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PERSONAL COMPUTER
OWNER'S MANUAL

or
The Joy of Personal Computing

J. Baird

**Computer Sciences And
Simulation Division**

April 1987

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NAVAL OCEAN SYSTEMS CENTER
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The Owner's Manual for Personal Computers (PCs) was prepared by the Center-wide Office Automation Network Office (Code 9102) under NAVOCEANSYSCEN funding.

RH

P.183470

REPORT DOCUMENTATION PAGE

1a REPORT SECURITY CLASSIFICATION	1b RESTRICTIVE MARKINGS		
UNCLASSIFIED			

2a SECURITY CLASSIFICATION AUTHORITY	3. DISTRIBUTION/AVAILABILITY OF REPORT
2b DECLASSIFICATION/DOWNGRADING SCHEDULE	Approved for public release; distribution is unlimited.

4 PERFORMING ORGANIZATION REPORT NUMBER(S)	5 MONITORING ORGANIZATION REPORT NUMBER(S)
NOSC TD 1048	

6a NAME OF PERFORMING ORGANIZATION	6b OFFICE SYMBOL (if applicable)	7a NAME OF MONITORING ORGANIZATION
Naval Ocean Systems Center	Code 9102	

6c ADDRESS (City, State and ZIP Code)	7b ADDRESS (City, State and ZIP Code)
San Diego, CA 92152-5000	

8a NAME OF FUNDING/SPONSORING ORGANIZATION	8b OFFICE SYMBOL (if applicable)	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
Naval Ocean Systems Center		

8c ADDRESS (City, State and ZIP Code)	10 SOURCE OF FUNDING NUMBERS			
	PROGRAM ELEMENT NO	PROJECT NO	TASK NO	AGENCY ACCESSION NO
San Diego, CA 92152-5000	VARI	VARI	VA01	DN788 736

11. TITLE (include Security Classification)

Personal Computer Owner's Manual or The Joy of Personal Computing

12. PERSONAL AUTHOR(S)

J.M. Baird

13a TYPE OF REPORT	13b TIME COVERED	14 DATE OF REPORT (Year, Month, Day)	15 PAGE COUNT
Final	FROM _____ TO _____	April 1987	76

16. SUPPLEMENTARY NOTATION

17 COSATI CODES			18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)
FIELD	GROUP	SUB-GROUP	ADP

18 SUBJECT TERMS (Continue on reverse if necessary and identify by block number)

ADP
Applications of computers
Communications
Computer accessories
Classified use of computers
Computer communications
Computer documentation
Computer graphics

19 ABSTRACT (Continue on reverse if necessary and identify by block number)

The document was written to help potential and present owners of personal computers (PCs) make effective use of PCs at work. Technical, scientific, and office applications of PCs are discussed. Material on uses of PCs, the selection process, installation, training, and working with the PC is included. Many programs and hardware add-ons to enhance the utility of PCs are described. Some of the material is specific to IBM-compatible PCs, but most of the material is of general interest to all PC owners. Tutorials on file backup, directory organization and management, output control, and other topics are included. An extensive index with cross-references to UNIX and VMS operating system terminology is included.

20 DISTRIBUTION/AVAILABILITY OF ABSTRACT	21 ABSTRACT SECURITY CLASSIFICATION	
☐ UNCLASSIFIED/UNLIMITED ☒ SAME AS RPT ☐ DTIC USERS	UNCLASSIFIED	
22a NAME OF RESPONSIBLE INDIVIDUAL	22b TELEPHONE (include Area Code)	22c OFFICE SYMBOL
J.M. Baird	619-225-7554	Code 9102

DD FORM 1473, 84 JAN

18. Computer hardware selection, computer networking, computer programming, computer programs, computer repair, computer security, computer software selection, computer training, computer tutorial, computers, database management, Defense Data Network (DDN), desktop publishing, disk operating system, electronic mail, electronic publishing, ergonomics, file backup, file transfer, handicapped use of computers, microcomputers, MS-DOS, networks, office automation, operating system, organization of files, PC-DOS, Personal Computers (PCs), Personal System/2 (PS/2), proprietary software, public domain software, software licenses, terminal emulation, UNIX, VMS, word processing

DD FORM 1473, 84 JAN

Purpose and Scope of Manual

This manual is organized so that personal computer (PC) owners and those considering ownership can quickly locate the information or example they need. For the VMS or UNIX user, familiar terms are cross-referenced to help find information quickly. In this manual, many types of information are collected into one source, so that you can find out what to do with PCs and how to make better use of them. The scope of the manual is deliberately limited to material that is of general interest. The sections of interest to various groups are shown below.

Everyone	—————————	**Introduction**
Potential Owners	—————————	**Discovery**
		Getting a PC
New Owners	—————————	**It's Here**
		Using It
Owners	—————————	**Beyond Basics**
Everyone	—————————	**Additional Topics**

HELP!

Do you have an immediate problem that can't wait while you "look it up in the book"? If you know any nearby coworkers with the same type of equipment that you have, and who have owned it longer, they might be able to help, but if you don't or they can't, then call one of the Computer Resource Centers. There are Computer Resource Centers Bayside, Topside, and in Hawaii. There is someone available during normal working hours to provide help with your problems.

Location	Number
Bayside, Bldg. 204 (south end)	X-2353, 6754
Topside, Bldg. A33, Rm. 2018	X-6346, 5904
Hawaii, Bldg. 1181, Upstairs	X-420

Contents

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1. INTRODUCTION

Audience

The audience of the Owner's Manual includes all present and future owners of PCs. Technical, scientific, and office applications of PCs are discussed. Whether you are considering buying, have just bought, or have owned one for a while, some of the material in the Owner's Manual should be useful to you. Most of the information is applicable to all PCs, but the material on hardware accessories is oriented toward PCs compatible with the International Business Machines (IBM) Personal System/2 (PS/2) and Personal Computers (PCs). Since many PC owners have previously used other computer systems (such as VMS or UNIX minicomputers), cross-references to the terminology of those operating systems are included in the manual and its index.

Potential Users

PC Users ●**VMS Users** △**UNIX Users**
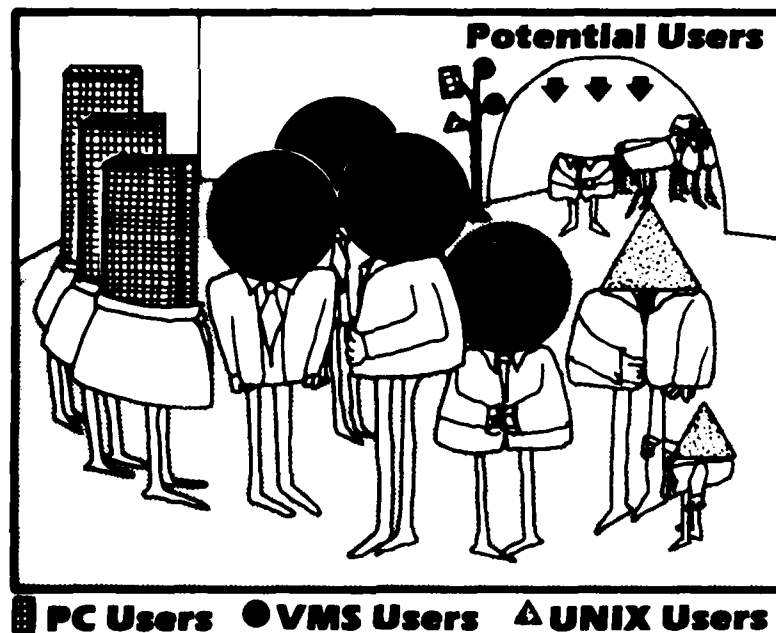
Structure

The Owner's Manual is divided into sections as follows:

Section 1 – *Introduction* states why the Manual was written, for whom it was written, what the rest of the sections contain, and how to get more information.

Section 2 – *Discovery* suggests places to go for ideas about PCs, and provides information to help you discover how a PC can be used.

Section 3 – *Getting a PC* discusses the process of deciding what PC hardware and programs to buy initially, how to buy them, and licenses.

Section 4 – *It's Here* discusses the process of unpacking, checking out the PC, and turning it on and off, along with suggested first day training and ways to learn more about the PC.

Section 5 – *Using It* discusses routine operation of the new PC: what to do (and what not to do) to keep everything working properly.

Section 6 – *Beyond Basics* suggests additional programs and accessories that can extend the power and utility of the PC.

Section 7 – *Additional Topics* contains a collection of discussions on various topics detailing ways to make better use of a PC.

Index – The *Index* lists most of the key words and topics discussed in the manual, and also includes cross-references and synonyms to aid in locating desired material.

More Information

To hold down the size of the manual, many topics are only touched on, but references to more detailed documents are given. Additional information on any topic discussed in the manual can be obtained by calling the Computer Resource Center (CRC) at one of the numbers on page i. Information on additional PC-related topics not covered by the Manual can be obtained from Center-wide Office Automation Network (COAN) personnel at A/V 933-7554/6136 or commercial (619) 225-7554/6136.

2. DISCOVERY

"You can have all three for the price of two!!"

Sources of Information

There are plenty of sources of information about PCs. Before you consult any of them about what to buy, however, you need to decide how you will use your PC. Four frequently used sources of information are magazine advertisements, sales personnel, co-workers, and the support staff in the CRC. There are other sources, including books in the Code 964 Technical Library, occasional computer shows, computer user's groups, and evening courses at the local colleges. Ideas from any of these sources should be treated with skepticism. You are buying this PC for *your* use. The first three sources tend to be more interested in what you should buy than in why you want to use it. While you can get ideas from magazine advertisements and sales personnel, they should not be relied upon to make decisions. Co-workers and the CRC are more reliable, but no one source is completely unbiased.

What Can a PC Do?

This section provides information about what PCs can (and cannot) do to help you decide what you want your PC to do. In the laboratory or the office, a

PC can *sometimes* be an effective substitute for many things. *Sometimes* is a key word, so the limitations of PCs as well as their potential are discussed. The **Beyond Basics** section describes the extra things you need to buy to do the things described in this section, and the **Additional Topics** section suggests ways to do many of them. Used carefully, the PC can help you get more done every day than you could ever do otherwise. Used carelessly, it can cause you to waste incredible amounts of time doing very little.

What can a PC do by itself?

The PC can help you:

- When working with words
- When doing research and development
- When doing office work
- If you are physically handicapped.

Working with words
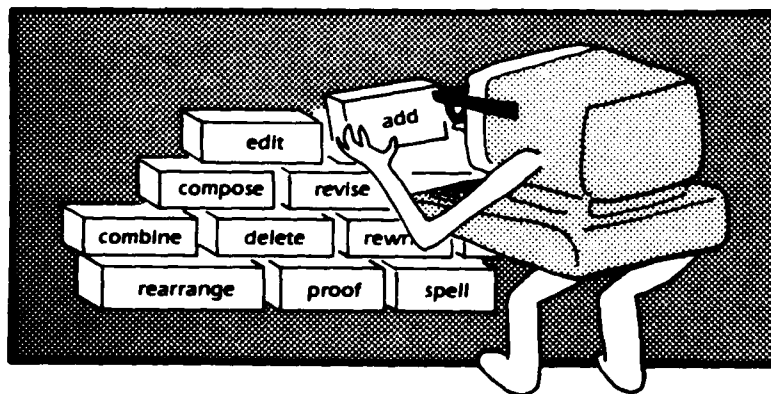
Work with words

This is probably *the* area where a PC can help you the most. Think of all the things you write down or think about at work. For collecting, organizing, and revising your thoughts and plans, and the words you use to describe them, the PC is a very flexible, powerful tool. Any thoughts or data you record on paper

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repeatedly (such as a quarterly progress report or stub requisition), or revise after being recorded (such as a rough draft or polished technical report), can be written in about the same time on either a PC or a typewriter. Once on the PC, *every* revision requires a fraction of the original time. Adding new thoughts, changing previous data, and combining existing documents is much faster and easier than with scissors and paste. It can find most spelling errors for you, and then professionally typeset the printed result. PCs can even work with foreign languages, including German and Chinese. **Limitation:** If the result must be printed on a special multipart form, or you *really* never change it after writing it, you may want to stick to paper. Most PCs only show about half a page at a time, so reviewing a long document on the PC is quite different from reviewing it on paper.

Doing research and development

On the design bench – Whatever your engineering discipline, there are programs for the PC that can simplify the design process and improve the quality of the product. From the initial development of a prototype to designing the production process and modeling or analyzing the performance, there are specialized programs just for you.
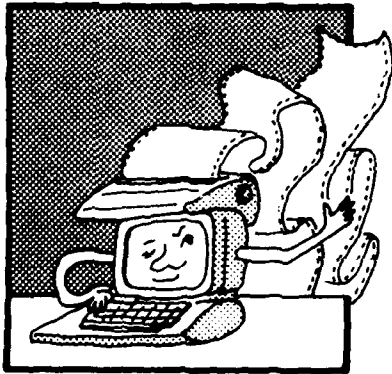
Speed up programming

Programming – Any time you need to write a program, a PC can help. Because the PC is always ready when you are, the initial entry and editing of programs is quicker on the PC than on a minicomputer, whatever language you choose to program in. Also, there are programs that can speed up the analysis, design and implementation phases of development. Many programs can even be run (or at least debugged) on the PC, leaving only the actual number crunching or processing of massive amounts of data to be done on the larger computer. **Limitation:** If several people need to work together in developing a program, if the program is *really* large, or if classified algorithms are involved, it may be better to keep the program on a larger computer.

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In the lab – By adding extra hardware to your PC, you can get it to automatically monitor, record the results of, and even control many of your experiments. It can do data reduction and decide how many times to repeat an experiment based on the results of the last trial. You can include the results in your report without having to enter them even once. It will keep a history of all experiments you have performed and rapidly retrieve or analyze their results. **Limitation:** The typical PC straight from the factory won't do this. Extra hardware and special programs (possibly written by you) are needed and extra time in the beginning to get everything set up is required. Only then can you let it do the busy work, while you think about additional trials to get more information out of your experiment.
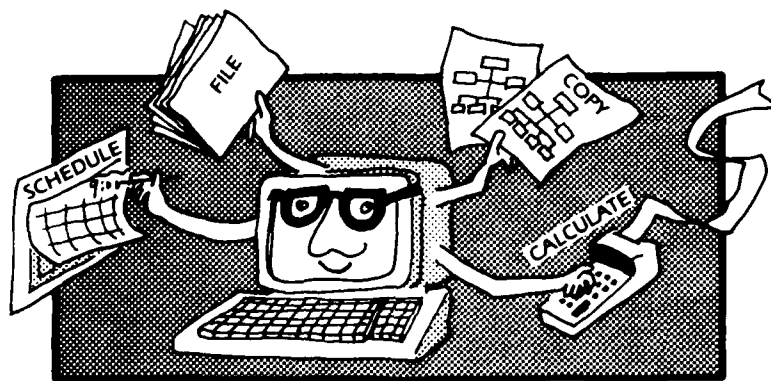
do office work

Doing Office Work

Scheduling – One thing that almost everyone does is keep an eye on a calendar and an appointment book. A PC can provide instant access to a calendar for any month from 1901 through 2099. It can keep your schedule, and those of your co-workers, up to date and coordinated. It will even automate your 'to do' list. You can print a copy of your schedule for your secretary or to carry with you. A PC can also help when one person coordinates the schedules of several people, or of a shared resource (like a conference room). **Limitation:** Someone must be at your PC to update your schedule; if you frequently revise your schedule while away from your desk, or don't want other people using your PC, you may want to stick with paper.

Calculating – If you work with numbers, a PC can help you. Anyone who works with project budgets, manpower loading, or tables of numbers can benefit

from the use of an 'electronic spreadsheet.' Also, if you frequently include calculations in the reports that you write, you can 'cut and paste' your calculations directly into your report on the PC, saving time and those annoying errors that creep in when rewriting rows of numbers.

Making Copies – Making copies of anything already in the PC, either on paper or for another PC owner to use, is quick and simple. And you will find you use less paper to share your work with other people when they also have a PC. **Limitation:** For something that is already on paper that you only want to copy without changing, you may not want to bother entering it into the PC. You can always share paper, but you occasionally cannot share things in your PC.

Filing – Have you ever lost a piece of paper in your filing cabinet; you *knew* it was there, but not in which folder? Well, the PC can eliminate that problem forever. While a poorly organized PC filing system can be as bad as a poorly organized filing cabinet, a good PC filing system, or database, is faster and more flexible than a well organized filing cabinet. And on the PC, programs can search for documents to help overcome the poor organization in ways that are impossible with a filing cabinet. **Limitation:** If several people need to share a filing system, or if classified material is being stored, careful effort will be required to realize the benefits of using PCs instead of paper.

Throwing things away – Any filing system eventually fills up and you need to throw things away. A PC is environmentally superior to a wastebasket; it does not waste paper. It also holds a lot; yet when it does need to be cleaned out, it can be trained to do some things automatically. **Limitation:** It is so easy to throw things away on a PC that sometimes you get rid of something you didn't really want to. Fortunately, there are ways to recover things from the wastebasket (if the equivalent of the trash collector hasn't been by yet).

If You are Handicapped

PCs can help people who are physically impaired to work without pencils or normal typewriters. They can help people who are visually impaired by showing things on the screen **THIS BIG**, or by printing braille on paper, or by optically scanning printed material, and speaking it aloud. They can help people who can talk by responding to spoken commands, and by speaking for people who cannot. They can also help paraplegics by allowing them to work without leaving their office (or home), and by not requiring use of a keyboard--they can be controlled by moving a pointer or touching the screen instead.

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What Can a PC Do With Other Computers?

The PC can sometimes be an effective alternative to

- telephone calls and meetings
- paper shuffling
- printed information.
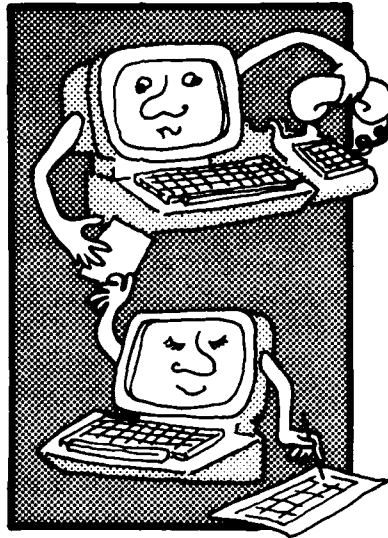
communicate through other computers

Telephone Calls and Meetings – Have you ever placed a call to another busy person, and failed to complete the call the first time? And then lost hours or days playing 'telephone tag'? An electronic mail program on your PC can be an effective substitute for the telephone for short exchanges with people you already know (like the other people working on your project). You can exchange results, report progress, resolve problems, and plan future work faster than is possible in most meetings. Couple the time saving of having your mail on your own PC, with the ability to revise or copy or share with co-workers, and you can get even more done. **Limitation**: Electronic mail requires practice to convey humor or emotions accurately, and creates a permanent record of whatever you say. This is usually an advantage, but can (on occasion) be embarrassing.

Paper Shuffling – Speed and accuracy improve, and frustration usually shrinks when you can transfer files among computers and your PC rather than carrying papers and documents from office to office. **Limitation**: Not all paper

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can (or should) be stored in a computer. Graphic contents or classification or sensitivity of a document may require that it remain on paper. Shared paperwork can't be processed on the computer if some of the people involved have not (yet) gotten their own PCs.

Printed information – Without leaving your desk, you can

- get financial information for your project
- determine the current status of a procurement
- find out who charged to a particular job order number last week
- find out what equipment and services the CRC provides
- browse through the reports at the Technical Library without going there.

Limitation: All these powerful capabilities only work when your PC is compatible with the computer at the other end, which must allow you to access the information. You must know that the information exists to be accessed, and how to access it. There is no free lunch.

3. GETTING A PC
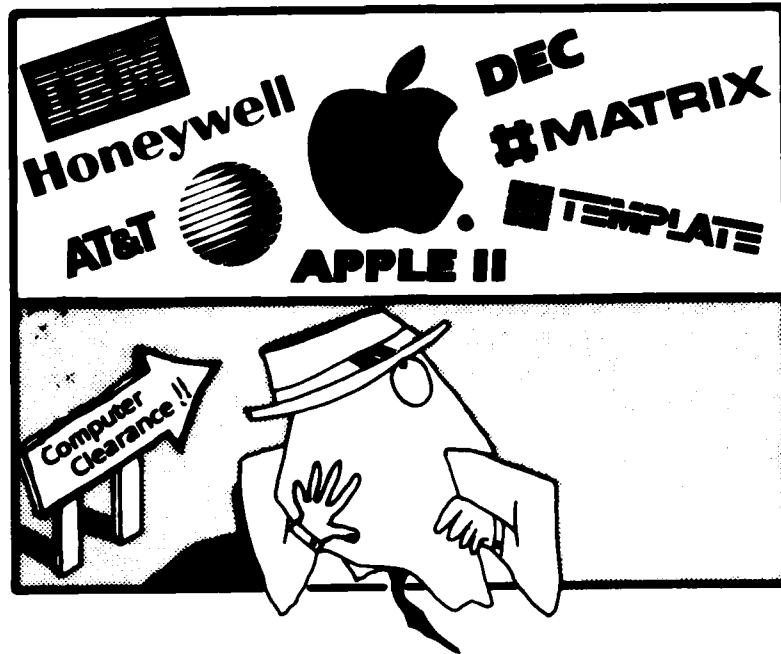
Selection

Somehow, you have decided that you want to buy one. So it becomes a question of which PC to buy, and what programs and accessories to get with it. If you are new to PCs, you will want to rely on your co-workers and the CRC for advice in deciding what to buy. There are thousands of programs, hundreds of (slightly different) PCs, and thousands of accessories to choose from. You have many more choices to make than when buying a new car and a smaller chance of being satisfied with the result. Hence the importance of seeking advice. When you select a PC, try to consider all the programs and options you might use in the first year or so. Buying everything at the same time can save lots of time and grief once you start using your PC. Before you go to the effort of generating your procurement package, have someone else check over your requirements. The safest path in selection is to buy something that meets your needs and is compatible with most of the other equipment at work. Compatibility may not seem important now, but after you are using your machine, and want to share files or access other computers, it will become *very* important. Compatibility generally

means it should be similar to (if not identical to) an IBM AT or PS/2 Model 50, or XT or PS/2 Model 30 PC. An XT is a basic model of the IBM PC, the Model 30 is a basic model of the IBM PS/2, and the AT and PS/2 Model 50 are faster and hold more data. A minimum recommended hardware configuration, and compatible programs for many needs, are contained in the **COAN Recommended Software and Hardware** handout available from the CRC.
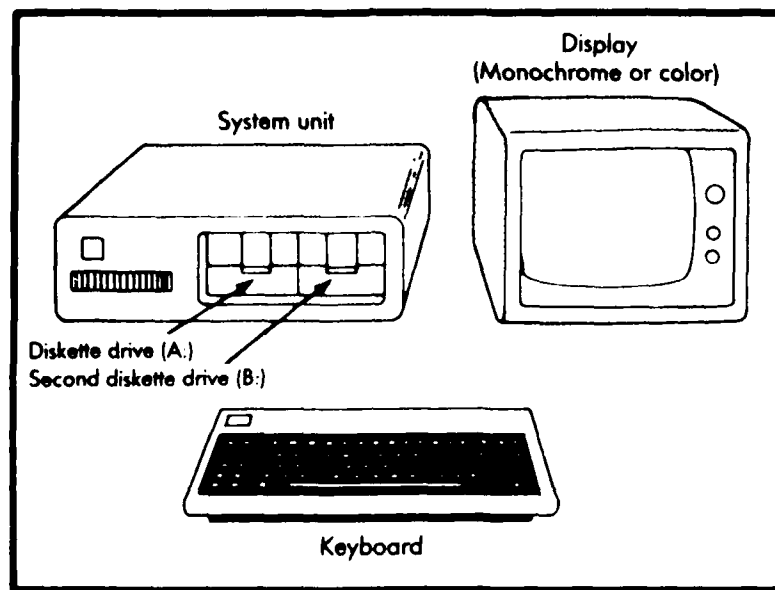

Things you will want to order include

- the PC with its standard peripherals
- a display **screen** (also called CRT or monitor)
- a printer
- communications hardware
- an editing program
- **other** programs (depending on what you want to do with your PC)
- a surge protector
- the cables and any other stuff needed to connect everything.

You will also want to order an initial supply of consumables (paper, ribbons, and the like) along with your PC. This manual does not contain any extensive descriptions of PC hardware. The documentation that comes with each PC usually does that fairly well. Programs tend to be fairly interchangeable, hardware accessories

do not. What works perfectly well on an AT–like PC may not even fit in an XT–like PC or any PS/2–like PC. If you want to share some equipment with other PC owners, or attach it to the General Communication Backbone (GCB), you or your advisor will need to decide whether to order parallel or serial interfaces[1] (or both) for that equipment.

Purchase

Buying anything can be a frustrating experience. Buying anything labeled Automated Data Processing Equipment (ADPE) can be even more frustrating. If you know what you want your PC to do, and it is something that an AT–like PC is capable of, your purchase is simplified. There are several contracts in place from which you can choose AT–like PCs. They will deliver compatible, low cost machines with relatively low effort on your part. If what you need is not AT–like, or you need something different than any of the existing contracts can deliver, you will have to write a sole–source justification and hope you get it. The CRC maintains a file of available contracts.
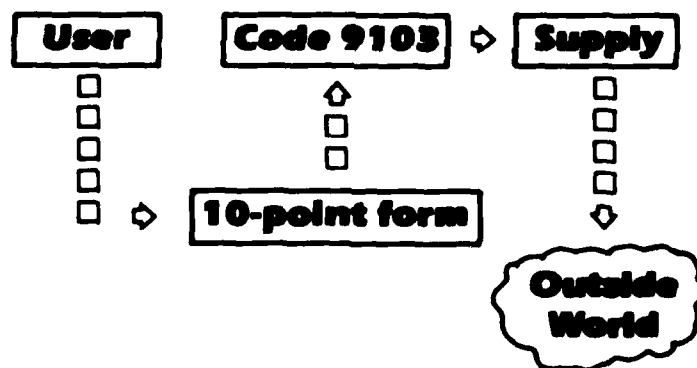

Besides a job order number (which can be just about any kind of money for a PC costing under $3000) on your stub requisition, you will need block 25 (Internal Approval Signature) signed by Code 9103, the Information Resources Management (IRM) Focal Point office. They require a 10–point paper to be filled out (more signatures and information). It is a good idea to call and ask for a copy of the 10–pointer (they will mail it) when you begin to fill out the stub. The

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1 A serial RS-232C interface is required to connect to a modem on the GCB. A parallel Centronics-compatible interface is often used to connect a printer directly to a PC.

10-pointer comes with instructions on how to complete it. You can get samples of completed 10-pointers from the CRC. There is no way around this step, and filling out the 10-pointer now (and saving a copy) will save time later when you want to repair your PC or buy something else for it, since you will need some of the information from the 10-pointer.

Location

These really are trivial details, if you decide before the PC arrives. They can become nontrivial if you wait until after the PC arrives to decide.
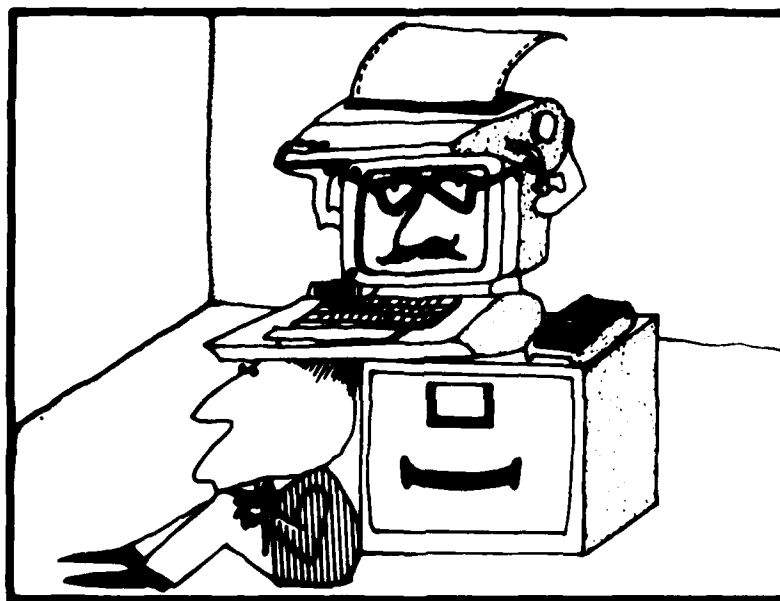
Location: making space for your PC

Things to consider:

Where to locate the PC and its printer? (It will take a lot of desk space. If you want a computer table or special cabinet, plan on waiting some months for the furniture to arrive.)

Where to store the documentation that comes with it? (Allot about one-half of a shelf and keep it together so you can always find it.)

What drawer to store consumable supplies in? Where to plug it in? (It usually takes several receptacles, unless you have gotten a surge protector for your system to plug into.)

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Can I see the screen with the overhead light on? (The screen should be at or just below eye level and two feet or so from your eyes, with no glare from overhead lights or the sun shining in the window. You can buy a shield to control or reduce the glare. Some shields are better than others, none are perfect.)

How do I reach the documentation and disks while using the system? Do I have a comfortable chair and adequate ventilation where it will be used? (You will use it several hours a day; these are important.)

Licenses

All the programs you have for your PC should be legal, or you and the Center are breaking the law. A program can be legal in various ways. A program you write yourself, or one that is given to you by its author, or which is owned by the Center, is legal. A program that is in the **public domain** is legal. A program is only in the **public domain** if its documentation clearly states that the program is in the public domain and the author deliberately gives up all rights to the program. Most programs are **proprietary**; they are written by someone to be sold for a profit. When you buy a proprietary program, you are usually buying the right for one person to use it, not a group. You don't own it and you can't give copies of it to anyone else unless the documentation says it is OK to do so. A few programs can be treated like books and used by only one person at a time, but passed from person to person as needed. Most proprietary programs come with a **license agreement** in their package. It limits what you can and can't do with the program. It takes effect the moment you open the package, whether you use it or not. Some license agreements ask you to sign a form and send it in. It is OK to sign it and send it in (it usually gives you the right to call and ask for help using the program, and the right to buy later upgrades at a reduced price). It is OK to trash it, but *don't* give copies of the program away.

Navy Policy on Program Copying

Proprietary programs are protected by copyright laws. DO NOT copy proprietary programs without authorization. It may make both the individual and the Navy liable for damages.

THINK BEFORE YOU COPY!

4. IT'S HERE
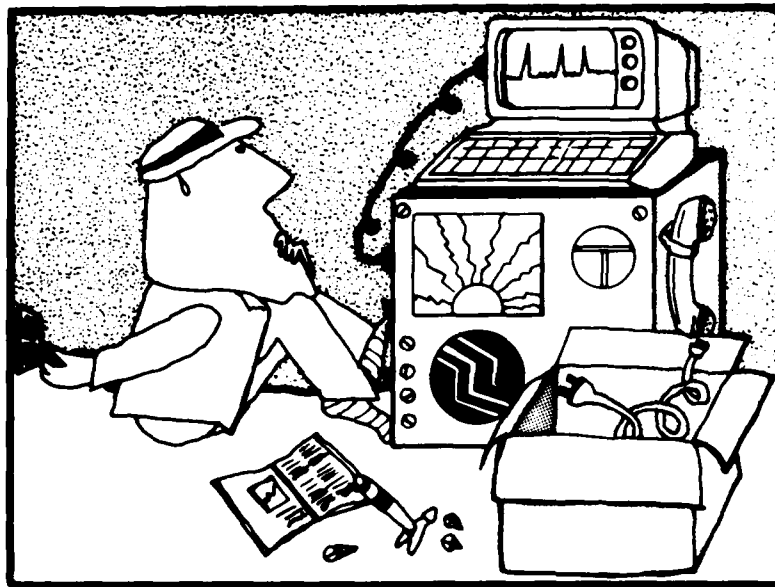
**Unpacking ... How to put your PC together**

Unpacking

A knock on the door. A delivery by Shipping and Receiving. Two or more boxes are sitting on your floor, waiting to be opened. At this moment, you really need a little help from your friends. Certainly you can assemble the system yourself, given enough time. However, an *experienced* co-worker, or someone from the CRC, can do it in a fraction of the time, without any clouds of smoke, and without voiding your warranty. The vendor you bought it from might give you some help. Your warranty is important, since PCs seem to have about a 40% failure rate (some little thing breaks) during the first 90 days. Also important are the paperwork and minor property sticker delivered with the system (usually taped to the outside of the box). The little blue minor property sticker should end up on the PC, and your division ADP System Security Officer (DADPSSO) wants to check the system identification number (SIN) of the PC and the paperwork. If you don't know what SIN is, you haven't followed the directions that came with the 10-pointer (discussed in section 3), and you shouldn't have a PC yet. Even

the boxes may be important, if the PC arrives with something broken. Read the Warranty discussion in the next section for details. Written instructions on how to unpack, check out, and turn your system on and off are contained in the documentation that comes from the manufacturer; for example, in the National Cash Register (NCR) **PC-6 Owner's Manual**, Chapter 2; in the IBM **AT Installation and Setup** Sections 6 & 7; and in the Zenith **Z-248 Owner's Manual** Chapters 1 & 2.

Computer Terms

We haven't used many special computer terms up to this point in the manual, but now we need to define some. If you already understand the terms disk, disk drive, file, directory, command, prompt, operating system, and boot, skip this section. After the first day of using your PC, you will understand these terms.

Computer Terminology
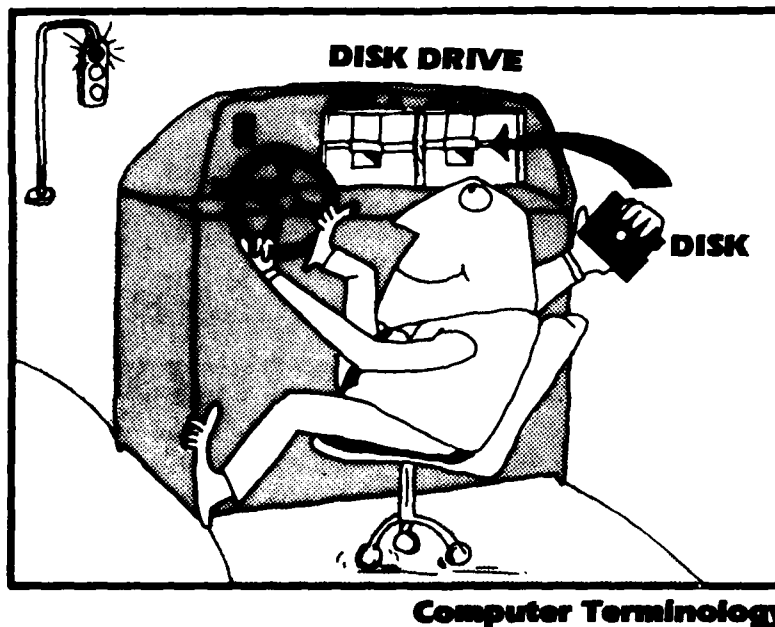
A **disk** is round, turns when you use it, and hates magnets. About all you really need to know is that there are two types of disks: hard disks, which hold a lot and are inside your PC, and floppy disks, which hold less, and can be inserted into and removed from the PC.

A **disk drive** turns a disk. Disk drives have names. A floppy disk drive is usually called **A:** or **B:**, and looks like a slot in the PC's case. A hard disk drive is usually called **C:**. A hard disk and its disk drive are almost synonymous.

A **file** is a place on a disk that holds some data or a program. To tell the PC to do something to a file, the file has to have a filename. A filename is usually short and may have a period (.) in it.

A **directory** is a special file. Like every file, it has a filename. A directory is special because it only has filenames in it. Directories are useful because a disk can have hundreds of files on it, and the directories help to organize the other files so you can locate a particular file when you need to use it. A directory whose name is in another directory is called a subdirectory.
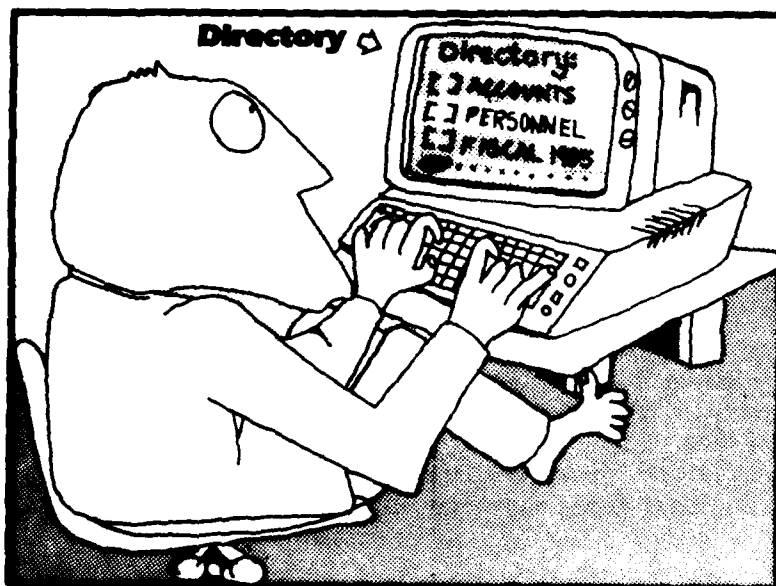
Computer Terminology

A **command** is an order you give to the PC. A command can make changes to files or what you see on the screen of your PC. Some commands always do the same thing, some commands do different things to different files each time you use the command, depending on what you type on the keyboard. Different manufacturers call commands different things. For example, Zenith documentation calls a command a **function**.

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A **prompt** is something the PC prints on the screen to show it is ready for your next command. A prompt is usually short. Typical prompts are '>' and 'C:>'.

An **operating system** is a program that every computer seems to need. Your PC has one, called DOS, the **Disk Operating System**. The only part of it you usually are aware of is a file called COMMAND.COM. DOS is always there even though you don't see it. Sometimes it responds directly to your commands; sometimes it uses other programs to respond to them. The most visible thing DOS does is print the prompt. When it uses another program to respond to your command, it will use the directories on your disks to find it.

A **boot** (short for bootstrap) is anything you do to your PC to get it running. There are several ways to boot a computer. A boot is finished when the computer prints a prompt on the screen.

Check It Out

Everything is assembled, plugged together, and waiting for the power to be turned on. Before they leave, ask whoever helped you unpack to do an initial boot of your system, and check it out. Watch what they do. Ask questions. Just turning on the power the very first time is usually not enough. Your hard disk may need some special attention, DOS may need to be told what configuration your PC has, and programs you purchased may need to be put on your hard disk. Any accessories you purchased should be tested to see if they are working properly. The information to do all this is in the documents on your desk, but you can literally spend days finding it. It is quicker (and safer) to let someone else do it. If you must do it yourself, at least try to visit the CRC so they can show you the steps involved on one of their display machines. Trying to do it yourself working with the vendor's documentation is possible (if the documentation correctly describes what you want to do, which is not always the case), but is neither desirable nor necessary.

Switching On

After the initial boot is completed, also ask the person helping you to turn the system off, and then back on again. You will be turning the system on and off at least once a day, so you need to be sure you know how to do it properly. Ask them to show you the different ways it can be booted, and ask when to use each of them. Also, be sure to ask about the **Break** key and when to use it.

Learning -- First Day

It's all yours. Now, how can you make your PC work for you? It is like the first time you sat behind the wheel of a car--you knew it could go somewhere, but you were not sure how to put it in gear or accelerate smoothly. At this point, you need some training. Not a whole lot, but a couple of hours of training will put you well on your way to using the PC productively.

You probably should begin by learning a little about DOS. If you have an IBM PC, your **DOS Reference Manual** Chapter 7 lists the DOS commands. If you have a Zenith PC, your **MS-DOS Manual**, Volume III lists the DOS commands. If you have an NCR PC, your **NCR-DOS Manual** Chapter 4 lists the DOS commands. If you are familiar with VMS or UNIX, DOS will seem primitive, but it gets the job done. Just like VMS and UNIX, DOS knows about directories, but instead of brackets around directory names [*a la* VMS], or forward slashes (/) to separate them [*a la* UNIX], DOS uses a backward slash (\). The forward slash is used to specify qualifiers, just like in VMS.

The UNIX user will be distressed to learn that although DOS commands do have options, they are specified with slash (/), not dash (-). For UNIX users who insist, there is a way to get DOS to use dash instead of slash for options; ask at the CRC or a nearby UNIX expert can show you how it is done. Depending on who wrote your documentation, a **qualifier** (VMS terminology) or **option** (UNIX terminology) may be called a switch, a parameter, or an option.

A safe way to get some hands-on experience with DOS is to make a copy of the DOS floppy disk that comes with your PC (or ask someone to make a copy for you). Then boot your PC using that floppy disk, so that anything you do will only affect that disk. (Be sure to use a copy of the DOS floppy disk, not the original.) Then try out some of the commands, to get a feel for what they will do. A few that you might try, since you probably will be using them a lot, are listed here.

DOS COMMAND	WHAT IT DOES
TYPE	show a file on the screen
COPY	copy one file to another file
RENAME	change the name of a file
DIR	show the filenames in a directory
CLS	erase everything on the screen and print a prompt
DEL	delete any file other than a directory
C: or A:	tells DOS which disk to look on for commands

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(Actually C: and A: aren't commands, but they look a lot like commands.)

Some commands you should *not* try out until you have more experience are: CONFIGUR, DETECT, FORMAT, FDISK, PART, PREP, SELECT and any command that begins with 'KEYB'. You should not try them out because they can make permanent changes to your hard disk that you may not want made. You can try the rest of the commands if you want to, just to see what they do. Many of them don't do anything very interesting.

Learning More

The programs that came with the PC probably include tutorials for at least DOS, and you can start with that. Friends who use the same program that you have bought will be willing (even anxious) to help. If you happen to have an NCR PC, it may have a command called "help" that is useful in learning about what the other commands on the PC do. Also, the learning laboratory is available on Tuesday afternoon at the Computer Classroom in Building 173 to learn about your programs. It has PCs and tutorial programs for hands-on training, *and* it's free.

You can call the CRC to ask questions, or visit them for a quick tutorial on use of your PC. There are also scheduled classes in the classroom that teach how to use several popular PC programs. The monthly Highlights distributed by Code 912 tells how to obtain a class schedule. Sometimes the Employee Development Office, Code 142, will distribute announcements of OPM courses on PC programs given in the San Diego area.

The documentation that came with the PC can also be used to learn about the programs. The documentation tends to be useful only when you already know something about computers, or are very patient. Your PC always has some documentation with it, and most accessories and programs come with some. The quality is usually barely acceptable. For programs that COAN supports with training courses, you can purchase related documentation from the Technical Library, Bayside or Topside. Just ask for a list of the documents they stock. If you want to buy additional documentation, a stub requisition must be submitted via the Technical Library, Code 964. Two books that are useful for learning more about DOS are:

USING PC-DOS by Chris DeVoney, QUE Corp., 7999 Knue Road, Indianapolis, Indiana 46250, 1986

Running MS-DOS by Van Wolverton, Microsoft Press, 10700 Northup Way, Box 97200, Bellvue, WA 98009, 1984.

Most of the material in the **Additional Topics** section that is specific to DOS is covered in greater detail in the first book. Also, if you want to really tailor the appearance and behavior of DOS on your PC to your taste, the book

THE FULLY POWERED PC, by Alperson, Fluegelman, Magid, PC World Books, Simon and Schuster, Inc. NY, NY.

contains a wealth of suggestions and ideas, plus a floppy disk of public domain programs to aid in the tailoring.

5. USING IT

Care

As a general rule, treating your PC like you are supposed to treat your typewriter, TV set, video cassette recorder and tapes at home is pretty close. Wipe dust off if any has accumulated. Clean the screen and keyboard if they are dirty, but *no* spray cleaners, please. Instructions on how to care for and clean your PC are contained in the documentation that comes from the manufacturer; for example, in the NCR **PC-6 Owner's Manual** Chapter 4; in the IBM **AT Installation and Setup** Section 7; and in the Zenith **Z-248 Owner's Manual** Chapters 2 & 3. Look up the manufacturer's directions, and follow them, or you risk ruining your screen. Clean your floppy disk drive only when you start getting error messages about it.

Supplies

PCs don't need much in the way of supplies. The printer needs paper and a ribbon. You will occasionally want to buy another box of blank floppy disks. Maybe you bought some other accessories (such as a plotter or a tape backup unit) that use special consumable supplies. If you chose your printer and PC with compatibility in mind, what you need can be bought from Shop Stores #4 or the CRC. If you didn't, then you need to plan on always having about a 6 months' supply and doing your own reordering when you get down to 3 months' stock on hand. Floppy disks almost always come unformatted and without labels on them. You must format the disks before you can use them with the FORMAT command. (Careful with FORMAT; always specify disk drive A:, or you may destroy *all* the data on your hard disk.) You should have a special storage unit for your floppy disks. If you use floppy disks for backing up your hard disk, allow for at least 40 just for that.

Use the labels that come with the disks. A disk with valuable files on it and no label is likely to be used at the wrong time. It is a good idea to use a felt tip pen to write on the label. If you *must* use a ball point pen, remove the label, write on it, and then re-affix the label to the floppy disk. Make the label descriptive, so that you (or someone else) will understand it six months later.

Daily Routine

Whatever you use your PC for, there are certain routine things you need to do to keep it running, or to recover after it stops running. It is a machine; it will
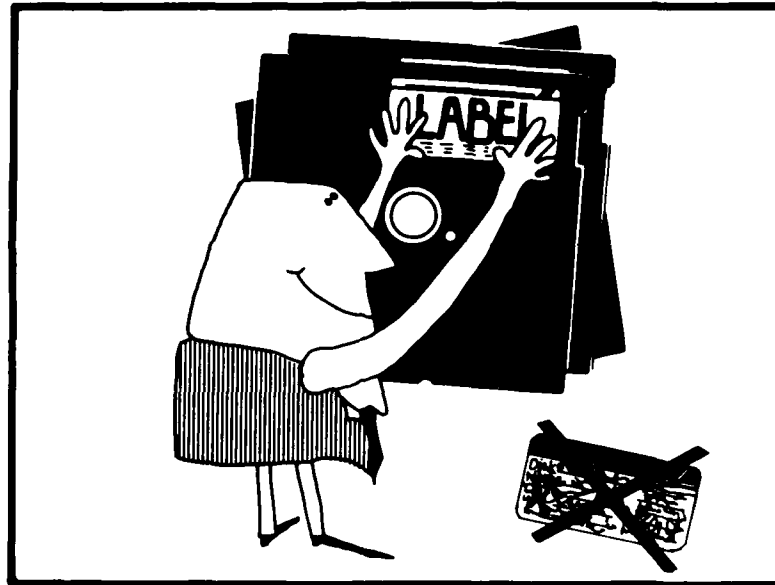
Supplies: Label ALL Disk Contents

break. It may break in the first two days or run perfectly for two years, but it will eventually break. What you do while it is running normally will determine how painful the inevitable breakdown will be.

Visual Inspection – Every day, before you turn it on, look at it. Is anything missing? People have been known to borrow equipment without asking. Even whole systems get stolen, so some simple physical security is in order. Look at the printer; is it almost out of paper? Is everything still plugged into your surge protector? After you turn it off at the end of the day, look around. Have you put your floppy disks away in their special storage unit? If you need a new ribbon or paper or whatever, make a note to do it first thing tomorrow, before turning the system back on.

Stay Organized – A frequent thing you will do with your PC is create a new file. You will either create the file yourself, or it will be created by a command in response to your instructions. After you have been doing this for a few months, you may have hundreds of files on your hard disk. Since the filenames are not very long, if you don't use some organized approach to naming files and grouping them in directories, you will have a hard time finding anything after a while. If you have ever tried to find something in a filing cabinet without labeled folders, you know how important organization is. Some suggestions for file organization

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are given in the **Additional Topics** section; adopt or adapt them, but stay organized

Stay Organized
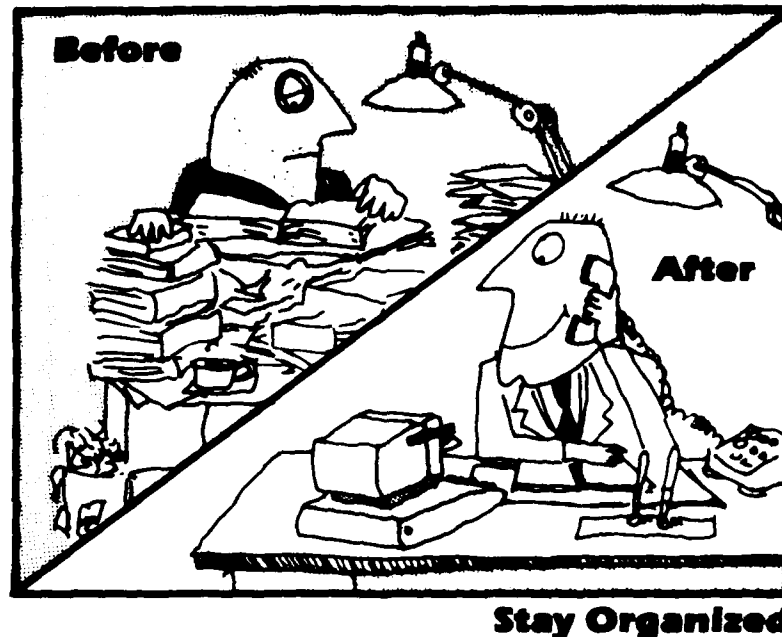
Think it through – Another frequent thing you will do while using your PC is create something to give to another person. It may be something printed, or a file on a floppy disk, or a file you transfer directly to another computer. Sometimes it may be something you don't want just anybody to have, like Privacy Act material, or your clearly expressed personal opinions about something. So don't leave it lying around, or just anybody *will* have it. The same warning applies to files on your hard disk—anyone who can boot your PC has access to *all* those files, so you ought to keep Privacy Act and private files only on floppy disks, and put them away when you are away. If there is any possibility it could be classified, lock it up.

Backup – The most important thing you need to do every day before you turn off your PC is to **back up** your files. The second most important thing is to make sure your back up materials (and all your floppy disks) are safely stored in their special storage unit. Backing up your files is an operation that takes only a few minutes each day, but can save you weeks of effort when that inevitable breakdown occurs. The breakdown may be caused by the hardware in the PC, a command that did the wrong thing, a power failure at the wrong time, or you, the owner. How it happens doesn't really matter, but it *will* happen without any warn-

ing. Pick a time--morning, noon, or night, and make a habit of doing that back-up! There are several ways to do back ups, each with their strong and weak points. Examples of back up methods appear in the **Additional Topics** section. Read about them, choose a way, and then *use it* regularly.

Get more done - After you have had your system a while, you may think of additional applications you would like to use it for, but can never seem to find the time to implement them. Ask around--someone else may have already done it for you. You might consider paying someone to develop them for you, if you don't mind the contracting hassle. Call the CRC, and ask if they know of anyone who has already done it. They are aware of many small office automation, project management, and configuration control applications implemented by other PC owners.

Moving the PC - Once in a while, you may want to move your PC. As with any electronic equipment, you should turn it off, unplug it, and (if moving it very far) package it before moving it. If you are only going to move it a few inches (to dust around it, for example), turn it off and go ahead. However, if you are going to pick it up and carry it, you should **park** your hard disk before turning the PC off. To **park your hard disk** (this locks part of the disk that normally is free to move into a fixed position to prevent physical damage to the disk and loss of data during the move) you usually need to give a special command to the PC. The name of the command is usually something like park, ship, shutdown or parkit--it will depend on who made your PC and hard disk drive. Whoever helped you set up your PC should know--ask them. Finally, put the carrier card in the floppy disk drive. The carrier card for your floppy disk drive is simply a piece of cardboard that you stick in the disk drive to protect it from damage during movement. You did save it when you unpacked your system, didn't you? After moving the PC, take it out again, and put it away for the next move. If you ever want to take your PC off station, perhaps to your home to do some work on a weekend, you need to box it up and fill out some paperwork. Ask your division ADPSSO for help with the paperwork. Don't ignore the paperwork; if the PC gets lost or damaged in transit, or is stolen from your home, you might have to pay for it!

Maintenance

Warranties - Every PC comes with a 90-day warranty. That means that if anything breaks within 90 days of delivery, the manufacturer will repair it. After 90 days, if anything breaks, it must be repaired at your expense. (Zenith PCs purchased on the Air Force contract are a little different; see the end of this paragraph.) When something breaks under warranty, it must be shipped back to

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the manufacturer to be fixed. This will take a while. A no-cost stub and the broken equipment (in the original shipping carton) must be sent by Supply to the manufacturer. The address to send it to can usually be found in the documentation that came with it, and a phone call to the manufacturer before returning anything is usually a good idea. If you can't find an address or phone number, call the CRC and ask them. The no-cost stub must also be signed by Code 9103, the IRM Focal Point Office, or the repair will take even longer. Zenith Z-248 PCs purchased on the Air Force contract come with a 90-day warranty *and* a 270-day on-site maintenance agreement. So, if it breaks during the first year, just call them and they will come and fix it within 2 working days--*if* you filled out and sent in the warranty card for your PC when it arrived. Also, you can order subsequent years of on-site maintenance from the same contract. If you can't find the Zenith telephone number, ask the CRC.

Repairs - Repairs (on-site or at the vendors location, your choice) to a PC that breaks when it is not under warranty are paid for by you. You can pretty much choose your vendor, and call and ask them for a price quote. Then put a job order number and a suggested source on a stub requisition, get Code 9103's signature, and send it through the system. Repair stubs move fairly quickly through Supply, no matter what priority is on them, so a high priority won't help. Repairs are a hassle, because of the paperwork involved, and because you will be without a PC until it is repaired. It is easier to use the Center-wide umbrella contract for PC maintenance; call the CRC for details. If you have faithfully been backing up your files using one of the systems suggested in the Additional Topics section, you can share a co-worker's PC while yours is being fixed. If you are the adventurous type, the Chilton Book Company publishes a book called

HOW TO REPAIR AND MAINTAIN YOUR IBM PC by Gene B. Williams.

Security

Every PC owner needs to read this paragraph. Only PC owners who process classified material need to read the next paragraph. Every computer, PCs included, *must* be accredited. For a PC that doesn't process classified material, an ADP Security Survey must be completed (ask your division's ADPSSO how that is done) and sent to Code 153. Your PC should be in a locked room at night. A PC at work is for business, not games or golf scores. If you work with Privacy Act material, be careful with printouts and your floppy disks, and don't put any Privacy Act material on your hard disk. There, that wasn't too hard.

Now, for those of you who work with classified material on your PC. You have to ask your division's ADPSSO to get a TEMPEST inspection of your system
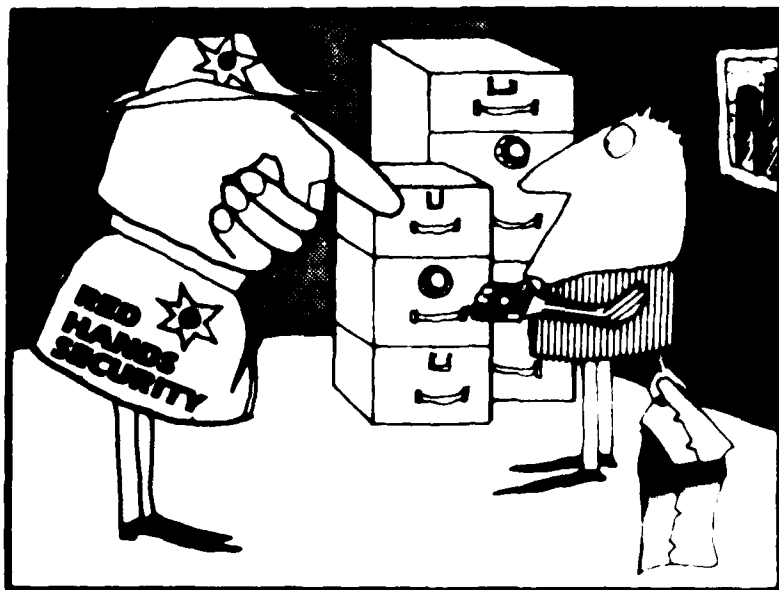
Secure all classified materials

before you begin using it for classified work. The hardware in your system doesn't have to be TEMPEST approved, but your complete system must be TEMPEST tested. *Anything* that has classified material on it must be marked as a WORKING PAPER at the appropriate classification level, and locked up when you are away from your office. That includes floppy disks, printouts, and printer ribbons, and (if the hard disk has classified material on it, the PC. Removable hard disks are a good accessory to buy for processing classified material on a PC. If the hard disk on your PC is clear, you still need to declassify the PC memory every night, or before doing any unclassified work on the PC. On most PCs, you can **declassify** the memory by running the memory diagnostic test that comes from the manufacturer. Maintenance can be very expensive, if something goes wrong with your hard disk, you may have to destroy it instead of fixing it, since most repair personnel don't have high security clearances. Talk to your division's ADPSSO before trying to get a PC used for classified work repaired. Turn your printer ribbons and floppy disks in for classified burn when you are through with them. You shouldn't bring your own PC in to work, but if you choose to, don't put classified data on it. You won't be allowed to take it home again until you can prove the data are all removed (which can take a while)

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When Things Go Wrong

All sorts of things can go wrong with any equipment, and PCs are no exception. Only a few possibilities are discussed below. You will encounter other problems. These things happen to every one. Any problem on a PC (other than a fire) will not get any worse if you let the machine sit for a while. Remain calm. Seek out a more experienced co-worker or call the CRC for help.
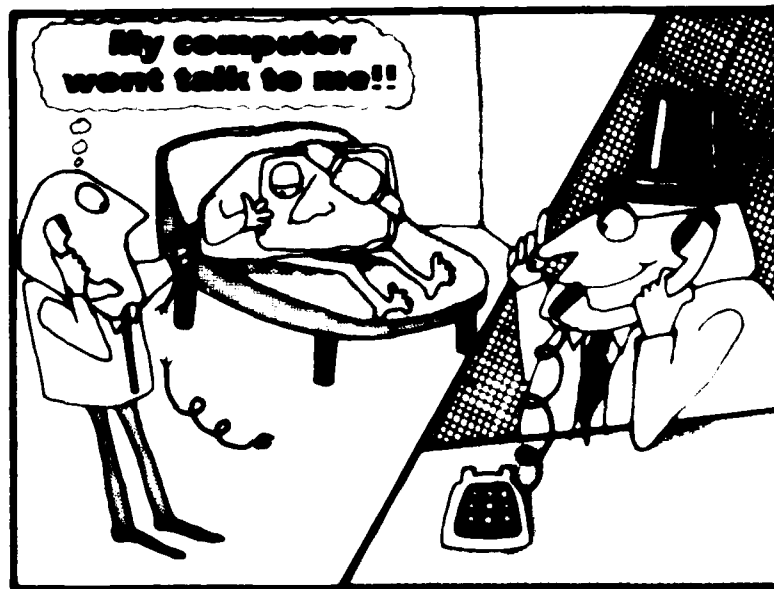
When things go wrong ...

I DELETED THE WRONG FILE

This is probably the most frequent thing that goes wrong. If your file is backed up, just reload it from your backup media. If you accidentally deleted a file you had just spent several hours changing, you can usually Undelete it using a nifty program called Norton Utilities, provided you try to Undelete it immediately. Get someone to use their Norton Utilities program to Undelete the file for you.

I GOT AN ERROR MESSAGE ON DRIVE A

Have you ever cleaned your floppy disk drive? Try cleaning it now and see if the error persists. Also, maybe a co-worker's PC can read the floppy disk without

an error. If so, you might want to ask someone to run a disk diagnostic program on your PC.

I REALLY DIDN'T MEAN THAT.

You made some changes to a file with an editor, and did something awful, like delete most of the file. Usually, editing programs will automatically make a copy of the original file with a filename that ends in .BAK or something like that. If you make this mistake, exit from the editor and make a temporary copy of the original file to recover the deleted material.

MY PC WON'T TALK TO ME

Sometimes, the last command you used does something weird, and the PC seems to be frozen. It won't print a prompt, the screen won't change--nothing-- no matter what keys you press. The Break key does nothing. In this case, some form of reboot will usually get the PC running again. The good news is that at most one file on your disk will be lost. The bad news is that if any file is lost, it will be the one you were just working with.

I GOT THIS ERROR MESSAGE

Error messages can be very helpful or tell you nothing. If you get one you don't understand, you can try locating it in the list of error messages in the DOS documentation. Sometimes it helps. Error messages are located in Appendix C of the NCR-DOS document, Appendix A of the IBM document, and Appendix A, Volume III of the Zenith document.

Getting Rid of It

Well, it's finally happened. For some reason, you need to dispose of your old PC. Since PCs seldom really wear out, you don't want to just throw it away, so what do you do with it? The answer is to give it to someone who doesn't have one, perhaps one of your co-workers. If you can't find someone who wants it, then check with the CRC. They are a clearing house for used PCs, and probably can find someone who will make good use of it. Don't forget the paperwork, either. Transfer it to the new owner. Years later (when you retire, for example), you will be glad you did. If you can't find anyone who wants it, you still can't just throw it in the trash can. It must be "excessed." Call Code 9103 and ask how to do that. When they inquire about your SIN, they are asking for the System Identification Number of the PC.

6. BEYOND BASICS

Introduction

This section describes programs and accessories that are available to extend the power and utility of your PC. In addition, the book:

> IBM PC EXPANSION & SOFTWARE GUIDE,
> Pamela Fullerton, ed., by QUE Corp.,
> 7999 Knue Road, Indianapolis, Indiana 46250

contains an encyclopedic listing, by category, of hundreds of specific items you can buy to enhance your PC. The CRC has a copy of the book. They also have dozens of programs and accessories on display that you might like to try out "hands on" before buying anything.

More Programs

There are thousands of public domain and proprietary programs you can get for your PC. The problem lies in deciding which ones are worth getting and using. The few that interest you may not the same ones that interest someone else. Rather than try to describe so many specific programs, categories are briefly described. Some specific programs mentioned are recommended by COAN, as programs you might want to have on your PC, but there are hundreds of others that the CRC can provide detailed information about. Public domain and COAN sponsored programs are generally free at the CRC. Programs are discussed in three general categories

Application programs	These help you perform a specific task using your PC.
Extension programs	These help you use the PC to perform a task that involves other computers and people.
Utilities	These help you use the other programs on the PC and manage the data on its disks.

Application Programs. The only person who doesn't need at least one application program is the person who doesn't use a PC. Everyone else will probably

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want to pick a program from the first application area (editing) and most will want at least one from the next three areas (word processing, spreadsheets, and database management). Beyond that, the need for a program in an application area depends on what your needs are and how you plan to use the PC.

Editing – In order to do anything on a PC, files need to be typed in and changed, and an editing program is needed to do this. One comes with DOS (EDLIN), but almost no one uses it, because there are so many better ones. COAN sponsors Easy Editor (EE). VMS users can buy an **EDT** look–alike (Mass–11 has an EDT mode), while UNIX users can buy a vi look–alike (PC/VI). Many people use their word–processing program (next category) as their editing program.

Word Processing – Most PCs are used to do at least some word processing. Word processing includes simple typing and changing of files, plus underlining, pagination, spelling correction, and table of contents generation, and can include footnotes, automatic indexing, analysis of style, and typesetting on a laser printer. WordStar, WordPerfect, and WordMARC are representative programs.

Spreadsheets – Any time rows or columns of numbers must be manipulated, an electronic spreadsheet program can help. LOTUS 1-2-3 is a representative program. A spreadsheet can sometimes do numeric modeling faster than custom designed programs.

Database Management – Any data that are important enough to collect and keep for later reference, analysis, or change is a database. Data can be printed in tabular form, with columns of like data, or narrative form, like a book or a program. dBASE III and Rbase:5000 are representative programs that assist in every aspect of managing tabular databases. There are also programs that specialize in managing narrative databases. The FIND program that comes with DOS and the public domain GREP program are simple (but extremely useful) programs; much more powerful programs like Zyindex can be purchased that index, retrieve, and analyze narrative databases.

Time Management – Whether you want to automate your calendar, plan better use of your time, organize your day, or analyze where it went, the PC can help. Sidekick and Spotlight are representative programs.

Thought Organizers – There are programs that will help you try to bring orderly structure to any creatively generated rat's nest of ideas. ThinkTank is a representative program.

Business Graphics – The visual display of words, numerical data, and graphs at meetings, project reviews, and other informal presentations using viewgraphs can be easily done. The MASTER series is a representative suite of programs.

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Publishing – To produce high-quality typeset documents with a PC and a laser printer, publishing programs are available, which combine text and graphics and many typesetting options (format, type face and size, column layout). Ventura and PageMaker are representative programs.

Scientific Graphics – The analysis of numerical data in graphic form for presentation at meetings, or inclusion in reports and papers, is possible. DISSPLA is a representative program.

Statistical Analysis – The analysis of numerical data for underlying correlations or trends can be done. STATPAC is a representative program.

Project Management – The planning, scheduling, resource allocation, budgeting, and other aspects of managing a project can all be done. Time Line is a representative program.

Compilers – There are compilers for just about any language, from venerable LISP, C, Pascal, and FORTRAN, to the more modern ADA and MODULA2 languages.

Programming Design Aids – The design, structure, and actual programming of most programs can be speeded up and their correctness improved, analyzed, or verified. Sometimes documentation can be generated. Action Diagrammer is a representative program.

CAD/CAE – Many programs to assist the designer and engineer in doing Computer Aided Design (CAD)/Engineering (CAE) are available. CADKey and AutoCAD are representative programs.

AI – Many programs previously only available on minicomputers are now available on the PC for artificial intelligence (AI) work. GURU is a representative program.

Extension Programs – Whenever you start working with other people or computers, you quickly learn that the PC cannot stand alone. It must work with other computers. The programs discussed in this section extend the PC outside your office via communications over the GCB to the rest of the Center, and even to the rest of the world.

Terminal Emulation – Almost everyone will probably want to use their PC as a terminal connected to some other computer on the GCB at some time. There are many proprietary programs that do this, such as Crosstalk XVI. A simple-to-use program that lets the PC emulate a DEC VT100 terminal is the COAN-sponsored terminal program. Terminal can also emulate the Z29 terminal.

Electronic Mail – To be able to do all the electronic mail functions--receive, read, answer, and send new messages--from your PC, get a copy of the COAN-

sponsored μmail program. There is a brief registration process required to allow you to receive mail.

File Transfer – To be able to exchange files with another computer, a special program is required on both computers. The terminal program mentioned under terminal emulation lets your PC exchange files with any VMS or UNIX computer that has mcp installed. The proprietary program Crosstalk XVI exchanges files with computers that have Umodem installed. The public domain Trivial File Transfer Protocol (TFTP) program lets you exchange files with any other computer (including another PC) that also has TFTP installed.

Remote Access – If you ever want to use your PC when you are away from your desk, there are programs that will let you remotely access your PC from another computer. Not all PC programs can be used remotely--ask the CRC if yours can. REMOTE is a representative program. Another type of remote access is the use of a printer that is not directly connected to your PC, but is instead connected to the GCB. There are several programs that will permit you to use a remote printer (dot matrix or laser) as though it were directly connected to your PC. Inquire at the CRC about PCPRINT and other such programs.

Utilities – Utility programs help you maintain the other programs on the PC and manage the data on its disks, so that the other programs (and you) can find the data when you need it. One utility program that almost everyone needs is a DOS path enhancer. (See below for a definition of DOS enhancers, also see the directory management discussion in **Additional Topics**.)

File Backup – The most important category of utility programs is the file backup category. File backup programs make a copy of your hard disk on something else (floppy disks or tape or another computer) so that you will have a copy of your precious files if your hard disk ever loses them. File backup is like health insurance--you hope you never have to use it and you don't like making the payments, but when you need it, you are really glad it's there. The BACKUP/RE-STORE, which comes with DOS, and Fastback/Frestore, which you can buy, are representative examples. Tape units (described in the **More Hardware** section, below) come with software to do file backups, also.

DOS Enhancers – Programs in this category do things that DOS should be able to do, but can't. Keyboard enhancers let you reprogram the keyboard (if you like DVORAK rather than QWERTY, for example) or create your own style of using application programs (if you like your word processor to react the same way

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to the keyboard that EDT does on VMS, for example).[1] Keyworks is a representative example. Path enhancers let you decide where DOS looks for data files and commands. Dpath is a public domain example of this category, and FilePath (FP) is a proprietary example.

Configuration – Programs in this category change switch settings (either in the hardware or programs on the PC) to customize the behavior of the PC. Many application programs need some sort of configuration changes at the time they are installed on a PC. This is usually done by a subprogram that comes with the main program. Some cards need physical switches set at the time they are installed in the PC, some need switches set in the programs that use the cards. DOS usually needs to be configured for communications by the program that comes with it.

File Manipulation – Programs in this category manipulate files—they move them around, copy them, change their names, change their status, delete them, or undelete them. Examples are:

FUNCTION	DOS PROGRAMS	PUBLIC DOMAIN
Move files around	MOVE	MV
Copy files	COPY	CP
Change file names	REN	MV, RENDIR
Change status	ATTRIB	CHMOD, TOUCH, ATTRIB
Delete files	DEL, ERASE	RM

Norton Utilities is a representative program that can manipulate files *and* undelete them, too. There are others.

Disk Management – Programs in this category format your disk, divide it up into manageable chunks, and convert disks from one computer system to another. The FORMAT and FDISK programs that come with DOS, and the Uniform program, are representative examples. Some programs in the access control category below also perform disk management.

Directory Management – Programs in this category help keep track of the programs and subdirectories on your disks, and reorganize them when you want to change them around. Some programs manage all the directories on a disk, others work with specific directories. The TREE and CHKDSK programs that come with DOS are disk-oriented, as are the DF and DU public domain pro-

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[1] The QUERTY keyboard (so called because the sequence of letters in the top line) is standard, the DVORAK keyboard is an alternative arrangement of the keyboard proposed in 1943 by A. Dvorak.

grams. XTREE is another representative program. The DIR program that comes with DOS and the D and LS public domain programs are directory-oriented.

File Comparison – Programs in this category compare two different files to determine whether they are copies (or descendants) of the same original file. The DISKCOMP and COMP programs that come with DOS and the COMPARE and DIFF public domain programs are representative examples.

File Ordering – Programs in this category sort or rearrange the lines of data in a file. A simple SORT program comes with DOS; public domain and proprietary programs of much greater ability are available.

Printing – Programs in this category show files on the screen or print them on paper, or do special things with printers (like maintain queues of files and run the printer while the PC is doing other things––this is called **spooling**). DOS provides the PRINT spooler (which barely does the job, but is free) and TYPE; but almost every word processor does its own printing. Public domain programs like PR, HEAD, TAIL, and MORE are also available. Most multi-function cards (see the **More Hardware** section) come with a spooling program.

RAM Disk – Programs in this category let you define disk drives that exist in the PC's memory, rather than as physical devices. They provide a great increase in speed of access to files. NCR DOS and Zenith DOS 3.1 both include a ram disk program.

Windowing – Programs in this category let several programs simultaneously display on the screen and await your next command. MS Windows is an example of a program in this category; it is included when you buy a Zenith PC from the Air Force contract.

Shell – Programs in this category let DOS act like some other operating system (at least on the screen and in response to the keyboard). Every PC comes with one, called COMMAND.COM. There is a program that makes DOS act a lot like VMS called PCVMS from Wendin, Inc. They also sell PCNX, and several public domain UNIX shells are available.

Encryption – Programs in this category encrypt the files on your disk so that only authorized users will understand their contents. Some programs in the access control category below also perform encryption. The public domain program CRYPT is a representative example.

Access Control – Programs in this category ensure that only authorized users can see and understand things on your disk. Some of these programs require special added hardware, and all require a password at the time the PC is booted. Vfeature is a representative program, that can work in conjunction with FiXT/S (see the security device topic in **More Hardware** below).

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More Hardware

Just about any option for a PC that you can dream of exists. The following categories barely scratch the surface. Some accessories mentioned here are recommended by COAN as options you might want to have on your PC. Some accessories go on the outside of the PC, and attach with cables; they are called peripherals. Some accessories go inside the PC, and plug directly in to the PC; they are called cards or boards.

File Backup – These accessories come in peripheral and board form, and usually consist of a cartridge tape drive and a program that runs on the PC.

Surge Protectors – Most PC power supplies are sensitive to voltage surges on the power line, and a cheap (about $20) surge protector peripheral can prevent expensive repairs. The CRC stocks them.

Display Screen – Every PC needs one, either in color or monochrome. You can change the color, the size, or the quality of your display by buying a new one, along with the corresponding display driver card to go inside the PC.

Keyboards – If you like the one you have, keep it, but be aware that several styles of key layout, function key location, tactile feedback, and other differences are available.

Mouse – If you don't like using the cursor keys on your keyboard, you can use a mouse instead. By moving it around on a flat surface, you can avoid having to touch the cursor keys. If you have decided to use some windowing software (see above), you can avoid having to touch the entire keyboard, except when actually entering new data.

Touch Pad – This is similar to a mouse (see above), except you move the cursor by touching a pad rather than moving the mouse.

Network Communications – At work, there is one primary network--the GCB--and either a Sytek Localnet 20/100 (T-box) peripheral or an Ungermann-Bass Network Interface Unit (NIU) card is used to communicate between your PC and other computers on the GCB.

Modems – A modem can be either a peripheral or a card. It allows the PC to communicate over a telephone line to other equipment that talks the serial RS-232C protocol.

Memory Boards – A board that allows the amount of random access memory (RAM) inside the PC to be expanded, typically to 640 kb or more on an XT-like PC, to 2 Mb or more on an AT-like PC, and up to 16 Mb on a PS/2-like PC.

Clock Cards – A board that contains a calendar and clock that keeps running when the PC containing it is turned off. Every PC should have one. PS/2-like PCs, AT-like PCs, and some XT-like PCs, already have one. If yours doesn't, you should get one. Then you won't have to keep entering the date and time every time the PC is booted. And you need the correct date and time in your PC so that the file backup software will work correctly.

Port Expanders – This card allows your PC to talk to more peripheral equipment, by adding serial (COM) ports or parallel (LPT) ports or even ports for new protocols, like Ethernet.

Multi-function Cards – A board that has memory, a clock, and some extra ports on it (combining the features of the above three types of cards) is called a multi-function card. Usually, such a card will also have some ram disk and spooling programs included with it (which may or may not work on your PC).

Hard Disk Upgrades – Whatever hard disk your PC comes with may not be large enough for everything you want to do. You can either replace it, or add additional hard disks. Be careful that your add-ons are compatible with your disk controller card. Removable hard disks function just like normal hard disks, but can be removed from the PC almost as easily as a floppy disk, and are useful for Privacy Act or classified data storage. Fault-tolerant hard disks have some form of redundancy in the hardware to greatly increase their reliability, reducing the need for frequent backups.

Floppy Disk Upgrades – Your PC uses either 5 1/4"or 3.5" floppy disks. If you have an XT-like PC, it probably only has 360-kb 5 1/4" floppy disk drives. An AT-like PC may have both a 360-kb and a 1.2-Mb 5 1/4" drive, or just a 1.2-Mb 5 1/4" drive. A PS/2-like PC may have either a 720-kb or a 1.44 Mb 3.5" drive. You can add more drives to any PC, but be careful when moving floppy disks between drives, even if they are the same size—they are not always fully interchangeable. You may want to add a 3.5" floppy disk drive to an AT-like or XT-like PC to exchange files with lap-top or PS/2 computers.

Accelerator Boards – An accelerator board can make an XT-like PC perform faster than an AT-like PC, and an AT-like PC perform faster than a DEC VAX-11/780. With new speed comes new problems, so don't get an accelerator board unless you need one.

Data Acquisition – If you want to use your system in the laboratory, controlling laboratory devices, or with analog signals, explore the boards that are available.

Security Devices – There are many forms of security devices, ranging from simple locks on the keyboard or power switch to elaborate encryption cards. An

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encryption card protects your hard disk by encrypting the data on it, so that only someone knowing your password can access your data.

Plotters – For graphic presentation of data, and for high-quality preparation of viewgraphs for informal presentations, a plotter is a necessity. Multiple pens (for multiple colors) and many combinations of page size and resolution are available. Hewlett-Packard makes several that most of the PC graphics programs are compatible with.

Printers – Almost every PC should have a cheap dot-matrix printer as a peripheral for draft copies of written material. High-quality printers, and laser printers for typesetting, are also readily available for the PC around $2,000, and can be shared among several PCs over the GCB. It is important that the dot-matrix printer be compatible with an Epson printer, so that lots of your PC software will be able to use it.

Printer Buffers – This peripheral is inserted on the cable between your PC and your printer. It allows the PC to quickly format many pages of data and then lets you do something else, while the printer slowly prints it out. Some printers already have one built in, so don't buy one unless you need it. Some printer buffers can also allow you to connect a parallel printer to a serial COM port or network communication device, or share a printer among several PCs.

Optical Scanners – Optical scanners will automatically enter many pages of printed material into a PC in a very short time with high accuracy, and can be real time-savers compared to the alternative of manually entering all that data. They continue to suffer from limitations, including which styles of type they can read and the quality demanded of the print on the paper being scanned, but when they work, they work very well. Many optical scanners are compatible with the COAN-recommended word-processing programs. Some scanners can also digitize (see next paragraph).

Digitizers – Digitizers are similar to optical scanners, except that they work with pictures rather than printed material. They are more limited in the PC programs they work with, and are frequently only compatible with the program that comes with the digitizer.

7. ADDITIONAL TOPICS

This section contains brief discussions of several topics of general interest to PC owners. The first topic (file backup) is of interest to all owners. The rest of the topics should be skimmed **now and reread as appropriate.**

File Backup

File backup was emphasized in the **Using It** section as some thing that you should do every day. It is up to you how often you perform a backup. Just remember that if anything does go wrong with your PC or its hard disk, the only thing you can count on recovering is your backed-up files. If you have been working really hard for two weeks on a project, and have been too busy to do a backup, this is exactly when you will have a hard disk failure, and be forced to spend the next two weeks manually re-entering all that work. On the other hand, if you have been busy away from the PC and have not changed too many files, it is a small risk to skip an occasional daily backup. For more information about doing backups, and for details about the systems described here, talk to an experienced co-worker or someone in the CRC.

Types of systems – Four types of systems are discussed. There are others that you could use, but they are not in widespread use, so they won't help you if you ever need to use a friend's machine while yours is being repaired. Also, none of the four is compatible with the others.

NAME	CHARACTERISTICS	DESCRIPTION
Backup/Restore	Free, slow	DOS-provided commands user-provided floppy disks
Fastback/Frestore	Cheap, fast	Proprietary commands w/user-provided floppy disks
Cartridge Tape	Fast, noisy	Cartridge tape drive w/ user-provided cartridges
Network	Fast,safe, costly	Another computer on the GCB does backup.

Range of use – Each of the four types of systems works best for a certain type of use, with considerable overlap, as follows:

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Name	Type of System
Backup/Restore	XT with 10-Mb hard disk, patient user, 40 or so 5 1/4" floppy disks
Fastback/Frestore	AT with 20-Mb hard disk, coordinated user, 20 or so 5 1/4" floppy disks
Cartridge Tape	AT or PS/2 with 44-Mb hard disk or larger, 10 or so tape cartridges
Network server	Any PC, a high-speed NIU to connect via GCB to backup computer.

Frequency of use – About once a month, with any backup system, a full backup should be taken. A full backup means that a copy of everything on the hard disk of the PC is backed up. Between full backups, a series of incremental or daily backups should be made. An incremental backup is a backup of every file that was modified since the last full backup, and is typically done every week. A daily backup is a backup of every file that has been modified since the last backup (of any type), and is typically done every day.

Tips:

· Label your backup disks or tapes, and don't ever use them for anything else, or else.

· Try to keep two full backups, and alternate the media. Two is enough. Keep one full backup in another location, just in case.

· Think of some way to verify that the data written on your backup media is valid (without trying to reload it). When you back up 10 Mb or more to magnetic media, statistics suggests that at least 2 bits are wrong. If you back up to floppies, a simple "COPY A:*.* C:NUL" will read all the files, and complain if there are any errors. On a cartridge tape unit, use the /VERIFY switch (at least on the full backups).

· When you copy a file from a floppy disk to your hard disk, it may not be marked as needing backup, unless you modify it--this means that whenever you copy a large application program to your PC's hard disk, you should think about doing a full backup, so it will definitely be included in the backup.

- If any of the software on your hard disk is copy-protected, it won't be correctly backed up by a full dump without special effort on your part. The intent of copy protection is to prevent PC owners who have not bought proprietary software from using it. The intent usually fails. It does succeed in making backups difficult, so ask the CRC for suggestions if you have any copy-protected software.

- Most of the backup software is too dumb to restore a file to any directory other than exactly the one you backed it up from, so if you change your directory organization, remember to do a full backup.

- When you delete a file on your hard disk, it is still on your backup media, so if you have to do a reload, the "deleted" file will suddenly reappear. This can occasionally be useful, but is more often annoying.

Boot Files

Whenever you boot your PC, one of the first things it does is look for two files called CONFIG.SYS and AUTOEXEC.BAT. When it is through obeying the commands it finds in these files, it prints a prompt and waits for your first command. Each file is briefly explained below, along with a recommended minimum set of commands for each file. Some tips about how to use and avoid misuse of the boot files follow. The CONFIG.SYS file is where your PC's peripheral configuration is specified, and where DOS configuring gets done. At a minimum, the file should contain the following lines:

```
BREAK ON
BUFFERS=20
DEVICE=ANSI.SYS
FILES=31
```

Other lines may be required. If you have RAM disk or any special peripherals, you would add extra DEVICE lines to this file. Why you want these lines in your CONFIG.SYS file is explained in your DOS manual. The AUTOEXEC.BAT is where you store the commands that you always want executed every time you boot your system. A minimal AUTOEXEC.BAT file would contain:

```
PATH C:\
PROMPT $n$g
```

Beyond this, you can add many commands to personalize the way the PC will work for you. Detailed directions on PATH and PROMPT and more about AUTOEXEC.BAT are in your DOS manual.

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If you have an XT-like PC, you probably should also include some command to set the PC's clock; AT-like PCs and PS/2-like PCs do it automatically. You will probably want to experiment with both PATH and PROMPT until they are the way you want them. For more detailed information, the NCR NCR-DOS Manual talks about CONFIG.SYS and AUTOEXEC.BAT in Chapter 3. The IBM DOS Reference Manual talks about CONFIG.SYS in Chapter 4, and AUTOEXEC.BAT in Chapter 7. The Zenith MS-DOS Manual talks about CONFIG.SYS in Volume I Chapter 9 and AUTOEXEC.BAT in Volume I Chapter 5.

One thing you usually do in AUTOEXEC.BAT is to set up your configuration and time management programs. Be careful of the order of the programs in AUTOEXEC.BAT. Sometimes the programs interact, and won't work unless you have them in just the right order. When you want to add another such program, the order may change. Sometimes quite a bit of experimenting with programs like MODE, SIDEKICK, and Dpath is needed to get everything to work properly.

Keyboard Entries

Some of the topics in this section discuss the use of the keyboard to control the PC or enter data. Occasionally more than one finger is required, because more than one key needs to be pressed at the same time. Whenever two (or more) keys need to be pressed at the same time, this manual shows them together inside brackets. For example, <Ctrl-Break> indicates that the Ctrl key on the keyboard should be pressed and, *while holding it down*, the Break key should also be pressed. Both keys should then be released. <Ctrl-C> is equivalent to CTRL/C in VMS documentation and ^C in UNIX documentation. The Break key is usually in the upper right-hand corner of the keyboard. The Break key probably is also labeled Scroll Lock. When entering data, the Enter key (sometimes labeled Return) needs to be pressed after all the data for that line has been entered. This manual indicates pressing the Enter key by <Enter>. Whenever two keys need to be pressed at the same time, upper and lower case don't matter--<Ctrl-X> is just the same as <Ctrl-x>. One exception to this statement occurs with <Enter> and <Shift-Enter>--some programs on your PC may treat them differently.

Filenames and Extensions

Filenames in DOS can't be very long--up to 8 characters--and not many characters can be used, so you have to be careful how you name files if the names are going to be meaningful. Filenames are shorter than names on file tab folders

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in a filing cabinet, but the same techniques can be used in creating names. Some sort of consistent way to name files will help in remembering what all those files contain (or help someone else discover what they contain, if the need should arise). The DOS book probably says you can use other characters besides "A" through "Z", "0" through "9", "$", "_" (underscore), "(", and ")" in file names, and usually you can, but a few programs just don't like any other characters, so it is safest to avoid them. Also, upper-case and lower-case letters (for example, "A" and "a") are equivalent in file names. Every DOS book has at least one chapter on the technical details of what filenames can look like. The **wild cards** "?" and "*" are quite useful; it is worth the time required to struggle through the discussion of them in your DOS book. Don't try to use the **extension** (a period (".") and another 3 characters after the filename) to get 11 character filenames; you will eventually regret it. The extension is useful as a way to categorize a file as to the type of material it contains. It is more flexible than color coding (sometimes used on file tab folders), and serves about the same purpose. Most DOS books (except IBM) have a list of the common extensions that programmers use. .TMP (temporary file) and .BAK (backup copy of some other file) are commonly used extensions. .EXE (a program in executable load module format), .COM (a program in binary image format), and .BAT (a batch of DOS commands in a file) are the only extensions that are recognizable to DOS. You can define your own set of extensions to help you categorize files, just don't get too fancy. Also, it is helpful to keep a .TXT (plain text, no fancy formatting) file on your PC with a line defining each extension you use. For example, a set of extensions a secretary's EXTENSON.TXT file might include is:

.MEM	file with a memo in it
.LTR	file with an official letter in it
.MTG	file with the minutes of a meeting in it
– or –	
.MIN	file with the minutes of a meeting in it
.TRP	file with trip report in it
.RPT	file with a technical report in it
.IDX	file with an index to some other files in it

VMS users can use the extension as an alternative to the version number.

Directory Organization

The need for directories on your hard disk has been mentioned in previous sections. The concepts behind directories are discussed here, and guidelines for how to organize and use directories are given.

Concepts – Directories are a form of hierarchy. Another form of hierarchy is an organization. Every hierarchy has a name. Our organization is called the

```
┌────────┐
│   20   │
│   30   │
│   40   │      ┌────────┐
│   80   │──────│   81   │
│    ·   │      │   82   │
│    ·   │      │  8203  │
│   90   │      │    ·   │
└────────┘      │    ·   │      ┌────────┐
  NOSC          │   84   │──────│  841   │
                │    ·   │      │  842   │
                └────────┘      │  8421  │
                                │  843   │────( Jim )
                                │    ·   │
                                │    ·   │
                                └────────┘
                                      │
                                      · · ·
                                 ( people )
```
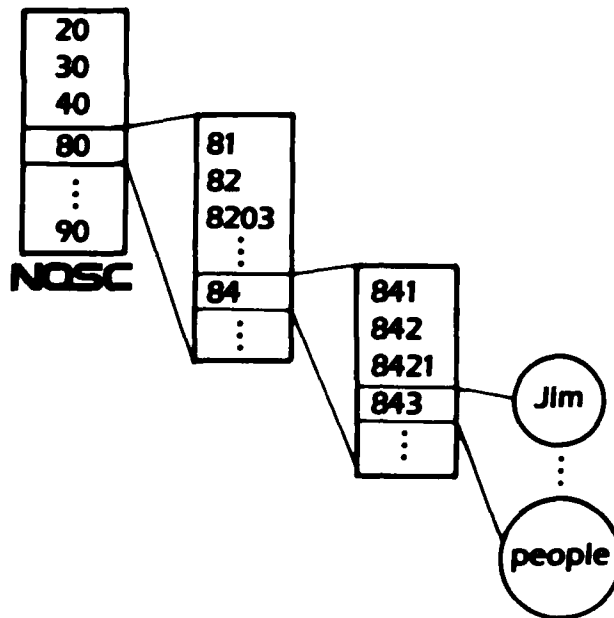
NAVOCEANSYSCEN. The highest level (or root) directory in the hierarchy on a PC's disk is called "\". Below NAVOCEANSYSCEN, the subdivisions are called departments, divisions, and branches. Whenever a person in a subdivision is referred to, a complete **path name** may be needed. For example, the path name for Jim in Code 843 would be "Jim works at NAVOCEANSYSCEN in the eighth department, fourth division, third branch". To other people in Code 843, "Jim" is enough. Similarly, below the "\" on a disk, the subdivisions are called subdirectories, subdirectories, and (surprise) subdirectories. Just to keep things simple (or confusing, depending on your viewpoint) subdirectories are usually called directories. Whenever a directory is referred to, the complete path name is given. For example, \subdir1\subdir2\data and \forms\test.txt are complete path names. If DOS is already looking at the right directory, only the filename needs to be given. The Zenith document **Conversational MS-DOS** has a longer discussion, with examples, in Chapter 6. The NCR **NCR-DOS Manual** Chapter 2 talks about files and directories, and may be worth skimming. The IBM **DOS Reference Manual** Chapter 5 talks about directories. The Zenith **MS-DOS Manual,** Volume III, Chapter 7, also talks about directories.

Guidelines – If you are going to use your PC very much, you will need to separate your files into several directories. The first major division you want to

make is between your files and "the system's" program files. VMS and UNIX users are already familiar with this division. Also, you want to keep root (\) fairly empty. There are several reasons for this, but an important one is speed--the more files in a directory, the more time it takes to search, and DOS looks at root many, many times a day. A suggested contents for root on your C: drive is:

```
CONFIG.SYS
AUTOEXEC.BAT
COMMAND.COM
ANSI.SYS
BIN
     .
other program directories
     .
U
```

The first four files are DOS files that you have to have anyway. The directories are discussed below. If your PC is part of a network, you will probably use directories on the network disk drive (this disk drive is not on your PC--it is somewhere else on the network), and you will avoid future problems by separating your files as suggested here. Also, this standard separation of files will make it much easier for other people to help you when you ask questions.

"BIN" is a directory to contain all the files that are a part of DOS from the system floppy disk that came with your PC. VMS (and some UNIX) users might prefer "SYS." You will probably want additional directories for the major proprietary applications you purchase--it is not uncommon for an application like LOTUS 1-2-3 to have more programs and require more disk space than DOS does. Whether they are subdirectories of "\BIN" or "\" is a matter of personal or program preference. An additional directory you should probably have is one called "LOCAL or "PD"--it is a place to put locally written, public domain, legally shareable programs that you will encounter in the use of your PC. There are many such programs, and some of them will probably end up on your PC. It is safest to have them in a separate directory so that you won't have to worry about which programs you can legally share with friends and which you can't.

"U" is a directory to contain all the files that you create on your PC and spend most of your time manipulating. VMS users might be more at home with "USER," and UNIX users might prefer "USR." You might want to personalize it by using your last name (if you don't mind typing it frequently), but the idea is to separate everything that is yours from all the files on the disk that are proprietary or public domain programs. The extra layer of directories takes no extra effort in normal use of the PC, if you include as the last line of your AUTOEXEC.BAT

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file a command to change to your most frequently used directory, for example, "CD \U\FORMS."

Within "U," further directories should be created as they are needed. The names you choose will depend on your work, but you want to try to separate your files by project, or function, or subject matter (just don't get too clever, or you will get lost). If you primarily write programs, you might want a directory for each program. If you work on several projects, you might want a directory for each project. If you attend many meetings, you might want a directory of just meetings, etc. You can use MMDDYY.EXT, where MMDDYY is the numerical month, day and year of some event, and EXT is one of your categories, to help file many reports, memoranda, and minutes in chronological order in one subdirectory. As a rule of thumb, try to keep more than four but less than fifty files in each directory. Any less and the directory isn't paying for the extra typing involved in having it, and many more and you will start spending too much time trying to find individual files in it.

Directory Management

Assuming you have adopted the organization suggested in the previous discussion, you now have a set of subdirectories to manage. Two problems that arise are: (1) locating a file that is yours, when you remember part of its name, but not the full name or path name for it; and (2) locating a file that a command needs (but is not in the current directory).

Locating a file that is yours – good organization will help you here, but is not always enough. The DIR and LS commands are quite helpful, because they show the filenames in the present directory, or if you want to specify a path name, in any other directory on your disks. LS is particularly helpful with its –R switch (which will show the files in a directory, plus the files in any subdirectories of the directory). If you want a list of all the directories on your disk (or all the directories plus all the files in them), TREE is your command. XTREE is a more graphic way to see all the files on your disk. The DOS command FIND can help locate a file when you remember part of what is in the file, like a phrase or a special word, since FIND searches for phrases in files.

Locating a file that a command needs – good organization and advance planning help here. The PATH line in your AUTOEXEC.BAT file is important, for it tells DOS which directories to look in when you want a command to do something for you. For example, the recommended disk organization splits up the application programs, requiring a PATH line like:

        PATH C:\;C:\BIN;C:\LOCAL

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Then, whatever subdirectory of "U" you were working in, DOS would always be able to find your commands in the program directories, without your having to change directories all the time. However, suppose you use a command called WS (this is the name of the word processing program, WordStar), and it needs a file that is in \BIN\WS, to check the spelling of a file you are editing. Only DOS uses the PATH to figure out what other directories to search. To help WS, another command needs to be in your AUTOEXEC.BAT file:

FP C:\BIN\WS

This command tells a program called FilePath to be ready at any time to help programs that can't find a file they need (either a data file or another program file) by looking in subdirectory \BIN\WS on drive C: for it. Of course, FP can look in more than just one directory, and there are other programs besides FP, like the public domain Dpath program that can do the looking. DOS enhancers (a separate category of utility programs described in the **Beyond Basics** section) are vital in directory management. For more details, or a copy of Dpath, inquire at the CRC.

Networks

A PC network ought to let you access files on the disks of other PCs as if they were on your own PC; use shared laser printers, optical scanners, and other specialized peripherals easily; and provide a delightfully simple way to backup your own PC's disk files. There are more than two hundred different, mostly incompatible, PC networks you can buy. Most of them look good on paper; many of them *are* good; a few are lousy.

Whole books have been written about PC networks, but you don't need to read them. If you want more than the brief definition and warnings that follow, you really need to go to the CRC. They can demonstrate a PC network for you, and provide information and help you set up your own network. A PC network is a combination of two things: options *added* to each PC in the network and connections *between* all the PCs in the network. The options *added* to each PC are special communication hardware and software. Each PC owner usually buys these for their own system. The connections *between* PCs are usually done through the GCB. Sometimes PCs are directly wired to each other, but connections through the GCB are much more flexible. Warnings: When you buy a house, there are three things to look for: location, location, and location. Similarly, when you buy a PC network, the three things to look for are compatibility, compatibility, and compatibility. Setting up and using a PC network can be as complex as you let it become, or it can remain quite simple. It is much easier to ask for help than to reinvent a solution to a network problem. Perhaps it is not as satisfying, but it is much quicker, and helps maintain **compatibility**.

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Terminal Emulation
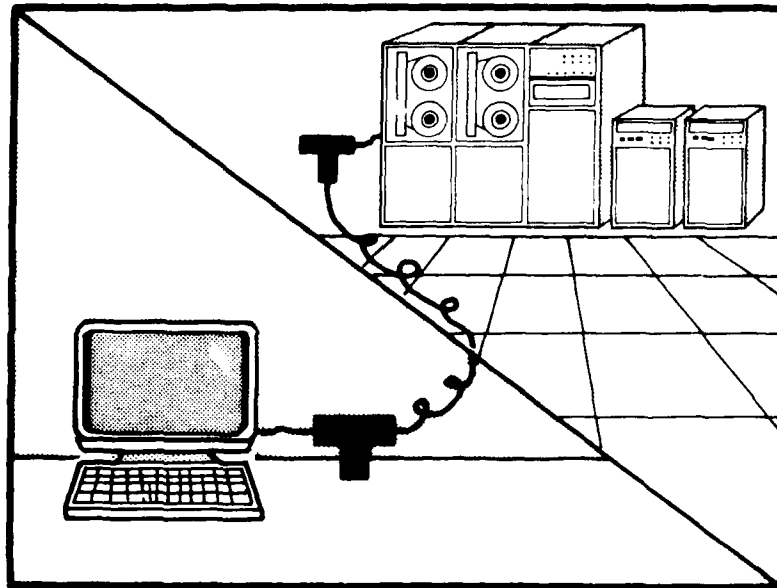
Terminal Emulation

Before PCs became common, larger computers with many terminals attached to them were the way to do computing. Even today, the best (or only) way to do some things is to use a larger computer. So one of the common uses of a PC is as a terminal to a larger computer. This requires the use of a terminal emulation program, so that the PC's screen and keyboard can act like the screen and keyboard of a real terminal. Any time a PC emulates a terminal, some compromises will need to be made—the PC will not look exactly like the terminal it is emulating, nor will it behave the same way. Frequently, the keyboard will have slight, but annoying differences (like no GOLD key), and some special characteristics of the terminal won't exist in the PC. The terminal emulation program will also usually provide some form of file transfer capability (see the next topic). Since the PC is flexible, it can emulate almost any type of terminal (provided the right emulation program is available). The most frequently emulated terminals locally are the DEC VT100, Zenith Z29, and Tektronix 4014. Programs to emulate these terminals were mentioned in the Extension Programs portion of the **Beyond Basics** section.

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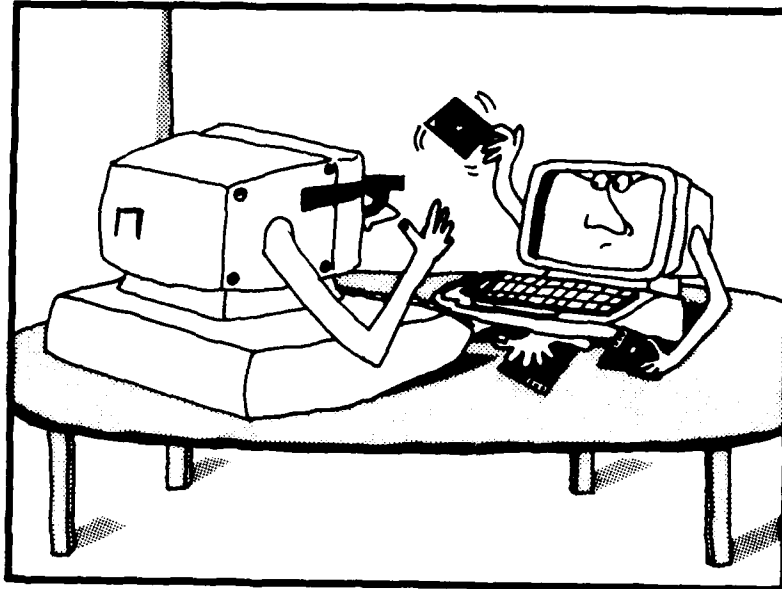
File Transfer

File Transfer: from one PC to another

If you want to give a copy of a file on your PC to another co-worker (whether they use a PC or a larger computer), you need to do a computer-to-computer file transfer. The transfer may be as simple as copying the file from your PC's hard disk to a floppy disk, removing the floppy disk from your PC, carrying the floppy disk to the other computer, inserting it, and copying the file to the other computer's hard disk. Frequently it is not easy—many problems can complicate this apparently simple process. All the problems can be solved, but the solutions may not be worth the effort. Even when the transfer is possible, it may not be worth doing, because the file you want to transfer is not compatible with the programs of the receiving computer.

Compatibility – Every computer has files of several different incompatible formats on its disks. Only when the format of the file on your PC is compatible with the other computer (or can be converted to a compatible format) is a satisfactory transfer possible. If you are not sure the format of the file you want to transfer is compatible, ask a knowledgeable co-worker or someone at the CRC before attempting the transfer. Usually, if the same program (a word-processing program, for example) is going to be used on both computers to manipulate a file

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being transferred, then transfer is possible. Also, if the file on your PC can by displayed on the screen by TYPE or some other simple utility program, without any funny results, it can probably be transferred. This would appear to rule out the transfer of programs, since TYPEing a program displays all sorts of funny things. However, there are two types of file transfer—text (you are reading text now), and program. Binary transfer is the time-honored traditional name (which we will use) for program transfer. Whenever you want to transfer a program, be sure to use binary transfer, or the result will be useless. Successful binary transfer is only possible between nearly identical computers, such as IBM-compatible PCs.

Transfer techniques – there are three combinations of computers that need to be considered when transferring files:

(1) two PCs
(2) two larger computers
(3) a PC and a larger computer .

The first case is the simplest. If the file is compatible with both PCs, and they are close to each other, transfer via floppy disk is probably the easiest. If it is not compatible, or the PCs are too far apart to use floppy disks, the simplest way to transfer the file is usually via a third (larger) computer—transfer the file from one PC to a larger computer, and then from the larger computer to the other PC.

The second case is also fairly simple. NAVOCEANSYSCEN **Technical Document 940, Introduction to the Defense Data Network (DDN)**, August 1986, Chapter 6, describes how to transfer files between larger computers by using the FTP program. Even if you don't use any computers other than your PC, you can still use anonymous file transfer (described in that chapter) to transfer files to other computers. Chapter 5 of that document also describes how to transfer files from a PC to a larger computer via the DDN.

The third case is fairly simple, if the terminal or TFTP programs are used. These extension programs are discussed in the **Beyond Basics** section. Many other public domain and proprietary programs exist that can do file transfer, but these are two fairly simple programs that are in widespread local use. Inquire at the CRC for copies of the programs and their documentation.

Controlling Output

One of the main uses of the PC is to generate output, either to the screen or on the printer. Sometimes it generates output too fast, or in the wrong format. Sometimes it generates something you would like to save for use later in another program. Various techniques to control the speed and destination (screen, printer, or file) of output are described here.
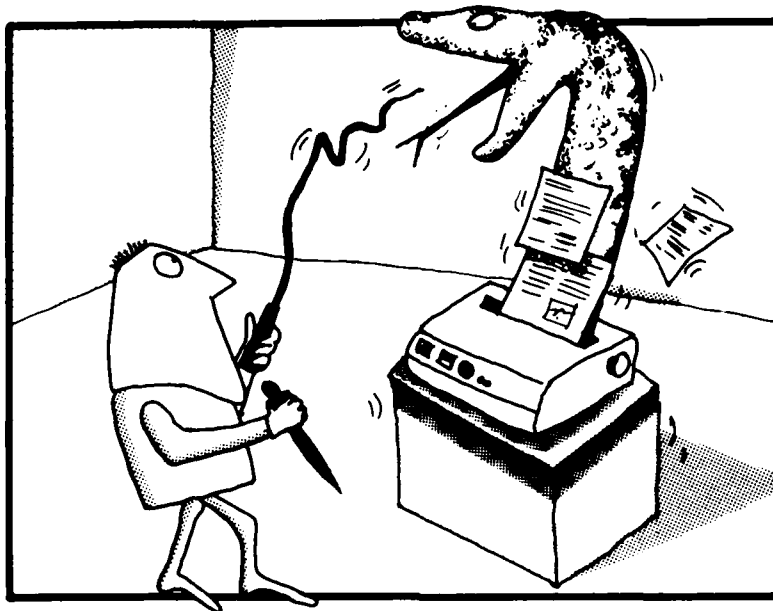
Controlling Output

Stopping output – When the PC generates too much output to fit on one screen, or does it too rapidly for you to read it, you can stop the output, either temporarily (giving you a chance to read it and then continue) or permanently (by terminating the program that is generating the output). Two ways to temporarily stop output are by pressing <Ctrl-S> or <Ctrl-NumLock>. In either case, output will be stopped, and will only resume after you press another key. <Ctrl-S> is familiar to VMS and UNIX users. [Aside to VMS and UNIX users: pressing *any* key will resume output, including <Ctrl-Q>.] Unfortunately, <Ctrl-S> only works occasionally, but <Ctrl-NumLock> almost always works. Two ways to permanently stop output are by pressing <Ctrl-C> or <Ctrl-Break>. **<Ctrl-C>** is familiar to VMS users, and is about like **Delete** or **Rubout** for UNIX users. Unfortunately, neither <Ctrl-C> nor <Ctrl-Break> work 100% of the time. Once in a while a program will ignore all of these ways to stop the output—then it is time for <Ctrl-Alt-Del>, which forces a reboot to occur.

Slowing down output – If you don't want to stop the output, but instead slow it down, the DOS command called MORE comes in handy. It will only allow output to appear one screen at a time, and will pause whenever the screen is full to let you read the output before continuing. The MORE command is described

with the other commands in your DOS documentation. A simple example would be:

TYPE LONG.TXT | MORE

if LONG.TXT is a long text file that you want to display on your screen. Notice the funny "|" character in the example. "|" is used by DOS to pipe the output of one program into another program. Piping is described in the DOS documentation. UNIX users will already know about it, and other PC owners should learn a little about it, as it comes in handy once in a while. Also, it is worth noting that there is a public domain MORE program available from the CRC that is much more versatile than the DOS version, and does not require the use of pipes.

Destination Control – TYPE and some other DOS commands insist on displaying all their output on the screen, when some times you would like to print the output, or save it in a file. The output of COPY, other DOS commands, and many public domain programs normally goes to a file, when sometimes you would rather display the output on the screen or print it. There are three techniques that can be used to change the destination of the output of a program: *device names*, *redirection*, and *screen dumping*. Device names are used when you want output that would normally go to a file to be printed or displayed on the screen. Redirection is used when you want output that would normally be displayed on the screen to be printed or saved in a file. Screen dumping is used when you want to "dump" a copy of whatever is on the screen to the printer.

Device names – To get the output of COPY to appear on the printer, rather than going to a file, the device name PRN is used. For example, COPY could be used to get a printed copy of the LONG.TXT file mentioned above:

COPY LONG.TXT PRN

PRN can also be used as the output file with other DOS commands to get their output to appear on the printer. To get the output of COPY to be displayed on the screen, rather than going to a disk file, the device name CON (CONsole – the screen and keyboard of a computer *used* to be called its console) is used. For example:

COPY LONG.TXT CON

could be used to get a copy of the LONG.TXT file displayed on the screen. Other device names exist, and are described in the DOS documentation.

Redirection – A funny character (">") is used to redirect output. For example, the LONG.TXT file mentioned above could be printed rather than displayed on the screen by:

TYPE LONG.TXT > PRN

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Or the output of the DIR command could be printed by:

DIR > PRN

Or it could be saved in a file by:

DIR > SHORT.TXT

and then edited before being printed. If you wanted to have the directory information about a file, along with the contents of the file, transferred to another computer, you could combine both in one file by:

DIR SHORT.TXT > TRANSFER.TXT
TYPE SHORT.TXT >> TRANSFER.TXT

and then use some file transfer program to get TRANSFER.TXT transferred. The use of a double ">>" in the above example causes the output of TYPE to be **appended** to (added on to the end of rather than replace) the contents of TRANSFER.TXT. Redirection is discussed in the DOS documentation, and is worth learning about.

Screen dumping – It is handy to be able to dump a copy of the screen whenever you want. If you include the line:

GRAPHICS

in your AUTOEXEC.BAT file, then anytime you are using your PC and your printer is turned on, you can "dump" a copy of whatever is on the screen by pressing <Shift-PrtSc>. It will not always be an exact copy, but it will be readable. GRAPHICS is discussed in your DOS documentation. If you have added any graphics software or hardware on your PC, it is possible that a different line (described somewhere in the documentation for the add-on) needs to be in your AUTOEXEC.BAT file to make screen dumping work.

Batch Files

Any file whose name ends with the extension BAT is a batch file. Batch files are worth knowing about because DOS does something special with a batch file—it will read the file and obey the commands in the file just as though you had typed them on the keyboard. VMS users may be familiar with a similar feature called command procedures, and UNIX users may be familiar with shell scripts. We have already talked about one batch file; AUTOEXEC.BAT was mentioned in the Boot Files discussion. After you have used your PC for a short while, you will find yourself typing the same commands over and over (perhaps with minor variations), and wish that there was a single command to do the job for you.

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Well, with an editor or word processor program, you can create that command. After you have created the BAT file, you use it by just typing its name (without the extension). The DOS manual that comes with your PC has a discussion of the details of constructing and using batch files (look in the index under batch). **PC Magazine** always has an article giving examples of useful batch files. A visit to the CRC or the Technical Library to look at some back issues might be worthwhile. The more you use your PC, the more useful batch files will become.

You can do some programming inside batch files, including logical tests (the IF command) and loops (the FOR and GOTO commands). You can use one batch file to do different things or to do the same thing to different files by passing it parameters (they are identified as %1 through %9 inside the batch file). One thing that doesn't receive much coverage in most DOS manuals is the use of variable names from the system environment (the strings that you set with the SET command), but it is possible to use them in batch files. For example, if MYNAME had been set to "Jones," then the line

>   ECHO %MYNAME%

in a batch file would cause "Jones" to appear on the display screen. The use of percent signs (%) around the variable name in DOS is analogous to the use of quotes (') around the environment symbol in VMS and the dollar sign ($) in front of the environment variable in UNIX. Watch out when nesting batch files. If you want to use a batch file named MYOWN.BAT from inside another batch file, you can do it in either of two ways--you can use just the name MYOWN or you can use the line

>   COMMAND \C MYOWN

In the first case, when DOS has obeyed all the commands in MYOWN.BAT, it will exit out of *all* the nested batch files. In the second case, when DOS has obeyed all the commands in MYOWN.BAT, it will then go back to the batch file that used it, and continue where it left off.

Information Access

There is a wealth of information accessible by your PC over the GCB on other computers here at the Center. Some of the types of information available are briefly described toward the end of the **Discovery** section. The types and locations of the computer resident information that can be accessed change with time, so they are not described in detail here. Instead, the places around the Center that make information available are identified. From them, you can get current details on what is available, and how to access it. If you want to do anything with the information you access (other than look at it on your screen), then

some sort of file transfer to your PC will be required, so the warnings about file compatibility in the **file transfer** discussion above apply.

If you want to look at institutional data—job orders, payroll, budget, personnel, procurement, plant property, Lab Program Summaries (LPS/1498)—things like that, then the place to ask is the **Administrative Systems Development Branch, Code 111**. Some of this type of information has been available in the past on the Marlin computer via the Project Manager Support System (PMSS) program. You can purchase a document that describes how to use PMSS from the Technical Library. In the future, a system to provide access to this information will be available on several computers at the Center. Ask the folks in Code 111 for details.

You can find out quite a bit about what the Technical Library has in the way of holdings and technical reports, and query the subject and topic indexes of the local library, and other libraries (including the University of California), by accessing the Snook computer. Ask the **Technical Library** folks in **Code 946** for details.

The **CRC** maintains an extensive computer bulletin board of the services they provide, the PCs, peripherals, and programs they have installed for your evaluation, and up-coming demonstrations of equipment, as well as historical records of hundreds of previously evaluated items, on-line in the Marlin computer. Ask the CRC folk about it, or try the crc command on the Marlin computer. They may know of other computer bulletin boards that you can access.

The **COAN Office, Code 9102**, is aware of many different information sources that are available over the GCB, so if there is some information that you want but don't know how to get to it, ask them. If it isn't presently available, perhaps they can help make it available.

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