FAQ: Solving the Gateway / Anigma 486 Enigma

Upgrading Your Gateway / Anigma 486 System
Revision 2.0, May 11, 1998, by Ben Myers
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Although the subjects of this FAQ are the Anigma 486 motherboards used in many Gateway 2000 computer systems, there is is a lot of information which interests a broader audience. Many companies sell processor upgrade products and represent them as really simple to do, yet there are many postings on usenet complaining of the difficulty of doing one processor upgrade or another. The combination of our experience, the experiences of others, and the various collections of data on the web has shown us that 486 processor upgrades are not always a done deal. If you are considering a processor upgrade for any motherboard, read on and proceed with caution. Likewise, there are some misconceptions about memory, hard disk, and CD-ROM upgrades. We'll set the record straight in these areas, too.

This is probably the last major update to this document, because I don't think there will be anything significantly new to say in the future.

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Q1. How can I identify an Anigma motherboard? Which one do I have?

A1. Gateway 2000 systems use 486 motherboards produced by three hardware designer/manufacturers, Anigma, Intel, and Micronics. The actual manufacturers of the Anigma boards have never been revealed officially by Gateway. Rumor has it that Texas Instruments made some of the Gateway 486 boards, building the designs of the Anigma company, of which no trace exists any longer. The absence of detailed information on the Gateway web site, and just about anywhere else for that matter, about the Anigma 486 motherboards makes them quite mysterious. To Gateway's credit, it provides flash BIOS updates for these boards at its web site, but information about the improvements and corrections in each BIOS update is sketchy, at best.

Knowing which Anigma board is the first step in determining what upgrades can be done. Anigma boards vary widely in physical layout. You can identify an Anigma motherboard by what it is not! It is neither a Micronics motherboard nor an Intel Classic R motherboard. Boards manufactured by Micronics and Intel have manufacturer part numbers silk-screened on them. Anigma boards have only a bar-coded sticker applied by Gateway. The table below shows Anigma motherboard styles, typical Gateway part numbers, and BIOS revisions. All of the Anigma boards use a Phoenix BIOS except for the EISA board which has an Award BIOS. The boards identified as "LPX" have built-in graphics and a vertical riser card for add-in cards.

Motherboard Layout/Slots	Gateway Part Numbers	BIOS Revisions	CPU Socket
LPX with ISA riser	LP486P24T, LP48625SX, LP48633SX	A486 1.01	Type 3 ZIF
LPX with ISA riser	LP48625SX, LP48633SX	A486 1.01	LIF
Full-sized AT EISA	EISA486	Award 4.28A or 4.32A	LIF
Baby-AT PCI	BAT486IP	A486 1.03, 1.03.MFI01	Type 3 ZIF
Baby-AT PCI ("Saturn II" BAT486IP2 or BAT486IP2V)	MBDPCI001AxWW or MBDPCI002AxWW	4.03.08, 4.03.09, 4.04.06, 4.04.7, 4.04.07	Type 3 ZIF
Baby-AT PCI ("Aries" BAT4IP3 or BAT4IP3E)	MBDPCI003AxWW	4.04.07, 4.04.5, 4.04.C	Type 3 ZIF
LPX with PCI-ISA riser (LP4IP1)	MBDPCI004AxWW	4.04.07, 4.04.09, 4.04.D	Type 3 ZIF
Baby-AT PCI w/ on-board graphics	MBDPCI008AxWW	4.04.E, 4.04.H, 4.04.I	Type 3 ZIF

There are three types of Anigma LPX/ISA boards with riser cards. The early LPX/ISA boards have two Limited Insertion Force (LIF) sockets which only accept 486 processors. The later LPX/ISA boards have Type 3 Zero Insertion Force (ZIF) sockets which accept either a 486 processor or a Pentium OverDrive processor. The third variation of LPX/ISA board also has a surface-mounted 486SX processor which is disabled via jumper settings when another processor is installed.

Q2. What processor upgrades are possible for my Gateway/Anigma 486 system?

A2. First, if you have a Gateway / Anigma system that uses a 25MHz 80486-SX, a 25 MHz 80486-DX or a 50 MHz 80486-DX2, you can change the motherboard switch settings to run the system with a 33 MHz system bus, rather than the current 25 Mhz. All of the Anigma motherboards have jumpers to change the system bus frequency. The Anigma boards cannot be operated at system bus speeds greater than 33MHz. (The Anigma board with Gateway part number MBDPCI004AxWW has jumper settings for a 50mhz system bus speed, but we have not found a processor that operates reliably at that speed. Maybe an old Intel 50MHz 486DX would.)

The Anigma EISA486 and LP486 motherboards used by Gateway were designed for 5 volt processors. All the others are supposed to run with either a 3.3 volt or a 5 volt processor, IN THEORY! Anigma motherboards were not manufactured to the highest quality control standards. Many Anigma boards were built with jumpers to switch between processor voltages, but WITHOUT the integrated circuits needed to provide the correct voltage to a 3.3v processor! Be extra careful here. Make sure that your Anigma motherboard has the circuits required to run a 3.3v processor, or buy a processor upgrade kit that includes its own voltage regulator.

Next, let's start with the older 5 volt processors, ranked in order from slowest to fastest...

- Intel 66 MHz 80486-DX2 OverDrive
- Cyrix, IBM, or SGS-Thomson 66 MHz or 80 MHz Cx486DX2
- Intel 100 MHz 80486-DX4 OverDrive
- Intel 83 MHz Pentium OverDrive

Cyrix is a fabless (without its own chip fabrication plants) semiconductor company, recently acquired by National Semiconductor. Cyrix designs processor chips, tests prototype chips, obtains patents on their designs, and contracts with semiconductor manufacturers to produce their designs. IBM, SGS-Thomson, and Texas Instruments manufacture processors under license granted by Cyrix, and they manufacture some processors to sell under their own brand names. You may find identical processor chips branded variously as Cyrix, IBM, SGS-Thomson or Texas Instruments. When we refer to a Cyrix processor here, it is shorthand for any of these brands.

The Cyrix Cx486DX2 defaults to a write-back cache at power on. If your motherboard does not have the additional more expensive circuits for reliable operation of write-back cache, the Cx486DX2 is not for your system.

The Intel 83 MHz Pentium OverDrive requires a Type 3 ZIF socket, found on the later Anigma PCI motherboards.

Finally, there are the 486 style processors which have an operating voltage of 3.3 or 3.45 volts. These processors require a voltage regulator to operate in a 5 volt motherboard. A voltage regulator is a tiny circuit board installed in the motherboard socket with a 3 volt processor plugged in piggy back style on top.

- AMD 66 or 80 MHz Am486DX2-66 or -80
- AMD 75, 100 or 120 MHz Am486DX4-75, -100 or -120
- AMD 133 MHz Am5x86-P75 or Am5x86-133
- Cyrix 100 or 120 MHz 5x86-100 or -120

If your motherboard does not support a write-back cache, the AMD 133 MHz Am5x86-P75 (and sometimes a Cyrix 5x86) must be used with a voltage regulator that inhibits write-back to give you reliable operation.

The Am486DX2-80, the Am486DX4-120, the Cyrix 80 MHz Cx486DX2, and the Cyrix 5x86-120 all require an external bus clock operating at 40 MHz to achieve full operating speed, so they cannot operate at their full rated speeds in any Anigma motherboard.

Despite their cleverly chosen names, the AMD Am5x86 and the Cyrix 5x86 do not have complete Pentium-compatible instruction sets. The AMD Am5x86 is a very fast 486-compatible processor. The Cyrix 5x86 uses architectural features similar to the Intel Pentium to run its 486-like instructions very quickly, despite its slower clock speed.

All of the chips listed here are no longer in production. As far as I know, the AMD Am5x86-P75 was the last one made, with a final production run in August of 1997. You will probably find them in the market for used and surplus chips.

You can buy a 3.3 or 3.45 volt processor, voltage regulator, and processor cooling fan separately, but we recommend a packaged upgrade, backed by a full money-back guarantee covering both performance and reliability. You pay a few more bucks for a packaged and guaranteed upgrade, but in return you get predictable and proven results.

Q3. Which is the fastest reliable upgrade for my system?

A3. The Am5x86-P75, Cyrix 5x86-100, and the Intel 83 MHz Pentium OverDrive all perform at similar levels, somewhere in the range of the Intel 75 MHz and 90 MHz Pentium processors. Shop for your upgrade among these based on a combination of price, performance, guarantee, reliability, and compatibility. The following table shows compatibility among the various Anigma 486 motherboards and these processors. The small "x" in some Gateway part numbers represents a letter: A, B, C, D, etc.

Typical Gateway Part Number	BIOS Revision Tested	CPU Socket	Intel Pentium OverDrive	AMD Am5x86	Cyrix/IBM 5x86
LP486P24T	A486 1.01	Type 3 ZIF	Yes	Yes	No
LP48633SX	A486 1.01	LIF	No	Yes	No
EISA486	Award 4.28A or 4.32A	LIF	No	Yes	No
BAT486IP	A486 1.03.MFI01	Type 3 ZIF	Yes***	Yes	Yes
MBDPCI001AxWW or MBDPCI002AxWW	4.04.7	Type 3 ZIF	Yes	Yes*	No
MBDPCI003AxWW	4.04.C	Type 3 ZIF	Yes	Yes****	No
MBDPCI004AxWW	4.04.D	Type 3 ZIF	Yes	Yes**	No
MBDPCI008AxWW	4.04.I	Type 3 ZIF	Yes	Yes	No

Notes:
* With or without separate voltage regulator; set jumper J32 1-2.
** With or without separate voltage regulator; set jumper J22 5-6.
*** Requires patched BIOS from MicroFirmware, **http://www.firmware.com**
**** With or without voltage regulator.

"With or without voltage regulator" means that our sample boards had built-in integrated circuits to operate 3.3v processors, not just the jumpers. Be careful here! Gateway could tell us which Anigma boards REALLY support 3.3v processors, but do not hold your breath waiting for this to happen. The Gateway documentation we have seen for some Anigma motheboards warns against using 3.3v processors.

Q4. What kind of performance improvement can I expect in my system from one of these processor

upgrades?

A4. If your system is currently powered by a 33MHz 80486 processor, you can expect nearly a four-fold increase in overall processing speed. If your system is currently powered by a 66MHz 80486-DX2 processor, you can expect overall processing speed to be almost twice as fast. As a rule, calculations such as spreadsheet recalcs and spell checking of a document will be much faster, but tasks that rely on external devices such as database and WWW searches will not run much faster at all.

Q5. Which motherboards have you tested extensively?

A5. We have tested all of the Anigma 486 motherboards known to have been used by Gateway, and they are all robust enough in design to run reliably with the AMD processor. With any of the Am5x86-P75, Cyrix 5x86-100, or the Intel 83 MHz Pentium OverDrive processors, typical results running Windows Magazine's WINTUNE (Version 2.0) exceed 60 on the Dhrystone test and 14 on the Whetstone test. By comparison, the Dhrystone and Whetstone numbers for the same motherboards running a 33MHz Intel 80486-DX are 19.0 and 3.7. For a 66mhz Intel 80486-DX2, the numbers are 37.5 and 7.3.

Generally you do not need to upgrade the BIOS in your computer to install any of the processor kits we sell, as described in A14 below. We do recommend that you upgrade to the BIOS revisions shown in the table above.

If you have already upgraded the BIOS in your Gateway/Anigma 486 with a MicroFirmware BIOS upgrade, MicroFirmware states that their BIOS needs to be at a minimum revision level to operate correctly with processors at clock speeds of 100MHz or greater. Contact Micro Firmware at **http://www.firmware.com**

for more information. If you are a registered licensee of a MicroFirmware BIOS, you can download the latest firmware version for your board from their web site.

Q6. Which processor upgrade do you recommend?

A6. The only reasonable and unbiased answer is... Shop for the best combination of price, performance, and reliability that you can afford.

The only processor recommended for ALL of the motherboards shown above is the Am5x86-P75. The Cyrix 5x86-100 and the Intel 83 MHz Pentium OverDrive processors are recommended only for some of the motherboards as tabulated in A3. When I say "recommend", that means we have tested the given combination of processor and motherboard here under varying conditions, and the combination gives reliable performance at the rated speed of the processor. If we do not recommend a processor, you are certainly free to try it, and maybe you'll find a workable combination of processor and jumper settings, but we doubt it.

Q7. My computer BIOS reports a processor type and speed different from what is actually installed inside. Is something wrong?

A7. Run an independent and reliable utility program to verify the processor clock speed and system cache configuration. Ray Van Tassel's shareware CACHECHK is a good one, as is CPUTYPE which we ship with our

upgrade kits. As long as an independent and reliable utility program reports the expected processor clock speed and system cache configuration, and your system behaves reliably, there is nothing to worry about. Many BIOSes were written before newer processor chips were even designed. An older BIOS does not have the necessary logic to detect and report a newer chip accurately. This is also true for many older Pentium motherboards when they are confronted with Socket 4, Socket 5, and Socket 7 Pentium upgrades such as the Pentium OverDrive and kits that use plug-in adapters. You can obtain a copy of CACHECHK thru **http://www.shareware.com** , the C|NET shareware web site, among other places.

Q8. Do I need a BIOS upgrade or any software changes to upgrade the processor in my system?

A8. No, with two exceptions. If your system has a MicroFirmware BIOS, you must make sure that it is at or greater than the minimum revision number required by MicroFirmware for 100mhz or faster processors. If you have a BAT486IP motherboard, you may need to update the BIOS with the Phoenix A486 1.03.MFI01 BIOS, a free download from **http://www.firmware.com**. This is a BIOS that is "patched" to operate correctly with the Intel 83mhz Pentium OverDrive, the subject of a "Pentium Ready" class action lawsuit settled on behalf of owners of many Gateway 486 computers.

Q9. What else can I do to improve the computing power of my Gateway/Anigma 486?

A9. If the processor in your computer is or soon will be at least a 100 MHz 80486-type, upgrade the external cache memory to the largest size possible, either 128K or 256K bytes, depending on the Anigma model. The performance difference between a smaller cache and 256K external cache can be as much as 25% for some applications, but more often lies in the 10-15% range. The design of many motherboards limits the address range of memory being cached when the external cache size is small. The Anigma EISA 486 motherboard requires a special cache module, for which no known source currently exists.

Adding memory to your system often improves overall performance by allowing Windows to cut down on its use of its virtual memory swap file. If you are running or intend to run Windows 95, 16 megabytes or more of memory is highly recommended. Windows 95 and its applications are memory eaters.

Q10. What do I need to do to upgrade the memory of my Gateway/Anigma 486?

A10. Most of the Anigma motherboards were built with jumpers to enable and disable memory parity checking. Gateway used mostly non-parity memory in these systems. Check the memory parity jumper setting on your system before buying. You can use more expensive 72-pin "x36" parity memory in any of these systems, or you can use 72-pin "x32" non-parity memory by setting the motherboard jumper than disables parity checking. You can also generally intermix parity and non-parity SIMMs on the same motherboard with parity checking disabled. Memory should be Fast Page Mode (FPM), rather than the Extended Data Out (EDO) memory used in newer Pentium systems.

All of the Anigma 486 motherboards with 4 SIMM sockets require installation of identical SIMMs in pairs. Some of the Anigma 486 motherboards may operate correctly with newer 2x32 8MB and 8x32 32MB SIMMs, but others do not. We have not yet tested all combinations here. Refer to the documentation for your motherboard for specifics.

Despite claims attributed to Gateway sales and technical support people, you do NOT need to buy memory only from Gateway. Any reputable supplier of generic SIMM memory can sell you memory that works reliably in your Gateway/Anigma motherboard.

If you need memory configuration, jumper settings, and switch settings for your motherboard feel free to email benmyers@ultranet.com for this information. You need to tell us the Gateway part number or the BIOS revison for your motherboard. Our information is more complete that the information from Gateway, which has absolutely NONE of this information at its web site.

Q11. How can I increase hard disk capacity?

A11. If you want to upgrade or replace your IDE hard disk drive with one of the newer large capacity IDE disks (> 528MB capacity), there are three general solutions:

- a BIOS upgrade
- an Extended IDE (EIDE) controller card
- software drivers supplied by most manufacturers of large EIDE hard disks.

An up-to-date BIOS is the most trouble-free solution for using large IDE hard disks. It is compatible with both your motherboard and nearly all major operating systems. The BIOS installed on your motherboard must provide Logical Block Addressing (LBA), at minimum, to support large hard disk drives.

Any Phoenix BIOS identified as Version 1.xx is limited to handling IDE hard disks no larger than 528MB. The Award 4.28 and 4.32A BIOS used in the Anigma EISA 486 board has the same limitations. As a general rule, any Phoenix BIOS identified as 4.xx is capable of handling EIDE hard disks up to 2.1GB in capacity. The latest MicroFirmware BIOS upgrades allow you to install the largest EIDE hard disks available. Contact MicroFirmware for BIOS upgrade information. All MicroFirmware BIOS upgrades support LBA plus other advanced BIOS features.

If you decide to investigate an EIDE controller card solution, you must have one which supports LBA, at minimum.

Software solutions to the large IDE hard disk problem are not universal. They apply only to the operating system that you use, sometimes requiring an exact software release to operate correctly. Generally, they require that you set up a conventional DOS partition on the hard disk, then run a software install program which adds drivers and other special software to your system to give you access to the additional hard disk capacity.

Finally, if your system uses SCSI hard disks, refer to the manufacturer-supplied documentation for the SCSI host adapter installed on your system. This documentation describes the capacity limitations, if any, of the SCSI host adapter. Modern SCSI host adapters support very large hard disks with little extra effort on your part.

Q12. Can I add an Extended IDE (EIDE) CD-ROM drive to my system?

A12. Usually, yes. EIDE CD-ROM drives are often misunderstood. Some articles and technical documents may refer to EIDE as the Attached AT Peripheral Interface (ATAPI). First, the typical EIDE CD-ROM drive operates entirely through a software driver in CONFIG.SYS, bypassing the system BIOS completely. So a BIOS upgrade is not required to support an EIDE CD-ROM drive on most motherboards. You can attach an EIDE CD-ROM drive as a slave drive on the same primary IDE connector as your hard drive, or to a secondary IDE connector, either on the system motherboard or as an EIDE controller card. You must follow the normal IDE master-slave configuration rules in setting up both EIDE CD-ROM and any IDE hard disks. IDE and EIDE drives sometimes

have a neutral jumper setting, often labeled CSEL, used when a drive is alone on an IDE connector. Prior to installing the EIDE CD-ROM in your system, make sure that the system CMOS refers to it as "Not installed" or similar. Then, connect the drive to the system, and install the EIDE CD-ROM software drivers in CONFIG.SYS and the Microsoft CD-ROM Extensions (MSCDEX.EXE) program in AUTOEXEC.BAT. By following this general procedure, we have successfully installed EIDE CD-ROM drives in Gateway/Anigma 486 PCI motherboards, other older 486 motherboards with built-in IDE connectors, and a few motherboards with separate IDE controller cards. The Anigma EISA486 motherboard BIOS **does not** support EIDE CD-ROM drives attached to a primary IDE controller.

Q13. Why should I use a 3.3 volt processor upgrade kit when I can get a new 3.3 volt 486 motherboard and processor for much less?

A13. You get what you pay for... Here are some reasons for sticking with the Anigma motherboards over newer 486 motherboards. The most important is that if you are going to spend time and money on a motherboard replacement, you might as well go for a newer Pentium or Pentium Pro board. See A14 below.

Some other reasons are:

- There are very few name brand 486 motherboards being manufactured today. Be very suspect of the quality of a new 486 motherboard. If you go this route, make sure you know EXACTLY what you are getting, backed by the seller's guarantee.
- You may also find out that a new 486 motherboard is not compatible with the add-in cards or the hard disk of your Gateway system. Be on the lookout for incompatibilities between the Gateway Phoenix BIOS and whatever BIOS is in a replacement 486 motherboard, especially for IDE hard disk support. The EIDE standard provides for electronic compatibility of IDE drive and BIOS, but the conventions for handling large (>528MB) EIDE hard disks are not always followed by BIOS writers.
- If your system has an Anigma EISA motherboard, you can continue to use EISA add-in cards with a processor upgrade.
- If your computer has an LPX motherboard or a motherboard with integrated graphics, you will have a lot of difficulty finding a board that is an exact physical replacement. Very few LPX boards are available from resellers, and the physical layout of LPX boards was never standardized across the industry.
- If your computer has a motherboard and case with PS/2 style keyboard and mouse connectors, you need to examine the back of the computer case. Many cases used by Gateway for its 486s have a small removable plate attached by a pair of screws covering the keyboard and mouse connector area. If you can remove this plate, you can install a replacement motherboard with an AT-style keyboard connector. Then you would also have to buy a new keyboard or a PS/2-to-AT keyboard converter, plus a serial mouse.
- Replacement motherboards that match PS/2 cutouts on a case are not commonly available.
- It takes less time to install a processor upgrade kit than to do a motherboard swap. If your motherboard has a ZIF socket, the whole upgrade takes less than 15 minutes. Add another 5 to 10 minutes for CAREFUL extraction of a processor from a motherboard without a ZIF socket. Plan on spending at least an hour to change motherboards, more if you are inexperienced at this sort of thing.

Q14. Why should I use a 3.3 volt processor upgrade kit when I can get a new Pentium, Pentium Pro, or Pentium II motherboard?

A14. Now THAT is a really good question to consider for any Gateway/Anigma system with a baby-AT sized motherboard, even with PS/2-style keyboard and mouse connectors. Many Gateway system cases have a small plate covering the keyboard opening, as described above. You can remove the plate and install any standard baby-AT sized motherboard with classical AT-style keyboard connector. There is a wide choice of baby-AT Pentium and Pentium Pro motherboards with AT-style connectors on the market today. They install easily inside your Gateway 486 computer case. You may also need to replace your PS/2-style mouse with a serial mouse, and probably buy a PS/2-to-AT keyboard adapter.

If your 486 motherboard uses 72-pin SIMMs, you may be able to use them in a Pentium motherboard, but only in pairs. Check the specifications of the motherboard before you buy if reuse of memory is important to you. As always, buy based on a combination of quality, price, reliability, documentation quality, and ready availability of technical support. A Pentium motherboard plus other accessories may be a cost-effective upgrade for you.

The following table shows our recommendations for the form factor of a replacement motherboard which can be installed with a minimum of additional work and other parts. If you have a system with an LPX motherboard, you are better off getting another more standard system case at the same time that you replace the motherboard. Replacement motherboards with LPX form factors are not readily available. The LPX motherboard never achieved wide standardization regarding the placement of external connectors and riser card slot.

Motherboard Layout/Slots	Gateway Part Numbers	Replacement Form Factor	Other Req'd Replacements
LPX with ISA riser	LP486P24T, LP48625SX, LP48633SX	None	Not applicable
LPX with ISA riser	LP48625SX, LP48633SX	None	Not applicable
Full-sized AT EISA	EISA486	Baby-AT	Memory
Baby-AT PCI	BAT486IP	Baby-AT w/ PS/2	Note 1
Baby-AT PCI ("Saturn II" BAT486IP2 or BAT486IP2V)	MBDPCI001AxWW or MBDPCI002AxWW	Baby-AT w/ PS/2	Note 1
Baby-AT PCI ("Aries" BAT4IP3 or BAT4IP3E)	MBDPCI003AxWW	Baby-AT w/ PS/2	Note 1
LPX with PCI-ISA riser (LP4IP1)	MBDPCI004AxWW	None	Not applicable
Baby-AT PCI w/ on-board graphics	MBDPCI008AxWW	Baby-AT w/ PS/2	Note 1

Note 1 - Pentium motherboards require SIMMs in matched pairs. If the memory in your system is not matched in pairs, you may have to buy additional memory. You may also have to replace the internal serial cables currently attached to your motherboard.

Q15. What is your interest in all this?

A15. We found that the upgrade needs of the owners of Gateway 486 computers were not being adequately served in the industry. We developed and tested a reliable 486 upgrade kit based on the AMD Am5x86-P75, today's most cost-effective upgrade for owners of 486 computers. We tested the kit extensively in the Anigma motherboards shown in the table above, and guarantee reliable 4x 133 MHz operation of our kit in any of these motherboards. The voltage regulator we have selected for the kit has a jumper which you can set to enable write-back cache when installed in motherboards that support write-back cache. The kit costs $119 plus exact shipping costs.

We offer another 486 upgrade kit based on the100MHz IBM 5x86, but only for a few Anigma motherboards as well as selected non-Gateway computers. It is not compatible with many Anigma 486 motherboards used by

Gateway. Our IBM 5x86 kit costs $109 plus exact shipping costs.

Now and again, we are able to acquire Intel 83MHz Pentium Overdrive processors and offer them at $149, less if used and in less than perfect physical condition. Check the information at **http://www.intel.com** if you have another type of motherboard with a Type 3 ZIF socket. Intel has compiled a lot of data about the compatibility of their processors with various systems and motherboards, but Intel disclaims responsibility for its accuracy.

We sell Intel 5 volt 80486-DX4 OverDrive processors for $79, when we can get our hands on them. They are no longer manufactured, but now and again some of them turn up.

If you need to upgrade more than one computer, please contact us for quantity pricing and/or affordable upgrades done by us at your offices (25 or more computers only).

Our guarantee extends for one year but excludes both overclocking and write-back cache when used inappropriately. Shipping costs are not refundable.

With each order, we ship you a diskette with copies of two reliable public-domain programs which verify the CPU bus speed, Ray Van Tassel's CACHECHK and Frank Van Gilluwe's CPUTYPE. We also provide printed information about motherboard jumper and switch settings, plus motherboard schematics if we have them.

We sell external cache memory upgrade kits for all the Anigma motherboards (except the EISA 486) and other motherboards which have sockets for common 28-pin SRAM chips. Our kits include a simple and complete step-by-step chip installation guide. Contact us for pricing for your motherboard with its current cache memory setup. We offer package pricing for processor kits and cache kits ordered together.

Finally, if you are interested in a replacement name-brand Micronics and Intel baby-AT motherboard with PS/2-style connectors, full BIOS compatibility, and a decent (though not screaming fast) Pentium-class processor with MMX compatibility, contact us for models, pricing, and availability at benmyers@ultranet.com. We will sell them as long as we have some to sell.

Q16. What is overclocking? Can I do it? Should I do it?

A16. Over-clocking, running the processor at a clock speed higher than designed by its manufacturer, is a long-established method of coaxing higher performance out of personal computers. It all began when some enterprising hardware hackers discovered that the 1984 vintage IBM AT would run above the rated 8 MHz speed of its 80286 processor. Other devices in a computer could also be overclocked, but processor overclocking is most common one.

Overclocking generates additional heat and electronic emissions that may go beyond the design limits of your computer. As a general rule, we recommend against it.

Q17. What about Gateway 486 systems that use other motherboards, for example Micronics or Intel?

A17. We have tested all of the Micronics 486 motherboards used by Gateway and have complete information about them here. We have thoroughly tested the Intel Classic R 486 motherboard used in some Gateway mini-desktop systems, and we have complete technical information about it, too. The Classic R works reliably with both the Intel Pentium OverDrive and our AMD Am5x86-P75 processor kit.

If you have a question about a specific Micronics board or the Intel Classic R, send email to benmyers@ultranet.com , or request our companion to this FAQ, the Gateway/Micronics 486 FAQ.

Q18. What about Gateway Pentium systems?

A18. We have tested all of the baby-AT and some ATX Intel-made Pentium motherboards used by Gateway and have complete information about them here. Look for our Gateway Pentium FAQ in the near future.

Q19. What is Spirit of Performance and who is Ben Myers?

A19. Spirit of Performance, Inc. is a family owned business incorporated in 1987. Both the company, and one of its principals, Ben Myers, have done extensive hardware and software testing over the years for PC Week, PC Magazine, Windows Magazine, as well as other companies. Ben Myers developed several releases of the Ziff-Davis Winbench graphics benchmark for Windows, and has many years of experience testing performance and reliability of computers. The Ben Myers of Spirit of Performance is NOT to be confused with his namesake English beer drinking expert who turns up elsewhere on the web, although he does quaff a good beer rather infrequently. (Search for "Ben Myers" using DEC's Alta Vista search engine to check out your beer interests, too.)

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MasterCard, VISA & AMEX accepted.
Purchase orders from corporations, governments, and educational institutions subject to approval.