



Performance Enhancement Sheet

NOTE: Some machines require very specific settings to get them to run and perform properly. It may be necessary to call Evergreen Technical Support to get these settings.

There are two major issues to consider when attempting to increase the performance of your system: Motherboard/Upgrade settings and BIOS settings.

Motherboard/Upgrade Settings

The Evergreen 586 upgrade utilizes the AMD X5 processor. This processor contains a 16k internal or L1 cache which is capable of either Write Through(WT) or Write Back(WB) cache schemes. For specific details about the differences between these cache schemes, please refer to the document entitled "WB VS. WT". Write Back is the more efficient of the two schemes and can result in higher performance on systems that have full support. WB cache, support must be found not only in the CPU but in the BIOS and on the motherboard as well; not all systems will support WB cache.

The "CPU Type" options on the motherboard, is the first place to look for WB support. If your motherboard is configurable for the AMD X5 133, Intel P24D, or 486DX-WB CPU Types, then you may be able to make use of the more efficient WB cache scheme on the upgrade and increase your system performance. Use the following table to configure the motherboard and upgrade together:

| CPU Type Configuration | Upgrade Configuration |
|--|---------------------------|
| AMD x5/133 | Normal/WB |
| Intel P24D (equal performance to AMD 133) | Overdrive/WB |
| 486DX-WB | Overdrive/WB or Normal/WB |
| 487sx or ODP (equal performance to DX/DX2) | Overdrive/WT |
| Intel 486DX or DX2 (Non SL enhanced) | Normal/WT |
| AMD DXL | Normal/WT |

NOTE: If you use a CPU Type listed above that utilizes the Write Back (WB) cache setting on the upgrade, use the ETDIAG utility that came with the upgrade to confirm that the chip is implementing the cache scheme correctly. Check the CPU Cache in the program, it should read "16k Unified WB enabled". If it does not, look in your BIOS settings for a Cache Scheme setting relating to the internal, or L1 cache, and try adjusting that to the WB or Write-Back option. Not all BIOS setup utilities have this option, so don't be alarmed if you do not find it. Recheck all of your jumper changes to see that all of your settings are correct.

If ETDIAG reports that the cache is "16k Unified WT enabled" despite being configured in WB mode on the upgrade, motherboard and the BIOS, your system is unable to operate correctly in WB mode. Adjust all of the settings that you changed back to a WT (Write Through) option. Attempting to run the system in WB mode when WB is not fully supported can lead to a loss of data integrity and result in data corruption.

Other hardware considerations

On most systems level 2 or external cache will have an impact on the performance of faster CPUs. Main memory is sufficient for keeping up with most processors running up to a 486DX 2/66 level, but when a faster CPU is installed RAM is less able to 'keep up'. Level 2 or External Cache will be beneficial in providing more performance for the system. Without this cache memory your system performance may not achieve expectations. The L1 cache on the 586 upgrade can make up for a lack of External cache to some degree, but to fully utilize the performance potential of the processor, external cache is recommended.

BIOS Settings

Several settings in your system BIOS setup can dramatically affect the speed at which your system performs. What the settings in the BIOS setup do can be cryptic and hard to understand. Changing these settings may cause errors in the operation of your computer.

Before changing any settings in your BIOS setup, you should make a record of the current settings. This will allow you to go back to a known set of working values if your system develops errors. Make changes to the BIOS only one setting at a time and by only one value at a time. This helps to simplify the troubleshooting process if errors occur due to incorrect BIOS settings. If changing a value in the BIOS generates errors in system operation, it will be easily recognizable which setting is causing the problem. If you change too many settings at once, and your system develops errors, it may be difficult to diagnose which BIOS setting caused the error.

Here is a brief explanation of some BIOS settings and general recommendations for how to adjust them for optimal performance. Read the entire document before making any changes. Many of these settings may be referenced by different labels in different BIOS. We have chosen the most commonly used nomenclature for use in this document. See the [Glossary](#) document on the Evergreen Website for more detailed definitions.

Auto-configuration: This setting controls whether the BIOS will automatically configure the system's timing settings. Values for this setting are enable or disable. In most systems, this setting will be enabled. You may notice that several settings in the BIOS are not available to be configured when the auto-configuration is enabled. If you wish to manually configure your system's timing settings, you should set this to disable.

| System Bus Speed | AT Bus Clock Speed Setting |
|------------------|----------------------------|
| 25 MHz | CLK/3 or 2/6 |
| 33 MHz | CLK/4 or 2/8 |
| 40 MHz | CLK/5 or 2/10 |
| 50 MHz | CLK/6 or 2/12 |

AT Bus Clock Speed: This setting controls the speed at which the ISA bus slots operate. VLB and PCI peripherals are not affected by this setting. Usually this is a divisor of your motherboard speed (i.e. CLK/4 on a 33 MHz motherboard would set the ISA bus at about 8.33 MHz). For best performance and stability, the ISA bus should be set as close to 8.33 MHz as possible.



Setting the AT Bus Clock speed too fast or too slow can create problems with older peripherals on your system (whether they are integrated into the motherboard or plugged into bus slots on the mother board).

L2 Cache Scheme: This setting controls the logic used for the external cache. Settings are usually Write-Through (WT), Write-Back (WB), and Disable. You must have an L2 cache installed on your system for this setting to have an effect. Unless your external cache is causing errors on the system, this should be set to write-back. This is a better performing cache logic than write through.



Make sure this setting is for the L2 or external cache, not L1 or internal cache. There may be some performance gain by setting the L2 cache scheme to write-back. If you set your L2 cache scheme to write-back and your system develops errors, return the value of this setting to Write-Through.

L1 Cache Scheme: Like the L2 cache scheme, this may also have settings for Write-Through (WT), Write-Back (WB), and Disable. The cache logic works similarly to the L2 cache scheme, but applies to the high speed internal cache of the processor. This setting should always be set to write-through unless your motherboard lists support for the exact processor you are installing on the system (AMD 5X86). If your board does not support the processor on the motherboard, setting the L1 Cache Scheme to write back can cause problems.



Do not set this setting to write back unless you are confident that your motherboard has the proper support. Use the table at the beginning of this document and your system manual to check the CPU types supported by your motherboard. If your motherboard will not support a CPU which utilizes WB cache keep this setting on WT.

Wait States: A wait state tells the processor to pause a certain number of clock cycles every time it accesses a certain device such as L2 cache, main memory, or the VESA local bus. This helps the processor to synchronize its timing with the device for proper communication. Often, the wait states of the system need to be adjusted for a processor upgrade to operate in a stable fashion.

Increasing the wait states on a given device will slow down the processor's performance while accessing that device.

Wait states should be set to as low a value as possible, while maintaining stability. If decreasing a wait state causes the system to become unstable, you should increase the value of the wait state until the system becomes stable again.



DRAM Read and Write Wait States: These are wait states set on the main memory of the system. Since main memory is central to the operation of the whole system, wait states on main memory can cause a degradation of the overall system's performance. Most 486 systems with 60-70ns memory should have these set to 0, but may have to be increased to 1 or 2 after a processor upgrade has been installed because of the additional clock multiplication.

Cache Write Wait State: This wait state is set on the L2 or external cache (often referred to as SRAM). The external cache is also central to the entire system and increasing the L2 cache wait states can cause degradation of the overall system's performance. Most 486 systems should have this set to 0, but may have to be increased to 1 after a processor upgrade has been installed. You must have an L2 cache installed on your system for this setting to have an effect.

Cache Read Bust Mode: This is the equivalent to a cache read wait state. This setting controls how your system reads to the external cache. Common settings are 3-2-2-2, 3-1-1-1, and 2-1-1-1. The 3-2-2-2 setting is the slowest available (same as 2 wait states) and 2-1-1-1 is the fastest setting available (same as 0 wait states). Most 486 systems should have this set to 3-1-1-1, but may be changed to 2-1-1-1 or 3-2-2-2 after a processor upgrade has been installed. You must have an L2 cache installed on your system for this setting to have an effect.

Video ROM Shadow/System ROM Shadow: Shadowing Video and System ROM can result in increased boot speed and faster system operation. If the system remains stable with these options set to 'enabled' it is recommended that you keep them enabled. Set and test each one separately, fully testing the system with each change.

Video BIOS cacheable/System BIOS cacheable: Like shadowing, adjusting these settings to 'yes' or 'enabled' can result in better system performance. Likewise, stability may become an issue so set and test each setting separately, reverting to the most stable option when necessary.

Other BIOS considerations

There are several other options available in BIOS's that may also help you get additional speed. Memory Remapping, Hidden Refresh, Fast Page Mode are the most common of these. These options may also introduce problems into your system.



If you make any changes to these settings and your system becomes unstable or fails to boot properly, return the BIOS setting to its original state. You may need to re-install the original processor to do this.