SIEMENS

SIMATIC

PC FI25

Technical Description

Contents

C79000-G7076-C793-02

Safety Guidelines

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

Danger

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

Warning

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

Caution

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

Note

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

Qualified Personnel

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

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

Correct Usage

Note the following:

Warning

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

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

Trademarks

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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.

SiemensAktiengesellschaft

Order No. C79000-G7076-C793

Contents

System unit

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Chapter Overview

1.1 Technical specifications

Dimensions	(W x H x D in mm) 483 x 310 x 180			
Weight	Approx. 14 kg			
Line Voltage (U_N)	120 V / 240 V ± 10 % ; 4 A / 2 A (voltage selector switch on the exterior of the unit)			
Line voltage frequency	50/60 Hz (47 bis 63 Hz)			
Brief voltage interruption acc. to NAMUR	max. 20 ms at 150 W load (max. 10 events per hour, recovery time 1 s)			
Max. power consumption	310 W			
Max. current delivery +12V can be loaded to 8A for up to 10s	5V 19 A	12V 4.2 A	-5V 0.5 A	-12V 0.5 A
Degree of protection	IP 65 (front), IP 20 (complete unit)			
Safety				
Protection class	Protection class I according to VDE 0106 T1: 1982 (IEC 536)			
Safety requirements	IEC 950/09.91 according to DIN VDE 0805/11.93			
Electromagnetic Compatibility (EMC)				
Emitted interference	EN 55022 Class B			
Noise immunity: Line-fed interference on supply lines	+- 2 kV (to IEC 1000-4-4:1995; burst) +- 1 kV (to IEC 1000-4-5:1995; surge symm) +- 2 kV (to IEC 1000-4-5:1995; surge unsymm)			
Noise immunity on signal lines	+- 1 kV (to IEC 1000-4-4:1995; burst;length < 3m) +- 2 kV (to IEC 1000-4-4:1995; burst;length > 3m) +- 1 kV (to IEC 1000-4-4:1995; surge symm; length > 3m) +- 2 kV (to IEC 1000-4-4:1995; surge unsymm; length > 3m)			
Noise immunity to discharges of static electricity	+- 6 kV contact discharge (to IEC 1000-4-2:1995) +- 8 kV air discharge (to IEC 1000-4-2:1995)			
Noise immunity to high-frequency radiation	10 V/m 80-1000 Mhz, 80% AM (to ENV 50140:1993) 10 V/m 900 Mhz, 50% ED (to ENV 50204:1995)			
Noise immunity to high-frequency currents	10 V 9 KHz - 80 MHz 80% AM (to ENV 50141:1993)			
Noise immunity to magnetic fields	30 A/m 50 Hz (to IEC 1000-4-8:1993)			
Ambient Conditions				
Temperature - operation - storage/transport - gradient	Tested to DIN EN 60068-2-2, DIN IEC 68-2-1, DIN IEC 68-2-14 + 5°C to +45°C - 20°C to +60°C Max. 10 degrees C/h (no condensation)			
Relative humidity - operation - storage/transport	Tested to DIN IEC 68-2-3, DIN IEC 68-2-30, DIN IEC 68-2-56 5 % to 85 % at 25°C (no condensation) 5 % to 95 % at 25°C (no condensation)			
Mechanical Specifications				
Vibration - operation - transport	Tested to DIN IEC 68-2-6 10 to 58 Hz: 0.0375 mm, 58 to 500 Hz: 5 m/s^2 5 to 9 Hz: 3.5 mm, 9 to 500 Hz: 9.8 m/s^2			
Shock - operation - storage	Tested to DIN IEC 68-2-29 50 m/s^2, 30 ms 250 m/s^2, 6 ms			

Mother Board		
	FI25 (Variant 1)	**FI25 (Variant 2)**
Processor	Pentium 133 MHz	Pentium 166 MHz
Internal processor cache	8 KB code + 8 KB data	
Main memory	8 MB RAM (2 x 4 MB Fast Page)	16 MB RAM (2 x 8 MB EDO)
Second level cache	256 kB optional	
Free expansion slots	4 ISA long/1 ISA short	4 ISA long/1 ISA short (1 ISA occupied by SafeCard)
Drives		
Floppy disk drive	3,5” (1.44 MB)	
Hard disk drive	3.5” EIDE (1.6 GB)	
LC-Display		
	FI25 (Variant 1)	**FI25 (Variant 2)**
Display type	passive DSTN, color	active TFT, color
Display size	211 x 158 mm (10,4 in.)	211 x 158 mm (10,4 in.)
Resolution	640 x 480 (VGA)	800 x 600 (SVGA)
Available colors	256	65536 (from 162.144)
Contrast	30:1	60:1
Brightness	70cd/m^2	120 cd/m^2
Response time	270 ms (t_{rise}/t_{fall})	30/50 ms (t_{rise}/t_{fall})
Permissible error locations	–	high/low level: <12/25 spots green high level: <5 spots
Keyboard		
Keyboard type	Membrane keyboard, full keyboard functionality	
Key size/key distance	14 mm / 14 mm	
Labelling	US/international	
Keyboard controller	Freely programmable, parallel operation with external keyboard	
Graphics		
Graphics chip	SVGA LCD controller Cirrus GD7543 on the PCI bus with Windows accelerator	
Graphics memory	1 MB DRAM	
Resolutions/frequencies/ colors	CRT: up to 1024x768/75 Hz/256 colors	
Interfaces		
COM1	Serial port 1 (V.24/RS232C), 25-pin sub D socket connector NS 16550-compatible	
COM2	Serial port 2 (V.24/RS232C), 9-pin sub D plug connector NS 16550-compatible	
LPT1	Parallel port (standard, EPP and ECP mode) Interface for printer with parallel port	
VGA	VGA interface, for external monitor	
Keyboard	PS/2 keyboard connection (front and rear)	
Mouse	PS/2 mouse port	

MPI/DP Interface, optically isolated * Data signalling rate Operating mode Physical interface	9-pin sub D socket connector, screw-type locking 9.6 Kbaud to 1.5 Mbaud, software-selectable Isolated*: Data lines A, B Control lines RTS_AS, RTS_PG 5V supply voltage (max. 90 mA) Ground connection: MPI/DP connector cable shield RS485, optically isolated	
Relay interface	Connection of a signalling device in conjunction with monitoring module SafeCard (serial feature on FI25 Variant 2) Switching voltage DC : max. 60 V Current voltage DC : max. 1 A Switching capacity DC : max. 30 W Limiting continuous current DC : max. 1 A	
Function Displays		
	FI25 (Variant 1)	**FI25 Variant 2)**
LEDs on device	Power Disk Run (only with Safecard) Temp (only with Safecard) Appl. (only with Safecard)	Power Disk Run Temp Appl.
Status display (2x seven–segment)	(only with SafeCard)	Yes

* Optically isolated within the SELV circuit

1.2 Dimensions of expansion modules

Information on modules

The SIMATIC PC FI25 is designed for modules according to AT-/PCI specification. The size of the modules has to be within the range of dimensions indicated. Any deviation of their height can cause problems of contacting, functional disorders or difficulties during their installation. The figures below illustrate two cards with full AT-/PCI overall length. Individual slots can demand different dimensions of cards.

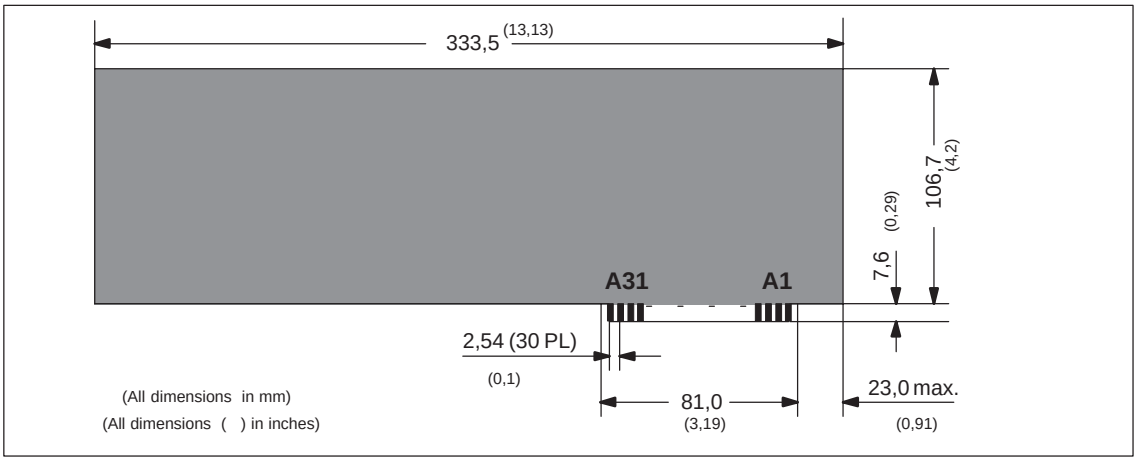


Figure 1-1 XT module

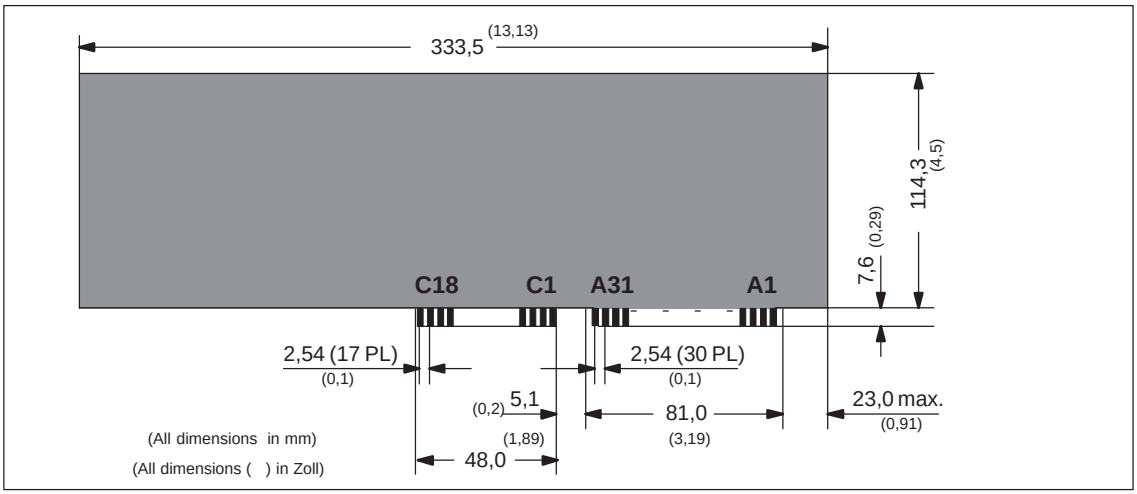


Figure 1-2 AT module

1.3 Power requirements of the components (maximum values)

Componente	+ 5V	– 5V	+ 12V	– 12V
Motherboard	5.1 A	0.01 A	0.1 A	0.02 A
Monitoring board SafeCard	0.35 A	–	0.03A	–
Fan			0.5 A	
3,5” floppy disk drive	0.34 A			
FP 1.6 GB	1.2 A		1.0 A	
TFT Display	0.25 A			
TFT Inverter			0.5 A	
DSTN Display				
DSTN Inverter			0.35 A	
Keyboard controller	0.12 A			

Restrictions on power supply

Due to thermal stress the maximum capacity of the power supply is restricted to:

Power supply	Restriction
Standard power supply (220 W)	maximum load 150 W

1.4 Removing and installing components

Prerequisites

The system unit is designed to enable any necessary maintenance work to be carried out quickly and at low cost.

Warning

Please read the warnings on the first pages of the user's guide before you open the housing of the system unit.

- Do not open the housing unless you need to install or remove components, or to replace the battery.
- Write down your configuration parameters before starting the procedure.

Caution

Risk of damage to the unit!

Note that only qualified personnel should be allowed to work on the open unit, so the warranty on the device is not affected. Authorized SIEMENS maintenance and repair centers offer you a specialist maintenance service. The user's guide supplies you with their addresses.

Caution

The electronic components of the printed boards are extremely sensitive to electrostatic discharge. When handling the boards, you must follow the guidelines for electrostatically sensitive components (ESD guidelines) at the end of this manual.

Limitation of Liability

All technical specifications and licenses apply only to expansion functions approved by SIEMENS. No liability can be assumed for functional constraints caused by the use of devices and components of other manufacturers.
The following sign warns that electrostatically sensitive modules are present. Please read the ESD guidelines.

Before Opening the Unit

Before opening the unit you should carefully read the following rules:

- Before you disconnect the power supply cable, discharge any electrostatic charge on your body. You can do this by touching metallic parts, such as screws, on the rear panel of the PG.
- Discharge any electrostatic charge from tools that you are using.
- Wear a grounding wrist strap if you are handling components.
- Leave components and modules in their packing until you are ready to install them.
- Disconnect the PC from its power supply before plugging in or removing any modules or components.
- Touch components and modules only on their edges. Above all, do not touch the connecting pins and printed conductors.
- Do not operate the PC with the cover open.

Tools

Use a suitable crosstip or TORX screwdriver to remove or install components.

1.4.1 Opening and closing the system unit

- Remove the diskette from the floppy disk drive.
- Disconnect the power supply.
- Remove the PC from its support/cabinet.
- Release the three screws (see figure 1-3).
- Move the front approx. 4 cm out of the housing, then tilt it down forwards. It remains open at a 90 ˚ angle (the front is fixed with two straps).

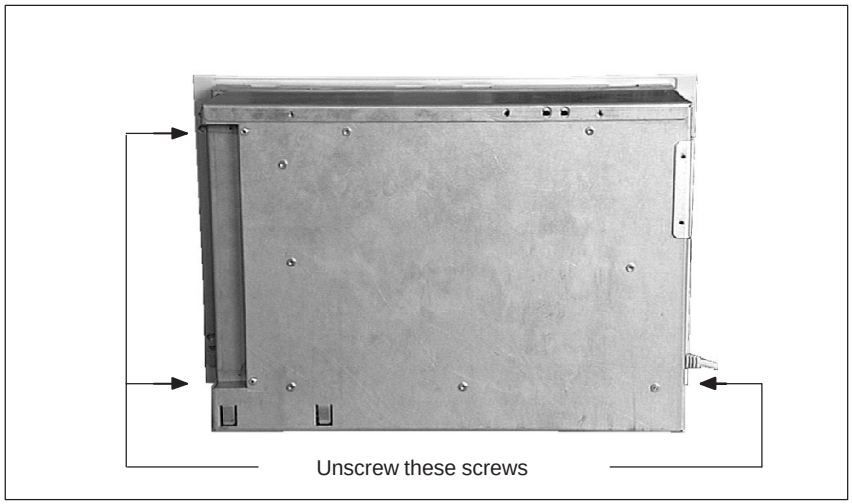


Figure 1-3 Opening the system unit

When the front plate is tilted down the following functional units can be seen in the housing:

– Motherboard
– Passive bus board
– Fan
– Hard disk drive
– Floppy disk drive

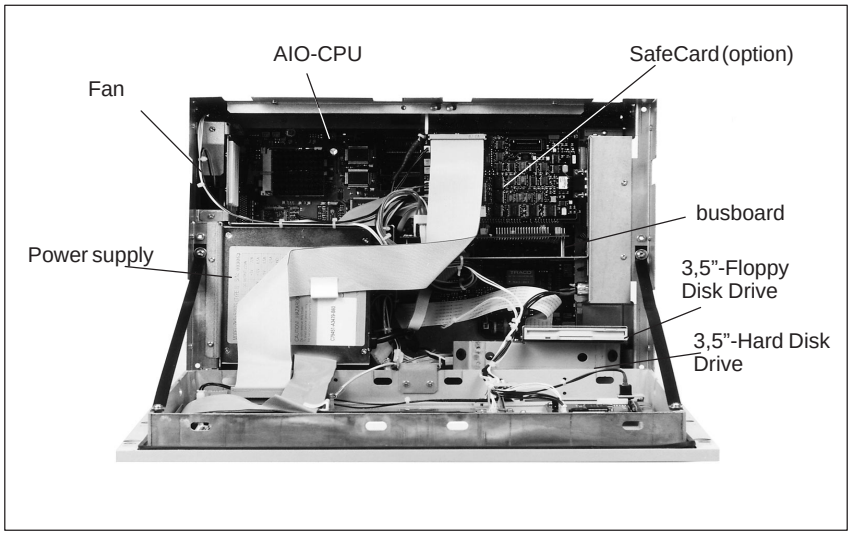


Figure 1-4 Overview of the functional units

The following parts are located in the front:

- LC display and inverter module
- Keyboard controller
- Diagnostics display

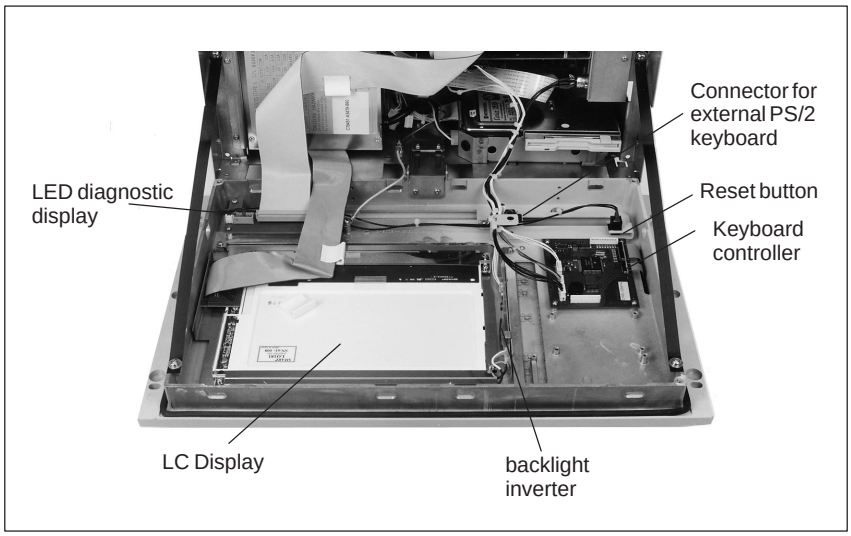


Figure 1-5 Overview of the functional units located in the front plate

1.4.2 Removing and installing the diagnostics display

- Open the IPC as described in chapter 1.4.1.
- Carefully disconnect the cables and write down their previous connections.
- Release the four screws to take out the module.

Proceed in reverse order to reassemble the unit.

1.4.3 Removing and installing the flat screen / the inverter

- Open the IPC as described in chapter 1.4.1.
- Before disconnecting all cables write down their previous connections.
- The flat screen and its inverter module are fixed on a mounting device which is screwed to the front unit.
- Release the four screws by which the display unit is mounted to the device and take the unit out.
- The inverter module is fastened to the mounting device by means of 3 (TFT) or 4 (DSTN) plastic rivets. Release the rivets by pushing their thorns out of the rivet hole.

Caution

Do not forget to mount the insulating sheet between inverter module and sheet metal while installing.

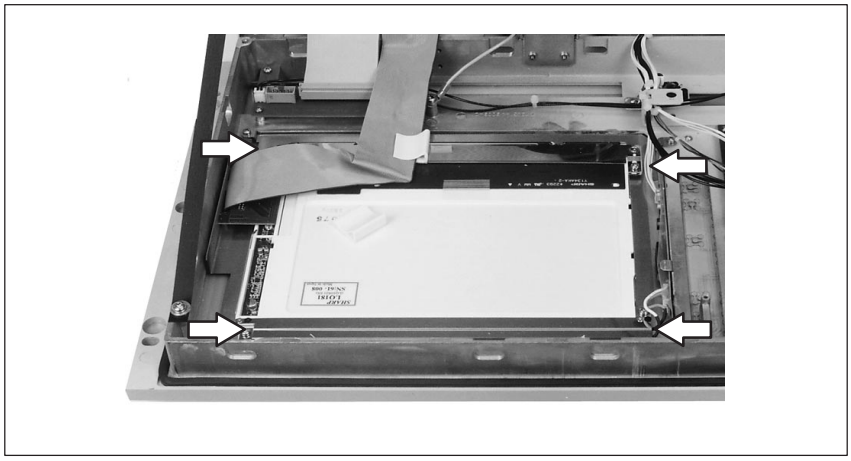


Figure 1-6 Removing the flat screen

1.4.4 Replacing backlight tubes for displays

The backlight tube of the LC display is subjected to wear. Depending on the operating temperature, the brightness of the tube, and hence the brightness of the display, will become less. We recommend to replace the tube once your display dimmed to 50% of its original brightness. The so called half-life period of your display is indicated (in operating hours) in the description of your LC display.

The backlight tube can be ordered as a spare part. Replacing the tube has to be executed in a dustproof room and according to ESD guidelines. The replacement should be executed by our authorized service personnel or in an authorized service shop.

Replacement in the DSTN Display

The backlight tube for the DSTN display is replaced as follows:

- Remove the display from the front plate as described in Section 1.4.3.
- Place the display face down on a flat dust-free surface.
- Align the 17 metal lugs (3 at the left, 7 on top, 7 on bottom - see Figure 1-7).
- Remove the 6 screws as shown in Figure 1-7 (2 left, 4 right).
- Disassemble the rear panel of the display as shown in Figure 1-8.
- Lift the reflector foil at the top edge of the display and remove the backlight tube carefully.
- Insert the new backlight tube and cover it with the reflector foil.
- The sealing rings (O rings) on the tube must be seated correctly and must be covered with reflector foil.
- The cables connected to the tube must be laid in the appropriate channels (see Figure 1-9).
- Reassemble the rear panel of the display (see Figure 1-10) and replace the 6 screws.
- Turn the 17 metal lugs back to the original skewed position.
- Check that the tube functions correctly.

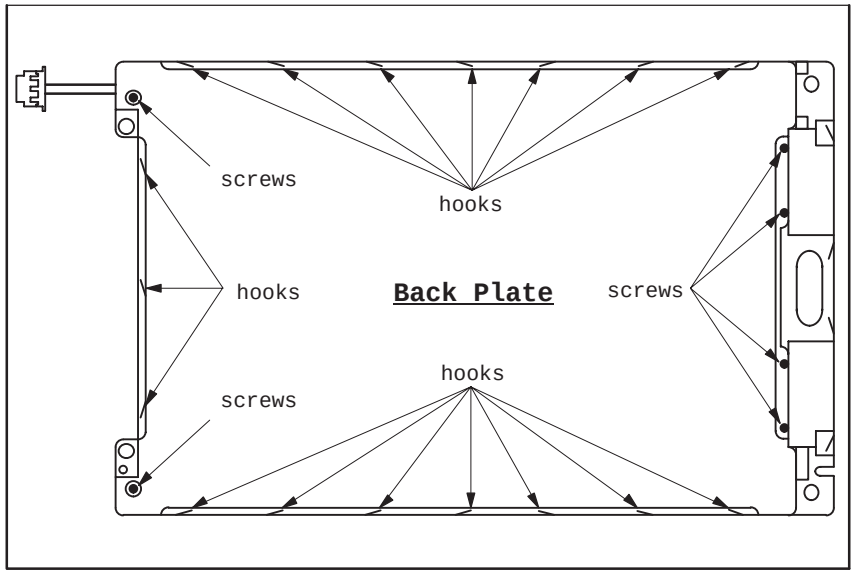


Figure 1-7 Removing the screws and metal hooks

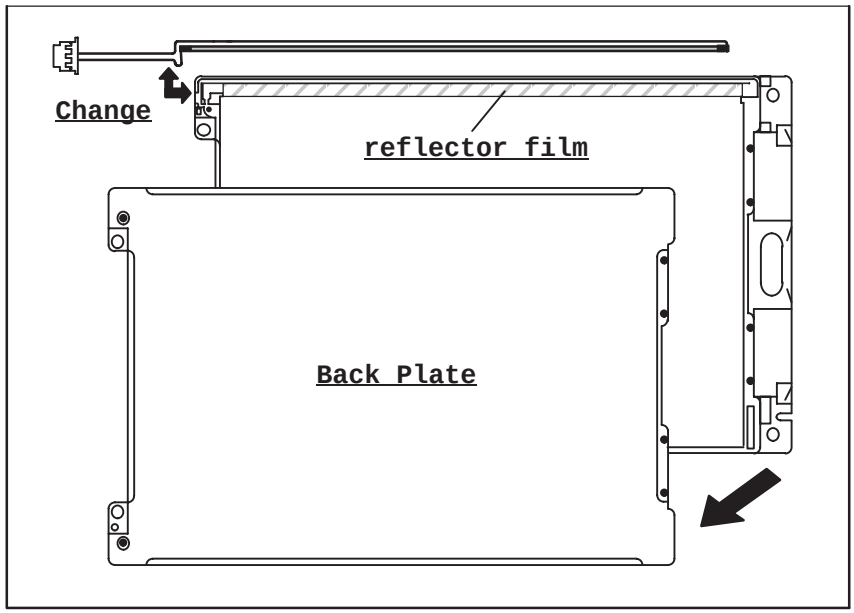


Figure 1-8 Removing the tube

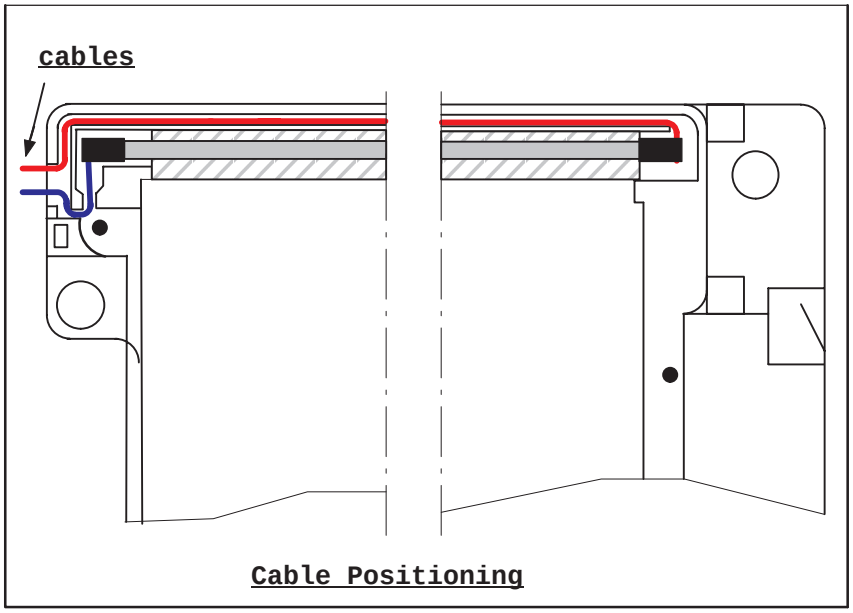


Figure 1-9 Position of the tube cables

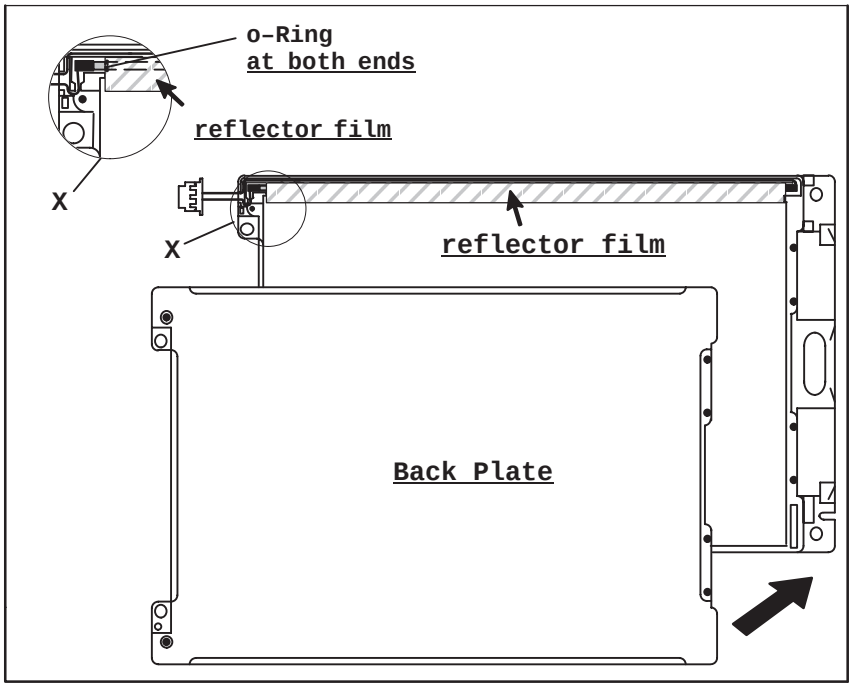


Figure 1-10 Reassembly

Replacement in the TFT Display

The backlight tube for the TFT display is replaced as follows:

- Compliance with the ESD guidelines in the Manual, Section 1.1 is essential.
- Remove the display from the front plate as described in Section 1.4.3. Lay the display face up on a dust-free surface.
- The backlight tubes are accessible from the side (on the left as viewed from the rear).
- Prise the white plastic tube socket out of the display housing using a medium-sized slot screwdriver. Holding the plastic (not the cable), pull the tube together with the socket carefully out of the display housing.
- Install the new tube by following the above instructions in reverse order. Ensure that the tube socket locks in the display housing correctly.

Note

Always replace both tubes.

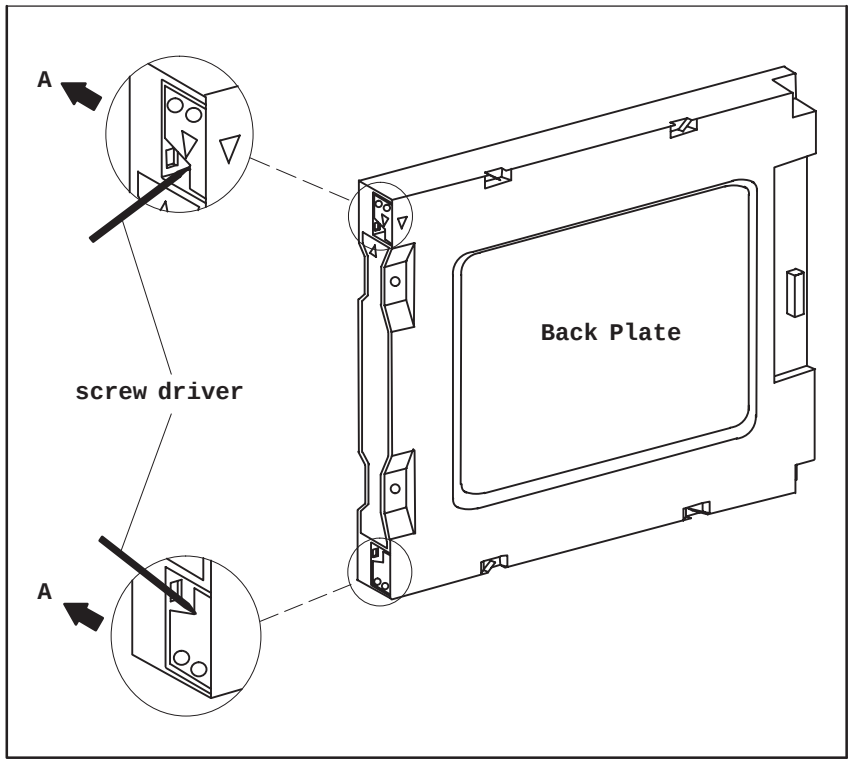


Figure 1-11 Applying the screwdriver

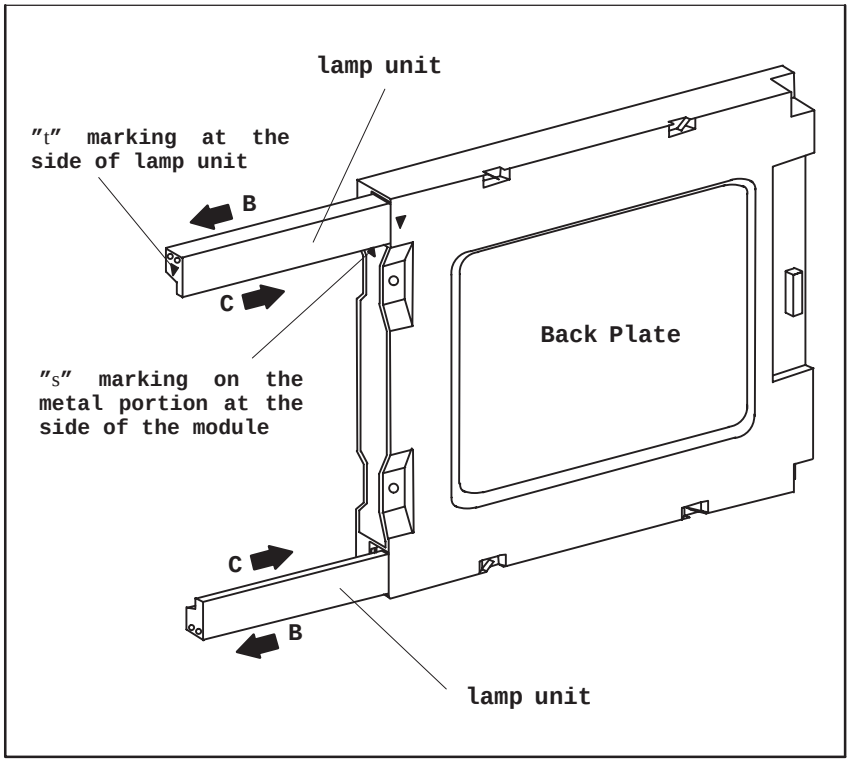


Figure 1-12 Sliding the tubes in and out

1.4.5 Removing and installing the keyboard controllers

- Open the IPC as described in chapter 1.4.1.
- Remove the two connecting cables of the membrane keyboard.

Caution

Release the socket connector locking before removing the connecting cables to avoid any damage to the foil coating.

- Before disconnecting all cables please write down their previous connections.
- Release the four mounting screws, then take out the keyboard controller module.

Please proceed in reverse order to reassemble the unit.

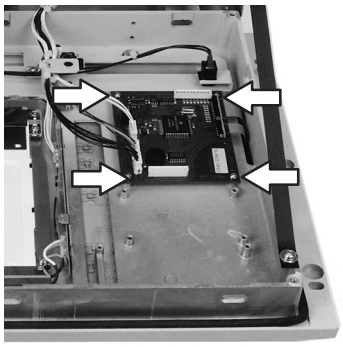


Figure 1-13 Removing the keyboard controller

1.4.6 Removing and installing disk drives

- Open the system unit as described in chapter 1.4.1.
- Hard disk drive and floppy disk drive are located in a drive support. This drive support is mounted with four screws to the bottom of the system unit. Release these screws, then pull the support out of the unit.
- Before disconnecting the cables please write down their previous connections.

Caution

Release the socket connector locking before disconnecting the connecting cable of the floppy disk drive.

- Release the three screws which mount the floppy disk drive to its support and loosen the three screws which mount the angle bracket of the floppy disk drive to the support. Pull the floppy disk drive out of the support.
- Release the four screws which mount the floppy disk drive to the vibration reducing part of the support. Take the hard disk drive out of the drive support.

Figure 1-14 Support for floppy and hard disk drive

Proceed in reverse order to install a new drive.

1.4.7 Removing and installing expansion modules

- Open the system unit as described in chapter 1.4.1.
- Release the six screws on top of the unit (as indicated in figure) and pull off the sheet metal top.

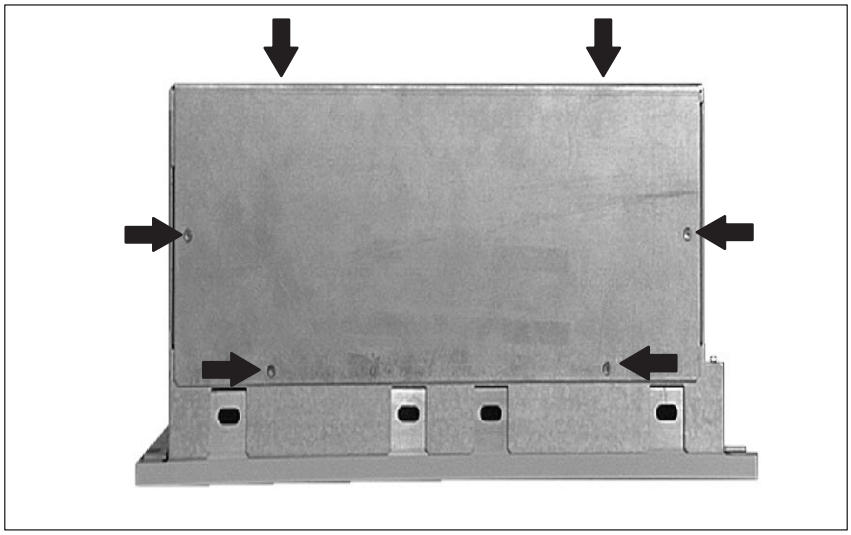


Figure 1-15 Removing the top of the casing.

Removing and installing module retainers

First remove the crossbeam on which the modules are mounted.

- Bend the two notched spring clips slightly inwards to release the snap-in lockings.
- Grip the crossbeam and push it about 1 centimeter (half an inch) backwards and then lift it out with the retainers.

Proceed in reverse order to install the retainers.

Adjusting retainers

Insert sliding element at the top push it down until it covers the module. Then guide the module in the notch.

Caution

Do not exert pressure on the module. Therefore, do *not* push down or force the retainers in any way.

Cut off the part of the sliding element that sticks out as described below:

- Scratch a notch in the top of the sliding element at the surface of the retainer using a knife and bend it over to brake it off.
- Cut off the part that sticks out using a sharp side cutter or a hacksaw.

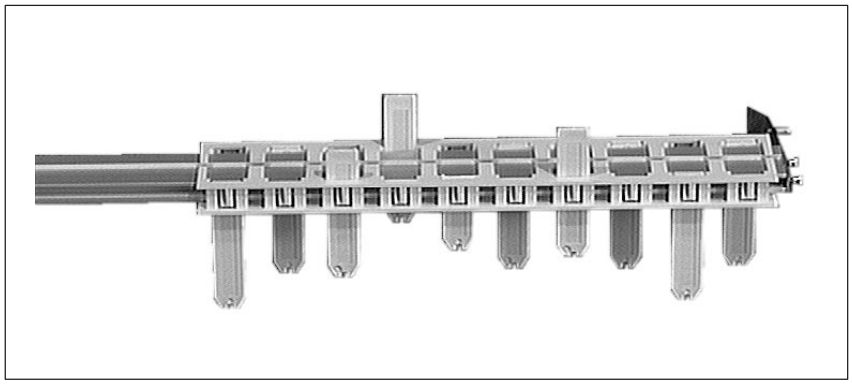


Figure 1-16 Retainers

Removing and installing an expansion module

Please proceed as follows:

- Release the screw on the slot plate of the module.
- Pull the module carefully out of the slot. Make sure that you do not jam it.

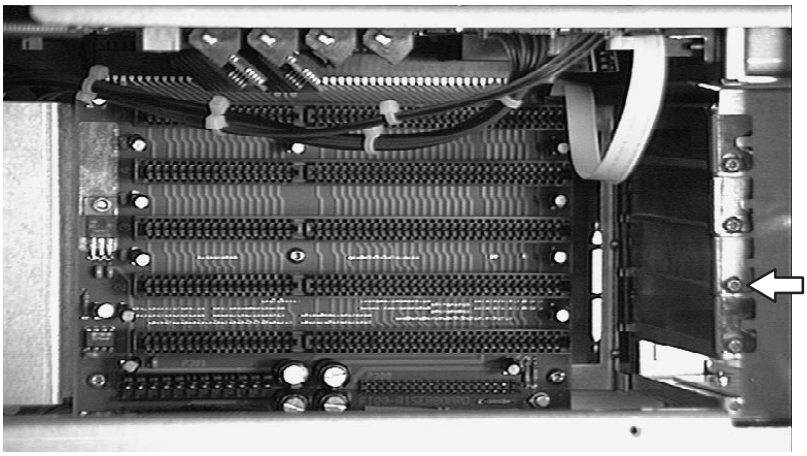


Figure 1-17 Removing an expansion module

- DIP switches and jumpers of the new module should be set as those of the old module, (provided that both modules are of the same type and version; in any other case refer to the corresponding documentation of your module).

Proceed in reverse order to install a new expansion module.

1.4.8 Removing and installing the bus board

- Open the system unit as described in chapter 1.4.1.
- Remove all modules from the slots (proceed as described in chapter 1.4.7).
- Disconnect all connecting cables of the bus board.
  Please write down their previous connections.
- Release the two screws on the right side of the crossbeam (see figure 1-18) and the two screws on top of the fan cage.

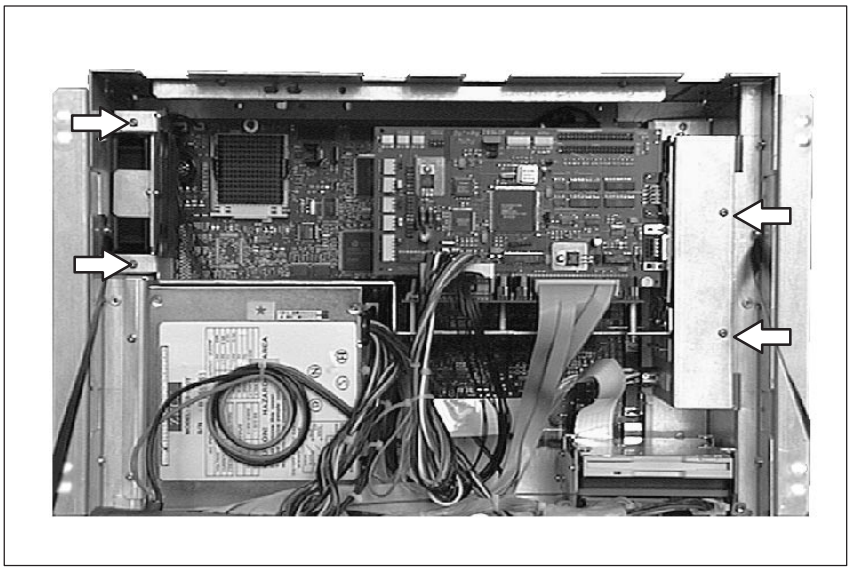


Figure 1-18 Mounting the crossbeam on the system housing

- Now you can remove the crossbeam together with the bus board. Three spacers mount the bus board on the supporting sheet.

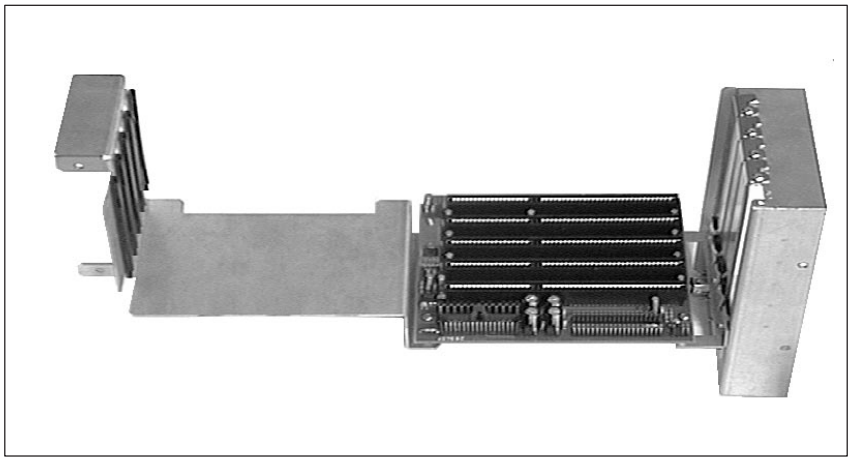


Figure 1-19 Crossbeams

- Undo the three screws on the bus board as shown in figure 1-20.

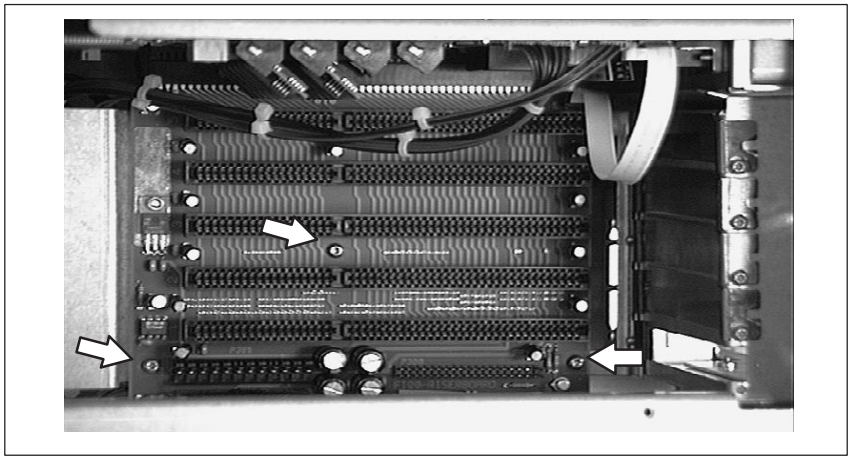


Figure 1-20 Removing the bus board

To install the bus board proceed in reverse order.

1.4.9 Removing and installing a fan

- Open the system unit as described in chapter 1.4.1.
- First release the screw to remove the angle brackets (see figure 1-21).
- Then pull the fan by means of a screwdriver forwards and unplug the cable from the CPU board or the SafeCard.

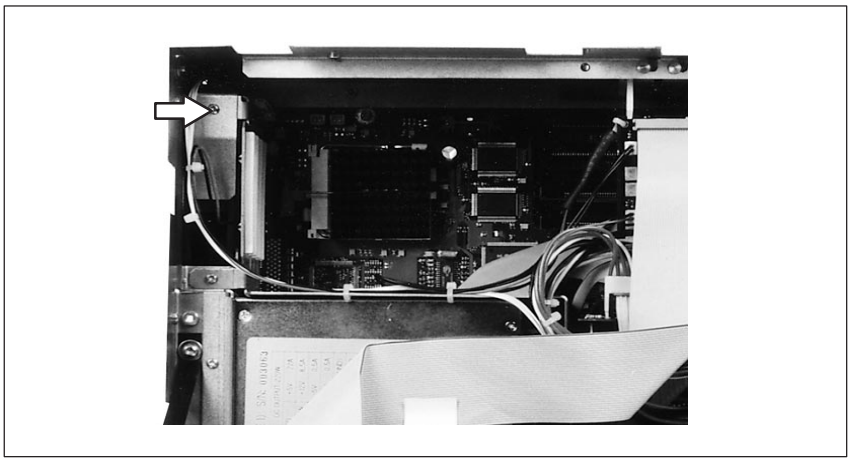


Figure 1-21 Removing the fan

Proceed in reverse order to install the fan.

1.4.10 Removing and installing the power supply unit

- Open the system unit as described in chapter 1.4.1.
- Disconnect all connecting cables and write down their previous connections.

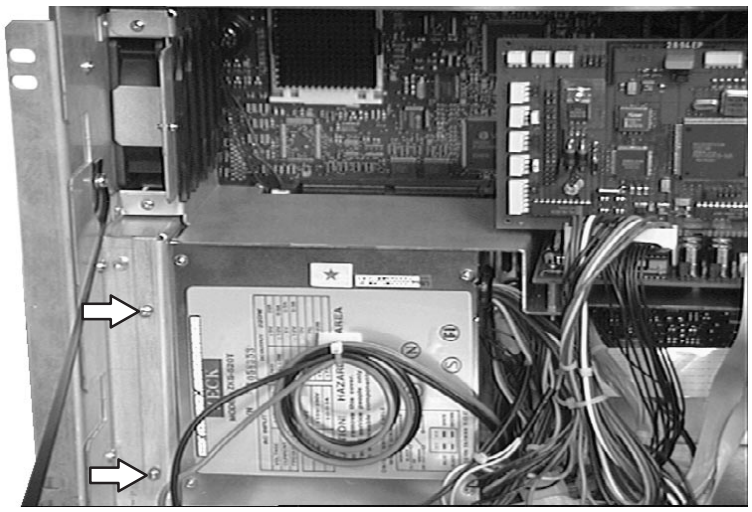


Figure 1-22 Removing the power supply unit

- Release the two screws of the power supply (see figure 1-22).
- The power supply unit is engaged to the casing by two sheet metal notches. Pull the power supply unit some centimeters to the right, then forwards and remove it.

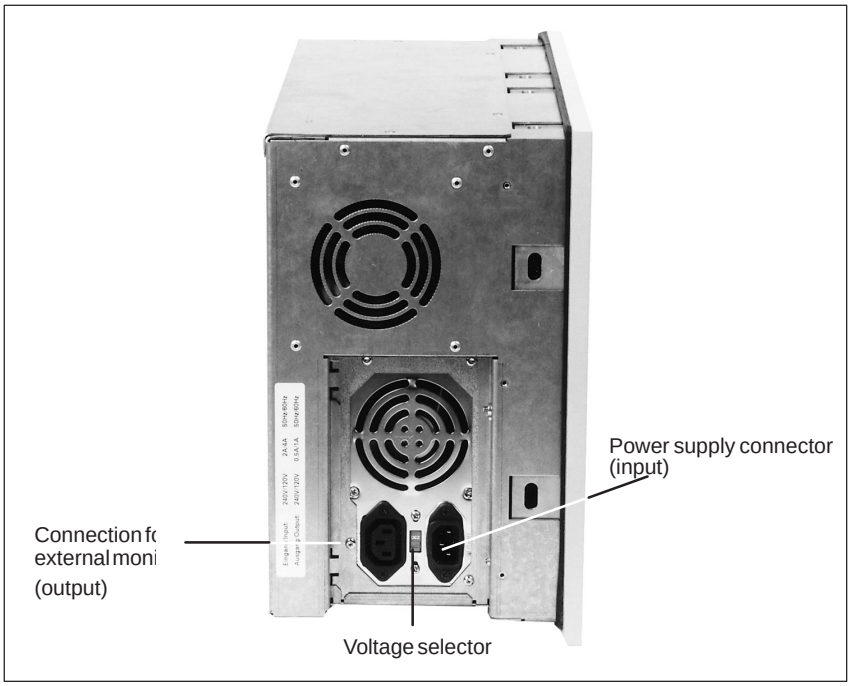


Figure 1-23 Sheet metal notches and screw on the casing

To install the power supply proceed in reverse order.

Input voltage selector

The power supply unit can be switched over from 115 V AC to 230 V AC using the red switch.

Caution

Always disconnect your IPC from the power supply before changing the voltage selector setting!

If the voltage selector is set to 115 V, and the PC is connected to a 230 V network, do not try to operate the industrial PC at 230 V! This can damage your PC.

1.4.11 Removing and installing CPU board

- Open the system unit as described in chapter 1.4.1 and remove all expansion modules (see chapter 1.4.7) and the crossbeam (see chapter 1.4.8).
- The CPU board is mounted to the rear panel of the unit by seven screws. Release these screws.
- Then pull the CPU downwards out of the casing.

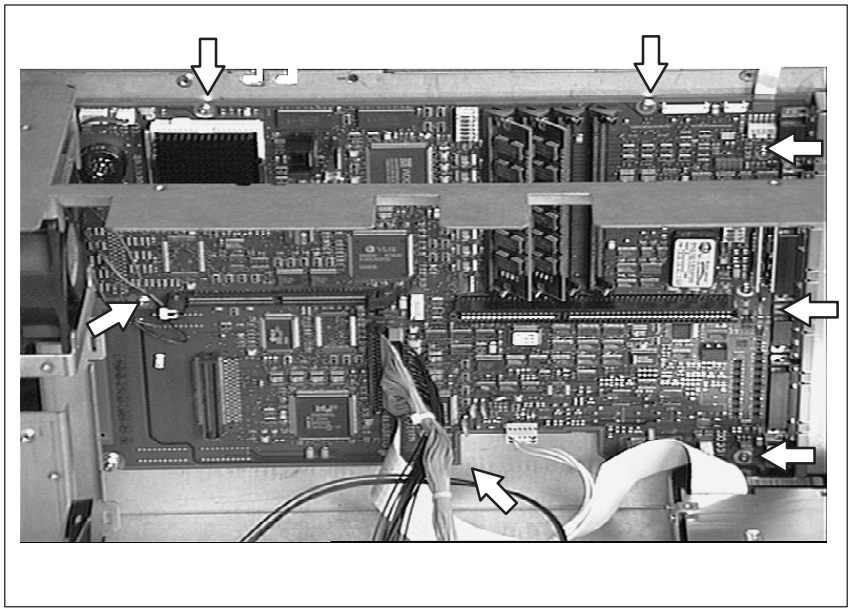


Figure 1-24 Removing CPU board

To reinstall the board or to install a new one, please proceed in reverse order.

Note

Processor and memory cards are not included with the CPU, when supplied as a spare part.

1.4.12 Connecting MPI/DP interface

Connecting a PROFIBUS-DP network via MPI/DP interface

You can connect your IPC to PROFIBUS-DP networks via the optically isolated *) MPI/DP interface. The connection is established via SINEC L2 components for stationary links or via an MPI connecting cable with a length of 5 meters for non-stationary links (Order No.: 6ES7001-0BF00-0AA0). SINEC L2 components and MPI connecting cables are not included with the IPC and have to be ordered separately. The MPI connecting cable (5m) can only be employed for data transfer rates up to 187,5 Kbps.

To connect your IPC to a PROFIBUS-DP network, proceed as follows:

1. Switch off your IPC.
2. Plug the connecting cable (of the SINEC L2 components or the MPI connecting cable) into the MPI/DP socket connector of your IPC and tighten the connector by means of screw-type locking.
3. Switch on your IPC.

Caution

Risk of damage to the unit!

Before plugging in the connecting cables, you must discharge the electrostatic charge of the cables and of your body by briefly touching a grounded object (ESD guideline).

PROFIBUS-DP network

You can network up to 32 devices (PC, PG, PLC or DP components) via the MPI/DP interface in one segment. The interconnection to the PROFIBUS-DP segments is established via an optically isolated *) RS 458 port, which is part of the interface.

Interconnect several PROFIBUS-DP segments via a repeater.

The entire PROFIBUS-DP network has a maximum capacity of 127 stations. The data transfer rate of the MPI network is 187.5 Kbps. The data transfer rate that can be achieved via MPI/DP interface in the PROFIBUS-DP network ranges from 9.6 Kbps up to 1.5 Mbps.

Note

For further information on configuring a PROFIBUS-DP network please refer to the ”S7-300 Hardware manual”, oder no.: 6ES7030-0AA00-8AA0.

*) Optically isolated within SELV circuit

1.5 List of spare parts

The most important components of your PC (e.g. CPU, drives) are listed together with their precise designation in the log. In addition to these components the following spare parts are available for your SIMATIC PC FI25:

Component	Serial number	FI25 Variant 1	FI25 Variant 2
FI25 AOI main board without processor and without RAM	C79458-L7005-B338	1	1
Bus board, 5xISA	C79451-Z1538-K1	1	1
Power supply 220W	C79451-A3479-B60	1	1
Fan	C79451-A3479-B908	1	1
Display board FI25	C79451-Z1538-K2	1	1
Monitoring module SafeCard	C79458-L7000-B126	0	1
3.5” (0.5”) floppy disk drive	C79451-Z1329-K1	1	1
3.5” IDE 1.6 GB hard disk drive	C79451-Z1423-K5	1	1
SIMM 8 MB (EDO)	C79458-Z7113-B321	0	2
SIMM 4 MB (Fast Page)	C79458-Z7101-B321	2	0
TTY X3134 Transmitter	W79036-X3134-X	1	1
TTY X3133 Receiver	W79036-X3133-X	1	1
User’s guide FI25	C79000-G7000-C790	1	1
Membrane keyboard + Front	W79451-A3479-B10	1	1
Battery 3.6V	W79084-E1003-B1	1	1
Kexboard controller FI25	C79451-Z1540-K3	1	1
TFT-Display (thin film transistor)	C79451-Z1502-K8	0	1
TFT-Inverter	C79451-Z1502-K7	0	1
TFT-Adapter	C79451-L7000-B322	0	1
Backlight tube	C79451-Z1502-K9	0	1
DSTN Display	C79451-Z1530-K5	1	0
DSTN Inverter	C79451-Z1530-K4	1	0
DSTN Adapter	C79451-L7000-B323	1	0
Backlight tube	C79451-Z1530-K6	1	0
Processor Pentium 133 Mhz	W79038-A3041-T296	1	0
Processor Pentium 166 Mhz	W79038-A3047-T296	0	1

These spare parts can be obtained in the nearest technical service department. Addresses are indicated in your PC’s user’s guide. In urgent cases please mark ”plant standstill” on your order form thus we can ensure immediate performance.

Spare parts are usually available for at least 5 years after the production of the PC has been phased out.

1.6 Error diagnostics

Table 1-1 Errors in I PC operation

Error	Cause	Remedy
Power-ON LED does not light up	• PC is switched off • • Power supply is not properly connected	• Check power supply connections, power cable and power plug
The "Invalid configuration information... Press the F1 key for continue, F2 to run Setup utility" appears on the screen	• Incorrect configuration data • Buffer battery is low or damaged	• Press "F2" key, check the configuration data in SETUP, enter any default values, and check error messages in the first SETUP menu
The "No boot device available" appears on the screen	• There is no boot diskette in the drive • Wrong hard disk drive set in SETUP	• Use the "Fixed disk function" in SETUP
"Keyboard stuck key failure" message appears	• A key has become blocked during the system keyboard self-test	• Check the keyboard • Restart the system
Booting of the PC aborted after several beeps	• An error has occured during the system self-test	• Check the hardware
Every time a key is pressed, a beep is heard and no characters appear	• Keyboard buffer overflow	• <CTRL> <PAUSE>
Not-ready message when trying to write to a diskette	• No diskette has been inserted • Diskette has not been formatted	• Insert diskette • Format diskette
Write-protect error when trying to write to a diskette	• Diskette write-protect activated • Write-protect hole open on 3.5" diskette	• Cancel write protection
"EPROM TSR Interface disabled, check Power Management" message	• "Programming Interface" has been disabled in SETUP	• Enable "Programming Interface" in SETUP under submenu "FI Hardware options"
COM1,COM2, LPT1 or MPI/DP do not respond	• Ports have been disabled in SETUP	• Enable COM1,COM2, LPT1 or MPI/DP in SETUP under submenu "FI Hardware Options".
<\> key labeling missing	• No original keyboard	• German keyboard: <ALTGr > < ß >, or <ALT> <9> <2> • International keyboard: <ALT> <9> <2>
<\> key is not displayed	• Wrong keyboard driver is being used	• Load correct keyboard driver • <ALT> <9> <2>
Mouse not working	• Trackball does not rotate • No or wrong mouse driver is used	• Clean trackball and housing • Load correct mouse driver
Mouse pointer cannot be moved	• PS/2 port has been disabled in SETUP	• Check SETUP settings
Mouse pointer moving erratically	• Trackball dirty	• Clean trackball and housing
Drive cover cannot be opened	• Filter cap not properly fixed	• Push filter cap in proper position

Motherboard

2

Chapter Overview

2.1 Components

Features of performance

The following table lists the components of the motherboard and their features:

Components	Features of components
Processor	Pentium 133/166 MHZ with integrated cooling unit in ZIF socket Prepared for Pentium 200 MHZ
Processor upgrade	Socket 7
Cache	The cache module is optionally synchronous 256 kB
Memory	64 Bit, 4 SIMM sockets, uni-/bilateral, Fast Page Mode or Extended Data Out (EDO). Usable Modules: 8 MB (2*4MB-Module), 16 MB (2*8MB-Module), 32 MB (2*16MB-Module), 64 MB (2*32MB-Module), 128 MB (4*32MB-Module) Pairs can be combined
EPROM	128kB or 256kB Flash
CMOS	114 Byte CMOS-RAM battery backed-up.
Chipset	Intel Chipset, NSC Super I/O PC87306
Grafics card	SVGA-LCD controller Cirrus GD7543 with Windows accelerator on PCI-Bus, 1MB RAM with LCD up to 800x600/64 colors, with CRT up to 1024x768/75Hz/256 colors possible
IDE	PCI bus EIDE interface with IO mode 4 for max. 4 drives
Floppy disk drive	1 drive 1,44 or 2,88 MByte
Expansion slots	4 ISA (full length) with FI25 V1 and 3 ISA (full length) with FI25 V2 1 ISA (short)
Keyboard	Membrane keyboard, port for external PS/2 keyboard (front side), for external DIN keyboard (at one side of the unit).
Mouse	PS2 mouse port
Serial	1 x V.24/TTY, 1 x V.24
Parallel	Standard, EPP and ECP mode
MPI	Multi Point Interface for SIMATIC S7

2.2 Processor

Recommended processors

Pentium 75/90/100/120/133/166/200 MHz with integrated cooling unit in ZIF socket.

Replacing the processor

Please proceed as follows:

1. First remove the cooling unit which is fixed by the help of a lifting lever.
2. Then push the lever in direction of the arrows (1) and swing it upwards until it stops (2).
3. Lift the old processor out of the slot (3).
4. Put the new processor in its socket and make sure that the marks on top of the processor have the exact position (4) as indicated on the slot (A).

Caution

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

5. Swing the lever upwards until it stops distinctly (5).
6. Fix the cooling unit with the help of the lifting lever.

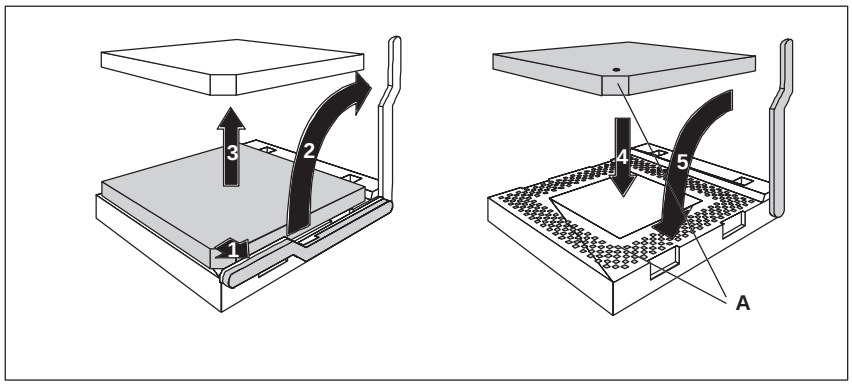


Figure 2-1 Upgrading the processor

2.3 Cache modules

Recommended cache modules

The cache module is optional synchronous 256 kB or asynchronous (COACH compatible).

Do not use any cache modules that have not been approved by your system engineering company.

Installing cache modules

Plug the optional cache module vertically into connector 23 which is protected against polarity reversal and located on the motherboard (see chapter 2.8 Position of connectors and switches). Enable the cache module under SETUP of the system's BIOS (External Cache Enabled).

2.4 Graphics interface module

Brief description

The graphics interface module of the motherboard is a planar PCI implementation i.e. the SVGA-LCD-controller Cirrus Logic GD7543 is located on the board and connected to the PCI bus. Its refresh memory has a back-up capacity of 1 MB 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	Characters x line	Characters per cell	Pixels	Display mode	Horizontal scan frequency kHz	Vertical scan frequency Hz
00/01	—	16/256K	40x25	8x8	320x200	text	31,5	70
00*/01*	—	16/256K	40x25	8x14	320x350	text	31,5	70
00+/01+	—	16/256K	40x25	9x16	360x400	text	31,5	70
02/03	—	16/256K	80x25	8x8	640x200	text	31,5	70
02*/03*	—	16/256K	80x25	8x14	640x350	text	31,5	70
02+/03+	—	16/256K	80x25	9x16	720x400	text	31,5	70
04/05	—	4/256K	40x25	8x8	320x200	graphics	31.5	70
6	—	2/256K	80x25	8x8	640x200	graphics	31,5	70
07*	—	mono	80x25	9x14	720x350	text	31,5	70
07+	—	mono	80x25	9x16	720x400	text	31,5	70
0D	—	16/256K	40x25	8x8	320x200	graphics	31,5	70
0E	—	16/256K	80x25	8x8	640x200	graphics	31,5	70
0F	—	mono	80x25	8x14	640x350	graphics	31,5	70
10	—	16/256K	80x25	8x14	640x350	graphics	31,5	70
11	—	2/256K	80x30	8x16	640x480	graphics	31,5	60
12	—	16/256K	80x30	8x16	640x480	graphics	31,5	60
13	—	256/256K	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	Characters x line	Characters per cell	Bildschirm 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
5D	104	16/256K	128x48	8x16	1024x768	78,75	60	75
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
60	105	256/256K	128x48	8x16	1024x768	78,75	60	75
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
66	110	32K†	—	—	640x480	25	31,5	60

Mode No. (hex)	VESA No. (hex)	Colors	Charac-ters x line	Charac-ters per cell	Bildschirm Format	Dot Clock MHz	Horizon-tal scan frequency kHz	Vertical scan frequency Hz
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	Characters x line	Characters per cell	Display format	Type of flat screen	Dot Clock MHz	Min. MCLK MHz	VCC in Volt
5E	100	256/256K	80x25	8x16	640x400	DSTN/TFT	25	45	3.3
5F	101	256/256K	80x30	8x16	640x480	DSTN/TFT	25	45	3.3
64	111	64K	—	—	640x480	DSTN/TFT	25	45	3.3
66	110	32K†	—	—	640x480	DSTN/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	Charact. x line	Charact. per cell	Display-format	Expansion 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	Characters x line	Characters 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	Characters x line	Characters 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)

2.5 Memory

Memory configuration

64 Bit, 4 uni- or bilateral SIMM sockets, Fast Page Mode or Extended Data Out (EDO) are provided. Only use SIMM cards with an access time of 60 ns or lower!

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

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

Recommended memory expansion cards:

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

Only plug memory cards of the same type and brand into an expansion slot!

Memory configuration	Memory cards in expansion slot 1/2	Memory cards in expansion slot 3/4
8 MB	empty	2 * 4 MB
16 MB	empty	2 * 8 MB
16 MB	2 * 4 MB	2 * 4 MB
32 MB	empty	2 * 16 MB
32 MB	2 * 8 MB	2 * 8 MB
64 MB	empty	2 * 32 MB
64 MB	2 * 16 MB	2 * 16 MB
128 MB	2 * 32 MB	2 * 32 MB

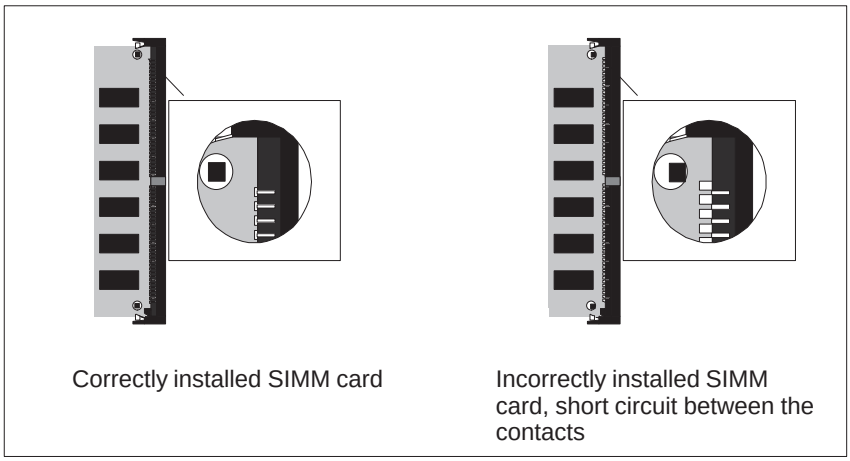
Replacing/ upgrading memory cards

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 included user's guide and read carefully the ESD guidelines!

1. Disconnect the device from the (external) power source.
2. Switch off the device.
3. Unscrew the housing and remove the cover (it is not necessary to remove the two screws on top of the front, just unscrew them far enough).
4. Remove all plugged ISA- and PCI modules.
5. Remove the bus module (start with unscrewing the 5 screws which are accessible from their tops using a Torx screwdriver, then lift the module and pull it out of its motherboard socket).
6. Plug or unplug the SIMM cards as described below. Plug in from the right to the left slot, unplug in reverse order.
7. Make sure that the cards are correctly plugged in as shown in figure 2-2.
8. Reassemble the unit in reverse order.



Correctly installed SIMM card

Incorrectly installed SIMM card, short circuit between the contacts

Caution

Risk of short circuit!

The SIMM cards have to be installed properly, otherwise the motherboard 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 (1). 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 (2).

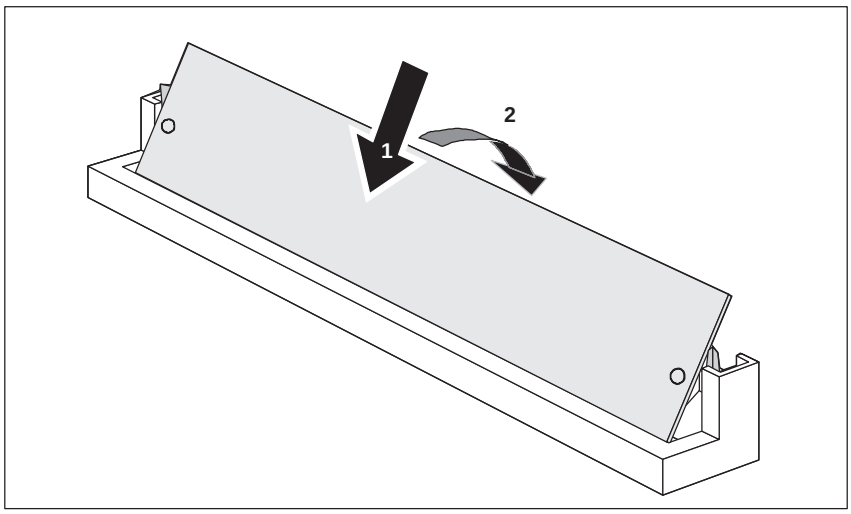


Figure 2-2 Install memory card

Remove memory card

Proceed as follows to remove a memory card:

1. Press the holding clips on the left and right side carefully outwards (1).
2. Tilt the memory card forward (2) and pull it diagonally out of the slot (3).

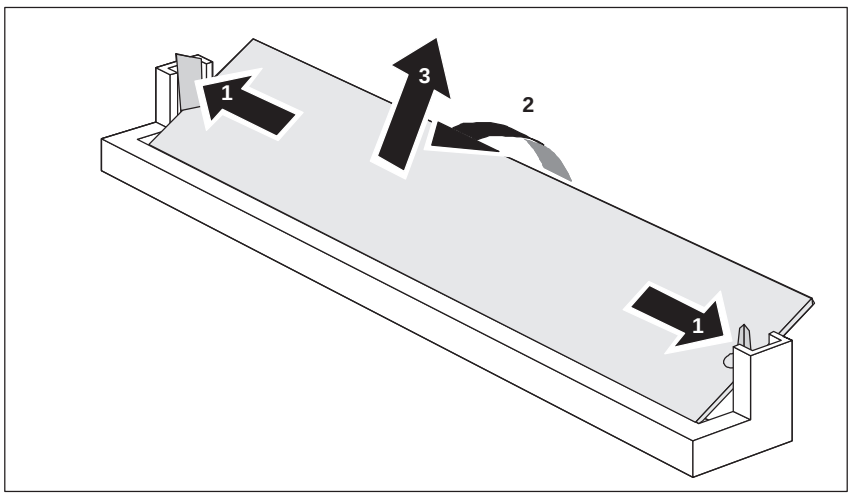


Figure 2-3 Remove memory card

2.6 Changing the back-up battery

Battery Power Supply for Real-Time Clock and Configuration

A back-up 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 back-up 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 back-up 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.

To change the battery, please proceed as follows:

1. Disconnect the device from the (external) power source; then disconnect all connecting cables.
2. Open the unit as described in chapter 1.4.
3. Remove the drive support.
4. Now replace the back-up battery, which is attached to the motherboard by a short length of a cable.
5. 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 used batteries 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 back-up battery, you have to reset your PC's configuration data using the SETUP program.

2.7 Block diagram of the motherboard

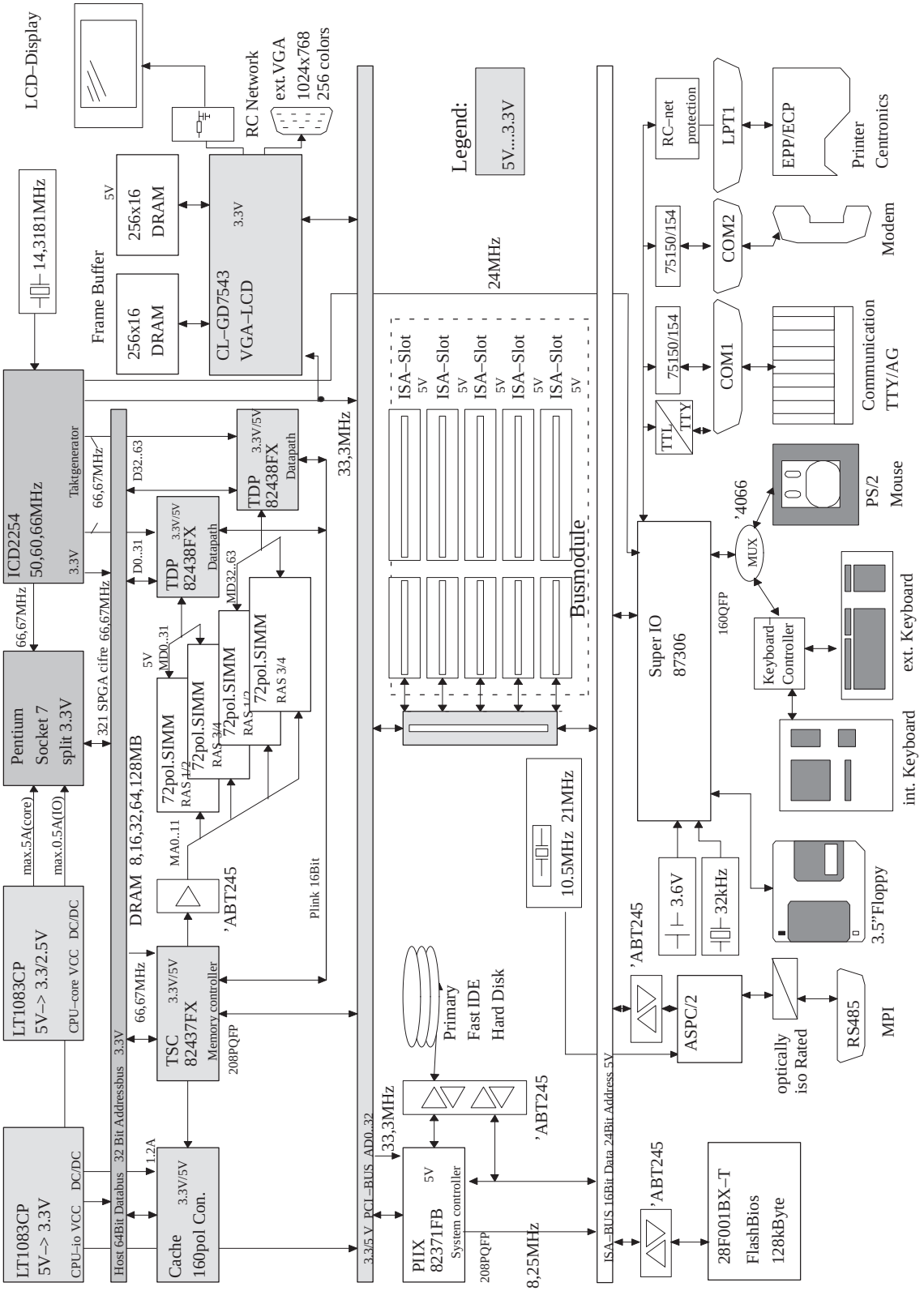


Figure 2-4 Motherboard

2.8 Hardware ports

Position of connectors and switches

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

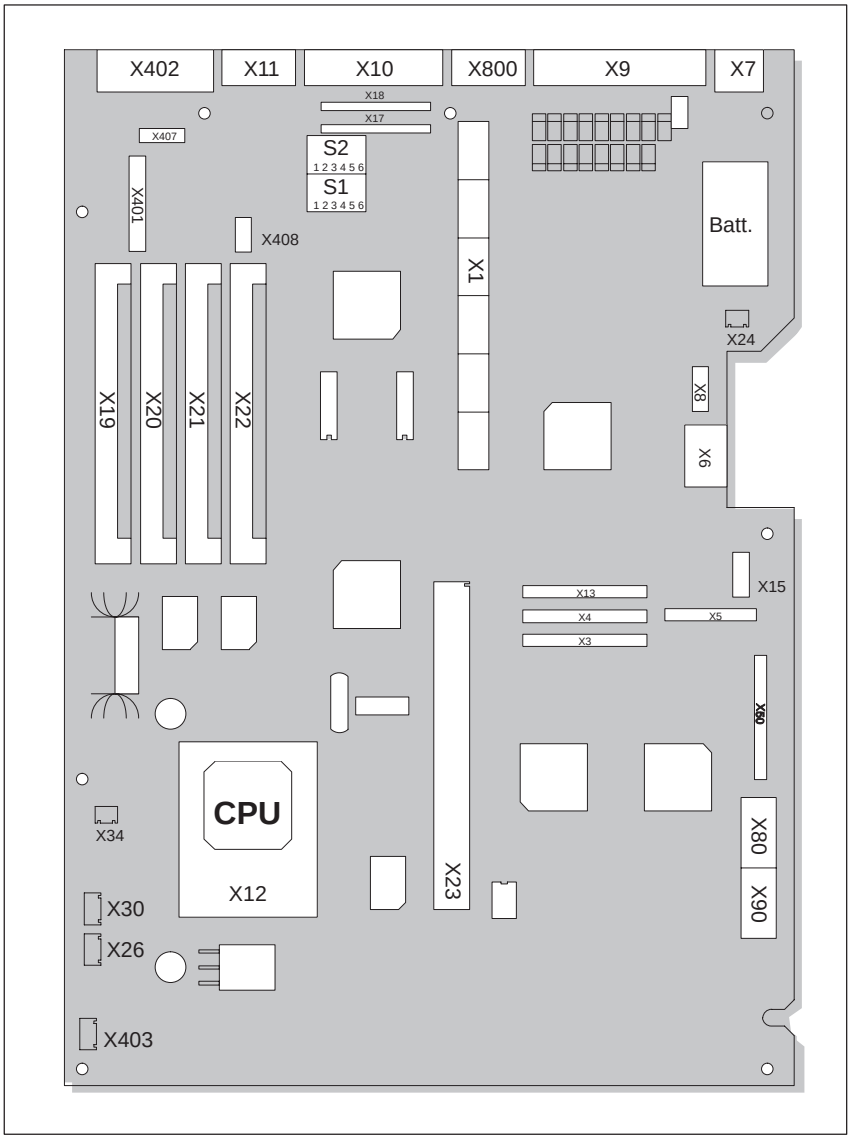


Figure 2-5 Motherboard

Connectors on the motherboard

The following connectors are located on the IPC's motherboard:

Designation	Name	Description
X1	Slotbus	ISA/PCI connector linking motherboard (GBG) and bus module (BBG)
X4	IDE primary	primary IDE port standard ribbon cable
X5	Floppy Disk	Floppy Disk port
X7	Mouse port	MINI DIN PS/2 mouse connector
X8	Keyboard port	Port for keyboard controller
X9	LPT	Parallel port LPT1/printer port (25-pin Centronics)
X10	Com1	Serial port 1 (25-pin)
X11	Com2	Serial port 2 (standard 9-pin)
X12	CPU	Processor with cooling unit (Pentium Socket 7)
X13	Power	16-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	RAM bank 1,2 low	Socket for RAM
X20	RAM bank 1,2 high	Socket for RAM
X21	RAM bank 3,4 low	Socket for RAM
X22	RAM bank 3,4 high	Socket for RAM
X23	2ndlevel cache	Socket for CACHE module
X24	Battery	Connector for lithium battery
X26	Fan	Fan port +12V
X30	Fan	Fan port +12V
X34	(plug–in) jumper	Selects processor type
X401	Display	Port for flat screen
X402	VGA	Standard-VGA (15-pin)
X403	VCC inverter	Port for inverter module
X407	Contrast	Contrast control port
X408	VCC Display	Power supply for display port
X800	MPI	MPI port
S1	Switch 1	Display type
S2	Switch 2	CPU clock, FlashEPROM, TTY port

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) 360kB, 720kB, 1,2MB, 1,44MB 3F0h-3F7h, 370h-377h, disconnectable IRQ 6, edge triggered 26-pin,
IDE hard disks	X4	capacity of two drives 170h-177h, 1F0h-1F7h, disconnectable IRQ14, IRQ15, edge triggered 40-pin standard connector
COM1	X10	3F8h-3FFh, disconnectable IRQ4, edge triggered 25-pin, socket connector, V24/V28, TTY
COM2	X11	2F8h-2FFh, disconnectable IRQ3, edge triggered 9-pin, standard connector
LPT1/PRINTER	X9	378h-37Fh, disconnectable IRQ7, edge triggered 25-pin, standard socket connector
VGA	X402	3B0h-3BFh, 3C0h-3CFh, 3D0h-3DFh, disconnectable IRQ9, edge triggered 15-pin, standard connector
Mouse	X7	060h-064hIRQ12, edge triggered 6-pin, mini Din socket
MPI/DP	X800	0CC000h-0CC7FFn or 0DC000h-0DC7FFh IRQ5, 9-pin, D-Sub-socket connector

Switch position

S1 Display type and bus clock.

S1 (3)	S1 (2)	S1 (1)	Function
on	on	on	800x600 DSTN 1)
on	on	off	800x600 TFT special
on	off	on	640x480 DSTN 1)
on	off	off	640x480 TFT special
off	on	on	800x600 DSTN 2)
off	on	off	640x480 TFT
off	off	on	640x480 DSTN 2)
off	off	off	800x600 TFT (standard setting)

1) full color selection
2) reduced color selection

S1 (6)	S1 (5)	S1 (4)	Function
x	x	on	VGA Disabled
x	x	off	Onboard VGA (standard setting)
x	on	x	Clockratio CPU–BUS/-CORE 1/2
x	off	x	Clockratio CPU–BUS/-CORE 2/3
on	x	x	Clockratio ISA/PCI 1/4
off	x	x	Clockratio ISA/PCI 1/3

S2 (2)	S2 (1)	Function
on	on	active TTY port (standard setting)
x	off	TTY transmission loop separate from current source (passive setting)
off	x	TTY receiving loop separate from current source (passive setting)

S2 (4)	S2 (3)	Function
on	off	Hardware in normal operation (standard setting)
x	on	Boot-EPROM disabled (Boot module necessary)
off	x	Disable Boot block; ROM-pages are swapped at 32 kByte

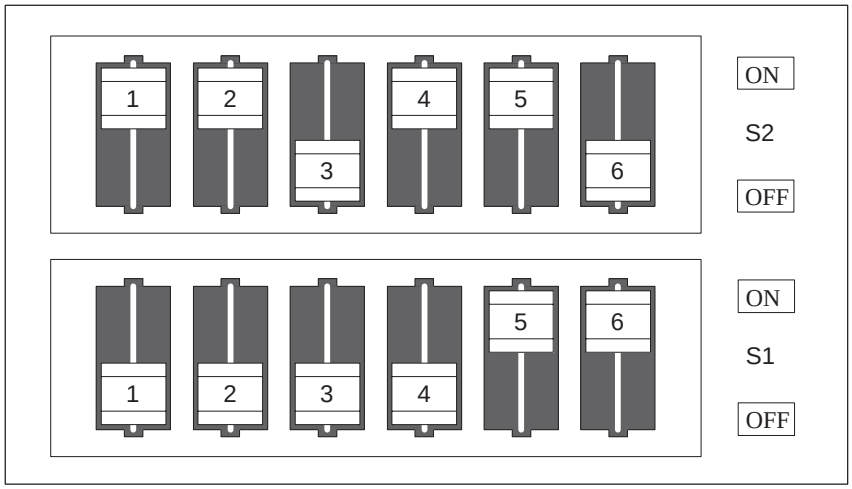


Figure 2-6 Standard setting for switches S1 (1..6) and S2 (1..6) for 133 MHz Pentium-CPU

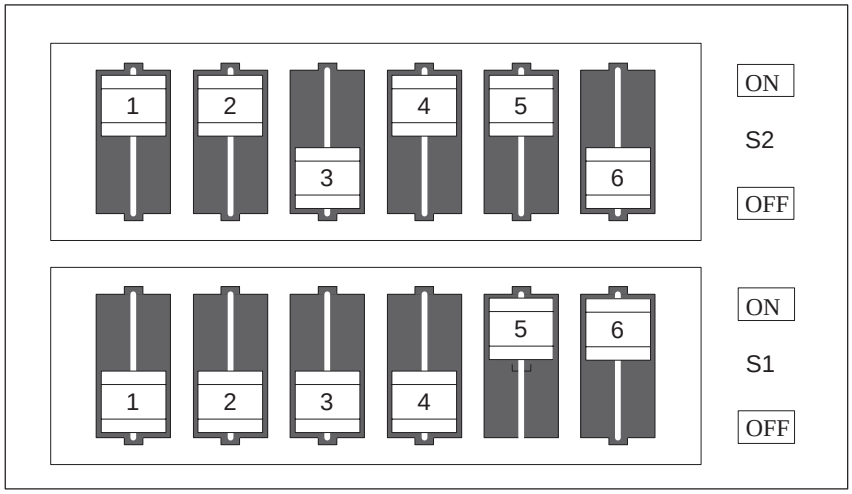


Figure 2-7 Standard settings for switches S1 (1..6) and S2 (1..6) for 166 MHz Pentium CPU, jumper X34 closed

Clock setting

Jumper X34	S2(6)	S2(5)	S1(6)	S1(5)	ISA bus clock	PCI bus clock	CPU bus clock	CPU core clock (CPU internal)
open	**off**	**on**	**on**	**on**	**8.25MHz**	**33MHz**	**66MHz**	**133MHz**
open	on	off	on	on	7.50MHz	30MHz	60MHz	120MHz
open	on	on	off	on	8.33MHz	25MHz	50MHz	100MHz
open	**off**	**on**	**on**	**off**	**8.25MHz**	**33MHz**	**66MHz**	**100MHz**
open	on	off	on	off	7.50MHz	30MHz	60MHz	90MHz
open	on	on	off	off	8.33MHz	25MHz	50MHz	75MHz
closed	off	on	on	on	8.25MHz	33MHz	66MHz	166MHz
closed	off	on	on	off	8.25MHz	33MHz	66MHz	200MHz

COM1 port (AG/V24/modem)

The port is designed for V.24/TTY.

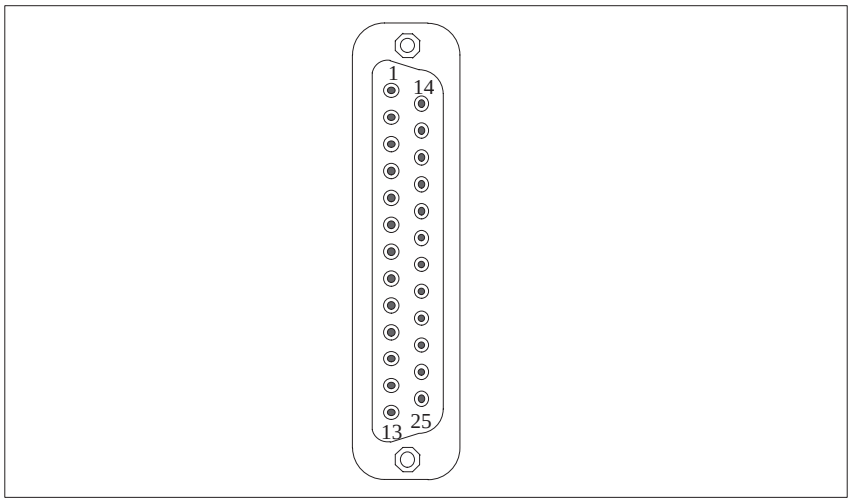


Figure 2-8 Serial port COM1

Pin–No.	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	
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 (V.24/mouse)

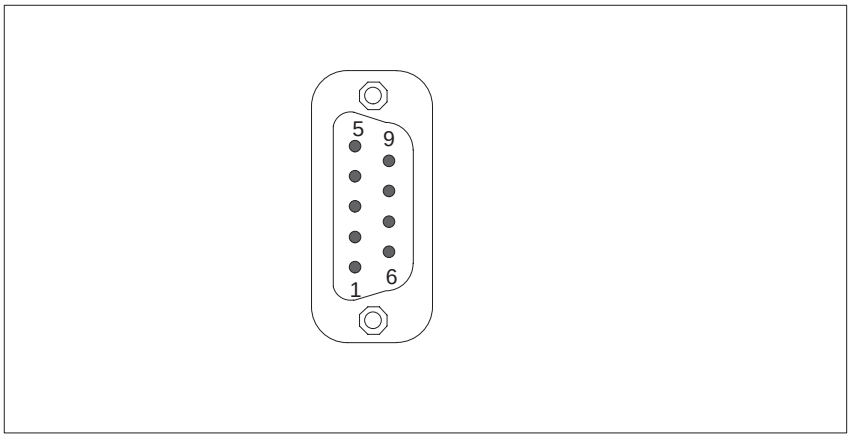


Figure 2-9 Serial port COM 2

Signal designation

Pin	Signal designation	Description
1	DCD (Data Carrier Detect)	Data Carrier Detect
2	RxD (Receive Data)	Receive Data
3	TxD (Transmit Data)	Transmit Data
4	DTR (Data Terminal Ready)	Data Terminal Ready
5	Signal Ground	Signal Ground
6	DSR (Data Set Ready)	Data Set Ready
7	RTS (Request to Send)	Request to Send
8	CTS (Clear to Send)	Clear to Send
9	Ri (Ring Indicator)	Incoming call

LPT1 / Printer port

The parallel port offers two transmisison modes: unidirectional and bidirectional. The SPP mode (Standard Parallel Port) is the standard mode which is usually used to trigger or address a printer. EPP (Enhanced Parallel Port) is a transmission mode which permits data transfer rates of 2 up to 2.4 Mbytes/s. Such rates demand I/O devices which support these new modes.

The new modes are applied in cases like e.g. the conversion of parallel port to an SCSI or to an IDE port. Each mode has an individual pinout.

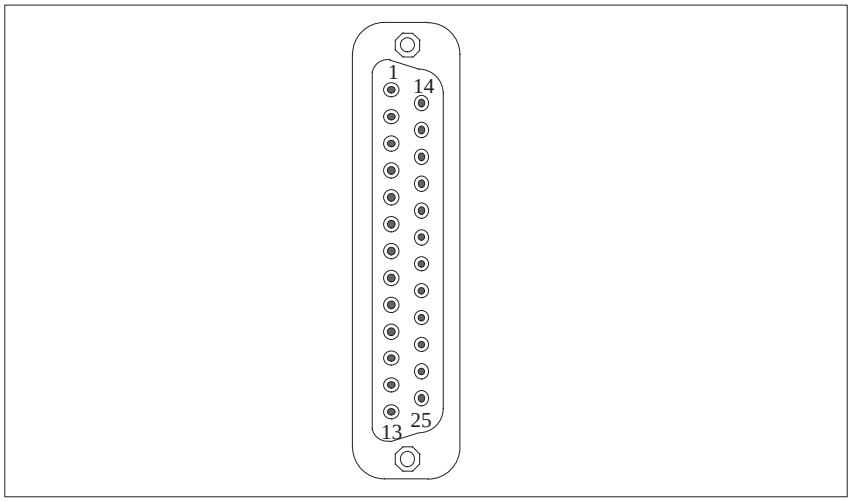


Figure 2-10LPT 1 parallel port

Signal description SPP mode

Pin-No	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:

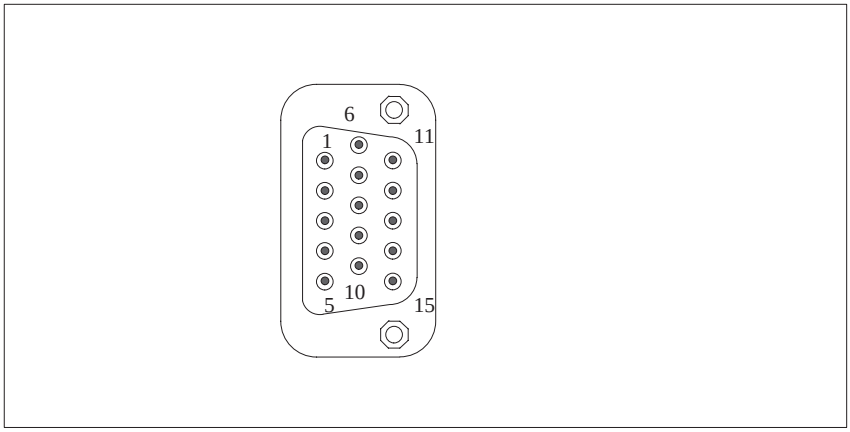


Figure 2-11 VGA socket connector

Pinout

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

Connecting an external keyboard

You can connect an external PS/2 keyboard to the front of your IPC. The connector has the following pinout:

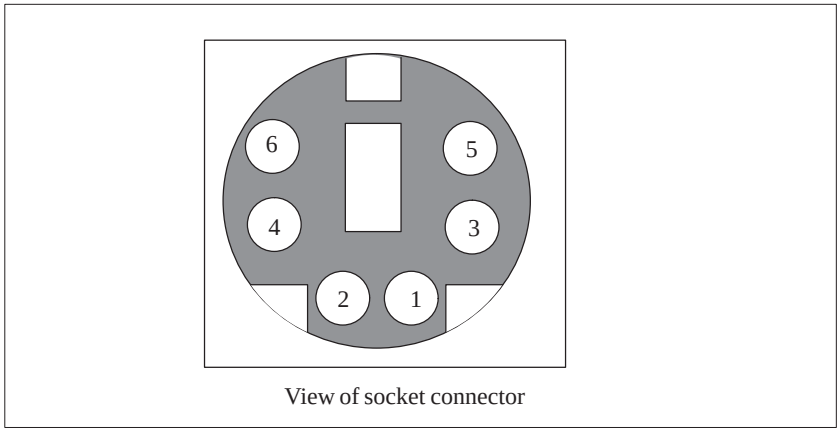


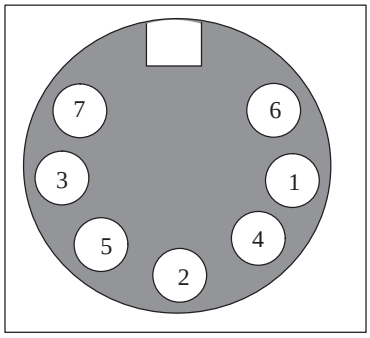
Figure 2-12 Connecting cable for external keyboard

Pinout

Pin	Description
1	Keyboard data line
2	open
3	0 V
4	+5 V
5	Keyboard clock line
6	open

Connecting an external keyboard

You can connect an external MF-II keyboard to one side of your IPC. The connector has the following pinout:



View of the socket connector

Figure 2-13Connecting cable for external keyboard

Pin	Description
1	Keyboard clock line
2	Keyboard data line
3	open
4	0 V
5	5 V
6	open
7	open

Connecting PS/2 mouse

You can connect an external PS/2 mouse to your IPC. The connector has the following pinout:

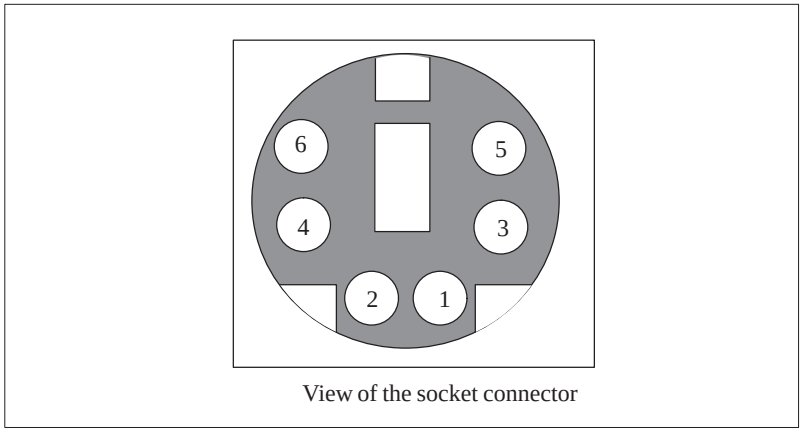


Figure 2-14Connecting PS/2 mouse

Pinout

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

MPI/DP port

The MPI/DP socket connector has the following pinout:

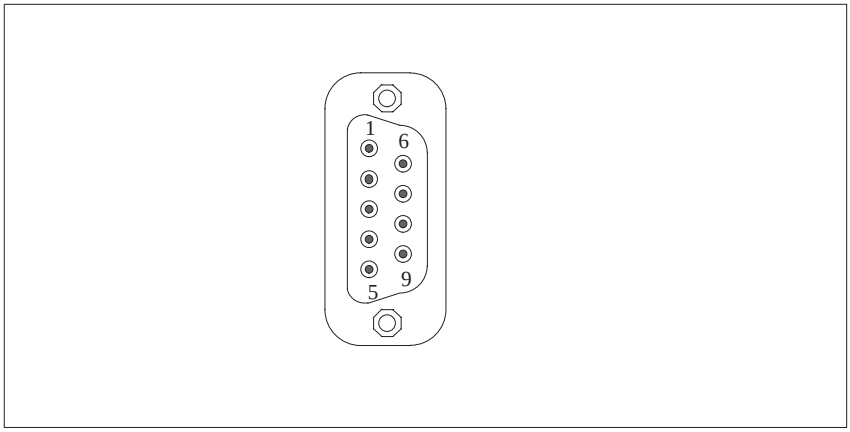


Figure 2-15MPI/DP socket connector

Pinout

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

2.9 Hardware addresses

How memory decoding works

The memory address area of a Pentium CPU has a capacity of 4 Gbyte. 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 kByte) and from 0010 0000h to 07FF FFFFh (127 MByte) are not included.

The ISA bridge maps the ISA address bus exactly one time 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 MByte).

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 MByte ISA address area.
If the CPU references address areas which are occupied by the main memory, ISA bus control signals do not occur i.e. ISA bus modules within this memory area are not referenced. In the reverse case an ISA bus master cannot reach addresses higher than 16 MByte. Different decoding holes in the Pentium PG motherboard are provided for Dualport RAM extensions in order to gain a larger address area than the memory address area with a maximum range from 640kByte to 1 MByte:

- The CPU address area from FFF8 0000h to FFFD FFFFh (512 k to 128 k BIOS = 384 Kbyte) 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 motherboard.
- A 1MByte memory address area can be assigned to the ISA bus in the 16th MByte. This option can be activated or deactivated during 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 inidvidual functional groups for more details.

IO address assignments

The following table shows the IO address assignments.

Address		Size	Description	
from	**to**	**byte**	**Basic function**	**Additional functions**
0000	000F	16	PiiX DMA 1	
0020	0021	2	PiiX PIC 1 (Interrupt Controller)	
002E	002F	2	Configuration port Ultra I/O	
0040	0043	4	PiiX Timer1 (SW-clock/refresh/speaker)	
0060	0060	1	Keyboard controller date	
0061	0061	1	PiiX NMI, Speaker control	
0063	0063	1	PG configuration port write only	
0064	0064	1	Keyboard controller CMD/STATUS	
0070	0070	1	PiiX NMI enable, RTC Index	
0071	0071	1	RTC Date	
0080	008F	16	PiiX DMA–Page Register	
00A0	00A1	2	PiiX PIC2 Interrupt controller	
00B2	00B3	2	PiiX Power management control, status	
00C0	00DE	31	PiiX DMA 2	
00F0	00F0	1	Reset numeric error	
0100	010F	16	SINEC H1 expansion card	usually free
0170	0177	8	Secondary IDE channel	
01F0	01F7	8	Primary IDE channel	
0200	020F	16	Game I/O expansion card	usually free
0278	027B	4	LPT 2 unassigned	
02F0	02F7	8	GBIP adapter expansion card	usually free
02F8	02FF	8	COM2	
0300	032B	32	unassigned	
032C	032F	32	Monitoring module	usually free
0320	033F	32	unassigned	(XT hard disk), SCSI adapter (AHA1540B)
0340	035F	8	HighGraph (CPU-)host interface expansion card	usually free
0360	036F	16	PC-Net expansion card	usually free
0370	0375	16	Secondary Floppy	unassigned
0376	0376	1	Second IDE command	
0377	0377	1	Second IDE status	
0378	037F	8	LPT 1	
0380	038F	16	SDLC 2 expansion card	usually free
03A0	03AF	16	SDLC 1 expansion card	usually free
03B0	03BB	12	Monochrome monitor card / VGA	
03BC	03BF	4	LPT x unassiged	unassigned
03C0	03CF	16	VGA control register	
03D0	03DF	16	CGA / VGA control register	

Address		Size	Description	
from	**to**	**byte**	**Basic function**	**Additional functions**
03E0	03E1	2	PCMCIA controller can be switched off in Setup	then free
03E8	03EF	2	COM 3 unassigned	
03F0	03F5	6	Primary Floppy on board	
03F6	03F6	1	Primary IDE-command	
03F7	03F7	1	Primary IDE-status / Floppy Change	
03F8	03FF	8	COM 1 / TTY	
0400+	LPT1	8	ECP LPT	
04D0	04D1	2	PiiX PIC 1,2 Interrupt controller edge/level control	
0CF8	0CFB	4	PCI config index (TSC)	0CF9h PiiX- CPU system reset
0CFC	0CFF	4	PCI config data (TSC)	
FCF0	FCF2	2	Bus Master Interface prim.IDE register Command & Status	
FCF4	FCF7	4	Bus Master Interface prim. IDE register Memory Descriptor Table Base Address	
FCF8	FCFA	2	Bus Master Interface prim. IDE register Command & Status	
FCFC	FCFF	4	Bus Master Interface prim. IDE register Memory Descriptor Table Base Address	

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 aystem memory	
0008 0000	0009 FBFF	127k	conventional aystem memory extended	via Setup ISA-Memory
0009 FC00	0009 FFFF	1k	conventional aystem memory extended BIOS data	via Setup ISA-Memory
000A 0000	000A FFFF	64k	VGA graphics refresh memory	shared SMM for Power management
000B 0000	000B 7FFF	32k	Monochrome graphics/text refresh memory	shared SMM for Power management
000B 8000	000B FFFF	32k	VGA graphics/text refresh memory	shared SMM for Power management
000C 0000	000C BFFF	48k	VGA-BIOS-expansion	
000C C000	000C C7FF	2k	MPI when enabled	via EMM High Dos Memory
000C C800	000C FFFF	12k	ISA memory usually BIOS expansion	via EMM High Dos Memory
000D 0000	000D FFFF	64k	PCMCIA when enabled, usually BIOS expansion	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	System BIOS Boot Block	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 expansion	
FFF8 0000	FFFD FFFF	384 k	ISA memory, DualPort memory application	
FFFE 0000	FFFF FFFF	128k	System BIOS (mirrowed from 000E 0000 to 000F FFFF)	

2.10 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/ECP) 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	secondary IDE interface (only necessary for special configuration versions) can be enabled via Setup

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

2.11 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 MB, 31/2	1.2 MB; 720 KB; 360 KB; 2,88 MB
Diskette B	Not installed	1,2 MB; 720 KB; 360 KB; 1.44 MB; 2.88 MB
IDE Adapter O Master	C: 1.6 GB	User, 1 - 14, RSRV, 16 - 39
IDE Adapter O Slave	None	User, 1 - 14, RSRV, 16 - 39
IDE Adapter 1 Master	None	User, 1 - 14, RSRV, 16 - 39
IDE Adapter 1 Slave	None	User, 1 - 14, RSRV, 16 - 39
Video System	EGA/VGA	
Memory Cache		
Cache	Enabled	Disabled
Cache system BIOS area	Enabled	Disabled
Cache video BIOS area	Enabled	Disabled
Memory Shadow		
System shadow	Enabled	
Video shadow	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
FI HW Options	Addr.	Addr.
Configure MPI address range	CC00	DC00, 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-Mode, ECP-Mode
CRT/LCD selection	SIMULTAN	LCD enabled / CRT enabled
CRT 640 x 480	75	72, 60
CRT 800 x 600	75	72, 60, 56

Menu item	Standard	Optional
CRT 1024 x 768	72	interlaced, 60, 70, 72
LCD Screensize	EXPANDED	Normal
Trackball / PS2 Mouse	External	Internal , Disabled
Advanced		
PCI-Devices		
Slot#1		
Enable Master	Enabled	Disabled
Default Latency Timer	Yes	No
Latency Timer	0040	0 - 280H in steps of 8
Plug & Play O/S	No	Yes
Reset Configuration Data	No	Yes
Diskette controller	Enabled	Disabled
Local Bus IDE Adapter	Primary	Disabled, Primary
Large Disk Access Mode	DOS	Other
VGA Interrupt	Disabled	Enabled
Memory Gap at 15. MByte	Disabled	Enabled
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 Acces	Supervisor	User
Fixed disk boot sector	Normal	Write protected
Power		
APM	Enabled	Disabled
Power Savings	Disabled	Customize, Maximum, Medium, Minimum
Power Saving with customize		
Standby Timeout	Disabled	2, 15, 30 min, 1, 2, 3, 4h
Suspend Timeout	Disabled	2, 15, 30 min, 1, 2, 3, 4h
Standby CPU-Speed	Med	Low, High, Max
Fixed Disk Timeout	Disabled	1, 2, 3, 4, 5, 10, 16 min
CRT Timeout	Off in Standby	On
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 Version 4.05
Copyright 1985-1995 Phoenix Technologies Ltd., All Rights
Reserved.


SIEMENS PC FI V03.0

CPU = Pentium  100 MHz
0000640K System RAM Passed
0015360K 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:

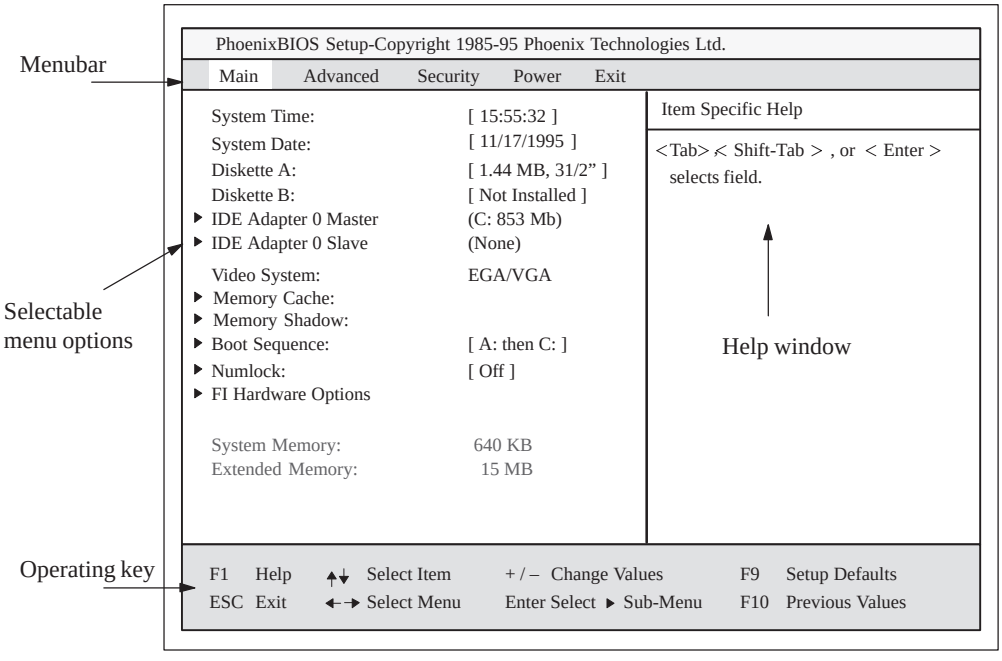


Figure 2-16SETUP main menu

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 e.g. password
Power	Define power management functions
Exit	Save settings and exit SETUP

2.11.1 Main Menu

Overview

The main menu has the following structure:

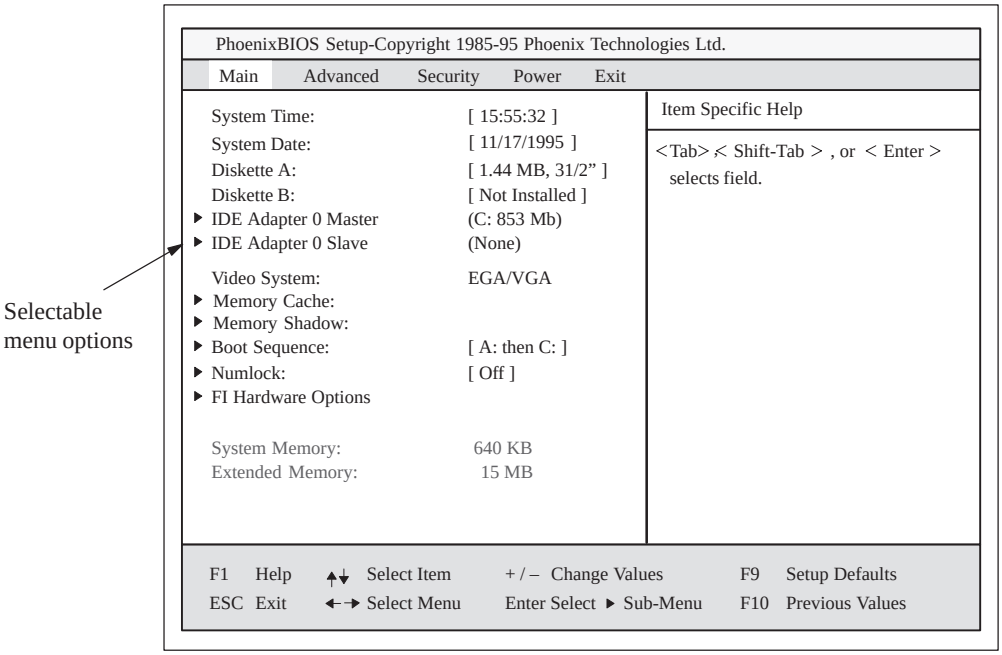


Figure 2-17SETUP Main Menu

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 installed floppy disk drive
Submenus	
IDE Adapter	Sets type of installed hard disk drives
Video	Displays monitor settings
Memory cache/ shadow	Sets memory options
Boot sequence/ Numlock	Sets boot options
FI Hardware Options	Sets 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 (e.g. 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 KB,5 1/4”]	
[1.2 MB,5 1/4”]	
[720 KB,3 1/2”]	
[1.44 MB, 3 1/2”]	Standard setting for installed floppy disk drive A
[2.88 MB, 3 1/2”]	

IDE Adapter
Hard disk drive

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

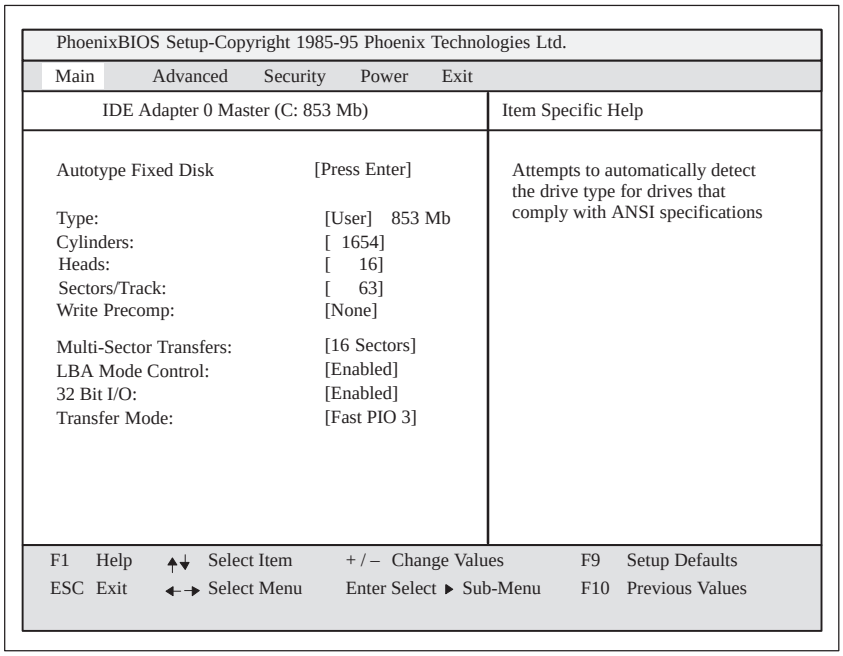


Figure 2-18 Submenu ”Hard disk drive IDE Adapter”

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-existing 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.

In the standard configuration of your PC only one hard disk drive connected to IDE adapter 0 is set as master. The setting of the option Type for all other hard disks is [none].

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 Transfers

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

A hard disk capacity higher than 528 MByte 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.

32 Bit-IO

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

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

Transfer Mode

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.

```
Standard         up to a maximum of 2 Mbyte/s
Fast PIO 1       up to a maximum of 4 Mbyte/s
Fast PIO 2       up to a maximum of 5 Mbyte/s
Fast PIO 3       up to a maximum of 10 Mbyte/s
```

We recommend to use the Autotype function. Only use the manual setting option to set old hard disks without IDE features.

Depending on the operating system used e.g. 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

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

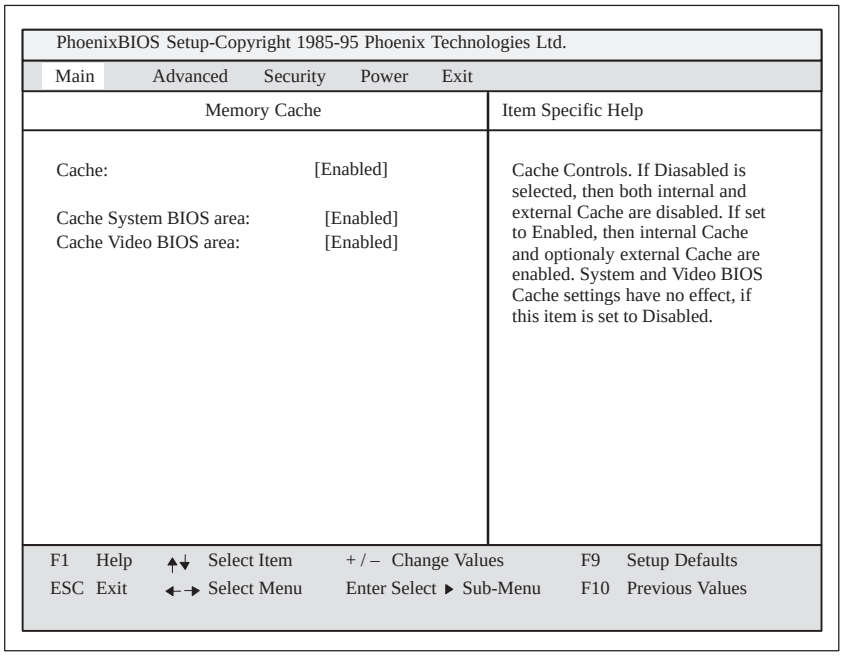


Figure 2-19 Submenu "Memory Cache"

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.

Memory Shadow

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

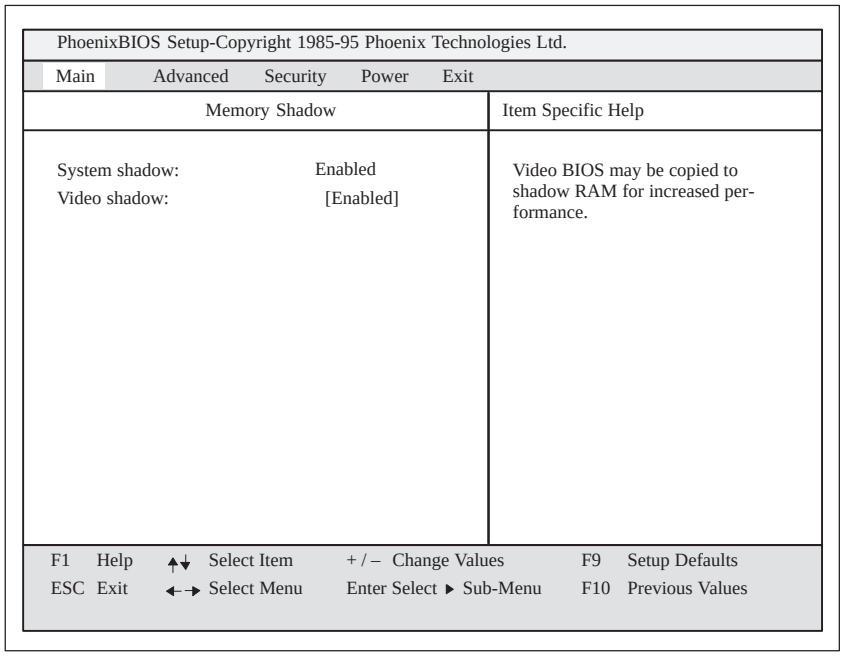


Figure 2-20 Submenu "Memoy Shadow"

Some parts of the EPROM e.g. those which contain PowerOnSelfTests and the BasicInOutputSystem are copied into the dRAM memory (shadow memory) providing faster access. System Shadow is always enabled because the System BIOS is always copied into the faster RAM.

Video Shadow enabled	copies the BIOS expansion for display output in the RAM
Video shadow disabled	does **not** copy the BIOS expansion for display output in the RAM

These settings are only valid if an extended VGA graphics interface is used.

Boot sequence

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

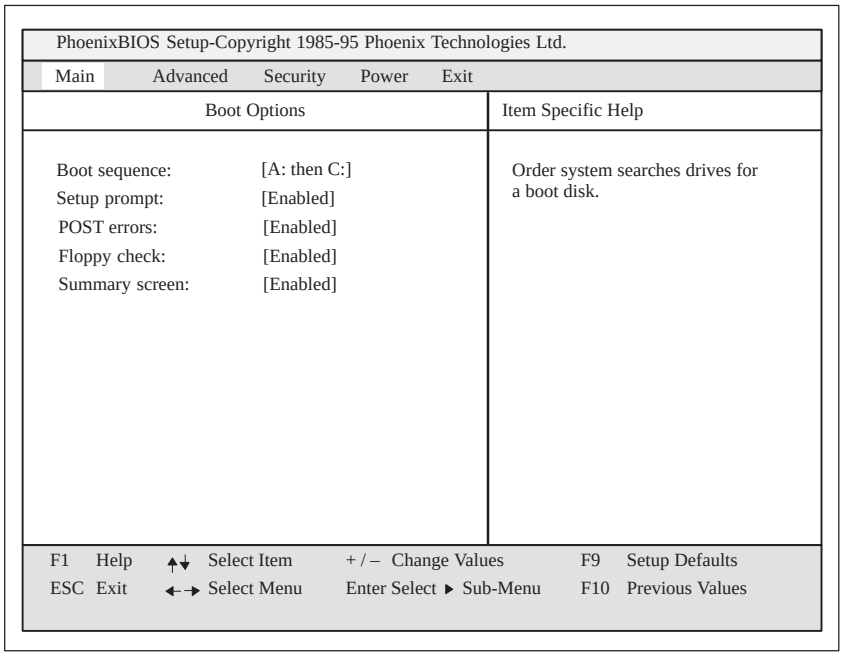


Figure 2-21 Submenu "Boot Options"

Boot sequence	sets the boot sequence.. 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 1985-95 Phoenix Technologies Ltd.

CPU [100MHz]:	Pentium	System ROM:	F28C – FFFF
Coprocessor:	Installed	BIOS Date:	11/14/95
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:	853 Mb	Diskette A:	1,44 MB, 31/2 ”
Hard Disk 1:	None	Diskette B:	None
Hard Disk 2:	None		
Hard Disk 3:	None		

Numlock

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

PhoenixBIOS Setup-Copyright 1985-95 Phoenix Technologies Ltd.

Main Advanced Security Power Exit

Keyboard Features		Item Specific Help
Numlock:	[Off]	Selects Power-on state for Num-lock
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 2-22 Submenu ”Keyboard Features”

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

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

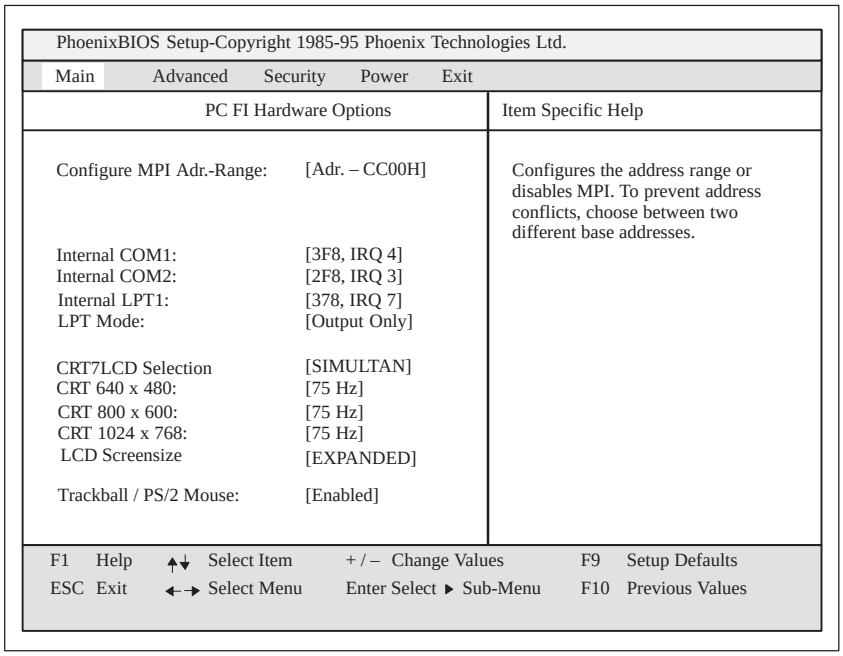


Figure 2-23 Submenu ”PC FI Hardware Options”

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

Configure MPI Addr. Range	Address area of the MPI which is referenced. ”0CC00H” ”0DC00H” are memory addresses. MPI covers an address area of 2 kByte. ”Disabled” releases the address area.	
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 or EPP support
	EPP	EPP support
	ECP	ECP 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 640 x 480 resolution is expanded to the size of the screen.
	Normal:	With TFT, 640 x 480 is imaged; that is, a smaller picture

Trackball / PS/2 Mouse	Internal	PS/2port is enabled. IRQ 12 is occupied.
	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

2.11.2 Advanced Menu

Menu structure

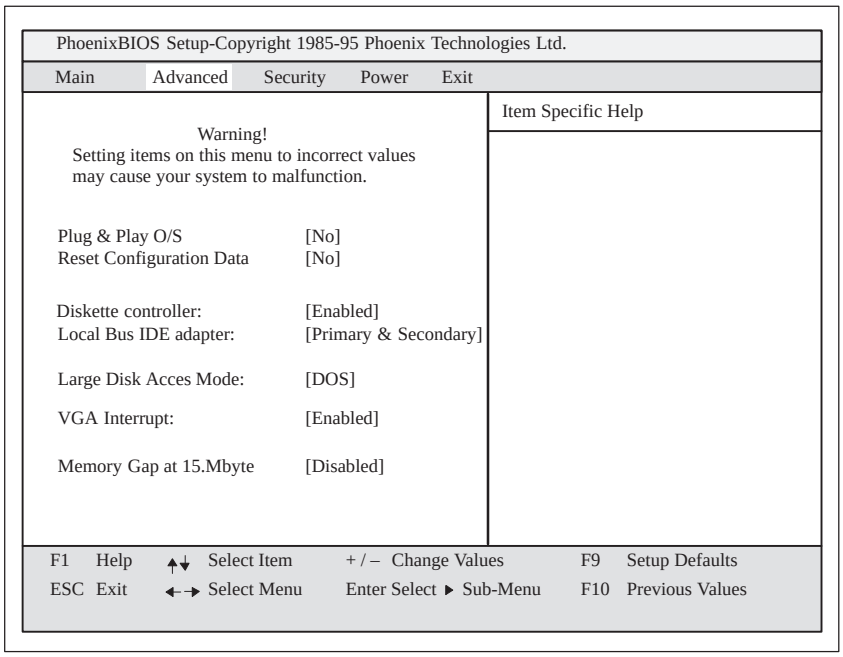


Figure 2-24Menu "Advanced"

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 motherboard.
Local Bus IDE adapter	[Primary] One IDE interface for a max. of two drives [Primary and Secondary] Two IDE interfaces for a max. of 4 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] [Disabled]	IRQ 9 is reserved for the VGA card. IRQ 9 is reserved for other devices.
Memory Gap at 15. Mbyte	[Disabled]	The ”on–board RAM memory” is completely available.
	[Enabled]	A 1MByte area of the HSP address area from 15MByte onward (addresses F0 0000–FF FFFF) can be used by ISA bus supplementary modules.

2.11.3 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.

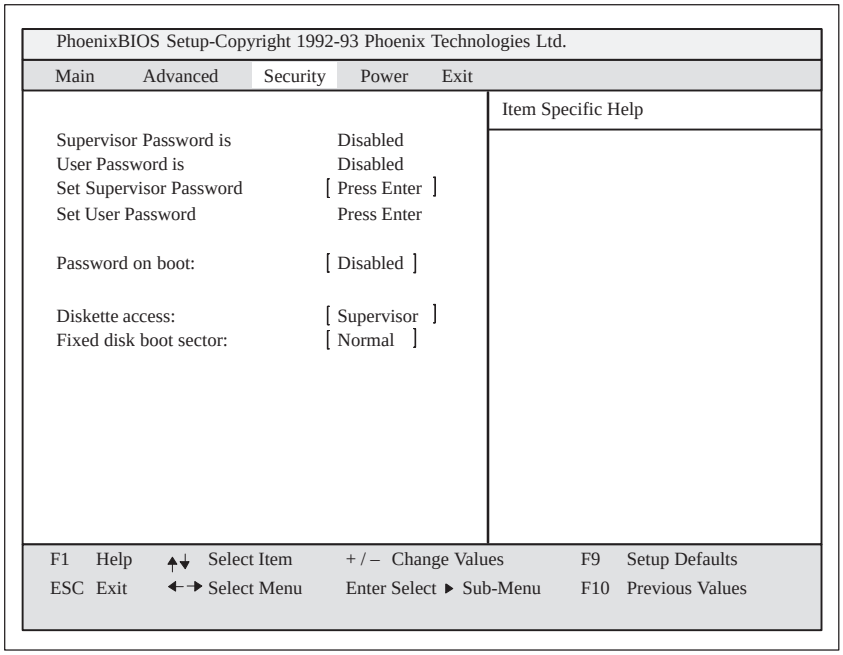


Figure 2-25 Submenu "Security"

2.11.4 Power Menu

Overview

This menu has the following structure:

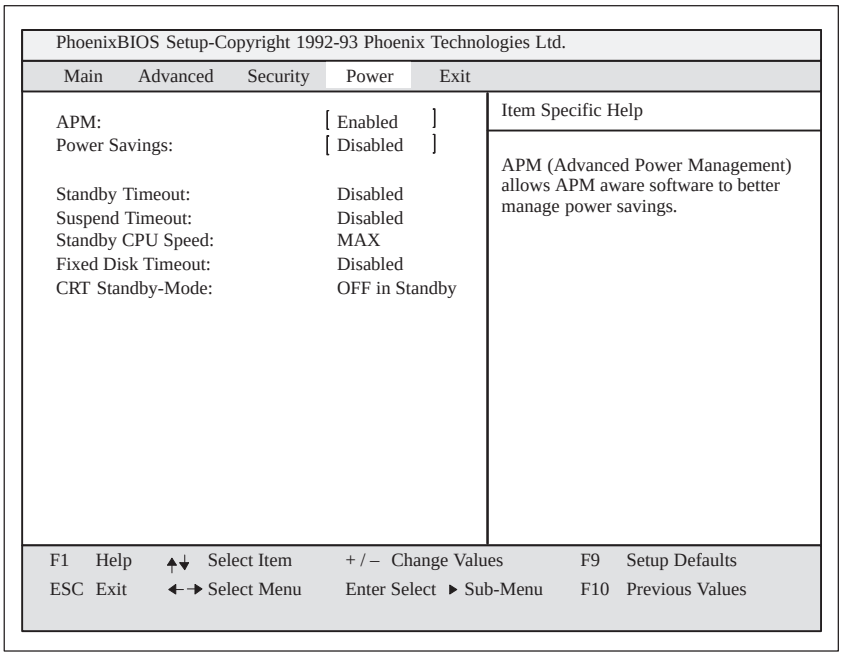


Figure 2-26 Submenu "Power"

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 parameter settings
	[Maximum][Medium][Minimum][Customize]	Preset power-saving parameters for maximum, medium and minimum power-saving features. The parameters for Standby Timeout/Suspend Timeout, Standby CPU Speed, Fixed Disk Timeout and CRT Mode are set correspondingly. User-defined parameters are set with Customize.

Standby Timeout	[disable]	no Standby mode
	[15min][30min]	minutes causing the PC to enter Standby mode,
	[1hr][2hr][3hr][4hr]	hours causing the PC to enter Standby mode during absence of any mouse or keyboard operation
Suspend Timeout	[disable]	no Suspend mode
	[15min][30min]	minutes causing the PC to enter Suspend mode,
	[1hr][2hr][3hr][4hr]	hours causing the PC to enter Suspend mode during absence of any mouse or keyboard operation

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

Standby CPU Speed		CPU speed in standby mode
	[Low]	1/16 CPU-Clock
	[Medium]	1/8 CPU-Clock
	[High]	1/4 CPU-Clock
	[Max]	1/1 CPU-Clock
	[Disabled]	Hard disk is not switched off
Fixed Disk Timeout	[1min][2min] [3min][4min] [5min][10min] [16min]	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 is has been switched-off, access delay occurs during which the hard disk is re-accelerated.
CRT	[OFF in Standby]	signifies that the synchronous signals to the VGA graphics interface are shut off in standby mode. The connected monitor also enters standby mode.
	[On]	Monitor or display always remains in operation

2.11.5 Exit Menu

Overview

Always exit the setup program via the following submenu.

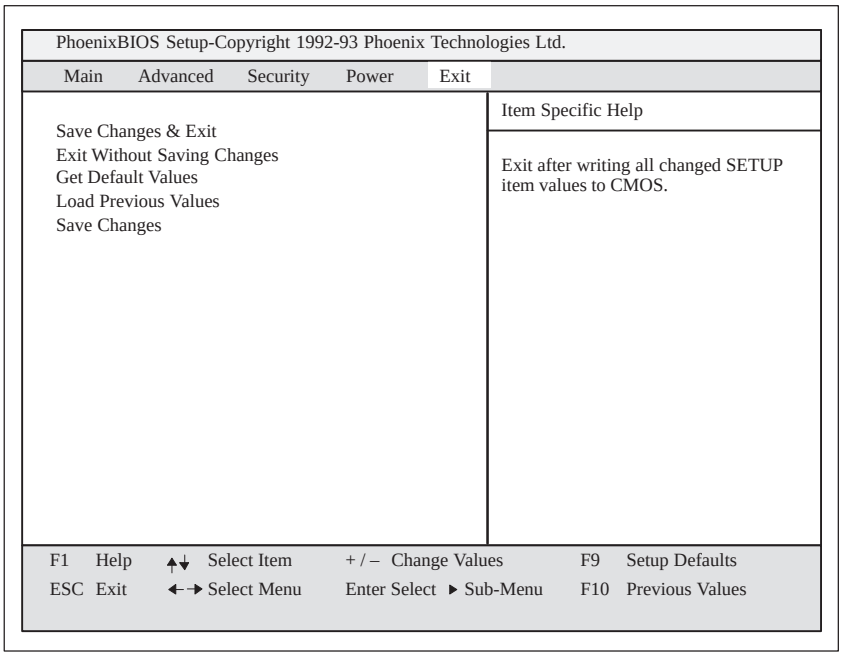


Figure 2-27 Submenu "Exit"

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.

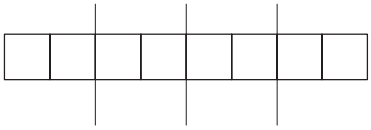
Menu item	Standard settings	Your entries
Main		
System time		
System Date		
Diskette A	1.44 MB, 31/2	
Diskette B	Not installed	
IDE Adapter O Master	C: 1.6 GB	
IDE Adapter O Slave	None	
IDE Adapter 1 Master	None	
IDE Adapter 1 Slave	None	
Video System	EGA/VGA	
Memory Cache		
Cache	Enabled	
Cache system BIOS area	Enabled	
Cache video BIOS area	Enabled	
Memory Shadow		
System shadow	Enabled	
Video shadow	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	
FI HW Options	Addr.	
Configure MPI address range	Adr-CC00	
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	

Menu item	Standard settings	Your entries
CRT 1024 x 768	72	
LCD Screensize	EXPANDED	
Trackball / PS2 Mouse	External	
Advanced		
PCI-Devices		
Slot#1		
Enable Master	Enabled	
Default Latency Timer	Yes	
Latency Timer	0040	
Plug & Play O/S	No	
Reset Configuration Data	No	
Diskette controller	Enabled	
Local Bus IDE Adapter	Primary	
Large Disk Access Mode	DOS	
VGA Interrupt	Disabled	
Memory Gap at 15 Mbyte	Disabled	
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	
Standby CPU-Speed	Med	
Fixed Disk Timeout	Disabled	
CRT Timeout	Off in Standby	
Exit		
Save Changes & Exit		
Exit Without Saving Changes		
Get Default Values		
Load Previous Values		
Save Changes		

2.12 Diagnostic messages (Port 80)

in order of occurence

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:



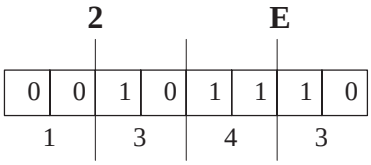
Division of the bytes into 2-bit-combinations

Output of this combination as 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
34	TP_CMOS_TEST	Test CMOS RAM

Display (hex)	Signification	Description
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
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

Display (hex)	Signification	Description
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

3

Chapter Overview

3.1 Overview

The keyboard controller checks the 10 x 8 keyboard matrix of the SIMATIC PC FI25. 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 configuration file for the PC FI25 is described in the following chapter 3.2..

The following programs/data are included with the PC:

- `PROG.EXE` which is required to program the keyboard controller start with ”PROG `[name]`” (`[name]` of the text file without `”.KEY”`)
- `SHOW.EXE` provides the matrix number of keys and switches during confirmation
  start with ”SHOW”
- `FI25.KEY` Configuration file for PC FI25

3.2 Syntax and structure of the configuration file

To program the keyboard controller you have to generate a text file.Choose `[name].key` as file name.

Text file structure

```
KEY      <HEX> <HEX> <HEX> <HEX> [<HEX> <HEX>] [;{TEXT}]
         Matrix-No.   AT-Code1 Attribute1 IO-Attribute AT-Code2  Attribute2
SWITCH   <HEX><HEX> <HEX> <HEX>  [<HEX>  <HEX>] [;{TEXT}]
         Matrix-No.  AT-Code1 Attribute1 IO-Attribute AT-Code2  Attribute2

STRING        <HEX>          [;{TEXT}]
SYSTEM FLAG   <HEX>          [;{TEXT}]
BEEPLEN       <HEX>          [;{TEXT}]
ENTPRELL      <HEX>          [;{TEXT}]
EXTENDPRELL   <HEX>          [;{TEXT}]
SPEZBREAK     <HEX>          [;{TEXT}]
```

Key words and their syntax

Key word	in italics
HEX	Hex-value from 00 to FF
TEXT	characterstring
[]	optional
<>	one word
{}	several

Definitions

SYSTEMFLAG	00 – FF, e. g. LED outputs for control purposes, auto-repeat possible, no ESC after RESET, several keys can be pressed simultaneously: 20
BEEPLEN	00 – 3F, duration of beep sound in 1/60 of a second, e.g.. 02: 2/60 seconds, 00: inactive
ENTPRELL, EXTENDPRELL	00 – 3F, duration of debounce time in 1/60 second, e.g.. 04: 4/60 seconds. If Bit 7 in IO–attribute = 0, EXTEND-PRELL is taken.
SPEZBREAK	00 – FF If Bit 6 in attribute1,2 is set, the defined break code is sent instead of the normal break code, e. g. AA: AA
Matrix-Ngor.	00 – 7F will be revealed when the program SHOW.EXE is started and the key or the switch is hit. You can also refer to figure 3-3 to obtain the XY–matrix point.
AT-Code1,2	00 – 65 FF when no key code should be sent; 70 – 7F String 0 ... 15 in the sequence defined by STRING, e. g. ”hello”: 70 if first STRING definition STRING 40 3B 43 43 2E
Attribute1,2	00 – FF, e.g. key with auto-repeat and Shift: 81
IO attribute	00 – FF, e.g. Shift key (first debouncing): 7F; toggle (first debouncing): 20 **Attention!** Bit 0 to 5 must be 1 when no port functions exist.

SYSTEMFLAG

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 CAPS, NUM, SCROLL	

Attribute1,2

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

IO attribute

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	00: Port–No. OFF 01: Port–No. ON 10: Port–No. toggle 11: Port–No. key operation		Port number:	0000 0001 0010	LED1 LED2 LED3	

3.3 Connector assignment of keyboard controller

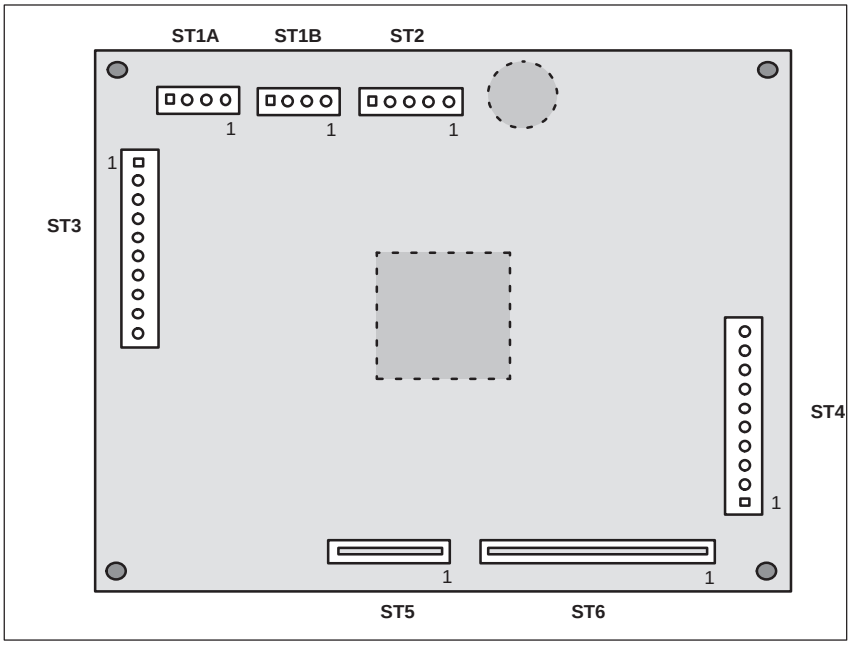
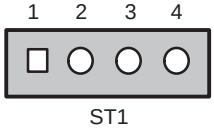


Figure 3-1 Location of the plug connectors on the controller board

Connector for external keyboard

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

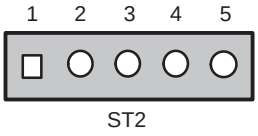
4-pin plug connector: ST1A/ST1B



Connector for keyboard port on slot CPU

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

5-pin plug connector: ST2



Connector for LED (unassigned)

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 (not assigned in the standard configuration)

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

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

Input keyboard matrix Y

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 ... 16	unassigned

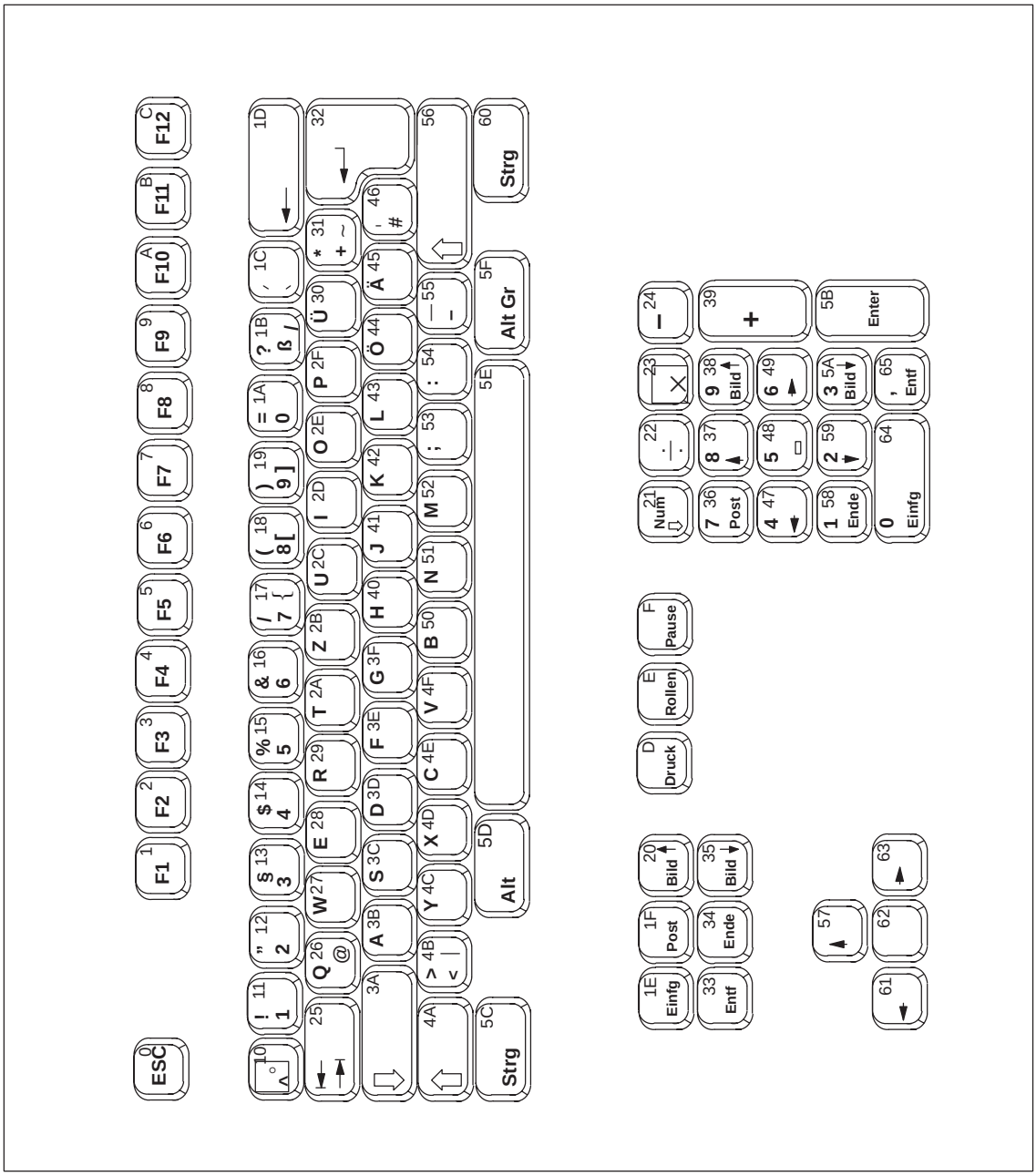


Figure 3-2 Serial numbers of keys

3.4 Matrix configuration

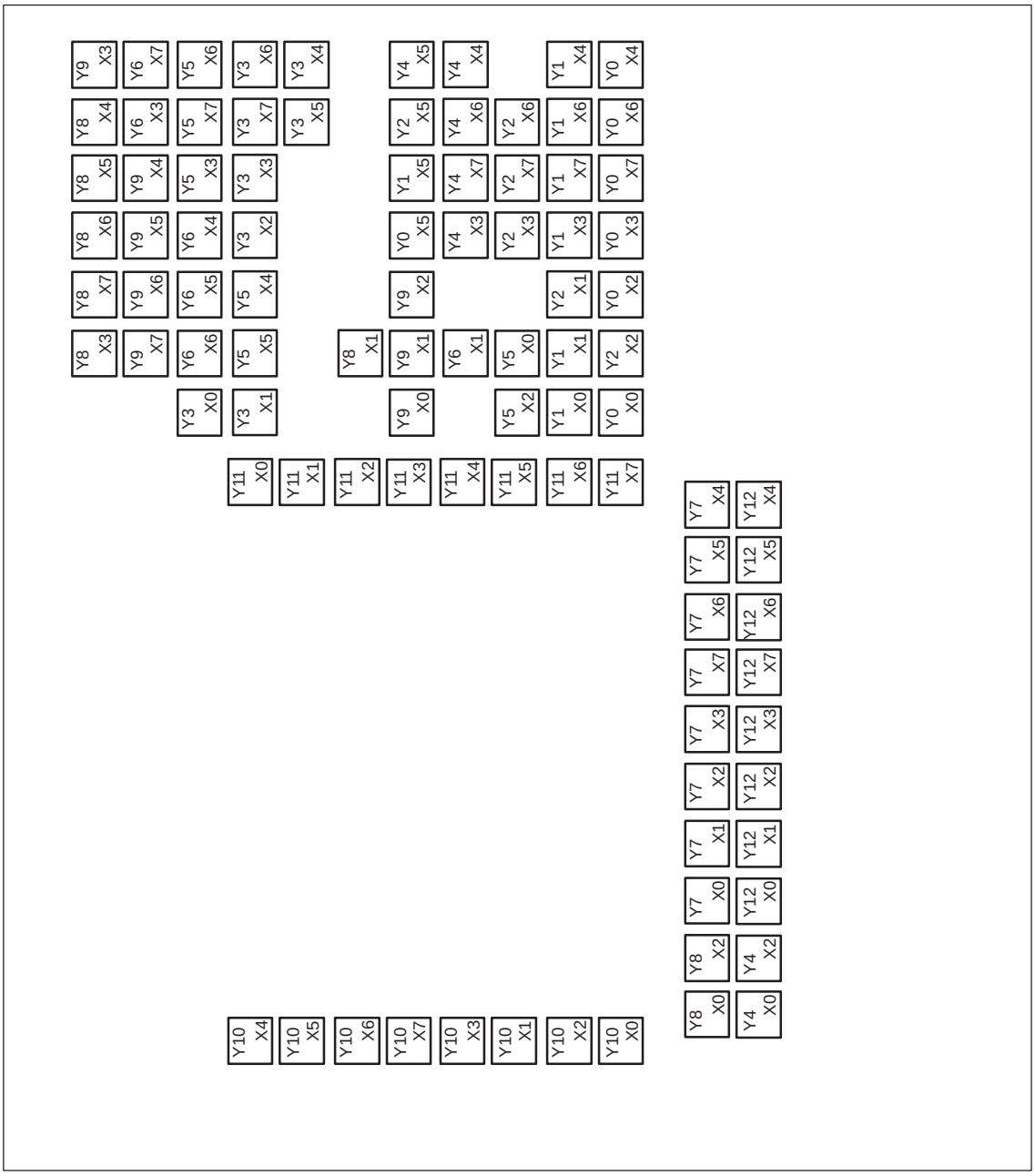


Figure 3-3 Matrix configuration of the membrane keyboard

3.5 Configuration file for keyboard controller

```
;=========================Configuration ========================

System Flag  04                Send ESC after RESET
Beep Len     02                Beep length
Entprell     00                normal debounce time
Extend Prell 00                Extended debounce time
Spez Break   AA                Special break code $AA

KEY03 FF 00 7F              ; alpha-/special character
KEY13 4A 00 3F              ; upper-case/lower-case

KEY38 3B 80 3F 19 81        ; a/A, (
KEY78 50 80 3F lA 81        ; b/B, )
KEY68 4E 80 3F 17 81        ; c/C, &
KEY58 3D 80 3F 14 81        ; d/D, $
KEY48 28 80 3F 55 81        ; e/E, ?

KEY39 3E 80 3F 30 80        ; f/F, [
KEY79 3F 80 3F 31 80        ; g/G, ]
KEY69 40 80 3F 12 81        ; h/H, @
KEY59 2D 80 3F 15 81        ; i/I, %
KEY49 41 80 3F 11 81        ; j/J, !

KEY36 42 80 3F 30 81        ; k/K, {
KEY76 43 80 3F 31 81        ; l/L, }
KEY66 52 80 3F 13 81        ; m/M, #
KEY56 51 80 3F 45 81        ; n/N, ”
KEY46 2E 80 3F 45 80        ; o/O, ’

KEY35 2F 80 3F 53 81        ; p/P, C
KEY75 26 80 3F 54 81        ; q/Q, “
KEY65 29 80 3F 10 81        ; z/R, “
KEY55 3C 80 3F 1B 81        ; s/S,
KEY45 2A 80 3F 53 80        ; t/T, ,


KEY23 2C 80 3F 16 81        ; u/U, “
KEY33 4F 80 3F 55 80        ; v/V, /
KEY73 27 80 3F 46 80        ; w/W, \
KEY63 4D 80 3F 46 81        ; x/X, “
KEY53 2B 80 3F 44 81        ; y/Y, .
KEY43 4C 80 3F 44 80        ; z/Z, ;

KEY70 1A 80 3F 64 80        ; 0
KEY31 11 80 3F 58 80        ; 1
KEY71 12 80 3F 59 80        ; 2
KEY61 13 80 3F 5A 80        ; 3
KEY32 14 80 3F 47 80        ; 4
KEY72 15 80 3F 48 80        ; 5
KEY62 16 80 3F 49 80        ; 6
KEY34 17 80 3F 36 80        ; 7
KEY74 18 80 3F 37 80        ; 8
KEY64 19 80 3F 38 80        ; 9
```

```
KEY08 01 80 3F              ; Function key F1
KEY28 02 80 3F              ; Function key F2
KEY07 03 80 3F              ; Function key F3
KEY17 04 80 3F              ; Function key F4
KEY27 05 80 3F              ; Function key F5
KEY37 06 80 3F              ; Function key F6
KEY77 07 80 3F              ; Function key F7
KEY67 08 80 3F              ; Function key F8
KEY57 09 80 3F              ; Function key F9
KEY47 0A 80 3F              ; Function key F10
KEY04 0B 80 3F              ; Function key F11
KEY24 0C 80 3F              ; Function key F12
KEY0C 03 80 3F              ; Function key F13
KEY1C 04 80 3F              ; Function key 14
KEY2C 05 80 3F              ; Function key F15
KEY3C 06 80 3F              ; Function key F16
KEY7C 07 80 3F              ; Function key F17
KEY6C 08 80 3F              ; Function key F18
KEY5C 09 80 3F              ; Function key F19
KEY4C 0A 80 3F              ; Function key F20

KEY4A 01 80 3F              ; Softkey S1
KEY5A 02 80 3F              ; Softkey S2
KEY6A 03 80 3F              ; Softkey S3
KEY7A 04 80 3F              ; Softkey S4

KEY3A 05 80 3F              ; Softkey S5
KEY1A 06 80 3F              ; Softkey S6
KEY2A 07 80 3F              ; Softkey S7
KEY0A 08 80 3F              ; Softkey S8
KEY0A 09 80 3F              ; Softkey S9
KEY1B 0A 80 3F              ; Softkey S10
KEY2B 0B 80 3F              ; Softkey S11
KEY3B 0C 80 3F              ; Softkey S12
KEY4B 01 80 3F              ; Softkey S13
KEY5B 02 80 3F              ; Softkey S14
KEY6B 03 80 3F              ; Softkey S15
KEY7B 04 80 3F              ; Softkey S16

KEY18 57 80 3F              ; 'upwards'
KEY09 61 80 3F              ; 'to the left'
KEY19 1F 80 3F              ; 'HOME'
KEY34 80 80 3F              ; 'END'
KEY29 63 80 3F              ; 'to the right'
KEY16 62 80 3F              ; 'down'
KEY05 20 80 3F              ; 'Page up'
KEY25 35 80 3F              ; 'Page down'

KEY54 39 80 3F              ;  +
KEY44 1C 80 3F              ;  =
KEY52 24 80 3F              ;  -
KEY51 22 80 3F              ;  /
KEY30 54  80 3F             ;  ;
KEY60 5E 80 3F              ; 'Blank'
KEY50 23 80 3F              ;  *
```

```
KEY22 5C 80 3F              ; <CTRL>
KEY12 1E 80 3F              ; <INS>
KEY0l 5D 80 3F              ; <ALT>
KEYll 33 80 3F              ; <DEL>
KEY41 1D 80 3F              ; 'Backspace'
KEY00 00 80 3F              ; <ESC>
KEY20 25 80 3F              ; 'Tab right'
KEY25 81 80 3F              ; 'Tab left'
KEY40 32 80 3F              ; <CR>


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

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

STRING    3D 2D 3C 42 28 2A 2A 28      ;
STRING    2E 29 3D 51 28 29            ;
STRING    42 3B 2A 3B 43 2E 3F         ;
STRING    3E 2E 29 52 2C 43 3B 29      ;
STRING    3E 2E 29 52 2C 43 3B 29 28   ;
STRING    2D 2F 4E 5E 3E 2D 5E 12 1A   ;
STRING    2A 3B 3C 2A 3B 2A 2C 29      ;
STRING    52 3B 2C 3C                  ;
```

Bus board

4

Chapter Overview

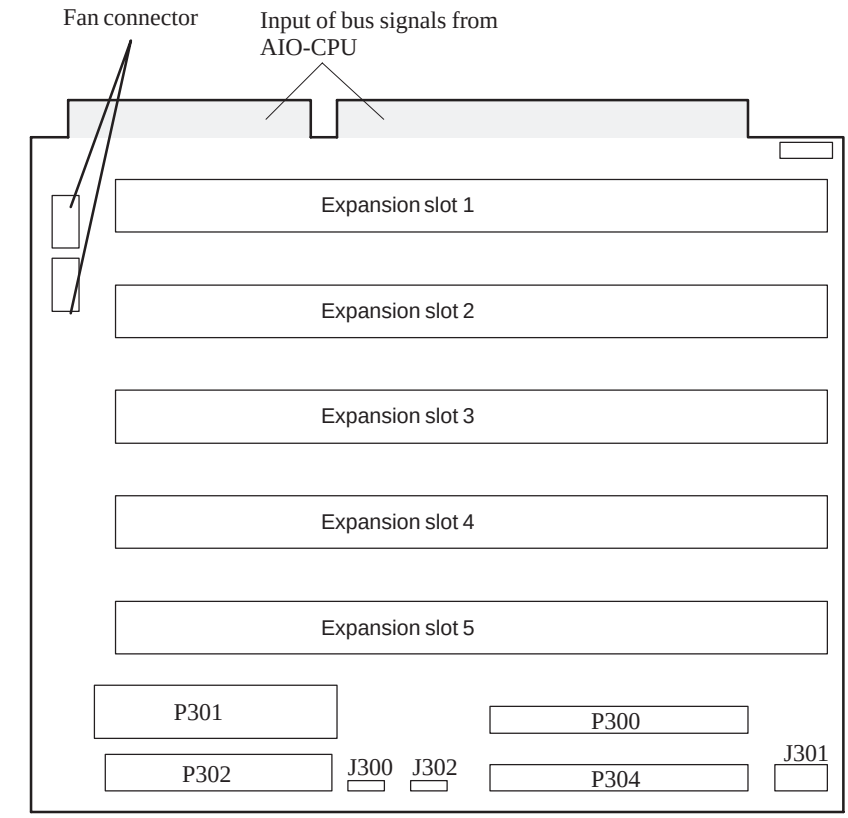
In chapter	you find	on page
4.1	Technical Specifications	4-2
4.2	Design and mode of operation	4-3
4.3	Pin assignments	4-4

4.1 Technical Specifications

Slots	5 AT slots, AT format	
Ambient temperature during operation	max. 60 °C	
Dimensions	L x W Mounting holes	136 x 152 mm 3,2 mm
Design	Base material Supply conductors Signal conductors	Epoxy 2,6 mm 70 µm Cu 35 µm Cu

4.2 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 three screws above the CPU.



P300 not used
P301 Power supply input
P302 Power supply output for AIO-CPU
P304 not used

J300 Jumper for –5 V generation
J301 not used
J302 Jumper for Power-Good-generation

Figure 4-1 Bus board

4.3 Pin assignments

Power supply input (P301)

Pin	Description
1	Power Good (external)
2	+ 5V
3	+ 12V
4	– 12V
5	GND
6	GND
7	GND
8	GND
9	– 5V (external)
10	+ 5V
11	+ 5V
12	+ 5V

Power supply output for AIO-CPU (P302)

Pin	Description
1	GND
2	GND
3	GND
4	+ 5V
5	+ 5V
6	+ 5V
7	– 5V
8	– 12V
9	+ 12V
10	+ 12V
11	GND
12	Power Good (out)
13 – 16	not connected

Fan connector

Pin	Description
1	+ 12V
2	GND
3	not connected

Bus signal input from AI0-CPU and expansion slots

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

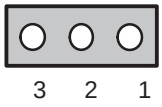
*) I/O determines the direction of the signals coming from the CPU module.

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

Under common circumstances the signals –SBHE, LA17 – LA23, –MEMR and MEMW are operated as outputs (transmit data from the CPU). Only CPU-boards which can be employed as master CPUs for system bus access operations send and receive these signals. A ”–” indicated before any signal name, signifies that this signal is low-active.

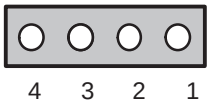
Jumper for – 5V generation

Pin	Description
none	– 5V does not exist
1 – 2	– 5V via charge controller from – 12V
2 – 3	– 5V directly from power supply input



Jumper for Power Good generation

Pin	Description
none	no Power Good generation
2 – 3	Power Good generated internally
3 – 4	Power–Good directly from power supply input
1	Coding



Status display PC FI25

The status display contains:

5 LEDs	DUO-LED red/green, 5x2,5 mm rectangular
Diagnostics display	Two green 7-segment display with a character size of approx. 8 mm; Connectors conducted onto plug connector P1
Plug connectorP1	40-pin, 2-row plug connector
Plug connector P2	10-pin, 2-row plug connector Connection to the motherboard (no SafeCard plugged).
Plug connector P3	2-pin plug connector, Connector for Reset key button

Figure 4-2 Status display

Connector pinout plug connector P1

Pin	Assignment	Pin	Assignment
1	Reset	21	Display 2, Segment 5
2	Speakers	22	Display 1, Segment 5
3	Coding	23	Display 2, Segment 6
4	+ 5V	24	Display 1, Segment 6
5	GND	25	n.c.
6	Power LED/green	26	n.c.
7	n.c.	27	n.c.
8	Lock	28	n.c.
9	HD-LED/+	29	n.c.
10	HD-LED/green	30	LED Temp. red
11	Display 2, Segment 0	31	LED Temp. green
12	Display 1, Segment 0	32	LED Run red
13	Display 2, Segment 1	33	LED Run green
14	Display 1, Segment 1	34	n.c.
15	Display 2, Segment 2	35	LED FDD. green
16	Display 1, Segment 2	36	n.c.
17	Display 2, Segment 3	37	n.c.
18	Display 1, Segment 3	38	n.c.
19	Display 2, Segment 4	39	n.c.
20	Display 1, Segment 4	40	n.c.

Connector pinout plug connector P2

Pin	Assignment	Pin	Assignment
1	Reset	2	n.c.
3	n.c.	4	Power LED / green
5	GND	6	n.c.
7	n.c.	8	n.c.
9	HD LED / +	10	HD LED / green

Connector pinout plug connector P3

Pin	Assignment	Pin	Assignment
1	Reset	2	GND

Displays

5

Chapter Overview

In chapter	you find	on page
5.1	TFT Display (SVGA)	5-2
5.2	TFT Display (VGA)	5-3
5.3	DSTN Display	5-4

5.1 TFT Display (SVGA)

Note

The backlight tube of the TFT display is subjected to wear and hence a guaranty against a defective tube cannot be granted. Depending on its operating temperature, the tube's half-life period is at least 10000 operating hours i.e. your display then dimmed to 50% of its original brightness. Under unfavorable operating conditions, we recommend you replace the tube after the half-life period has elapsed. The backlight tube is available as a spare part.

Technical specifications

Screen (visible effective surface)	Diagonal: Width: Heigth:	10.4 inches 211.2 mm 158.4 mm
Resolution	800 x (RGB) 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 8.0 mm
Weight	380 g	

5.2 TFT Display (VGA)

Note

The backlight tube of the TFT display is subjected to wear and hence a guaranty against a defective tube cannot be granted. Depending on its operating temperature, the tube's half-life period is at least 25000 operating hours i.e. your display then dimmed to 50% of its original brightness. Under unfavorable operating conditions, we recommend you replace the tube after the half-life period has elapsed. The backlight tube is available as a spare part.

Technical specifications

Screen (visible effective surface)	Diagonal: 10.4 inches Width: 211.2 mm Heigth: 158.4 mm
Resolution	640 x (RGB) x 480 pixels
Size of pixels	0.264 mm vertical 0.264 mm horizontal
Faulty spots permitted	High-Level < 12 spots Low-Level < 25 spots Green-High-Level < 5 spots
Order of pixels	RGB vertical strips
Display mode	white characters on black background
Dimensions	Width: 265 mm Height: 195 mm Depth: 11 mm
Weight	710 g

5.3 DSTN Display

Note

The backlight tube of the STN display is subjected to wear and hence a guaranty against a defective tube cannot be granted. Depending on its operating temperature, the tube's half-life period is at least 10000 operating hours i.e. your display then dimmed to 50% of its original brightness. Under unfavorable operating conditions, we recommend you replace the tube after the half-life period has elapsed. The backlight tube is available as a spare part.

Technical specifications

Screen (visible effective surfaces)	Diagonal: Width: Height:	10.4 inches 211.2 mm 158.4 mm
Resolution	640 x (RGB) 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

6

Chapter Overview

6.1 Overview

Function

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

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 64kB by battery

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

Functional block diagram

Figure 6-1 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.

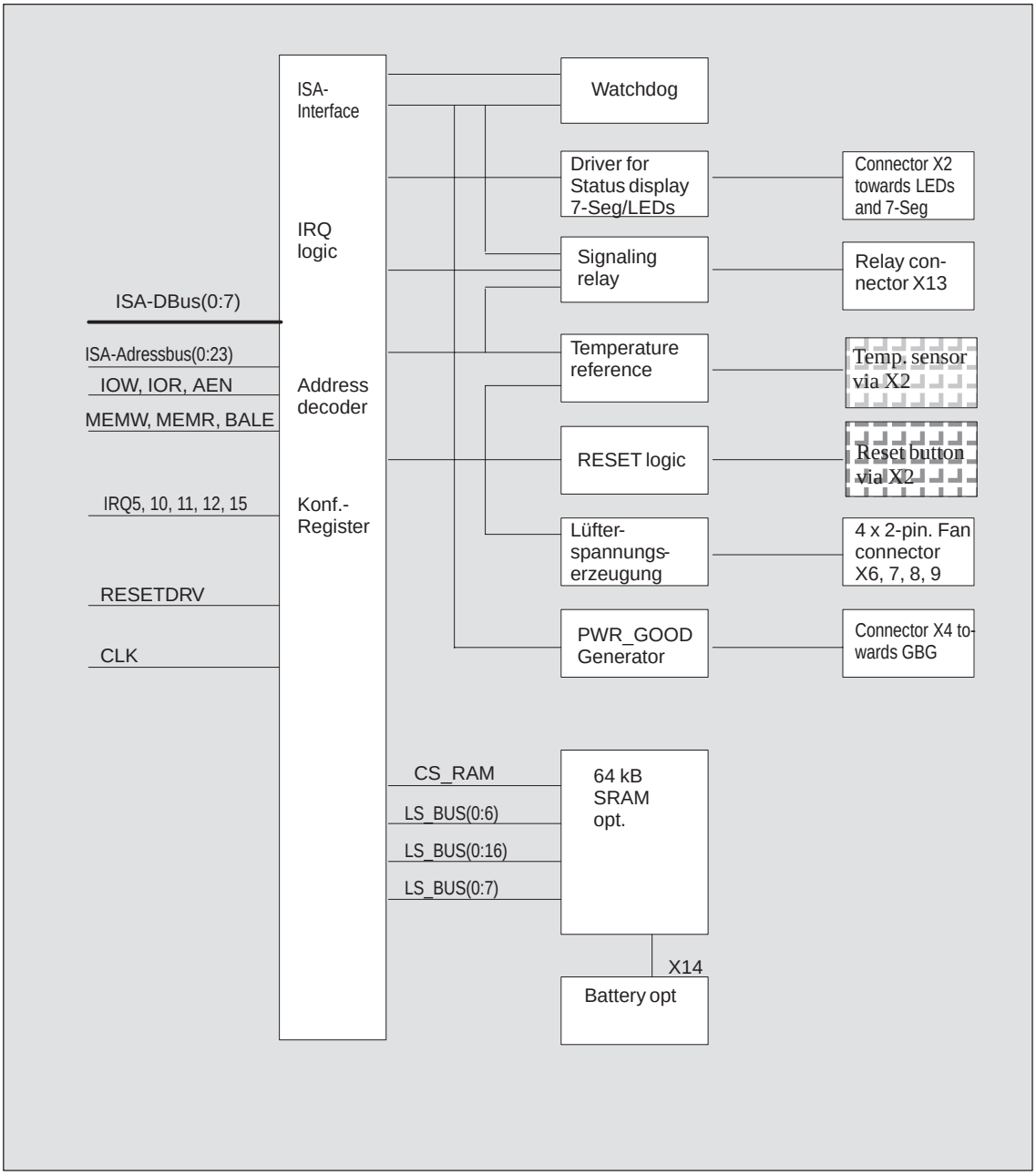


Figure 6-1 Functional block diagram of a SafeCard

Connector and switch position

Figure 6-2 illustrates the position of connectors and switches on the monitoring module.

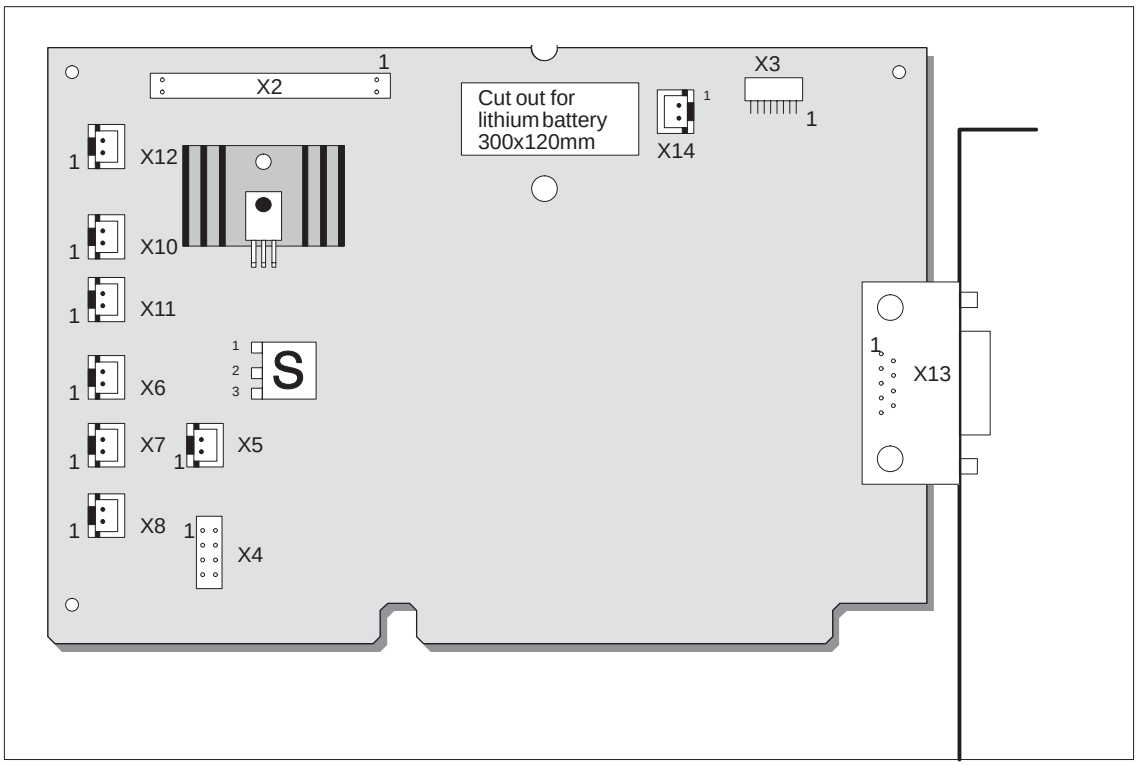


Figure 6-2 Connector and switch positions on the SafeCard

6.2 Status and diagnostics displays

Overview

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

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

7-segment display

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

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

Every cold restart of the system (switch ON/OFF) causes a detailed Power Onself Test (**POST** = **P**ower **O**n **S**elf **T**est). The POST controlling steps are displayed as so called POST codes on the 7-segment display of the PC. The POST code descriptions are listed in chapter 2.12, Diagnostic Messages of the motherboard description.

LEDindicators

The LEDs have the following significations:

LED	OFF	GREEN	RED
Power	System OFF	System ON	—
Disk	inactive	active	—
Run	Watchdog inactive	Watchdog active	Watchdog executed
Temp	System OFF	Normal internal tempe-rature	internal temperature be-yond acceptance level or cable towards temperature sensor unplugged or interrupted.

6.3 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.

6.4 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 intervall 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.

6.5 Relay output

Switching ON/OFF conditions

An external unit (e.g. 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 occured. 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 occuring 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

6.6 Backed-up RAM (optional)

Size

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

Addressing

The address area listed below is determined to the programmer. The motherboard mirrows 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 settings

Address switch S1	RAM address area
on	000D0000 to 000DFFFF (standard setting)
off	00FD0000 to 00FDFFFF

Backup

A lithium battery provides the RAM back-up power.

Battery: lithium battery 3,6V type SL-750 Manufacturer: Fa. Sonnenschein Lithium GmbH

6.7 Software Interfaces

Overview

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

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

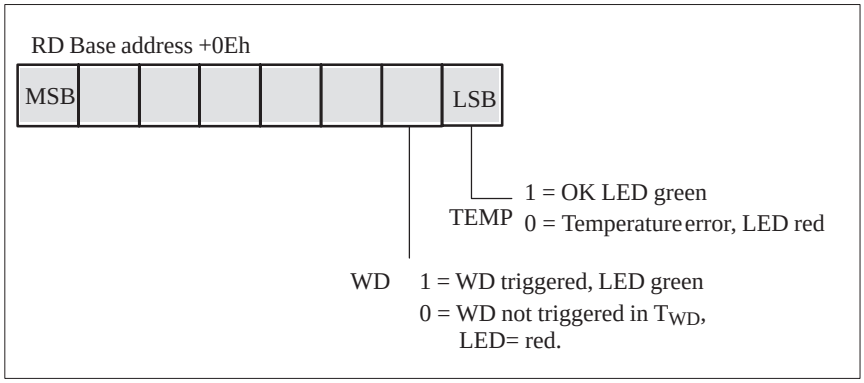
Base addresses

Address switch S3	Address switch S2	Base addresses	Notes
on	on	220h	
on	off	2A0h	
off	on	320h	Standard setting
off	off	3A0h	

Reading register base address + 0Eh

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

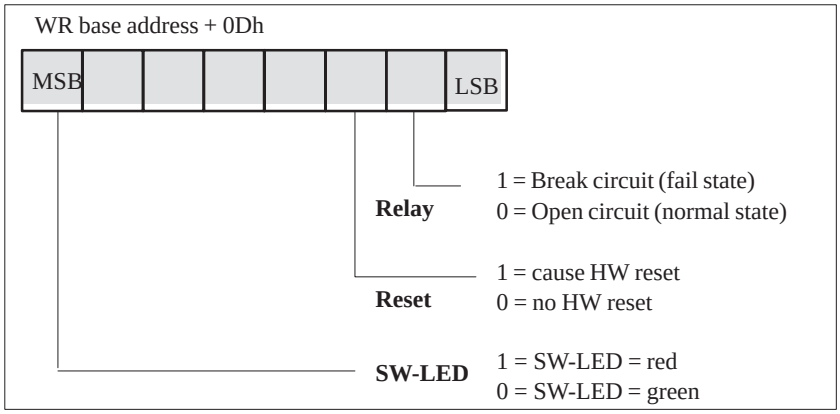
Contents of IO cell base address + 0Eh while reading out.



If 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.



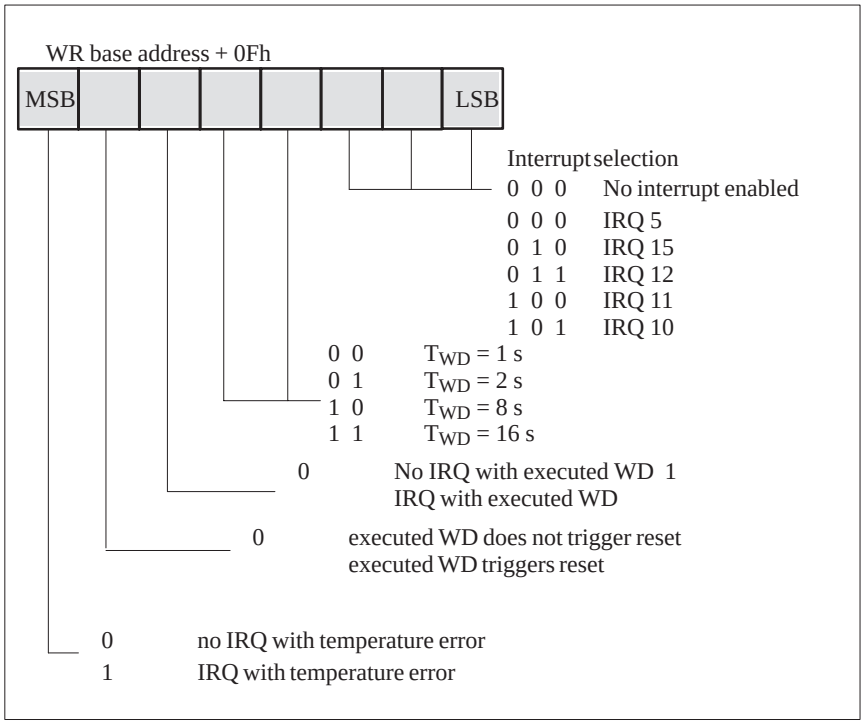
Write register base address + 0Eh

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!

6.8 Hardware ports

Signal output towards display panel (X2)

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

Signal assignments

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

Signal input for diagnostic LEDs from CPU board (X3)

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

Signal assignments

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

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

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

Signal assignments

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

PWR_GD connector (X5)

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

Signal assignments

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

Connector for external HD-LED e.g. from SCSI controller (X10, 11)

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

Signal assignments

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

Fan connector (X6,7,8)

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

Signal assignments

Pin	Signal
1	Fan voltage
2	GND

Connector for temperature sensors (X12)

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

Signal assignments

Pin	Signal
1	Sensor input
2	Sensor output

Relay output connector at slot sheet metal(X13)

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

Signal assignments

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

Battery cable connector (X14)

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

Only optionally equipped for battery backed-up RAM versions!

Signal assignments

Pin	Signal
1	Battery voltage
2	GND

Touch Screen

7

Chapter Overview

7.1 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.

7.2 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.

7.3 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.

7.4 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 chapter 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.

7.5 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.

7.6 Installation under Windows NT

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

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

Calibrating the Touch Screen

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

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

Double Touch (similar to a mouse double click)

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

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

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

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

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

Removing the Mouse Cursor

To remove the mouse cursor, proceed as described for Windows 95 in Section 7.5

Tips for Touch Screen Applications

The same conditions described for Windows 95 also apply here (see Section 7.5).

7.7 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

8

Chapter Overview

In chapter	you find	on page
8.1	Technical specifications	8-2

8.1 Technical specifications

Capacity		1.6 GByte
Spare part order number		C79451-Z1423-K5
Manufacturer		WESTERN DIGITAL
Manufacturer's designation		WAC21600
Power requirements	representative value (startup) 5V representative value (startup) 12V	0.41 A (0.3 A) 0.21 A (1.3 A)
Parameters	Cylinders Sectors Heads	3148 63 16
Jumpers	Single * Master Slave	J8-1 = 0 J8-3 = 0 J8-5 = 0 J8-1 = 0 J8-3 = 0 J8-5 = 1 J8-1 = 0 J8-3 = 1 J8-5 = 0
Fast - IDE Highspeed		yes

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

Floppy Disk Drive

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Chapter Overview

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9.1 Technical specifications

Capacity		1.44 MByte
Spare part order number		C79451-Z1329-K1
Manufacturer		TEAC
Manufacturer's designation		FD-05 HF 4644-U
Power requirements	representative value (startup) 5V representative value (startup) 12V	0.40 A (0.70 A)
Parameters	Cylinders Sectors Heads	80 18 2
Jumpers	Single *	None

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

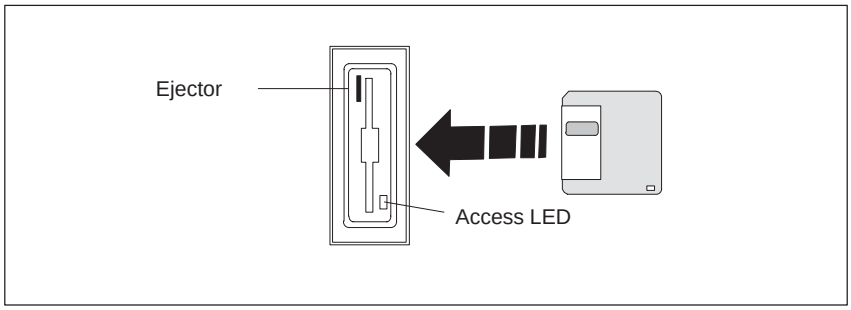

Figure 9-1 Floppy Disk Drive

Power supply 220 V

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Chapter Overview

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10.1 Technical specifications

Voltage

Voltage	Max. current	Voltage stability
+ 12 V	8.5 A	± 4 %
– 12 V	0.5 A	± 6 %
+ 5 V	22 A	± 3 %
– 5 V	0.5 A	± 5 %

Input voltage	115/230 V AC, ± ×10 %
Current	4 A / 3 A
Line voltage frequency	47 – 63 Hz
Power consumption	≤ 320 Watt
Jumpering when power down	min. 16.6 ms with full load
Output power	220 W DC to T_U = 32°C / 180 W DC to T_U = 45°C
Degree of protection	IP20
Protection class	VDE 0106
Certification	EN 60950/IEC 950, UL 1950, C 22.2 No. 950

The external power supply is protected by an internal fuse (250 V / 5 A) that is not accessible to the user. This fuse must only be replaced by trained, authorized personnel.

Power-Good Signal

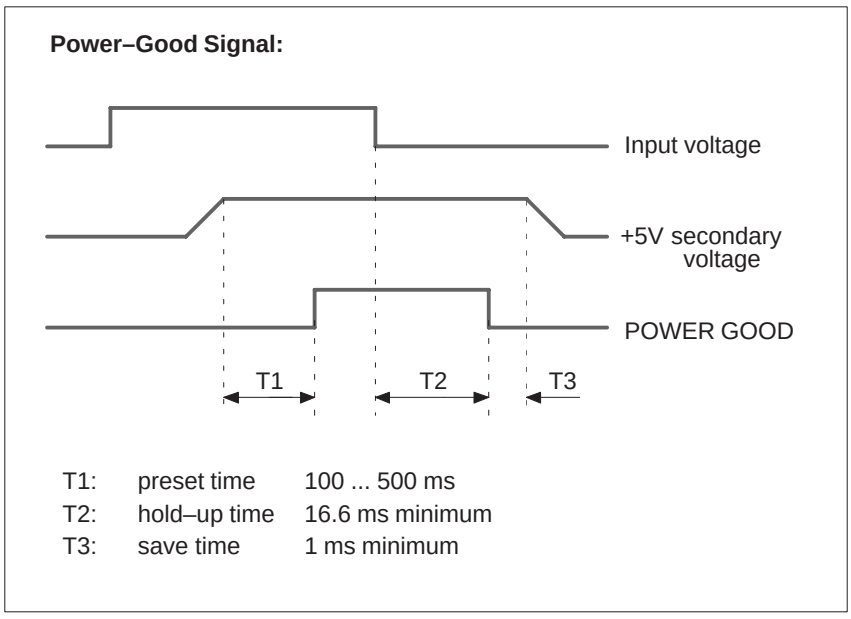

Figure 10-1 Time Characteristics of the Power-Good Signal

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