



NEW MEDIA COMMUNICATION

MANUAL FOR NMC MOTHERBOARDS



I. INTRODUCTION

This manual is intended to support computer manufacturers and end users with the installation and configuration of motherboards. In addition, the material contained in this manual is intended to provide information about other products and to explain the technical differences between products and their operation. The manual contents have been carefully checked to ensure it is free of errors. Nevertheless we cannot guarantee that it is completely free of errors. NMC accepts no liability for any loss of profits or business or for any loss of data or working time or for any direct, unusual, incidental damage or consequential damage sustained of whatsoever kind.

The equipment concerned is EMC-critical. Therefore installation and set-up of the motherboard may only be carried out by trained technical staff who are familiar with relevant current EMC guidelines. NMC PE GmbH reserves the right to make changes without prior notice to this manual or to the motherboard described in the OSM for technical reasons.

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Allusions by name to other products in this manual are purely for the purpose of unambiguously designating and identifying the products described in the manual, which remain the property of their owners.

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Introduction

TECHNICAL SUPPORT

If you need any additional information regarding installation or operation of the NMC motherboard, please refer in the first instance to your supplier. If your supplier is unable to provide further assistance, you can send your queries to our Technical Support team at any time, at our email address. **Support@nmc-pe.de**

INTERNET:

<http://www.nmc-pe.de>

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Please note down the serial number of your NMC motherboard. You will find this on the external ISA slot on a white label underneath the bar code.

Motherboard serial number:

BIOS UPDATE

If you need a Bios update for the motherboard, you can download this (provided a Bios update is available) from our home page. You will also find on our home page the tools which are necessary in order to flash update the Bios.

Internet Addresses

<http://www.nmc-pe.de> or www.nmc-pe.com

Support@nmc-pe.de

TRADEMARK

All brand names are the property of their owners and are mentioned only for the purposes of identification.

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III. THE MOTHERBOARD

COMPONENTS CHECKLIST

The components listed below should come with your NMC motherboard.

AT motherboard

- 1 NMC motherboard
- 1 NMC manual/OSM
- 1 Chipset driver (on diskette or CD)
- 1 Retention mechanism ¹⁾

ATX motherboard

- 1 NMC motherboard
- 1 NMC manual/OSM
- 1 Chipset driver (on diskette or CD)
- 1 Retention mechanism ¹⁾
- SCSI cables ²⁾

1) Only for Slot 1 and Slot 2 motherboards for Pentium® II / III / Xeon™, Celeron™

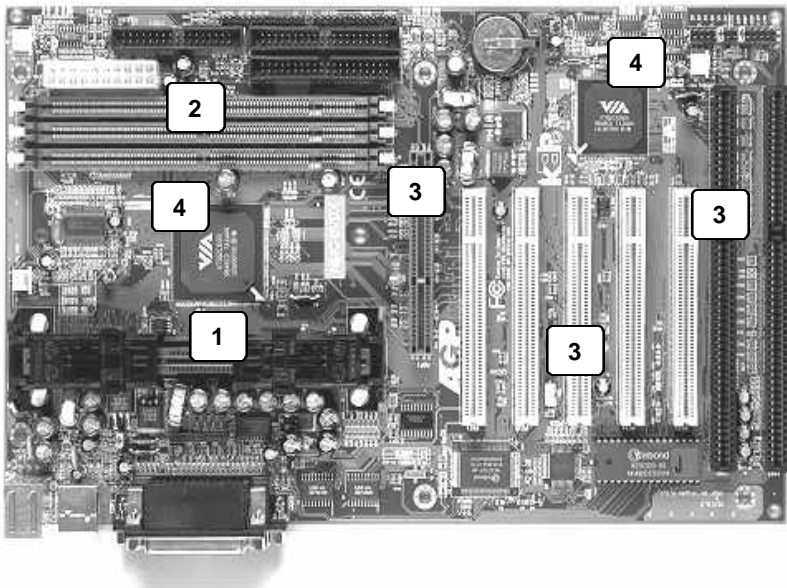
2) Only with On Board SCSI

The Motherboard

THE MOTHERBOARD LAYOUT

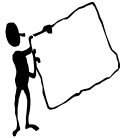
The motherboard or main board of your computer is the central component of your system. Conventional motherboards contain the CPU (1) [shown here as a Slot 1 board], the memory (2) and the plug-in printed-circuit boards (3). The chipset (4), as the heart of the system, is also an essential component of the motherboard.

If you ever want to change the motherboard on your computer, you should take care to ensure that the new motherboard you purchase has the same fastening points and connections as well as the same form factor as the old motherboard. In case of doubt you should consult your supplier.



Removing the motherboard

Please read the instructions below carefully before you start dismantling the motherboard.



- Before you open the case and touch any components of the computer, make sure you have discharged any electricity from your body as otherwise one or more of the components in the computer could be destroyed. This is achieved by touching some well-earthed objects such as bare heating or water pipes.
- Make sure that you eliminate any electrostatic discharge from your body whenever you are about to work with any computer components.
- Unplug all external connections (mains plugs, keyboard etc.) and reassure yourself once again that all mains plugs have been pulled out from the power sockets. Do not forget to discharge yourself! Now open the case in accordance with the manufacturer's instructions.
- Mark all the cable connections inside the case and then pull them out. Take out all the plug-in printed-circuit boards.
- Now unscrew the cross-head screws holding your motherboard in place, using a cross-head screwdriver
- When you have taken out all the screws, pull the board a little way out from the rear panel so that the keyboard connector of the ATX I/O connection area can be pulled out of the case opening.
- The motherboard is resting on spacers. These can be so firmly attached to the cross-head screws that the action of unscrewing these screws also loosens the spacers. Check once again to see if all the spacers are loose. Now take the motherboard out of the case and remove the spacers so that you can use them again later.

The Motherboard

Installing the motherboard



To install the motherboard you should follow these steps:

- Remove any spacers still in position from your motherboard. Compare the drilling template on your motherboard with the one in the case.
- Insert the spacers in the case in accordance with the drilling template and screw them tight. (In some cases the spacers are used as clips.)
- Mount the panel for the external connections in the case opening provided for this purpose. If you have purchased an ATX board and still have an AT case, on newer case types you can take out the panel in which the keyboard connection is located.
- Place the motherboard on the spacers and fasten it with the screws provided for this purpose. Make sure that the external connectors are correctly fitted in the panel provided.



Please note once again that for fastening purposes you should only use the drilled holes in your board which come with a metal rim.

HARDWARE CONFIGURATION

To ensure that your system functions without any problems, you must configure your motherboard for use with the components you will be using such as the CPU, memory and any special functions. The relevant settings can be defined partly through the jumpers and also via the Bios settings. On the next few pages you will find information regarding the individual configuration options.

Jumpers and Switches

On the motherboard, next to the slots for expansion boards you will find a small number of jumpers (see picture on the right) and/or switches (see picture on the left), which are used to configure your hardware correctly. As well as the jumpers which enable and disable a few special functions of the motherboard, there are some jumpers and jumper blocks and/or switches on NMC motherboards which are absolutely essential for correct configuration of the hardware. A jumper consists of either two or three pins which are joined together with a plug link and thus form an electrically conductive link which closes the circuit concerned. To enable or disable the relevant function of the jumper you must either join or disconnect the pins. A switch works on the same principle. Just as with the jumpers, the desired setting is established through the combination of enabled or disabled switch circuit breakers. An indication on the switch makes clear the position of the circuit breaker which is in the "On" position.



External bus clock / multiplier

To specify the external bus frequency (FSB) and the internal CPU clock frequency, you will generally find an Easy Setting Dual Jumper (ESDJ) or an Easy Setting Single Jumper (ESSJ) on NMC motherboards. Some boards use a switch. The pictures below show the ESDJ and ESSJ respectively. These jumper blocks are responsible for the correct setting of the FSB and the clock multiplier for the CPU.

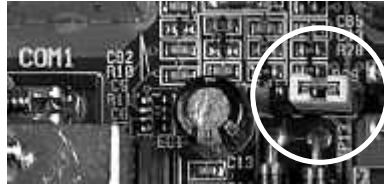
ESDJ



The Motherboard

Keyboard Power On

The keyboard power on function allows you to switch the computer on via the keyboard. Normally you need to set a jumper for this. On NMC motherboards this jumper will be found near the I/O shield.



Clear CMOS

In order to be able to delete the Bios settings as required quickly and easily, many NMC motherboards include a jumper which holds the Bios data in the factory condition and, after a conversion process lasting approx. 5 seconds, deletes the Bios data, converting the unit to the delivery state.



DIMM clk select

With this jumper you can specify whether your memory should be controlled by the external clock (FSB) or via the AGP clock frequency. The advantage is that you can use older SDRAM's and at the same time also use the 100MHz bus clock. This function is only found on NMC motherboards which are fitted with a VIA chipset.

ONBOARD CONNECTIONS

The onboard connections for the external devices must be subdivided according to the appropriate form factor of the board. Whereas with the ATX form factor, the serial, parallel and also the USB and PS/2 interfaces are accommodated in an I/O shield on the board, with the AT form factor equivalent interface cables with the connectors provided for this purpose must be connected on the board and led through the slot panels for the plug-in printed-circuit boards to the outside. In addition, there is another plug connection for the power supply. However, AT boards usually also offer power connections for AT and ATX. All the other connections will be found on every NMC motherboard, irrespective of form factor.

You will find the pin assignment for the onboard connections in the appendix under "Pinouts".



WOL (Wake On LAN)

The Wake on LAN is a three-pin connection which is provided for connecting to a network card designed for this purpose. This connection is used solely for the purpose of switching on or reactivating the computer via the network card from another computer in the network.



SB Link

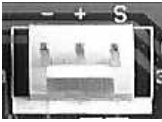


Figure 1

The SB link is a six-pin connection in which one pin is unused (see circle). This connection is provided for the PCI sound card in order to accommodate the standard settings for ISA sound cards (Sound Blaster compatible) required by some older applications).

The Motherboard

Fan connections



Like the WOL connection, the fan connection is also a three-pin connection, but its distinctive design ensures that it is not confused with the other onboard connections. Fan connections are provided for controlling the CPU, case and power supply fans. In exceptional cases you will find fewer than the normal three fan connections on the board.

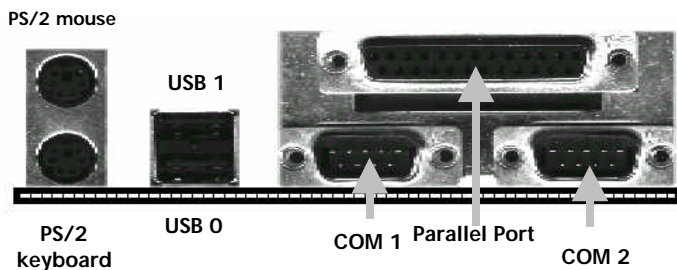
Infrared connection

NMC motherboards are also fitted with a connection for an infrared interface. This connection is normally located in the terminal strip for the LED and switch housing.



THE I/O SHIELD

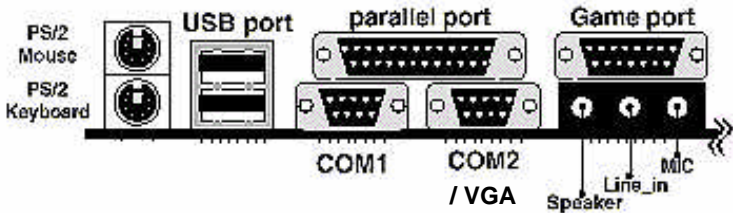
Before the system can be started up for the first time it is necessary to connect up any external components such as input devices and monitors. On ATX motherboards this is done using the "I/O shield". The I/O shield contains the PS/2 connections, the USB ports and also the serial and parallel connections.



The Motherboard

On some motherboards with one particular chipset (see "Chipsets" chapter) the I/O shield includes additional connections for the sound card and/or the onboard video card.

The figure below provides a schematic representation of the connections which you will find on your motherboard.

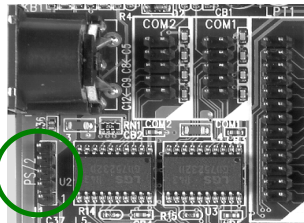


Interface cables

AT motherboards include connections for the interface cables. These are located next to the keyboard connection (see figure on the right) and must be led outside using appropriate interface cables.

USB and PS/2 on AT motherboards

Special connecting cables are required for the USB



ports and the PS/2 connection as well as for the serial and parallel interfaces. You will find the PS/2 connection directly next to the AT keyboard connection (circle in the above picture). The USB is located next to the PCI slots.

The Motherboard

Connecting the external components

Once you have installed the motherboard in the case, you should now connect up the external components as follows:

Each connector has its counterpart on the rear panel of the computer.

- Start with the lowest plug connector. If you do this, your view of the next plug connection will not be obscured.
- The individual connections are identified by the case manufacturer on the back panel of your computer.
- Identify the appropriate connection.
- Connect up the connecting cable to the appropriate connection.



Each connector can only be inserted in one position. Please do not apply any force.

- Screw in the connector once it is in position. This will protect it from slipping out inadvertently and causing errors during operation.
- Proceed with the other connectors in the same way until they have all been plugged in.
- Check one last time to ensure that all the connectors are properly attached.

SCSI

What is SCSI?

SCSI (Small Computer System Interface) is a standard interface used to connect up intelligent peripheral devices (hard disks, CD ROM drives, streamers, removable disks etc.) to the computer bus. The SCSI device which forms the connecting link between computer ("host") and SCSI bus is called the *host adapter*. SCSI devices are called "intelligent" devices because they have their own control electronics which are capable of accepting and processing complex commands from the controller. This relieves the load on the processor as this only has to pass on once commands like Copy or Move, which are then implemented independently by the devices. A larger number of devices can be connected to a SCSI controller than to an IDE controller. Each device is assigned a unique identifier. There is currently a SCSI standard which has undergone further development over time and is divided into three subgroups.

- SCSI-1 has been in existence since 1981 and permits transfer rates of up to 5 MB per second, at a bus width of 8 bits. Up to 7 devices can be connected to one host adapter.
- SCSI-2 has been on the market officially since 1993. The number of devices which could be connected up was increased to an upper limit of 31 and the data width to a maximum of 16 bits (32 bits on Wide SCSI), with full compatibility with SCSI-1. The transfer rates achievable with SCSI-2 are between 20 and 40 MB/second.
- SCSI-3, which entered the market officially in 1998, incorporates the LVD standard and achieves a maximum transfer rate of 80 MB/second.

The Motherboard

On Board SCSI

The NMC 6BCD+ motherboard is a dual motherboard which incorporates one AIC 7890 and one AIC 3860 SCSI controller on the board.. This supports SCSI Ultra/Ultra Wide and Ultra 2 Wide devices.

There are 3 SCSI connections on the board (SCJ1 , SCJ2, SCJ3). The SCJ1 and SCJ2 connections are for single-ended devices with a maximum data transfer rate of 40 MB/second when the 68-pin connection (SCJ1) is used and 20 MB/second with the 50-pin connection.

We recommend connecting all relevant devices to one of the two connections. With up to four devices, the cable should not exceed 3m. in length. With up to 8 devices, the cable should not exceed 1.5m.

The 68-pin SCJ3 connection is intended for SCSI U2W devices with a maximum data transfer rate of 80 MB/second, using a cable no longer than 12m.

External SCSI devices can be connected using the SCSI-2 adapter which comes supplied as standard.

Termination

For safe and trouble-free signal transmission on the SCSI bus it is necessary to terminate the leads at both ends with the characteristic impedance. A primary distinction is made between passive and active termination. In the passive variant the terminating resistor is established through parallel switching of several resistors. Active termination is implemented through an active voltage regulator and is recommended from SCSI-2. In the simplest case a jumper for the termination must be set on the relevant devices. A SCSI bus has exactly two terminators, no more and no less, at the beginning and end of the SCSI cable. No terminator is required for the onboard controller, which functions automatically.

SCSI ID

Every device connected to a SCSI bus has a unique address, known as its SCSI ID. This ID can be viewed as a kind of PO box, to which data from other devices on the bus is sent as well as valid originating addresses. Two (or more) devices on the same SCSI bus must never have the same SCSI ID. The host adapter itself also has its own SCSI ID, which is normally the ID 7.

The Motherboard

The boot disk should be given the ID 0. Otherwise, we recommend assigning the highest ID to the fastest SCSI device connected, as access priority is assigned as a function of SCSI ID. Details of how to assign IDs will be found in the manufacturer's instructions for the device.

IV. THE CPU, THE BRAINS

The CPU is the brain or head of the system. All logical and arithmetical operations are performed in the CPU. Generally, the processor reads data from the memory, processes this in the manner specified in the command and saves the results again afterwards.

Today's CPUs are descended from the 8086, which succeeded the 8080. The functions and modes of operation have been steadily reviewed and improved right up to the processors found today. The continued development of silicon technology has made it possible to produce ever smaller and more powerful processors. Quite different types of processors were developed by leading companies working in this area from the wealth of technologies available, and these take their names from the instruction code applicable in each case. At the end of this chapter you will find two tables which will help you gain an overview of the CPUs currently available on the market.

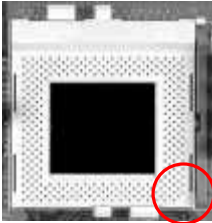


The CPU, the Brains

REPLACING THE CPU

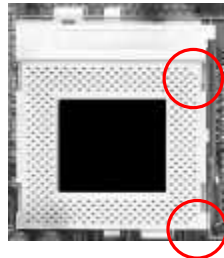
Socket 7/Supersocket 7/S370

Difference between Super Socket 7 and Socket 370



The picture on the left shows a standard Socket 7 / Super Socket 7. The lever located to the right next to the socket is used to open and close the CPU clamping device. The socket has a marker (indicated by circle) which has the same shape as a one corner of the CPU. This marker is a reference pointer as to how the CPU should be inserted into the socket.

The picture on the right shows a Socket 370. This has been designed for the Celeron™ in the PPGA case. At first glance this looks like the Socket 7 shown above. However, the S370 has an extra row of pins. Attachment of the CPU in the socket and the marker are both similar to their equivalents in the Socket 7. The Celeron™ PPGA socket has two faced corners which again are also found on the CPU.

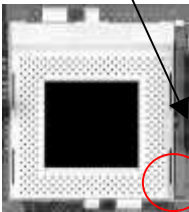


The CPU, the Brains

Taking out the CPU

Please read through these instructions on how to take out your CPU carefully.

Locking lever



- After opening the case, mark the connected cables and their positions. Pull them out if they are blocking direct access to the CPU.

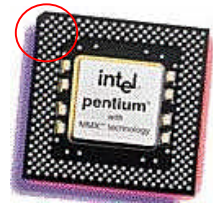
- Now detach the power supply of the fan which is located on the CPU. If possible, undo the bracket on the socket and remove the fan. Use the lever attached to the CPU socket to detach the CPU, pushing out the lever, which is folded downwards, a little bit from the socket, and then

pull it out of its bracket. Now fold the lever upwards. Take down the CPU carefully from the socket. Take care not to bend the pins.

Inserting the CPU

To insert the CPU, follow these steps:

- Open the socket catch described above (if this is not already open).
- Examine the corners of your CPU. One of these corners (two in the case of the Celeron™ PPGA) is faced. On the socket you will find there are two corresponding faced corners (red circle). The corners must be one above the other when the CPU is installed.
- Take care not to bend the CPU pins. Now insert the CPU so that the faced corners are one above the other. Then lock the socket in position with the lever. Do not forget to reinstall the fan.



The CPU, the Brains

Slot 1 / Slot 2 CPU

Pentium® II/III

The Pentium® II/III and Pentium® II/III Xeon processors are known as “slot processors” which in principle are taken out and inserted like a PCI or ISA card.

The slot provided for this is Slot1/Slot2, a special socket specified by Intel and designed exclusively for use with the Pentium® II/III, Pentium® II/III Xeon and Celeron™ (up to 300MHz as Slot1 CPU). Unlike Socket 7 CPUs, these CPUs use a bus protocol also specified by Intel called GTL+.



Slot1/Slot2 CPUs, unlike Super Socket 7 CPUs, do not have the second level cache on the motherboard itself but on the main board of the processor (Figure 7-4). The Celeron™ CPU is the odd man out in this series. It is available in three versions:

- Celeron without cache for slot 1.
- Celeron with 128KB L2 cache for slot1.
- Celeron in the PPGA case for Socket 370 (also works with an adapter card on slot 1).



The CPU, the Brains

Pentium® II Xeon™

The next CPU generation of Intel slot processors are the Slot 2 processors. These are treated as plug-in printed-circuit boards just like the Pentium® II and Pentium® III, but mechanically they are not compatible with Slot 1 processors. Unlike the Pentium® II / III processors, this processor type, which is known as the Pentium® II/III Xeon™, is available with a second level cache of 512KB (standard size) up to 2MB. Synchronization is achieved via the main internal processor clock.



Comparison of slots

As described above, the Pentium® II/III Xeon uses a slot which has a mechanically similar design. To make the difference between the two types of slot clear to you, the two variants are shown one above each other so that you can compare them easily.

Slot 2




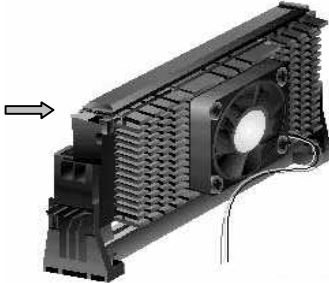
Slot 1



The CPU, the Brains

Taking out the CPU

If the Slot 1 CPU is still in the socket, you should follow these steps:

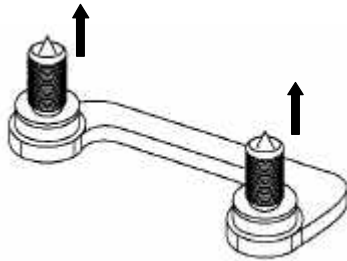
- First of all, detach the cable for the CPU fan from the motherboard. To do this, pull out the connector carefully from the fan connection.
- Release the bracket for the Pentium® II/III, Celeron™ CPU in the positions marked with arrows.
- Now pull the CPU upwards out of the slot or bracket.
- If the CPU jams a little as you pull it out, please refrain from using force. Try pushing the CPU backwards a little and then put it out once again without tilting it.

The CPU, the Brains

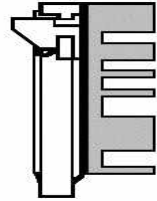
Inserting the CPU

Before inserting the CPU, please check that the fan is in the correct position on the CPU. Please take care to ensure that the CPU fastening device which is located on the board is compatible with the CPU case on your machine. The following tips will guide you as to the correct insertion of the CPU.

- Make sure the fan is correctly connected and is in direct contact with the CPU case. Only use a fan which is designed for use with your CPU (SECC or SECC2).



- Install the two pairs of bolts which are shown on the left (if they have not already been preinstalled) on the motherboard. Use the drilled holes provided for this purpose, next to slot 1.

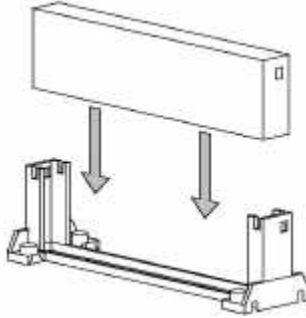


- The next figure shows the CPU fastening device (retention clip). The clip shown may have a different shape from the one next to your motherboard or the preinstalled CPU fastening device. Put this on the two preinstalled bolts and attach the CPU fastening device using the screws supplied.



The CPU, the Brains



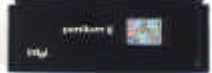



- Now insert the CPU as shown in the diagram below and lock the bracket at the sides of the guide rail.
- When you have completed the installation, check once again that the CPU is in the correct position.
- Please do not forget to connect up the CPU fan connector to the appropriate connections on the board.
- If you have a dual board, please use the fan connections assigned to the individual slots.









When you have completed the installation of the CPU you can move on to installing the remaining components.

On the next two pages you will find a summary of the CPUs used in the past (and no longer available) and the CPUs currently manufactured by various suppliers.

The CPU, the Brains

CPU	Clock rates [MHz]	Voltage [V] Vcore I/O		FSB [MHz]	L2 Cache	Process Tech.	Casing	Processor Architecture	Picture
Pentium®	75-166	3.3	3.3 3.45	66	On Board	0.35	CPGA	CISC	
Pentium® MMX	166-233	2.8	3.3	66	On Board	0.35	PPGA	CISC	
Pentium® II	233-450	2.8	3.3	66/100	512KB	0.35 0.25	SECC	CISC	
Celeron™ Celeron™A	233-300 333-466	2.	3.3	66	0 128KB	0.35 0.25	SECC2	CISC	
Pentium® III	450-6xx	2.0	3.3	100	512KB	0.25	SECC2	CISC	
Pentium® II Xeon Pentium® III Xeon	450-500 533-6xx	2.0	3.3	100	512KB- 2MB	0.25	SECC	CISC	

The CPU, the Brains

CPU	Clock rates [MHz]	Voltage [V] Vcore I/O		FSB [MHz]	L2 Cache	Process Tech.	Casing	Processor Architecture	Picture
IDT	180-240	3.52	3.5	66/75	On Board	0.35	CPGA	RISC	
AMD K5®	Up to PR166	3.45	3.45	66	On Board	0.35	CPGA	RISC	
AMD K6®	Up to 300	2.2/2.9/ 3.2	3.3/3.45	66	On Board	0.35 0.25	CPGA	RISC	
AMD K6®-2	Up to 475	2.2	3.3	66/100	On Board	0.25	CPGA	RISC	
AMD K6®-III	From 400	2.4	3.3	100	256KB	0.25	CPGA	RISC	
IBM/Cyrix	166-266 PR	2.9/3.5	3.3	60-83	On Board	0.25	CPGA	RISC	

The Chipset, the Heart

V. THE CHIPSET, THE HEART

If the CPU is the brains of a system, then the chipset performs the function of a heart. Without the chipset, nothing will work. It is known as the distributor on the motherboard as it manages and coordinates the data generated between processor, memory, the various slots and the I/O interfaces.

A chipset always consists of a "south bridge" and a "north bridge". Each of these bridges performs different functions. The south bridge is responsible in the system for the connection to the PCI and ISA bus and also performs some of the work of managing the I/O interfaces. The north bridge on the other hand controls communication between CPU, cache and memory.



On the next few pages the technical characteristics of the individual chipsets which you will find on NMC motherboard are described. We have limited the discussion to the most important chipsets produced by VIA

and Intel®. The technical characteristics are presented in the form of a table on the next two pages.

The Chipset, the Heart

CHIPSET BRIEF DESCRIPTION

INTEL® BX

The Intel® 82443 BX was developed for Slot 1. This chipset was the first one to provide a bus clock frequency of 100MHz, and thus prepared the way for Intel 100MHz Pentium® II/III CPUs. Like the LX and EX, the BX has an AGP slot and allows multi-processing.

INTEL® ZX

The Intel® 82443 ZX is the counterpart to the EX chipset, except that in this case the BX chipset served as the model. Again, some of the functions have only limited capability or have been omitted from the scope of the functionality (no ECC, only 2x SDRAM). Otherwise, the ZX has the same characteristics as the BX.

INTEL® 443 GX

The GX was new in the sense that it was the first chipset to incorporate the new Slot 2. This slot was designed for the Pentium® II/III Xeon processor, which was intended to be used mainly in server applications as a powerful CPU with a cache of up to 2MB.

INTEL® 450 GX/KX

This chipset was designed for Pentium® Pro processors and supports multi-processing with up to 4 CPUs (2x 450KX, 4x 450GX). These chipsets support the 60MHz and 66MHz external bus clock generally used on the Pentium® Pro.

INTEL® 450 NX

The Intel® 450 NX, like the 443GX, was designed for the Pentium® II Xeon processor. Although it supports 4 x multi-processing operations, it has no SDRAM and does not support AGP.

The Chipset, the Heart

INTEL® 82810/82810-DC100

The Intel® 82810 is Intel's latest chipset. This has been designed for All In One boards and is available in three different versions. This chipset combines graphics, memory controller (now described as a "hub"), soft audio and soft modem all in one chipset.

Two of these chipset versions also support Ultra ATA/66. The Intel® 82810 and Intel® 82810-DC100 are primarily intended for the Celeron™ processor. Unlike other 100MHz motherboards, only 100 MHz SDRAM modules can be used on boards fitted with the Intel® 810 chipset.

The Chipset, the Heart

VIA MVP3

The MVP3 chipset developed by VIA for Socket 7, in addition to supporting 66MHz, 75MHz and 83MHz clock frequencies, also supports the 100MHz frontside bus, as well as AGP and a higher second level cache size than Intel's Socket 7 chipsets.

It is also possible to extend the memory to up to 1GB, while the cacheable area can be up to 512MB and ECC (Error Correction Code) is also supported.

The MVP3 is suitable both for the desk top and also for mobile use.

VIA MVP4

The MVP4 is the successor to the MVP3. As an enhancement to All In One Boards, it offers a graphics and sound solution on one chip. The MVP4 supports UDMA 66 as well as UDMA 33. Like its predecessor, it is a 100MHz chipset.

VIA APOLLO PRO (+)

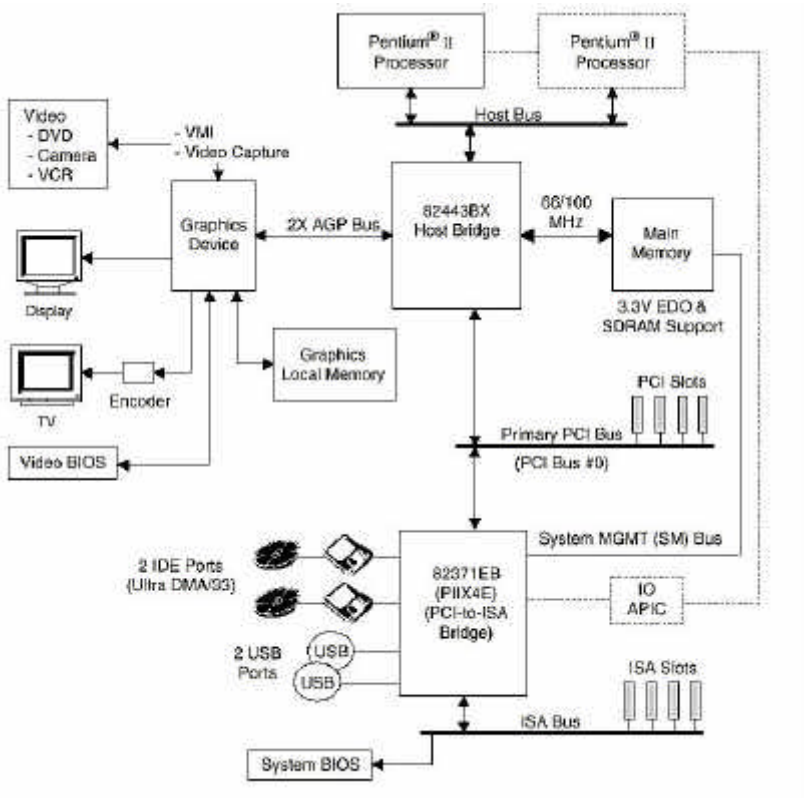
The Apollo Pro is VIA's Slot 1 chipset.

As well as a range of features which are already familiar from the BX, the Apollo Pro also supports 5 PCI Bus Master, and has an independent main storage access controller. The idea is that you can control your memory at 66MHz with a 100MHz system bus clock and hence you can still work with "older" memory chips.

The Chipset, the Heart

OPERATIONAL AND FUNCTIONAL MODE OF A CHIPSET

Example: Intel®82443BX



CHIPSET OVERVIEW

The tables on the next few pages provide you with a technical overview of the chipsets currently used on NMC motherboards.

The Chipset, the Heart

	VIA				
	VPX97	MVP3	MVP4	Apollo Pro	Apollo Pro+
North bridge	VT82C595	VT82C598AT	VT82C501	VT82C691	VT82C693
South bridge	VT82C586B	VT82C586B	VT82C686A	VT82C596 #	VT82C596 #
Number of CPUs supported	1	1	1	1	1
Cache type	**	*	*	****	****
Max.cache size	2048KB	2048KB	2048KB	****	****
Max. cacheable area	512MB	Wb: 256MB Wt: 512MB	Wb: 256MB Wt: 512MB	****	****
RAM types supported	FPM/EDO/BEDO SDRAM	FPM/EDO/SDRAM	FPM/EDO/SDRAM	FPM/EDO/SDRAM	EDO/SDRAM
Max. RAM size	512MB	1GB	768 MB	1GB	1GB
FPM read timing	5-3-3-3	5-3-3-3	5-2-2-2	X-4-4-4	x-4-4-4-4
EDO read timing	5-2-2-2	5-2-2-2	5-2-2-2	X-2-2-2	x-2-2-2-2
BEDO read timing	5-1-1-1	No info available	No info available	No info available	No info available
SDRAM read timing	3-1-1-1	3-1-1-1	6-1-1-1	X-1-1-1	x-1-1-1-1
ECC support	No	Yes	Yes	Yes	Yes
Hard disk controller	VT82C586B	VT82C586B	VT82C686A	VT82C596 #	VT82C596 #
U/DMA support	Yes	Yes	Yes	Yes	Yes
Bus mastering	Pio Mode 4/U-DMA	Pio Mode 4/U-DMA	U-DMA 33/66	Pio Mode 4/U-DMA	Pio Mode4/UDMA
Supported bus frequencies [MHz]	50 , 60 , 66 , 75	50 , 60 , 66 , 75 , 83.3 , 100	50 , 60 , 66 , 75 , 83.3 , 100	66 , 100	66 , 100
Unofficial bus frequencies [MHz]	68.8 , 83.3	/	/	/	/

- * Synchronous Pipeline Burst Cache
- ** Asynchronous/Synchronous Pipeline
- *** Asynchronous/Synchronous Pipeline Burst Cache
- **** On the CPU
- # PiiX4 compatible

Overview of VIA Chipsets

The Chipset, the Heart

	Intel®				
	LX	EX	BX	ZX	GX
North bridge	82443LX	82443LX	82443BX	82443ZX	82443GX
South bridge	82371AB	82371EB	82371EB	82371EB	82371EB
Number of CPUs supported	2	1	2	1	2
Cache type	****	****	****	****	****
Max. cache size	****	****	****	****	****
Max. cacheable area	****	****	****	****	****
RAM types supported	EDO/SDRAM	EDO/SDRAM	EDO/SDRAM	EDO/SDRAM	SDRAM
Max. RAM size	512 MB SDRAM 1GByte EDO	256 MB	512MByte SDRAM 1GB registerd EDO	256 MB	2 GByte
EDO read timing	5-2-2-2	5-2-2-2	x-1-1-1	x-1-1-1	x-1-1-1
SDRAM read timing	5-1-1-1	5-1-1-1	x-1-1-1	x-1-1-1	x-1-1-1
ECC support	Yes	/	Yes	/	Yes
Hard disk controller	PIIX4	PIIX4E	PIIX4E	PIIX4E	PIIX4E
U/DMA support	Yes	Yes	Yes	Yes	Yes
Bus mastering	Yes	Yes	Yes	Yes	Yes
Supported bus frequencies [MHz]	66	66	66,100	66,100	100

- * Synchronous Pipeline Burst Cache
- ** Asynchronous/Synchronous Pipeline
- *** Asynchronous/Synchronous Pipeline Burst Cache
- **** On the CPU/dependent on the CPU
- # PiiX4 compatible

Overview of Intel® Chipsets

Bus (Systems)

VI. BUS (SYSTEMS)

A “bus” is a grouping together of a number of parallel lines, to which several functional blocks or components of a computer are connected. Amongst other things, buses are used to convey data and control signals for diverse functions and also to pass power supply voltages. Generally, a bus is subdivided into data bus, address bus and control bus. For example, people talk about a CPU’s internal bus or a bus between the individual components on the main board of a PC. On this so-called system bus the data and commands are passed between the individual components of the system, such as the CPU, main memory, video cards and storage media.

The interface to peripheral devices is also called a bus if this has the capability to connect up a number of devices.

Since the introduction of the IBM-compatible PC, various bus systems, which are still in use today (albeit sometimes to only a limited extent), have been developed. To provide you with an overview we shall explain the most important bus systems.

STANDARD BUS SYSTEMS

ISA (Industry Standard Architecture)

The designation “ISA” (“Industry Standard Architecture”) refers primarily to the standardized design of the expansion bus, which first appeared on IBM’s IBM PC/AT machines. The ISA is the “oldest” bus system and is still used today on the PC. A distinction is made here between the 8-bit and the expanded 16-bit ISA bus.

PCI (Peripheral Component Interconnect)

PCI is a bus system which was developed by Intel as a more powerful alternative to the VESA local bus (VLB). The PCI bus rapidly achieved widespread use, especially after the launch of the Pentium processors, as the VLB cannot utilize the Pentium’s enhanced performance capability. However, the PCI bus is independent of the processor used and can therefore be used on other systems (e.g. on the Apple Macintosh). The current version 2.1 of the PCI standard has a maximum transfer rate of 264 MB/seconds with a data width of 64 bits. The clock rate associated with the bus is between 25 and 33 MHz.

Bus (Systems)

When combined with the appropriate Bios, PCI allows plug-in printed-circuit boards to be automatically configured. As was the case with the VLB, the PCI bus is primarily relevant to expansion cards with a high data throughput, such as video cards or hard disk controllers.

SPECIAL BUS SYSTEMS

SCSI

See page 19.

Firewire (IEEE 1394)

Firewire (IEEE stands for Institute of Electrical and Electronics Engineers, 1394 is the Standard number) is a plug&play system, which means that it is self-configuring and also integrates new devices on its own. Unlike USB, which is a variation, no PC has to be connected to Firewire. Firewire supports up to 63 devices and allows data transfer rates of up to 400 MB/second. Firewire is part of the ATX 2.1 specification.

USB (Universal Serial Bus)

USB (Universal Serial Bus) is an interface developed by Intel which can be used in many applications. It is a variation of the IEEE 1394 ("Firewire"), which is also used outside computers. Up to 127 devices can be connected to the USB cable and the data transfer rate is up to 1MB/second, which is also sufficient for scanners and printers. These devices can be unplugged and plugged in during operation. Windows 95 OSR 2.5 and Windows 98 detect the change automatically and install the appropriate drivers.

AGP BUS (Accelerated Graphic Port)

3D applications typically require a huge amount of memory and a higher data throughput. This standard contains an additional expansion slot on the motherboard which was designed solely to accommodate a video card designed for this standard.

The AGP video card is operated with the PCI clock rate doubled and allows direct access to the main memory in order to swap textures. Unlike other PCI/ISA bus systems, it is connected not to the south bridge (see chipset functional diagram) but to the north bridge. As the north bridge is responsible for memory control, this makes internal memory swapping possible for the AGP card.

MEMORY MODULES

VII. MEMORY MODULES

BASIC INFORMATION

Virtually no other components of the PC are subject to such fierce competition as memory chips. At the start of the PC era the chips used were usually either 16KB or 64KB. The current capacity of common memory modules is around 2048MB (4096MB modules are undergoing laboratory testing). [Memory module size is always expressed in megabits (MB).] As well as capacity, the technology on which the modules run has also undergone further development.

MEMORY

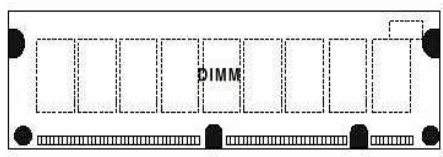
Module Design

SIMM

The term "SIMM" ("single inline memory module") refers to small printed circuit boards on which individual DRAM circuits are combined. The SIMMs are inserted into special slots on the motherboard using a stable contact strip. The first generation of SIMMs had a contact strip with 30 contacts, whereas the PS/2 SIMMs used nowadays have 72 contacts. However, old SIMM modules can also be used on modern motherboards with PS/2 SIMM slots using an appropriate adapter, although it should be mentioned that the number of motherboards which support SIMMs is steadily declining.

DIMM

Now that SIMM modules can no longer be used since the introduction of the Pentium® II and ATX motherboards, DIMM's ("dual inline memory module") are used instead. They have 168 pins on their underside; these are used to transfer data from the central memory to the processor and are based on the SDRAM memory type.



MEMORY MODULES

REPLACING MEMORY CHIPS

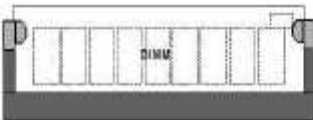
To remove a memory module simply, follow the guidance provided below.

DIMM Module

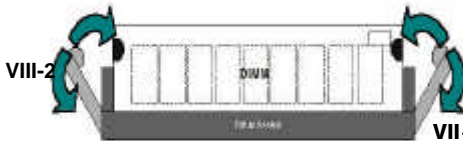
Removing the memory



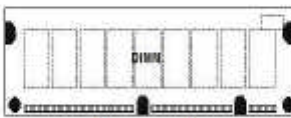
VIII-1



VII-1



VII-2



VII-3



VIII-3

- Unfasten the brackets which are holding the memory module in the socket as shown in Figures VII-1 and VII-2. As you loosen the brackets, the module will already lift up a little.

- Now pull the memory module right out of the socket (see Figure VII-3). If it seems a bit tight, please do not apply any force.

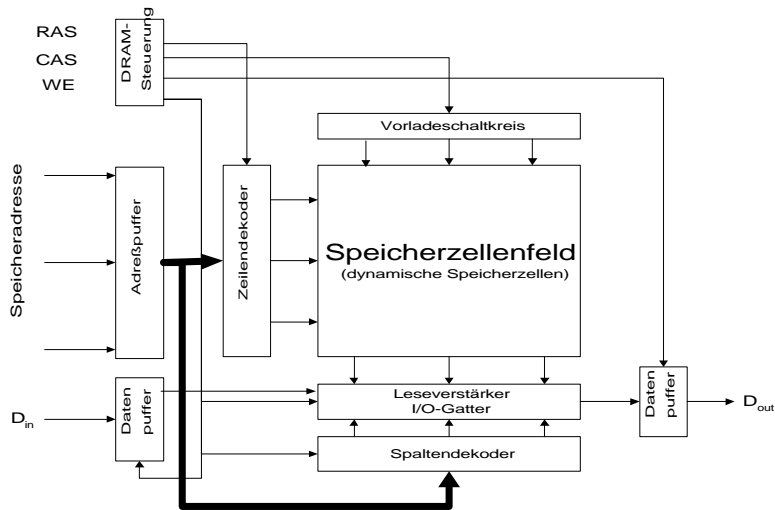
Installing memory

- When installing the DIMM module, make sure that the pattern of notches on the pin side of the module agrees with the pattern on the socket as it is not possible to mount the module the other way round.

- When you have inserted the module, lock the brackets as shown in Figure VII-2.

MEMORY MODULES

Design and mode of operation of a memory module



DRAM-Steuerung	DRAM controller
Vorladeschaltkreis	Precharge circuit
Speicheradresse	Memory address
Adreßpuffer	Address buffer
Zeilendekoder	Row decoder
Speicherzellenfeld dynamische Speicherzellen)	Memory cell field (dynamic memory cells)
Datenpuffer	Data buffer
Leseverstärker I/O-Gatter	Read amplifier I/O logic element
Spaltendekoder	Column decoder

MEMORY MODULES

Conventional DRAM

The dynamic RAM used in the past plays virtually no role in PCs today. The addressing method which is used here entails first creating the row address and then the column address. After a short delay the desired information can then be read out at the output. This delay, also known as "latency", determines the speed of the DRAM and results in a waiting time. This means that the processor must operate with wait cycles, which in turn act as a system brake. In a PC with a 66MHz frontside bus (FSB), four wait cycles are required. As a result, one bit can be read only every 5 clock cycles. The cycle sequence for 4 bits thus comes to 5-5-5-5. Because of the way PC applications work, this is an important reference value.

FPM DRAM (Fast Page Mode)

FPM DRAM (FPM) is somewhat faster than conventional DRAM. FPM makes use of the fact that memory access is not completely random but the CPU requests memory addresses which are close together. For FPM it is sufficient to know the row address to the nearest page. Within this page several columns are then read. Access times are generally between 60 and 80 nanoseconds. For a 60 ns module, the clock frequency for one page is 28.5MHz (35 ns). The clock cycle for a 4-bit burst is hence 5-3-3-3.

EDO DRAM

EDO DRAM is widely used. The difference between EDO DRAM and FPM is that the former utilizes a different access method (modified timing). This allows overlapping memory accesses, whereby an original register (additional internal memory) makes the next address available at the output while the current information is ready to be fetched. As a result, the module gains sufficient time to process the new address and place the data in the register. This makes access time within one page 40% faster. Instead of the clock cycle frequency of 28.5MHz which is found with FPM, 40MHz is achieved with EDO DRAM.

MEMORY MODULES

SDRAM (synchronous DRAM)

SDRAM was originally designed for use as a fast, cheap video memory and VRAM substitute. Compared with the memory types described thus far, SDRAM works synchronized to the bus clock. SDRAM modules also possess internally two independent memory banks which can be addressed either individually or interleaved. Because the two memory banks are independent, two addresses can be addressed simultaneously. In this way it is possible to write or read data on one memory bank while the cells of the other one are being rewritten (hidden precharge).

DDR synchronous DRAM II

SDRAM II, also known as DDR (Double Data Rate) is one of the possible successors to today's SDRAM. DDR is based on the same design as SDRAM but greater speeds are possible. To achieve this, DDR possesses extended synchronization circuits and a special mechanism which generates a data strobe signal as soon as the data appears at the output.

SLDRAM SyncLink DRAM

SLDRAM is an enhanced version of SDRAM. Whereas currently SDRAM possesses function-related pins, SLDRAM has a command bus which requires fewer pins and, thanks to higher external speeds, permits higher bandwidths. The bus design permits an extensive set of commands without additional pins. For video, graphics and telecommunications applications, SLDRAM possesses several independent banks (4 to 16) which enable rapid read and write access. SLDRAM supports clock frequencies of 400 to 800 MHz – four to eight times as high as current SDRAM. Depending on memory configuration, data transfer rates of up to 3.2 GB per second are possible.

RDRAM Rambus DRAM

Rambus is a system-wide chip-to-chip interface which permits high data transfer rates over a simple bus. The RDRAM design is not confined ultimately only to the actual memory type but also affects the entire system.

MEMORY MODULES

The Rambus design contains three components: the RDRAM based on the Rambus, special Asic chips and the connecting component, which is called the Rambus channel. Rambus has been in use since 1995 on graphics work stations with the special RSL technology, which makes clock frequencies of 600MHz possible. These chips are also to be found in the Nintendo 64 and on some video cards. Rambus works with very low signal levels and uses both edges of the synchronization pulse.

PC100 specification

In order to make the choice of the correct memory for a 100 MHz motherboard less confusing, Intel® has published the PC100 specification in collaboration with certain of the chip manufacturers. In this specification, precise requirements are defined as to what times and signal tolerances are permitted in order to ensure that the modules in 100MHz motherboards work reliably. The PC100 specification defines the visual layout of the DIMM modules and the SPD EEPROM (Serial Presence Detect) in great detail. The specification contains detailed information regarding the number of layers (number of circuit board locations), printed wiring width and spacing, terminators, capacitors, clock pulse distribution and form factor.

VIII. THE BIOS

This chapter covers the setting and functions of the Bios, its commands and their significance, as well as the possible consequences of the settings. In this chapter you will find all the AWARD Bios functions for the chipsets used on NMC motherboards. This means that you will find Bios functions described which are not available on your NMC motherboard. You will find an appropriate note as to which chipsets and NMC motherboards provide each Bios function next to each Bios setting discussed.

WHAT IS BIOS?

The Bios (Basic Input Output System) is a kind of mini-operating system which configures your computer on start-up. Chip-specific settings such as the simple specification of the hard disk types used and the date are defined here and, if requested, these are backed up in the so-called CMOS. CMOS is a small battery-powered memory which retains the settings even after the computer has been switched off. This means that it is not necessary to keep reconfiguring the Bios.



A distinction is made in the Bios chips not only between type or manufacturer but also as regards the storage capacity of the chip. Generally, 128KB and 256KB-sized chips are used on the motherboards. More recent versions of the Bios are available in 512KB.

The capacity is usually stated as a 1 (= 128KB) or a 2 (= 256KB) [see circle above]. The complete type designation gives the voltage to be used during the flash process.

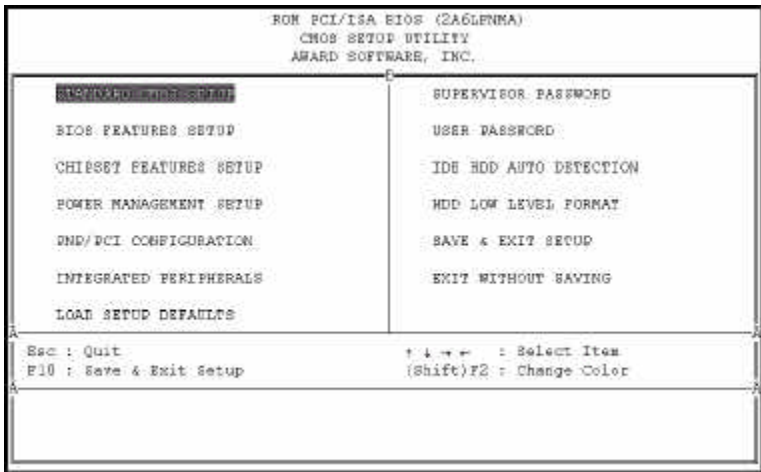
On the next few pages the individual setup menu options and the options provided under each option will be explained.

The Bios

Initiating Bios setup

The following steps will take you to the main Bios menu.

- Switch on your computer or perform a hardware RESET (not recommended if you have any applications running). After a few system checks, the message "Press DEL to enter SETUP" will appear.
- Press the key to start the Award Bios program and the following menu will appear.



Choose one of the options and press <ENTER>. Adjust the settings under this option to your system (see details further on).

- You can press <ESC> at any time to leave the submenu.
- In the main menu, select <Save & Exit Setup> to save your changes and then start your system up again. Select <Exit Without Saving> to cancel the changes and start your system up again..

The various options in the main menu are explained in the sections below.

The Bios

STANDARD CMOS SETUP

```
ROM PCI/ISA BIOS (2A6LFNMA)
STANDARD CMOS SETUP
AWARD SOFTWARE, INC.

Date (mm:dd:yy) : Fri, 05 22 1999
Time (hh:mm:ss) : 9 : 21 : 29

HARD DISKS          TYPE      SIZE  CYLS  HEAD  PRECOMP  LANDS  SECTOR  MODE
-----
Primary Master      : None      0      0    0      0      0      0  -----
Primary Slave       : None      0      0    0      0      0      0  -----
Secondary Master     : None      0      0    0      0      0      0  -----
Secondary Slave     : None      0      0    0      0      0      0  -----

Drive A : None
Drive B : None
Floppy 3 Mode Support : Disabled

Video : EGA/VGA
Halt On : All Errors

Base Memory:  0K
Extended Memory:  0K
Other Memory:  512K
Total Memory:  512K

ESC : Quit          F4/F5/F6 : Select Item      F10/F11/F12 : Modify
F1 : Help          (Shift)F2 : Change Color
```

1. Select "STANDARD CMOS SETUP" from the main menu.

Use the arrow keys to move between the menu options. The individual menu options can be modified by using the PgUp/PgDn/+/- keys. Some fields allow you to make direct inputs. The individual commands are explained on the next page.

The Bios

➤ Date/Time

This field allows you to adjust the date and time of the real time clock. Incidentally, it is this time which is the cause of the Year 2000 problem. Older Bios types do not interpret the two-digit date output by the RTC correctly so that on 1 January 2000 the system will revert to the year 1900, 1980 or some other preprogrammed date (e.g. the date of manufacture). However, in most cases a Bios update can prevent this error from occurring.

Recommendation: normally you should only set the date and time in the Bios when the motherboard is first installed. Any operating system can alter and save this data.

➤ HARD DISKS

These options configures the EIDE connections which are integrated on most motherboards (Primary Master, Primary Slave, Secondary Master and Secondary Slave). It is essential that the settings for type, cylinder, head, sector and transfer mode are correct if the hard disks and other connected devices are to operate error-free. The settings under PRECOMP and LANDZ are unimportant for new hard disks and do not necessarily have to be completed.

Recommendation: enter the values stated on the hard disk. If you do not know the correct values, you should use the automatic detection facility (IDE HDD Auto Detection). The Auto setting works on most modern hard disks but it does mean that booting up takes longer. CD drives function best under the settings CD ROM or AUTO. If there are any unused IDE channels, they should be disabled completely. This will speed up the boot-up process.

The Bios

➤ MODE

As computers evolved it was necessary for the IDE standards to be extended. In the Normal setting, the disk can have a maximum of 1024 cylinders, 16 heads and 63 sectors. Larger disks use the LBA (Logical Block Addressing) setting and convert the Bios addressing into an internal block address.

Setting options

- Auto
- Normal
- Large
- LBA

Recommendation: try seeing whether the Auto setting works. If it does, then the Bios has performed the optimum configuration. Hard disks with more than 504MB often run with the LBA Addressing setting.

➤ Drive A / B

There are two connections available for disk drives, an A drive and a B drive. When correctly set, this tells the computer how many drives are connected and what they are.

Setting options:

- 2.88 MB
- 360 KB
- 1.44 MB
- 1.2 MB
- 720 KB

Recommendation: enter the appropriate setting for your floppy drive. This selection does not refer exclusively to the capacity of the diskettes. A 1.4 MB 3.5" floppy can also read 720 KB formatted disks.

➤ Floppy Mode 3

Some 3.5" disk drives can format 1.2 MB diskettes. This standard is widely used in Japan, but in Europe it is seldom found. (Not to be confused with the old 5.25" disk drives, which often use 1.2 MB diskettes.)

Setting options:

- Disabled
- Drive A
- Drive B
- Both

Recommendation: unless you have a 3.5" disk drive which supports 1.2 MB diskettes, you should set this option to Disabled.

The Bios

➤ Video

This option determines the primary video system of the computer.

Setting options:

- EGA/VGA
- CGA 40/80
- Mono

Recommendation: as only VGA video cards are used, this option must always be set to EGA/VGA. Only with old CGA or monochrome video cards does this setting need to be adjusted.

➤ Halt on

Shortly after the computer is switched on, the Bios initiates a self-test (Post: Power On Self-Test). During this test, the CPU, the main memory, the hard disk, disk drive, keyboard and other important system components are tested. If the Bios finds an error during the start-up test, this option determines whether system start-up should be terminated.

Setting options:

- All Errors
- No Errors
- All But Keyboard
- All But Diskette
- All But Disk/Key

Recommendation: if you want to be informed about every error, you should set this option to "All Errors". Otherwise, to interrupt the boot-up procedure in the event of an error occurring, you can choose any option you like.

The Bios

BIOS FEATURES SETUP

```
ROM PCI/ISA BIOS (2A6LEUMA)
BIOS FEATURES SETUP
AWARD SOFTWARE, INC.

Virus Warning      : Disabled
CPU Internal Cache : Disabled
External Cache     : Disabled
CPU L2 Cache ECC Checking : Enabled
Quick Power On Self Test : Disabled
Boot Sequence      : A, C, SCSI
Swap Floppy Drive   : Disabled
Boot Up Floppy Seek : Disabled
Boot Up NumLock Status : Off
Gate A20 Option     : Normal
Memory Parity/ECC Check : Disabled
Typematic Rate Setting : Disabled
Typematic Rate (Chars/Sec) : 6
Typematic Delay (Msec) : 250
Security Option     : Setup
PCI/VGA Palette Snoop : Disabled
OS Select For DRAM > 64MB : Non-OS2
HDD S.M.A.R.T. capability : Disabled
Report No FDD For WIN 95 : No

Video BIOS Shadow : Disabled
C8000-CBFFF Shadow : Disabled
CC000-CFFFF Shadow : Disabled
D0000-D3FFF Shadow : Disabled
D4000-D7FFF Shadow : Disabled
D8000-DBFFF Shadow : Disabled
DC000-DEFFF Shadow : Disabled

ESC : Quit      F4 : Select Item
F1 : Help      F5/FD : +/- : Modify
F5 : Old Values (Shift) F2 : Color
F7 : Load Setup Defaults
```

When "Bios Features Setup" is selected, the following screen appears:

Use the cursor keys to select the option. Use the PgUp/PgDn/+/-keys to adjust the settings.

You can use the function keys here. The function keys produce the following effects:

- <F1> Help is provided on the possible settings.
- Shift <F2> Changes the color settings
- <F5> Restores the settings to their initial values (the settings at the beginning of start-up)
- <F6> Sets all settings to the default settings.
- <F7> Sets all settings to the "power-up" settings.

The various options are explained over the next few pages.

The Bios

➤ Virus Warning

If this option is enabled, the Bios stops the PC in the event of any write access to the boot sector or the partition table and does not resume until the user confirms that the operation should proceed. However, the Bios cannot distinguish real viruses from an operating system reinstallation and will warn of a possible virus attack in either case. The Bios does not have a proper virus scanner but can issue a warning message if a virus is suspected.

Setting options:

- Enabled
- Disabled (default setting)

Recommendation: you should enable this option after installing the operating system as it will help to arrest any viruses. Care should be exercised when running boot managers. Sometimes these write data to the boot sector during boot-up, so that an alarm is triggered every time this happens. Anti-virus programs can also trigger this alarm when they are checking out the boot sector with a checksum test. In this case you should disable the option.

➤ CPU Internal / External Cache

Every CPU today possesses an internal buffer (level 1 or "L1" cache) which you can access. Pentium® II/III processors also have an L2 cache on the CPU printed circuit board. All other processors which were not developed for Slot I/II have an L2 cache on the motherboard. With this cache option it is possible to prevent access to the cache – this makes the processor work significantly more slowly.

Setting options:

- Enabled (default setting)
- Disabled

Recommendation: make sure that the two options are both selected. Otherwise your PC will not work at its full potential speed. Often when the operating system crashes it is possible to disable the cache in order to test whether this has a fault. If the problems disappear after disabling, then you may assume that the cache is faulty.

The Bios

➤ CPU L2 Cache ECC Checking

This enables error detection and correction for the L2 cache on the Pentium® II/III (versions 266 MHz and higher). However, this is only possible provided that the chipset, the CPU, the memory and the cache itself support this function. Enabling this option has a negative impact on speed. Disabling it theoretically reduces reliability, but this is of little consequence to professional server or workstation applications. A cache protected with ECC reduces the risk of an uncontrolled crash during overclocking.

Setting options:

- Enabled
- Disabled (default setting)

Recommendation: the ECC function requires memory modules which are more expensive to buy than conventional memory modules. If you use modules which support this function, set the option to Enabled.

➤ Processor Number Feature

This function releases the Pentium® III processor ID so that it can be transmitted to the Internet.

Only on Slot 1/2 motherboards

Setting options:

- Enabled
- Disabled (default setting)

Recommendation: the standard setting for this option is to have it disabled. You should only enable this function if there are compelling reasons for doing so.

➤ Quick Power On Self-Test

This option enables one to reduce the scale of the Power On Self-Test. When enabled, the Bios will reduce the scope of some of the POST tests and omit others altogether, so that any memory in excess of 1 MB is no longer tested.

Setting options:

- Enabled (default setting)
- Disabled

Recommendation: if you want to enjoy the security of the Power On Self-Test, you should set the Quick Power On Self Test option to Disabled.

The Bios

➤ Boot Sequence

This field is used to specify the order in which the various drives will be addressed. In other words, the entry here determines where the system should begin its search for an operating system. The first drive in the sequence which has a bootable system is used.

Setting options:

- A, C, SCSI / C, A, SCSI / SCSI, C, A / LS/Zip, C / C, CDROM, A
- CDROM, C, A / Only

Recommendation: enter the drive on which the operating system is installed first. After that, choose drive A. This will allow you to boot up your computer from a diskette in case the primary boot drive fails. If you mainly boot up from diskette, you should put that drive in first place.

➤ Swap Floppy Drive

This function swaps over the drive designations A and B.

Setting options:

- Enabled
- Disabled (default setting)

Recommendation: if you only use a floppy disk drive, it is not necessary to enable this function. However, if you do enable this function, depending on how you have connected the drive, it may no longer be possible to boot up from diskette.

➤ Boot up Floppy Seek

“Boot Up Floppy Seek” is a short drive test which originally was designed so that the type of drive could be detected. The search for the floppy drive differentiates between drives with 40 and 80 tracks. However, since only 360 KB byte floppy disks have 40 tracks and this drive is no longer used, the test is generally superfluous. Only the electrical contact and the correct connection are checked.

Setting options:

- Enabled
- Disabled (default setting)

Recommendation: as soon as you are satisfied that your floppy disk drive is working properly, you should disable this test.

The Bios

➤ Boot up NumLock Status

This option specifies whether the numeric keypad should be locked on during the boot-up procedure.

Setting options:

- Enabled
- Disabled (default setting)

Recommendation: you can either enable or disable this option, as you please. This setting does not affect system performance.

➤ Gate A20 Option

This function allows faster access to memory in excess of 1 MB.

Setting options:

- Normal
- Fast (default setting)

Recommendation: choose Fast. This will allow access to the High Memory Area.

➤ Memory Parity/ ECC Check

This function enables the detection and correction of memory errors. The option is only enabled in order to enable error detection.

Setting options:

- Enabled
- Disabled (default setting)

Recommendation: if you use memory modules which support ECC, you should enable this function.

➤ Typematic Rate Setting

This option specifies whether the next few settings are enabled for the programming of the keyboard.

Setting options:

- Enabled
- Disabled (default setting)

Recommendation: if you want to change the Typematic Rate settings you must choose the **Enabled** option.

The Bios

➤ Typematic Rate (Chars/sec)

To set this option, the Typematic Rate Setting must have been enabled. Only then will you be able to complete the other entries. This option determines the speed of the repeat function, i.e. how many typed characters are displayed per second.

Setting options:

- 6 / 8 / 10 / 12 / 15 / 20 / 24 / 30

Recommendation: set the repeat rate to suit your requirements. If you type very quickly, you can modify the keyboard response to accommodate your typing speed.

➤ Typematic Delay (Msec)

This function defines when a key is interpreted as being "held down".

Setting options:

- 250
- 500
- 750
- 1000

Recommendation: accept the default setting. If you change the setting it will not have any negative impact on the system.

➤ Security Option

This option is used to specify whether when a password is assigned only the Bios is accessed or the entire system.

Setting options:

- Setup (default setting)
- System

Recommendation: only define a password for your system if you really need it. If you forget your password, the only way to access the system is via CMOS Reset.

The Bios

➤ PCI/VGA Palette Snoop

If this option is selected, the color palette register of a PCI VGA card can also be viewed over the ISA bus. When the color palette is changed, with ISA MPEG or video cards it is thus possible to adapt the color presentation to the palette register of the PCI card.

Setting options:

- Enabled
- Disabled (default setting)

Recommendation: set this option to Enabled if, when playing videos with an ISA MPEG decoder, you find that the colors are wrong. This should resolve any problem with the colors. Otherwise, PCI/VGA Palette Snoop should remain disabled.

➤ Assign IRQ for VGA

This function enables you to assign an interrupt request signal (IRQ) directly to the video card.

Setting options:

- Enabled (default setting)
- Disabled

Recommendation: this function should always be enabled.

Only on dual
boards

➤ MPS Version Control for OS

If your system supports the use of several CPUs, you can specify the MPS version supported.

Setting options:

- 1.1 (default setting)
- 1.4

Recommendation: if you plan to use two CPUs on a dual motherboard and your operating system supports operation with several CPUs, you should set this function to 1.4. Normally you only need the 1.4. 1.1 is for special screen resolutions.

The Bios

➤ OS Select for DRAM > 64MB

This function is intended for operating OS/2 with more than 64MB RAM. In version 3.0, OS/2 can only address 64 MB of RAM.

Setting options:

- NON-OS2 (default setting)
- OS2

Recommendation: if you use Windows[®] you should set this option to Disabled. If you use OS/2 as the operating system and have installed more than 64 MB RAM but have only been able to use 64 MB up to now, you should set this option to Enabled.

➤ HDD S.M.A.R.T. capability

SMART (Self Monitoring Analysis and Reporting Technology) is implemented in modern hard disks and monitors important operating parameters of the drives with a number of sensors.

Setting options:

- Enabled (default setting)
- Disabled

Recommendation: if you use a SMART-compatible hard disk in your computer, you can safely set this function to Enabled.

➤ Report No FDD for WIN 95

With this function you can prevent access to an existing floppy disk drive under Windows 95/98.

Setting options:

- Yes
- NO (default setting)

Recommendation: this function is useful where you only want the disk drive to be available for booting up or for emergencies.

The Bios

➤ Video Bios Shadow/ XXXXX-XXXXX Shadow

The shadow functions map memory addresses from slow areas (ROM) to fast areas (RAM). The complete contents of any video card ROM can thus be copied to a particular location in the RAM which corresponds to the ROM address.

Setting options:

- Enabled
- Disabled (default setting)

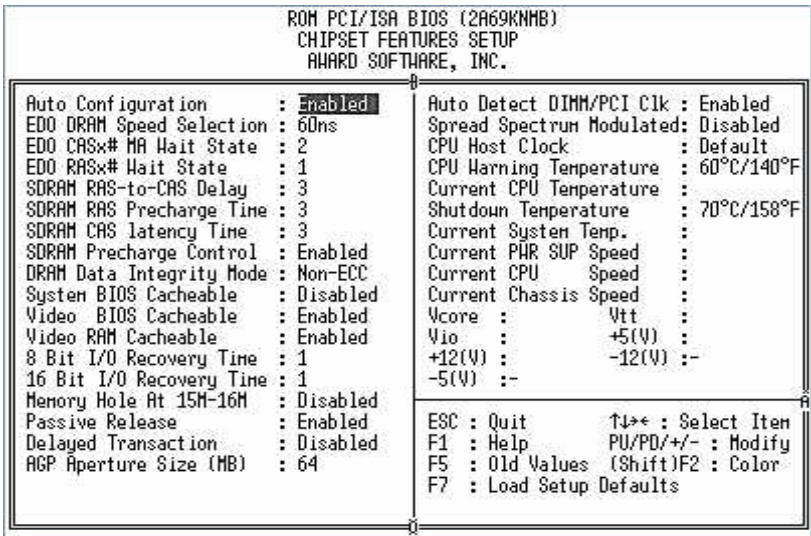
Recommendation: on older systems, we recommend using the video ROM Bios Shadow function. More recent PCI/AGP video cards rarely need this feature any more. Their video Bios is often located in areas of the memory which cannot be mapped. Moreover, under Windows 95/98 a 32 bit device driver takes over control of the video card and this does not use the Bios function any more.

The Bios

CHIPSET FEATURE SETUP

Under Chipset Feature Setup you can enter settings relating to the control of the memory as well as defining some special chipset settings.

Use the cursor keys to select the option. Use the PgUp/PgDn/+/-keys to adjust the settings.



You can use the function keys here. The function keys produce the following effects:

- <F1> Help is provided on the possible settings.
- Shift <F2> Changes the color settings
- <F5> Restores the settings to their initial values (the settings at the beginning of start-up)
- <F6> Sets all settings to the default settings.
- <F7> Sets all settings to the "power-up" settings.

The various options are explained over the next few pages.

The Bios

➤ Auto Configuration

This function gives you the option of either having the memory settings automatically configured by the Bios or else of performing this manually.

Setting options:

- Enabled (default setting)
- Disabled

Recommendation: select the Auto setting if you are not sure of the parameters of the memory you are using. The Auto setting ensures that configuration of the memory settings runs smoothly.

Via VPX

Intel® except for
GX

➤ Bank 0/1 ; 2/3 ; 4/5 DRAM Timing

This option is used to configure your FPM/EDO DRAM memory modules in the relevant banks. A DIMM slot contains two banks.

Setting options:

- Normal
- Fast

Recommendation: leave the settings on Fast. If the system is unstable with the Fast setting, change it to Normal.

Via MVP3

Via Apollo Pro
Via Apollo Pro+

➤ Cache Rd+CPU Wt Pipeline

This parameter is used to define the cache timing. It contains the cache read pipeline cycle and the cache write pipeline cycle.

Setting options:

- Enabled
- Disabled

Recommendation: enabling this option switches on the pipeline burst cycle.

Via MVP3

Via Apollo Pro

➤ Cache Timing

This parameter controls driving of the cache. Depending on the type of cache or motherboard you are using, you can alter the timing here.

Setting options:

- Fast
- Fasting (default setting)

Recommendation: if you have any memory problems, you can reduce the cache timing.

Via MVP3
Via VPX

The Bios

Via Apollo Pro
Via Apollo Pro+

➤ CPU Hardwired IOQ Stage

In order to utilize the full performance of the chipset, you can configure the drive settings here.

Setting options:

- 1 Level
- 4 Level

Recommendation: select 4 Level. If the system appears unstable, change the setting back to 1 Level.

Intel® LX
Intel® BX

➤ CPU-to-PCI IDE Posting

As in Write Posting, access from the CPU to the PCI-IDE interface is via a buffer.

Setting options:

- Enabled
- Disabled

Recommendation: this function should be set to Enabled in order not to act as a brake on the CPU.

Intel®BX
Intel®ZX

➤ EDO CASx# MA Wait State

In the event that the system is unstable with the EDO modules used, under this option you can adjust access to the memory by specify additional wait states.

Setting options:

- 1
- 2

Recommendation: if the timing of the modules used results in problems, you can increase the number of wait cycles. This does make access to the memory slower, but the effect is hardly noticeable.

The Bios

➤ EDO RASx# Wait State

Intel®BX
Intel®ZX

In the event that the system is unstable with the EDO modules used, under this option you can adjust access to the memory by specifying additional wait states.

Setting options:

- 1
- 2

Recommendation: if the timing of the modules used results in problems, you should increase the number of wait cycles. This slows down access to the memory.

➤ DRAM Page Mode

VIA MVP3
VIA MVP4
VIA Apollo Pro

This option constitutes a special type of access to the internal memory. The page function used here leaves a given page open after it has been accessed once, ready for the next access.

Setting options:

- Enabled
- Disabled

Recommendation: this option should be set to Enabled.

➤ DRAM Read Pipeline

VIA MVP3
VIA MVP4

This function is used to enable or disable the Read Pipeline function for DRAM.

Setting options:

- Enabled
- Disabled

Recommendation: this option should be changed to Enabled, if it is not already set to that setting.

The Bios

VIA VPX

VIA MVP3

VIA MVP4

VIA Apollo Pro

➤ DRAM Fast Decoding

This function is used to enable or disable the Fast Decoding function for DRAM.

Setting options:

- Enabled
- Disabled

VIA Apollo Pro

➤ DRAM Read Latch Delay

To adjust the DRAM timing, a wait state can be specified here for the latch buffer.

Setting options:

- 0.5ns
- 1ns
- 2ns
- Disabled

Recommendation: take care over this setting, otherwise the system could become unstable.

VIA VPX

VIA MVP3

VIA MVP4

➤ SDRAM Cycle length

This option is used to specify the SDRAM cycle length.

Setting options:

- 3
- 2

Recommendation: choose a higher value at the start, or else keep the default settings. The correct data will be read from the SPD.

VIA VPX

VIA MVP3

VIA Apollo Pro

➤ SDRAM Bank Interleave

This option is used to specify the number of banks supported with interleaving.

Setting options:

- 2 (supports 2 banks)
- 4 (supports 4 banks)
- Disabled (disables interleaving)

The Bios

➤ SDRAM RAS-to-CAS Delay

Between the row address strobe (RAS) signal (row address) and the column address strobe (CAS) signal (column address) there must be a time interval. The required value is entered in this field. The shorter a value you choose, the more quickly memory is accessed and hence the greater the danger of memory errors. The value entered depends on the memory module.

Setting options:

- Slow
- Fast

Recommendation: *the performance gains you can expect are negligible and are definitely not worth the risk of an unstable computer. Only make an entry here if you are familiar with the specification of your memory.*

Intel®810
Intel®BX
Intel®GX

➤ SDRAM RAS Precharge Time

This option intervenes in the memory timing of the SDRAM module. The data stored in a module must always be recharged. This is done in the pause defined via the clock cycle. The shorter the precharge time, the faster the access. However, if the charge times are set too low they will result in memory errors: the data will fade as it has not been recharged.

Setting options:

- Slow
- Fast

Recommendation: *once again we recommend that you accept the automatic setting configured by SPD. If your modules do not work with the automatic setting, you should perform a manual configuration.*

Intel®810
Intel®BX
Intel®GX

The Bios

Intel®810

Intel®BX

Intel®GX

➤ SDRAM CAS latency Time

The memory is organized as a matrix, with each address consisting of one row and one column. It is accessed by blocks, in bursts. Cells are accessed at the full speed of the memory, whereas columns are accessed at only half this speed. Depending on the chip and the specification, delays can occur during column access. This delay is specified in clock cycles under the option SDRAM CAS latency Time.

Setting options:

- 2
- 3

Recommendation: tuning at this point can easily turn a stable system into one likely to crash at any minute. You should therefore rely on the automatic configuration performed by the SPD chip. If you use old SDRAM modules, you should first test the automatic timings in the SDRAM Configuration option.

Intel®810

Intel®BX

Intel®GX

➤ SDRAM Precharge Control

If you have installed any SDRAM memory modules, then with this parameter you can define the wait states prior to loading the RAS of an access cycle for your DRAM system memory.

Setting options:

- Enabled
- Disabled (default setting)

Intel®810

Intel®BX

Intel®GX

➤ DRAM Data Integrity Mode

This option is closely linked to the ECC Test option. It is used to specify a sub-optimal parity test which only detects errors and does not remove them.

Setting options:

- Non-ECC
- ECC

The Bios

➤ Sustained 3T Write

This parameter is responsible for the Write Through function, which increases the cacheable area.

Setting options:

- Enabled
- Disabled

Recommendation: use this option to exploit the maximum cacheable area for the MB.

VIA VPX
5VMX
VIA MVP4

➤ System BIOS Cacheable

If this option is enabled, the cache memory can also take account of the system Bios ROM in addresses F0000h to FFFFFh.

Setting options:

- Enabled
- Disabled

Recommendation: you should bear in mind that cacheing can be risky if a program tries to write to the Bios area while the code is in the cache. For normal operations the cache should always be kept as free as possible.

➤ Video BIOS Cacheable

If this option is enabled, the cache memory can also take account of the video Bios of the video card in addresses C0000h to C7FFFh.

Setting options:

- Enabled
- Disabled

Recommendation: you should bear in mind, however, that cacheing can be risky if a program tries to write to the Bios area while the code is in the cache. For normal operations the cache should always be kept as free as possible.

➤ Linear Burst

This parameter is intended for Cyrix CPUs which drive the cache in a special way.

Setting options:

- Enabled
- Disabled

Recommendation: if you are not using a Cyrix CPU, you should disable this parameter.

VIA VPX
MVP3

The Bios

➤ Video RAM Cacheable

This option is used to specify whether the frame buffer of the video card is suitable for cacheing and whether it should be cached.

Setting options:

- Enabled
- Disabled

Recommendation: *this option is only recommended on older video cards which, because of their slower RAM, can be made to work faster with this method. However, this method could cause problems for newer cards and their drivers. A loss of performance cannot be ruled out.*

Intel®810
Intel®BX
Intel®GX

➤ 8/16 Bit I/O Recovery Time

This option is used to configure access to the 8-bit or 16-bit ISA bus. Specifying wait cycles enables older ISA plug-in printed-circuit boards to be used in modern PCs. The fast PC must not ask too much of the old cards.

Setting options:

- 1-8
- NA

Recommendation: *the more wait cycles you add, the slower the system becomes. With today's cards it is possible to reduce the number of wait cycles.*

➤ Memory Hole At 15M-16M

This option locks the address memory between 15 and 16 MB.

Setting options:

- Enabled
- Disabled

Recommendation: *this option is only intended for older ISA video cards with frame buffer and should normally be set to Disabled.*

The Bios

➤ Delayed Transaction

Intel®810
Intel®BX
Intel®GX

This option enables the 32-bit write buffer during data transfer over the PCI bus. To ensure full compatibility with PCI standard 2.1, Delayed Transaction must be set to Enabled.

Setting options:

- Enabled
- Disabled

Recommendation: set the Delayed Transaction option to Enabled. Problems may only be expected on PCI motherboards of the first generation (older than three years) or if there is still an older PCI plug-in printed-circuit board in the PCI bus.

➤ Passive Release

Intel®810
Intel®BX
Intel®GX

Passive Release controls the way the PCI bus is accessed. If this option is enabled, the CPU can access the PCI bus even when this is occupied with bus operations. It is then possible for ISA and EISA cycles and also CPU-to-PCI cycles to coincide. When Passive Release is disabled, only PCI Bus Master devices are allowed to access the local DRAM.

Setting options:

- Enabled
- Disabled

Recommendation: this option should be set to Enabled. The PCI bus will then be available to all plug-in printed-circuit boards for longer. This can be beneficial when running applications which require a continuous stream of data.

The Bios

➤ AGP Aperture Size (MB)

AGP video cards can use random access memory as texture memory. The Graphics Address Remapping Table (GART) transfers graphics data from the video memory to the random access memory and back again. To AGP video cards the memory provided by the RAM appears as continuous. In reality, however, it does not have to be continuous – the GART only maps the memory as a continuous block. The size of the block defines the size of the memory address window for the AGP.

Setting options:

- 4 / 8 / 16 / 32 / 64 / 128 / 256

Recommendation: do not change anything unless this would mean having to accept limitations when running games. The standard value is 64 MB. If this value is reduced, no memory is released. The aperture size is a virtual size and does not really require the specified memory.

➤ Auto Detect DIMM/PCI Clk

This function has the same background as Spread Spectrum. If there are any unused PCI and/or DIMM slots, this function prevents the slots being controlled by the clock generator. The function also affects the radiation characteristics.

Setting options:

- Enabled
- Disabled

Recommendation: leave this option set to Enabled.

VIA MVP3
VIA Apollo Pro
Intel®BX
Intel®GX

The Bios

➤ Spread Spectrum Modulated

At higher clock frequencies, the EMC discharge from the computer increases. To prevent your system from interfering with radio reception, when this option is enabled the bus clock frequency fluctuates very slightly, changing the interference emitted by the PC. As a result, the interference exerted by the PC on other equipment is reduced.

Setting options:

- Enabled
- Disabled
- 0.25% (CNTR)
- 0.5% (DOWN)/(CNTR)
- 1.5% (CNTR)/(DOWN)

Recommendation: *only enable this option if the PC is interfering with radio or television reception. Deliberate modification of the frequency reduces system performance slightly.*

VIA MVP3
VIA Apollo Pro
Intel®BX
Intel®GX

➤ Read around write

This option is used to optimize RAM access, i.e. when the DRAM needs to be read and there is still data in the buffer memory of the chipset, the read requirement is addressed directly from the chipset.

Setting options:

- Enabled
- Disabled

Recommendation: *you can enable this option to optimize memory access.*

Via MVP3
Via Apollo Pro
Via Apollo Pro +

➤ CPU Host Clock / CPU Clock Frequency

This option allows you to set the external bus frequency without having to touch the jumpers on the board. If you use this option, it is not necessary to set the onboard jumper. Either method can be used.

Recommendation: *use the function when your system is already up and running.*

5VMX
VIA Apollo Pro
VIA Apollo Pro +
Intel®BX
Intel®GX

➤ ON Chip USB/AGP/Sound/Modem

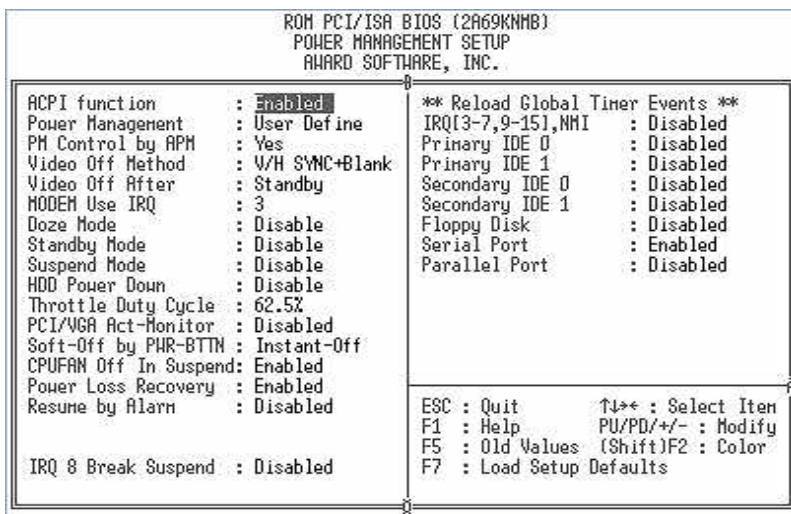
This option allows you to enable or disable the integrated components.

Setting options:

- Enabled
- Disabled

The Bios

POWER MANAGEMENT SETUP



This group of functions is provided so that you can enable and adjust the Power Management function.

Use the cursor keys to select the option. Use the PgUp/PgDn/+/-keys to adjust the settings.

You can use the function keys here. The function keys produce the following effects:

<F1> Help is provided on the possible settings.

Shift <F2> Changes the color settings

<F5> Restores the settings to their initial values (the settings at the beginning of start-up)

<F6> Sets all settings to the default settings.

<F7> Sets all settings to the "power-up" settings.

The various options are explained over the next few pages.

The Bios

MVP3
Apollo Pro

➤ ACPI Function

This field allows you to enable or disable the ACPI function of the board. ACPI allows the operating system to take over direct control of the Power Management and Plug and Play functions of a computer.

Setting options:

- Enabled
- Disabled

Recommendation: to ensure that the ACPI functions run normally, you must be careful on two points. First, your operating system must support ACPI, something which up to now only Microsoft® Windows® 98 has done. Secondly, all devices and additional installed cards on your system, both hardware and software (drivers), must fully support ACPI.

➤ Power Management

This parameter is used to set the various modes which are responsible for reducing power consumption.

Setting options:

- User Define
- Max Define
- Min Define

➤ PM Control by APM

Power Management is entirely controlled by APM. APM stands for Advanced Power Management and is a power-saving standard specified by Microsoft®, Intel® and other major suppliers.

Setting options:

- Yes
- No

Recommendation: if your operating system is designed for this, you should set this parameter to Yes.

➤ Video Off Method

This parameter specifies the method according to which your monitor is powered down in power-saving mode.

Recommendation: three "Video Off" settings are available, "Blank", "V/H SYNC+Blank" and "DPMS". The default setting is "V/H SYNC + Blank". If the settings do not power down the screen, select "Blank". If your screen and video card support the DPMS standard, select "DPMS".

The Bios

➤ Video Off After

This parameter determines the save mode in which the monitor is powered down.

Setting options:

- NA (not available) (video is never powered down in the NA save mode).
- Doze (video is powered down in all save modes).
- Standby (video is only powered down in Standby or Suspend Mode).
- Suspend (video is only powered down in Suspend Mode).

➤ MODEM Use IRQ

This option allows you to specify the interrupt line of any modem which is installed. Activities on this line wake the computer up e.g. in order to receive a fax.

Setting options:

- 3-11
- NA

Recommendation: set one free IRQ.

➤ Soft-OFF by PWRBTN

This parameter defines the method by which you switch off the computer.

Setting options:

- Delay 4sec.
- Instant Off

Recommendation: choose the Instant Off setting, as this will allow you to switch the computer on and off via a simple click of a button.

➤ HDD Power Down

This parameter determines the time after which the hard disk powers down when it is not in use.

Setting options:

- 1-20 min
- Disabled

Recommendation: to avoid problems, select approx. 20 minutes as it is not good for the hard disk to keep being powered down and up.

The Bios

➤ Doze Mode

This parameter defines how long it takes for the processor to clock down.

Setting options:

- 1 min. – 1 hr.
- Disabled

Recommendation: if you do not need to have anything running in the background, you can set the time very short.

➤ Suspend Mode

This is the most extreme save mode, under which all components other than the CPU are powered down as far as possible.

Setting options:

- 1 min. – 1 hr.
- Disabled

Recommendation: the minimum time set should be 15 minutes.

➤ Throttle Duty Cycle

This parameter controls the work break of the CPU in doze mode.

Setting options:

- 12.5%-75%

Recommendation: if you are running long drawn-out calculations in the background, you should not let the CPU run slower in doze mode. But if you are working with “normal” software and the PC is not busy during the pauses, then you should set this parameter to 50%.

➤ PCI/VGA Act-Monitor

When this option is enabled, the timer for power saving measures will also be reset by VGA activities.

Setting options:

- Enabled
- Disabled

Recommendation: the Enabled setting ensures that any activity on the screen or a video wakes the PC up from doze mode.

The Bios

➤ CPUFAN Off In Suspend

This parameter determines whether the CPU fan is switched off in Suspend Mode.

Setting options:

- Enabled
- Disabled

Recommendation: *should always be disabled.*

Intel® Chipsätze
VIA Apollo Pro +

➤ Power Loss Recovery

This function enables the computer to start up automatically after a power failure.

Setting options:

- Enabled
- Disabled

Recommendation: *this function should be enabled. It is indispensable in applications in which the computer has to operate continuously.*

➤ Resume by Alarm

This parameter allows you to specify an exact time when the computer should be switched off. If you select Enabled, the additional options relating to manipulation will be enabled.

Setting options:

- Enabled
- Disabled

➤ IRQ 8 Break Suspend

When this option is enabled, the real-time clock restores the PC from its Suspend mode (IRQ8 is the real-time clock (RTC) interrupt).

Setting options:

- Enabled
- Disabled

The Bios

➤ Reload global Timer Events

This set of options is used to define the events upon which the computer should be “woken up” from power save mode.

Setting options:

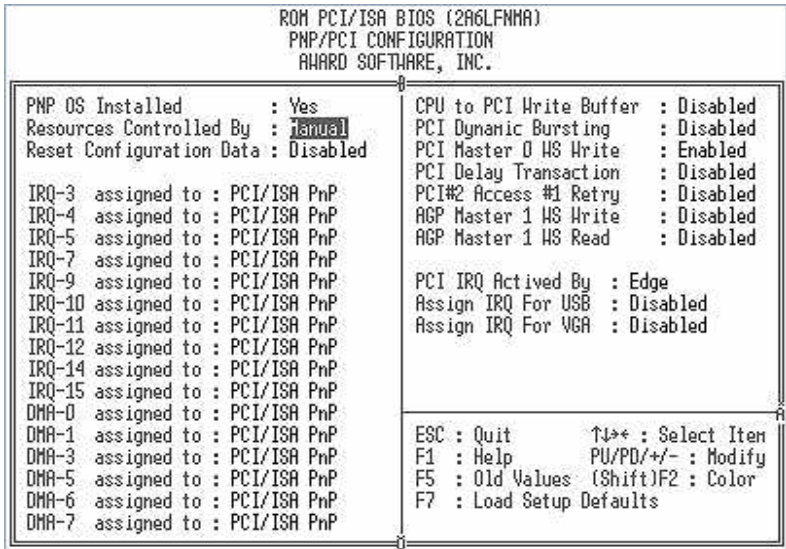
- IRQ [3-7 , 9-15]
- PRIMARY IDE 0
- PRIMARY IDE 1
- SECONDARY IDE 0
- SECONDARY IDE
- FLOPPY DISK
- SERIAL PORT
- PARALLEL PORT

Recommendation: *define the events in accordance with your particular requirements.*

The Bios

PNP/PCI CONFIGURATION

This menu option contains the functions which control the Plug and Play and the IRQ assignment.



Use the cursor keys to select the option. Use the PgUp/PgDn/+/-keys to adjust the settings.

You can use the function keys here. The function keys produce the following effects:

- <F1>** Help is provided on the possible settings.
- Shift <F2>** Changes the color settings
- <F5>** Restores the settings to their initial values (the settings at the beginning of start-up)
- <F6>** Sets all settings to the default settings.
- <F7>** Sets all settings to the “power-up” settings.

The various options are explained over the next few pages.

The Bios

➤ PNP OS installed

This parameter setting tells the Bios whether a Plug and Play-capable operating system is installed or not. Operating systems such as Windows 95 and 98 are able to detect the installed components and allocate the available resources automatically. Windows always takes over control of the Bios.

Setting options:

- Yes
- No

Recommendation: if you use Windows 95/98 you should always set this option to **Yes**. With other operating systems e.g. WIN NT, you should set this option to **No**.

➤ Resources Controlled By

This option allows you to choose whether the system should assign the IRQs automatically or whether this should be done manually.

Setting options:

- Auto
- Manual

Recommendation: provided you have not installed any critical (older ISA cards) components on your system, you should let the Bios perform this assignment automatically.

➤ Reset Configuration Data

If you select **Enabled**, all the settings relating to Plug&Play and IRQs will be reset and replaced by the default settings.

Setting options:

- Enabled
- Disabled

Recommendation: only set this function if a conflict occurs when new components are installed.

The Bios

➤ IRQ-x assigned to PCI/ISA PnP

These options are enabled if you have set **Resources Controlled By** to **Manual**. You can “reserve” one or more IRQs if, for example, you have an ISA card on the system which uses a particular IRQ that is not enabled when the IRQs are allocated automatically.

Recommendation: use this setting if you have a card such as described above in the system.

➤ Slot.X USE IRQ Number...x

This setting allocates an interrupt to each PCI slot. The PCI slot with the lowest address is given the first free interrupt, and so on. When they are all assigned, the Bios starts to share the interrupts. During the boot-up procedure a table showing the results of the interrupt allocation appears briefly.

Recommendation: leave the initial assignment of interrupts for the PCI slots to the Bios by selecting **Auto**. Only if you wish to assign a particular interrupt to a PCI card or to prevent a particular assignment should you specify the setting manually.

➤ PCI Latency Timer

This option is used to specify the time period (in PCI ticks) for which each card is assigned exclusive use of the bus and is characterized as active. If another card signals that it needs to use the bus, it must wait no longer than the time span which has been defined.

Recommendation: the lower the value you set here, the sooner the active PCI card has to respond to a request for resources from the next card and release the bus. This ensures that the PCI bandwidth is allocated rapidly. However, this does mean that long transactions are interrupted more often, which in turn can reduce performance. The standard setting of 32 PCI pulses is a good compromise between long transfers and rapid requests.

➤ CPU to PCI Write Buffer

When this function is enabled, the CPU can write up to four DWords to the PCI write buffer without having to wait until the PCI cycle is completed.

Recommendation: this function should be enabled.

The Bios

➤ PCI Dynamic Bursting

VIA MVP3
VIA Apollo Pro

When this function is enabled, every write access is processed via the buffer. Access based on the burst method can then take place.

Recommendation: *this function should be enabled.*

➤ PCI Master 0 WS write

VIA MVP3
VIA Apollo Pro

When this function is enabled, write accesses are executed without any waiting time.

Recommendation: *this function should be enabled.*

➤ PCI IRQ Activated By

VIA MVP3
VIA Apollo Pro

Standard PCI cards generally support interrupts with a signal amplitude resolution (known as *level triggering*). This means that several PCI cards can also share a single interrupt line.

Setting options:

- Level
- Edge

Cards which do not follow these ground rules can be controlled via the Edge setting. It is imperative that PCI 2.1 has Level-triggered PCI cards.

➤ PCI Delay Transaction

VIA MVP3
VIA Apollo Pro

This option ensures compatibility with PCI 2.1. The option should be set to *Enabled*. Problems can occur if you are still using an old PCI card.

Setting options:

- Enabled
- Disabled

Recommendation: *the option should be set to Enabled. Problems can occur if you are still using an old PCI card.*

The Bios

VIA MVP3
VIA Apollo Pro

➤ PCI#2 Access #1 Retry

Determines whether a PCI Bus Master may initiate another attempt though a different Bus Master after an unsuccessful request, or whether accesses continue in sequence.

Setting options:

- Enabled
- Disabled

Recommendation: keep the default settings.

VIA MVP3
VIA Apollo Pro

➤ AGP Master 1WS Write

This parameter allows you to adjust access to memory by assigning wait states during write processes.

Setting options:

- Enabled
- Disabled

Recommendation: keep the default settings.

VIA MVP3
VIA Apollo Pro

➤ AGP Master 1WS Read

This parameter allows you to adjust access to memory by assigning wait states during read processes.

Setting options:

- Enabled
- Disabled

Recommendation: keep the default settings.

VIA MVP3
VIA Apollo Pro

➤ ACPI I/O device Node

With this command you can enable and disable the ACPI function of the board, as described in "Power Management" under "ACPI Function".

Setting options:

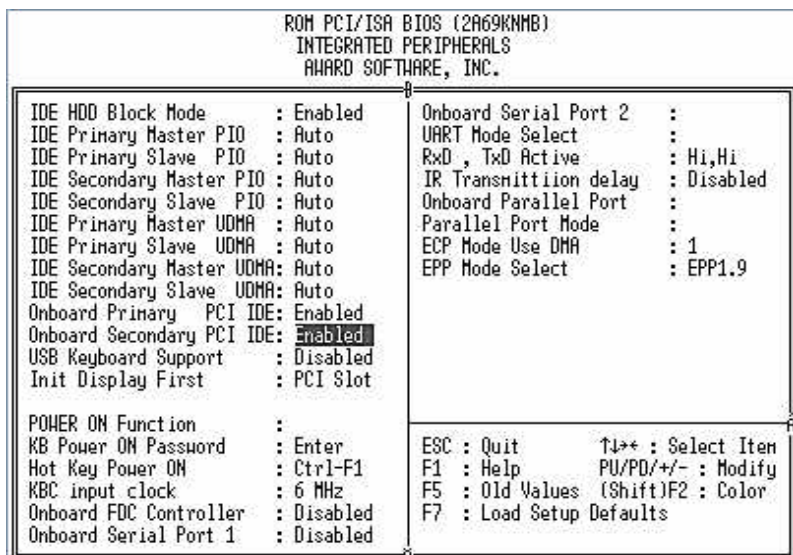
- Enabled
- Disabled

Recommendation: if you want to use the ACPI functions of the board, you should select Enabled here. This presupposes that the operating system supports ACPI.

The Bios

INTEGRATED PERIPHERALS

Under Integrated Peripherals you can enable or disable the IDE ports. The UDMA functions and control of the serial and parallel interfaces are also specified here.



Use the cursor keys to select the option. Use the PgUp/PgDn/+/-keys to adjust the settings.

You can use the function keys here. The function keys produce the following effects:

- <F1> Help is provided on the possible settings.
- Shift <F2> Changes the color settings
- <F5> Restores the settings to their initial values (the settings at the beginning of start-up)
- <F6> Sets all settings to the default settings.
- <F7> Sets all settings to the "power-up" settings.

The various options are explained over the next few pages.

The Bios

➤ IDE HDD Block Mode

This parameter enables the block-by-block transfer of the hard disk.

Setting options:

- Enabled
- Disabled

Recommendation: if you are using older hard disks, you must be completely satisfied that they support the HDD block mode.

➤ Primary/Secondary Master/Slave PIO

This parameter is used to specify the PIO mode of your hard disk.

Setting options:

- Mode 0-4
- Auto

Recommendation: if you do not know the PIO mode of your hard disk, select Auto.

➤ Onchip IDE First Channel

This option enables the first IDE port.

Setting options:

- Enabled
- Disabled

Recommendation: if you want to connect any drives to this port, the option must be enabled.

➤ Onchip IDE second Channel

This option enables the second IDE port.

Setting options:

- Enabled
- Disabled

Recommendation: if you want to connect any drives to this port, the option must be enabled.

The Bios

➤ Primary/Secondary Master/Slave UDMA

This parameter is used to specify whether the drives on each of the connected UDMA ports can be used.

Setting options:

- Enabled
- Disabled

Recommendation: the UDMA setting for a given port depends on the UDMA capability of the drives used.

➤ Init Display First

This option is used to initialize the video card. If two screen settings are possible on your system, then you should specify here whether the PCI or the AGP video card should be the first card to be initialized.

Setting options:

- PCI
- AGP

Recommendation: if two screen settings are possible, select the card which you would like to use as the first video card.

➤ Onboard FDD Controller

This option enables or disables the floppy disk drive controller.

Setting options:

- Enabled (default setting)
- Disabled

➤ USB Keyboard Support

To enable USB keyboard support, set this parameter to **Enabled**.

Setting options:

Enabled

Disabled (default setting)

Recommendation: if you would like to use a USB keyboard, set this parameter to **Enabled**.

The Bios

➤ On Board Serial Port 1/2

This parameter is responsible for the serial On Board interfaces. It is used to specify the address of the relevant interface

Setting options:

Auto
2E8/IRQ3
2F8/IRQ3
3E8/IRQ4
3F8/IRQ4
Disabled

Recommendation: choose either Auto or else the default settings.

➤ Power On Function

This option enables the keyboard Power On function, which allows you to start the computer via the keyboard.

Setting options:

- Button only (key on unit case is used to start the computer).
- Any Key (you can use any key to start the computer).
- Hot Key (you can define <Ctrl>F1 to <Ctrl>F12).
- Password (you define a password).

➤ KBC Input Clock

This option enables you to alter the speed of the integrated keyboard controller.

Setting options:

- 6MHz
- 8MHz
- 12MHz
- 16MHz

Recommendation: if you connect any older devices (scanners etc.), in the event of any problems you can make the necessary adjustments here.

The Bios

SENSOR AND CPU SPEED SETUP

ROM PCI/ISA BIOS (2A5LHM9)	
CPU FEATURES SETUP	
AWARD SOFTWARE, INC.	
Auto Detect DIMM/PCI Clk : Enabled	Current CPU Temp. :
Spread Spectrum : Disabled	Current System Temp. :
CPU Host Clock (CPU/PCI) : Default	Current CPU FAN Speed:
CPU Fan In Suspend : Off	Current Chassis FAN Speed:
	Vcore : 2.5V :
	3.3V : 5V :
	12V :
ESC : Quit ↑↓↓ : Select Item	
F1 : Help PU/PD/+/- : Modify	
F5 : Old Values (Shift)F2 : Color	
F7 : Load Setup Defaults	

Use the cursor keys to select the option. Use the PgUp/PgDn/+/-keys to adjust the settings.

You can use the function keys here. The function keys produce the following effects:

- <F1> Help is provided on the possible settings.
- Shift <F2> Changes the color settings
- <F5> Restores the settings to their initial values (the settings at the beginning of start-up)
- <F6> Sets all settings to the default settings.
- <F7> Sets all settings to the “power-up” settings.

The various options are explained over the next few pages.

The Bios

➤ **Auto Detect DIMM/PCI Clk**

See "Chipset Features"

➤ **Spread Spectrum**

See "Chipset Features"

➤ **CPU Host Clock (CPU/PCI)**

See "Chipset Features"

➤ **CPU Fan In Suspend**

See "Power Management Setup"

The Bios settings listed on the left are only found on MVP4 NMC motherboards.

The Bios

LOAD SETUP DEFAULTS

To load the default settings on your motherboard, enter "Y" at the prompt and hit the carriage return key.

SUPERVISOR PASSWORD

This option is used to enter the password (Administrator) for access to Bios setup, boot-up and saving in CMOS.

USER PASSWORD

This option is used to specify the password for access to your PC.

Recommendation:

Do not use this function unless it is absolutely necessary. We recommend that you keep the password ready to hand in a safe place in case you forget it.

IDE HDD AUTO DETECTION

If you do not have a full specification of your hard disk, you can specify here that an automatic detection procedure which reads the data on your hard disk, and after a further selection, enters it in the standard CMOS setup should be initiated.

SAVE & EXIT SETUP

This option saves your settings and terminates setup.

EXIT WITHOUT SAVING

If this option is selected, setup is terminated without the settings having been saved.

The Bios

BIOS UPDATE

If you want to replace the Bios version on your system with an update, the sections below contain guidance on how to perform an update in a simple fashion.

NMC cannot guarantee that no errors will occur during the flash procedure, even if you follow these instructions to the letter.

Bios flash procedure

Do not perform any Bios update unless it is really necessary. Flash updating the Bios is entirely at your own risk.

- Download the necessary flash program Awdflash.exe (if possible, the latest version) from the Internet, together with the associated xxx.bin file which goes with your board. Make sure you only use the file designed for your board and for the size of the EEPROM that you have on the board.
- Create a system diskette, which should contain only the data necessary for booting up. Copy the two files (flash program and bin file) to this system diskette.
- Boot up the computer using this system diskette (not a start-up diskette).
- Start the Awdflash.exe program and enter the correct name of the *.bin file (including the BIN suffix). The example below illustrates the syntax which has to be used.

[drive] :\ [flash program] [name of Bios file] /[parameters]

Here is a specific example:

awdflash bx0604.bin /py /sn

- This specific example instructs the flash program to program the Bios file specified without prior user prompting and not to create a backup of the original Bios file.

The Bios

- Another option is to simply invoke the flash program, as follows:
[drive]:\ [flash program]

Here is a specific example:

A:\awdf flash

- This entry triggers a sequence in which first of all you are prompted to enter the name of the file to be flashed. Enter the correct name including the file suffix and confirm by pressing <Enter>.
- Confirm that you want to back up your entries and enter a name xyz.bin for the Bios which is to be backed up.
- The next prompt relates to backing up the Bios file. Enter "Y" if you want the Bios to be backed up. If you want to back up the Bios, enter a name of your choice for the file. Do not forget to give it the suffix .bin.
- After the Bios has been successfully flashed, press F1 to perform a Reset (reboots the computer) or F10 to terminate the program.
- When the computer starts up again, load the setup defaults in the Bios and check your individual entries.

Important program parameters

py	Program flash memory	Program without any user prompting
pn	No programming	No programming procedure
sy	Save Biosfile to Disk	Original Bios is saved on the diskette as a *.bin file with a user-definable name
sn	No save	The original Bios is not backed up.
?	"Help function"	This parameter displays all the available parameters and their meanings.

Appendix

IX. APPENDIX

REPLACEMENT OF LITHIUM BATTERIES



If you are not sure how to change the lithium battery, leave that to your supplier.

Faulty lithium batteries are removed from their socket on the motherboard. It does not normally require any specialist knowledge to change these batteries.



CAUTION! *Improper replacement of batteries carries the risk of an explosion. Only replace with the same type or with an equivalent type recommended by the manufacturer.*

Think about the environment!



Batteries and accumulators which contain heavy metals do not belong in the household garbage. They will be taken back and properly disposed of by the manufacturer, the supplier or a representative of theirs free of charge.

Appendix

LIABILITY AND WARRANTY

NMC Peripherals Europe GmbH generally will not accept liability or any claims under warranty where damage or malfunctions arise as a consequence of:

- failure to observe the operating instructions;
- incorrect operation and improper use;
- use for a purpose other than that intended;
- use of spare parts and purchased parts which have not been expressly approved by the manufacturer;
- reconstruction and modifications which have not been approved by the manufacturer;
- improper maintenance and servicing.

The conditions of warranty and liability contained in NMC-GmbH's general terms and conditions shall apply.

Technical Changes

NMC PE GmbH reserves the right to make changes without prior notice to the illustrations and factual content of this manual in order to reflect technical developments. This affects particularly any measures which promote technical progress.

In order to provide you with a quality manual, this document has been prepared with the utmost care and will be revised at regular intervals. Despite all the checks to which this process is subject, we cannot exclude the possibility that the document contains technical inaccuracies or typographical errors. All errors we are aware of will be rectified in future editions. We would appreciate it if you would notify us of any errors that you notice in this document.

If you have any suggestions or criticisms to make, please send an email either to koester@nmc-pe.com or info@nmc-pe.com.

Appendix

PINOUT

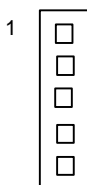
This chapter describes the pin assignments for all the onboard connections described in this manual.

Interface pinout

AT motherboard

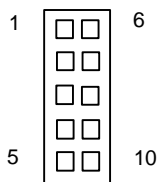
For AT motherboards, please use a type A interface cable.

PS/2 mouse connection



Signal Name	Pin #
Data	1
Clk	2
Ground	3
NC	4
VCC	5

COM 1,COM 2

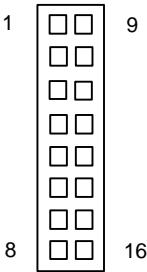


Signal Name	Pin #	Pin #	Signal Name
DCD	1	6	DSR
SIN	2	7	RTS
SOUT	3	8	CTS
DTR	4	9	RI
GND	5		

Appendix

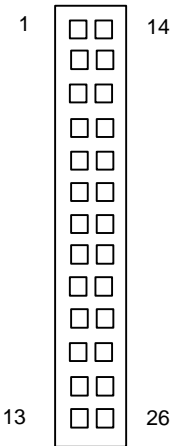
USB connection

Signal Name	Pin #	Pin #	Signal Name
USB_VCC	1	9	Ground
USB_data0-	2	10	Ground
USB_data0+	3	11	Ground
Ground	4	12	Ground
USB_VCC	5	13	Ground
USB_data1-	6	14	Ground
USB_data1+	7	15	Ground
Ground	8	16	Ground



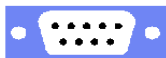
Parallel Port

Signal Name	Pin #	Pin #	Signal Name
Strobe-	1	14	Auto Feed-
Data Bit 0	2	15	Error
Data Bit 1	3	16	INIT
Data Bit 2	4	17	SLCT IN
Data Bit 3	5	18	Ground
Data Bit 4	6	19	Ground
Data Bit 5	7	20	Ground
Data Bit 6	8	21	Ground
Data Bit 7	9	22	Ground
ACJ-	10	23	Ground
BUSY	11	24	Ground
PE	12	25	Ground
SLCT	13	26	N.C.



Appendix

Serial interface



Signal Name	Pin #	Pin #	Signal Name
DCD	1	6	DSR
SIN	2	7	RTS
SOUT	3	8	CTS
DTR	4	9	RI
GND	5		

Parallel interface



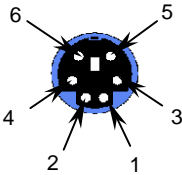
Signal Name	Pin #	Pin #	Signal Name
Strobe	1	14	Auto Feed-
Data Bit 0	2	15	Error-
Data Bit 0	3	16	Init-
Data Bit 0	4	17	SLCT In-
Data Bit 0	5	18	Ground
Data Bit 0	6	19	Ground
Data Bit 0	7	20	Ground
Data Bit 0	8	21	Ground
Data Bit 0	9	22	Ground
ACJ	10	23	Ground
Busy	11	24	Ground
PE	12	25	Ground
SLCT	13		

Appendix

ATX motherboard

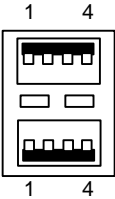
PS/2 keyboard / mouse connection

Signal Name	Pin #	Pin #	Signal Name
DCD	1	6	DSR
SIN	2		
SOUT	3		
DTR	4		
GND	5		



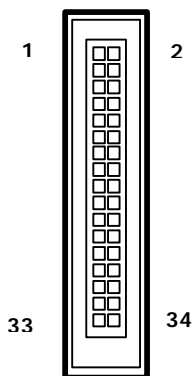
USB pin assignment ATX

Signal Name	Pin #
DCD	1
SIN	2
SOUT	3
DTR	4

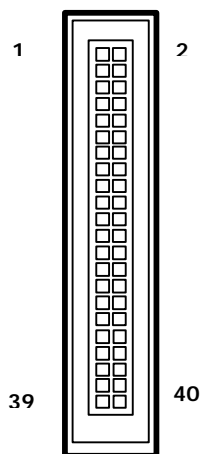


Appendix

IDE interfaces pin assignment



Signal Name	PIN #	PIN #	Signal Name
Ground	1	2	FDHDIN
Ground	3	4	Reserved
Ground	5	6	FDEDIN
Ground	7	8	Motor Enable
Ground			
Ground	11	12	Drive Select B
Ground	13	14	Drive Select A
Ground	15	16	Motor Enable
Ground	17	18	DIR-
Ground	19	20	STEP-
Ground	21	22	Write DATA
Ground	23	24	Write Gate
Ground	25	26	Track 00-
Ground	27	28	Write Protect-
Ground	29	30	Read Data-
Ground	31	32	Side 1 Select
Ground	33	34	Diskette



Signal Name	PIN #	PIN #	Signal Name
Reset IDE	1	2	Ground
Host Data 7	3	4	Host Data 8
Host Data 6	5	6	Host Data 9
Host Data 5	7	8	Host Data 10
Host Data 4			Host Data 11
Host Data 3	11	12	Host Data 12
Host Data 2	13	14	Host Data 13
Host Data 1	15	16	Host Data 14
Host Data 0	17	18	Host Data 15
Ground	19	20	Key
DRQ3	21	22	Ground
I/O Write	23	24	Ground
I/O Read	25	26	Ground
IOCHRDY	27	28	Bale
DACK3-	29	30	Ground
IRQ14	31	32	IOCS16-
Addr 1	33	34	Ground
Addr 0	35	36	Addr 2
Chip select 0	37	38	Chip select 1
Activity	39	40	Ground

Appendix

Glossary

AGP	Accelerated Graphic Port
AMD	Advanced Micro Devices
ANSI	American National Standards Institute
ASCII	American Standard Code for Information Interchange
ASPI	Advanced SCSI Programming Interface
BPS	Bits per second
CAD	Computer Aided Design
CAS	Column Address Strobe
CD	Compact Disk
CMOS	Complementary metal-oxide semiconductor
COM	COMmunication port
CPU	Central Processing Unit
DIN	German Industry Standard
DIP	Dual Inline Package
DMA	Direct Memory Access
DMI	Desktop Management Interface
DPI	Dots Per Inch
DRAM	Dynamic Random Access Memory
ECC	Error Correction Code
EEPROM	Electrical Erasable Programmable Read Only Memory
EGA	Enhanced Graphics Adapter
EISA	Extended Industrial Standard Architecture
ESCD	Extended Specification and Configuration Data
FDC	Floppy Disk Controller
FIFO	First In First Out
HD/HDD	Hard Disk /Drive
HDC	Hard Disk Controller
IDE	Intelligent Drive Electronics
IRQ	Interrupt ReQuest
I/O	Input/Output
LPT	Line PrinTer
MIPS	Million Instructions Per Second
NMI	Non-maskable interrupt
PCI	Peripheral Component Interconnect
PIO	Programmed Input Output
POST	Power-On Self Test
RAS	Row Access Strobe

Appendix

RTC	Real Time Clock
SCSI	Small Computer Systems Interface
SIMM	Single Inline Memory Module
SDRAM	Synchronous Dynamic Random Access Memory
SRAM	Static Random Access Memory
SVGA	Super Video Graphics Array
TTL	Transistor-Transistor Logic
UART	Universal Asynchronous Receiver and Transmitter
USB	<u>U</u> niversal <u>S</u> erial <u>B</u> us
VRAM	Video RAM

Appendix

X. POST CODES

POST (hex)	DESCRIPTION
01-02	Reserved.
C0	Turn off OEM specific cache, shadow.
03	1. Initialize EISA registers (EISA BIOS only). 2. Initialize all the standard devices with default values. Standard devices includes. - DMA controller (8237). - Programmable Interrupt Controller (8259). - Programmable Interval Timer (8254). - RTC chip.
04	Reserved
05	1. Keyboard Controller Self-Test.
06	2. Enable Keyboard Interface.
07	Reserved.
08	Verifies CMOS's basic R/W functionality.
C1	Auto-detection of onboard DRAM & Cache.
C5	Copy the BIOS from ROM into E0000-FFFF shadow RAM so that POST will go faster.
08	Test the first 256K DRAM.
09	OEM specific cache initialization. (if needed)
0A	1. Initialize the first 32 interrupt vectors with corresponding Interrupt handlers. Initialize INT numbers from 33-120 with Dummy (Spurious) Interrupt Handler. 2. Issue CPUID instruction to identify CPU type. 3. Early Power Management initialization. (OEM specific)

Appendix

Post Code	Description
0B	<ol style="list-style-type: none">1. Verify the RTC time is valid or not.2. Detect bad battery.3. Read CMOS data into BIOS stack area.4. PnP initializations including (PnP BIOS only):<ul style="list-style-type: none">- Assign CSN to PnP ISA card.- Create resource map from ESCD.5. Assign IO & Memory for PCI devices. (PCI BIOS only)
0C	Initialization of the BIOS Data Area. (40:00 - 40:FF)
0D	<ol style="list-style-type: none">1. Program some of the Chipset's value according to Setup. (Early Setup Value Program)2. Measure CPU speed for display & decide the system clock speed.3. Video initialization including Monochrome, CGA, EGA/VGA. If no display device found, the speaker will beep.
0E	<ol style="list-style-type: none">1. Test video RAM. (If Monochrome display device found)2. Show messages including.<ul style="list-style-type: none">- Award Logo, Copyright string, BIOS Data code & Part No.- OEM specific sign on messages.- Energy Star Logo. (Green BIOS ONLY)- CPU brand, type & speed.- Test system BIOS checksum. (Non-Compress Version only)
0F	DMA channel 0 test.
10	DMA channel 1 test.
11	DMA page registers test.
12-13	Reserved.
14	Test 8254 Timer 0 Counter 2.
15	Test 8259 interrupt mask bits for channel 1.
16	Test 8259 interrupt mask bits for channel 2.
17	Reserved.
19	Test 8259 functionality.
1A-1D	Reserved.
1E	If EISA NVM checksum is good, execute EISA initialization. (EISA BIOS only)
1F-29	Reserved.

Appendix

30	Detect Base Memory & Extended Memory Size.
31	1. Test Base Memory from 256K to 640K. 2. Test Extended Memory from 1M to the top of memory.
32	1. Display the Award Plug & Play BIOS Extension message. (PnP BIOS only) 2. Program all onboard super I/O chips (if any) including COM ports, LPT ports, FDD port ... according to setup value.
33-3B	Reserved.
3C	Set flag to allow users to enter CMOS Setup Utility.
3D	1. Initialize Keyboard. 2. Install PS2 mouse.
3E	Try to turn on Level 2 cache.

Note: Some chipsets may need to turn on the L2 cache at this stage, But usually, the cache is turn on later in POST 61h.

3F-40	Reserved.
BF	1. Program the rest of the chipset's value according to Setup. (Later Setup Value Program)
41	2. If auto-configuration is enabled, program the chipset with pre-defined values.
42	Initialize floppy disk drive controller.
43	Initialize hard drive controller.
45	If it is a PnP BIOS, initialize serial & parallel ports.
44	Reserved.
45	Initialize math coprocessor.
46-4D	Reserved.
4E	If any error is detected (such as video, kb...), show all error messages on the screen & wait for user to press <F1> key.
4F	1. If password is needed, ask for password. 2. Clear the Energy Star Logo. (Green BIOS only)
50	Write all CMOS values currently in the BIOS stack area back into the CMOS.
51	Reserved.
52	1. Initialize all ISA ROMs. 2. Later PCI initializations. (PCI BIOS only) - assign IRQ to PCI devices.

Appendix

	<ul style="list-style-type: none"> - initialize all PCI ROMs.
	3. PnP Initializations. (PnP BIOS only)
	<ul style="list-style-type: none"> - assign IO, Memory, IRQ & DMA to PnP ISA devices. - initialize all PnP ISA ROMs.
	4. Program shadows RAM according to Setup settings.
	5. Program parity according to Setup setting.
	6. Power Management Initialization.
	<ul style="list-style-type: none"> - Enable/Disable global PM. - APM interface initialization.
53	1. If it is NOT a PnP BIOS, initialize serial & parallel ports. 2. Initialize time value in BIOS data area by converting the RTC time value into a timer tick value.
60	Setup Virus Protection. (Boot Sector Protection) functionality according to Setup setting.
61	1. Try to turn on Level 2 cache.
	Note: If L2 cache is already turned on in POST 3D, this part will be skipped.
	2. Set the boot up speed according to Setup setting. 3. Last chance for chipset initialization. 4. Last chance for Power Management initialization. (Green BIOS only) 5. Show the system configuration table.
62	1. Set up daylight saving according to Setup value. 2. Program the NUM Lock, typematic rate & typematic speed according to Setup setting.
63	1. If there is any changes in the hardware configuration, update the ESCD information. (PnP BIOS only) 2. Clear all memory that has been used. 3. Boot system via INT 19H.
FF	System Booting. This means that the BIOS already passes control correctly to the operating system.

Appendix

RARE ERRORS

Post Code

Description

B0

If interrupt occurs in protected mode.

B1

Unclaimed NMI occurs.0