

COMPAQ DESKPRO 386/20e  
Personal Computer  
*Features/Specifications*

**COMPAQ**

It simply works better.



---

# The COMPAQ DESKPRO 386/20e Personal Computer

## NOTICE

The information in this guide is subject to change without notice.

COMPAQ COMPUTER CORPORATION SHALL NOT BE LIABLE FOR TECHNICAL OR EDITORIAL ERRORS OR OMISSIONS CONTAINED HEREIN; NOR FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM THE FURNISHING, PERFORMANCE, OR USE OF THIS MATERIAL.

This guide contains information protected by copyright. No part of this guide may be photocopied or reproduced in any form without prior written consent from Compaq Computer Corporation.

The software described in this guide is furnished under a license agreement or nondisclosure agreement. The software may be used or copied only in accordance with the terms of the agreement.

© Copyright 1989, Compaq Computer Corporation. All rights reserved. Printed in the U.S.A.

COMPAQ®, COMPAQ DESKPRO 386/25®, COMPAQ DESKPRO 386/20e®, COMPAQ DESKPRO 386s®, and It simply works better® are trademarks of Compaq Computer Corporation.

AutoCAD® is a trademark of Autodesk, Inc.  
Intel®, Intel 386, Intel 387, Intel 386SX, and Intel 387SX are trademarks of Intel Corporation.  
MS®, Microsoft®, and MS-DOS® are trademarks of Microsoft Corporation.  
MS® OS/2 is a product of Microsoft Corporation.

Product names mentioned herein are for identification purposes only and may be trademarks and/or registered trademarks of their respective companies.

®Registered United States Patent and Trademark Office.

COMPAQ DESKPRO 386/20e PERSONAL COMPUTER  
FEATURES/SPECIFICATIONS  
Second Edition (June 1989)  
Part Number 113695-002

Compaq Computer Corporation

---

## Contents

### Section 1: FEATURES OVERVIEW

Introduction .....	1
Standard Models and Options .....	2
Product Illustration .....	3

### Section 2: FEATURES/FUNCTIONS/BENEFITS

Microprocessor .....	4
Coprocessor .....	4
System Memory .....	4
Diskette Drives .....	5
Fixed Disk Drives .....	5
Fixed Disk Expansion Unit .....	6
Tape Drives .....	6
Modem .....	7
Expansion .....	7
Keyboard .....	7
Standard Interfaces .....	7
Clock .....	7
Security .....	8
Power Supply .....	8
Operating Systems .....	8
Physical Characteristics .....	9
Video .....	9
Operations Guide .....	10

### Section 3: MEMORY EXPANSION .....

### Section 4: TECHNICAL SPECIFICATIONS

Diskette Drives .....	13
Fixed Disk Drives .....	13
Tape Drives .....	15
Fixed Disk Expansion Unit .....	16
Expansion Slots .....	16
System Unit .....	16
Video .....	17

### Section 5: SYSTEM DESIGN OVERVIEW

Introduction .....	20
Microprocessor/Memory .....	20
The System Peripherals Advantage .....	22
Bus Architecture .....	28
Test Methodology .....	30

### Section 6: QUESTIONS AND ANSWERS .....

Section 6: QUESTIONS AND ANSWERS .....	31
--	----

---

Contents

Introduction

Chapter 1: Getting Started

Chapter 2: The Desktop Environment

Chapter 3: Managing Files and Folders

Chapter 4: Working with Applications

Chapter 5: Customizing the Desktop

Chapter 6: Troubleshooting

Appendix A: Hardware Requirements

Appendix B: Software Requirements

Appendix C: Glossary

Appendix D: Index

The COMPAG DESKPRO 386/30 PC Version of the Court is designed to provide a comprehensive and user-friendly environment for legal professionals. This manual is intended to guide you through the various features and functions of the software, ensuring that you can maximize its potential in your daily work.

Before using the software, it is important to ensure that your system meets the minimum hardware and software requirements. Please refer to the relevant appendices for detailed information on these requirements.

The software is designed to be easy to learn and use. It includes a variety of features that can help you manage your case files, create legal documents, and communicate with your clients. The user interface is intuitive and designed to be consistent across different versions of the software.

This manual is organized into several chapters, each covering a different aspect of the software. The chapters are:
 

- Chapter 1: Getting Started - This chapter provides an overview of the software and guides you through the initial setup process.
- Chapter 2: The Desktop Environment - This chapter describes the desktop environment and how to navigate it.
- Chapter 3: Managing Files and Folders - This chapter explains how to create, delete, and move files and folders.
- Chapter 4: Working with Applications - This chapter details the various applications available in the software and how to use them.
- Chapter 5: Customizing the Desktop - This chapter shows you how to personalize your desktop environment to suit your needs.
- Chapter 6: Troubleshooting - This chapter provides solutions to common problems you may encounter while using the software.

Appendix A: Hardware Requirements - This appendix lists the minimum hardware specifications required to run the software.

Appendix B: Software Requirements - This appendix lists the minimum software requirements, including operating system and other necessary software.

Appendix C: Glossary - This appendix provides definitions for key terms used throughout the manual.

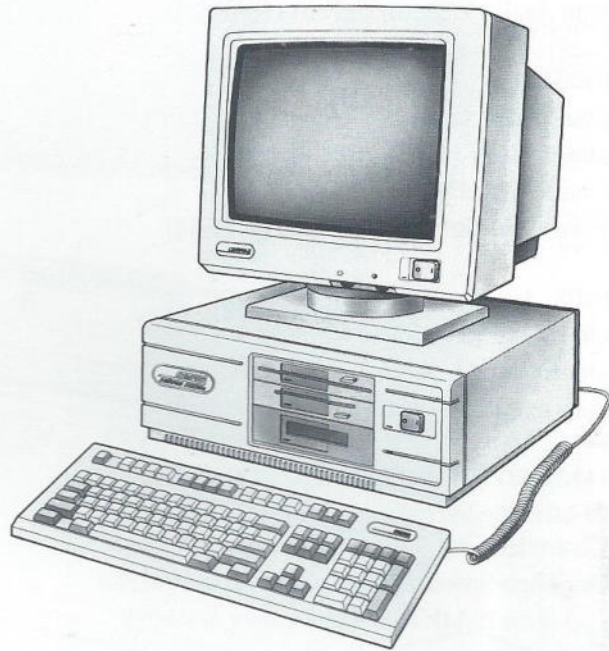
Appendix D: Index - This appendix provides a quick reference to the various topics covered in the manual.



## Features Overview

The COMPAQ DESKPRO 386/20e Personal Computer delivers advanced 386 power and performance designed to fit the increasingly sophisticated needs of the 286-based computer user. The COMPAQ DESKPRO 386/20e combines the 20-MHz Intel 386™ microprocessor with COMPAQ Flexible Advanced Systems (Flex) Architecture to provide up to 25 percent performance improvement over noncache 20-MHz 386-based systems.

The COMPAQ DESKPRO 386/20e has been carefully designed to integrate the features today's advanced users require while providing ease of transition from 286-based computers. The integrated video graphics controller supporting COMPAQ VGA-compatible monitors provides high-performance VGA graphics. One megabyte of 32-bit memory as well as standard interfaces, diskette drive and fixed disk drive backup controllers, and interfaces for the fixed disk drives are also included. A high-speed, 32-bit memory expansion slot allows you to expand 32-bit memory to the 16-megabyte limit of MS® OS/2. Because the features that business users require are integrated onto the system board, all four industry-standard expansion slots are available for future growth and options. For numeric-intensive applications such as financial modeling or CAD, the COMPAQ DESKPRO 386/20e accommodates an optional



The COMPAQ DESKPRO 386/20e Personal Computer

20-MHz Intel 387™ or a Weitek 3167 coprocessor. The COMPAQ DESKPRO 386/20e brings the performance and potential of the 386 microprocessor to those users whose needs exceed the capabilities of their 286-based personal computers.

## Standard Models and Options

### MODEL 110

- One Megabyte of 32-Bit Memory
- One 5¼-Inch 1.2-Megabyte Diskette Drive
- One 110-Megabyte Fixed Disk Drive
- Four Available Expansion Slots (8-/16-bit)

### MODEL 40

- One Megabyte of 32-Bit Memory
- One 5¼-Inch 1.2-Megabyte Diskette Drive
- One 40-Megabyte Fixed Disk Drive
- Four Available Expansion Slots (8-/16-bit)

### MODEL 1

- One Megabyte of 32-Bit Memory
- One 5¼-Inch 1.2-Megabyte Diskette Drive
- Four Available Expansion Slots (8-/16-bit)

### STANDARD FEATURES ON ALL MODELS

- 20-MHz 386 Microprocessor and Cache Memory Controller
- One High-Speed 32-Bit Memory Expansion Slot
- Socket for 20-MHz 387 Coprocessor or Weitek Coprocessor
- Integrated Video Graphics Controller (VGA)
- COMPAQ Expanded Memory Manager (CEMM)
- Disk Cache Utility
- Enhanced Keyboard
- Power-on and Keyboard Password Security
- Parallel, Asynchronous Communications (serial), and Auxiliary Input (mouse) Interfaces
- Real-Time Clock/Calendar
- Security Lock
- 140-Watt Steady-State Power Supply
- Full One-Year Limited Warranty

### OPTIONS

- 20-MHz 387 Coprocessor
- Weitek 3167 Coprocessor
- 4-Megabyte 32-Bit Memory Expansion Board
- 1-Megabyte 32-Bit Memory Expansion Board
- 4-Megabyte Memory Module
- 1-Megabyte Memory Module
- 5¼-Inch 1.2-Megabyte Diskette Drive
- 5¼-Inch 360-Kbyte Diskette Drive
- 3½-Inch 1.44-Megabyte Diskette Drive
- 15-MHz ESDI Controller
- 320-Megabyte Fixed Disk Drive
- 110-Megabyte Fixed Disk Drive
- 84-Megabyte Fixed Disk Drive
- 40-Megabyte Fixed Disk Drive
- 20-Megabyte Fixed Disk Drive
- Fixed Disk Expansion Unit (Model 300)
- 300-Megabyte Fixed Disk Drive (Fixed Disk Expansion Unit)
- 150-/250-Megabyte Tape Drive
- 40-Megabyte Tape Drive
- Asynchronous Communications/Parallel Printer Board
- Advanced Graphics Color Monitor
- COMPAQ Video Graphics Color Monitor
- COMPAQ Video Graphics Monochrome Monitor
- Advanced Graphics 1024 Board
- Advanced Graphics Memory Board
- DGIS™ Software Interface
- 2400-Baud Internal Modem (U.S. and Canada only)
- 250-Megabyte Tape Cartridge
- 150-Megabyte Tape Cartridge
- 40-Megabyte Tape Cartridge
- MS-DOS® Version 4 as published by Compaq
- MS-DOS Version 3 as published by Compaq
- Microsoft® Operating System/2 Standard Version 1.1 as published by Compaq
- COMPAQ DESKPRO 386/20e Technical Reference Guide
- COMPAQ Video Graphics System Technical Reference Guide



COMPAQ Video Graphics  
Color Monitor

Brightness  
Control

Contrast  
Control

On/Off  
Switch

1-Megabyte 32-bit  
Memory Expansion Board

1-Megabyte  
Memory Module

8-/16-bit  
Expansion Slots

387 or Weitek  
Coprocesor  
Socket

110-Megabyte  
Fixed Disk Drive

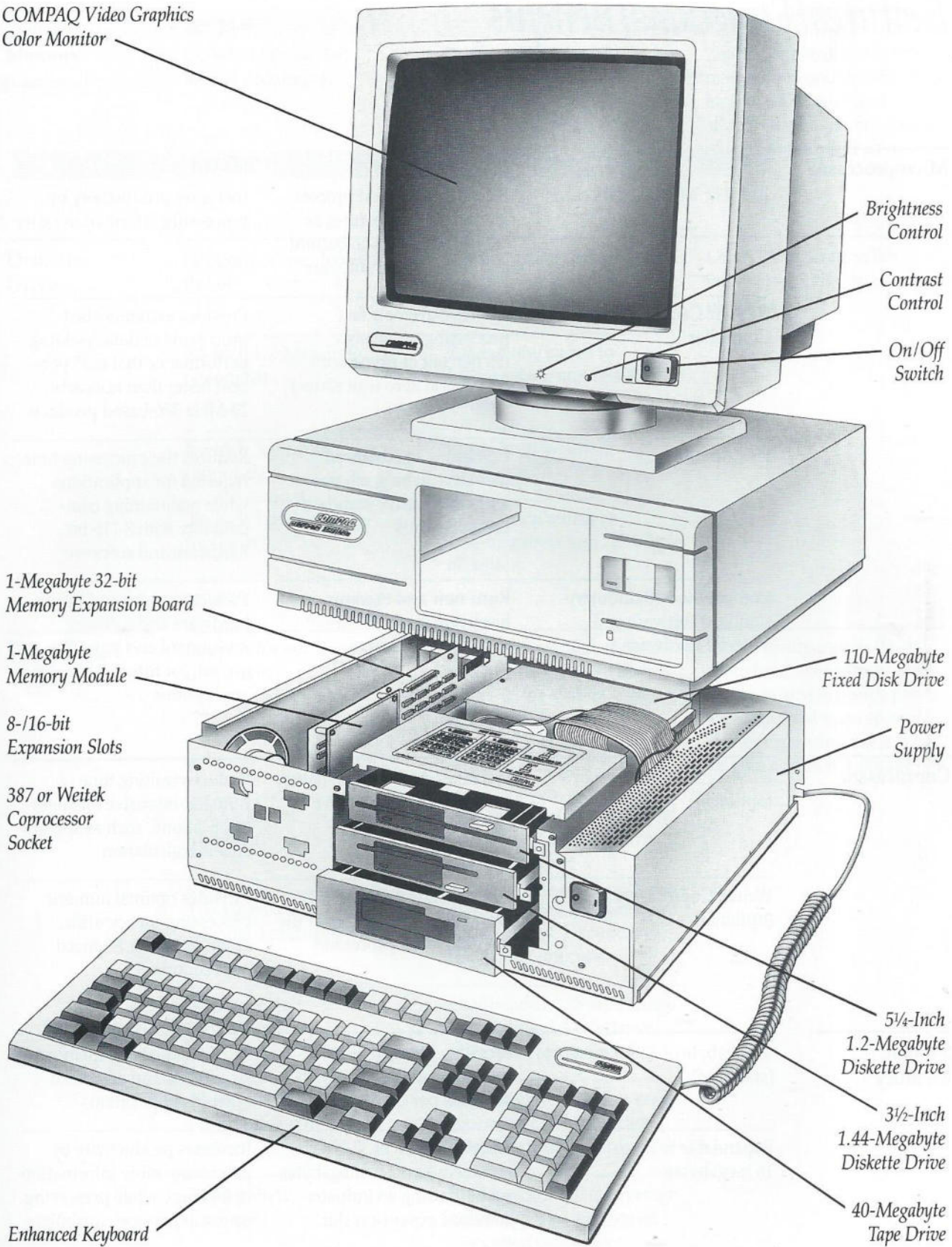
Power  
Supply

5¼-Inch  
1.2-Megabyte  
Diskette Drive

3½-Inch  
1.44-Megabyte  
Diskette Drive

40-Megabyte  
Tape Drive

Enhanced Keyboard



## Features/Functions/Benefits

<b>Microprocessor</b>	<b>FEATURE</b>	<b>FUNCTION</b>	<b>BENEFIT</b>
	20-MHz 386 Microprocessor	Provides advanced processing power and features as well as a gateway to current and future 32-bit software	Increases productivity by processing information faster
	20-MHz Cache Memory Controller	Allows extremely fast processing of memory (95 percent of processor requests at zero wait states)	Provides extremely fast processing of data, yielding performance that is 25 percent faster than noncache 20-MHz 386-based products
	Flex Architecture	Combines an advanced memory-caching scheme with an industry-standard expansion bus	Reduces the processing time required for applications while maintaining compatibility with 8-/16-bit hardware and software
	Compatible with industry-standard software and 8-/16-bit hardware	Runs new and existing hardware and software without modification	Protects current and future hardware and software investment and provides growth for future applications
<b>Coprocessor</b>	20-MHz 387 Coprocessor (optional)	Increases numeric calculation speed for math-intensive applications	Reduces waiting time of numeric-intensive business applications, such as spreadsheet recalculation
	Weitek Coprocessor (optional)	Allows significant performance improvement over the 20-MHz 387 coprocessor	Provides optimal numeric processing for scientific, engineering, or financial applications
<b>System Memory</b>	1 megabyte of 32-Bit memory (standard)	Provides 1 megabyte of system memory, processed at 32 bits per CPU cycle	Provides the basic memory required to run advanced business applications
	Expandable to up to 16 megabytes	Allows growth of 32-bit system memory to 16 megabytes without using an industry-standard expansion slot	Increases productivity by processing more information in less time while preserving future expansion capabilities



	FEATURE	FUNCTION	BENEFIT
<b>System Memory</b> (continued)	COMPAQ Expanded Memory Manager	Supports the Lotus/Intel/Microsoft Expanded Memory Specification (LIM/EMS) Standard Version 4.0. without purchase of additional hardware	Enables applications to access memory beyond the MS-DOS limit of 640 Kbytes and allows efficient manipulation of large amounts of data
<b>Diskette Drives</b>	Support for two diskette drives	Allows installation of up to two diskette drives in the system at the same time	Offers configuration flexibility for a wide variety of media
	5¼-Inch 1.2-Megabyte (standard)	Reads from/writes to 1.2-megabyte and 360-Kbyte diskettes	
	5¼-Inch 360-Kbyte (optional)	Reads from/writes to 360-Kbyte diskettes	
	3½-Inch 1.44-Megabyte (optional)	Reads from/writes to 1.44-megabyte and 720-Kbyte diskettes	
<b>Fixed Disk Drives</b>	Support for two fixed disk drives	Allows installation of up to two half-height fixed disk drives in the system at the same time	Offers configuration flexibility to best meet current and future business needs; provides internal mass storage device expansion users who require additional storage
	320-Megabyte (optional)	Half-height; <18 ms average access time; 1:1 interleave; ESDI Controller	
	110-Megabyte (standard and optional)	Half-height; <25 ms average access time; 1:1 interleave; integrated controller	
	84-Megabyte (optional)	Half-height; <25 ms average access time; 1:1 interleave; integrated controller	
	40-Megabyte (standard and optional)	Half-height; <29 ms average access time; 1:1 interleave; integrated controller	
	20-Megabyte (optional)	Half-height; <30 ms average access time; 1:1 interleave; integrated controller	

	FEATURE	FUNCTION	BENEFIT
<b>Fixed Disk Drives</b> (continued)	Disk Cache (standard)	Increases the performance of fixed disk drive read operations by improving access to data stored on the fixed disk drive	Increases productivity by providing faster access to frequently requested information
<b>Fixed Disk Expansion Unit</b>	Model 300	Supports one or two full-height 300-megabyte fixed disk drives for up to 600 megabytes of external storage	Allows over 1.2 gigabytes total mass storage
	300-Megabyte (Fixed Disk Expansion Unit only) (optional)	Full-height; <18 ms average access time; 1:1 interleave; ESDI Controller	
<b>Tape Drives</b>	Choice of two internal	Duplicates data stored on a fixed disk drive onto a removable tape cartridge and verifies	Permits backup and protection of important or sensitive data
	150-/250-Megabyte (optional)	Permits choice of 150- or 250-megabyte media Copies 150 or 250 megabytes of data, depending on tape length selected, at 5 megabytes per minute transfer rate	Allows choice of tape size to suit size of drive to be backed up; larger tape cartridge capacity allows unattended backup of large capacity fixed disk drive
	40-Megabyte (optional)	Copies 40 megabytes of data at 2 megabytes per minute transfer rate	Permits easy backup, especially of smaller drives or of selected large directories or files
	SY-TOS™ Tape Operating System Diskettes and User's Guides for the MS-DOS and MS OS/2 environments (included with the 150-/250-Megabyte Tape Drive)	Provides high-performance tools to manage data backups	Makes backing up data easy and efficient and reduces the possibility of lost data
	COMPAQ Tape Utility	Supports the 40-Megabyte Tape Drive under MS-DOS and MS® OS/2	Allows easy and convenient backup of valuable data



	FEATURE	FUNCTION	BENEFIT
<b>Modem</b>	2400-Baud Internal Modem with Hayes asynchronous modem compatibility (optional) <ul style="list-style-type: none"> <li>• 300-/1200-/2400-baud</li> <li>• Tone/pulse dialing</li> <li>• Full/half-duplex</li> <li>• Auto answer/originate</li> </ul>	Provides communications capabilities to transfer data to and from other personal computers, mainframes, or outside services	Enables users to choose from a wide array of Hayes-compatible communications programs
<b>Expansion</b>	Five total slots <ul style="list-style-type: none"> <li>• One 32-bit memory slot</li> <li>• Four full-sized 8-/16-bit industry-standard expansion slots</li> </ul>	Allows for internal memory expansion and for the installation of industry-standard expansion boards such as modems, LAN cards, I/O boards, and micro-to-mainframe communication boards	Increases system flexibility by providing the ability to customize the machine for particular applications
	System components included on the system board <ul style="list-style-type: none"> <li>• Video graphics controller</li> <li>• Fixed disk drive controller</li> <li>• Standard interfaces</li> <li>• 1 megabyte of memory</li> </ul>	Eliminates the need to use industry-standard expansion slots for standard for user's needs	Allows the use of all five available expansion slots to customize machine
<b>Keyboard</b>	Enhanced Keyboard	Allows input to the system and provides dedicated areas for for cursor movement and numeric input	Increases productivity by enabling faster cursor movement and easier numeric input
<b>Standard Interfaces</b>	Pointing device (mouse)	Supports a mouse or other pointing device	Allows the use of pointing device without using the asynchronous communications (serial) interface or an expansion slot
	Parallel and Asynchronous Communications	Provides for connection of parallel and high-speed serial devices (up to 19.2 Kbaud)	Offers flexibility in choosing output devices at no incremental cost and without using an expansion slot
<b>Clock</b>	Real-time battery powered clock/calendar on the system board	Provides current date and time during power-on or system reset	Saves time by not having to reset the clock each time the unit is turned on

Security	FEATURE	FUNCTION	BENEFIT
	External Keylock	Prevents unauthorized access to the internal system components	Prevents tampering with system hardware
	Power-On Password Security	Provides a user-invoked password capability	Prevents unauthorized access to the system at power-on
	Keyboard Password	Prevents unauthorized access to data while the system is running	Protects data while the computer is unattended
<b>Power Supply</b>	Steady State: 140 watts Peak: 175 watts	Converts AC power to DC, providing ample power to support all available configurations	Provides ample power to run existing and anticipated system configurations
	Automatic Line Switching (110V/220-240V)	Determines voltage of incoming power and switches power supply to the correct line voltage	Provides system flexibility for 110V or 220-240V environments
<b>Operating Systems</b>	MS-DOS Version 4 Diskettes and Reference Guide (optional)	Includes MS-DOS Shell graphical user interface and COMPAQ FASTART installation and upgrade utility; supports LIM 4.0 for expanded memory enhancements; and allows logical fixed disk drive partitions up to 2 gigabytes	Increases productivity through ease-of-use improvements, expanded memory use and greater fixed disk drive partition size
	MS-DOS Version 3 Diskettes and Reference Guide (optional)	Enables partitioning of high-capacity fixed disk drives into logical drives of up to 512 megabytes each	Ensures compatibility with the installed base of software and allows efficient use of high-capacity fixed disk drives
	MS OS/2 Standard Version 1.1 Diskettes, Command Reference and User's Guide (optional)	Includes Presentation Manager, a graphical user interface to assist users in interacting with a personal computer; allows logical fixed disk drive partitions up to 2 gigabytes	Increases productivity, by allowing multiple Presentation Manager applications to be run in a windowed environment, reducing training time, and providing user-friendly features



	FEATURE	FUNCTION	BENEFIT
<b>Operating Systems</b> (continued)	MS OS/2 Standard Version 1.1 Diskettes, Command Reference and User's Guide (optional) (continued)	Provides a multi-tasking feature, that allows an application to run in the foreground while other applications continue to run in the background	Increases productivity by permitting a user to run multiple applications at the same time
		Expands the addressable memory capacity to 16 megabytes	Enhances productivity by allowing increased memory to 16 megabytes multi-tasking and larger data files
<b>Physical Characteristics</b>	Small system unit footprint • Height 5.9 inches (14.9 cm) • Depth 14.8 inches (37.6 cm) • Width 15.8 inches (40.1 cm)	Offers a compact, space-efficient design that fits on a narrow work surface such as a credenza	Provides maximum computer performance in minimal space
	Support for four mass storage devices	Permits installation of up to four mass storage devices in the system at the same time	Permits extensive configuration flexibility in a streamlined computer package
<b>Video</b>	Integrated Video Graphics Controller Board (standard)	Supports VGA, EGA, and CGA graphics resolution, displaying up to 256 colors simultaneously; displays graphics and scrolls text up to 50 percent faster than other VGA products	Allows greater graphics creativity while protecting software investment
	Advanced Graphics Color Monitor (optional)	High-resolution graphics on a 16-inch (diagonal) screen with up to 256 colors in 1024 × 768 or 640 × 480 resolutions	Provides a high-quality image that makes details more precise and easier to see
	High-Resolution Video Connector (located on the 1- and 4-Megabyte 32-Bit Memory Expansion Boards)	Provides VGA, EGA, and CGA compatibility when used with video display boards that support resolutions beyond VGA	Protects investment by ensuring VGA software compatibility when using higher resolution display boards
	Video Graphics Color Monitor (optional)	VGA-compatible, displaying up to 256 colors in 320 × 200 graphics resolution and 16 colors in 640 × 480 resolution	Increased resolution color provides better color graphic images

**Video***(continued)*

FEATURE	FUNCTION	BENEFIT
Video Graphics Monochrome Monitor (optional)	Displays graphics in 640 × 480 resolution and text in 720 × 400 resolution and allows black letters on white display	Provides a high-quality screen image and a more realistic view of how a printed document will look
Advanced Graphics 1024 Board (optional)	Provides high-performance, high-resolution display capabilities <ul style="list-style-type: none"> <li>• 1024 × 768 resolution 16 colors</li> <li>• 1024 × 768 resolution with 256 colors with optional memory board</li> </ul>	Provides higher performance in graphics-intensive applications such as CAD/CAE or business graphics

**Operations Guide**

<i>Getting Started</i>	Guides both new and experienced users through initial set-up procedures	Allows users to put their systems to work quickly and easily
<i>System Overview</i>	Provides more detailed information about the COMPAQ DESKPRO 386/20e	Allows user to gain a working knowledge of the technical features of the system
<i>User Programs Reference</i>	Gives a convenient reference to COMPAQ User Programs software designed to enhance system performance	Makes it easy for users to install and take advantage of these software programs



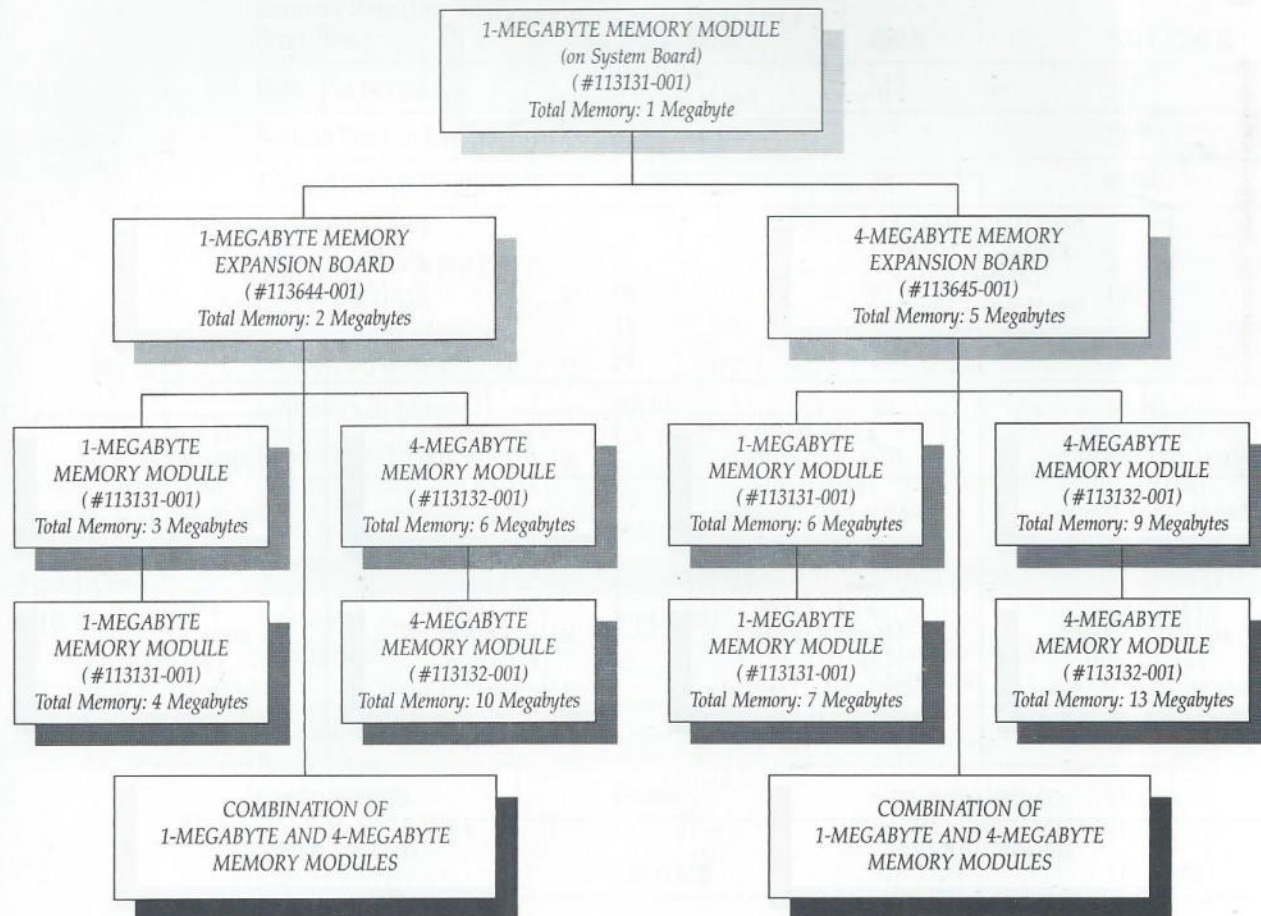
## Memory Expansion

The COMPAQ DESKPRO 386/20e Personal Computer is configured with a 1-Megabyte Memory Module on the system board. By installing an optional 1- or 4-Megabyte 32-Bit Memory Expansion Board in the high-speed, 32-bit memory expansion slot and optional 1- and 4-Megabyte Memory Modules, the COMPAQ DESKPRO 386/20e can be configured with varying amounts of memory up to 16 megabytes.

The 1-Megabyte 32-Bit Memory Expansion Board has one megabyte of memory soldered on the board, bringing the total system memory to two megabytes.

The 4-Megabyte 32-Bit Expansion Board has four megabytes of soldered memory and brings the total system memory to five megabytes.

### COMPAQ DESKPRO 386/20e Memory Expansion Alternatives Using 1-Megabyte Memory Module



MEMORY INCREMENTS SUPPORTED

1, 2, 3, 4, 5, 6, 7, 9, 10, 13

Each board contains sockets for two of the following memory options, also used in the COMPAQ DESKPRO 386/25 Personal Computer:

- 1-Megabyte Memory Module
- 4-Megabyte Memory Module

Using the 1-Megabyte 32-Bit Memory Expansion Board, system memory can then be expanded to either 3 or 4 megabytes using 1-Megabyte Memory Modules, to 7 megabytes using 1- and 4-Megabyte Memory Modules, and to either 6 or 10 megabytes with 4-Megabyte Memory Modules.

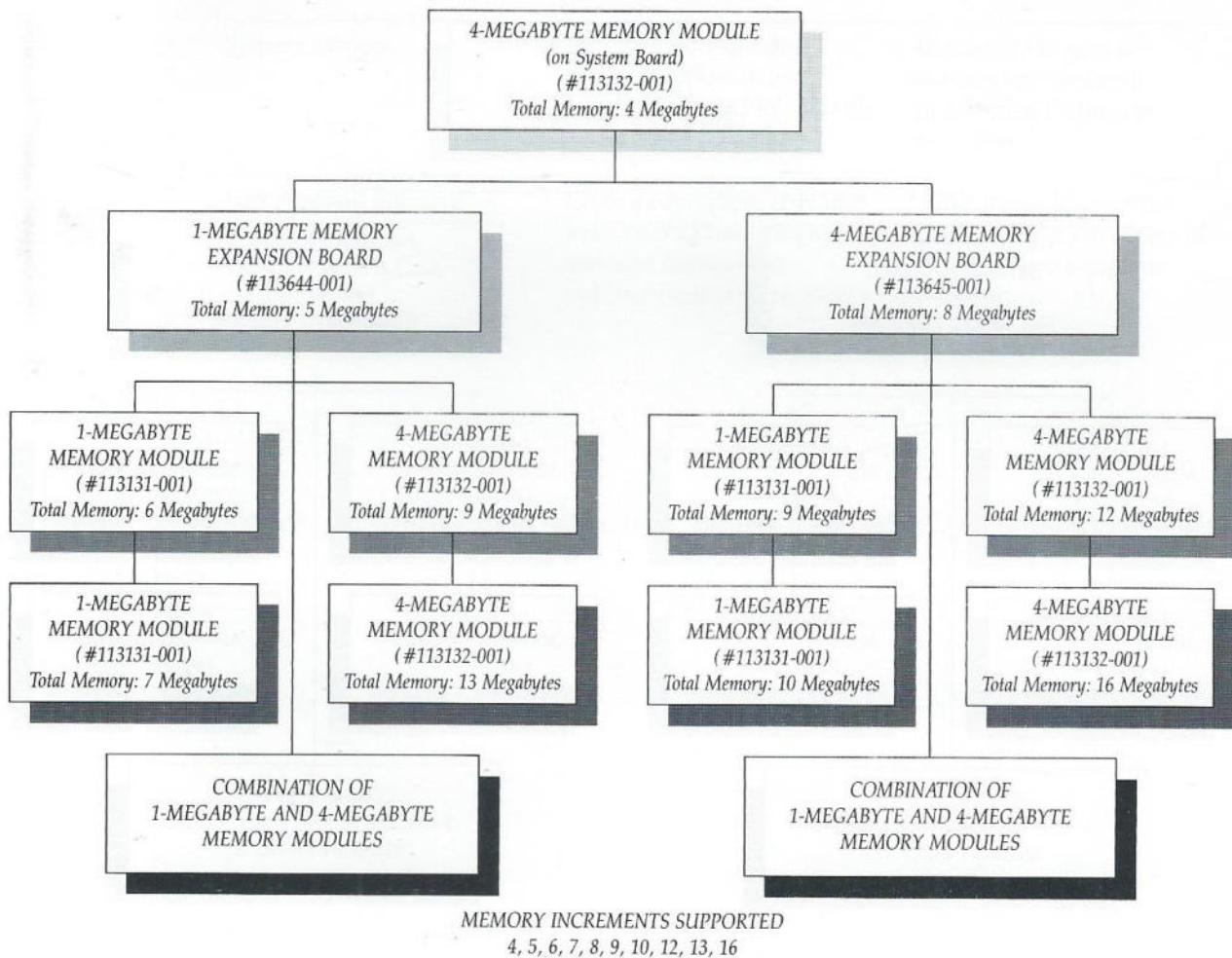
With the 4-Megabyte 32-Bit Memory Expansion Board, system memory can be expanded to either

6 or 7 megabytes of memory using 1-Megabyte Memory Modules, to 10 megabytes using 1- and 4-Megabyte Memory Modules, and to either 9 or 13 megabytes of memory using 4-Megabyte Memory Modules.

By replacing the 1-Megabyte Memory Module on the system board with a 4-Megabyte Memory Module, you can expand system memory to the full 16 megabytes without using an industry-standard slot.

The charts on pages 11 and 12 illustrate the COMPAQ DESKPRO 386/20e memory expansion options.

COMPAQ DESKPRO 386/20e Memory Expansion Alternatives Using 4-Megabyte Memory Module





## Technical Specifications

Diskette Drives	1.2-MEGABYTE 5¼-INCH	360-KBYTE 5¼-INCH	1.44-MEGABYTE 3½-INCH
LED Indicators:			
Read/Write (high density)	Green	N/A	Green
Read/Write (low density) (domestic/international)	Red/Orange	Red/Orange	Orange/Orange
Capacity Per Diskette (high/low)	1.2 MB/360 KB	360 KB	1.44 MB/720 KB
Drives Supported	Two	Two	Two
Drive Height	Third	Third	Third
Diskette Drive	5¼-in	5¼-in	3½-in
Drive Rotation (rpm)	360	300	300
Transfer Rate (bits/sec) (high/low)	500 K/300 K	250 K	500 K/250 K
Bytes Per Sector	512	512	512
Sectors Per Track (high/low)	15/9	9	18/9
Tracks Per Side (high/low)	80/40	40	80/80
Access Times:			
Track-to-Track (ms)	3	6	3
Average (ms)	95	95	100
Settling Time (ms)	15	15	15
Latency Average (ms)	84	100	100
Cylinders (high/low)	80/40	40	80/80
Read/Write Heads	2	2	2

Fixed Disk Drives	320-MEGABYTE	300-MEGABYTE	110-MEGABYTE
Standard Configuration	(optional)	Fixed Disk Expansion Unit Model 300	Model 110
LED Indicators			
Read/Write (high density)	Green	Green	Orange
Formatted Capacity Drive	325.0 MB	315.3 MB	112.4 MB
Drives Supported	Two	Two <sup>1</sup>	Two
Drive Height	Half	Full	Half
<sup>1</sup> Per Expansion Unit			

**Fixed  
Disk Drives**  
(continued)

	320-MEGABYTE	300-MEGABYTE	110-MEGABYTE
Drive Size	5¼-inch	5¼-inch	3½-inch
Drive Type(s)	28	38	33
Transfer Rate (bits/sec)	15 M	10 M	10 M
Sector Interleave	1:1	1:1	1:1
Access Times: (including settling)			
Track-to-Track (ms)	<5	<5	<8
Average (ms)	<18	<18	<25
Maximum (ms)	<40	<40	<45
Physical Configuration:			
Cylinders	1744	1222	832
Heads	7	15	8
Sectors Per Track	52	34	33
Bytes Per Sector	512	512	512
Logical Configuration:			
Cylinders	872	611	832
Heads	14	16	8
Sectors Per Track	52	63	33
Bytes Per Sector	512	512	512
	84-MEGABYTE	40-MEGABYTE	20-MEGABYTE
Standard Configuration	(optional)	Model 40	(optional)
LED Indicators Read/Write (high density)	Orange	Orange	Green
Formatted Capacity Drive	84.3 MB	42.8 MB	21.4 MB
Drives Supported	Two	Two	Two
Drive Height	Half	Half	Half
Drive Size	3½-in	3½-in	3½-in
Drive Type(s)	27	43	2
Transfer Rate (bits/sec)	10 M	8 M	8M
Sector Interleave	1:1	1:1	1:1
Access Times: (including settling)			
Track-to-Track (ms)	8	<8	<8
Average (ms)	<25	<29	<30
Maximum (ms)	45	<50	70

**Fixed  
Disk Drives**  
(continued)

	84-MEGABYTE	40-MEGABYTE	20-MEGABYTE
Physical Configuration:			
Cylinders	832	805	636
Heads	6	4	2
Sectors Per Track	33	26	33
Bytes Per Sector	512	512	512
Logical Configuration:			
		Type 43	Type 17
Cylinders	832	805	980
Heads	6	4	5
Sectors Per Track	33	26	17
Bytes Per Sector	512	512	512

**Tape Drives**

	150-/250-MEGABYTE	40-MEGABYTE
LED Indicators	Green	Green
Drive Height	Half	Half
Approximate Operating Times		
Backup and Verify	5 MB/min	1 MB/min
Restore	5 MB/min	2 MB/min
Format Blank Cartridge	Not required	74 min
Maximum Formatted Capacities:		
Per Track	7.5 MB/12.5 MB	2.0 MB
Per Data Block (bytes)	512	16,384
Per Sector (bytes)	N/A	1,024
Mechanical Measurements:		
Tape Width	.25 in	.25 in
Tape Length	600 ft/1000 ft	205.00 ft
Tape Speed:		
Read/Write (both directions)	72 ips	50 ips
Rewind/Fast Forward	90 ips	70 ips
Track Pattern:		
Number of Tracks	Serpentine 18	Serpentine 20
Number of Blocks Per Track	16,276/27,126	124
Number of Data Sectors Per Block	N/A	16
Percentage of ECC	6.25	11.11
Recording Density/Inch	10,000 bits	10,000 bits
Flux Reversals/Inch	12,500 bits	10,000
Track Density/Inch	76	83
Data Encoding Method	4,5 GCR	MFM
Data Transfer Rate (bps)	720K	500K
Error Detection/Correction	CRC/ECC	CRC/ECC
Tape Cartridge:		
Read/Write	3M 6150/3M 6250 QIC150	3M DC 2000
Read	QIC24,QIC120	3M DC 1000
Connection	Tape Host Adapter (requires ISA slot)	System Board



Fixed Disk Expansion Unit (Model 300)	ENGLISH		METRIC	
	Dimensions:			
Height	6.5 in		16.2 cm	
Depth	16.5 in		41.9 cm	
Width	14.1 in		35.9 cm	
Weight	27.5 lb		12.4 kg	
Standard Drive:	One 300-Megabyte Fixed Disk Drive			

Expansion Slots	SLOT	TYPE
	1	8-/16-bit full sized
	2	8-/16-bit full sized
	3	8-/16-bit full sized
	4	8-/16-bit full sized
	5	32-bit full sized (reserved for the 1- or 4-Megabyte) 32-bit Memory Expansion Board

System Unit	ENGLISH		METRIC	
	Dimensions:			
Height	5.9 in		14.9 cm	
Depth	14.8 in		37.6 cm	
Width	15.8 in		40.1 cm	
Weight:				
Model 110	28.0 lb		12.7 kg	
Model 40	28.0 lb		12.7 kg	
Model 1	27.0 lb		12.2 kg	
Power Supply				
Operating Voltage	120 V, 60 Hz		220-240 V, 50 Hz	
Steady-State Power	140 W		140 W	
Peak Power	175 W		175 W	
Temperature Range:				
Operating	50° to 104°F		10° to 40°C	
Nonoperating	14° to 122°F		-10° to 50°C	
Shipping	-22° to 140°F		-30° to 60°C	
Relative humidity (noncondensing):				
Operating	20% to 80%		20% to 80%	
Nonoperating	5% to 90%		5% to 90%	



**Video**

ADVANCED VIDEO GRAPHICS COLOR MONITOR	ENGLISH	METRIC
Type	Color	Color
Mounting	External	External
Dot Pitch	.29 mm	.29 mm
Maximum Resolution:		
Text Mode	720 × 400	720 × 400
Graphics Mode	1024 × 768	1024 × 768
Color Scale	Supports up to 256 colors simultaneously	Supports up to 256 colors simultaneously
Brightness and Contrast	Adjustable	Adjustable
Diagonal Size	16.0	40.6
Scanning	Noninterlaced	Noninterlaced
Bandwidth	41.0-MHz	41.0-MHz
Horizontal Frequency (Dual-synchronous)	53.5 KHz (31.5 KHz VGA mode)	53.5 KHz (31.5 KHz VGA mode)
Vertical Frequency	66 Hz (70 Hz VGA mode)	66 Hz (70 Hz VGA mode)
Integrated Tilt	5° down, 15° up	5° down, 15° up
Swivel	+1° or -90°	+1° or -90°
Temperature Range:		
Operating (sea level to 7,000 ft.)	50° to 95°F	10° to 35°C
Operating (above 7,000 ft.)	50° to 86°F	10° to 30°C
Nonoperating	30° to 140°F	0° to 60°C
Relative Humidity (noncondensing):		
Operating	10% to 90%	10% to 90%
Nonoperating	10% to 95%	10% to 95%
Altitude (mean sea level):		
Operating	12,000 ft	3,658 ft
Nonoperating	40,000 ft	12,192 m
Dimensions:		
Height	15.0 in	38.1 cm
Depth	15.5 in	39.4 cm
Width	16.0 in	40.6 cm
Weight	40.0 lb	18.2 kg

**Video***(continued)*

	ADVANCED GRAPHICS 1024 BOARD	
	ENGLISH	METRIC
Operating Modes:	1024 × 768 640 × 480 VGA via VGA pass-through	1024 × 768 640 × 480 VGA via VGA pass-through
Color Scale Standard:		
1024 × 768	16 out of 16.7 million palette	16 out of 16.7 million palette
640 × 480	256 out of 16.7 million palette	256 out of 16.7 million palette
With Optional Memory Expansion:		
1024 × 768	256 out of 16.7 million palette	256 out of 16.7 million palette
640 × 480	256 out of 16.7 million palette	256 out of 16.7 million palette
Standard Memory	512 Kbytes VRAM 128 Kbytes VRAM	512 Kbytes VRAM 128 Kbytes VRAM
Optional Memory Expansion	512 Kbytes VRAM for 1 MB total	512 Kbytes VRAM for 1 MB total
Bus Width	16-Bit ISA (8-/16-bit operation)	16-Bit ISA (8-/16-bit operation)
Graphics (horizontal/vertical):		
640 × 480	31.5 KHz/60 Hz	31.5 KHz/60 Hz
1024 × 768	53.5 KHz/66 Hz	53.5 KHz/66 Hz
1024 × 768	48.0 KHz/60 Hz	48.0 KHz/60 Hz
VGA	31.5 KHz/60-70Hz	31.5 KHz/60-70Hz
Interface	Analog 15-pin video connector	Analog 15-pin video connector
Environmental Requirements:		
Temperature (with VCC held between 4.74 and 5.25V)	50° to 104°F	10° to 40°C
Humidity	20% to 80%	20% to 80%
Altitude	-100 ft to 8,000 ft	-30 m to 2438 m
	VIDEO GRAPHICS COLOR MONITOR	
	ENGLISH	METRIC
Type	Analog/Color	Analog/Color
Mounting	External	External
Dot Pitch	.31 mm	.31 mm
Maximum Resolution:		
Text Mode	720 × 400	720 × 400
Graphics Mode	640 × 480	640 × 480
Character Display	80 × 25	80 × 25



**Video**  
*(continued)*

VIDEO GRAPHICS COLOR MONITOR (continued)	ENGLISH	METRIC
Color Scale	Supports up to 256 colors	Supports up to 256 colors
Brightness	Adjustable	Adjustable
Diagonal Size	14.0	35.56
Bandwidth	30.0 MHz	30.0 MHz
Horizontal Frequency	31.5 KHz	31.5 KHz
Vertical Frequency	60.0/70.0 Hz	60.0/70.90 Hz
Dimensions:		
Height	14.1 in	35.7 cm
Depth	14.6 in	37.0 cm
Width	13.8 in	35.0 cm
Weight	32.0 lb	14.5 kg
VIDEO GRAPHICS MONOCHROME MONITOR	ENGLISH	METRIC
Type	Analog	Analog
Mounting	External	External
Maximum Resolution:		
Text Mode	720 × 400	720 × 400
Graphics Mode	640 × 480	640 × 480
Character Display	80 × 25	80 × 25
Gray Scale	64 Levels	64 levels
Brightness	Adjustable	Adjustable
Diagonal Size	12.0	30.48
Bandwidth	30.0 MHz	30.0 MHz
Horizontal Frequency	31.5 KHz	31.5 KHz
Vertical Frequency	60.0/70.0 Hz	60.0/70.0 Hz
Dimensions:		
Height	10.2 in	26.0 cm
Depth	12.6 in	32.1 cm
Width	11.7 in	29.8 cm
Weight	13.0 lb	5.9 kg
MONITOR UNIT		
Dimensions:		
Height	10.2 in	25.9 cm
Depth	12.6 in	32.1 cm
Width	11.7 in	29.7 cm
Weight	13.0 lb	5.9 kg

# System Design Overview

---

## Introduction

The COMPAQ DESKPRO 386/20e Personal Computer extends advanced 386 power and performance to fulfill the increasingly sophisticated needs of today's 286 users by delivering:

- Optimized system architecture engineered to provide high performance for a variety of applications
- Innovative personal computer design that offers popular features and expansion capabilities

This **System Design Overview** discusses the optimized system performance of the COMPAQ DESKPRO 386/20e Personal Computer. It focuses on the high-performance subsystems of the COMPAQ DESKPRO 386/20e and permits evaluation of their performance in the context of comparable systems by means of sample application tests. It also provides a discussion of bus architecture, an essential element of a system that cannot improve performance but which, unless carefully designed and implemented, can impede it.

In addition, this section contains a multitasking test that allows users to evaluate the impact of carefully integrated high-performance subsystems in a typical multitasking environment.

---

## Microprocessor/Memory

The COMPAQ DESKPRO 386/20e Personal Computer combines the advanced 20-MHz 386 microprocessor with COMPAQ Flexible Advanced Systems (Flex) Architecture to deliver outstanding personal computer performance for demanding applications. Flex architecture uses an advanced memory caching design combined with an

industry-standard expansion bus to deliver zero-wait-state memory performance and complete compatibility with industry-standard hardware and software products.<sup>1</sup>

The microprocessor, clock rate, and memory architecture of each tested product are shown in Chart 1.

With the advent of new, more sophisticated applications for the MS-DOS and Microsoft OS/2 operating systems, today's users are demanding more power from their personal computers. With the expertly engineered COMPAQ DESKPRO 386/20e Personal Computer, these emerging requirements can be satisfied.

The Intel 82385 Cache Memory Controller with its own 32 Kbytes of high-speed (35-ns) static RAM keeps the most frequently used data in cache memory so that most microprocessor accesses are from cache memory rather than from main memory and, therefore, do not require additional wait states.<sup>2</sup> The cache memory in the COMPAQ DESKPRO 386/20e Personal Computer is implemented as a two-way-set associative cache. This organization reduces the potential for thrashing and provides significant performance benefits in multitasking environments.

---

<sup>1</sup>For a more complete discussion, please see the section entitled "COMPAQ Flexible Advanced Systems Architecture."

<sup>2</sup>In 286- and 386-based personal computer architectures, a minimum of two microprocessor clock cycles is required to complete a memory transaction. Each additional cycle beyond these two is referred to as a "wait state" and represents a cycle the CPU must wait before the memory transaction is complete. A "zero-wait-state" operation is one in which no additional cycles are required.

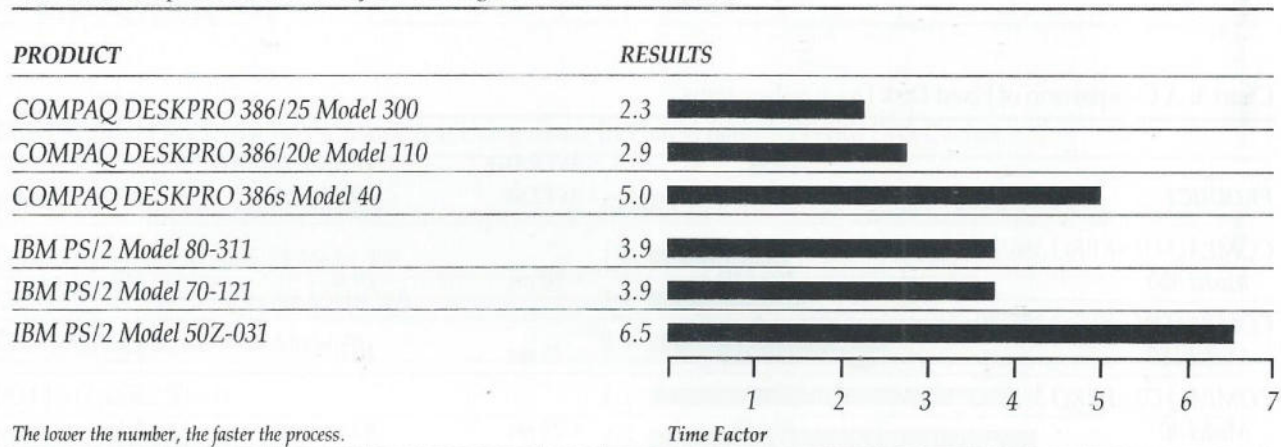


**Chart 1: Architectures of Personal Computers Tested**

PRODUCT	MICROPROCESSOR	CLOCK RATE	MEMORY TYPE
COMPAQ DESKPRO 386/25 Model 300	386	25 MHz	Cache
COMPAQ DESKPRO 386/20e Model 110	386	20 MHz	Cache
COMPAQ DESKPRO 386s Model 40	Intel 386SX™	16 MHz	Paged
IBM PS/2 Model 80-311	386	20 MHz	Paged
IBM PS/2 Model 70-121	386	20 MHz	Paged
IBM PS/2 Model 50Z-031	80286	10 MHz	DRAM

The impact of microprocessor speed and memory architecture on the typical application performance is demonstrated in the application test, as shown in Chart 2 entitled "Microprocessor/Memory Test Using Lotus 1-2-3 Version 2.0." The task performed was the recalculation of a complex business forecast spreadsheet under Lotus 1-2-3 Version 2.0. The results, expressed in increments of time, are shown numerically and in bar graph form. The

COMPAQ DESKPRO 386/20e, with a 20-MHz 387 coprocessor and cache memory architecture, outperformed the IBM PS/2 Model 70-121 with a 20-MHz 387 and paged-memory architecture by 34%. Because both machines were using the 20-MHz 386 and 387, this performance differential can be directly attributed to the sophisticated cache memory architecture of the COMPAQ DESKPRO 386/20e.

**Chart 2: Microprocessor/Memory Test Using Lotus 1-2-3 Version 2.0**

## The System Peripherals Advantage

The advanced system peripherals in the COMPAQ DESKPRO 386/20e Personal Computer complement the high level of performance featured in the 20-MHz 386 microprocessor. By providing a balanced system architecture in which no subsystem constrains another, the COMPAQ DESKPRO 386/20e provides high performance across a variety of applications.

### FIXED DISK DRIVES

The 110- and 40-megabyte fixed disk drives offered with the COMPAQ DESKPRO 386/20e have been designed to deliver consistent high performance across a variety of business applications (Chart 3).

The integrated 110- and 40-megabyte fixed disk drives use very large scale integration (VLSI) technology to integrate a buffer with the drive controls on the drive itself. The 110-megabyte fixed disk drive features a 32-Kbyte look-ahead buffer that contributes significantly to the high performance of the drive. The drive interface is integrated onto the system board, saving an industry-standard expansion slot for other uses.

In most cases, these controllers immediately provide the buffered data when the microprocessor makes the next request, significantly reducing the amount of time the microprocessor spends accessing the fixed disk drive. The controller can transfer a full track of data between the disk and buffer in one disk revolution (1:1 interleave), where other systems might require multiple revolutions to transfer a track.

For applications such as databases that make frequent, random requests for data, the COMPAQ DESKPRO 386/20e fixed disk drives offer fast average access times that shorten the time needed to sort and index database files. For a typical database test involving a series of four operations (copy, sort, index, and replace) on a 1000-record database, the COMPAQ DESKPRO 386/20e was significantly faster than the IBM PS/2 Model 70-121 (Charts 4 and 5).

For applications such as databases that load large data files from the fixed disk drive to system memory, the high-capacity COMPAQ DESKPRO 386/20e fixed disk drives offer fast data transfer rates, 1:1 interleave, and built-in data buffering capability to load application data files faster.

**Chart 3: A Comparison of Fixed Disk Drive Subsystems**

PRODUCT	DISK CAPACITY	AVERAGE ACCESS	TRANSFER RATE MBIT/SEC	INTERLEAVE
COMPAQ DESKPRO 386/25 Model 300	300 MB	<20 ms	10.0	1:1
COMPAQ DESKPRO 386/20e Model 110	110 MB	<25 ms	10.0	1:1
COMPAQ DESKPRO 386s Model 40	40 MB	<29 ms	8.0	1:1
IBM PS/2 Model 80-311	314 MB	23 ms	10.0	1:1
IBM PS/2 Model 70-121	120 MB	23 ms	10.0	1:1
IBM PS/2 Model 50Z-031	30 MB	39 ms	7.5	1:1

The lower a figure expressed in units of time (such as "Average Access"), the faster the process. The higher a figure expressed in amounts/time (such as "Transfer Rate"), the faster the process.

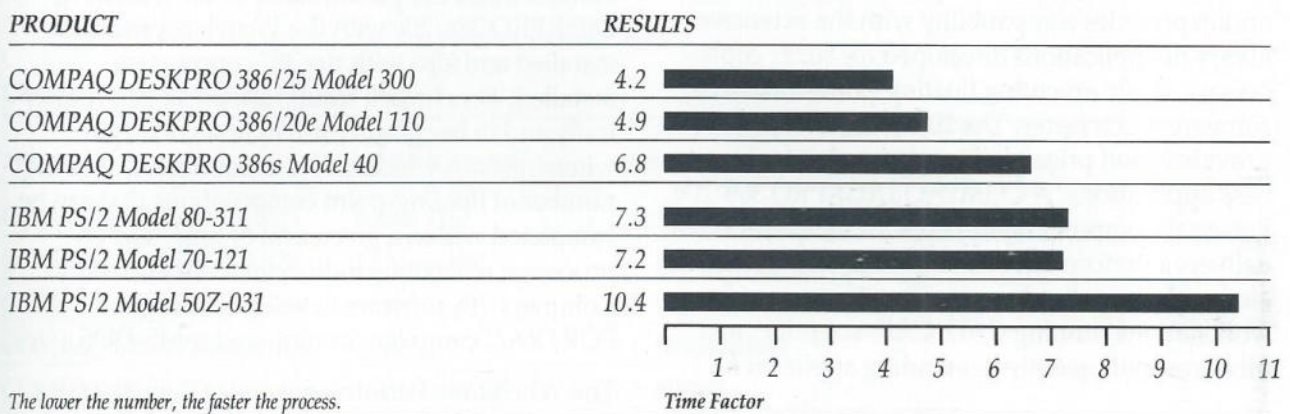


Further enhancing fixed disk drive performance is the COMPAQ Disk Cache utility which brings memory access speed to many disk reads (Chart 5). Disk caching stores frequently accessed disk information in memory to accelerate subsequent accesses. The Disk Cache utility also allows use of a queued writes option that brings increased performance across a variety of applications. The test results presented in Chart 5 were achieved using the new queued writes feature. MS-DOS

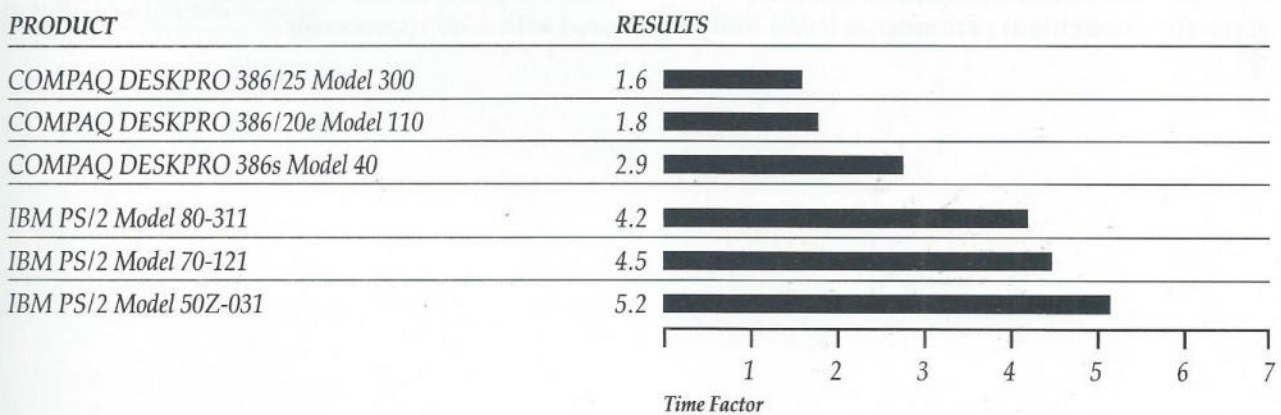
Version 3.3 as published by Compaq also enhances fixed disk drive use by permitting fixed disk drive partitions as large as the drives themselves (up to 512 megabytes).

Comparison of the two sets of results also demonstrates the performance contribution of the Disk Cache feature. The COMPAQ DESKPRO 386/20e Personal Computer Model 110 with Disk Cache performs the database test 172% faster than without Disk Cache.

**Chart 4:** Fixed Disk Drive Performance Test Using dBase III Plus Version 1.1 (Without Disk Cache)



**Chart 5:** Fixed Disk Drive Performance Test Using dBase III Plus Version 1.1 (With Disk Cache)



### COPROCESSORS

Use of a fast numeric coprocessor ensures that floating-point computations do not limit application performance. The COMPAQ DESKPRO 386/20e Personal Computer provides numeric coprocessor flexibility. While continuing its tradition of industry-standard compatibility, Compaq brings minicomputer computation speeds to the COMPAQ DESKPRO 386/20e by providing the optional 20-MHz 387 and Weitek coprocessors. Either option can be plugged into a superset socket on the COMPAQ DESKPRO 386/20e system board.

The industry-standard 387 is the coprocessor of choice for the majority of coprocessor users. This option provides compatibility with the extensive library of applications developed for 80287 coprocessors, while executing floating-point-intensive software much faster. The 20-MHz 387 coprocessor provides good price/performance value for business applications. A COMPAQ DESKPRO 386/20e Personal Computer equipped with the 20-MHz 387 delivers a performance level traditionally associated with specialized engineering and scientific workstations running CAD/CAE, scientific, and other computationally demanding applications.

The combination of the COMPAQ DESKPRO 386/20e Personal Computer and the Weitek coprocessor serves users with extremely complex computational requirements. Solids modeling, 3-D CAD, and other floating-point-intensive applications execute at performance levels well

above those of many minicomputers. The Weitek coprocessor takes advantage of Weitek-specific software.

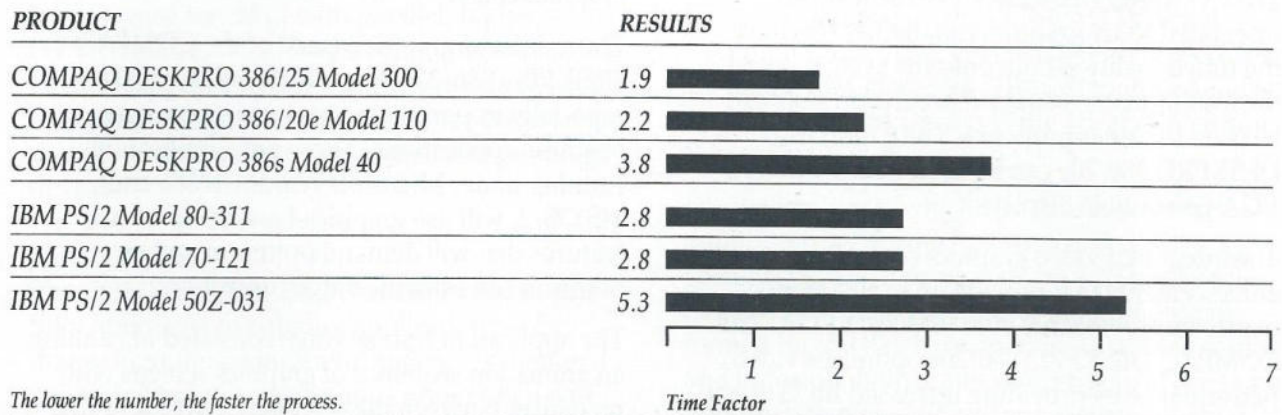
The application test for the 387 coprocessor removed hidden lines from a sample drawing of the Space Shuttle using the AutoCAD HIDE command. The results are shown in Chart 7, entitled "Intel Coprocessor Performance Using AutoCAD Version 9.0." Comparing the AutoCAD test results reveals 27% higher performance by the 387-equipped COMPAQ DESKPRO 386/20e over the similarly equipped IBM PS/2 Model 70-121.

Chart 8, entitled "Whetstone Performance," demonstrates the performance of the COMPAQ DESKPRO 386/20e with the Weitek coprocessor installed and also with the 387 coprocessor installed. Benchmark results are presented numerically and in bar graph form in units of mega-whetstones. A whetstone is a measurement of the number of floating-point computations that can be completed within a given unit of time. The coprocessor whetstone indices were measured by Compaq with software developed using a FORTRAN compiler running under MS-DOS.

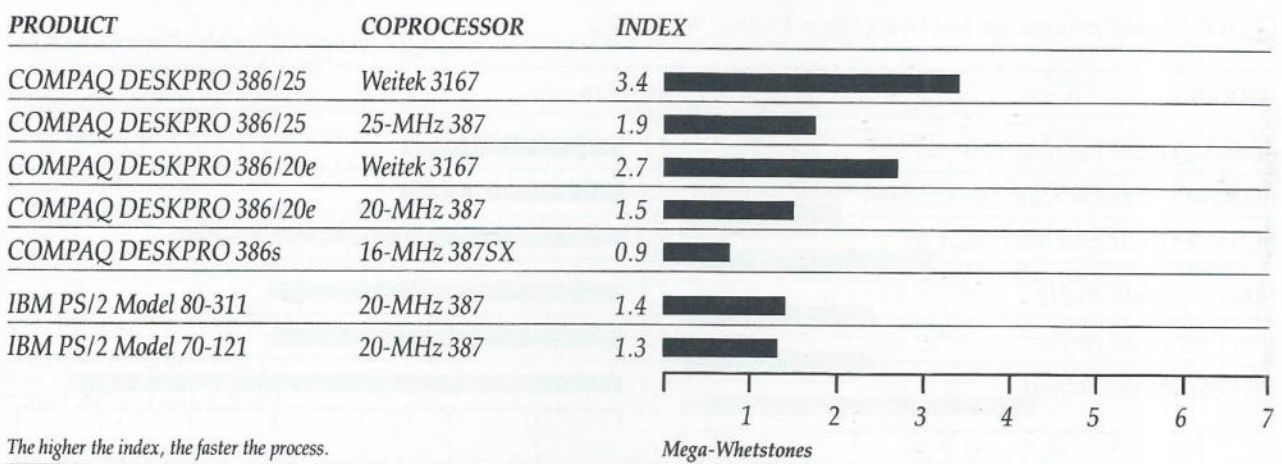
The Whetstone Performance Index demonstrates the high level of performance of the COMPAQ DESKPRO 386/20e in this computing area. For example, the index indicates that the COMPAQ DESKPRO 386/20e with the Weitek coprocessor installed performs 80% faster than when configured with a 387 coprocessor.



**Chart 7: Intel Coprocessor Performance Using Autocad Version 9.0**



**Chart 8: Whetstone Performance**



**VIDEO**

The COMPAQ DESKPRO 386/20e features integrated VGA-graphics capabilities. Because the functionality is built onto the system board, the four industry-standard expansion slots can be used for other purposes. The COMPAQ DESKPRO 386/20e can be used with COMPAQ VGA-compatible displays.

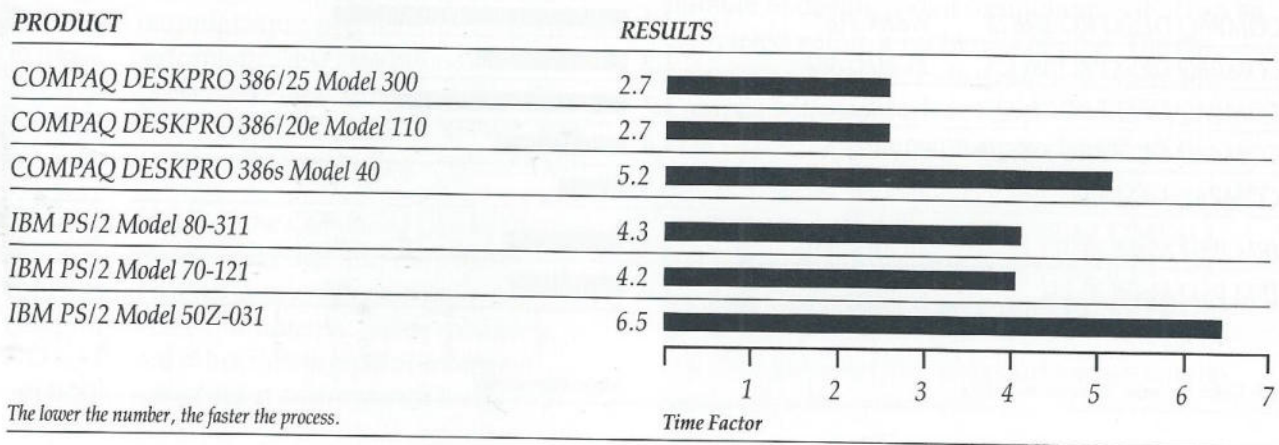
The integrated video graphics controller features enhancements that provide up to 50% performance improvements over IBM PS/2 VGA. The COMPAQ DESKPRO 386/20e optimizes video performance by providing increased BIOS execution speed, a 16-bit data path, and enhanced video

memory arbitration to improve text scrolling and graphics speed.

The increased graphics speed of the COMPAQ DESKPRO 386/20e Personal Computer will be especially important to users running emerging business applications. These new applications, running under Microsoft Windows/386 and MS OS/2, will use graphics-based ease-of-use features that will demand optimum system performance from the video controller.

The application test for video consisted of running an animation sequence of graphics screens with no pauses between the screens. Chart 9, entitled "Video Performance Test Using Show Partner Version 2.2," presents the results.

**Chart 9:** Video Performance Test Using Show Partner Version 2.2





**STANDARD INTERFACES**

The COMPAQ DESKPRO 386/20e Personal Computer comes standard with parallel, high-speed (19.2-Kbaud) asynchronous communications, and auxiliary input interfaces. These provide the ability to expand the system with a wide variety of I/O devices such as printers, modems, and pointing devices.

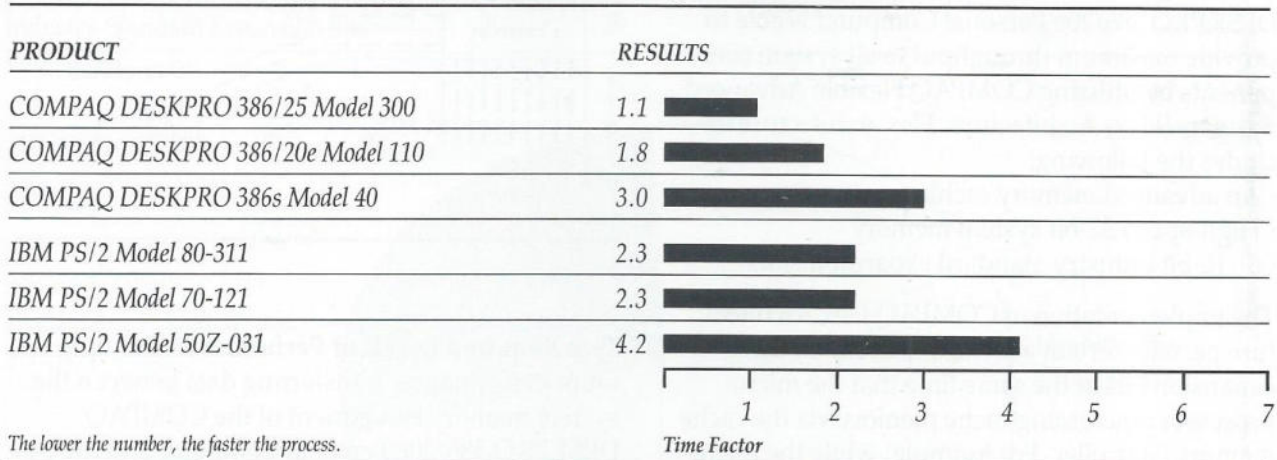
**MULTITASKING**

The COMPAQ DESKPRO 386/20e has been carefully optimized to enhance application performance in multitasking environments. Whether it is running today's applications under Microsoft Windows/386 or tomorrow's MS OS/2 applications, the COMPAQ DESKPRO 386/20e provides outstanding overall system performance.

The multitasking test was run using Microsoft Operating System/2 Standard Version 1.0 as published by Compaq on the COMPAQ Personal Computers and using IBM OS/2 Standard Version 1.0 on the IBM machines. The test multitasked two applications: IBM DisplayWrite 4/2 and Microrim R:base for OS/2.

DisplayWrite 4/2, which was the foreground application, performed a search and replace, a spell-check, and a pagination on a 35-page document. R:base, the background application, performed typical database operations such as sorting and indexing. Both applications began at the same time; testing ended when the background application finished. All machines were configured with four megabytes of memory.

**Chart 10: Performance of Typical Applications in a Multitasking Environment**



## Bus Architecture

### COMPAQ FLEXIBLE ADVANCED SYSTEMS ARCHITECTURE

**Bus Architecture:** Bus architecture is the way in which a system provides appropriate throughput for all of the attached system components. The microprocessor, memory, and I/O peripherals are the active contributors to system performance, with the bus providing support. In other words, bus architecture can only be a limiter of system throughput, not an enhancer, since the microprocessor and peripherals (especially the disk subsystem) are the primary determinants of system performance. As long as the bus architecture does not create a bottleneck for these critical subsystems, it is essentially a neutral factor in overall system performance.

**COMPAQ Flex Architecture:** The COMPAQ DESKPRO 386/20e Personal Computer is able to provide maximum throughput to all system components by utilizing COMPAQ Flexible Advanced Systems (Flex) Architecture. Flex architecture includes the following:

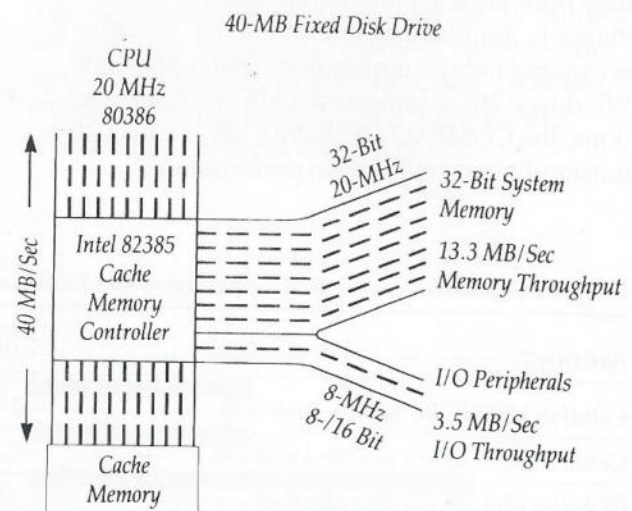
- An advanced memory caching system
- High-speed 32-bit system memory
- 8-/16-bit industry-standard expansion slots

The implementation of COMPAQ Flex Architecture permits certain activities to occur on the expansion bus at the same time that the microprocessor is accessing cache memory via the cache memory controller. For example, while the microprocessor is accessing cache memory during a database operation, data can be transferred over a network from another computer and stored in system memory for later use. Thus, COMPAQ Flex Architecture, that follows, permits even greater utilization of the high speed and the high perfor-

mance of the COMPAQ DESKPRO 386/20e while maintaining compatibility with industry-standard peripherals.

See the section on "Microprocessor/Memory" in this overview for more discussion of the cache memory function of the Intel 82385 cache memory controller.

### COMPAQ Flexible Advanced Systems Architecture



**Two Required Levels of Performance:** For optimum performance, transferring data between the system memory component of the COMPAQ DESKPRO 386/20e Personal Computer and the 386 microprocessor must occur rapidly enough so that the 386 rarely waits to receive system memory data. This need for rapid data transfer is satisfied by the cache memory design. Ninety-five percent (95%) of all microprocessor memory requests are satisfied at zero wait states.



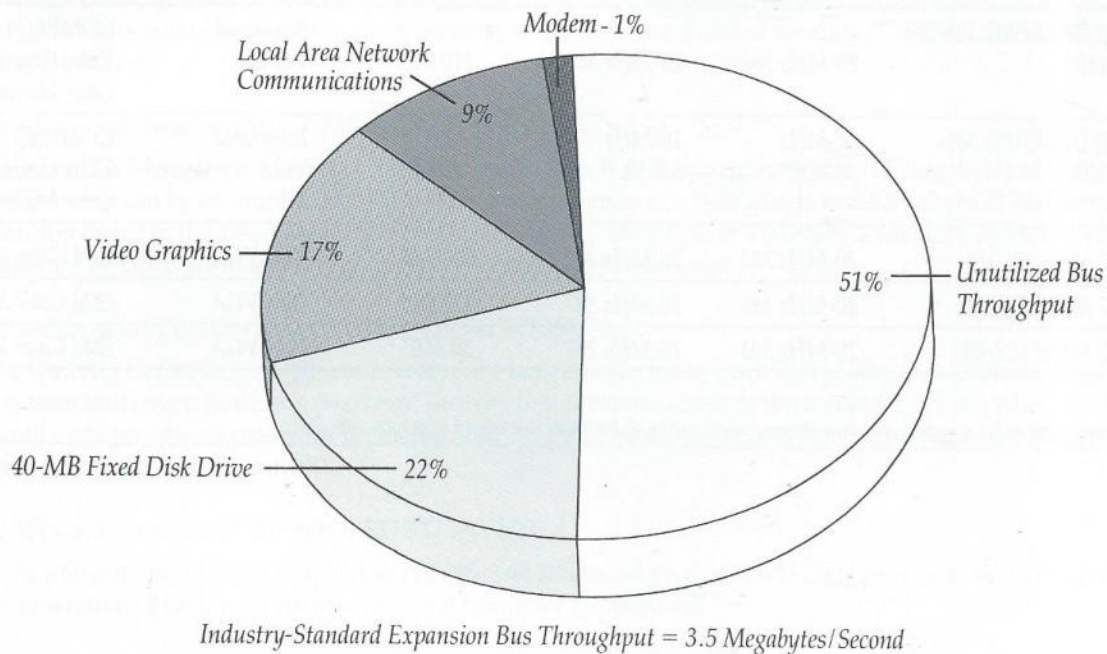
Chart 11 demonstrates the theoretical maximum expansion bus utilization for COMPAQ DESKPRO 386/20e. It compares the performance needs of typical, anticipated system components with the throughput potential of the industry-standard expansion bus. As shown in the chart, even if all system components access the industry-standard expansion bus simultaneously, more than 50 percent of the throughput potential of the expansion bus will be unutilized and available to perform additional tasks.

Other system components operate effectively by transferring data on the industry-standard, expansion bus. For example, even the highest-performance local area network (LAN) communications options typically utilize less than 10 percent of the industry-standard bus throughput.

The assumptions made in the diagram present an unlikely and "worst-case" scenario, since most operations involving system components do not involve transferring data on the industry-standard expansion bus. Typical fixed disk drive operations, for example, spend less than 5 percent of the time transferring data on the expansion bus (more than 95 percent of the operation involves finding the track [seek] and data access). This means that the average fixed disk drive rarely requires the expansion bus throughput noted in the diagram.

By carefully tuning COMPAQ Flex Architecture to the performance needs of all system components, the COMPAQ DESKPRO 386/20e Personal Computer delivers optimum system performance while maintaining full compatibility with expansion options.

**Chart 11:** Comparison of System Component Performance With Throughput Potential of the Industry-Standard Expansion Bus



## Test Methodology

Providing meaningful results requires careful, considered choices of equivalent products to test and compare in benchmarks and application results. Since the COMPAQ DESKPRO 386/20e is designed for the advanced business user, it was compared in this System Design Overview with comparable personal computers from the IBM Corporation. The hardware configurations used, all of which are available to the user, are listed in the table immediately following, "Tested Hardware Configurations."

Application results are presented numerically and as bar charts. Application tests were performed with the manufacturer's disk cache installed except where noted. The disk cache was configured for 256 Kbytes of extended memory on COMPAQ products; the IBM PS/2 Models 50Z, 70, and 80 used a page size of four sectors (P4). The COMPAQ models were tested with MS-DOS Version 3.3 as published by Compaq Computer Corporation; the IBM PS/2 models were tested with PC-DOS Version 3.3 as published by IBM Corporation, except where noted.

### Tested Hardware Configurations

<i>PRODUCT</i>	<i>MICRO-PROCESSOR</i>	<i>COPROCESSOR</i>	<i>FIXED DISK DRIVE</i>	<i>VIDEO CONTROLLER</i>	<i>MONITOR</i>
COMPAQ DESKPRO 386/25 Model 300	25-MHz 386	25-MHz 387	300 MB	Video Graphics Controller	COMPAQ Video Graphics Color Monitor
COMPAQ DESKPRO 386/20e Model 110	20-MHz 386	20-MHz 387	110 MB	Integrated VGA	COMPAQ Video Graphics Color Monitor
COMPAQ DESKPRO 386s Model 40	16-MHz 386SX™	16-MHz 387SX™	40 MB	Integrated VGA	COMPAQ Video Graphics Color Minitor
IBM PS/2 Model 80-311	20-MHz 386	20-MHz 387	314 MB	IBM VGA	IBM Color Monitor
IBM PS/2 Model 70-121	20-MHz 386	20-MHz 387	120 MB	IBM VGA	IBM Color Monitor
IBM PS/2 Model 50Z-031	10-MHz 386	10-MHz 287	30 MB	IBM VGA	IBM Color Monitor

*All products equipped with 1 megabyte of System Memory except during Multitasking Test when 4 megabytes were used.*



## Questions and Answers

**Q:** *How many mass storage devices can be installed in a COMPAQ DESKPRO 386/20e?*

**A:** The COMPAQ DESKPRO 386/20e can be configured with up to four mass storage devices. One or two diskette drives can be installed to enhance data interchange capabilities. In addition, either two fixed disk drives or a fixed disk drive and a tape drive can be installed. This configuration flexibility provides users with the opportunity to choose the options that best meet their requirements.

**Q:** *Can I install both a 387 and a Weitek coprocessor?*

**A:** No, the superset socket allows installation of either the 387 coprocessor or the Weitek coprocessor.

**Q:** *Do the integrated features of the COMPAQ DESKPRO 386/20e use any of the four industry-standard expansion slots?*

**A:** No, the integrated VGA graphics, 1 megabyte of 32-bit memory, and auxiliary input, asynchronous communications (serial), and parallel interfaces do not use any of the four available expansion slots. In addition, even controllers for such options as the diskette drive, fixed disk drive, and 40-Megabyte Tape Drive do not require the use of an expansion slot.

**Q:** *How can the one megabyte of standard memory be utilized?*

**A:** The USER PROGRAMS diskette includes a utility called INSTALL that will allow you to install utilities that take advantage of the additional 256 Kbytes of RAM beyond the normal 640-Kbyte limit of MS-DOS. This installation utility will allow you to choose how much memory to allocate for expanded memory (CEMM), virtual disk(s), and/or Disk Cache.

**Q:** *How do I upgrade memory in my COMPAQ DESKPRO 386/20e?*

**A:** Starting with a 1-Megabyte Memory Module on the system board, upgrades of up to 13 megabytes of high-speed 32-bit memory can be accomplished by installing a combination of a 1-Megabyte or 4-Megabyte 32-bit Memory Expansion Board in the 32-bit memory expansion slot and 1-Megabyte or 4-Megabyte Memory Modules. These options are installed without using an industry-standard expansion slot.

**Q:** *What are the security features of the COMPAQ DESKPRO 386/20e?*

**A:** The COMPAQ DESKPRO 386/20e comes standard with an external keylock that prevents unauthorized opening of the system unit cover; power-on password security that prevents access to the computer system when it is turned on until a unique, preset password is entered; and keyboard password security that locks the keyboard without having to turn the system unit off.

**Q:** *Will MS OS/2 run on the COMPAQ DESKPRO 386/20e?*

**A:** Yes. By utilizing the advanced capabilities of 386- and 286-based products, MS OS/2 provides the platform for the next generation of high-performance personal computer applications.

The first part of the document discusses the importance of maintaining accurate records. It states that records are essential for the proper management of an organization and for ensuring accountability. The text emphasizes that records should be kept up-to-date and accessible to all relevant personnel.

The second part of the document outlines the procedures for handling records. It describes the steps involved in creating, maintaining, and archiving records. The text also discusses the importance of security and confidentiality in record management.

The third part of the document provides a detailed overview of the record management system. It includes information about the software used, the roles and responsibilities of the staff, and the processes for monitoring and evaluating the system's performance.

The fourth part of the document discusses the challenges of record management. It identifies common problems such as data loss, corruption, and unauthorized access. The text offers solutions and best practices for addressing these issues.

The fifth part of the document provides a summary of the key findings and recommendations. It highlights the importance of a proactive approach to record management and offers suggestions for further improvement.

The final part of the document includes a list of references and a glossary of terms. The references cite various sources of information used in the document, and the glossary defines key terms and acronyms.



---

*Notes*

---

Notes

Notes





