Kingston Technology
TurboChip 200
MMX™ Enhanced
User's Guide

Model: TCMMX/200

Kingston Technology's

TurboChip® 200

200MHz MMX™ Enhanced Processor Upgrade For Pentium® Desktop Computers

User's Guide

Part No. 4460055-001.A01

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Introduction

Congratulations on the purchase of your Kingston *TurboChip 200 MMX*™ *Enhanced* 200MHz processor upgrade designed for Pentium® 75MHz or higher computers.   The TurboChip model TCMMX/200 incorporates the AMD-K6™ MMX™ enhanced processor to combine the power of Pentium® 200MHz processing with graphics-enhancing multimedia extensions to equip your system with the necessary tools for today's exciting media-intensive graphics, sound, and video software applications.

TurboChip 200 features 64KB of internal Level 1 cache, integrated cooling unit, and onboard voltage regulator to interface the processor with either a 2.9V or 3.3V system motherboard automatically. TurboChip 200 is a convenient, high-performance solution to increase your computer's CPU speed an estimated 250% over its current pentium processor providing a perfect fit for 16-bit or 32-bit operating systems such as Microsoft Windows® 95 and Windows NT.

TurboChip 200 is a chip-for-chip processor upgrade which installs directly into your existing Socket 5 or Socket 7 pentium processor socket.   Almost all pentium desktop computers use ZIF (zero-insertion-force) sockets with a swing lever to make removing the CPU chip quick and easy. There are no software drivers to install or hardware jumpers to set. The TurboChip package also includes an integrated heat sink and fan cooling unit to control the TurboChip's operating temperature for years of reliable service.
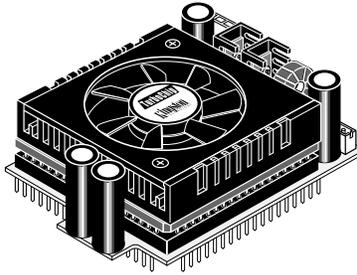
TurboChip® 200
200MHz MMX™ Enhanced Processor Upgrade

Special Features

Your Kingston TurboChip 200 includes these important features:

- Powerful AMD-K6™ MMX™ enhanced microprocessor running at 200MHz processing speed.
- 64KB Level One (L1) Cache:
  (32K dual-ported data cache and 32K write-back cache)
- Onboard voltage regulator to interface with either 2.9V or 3.3V system motherboard automatically.
- Supports multimedia extensions instructions
- "Plug and Play" installation. No software drivers to install.

Kingston features the Landmark System Speed Test® Version 2.10 for testing the performance of your new TurboChip upgrade. The Speed Test program is located on a 3.5" Utility Diskette included in your TurboChip package. Kingston suggests running the speed test before and after installation to compare the performance increase. Refer to Appendix A for instructions on running Landmark System Speed.

Package Contents

The TurboChip package should contain the following items:

- TurboChip processor upgrade with cooling fan
- Screwdriver (for removing heatsink retaining clip)
- Utility Diskette
- User's Guide

If any of the items are missing or damaged, please contact your Kingston dealer for a replacement. Remove the Processor Upgrade from its special anti-static foam pad only when you are at the point of installing it into your computer. Remember to ground yourself first to avoid static electricity discharge. Do this by applying both hands to a neutral metal surface like the rear of the computer or the power supply metal housing. Remove the protective foam pad from the TurboChip connector pins very carefully, and take care not to damage the pins when installing the upgrade. Retain all the protective packaging for future use.

Before You Begin

The TurboChip installation should take less than 15 minutes to complete. Before you begin, however, there is one very important point to be aware of. First, notice the location of Pin 1 on the TurboChip upgrade denoted by a white triangle on the bottom of the unit. This corner of the upgrade must match Pin 1 on the processor socket (See figures below). Your Pentium® computer should be using either a Socket 5 or Socket 7 type processor socket. Pin 1 orientation is standard for both socket types. Take a few moments to read the section below before beginning the installation process.

Pin 1 Orientation

The location of Pin 1 on the TurboChip must be oriented to match Pin 1 on the processor socket. The TurboChip upgrade is keyed to fit only one way into the CPU socket. If the pins are aligned, the upgrade should easily slide into the socket. Refer to the figures below for proper orientation:
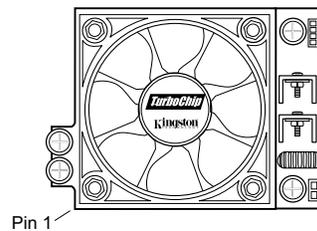
Figure 1: TurboChip Top View
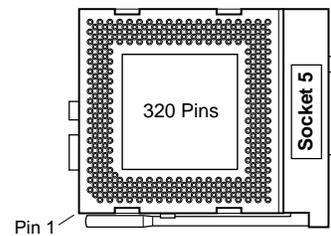
Figure 2: Empty Socket 5
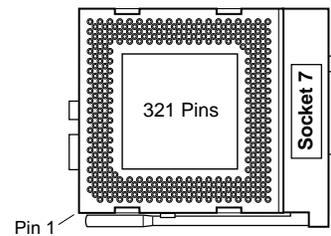
Figure 3: Empty Socket 7

Installing the TurboChip

The TurboChip 200 processor upgrade is designed to work in Pentium 75, 90, 100, 120, 133, 150, 166, and 200MHz computers. The installation procedure will differ slightly according to the location of your processor socket. Follow the steps below to install TurboChip into your computer.

Step 1. Opening the Computer

1.   Set the power switch on the system unit to OFF.

2.   Set all external power switches OFF (i.e. display, printer, etc.).

3.   Disconnect all power cords and cables from the rear of the computer.

4.   Remove the cover from your computer as described in your owner's manual. Make sure you have room to work. If necessary, place the computer on a desktop surface that is easily accessible with plenty of area to work.

Step 2. Locating the CPU

1.   Locate the Pentium CPU chip on your system board or CPU expansion card. The CPU chip will most likely have a large metal heatsink attached on top (See Figure 4 on the next page to view a standard heatsink). **Note:** some system manufacturers also include a cooling fan on top of the heatsink.

2.   Make sure the CPU chip is accessible. If the CPU socket is located under an expansion card, move any full-length adapter cards to other expansion slots. If no slots are available, place a half-length card in the slot nearest the CPU socket so that the CPU socket is unobstructed. If the CPU socket is located under the floppy drive (e.g., IBM ValuePoint™), loosen the retaining screws and remove the drive bay for easier installation.

Step 3. Removing the CPU Chip

1. **Remove the Heatsink Retaining Clip:** If your CPU has a heatsink similar to the illustration below, it is most likely secured with a retaining clip. Before removing the CPU chip from its socket, you must first unlatch the retaining clip by pressing down on the retaining clip **tab** (See Figure 4) then prying one side of the retaining clip **latch** using the screwdriver (provided). Try not to touch the motherboard or any other components near the socket. With the retaining clip completely removed from the heatsink, you are ready to remove the CPU chip.

   Note: The retaining clip is not needed for the TurboChip upgrade.

2. **Unlock the Socket:** Socket 7 and Socket 5 ZIF (zero insertion force) sockets use a side bar lever to lock and unlock the socket. Unlatch the side lever and lift upward to unlock the processor chip. Once the socket is in the unlocked position, remove the CPU by grasping the sides of the chip with your fingers.

   Note: you may use the TurboChip's protective foam packaging to store your original CPU chip.
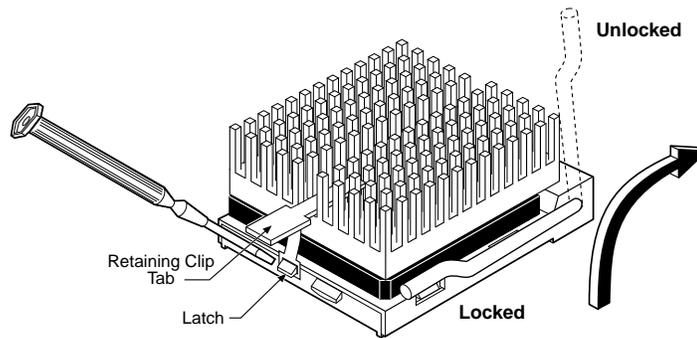
Figure 4: Removing the CPU Chip

Step 4. Orienting the TurboChip

When installing the TurboChip, the orientation of Pin 1 (See Figure 1 on page 3) must match Pin 1 on the processor socket (See Figures 2 and 3 on page 3). The orientation of the processor socket will vary depending on the make and model of your particular computer. Follow the steps below to determine the correct orientation of TurboChip in your computer.

1.   Look at the TurboChip carefully to verify which corner is Pin 1. Refer to Figure 1 on page 3 for help in locating Pin 1 on the TurboChip.

2.   With the TurboChip positioned so that the beveled corner on the upgrade matches the beveled corner on the processor socket, you are ready to insert TurboChip into the empty CPU socket.

Warning: The processor pins are keyed to fit into the socket one way only. If the processor upgrade is not installed correctly (Pin 1 to Pin 1), it may result in damage to the computer, the processor upgrade, or both. Please orient Pin 1 on the TurboChip upgrade to match Pin 1 on your CPU socket.   Refer to Figure 5 below.

Pin 1
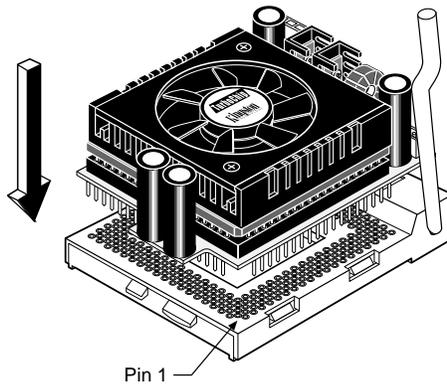
Figure 5: Orienting the TurboChip

Step 5. Inserting the TurboChip

To insert the processor upgrade correctly, you need to have the pins on the TurboChip adapter exactly lined up with the corresponding holes on the CPU socket.

1. While the socket is unlocked or in the open position, align the pins on the TurboChip into the holes on the ZIF socket. **Place the TurboChip into the socket without using any force.** Apply gentle pressure, only if needed, to make sure the processor is completely inserted, but be careful not to press down on the fan unit. Instead, grasp the sides of the unit for handling.

2. Lower the sidebar to close the socket back to a locked position. Refer to Figure 6 below.
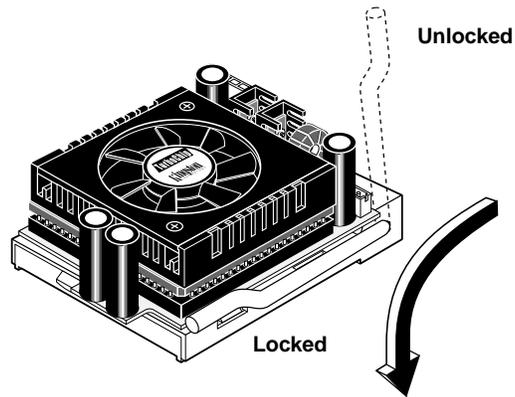
Figure 6: Securing the ZIF Socket

Step 6. Plugging in the Power Cable

The TurboChip uses a standard 4-Pin Molex connector which attaches to any available power connector coming from the computer's power supply. The power supply in your computer should have several power connectors available for adding hard drives, CD-ROMs, and other devices.

Note: The external power cable allows the TurboChip to support both Socket 5 and Socket 7 processor sockets.

Find any available power connector which is not currently in use and attach it to the 4-Pin male connector from the TurboChip (See Figure 7 below). If no power connectors are available, the TurboChip also has an in-line female connector which allows the upgrade to connect into an existing power line. Simply disconnect an existing power cable. Attach the male connector to the power source. Then reattach the other end of the cable to the in-line female connector on the TurboChip cable.
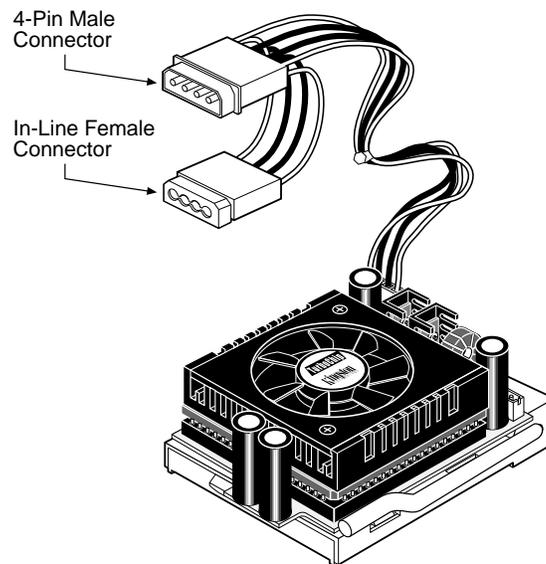
Figure 7: Attaching the Power Cable

Step 7. Completing the Installation

1. Replace any adapters removed earlier.

2. Depending on the clock speed of your original Pentium® processor, the external bus speed may be running at 50MHz, 60MHz, or 66MHz. If your computer has a hardware jumper on the system board to set the external bus speed, set it to **66MHz**. If your motherboard is not set to 66MHz, the TurboChip will not run at optimal performance. Refer to the table below:

External Bus Speed	Clock Multiplier	Processing Speed
50MHz	3x	150MHz
60MHz	3x	180MHz
66MHz	**3x**	**200MHz**

Table 8: Setting the external bus speed

Note: If your computer has a jumper setting for clock multiplier or voltage levels, the TurboChip upgrade will automatically set the clock multipler (1X, 1.5X, 2X, etc.) to **3X** and regulate the necessary voltage to your system (2.9V or 3.3V).

3. Replace the computer cover, and reconnect any cables that were removed.

4. Check that your computer starts correctly. It should begin a memory count and run its POST (Power-On-Self-Test). If it does not boot, turn to *"Appendix B Troubleshooting"* in the back of this manual for help.

Congratulations!   The installation is now complete. Because TurboChip requires no device drivers, there is no software installation to perform. If you experience any problems, refer to *"Appendix B Troubleshooting"*. If your problem is beyond the scope of this manual or you have questions regarding this product, call Kingston Technical Support at (714) 435-2639 or toll-free at (800) 435-0640 (U.S. and Canada only) to speak to a trained technician.

Appendices

Appendix A   Running the Landmark Speed Test

Included on the Kingston Utility diskette is the Landmark System Speed Test Version 2.10. To verify the clock speed and ensure proper operation of your new TurboChip, run SPEED210.EXE from a DOS prompt.

Note: Due to the multitasking nature of both Windows and OS/2, running Landmark Speed Test in these environments yields inconsistent results. In order to obtain accurate results, you must start SPEED210 directly from DOS. Do not open a DOS window from within OS/2 or Windows.

To run SPEED210.EXE from DOS, follow the steps below:

Step 1.   Insert the Kingston Utility diskette into Drive A.

Step 2.   At the DOS prompt, enter the following commands:

                         C> **A:** [Enter]

                         A> **SPEED210** [Enter]

                Speed Test can also be run with the following switches, as desired:

                         /b   bypass initial menu screen.

                         /nv   do not run video test.

                         /q   run in quiet mode (no sound). Note: Pressing [F10] while the test is running turns sound off.

                         /xx   perform test for *xx* seconds, then exit.

                To use one or more switches, type the following command in bold:

                         A> **SPEED210 /b /nv /q** [Enter]

Benchmark Test Results

Note: Test results will vary depending on your configuration, make, and model.

The following benchmark tests were performed on an IBM® PC 750-P100, Compaq® Prolinea™ 590, and Compaq® Deskpro™ 575, using Pentium 100MHz, 90MHz, and 75MHz, respectively. The results depend on the external bus speed of the systemboard which usually runs at either 50, 60, or 66MHz. Some systemboards use a hardware jumper to set the external bus speed. If your system has a jumper to set the bus speed, set it to **66MHz**.

The Benchmark Test Results below indicate the relative speed in Megahertz (MHz) of the processor as compared to an IBM® AT computer.

IBM® PC 750-P100	Original 100MHz	TurboChip 200MHz
Landmark Speed 2.10 MHz in relation to IBM AT	574 MHz	2042 MHz

Compaq® Prolinea 590	Original 90MHz	TurboChip 200MHz
Landmark Speed 2.10 MHz in relation to IBM AT	520 MHz	2159 MHz

Compaq® Deskpro 575	Original 75MHz	TurboChip 200MHz
Landmark Speed 2.10 MHz in relation to IBM AT	433 MHz	1542 MHz

Fig. A-1 Benchmark Test Results

Appendix B   Troubleshooting

This section describes problems you may encounter when installing the TurboChip processor upgrade. If you experience any problems, do the following:

1. Read this section carefully, and see if your problem is described. Try the suggested actions.

2. If necessary, call the place of purchase. However, before you call, write down the following information:

    *   Your computer make and model.

    *   The exact wording of any error messages associated with your problem.

    *   The contents of your CONFIG.SYS and AUTOEXEC.BAT files.

    *   The version numbers of your software applications and operating system.

Computer Does Not Start

If there is no display on the screen when you turn the power on:

1. Check the fan on the TurboChip unit. It should be spinning. Also check the 4-pin power cable which leads from the TurboChip unit. Verify the power cable is plugged into the system power supply. Ensure that all the external cables are correctly plugged in and power is ON. There should be a light on your system unit and on your monitor indicating that they have power.

2. Turn off your computer and disconnect the power cable. Remove the cover from the system unit and check the seating and orientation of the processor upgrade. The best method for checking the seating of the TurboChip is to remove the processor upgrade and carefully reinstall it. But first, verify that the sidebar lever is down in the locked position after reinserting the unit.

3.   Check that all other adapters are firmly seated in their sockets.
     Replace the cover and try the power again.

4.   If it still does not boot, remove the TurboChip from your computer
     and replace it with the original Pentium processor. Try the power
     again. If the computer now starts, the processor upgrade may be
     incompatible with your computer.   Contact Kingston Technical
     Support for help in diagnosing any problems.

Cannot Access Diskette or Hard Disk Drive

You may have dislodged the connection between the diskette or the hard disk
drive and its controller card when you installed the processor upgrade. Check
this connection now.

Older System BIOS

Some early model 75MHz and 90MHz Pentium systems do not support the
faster CPU technology. In some cases, the computers have older system BIOS
which must be upgraded to support the TurboChip 200 MMX^{TM} enhanced
processor. The older incompatible BIOS may cause the system to lockup or not
boot up at all. Below is a list of the major desktop BIOS manufacturers and
their version level which supports the AMD-K6 processor:

BIOS Manufacturer	Revision
AMI BIOS American Megatrends, Inc. (800) 828-9264	Version 3.31 or higher
Award BIOS Award Software International (415) 968-4433	Date 3/1/97 or later
Phoenix BIOS Phoenix Technologies, Ltd. (408) 654-9000	Version 4.0 or higher Date 4/7/97 or later

This problem can sometimes be resolved by upgrading the BIOS version of your computer, either with a software update or by replacing the chips. First check with your computer manufacturer or visit their website for a software utility to update your existing BIOS. If your system does not support flash ROM software updates, the next option is to replace the BIOS chips.

BIOS chipsets are relatively inexpensive and can be purchased at your local computer store, or contact **Unicore Software, Inc.** at 1-800-800-BIOS (2467) to order a BIOS upgrade. Unicore supports all the major brands of BIOS chipsets, including AMI, Award, Phoenix, MR BIOS, and others. Unicore Software, Inc. can be contacted at:

> **Unicore Software, Inc.**
> 1538 Turnpike Street
> North Andover, MA 01845
> (800) 800-BIOS
> (800) 800-2467
> (508) 686-6468
> (508) 683-1630 Fax

How to Reach Kingston

If you have any problems, questions, or comments associated with installing or using your TurboChip 200 processor upgrade, please call Kingston Technology Technical Support to speak to a technician. For the latest file updates and information, access the Kingston BBS or Kingston's Internet Web site using your modem. To receive immediate product information sent to you by fax, call Kingston's RAMfax™ service and use the voice menu system to make your selections. The RAMfax server will call back to your office fax machine and send you the requested information immediately from anywhere in the U.S. or Canada.

Technical Support:	6:00 am to 6:00 pm Pacific Time
	Monday through Friday
	(800) 435-0640 or (714) 435-2639
	(714) 424-3939 T/S fax
	(714) 437-3310 Network T/S fax
Kingston Europe:	8:00 to 17:00 GMT
	44 0 1932 738800
within the U.K.	01932 738 858 phone 44 1 932 738 880 fax
From Germany:	0130 115 639 phone 0130 860 599 fax
Austria:	0660 5569 phone 0660 7434 fax
Switzerland:	0800 557 748 phone 0800 552 182 fax
France:	0800 905 701 phone 0800 900 910 fax
Belgium:	0800 72763 phone 0800 72763
BBS:	Kingston's Bulletin Board Service
	(714) 435-2636, up to 28.8Kbps, 8-N-1
Internet:	Visit Kingston's Web site at
	http://www.kingston.com
	For Product Information:
	sales@kingston.com
	For Technical Support:
	tech_support@kingston.com
RAMfax:	Automatic Faxback System (U.S. and Canada)
	(800) 435-0056 or (714) 435-2677

Appendix C   Product Warranties and Notices

Limited Warranty

KINGSTON TECHNOLOGY COMPANY ("Kingston") warrants that this product is free from defects in material and workmanship. Subject to the conditions and limitations set forth below, Kingston will, at its option, either repair or replace any part of this product which proves defective by reason of improper workmanship or materials. Repair parts or replacement products will be provided by Kingston on an exchange basis, and will be either new or refurbished to be functionally equivalent to new.

This warranty does not cover any damage to this product which results from accident, abuse, misuse, natural or personal disaster, or any unauthorized disassembly, repair or modification.

Duration of Warranty

*Lifetime Warranty***:** The following Kingston products are covered by this warranty for life: solid state memory (e.g., memory modules and boards), networking adapters and hubs without cooling fans (excluding power supply), solid state PC Card (PCMCIA) adapters, and microprocessor upgrade products.

*Seven-Year Warranty***:** The following Kingston products are covered by this warranty for a period of seven years from the date of original retail purchase: storage enclosures, including power supply units, cables, terminators, and accessories.

Five-Year Warranty: The following Kingston products are covered by this warranty for a period of five years from the date of original retail purchase: power supply for hubs without cooling fans; and all other Kingston products (other than those products covered by a three-year, two-year, or one-year warranty, as provided below).

Three-Year Warranty: The following Kingston products are covered by this warranty for a period of three years from the date of original retail purchase: networking hubs with cooling fans.

Two-Year Warranty: The following Kingston products are covered by this warranty for a period of two years from the date of original retail purchase: Solid State Floppy Disk Cards (SSFDC), and Winchester hard disk drives in a 2.5 inch, 3.5 inch or 5.25 inch form factor.

*One-Year Warranty***:** The following Kingston products are covered by this warranty for a period of one year from the date of original retail purchase: Winchester hard disk drives in a 1.8 inch form factor, optical storage products, and magnetic tape storage products.

Warranty Claim Requirements

To obtain warranty service, return the defective product, freight prepaid and insured, to your local authorized Kingston dealer or distributor, or to the Kingston factory service center located at 17600 Newhope Street, Fountain Valley, California 92708, U.S.A. You must include the product serial number (if applicable) and a detailed description of the problem you are experiencing. You must also include proof of the date of original retail purchase as evidence that the product is within the applicable warranty period. If you return the product directly to the Kingston factory, you must first obtain a Return Material Authorization ("RMA") number by calling Kingston Customer Service at (714) 438-1810, and include the RMA number prominently displayed on the outside of your package. Products must be properly packaged to prevent damage in transit.

Free Technical Support

Kingston provides free technical support. If you experience any difficulty during the installation or subsequent use of a Kingston product, please contact Kingston's Technical Support department prior to servicing your system.

Kingston Technical Support can be reached in the U.S. at (714) 435-2639 or toll-free at (800) 435-0640 (U.S. and Canada only). Kingston European Technical Support can be reached from within the U.K. at 01932 738858. Kingston provides other service numbers when calling from Germany 0130 115 639 or fax 0130 860 599, from Austria 0660 5569 or fax 06 607 434, from Switzerland 0800 557 748 or fax 0800 552 182, from France 0800 905 701 or fax 0800 900 910, or from Belgium 0800 72763.

This warranty covers only repair or replacement of defective Kingston products, as provided above. Kingston is not liable for, and does not cover under warranty, any costs associated with servicing and/or the installation of Kingston products.

Disclaimers

The foregoing is the complete warranty for Kingston products and supersedes all other warranties and representations, whether oral or written. Except as expressly set forth above, no other warranties are made with respect to Kingston products and Kingston expressly disclaims all warranties not stated herein, including, to the extent permitted by applicable law, any implied warranty of merchantability or fitness for a particular purpose. In no event will Kingston be liable to the purchaser, or to any user of the Kingston product, for any damages, expenses, lost revenues, lost savings, lost profits, or any other incidental or consequential damages arising from the purchase, use or inability to use the Kingston product, even if Kingston has been advised of the possibility of such damages.

Rev. 10/97

Revision History

Revision Level	Comments
A00	General Release. New Warranty 10/97.
A01	TurboChip now registered trademark. Proofreading changes from Tech Support.