POWERLEAP™ PL-PROMMX

Pentium® CPU Upgrade Kit

--for--

- Intel Pentium (P54C) and Pentium w/MMX Technology (P55C)
- AMD K6 and K6-2
- Cyrix/IBM 6X86, 6X86L, 6X86MX, and MII
- IDT C6

Version 6.xx

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Introduction

Your PowerLeap™ PL-ProMMX CPU upgrade adapter allows Pentium socket 5 and socket 7 systems to take advantage of the latest MMX CPU technology from Intel, AMD, Cyrix, and IDT.

The CPU upgrade adapter employs *patented* technology to adapt socket 5 and socket 7 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.

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 bring 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 K6-2 processor and works with all existing operating systems and x86 applications.

Some Commonly Used Abbreviations

This manual uses the following abbreviations and acronyms.

MMX: Multimedia Extension

P54C: Intel Pentium CPU

P55C: Intel Pentium with MMX CPU

Special Features

PowerLeap PL-ProMMX (switching) offers the following advanced features:

- Supports both Socket 5 & Socket 7 Pentium systems' MMX-Enabled CPU upgrade

- Employed the patented IPS (Independent Power Source) technology. Which provides pure, sufficient & durable power to the V/Core of split-voltage type CPUs

- Switching VRM (Voltage Regulating Module) circuitry

- Supports Intel Pentium, Pentium w/MMX, AMD K6, K6-2, Cyrix/IBM 6x86L, 6x86MX, MII, and IDT C6 CPUs

- Large On-Chip 64KB L1 Cache (AMD K6, K6-2, Cyrix/IBM 6x86MX, MII, and IDT-C6) or 32KB L1 Cache (Intel Pentium w/MMX) for High performance implementation

- Chip-for-Chip replacement, with no software drivers to install

- The most cost effective MMX CPU upgrade solution

What You Have

Your PowerLeap™ PL-ProMMX CPU upgrade adapter includes the following items:

- The PowerLeap™ PL-ProMMX upgrade adapter

- Power connector cord

- PowerLeap™ Utility Diskette

- CPU cooling fan & heatsink

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The PowerLeap™ PL-ProMMX

This chapter describes setting the clock multiplier and voltages for your PowerLeap PL-ProMMX CPU upgrade adapter.

Quick Start: CPU Settings

This section shows how to use the SW1 DIP switch to choose the correct clock multiplier and voltages for your new Intel, AMD, or Cyrix/IBM processor.

Intel CPU	SW1 Settings
Pentium w/MMX-200 (66/3.0x)	ON ↓↑↓↓↓↓↑↓ (1 2 3 4 5 6 7 8)
Pentium w/MMX-233 (66/3.5x)	ON ↓↓↓↓↓↓↑↓ (1 2 3 4 5 6 7 8)

AMD K6 CPU	SW1 Settings
K6-200 (66/3.0x)	ON ↓↑↓↑↓↓↑↓ (1 2 3 4 5 6 7 8)
K6-233 (66/3.5x)	ON ↓↓↓↓↓↑↑↓ (1 2 3 4 5 6 7 8)
K6-266 (66/4.0x)	ON ↑↓↑↓↑↓↓↓ (1 2 3 4 5 6 7 8)
K6-300 (66/4.5x)	ON ↑↑↑↓↑↓↓↓ (1 2 3 4 5 6 7 8)

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AMD K6-2 CPU	SW1 Settings
K6-2 /300 (66/4.5x)	↑ ↑ ↑ ↓ ↑ ↓ ↓ ↓ (1-8)
K6-2 /333 (66/5.0x)	↓ ↑ ↑ ↓ ↑ ↓ ↓ ↓ (1-8)
K6-2 /366 (66/5.5x)	↓ ↓ ↑ ↓ ↑ ↓ ↓ ↓ (1-8)
K6-2 /400 (66/6.0x)	↑ ↓ ↓ ↓ ↑ ↓ ↓ ↓ (1-8)
#K6-2 /450 (75/6.0x)	↑ ↓ ↓ ↓ ↓ ↑ ↑ ↓ (1-8)

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

IDT CPU	SW1 Settings
C6 MMX-200 (66/3.0x)	↓ ↑ ↓ ↑ ↑ ↑ ↑ ↓ (1-8)
C6 MMX-240 (60/4.0x)	↑ ↓ ↑ ↑ ↑ ↑ ↑ ↓ (1-8)
WinChip2-240 (60/4.0x)	↑ ↓ ↑ ↑ ↑ ↑ ↑ ↓ (1-8)
WinChip2-266 (66/4.0x)	↑ ↓ ↑ ↑ ↑ ↑ ↑ ↓ (1-8)
#WinChip2-300 (75/4.0x)	↑ ↓ ↑ ↑ ↑ ↑ ↑ ↓ (1-8)

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

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Cyrix/IBM 6x86MX CPU	SW1 Settings
6x86MX-PR233GP (66/3.0x)	ON ↓ ↑ ↓ ↑ ↓ ↓ ↑ ↓
#6x86MX-PR233GP (75/2.5x)	ON ↑ ↑ ↓ ↑ ↓ ↓ ↑ ↓
#6x86MX-PR266GP (83/2.5x)	ON ↑ ↑ ↓ ↑ ↓ ↓ ↑ ↓

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

Cyrix/IBM MII CPU	SW1 Settings
MII-300GP (66/3.5x)	ON ↓ ↓ ↓ ↑ ↓ ↓ ↑ ↓
#MII-333GP (75/3.5x)	ON ↓ ↓ ↓ ↑ ↓ ↓ ↑ ↓

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

SW1 Settings: Clock Multiplier and Voltage Settings

This section shows the SW1 clock multiplier and voltage settings for Intel, AMD, Cyrix/IBM and IDT CPUs. 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.

SW1: Pins 1, 2, & 3

Pins 1, 2, & 3: Clock Multiplier								
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

SW1: Pins 4, 5, 6, 7, & 8

Pins 4, 5, 6, 7, & 8: Core Voltage						
Core Volt.	**3.5V**	**3.2V**	**2.9V**	**2.8V**	**2.4V**	**2.2V**
CPU TYPE	**C6 WinChip2**	**K6-233**	**K6-200 6x86MX MII**	**P55C**	**K6-2/450**	**K6-266 K6-300 K6-2**
SW1: Pin 4	ON	OFF	ON	OFF	OFF	OFF
SW1: Pin 5	ON	OFF	OFF	OFF	OFF	ON
SW1: Pin 6	ON	ON	OFF	OFF	ON	OFF
SW1: Pin 7	ON	ON	ON	ON	OFF	OFF
SW1: Pin 8	OFF	OFF	OFF	OFF	OFF	OFF

For systems with an external clock speed of less than 66MHz, there may be a slight performance sacrifice for your new CPU. For example, changing to a K6-2/400 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.

Installing the PL-ProMMX

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

Figure 1. PL-ProMMX (SVRM)

To compare the performance increase provided by the PL-ProMMX CPU upgrade adapter, we suggest running the PowerLeap CPU Control Panel® software 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-ProMMX 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.**

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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

Ã   **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 under 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 5. 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 6. 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, the CPU may be damaged.

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

Figure 7. Locking the CPU upgrade adapter into the ZIF socket

9. Plug the PL-ProMMX's power cable and the cooling fan's power cable into the power connector and fan connector, respectively, on the CPU upgrade adapter.

Figure 8. 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 computer's power supply.

Technical Reference

You can achieve the best CPU performance by adjusting the system board's external clock speed according to the tables below. Or use the formula below to calculate the CPU upgrade adapter's clock multiplier.

System Upgrade Speed = External Clock Speed x Upgrade Adapter Clock Multiplier

Intel CPU	External Clock Speed	Upgrade Adapter Clock Multiplier	Internal Clock 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 /266	66 MHz	4x	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 /400	66 MHz	6.0x	400 MHz
K6-2 /450	75 MHz	6.0x	450 MHz

IDT CPU	External Clock Speed	Upgrade Adapter Clock Multiplier	Internal Clock Speed
C6 - 200	66 MHz	3x	200 MHz
C6 - 225	75 MHz	3.5x	225 MHz
C6 - 240	60 MHz	4x	240 MHz
WinChip-2 - 240	60 MHz	4x	240 MHz
WinChip-2 - 266	66 MHz	4x	266 MHz
WinChip-2 - 300	75 MHz	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
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 slower than 50MHz, there may be a slight performance sacrifice for your new CPU. For example, changing to a K6-166 from a Pentium-75 will result in a system upgrade speed of 150MHz (not 166MHz).

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
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

Core Voltage	Pin 4	Pin 5	Pin 6	Pin 7	Pin 8
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

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Windows 95 Updates for AMD CPUs

If you are running Windows 95 on a computer with an AMD K6-2, K6-III, or K6-2+ 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

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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*.