

IBM Personal Computer Questions and Answers

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PREFACE

This is an **IBM INTERNAL USE ONLY** document and, therefore, its use is confined to IBM employees.

This document has not been subjected to any formal review and has not been checked for technical accuracy.

The products referenced in this document may not be available in all countries.

This document is a mixture of announcement material, answers from the National Marketing center, information from the employee information packet, results from a physical examination of the unit, general industry knowledge, and a liberal amount of personal opinion.

If you have further questions, corrections to my answers, or any further information, I'd like to hear from you.

THE OPINIONS EXPRESSED ARE THOSE OF THE AUTHOR, NOT IBM.

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EMPLOYEE QUESTIONS

What does the NMC say about this document? (10/5)

I sent a copy of this document to the National Marketing Center for their information and verification. They asked me to emphasize that there is considerable personal opinion in this document, and that it may not be entirely correct. I'll state it again, **THE OPINIONS EXPRESSED ARE THOSE OF THE AUTHOR, NOT IBM.**

It is not my intent to mislead anyone, or to reveal IBM Confidential product plans. This information is derived from:

- The announcement literature
- The employee information packet
- 5 The Technical Reference manual
- Discussions with the National Marketing Center
- Personal observation of the IBM Personal Computer
- intel's product literature
- Experience with other personal computers
- Personal opinion
- Personal Computer periodicals

What are the employee prices? (10/5)

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Component	List	Empl	Disc
	----	----	----
System Unit (48K, 1 diskette)	2235	1517	32
16KB Memory Expansion Kit	90	45	50
32KB Memory Expansion Option	325	212	34
64KB Memory Expansion Option	540	344	36
Additional diskette drive	570	366	36
IBM Monochrome Display	345	227	34
IBM Monochrome Display and Printer Adapter	335	207	38
Color/Graphics Monitor Adapter	300	223	22
IBM 80 CPS Matrix Printer	755	555	26
Printer Adapter	150	89	41
Printer Cable	55	37	33
Printer Stand	55	37	33
Game Control Adapter	55	39	29
IBM Personal Computer DOS diskette	40	20	50
Asynchronous Communications Adapter	150	96	36
Asynchronous Communications Support	40	25	38
VisiCalc	200	135	32
EasyWriter	175	91	48
Pascal Compiler	300	150	50
General Ledger	595	300	49
Accounts Receivable	595	300	49
Accounts Payable	595	300	49
Microsoft Adventure	30	18	40
Advanced Diagnostics	155	93	40
5 Technical Reference Manual	36	21.50	40

The employee price applies to components purchased with the system unit.

What is the fastest way to get one? (9/18)

Buy it from ComputerLand. Put in your order now. You won't get the employee price that way, though.

What if I want the employee price? (9/18)

Mail the information request card in the current issue of THINK magazine to Boca Raton. If you haven't received THINK, mail a letter to:

International Business Machines, Inc.
 IBM Personal Computer
 Employee Purchase
 P.O. Box 1328-E
 Boca Raton, Florida 33432

Include your name, employee number, IBM location, and home address in the letter.

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What is the first day order window for employees? (10/7)

All employee orders received before October 31 will be pooled, and a random selection will determine the delivery sequence.

| Only one system per employee will be placed into the first day order pool.

| If you place multiple orders before October 31, Boca Raton will pick one arbitrarily or they may contact you.

| Boca Raton will compare serial numbers on all employee orders to keep employees from ordering multiple systems in the first day order lottery. That means if you have multiple IBM employees in your family, you can get into the lottery multiple times.

Do I have to order by 10/31 to get the Employee price? (9/18)

No. Employees should be able to get the discount at any time.

Can I get a Special Price on new announcements? (10/7)

| Boca Raton indicates that the discount will be available only with system units. If a new announcement occurs, an employee price will be available on the new component. However, to get the employee price, you must order a (new) system unit.

5 If a new announcement occurs before you receive your system, you may cancel your order and send in a new order. You will get a changed (that means later) delivery date.

5 If you anticipate new announcements later, give consideration to delaying your order until that announcement occurs. Balance your immediate desire to get a system with the financial impact of the employee price on a new announcement.

When does the payroll deduction start? (9/23)

I assume that the payroll deductions begin when your system is delivered, but I'm not sure. I'm checking with ISD.

When will I get my system? (10/6)

6 The Employee information packet indicates that employee orders will be scheduled on an "as available" basis. Volume shipments for employees may not begin until the first quarter of 1982.

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How many systems can I get at the Employee price? (10/7)

| One per immediate family member. Boca Raton defines "immediate" family members as your dependents.

| Only one system per employee will be placed into the first day order pool.

Will I have to pay sales taxes? (10/5)

5 I'm afraid so. The employee information packet states that the taxes
5 you will be charged are the applicable taxes that apply to the pick-up
5 location (dealer store).

What payment options do I have? (10/7)

| Boca Raton indicates you have two options:

| Pay the total price by check at delivery

| Finance the total amount over two years

| If you want to pay off the total early, contact your local payroll department, they will compute the payoff charge.

What is the finance charge? (10/7)

| 12% in all states except Alabama, which is 10%.

| Boca Raton indicates that the computation is:

| Take the total price, including sales tax

| Multiply by 1.13

| Divide by the number of pay periods in two years (normally 104 or 48)

| The result is the per paycheck deduction for your system

Where can I see the IBM Personal Computer? (10/5)

5 A demonstration system should be available at most ComputerLand stores.

When will I get my information packet? (10/5)

The National Marketing Center indicated that the packets would be mailed during the week starting September 21. The first day order window was also extended to 10/31/81 for employees to get the packets back.

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5 Some employees reported receipt as early as September 28. I received
5 mine October 3.

Who can submit software? (9/20)

The program is open to the general public with the exception of the few IBM employees who evaluate submissions. The submitter must be an adult (age 18 or over).

What if IBM rejects my submission? (10/6)

IBM's position is that if IBM rejects employee submitted software, it would be a conflict of interest for the employee to market it independently or submit it to someone else.

6 Several of the IBM Computer Clubs plan to distribute public domain software for the IBM Personal Computer and solicit employee contributions of software that IBM rejects.

6

6 Those clubs are checking with the lawyers to find out if such operations will be permitted.

Is there an Engineering Change policy? (10/7)

| Boca Raton has no plans to upgrade systems to reflect engineering changes.
| es.

Can I write it off my income tax? (10/5)

5 Check with your accountant. I'd suggest two possible approaches, either a professional tool, or as an offset to software royalty income.

Can I change my order after I submit it? (10/5)

5 You can cancel it and reorder. That will probably affect your delivery date.

Do I need a separate Diskette Adapter? (10/6)

6 The Employee information packet lists a diskette adapter, item number 1503780, with an employee price of \$135. Some employees are confused by this item's significance.

6

6 YOU DON'T NEED TO ORDER A SEPARATE DISKETTE DRIVE ADAPTER, it is included in the Employee System unit configuration.

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Should I order the Communications software now? (10/7)

| The Employee information packet indicates that the Asynchronous Communi-
| cations Support software wouldn't be available until December, and
| employees ordering that software wouldn't get a delivery date until it
| became available.

| I wouldn't mess with it. The employee discount on that item is only
| \$15.

| Note that the hardware (which is the expensive part) isn't delayed, just
| the software.

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MARKETING INFORMATION

How do I deal with customer inquiries? (10/6)

If your customer is a Volume Purchase Agreement (VPA) candidate (e.g. if they are interested in 20 or more units), the IBM Marketing Representative or the customer can call the National Marketing Center at (800) 431-2670. IBM employees can use tieline 254-6840.

If the interest is in less than 20 units, the customer should be referred to a ComputerLand store, a Sears Business Systems Center, or an IBM Product Center. ComputerLand is the only active distribution channel in the Los Angeles area.

6 Please don't call me to tell me about your prospect. That is the func-
6 tion of the National Marketing Center.

Where is the nearest ComputerLand? (10/6)

6	La Mesa:	7200 Parkway Drive	(714) 464-5656
6			
6	Lawndale:	16720 South Hawthorne Blvd.	(213) 371-7144
6			
6	Newport Beach:	4250-M Scott Drive	(714) 975-0953
6			
6	Pasadena:	81 North Lake Avenue	(213) 449-3205
6			
6	San Bernardino:	289 East Highland Avenue	(714) 886-6838
6			
6	San Diego:	4233 Convoy Street	(714) 560-9912
6			
6	San Fernando Valley:	20812 Ventura Boulevard	(213) 716-7714
6			
6	Thousand Oaks:	171 E. Thousand Oaks Blvd.	(805) 495-3554
6			
6	Tustin:	104 West First Street	(714) 544-0542
6			
6	West Covina:	853 South Glendora Avenue	(213) 960-6351
6			
6	West Los Angeles:	10600 Pico Boulevard	(213) 559-3353

How do I deal with distributor inquiries? (10/7)

The Blue letter states:

Inquiries from enterprises who wish to act as distributors or resellers of the IBM Personal Computer should be directed to:

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Manager of Personal Computer Marketing
DPD HQ, Department 8C3
1133 Westchester Avenue
White Plains, NY 10604

The NMC told me that they were routing these inquiries to ISD.

Other inquiries, such as firms desiring to develop software or hardware, or "professional or technical" inquiries, should be directed to:

IBM Personal Computer
P.O. Box 1328-P
Boca Raton, Florida 33432

What promotional material is available? (9/18)

The following publications can be ordered from Mechanicsburg:

G520-3722 For Professional Productivity brochure
G520-3723 For the Educational Community brochure
G520-3916 Hardware Overview flyer
G520-3917 Software Overview flyer
G520-3918 Accounts Receivable flyer
G520-3919 Accounts Payable flyer
G520-3920 General Ledger flyer
G520-3921 Communications flyer
G520-3922 VisiCalc flyer
G520-3923 EasyWriter flyer

I'm told that Mechanicsburg is out of these, well back ordered, and some weeks from relieving that backlog.

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SYSTEM QUESTIONS

Is the S-100 bus used?

No.

Is a real time clock included? (9/21)

Yes. You can set the time of day from DOS or from BASIC. The time and date are lost when the system is bootstrapped or powered off.

Is it simple to start up? (9/21)

You just insert a system disk into drive A and turn on the power. If you want to re-boot without turning the power off, you press three keys simultaneously and it re-boots.

Are 5 expansion slots enough? (10/5)

In my opinion, it could be a problem.

The first 64KB fits onto the system board, taking no slots.

5 Each additional memory increment (32 or 64KB) takes one slot.

One expansion slot is also used by each of the following:

5-1/4 inch Diskette Drive Adapter

Asynchronous Communications Adapter

Monochrome Display and Printer Adapter

Color/Graphics Monitor Adapter

Printer Adapter

Game Control Adapter

The maximum 256K configuration uses 3 expansion slots for memory boards, and probably one slot each for the diskette adapter the Monochrome Display and Printer Adapter.

You probably wouldn't need both the Monochrome Display and Printer Adapter and the Color/Graphics Monitor Adapter. Furthermore, the Printer Adapter isn't necessary if you have the Monochrome Display and Printer Adapter.

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I talked this issue over with the National Marketing Center, they suggested that I probably wouldn't need all the cards at the same time, and depending upon what I was doing, I could swap cards.

How much memory do I need? (10/6)

EasyWriter and VisiCalc need a minimum of 64KB.

Pascal requires 128KB.

128KB is recommended for VisiCalc.

BASIC won't be able to use much more than 96KB.

6 I don't know how to say this well, but I'd get 128KB minimum if I were a
6 machine language programmer.

What are some sample configurations? (10/6)

Use these configurations for comparison, your configuration may differ.

The minimum system for the employee price includes a system unit with 48KB RAM, a diskette drive adapter, and one diskette drive.

In all of the below configurations, the "System Unit" includes:

40KB ROM containing Microsoft BASIC

48KB User memory

83 key keyboard

Programmable speaker

Cassette attachment jack

5-1/4 inch diskette drive adapter

One 5-1/4 diskette drive

1. Minimal configuration. User supplies RF modulator and TV set.

Component	List	Empl
-----	----	----
System Unit	2235	1517
Color/Graphics Monitor Adapter	300	207
IBM Personal Computer DOS diskette	40	20
	----	----
Total	2575	1744

The employee price is 32% off list.

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2. Minimal configuration plus games. User supplies RF modulator, TV set, and game paddles or joysticks.

Component	List	Empl
-----	-----	-----
System Unit	2235	1517
Color/Graphics Monitor Adapter	300	207
Game Control Adapter	55	39
IBM Personal Computer DOS diskette	40	20
-----	-----	-----
Total	2630	1783

The employee price is 32% off list.

3. Minimal configuration plus printer. User supplies RF modulator and TV set.

Component	List	Empl
-----	-----	-----
System Unit	2235	1517
Color/Graphics Monitor Adapter	300	207
IBM 80 CPS Matrix Printer	755	555
Printer Adapter	150	89
Printer Cable	55	37
IBM Personal Computer DOS diskette	40	20
-----	-----	-----
Total	3535	2425

The employee price is 31% off list.

4. Minimal Monochrome configuration.

Component	List	Empl
-----	-----	-----
System Unit	2235	1517
IBM Monochrome Display	345	227
IBM Monochrome Display and Printer Adapter	335	207
IBM Personal Computer DOS diskette	40	20
-----	-----	-----
Total	2955	1971

The employee price is 33% off list.

5. Minimal Monochrome configuration plus printer.

Component	List	Empl
-----	-----	-----
System Unit	2235	1517
IBM Monochrome Display	345	227
IBM Monochrome Display and Printer Adapter	335	207
IBM 80 CPS Matrix Printer	755	555
Printer Cable	55	37
IBM Personal Computer DOS diskette	40	20
-----	-----	-----

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Total 3765 2563

The employee price is 32% off list.

6. Monochrome word processing configuration, 64KB.

Component	List	Empl
-----	----	----
System Unit	2235	1517
16KB Memory Expansion Kit	90	45
IBM Monochrome Display	345	227
IBM Monochrome Display and Printer Adapter	335	207
IBM 80 CPS Matrix Printer	755	555
Printer Cable	55	37
IBM Personal Computer DOS diskette	40	20
EasyWriter	175	91
-----	----	----
Total	4030	2699

The employee price is 33% off list.

7. Monochrome word processing configuration, 64KB and 2 drives.

Component	List	Empl
-----	----	----
System Unit	2235	1517
16KB Memory Expansion Kit	90	45
Additional diskette drive	570	366
IBM Monochrome Display	345	227
IBM Monochrome Display and Printer Adapter	335	207
IBM 80 CPS Matrix Printer	755	555
Printer Cable	55	37
IBM Personal Computer DOS diskette	40	20
EasyWriter	175	91
-----	----	----
Total	4600	3065

The employee price is 33% off list.

8. Monochrome planning configuration, 128KB, 2 drives, VisiCalc, and EasyWriter.

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Component	List	Empl
-----	-----	-----
System Unit	2235	1517
16KB Memory Expansion Kit	90	45
64KB Memory Expansion Option	540	344
Additional diskette drive	570	366
IBM Monochrome Display	345	227
IBM Monochrome Display and Printer Adapter	335	207
IBM 80 CPS Matrix Printer	755	555
Printer Cable	55	37
IBM Personal Computer DOS diskette	40	20
VisiCalc	200	135
EasyWriter	175	91
	-----	-----
Total	5340	3544

The employee price is 33% off list.

9. Monochrome Pascal programming configuration, 128KB, 2 drives, and printer.

Component	List	Empl
-----	-----	-----
System Unit	2235	1517
16KB Memory Expansion Kit	90	45
64KB Memory Expansion Option	540	344
Additional diskette drive	570	366
IBM Monochrome Display	345	227
IBM Monochrome Display and Printer Adapter	335	207
IBM 80 CPS Matrix Printer	755	555
Printer Cable	55	37
IBM Personal Computer DOS diskette	40	20
Pascal Compiler	300	150
	-----	-----
Total	5265	3468

The employee price is 33% off list.

10. Monochrome Pascal programming configuration, 128KB, 2 drives, printer, communications, VisiCalc, and EasyWriter.

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Component	List	Empl
-----	----	----
System Unit	2235	1517
16KB Memory Expansion Kit	90	45
64KB Memory Expansion Option	540	344
Additional diskette drive	570	366
IBM Monochrome Display	345	227
IBM Monochrome Display and Printer Adapter	335	207
IBM 80 CPS Matrix Printer	755	555
Printer Cable	55	37
Asynchronous Communications Adapter	150	96
IBM Personal Computer DOS diskette	40	20
Asynchronous Communications Support	40	25
Pascal Compiler	300	150
VisiCalc	200	135
EasyWriter	175	91
	----	----
Total	5830	3815

The employee price is 34% off list.

11. 128KB, 2 drives, Pascal, VisiCalc, EasyWriter, communications, and games. User supplied monitor, printer, game paddles or joysticks, and light pen.

Component	List	Empl
-----	----	----
System Unit	2235	1517
16KB Memory Expansion Kit	90	45
64KB Memory Expansion Option	540	344
Additional diskette drive	570	366
Color/Graphics Monitor Adapter	300	223
Printer Adapter	150	89
Printer Cable (see note below)	55	37
Game Control Adapter	55	39
Asynchronous Communications Adapter	150	96
IBM Personal Computer DOS diskette	40	20
Asynchronous Communications Support	40	25
VisiCalc	200	135
EasyWriter	175	91
Pascal Compiler	300	150
	----	----
Total	4900	3177

The employee price is 35% off list.

Note: The printer cable is included because it is non standard. See printer section for details.

12. 128KB, 2 drives, Pascal, VisiCalc, EasyWriter, communications, and games. IBM Monochrome Display, Color/Graphics Monitor Adapter for games on TV. User supplied game paddles or joysticks, and light pen.

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Component	List	Empl
-----	----	----
System Unit	2235	1517
16KB Memory Expansion Kit	90	45
64KB Memory Expansion Option	540	344
Additional diskette drive	570	366
IBM Monochrome Display	345	227
IBM Monochrome Display and Printer Adapter	335	207
IBM 80 CPS Matrix Printer	755	555
Color/Graphics Monitor Adapter	300	223
Printer Cable	55	37
Printer Stand	55	37
Game Control Adapter	55	39
Asynchronous Communications Adapter	150	96
IBM Personal Computer DOS diskette	40	20
Asynchronous Communications Support	40	25
VisiCalc	200	135
EasyWriter	175	91
Pascal Compiler	300	150
Microsoft Adventure	30	18
	-----	-----
Total	6270	4132

The employee price is 34% off list.

13. IBM Monochrome Display and Printer, 128KB, 2 drives, communications, EasyWriter, VisiCalc, and Pascal.

Component	List	Empl
-----	----	----
System Unit	2235	1517
16KB Memory Expansion Kit	90	45
64KB Memory Expansion Option	540	344
Additional diskette drive	570	366
IBM Monochrome Display	345	227
IBM Monochrome Display and Printer Adapter	335	207
IBM 80 CPS Matrix Printer	755	555
Printer Cable	55	37
Printer Stand	55	37
Asynchronous Communications Adapter	150	96
IBM Personal Computer DOS diskette	40	20
Asynchronous Communications Support	40	25
Pascal Compiler	300	150
VisiCalc	200	135
EasyWriter	175	91
	-----	-----
Total	5885	3852

The employee price is 34% off list.

14. All hardware (except printer adapter) and software, 256KB. Note that not all the hardware can be installed at the same time.

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	Component	List	Empl
	-----	----	----
	System Unit	2235	1517
	16KB Memory Expansion Kit	90	45
	64KB Memory Expansion Option	540	344
	64KB Memory Expansion Option	540	344
	64KB Memory Expansion Option	540	344
	Additional diskette drive	570	366
	IBM Monochrome Display	345	227
	IBM Monochrome Display and Printer Adapter	335	207
	Color/Graphics Monitor Adapter	300	223
	IBM 80 CPS Matrix Printer	755	555
	Printer Cable	55	37
	Printer Stand	55	37
	Game Control Adapter	55	39
	Asynchronous Communications Adapter	150	96
	IBM Personal Computer DOS diskette	40	20
	Asynchronous Communications Support	40	25
	Pascal Compiler	300	150
	VisiCalc	200	135
	EasyWriter	175	91
	General Ledger	595	300
	Accounts Receivable	595	300
	Accounts Payable	595	300
	Microsoft Adventure	30	18
	Advanced Diagnostics	155	93
6	Technical Reference Manual	36	21.50
		----	----
6	Total	9326	5834.50

The employee price is 37% off list.

What memory chips are used? (9/21)

I examined a unit that had chips labeled "AM9016DPC" on the system unit board. I did not examine a memory expansion board.

Is the display memory addressable from the CPU? (9/25)

Yes.

The Monochrome Display Adapter memory occupies 4KB starting at X'B0000'.

The Color/Graphics Monitor Adapter memory occupies 16KB starting at location X'B8000'.

This is memory on the adapter card, it doesn't come out of the 256KB user memory.

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Are all address lines on the bus? (10/5)

5 The 8088 can address one megabyte. Sufficient address lines (20) are
5 present on the bus to permit the entire megabyte to be addressed.

Does it matter where the adapters are plugged? (9/25)

The diskette adapter should be plugged into slot 5, because the cables
to the diskette drives aren't long enough to use any other slot.

The Blue letter recommended slot 2 for the Monochrome Display and Print-
er Adapter, and also slot 2 for the Color/Graphics Monitor Adapter.
This led to some speculation that both adapters couldn't be put into the
system at the same time.

In fact, the two display adapters can be put in any slot, but the cards
are quite long (full depth of the cabinet), and there is a card guide in
slot 2 to support the front of the card. Slot 1 should also be avoided
for a long card because of its proximity to the internal speaker, and if
the card isn't fastened down at the front, it may short to the speaker.

There is additional clearance below slot 2 to permit the long card to
seat firmly without contacting the memory chips.

What is in the Technical Manual? (10/6)

- 6 Technical description of the system board
- 6
- 6 Description of each adapter
- 6
- 6 Programming information
- 6
- 6 BIOS listing
- 6
- 6 Memory map
- 6
- 6 Keyboard scan codes
- 6
- 6 Logic diagrams
- 6
- 6 Bus description

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PROCESSOR QUESTIONS

What microprocessor is used? (10/6)

The intel 8088, a 16 bit processor with an 8 bit data path. The processor supports an address space of one megabyte.

There is a separate intel 8048 microprocessor within the keyboard unit, and the IBM Printer also contains an internal microprocessor.

Can I use 8080 or Z-80 programs? (9/21)

Not without some work. The instruction set of the 8080 is not object compatible with the 8088. intel has stated that the 8088 is upward compatible with the 8080 at the source program level. Each 8080 instruction can be replaced with an 8088/8086 instruction or a short sequence of instructions. This substitution can be performed by a program, if desired. Digital Research supplies such a program with CP/M-86. intel also offers a source language conversion tool with their development system.

Microsoft BASIC programs would be easier to transport to the IBM Personal Computer, provided they don't use any of the special features of the other Personal Computers, such as graphics.

Pascal programs would probably be more portable.

The diskette formats used by other personal computers aren't compatible with IBM's.

This is one reason you might want the Asynchronous Communications Adapter. You can transfer files from one personal computer to another. This may require some software work on both machines.

What's the difference between the 8088 and the 8086?

The instruction sets are the same. The 8086 uses a 16 bit data bus, the 8088 uses an 8 bit data bus.

Does the microprocessor have multiply and divide? (9/25)

Yes, 16 bit multiply and divide are in the instruction set of the intel 8088.

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Is multiprogramming supported?

All of the microprocessors have that capability, provided all the tasks cooperate. The DOS and the supplied software may permit it, but don't count on it.

Multiprogramming is needed in larger systems because of the relatively high cost of the processor, and because most programs have some wait time. A personal computer avoids the cost, and the complexity of task management isn't normally justified.

Why 4.77 MHz for a clock? (10/5)

5 The crystal used is 14.31818 MHz, which, when divided by three yields
5 4.77 MHz for the 8088, and when divided by 4 yields 3.58 MHz for the
5 color burst signal.

Is there an 8087 coprocessor? (10/5)

5 An expansion socket exists on the system board for an 8087 numeric pro-
5 cessor. The extent of the software support for that chip is in
5 question. I understand intel is still working some bugs out of that
5 chip.

5
5 The intel 8087 supports hardware floating point operations.

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CASSETTE QUESTIONS

Does the cassette interface have motor control? (10/5)

5 Yes.

What is the baud rate? (10/7)

| Between 1000 and 2000 bits per second. The zero bits are recorded at
| 2000 bits per second, the one bits are recorded at 1000 bits per second.
| (I always knew that "1" bits were more important.) Blocks are 256
| bytes, plus a two byte CRC sequence using the SDLC algorithm.

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GENERAL DISPLAY QUESTIONS

What's the difference between adapters?

Both adapters support in text mode:

Upper and lower case letters

Normal and high intensity

Reverse image

Non display fields

Blinking fields

The IBM Monochrome Display and Printer Adapter with the IBM Monochrome Display offers these unique features:

Extremely sharp resolution, superior to most personal computer displays marketed today

11.5 inch diagonal screen

Anti glare screen surface

High persistence green phosphor

Front panel brightness and contrast controls

Underline

Characters are 7 by 9 dots in a 9 by 14 dot box

4KB screen buffer on adapter

16 MHz bandwidth

The Color/Graphics Monitor Adapter, with a user supplied monitor, supports:

User supplied light pen

25 by 40 column mode for television

25 by 80 column mode for monitor

Characters are 7 by 7 dots in an 8 by 8 dot box

Direct drive RGB color

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NTSC.Composite video color

Eight background colors, (black, blue, green, cyan, red, magenta, brown, and white)

16 foreground colors, (all 8 background colors plus gray, light blue, light green, light cyan, light red, light magenta, yellow, and high intensity white)

Four color graphics resolution is 320 by 200 dots

Black and white graphics resolution is 640 by 200 dots

16KB screen buffer on adapter

Do I need both the Color and Monochrome adapters? (9/21)

The Color/Graphics Monitor Adapter supports a standard black and white or color monitor for text applications.

If you wish to use the IBM Monochrome Display, you will need the Monochrome Display and Printer Adapter.

I'd compare the relative text quality of the IBM Monochrome Display and the Color/Graphics Monitor Adapter with a good monitor before you decide.

Several individuals have indicated that they were going to get both the Monochrome Display and Printer Adapter and the Color/Graphics Monitor Adapter. Some were interested in the IBM Monochrome Display for normal use, and color on their TV set for games. Others said they were going to use the Color/Graphics Monitor Adapter for primary use, and were buying the Monochrome Display and Printer Adapter for use as just a printer adapter right now, but in case they later added an IBM Monochrome Display, they would already have the adapter. They planned to use the Monochrome Display and Printer Adapter initially as an "expensive printer adapter".

Can I put both adapters in at the same time? (10/6)

The demonstrator machine I've seen has both adapters in it, we switch from one to another by sliding an internal switch (SW1, bit 5). I've been told of a technique to switch adapters by changing a low storage location, but haven't tested it.

What CRT controller is used? (9/14)

Both adapters use the Motorola MC6845.

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MONOCHROME DISPLAY QUESTIONS

Can I use my own monitor with the IBM Monochrome adapter? (9/21)

No. The IBM Monochrome Display and Printer Adapter does not support a standard monitor, either black & white or color. It is intended for use only with the IBM Monochrome Display.

COLOR/GRAPHICS MONITOR ADAPTER QUESTIONS

CAN I USE A TV SET INSTEAD OF A MONITOR? (10/6)

With some restrictions, yes. A standard unmodified television doesn't have sufficient bandwidth or resolution to display 80 readable characters on a line. The DOS and BASIC interpreter have a 40 character mode to support operation with a television set. You will need an RF modulator, which can be purchased at a computer store for about \$30 to \$40. You won't be happy with a television's resolution for text applications, though. I think it looks OK for color graphics.

I've talked to people who have modified television sets for direct video input, which increases the character clarity and eliminates the need for an RF modulator.

6 Some newer televisions have a direct video input designed for personal computers and video games.

CAN I USE THE MONOCHROME DISPLAY WITH THE COLOR ADAPTER? (10/6)

6 No.

WHERE CAN I GET AN RF MODULATOR? (9/17)

I purchased a "SUP R MOD II" from Jade in Hawthorne for \$33. The designer of the Color/Graphics Monitor Adapter thoughtfully provided a connector for it. It works fine for graphics and 40 column text. As I noted above, the resolution isn't adequate for 80 column text.

IBM doesn't endorse any particular vendor, of course.

WHAT DOES A COLOR MONITOR COST? (9/23)

From \$250 to \$1300, depending upon your source and the quality of the unit. Generally, an RGB (Red Green Blue) monitor offers better resolution at higher cost.

ISD has demonstrated the machine with a Hitachi Model CN-1472 color monitor. It reportedly is in short supply and costs about \$1200.

HOW GOOD IS THE TEXT QUALITY WITH THE COLOR ADAPTER? (10/6)

This is subjective.

Before seeing the system, I had tentatively decided to use the Color/Graphics Monitor Adapter with my own B&W monitor (which I now own). After seeing the character quality difference between the IBM Monochrome Display and the Color/Graphics Monitor Adapter, I've reconsidered that decision. As someone pointed out, you stare at text a whole lot more than you stare at color graphics.

The Color/Graphics Monitor Adapter produces readable text, but it is only a 7 by 7 dot character which looks rough to me. The text lines aren't spaced very far apart.

The IBM Monochrome Display, on the other hand, looks like the text was typewritten on the screen. It is really beautiful. The focus is just fuzzy enough to merge the dots. You can barely tell that the characters are constructed from dots.

KEYBOARD QUESTIONS

HOW GOOD IS IT? (10/6)

This is subjective.

6 I'd heard great things about the new keyboard on the IBM Personal Computer. The
6 keyboard on the IBM Personal Computer is one of the best I've used. The feel is excellent, a little lighter than the IBM 3279 I use most of the time. The placement of the special function keys differs from what I'm used to, so I have to hunt for keys.

The keyboard has a lot of keys, which is good or bad, depending upon your point of view. It will take a little time to be able to find them rapidly.

My only complaint is that the 6 foot coiled cable doesn't seem long enough to pull away from the system unit very far without straining the cable. The cable plugs into the center of the back of the system unit.

An interesting feature is the ability to press the CAPS LOCK key, which results in upper case letters, but leaves the numbers unshifted (e.g. you don't get special characters for the numbers). Pressing the shift key in this mode results in lower case letters. This feature should be useful for data entry of source code.

PRINTER QUESTIONS

CAN I USE OTHER PRINTERS? (10/5)

5 I'm told that almost any printer with a Centronics parallel interface can be
5 used.

The IBM Printer looks a whole lot like the standard Epson MX-80.

Epson also markets an MX-80 F/T, which includes friction and tractor feed.

The GRAFTRAX option adds a graphics capability and some additional fonts, including italics. GRAFTRAX lists for \$95, but may be cheaper if purchased with an MX-80 or MX-80 F/T.

5
5 The Epson MX-100 is a newer printer, providing a 15.5 inch wide paper handling
5 capacity, standard friction and tractor feed, and standard bit image graphics
5 capability.

Even if you consider another printer, you might want to get the IBM Printer Cable. The printer end of the cable has a male Centronics style connector. The Personal Computer end of the cable has a 25 pin D connector, the same connector normally associated with an RS-232 interface. This does not mean that the standard RS-232 signals are present on this connector, it is a parallel interface.

It is also important to some people that the colors of the units match. The color of the Epson MX-80 is different than the color of the IBM Personal Computer.

5
5 You might also consider the time value of funds in your decision. The IBM Printer
5 at \$555, spread over 24 months, may be less expensive than a cheaper printer
5 purchased for cash now.

DOES THE IBM PRINTER HAVE FRICTION FEED? (10/5)

No, only tractor feed.

5 I have friction feed on my printer now, and use it very infrequently. I'm not
5 going to fool anyone into thinking that the output wasn't produced by a
5 computer. The same individual won't be bothered by the rough edges resulting
5 from tearing the edges off the pin feed paper. I don't use letterhead paper,
5 though.

IS THE QUALITY ADEQUATE FOR CORRESPONDENCE? (9/21)

This is subjective.

The IBM Printer has excellent print quality for a matrix printer. However, no one is going to mistake it for an IBM Selectric.

WHAT ARE THE 12 FONTS? (10/5)

There are two basic sizes of letters:

Normal size, 10 pitch, 80 characters per line

Condensed size, 16.5 pitch, 132 characters per line

Either size may be printed double width, giving 40 or 66 characters per line.

In addition to the size characteristic, there are four options of how much ink to lay down on the paper:

Standard mode.

5 Emphasized mode, which fires the pins twice as often as standard mode. This
5 is still bidirectional print, and looks like bold face type. The speed is
halved to 40 characters per second.

5 Double mode, which prints in one pass, advances the paper 1/206th of an
inch, and repeats the line. This tends to fill in the vertical dots in an 18
pin pattern. It also halves the print speed.

Double emphasized mode, which is the combination of emphasized and double
print mode.

Two sizes times four modes is eight fonts.

Printing double width doubles that to sixteen fonts.

However, the emphasized and double emphasized modes aren't available with condensed sizes, so it nets out to twelve fonts.

If the Epson GRAFTRAX option can be installed on the IBM Printer, that would double the number of fonts, by adding italics. GRAFTRAX would also add a bit graphics capability. I doubt that EasyWriter would support all of these added fonts.

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DOES THE PRINTER COME WITH A CABLE? (10/5)

5 No.

DISKETTE QUESTIONS

WHAT CONTROLLER CHIP IS USED? (9/14)

The Diskette adapter uses an NEC upd765.

DO I HAVE TO USE IBM DISKETTES? (9/21)

No. Use any 5-1/4 inch, soft sector, single sided, double density diskette. There are quality issues involved, so let the buyer beware.

One IBM employee cautioned me to point out that the format used by the IBM Personal Computer is double density, 40 tracks. He suggested that the diskettes be certified for double density, 40 track operation.

I've been buying IBM 8 inch diskettes for several years. The price to an employee (20 percent off from the OPD store) is \$4 per diskette, which is quite competitive. I've always found IBM diskettes to be of very high quality, and I have had no trouble with double density operation on diskettes sold for single density.

HOW IS THE DATA ORGANIZED? (10/6)

Soft sector, 512 bytes per sector, 8 sectors per track, 40 tracks per diskette, single sided, double density, total storage capacity is 163,840 bytes.

6 The directory space permits 64 files per diskette. The allocation increment is
6 one sector.

WHAT IF I NEED MORE DISKETTE CAPACITY? (9/21)

IBM hasn't announced any other options. I would expect any number of other vendors to offer compatible hardware. If you really need more capacity than the amount announced, I'd wait for alternatives and evaluate them as they appear.

There is a 37 pin connector on the back of the diskette adapter. IBM has not announced how to make use of this connector.

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DOES THE DISKETTE CONTROLLER USE DIRECT MEMORY ACCESS?

Yes, the processor can perform other functions while the data is read from the diskette.

COMMUNICATIONS QUESTIONS

WILL IT EMULATE A 3270? (10/6)

IBM has announced its intent to provide a 3270 emulator for the IBM Personal Computer. I've heard no details.

HOW CAN I USE THE COMMUNICATIONS ADAPTER? (9/21)

You can exchange files with other IBM Personal Computers, with suitably programmed hosts (like VM/370), and you can access many time sharing systems and special systems like CompuServe and The Source.

Don't forget to order the Asynchronous Communications Support software.

Another use would be to exchange programs between the IBM Personal Computer and another personal computer.

DO I NEED A MODEM ALSO? (9/25)

If you wish to use the Asynchronous Communications Adapter for remote interface to another computer; you will need an external, user supplied modem. Suitable 300 BPS modems are available in the \$200 range.

You wouldn't need a modem to connect a device locally (in the same room), such as a serial printer, another personal computer's RS-232 interface, etc. That kind of connection can be made with just a cable.

HOW ABOUT BINARY SYNCHRONOUS OPERATION? (10/6)

The chip used is an INS8250 Asynchronous Communications Element, which has asynchronous capability only.

GAME CONTROL ADAPTER QUESTIONS

WHAT RESISTANCE SHOULD THE JOYSTICKS BE? (10/5)

5 100K ohms.

SOFTWARE QUESTIONS

WHAT DO I GET WITH THE DISK OPERATING SYSTEM?

IBM's Personal Computer DOS contains two extensions to BASIC, called the Disk and Advanced BASIC language extensions to the Cassette level BASIC stored in the Read Only Memory (ROM) of the System Unit.

The DOS supports sequential and random access of files stored on diskette, with dynamic space allocation.

Other diskette file functions include:

- Format diskette

- Directory display

- Rename file

- Erase file

- Display file

- Copy file

- Compare files

- Copy diskette

- Compare diskettes

- Diskette integrity check

- Set time and date

- Transfer system files to another diskette

A "submit" file permits a sequence of programs to be executed as a predefined job stream.

A specially named "submit" file, named AUTOEXEC.BAT, will be automatically be executed at system startup if the user provides it. This can be used, for example, to automatically execute a BASIC program at system startup.

Other utilities include:

- A line oriented editor

- Debug utility program

- Linkage editor

WHERE IS MY ASSEMBLER? (10/6)

IBM has not announced an assembler.

WHAT'S IN THE BASIC INTERPRETER? (9/21)

This is the full function Microsoft BASIC-80 interpreter plus a lot of goodies.

- PEEK and POKE

- Interface to user written machine language routines.

- Long (40 character) variable names, all characters significant

- A full screen editor for BASIC programs only

HOW MUCH STORAGE IS LEFT WITH DOS AND BASIC? (9/21)

I tested a 64KB system.

BASIC tells you when you bring it up how much storage is available. There are options with the Disk and Advanced level BASIC to alter the default number of buffers reserved for I/O. I didn't change those defaults.

- Cassette level BASIC says 61,404 bytes are available.

- Disk level BASIC says 39,498 bytes are available.

- Advanced BASIC says 34,049 bytes are available.

WHAT IS VISICALC? (9/23)

VisiCalc is a planning and analysis tool for users who will be building "what if" models. I think it might be useful for financial planning applications. You can see VisiCalc at most computer stores.

128KB is recommended for VisiCalc.

WILL CP/M-86 OR UCSD PASCAL BE AVAILABLE? (10/6)

IBM has announced that it is making arrangements with both Digital Research (CP/M-86) and Softech (UCSD Pascal) to make this software available.

6 Don't confuse CP/M-86 with the 8080/Z-80 standard CP/M-80. Most CP/M software
6 currently available runs on CP/M-80, not on CP/M-86.

WHAT DOES THE DEBUG PROGRAM PROVIDE? (9/23)

The Debug program provides:

Display memory

Change memory

Fill blocks of memory with a constant value

Execute with optional breakpoints

Hexadecimal arithmetic calculator

Read and display a byte from an I/O port

Load a file or from absolute diskette sectors

Move a block of memory

Define files and parameters

Send a byte to an output port

Display registers and flags

Search for a string

Trace execution

Unassemble instructions (to the screen or printer, not to a diskette file)

Write file or absolute diskette sectors

GLOSSARY

BIOS	Basic Input Output System, that component of the Disk Operating system that performs primitive I/O functions. In the IBM Personal Computer, this programming resides in the Read Only Memory (ROM).		used for games. Presumably named after the aircraft control device. If you have ever seen a radio control airplane control device, the joystick is the little stick that is manipulated by the pilot.
BPS	Bits per second	RAM	Random Access Memory
CPS	Characters per second	ROM	Read Only Memory
CRC	Cyclic redundancy check	UCSD	University of California at San Diego
Joystick	A device with two potentiometers and a button,		