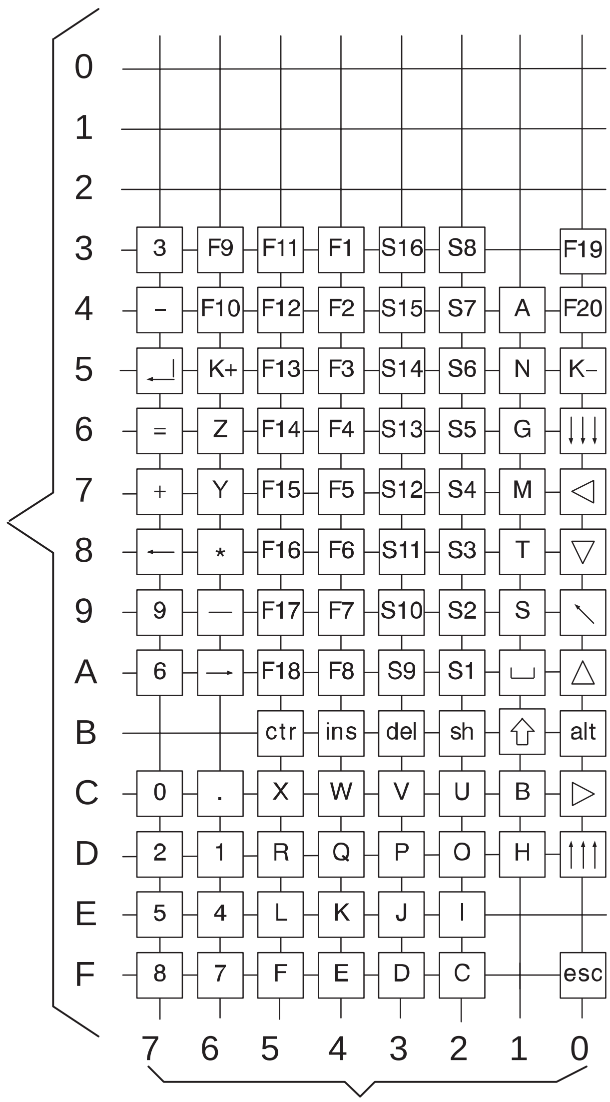


Figure 3-4 Matrix Configuration of the Membrane Keyboard

3.6 Configuration File for Keyboard Controller

```
Configuration file for keyboard controller SIMATIC PC FI15

In the following example the keys F1 to F16 are direct keys 1 to 16 and the keys
S1 to S16 are direct keys 17 to 32.

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

System Flag  06                  No ESC after RESET
Beep Len     02                  beep length
Entprell     03                  normal debounce time
Extend Prell 03                  extended debounce time
Spez Break   AA                  special break code is AA


KEY2B FF 00 7F            ;  alpha/special characters
KEY1B 4A 00 3F            ;  capital letter/small letters

KEY14 3B 80 3F 19 81      ; a/A, (
KEY1C 50 80 3F 1A 81      ; b/B, )
KEY2F 4E 80 3F 17 81      ; c/C, &
KEY3F 3D 80 3F 14 81      ; d/D, $
KEY4F 28 80 3F 55 81      ; e/E, ?

KEY5F 3E 80 3F 30 80      ; f/F, [
KEY16 3F 80 3F 31 80      ; g/G, ]
KEY1D 40 80 3F 12 81      ; h/H, @
KEY2E 2D 80 3F 15 81      ; i/I, %
KEY3E 41 80 3F 11 81      ; j/J, !

KEY4E 42 80 3F 30 81      ; k/K, {
KEY5E 43 80 3F 31 81      ; l/L, }
KEY17 52 80 3F 13 81      ; m/M, #
KEY15 51 80 3F 45 81      ; n/N, ”
KEY2D 2E 80 3F 45 80      ; o/O, ’

KEY3D 2F 80 3F 53 81      ; p/P, <
KEY4D 26 80 3F 54 81      ; q/Q, >
KEY5D 29 80 3F 10 81      ; r/R, ~
KEY19 3C 80 3F 1B 81      ; s/S, _
KEY18 2A 80 3F 53 80      ; t/T, ,

KEY2C 2C 80 3F 16 81      ; u/U, ^
KEY3C 4F 80 3F 55 80      ; v/V, /
KEY4C 27 80 3F 46 80      ; w/W, \
KEY5C 4D 80 3F 46 81      ; x/X, |
KEY67 2B 80 3F 44 81      ; y/Y, :
KEY66 4C 80 3F 44 80      ; z/Z, ;

KEY7C 1A 80 3F 64 80      ; 0
KEY6D 11 80 3F 58 80      ; 1
KEY7D 12 80 3F 59 80      ; 2
KEY73 13 80 3F 5A 80      ; 3
KEY6E 14 80 3F 47 80      ; 4
KEY7E 15 80 3F 48 80      ; 5
KEY7A 16 80 3F 49 80      ; 6
```

```
KEY6F 17 80 3F 36 80      ; 7
KEY7F 18 80 3F 37 80      ; 8
KEY79 19 80 3F 38 80      ; 9

KEY0A 57 80 3F            ; 'up'
KEY07 61 80 3F            ; 'left'
KEY09 1F 80 3F 34 80      ; 'Home' , 'End'
KEY0C 63 80 3F            ; 'right'
KEY08 62 80 3F            ; 'down'
KEY0D 20 80 3F            ; 'Page up'
KEY06 35 80 3F            ; 'Page down'

KEY77 39 80 3F            ; +
KEY74 1C 80 3F            ; =
KEY69 24 80 3F            ; -
KEY76 22 80 3F            ; /
KEY6C 54 80 3F            ; .
KEY1A 5E 80 3F            ; 'Space'
KEY68 23 80 3F            ; *

KEY5B 5C 80 3F            ; <CTRL>
KEY4B 1E 80 3F            ; <INS>
KEY0B 5D 80 3F            ; <ALT>
KEY3B 33 80 3F            ; <DEL>
KEY78 1D 80 3F            ; 'Backspace'
KEY0F 00 80 3F            ; <ESC>
KEY6A 25 80 3F 25 81      ; 'Tab right' , 'Tab left'
KEY75 32 80 3F            ; <CR>

KEY43 01 80 3F <C0>    ; Function key F1  = Direct key 00hex
KEY44 02 80 3F <C1>    ; Function key F2  = Direct key 01hex
KEY45 03 80 3F <C2>    ; Function key F3  = Direct key 02hex
KEY46 04 80 3F <C3>    ; Function key F4  = Direct key 03hex
KEY47 05 80 3F <C4>    ; Function key F5  = Direct key 04hex
KEY48 06 80 3F <C5>    ; Function key F6  = Direct key 05hex
KEY49 07 80 3F <C6>    ; Function key F7  = Direct key 06hex
KEY4A 08 80 3F <C7>    ; Function key F8  = Direct key 07hex
KEY63 09 80 3F <C8>    ; Function key F9  = Direct key 08hex
KEY64 0A 80 3F <C9>    ; Function key F10 = Direct key 09hex
KEY53 0B 80 3F <CA>    ; Function key F11 = Direct key 0Ahex
KEY54 0C 80 3F <CB>    ; Function key F12 = Direct key 0Bhex
KEY55 03 80 3F <CC>    ; Function key F13 = Direct key 0Chex
KEY56 04 80 3F <CD>    ; Function key F14 = Direct key 0Dhex
KEY57 05 80 3F <CE>    ; Function key F15 = Direct key 0Ehex
KEY58 06 80 3F <CF>    ; Function key F16 = Direct key 0Fhex
KEY59 4E 80 3F         ; Function key F17
KEY5A 5C 80 3F         ; Function key F18
KEY03 5D 80 3F         ; Function key F19
KEY04 33 80 3F         ; Function key F20

; Softkeys with assignment like function keys
KEY2A 01 80 3F <D0>    ; Softkey S1  = Direct key 10hex
KEY29 02 80 3F <D1>    ; Softkey S2  = Direct key 11hex
KEY28 03 80 3F <D2>    ; Softkey S3  = Direct key 12hex
KEY27 04 80 3F <D3>    ; Softkey S4  = Direct key 13hex
KEY26 05 80 3F <D4>    ; Softkey S5  = Direct key 14hex
KEY25 06 80 3F <D5>    ; Softkey S6  = Direct key 15hex
```

```
KEY24 07 80 3F <D6>    ; Softkey S7  = Direct key 16hex
KEY23 08 80 3F <D7>    ; Softkey S8  = Direct key 17hex
KEY3A 09 80 3F <D8>    ; Softkey S9  = Direct key 18hex
KEY39 0A 80 3F <D9>    ; Softkey S10 = Direct key 19hex
KEY38 0B 80 3F <DA>    ; Softkey S11 = Direct key 1Ahex
KEY37 0C 80 3F <DB>    ; Softkey S12 = Direct key 1Bhex
KEY36 01 80 3F <DC>    ; Softkey S13 = Direct key 1Chex
KEY35 02 80 3F <DD>    ; Softkey S14 = Direct key 1Dhex
KEY34 03 80 3F <DE>    ; Softkey S15 = Direct key 1Ehex
KEY33 04 80 3F <DF>    ; Softkey S16 = Direct key 1Fhex

;================= Keys for contrast settings ==================

KEY05 FF 00 31             ; KEY K–
KEY65 FF 00 32             ; KEY K+

;================= Switch definitions ==================

;================== String definitions ===================
```

Direct Key Module (Optional)

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 FI 10, 15 and 25.

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 baud 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 baud 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 PG/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 <u>no</u> 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:

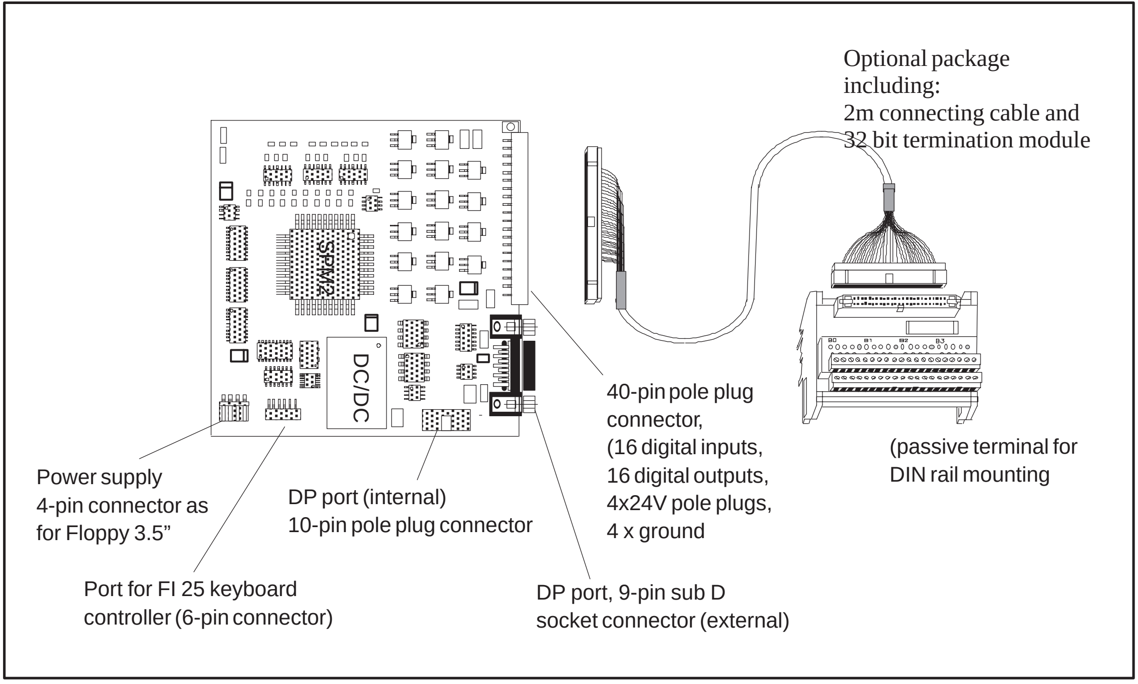
- Start the SIMATIC Manager
- Select the function **“Assign PROFIBUS Address”** in the **PLC** menu of the SIMATIC Manager. The SIMATIC Manager then contacts the direct key module. A dialog box appears. This dialog box both displays the currently set address of the direct key module and allows you to 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 (file name: SIEM8007.GSE).

For your system configuration use the STEP 7 software. The device database file is included in STEP 7, Version 4.0 and above.

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

Because of 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 of 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)

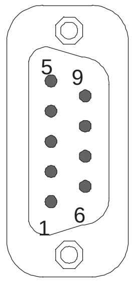


Figure 4-1 DP Port

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

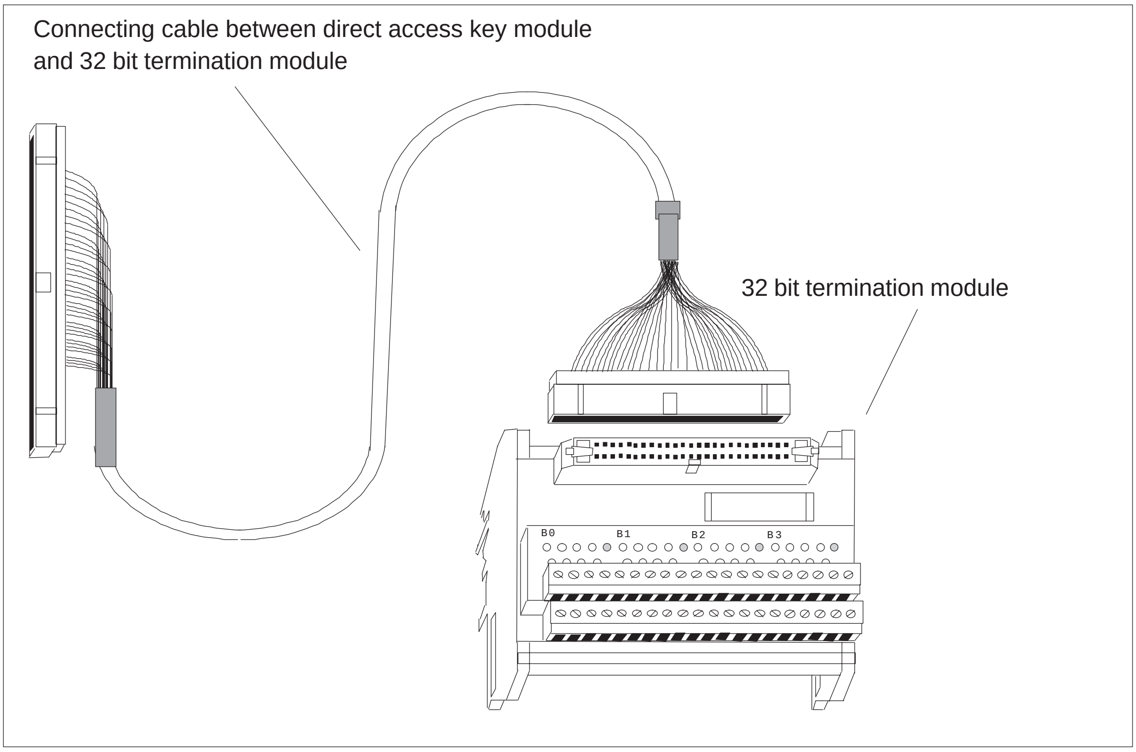
Order number	C79458–L7000–B418
Dimensions	(B x H x T in mm)110 x 110 x 20
Electricalparameters	
Line voltage	5V DC
Current consumption to 5V	approx. 400 mA
Power output at 9-pin sub D socket connector (5V isolated)	max. 90 mA
Module connector (external)	
DP port	9-pin sub D socket connector
I/O port (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
Transmissionrate	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)
Mechanicalspecifications	
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
Schock – 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 is shipped with a shielded connecting cable. The shield must be connected to the SIMATIC PC and make large–area contact with the terminal block.

Bus Board

5

Chapter Overview

5.1 Technical Specifications

Slots	1 short ISA slot 1 shared IS/PCI 290 mm long
Ambient temperature during operation	Max. 60 °C
Design	Base material Epoxy 1 mm Supply conductors 35 µm Cu Signal conductors 10 µm Cu

5.2 Design and Mode of Operation

The bus board is designed as a passive link to the all-in-one CPU. It is mounted by means of four screws.

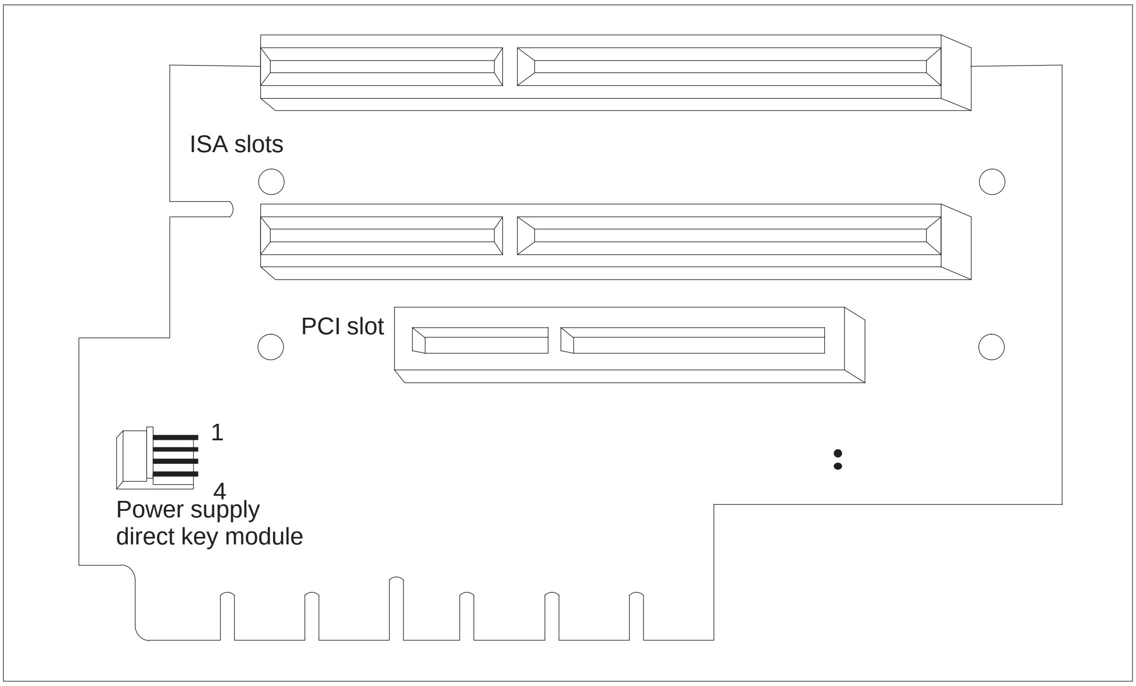


Figure 5-1 Bus Board

5.3 Pin Assignments for the Expansion Slots

ISA Bus Signals (ISA 0, 1)

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 coming from the CPU module. A minus sign “–” preceding the signal indicates that the LOW signal is the active signal.

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
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

I/O determines the direction of the signals coming from the CPU module. A minus sign "–" preceding the signal indicates that the LOW signal is the active signal.

PCI Bus Signals (PCI)

Pin	5V System Environment		Pin	5V System Environment	
	Side B	Side A		Side B	Side A
1	–12V	TRST#	44	C/BE[1]#	AD[15]
2	TCK	+12V	45	AD[14]	+3.3V
3	Ground	TMS	46	Ground	AD[13]
4	TDO	TDI	47	AD[12]	AD[11]
5	+5V	+5V	48	AD[10]	Ground
6	+5V	INTA#	49	Ground	AD[09]
7	INTB#	INTC#	50	CONNECTOR KEY	
8	INTD#	+5V	51	CONNECTOR KEY	
9	PRSNT1#	Reserved	52	AD[08]	C/BE[0]#
10	Reserved	+5V (I/O)	53	AD[07]	+3.3V
11	PRSNT2#	Reserved	54	+3.3V	AD[06]
12	Ground	Ground	55	AD[05]	AD[04]
13	Ground	Ground	56	AD[03]	Ground
14	Reserved	Reserved	57	Ground	AD[02]
15	Ground	RST#	58	AD[01]	AD[00]
16	CLK	+5V (I/O)	59	+5V (I/O)	+5V (I/O)
17	Ground	GNT#	60	ACK64#	REQ64#
18	REQ#	Ground	61	+5V	+5V
19	+5V (I/O)	Reserved	62	+5V	+5V
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			

The “#” character appended to the signal name indicates that the LOW signal is the active signal.

PCI Slot Configuration

The idsel signal of the PCI slot is permanently assigned to address line AD29.

Special Characteristics of the PCI Slot

A 3.3 V supply is not provided by the mother board.

64-bit data access via the PCI bus is not possible.

The power losses for the PCI modules cannot be measured.

Boundary scan via the PCI bus is not supported.

Power Supply Connector for Direct Key Module

Pin	Signal
1	+5V
2	GND
3	GND
4	–

6 Displays

Chapter Overview

6.1 VGA-TFT Display

Note

The backlight tube of the VGA-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 at least 25000 operating hours; that is, your display will then dim 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: 10.4 inches Width: 211.2 mm Height: 158.4 mm
Resolution	640 x 480 pixels
Size of pixels	0.33 mm vertical 0.33 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: 265 mm Height: 195 mm Depth: 11 mm
Weight	710 g

6.2 SVGA-TFT Display

Note

The backlight tube of the SVGA-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 at least 15000 operating hours; that is, your display will then dim 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: Width: Height:	10.4 inches 211.2 mm 158.4 mm
Resolution	800 x 600 pixels	
Size of pixels	0.264 mm 0.264 mm	vertical horizontal
Faulty spots permitted	High Level Low Level Green High Level	< 12 spots < 25 spots < 5 spots
Order of pixels	RGB vertical strips	
Display mode	White characters on black background	
Dimensions	Width: Height: Depth:	246.5 mm 179.4 mm 8 mm
Weight	380 g	

6.3 STN Display

Note

The backlight tube of the STN 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 at least 10000 operating hours; that is, your display will then dim 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

Resolution	640 x 480 pixels	
Size of pixels	0.33 mm 0.33 mm	vertical horizontal
Dimensions	Width: Height: Depth:	243 mm 179.4 mm 8.0 mm
Weight	450 g	

Monitoring Module (Optional)

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 and fail-state characteristics, and controls the fans.

SafeCards fulfill 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

Signals from the SafeCard can be transferred to applications via the SafeCard driver. The installation procedure for installing the SafeCard driver for various operating systems is described in the file **ReadMe.TXT** in the directory **C:\SAFECARD**.

Functional Block Diagram

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

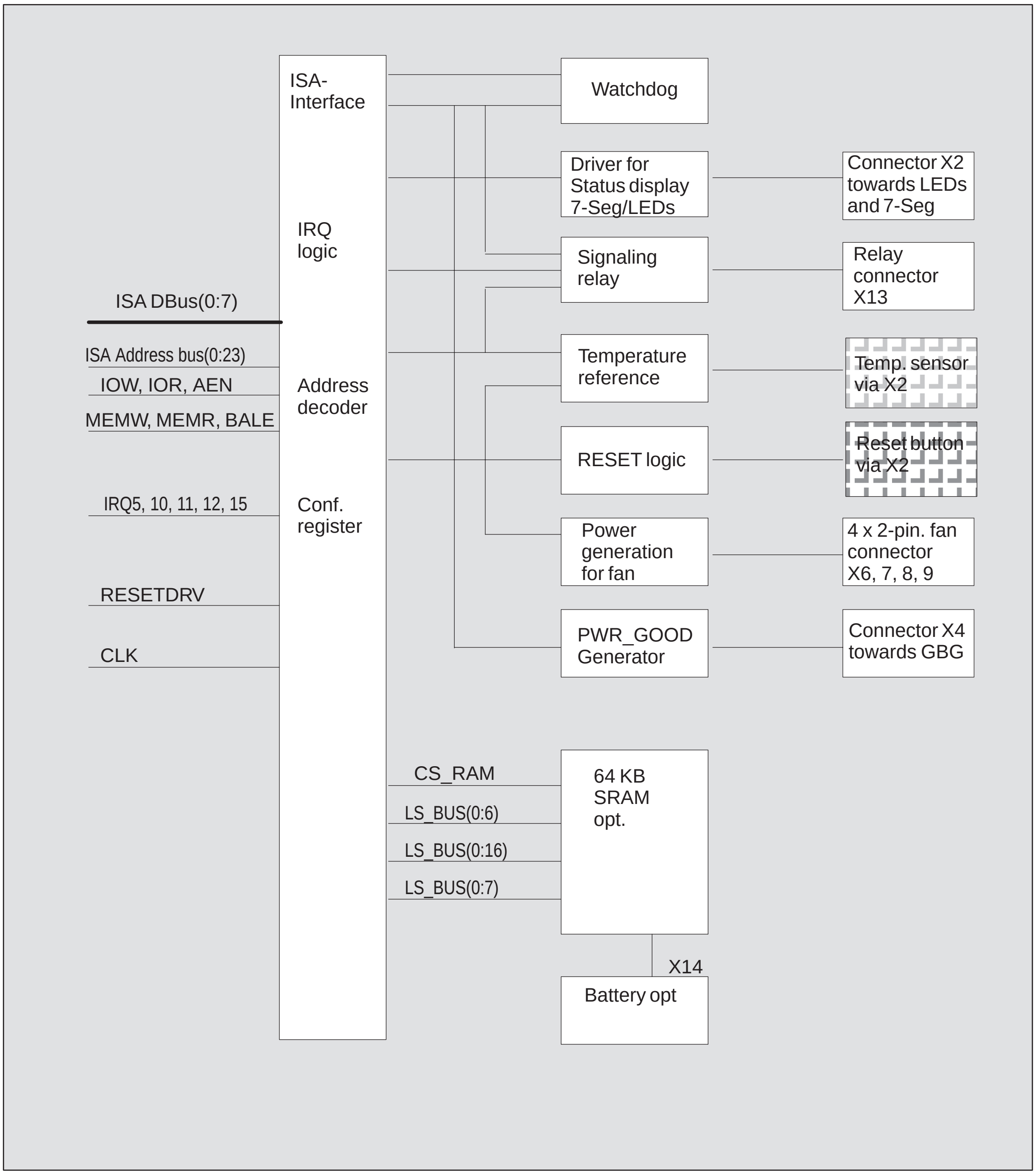


Figure 7-1 Functional Block Diagram of a SafeCard

Connector and Switch Position

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

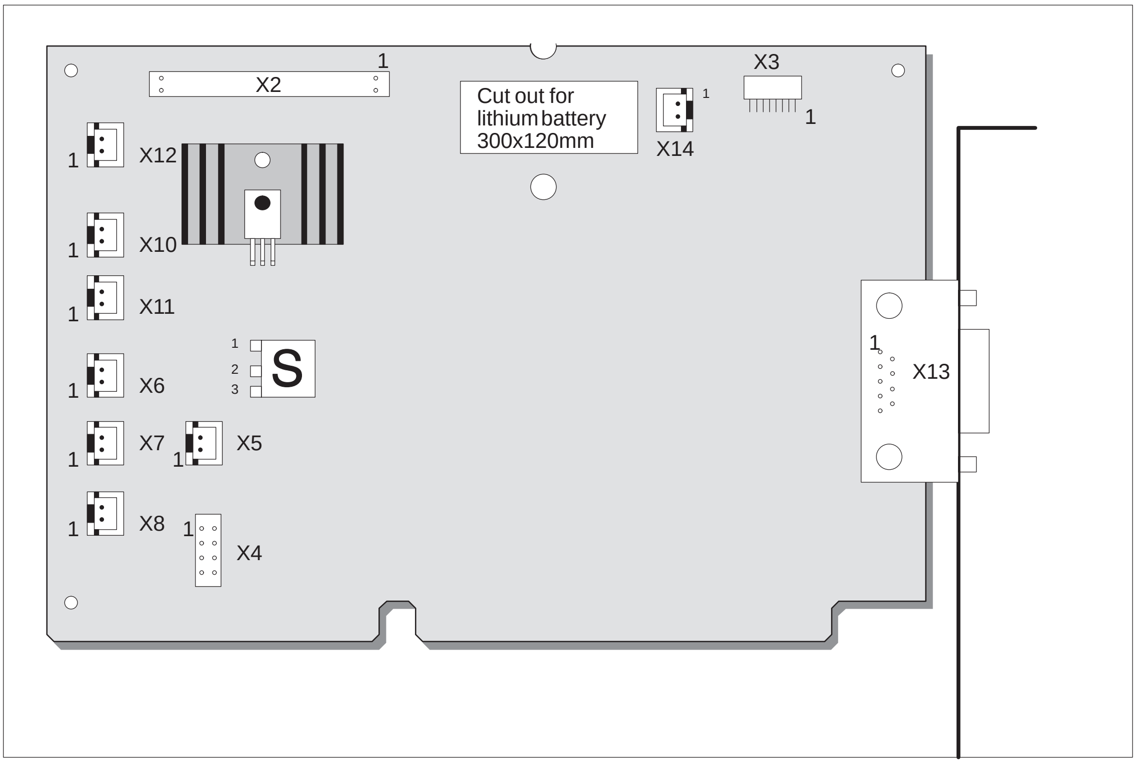


Figure 7-2 Connector and Switch Positions on the SafeCard

7.2 Status Displays

Overview

The diagnostics display for SIMATIC PCs is triggered by the SafeCard and realized in form of LEDs which are visible on the control panel mounted on the front side of the device (different for individual PCs). Monitoring features are thus controlled.

The control panel is a separate component and only connected to the SafeCard via a cable (see Technical Description, chapter Control Panel).

LED Indicators

The LEDs have the following meanings:

LED	OFF	GREEN	RED
Power	System OFF	System ON	—
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 twisted pair cable. The errors “line break” and “connector unplugged” are additionally monitored by an open-circuit monitoring. Line break is signaled by a temperature error.

7.4 Watchdog (WD)

Function

Watchdog monitors the program execution. WD has the task 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 WD status can be checked in bit 1 of the IO cell base address + 0Eh.

WD Reactions

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

WD 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 WD 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 with 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 occurs) that is the relay coil is energized and the switch makes contact, that means it changes into working position.

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

Open circuit and break circuit working of the 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 fail-state occurs (that is temperature error or Watchdog executed).

State Diagram

The following table informs you about the occurring operating status and the corresponding switch positions.

State	Switch position
Normal operation	Working position
WD 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 with 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 mother board mirrors the address areas FFF80000h to FFFFFFFFh on to the 16th Mbyte of the AT bus that is, on the addresses 00F80000h to 00FFFFFFh.

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

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.

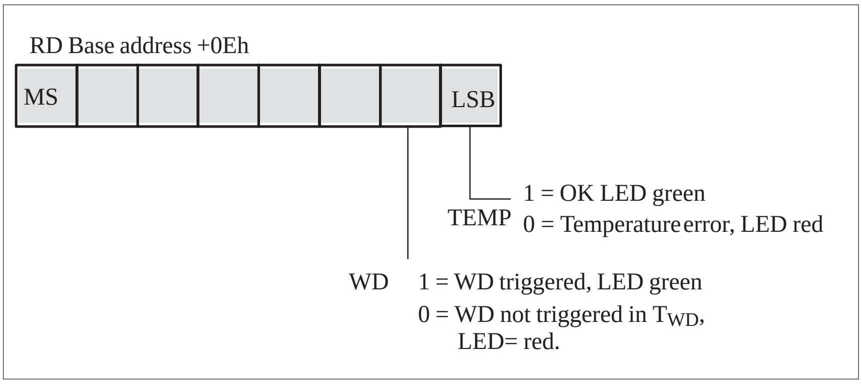
In order to avoid address overlaps, alternative addresses are available. These are set by two address switches S2 and S3 (on = Switch closed).

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.

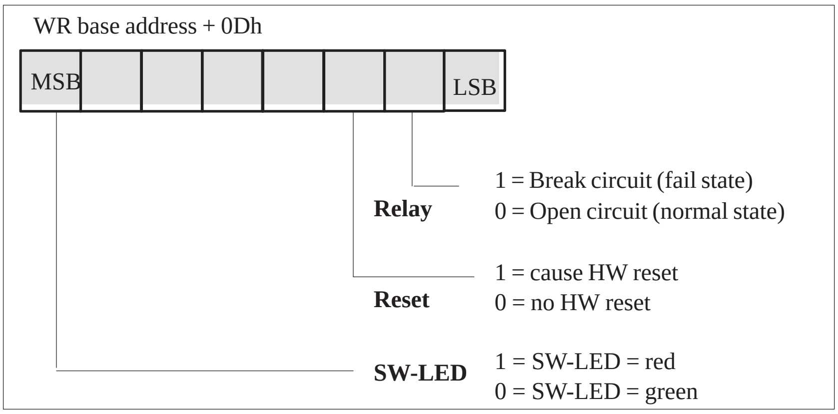
Contents of IO cell base address + 0Eh while reading out.



If WD 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.



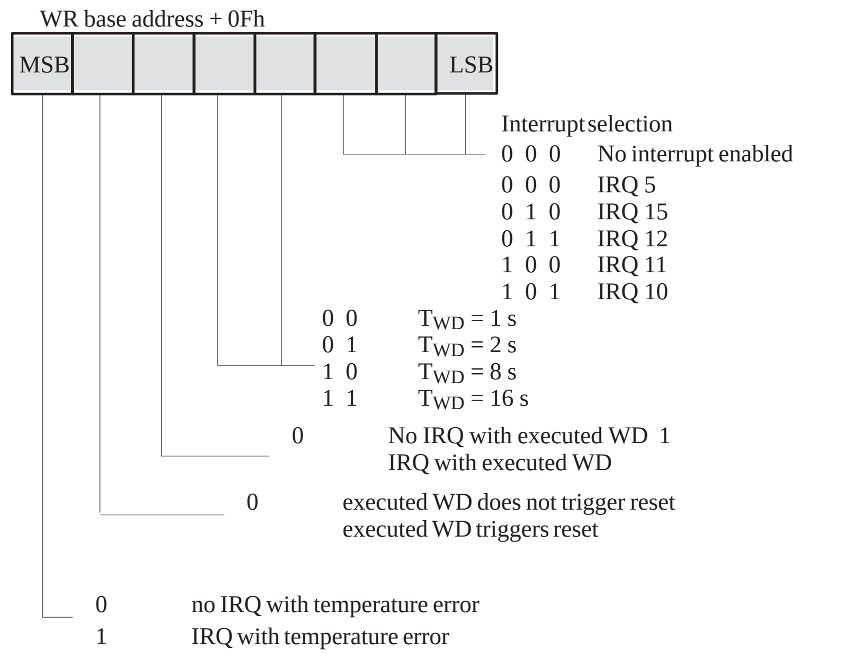
Write Register Base Address + 0Eh

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 WD 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 Watchdogs is retriggered!

7.8 Hardware Ports

Signal Output Towards Display Panel (X2)

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

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	Power Good out	
28	MPI LED	
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
36	NC	
37	NC	
38	NC	
39	NC	
40	NC	

* These interface signals/pins are not used with the FI10/15.

Signal Input for Diagnostic LEDs from CPU Board (X3)

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

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

Pin	Signal	Type
1	RESET# = PWR_GD_OUT	A
2	SPK_DATA	E
3	NC	
4	+5V	V
5	GND	V
6	MPI LED	
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’

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’

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’

Pin	Signal
1	Fan voltage
2	GND

Connector for Temperature Sensors (X12)

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

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

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 optionally equipped for battery backed-up RAM versions!

Pin	Signal
1	Battery voltage
2	GND

Touch Screen (Optional)

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 FI 25 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 to install 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 NT, 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.

Hard Disk Drive

9

Chapter Overview

9.1 Technical Specifications

Capacity		1600 Mbytes	2109 Mbytes	2100 Mbytes
Spare part order number		C79451-Z1423-K5	C79451-Z1423-K6	C79451-Z1423-K8
Manufacturer		WESTERN DIGITAL	WESTERN DIGITAL	Fujitsu
Manufacturer's designation		AC21600	AC22100	MPB3021AT
Power requirements	typical (startup) 5V	0.41 A (0.2 A)	0.41 A (0.3 A)	0.5 A
	typical (startup) 12V	0.26 A (1.4 A)	0.21 A (1.3 A)	0.32 A
Parameters	Cylinders	3148	1023	4470
	Sectors	63	63	63
	Heads	16	64	15
Jumpers	Single	As printed on drive		

Floppy Disk Drive

10

Chapter Overview

10.1 Technical Specifications

		FI 10 + BI 10		FI 15
Capacity		1.44 Mbytes	1.44 Mbytes	1.44 Mbytes
Spare part order number		C79451-Z1329-K1	C79451-Z1329-K1	C79451-Z1391-K5
Manufacturer		TEAC	NEC	NEC/TEAC
Manufacturer’s designation		FD-05 HF 4644-U	FD1238 H	FD1239T/ FD-04HFF-2300-U
Power requirements	representative value (startup) 5V representative value (startup) 12V	0.5 A (0.70 A)	0.5 A (0.74 A)	0.5 A (0.9 A)
Parameters	Cylinders Sectors Heads	80 18 2	80 18 2	80 18 2
Jumpers	Single *	None	None	None

1 = Jumper inserted
0 = Jumper not inserted
* = Standard settings

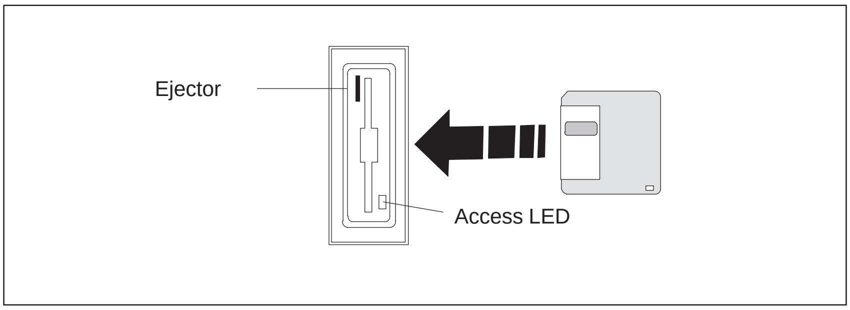


Figure 10-1 Floppy Disk Drive

Power Supply

11

Chapter Overview

11.1 Technical Specifications

Voltage

Voltage	Max. Current	Voltage Stability
+ 12 V	1.5 A	± 3 %
– 12 V	0.2 A	± 3 %
+ 5 V	8 A	± 3 %
+ 3.3 V	2.2 A	± 5 %
– 5 V floating	0.24 A	± 5 %

Input voltage	85 – 265 V AC
Line voltage frequency	47 – 63 Hz
Power consumption	≤ 120 W
Rated current	1.4/0.8A at 120/240 V AC
Jumpering when power down	min. 20ms/93V with full load
Output power	70 W DC
Degree of protection	IP20
Protection class	VDE 0106 protection class I
Certification	EN 60950/IEC 950, UL, CUL

Power-Good Signal

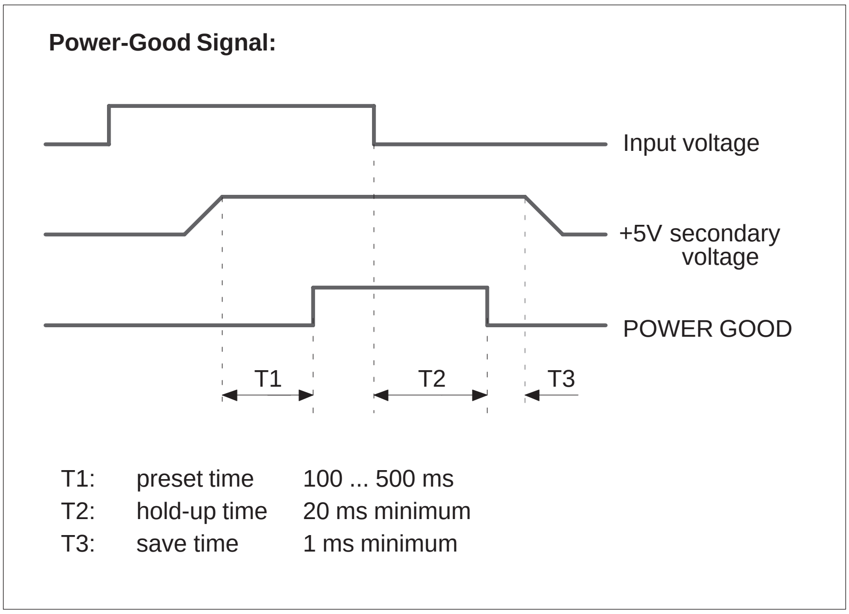


Figure 11-1 Time Characteristics of the Power-Good Signal

Guidelines for Handling Electrostatically-Sensitive Devices (ESD)

A

Chapter Overview

Section	Contents	Page
A.1	What is ESD?	A-2
A.2	Electrostatic Charging of Persons	A-3
A.3	General Protective Measures Against Electrostatic Discharge Damage	A-4

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.

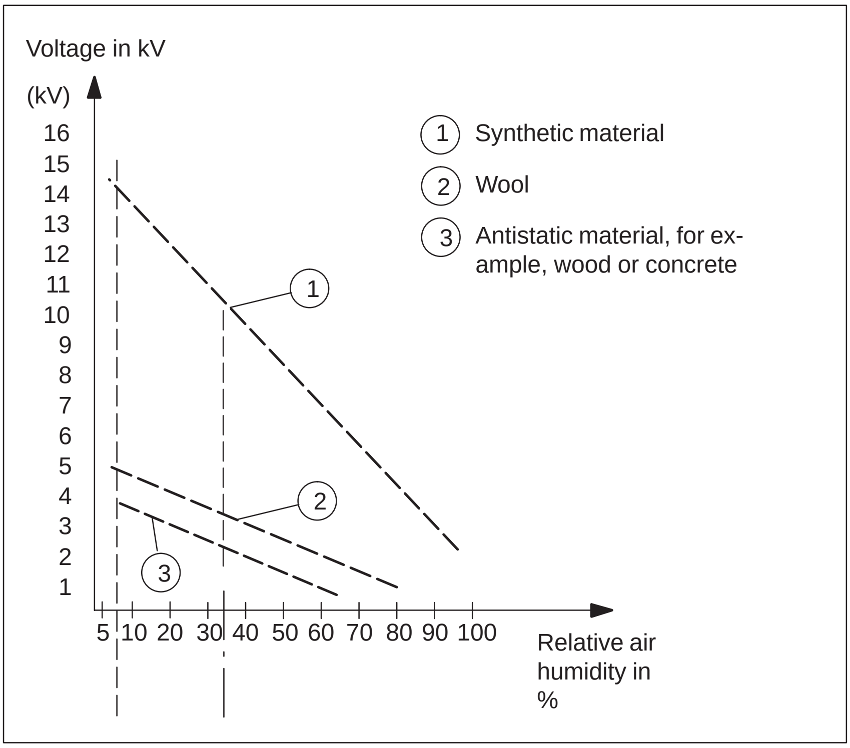


Figure A-1 Electrostatic Voltages which can Build up on a Person

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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From:
Your Name: _
Your Title: _
Company Name: _
Street: _
City, Zip Code _
Country: _
Phone: _

Please check any industry that applies to you:

❒ Automotive
❒ Chemical
❒ Electrical Machinery
❒ Food
❒ Instrument and Control
❒ Nonelectrical Machinery
❒ Petrochemical
❒ Pharmaceutical
❒ Plastic
❒ Pulp and Paper
❒ Textiles
❒ Transportation
❒ Other _ _ _ _ _ _ _ _ _ _ _

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