

**Installation  
Guide**

KTC-1000s and KTC-4000s Series

**Expansion Memory Boards  
and Associated Add-on  
Memory Modules for the  
COMPAQ DeskPro 386s**

**Kingston**  
TECHNOLOGY CORPORATION

KTC-1000s and KTC-4000s

**Expansion Memory Boards  
and Associated Add-on Memory Modules for the  
COMPAQ DESKPRO 386s**

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Fountain Valley, CA 92708

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KTC-1000s and KTC-4000s

# Expansion Memory Boards and Associated Add-on Memory Modules for the COMPAQ DESKPRO 386s

## 1. General Description

The COMPAQ Deskpro 386s Personal Computer has a standard 1-megabyte (1MB) enhanced-page memory. Using COMPAQ's high-speed option, the memory in the system may be increased up to 13MB by installing an expansion memory board with add-on memory modules in one 32-bit expansion slot.

The KTC-1000s and KTC-4000s expansion memory boards, manufactured by Kingston Technology Corporation, are available in 1-megabyte (1MB) or 4-megabytes (4MB) versions. These boards are completely compatible with COMPAQ's 32-bit expansion memory bus, which takes advantage of the 32-bit cache memory architecture of the 16-MHz 80886SX CPU. The KTC-1000s or KTC-4000s boards plug directly onto COMPAQ's memory expansion slots.

The KTC add-on 1MB and 4MB memory modules plug onto the boards for further memory expansion.

### 1.1 Memory Expansion and Add-on Kits

The KTC memory boards are available in expansion boards and add-on modules. Memory can be expanded to 13MBs with the following 32-bit memory expansion and add-on kits:

<b>KTC-1000s</b>	1MB Expansion Memory Board — 256K x 4 RAM
<b>KTC-4000s</b>	4MB Expansion Memory Board — 1MB x 1 RAM
<b>KTC-1100</b>	1MB Add-on Memory Module — 256K x 4 RAM
<b>KTC 4200</b>	4MB Add-on Memory Module — 1MB x 1 RAM

## 1.2 Major Components on the Memory Boards & Modules

Figure 1 shows the major components of the KTC-1000s and KTC-4000s expansion memory boards. Figure 2 and Figure 3 show the major components on the 4MB KTC-4200 and KTC-1100 add-on memory

module, respectively. The 1MB and 4MB versions have the same component configurations.

These components are described in detail on the following page.

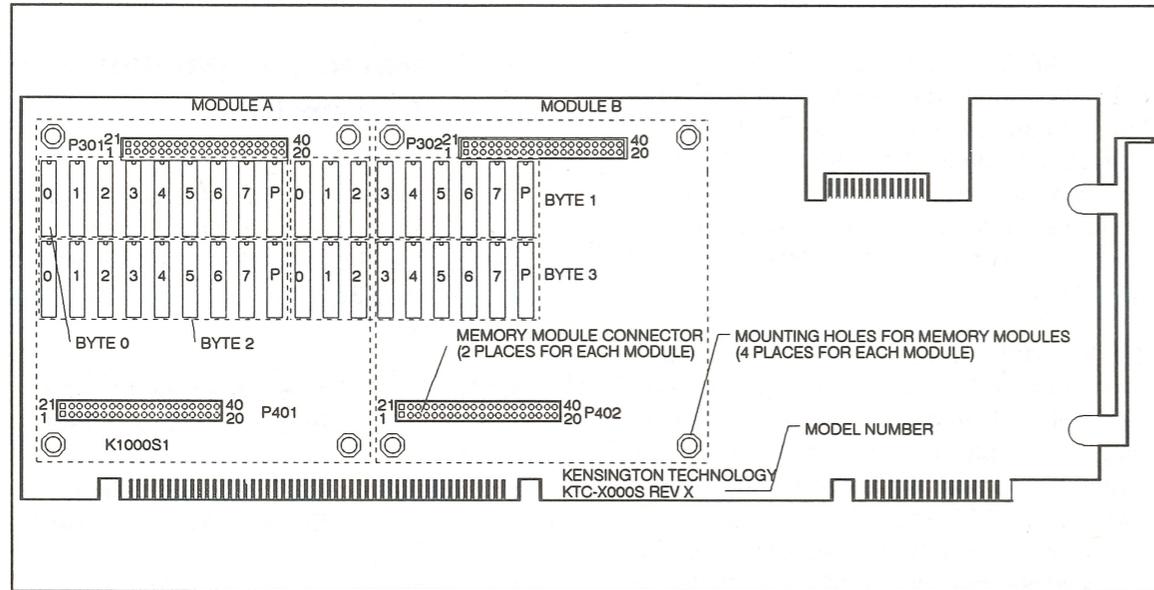


Figure 1: Components on the KTC-1000s and KTC-4000s Expansion Memory Boards

## Memory Expansion Boards

There are four banks of memory (Bytes 0 through Bytes 3). The chips are standard 100 nanosecond (ns) Dynamic RAM (DRAM) devices, which are soldered in place. The 1MB version of the KTC board uses 256K x 4 RAM chips, and the 4MB version uses 1MB x 1 RAM chips. Each bank contains eight bits of memory and a parity bit (P).

## Add-on Memory Modules

The memory modules have the same memory arrangement as the memory boards. These modules mount onto the memory boards to provide additional add-on memory. The memory modules contain standoffs that insulate it from the memory board.

## Memory Board Interface (P301-401 and P302-402)

These are the connectors that interface the memory modules to the memory board. The associated connectors on the memory modules are labeled J3 and J4.

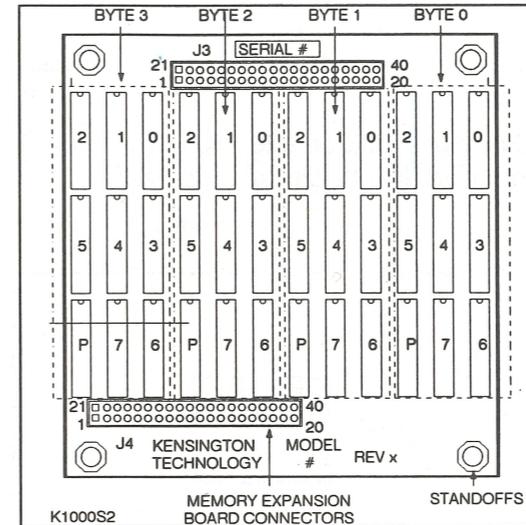


Figure 2: Components on the 4MB KTC-4200 Add-on Module

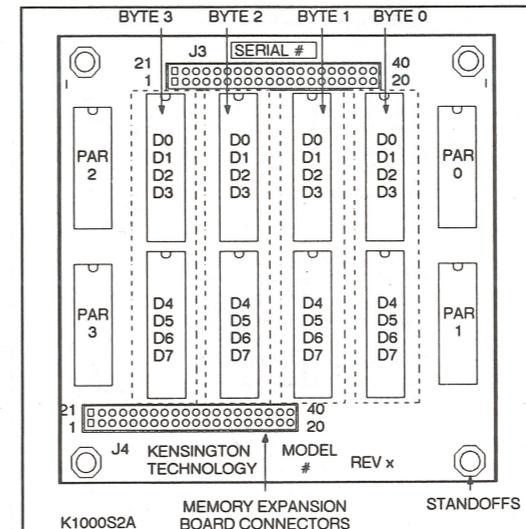


Figure 3: Components on the 1MB KTC-1100 Add-on Module

## 2. Installation

This chapter explains how to install your KTC memory boards and add-on memory modules. Pay special attention to the charts that define memory configurations before you begin installation.

### 2.1 Precautions

The memory boards are packaged in special anti-static "bubble" envelopes that protect them from shock and static electricity that could cause damage to the memory chips. Handle the expansion memory board and modules carefully and keep them in the protective envelope until you are ready to install them.

**Note**

Read the entire installation section before you remove the expansion memory board or modules from their protective envelopes.

### 2.2 Planning Memory Arrangements

Planning a memory system for Compaq's Deskpro 386s is designed around the system's standard 1MB memory. You can

add either a 1MB or 4MB memory expansion board in a 32-bit expansion slot.

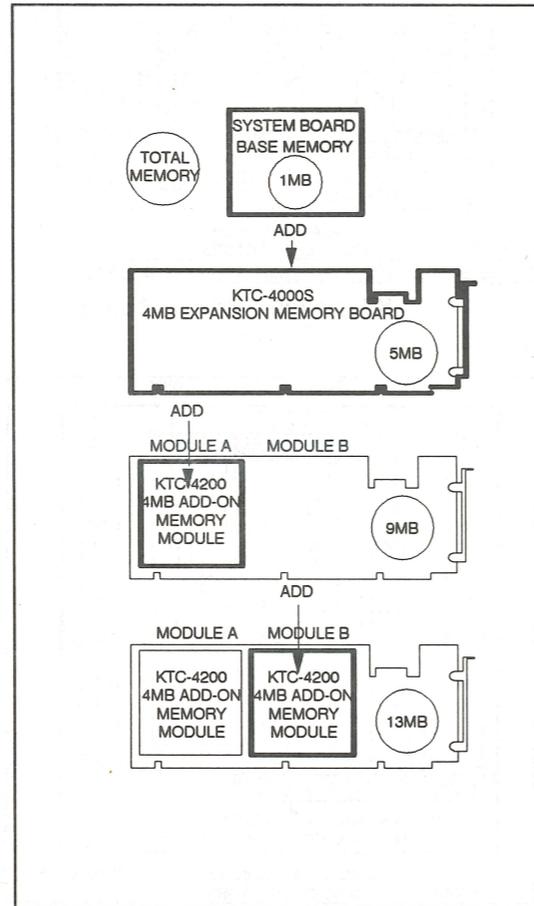


Figure 4: Planning a 4MB Expansion Memory Board

You can further increase memory capacity by installing one or two 1MB and/or 4MB memory modules onto the memory expansion board. When mixing 1MB and 4MB add-on modules, the 4MB module must be installed in location B. (This is shown in the last configuration in Figure 5.)

The possible configurations for each type of base memory are shown in Figures 4 and 5.

Installation procedure are the same for both the 1MB and 4MB expansion boards and add-on memory modules.

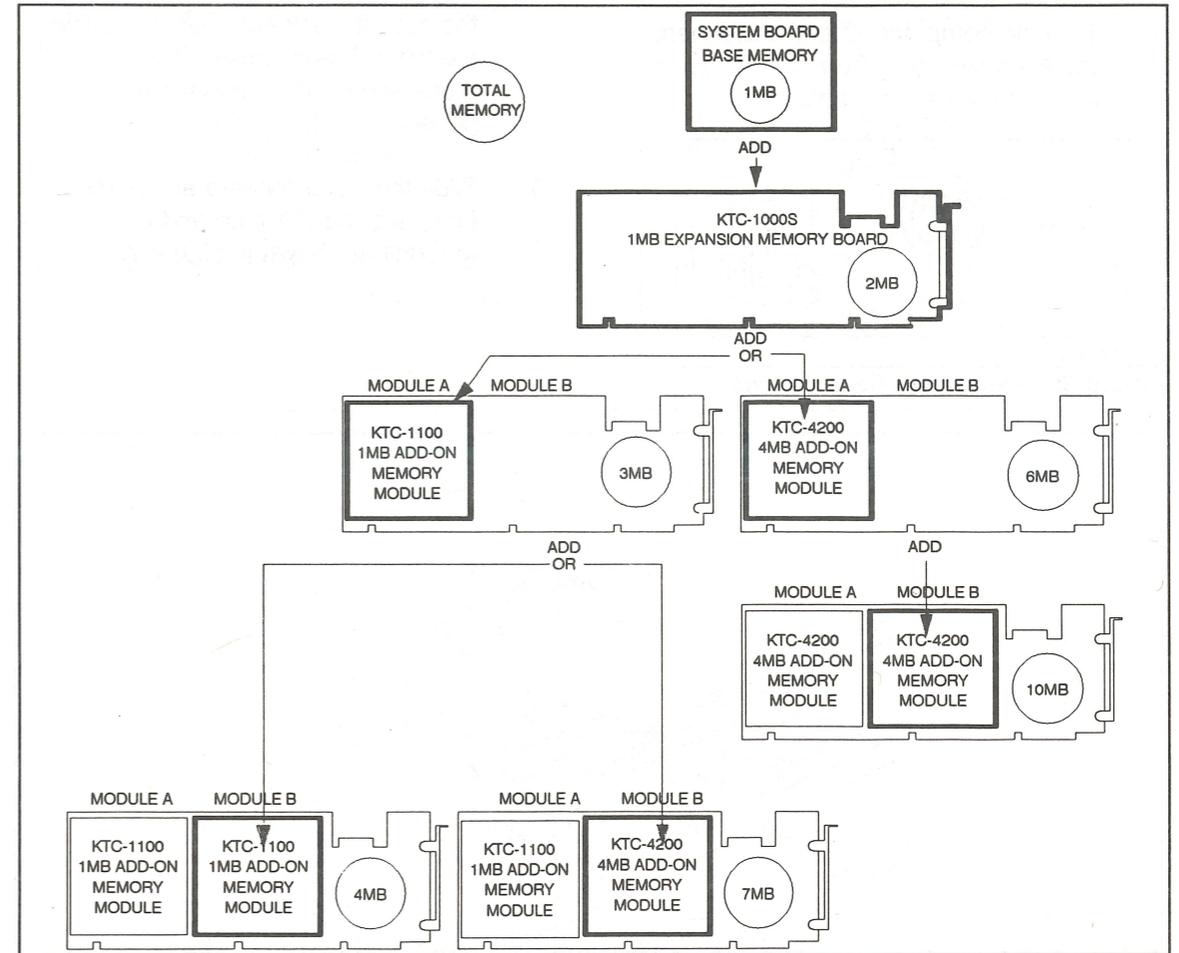


Figure 5: Planning a 1MB Expansion Memory Board

## 2.3 Opening the Computer to Install Memory

Use the following procedure to open the computer so you can install additional memory.

1. Turn the computer off and disconnect the AC power cord from the AC outlet and from the system unit.

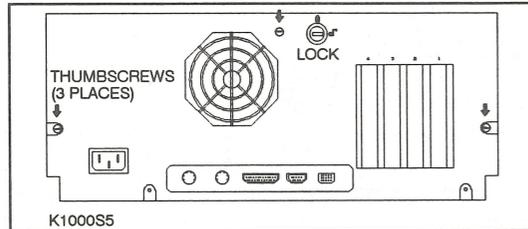


Figure 6: Removing Rear Screws

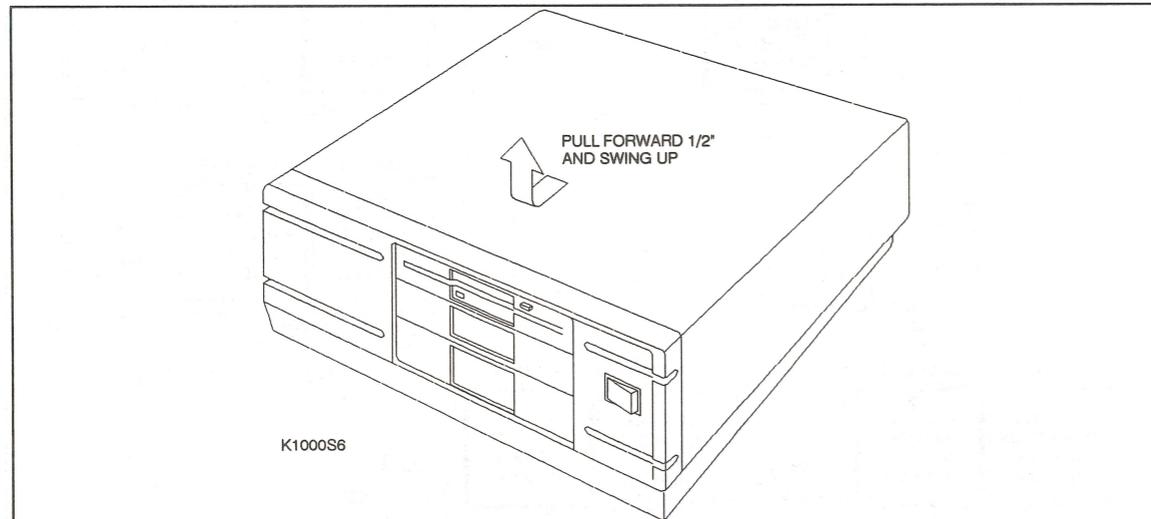


Figure 7: Removing the Computer Cover

2. Turn AC power off and disconnect any peripheral equipment such as printers, monitors, and modems.
3. Disconnect the keyboard cable at the rear of the system unit (Figure 6).
4. Release the cover by first unlocking the security lock and then loosening the three thumbscrews. (The thumbscrews remain in the rear panel.)
5. Slide the cover forward about 1/2 an inch, and then lift it up and off the system unit as shown in Figure 7.

## 2.4 Installing Additional Memory to a 1MB System

The procedure for installing 1MB or 4MB expansion boards is the same. The 1MB and 4MB add-on memory module installation is also the same.

### 2.4.1 Removing a Memory Expansion Board

You need to remove an existing memory expansion board to install memory modules, or to replace the 1MB memory expansion board with a 4MB board. Use the following

procedure to remove an expansion memory board.

1. Remove the retaining screws that holds the 1MB expansion board in the 32-bit expansion slot (Figure 8).
2. Lift the memory expansion board from the expansion slot.

#### Caution

Do not expose memory boards or modules to static electricity. Touch a grounded metal object to discharge yourself of static electricity before handling the memory.

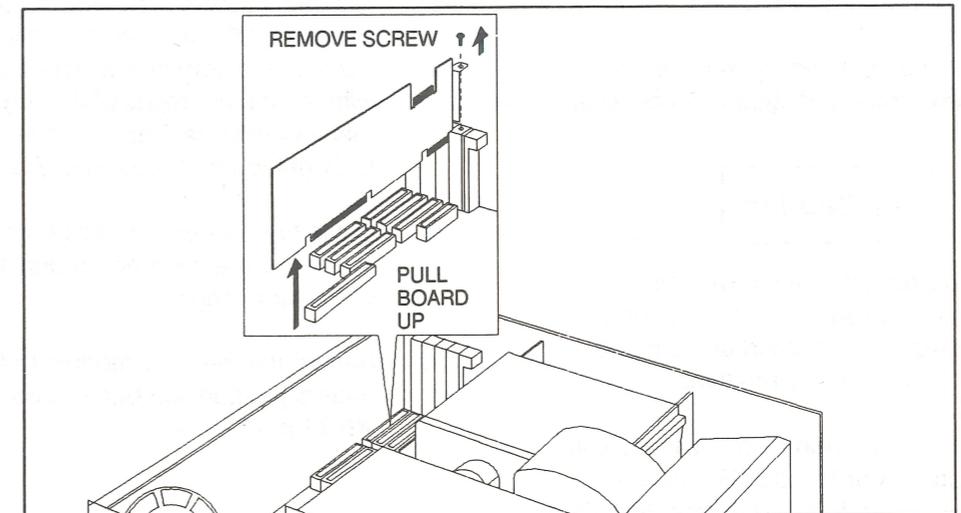


Figure 8: Removing an Expansion Memory Board

## 2.4.2 Installing Memory Modules

You can install add-on memory modules either to an existing memory expansion board or to a newly purchased KTC memory expansion board. Installation procedures for installing memory modules on either board is the same.

Use the following procedure to install add-on memory modules onto the memory expansion board.

1. If a memory expansion board already is installed in the system, remove it according to the previous section. If you are going to install a new KTC memory expansion board, carefully remove it from its packing.
2. Remove the memory modules and screws from their shipping container.

### Caution

Do not expose the memory modules to static electricity. Also, be careful not to bend any pins on the memory modules.

3. Place the add-on memory module in location A or location B. Figure 6 shows Module A installation. Installation in other location B is the same. Use the following guidelines to select

either location A or location B.

- If a single memory module is installed, it must be placed in location A (nearer the front of the computer).
  - When mixing 1MB and 4MB memory modules, the 4MB module must be placed in location B and the 1MB module in location A.
4. The threaded standoffs on the modules should line up with the mounting holes on the memory expansion board.
  5. Notice that there are two sets of connectors (P30x and P40x) on the expansion memory board. These mate with J3 and J4, respectively, on the memory module. These features are highlighted for Module A in Figure 9.
  6. Press the memory module onto the memory expansion board until the connectors engage.
  7. Secure the memory module to the memory expansion board using the #6-32 x 3/8" screws.

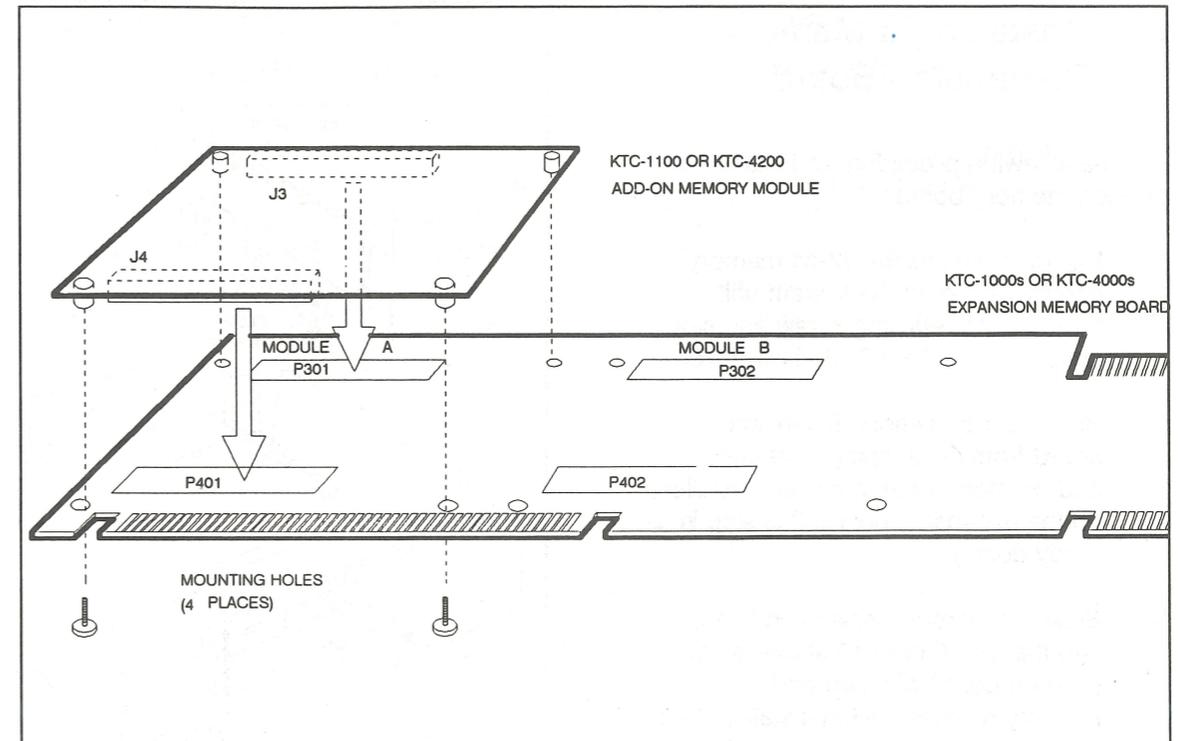
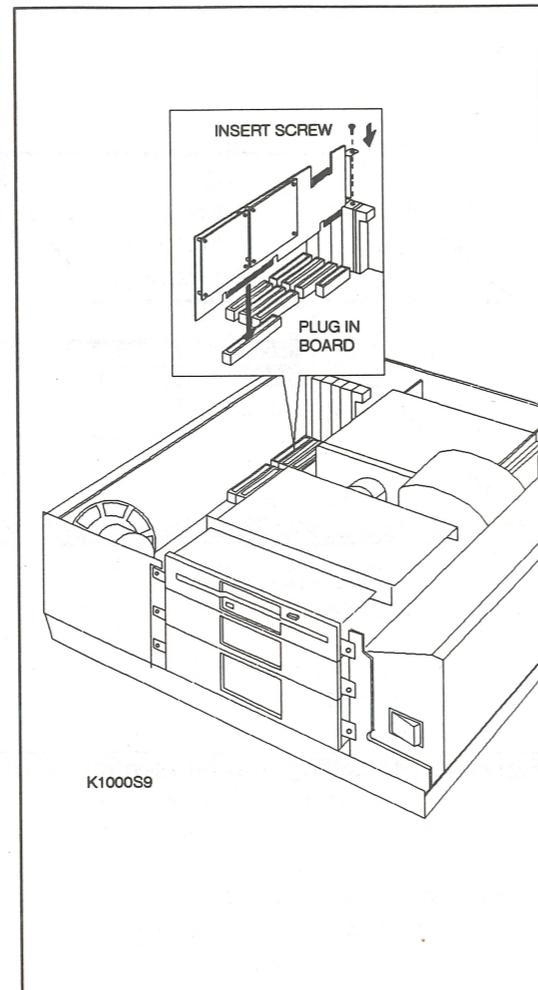


Figure 9: Installing Add-on Memory Modules onto a Memory Expansion Board

## 2.5 Installing a Memory Expansion Board

Use the following procedure to install a expansion memory board.

1. Figure 10 shows the 32-bit memory expansion slot in the system unit. Remove the retaining screw and slot cover using a Torx T-15 screwdriver.
2. Remove the memory expansion board from its shipping container. (If add-on memory modules are installed on the expansion board, this step is already done.)
3. Slide the memory expansion board into the slot. Figure 10 shows an expansion board with two add-on memory modules being installed. One or no add-on modules may be installed on your expansion board.
4. Screw the retaining screw back into the chassis.



**Figure 10: Installing an Expansion Memory Board with Add-on Modules**

## 2.6 Setting Switches on the System Board

The COMPAQ DeskPro 386s must know how much memory you installed in its system. Set the switch SW3 on the system board for your new memory configuration.

These switch settings are defined in Figure 11.

## 2.7 Running the SETUP Program

Now run the SETUP program on the diagnostic diskette that came with your DESKPRO 386s.

You are now ready to use your new expanded memory with your COMPAQ DeskPro 386s computer.

**SWITCH SW3**

-- SW 3 POSITION --				MEMORY EXPANSION BOARD	MEMORY MODULE A	MEMORY MODULE B	TOTAL MEMORY
3	4	5	6				
*ON	ON	ON	ON	-	-	-	1MB
ON	ON	ON	OFF	1MB	-	-	2MB
ON	ON	OFF	ON	1MB	1MB	-	3MB
ON	ON	OFF	OFF	1MB	1MB	1MB	4MB
OFF	ON	ON	OFF	4MB	-	-	5MB
ON	OFF	OFF	ON	1MB	4MB	-	6MB
ON	OFF	ON	ON	1MB	1MB	4MB	7MB
OFF	ON	OFF	ON	4MB	4MB	-	9MB
ON	OFF	OFF	OFF	1MB	4MB	4MB	10MB
OFF	ON	OFF	OFF	4MB	4MB	4MB	13MB

\*STANDARD 1MB SYSTEM MEMORY K1000S10

REFER TO YOUR DESKPRO 386s DOCUMENTATION FOR SW3 POSITIONS 1 AND 2 (BASE MEMORY LIMIT)

**Figure 11: Setting System Board Memory Configurations**

### 3. Memory Parity Error Codes

The DESKPRO 386s system reports parity errors found during normal operation. The error message is displayed as:

**XX =** An address within some range found in Table 1. The address defines which memory board is bad. They are based on the system memory configurations specified in the previous section.

If the address is less than any shown in the tables, it is on the system memory board. A larger address may also be assigned to the system board if part of the base address is mapped into COMPAQ's user memory space.

**YY =** Specifies one of four bytes of the XX memory board. The KTC bytes are labeled on Figure 1.

**ZZ =** Defines which bit within the YY byte is bad.

**201** Indicates a Memory Error.

**XX00YY ZZ 201**

Always 201 for memory error.

This value defines which bits within a byte are bad.

- 00 = Parity Bit
- 01 = Data Bit 0
- 02 = Data Bit 1
- 04 = Data Bit 2
- 08 = Data Bit 3
- 10 = Data Bit 4
- 20 = Data bit 5
- 40 = Data Bit 6
- 80 = Data Bit 7

This value defines which bytes within a particular megabyte are bad.

- 00 = Byte 0
- 01 = Byte 1
- 02 = Byte 2
- 03 = Byte 3

00 = Always 00

This value is a 64KB block between 00h to FFh.

The system automatically displays the error code and the location of the faulty memory chip. The following examples illustrate the correlation between the error code and the faulty chip.

**Example 1**  
**2B0001 00 201**

**XX = 2B** 2B is in the range 20-2F. Table 1 shows this to be the 1MB add-on board located in "Module A" on a system with total memory capacity of 3MB, 4MB, or 7MB.

2B is also in the range 20-5F, which is the 4MB add-on module located in "Module A" of a 6MB system.

**YY = 01** The error is located in Byte 1. Figure 2 shows the location of Byte 1 for a 4MB add-on module. Figure 3 shows the location of Byte 1 for a 1MB add-on module.

**ZZ = 00** 00 indicates a parity error (bit 8 in Figure 2 or Figure 3).

**Example 2**  
**0A0003 80 201**

**XX = 0A** This 0A is in the system memory board range (less than address ranges in Table 1).

**YY = 03** The error is located in Byte 3. Refer to your Compaq documentation for the location of byte 3 on the system memory board.

**ZZ = 80** 80 indicates a data bit 7 error.

**Example 3**  
**600003 40 201**

**XX = 60** 60 is in the range 60-9F. Table 1 shows this to be the 10MB memory system with the faulty add-on board located in "Module B."

**YY = 03** The error is located in Byte 3. Figure 1 shows the location of Byte 3.

**ZZ = 40** 00 indicates a data bit 6 error (bit 6 in Figure 3).

### 4. Specifications

Versions	Model	Capacity	Compaq	Expansion	KTC-1000s	1MB	113633-001
:			Equivalent P/N	Boards	KTC-4000s	4MB	113634-001

<sup>a</sup> Total System Memory	----- Capacity/Address Range -----		
	<sup>b</sup> Expansion board	Module Location	
	A	B	
1MB			
2MB	1MB/10-1F		
3MB	1MB/10-1F	1MB/20-2F	
4MB	1MB/10-1F	1MB/20-2F	1MB/30-3F
5MB	4MB/10-4F		
6MB	1MB/10-1F	4MB/20-5F	
7MB	1MB/10-1F	1MB/20-2F	4MB/30-6F
9MB	4MB/10-4F	4MB/50-8F	
10MB	1MB/10-1F	4MB/20-5F	4MB/60-9F
13MB	4MB/10-4F	4MB/50-8F	4MB/90-CF

<sup>a</sup>See circles in Figure 4 and Figure 5.  
<sup>b</sup>See Figure 1 for Expansion Board and Figure 2 and 3 for Module A B locations.

Table 1: Address Ranges for Memory Error Codes

Add-on Modules	KTC-1100	1MB	113646-001
	KTC-4200	4MB	112534-001

Add-on modules plug directly onto expansion board P30x and P40x connectors. Screws inserted through standoffs insulate the add-on board and secure the module in place.

Compatibility: Completely hardware compatible with COMPAQ's DESKPRO 386s.

Completely software compatible with operating systems and diagnostics designed for the COMPAQ system.

Environment:	Operating	Storage
Temperature:	50°F to 104° (10°C to 40°C)	F60°F to 140°F (10°C to 60°C)
Humidity:	20% to 80%	5% to 90%
Maximum Altitude:	10,000 feet	30,000 feet

DRAM:

Access Time: 100ns

Memory Arrangement: 4 bytes, each with 32-bits of data and 4 bits of parity.

Dimensions:

Boards: 13.1" x 4.8"

Modules: 4.3" x 4.3"

Power Requirements: +5VDC @ 2A (maximum)

Installation: Expansion boards plug directly onto the system 32-bit memory expansion slot.

**Notes**

