

**Kingston Technology
Memory Expansion
Boards
for IBM PS2 Model 70 and
80 Computers**

Model: KTM-MC64/X

Kingston Technology's

Memory Expansion Boards

**For IBM PS/2 Model
70 and 80 Computers**

Installation Guide

Part No. 4401193-001.A00

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General Description

Congratulations on the purchase of your Kingston Memory expansion board designed specifically for use in IBM PS/2 Model 70 and 80 series computers. There are two memory expansion boards available (KTM-MC64/4 and KTM-MC64/8); each is expandable to 64MB and each has four 72-pin memory expansion sockets. Kingston's KTM-MC64/4 memory expansion board includes one 4MB upgrade module. The KTM-MC64/8 includes one 8MB module.

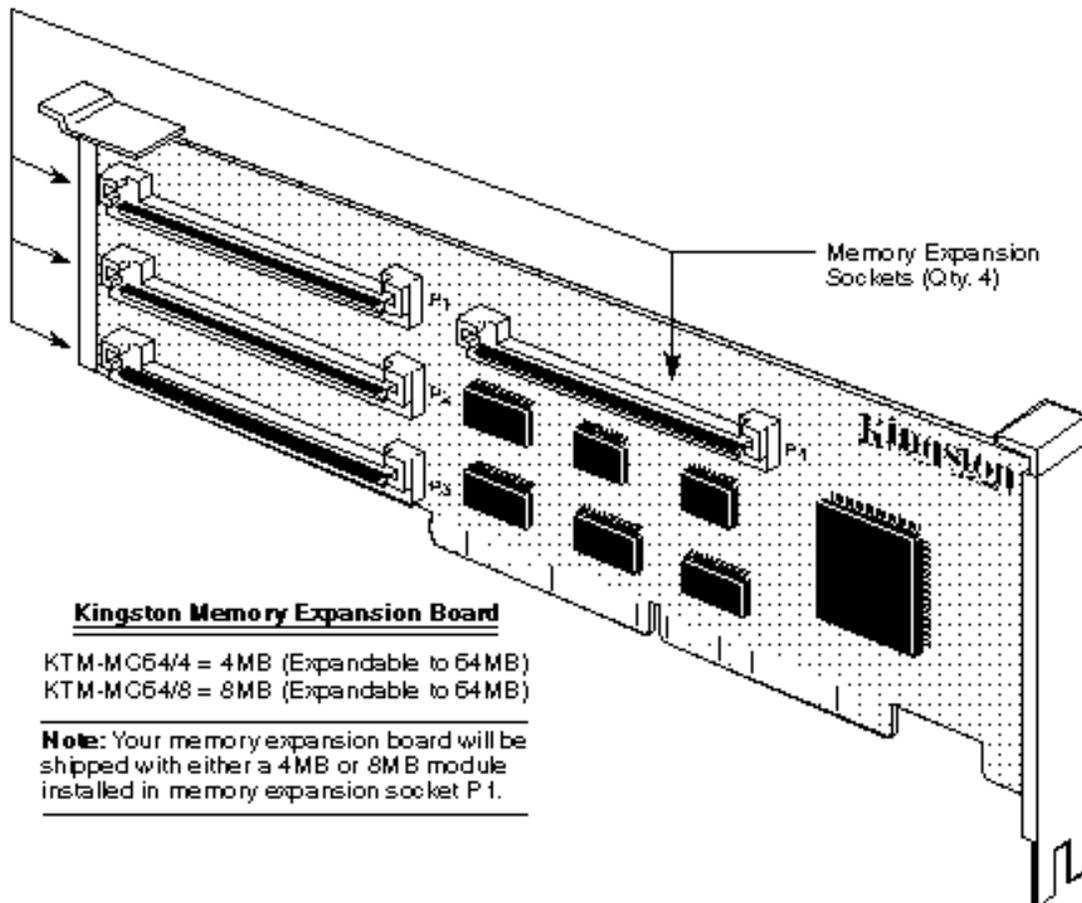


Figure 1—Kingston Memory Expansion Board

Model 70 IBM PS/2 computer's have either two or four memory expansion sockets located on the main system board, allowing for a maximum memory capacity of either 6MB or 8MB. Model 80 IBM PS/2 computers have two memory expansion sockets located on the main system board with a maximum memory capacity that ranges from 2 to 8MB. With the addition of a Kingston memory expansion board, your IBM PS/2 Model 70 or 80 computer can be upgraded to a maximum of 64MB.

Note: While it may be physically possible to install more than 64MB of memory, your computer will not recognize memory beyond 64MB.

Package Contents

Your Kingston memory expansion board product kit should contain the following items:

- KTM-MC64/4 (4MB) or KTM-MC64/8 (8MB) Memory Expansion Board
- Kingston Option Diskette
- Installation Manual

If any of the items are missing or damaged, please contact your Kingston dealer for a replacement.

Memory Requirements

As mentioned above, your IBM PS/2 computer will have from two to four memory expansion sockets located on the main system board. In order to install your new Kingston memory expansion board, at least one of the sockets on the main system board must contain a memory module. For example, the IBM PS/2 Model 70 A81 computer has four memory expansion sockets located on the main system board. This computer is shipped by IBM with a 2MB memory module installed in one of the four expansion sockets; the other three sockets are empty. To install the Kingston memory expansion board in this configuration, the 2MB memory module must remain in place on the system board; it doesn't matter whether or not the other three sockets contain memory modules.

Creating a Configuration Diskette

Note: In order to perform this installation, you must have a copy of the IBM Reference Diskette. If you do not have a copy of the IBM Reference Diskette, you can obtain one from IBM or if you have a modem, you can download a copy from IBM's BBS.

Before you can install your new Kingston memory expansion board into your computer, you must first create a configuration diskette. The configuration diskette will include all the files from the IBM Reference Diskette plus the required drivers from the Kingston Option Diskette. To create this diskette, use the following procedure:

1. Insert a backup copy of your IBM Reference Diskette into drive a:. Make sure the IBM Reference Diskette is not write protected.
2. Power up your computer. When the IBM logo appears, press **F6**, which will display the main menu.
3. From the main menu, select *Copy an Option Diskette*.
4. You will be prompted to remove your IBM Reference Diskette and instructed to insert the Kingston Option Diskette.
5. Once you insert the Kingston Option Diskette, the drivers necessary to support your new Kingston memory expansion board will be copied into memory. Once this process is complete, you will be instructed to remove the Kingston Option Diskette.
6. Next, the program will prompt you to reinsert your IBM Reference Diskette. At this point, the Kingston memory expansion board drivers will be copied from memory to the IBM Reference Diskette.
7. Once the process is complete, you can turn off your computer.

Hardware Installation

The next two sections will guide you through the hardware portion of this installation. The first section describes how memory modules are plugged into the memory expansion sockets located on your new Kingston memory expansion board. The second section explains how to install the memory expansion board into your computer.

Note: If you're not adding any additional memory modules to your Kingston memory expansion board, you can jump forward to the section that describes how to install the memory expansion board into your computer.

Installing Memory Modules



Note: With the AC power cord unplugged and the computer's cover removed, the components inside your computer are vulnerable to damage caused by static discharge. Prior to handling any computer hardware, make sure your work area is properly protected against static discharge. There are a number of commercially available static protection devices, designed specifically to help protect your equipment from harmful static discharge.

The following memory modules are supported for use in the KTM-MC64/4 or KTM-MC64/8 memory expansion board:

Memory Module Part Number	Memory Module Capacity
KTM2000/M70	2MB
KTM4000/M70	4MB
KTM0129	8MB
KTM4X36L-80	16MB

You can install memory modules in any or all of the four expansion sockets. There is no installation order or sequence. Memory modules can be installed in any socket and in any order. You can also mix or match module capacities in any of the sockets.

Install your memory module or modules as shown in the illustration below. Note how the memory module is keyed to the memory expansion socket; this insures the module can only be installed one way. The procedure for installing a memory module is as follows:

1. Gently insert the module into the socket at slight angle as shown.
2. If you're having problems getting the memory module inserted into the socket—stop and examine both the module and the expansion socket. Make sure the keyed module is properly aligned with the keyed expansion socket.
3. Once the module is fully inserted into the socket, rotate the module back until the clips at each end of the expansion socket click into place.
4. Install any additional memory modules if applicable.
5. After all the modules have been installed, examine each module and make sure they are properly seated into their expansion sockets and locked into position.

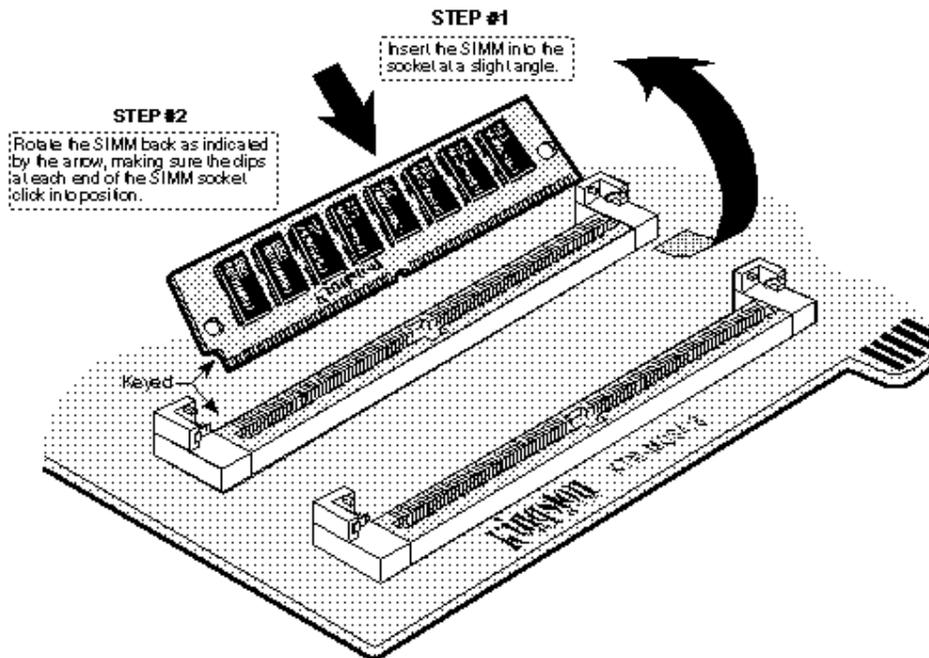


Figure 2—Installing Memory Modules

Installing the Memory Expansion Board

Before installing your Kingston memory expansion board, make sure you observe the anti-static precautions outlined earlier in this document. The instructions below will guide you through the memory expansion board installation process:

1. Place your computer's power switch in the *off* position and unplug the AC power cord.
2. To locate the computer's expansion card slots, refer to your *IBM PS/2 User's Guide*.
3. The memory expansion board must be installed into a 32-bit expansion slot located on your computer's main system board. 32-bit expansion slots are longer than the other expansion slots. Because the memory expansion board is keyed to fit only into a 32-bit slot, it is not possible to accidentally install the board into the wrong type of expansion slot. IBM PS/2 Model 70 computers have two 32-bit expansion slots; Model 80 computers have three 32-bit expansion slots.
4. Carefully align the memory expansion board with your computer's 32-bit expansion slot. Once the board and expansion slot are properly aligned, firmly press the memory expansion board down into the expansion slot. Make sure the board is completely seated into the expansion slot.
5. Once the memory expansion board is installed, replace the computer's top cover and reconnect any external cables disconnected during the installation process.
6. Proceed to the next section, "Configuring the System," which describes how to make your computer recognize the newly installed memory.

Configuring the System

In order to access your newly installed memory, you must follow the procedure outlined in the section “Configuring Extended Memory.” Once this procedure is complete, your computer will recognize the new memory. If you use an application program that requires expanded memory, you will want to **also** complete the instructions outlined in the section “Configuring Expanded Memory.” However, not all computers have application programs that require expanded memory. If you are not familiar with the terms *extended* and *expanded* memory, refer to Appendix A, “Your Computer’s Memory,” for more information.

Configuring Extended Memory

Use the following procedure to configure the newly installed memory as extended memory:

1. Insert the configuration diskette you created earlier into drive a:.
2. Turn on your computer. As the computer boots, the size of the base memory will be displayed, followed by the number 165. The number 165 indicates a new device has been detected on the computer. The IBM logo will appear after 5 or 10 seconds.
3. Press **Enter** to generate the next screen display.
4. At the prompt “Automatically configure system memory? (Y/N),” press the **Y** key.
5. After the automatic configuration is complete, remove the configuration diskette from your diskette drive and press **Enter** to reboot your computer. As the computer boots, the total amount of installed memory will be displayed.
6. If you use an application program that requires expanded memory, follow the instructions in the section “Configuring Expanded Memory.” If you do require expanded memory, your installation is now complete.

Configuring Expanded Memory

In order to use the expanded memory feature, you must first install the expanded memory device driver, KEMM.SYS. The following instructions describe how to transfer this driver from the Kingston Option diskette to your hard drive, as well as how to configure the driver.

1. Insert the Kingston Option Diskette into drive a:.
2. At the DOS prompt type:

```
CD\ Enter
```

3. Next, create a directory on your hard disk drive where the KEMM.SYS driver will reside, type:

```
MD KTCEMS Enter
```

4. To transfer the driver from the Kingston Option Diskette to your hard drive, type:

```
COPY A:\KTCEMS\KEMM.SYS C:\KTCEMS\KEMM.SYS Enter
```

5. You need to use a text editor to add the KEMM.SYS command line to your CONFIG.SYS file. Add the following command line to your CONFIG.SYS file:

```
DEVICE=C:\KTCEMS\KEMM.SYS
```

Note: When the KEMM.SYS command line is entered exactly as shown above, the system will search for an available page frame segment address and use **all** available extended memory.

6. You can also add parameters to your KEMM.SYS command line to cover special circumstances. The format for the extra parameters are as follows:

```
DEVICE=C:\KTCEMS\KEMM.SYS FRAME=XXXX BASE=YYYYY  
HANDLES=ZZZ
```

Where **XXXX** is:

the parameter that tells KEMM.SYS to look for a valid page frame. The page frame is the first address of the EMS mapping window. For example:

```
FRAME=C000
```

Where **YYYYY** is:

the parameter that tells KEMM.SYS what part of extended memory will be allocated for expanded memory. The following formula is used to determine the base expanded memory parameter:

$$\text{YYYYY} = \text{Total Memory (KB)} + 384 - \text{Amount of Expanded Memory Required}$$

For example, if your computer has 8MB (8,192KB) of memory, 640KB is the base memory and 7,552KB are used as extended memory. If you wanted to allocate 2MB (2048KB) of expanded memory, you would perform the following calculation:

$$\text{YYYYY} = 8192 + 384 - 2048 = 6428$$

In this case, the base parameter would be:

$$\text{BASE} = 6428$$

Where **ZZZ** is:

the parameter that specifies the number of handles and names available. Handles are values the memory manager assigns to identify a block of memory requested by an application program. Each application that uses expanded memory requires at least one handle. Some programs require more than one handle and these programs will prompt you if they run out of handles. The acceptable handle parameter range is from 16 to 255. Note that each handle/name defined consumes expanded memory, making less expanded memory available for your application program. Because of this, you should only define enough handle/name parameters to support your application. In most cases, the default value of 32 should be adequate for most applications. If you require more than 32 handles, you can specify a greater number of handles. For example:

$$\text{HANDLES} = 64$$

7. Once you are satisfied with the format of your KEMM.SYS command line, save and exit your CONFIG.SYS file.
8. For the changes you made in your CONFIG.SYS file to take effect, you need to reboot your computer. You can do this by either turning off your computer and then turning it back on again; or you can soft boot the computer using the standard **Ctrl + Alt + Del** key sequence.

9. As the computer boots, the following messages will appear:

```
KEMM: 80386 Expanded Memory Manager, V 4.0  
Copyright 1990, Kingston Technology Corp.  
Page Frame Address at Segment C000H  
Total EMS Memory is 9472Kbyte (592 pages)  
KEMM: EMS driver is successfully loaded!
```

Appendices

Appendix A—Your Computer's Memory

The total amount of memory your computer contains is divided into categories—i.e., Base, Reserved, Extended, and Expanded. The information that follows is a brief explanation of each of these memory categories.

Base Memory

Base memory is the memory in the range from 0 to 640KB (00000h - 9FFFFh). This area of memory is used for executable DOS programs and data.

Reserved Memory

Reserved memory is the memory in the range from 640KB to 1024KB (A0000H - FFFFFH). This area of memory can not be addressed by the user. Only the computer can access this area of memory, which it uses for loading device drivers and other software necessary for the computer to function. This area of memory is also used as the I/O port address area for expanded memory called page frame.

Extended Memory

Extended memory is the memory in the range from 1MB to 16MB (100000H - FFFFFFFH). This area of memory can be accessed by user applications to store data and programs. DOS does not recognize this address space, but a number of programs are designed to make use of this area—e.g., the VDISK.SYS RAM disk utility and the OS/2 Disk Operating System.

Expanded Memory

In a joint effort, Intel, Lotus, and Microsoft developed a specification that would allow certain executable programs to overcome the DOS imposed 0 to 640KB limit. By using expanded memory configurations, it is possible to have program data as large as 8MB using EMS Ver. 3.2, or as large as 32MB using EMS Ver. 4.0.

At the time your computer was created, the concept of expanded memory did not exist. Therefore, the DOS operating system does not recognize expanded memory. To overcome this problem, you need a special device driver that is enabled each time you boot your computer. Most programs do not require the use of expanded memory. Programs that do require expanded memory will prompt you when they are launched if expanded memory is not available.

A special device driver (KEMM.SYS) that supports expanded memory on your Kingston memory expansion board is included on the Kingston Option Diskette. This device driver is located in a subdirectory called \KTCEMS.

Regardless of how much extended memory your computer has, only a maximum 15MB can be allocated as expanded memory. In fact, to preserve your extended memory, you should only allocate the amount of expanded memory necessary to support your particular application.

Appendix B—Product Warranties and Notices

Limited Warranty

KINGSTON TECHNOLOGY CORPORATION ("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 furnished by Kingston on an exchange basis, and will be either new or refurbished to be functionally equivalent to new.

This warranty applies only to the original end user purchaser, and 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., Single Inline Memory Modules, or "SIMMs"), network interface cards and adapters, solid state PCMCIA interface adapters, and x86-based microprocessor upgrade products.

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: storage enclosures, power supply units and subassemblies, Winchester hard disk drives with a capacity of one gigabyte or more, and all other Kingston products (other than those products covered by a two-year or one-year warranty, as provided below).

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: Winchester hard disk drives in a 2.5 inch, 3.5 inch or 5.25 inch form factor and with a capacity of less than one gigabyte.

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. For products covered by the five-year, two-year or one-year warranty, 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 at (714) 435-2639 prior to servicing your system. 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 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.

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