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# Systembaugruppe D990 System board D990

Technisches Handbuch  
Technical Manual

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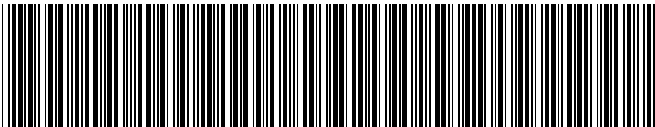
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System board D990



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# **Systembaugruppe D990**

## **System board D990**

**Technisches Handbuch**  
**Technical Manual**

**Ausgabe November 1998**  
**November 1998 edition**

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## Introduction



This system board is available in different configuration levels. Depending on the hardware configuration of your device, it may be that you cannot find several options in your version of the system board, even though they are described.

You may find further information in the description "BIOS Setup".

Further information to drivers is provided in the readme files on hard disk or on the supplied drivers diskettes or on the "Drivers & Utility" CD.

## Notational conventions

The meanings of the symbols and fonts used in this manual are as follows:



Pay particular attention to texts marked with this symbol. Failure to observe this warning endangers your life, destroys the system, or may lead to loss of data.



This symbol is followed by supplementary information, remarks and tips.

► Texts which follow this symbol describe activities that must be performed in the order shown.



This symbol means that you must press the Enter key.

Texts in this typeface are screen outputs from the PC.

Texts in *italics* indicate commands or menu item.

"Quotation marks" indicate names of chapters and terms that are being emphasized.

## Important notes

Store this manual close to the device. If you pass on the device to third parties, you should also pass on this manual.



Be sure to read this page carefully and note the information before you open the PC.

You cannot access the components of the system board without first opening the device. How to dismantle and reassemble the device is described in the Operating Manual accompanying the device.

Please note the information provided in the chapter "Safety" in the Operating Manual of the PC.

Incorrect replacement of the lithium battery may lead to a risk of explosion. It is therefore essential to observe the instructions in the chapter "[Add-on modules](#)" - "[Replacing the lithium battery](#)".

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer (CR2032).

Do not throw lithium batteries into the trashcan. It must be disposed of in accordance with local regulations concerning special waste.



The shipped version of this board complies with the requirements of the EEC directive 89/336/EEC "Electromagnetic compatibility".

Compliance was tested in a typical PC configuration.

When installing the board, refer to the specific installation information in the Operating Manual or Technical Manual of the receiving device.

Connecting cables for peripherals must be adequately insulated to avoid interference.

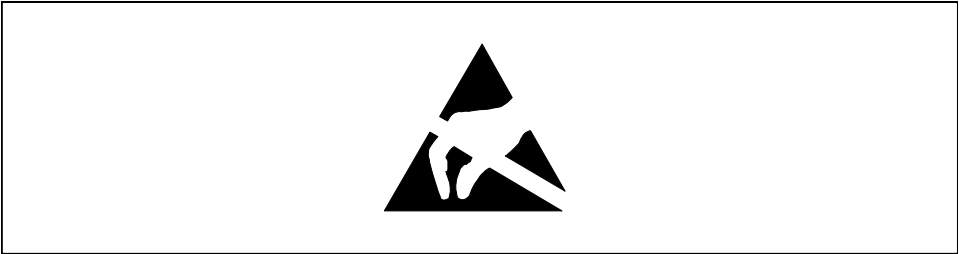


Components can become very hot during operation. Make sure you do not touch components when making extensions to the system board. There is a danger of burns!



The warranty expires if the device is damaged during the installation or replacement of system expansions. Information on which system expansions you can use is available from your sales office or the customer service.

Boards with electrostatic sensitive devices (ESD) may be identified by labels.



When you handle boards fitted with ESDs, you must observe the following points under all circumstances:

- You must always discharge yourself (e.g. by touching a grounded object) before working.
- The equipment and tools you use must be free of static charges.
- Pull out the power plug before inserting or pulling out boards containing ESDs.
- Always hold boards with ESDs by their edges.
- Never touch pins or conductors on boards fitted with ESDs.

## Features

- ATX system board
  - 64-bit microprocessor Intel Pentium with MMX and with 32 Kbytes internal cache (first-level cache, 16 Kbytes data cache, 16 Kbytes address cache) or OverDrive-Processor for Pentium
- or
- 64-bit microprocessor Intel Pentium without MMX and with 16 Kbytes internal cache (first-level cache, 8 Kbytes data cache, 8 Kbytes code cache) or OverDrive-Processor for Pentium
- or
- Prepared for AMD-K6
  - The system board supports Pentium MMX™.
  - Memory configuration on the system board: 8 to 256 Mbyte (SDRAM)
  - 2 Mbit Flash BIOS
  - 3 PCI, 2 ISA slots and 1 ISA/PCI slot (shared)
- or
- 3 PCI and 2 ISA slots
  - PCI bus
  - IDE hard disk controller connected to PCI bus for up to four IDE drives (e.g. IDE hard disk drives, ATAPI CD-ROM drives), (prepared for ultra DMA33 mode)
  - Real-time clock/calendar with integrated battery backup
  - Floppy disk controller (up to 2.88 Mbytes format)
  - Parallel interface (ECP- and EPP-compatible)
  - 1 serial port (16C550 compatible with FIFO)
  - PS/2 mouse port
  - PS/2 keyboard port
  - Security functions

## Optional Components

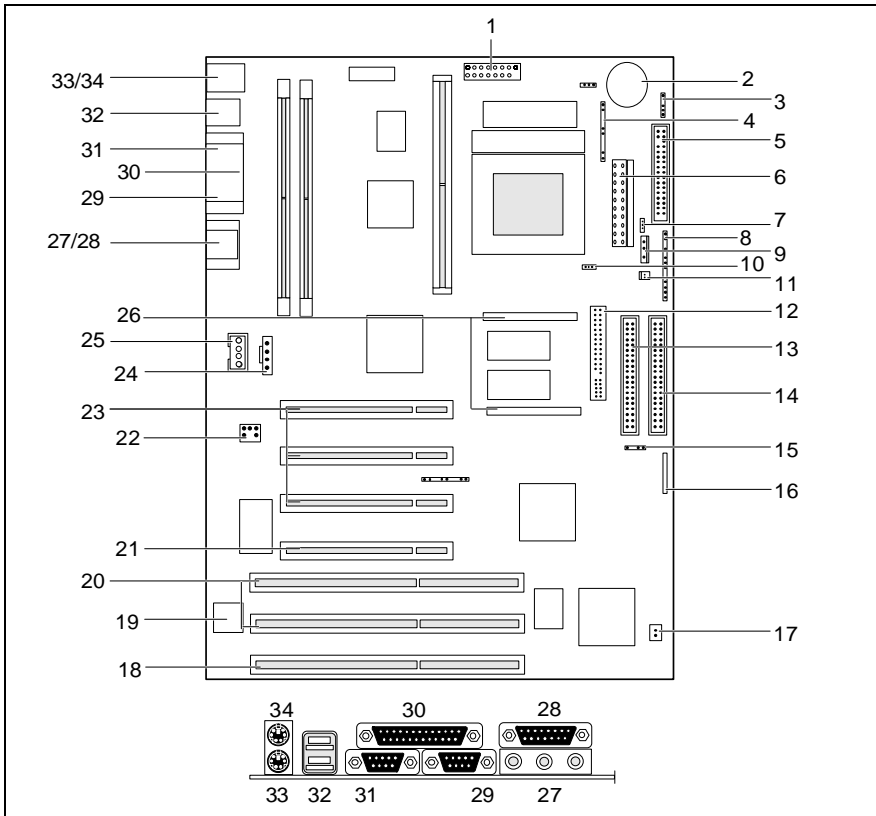
- Video connector
- 64 bit screen controller connected to PCI bus, graphics processor Matrox MGA 1064SG (Mystique) with Windows accelerator, 3D accelerator and 2 Mbyte SGRAM video memory
- Video memory can be upgraded to 4 Mbytes of SGRAM (original Matrox memory upgrade)
- Audio controller on ISA-BUS (PnP) Crystal CS 4238 or CS 4235 Audio Codec, 16 bit stereo; compatible with Soundblaster Pro™, Windows Sound System and MPU 401; 3D audio support (Q-Sound); internal FM synthesis



The audio output can be set in the BIOS Setup in the screen *Advanced/Peripheral Configuration*, menu option *Audio Output* to *Line Level* or *Full Power*. Use *Line Level* if you connect headphones or an active loudspeaker (with amplifier) to the audio output. Use *Full Power* if you use passive loudspeakers.

- USB (Universal Serial Bus)
- Energy saving functions
- Connector for feature connector, loudspeaker
- Connector for remote-on (fax/modem board), chipcard reader and infrared interface
- Connector for CD-line in, Game/Midi, Voice-Modem, AUX IN
- Microphone jack
- Audio input (Line in)
- Loudspeaker connector (active / passive)
- Socket for wavetable chip

## Interfaces and connectors



- |                                     |                                       |
|-------------------------------------|---------------------------------------|
| 1 = Chipcard reader                 | 18 = ISA slot 1                       |
| 2 = Battery                         | 19 = Socket for wavetable chip        |
| 3 = Infrared interface              | 20 = ISA slots 2-3                    |
| 4 = RESET switch                    | 21 = PCI slot 1                       |
| 5 = Floppy disk drive               | 22 = Voice modem                      |
| 6 = Power supply                    | 23 = PCI slots 2-4                    |
| 7 = SCSI indicator                  | 24 = CD Line in                       |
| 8 = LED indicators in front panel   | 25 = AUX IN                           |
| 9 = Soft-off power supply           | 26 = Connector for video memory board |
| 10 = Fan                            | 27 = Audio                            |
| 11 = Power on switch                | 28 = Game                             |
| 12 = Feature connector              | 29 = Video connector                  |
| 13 = IDE drives 1 and 2 (primary)   | 30 = Parallel interface               |
| 14 = IDE drives 3 and 4 (secondary) | 31 = Serial port 1                    |
| 15 = External loudspeaker           | 32 = USB                              |
| 16 = I <sup>2</sup> C connector     | 33 = Keyboard port                    |
| 17 = Remote on via fax/modem        | 34 = PS/2 mouse port                  |

The connectors marked do not have to be present on the system board.

## Possible screen resolution

Depending on the operating system used the screen resolutions in the following table refer to the screen controller on the system board. If you are using an external screen controller, you will find details of supported screen resolutions in the Operating Manual or Technical Manual supplied with the controller.

To select the appropriate setting for your monitor, please use the Matrox VGA drivers supplied.

In Windows 95 you can select your monitor type (you should possibly use the standard type) and the resolution in the "Control Panel" under „Display Properties“ in the tabs „MGA-Monitor“ and „MGA settings“ after these drivers have been installed.

Screen resolution	Refresh rate (Hz)	Horizontal-rate (kHz)	Max. number of colors (2D)	Max. number of colors (3D)
640x480	60 to 120	32 to 65	16777216	65536
800x600	60 to 120	37 to 80	16777216	256
800x600	60 to 120	37 to 80	16777216	65536
1024x768	60 to 120	48 to 100	65536	--
1024x768	60 to 120	48 to 100	16777216	256
1152x864	60 to 110	54 to 105	65536	--
1152x864	60 to 93	54 to 90	16777216	--
1280x1024	60 to 94	63 to 105	256	--
1280x1024	60 to 94	63 to 105	16777216	--
1600x1200	60 to 66	74 to 85	256	--
1600x1200	60 to 66	74 to 85	65536	--

-- not available

The values marked are only available with a 4-Mbytes video memory.

## Resource table

	assigned IRQ	possible IRQ	Possible Address	Possible DMA
Keyboard	IRQ1			
IrDA / chip card reader	IRQ3		02F8, 03F8 02E8, 03E8	
Serial interface COM1	IRQ4		03F8, 02F8 03E8, 02E8	
Floppy disk drive controller	IRQ6			DMA2
Parallel interface LPT1	IRQ7	IRQ5, IRQ7	0278, 0378	DMA1, DMA3
RTC	IRQ8			
Audio controller		IRQ5, IRQ7, IRQ9, IRQ11, IRQ12, IRQ15		DMA1, DMA3, DMA0
Joystick:			0200-0207	
Base address:			0220-022F 0240-024F 0260-026F 0280-028F	
MPU 401:			0300-0301 0330-0331	
Adlib:			0338-038B	
USB controller	IRQ11			
Mouse controller	IRQ12			
Numeric processor	IRQ13			
IDE controller 1	IRQ14			
IDE controller 2	IRQ15			

"assigned IRQ" = interrupts assigned as shipped

"Possible IRQ" = these interrupts can be used for your particular application

"Possible address" = this address can be used for your particular application

"Possible DMA" = these DMAs can be used for your particular application

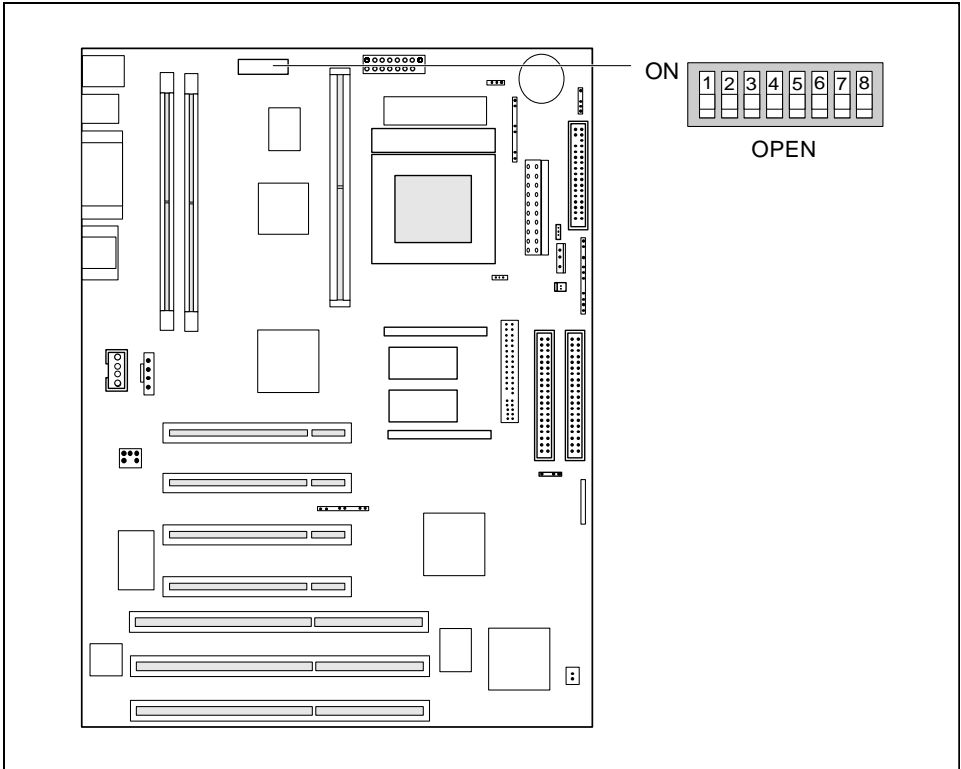


MPU 401: If you want to use external MIDI devices (for example a MIDI keyboard), you must assign an interrupt for the MPU 401 (MIDI interface). Detailed information is provided in the audio documentation on the driver and utility CD.

Please note that a resource cannot be used by two applications at the same time.



## Settings with switch block



Switch 1, 2, 3 and 4 = clock speed  
Switch 5 = recovering system BIOS  
Switch 6 = must be set to *off*

Switch 7 = reserved  
Switch 8 = write protection for floppy disk drive

## Clock speed - switch 1, 2, 3 and 4



The switches may only be set as specified in the table below for the particular processor used.

Make sure you also check the jumper settings for the processor auxiliary voltage.

processor	switch 1	switch 2	switch 3	switch 4
90 MHz	off	on	off	off
100 MHz	on	off	off	off
120 MHz	off	on	on	off
133 MHz	on	off	on	off
150 MHz	off	on	on	on
166 MHz	on	off	on	on
200 MHz	on	off	off	on
233 MHz	on	off	off	off
Reserved	off	off	off	off

## Recovering System BIOS - switch 5

Switch 5 enables recovery of the old system BIOS after an attempt to update has failed. Memory bank 1 must be populated in order to be able to restore the system BIOS. To restore the old BIOS you need a Flash BIOS Diskette (call customer service).

*on* The System BIOS executes from floppy drive A: and restores the System BIOS on the system board.

*off* The System BIOS is started from the system board (default setting).

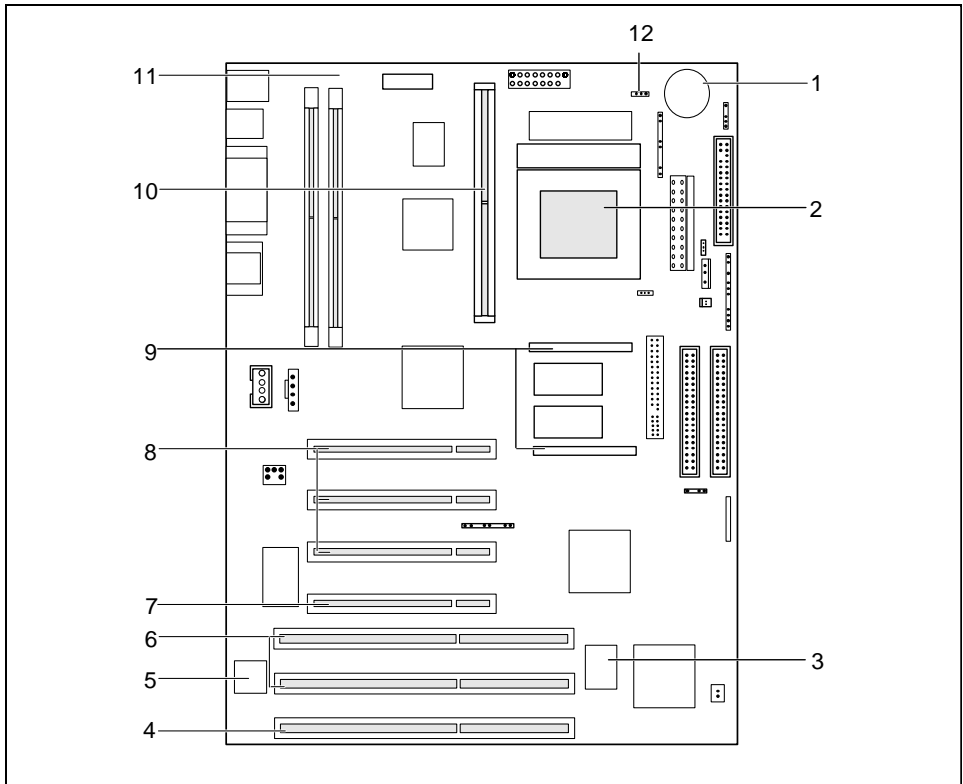
## Write protection for floppy disk drive - switch 8

Switch 8 is used to define whether floppy disks can be written or deleted in the floppy disk drive. To write and delete floppy disks, the write protection in *BIOS setup* must be disabled (in menu *Security*, the field *Diskette Write* must be set to *Enabled*).

*on* The floppy disk drive is write-protected.

*off* Read, write and delete floppy disks is possible (default setting).

## Add-on modules



- |                                      |   |
|--------------------------------------|---|
| 1 = Lithium battery                  | 8 = PCI slots (from below: 2, 3, 4)     |
| 2 = Processor with heat sink and fan | 9 = Socket for video memory board       |
| 3 = Flash BIOS                       | 10 = Location for second-level Cache    |
| 4 = ISA slot 1                       | 11 = Locations bank 1/2 for main memory |
| 5 = Socket for wavetable chip        | 12 = Jumper for processor core voltage  |
| 6 = ISA slots (from below: 2, 3)     |   |
| 7 = PCI slot 1                       |   |

The connectors marked do not have to be present on the system board.



PCI slot 1 does not have bus master capability. PCI slot 1 has busmaster capability only if the graphics controller on the PCI bus is not a bus master. PCI slots 2, 3 and 4 have bus master capability.

## Upgrading main memory

Two locations (bank 1 and bank 2) are available on the system board for installing memory modules. DIMM modules (dual inline memory module) are used.

A maximum of 256 Mbytes of SDRAM memory modules may be installed. SDRAM memory modules can be mixed.



You may only use unbuffered 3.3V modules. Buffered modules are not permitted.

You can only use 66 MHz or faster SDRAM memory modules!

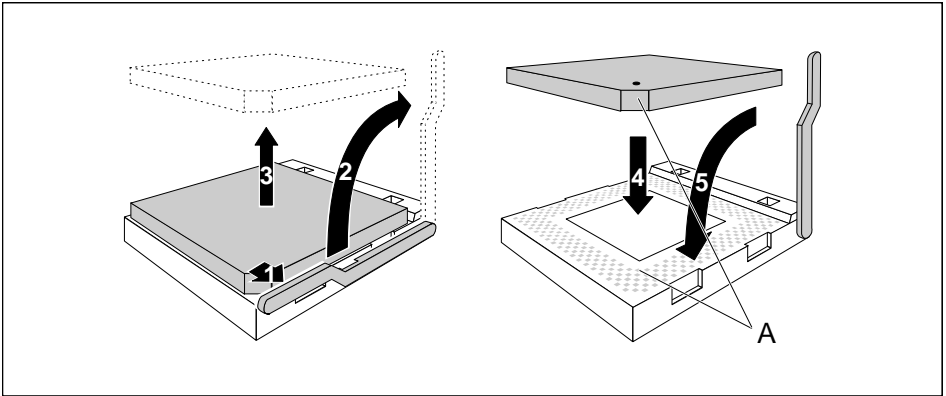
### Installing memory modules

- ▶ Flip the retainers to the left and right of the location outward.
- ▶ Insert the memory module into the appropriate location.
- ▶ Press the lateral holders until they snap in place.
- ▶ Press the lateral holders firmly against the location.

### Removing a memory module

- ▶ Flip the holders to the right and left of the location outwards.
- ▶ Pull the memory module out of its location.

## Replacing the processor



- ▶ Push the lever in the direction of the arrow (1) and lift it as far as it will go (2).
- ▶ Remove the old processor from the socket (3).
- ▶ Insert the new processor in the socket so that the mark on the upper side of the processor matches the mark (A) on the socket (4).



The mark on the processor may be covered by a heat sink. In this case let yourself be guided by the marking in the rows of pins on the underside of the processor.

- ▶ Push the lever back down so that it snaps into place.
- ▶ Set the switches 1, 2, 3 and 4 depending on the processor which is installed.

## Setting the processor core voltage

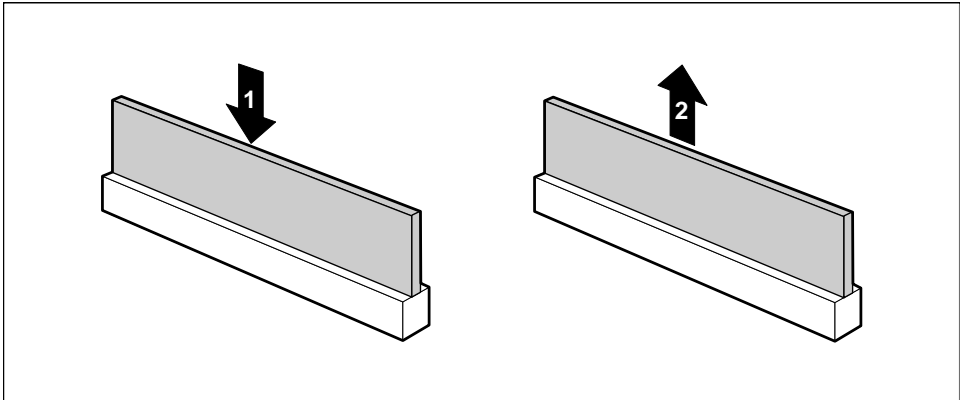
Processor type	Jumper VCore
Intel	not inserted
AMD-K6 - 166	connected to 1-2
AMD-K6 - 200	
AMD-K6 - 233	connected to 2-3

## Upgrading the Second-level cache

The system board has a socket for second-level cache. You can install a Pipelined-Burst second-level cache module with 128 Kbytes, 256 Kbytes or 512 Kbytes.



To avoid damage to the system board only cache modules released by Siemens should be used.



1 = Installing second-level cache

2 = Removing second-level cache

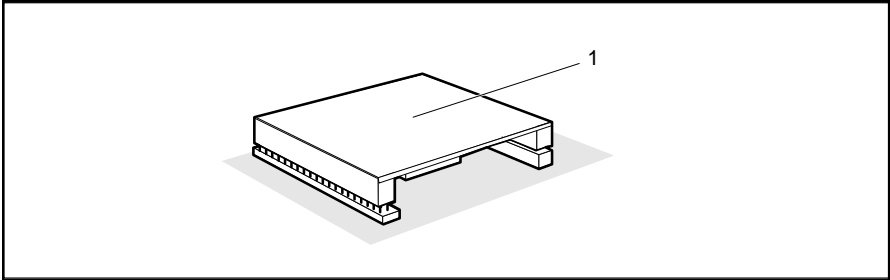
- ▶ If a second-level cache is already installed, pull it out of the mounting location in the direction of the arrow (2).
- ▶ Insert the new second-level cache module into the mounting location, making sure it snaps into place (1).



To be able to use the second-level cache, you must set the Cache field in the *Advanced / Cache Memory* menu of the *BIOS Setup* to *Intern and Extern*. You can enhance the performance by setting the *Cache System BIOS Area* and *Cache Video BIOS Area* fields in the same menu to *Enabled* and copying ROM sections with *Cache memory regions* to the cache.

## Upgrading the video memory

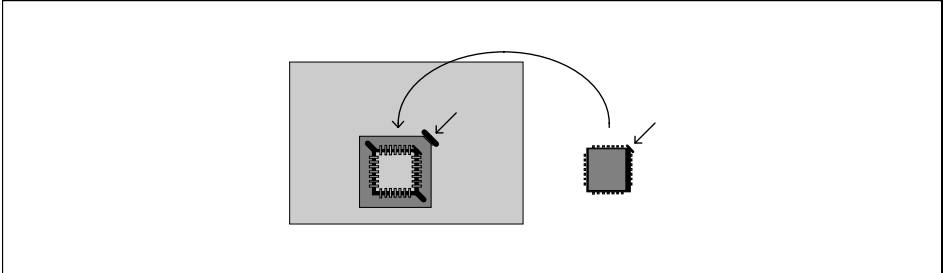
If your system board is supplied with a video memory configuration of 2 Mbyte, you may enlarge the video memory up to 4 Mbytes.



Check that the memory extension is correctly aligned before you press it into the base on the system board. The pins on the connector strip must fit exactly into the openings of the female connectors. Otherwise the memory extension might be damaged.

## Upgrading the wavetable module

If the system board is prepared for upgrading with a single-chip wavetable module (Crystal CS9236), the upgrade is carried out as shown in the figure.



## Replacing the lithium battery



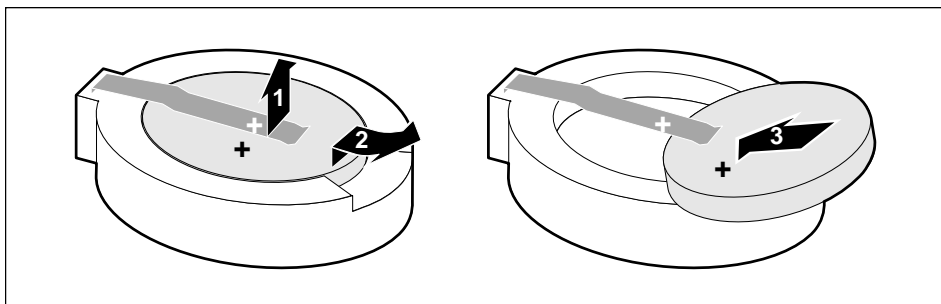
Once you have installed the system board, you should remove the battery protection (i.e. the thin plastic plate between battery and contact spring).

Incorrect replacement of the lithium battery may lead to a risk of explosion.

The lithium battery must be replaced with an identical battery or a battery type recommended by the manufacturer (CR2032).

Do not throw lithium batteries into the trashcan. It must be disposed of in accordance with local regulations concerning special waste.

Make sure that you insert the battery the right way round. The plus pole must be on the top!



- ▶ Lift the contact (1) a few millimeters and remove the battery from its socket (2).
- ▶ Insert a new lithium battery of the same type in the socket (3).