POWERLEAP™ PL-K6-III

Pentium® CPU Upgrade Kit

--for--

- AMD K6-III

Version 2.xx

Visit our Web sites at:

http://www.powerleap.com

http://www.friendtech.com

The PowerLeap web site (http://www.powerleap.com/download.htm) contains links to utility files available for download.

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Introduction

Your PowerLeap™ PL-K6-III CPU upgrade kit allows Pentium Socket 7 and Socket 5 systems to take advantage of the latest CPU technology from AMD. The PL-K6-III employs patented technology to adapt Socket 7 and Socket 5 systems to the voltage and pinout requirements of this new generation of processors. It provides an upgrade solution that would otherwise require the replacement of the motherboard.

In version 2.0 of the PL-K6-III, we reduced the size of the adapter for easier installation on a greater number of motherboards. If your motherboard has capacitors or other components right next to the CPU socket, this new version will allow installation of the PowerLeap adapter without adding a PGA socket extender (riser). We also added a DIP switch function that enables/disables the CPU's AL-1 pin signal for split-voltage detection. This switch provides an easy compatibility solution for certain HP Vectra systems and Biostar motherboards that check the signal.

About the MMX™ Technology

Intel's MMX technology extends the performance of Pentium processors with 57 new instructions, a 32K L1 cache, four new 64-bit data types, and more. For multimedia and communications applications, MMX can significantly enhance audio/video playback and image processing. MMX technology is compatible with a wide range of existing operating systems (including MS-DOS, Windows, OS/2, and UNIX) and 16/32-bit applications.

About the 3DNow!™ Technology

AMD's 3DNow! technology is an innovative group of 21 new instructions for the x86 architecture that brings powerful performance enhancements for multimedia and floating-point-intensive applications. With 3DNow! technology, applications can achieve more detailed 3D imaging, faster frame rates for video playback, and dramatic improvements in audio. 3DNow! technology appears in the AMD K6-III processor and works with all existing operating systems and *x*86 applications.

PowerLeap PL-K6-III Special Features

The PowerLeap PL-K6-III offers the following advanced features:

- Supports the AMD K6-III CPU with 3DNow! and MMX CPU technologies.

- Provides chip-for-chip replacement, with no software drivers to install.

- Supports the 66MHz, 75MHz, 83MHz, 95MHz, and 100MHz system bus (frontside bus).

- Provides clock multiplier control from 2.5x up to 6.0x--for a maximum CPU core speed of 400 MHz on a 66MHz FSB motherboard, 450MHz on a 75MHz FSB motherboard, 500MHz on an 83MHz FSB motherboard, and 600MHz on a 100MHz FSB motherboard.

- Employs PowerLeap's patented IPS (Independent Power Source) technology, which provides pure, abundant, and durable power to the V/Core of split-voltage type CPUs.

- Provides large 64KB on-chip L1 cache for high-performance implementation.

- Supports the AMD K6-III with internal 1:1, 256KB L2 cache.

- Incorporates PALs to handle the timing of the CPU's on-chip L2 cache (running at full CPU speed).

- Includes high-capacity switching VRM (Voltage Regulating Module) circuitry.

- Provides CPU overcurrent and overvoltage protection (with a self-repairing fuse).

- Offers a unique CPU overheating protection function: if the fan fails and the CPU overheats, the clock frequency is gradually reduced to a level that allows the system to stay up and running until the situation is corrected.

- Includes PowerLeap CPU Control Panel software with integrated CPU cooling technology and support for advanced AMD K6-III performance enhancements such as Write Allocate.

- Delivers the most cost-effective MMX CPU upgrade solution!

What You Have

Your PowerLeap™ PL-K6-III CPU upgrade kit includes the following items:
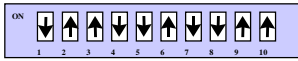
- The PowerLeap™ PL-K6-III upgrade adapter

- Power connector cord

- PowerLeap™ software distribution media (including the CPU Control Panel software)

- CPU cooling fan & heatsink

Getting Started with the PowerLeap™ PL-K6-III

This chapter describes how to choose the correct clock multiplier and core voltage setting for your new AMD K6-III CPU. It also provides a detailed listing of DIP switch settings for the PowerLeap PL-K6-III.

Quick Start: AMD CPU Settings

This section shows how to use the SW1 DIP switch to choose the correct clock multiplier and core voltage setting for your new AMD K6-III processor. (For a detailed description of SW1 DIP switch settings, refer to the next section of this chapter.)

AMD K6-III CPU	SW1 Settings
K6-III 333 (66MHz / 5.0x)	
K6-III 400 (66MHz/6.0x)	
#K6-III 450 (75MHz/6.0x)	

For systems with an external clock speed faster than 66MHz.

PowerLeap™ Installation Guide

SW1 Settings: Clock Multiplier, CPU Voltage, System Compatibility, and CPU Overheating Protection

This section shows the SW1 clock multiplier and core voltage settings for supported AMD CPUs. It also lists settings for pin AL-1 compatibility and CPU overheating protection.

SW1: Pins 1, 2, & 3 (Clock Multiplier)

The default clock multiplier setting for the PL-K6-III is 6x. (For a description of calculating the bus clock speed, clock multiplier, and CPU speed for a variety of CPUs, refer to "Technical Reference" later in this document.)

Pins 1, 2, & 3: Clock Multiplier for AMD K6-III								
CLKMUL	**6x**	**5.5x**	**5x**	**4.5x**	**4x**	**3.5x**	**3x**	**2.5x**
SW1: Pin 1	**ON**	OFF	OFF	ON	ON	OFF	OFF	ON
SW1: Pin 2	**OFF**	OFF	ON	ON	OFF	OFF	ON	ON
SW1: Pin 3	**OFF**	ON	ON	ON	ON	OFF	OFF	OFF

For systems with an external clock speed of less than 66MHz (50MHz or 60MHz), there may be a slight performance sacrifice for your new CPU. For example, changing to a K6-III 400 from a Pentium-75 will result in a system upgrade speed of 300MHz (not 400MHz). In this case, you can get improved performance by adjusting the external clock speed to 66MHz.

SW1: Pins 4, 5, 6, 7, & 8 (Core Voltage)

To reduce power consumption, dual-voltage CPUs use two separate supply voltages: an I/O interface voltage and a lower core voltage for the processor. The default core voltage for the PL-K6-III is 2.4V (for the AMD K6-III CPU).

Pins 4, 5, 6, 7, & 8: Core Voltage for AMD K6-III	
Core Voltage	**2.4V**
CPU Type	**K6-III**
SW1: Pin 4	**OFF**
SW1: Pin 5	**OFF**
SW1: Pin 6	**ON**
SW1: Pin 7	**OFF**
SW1: Pin 8	**OFF**

> **For a complete listing of supported core voltage settings, refer to "Technical Reference" later in this document.**

SW1: Pin 9 (Pin AL-1 Compatibility)

Pin 9 of SW1 lets you enable/disable the pin signal for split-voltage detection. This function provides compatibility for certain HP Vectra and Biostar systems that check the signal.

For split-voltage CPUs, certain HP Vectra (VL100 and VL5/133 Series 5 DT) systems and certain Biostar motherboards (8500TUD and M5ALA) check for the presence of a signal from pin AL-1. Unfortunately, these systems use the AL-1 pin signal differently: the signal must be disabled in order for the HP Vectra systems to

function properly, while the Biostar motherboards need to detect the signal in order to boot.

If your HP Vectra or Biostar system does not run properly with the PL-K6-III installed, try using pin 9 of the SW1 DIP switch to turn the AL-1 pin signal on/off. Pin 9 is set to ON by default--this setting allows Biostar systems to detect the pin signal and boot. For HP Vectra systems, changing the switch setting to OFF will disable the signal and allow the system to function.

> **Most systems (including most HP Vectra systems and Biostar motherboards) will be unaffected by the pin AL-1 setting.**

Pin 9: Pin AL-1 Compatibility	
SW1: Pin 9	
ON	**Pin Connected**
OFF	Pin Disconnected

SW1: Pin 10 (CPU Overheating Protection)

Your PowerLeap CPU upgrade adapter offers a unique *CPU overheating protection* function that can prevent damage to your CPU if the temperature increases. When this function is enabled, the CPU speed will automatically drop 60% if the CPU temperature reaches 70°C or higher. This prevents the CPU from overheating. Protection is enabled by default.

Pin 10: CPU Overheating Protection	
SW1: Pin 10	**CPU Overheating Protection**
ON	**Enabled**
OFF	Disabled

Installing the PowerLeap™ PL-K6-III

This chapter describes installing your CPU upgrade adapter in your computer.

Figure 1. PL-K6-III

To compare the performance increase provided by the PL-K6-III CPU upgrade adapter, we suggest running the PowerLeap CPU Control Panel® both before and after installation. If you are uncertain about the speed of your existing CPU, you can determine the speed by running the PowerLeap CPU Control Panel®.

> **The PowerLeap web site (http://www.powerleap.com) contains links to files available for downloading, including the PowerLeap CPU Control Panel® software.**

Ä **To install a CPU in the PL-K6-III upgrade adapter:**

1. Loosen the hex nuts at each corner of the provided CPU cooling fan/heatsink. You should be able to freely move the heatsink up and down.

2. Turn your new CPU over (so that the pins are facing upward) and slide it under the grooves at the sides of the CPU cooling fan/heatsink.
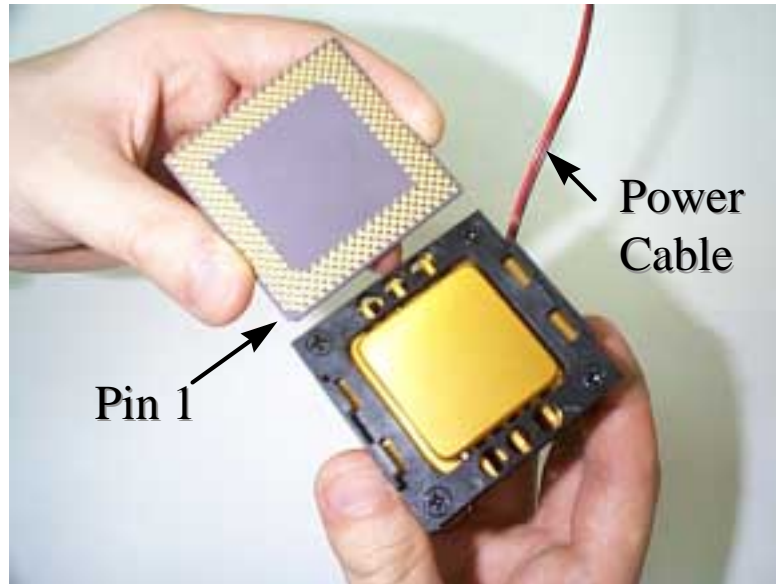
Figure 2. Sliding the CPU onto the CPU plate

Pin 1 of the CPU must occupy the corner diagonally opposite the fan's power cable. If necessary, remove the CPU from the CPU plate and insert it again, with pin 1 in the correct position.

3. Tighten the hex nuts. The CPU should be firmly attached to the CPU plate.

Figure 3. Tightening the hex nuts

4. Turn the assembled CPU cooling fan/heatsink and CPU over and insert the CPU into the socket on the upgrade adapter, **making sure that pin 1 of the CPU corresponds to pin 1 of the socket**. <u>Be sure the CPU is firmly seated in the socket</u>.
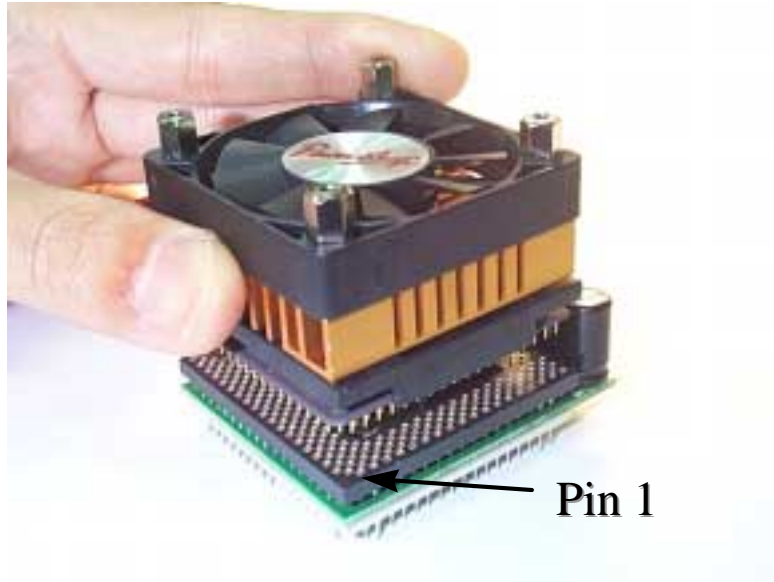
Figure 4. Inserting the CPU into the upgrade adapter

5. Make sure the CPU upgrade adapter's DIP switch settings are correct.
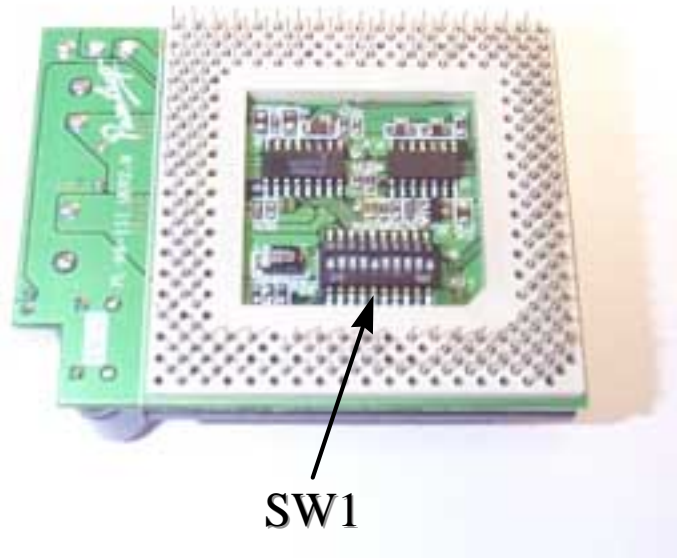
Figure 5. Checking the DIP switch settings

Ü **To install the CPU upgrade adapter in your computer:**

1. Place your computer where you will have plenty of space to work.

2. **Turn the computer off and disconnect all power cords and cables from the rear of the computer.**

3. Remove the cover from the computer (as described in the computer documentation).

4. Locate the CPU ZIF socket on the computer's motherboard. The CPU itself may be concealed underneath a CPU cooling fan and/or heatsink.

5. If your computer has a CPU cooling fan/heatsink, remove it.

6. Raise the ZIF socket arm and remove the CPU from the ZIF socket.
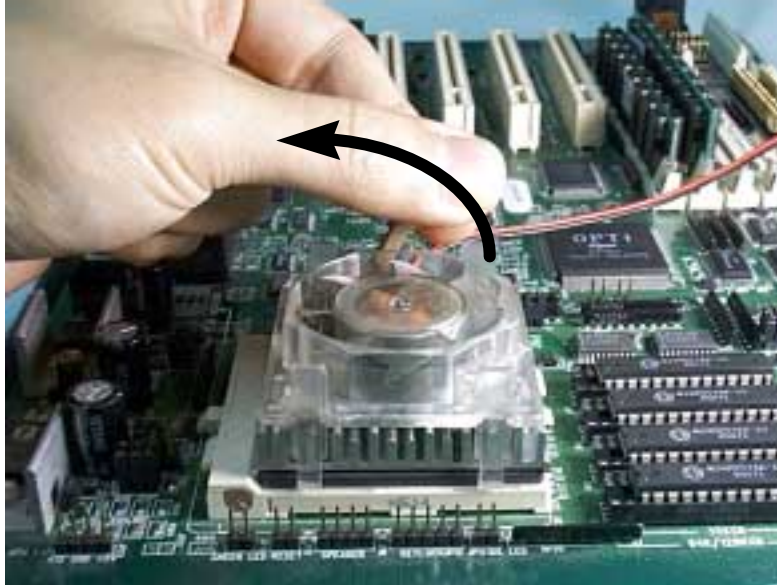
Figure 6. Raising the ZIF socket arm

7. Install the CPU upgrade adapter into your computer's ZIF socket, **making sure that pin 1 of the upgrade adapter is installed in pin 1 of the ZIF socket.**
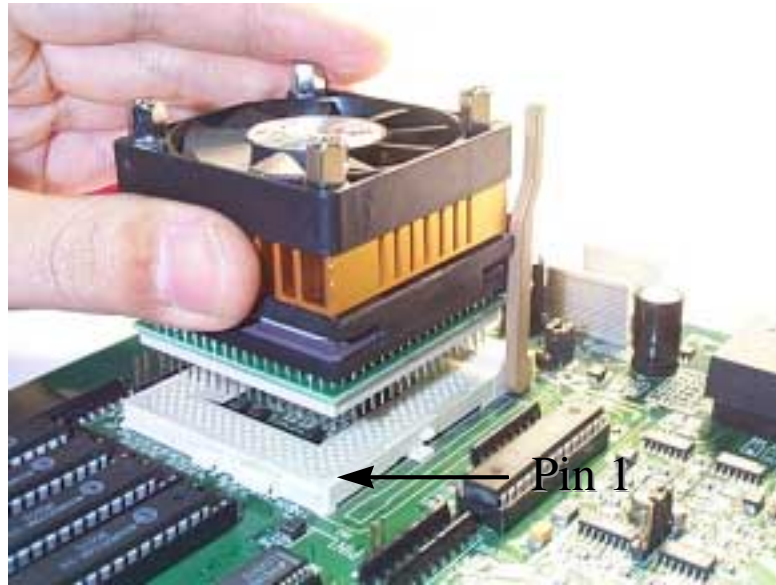
Figure 7. Installing the CPU upgrade adapter into the ZIF socket

Pin 1 of the CPU upgrade adapter must match the pin 1 hole of the ZIF socket. If the upgrade adapter is installed incorrectly, it may be damaged.

8. Lock the CPU upgrade adapter into the ZIF socket by pressing the socket arm down.
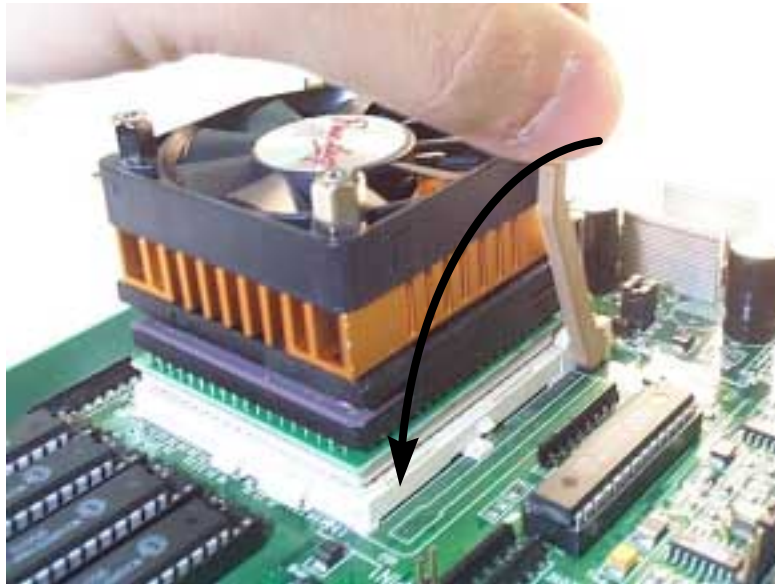
Figure 8. Locking the CPU upgrade adapter into the ZIF socket

9. Plug the PL-K6-III's power cable and the cooling fan's power cable into the power connector and fan connector, respectively, on the CPU upgrade adapter.
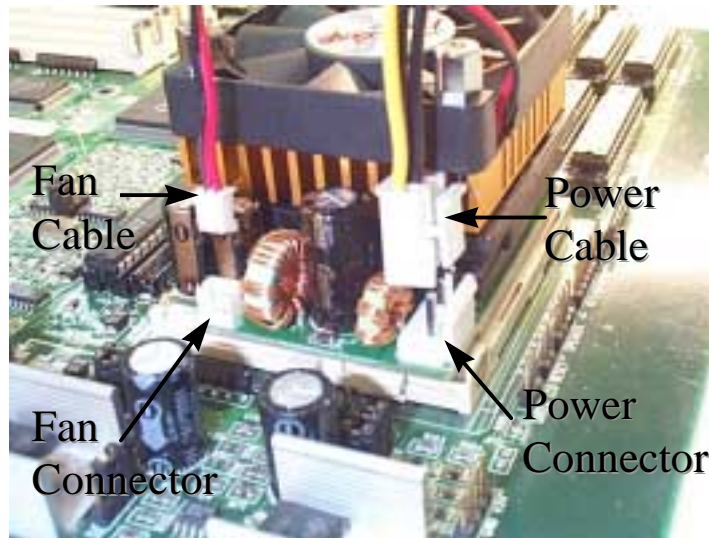
Figure 9. Connecting the power cables

The CPU upgrade adapter must have an independent (external) power supply in order to operate properly.

For maximum reliability, do not use the unused connector on the power connector cord to supply power to a CD-ROM drive or other device. In other words, use the power connector cord to connect only the upgrade adapter to the power supply.

Technical Reference

This chapter shows you how to calculate the bus clock speed, clock multiplier, and CPU speed for a variety of CPUs. It also lists the available core voltage settings for the PL-K6-III.

Calculating Clock Speeds

You can achieve the best performance for your CPU by changing the motherboard's bus clock (for instructions, refer to your documentation that came with your motherboard) according to the tables below. You can also use the formula below to calculate the PL-K6-III adapter's clock multiplier.

CPU Speed = Bus Clock Speed x Clock Multiplier

Intel CPU	Bus Clock Speed	Clock Multiplier	CPU Speed
Pentium - 75	50 MHz	1.5x	75 MHz
Pentium - 90	60 MHz	1.5x	90 MHz
Pentium - 100	66 MHz	1.5x	100 MHz
Pentium - 120	60 MHz	2x	120 MHz
Pentium - 133	66 MHz	2x	133 MHz
Pentium - 150	60 MHz	2.5x	150 MHz
Pentium -166	66 MHz	2.5x	166 MHz
Pentium - 200	66 MHz	3x	200 MHz
P55C MMX - 166	66 MHz	2.5x	166 MHz
P55C MMX - 200	66 MHz	3x	200 MHz
P55C MMX - 233	66 MHz	3.5x	233 MHz

AMD CPU	External Clock Speed	Upgrade Adapter Clock Multiplier	Internal Clock Speed
K6-166	66 MHz	2.5x	166 MHz
K6-200	66 MHz	3x	200 MHz
K6-233	66 MHz	3.5x	233 MHz
K6-266	66 MHz	4x	266 MHz
K6-300	66 MHz	4.5x	300 MHz
K6-2 /233	66 MHz	3.5x	233 MHz
K6-2 /233	75 MHz	3x	225 MHz
K6-2 /266	66 MHz	4x	266 MHz
K6-2 /266	75 MHz	3.5x	266 MHz
K6-2 /300	66 MHz	4.5x	300 MHz
K6-2 /300	75 MHz	4x	300 MHz
K6-2 /333	66 MHz	5x	333 MHz
K6-2 /333	75 MHz	4.5x	337 MHz
K6-2 /366	66 MHz	5.5x	366 MHz
K6-2 /380	75 MHz	5x	375 MHz
K6-2 /400	66 MHz	6x	400 MHz
K6-2 /450	75 MHz	6x	450 MHz
K6-III /400	66 MHz	6x	400 MHz
K6-III /450	75 MHz	6x	450 MHz

IDT CPU	External Clock Speed	Upgrade Adapter Clock Multiplier	Internal Clock Speed
C6 - 180	60 MHz	3x	180 MHz
C6 - 200	66 MHz	3x	200 MHz
C6 - 2 25	75 MHz	3.5x	225 MHz
C6 - 240	60 MHz	4x	240 MHz
WinChip2 - 225	75MHz	3x	225 MHz
WinChip2 - 240	60MHz	4x	240 MHz
WinChip2 - 250	83MHz	3x	250 MHz
WinChip2 - 266	66MHz	4x	266 MHz
WinChip2 - 300	75MHz	4x	300 MHz

Cyrix/IBM CPU	External Clock Speed	Upgrade Adapter Clock Multiplier	Internal Clock Speed
6x86 - P120+	50 MHz	2x	100 MHz
6x86 - P133+	55 MHz	2x	110 MHz
6x86 - P150+	60 MHz	2x	120 MHz
6x86 - P166+	66 MHz	2x	133 MHz
6x86 - P200+	75 MHz	2x	150 MHz
6x86L - P120+	50 MHz	2x	100 MHz
6x86L - P133+	55 MHz	2x	110 MHz
6x86L - P150+	60 MHz	2x	120 MHz
6x86L - P166+	66 MHz	2x	133 MHz
6x86L - P200+	75 MHz	2x	150 MHz
6x86MX - PR166	60 MHz	2.5x	150 MHz
6x86MX - PR200	66 MHz	2.5x	166 MHz
6x86MX - PR200	75 MHz	2x	150 MHz
6x86MX - PR233	75 MHz	2.5x	188 MHz

Cyrix/IBM CPU	External Clock Speed	Upgrade Adapter Clock Multiplier	Internal Clock Speed
6x86MX - PR233	66 MHz	3x	200 MHz
6x86MX - PR266	83 MHz	2.5x	207 MHz
MII-300GP	66 MHz	3.5x	233 MHz
MII-333GP	75 MHz	3.5x	263 MHz

For systems with an external clock speed of less than 66MHz (50MHz or 60MHz), there may be a slight performance sacrifice for your new CPU. For example, changing to a K6-III 400 from a Pentium-75 will result in a system upgrade speed of 300MHz (not 400MHz). In this case, you can get improved performance by adjusting the external clock speed to 66MHz.

SW1: Core Voltage Settings

Core Voltage	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
3.5V	ON	ON	ON	ON	OFF
3.4V	OFF	ON	ON	ON	OFF
3.3V	ON	OFF	ON	ON	OFF
3.2V	OFF	OFF	ON	ON	OFF
3.1V	ON	ON	OFF	ON	OFF
3.0V	OFF	ON	OFF	ON	OFF
2.9V	ON	OFF	OFF	ON	OFF
2.8V	OFF	OFF	OFF	ON	OFF
2.7V	ON	ON	ON	OFF	OFF
2.6V	OFF	ON	ON	OFF	OFF

Core Voltage	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
2.5V	ON	OFF	ON	OFF	OFF
2.4V	OFF	OFF	ON	OFF	OFF
2.3V	ON	ON	OFF	OFF	OFF
2.2V	OFF	ON	OFF	OFF	OFF
2.1V	ON	OFF	OFF	OFF	OFF
2.0V	OFF	OFF	OFF	OFF	OFF
2.05V	ON	ON	ON	ON	ON
2.00V	OFF	ON	ON	ON	ON
1.95V	ON	OFF	ON	ON	ON
1.90V	OFF	OFF	ON	ON	ON
1.85V	ON	ON	OFF	ON	ON
1.80V	OFF	ON	OFF	ON	ON
1.75V	ON	OFF	OFF	ON	ON
1.70V	OFF	OFF	OFF	ON	ON
1.65V	ON	ON	ON	OFF	ON
1.60V	OFF	ON	ON	OFF	ON
1.55V	ON	OFF	ON	OFF	ON
1.50V	OFF	OFF	ON	OFF	ON
1.45V	ON	ON	OFF	OFF	ON
1.40V	OFF	ON	OFF	OFF	ON
1.35V	ON	OFF	OFF	OFF	ON
1.30V	OFF	OFF	OFF	OFF	ON

PowerLeap™ Installation Guide

Windows 95 Updates for AMD CPUs

If you are running Windows 95 on a computer with an AMD K6-2 or K6-III processor running at speeds of 350MHz and above, you may receive one of the following error messages:

- Windows Protection Error.

- Device IOS failed to initialize.

- You must reboot your computer.

> **These error messages are not an issue under Windows 98, Windows NT, or Linux.**

Depending on your version of Microsoft Windows 95, you can correct this problem with a patch file.

Windows 95B (OSR2) Patch for AMD CPUs

Microsoft has released a patch for Windows 95 OSR2 (OSR2, OSR2.1, or OSR2.5) to correct a timing problem with the AMD K6-2 at speeds of 350MHz and higher. This file is available from the PowerLeap web site. For complete information on this patch, please go to
http://www.microsoft.com/windows95/downloads/contents/wurecommended /s_wuservicepacks/amdpatch/default.asp?site=95.

Please note that this patch will not resolve issues associated with any versions of Windows 95 other than the OEM SR2 version.

If you are not sure which version of Windows 95 you have, you can find out by checking your System Properties. An OEM SR2 system will show a version designator such as "4.00.9500 B". The number may vary slightly, but the letter designator will be a "B" for the OSR2 version. Version designators without a "B", such as an "A" or nothing after the number, cannot use the patch.

Windows 95A (OSR1) Patch for AMD CPUs

A patch available on www.friendtech.com fixes the "Windows Protection Error" problem that occurs when running AMD K6-2/K6-III CPUs at speeds of 350MHz (or higher) under Win95a (OSR1).

IMPORTANT: Use this patch for Windows 95a (OSR1) only. If you have Windows 95b (OSR2), use the OSR2 patch provided by Microsoft. Windows 98 users are not affected by this problem. For more information on this issue, read the PL-ProMMX *Troubleshooting Guide*.