

{owc HLP256,HLP256_TILE,MAINMARK.BMP}

The PC Owner's Survival Guide

A free resource from First Train for the Internet, <http://www.firsttrain.com>



This guide is a sample of one of the supplemental resources included with First Train for the Internet, the complete Internet help resource for Windows wanderers. The button opens the navigator window. It contains a variety of information on a number of computing topics, some controversial, some rather tame, and is intended to help fill the holes in the knowledge of most novice to advanced intermediate computer users. It was developed in response to the concerns, misinformation and questions our users, clients and friends have expressed. Many features of this guide are limited or non-existent in this freeware release. See the enclosed README file for information about redistributing this software.

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

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Survival Guide information center



This is by no means a definitive guide to working with your PC. Instead it's designed to fill the holes left by the manuals, help and advice you get from other sources and represents what we discovered most novice to intermediate-level users wanted to know about their computers. Please keep that in mind...it's a *supplement to*, not a *replacement for*, your usual sources of information on computer-related subjects.

 [Tips for making the most of the guide](#)

 [A note to Windows Help authors](#)

 [Who wrote this?](#)

 ["How did you do that?"](#)

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Tips for using PC Owner's Survival Guide (pic: HLP206.HLP206_TLESECMARK.BMP)

Hidden hotspots



The first feature is provided to help you make sense of what you're doing. PC Owner's Survival Guide is sprinkled with thousands of "hidden hotspots", words you may not fully understand which are important to understanding Internet and computing. Hold your mouse cursor over any word you don't understand or want clarified and if it turns into a pointing finger, clicking the word will pop up its definition. Try clicking the word "hotspot" anywhere you see it in this paragraph to see how this works.

The Find button



This special feature, activated by the button on the button bar, lets you track down any word or phrase in the Guide in a matter of seconds, but it does have one small bug. If you have used the Supplementary Help Window or the Navigator window, the **Find** function stops working. You can re-enable it by closing the guide and clicking **Find** again. This feature also lets you print multiple topics in one pass and also copy information to the clipboard for pasting into other documents. (Please respect copyrights when doing this.)

Right-click mouse menus



The second is that the guide includes a right-click pop-up menu designed to take you to each of its main section indices. To see this menu now, click the right mouse button over the *white* section of this window. (Unfortunately, due to limitations in Windows Help we were unable to expand these menus to include the sub-menus for each section.)

The Survival Guide Navigator



Use the Navigator window for a complete on-demand menu of everything in the guide. This button opens it from here, and you can also open it by clicking the **Map** button on the button bar.

Bookmarks and annotations



The third feature you'll find handy is bookmarking. You can maintain a set of bookmarks for the Guide which will quickly take you to any topic or submenu you like at the click of a menu item. Try it...it will make finding a lot of useful points much easier once you begin to work seriously with the Internet.

Take notes!



That's what the **Notes** button on your button bar is for. A few judicious notes can go a long way toward making life as a first-time Internet traveller a lot easier. Only people with photographic memories are likely to remember everything they want to remember. Unlike annotations, which

work only for one topic at a time, this feature will allow you to collect your notes for all topics in the guide in a handy, single file.

Keep an eye on our Web site!

<http://www.firsttrain.com>

Okay, so it's a plug, not a tip.



Extension software (only HLP256.HLP256_TILE.SECMARK.BMP)

Some or all of the following Windows Help extension libraries and miscellaneous utilities may have been utilized in enhancing the look, feel and functionality of PC Owner's Survival Guide. Check your installation directory to determine which of these files were used. **Note:** The publisher reserves the right to alter this list without notice.

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See the documentation NOTEBOOK.WRI for information regarding Gregg Braun's NOTEBOOK.EXE. It is freely distributable with other projects.

[<- Last topic](#)

 [Done](#)

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Information about the Windows Help extensions used in this product can be viewed at the topic linked to this help button.

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(Legalese with English subtitles; click the BACK or CONTENTS button when you've had enough)

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This might sound strange. The first part is fairly standard stuff...you can make as many as two backup copies of the software if you like, but you might be confused by our second condition here.

Think of it this way. If your home burns down, or your computer is stolen, and your only backup copy was sitting next to your computer, you are truly out of luck. Store at least one of your backups far enough away from the original so that it can't be lost in the same disaster that results in the loss of your computer.

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If your disks fail when you try to install them, get in touch with us. If you can contact us by email we can often help you get a new copy of the software via the Internet or an online service in less time than it would take to mail you a replacement.

If the failure is not due to a problem which we can control, we can't be responsible for it.

And if you do not have a properly functioning, 100-percent industry standard IBM-compatible computer with a properly-functioning Microsoft Windows 3.1/3.11 or Windows 95 operating system for which you have a legal license, we can't be responsible for that either.

If you do have this software and there are conflicts with other programs that prevent you from using this software, we can't be responsible for that either, although we will usually do our best to insure compatibility if a conflict arises between our software and another widely-used program.

If it's our fault, we'll do everything in our power to fix it. If it's not our fault, well, we need this disclaimer to protect ourselves against people who enjoy frivolous lawsuits.

A note to help authors

"How did you do that?"



Please don't write to ask this. We have no intention of sharing our secrets via email. Instead we encourage you to find out for yourself, and there's a fairly easy way to do this.

There is now an excellent free decompiler available which will convert Windows Help binaries to RTF formatted text and extract all bitmaps and baggage, and even write a project

file. If you decompile this software you'll learn precisely how we did our stuff, what DLLs we used, and if you care to spend a few hours FTPing, we'll even tell you where to get the tools.

The two FTP sites we relied upon most for developing this software were ftp.onyxgfx.com/pub/winhelp and ftp.gmu.edu/pub/winhelp. If your FTP client doesn't like these URLs, try them in your browser. The decompiler was most recently filenameed **HELPDC13.ZIP**.

"How can I do that?"



Just follow our examples. Anything more than that would be spoonfeeding. We do remind you that this material *is* copyrighted, although many of the DLLs we used are freeware.

"Why are you doing this?"



If you had gone through half of the heartache we experienced when developing this software, you'd probably feel the same way. Damned if we'll watch *anyone* go through that kind of pain and frustration if we can help it.

Besides, they call it *winhelp*, not *winhoard*, and we had a lot of assistance from other Winhelp authors in developing and fine-tuning this project.



{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK.BMP}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Tips for making the most of the guide](#)
-  [A note to Windows Help authors](#)
-  ["How did you do that?"](#)
-  [Licensing and copyright information](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

 [About the guide and tips for use](#)

 [Essential computing terms and definitions...what exactly is meant by:](#)

 [Path?](#)

 [Memory?](#)

 [Boot?](#)

 [Format?](#)

 [Modem?](#)

 [SIG?](#)

 [Prompt?](#)

 [Shell?](#)

 [UNIX?](#)

 [Hacker?](#)

 [File and directory?](#)

 [Software and program?](#)

 [Virus and trojan?](#)

 [DOS and Windows?](#)

 [ZIP or compressed archive?](#)

 [BBS or Bulletin Board System?](#)

 [Hard disk and floppy disk?](#)

 [Bits, bytes, kilobytes and megabytes?](#)

 [Installation, setup and configuration?](#)

 [Part 1: Support](#)

 [Part 2: Maintenance](#)

 [Part 3: Ergonomics](#)

 [Disaster prevention for Windows and DOS](#)

 [Computer Virus Myths](#)

 [The Virus Awareness Kit](#)

 [Back it up!](#)

 ["Right computing" for the 1990s and beyond](#)

 [More than you ever wanted to know about floppy disks and formatting](#)

 [A data compression primer](#)

 [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [**Part 1: Support**](#)
-  [Introduction](#)
-  [A consumer's guide to after-sale support](#)
-  [When and who to call for help: a reference card for service and support](#)
-  [Learning to be a teacher: a guide for would-be tutors](#)
-  [Midwifing your small or home business into the digital age](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Introduction](#)
-  [A consumer's guide to after-sale support](#)
-  [What's out there](#)
-  [Let the buyer beware](#)
-  [The crunch: what it costs](#)
-  [Where to find the right people](#)
-  [What you can and can't expect from your support professional](#)
-  [When and who to call for help: a reference card for service and support](#)
-  [Learning to be a teacher: a guide for would-be tutors](#)
-  [Midwifing your small or home business into the digital age](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Introduction](#)
-  [A consumer's guide to after-sale support](#)
-  [What's out there](#)
-  [Let the buyer beware](#)
-  [The crunch: what it costs](#)
-  [Tutors](#)
-  [Classroom training](#)
-  [Troubleshooters](#)
-  [Contracted support](#)
-  [Shop service](#)
-  [Where to find the right people](#)
-  [What you can and can't expect from your support professional](#)
-  [When and who to call for help: a reference card for service and support](#)
-  [Learning to be a teacher: a guide for would-be tutors](#)
-  [Midwifing your small or home business into the digital age](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [**Part 1: Support**](#)
-  [Introduction](#)
-  [A consumer's guide to after-sale support](#)
-  [**When and who to call for help: a reference card for service and support**](#)
-  [The 'local hero'](#)
-  [Bulletin boards, internet and online services](#)
-  [Vendor product support lines](#)
-  [Hardware and software vendors](#)
-  [Private tutors and on-site troubleshooters](#)
-  [Classroom training](#)
-  [Computer clubs and special interest groups](#)
-  [Learning to be a teacher: a guide for would-be tutors](#)
-  [Midwifing your small or home business into the digital age](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Introduction](#)
-  [A consumer's guide to after-sale support](#)
-  [When and who to call for help: a reference card for service and support](#)
-  [Learning to be a teacher: a guide for would-be tutors](#)
-  [Learning to be a teacher](#)
-  [Twelve tips for smoothing out the learning curve](#)
-  [Midwifing your small or home business into the digital age](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [Back it up!](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Section 1: System and software troubleshooting](#)
-  [Section 2: Do-it-yourself hardware maintenance](#)
-  [Section 3: Upgrades and updates](#)
-  [Upgrading how-to's, when-to's and when-not-to's](#)
-  [An upgrading checklist](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Section 1: System and software troubleshooting](#)
-  [Making emergency start-up boot disks \(Windows 3.1\)](#)
-  [Making emergency start-up boot disks \(Windows 95\)](#)
-  [DOS and Windows backup disks](#)
-  [Checking your hard disk for errors or damage](#)
-  [CMOS data and battery replacement](#)
-  [Clock batteries: what they are and how to replace them](#)
-  [Section 2: Do-it-yourself hardware maintenance](#)
-  [Section 3: Upgrades and updates](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Section 1: System and software troubleshooting](#)
-  [Section 2: Do-it-yourself hardware maintenance](#)
-  [Dust buildup: what to do...or not do](#)
-  [Chip creep: when old chips decide to walk away](#)
-  [Basic floppy drive maintenance](#)
-  [Tape drives, CDs and backup floppies](#)
-  [Printers: easy to please \(well, most of them\)](#)
-  [Monitor maintenance...or not](#)
-  [Section 3: Upgrades and updates](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Section 1: System and software troubleshooting](#)
-  [Section 2: Do-it-yourself hardware maintenance](#)
-  [Section 3: Upgrades and updates](#)
-  [Upgrading how-to's, when-to's and when-not-to's](#)
-  [An upgrading checklist](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [General information](#)
-  [Repetitive strain injury](#)
-  [Tips for preventing and dealing with RSIs](#)
-  [Creating a user-friendly workspace](#)
-  [Monitor-related stressors](#)
-  [Computer-related emissions](#)
-  [Noise pollution](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [General information](#)
-  [Medical disclaimer](#)
-  [Philosophical issues: why bother at all?](#)
-  [Seven areas of computer-related stress management](#)
-  [Repetitive strain injury](#)
-  [Tips for preventing and dealing with RSIs](#)
-  [Creating a user-friendly workspace](#)
-  [Monitor-related stressors](#)
-  [Computer-related emissions](#)
-  [Noise pollution](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [General information](#)
-  [Repetitive strain injury](#)
-  [Tips for preventing and dealing with RSIs](#)
-  [Creating a user-friendly workspace](#)
-  [Keyboard ergonomics](#)
-  [Wrist rests](#)
-  [Elbow rests](#)
-  [Relaxation: the best prevention](#)
-  [Alternative input devices](#)
-  [Mouse ergonomics](#)
-  [Monitor-related stressors](#)
-  [Computer-related emissions](#)
-  [Noise pollution](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [General information](#)
-  [Repetitive strain injury](#)
-  [Tips for preventing and dealing with RSIs](#)
-  [Creating a user-friendly workspace](#)
-  [Monitor-related stressors](#)
-  [Effects of monitor stress](#)
-  [Eliminating glare with filters and screens](#)
-  [Eliminating glare with common sense](#)
-  [Flicker: what it is and what to do about it](#)
-  [Fluorescent lighting and interference flicker](#)
-  [Screen sway](#)
-  [Flyback wear: a very serious problem](#)
-  [Screen type, size and dot pitch](#)
-  [Screen resolution](#)
-  [Screen brightness](#)
-  [Gauging your level of monitor stress](#)
-  [Copy holders](#)
-  [Color your \(virtual\) world](#)
-  [Computer-related emissions](#)
-  [Noise pollution](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [General information](#)
-  [Repetitive strain injury](#)
-  [Tips for preventing and dealing with RSIs](#)
-  [Creating a user-friendly workspace](#)
-  [Monitor-related stressors](#)
-  [Computer-related emissions](#)
-  [An introduction to computer-related radiation](#)
-  [Scalar-wave ELF emissions](#)
-  [Medical foundation for ELF shielding](#)
-  [Reduced emissions and energy savings](#)
-  [Noise pollution](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [What you need to know about uninstallers](#)
-  [Faros 3 PLUS: our uninstaller of choice](#)
-  [Emergency backup for recovery from common software problems](#)
-  [Our own F-A-S-T Emergency Windows Backup](#)
-  [Antivirus software](#)
-  [Delete protection: how to reclaim what you wish you hadn't trashed](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [What you need to know about uninstallers](#)
-  [Windows' simple look is deceptive](#)
-  [Windows 3.1/3.11 won't make it easy for you](#)
-  [What about the Windows 95 uninstaller?](#)
-  [How do uninstallers for Windows work?](#)
-  [Two types of uninstallers: which one to choose?](#)
-  [Faros 3 PLUS: our uninstaller of choice](#)
-  [Emergency backup for recovery from common software problems](#)
-  [Our own F-A-S-T Emergency Windows Backup](#)
-  [Antivirus software](#)
-  [Delete protection: how to reclaim what you wish you hadn't trashed](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [Introduction](#)
-  [Definitions](#)
-  [Contents: 21 Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

- 📖 [About the guide and tips for use](#)
- 📖 [Essential computing terms and definitions](#)
- 📖 [Part 1: Support](#)
- 📖 [Part 2: Maintenance](#)
- 📖 [Part 3: Ergonomics](#)
- 📖 [Disaster prevention for Windows and DOS](#)
- 📖 [Computer Virus Myths](#)
- 📖 [Introduction](#)
- 📖 [Definitions](#)
- 📖 [Contents: 21 Computer Virus Myths](#)
- 📖 All purposely destructive code spreads like a virus.
- 📖 Viruses and Trojan horses are a recent phenomenon.
- 📖 Viruses are written by teenage hackers.
- 📖 Viruses infect 25% of all IBM PCs every month.
- 📖 Only 500 different viruses? But most experts talk about them in the thousands.
- 📖 A virus could destroy all the files on my disks.
- 📖 [Viruses have been documented on over 300,000 computers \(1988\).](#)
- 📖 Viruses can hide inside a data file.
- 📖 Some viruses can completely hide themselves from all antivirus software, making them truly undetectable.
- 📖 [BBSs and shareware programs spread viruses.](#)
- 📖 [My computer could be infected if I call an infected BBS.](#)
- 📖 So-called 'boot sector' viruses travel primarily in software downloaded from BBSs.
- 📖 My files are damaged, so it must have been a virus attack.
- 📖 Donald Bursleson was convicted of releasing a virus.
- 📖 [Robert Morris Jr. released a benign virus on a defense network.](#)
- 📖 [The U.S. government planted a virus in Iraqi military computers during the Gulf War.](#)
- 📖 Viruses can spread to all sorts of computers.
- 📖 My backups will be worthless if I back up a virus.
- 📖 Antivirus software will protect me from viruses.
- 📖 Read-only files are safe from virus infections.
- 📖 Viruses can infect files on write-protected floppy disks.
- 📖 [How to protect yourself](#)
- 📖 [About the authors](#)
- 📖 [The Virus Awareness Kit](#)
- 📖 [Back it up!](#)
- 📖 ["Right computing" for the 1990s and beyond](#)
- 📖 [More than you ever wanted to know about floppy disks and formatting](#)
- 📖 [A data compression primer](#)
- 📖 [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [Computer Virus Myths](#)
-  [Introduction: Flat tires and broken fanbelts](#)
-  [Viruses, trojans and the Internet](#)
-  [Trojans: a greater worry than viruses](#)
-  [A seven-point battle plan](#)
-  [Backups and antivirus software: minimize your risk of infection](#)
-  [Back it up!](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [Computer Virus Myths](#)
-  [Introduction: Flat tires and broken fanbelts](#)
-  [Viruses, trojans and the Internet](#)
-  [Trojans: a greater worry than viruses](#)
-  [A seven-point battle plan](#)
-  [Backups and antivirus software: minimize your risk of infection](#)
-  [A seven-point battle plan](#)
-  [Antivirus software: which to choose?](#)
-  [Problems with antivirus software](#)
-  [Our picks of the best: all available free or for free trial](#)
-  [The importance of being new and improved](#)
-  [Back it up!](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  [What backups are and why you need them](#)
-  [The why's and how's of preserving your precious data](#)
-  [An equally important question: *what* to back up](#)
-  [The common types of backups](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  [*What backups are and why you need them*](#)
-  [*Why are backups so important?*](#)
-  [*Disks and data aren't damage-proof*](#)
-  [*It pays to have a lot of duplicate files*](#)
-  [*Are there any shortcuts you can take?*](#)
-  [*The why's and how's of preserving your precious data*](#)
-  [*An equally important question: *what* to back up*](#)
-  [*The common types of backups*](#)
-  [*"Right computing" for the 1990s and beyond*](#)
-  [*More than you ever wanted to know about floppy disks and formatting*](#)
-  [*A data compression primer*](#)
-  [*Random jottings*](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  [What backups are and why you need them](#)
-  [*The why's and how's of preserving your precious data*](#)
-  [Backups from the DOS perspective](#)
-  [Manual versus automated backups](#)
-  [An important and oft-overlooked point: where to store backups](#)
-  [What you need for a proper backup](#)
-  [How much are you prepared to invest?](#)
-  [An equally important question: *what to back up*](#)
-  [The common types of backups](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  [What backups are and why you need them](#)
-  [The why's and how's of preserving your precious data](#)
-  [An equally important question: *what* to back up](#)
-  [*The common types of backups*](#)
-  [Full backup](#)
-  [Partial backup](#)
-  [Incremental backup](#)
-  [Emergency backup](#)
-  [Tape drives](#)
-  [Magneto-optical drives](#)
-  [Floppy disks](#)
-  [Compact disks \(CDs\)](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [Back it up!](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [Legal issues regarding software and copyrights](#)
-  [Software publishing: information marketing or cybertraffick?](#)
-  [Letting go of the Joneses](#)
-  [Radiation and emissions protection](#)
-  [Visual stress reduction](#)
-  [Noise reduction](#)
-  [Gas-off from new computers](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [**More than you ever wanted to know about floppy disks and formatting**](#)
-  [The purpose of formatting](#)
-  [The four common IBM-compatible disk formats](#)
-  [A little history](#)
-  [About special formats](#)
-  [Telling them apart without a program](#)
-  [About disk stretching](#)
-  [A very stern warning](#)
-  [A data compression primer](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [Back it up!](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Universally used and universally useful](#)
-  [A few compression and archiving terms and meanings](#)
-  [Hard disk compression](#)
-  [Data transmission compression](#)
-  [Graphics compression](#)
-  [File compression \(archiving\)](#)
-  [Executable compression](#)
-  [Using data compression software](#)
-  [Some theory: how data compression programs do their stuff](#)
-  [Data compression software...who needs it?](#)
-  [The limits of data compression technology](#)
-  [LHA, ARC and other data compression archivers for the PC](#)
-  [Copyrights and rights of use](#)
-  [Random jottings](#)

{ewl LZANI,LZANIMATE,GRAPHICS.DAT;NAVMARK2}

-  [About the guide and tips for use](#)
-  [Essential computing terms and definitions](#)
-  [Part 1: Support](#)
-  [Part 2: Maintenance](#)
-  [Part 3: Ergonomics](#)
-  [Disaster prevention for Windows and DOS](#)
-  [Computer Virus Myths](#)
-  [The Virus Awareness Kit](#)
-  [*Back it up!*](#)
-  ["Right computing" for the 1990s and beyond](#)
-  [More than you ever wanted to know about floppy disks and formatting](#)
-  [A data compression primer](#)
-  [Random jottings](#)
-  [DOS 6.0's buggy disk compression](#)
-  [Cleaning out those useless files](#)
-  [Delete protection: how to reclaim your own trash](#)
-  [Reclaiming DOS memory](#)
-  [Better sound without better speakers](#)
-  [Two timeless Windows tips](#)
-  [If DOS won't verify your data, who will?](#)
-  [Transferring old data to new computers](#)
-  [Silence is golden, not necessarily deadly](#)
-  [Surge protectors: no best-before dates here](#)
-  [Did you know...\(a collection of truly random tips\)](#)



Main menu

{owc HLP256,HLP256_TILE,MAINMARK.BMP}

A data compression primer

-  ***An introduction***
-  **Universally used and universally useful**
-  **A few compression and archiving terms and meanings**
-  ***Types of compression***
-  **Hard disk compression**
-  **Data transmission compression**
-  **Graphics compression**
-  **File compression (archiving)**
-  **Executable compression**
-  ***Data compression in practice***
-  **Using data compression software**
-  **Some theory: how data compression programs do their stuff**
-  **Data compression software...who needs it?**
-  **The limits of data compression technology**
-  **LHA, ARC and other data compression archivers for the PC**
-  **Copyrights and rights of use**

 **Main menu**

 **Data compression**

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Universally used and universally useful

Cosmic secrets revealed...



Data compression has always been one of those mysteries reserved for the Grand Mystics of computerdom. The guys who operated the big corporate mainframe systems knew about it, used it, even worshipped it. But getting an explanation a layman could understand was tougher than finding a third-grade primer on nuclear physics.

Hackers tortured hundreds of thousands of PC users with terms like archive extraction and recursively-collected subdirectories, and left supposedly useful files on systems with extensions like .ARC and .ZIP that most people never even learned how to use.

Data compression technology (or, to be more specific, compression *programming*, since compression is performed by software, not hardware, although hardware can be used in the compression process...confused yet?) has been one of the great boons to computerdom at virtually every level. It's in everyday use by everyone from the home hobby user to the massive government and corporate databases.

Several kinds of savings



It saves time, because it takes time to transmit large amounts of data over the typically slow communications channels in use today. It saves space because uncompressed data needs considerably more storage space than compressed data.

But most importantly it saves money, because disk storage costs money. Compression is, very simply, a means of storing more data in less disk space. Whether compression actually saves space at this time really isn't important. How many people do you know with hard disks and floppy disk collections so large in physical size that they need compressing?

Used in every aspect of computing today



Data compression is used today in virtually every aspect of computing. That RLE graphics file which graces your Windows startup screen is compressed. If it wasn't, it might take up 50,000 bytes instead of the 25,000 bytes it occupies on your disk now. If you use a 14.4kbaud modem, your data is probably being compressed by your modem and decompressed at the other end to save time in transmission. If you have DOS 6.0 or higher on your system, chances are you're using DoubleSpace to increase your hard disk capacity. DoubleSpace is a form of data compression designed to compress an entire hard disk. And if you have a shareware CD-ROM or get new programs from bulletin boards or online services, you're probably acquainted with those pesky files with .ZIP extensions. These .ZIP files usually contain several files in a compressed form, condensed into a single file to simplify storage.



Next topic ->



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A compression and archiving lexicon

There are a few basic terms that almost every user will benefit from knowing when it comes to working with even the simplest file compression software. Here are the most important:

Archive

■ An archive, when speaking of compressed files, usually refers to the file which is created by the compression software after it has processed your data. A ZIP file might be referred to as a ZIP archive, or just an archive. It's not necessarily a true archive though, because in most cases a real, live archive file has had a specific bit of data altered so that the system software knows a backup copy has been made.

Compress

■ To shrink in size without reducing value. Simple enough.

Extract, Expand or Decompress

■ What you have to do to get usable data from a compressed archive file. In most cases, the same piece of software can be used for adding files to a compressed archive and extracting one or more files from that archive. Not so with PKZIP, which uses two separate programs for the job, a decision by Phil Katz that actually makes life easier for the average user.

You usually create an archive file by adding files to a new compressed file whose name you specify when you run the software. This data isn't normally usable again until you extract files from the archive. Usually you extract all of the files in the archive, but if you use compression software to create archival backups of your data, extraction can be used to restore single files from the archive.

Unlike most forms of data compression, archiving file compression software doesn't change a thing about your original files unless you tell it to. When you add files to an archive, your original files remain just as they were. And when you extract them from an archive, the archived file will usually still contain a compressed copy of the data.

PKUNZIP.EXE (or PKUNZJR.COM)

■ One of two programs which were mandatory until just a couple of years ago for handling ZIP archives. These programs were two of very few programs capable of extracting files from the tens of millions of publicly-available archives with ZIP extensions (i.e. files with ZIP at the end of the name, such as MYFILES.ZIP). The latest version as of December, 1995 was 2.04g, and if you work with DOS you'll need this newer version to handle most of the ZIP files floating around today.

If you're not sure you have the right version of PKUNZIP.EXE, the unfortunate part is that you can't find out the version number by running it, and its date stamp may also be unreliable. You'll have to check the file's size. Version 2.04g of PKUNZIP.EXE is 28,806 bytes long.

Fortunately, if you have Windows there are dozens of programs available for handling ZIP archives, including the StuffIt Expander program featured in First Train for the Internet.

By the way, if all you have is PKUNZIP.EXE, you don't have a full version of the software. PKWARE Inc. has decreed that everyone who receives PKZIP software should have

the full version of the software, which comes in a compressed archive file called **PKZ204G.EXE**. This package includes tools for creating ZIPs as well, and a useful utility for fixing damaged and distorted-but-healthy ZIP archives, both of which are near-necessities for anyone with the smallest drop of hacker blood in them.

You'll find links where you can obtain the full **PKZ204G.EXE** (or a newer version if it exists) on the Software Resources Page where you can obtain this package now. It's free for personal use -- you only need to purchase a license for commercial use -- so why not take advantage?

Syntax

 Every file compression program seems to have its own syntax, or dialect if you like. Some attempts have been made at standardizing the syntax, but this standardization has been voluntary, and if the author of the software decides not to go along with the norm, there's not much we as users can do about it. Knowledge of syntax is necessary for the use of virtually every compression/decompression program around unless you use a shell program to handle archives.

And if you are a novice user, it is strongly suggested that you find and use one of the many DOS or Windows shareware and freeware shells. It's much easier to be prompted by a shell that says *What do you want to add to the .ZIP file?* than it is to remember that the .ZIP file comes before the source files and that hyphens are needed for this program and **-d** doesn't have the same meaning here as it did there. These shell programs take the memory work out of managing compressed archive files and are a must for virtually anyone in their first year or two of computing.





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Hard Disk Compression

More space...but at a price



The most commonly used form of compression on the PC, at least until the Internet started changing everyone's notions of how software can be delivered, was probably hard disk compression. Millions of people are now using DoubleSpace (now known as DriveSpace). Less common is a program called Stacker, which predated DoubleSpace by several years.

Microsoft made DoubleSpace part of the DOS 6.0 package, effectively giving access to low-cost disk compression to everyone. The folks who make Stacker had almost cornered the market before DoubleSpace came along, and even manufactured hardware add-on boards to compress and decompress data even faster and with less memory.

In theory it's an excellent idea...twice the hard disk space almost instantly. In practice many people who compress their hard disks later wish they hadn't.

How it works



These programs load a small sub-program into your system at boot-up that intercepts every byte of data going to and coming from your hard disk. When you save a file to disk, it takes that file and performs some fancy encoding on it. When it's done, the rewritten file is useless to your system but still perfectly understandable to your compression program, and it takes up an average of 40 to 55 percent less space. When the file is read back into memory again, the disk compressor's sub-program grabs the data before the program can get to it and expands it to normal size so it's understandable to the program. It's a wonderful way to turn a 500-megabyte hard disk into a 900-megabyte hard disk in just a couple of hours.

The downside



The problems are obvious to serious users almost instantly. The first noticeable change to your system is dependence upon yet another piece of software that could, theoretically, cost you every byte of data on your system if the software fails. You must always have that encoding/decoding software in your system or you'll never be able to properly access the data. It's the same with most forms of compression. You need the secret decoder ring, the sub-program that compresses and decompresses, to translate the data. Without it, all you have is gibberish.

Then there's the problem of having a piece of software process every bit of data on your system going to and from the hard disk. Keep in mind that data compression and decompression take system time, and that disk read and write is the biggest speed bottleneck on every computer...next to the modem of course. Suddenly everything on the system is slowed by the amount of time taken to compress and decompress the data.

The third problem is the increased risk of data loss. Computers are and probably will continue to be as imperfect as the people who build and program them. Any extra processing of data adds to the insecurity of the resulting data, and disk compression is one huge layer of processing.

Add it all up and chances are that you'll meet just as many people who were thrilled to get rid of their disk compression as you will people who were happy to have it.

Still using DOS 6.0 DoubleSpace? Get it fixed NOW!



Just a note to anyone who might still be using DOS 6.0's DoubleSpace: beg, borrow or steal a DOS 6.22 upgrade disk immediately if you haven't already done so. A large number of users reported all kinds of data problems with the original version of DoubleSpace, problems which were fixed with the MS-DOS 6.22 upgrade. If you have MS-DOS 6.0 on your system, you can purchase the upgrade disk from most dealers for as little as \$10.00.)

What's coming



Windows 95 promises some exciting changes to the old notions of how disk compression software should work. As of late 1995 there was a new type of disk compression called ZipStream available for the IBM-compatible which compressed a single file at a time, allowing for much smoother and quicker operation. Most current users of disk compression software are less than pleased by the performance of their systems once the software is installed, and understandably frightened by the way these compressors compress *everything* into one block of data, making the whole system that much more vulnerable to data loss.

There's no two ways about it...even with hard disk space dropping below 25 cents per megabyte there is still a market for disk compression.





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Data transmission compression

Used by everyone



Every consumer-level modem sold these days comes with data compression software built right into it. This compression programming is designed to reduce the cost of telecommunications by reducing the time it takes for data to pass over phone lines or microwave signals.

The most common type of data compression today is known as *v.42bis*. (There is also a *v.32bis*, but this is a scheme for allowing a modem to send and receive data at the same time. It's a timesaver in a lot of cases but not exactly a data compression scheme.) The old standard was known as MNP (Microcom Networking Protocol), and virtually every modem includes MNP-5 somewhere in its hardware.

US Robotics, makers of perhaps the most popular and best-loved modems in North America, used their own special compression scheme called HST (stands for High-Speed Transmission) for several years. While v.42 is part of almost every modem, including the USR's, HST can only be used when one USR modem is talking to another USR modem.

A noticeable improvement



If you've ever dialed up a bulletin board and waited for screens of information to be drawn on your computer, you can understand the value of compressing data for transmission. Long-distance modemers in particular appreciate this feature of modern modems. It can cut the time it takes for a screen to be drawn on your monitor by as much as 75 percent, but if you're downloading data in the form of .ZIP files or other compressed files, it seems the best these schemes can achieve at this time is about a fifteen percent increase in speed. But every penny counts when you're dialing a "pay-for-play" BBS or online service such as GEnie or CompuServe.





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Graphic Compression

A picture is worth a tenth of its space



If you have explored Windows at any depth and enjoy computer graphics, chances are you have been introduced to the .GIF or .JPG file. The compression formats used on these files are specifically designed for graphics for reasons which will be explained a little later. The more efficient that computer monitors become at displaying smaller pixels and larger numbers of colors, the more vital this form of data compression has become. And with the explosion of the Internet and the need for transmission of large amounts of graphics data in the shortest possible time, the ability to reduce the size of graphics files to as little as 1/10th to 1/20th their original size has become critical.

Both .GIF and .JPG files, the types most commonly used on the Internet's World Wide Web, are forms of compressed graphic data. But this type of compression is different from most others. It's known as lossy compression, as compared to most other types which are termed lossless.

You win a lot, you lose a little



DoubleSpace and v.32 won't change a single byte of your data when they compress it. But when you create a .GIF file, you actually lose data which you can never recover. This is because .GIF processing software looks at the graphics files and sacrifices data in non-critical areas on the assumption that the viewer will never miss the lost data. Purists despise this aspect of the GIF format, because it can visibly affect the quality of the image. JPEG, the software which creates .JPG files, performs similar trickery. Most other types of compression could never get away with this sort of corner-cutting without destroying the data completely.

There are many formats for graphics compression. AutoCAD has its own format (.DXF). Designers of paint programs all seem to have their own formats. Some are lossy and some are lossless. Which you prefer depends on the sharpness of your esthetic sense and the amount of room you have on your hard disk. Lossless compression always results in much larger graphics files, and for now at least the standards are GIF and JPEG.

What's ahead



We expect PNG (Portable Network Graphics) to become the new standard on the World Wide Web by 1997. This is because CompuServe owns the copyright on the GIF file format and has demanded royalties be paid by all commercial users of this type of graphics compression. JPEG faces a similar dilemma. PNG, a format available free to all, creates somewhat larger files than GIF, but the fact that it can be used royalty-free is bound to make it popular with businesses and software developers, and like it or not, they control what we eventually use.





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File Compression

Where the mud is deepest



This is the type of data compression that gives novice users the biggest headaches. File compression is one of the most confusing topics then novice computer user is likely to face, and also one of the most useful. File compression software, or archiving software, is something which until very recently almost everyone had to learn from the ground up. Skills learned with other types of programs were generally not too helpful when it comes to understanding file compression software.

As if things weren't confusing enough, there isn't even one standard type of file compression. There are several types which are popular and dozens more which aren't used very often. It sometimes seems like every developer who wants to save space in their software invents a new compression scheme to do it.

PKZIP: the only format you really need to understand



Fortunately the average user probably only needs to know how to handle two or three of them, and the main program almost everyone needed to learn -- again until just recently -- is PKWARE's extremely popular PKZIP. If (better make that *when*) you add a CD-ROM drive to your system you'll probably wind up with one or more "shareware" CDs. The files on most shareware disks are compressed with PKZIP. If you don't know what PKZIP does and how to handle these files, you're bound to run into problems at some point.

Almost every Windows Internet user eventually discovers that the overwhelming majority of IBM-compatible software is transferable to your computer only as a PKZIP-compressed archive. If you don't understand the basic principles of this software, you're like a kid in a candy store...a kid with a sugar allergy. All of these goodies and none to eat.

PKZIP.EXE is perhaps the most common program in all of computerdom, and by far the most popular of the file compression programs. It is faster than any other popular compressor, creates files as small or smaller, and it's also the easiest for the average user to learn.

Data conservation: the top priority



What PKZIP and related programs do is take whole groups of files and perform an encoding operation on them, just as all the other types of compressors do, but in the case of file compression for archiving, smaller size is more important than speed of extraction. Most of the better file compression programs perform one encoding operation, then encode the data a second time using a different formula to make the file even smaller.

This means it takes longer to compress and expand data this way than any other, but it also means that the files created take up less space. Sad to say, this multiple-algorithm compression process usually doesn't result in more than a ten to fifteen percent reduction in size over the much faster methods used by programs such as Stacker and DoubleSpace.

On average, PKZIP will shrink a group of files so that, in their compressed form, they take up an average of only about 40 to 45 percent of the disk space they needed when uncompressed. Until the most recent version of PKZIP (version 2.04g was released in 1993 and version 3.0 is expected early in 1996), two programs called LHArc and ARJ created smaller files at just about the same speed as the old PKZIP. PKZIP Version 2.04g is about 30 percent faster on average than LHArc and ARJ, and creates files five to ten percent smaller. Needless to say, LHArc and ARJ fell out of popular use very quickly in 1994 although you'll still see them in use occasionally. PKZIP is the standard, and until someone comes up with something better, it's the one we'll all be using most.





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Executable Compression

All the best runners are lean

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;runners.bmp}It wouldn't be fair to end this section without discussing a more specialized form of file compression software. This software is designed specifically for shrinking the size of executable or "runnable" files, the actual programs used by DOS and Windows. These programs are sometimes limited to compressing only .EXE or .COM files, and most of them function in DOS only. There's not much in the way of .BAT file compression...and not much needed when you consider that the average .BAT file is under a hundred bytes in length. Windows executable compression exists, but it has proven to be somewhat buggy and is not widely used.

This software is unique because it takes an .EXE or .COM file and compresses it without changing its ability to run as a program. It's like ZIP-ing your programs (or LZHing or ARJing them). It seems like everyone who writes compression software has created a companion program for packing executables at some time or another. There are more than a dozen in circulation for DOS executables as public domain, free software or shareware.

Good news and bad news



This form of compression has two drawbacks. It saves space and uses a lightning-fast decompression program tacked onto the end of the compressed original program so you don't wait more than a split-second for it to expand itself into memory. But it can't be used with all types of programs. Some programs have data segments inside them called overlays. Windows programs use overlays by the ton.

The DOS rules say you shouldn't put overlays in the program itself (Windows makes these overlays almost a necessity), but a lot of programmers ignored that rule or worked around it. When you try to compress an overlay you very often get bad results when running the program, but not always.

If you like the notion of using this type of compression, experiment to see which programs will compress without harm and which won't. The most popular is another PKWARE product: **PKLITE.EXE**, and literally hundreds of developers have purchased licenses for PKLITE to compress executable programs for their software packages.

The payoff: more disk space at (usually) no cost



Executable compression, also known as *program packing*, was used to save hard disk and floppy disk space when disk compression such as Stacker and DriveSpace was rare or expensive. Stacker -- the most common disk compression software in the world before DOS 6.0's DoubleSpace -- cost more to purchase than the whole DOS 6.0 package, so not everyone could take advantage of its benefits.

Program packing worked wonderfully well on 286 and 386-class machines, but (and here's the second drawback) older XTs and especially PCs produced noticeable delays when they tried to run packed programs of any size. It might not seem like much to you, but a lot of users found that waiting several seconds, or even just a second or two, for a program to unpack

itself when it was run was an intolerable situation. Fortunately, these delays on even the largest programs are almost unnoticeable on anything faster than a 386 running at 16MHz. Every program packer is written as much for raw speed as compression efficiency.

Even Microsoft believed in it



Until they finally broke down and purchased a license from PKWARE for the PKLITE executable compressor for MS-DOS 6.0, Microsoft packed their own programs using something called EXEPACK. If you examine many of the DOS utilities of 20,000 bytes or more from MS-DOS 5.0, you'll see "EXEPACK" written right into the code near the start of the program. EXEPACK was fast but not very efficient.

Unfortunately for those with 286's or slower, these programs can't be unpacked without special software. PKLITE is blazingly fast in decompressing, but the delay is still noticeable on slower machines. And when DoubleSpace is used on an AT, XT or PC-class machine, the user is faced with two decompression delays...one for DoubleSpace and one for PKLITE. Strange when you consider that with DoubleSpace installed, there's very little advantage in using PKLITE to compress the file an extra few dozen bytes or so.

Not much for Windows...yet



As mentioned previously, there's not much in the way of executable compression for Windows just yet, and there may never be. Windows 95's new method of operation may allow for whole new types of disk compression which will make any kind of compression that only works on executables both cumbersome and pointless.





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Using Data Compression Software

Your servant behind the scenes



The nicest thing about most data compression software is that you rarely have to think about it or learn how to use it. Compression schemes like GIF and JPEG are just "there", and the software designed to handle these files also handles the compression without your help. Backup software usually gives you the option of compressing your data. Once you give the okay you never need to know anything more about the compression. Data compression in modems is handled by software built into the modem's chips. Once you flick the ON switch on your modem, everything is taken care of for you. And with disk compression software like DriveSpace, once it's installed you never have to worry about it again (cross your fingers).

Until recently the one type of software you did need to learn was file compression, or archiving software, such as PKZIP. It will take a few years yet before everything on the IBM-compatible has the ease of use and graphic simplicity that the Macintosh's Compact Pro possesses. In the meantime, there are some useful programs available now for handling the job, and they have *finally* broken down the "geek wall" and made handling compressed archives a practical possibility even for first-time computer users. Our personal choice for new users is StuffIt Expander.





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How data compression programs do their stuff

Trickery and sleight-of-hand



How does data compression software manage to shrink data? This is a question inquiring computer users have asked since the first compression software emerged. When you think about it, data compression sounds absurd. After all, how can 0's and 1's be made smaller? The answer is surprisingly simple, but the time and energy needed to turn this simple answer into a useable, efficient piece of compression software can be staggering.

What PKZIP and all other data compression programs do is write shorthand. It's just that simple. As an example, suppose you had a short, one-line text file that read like this:

This is the time for all good men to come to the aid of the party.

This line of text takes up 69 bytes, not counting the formatting characters you can't see. Now suppose that there was a shorthand which used basic typewriter characters to substitute for whole words such as **the** and **to** and double letters such as **ll** and **oo**. The **becomes #**, **to** becomes **2**, **ll** becomes **@** and **oo** becomes **&**. Here's what happens:

This is # time for a@ gd men 2 cm 2 # aid of # party.

Those few changes resulted in a size reduction from 69 to 57 characters.

Shorthand and longhand



Now imagine that the software that creates this shorthand will not only write the shorthand for you, but translate it back into longhand at your request, and you have an idea of what data compression software does.

But suppose that there were *hundreds* of these shorthand tricks at work. Consider the amount of data that could save. Now imagine that once the shorthand was done, the software used a mathematical form of shorthand to create an even smaller file. For instance, every time **a** and a space were together in the file, the software could substitute a single character. In our example, we'd save two more bytes, and another three bytes if **#** and a space were together.

This is what PKZIP, DoubleSpace, GIF and all other data compression software does. Each type of compression has its own particular shorthand system, usually designed to fit the conditions it sees in the type of data it's designed to compress. The Graphics Interchange Format (GIF) uses shorthand based on the popular types of pairings and groupings of graphical data. Some types of compression use mathematical types of shorthand, while others combine both mathematical and language-based shorthand.

Language-based compression



By far the most popular type of compression shorthand is language-based. LHarc uses a fairly pure form of compression known as Lempel-Ziv-Huffman, which is why LHarc's compressed files end with .LZH extensions. Lempel-Ziv compression is the most common compression

algorithm on the IBM-compatible, used in everything from program packers to PKZIP to disk compressors. Its shorthand table is based on frequently-occurring pairs or groups of letters in the English language.

Huffman coding is usually used to process data which has already been through the Lempel-Ziv part of the process. Huffman is more mathematically based than Lempel-Ziv, but it's slow, so most disk compressors use a faster variation known as Welch coding as their additional algorithm to the Lempel-Ziv table.

A special type of compression known as JPEG (also referred to occasionally as JFIF), used to shrink the size of graphics files, is also language-based. It uses frequently-occurring pairs of binary (non-text) characters to create a special form of compression that works best with graphics files...better, in fact, than GIF and without degree of data loss GIF files often suffer.





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Data compression software...who needs it?

When we said "universal" we meant it



Just about everyone either needs or can make effective use of data compression, and just about everyone already does.

Imagine that you have a shareware or public domain software package that you want to share with six friends. The package has fifty files in it. In ten different directories. And you want to give all of these people the same files. By tomorrow. This is a situation many businesses face every day.

You have a choice. You can babysit your computer while you create a disk with all the files and directories and laboriously copy all ten directories, fifty files and six disks, or you can use PKZIP.EXE or a simpler shell program such as Winzip to shrink the files and directories down to one single, compact file, send them to a computer bulletin board, and leave messages for all these friends telling them that their software is ready and waiting and where they can find it.

We've already discussed the uses PKZIP has for dealing with files from bulletin boards, Internet and uldb shareware CDs. Almost every user who swaps data with friends or coworkers will eventually run across one or more .ZIP files.

Who needs graphics compression?



Graphics compression is a necessity in the television and motion picture industries. A single frame from a motion picture reel might be no bigger than a negative from a 35mm camera, but that single frame can eat up more than ten million bytes of data on a hard disk when it's translated into digital format. The better the reproduction quality, the bigger the file. Now imagine the storage headaches when you have several minutes' worth of video to store digitally at the industry standard 30 frames per second. A single 30-second video clip can chew up several times the space available on an average home user's hard disk.

JPEG and MPEG (named for Motion Picture Experts' Group, the developers of this video compression software) save millions of dollars in storage space for video labs and production houses. And with computer speeds increasing faster than hard disk speeds, it's becoming as fast or faster to read a .JPG file into memory and extract it than it is to read a full, uncompressed graphics file. Newer forms of compression are promising even better results.

Meeting the demand for desktop video



The demand for desktop video on home computers is huge. The storage problems are enormous, though. The key to creating real-time images of reasonable quality is the use of data compression -- once again usually JPEG or MPEG -- to reduce the disk storage requirements of the video images.

There are animation compression schemes in use as well which compress the data even further by calculating where each part of each frame will be located on the next frame of the

video. In addition to this lossless compression, a lossy compression is often used to strip out a lot of the detail the average viewer isn't likely to miss.

The result? In theory, video requires mountains more data than audio to store. But you can now purchase full-length motion pictures with audio on compact disks which are only designed to store 72 minutes of sound.





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The limits of data compression technology

Approaching theoretical maximums



According to experts in the field, we've come just about as far as we can in developing general-use data compression software using the mathematics we have at this time. The theoretical limit for reduction of file sizes seems to average out at a 60 percent reduction in size using a range of test files. PKZIP and LHArc have been refined and improved over the years to create smaller files, but if the software started with an average size reduction of 45 percent, the improvements have probably only taken it to 55 or 60 percent. Data compression is one area of computing where things aren't doubling every few years.

But there seems to be some question about the validity of these theories that limit average reductions. A lot of developers with strong math backgrounds claim that it should be possible to create software which can average 80 percent reductions or better.

Is the real limitation our slow computers?



Technically speaking, it wouldn't even take complex math to perform this feat. We could probably do it now if we could create programs big enough, and computers fast enough, to make it worthwhile. You could probably reduce an average file by 80 percent if you had thousands of shorthand codes and a computer fast enough to compare those codes to the list hundreds of times on every file.

Most data compression software is limited in speed and size reduction by the number of shorthand tricks it can use without having so many calculations to perform that the software becomes too slow to be usable. Shrinking a one megabyte file to one-fifth of its original size isn't of much value if it takes ten minutes to decode it for use on the average computer.





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Other compression schemes for the PC

The rest of the best



At this writing, PKZIP is acknowledged to be the best overall data compression software available to the general public. It compresses and expands data as fast or faster than anything in its class, and file sizes are as good or better than any other popular compression scheme. PKZIP started as an improvement over another popular type of archiving software called ARC.

ARC was the first popular compression software to combine several files into one single file after they had been shrunk. Systems Enhancement Associates are acknowledged by most to be the pioneers of ARC, although many computer mavens dispute this claim. And yes, ARC too used the language-based, Lempel-Ziv compression algorithm.

Before ARC, there were LBR (for LiBRary), and SQUEEZE. .LBR and SQUEEZE files were less efficient than ARC and also limited to shrinking one file at a time. This was a problem with the advent of bulletin boards and public domain software, because in the early 1980's when these formats were popular, a lot of publicly-available software packages included not just one but several files. This made downloading and preparing the software for use a real pain for the average user.

The up-and-comers



ARC isn't in wide use any more because ZIP, ARJ and LZH were so much more efficient. Developer Phil Katz created a program which could compress and extract .ARC archives faster than other ARC programs of the day and called it PKARC. He later changed the name of the program to PKPAK, partly to distinguish his software from others, and partly because several other developers were competing to create a better ARC format. (In this confusing sea of competition, No-Gate Consulting produced its own popular compression software called PAK, which -- ironically -- will handle .ZIP and .ARC files!)

Katz beat everyone to the better mousetrap by creating PKZIP in the late 1980's. Upstarts have stolen the stage for a few months here and there, most notably Robert Jung's ARJ compressor, but PKZIP has been the front-runner ever since PKWARE released Version 2.04 and will probably remain in front for most of the rest of the decade.

PKWARE has always had other publishers nipping at their heels though, and even as late as 1995 there have been a couple of newcomers. RAR and UC2 are a pair of new archiving formats that produce results comparable to or better than PKZIP 2.04g, and while neither is widely used, they will almost certainly prod PKWARE into producing even faster, more powerful compression software for their 3.x release in 1996.

File compression on other platforms



UNIX is either replacing or being added to DOS and Windows on a lot of PC's, thanks in no small part to the free Linux operating system and the enormous popularity of the Internet where UNIX is king. In addition to native versions of the ZIP and Lempel-Ziv formats, UNIX has its own compression schemes such as gzip. As Internet becomes more and more useful to the everyday user, we can expect to see UNIX compression schemes become much more widely used on the IBM-compatible.

The Apple Macintosh world also has its own compression software, of which the most common in use today is called Compact Pro. Earlier Mac compression programs were known as PackIt and StuffIt, created by Aladdin Systems who released the StuffIt Expander program for Windows. They too use the Lempel-Ziv algorithm as part of their process.



Phil Katz of PKWARE has continued in his tradition of making the programming secrets of ZIP compression available to the public, and now every commonly-used computer type, from the Atari to the NeXT, has its own ZIP-compatible software for creating and/or extracting .ZIP files. Katz' idea was to have one common type of data compression which could be used throughout the computing world regardless of which operating system you used. He wanted PKZIP to be that standard, and excellent PKZIP-compatible software can be had by IBM-compatible, UNIX, Atari and Amiga users.

Unfortunately, the one frontier he *needed* to conquer -- the Macintosh -- didn't have ZIP software which worked reliably until 1994.





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ARJ and PAK are released as shareware and licenses for use must be purchased by anyone who continues to use the software beyond the limits outlined in the licensing agreement.

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LHA and LHARC are available free of charge for use by anyone under the terms of the licensing agreement set forth by Yoshi.





Maintenance

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Maintenance section 3: *Back it up!*



What if we were to tell you that you need never fear viruses and trojans again, that you could look at them from now on as nuisances no worse than a stain on a nice piece of clothing? What if we were to tell you that all of five minutes a week could protect you from all but the worst losses you might experience? Enough of the "what-ifs"...let's get down to some hard facts.

A very common novice computing mistake is not backing up important data. Understandable, actually. We're taught that it's extravagant and expensive to have two of everything. But when it comes to software, it's not extravagant at all. It's essential insurance against loss. Computer data is very delicate, and almost everyone will eventually suffer some sort of data loss, either to a virus, old age or defective hardware. Here's some information on what you can do to minimize that loss with the least amount of effort.



What backups are and why you need them



The why's and how's of preserving your precious data



An equally important question: *what* to back up



The common types of backups

 **Maintenance**

 **Back it up!**

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What backups are why you need them



Any consultant worth their salt will advise you to backup, *Backup*, ***BACKUP!*** Consultants tend to be experienced, highly knowledgeable users, and most of them practice what they preach. Even software publishers believe in the practice, and they sell data, not disks. In fact, it advises right in your DOS manual to make a backup copy of your DOS installation diskettes. You'll see the same warning in the manual for just about every important piece of software you'll use, with the exception of some games and utility packages. Here's why.

-  **Why are backups so important?**
-  **Disks and data aren't damage-proof**
-  **It pays to have a lot of duplicate files**
-  **Are there any shortcuts you can take?**



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Why are backups so important?

Accuracy is everything



Backups are critical because of the nature of disks and data. You don't really need backups of your cassettes because if a little piece of magnetic film chips away from your tape, you'll hardly notice it. Over the years tape will sound thin, but you'll still be able to listen to the music.

Not so with floppy disks. Every bit of data has a purpose, and if a tiny bit of magnetic film chips away from a disk, or if a hair creeps into the disk's plastic shell and scratches the surface, or even if a stray gamma ray from the Sun manages to get through the ozone and strike the wrong place on your disk, the entire software package might be rendered worthless.

What's worth more...the software or your data?



Backups are also insurance against fire or theft. If you paid good money for your software, there's no reason why you shouldn't be able to keep using it even if a thief steals the original disks. Backups insure that you can. They also preserve your work. How would you feel if your computerized personal diary was lost in a fire along with every entry it contained? It's bad enough to lose your computer in a disaster. There's no reason why you should lose your data as well.

There is another reason why backups are so important, and it has more to do with mistakes we make as users than physical damage to disks. More on that later.





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Disks and data aren't damage-proof

Corruption in your midst



Computer hardware gets more reliable with each passing year, but we're still a long way from perfection. Disks fail and files get corrupted far more often than the average user realizes. It's probably fair to say that millions of users whose systems seem to be functioning fine have corrupted data they don't yet know about. No problem if the corrupted file is one you never use.

But what if it's the main program file that gets corrupted? If you didn't have a backup copy of that file somewhere, you can kiss the whole software package goodbye -- and worse, all the work you did with it -- until you get a new copy. And the problem might be a single 0 where there should be a 1.

Reputable consultants and tutors will always advise you to back up every bit of data in your collection. If you use your computer in a business environment, they'll probably advise you to back up any new data on a daily basis. Home users probably don't need to go to this extreme, but new files should be backed up at least once a month.

The chore no one wants to do



Yet most users still don't back up their data. In the first place, a full backup takes time. Usually an hour and often two or three. (Actually, it only takes that long the first time through. After the first full backup, adding new files to an existing backup set usually takes no more than two minutes a day, tops, or ten minutes a month for home users.) The second factor is cost.

Backing up a fat hard disk requires costly tape backup hardware or a lot of floppy disks, and not many people want to shell out for fifty to a hundred floppies just on the chance that they might some day need a tiny bit of data from just one of them.

That is, until they discover that the tiny bit of data is their 1992 tax return or a save file from a game they'd been playing for weeks.





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It pays to have a lot of duplicate files

Mistakes don't have to be fatal



If you get in the habit of doing regular backups of your whole system and you're a business user (or just a busy home user), you'll eventually wind up with several copies of the same files. This happens because each time you make changes to the file, the archive bit gets reset and your backup software will make a new copy of it. Far from being a waste of disks, this can literally save your backside in the long run.

Let's say you start doing your taxes with the Lotus 1-2-3 spreadsheet and save your work as **MY_TAXES.WRK**. You might chop away at this chore for weeks, and do backups of your new data every week, resulting in perhaps eight copies of **MY_TAXES.WRK** stored on eight different floppy disks. It seems like a waste of space until you consider what might happen if you make a mistake with Lotus that you don't discover for a whole month.

You can rewrite history



One evening you recalculate and nothing seems right. But you recall that a month ago, everything was right. If you have a backup copy of **MY_TAXES.WRK** from that time, you can ignore the newer backups and load that old, "useless" file into Lotus and make your detective work fairly simple. If you kept erasing or writing over top of your **MY_TAXES.WRK** file every week, that old file would be long gone by now.

This is only one example of the benefit of having backups of all your work in various stages of progress. Writers, home accountants, students, artists and even game players can all benefit from this seemingly wasteful duplication of data. Many times we've erased old backups to make space for new files and regretted the mistake later. We'd have been much better off spending the money on a few extra disks than trying to conserve space on the ones we had.





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Are there any shortcuts you can take?

Not a place for cutting corners



There are no real shortcuts for avoiding backup boredom and cost. There is generally a direct correlation between the speed of the backup and the amount of money spent on backup hardware. Even fast backup software takes a lot of time and patience.

The only real shortcut you can take with backups is to use preformatted disks if you are creating a floppy disk backup set so you don't spend fifteen minutes per box waiting for DOS' **FORMAT** to do its thing. Unfortunately not even this trick applies if your backup software uses special formatting, and some programs do.





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The why's and how's of preserving your data



Here's where you'll learn about the types of backups and learn how to make an informed decision about how to balance price, performance and security.



[Backups from the DOS perspective](#)



[Manual versus automated backups](#)



[An important and oft-overlooked point: where to store backups](#)



[What you need for a proper backup](#)



[How much are you prepared to invest?](#)



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Backups from the DOS perspective

Copy, change, watch, forget



At the most basic level, this is how DOS and Windows look at backups. The data being backed up is first copied to another medium, which could be anything from a floppy disk to a tape to another hard disk; then DOS changes the file so that it is "marked" as having been backed up (this prevents needless repeat backups every time the process is performed); and finally DOS or Windows then watches that data during all subsequent backups to see whether it should be included or "forgotten" for any future backups. If the data has been changed since the last backup, it is copied again so that the data with these changes is part of the backup set. If it hasn't been changed, it is "forgotten".

Hacking DOS at the bit level

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;microscp.bmp}The people who originally programmed DOS knew the importance of backing up data when they designed the MS-DOS software package. Backup software has been included with DOS for many years now. It had to be.

You might have memories of days not so long past when disk manufacturing technology wasn't nearly what it is today, when you could count on one bad disk in every fresh box of ten, and floppies couldn't be relied upon to store data accurately from one month to the next. The memory lingers to this day for many people, and a lot of computing veterans still make two backups of everything in case the first backup goes bad.

DOS' programmers had backups in mind they originally designed the file system. Since the first days of DOS, all files used on IBM-compatible computers have something called an archive bit which is found in the same place on every file.

The archive bit



A bit is the smallest increment of data, and it can either be a 0 or a 1. The archive bit is found in the same place on all files on your system. When backups are performed by intelligent backup software, the archive bit on the file is changed from 1 to 0, so that any backup software you might use will know that a backup copy of this file, or "one for the archives," has been created.

Any time a piece of software makes changes to a file, DOS looks at this bit. If it's set at 0, DOS changes it back to 1 again so your backup software knows that the file was changed since the last copy was made. All true backup software has the ability to ignore files which have already been copied to a floppy disk and back up only the new data. That's why it takes so little time after the first major backup has been done.





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Manual versus automated backups

Two basic types of backups



There are two basic ways to back up software: manually, meaning that you decide what to back up and how to back it up every time you perform the chore; and automatically, meaning that you use backup software which follows your instructions. While it seems to make sense to do it automatically all the time, it's not always the best way to go.

Pros and cons

- ❖ Manual backups take longer to perform, but automated backup software can be confusing for the novice user.
- ❖ Most backup software will break large files into pieces if they don't fit on a single floppy disk (a very common situation with newer software), encode the software in a special way to save disk space, and some even format disks in a way designed to maximize performance. It can take anywhere from fifteen minutes to two or three hours your first time out to figure out how the software works, select the data to be backed up and start the backup procedure.
- ❖ Manual backup, on the other hand, merely requires that you have an attached drive to be used to store the backup and enough skill to copy files using Explorer or File Manager. You can select what to back up as you go. You'll need a type of drive that can handle files of the largest size you intend to back up, which might pose a problem if you intend to use floppies for storage. Eventually you can expect to run into software that creates files too large to fit on a single floppy. Tape drives are not generally suitable for manual backup, but the newer magneto-optical drives such as the Iomega Zip Drive; and costlier removable cartridge hard disks such as the Syquest, are ideally suited to this type of backup.
- ❖ Another drawback of manual backups is that you must know precisely what files need to be backed up and where to find them. That requires real expertise in regard to your system.

A matter of preference



If you are comfortable with automated backup software, such as the backup program included with DOS, by all means use it. Chances are good that automated backup will be a much better choice than manual for the novice to intermediate-level user.

But keep this point in mind. The most common use you will make of your backup set will be to restore a single file that got corrupted, perhaps by a mistake on your part or a random hard disk error. (These happen on the best of systems with remarkable regularity). Automated backup systems using special file structures and encoding can make finding and restoring single files a time-consuming headache. Ask anyone who has tried to restore a single lost file from a 250 megabyte backup tape!

With manual backups, it's simply a matter of selecting the right disk and copying the right file, a job that won't take more than a minute once you become comfortable with your computer.

We recommend a two-pronged approach



The simple method used in the Tiny Perfect Menu software package (a primitive DOS training package available from our Web site) could be termed semi-automatic. The backup is automated in regard to creating the set of backup disks. If you decide to backup your entire hard disk, it will do little else but ask you to insert floppy disks for as long as it takes to copy the entire contents of your hard disk to floppies.

But restoring the backup will only be automated if you decide to make it so. You have the choice of restoring files manually, which you'll use most often; or automatically, which will be handy in case you need to reinstall everything on your system. For us, and for many users, it's the ideal choice

We often suggest to novice users who have access only to floppy disk backup that they avoid the DOS and Windows BACKUP and other commercial backup software and do their backups manually, at least until they become thoroughly familiar with file structures. Manual and semi-automatic backups require a few more floppy disks than automated backup software, but this extra cost is offset by the ease of restoring single files or directories.



On the other hand, if you have access to a tape drive, and can either configure automated backup software yourself or find someone to do it for you, that will usually be the preferred route.





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Where to store backups

Better safe than sorry



As a general rule, it's best never to store finished backup sets in the same location as the source computer. A backup is also insurance against theft and fire, and if your backed-up data is stored near your computer, theft or fire will result in the loss of both your computer *and* your data.

If you use a computer in your business, store your backups at home in case your business is burglarized or catches fire. And if you use your computer at home, keep your backup set in a drawer or locker at work, or with a neighbor or friend. Improper storage is far too common with backup sets. What good is your backup if the thief who steals your computer takes every existing copy of your data too? It simply doesn't need to happen that way.





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What you need for a proper backup

Time and tools



Aside from time (set aside three hours for the first thorough backup job; you may not need it but it's best to have it available just in case), the most important thing you need is disks or tapes to store your data. If you choose disks, you'll need lots of them.

If you've never backed up your data, purchase one high density floppy disk for every megabyte of space used on your hard disk. You can use older double density disks, but you'll need at least twice as many, so unless you already have a lot of them lying around, purchase high density disks for the job. When it comes to tapes, purchase at least one and possibly two more tapes than you think you'll need. For example, if you have a 500Mb hard disk and have 300Mb of data to back up to a 120Mb tape drive, get four, not three tapes, for the job. You might not need the extra tape, but better to have and not need than to need and not have.

First you need to know the capacity of your hard disk. Very often users either forget or simply aren't told by the dealer. If you don't know how many megabytes of data are in use on your system, here's how to find out. You may wish to print this topic by clicking **File** and selecting **Print topic**.

Measuring space



The same utility you may have used before for fixing errors on your hard disk, CHKDSK.EXE, can also be used to find out how much space is being used on your system so that you can determine exactly how much media you will need for your backup.

To use this utility you must exit Windows completely, or in Windows 95, restart the computer in DOS mode. At the `c:_>` prompt, type CHKDSK (you don't need the `/f`) and the program will report how much space is actually being used. If you also have a **D** drive, you'll need to run CHKDSK.EXE on that drive too by typing `CHKDSK D:`.

Here's a typical readout from CHKDSK. It's not instantly obvious how much space has been used on your hard disk. The actual amount of used space is shown on the fourth line, highlighted in dark red.

```

448,102,400 bytes total disk space
 1,499,136 bytes in 101 hidden files
 4,448,256 bytes in 539 directories
366,845,952 bytes in 11,557 user files
74,285,056 bytes available on disk
   8,192 bytes in each allocation unit
 59,415 total allocation units on disk
 13,783 available allocation units on disk
655,360 total bytes memory
602,256 bytes free

```



Using one-disk-to-one-megabyte, this user will need approximately 360 disks to backup their hard disk. At about 50 cents each, they're looking at a cost of at least \$180.00. This is an

enormous amount of data to copy to floppy, so much data that the cost of the floppies alone could pay for a tape backup unit. This user has a serious choice...learn how to make good *partial* backups or purchase a tape backup or removable disk unit.

The time involved for the first backup will also be considerable, probably between two and three hours depending on what kind of backup hardware is used.





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How much are you prepared to invest? *The choice ahead of you*



This might seem like a lot of time and money for something you might never need, and you'll have to think seriously about how -- or whether -- you want to pursue this. More and more people are foregoing floppies altogether and either buying, borrowing or renting tape backup units...or, with the cost of hard disks at an astonishingly low price, using spare hard disks for backup. Anyone who has lost the entire contents of their hard disk due to a hardware problem or a nasty virus will tell you how much they wished they had made a backup. It's cheap insurance, particularly when you consider the time and effort you spent creating any personalized data, and how you'd feel if you lost it.

Backups are insurance you're almost certain to use, even if you never need to collect full benefits. If you own a computer, you will eventually have data errors. And when (not if, but *when*) you do, you'll be grateful for the time and expense you put into the job...or should we say chore.





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The common types of backups

-  ***Backup methods***
-  Full backup
-  Partial backup
-  Incremental backup
-  Emergency backup
-  ***Backup hardware***
-  Tape drives
-  Magneto-optical drives
-  Floppy disks
-  Compact disks (CDs)





Backup types

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Full backup

What it is



A full backup includes every bit of data on your hard disk. When doing your first backup, it's always wise to bite the bullet, hunker down with a pizza and a rented video, and spend a quiet evening backing up every file on every disk in your collection. That includes your hard disk as well as anything on a floppy disk that you might feel badly about losing.

Who benefits most from this method

This is the preferred novice method for backing up data, as it is generally foolproof provided no damage occurs to the backup media. It is also recommended for people who work with a large number of programs or who like to sample a lot of software but don't want the hassle of saving everything to floppy disks.



This is not the best choice for backing up on a budget unless you have access to a portable backup unit you can borrow for the job.

Preferred hardware and software



This backup method is best stored on a high-capacity tape drive (at least 120Mb and preferably 240Mb or higher for people with many different programs on their systems), although many prefer newer types of hardware such as the much faster magneto-optical disk drives.

The type of software chosen is up to the individual, and when in doubt use the software which was bundled with the backup unit. If backing up to a floppy disk, you may have to settle for the backup software that comes with MS-DOS or Windows 95. If backing up to a tape or removable disk drive, there will almost always be special software included with the drive for creating the backup. While this bundled software isn't always the fastest and most versatile, it can almost always be upgraded later without necessitating a completely new backup.

When should they be done?

As soon as a few programs are installed on a new computer and any new data has been created by its owner which it would hurt to lose, it's time to think seriously about a full backup. The longer a system is left without a backup, the more important the first full backup becomes.

Other points to keep in mind



Full backups should also be complemented with smaller, emergency backups which contain only configuration information designed to return programs to their user-configured state.



Full backups must also be updated regularly or their value to the user drops substantially. These backups should be performed at the end of a computing session so they do not cut into productive computing time.







Backup types

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Incremental backup

What it is



An incremental backup is a backup of only those files which are new to your system or which have been updated since the last backup was done. Incremental backups are the backups you add to a backup set after having done the first full or partial backup.

Who benefits most from this method

Everyone who makes backups.

Preferred hardware and software

Incremental backups should always be done with the media used to create the full backup. So if the full backup was created on tape, the incremental backup should be *added* to the tape, not stored on floppy disks. This makes keeping track of the backup easier for the backup software and storage less of a hassle for the operator.

The software used for an incremental backup should *always* be the same software used to create the first full backup.

When should they be done?

It depends on the level of use and productivity by the user.

Generally speaking, it's a good idea for business users to develop a system that automatically adds new and changed data to a backup set at the end of each working day.

Personal business users who don't add a lot of data to their system might be able to get by with weekly incremental backups.

Home computers used by anyone who depends on their computer should be incrementally backed up at least weekly. Home computers used casually can probably get by with monthly or even seasonal incremental backups, providing the user doesn't mind the risk of losing a month's worth of new information.

Other points to keep in mind



Incremental backups are only as good as the time and effort put into them. Hopefully they'll be "worthless" in that they will never be needed to restore lost data, but it's usually best to prepare for the worst.

Daily incremental backups made by businesses and busy individuals have one serious drawback. It's important to have the backup media (tape, removable disk or floppies) near the computer if you plan on making daily backups, but this also leaves the risk of theft or damage quite high, since many events that damage the computer's data will also damage any nearby backup media.

It's wise to select a method of backup that allows you to duplicate your entire backup set if you wish to do daily backups. At this time, the removable magneto-optical disk drives appear to be the best candidates for this.





Backup types

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Partial backup

What it is



Simple enough...it's a backup that selects only the most critical data on your system, specifically any data created by the user and any configuration data which is used to personalize the software.

Who benefits most from this method

While it's not enough for people who want complete security and everything about their computer simplified for them, a partial backup can benefit everyone who creates new data on their computer. This even includes people who only play games. Partial backups will save positions in games, preventing the need to go through early levels again if the saved game is lost.

Preferred hardware and software

None. It depends on how much data will be saved with a partial backup. If it's just a few megabytes, it can be done manually using File Manager to copy files to floppies. If the partial backup involves a number of files created with many programs, it is usually a good idea to use a removable disk drive or tape backup unit for the job and use the backup software to select only those files and directories needing to be backed up.

Configuring backup software for a partial backup takes considerably longer than setting it up for a full backup, but this is usually a one-time investment of time, and modifying the setup later to include new files and directories takes only a fraction of the time taken by the original configuration.

When should they be done?

The first partial backup should be done as soon as there is useful data on the computer which it would hurt to lose.

Other points to keep in mind



If there is catastrophic failure of the hard disk, it won't be just the user's data which will be lost. All programs will be lost as well. While we cannot condone software piracy, it is a fact of computing life that most users have software on their computers which they do not own and cannot replace without purchasing it. The only protection against this sort of catastrophic loss, which is common enough to be worthy of serious consideration, is to create a full backup.





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Emergency backups

What it is



While the term is not commonly used yet, emergency backup generally refers to backups which contain only the most critical data on the system. For Windows users, this includes configuration files for Windows and any DOS system files which may be needed to restart the system and get into Windows if the system suddenly refuses to run.

Who benefits most from this method

It's useless if you never have an emergency situation such as a botched software installation that shuts you out of Windows, never encounter bad data on your hard disk in a critical location, never suffer a virus infection, and never make mistakes which might erase critical data.

In other words, *no one* should be without an emergency backup.

Preferred hardware and software

On the hardware side, emergency backups should always be made to floppies designed for floppy disk drive A.

On the software side, there are many programs to choose from but none of them are truly complete. Some, such as Norton Utilities, back up critical information about your hard disk but not all of your configuration files. Others, such as Safety Net, First Aid, and our own F-A-S-T Emergency Windows Backup back up some or all of your personal configuration files and DOS system files but can't save critical information that would guard you against a hard disk failure.

We recommend a combination of both types of emergency backups. Fortunately, emergency disks containing hardware information such as hard disk and CMOS setup data only need to be made once.

When should they be done?



Emergency backups of critical DOS and Windows files should be updated every time you add a new program to your system that you plan on keeping for any length of time, and any time you do any serious configuration of a program and want to make sure you have copies of the configuration files. This will insure that if you need to reinstall the program due to some problem with its operation -- even if it was completely erased from the system -- you can restore your personal settings quickly and easily...*provided* you reinstall the software to the same location as before.

The first emergency backup containing information about your hard disk and system should be made as soon as possible after purchasing the computer. In fact, you might ask the dealer to supply one on delivery of the computer.

Other points to keep in mind



Emergency backups of critical DOS and Windows files *must* be backed up regularly if you wish

to make sure that your system keeps performing in the way you've come to expect. Restoring an old emergency backup could cause programs which you have customized to be restored to an earlier state, meaning that you'll lose the work you put into the customization.





Tape drives come in two flavors: external and internal. The internal units usually operate much more quickly than external units and cost a lot less, but external tape drives have the advantage of allowing users to share the cost of the hardware among several users.

They also come in many capacities. In general, anything less than 120Mb capacity is a burden for Windows users, and tapes for smaller formats are becoming increasingly difficult to track down. If you are considering the purchase of a new unit, the best price/performance ratio seemed to be second-hand 120Mb units at US\$100 or less as of late 1995 and 240Mb new units at US\$200 or less.

Be aware that tape drives, being mechanical, require some maintenance (see the section on maintenance in the **Insurance and Medical** section for more information) and many servicepeople caution users not to expect a lifespan of more than two years on any tape drive. Many seven-year-old units still function flawlessly, but a large number of two- and three-year-old units give up the ghost, and they are usually not worth repairing.



Magneto-optical disk drives are currently the medium of choice for software collectors and people who want to use their backup unit as an extension to their hard disk and not just as a backup unit. At an average storage cost of US\$0.25 per megabyte of storage as of late 1995, they are economical means of storing backups of installation floppy disks, copies of critical installation files from compact disks, and software received from the Internet and online services.

The most popular magneto-optical drive at this writing was the Iomega Zip drive. At an average cost of US\$250-300, plus US\$20-25 for each 100Mb disk, and with a data transfer speed faster than floppy disks and the ability to track down individual files much faster than tape backup units, they became so popular that a serious shortage of disks developed in the fall of 1995.

These disks behave very much like tape or floppy disk media and should be treated with the same respect. This means that you should never count on one copy of your data to remain error-free for long periods. As with all backup methods, two copies of the data are recommended.



Floppies are the cheapest, but also the slowest and most labor-intensive backup medium, and we do not recommend them to anyone who can afford proper backup hardware. They are, however, essential for emergency backups.



Compact disks are becoming a more popular medium for backup all the time, due mainly to the cost. For about US\$75, plus the time it takes to remove the hard disk and transport it to and from the location where the CD will be made, you can have up to 650Mb of data transferred from your hard disk to a single CD...permanently.

At least, that's the common perception. In practice, these "one-off" backups onto CD are not nearly as reliable or long-lived as many people have been led to believe. Depending on the quality of the master CD used to create the backup, the disk itself may develop errors in as little as a year.

As with all backup media, we recommend making two copies of any custom CD backups for the sake of safety.

Also be aware that you cannot add to a CD once it has been created. All you can do is cut another CD with the new data to be added.



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What to back up

No easy answer



The easy answer is *everything*. Unfortunately, the easy answer is rarely the right one in the looking-glass world of computers. Naturally if you have the time and the inclination, and can afford a tape backup system for your PC, it makes sense to back up everything...twice. It's a job you can start at bedtime and finish in the morning with little lost productivity, and a second backup of even a full, fat hard disk will only cost you an extra \$50 or so at most.

But most people don't have tape backups, many don't even have access to loaners or rental units, floppy disk backups are grueling chores, and CD "one-off" shops and magneto-optical drives might not be an option.

There's a lot of data on your computer you can probably do without. But if you don't know enough about your computer to be able to tell the difference between essential and non-essential data, the logical choice is to back up everything.

Backups of installation floppies



Many veteran users have gotten into the habit of making copies of all new software that comes on floppy disks, and backing up the contents of the installation directory on a CD before actually installing the software. It might sound silly, but this kind of habit usually comes from hard experience with more than one installation disk or CD that went bad at a critical moment. There's nothing more irritating than having to reinstall Windows and discovering that one of the original disks is corrupted, or selling your old copy of WordPerfect to someone who discovers that the second disk in the installation set is damaged and the product won't install on their system.

Windows 95's disk copy function is blazingly fast compared to older DOS and Windows disk copy, and the **Copy Disk** function in File Manager (available from the **Disk** menu) is simple enough for virtually any novice to handle. If you're a new user, get into the habit of buying a box of floppies every time you purchase an expensive new program on floppy disk, and a new backup tape when you purchase expensive software on CD, and making a backup of the installation software. Not all manufacturers let you do this, and some will provide you with free replacement disks if yours should go bad, but ask yourself this:



If the program suddenly refused to function and your installation disks or CD had errors, could you afford the wait for delivery of new installation media? The choice is yours.

Full backups: much more important with Windows than DOS



Windows programs copy files to more locations than you'd probably care to count, so you can't just back up Lotus 1-2-3 for Windows or Print Shop Deluxe by copying its directory to a floppy disk. Simply put, if you're a Windows user and want to be secure, **back up everything**.

If you can't afford the time, expense and trouble to do a full backup, you're computing beyond your means. This may sound blunt and cruel, but it's the truth. The real tragedy isn't

that Windows is like this, it's that you probably weren't told you'd need to make this kind of investment when you purchased your computer.

Don't forget emergency backups



Even if you decide not to make full backups, there's no reason to avoid creating emergency backups...not when we've made it this easy. First Train for the Internet users will find an **Emergency Backup** item under their **Utilities** menu which will walk them through the process of creating an emergency backup of all their critical files in a matter of no more than a couple of minutes. This disk will protect against most of the major errors you are likely to encounter and should not be put off.

Finally, backup your backup software!



It sounds obvious, but you'd be surprised how many people forget to make floppy disk copies of their backup software and store them with their backup disks or tapes. If you use the backup software that comes with DOS or Windows 95, it's not a big problem since you'll find copies of this software just about anywhere. But if it's special software that came with the backup drive unit, you might have a sticky problem if your hard disk ever suffers a serious problem and you discover that one of the install disks for the backup software is corrupted.





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Disaster prevention for Windows



This section contains important information about *preventing* problems with Windows and Windows 95 through the use of two simple utilities. One of them tracks the complex arrangement of files installed on your computer when you install a new file into Windows and allows you to erase most, if not all, of an installation with the click of a button, preventing system conflicts and freeing up valuable disk space taken by unneeded software. The other utility makes sure that your most valuable Windows information -- your start-up files and personal configurations -- are secure and backed up in case you ever lose this information as the result of a botched installation or damaged files.



Uninstallers



[What you need to know about uninstallers](#)



[Faros 3 PLUS: our uninstaller of choice](#)



Emergency system backup



[Emergency backup for recovery from common software problems](#)



[Our own F-A-S-T Emergency Windows Backup](#)



Other protection



[Antivirus software](#)



[Delete protection: how to reclaim what you wish you hadn't trashed](#)



Disaster prevention

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What you need to know about uninstallers

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;eraser.bmp}If you're already using an uninstall utility most of this material will be old hat to you. We still recommend browsing the last two topics. They contain important information every user should know.

If you've never used such a utility, we recommend taking the full tour of this section. You'll find it enlightening, and if you have any sense of adventure in your spirit you are almost certain to find it very useful as you wander the net.



[Windows' simple look is deceptive](#)



[Windows 3.1/3.11 won't make it easy for you](#)



[What about the Windows 95 uninstaller?](#)



[How do uninstallers for Windows work?](#)



[Two types of uninstallers: which one to choose?](#)

 **Disaster prevention** **Uninstallers**

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Windows' simple look is deceptive

Not the easy job it once was

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;pc-bite.bmp}Removing DOS programs is rarely more difficult than erasing all the files in one directory. If you know how to do that, in most cases you can confidently maintain your hard disk and keep it clean. It's a skill most DOS users had to pick up in their first couple of months of use in order to competently maintain their machines.

Even if you have good DOS and file management skills, do not assume that you are skilled enough to erase unneeded Windows programs. About half the time, erasing the obvious files -- those in the directory containing the main program -- won't completely remove the software. About one time in ten, depending on what kind of software you choose, erasing all or part of a program will have unwanted effects on other important programs on your system. DOS may be messy, but Windows sweeps its dust under the rug so you can't see it.

Conflicts galore...part of life with Windows

{bml furious.bmp}Even more disturbing, some Windows programs install themselves in such a way that they make other programs impossible to use until they are removed from your hard disk. This includes some very popular and useful programs recommended to First Train for the Internet travellers and users of this guide. This sort of problem happens with DOS as well, but not nearly as often as it does with Windows.

Finally there's economics. Windows software takes up enormous amounts of space on your hard disk. If you get serious about using your computer, chances are excellent that you'll eventually run out of space to store new data. You'll either need to clean house or add another hard disk. This will happen much *less* quickly if you keep your system clean by removing data and programs that you don't want or need any more.



 **Disaster prevention** **Uninstallers**

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Windows 3.1 won't make it easy for you

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;eraser.bmp}Windows 3.1/3.11 and Windows for Workgroups do not make it easy for you to determine what is and is not useful data.

Uninstaller utilities keep track of what you have, where the components are kept on your hard disk, and what changes were made to your system when the program installed itself. It can use this information to hunt down and eliminate all traces of an unwanted program.

Why you need an uninstaller



If you buy new programs, subscribe to magazines with disks or CD's which include software, or plan to get software from the Internet on any kind of regular or semi-regular basis, eventually you will wish you had an uninstall utility.

If you want to try new programs and can't afford to keep adding new hard disks (most newer computers can have up to four of them, older units will allow only two) each time you run out of space, eventually you will wish you had used an uninstall utility when you had the chance.

And if you have ever installed a program and discovered that another favorite program stopped working the second you restarted your computer, you *already* wish you had an uninstall utility.





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What about the Windows 95 uninstaller?

It's just not enough

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;eraser.bmp}Windows 95 comes with its own built-in installation tracking utility. Like many things Microsoft, it demands that things be done *its way* and has some serious limitations that many users will never know about until it's too late.

{ewr LZANI.DLL,LZANIMATE,GRAPHICS.DAT;moustrap.bmp} The **Add/Remove Programs wizard** will track installations of Windows 95 programs...provided the author has included the appropriate file that the wizard needs to track the process. It will *not* track Windows 95 programs that do not include this file, and what's worse, if you try to install these programs using the wizard, *it will not even warn you that the installation has not been tracked*.

This wizard will track installation of drivers and operating system components too...*provided* you install them using the wizard. If you do not see the wizard during the installation, the software has not been tracked.

It will track *some* 16-bit Windows programs designed to run on both old and new versions of Windows, but *only* if these programs include the file needed by the wizard to track the installation.

Interestingly, while most Windows 3.1/3.11 uninstallers will leave traces of the old program behind when they uninstall (usually traces you won't mind or notice anyhow), they are every bit as effective for most programs than a dedicated Windows 95 uninstaller.

Useless with programs which have already been installed



We repeat...the wizard will help you remove programs you install after upgrading to Windows 95...*but only with programs specifically tailored for this wizard*. Even most new programs as of January 1, 1996 did not support Microsoft's uninstall wizard.

It will be of *no* use to you with software you already have on your system. It will only work with components of Windows 95's operating system and accessories, and with programs you have not yet installed.

Now that you know the facts, you have a choice. You can live without an uninstaller and either pay someone to clean your hard disk of useless files every few months, or you can start using an uninstaller, keep your system free of clutter, and start enjoying the mountain of software available on the Internet without worrying where to put it all...or how to clean up after programs that just don't cut it.





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How do uninstallers for Windows work?

Uninstallers range from the ridiculously simple to the unbelievably complex. But they all work in one of two different ways.

After-the-fact uninstallers

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;eraser.bmp}The more complex after-the-fact uninstallers check every file on your system against every other file, find out which files are strays or associated with particular programs, and give you choices about whether or not to erase them. They can also check inside the files themselves for clues about what program or programs they are designed to be used with. These programs can work with software already on your system.

This type of uninstaller also demands a lot of knowledge about your system...either that or a lot of reading in order to *get* that knowledge.

Installation trackers



The simpler installation-tracking type of uninstaller -- the type we recommend -- works only with software which have not yet been installed. You run this type of uninstaller before installing any new software. First it takes a reading of every file in every critical area where Windows software can install itself. The program is left running while you install your new software. When the job is done you click a button on the uninstall utility which starts a second reading. This second reading is compared against the first and the uninstaller creates a record of all changes made to your system.

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;eraser.bmp}This second method allows the uninstaller to keep a very accurate record of what went where during the installation procedure, and is smart enough to undo virtually anything that was done to your configuration, erase every single file associated with the software and every bit of configuration information added to your system during the installation process.

These simpler, install-tracking uninstallers aren't always as thorough as the expensive, sophisticated commercial models (for example, they won't find and remove unneeded duplicate files left behind by previous installations) but they are much easier to use and understand.





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Two types...which to choose?



Some people prefer to have one of each kind of uninstaller on their system, but the fact is that any quality uninstaller used as directed will do a pretty fair job of keeping your system clean. Still, you should have an idea of what you're getting into before you start working with any of these tools, because as mentioned previously, any software designed for the purpose of erasing data from your system can produce unwanted side effects if it isn't used carefully. If you can match the pros and cons of each type of uninstaller to your particular computing style, then you should be able to choose wisely between these two types.

Pros and cons of after-the-fact uninstallers



Can you use an uninstaller for programs already on your system? Yes. Should you? In most cases, our answer is no...but this depends on the uninstaller program you use and the software you want to remove.

There are many commercial programs, most in the US\$50.00 range, that claim to be able to remove almost any software package installed at almost any time. If you have a big collection of software you'd like to prune back right now, it might be worth the investment. But in tests done by some well-respected computing magazines, none received a perfect score. In fact, some actually erased important files needed by other programs! The ones that played it safe didn't do a thorough job. On the other hand, they're easy to use. You don't have to remember to run them before each new installation.

Pros and cons of install-tracking uninstallers

Install-tracker-type uninstallers tend to cost much less. Faros Uninstaller 3 PLUS is a *free* program from author Periklis Koutsogiannis and Software Innovations. Most install trackers cost from US\$10.00 to US\$25.00, and most of them do about the same job as Faros, although some are considerably less effective.



Check the information with this program...you may have an early version which will only work with pre-95 Windows versions.

On the plus side, a well-written install tracker won't accidentally delete software used by another program simply because it can't find a connection. It deletes what was installed and nothing else. They're fast, effective, simple to use and require no knowledge of your system. You don't have to (and shouldn't) use install trackers for programs you expect to keep for a long time. You can reserve them only for testing new software. They don't need updating, since a well-written install tracker should never have to be updated to accommodate minor changes to an operating system or new types of software available for an old operating system. And they can usually be used on any version of Windows.

On the minus side, some install trackers will erase files needed by other programs, since many programs need the same set of shared resource files. This is no more than an inconvenience though. At worst, you'll have to reinstall a program which uses one of these shared files, and it's not likely to happen that often, if ever. You must also remember to run the uninstaller before actually installing the software. And some install trackers do a less-than-

perfect job of cleaning up configuration details on your system. Once again, this should never be more than a minor inconvenience.

We hope you see now why we recommend install-tracking uninstallers, even though they require a little more effort to be used effectively.

If you need help now...



Our advice if you need a lot of data removal done right now is to find a local expert, perhaps a college student or high school hotshot you can hire for an hour or two, to clean your hard disk for you. Find someone who will know enough to get Windows back up and running if the wrong file gets erased. Not all of the commercial uninstallers can do that for you, but we *do* know of some which have a habit of suggesting that you delete important data.





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Faros: our uninstaller of choice

A gift from Software Innovations



The uninstaller supported by Dynamic Living Media is Faros Uninstaller. It's a free program, a junior version of their more sophisticated *AppControl* product, which should provide all the uninstall protection the average novice to intermediate-level Windows user is ever likely to need.



It has one unfortunate drawback. The version included in the January 1996 version of First Train for the Internet, 3 PLUS, was not Windows 95 compatible. The author was putting the finishing touches on Faros 4 at the time and you may be able to find links to the newest version either on the First Train support site.

Naturally if you can afford a sophisticated tool such as CleanSweep or Uninstaller, you might not want to bother with Faros. But if you're a Windows 3.1/3.11 user on a budget, this is the "best-of-show" of free or low-cost uninstall utilities and we strongly recommend using it.





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Emergency backup for Windows

Because Windows doesn't come with life-preservers

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;firext.bmp}The next essential item to pack for your trip is emergency Windows backup software. If you use a tool such as Safety Net, First Aid or another Windows utility that backs up your most important DOS and Windows files, you won't need this software. But if you *don't* have emergency backup software, sooner or later you're in for an unpleasant surprise. It's the rare Windows user who doesn't get locked out of their system due to a botched installation, a crash at a critical moment that corrupts a Windows or DOS file, a virus infection or something as unpredictable as a stray gamma ray from the Sun damaging a critical spot on your hard disk.

Good news and bad news

The bad news is that Windows and DOS don't come with emergency backup software, and the tool Microsoft makes available on the Windows 95 upgrade CD has proven to be less than satisfactory in our tests.

The good news is that we have included click-and-go emergency Windows backup software with First Train for the Internet as a no-cost extra. It's so important that we believe every computer user ought to have and use a tool like it, and until such time as we find a freeware program that does the job better we're making this software freely available to all from our support site.





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Our own F-A-S-T Emergency Backup

A better spare-tire-and-wrench set



This utility is a special backup routine that will copy the most important files from your system to a floppy disk. Once this disk has been made, you'll need to keep it updated regularly, which usually takes less than a minute each time you do it. This disk will help you effortlessly recover from about 90 percent of the most serious software emergencies you might have, and possibly save you an enormous amount of time and money spent troubleshooting a faulty installation.

We specialize in writing training and support software. We're not programmers. So be aware that this software is a bit of a hack-together job. But it works, and it has been tested and has already saved its users thousands of dollars in troubleshooting and service calls they would otherwise have needed. If you ever get locked out of Windows, F-A-S-T Emergency Windows Backup will get you up and running again almost instantly. You just have to remember to use it.

→Note: F-A-S-T Emergency Windows Backup is not included with this version of PC Owner's Survival Guide.





One of the nicest features about DOS since version 6.0 is its ability to allow you to recover deleted files you wish you hadn't erased. This button takes you to a section of **Random Jottings** where delete protection and undeleting is discussed in more detail.

Windows 95, of course, comes with delete protection as a standard feature, and you can unerase files dragged to the trash can by double-clicking on its desktop icon. This section is specifically designed for Windows 3.1/3.11 users.



This help button takes you to a section of the guide where you'll learn about antivirus [software](#).



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Part 3: Computer and workplace ergonomics

This unfinished guide to health, safety and comfort for professional computer users attempts to cover a wide range of topics. Unfortunately not all are covered in depth. Use the [links](#) to other sources for computer-related stress information found within this document.

(Section authored by Rae Telcher)



[General information](#)



[Repetitive strain injury](#)



[Tips for preventing and dealing with RSIs](#)



[Creating a user-friendly workspace](#)



[Monitor-related stressors](#)



[Computer-related emissions](#)



[Noise pollution](#)



Ergonomics

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General information



[Medical disclaimer](#)



[Philosophical issues: why bother at all?](#)



[Seven areas of computer-related stress management](#)



Ergonomics

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Creating a user-friendly workspace

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-  Keyboard ergonomics
-  Wrist rests
-  Elbow rests
-  Relaxation: the best prevention
-  Alternative input devices
-  Mouse ergonomics



Ergonomics

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Monitor-related stressors

-  Effects of monitor stress
-  Eliminating glare with filters and screens
-  Eliminating glare with common sense
-  Flicker: what it is and what to do about it
-  Fluorescent lighting and interference flicker
-  Screen sway
-  Flyback wear: a very serious problem
-  Screen type, size and dot pitch
-  Screen resolution
-  Screen brightness
-  Gauging your level of monitor stress
-  Copy holders
-  Color your (virtual) world



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Computer-related emissions

"Exposure to ELF (extremely low frequency) electric fields can alter cellular physiological and behavioral events...At present, studies serve as a warning that unnecessary exposure to electric fields should be avoided..."

"It is recommended that efforts be made to limit exposure, particularly for members of the general population, to levels as low as can be reasonably achieved."

Environmental Health Criteria: 35,
Extremely Low Frequency (ELF) Fields,
World Health Organization, Geneva, 1984, pp. 18 and 88.



[An introduction to computer-related radiation](#)



[Scalar-wave ELF emissions](#)



[Medical foundation for ELF shielding](#)



[Reduced emissions and energy savings](#)

(ewc HLP256.HLP256_TILE.MAINMARK.BMP) **Medical Disclaimer**

This work is designed to provide information in regard to the subject matter discussed. The author is an unlicensed, uncertified consultant whose expertise and qualifications extend only to offering general guidelines and suggesting possible avenues of individual exploration. Except where specifically stated in the text, this work is not to be construed as authoritative or based on accepted medical research or proven scientific principles. Every effort has been taken to insure that speculation, hearsay and conjecture are represented as such and not as proven facts.

The concepts, problems and solutions discussed in this work are presented to educate and entertain. Neither the author nor the publisher shall have liability or responsibility to any person or entity with respect to any loss or damage caused or alleged to be caused either directly or indirectly by misuse or misinterpretation of the information contained in this work. Any therapies, activities or devices described herein are strictly adjunctive or complementary to medical treatment, and are to be used only after consultation with, and under the strict supervision of, a qualified medical practitioner. Self-treatment is not advisable for any ailment, and the reader is urged to seek out the best possible medical assistance if and when symptoms described in this work present themselves.



Philosophical Issues: Why Bother At All?

Into our minds, out of our heads



The farther we get from nature, the more perils we create for ourselves and the harder we have to work to keep ourselves healthy and happy. Computers are no exception. The way they're used is one thing; the way they're built poses other problems. What computers do, what they have always been meant to do, is act as substitutes for our real brains. Since their inception, we have tried to create and structure the computer as a mirror of the way we think, and to create and structure its hardware -- the interface -- as a mirror of the way we move.

It has been a process doomed to failure. For starters, we are still learning how the human brain works. Trying to create a substitute for the brain under these conditions is like trying to invent margarine without ever having tasted butter. And if the computer itself is a poor representation of the human brain, the interface is doomed to be a poor fit for the human body. If it were a good fit, the computer probably wouldn't work!

Satisfied with a poor fit



The sad truth is that we are trained by our culture to be satisfied with poor fit. So it's no surprise to me that I encounter a lot of resistance when I speak to employers about the importance of ergonomics and computer-related stress. Too many would rather get rid of a whiny employee or chalk up repetitive strain injuries to poor work habits than spend a few dollars improving the work environment.

It's a damnable shame. People are getting hurt. And it's changing, because those same people are starting to win judgments from the Workmen's Compensation Board and their employers for work-related injuries. I believe that we're going to see a lot of proof over the next few years that computers are a much greater stressor than is commonly believed, or even suspected, today. That's sad, because it usually takes injuries to thousands of people to make us realize that a cultural institution is a health hazard. Remember how long it took with cigarettes.

The biggest risk: the problems we still don't recognize



The problems we can't see or adequately measure in the present are always the ones we most wish we knew about after the fact. It's too easy to call up the ghosts of asbestos, urea formaldehyde insulation or coal tar dyes in food. Two years ago, I may have needed to do so to make my point. At that time, carpal tunnel syndrome was just another medical buzzword. Now almost everyone who uses a computer knows what it means, at least in terms of physical suffering.

Probably the most frightening tendency I see in employers (and fortunately I don't see it often because I don't usually get -- or accept -- their business) is defiant ignorance of ergonomic concerns of any kind once the office is functioning at an acceptable level. The reasoning

behind this defiance appears sound. Make things easier in one area and the natives will get restless about something else. No one will ever be completely satisfied. And if no one is visibly, or at least *provably* ill, why fix what ain't broke?

This is sound logic used to support an unsound argument. Sure enough, if you remove a major stressor from someone's life there will usually be a long sigh of relief. But once the person relaxes into a less stressful environment, they begin to notice more subtle problems that never bothered them before.

Making an inhuman task humanly tolerable



Working with the contemporary computer is not a task suited to humans, and as long as people rely on the digital beast there will be distress and its associated symptoms. Any employer who takes action on these issues will almost certainly be met with another battery of complaints at a later date. If they refuse to deal with the most pressing set of problems, their employees will never have the strength or confidence to confront them on subtler issues. It's cheaper, at least over the short term, to avoid complaints rather than deal with them.

It's probably more true of computers than most things in life that it's best not to mess with what works. But computer-related stress doesn't leave visible marks, and illness and injury can be around for a long time, often chalked up to other things, before anyone wonders whether they might be related to workplace stressors. By the time we realize something doesn't work, it's often too late for anything but damage control.

I don't know whether it's better for a company's bottom line to ignore ergonomics completely or to make them a cost-is-no-object priority, but my guess is that neither is measurably more profitable in the long run. I'll also guess, with the wish that I could be more certain, that the highest cost-benefit spikes occur near the extremes: at the bare minimum acceptable and the maximum possible within reason. In a very real sense it's like raising a child: doing nothing is a recipe for eventual legal trouble; doing everything will bleed you dry.

Penny wise and dollar dumb



Any employer who responds only to the most serious and visible threats will eventually pay through occasional stress-related injuries, nuisance terminations, quitting/rehiring, and in many cases, lawsuits. An employer who spends a small fortune on ergonomics will, on the other hand, save money through increased employee satisfaction and loyalty, enhanced productivity and reduced downtime. How far a given employer goes with ergonomics and workplace health issues depends upon how much they value their employees as people and how far ahead they plan. Personally, I much prefer working with -- and *for* -- employers who strive toward long-term growth with a people-first philosophy.

Difficult choices



If this is your first serious look at computer and workplace ergonomics, you may be facing some difficult choices. You'll have to decide who you can trust and how much hard evidence you require before taking action. At the risk of straining my credibility, I believe very strongly that there are areas of human functioning which we have barely begun to acknowledge and aspects of life which we don't yet understand. Twenty years ago, Kirlian photography, which captures the electromagnetic field around living beings on film, was a novelty. Today it is gaining acceptance as a tool for medical diagnosis, and being used to monitor the effectiveness of medical treatment in many countries. Computer emissions can interfere with the human

electromagnetic field. How much evidence will you require before you decide that it's a potential hazard?

Now think in these terms. A few years back, when you were still working primarily with DOS-based applications, you may have been told that you needed to upgrade to the new 386s to bring office productivity up to where it should be. The truth is that while some DOS functions benefit from the increased speed, for example Lotus 1-2-3 spreadsheet calculations and WordPerfect's page-preview mode, many of them don't. You may also have been told you needed \$2,000 worth of color laser printer when a \$750 inkjet printer would have done the job. You may also have been sold a \$600 word processor where the Write program built into Windows, which sold by itself for around \$100, would have been more than adequate.

Overinvested and underinformed



Nearly half of my clients bought too much hardware or software based upon the recommendations of a colleague or computer professional. If you've been quick to invest based upon expert advice in your physical plant, and often find that you've overinvested, it's consistent business practice to be just as open to advice regarding the maintenance, upkeep and long-term performance of your personnel, and just as willing to risk overinvesting in this area.

(I don't apologize for referring to employees to numbers and raw resources here; this is business we're discussing after all, and the best long-term approach to business practice is almost always the most humane as well.)

How you choose to proceed is up to you, but this report should help you make more informed decisions. I personally prefer to err on the side of caution when possible. I've wasted money on the occasional quack gadget from time to time, but the state of my health tells me that I've made a lot more good decisions than bad ones. The proof of this pudding often needs a long time in the oven.

Scared smart



It's not fun to be motivated by fear, but it's often the only emotion that moves us to action. I'm going to discuss a few computer-related stressors that you may never have heard of before, let alone consider important, and it's my hope that you are scared by them. Our culture has a long and inglorious tradition in regard to stress management: the more we learn about stress, the more past damage we uncover and the bigger the bite we lose from our paycheques to cover the cost of cleanup.

Computer-related ergonomics is an area of special concern to me, and it will probably be several years before you hear another consultant discussing the dangers of flat-wave emissions coming from the central processing chip or interference-flicker stress from fluorescent lighting. It's up to you what you do to take care of your health and the health of your employees, but I'd rather risk losing a client or two than keep quiet about issues I believe in.





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Seven areas of stress management

***"Common sense prevails
where education fails."***

-author unknown-

***Common sense is only common
to those who have it.***

-Anonymous-



There are seven major areas where the average home or office computing environment can be ergonomically enhanced or made safer. They include:

-  **monitor type, condition and setup**
-  **monitor placement**
-  **mouse and keyboard ergonomics**
-  **noise**
-  **lighting**
-  **desk and seating (*furnishings; not included in this report*)**
-  **emissions protection**

None of them should be overlooked; all of them can be improved to the maximum reasonable degree for a one-time cost averaging from \$500 to \$1,000 per workstation; and there are free and under-\$100 solutions in all of these areas. Improvements in any area will contribute to enhanced safety, comfort and job satisfaction over the medium and long term.

In addition, there are ways to improve work efficiency with exercises and relaxed work pressures around the computer. I am not at all impressed with Japanese-style management; enforced exercise periods and structured group stress breaks seem almost fascistic to me. I prefer offering employees the opportunity and tools to take care of themselves; it's up to them whether they can -- or choose to -- take advantage of that opportunity. This aspect of workplace stress will be discussed at the end of this report.





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Repetitive Strain Injury (RSI)

The following was taken from Dan S. Wallach's (1994) Typing Injury FAQ (Frequently Asked Questions): General Info [USENET news.answers](http://www.UUNET.net/news.answers). Available via <http://www.CS.Princeton.EDU/~dwallach/tifaq/>

"Specific injuries you may have heard of (note: most injuries come in two flavors: acute and chronic. Acute injuries are severely painful and noticeable. Chronic conditions have less pronounced symptoms but are every bit as real.):

"Tenosynovitis: an inflammation of the tendon sheath. Chronic tenosynovitis occurs when the repetitive activity is mild or intermittent: not enough to cause acute inflammation, but enough to exceed the tendon sheath's ability to lubricate the tendon. As a result, the tendon sheath thickens, gets inflamed, and you've got your problem.

"Tendonitis: an inflammation of a tendon. Repeated tensing of a tendon can cause inflammation. Eventually, the fibers of the tendon start separating, and can even break, leaving behind debris which induces more friction, more swelling, and more pain. Sub-acute tendonitis is more common, which entails a dull ache over the wrist and forearm, some tenderness, and it gets worse with repetitive activity.

"Carpal Tunnel Syndrome: the nerves that run through your wrist into your fingers get trapped by the inflamed muscles around them. Symptoms include feeling pins and needles, tingling, numbness, and even loss of sensation. CTS is often confused for a diffuse condition.

"Adverse Mechanical Tension: also known as 'neural tension', this is where the nerves running down to your arm have become contracted and possibly compressed as a result of muscle spasms in the shoulders and elsewhere. AMT can often be misdiagnosed as or associated with one of the other OOS (occupational overuse syndrome) disorders. It is largely reversible and can be treated with physiotherapy (brachial plexus stretches and trigger point therapy).

"Others: for just about every part of your body, there's a fancy name for a way to injure it. By now, you should be getting an idea of how OOS conditions occur and why. Just be careful: many inexperienced doctors misdiagnose problems as Carpal Tunnel Syndrome, when in reality, you may have a completely different problem. Always get a second opinion before somebody does something drastic to you (like surgery).

"Why does Occupational Overuse Syndrome occur? Here's the theory:

"Normally, your muscles and tendons get blood through capillaries which pass among the muscle fibers. When you tense a muscle, you restrict the blood flow. By the time you're exerting 50% of your full power, you're completely restricting your blood flow.

"Without fresh blood, your muscles use stored energy until they run out, then they switch to anaerobic (without oxygen) metabolism, which generates nasty by-products like lactic acid, which cause pain.

"Once one muscle hurts, all its neighbors tense up, perhaps to relieve the load. This makes sense for your normal sort of injury, but it only makes things worse with repetitive motion. More tension means less blood flow, and the cycle continues. Another by-product of the lack of blood flow is tingling and numbness from your nerves. They need

blood too.

"Anyway, when you're typing too much, you're never really giving a change for the blood to get back where it belongs, because your muscles never relax enough to let the blood through. Stress, poor posture, and poor ergonomics, only make things worse.

"The most important element of both prevention and recovery is to reduce tension in the muscles and tendons. This requires learning how to relax. If you're under a load of stress, this is doubly important. Tune out the world and breath deep and regular. Relaxing should become a guiding principle in your work: every three minutes take a three second break. Every three minutes, take a three-second break. Really, do it every three minutes. It's also helpful to work in comfortable surroundings, calm down, and relax.

NOTES: Internet World Wide Web users will find this FAQ (Frequently Asked Questions sheet) available at:

<http://www.cis.ohio-state.edu/hyper-text/faq/usenet/typing-injury-faq/top.html> (Dan Wallach's page) <http://www.cs.princeton.edu/grad/dwallach/>). For other information, try <ftp.csua.berkeley.edu>, an extensive anonymous FTP archive, including the typing injury FAQ, alternative input device information (descriptions, reviews, and GIF images of alternative keyboards and mice), and some software. Maintained by Dan Wallach dwallach@cs.princeton.edu.





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Preventing and dealing with RSIs

The latest buzzword

Unless you've been living in the mountains for the past two years, chances are you've heard at least some of the fuss about repetitive strain injury in the workplace, and carpal tunnel syndrome in particular. It can affect almost anyone who performs the same repetitive manual tasks day-in and day-out who is not protected with supports or proper equipment. I saw the career of a capable rock guitarist destroyed in a summer of loading steel onto trucks. I've either seen first-hand or heard of it affecting everyone from workers in chicken-processing plants to robot arm operators.

The group probably most prone to repetitive strain injuries to the wrists and hands are computer workers, data entry clerks and typists. Injury usually results from holding your hands with the muscles tensed and the wrists bent backward while you type over a long period of time.

No palpable means of support



Strain to wrists, forearms and shoulders can also occur as a result of typing without proper support. Hunt-and-peck typists often suffer from stiffness in the upper back and shoulders. The only long-term solution is to retrain yourself to be a ten-finger typist so you can rely upon the wrist rest to support your arms rather than your back and shoulders.

Holistically speaking, if you try to deal with these problems as a preventive measure and you are not currently experiencing symptoms, chances are you will start having symptoms when you adopt proper support and technique. The most common symptom is irritability. This is not a sign that you're doing something wrong, but often a symptom of withdrawal. With less of a load to carry, your nervous system becomes more sensitive to other stimuli. Things which may not have bothered you much before may suddenly become intolerable. Unfortunately, this reaction doesn't fall under the scope of this report, so you'll have to find some way to diagnose and deal with it on your own.

Why RSI's occur



Why does RSI happen at all? You don't hear about professional pianists getting CTS, and they appear to break every rule in the book for healthy keyboard posture. The reason pianists seldom get CTS is because their hands, arms and shoulders don't remain in a fixed position for prolonged periods. The changing emotions in the music also change the way they use their muscles, and even which muscles they use.

In other words, pianists get a workout. What typists endure is torture in comparison. Less energy is required to press a computer key than a manual typewriter key, so rather than a tense-relax cycle each time you strike a key, the muscles get locked into a constant state of low-level tension that will ultimately try to make itself permanent. It's simply part of how our bodies adapt to stress and activity.

Low-cost, common-sense preventive treatment



Fortunately, a little common sense and some inexpensive accessories will virtually insure that you'll never suffer from carpal tunnel syndrome caused by your computer. The key lies in changing the wrist angle so that the wrist is either straight or breaks forward when typing, or to relax the forearm and reduce tension in the area surrounding the critical nerve bundles.

Changing the wrist angle can be as simple as retraining yourself to hold your hands higher off the desk as you type. But if the heels of your hands are not supported, you create a condition of prolonged tension in upper torso muscles. Depending on your physiology and response to stress, this could cause cramping or stiffness under the arms, between the shoulder blades, in the upper back, in the arms themselves or in all these locations.

This will not go away until the problem is solved, If symptoms appear to be reduced after a time, it may be because the muscles have permanently locked themselves into position. You'll often experience a warning that this is about to happen in the form of mild electric shocks or stabs, coldness, slight pain or numbness in the associated area. Once the muscles lock, physiotherapy may be the only way to unlock them, and it will probably be a painful process as blood starts to flow again into suffocated tissues.





Workspace tips

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Keyboard ergonomics

Covering the angles



Changing your wrist angle shouldn't require retraining your muscles. Instead it can be accomplished through changing the position of the keyboard or adding support to it. Ideal keyboard height is as low to the lap as possible. The angle between your shoulder and wrist should be greater than 90 degrees for optimum comfort and endurance.

Some people prefer a low chair and a high desktop for handwriting and reading. Setting the keyboard on the desk in this situation is a recipe for stiff muscles and a set-up for CTS. If the chair can't be raised far enough to create a large enough wrist/shoulder angle, an under-desk keyboard drawer should be installed. Some desks can be lowered by removing their casters; I've done this to my desk at home.

Keyboard drawers should be deep enough to accommodate the keyboard with three inches to spare. This extra three inches will be needed by the wrist rest, which I'll discuss in a moment. They should also be wide enough to hold both the keyboard and a mouse pad.

Getting a rise from your keyboard?



Most computer keyboard have riser or elevator tabs on them which allow the back to be raised. This sets the keyboard on an angle, giving it a feel more like that of a manual typewriter. These tabs can be folded back into the keyboard, and this could reduce wrist break by just enough to make the difference between safety and pain.

(I have a confession to make at this point. I've been computing for more than two years with the riser tabs opened out. As I was writing, I decided to see how it would feel to type without them. I was surprised by what I discovered. Instantly I found myself relying much more upon the wrist rest for support, which can only be a good thing. After a few minutes of adjustment my typing speed and familiarity with my desktop is back to normal. While this is just my own personal experience, this extra reliance upon the wrist rest is enough to make me wonder whether all computer keyboards shouldn't be used with the riser tabs folded away. Any change in keyboard position will require a short period of adjustment, and your computing may feel cramped for anywhere from a day to a week, but it's still better than not changing a stressful posture.)





Workspace tips

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Wrist rests

Mandatory equipment for all typists



Virtually every computer user who types with more than two fingers can and should use a wrist rest. A wrist rest is a pad or platform which butts onto the front edge of your keyboard and provides support for the heels of your hands while you type. This support relieves stress to wrists, shoulders and upper back, and forces your wrists to bend at a more natural angle while typing.

No more than two years ago, wrist rests were boutique items costing up to \$60 each. Today you can find them in almost every computer shop or department store at prices as low as \$3. At that price there's no excuse for not having one for every computer in the office, and your home system as well. Even computer manufacturers have gotten into the act; some keyboards, computer desks and notebook computers come with wrist rests designed right in.

You might not need a wrist rest



One- and two-finger hunt-and-peck typists probably don't need wrist rests, mainly the wrists break forward naturally when you type in this fashion, but as we'll see later, this style of typing has drawbacks of its own.

There are two main types of wrist rests: padded and hard platform. Which one you should choose depends upon your biochemical physiology more than your muscular makeup. If you're the type who gets a lot of rashes, sweat rashes in particular, stay away from hard plastic or steel wrist rests,. Even padded rests upholstered in vinyl or leather will probably be unsuitable. The cheap foam-rubber variety with the fabric surface will probably be more comfortable during long typing sessions. If you're more prone to eczema, dry skin and itching, a smooth, hard surface will probably be more comfortable, although it won't provide the same degree of balanced support offered by a padded wrist rest.

Two pads are often better than one



In cases where pain has already begun to appear in the wrists and hands, one wrist rest may not be enough. You might have to choose one of the pre-cut foam pads instead of the leather-covered tray-type rests and stack two of them on top of each other, or rig up some extra elevation on an existing wrist rest until your wrists bend far enough forward that you can type without discomfort.





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Elbow rests

The more support the better



Wrist rests simply aren't enough for many people. This will be particularly noticeable if a person using a wrist rest, or pair of stacked wrist rest pads, finds that the heels of their hands chafe while using the keyboard.

This chafing is nearly always a sign of overwork, but it can have other meanings as well. Skin sensitivity (which could in turn have a number of other causes) may also play a role. But until the root cause of the problem is dealt with, management of the irritation is critical. This chafing will prompt the typist to raise their hands off the wrist rest in an attempt to avoid irritation, causing stress to shoulder and back muscles.

In order to reduce the total level of stress, it's important to take pressure off the wrists. The best way to do that is to distribute some of the pressure to the elbows and forearms by giving them something to rest on.

Probably the best solution is a suitable desk chair. This chair should not merely have armrests, although that will do in a pinch, but adjustable armrests. Preferably the armrests should not merely move up and down to correspond with the natural height of the typist's elbows, but slant inward somewhat across the typist's lap.

Forced by the hardware into bad posture



Watch a typist working at a desk without elbow or forearm support and you can see how this works. Standard typewriter keyboards tend to pull one's elbows in toward the waist. For women in particular, this causes the elbows to be pulled tightly in toward the waist, well away from the support offered by standard armrests. This effect is not quite as pronounced with ergonomic keyboard designs, but it is still visible. The natural tendency is to pull one's arms in away from the armrests. Only an armrest design which slants inward over the lap will properly compensate for this effect. Ideally it should be positioned so that the armrests rise up just high enough to take the desired level of pressure off the heels of the hands, and slanted in far enough to allow for the hands to address the keyboard as naturally as possible.

These chairs are not cheap either, but once again they can be considered a lifetime purchase, and an investment in the health and well-being of the employee.

Any port in a gathering storm



A good second alternative is the use of unnatural support as an interim or temporary solution. Any chair with armrests that do not rise beyond the height of the desk is suitable for support. Since most keyboards are still positioned an inch or two higher than the ideal height, and most armrests provide the same excess height, a chair with armrests can be added to the workspace to match the desk height. The armrests will probably be positioned well away from the body as well. The typist will have to swing their arms out to set them on the armrests and this will result in a highly unnatural address angle to standard keyboards and even most ergonomic keyboards as well. This is not good for long-term use, but it does allow the typist a choice of two postures which can be alternated to spread the overall stress load and reduce the potential for long-term injury until a long-term solution is affordable.

Rolling your own supports



A cheap substitute for a proper ergonomically-designed steno chair can be rigged using a standard metal office chair with armrests. First, the wooden slats can be replaced with 3/4 plywood slats three to five inches in width (the smaller the typist, the wider the slats) which are bolted so that the excess width closes in on the typist's waist. Wrapping the wooden slats with several thicknesses of terry cloth towelling will provide fairly natural and comfortable padding. A keyboard tray can then be attached with a swing-out arm or removable hinge to the front of the chair to provide the correct keyboard height in relation to the armrest height. An inch or two of stiff foam can be added to the seat itself to bring the typist up to a proper height, and a footrest can be added for proper posture. All this guy-rigging will not be pretty, but it works, and it's a lot cheaper than a \$300-600 ergonomically correct steno chair.



Sadly, I do not foresee prices on quality chair designs dropping until demand rises considerably above current levels, meaning that a great many typists may have to resort to this homemade solution for short- to medium-term relief.





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Relaxation: the best prevention

Some people just aren't cut out for this



It's been my experience that relaxed typists don't suffer from typing ailments nearly as much as high-strung typists. (High-strung people probably aren't suited to clerical, data-entry and terminal-intensive work in the first place, but that's another story.) Typing under stress will magnify the effects of any improper keyboard posture or lack of support. If stress overload is a chronic condition with you, as it is with a large number of people, it is doubly important that you protect yourself with proper supports.

You can coax a little extra relaxation out of your hands and wrists by engaging in sports or games that use these muscles on a regular basis. It could be anything from table tennis to rock climbing to a couple of minutes of wrist curls with a dumbbell a couple of times a day at the office. This will have another unusual side effect at first: as your wrists and hands begin to relax, your typing speed will actually drop. It might even plummet. Once again, this is nothing to be concerned about. It's a side effect of your body's adaptation to using different muscles, or just *less* muscle, for a job that used to be more demanding. Stimulating yourself with music or conversation with coworkers will help to distract your consciousness and give your muscles more freedom to re-learn healthy typing posture.

An investment that pays off in many ways



A note to employers: if you're concerned by this talk about reduced performance when adopting healthy typing posture, be aware that this temporary reduction in job performance will be more than compensated over the long term. Healthy typing posture actually allows for increased typing speed once the muscles are retrained. I'm an exceptional case, but my typing speed dropped from 40 to 50 words per minute to under 20 when I first changed my keyboard posture. Today it sits at about 60 to 80wpm. I've been typing since I was ten, so this improvement was not a natural result of experience. And for the first time in my life, I don't need to look at the keyboard.





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Alternative input devices

Ergonomically designed keyboards



One of the most marked side effects of my increased typing speed is how it has changed my perception of the keyboard. I now find standard computer keyboards quite ungainly. I've been looking long and lovingly at the new ergonomically designed keyboards from Microsoft, Apple and others. If I did not have two fingers missing on my right hand, I'd probably own one of these new keyboards right now.

You've probably seen one or the other. The new Apple/Microsoft keyboards use a split-keyboard design which decreases stress by placing the keys in a more natural position in relation to your hands. I have become an ardent supporter of these devices for any ten-finger typist (or would-be ten-finger typist) who does depends upon a keyboard for their livelihood. There are custom keyboard and data entry units available in a variety of shapes, sizes and prices. The best mid-priced unit I've seen is the Ergo-Key, a keyboard that tilts the two halves of the keyboard up into an inverse V.

Once you get used to the unusual layout of the keys, the feel of these alternative input devices is extremely comfortable and over the long term actually contributes to improved typing speed. At about \$130 for the Microsoft keyboard to \$300 for the Ergo-Key to over \$1,000 for some custom-made input devices, these keyboards are not cheap. But if they are well-maintained they are a lifetime investment that will pay off handsomely in terms of reduced pain and irritation and increased efficiency.

A wish for kindness



At the very least, I'd like to see these offered to employees who use standard-type DIN-connector computer terminals on an employee purchase plan. At best, I'd like to see custom-built keyboards offered on a buy-back arrangement to all employees who use a keyboard more than two hours a day, so that the employee can purchase their custom keyboard at its depreciated value and take it with them if they decide to leave the company.

These items used to be reserved for paraplegics and those handicapped by other injuries, but some of these suppliers are discovering that their clientele are more and more frequently victims of RSI's who must have access to their computers. As of late 1992, a fact sheet and price list was published by Dan Wallach for those interested in alternative input devices. The file, typing-injury-faq/keyboards, can be requested through SOREHAND@UCSFVM.earn.

For more information...



For additional information, you can also seek out Don Sellers' *Zap! How Your Computer Can Hurt You--And What You Can Do About It* from Peachpit Press, Inc., 1994. ISBN 1-55609-021-0. His email address is dsellers@netcom.com. Emil Pascarelli and Deborah Quilter wrote *Repetitive Strain Injury, a Computer User's Guide*, published by John Wiley Sons, ISBN 0-471-59533-0. You can also look for Stephanie Brown's, *Preventing Computer Injury: The Hand*

Book from Ergonome, ISBN 1-884388-01-9. A free packet of information is also available from the US Government. Ask for: *Carpal Tunnel Syndrome Selected References* (March 1989), NIOSH Publications Dissemination, 4676 Columbia Parkway, Cincinnati, Ohio 45226. Thanks to Dan Wallach for this information.





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Mouse ergonomics

Mouse rests? You've got to be kidding.



Yes, you heard me right, the mouse rest, and I confess that when I first heard about the idea I thought someone had taken the whole repetitive strain issue just a tad too far. I don't need one personally, but having observed the way many of my clients handle and hold a mouse, I'm beginning to understand the need for this product.

Many mouse pads now come with a raised wrist pad to prevent the wrist from breaking backward during use. I confess that I never once considered the possibility that it might have a purpose, but I know several users who swear by them.

Whether you should use one depends upon how you hold the mouse. As a long-time user, I've grown so comfortable with it that I drag a lot of my hand across the desk as I'm using my mouse. Most importantly, the heel of my mouse hand never rises off the desktop. My wrist doesn't break. I have no personal need for a mouse rest.

More important than many users realize



Not so with many less-experienced users, particularly if they use a fabric-surfaced mouse pad. These pads make it rather uncomfortable to drag your hand along the desktop while you use the mouse, so many users get into the habit of resting the heel of their hand on the pad and breaking their wrist sharply backward as they use the mouse.

Some employers, usually for rather trivial reasons, insist upon the use of a mouse pad. I've never liked them and never used them for more than short periods. I much prefer moving the mouse over a hard, smooth desk surface, or even over a cardboard sheet used as a coaster. My favorite mouse pads are the smooth, Teflon-coated variety. Setting the mouse on a hard, smooth surface is the most natural way to use the mouse, and results in the least stressful grip. But if you must use a mouse pad, either use one with a mouse rest or rig up a makeshift wrist rest high enough to prevent your wrists from breaking backward. The Mouse Arena was one of the first devices to use a mouse rest, but it may not be nearly high enough for many people. In fact, none of the mouse rests I've seen offer enough elevation to provide proper wrist support for particularly high-strung users.

Trackballs demand more natural posture



If you use a desktop trackball instead of a mouse, you probably won't require support. You can lean into a trackball in a way you can't with a mouse, and this extra pressure eases the stress on tendons in the wrist. Pen mice offer a similar degree and type of strain relief.

Another way to reduce mouse stress is to choose the right mouse. Sicos and Microsoft build mice designed to support the hand and reduce strain. These mice are raised at the front so that the palm sits firmly on the body of the mouse. This reduces tension in the wrist. At the other extreme, I've tried fairly costly mice from Logitech and Dexxa which were almost torture to use for long periods. The Microsoft and Sicos mice at \$50 to \$100 at this writing, depending on the model, features and retailer, are two to four times costlier than generic replacement mice, but they are also such a joy to use that ordinary mice feel clumsy and uncomfortable in

comparison. Both are sold retail in right-handed models; both can be special-ordered for lefties.

An irritation your muscles actually like



Shifting back and forth between mouse and keyboard can be irritating for creative or detailed work where concentration is critical. But this movement helps spread the workload among the muscles. One problem I suffered at a time when I was heavily dependent upon the mouse was a condition called mouse shoulder.

The fine movements required by the mouse require relaxation. If you have not participated in physical activity recently, this fine movement can make other muscles in the areas affected feel jumpy, twitchy or even spasmodic. If they're not exercised, they'll eventually lock into a cramped position in order to permit the necessary fine movements. This cramping ultimately results in pain, and setting the mouse aside for a few days while the muscles unwind seems to be the best way to handle the problem. Fortunately I know of no cases where this problem was nearly as severe as carpal tunnel syndrome, but it is something to watch for if you use the mouse a lot or play a lot of mouse-driven games. Excessive joystick use can result in similar problems. Ask anyone who's ever stayed up all night with Flight Simulator, Doom or Wolfenstein.





Monitor stress

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Effects of monitor stress

It's not just the eyes that suffer



Anything that stresses the eyes or the visual cortex of the brain will have repercussions on the entire nervous system. The problem with nervous system complaints is that they're damnably difficult to trace back to the source. If you have unusually good eyes, monitor stress might not manifest itself in the eyes or even the head. It might show up as diarrhea or hypersensitive skin, increased irritability or hostility, or even an unnatural feeling of strength or weakness.

The difficulty in tracing these complaints often results in nothing being done to improve the environment until the exact cause of the problem can be isolated. That creates another dilemma: most nervous complaints have a root cause plus several environmental triggers. Eliminating one environmental trigger may reduce symptoms below the conscious level, but if the root cause is untreated they'll reappear later, leading you to believe you've done nothing at all to help the problem when in fact you have.

A dangerous and insensitive attitude



This is a dangerous and insensitive attitude. In actual fact, eliminating one stressor will have a definite positive effect. It buys time for the body to heal or build up defenses, or simply a few weeks or months of reduced symptoms.

Even if symptoms do come back, they won't be as severe as they would have been with the extra stressor. Anything you can do to remove or prevent negative stress is worthwhile. In your creative department, it often means providing staff with the highest performance they can comfortably handle so that boredom and waiting don't result in mistakes and frustration. In all departments, it means providing the safest, most natural work environment your budget can support.

It's time that more employers began looking at workplace stress from an economic standpoint, not through the lens of personal work ethics or tradition. A small change that reduces stress by one percent should result in an average of a little more than one fewer sick day per employee per year. If this reduction requires replacement of every monitor in the office with low-radiation units and provision of electromagnetic shielding devices for every employee at a total cost of \$400 per person, the investment will be fully repaid in less than two years based on a lost-productivity value of \$20 per hour.





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Eliminating glare with filters and screens

Fabric mesh glare screens: only for the desperate



Let's start with the painfully obvious. Take your expensive \$30 fiber mesh glare screen and toss it. They provide only the barest reduction in glare, and they also add stress to your view. These fibers are supposed to be woven so finely that you can't actually see them. In a way, that's true...you don't see them consciously. But they do register on your visual cortex. Fabric glare screens also have a slight fuzzing effect on the image that reaches your eyes.

Filtering out unwanted visual information takes energy. It's a negative stressor in this case since our bodies are not yet genetically adapted to appreciate this kind of visual input. Although it might seem minor, glare screen distortion is something you can usually do without or work around. Polarized screens made of plastic or glass are better than fiber mesh, but they may still not be enough. Test carefully before buying.

Non-glare screens: usually a disappointment

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;microscp.bmp}Non-glare screens are supposed to eliminate the need for glare filters, but as most owners will tell you, they're usually a disappointment. These screens are burnished by grinding which removes the gloss, but this grinding is also visible at a subconscious level as tiny grains of sand, or in the case of bad grinding jobs, as very fine streaks.

A newer generation of glare filters are actually beginning to do a reasonable job at a reasonable price. Many office supply stores now carry polarized glass filters which actually reduce glare and emissions. They use the same polarization used in sunglasses as a way to reduce glare, and radiation reduction is generally achieved by adding lead to the glass, just like lead-glass crystal. At this writing, the polarized glass screens range from \$35-50 and the same models with leaded glass from \$70-100. It's still not cheap, but it's considerably less than they sold for no more than two years ago.





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Eliminating glare with common sense

Rearranging the furniture



Reflected light is usually most visible on the top half of the screen because that's where the screen's curvature catches the glow of office lighting and reflected sunlight. Much of this glare can be reduced by lowering the height of the monitor or changing its angle. There's nothing wrong, relatively speaking, with raising the back of the monitor so that it tilts downward toward the desk, particularly if it alters the glare angle enough to kill reflected light. In most cases, a downward tilt on the monitor and a makeshift hood of paper, cardboard or sheet plastic will put an end to reflective glare.

Generally speaking, the fewer layers of filtration you can put between your eyes and the computer screen, the better. You can't escape the fact that there's a layer of glass (or, on a laptop, plastic) between you and the screen surface, but you can usually reduce or eliminate unnecessary glare without adding extra barriers.

Ideal lighting positions and conditions

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The ideal position for lighting either a home or office workspace is behind and above the user and out of the field of vision.

Unfortunately, most people have wide enough peripheral vision that anything other than ceiling-mounted fixtures will create glare. The ideal light source is natural, through a skylight or window. Windows should be ceiling-mounted or north-facing so that direct sunlight is not a problem, but this isn't possible if the south-facing high-rise across the street is covered in glass.

If you're lighting from a single source, you'll often get shadows which result in high-contrast areas in your field of vision. These shadows can be reduced with a second light source or through the use of fluorescent tubes if you don't mind the flicker, but they will add a second possible source of glare.





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Flicker: what it is and what to do about it

Not something the average user notices



Most color monitor screens flicker at a rate of 35 times per second. If you've ever noticed the way TV screens and monitors flicker when they're shown on film or videotape, you've seen how this works. This flicker is yet another stressor. Unfortunately, there's no way to eliminate it with today's monitor technology, so how you deal with it depends upon which side effects you find most tolerable.

If you're relaxed, overworked or part of a creative profession, at some point you'll become acutely aware of this flicker. Visible flicker is caused by a low-speed (and lower-cost) electron gun that only redraws the screen about 35 times per second. (Actually the screen is painted 70 times per second. The flicker comes from the gun painting every other line on each pass.) This is called interlacing. It's supposed to happen faster than the human eye can detect, but an individual's optical sensitivity changes from moment to moment. Creative people seem to spot flicker instantly in any monitor; high-strung people tend to notice it more when they look at the screen out the corners of their eyes; most people seem to see it most vividly under dim fluorescent lighting.

An often unnecessary irritation



The flicker itself is a sensory irritant as much as a direct nervous stressor. If the screen flashed at a rate of six to twelve times per second, it would probably put you to sleep, because that's your brainwave rate in relaxation and sleep. Flashing light at rates from 14 to 21 cycles per second tends to produce an increase in alertness. As the vibration rate rises beyond the rate of normal human alertness, people tend to feel a sort of unfocussed irritation. At 35 cycles per second, subtle brain functions can be affected. These effects are generally not felt consciously since the effects do not take place at a level anyone but a yoga master might notice. Still, if achievement of higher consciousness is a priority in your life, it's probably wise to avoid computer monitors and TV screens and stick with passive laptop screens which don't flicker at all.

Who will appreciate non-interlaced displays

Those most bothered by flicker tend to be people who work in creative professions, where any unnatural stimulus is unwelcome; or graphic arts, where there is intense visual focus on small screen details. It's safe to say that a non-interlaced monitor that paints the screen 60 to 70 times per second is an excellent investment for anyone needing minimal external stimulation. At this writing, non-interlaced monitors are generally \$50 to \$100 more than comparable interlaced monitors.



NOTE: Most amber monochrome (non-color) screens flicker at a rate of 60 to 70 cycles per second and are not nearly as stressful as inexpensive color monitors.



I also advise non-interlaced monitors for parents, since children may be more susceptible to the neurological effects of screen flicker at 35 cycles per second (cps).

Many people with non-interlaced monitors are not getting the performance they paid for. You can't just plug most non-interlaced monitors into your existing setup and expect the flicker to disappear. You may also have to adjust the graphics adapter card which attaches your monitor to the motherboard of your computer. There's often a little jumper or switch on these cards, shown in the card's manual, which changes your card to allow the monitor to operate in non-interlaced mode.

Other changes might be needed



Newer monitors may require that you run a piece of software which configures the graphics adapter card for non-interlaced operation. You may have to change your video drivers for Windows as well, particularly if you've been using the high-color drivers offering 65,000 or 16 million colors, because the video adapter card may not support non-interlaced operation at these higher color levels. Also be aware that some older VGA adapters do not support non-interlaced monitors at all, meaning you'll have to replace the card to get a non-interlaced display from your monitor.

There may also be a performance tradeoff as well. Since the card is working twice as hard to send data to the screen, you may notice significant speed reductions in some graphics operations when you switch to non-interlaced mode. In general I recommend upgrading the graphics adapter card than to go back to normal interlaced operation, particularly if you work in a creative profession.





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Fluorescent lighting and flicker

Two light sources at war with your nerves



There's another type of flicker almost no one in the field ever discusses. In most offices, lighting is supplied by fluorescent tubes. These tubes flicker sixty times per second as the current alternates from positive to negative. Some monitors, particularly older multisync models, flicker at the same 60-cycle rate, but most flicker at a different rate, usually 70 cps. Like two sets of ripples on a pond, the two waves cancel each other out or amplify each other as the ON and OFF peaks in their cycles meet each other. Twice every second you'll get a cycle with almost no flicker, and just as often you'll get a flicker which is about twice as intense. I haven't yet met the person whose eyes were so sharp that they could actually see this happening, but it is a very real phenomenon.

Your eyes may not notice flicker unless the environment is right, just as your ears won't notice the 60-cycle hum of a poorly-grounded radio until there's a break in the music. Imagine this hum with two loud ticks every second and you have an idea of the interference effect of working at a computer screen under fluorescent lighting.

I have observed that monitor flicker tends to be more noticeable under fluorescent lighting than under incandescents or halogens. Incandescent bulbs use a white-hot filament of metal to create light, Fluorescent tubes create light by applying an electrical charge to gases in the tube. Halogen lamps use both a filament and gas. The solid metal filaments in incandescent and halogen lamps don't heat and cool rapidly enough between pulses of current to cause a visible flicker, so they are considered to be flicker-free light sources.

Not a guaranteed fix



Changing from fluorescent to incandescent or halogen lighting in a sensitive computing environment won't eliminate screen flicker, but it can significantly reduce the degree to which it is noticed. Halogen bulbs tend to be much costlier than incandescent bulbs, but they also tend to last longer and produce more light from less energy.





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Screen sway

Dazzling...but not in a friendly way



Screen sway is visible as a mild to severe, rapidly vibrating screen image. It is generally found with inexpensive monitors or older monitors which have had a lot of use, and it's caused by electromagnetic interference. It's usually an intermittent problem but in severe cases it can be constant.

The interference itself usually emanates from a strong, poorly shielded power supply. The culprit could be the power supply transformer in the computer; the transformer in the monitor; the motor in a forklift, refrigerator or air conditioner; even the microwave oven in the lunchroom.

The only reliable method of tracing the problem

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;holmes.bmp}The only reliable way to trace the source of the interference is through trial and error, and the only reason to trace it is if several monitors are swaying at the same time on the same site. If only one monitor is experiencing sway, exchanging it with another monitor from a different office or site may cause the sway to disappear and prevent the need to purchase another monitor, at least temporarily. But if a geographical cure doesn't solve the problem, the monitor should be replaced immediately.

Screen sway is a serious optical stressor. Our eyes will try to dart back and forth with the screen, whether we want them to or not, in an effort to keep up with the movement of the image. The only relief from the irritation this produces comes with exhaustion, which is preceded by severe eyestrain, dizziness, and possibly double vision, headache and general irritability.

Not a problem to be taken lightly



I've seen far too many users take screen sway lightly. Momentary sway which only occurs for a second or two when a nearby motor switches on might disrupt a user's concentration for a moment, but constant sway is torture. I left one jobsite literally in tears at the end of each day after working on a monitor which swayed about a quarter of an inch for fifteen minutes out of the hour.





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Flyback wear: a very serious problem

A potential problem, especially with older monitors



This may be the most dangerous problem on any monitor...and perhaps the most common. Over time, circuits in any CRT device (monitor or TV) wear out. If nothing else dies first, the flyback will eventually collapse the image to a tiny dot or line in the center of the screen as the monitor says a final farewell.

Don't hesitate for one second before servicing (or, ideally, replacing) a monitor on which the display is shrinking vertically, horizontally or all around. Worn flybacks may be the number one cause of increased radio emissions from monitors, and these emissions can include large amounts of cancer-causing x-rays. According to a technician I met in Ontario, intermittent flyback failures on a worn TV or monitor are accompanied by large momentary bursts of x-rays. Some sensitive people even claim to be able to feel these bursts physically or experience bizarre visual effects. Even brief exposure to x-radiation can damage living tissue.

Emission levels rise with age

A flyback doesn't need to be worn out to emit higher than allowable levels of radiation. There are standards governing the level of x-radiation and radio emissions allowable from a new monitor. But like carbon monoxide emissions on cars, these levels change with use...almost always for the worse. This same technician also told me that almost every TV that came into his repair shop was over the legal line for emissions, and flyback maladjustment was the prime cause. Yearly adjustments help (if you can find a technician willing or able to do them) but they're no cure.

Fortunately, newer monitors use resistors which are designed to burn out before the flyback can actually get worn enough to produce this kind of problem, but when in doubt, err on the side of safety.

The best cure is prevention



The best solution at this time is to prevent emissions in the first place by purchasing a monitor conforming to stringent Swedish government standards for allowable emissions. These monitors leave the factory less toxic than standard monitors, and will probably continue to produce lower than normal emissions even when they're out of tune. TVM literally built their market presence in North America by marketing the first full line of affordable low-radiation monitors. Today almost every manufacturer produces low-rad versions of all of its most popular units.

It's easy to dismiss this as no big deal. After all, you don't see a lot of people demanding a change in standards or mandatory annual monitor tests. Then again, you don't see a lot of mechanics wearing face masks when they blow the dust out of your brakes either, even though that dust is probably asbestos. And you don't usually see mandatory auto emissions testing until the area considering the legislation has smog thick enough to serve on a plate.





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Screen type, size and dot pitch



Monitor screens come in three major types: dot-pitched, continuous phosphor and liquid-crystal display (LCD). There are others, such as plasma and rear-projection, but these are the three most common.

How monitor screens are laid out

Color monitor screens are usually made up of tens of thousands of circular dots. Hybrid dot screens such as the Sony Trinitron, Toshiba Blackstripe and RCA tubes use rectangular screen divisions rather than dots. If you look closely at these screens, you'll see that they're made up of interwoven rectangles rather than dots. These tubes are much more pleasing to the eye and provide a more accurate picture than dot screens, but they're also considerably more expensive. Sony is by far the most common and respected maker of hybrid color monitors, and their prices reflect that. A hybrid monitor is worth the investment for anyone who uses their computer for extended periods, especially for graphics-intensive work such as desktop publishing.

Dot screens come in various sizes, usually ranging from 14 diagonal to 19. (The latter are much costlier than 14 and 15 screens, and high-end graphics monitors of up to 30 diagonal can be purchased for prices starting in the thousands of dollars.)

The dots themselves come in various sizes, and generally speaking the smaller the dot size the better. When VGA monitors burst onto the scene a few years back, the dots were usually .39mm to .42mm in diameter. Today's standard is .28mm, and you shouldn't settle for anything less...or, rather, more. The smaller the dot, the sharper the picture...sort of.

Adjusting sharpness



You see, the way the monitor is adjusted plays a role in picture sharpness. Many monitors come with a sharpness dial on the back. Ideally this control should be set for maximum sharpness but a lot of people don't like this effect, particularly when running Windows in VGA mode. The screen fonts and graphics appear much more jagged and the dot pattern on the screen surface is much more visible on a screen with sharpness at optimum. This is an esthetic problem, and softening the screen to give it a more pleasing effect actually degrades picture quality. A sharp picture is also better for your eyes, and better for your psyche as well. Regardless of how irritating crisp pixels might look, our bodies always prefer a sharp, real image to one which has been artificially altered for esthetics.

I discovered this for myself a year or so ago when shopping for a monitor. I found that I had a distinct preference for LCD laptop screens, where each graphical software pixel is represented by its own clearly-defined liquid crystal and no dots distort the image in any way. Regrettably, I have not been able to find an LCD screen for my home computer.

In the end, it's up to you whether you prefer the soft illusion of sharpness created by a slightly fuzzy image or the sharp reality of jagged pixel images on a crisp display.

The size of your monitor depends on your pocketbook. If space is not a problem, my usual recommendation is to purchase the largest screen you can afford. A 17" monitor with a dot pitch (dot size) of .28mm will have more dots per inch than a 14 monitor with the same dot

pitch, resulting in less total distortion of the screen image.

If it's too intense, move back!



If working too close to a large screen overwhelms you, move it back on the desk...if you can. Some workspaces require that the monitor be fairly close to your face, and in these situations I usually advise a smaller screen or even a laptop. Select monitor size according to the level of comfort you feel when reading the smallest text you're likely to need. DOS text is generally always the same size. Windows icon descriptions and cue card text are about the smallest text you'll see in Windows.

Continuous-phosphor displays are found on monochrome monitors such as older amber or green-screen TTL's and on and VGA monochrome (black-and-white) units. The screen is fully coated with phosphor, not broken up into tiny circular or rectangular target frames. Framing isn't needed for the dots because there's only one electron gun. There's no problem with two or more color guns not aligning quite right and distorting the image.

For this reason, I and many others find a properly-adjusted monochrome screen much less stressful to work with for long periods of time. The old Macs with their small black-and-white screens, and Ataris with Goldstar monochrome monitors (these were also made for PC's and are highly recommended if you can find one) are legendary for comfort in marathon computing sessions.

Monochrome: less stressful than color



Monochrome screens also emit less radiation than color screens. Unfortunately, one very popular brand (Datatrain, made by Roland) has a history of being difficult to keep properly adjusted. The controls for screen size and sharpness are located inside the Datatrain VGA-mono's case, making it difficult for the user to adjust. Over time the image can get very fuzzy. It may also dim as the picture tube ages, and the image can even change its proportion or position on the screen. If you've noticed these problems on a Datatrain VGA monochrome, have it adjusted by someone who knows how to do the job. There are 600-volt currents inside monitor cases and the adjustments must be made with the power turned on. This is not a job for any but the most confident and sure-handed do-it-yourselfer, and even then thick rubber gloves are recommended. Adjusting and reassembling the monitor shouldn't take more than half an hour for a competent technician.

If you look closely at a monochrome screen, you'll see what appear to be lines of phosphor which extend from left to right across the screen with tiny black gaps between them. These lines are created by the electron gun, not carved into the screen itself. If you watch a technician fiddle with the monitor you'll see that the size and position of these lines can be changed. Dots on a color screen do not change in size or location.

Flat-screen tubes offer a more natural appearance



Flat-screen tubes are the latest rage in monitor ergonomics. The idea behind flat screens is to create a more natural focus on the screen itself. On a normal convex screen, the edges of the screen are often noticeably farther from your eye than the center. Ideally, the screen should be concave, so that all parts of the screen are the same distance from your eye. The flat screen is really a compromise. Flat-screen tubes are great for people who work primarily with graphics applications or for those who have a distinct taste for an accurate picture, and they can help reduce reflective glare because there's less chance of glare angle matching the reflection angle

of a light source. But from a health or stress standpoint, they have no real value. The human eye doesn't necessarily prefer to have everything it sees a fixed length from the eye. In fact, it prefers the positive stress of change and a variety of focal lengths.

LCD screens: the crispest (and dimmest) of all



Finally, there's the LCD screen found on all but the costliest laptops and notebooks. Most newer models are lit from behind the actual screen, leading you to believe they're fundamentally different in concept from an LCD screen. They aren't. If you look at a laptop screen from a sharp angle, you'll see the contents of the screen shift to what looks like a photographic negative image. This is the same effect you get from an LCD watch when you look at its display from the right angle.

The only light emitted from an LCD display comes from the illumination which occurs behind the screen, and it's provided by a low-power lamp, not a cathode ray tube. The screen itself is usually divided into small squares, or liquid crystals, which are supposed to match the size of a single screen pixel in VGA graphics mode. Because these screens don't rely on light to define the image, they don't suffer from sharpness problems associated with tube monitors. The relatively low intensity of the back lighting seldom results in excessive contrast which can lead to eyestrain. In fact, the reverse is true. They can be horribly difficult to see properly in any environment receiving a lot of direct sunlight.



LCD screens aren't nearly as pretty as CRT screens (passive color displays in particular tend to look washed out), and they are very fragile. But they do offer the greatest sharpness of any display type and the lowest overall level of user stress. What they lack is the ability to use higher graphics resolutions than standard VGA...and a reasonable price. Until recently, color LCD screens prohibitively expensive for most users.





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Screen resolution

A dot is a dot but a pixel can grow on you



There are many different levels of screen resolution, but there is one fairly standard type which has been in use since practically the birth of the personal computer: 640x480. This means that there are 640 divisions from left to right and 480 from top to bottom, regardless of how many dots the screen may have. Primitive graphics schemes such as Hercules and CGA had high-resolution modes with approximately the same number of pixels (the difference was that they allowed fewer color choices for individual pixels), and even non-graphical monochrome screens display text at about this degree of resolution.

There is a great deal of confusion over the value of the newer SVGA and XGA resolutions, which allow for more than twice as many pixels on the screen. What most first-time buyers don't realize is that when Windows is run on a SVGA monitor in high-resolution mode, it doesn't result in a sharper picture. Instead, every graphical object (except screen fonts if the Large Fonts option is selected) appears smaller, including text fonts, icons, and window borders. This is because Windows maps icons and window graphics to be a specific number of pixels high and wide, regardless of how many pixels can be shown on the screen.

What higher resolution won't do



Higher resolutions won't take your jaggy screen fonts and add extra pixels to make them smoother, not unless you select a larger font size, which you can't always do. You can't select larger icons either; they all have a standard number of pixels.

So rather than having a sharper picture with clearer fonts and graphics, as you'd probably expect from super-VGA, you get more screen to work with and everything reduced in size. This size reduction prompts a lot of people to opt for large, expensive 17 SVGA screens just to get the same degree of object visibility they had on an old 12" to 14" VGA.

A VGA monitor with a .28mm dot pitch will look pretty much the same as the same-sized .28mm SVGA monitor when both monitors are running in VGA graphics mode. So why bother with SVGA at all? What SVGA will give you is better graphic quality for desktop publishing, artwork and photo retouching, compatibility with the latest games, and better control and color for graphics and multimedia software.

Virtually all new monitors and adapter cards support SVGA



If you use your computer mainly for word processing, spreadsheets, databases and other non-graphical applications, you probably don't need SVGA. It's hard to find color monitors today which don't support SVGA, but you could save yourself an upgrade someone might have told you that you needed.

In general, there's no reason to change Windows from its standard VGA mode unless you want improved graphics resolution for animation, real-time video, actual graphic images, or a larger screen area to work with. If you're using an older EGA, CGA or Hercules monochrome monitor, you should be able to get something close to VGA's level of detail in all these modes, but there will be fewer color options available.

Higher screen resolution and more colors will also reduce the speed of your graphics display. An extra half-second wait for screens to redraw on an old, low-memory VGA card might seem like a nit-picky complaint, but when that wait occurs a hundred times a day or more, as it does with serious Windows use, it becomes a frustration that can usually be dealt with quite inexpensively by upgrading only your video card. Consult with a reputable hardware dealer before making any decisions, though.





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Screen brightness

Not such a brilliant idea



I've often wondered why some people crank up the brightness on their screens even when they have no visual problems. When I got my answer, I started to worry about people who prefer a bright screen.

Although it's by no means an accurate diagnostic indicator, it appears to me that those who prefer a bright screen tend to be overstressed, Type A personalities who prefer being bombarded with sensation over a relaxed work environment. Long-term exposure to a too-bright screen is harmful to the eyes and nervous system, and just as addictive as any other artificial sensory stimulant. These people may have weekend withdrawal symptoms and not even know it. People with this preference may not be suited to computer work at all; they may be more suited to positions which offer them greater social stimulation, which is a more natural stressor.

Brightness can boost emissions



It should go without saying that the brighter the screen, the more energy the monitor consumes and the higher the emission levels. I recommend the maximum level of brightness on any computer being used for long periods be no brighter than a piece of printed paper held next to the monitor. The optimum level of brightness for picture-tube screens is as dim as is comfortable while still being easily readable.

If you want a dramatic picture of how screen brightness relates to emissions levels, go to a store which sells the TVM line of monitors and ask to see one of these side-by-side with a same-size monitor which does not have TVM's low-radiation technology. (I suggest TVM since all of their consumer-level monitors employ low-radiation technology.) The TVM will look almost washed out compared to the other monitor, which may lead you to believe that it's an inferior picture. But if you view a nature scene on both screens, you may discover that the TVM's image looks a little less artificial than the image on a non-low-radiation monitor.

All monitors are missing elements of the spectrum



Neither is as pleasing as the real thing, because part of the brilliance of nature comes from ultraviolet and infrared light which are part of natural sunlight. We don't actually see these wavelengths, but if you flash a picture on a screen using the visible spectrum, from violet down to red; then flash the same picture with ultraviolet and infrared added in; many people claim to see a distinct difference in quality. Boosting brightness on the monitor may be a reflex action we take in order to get a more natural picture, but if so it's a futile response, because this degree of natural effect is something you can't get on a normal monitor.

Unless you're working with photographic images, you don't need a high-contrast, ultra-brilliant picture to do effective work. In fact, if you spend most of your day doing data entry, you may find your performance enhanced by using the dullest, dimmest picture you can stand. High contrast contributes to eyestrain just as surely as an overly-brilliant screen.





(ewc HLP256,HLP256_TILE,MAINMARK.BMP)

Gauging your level of monitor stress

A simple test



There's a good test to see how stressed your eyes and nervous system are. If you're relaxed and open, you'll be able to see the individual dots on the screen as you work. On monochrome monitors you'll see continuous lines. On laptop screens you'll see tiny squares. The higher your stress level, the less able you are to see them. Some people never see them, and some never lose sight of them. How often you see them is less important than whether you find yourself less able to see them than normal in certain situations.

For example, if you only see them at the end of the day, your job may actually be a stress-reducer for you, although as I'll explain below the opposite might also be true. If they disappear as the day progresses, you have a pretty good indicator that your job is taxing you in some way. If they come and go at various times of the day, you're fairly normal.

Nothing relaxes a body like exhaustion



There's a flip side to this which is worth noting. If you're extremely overstressed, you'll also be able to see these lines and dots more clearly. It's a trauma effect, the same sort of heightened level of awareness that occurs with soldiers in battle. It can often be difficult to tell whether heightened sensory awareness is a sign of relaxation or heightened stress, so be wary of making generalizations in regard to testing employees in this fashion. Even heightened productivity can be a sign of overstress.



When I first started working on this report, monitor-mounted copy holders were more common than wrist rests. They're a good idea...but maybe not for you. These copy holders are designed to reduce refocussing stress by placing the document to be transcribed or referred to on the same visual plane as the monitor screen, and the same distance from the eyes. They work wonderfully well for touch-typists; they're lousy for anyone who still has to look at the keyboard. If you're a hunt-and-peck typist, place your documents on the desk between the keyboard and the monitor. If necessary, move the monitor back to make room for the document. You'll probably find this a lot more productive than using a copy holder.





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Color your (virtual) world

Pleasing the eyes doesn't always please the body



Light text on a black screen is generally best for the eyes, but just about everyone is moving toward graphical, full-color video displays such as Windows, OS/2, Macintosh Finder and UNIX X-windows. The more light which emanates from the screen, the more radiation accompanies it.

Most, if not all, of these graphical operating systems include utilities for altering the colors of virtually every aspect of the workplace environment. It's usually worth doing, because the default screen color configuration usually includes a lot of white background. White uses more energy on a color screen than any other color, so changing this color will almost always reduce total emissions and lessen optical stress.

There are several schools of thought regarding which colors you should use to replace white. It would be simple enough to turn the screen image into a photographic negative, so that the screen was mostly black, but unfortunately it isn't always possible, and when it is, it doesn't always work. You may wish to experiment with various color schemes to see which provides you with the most pleasing look, the lowest total light output, and the least distortion of what you see on the screen.

Alternative color schemes



Microsoft Windows, the most popular of the graphical operating systems, comes packed with a wide range of alternate color schemes. Some are novelty items, some are useful for laptop computers, and all of them are highly configurable, often down to the last screen detail.

Choice of screen colors will have a subtle but definite psychological impact. Experiment with screen colors to see which suits you best at certain times of the day. You may wish to start the day with a mauve background to ease you out of your sleepiness, switch to green at mid-morning, and then to a reddish hue in the afternoon as a way of boosting your energy.

The Lüscher Color Test



If you'd like to learn more about the psychological implications of color, pick up a copy of The Lüscher Color Test by Dr. Max Lüscher at your local bookstore. There are software versions of the color test available, but the quality of those I've seen was so poor that I do not recommend them in place of the book.





Emissions

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Computer-related emissions

No straws here

"Everything causes cancer. What's one more thing?"



I don't think I'll ever forget hearing my father say those words as he butted his cigarette and hacked off another piece of pork chop. As long as I can't forget, I can't forgive either. This was the man I relied upon to teach me how to survive and prosper in the great Canadian jungle.

I don't believe in the straw that broke the camel's back, not when it comes to direct threats to the immune system. Anything that stresses natural immunity is a threat to your physical health. And make no mistake, whether it comes from sound waves emitted by tires on the highway or from microwaves emitted by the satellite dish on the roof of an office tower, intrusive radiation of any type is a negative stressor.

Before I go any further on this issue, it's important to distinguish between positive and negative stressors. Our bodies have evolved to manage, thrive, and even feed upon certain types of radiation. Our skin turns the sun's rays into vitamin D so we don't have to saddle our livers with the job as mammals with more body hair do. Sound waves resonate through our bodies and provide essential stimulation for a wide range of functions. Many believe we depend upon the electromagnetic radiation of the earth for a lot of our mental functions and instinctive reactions. The planet itself even emits a radiation which appears to resonate with our cells.

We may eventually thrive on "harmful" radiation



Humans as a species are infinitely capable of adaptation. Over the generations, we'll no doubt develop systems for coping, and eventually for thriving, on the energy we currently release in the form of radio waves, microwaves, and even emissions from nuclear waste. But at the present time our bodies aren't built to handle these things. So while the devices which create these emissions provide benefits in some areas of our lives, the emissions they produce create hazards in other areas. Denying these hazards is like saying there's a free lunch.

Since we've come too far and grown too dependent upon technology to shut it all down and go back to the land en masse, the only responsible course of action left to us is to protect ourselves against technology's hazards as they become known to us. Turning a blind eye, or waiting for tangible proof of risk in the form of illness in ourselves or a loved one, only passes the responsibility for damage control and cleanup on to future generations.

What I'm trying to say is that computer-related radiation is a problem here and now, and there are things we can do to minimize the damage.

Still in the dark ages



At this time our culture is still very much in the dark about these issues. Little has been said publicly about computer-related emissions, and the studies that the medical establishment insists upon before accepting any new idea as truth are so scarce that consciousness-raising on this issue currently requires a lot of salesmanship.

If you work in a large office, you might want to gather as much evidence as you can from different sources about EM, ELF, microwave and other forms of radiation, and lobby your employer to have the workplace swept for hot spots every six months or so by someone with the proper instruments. The more you can do to pinpoint and reduce sources of excessive radiation, the more long-term health benefits you'll reap. Healthy employees contribute to higher employee satisfaction ratings, which is almost always good business.





Emissions

(ewc_HLP256,HLP256_TILE,MAINMARK.BMP)

Scalar-wave ELF emissions

The radiation no one talks about



After years of working with relatively low-powered computers, I was a little bit hesitant to move up to the new 386/486 series. It wasn't the power of the chip that frightened me. It was what the chip did with its power. Central processing unit (CPU) chips eat up a lot of power for something a half-inch square and thinner than a fingernail. Some of that juice is wasted as radiant heat...most 386 chips need their own cooling fans just to dissipate this heat. But CPU chips also radiate in a different way, a way most people aren't even aware exists.

Our planet emits something called a scalar-wave electromagnetic pulse 6.14 times per second. This ELF vibration permeates everything around us, and it is actually part of us. Experiments in blocking this radiation resulted in immune system changes in both plants and animals. Adding the frequency back into the environment, even artificially, reversed the changes. Altering the frequency resulted in still more changes.

Unnatural scalars: a fact of modern life



You've probably guessed by now that CPU chips emit scalar-wave ELF emissions which are not in sync with the earth's natural emissions. So do computer power supplies. And transformers in video monitors. And a host of other electrical and electronic devices. In fact, the slightest signal changes in the 60-cycle electrical wave in your household electrical circuits will result in abnormal scalar-wave emissions.

All chips from the old Z-80's to today's Pentium and PowerPC chips produce a similar effect, albeit to differing degrees. In general, the more powerful the chip the stronger the radiation, and chips have been doubling in power every two years for the past twelve. To make matters worse, the cards and accessories included with today's PC's often use their own CPU chips, adding to the overall effect.

The result is one more invisible bird flipped at Mother Nature, and one more invisible stressor which most people won't take seriously until their kids or their neighbors start getting sick. The bad news is that everyone who uses a computer is exposed to this electromagnetic radiation. The good news is that technology exists today for negating its harmful effects, and this technology is a one-shot purchase.

Protection does not come cheap



The equalizer is that this is not a mass-market product yet, so volume hasn't brought costs down to reasonable levels. Right now, effective ELF shields cost between \$80 and \$250 per person, and larger units for a room or office cost upwards of \$500. In a few years they'll probably come down to the \$20-\$100 range and become standard computer accessories as demand drives up manufacturing volume and pays down the research and development costs.

I don't know for certain, but I believe one of these devices played a part in saving my life three years ago. At that time I suffered the greatest crisis of my adult life. Although I had an appetite, I was literally unable to eat more than small amounts of food for nearly three years

without severe physical discomfort.

A testimonial of sorts



I carried an ELF shielding device in the form of a wristwatch with me for two straight years, and the only physical illness I suffered during that period was viral pneumonia which was actually brought on by other stressors. In the two years previous, I had suffered a viral or bacterial infection at least once a season.

I damaged this device and could not afford to replace it for about a year, and in that time my stress level skyrocketed again. Within a week after replacing the device, I sank into a depression which was, in retrospect. Much more welcome than the wired state I had been in for the previous year. It was not at all the effect I expected, which leads me to believe that the device did not merely have a placebo effect.

I can't prove that the ELF shielding device contained in a wristwatch which I wore 24 hours a day was responsible in any way for preserving my health, but I strongly believe it was. I believe it so strongly that I recommend these devices to my clients, high cost be damned.





(ewc HLP256,HLP256_TILE,MAINMARK.BMP)

Medical foundation for ELF shielding

Some interesting test results



In tests conducted by Dr. Glen Rein at Stanford University Medical School, cell cultures exposed to abnormal ELF emissions showed hormonal activity that looked very much like the hormonal changes that go along with clinical depression. Depression is usually accompanied by reduced immune function. He also found that the use of a Teslar ELF shielding device (one of the first such devices created for the mass-market, and the device I used) in proximity to the test cultures reduced the absorption of depression-associated hormones by approximately 20 percent. It also boosted immune production by a whopping 76 to 134 percent. I believe these figures are too significant to be ignored, in spite of Dr. Rein's disfavor among his fellows in the medical community. Another frequently-quoted researcher is Anthony Scott-Morley.

Another frequently-quoted researcher is Anthony Scott-Morley. He discovered that ELF shielding devices seemed to be a great help to people who demonstrate a measurable stress response to computer terminal emissions. While his methods are not orthodox in medical terms, the same measuring devices he used in his research are now in use by consultants across North America to diagnose sick buildings.

World Health Organization concerns



Regardless of how you may feel about the researchers or the research, the fact remains that the World Health Organization clearly stated its concerns regarding ELF emissions more than a decade ago. Scalar-wave devices such as the Teslar watch, Cocoon and Pulsor, among others, have been shown to filter and counteract unnatural ELF emissions. They aren't cheap, but if they only provide a fraction of the benefits suggested by the results of Rein and Scott-Morley, they still represent one of the best employee health investments I have ever seen.

In Canada, Essentia Communications is my preferred source for the Teslar, Cocoon, Pulsor and other ELF shielding devices, and the only reliable supplier I know of. They can be reached by phone at (613)238-4437, by fax at (613) or by mail at 100 Bronson Ave., Suite 1001, Ottawa, ON K1R-6G8. Request information on specific products or types of products. They also have a selection of books and reports relating to office and computer ergonomics and environmental emissions.





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Reduced emissions and energy savings

Power down for added safety and savings



One way to reduce ELF emissions is to turn off computers -- as well as any other electronic devices -- when not in use. Turning your system on and off throughout the day will reduce the life of your hard disk and power supply, and probably other heat-sensitive components as well. Who cares? In five years, hard disks and motherboards lose 80 percent of their value. Even if they still have half their useful life left, the energy savings alone will make up for most of the remaining 20 percent, and the reduced emissions are almost pure gravy. My three-year-old TEAC hard disk has been turned on and off no fewer than ten times a day since I bought it, and it's still running smoothly with absolutely no errors.

Green PC



The new Green PC standard is a way of building reduced power consumption, and thus reduced emissions, directly into the hardware. Monitors conforming to this standard will turn off the video signal and cut power consumption after a short period of computer inactivity. Green computer circuit boards will also automatically reduce their power consumption after a period of inactivity. Both are excellent long-term investments thanks to the power savings, and the reduced emissions are, once again, gravy. Unfortunately, the green PC is not universal, so you'll have to ask for these features when you buy.

While we're on the subject, worn fluorescent tubes also emit x-rays. The grey spots where the fluorescent coating has been worn away are particularly hot. Some lighting experts recommend wrapping two inches of reusable lead tape around the glass at the ends of all fluorescent tubes, and I agree with them. (Any fluorescent tube which has begun to flicker should be replaced immediately.) Ballasts and, according to my sources, unballasted tubes also emit electromagnetic radiation not found with incandescent or halogen lighting.

"Natural" fluorescents: not always the best choice



Proper natural, emission-free lighting is so expensive that I have decided to forego all fluorescent lighting in my home and workplace. Essentia, mentioned in the above section, is the only supplier I know which provides pre-shielded, spectrum-balanced fluorescent tubes, and the cost of these tubes to refit a large office could run over \$1,500 at current prices due to the low production runs on these tubes and current recouping of RD costs. If you're interested, contact Essentia about the OTT-lite and related fixtures.

These OTT-lite tubes are also recommended to assist people with SADS (seasonal affective disorder syndrome) who find their functioning significantly impaired in winter months when direct sunlight is less available.





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Noise pollution

No fans wanted by this writer



As a writer, one of my biggest complaints about modern PCs is fan noise. I can't stand unnecessary noise in any creative situation. In most offices, computer fans are just one of many sources of background noise, and eliminating this noise often won't create a noticeably quieter environment. At home or in older, non-air-conditioned offices, computer fans can be an obnoxious intrusion.

What most users don't know is that the average PC in indoor use in Canada doesn't need a fan nearly as badly as many technicians would have you believe. I decided almost two years ago to disconnect the fan to my cheap Taiwanese power supply. If it only lasted six months instead of a decade, it was worth it for the peace and quiet. It's still humming along trouble-free more than two years later, although I left a little extra space at the back of the case for ventilation, not a job the average user should attempt on their own.

Giving the components room to breathe



The key is not just to disconnect the fan, but to remove as much of the case surrounding the power supply as possible so that heat-sensitive components are still protected by airflow from vents in the case. Sometimes you'll need to remove the fan completely to allow for direct airflow through the case's fan vents.

The new 486 and Pentium chips are often affixed with a fan designed to cool the main processing chip, even though the manufacturer claims they're not needed. If cooling concerns you, you can also get a device called a heat sink (a ribbed metal device which drains away heat from the chip) to do the job noise-free, and at about the cost of a chip fan. Every new 486 or Pentium chip will last longer if affixed with some sort of cooling device, but they're not necessary. A good half of the 486 machines I've serviced have neither chip fans nor heat sinks, and few have displayed the flaky behavior which is supposed to accompany the lack of a cooling device.

There's a risk involved, but for many it's worth it



Once again, if the hardware only lasts five years instead of the expected ten, who cares as long as a little more peace and quiet makes you happier or more productive?

If a technician tries to convince you that the fans are absolutely essential, ask them why they usually don't put chip fans in notebook computers, and can't put them in subnotebooks. Even my own tech, someone whose expertise I respect highly, was surprised that I've had so few problems.





(ewc HLP256,HLP256_TILE,MAINMARK.BMP)

More than you ever wanted to know about Floppy disks and formatting



Formatting is one of the most arcane and bizarre computer concepts the average new user is likely to encounter. Why should you need to write to a disk before you can write to it? You don't need to do that with cassettes or videotapes, so why a floppy disk or hard disk? Here's some mythbusting and mind-opening information on how it happens and why.



[The purpose of formatting](#)



[The four common IBM-compatible disk formats](#)



[A little history](#)



[About special formats](#)



[Telling them apart without a program](#)



[About disk stretching](#)



[A very stern warning](#)



Formatting

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The purpose of formatting

Starting from what you know



Whether you know it or not, you were using formatted electronic media long before you ever laid hands on a computer. The fact is that cassettes and videotapes use their own type of formatting. Tape decks have tape guides which hold the tape firmly in place so the head never has to move. The narrow area of the tape with the magnetic signal never wavers more than a few thousandths of an inch from its appropriate position no matter how fast the tape rolls. And the magnetic strength and area on the tape where information is stored has to follow a precise set of rules. All of these factors combine to define the format of an audio tape.

Old-style LP records had a format as well. The groove had to be a specific width and depth, and there could only be so many revolutions per disk. These and other factors combined to create *its* format.

Now imagine the problems associated with disk drives. Think of a floppy disk as a vinyl record album with no groove. The needle will slide all over the surface if there's no groove to guide it. An unformatted floppy disk is just like a record with no groove, and the drive heads are like tone arms with no needles. Formatting is a way of creating a magnetic groove for the drive head to ride in.

Data farming



Let's try a different analogy. Think of a disk as a big, round, open cornfield. If there are no rows, no furrows and no seeds, you can wander around planting at random for days. You'll plant too many seeds in some areas and too few in others. Your field will look very spotty at harvest time, and it won't be an efficient harvest.

Formatting a disk is like making between 40 and 80 circular furrows for the corn seed. It's like drawing a plan on the disk for the most efficient harvest. Think of writing data onto the disk as seeding the cornfield. When you read that data back into the computer, that's your harvest.

A disk drive is like a robot harvester. A robot can't think on its feet. It has to know where and how to plant for you, and where and how to pick the corn. When you format a disk, you create furrows for the robot farmer to follow. You create marks that tell this robot where to place every single chunk of data, up to one and a half million of them on a single floppy disk, and where to find the data later.





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The four common IBM-compatible disk formats

Hard disks do their own thing; floppies can't



Most users never need to know more about hard disk formatting than the fact that hard disks are formatted. Hard disks generally come preformatted from the dealer, and anyone needing a special hard disk format can probably acquire the expertise on their own. From this point on, we'll discuss floppy disk formatting exclusively.

There are four common types of disk format used with IBM-compatibles. Each type corresponds to a different type of disk. The four formats are known as 360k double density, 720k double density, AT format high density, and HD format high or quad density. There are actually many more types of formats, but these are by far the most common. (Actually, there is really only one *truly* standard format at this time: 1.44Mb HD.

Here's a chart which describes the format types and the types of disks which use them:

Disk Types And The Formats They Use

Disk size	Approx. storage size	Usual label	Other names
3-1/2	720,000 bytes	MF2DD	DSDD
3-1/2	1,440,000 bytes	MF2HD	DSHD, HD
5-1/4	360,000 bytes	M2D	DSDD
5-1/4	1,200,000 bytes	M2HD	AT, DSHD

M2D: A 5-1/4 double density 2-sided floppy disk holds 360K. (Strange as it might seem, not all floppies are claimed to have two sides...another logic-defying truth about computers.

M2HD: The AT-style disk is a 5-1/4 high density 2-sided floppy that holds 1.2M of data.

MF-2SD: A single-sided 3-1/2 double density disk isn't even designed to be formatted double-sided (IBM-compatibles can't normally even read single-sided disks), but they will usually format properly and hold data, although they're not likely to last as long as the...

MF-2DD: ...double-sided, double density 3-1/2 diskette. The boxes say they'll hold up to a megabyte of data, but even the Ataris and Macs with special formatting software can't get them to reliably hold more than 840k of data.

MF-2HD: A double-sided, quad density (high-density) 3-1/2 disk has a capacity of 1.44M. Once again, some claim they'll hold up to 2M of data, but that's really pushing it. The highest *reliable* format is approximately 1.7M. Microsoft uses disks of this extended capacity for distributing their new Windows 95 software.





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A little history

For those who care...



The original IBM-style microcomputer diskette was a 5-1/4 disk that held 180,000 bytes of data, also known as a 180 kilobyte disk or, most commonly, a 180K. (Experienced users usually refer to disks by the number of K (kilobytes) or M (megabytes or megs) they hold, as in a 720K or a 1.2 megger.

At the time these first became popular, floppy disks used by most microcomputers were a full eight inches in diameter! You'll still see these dinosaurs in pawnshops, Salvation Army stores and the hands of students working on some of these outdated systems in computing courses. 180K was a ton of space in days when it was rare to find programs larger than 20,000 bytes. Not any more, not now that Windows, Mac and OS/2 have "cracked the DOS memory barrier". Some newer Windows and OS/2 programs are several *million bytes* in size. Imagine installing Windows 95, which comes on 25 1.44Mb floppies, from about 200 180K floppies instead. It's ludicrous. The technology had to keep up.

So the next standard was the same size 5-1/4 disk which held 360k. They were a major improvement on the 180k disk because these new disks were able to store data on both sides of the disk. The older disks weren't nearly as well formulated, and if you attempted to write on both sides of many of these disks, the magnetic signal would drift through the plastic film and contaminate data on the other side of the disk.

Expanding by factors of two



The next development held twice as much data (computer innovations always seem to be of the twice-as-much variety, which makes sense when you consider that all computing is about 0's and 1's, or multiples of twos). It was a 3-1/2 disk in a sturdy plastic housing, fully protected from dirty fingers thanks to a nifty sliding aluminum door. These disks were not just smaller than the 360K, but denser, using higher-quality film and magnetic particles to permit the greater storage capacity in the smaller space.

They were originally available in both single-sided and double-sided formats, and the double-sided disks held 720k. These were, and still are, called micro floppy disks. The Apple Macintosh, Commodore Amiga and Atari ST computers all used the smaller, denser style of disk, as did the new portable PC's and some higher-end IBM clones.

AT format: a dead issue



Next came the AT disk, a 5-1/4 disk which held 1.2 million bytes, nearly four times as much as the 360k disks used on most IBM-compatible PC's. These were nicknamed AT disks because they first gained popularity when IBM introduced its faster AT-series computers in the mid- to late-1980s. They have also caused enormous confusion for thousands of novice PC users, because unless these disks are clearly labelled high density or AT diskettes, there is absolutely no way for the average user to tell them from a normal 360K diskette without attempting a

format. You can even format a 360k disk to a full 1.2Mb under DOS, because neither the hardware nor the software can tell the two apart. (This type of formatting is very unstable, however, and is definitely *not* recommended.)

The older 5-1/4-size disk was kept for this new format because that was the IBM disk capacity standard of the day. Newer AT-class disk drives could read and format the common 360K disks as well as the newer high density 1.2Mb, but it had its problems. Users soon discovered that 360K disks formatted or written to by earlier AT-style floppy drives were unreadable by most normal 360K drives. This problem all but disappeared with drives made after about 1992, but then 360K drives have pretty much vanished too. The problem was sorted out too late for most users.

The magnetic media is manufactured in a different way on the 1.2Mb disk, which accounts for its greater storage capacity on the same size disk. You might say the AT disk is to the 360k what metal-tape cassettes are to low-noise cassettes.

Today's standard



Last but not least is the current standard, the 1.44 megabyte, or 1.44Mb disk in the sturdy 3-1/2 case. This disk is almost exactly twice the capacity of the old-style 3-1/2 720k disk, thanks once again to improvements in the quality of the film and magnetic particles.

The engineers learned from their mistakes when they designed the 1.44Mb disk. Just as 360K disks won't format reliably to 1.2Mb, 720K disks will eventually suffer serious problems if you try to format them to 1.44Mb. A high-quality floppy drive using top-quality blank disks might be able to pull it off, but you'll still have to cheat the engineers.

DOS won't let you try this "stretched format" unless you drill an extra hole in the case of the 720K disk. 1.44Mb disks have a second window, which the disk drive checks before it will allow a 1.44M format to be attempted. Using a drill for this job is not recommended because it creates plastic shavings which can damage the surface of the disk if they get inside the plastic shell. Some manufacturers created special "clean punches" for turning 720K disks into 1.44M disks, and computer nuts still argue about the safety of this practice. More on this in one of the later topics.

Each disk format has its own code. It's an industry standard used by all reputable manufacturers, and you'll see the code written on the box, on the label, or right on the disk itself in some cases. C-60 tells you a cassette is a 60-minute compact cassette, and an MF2DD tells you it's a micro-floppy, 2 sides and double density.

The next standard is already five years old



Not many people know it, but 2.88Mb 3-1/2 disks have been around for almost five years without really taking off. They are still so uncommon that the prices of these disks make them unsuitable for the average PC user, and in a 1993 version of this article we predicted that by this writing (late 1995) almost every new computer would be equipped with a 2.88Mb floppy drive. They should be, but for reasons unknown the idea never caught on enough to allow the high production volumes of drives and disks that would have made this format a viable consumer option.

It's possible that the next floppy disk standard won't be a floppy disk at all, but a magneto-optical disk. Iomega manufactures a very popular device called a Zip drive that holds 100Mb of data on a 4" disk no heavier than a floppy, and it's entirely possible that this could be the next storage standard.

(Truth to tell, it's usually software publishers who set the standards for floppy disk popularity. People only started buying 1.44Mb drives when publishers began releasing many of their larger applications in this format. Since most larger apps are released today on CD, no major publisher has felt the need to promote or endorse a new floppy format.)





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About special formats

Getting more than you bargained for



There are a few free and shareware programs which claim to be able to format 360k diskettes to 720k, and add a minimum of 10 percent more space to any diskette. They'll do the job all right, and we've used special extended formats for years...on our Atari computer. There is a price to be paid if you try to use special formats on an IBM-compatible. The problem is that some newer IBM-compatible motherboards won't read these disks no matter what you do with them. Your extended-format diskettes may become useless if you upgrade from a 286 with Phoenix BIOS to a 486-DX%80x86 with AMI BIOS.

Two years ago we advised not to use extended format diskettes unless absolutely necessary. They work, and they save time and money, but in the long run new BIOS revisions could cause your computer to crash with spectacular results when you loaded the program designed to allow special formats.

At the time, there was only one viable widely-available program for creating and reading these extended-format disks: a free German program called **FDFORMAT . EXE**.

Fortunately this is no longer true. There are now several programs designed for safely and efficiently creating, copying and reading these extended formats both in DOS and Windows 3.1/3.11 and for Windows 95. Among these programs are HDCOPY, WinImage and CopyQM, all widely available from the usual archive sites (SimTel, SimTel Windows and CICA/Winsite).

Dealing with DMF format disks



At this time the most common extended-format disk in circulation is DMF, or Disk Media Format, used by Microsoft for distributing their new Windows 95 software. We were unable to find a single program which accurately formats a DMF-formatted disk, but more and more programs are able to copy these disks all the time. You *can* back up your Windows 95 software on floppy disk...you just need a program designed to handle the high disk capacity. Our personal favorite is **HDCOPY . EXE**. This is a free program available from many locations on the Internet, and you'll find a link to programs designed for this purpose either on the Software Resources Page or on our Web site.

One final note about special formats'



We recommend using only new, *unformatted* floppies for copying and creating extended-format diskettes. The reason for this has to do with the way the magnetic signature is laid down on the disk. When a disk is reformatted at a new capacity, the old magnetic signature is not completely erased. This means that the disk formatted with the new capacity is likely to be somewhat less stable and the integrity of the data will decay at a faster rate. How much faster we don't know, but it only seems logical that using unformatted floppies for copying and creating extended format diskettes is likely to produce a disk with a longer life.





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Telling them apart without a program

Two disk sizes



This is a 3-1/2" floppy disk.



This one is a 5-1/4" floppy.



They're both called *floppy* disks because the actual disk material inside the covering is made of a flexible material. Hard disks are so named because the circular disk inside the disk's airtight case is made of rigid metal.

Two disk capacities

You can tell high density 3-1/2" disks from old-style double density disks in two ways. High density disks always have HD embossed or painted on the disk shell beside the metal door in the lower left-hand corner and have two tiny holes at the top instead of just one. If the disk doesn't say HD, it's almost certainly a double density disk.

Unfortunately, there is no way to tell by looking at a 5-1/4 disk whether it is a double density or high density disk. It helps to mark a small HD or AT on the disk before you format it so you'll be able to tell later which density it is.

What type of disk should you use?



It's particularly important to select a regular disk type when you're just starting out in computing. Over the years, every enthusiast builds up a collection of anywhere from 100 to over 1,000 disks, and using a regular disk type for all your backups and personal disks makes economic and organizational sense. Which disk type makes the most sense to use? Unquestionably, 1.44Mb 3-1/2 floppies. They're practically the only game in town any more. If you don't have a drive that handles this disk type, get one.

That doesn't mean your old 720K floppies are useless. They can be used for storage, and if you have Windows 95 you have the advantage of an operating system that writes data to these floppies at speeds far faster than good old DOS 6.x and Windows 3.x. Just keep in mind

Your 5-1/4" disks? Copy the data to new 1.44M diskettes if the data is important and keep both the copies and the originals. If the data is irreplaceable and uncopyable (perhaps the disks are copy protected), store the disks in zipper bags to prevent oxygen damage to prevent decay and wrap the bag in aluminum foil to protect against accidental magnetism causing any wear to the disk. Speakers, microwave ovens and even kitchen blenders have been known to affect the flux density of the disk. (Flux density is the strength of the magnetic signal that carries the data.) Just don't use them for long-term storage unless absolutely necessary, since they tend to be the most prone to wear and damage, and 5-1/4" drives are becoming scarcer all the time.



And just in case you were thinking of turning your old 720K disks into 1.44M disks, read the next topic. It just might change your mind.







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About disk stretching

There ain't no such thing as a free lunch



What's the real scoop on turning 720K disks into 1.44Mb disks? Well, the following is a text taken from a widely-circulated BBS file on the topic. It's a good warning on how *not* to pinch a few pennies. Fortunately this is one fad which appears to be going out of fashion, but there are still a few supporters of the idea floating around.

"This is in response to suggestions I've heard on how to format 720K diskettes to 1.44 megabytes. I've seen various articles on how to modify disk drives to allow this and I have seen ads for a device that punches holes in the diskette case to fool the drive sensor. All these tricks are a bad idea. You risk losing your data if you format a 720K diskette to 1.44 megabytes.

"The reason is the nature of the diskette media. Data is written with a stronger magnetic field on the 1.44 meg diskettes. Using such a strong field on a 720K diskette makes the bits on the disk too strong for the medium, and they will gradually migrate out of position as they are attracted to and repelled from each other by their magnetic fields.

"The 720K diskette is designed to be formatted and written to with a magnetic field strength of 300 oersteds. The 1.44 meg diskettes are high coercivity media; they require a magnetic field strength of 600 oersteds, twice that of the lower density diskettes. The high capacity diskettes are less sensitive to magnetic recording (that's why they require a stronger magnetic field). This allows the bits to be recorded at twice the density, or twice as close together. Because the medium is less sensitive, the bits will not interfere with each other. On a more sensitive medium, such as that used for 720K diskettes, the bits must be farther apart to eliminate interference with each other. That's why you cannot get as much information on the disk."

Another warning



The book *Upgrading and Repairing PCs*, by Scott Mueller (*Carmel, Indiana: Que Corporation, 1988*), contains this warning:

"You should not actually store any important data on this incorrectly formatted disk because the data is recorded at twice the recommended strength and density. Over time, the adjacent magnetic domains on the disk begin to affect each other, causing migration of the domains due to the magnetic attraction and repulsion effects Over time, the disk seems to erase itself. The process may take a day, a week, a month or more, but the result is pretty much inevitable." (*page 316*)

The author goes on to say that incorrectly formatting the disk also ruins the disk because you cannot then reformat it to a lower density. When formatting to a lower density the drive writes with a weaker current, which cannot overwrite the high-volume information now on the disk. The only solution is to use a bulk eraser.

We say don't waste your time. The disk will seem to format correctly, but you may be sorry later when your data fades into the magnetic sunset.







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A very stern warning

It is not uncommon for new DOS users to accidentally format their hard disks and lose every bit of data they contained. You can recover the data from a reformatted hard disk if you've taken the proper precautions with Norton Utilities, DOS 6.0 or a similar package with hard disk protection software, but if you didn't, it could take someone with a lot of technical skill at \$25 an hour minimum to get your files back for you.

So until you become skilled with the formatting procedure, be very careful not to type a **C** or a **D** at any time during the format procedure. If you really want to be sure you don't accidentally format your hard disk, learn how to format floppies from Windows using the File Manager's **Disk** menu, which contains procedures for formatting and copying floppies. Windows 95 users will find their formatter by double-clicking the **My Computer icon** and then right-clicking on the icon for their floppy drive or drives.





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Part 1: Service and support



As an IBM-compatible owner, there are some cold and often unpleasant facts you must face. Access to the widest range of products and services comes at a price: a lack of true standardization everywhere except for the operating system, and unfortunately Windows is not always kind to less-than-expert users. Owning a PC today is a lot like owning a car, and just as it pays to know a good mechanic, good computer support is just as important. Here's a guide to finding -- and *keeping* -- that support.



[Introduction](#)



[A consumer's guide to after-sale support](#)



[When and who to call for help: a reference card for service and support](#)



[Learning to be a teacher: a guide for would-be tutors](#)



[Midwifing your small or home business into the digital age](#)



Help & support

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A consumer's guide to after-sale support



This section is designed to give you an overview of some of the services available, their costs, and some of the ground rules for finding and keeping good help.



[What's out there](#)



[Let the buyer beware](#)



[The crunch: what it costs](#)



[Where to find the right people](#)



[What you can and can't expect from your support professional](#)



Help & support

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When and who to call for help: a reference card for service and support



When should you call in professional help, and who should you call? You'll have to balance factors such as your sense of adventure, the risk of making the problem worse by attempting to fix it yourself, and the limits imposed by your budget against the actual urgency of the problem. There are no hard and fast rules, but the general guidelines offered here should help you to make a more informed decision.

```
{ewc
LZANI.DLL,LZANIMATE,GR
APHICS.DAT;shipwrek.bmp
}
```

-  [The 'local hero'](#)
-  [Bulletin boards, internet and online services](#)
-  [Vendor product support lines](#)
-  [Hardware and software vendors](#)
-  [Private tutors and on-site troubleshooters](#)
-  [Classroom training](#)
-  [Computer clubs and special interest groups](#)



Help & support

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Computer support: an introduction

Shamed into stupidity



Just as every driver ought to know how to change a tire, fill the tank and add a quart of oil, every computer owner needs a few basic skills. Among them are knowledge of disk, [file and directory structure](#); the difference between needed and unneeded files; how to recover from a [hard disk crash](#); and how to install, configure and remove new hardware and [software](#).

Sure. And perhaps you wouldn't mind carrying the rest of the world on your back as well.

Personal computing in the 1990's is as much an emotional minefield as a grand adventure. All too often the industry sets us up to feel helpless or foolish, and either infers or tells us outright that we need skills which aren't necessary to make productive use of the machines. Either that or they promise support and ease of use that simply doesn't match real world use.

It's little wonder that when things go wrong -- as they inevitably will -- users often feel like babes in the woods. Even if you know where to turn, you might still be unsure whether you should even ask for help. Who can you trust? How do you tell good service from bad? Is it even fair to ask for help with trivial problems? What is it okay for you not to know?

The days of D-I-Y computing are gone



A decade ago, a certain level of programming expertise was considered essential to keeping your PC up and running. Not today. Operating systems have gotten much easier to learn and use. But in the process they've grown so complex that even professional troubleshooters frequently call in outside help.

This help usually costs money. Most users will eventually have to give up on the idea that once they own a PC, the only maintenance they'll ever need will be hardware repairs. You can't go it alone any more.

It's been decades since our culture has faced a collective learning challenge similar to what we face with the personal computer. PC's have a lot in common with cars in terms of their complexity, the changes they're making to our culture, and the increase in opportunities they provide to us as owners.

Old logic and new problems



But that's old news. Problems start where we try to apply the same logic to using our PC that we apply to owning a car. The context is similar, and it seems to make sense, but we don't have the long cultural history with personal computers that we have with the automobile. We don't have injury prevention laws, service standards or generations of learning to fall back on. The truth today is that computer buyers are usually far less equipped for first-time ownership than new drivers.

For example, the software used by the car -- our streets and highways -- doesn't need manuals aside from a reference card for highway lines and road signs. We're taught practically from birth that we learn to drive from qualified instructors, leave auto maintenance to qualified servicepeople, and let trained public employees take care of road maintenance.

We have our whole childhood to watch and learn from other drivers. We were not taught to haul ourselves out of ditches, rebuild engines or fix potholes in the street.



Unfortunately, many new users believe they need to achieve a similar level of self-sufficiency on their computers -- and do it on their own -- if they don't want to appear as total idiots. In the early days of the automobile, basic mechanical and road maintenance skills were required in some parts of the country. Those who didn't have them faced the same dilemmas first-time PC owners face today: lack of quality service, fear, misinformation and dissatisfaction with their new tool.

That all changed in the 1930s and 1940s when cars became a cultural institution. We'll see similar changes occur with computers in the next few years, but in the meantime computing will be a lot like car ownership was sixty years ago.

Driver training: an ongoing process



The biggest difference -- and it's an important one -- is that once you learn to drive, you can drive almost anything. Until interfaces become truly standardized, driver training on your computer will be an ongoing process, not a one-shot deal. You'll have to upgrade your skills with each new operating system upgrade or program you install.

We may not have a Public Works Department of PC Maintenance to rely upon, but that doesn't mean you have to take on maintenance chores yourself.

In fact, you probably shouldn't even try unless you truly want the skills. In just a few years operating systems have grown from a handful of files totalling less than a megabyte to hundreds of files totalling dozens of megabytes. The days when the average user could reasonably be expected to troubleshoot and maintain their own system have vanished, probably forever. Like cars, the beasts have grown beyond user-serviceability.

Simply put, don't expect to know everything or achieve complete computing self-sufficiency! You'll be a lot happier with your computer, if perhaps a little poorer, when you accept that you need and deserve expert help in maintaining your machine and keeping up your skills.

The key to happiness: when in doubt, delegate!



When faced with problems that you'd rather not deal with on your own, give them to someone else to deal with. And keep in mind that when you buy a new system, at least part of your total investment will have to be devoted to maintenance, training and troubleshooting.



 **Help & support**

 **Shopping for help**

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Computer support: what's out there



At \$25 to \$50 an hour for telephone support, \$30 to \$75 an hour for shop service, and anywhere from \$15 to \$100 an hour plus possible travel charges for in-home training or on-site service, professional tutoring and technical support is not exactly dirt-cheap. But then neither is a good mechanic. How well -- and how *long* -- do you think you could keep your car on the road without one? Get used to it...computer ownership is becoming more like car ownership every day.

How much do you want to learn?



Trying to acquire maintenance skills on your own computer, reach peak efficiency with your applications software, or survive without occasional expert guidance is a lot like doing your own auto repairs. It's risky, often costlier than expected, and usually too time-consuming to be practical. Face it, you're going to need help. Probably more than you think.

There is so much to know about computers and software and the way they interact that no one person can keep up with more than a small fraction of what's out there. Most people spread their auto maintenance among a brake and transmission specialist, a tire dealer, a general mechanic, a tune-up specialist and a body shop. Computer support is moving very rapidly toward the same degree of specialization.

Business users need a cable specialist, a network troubleshooter, a service depot, two or more operating system hackers (one for their programs and another for the network software), a pair of tutors (there's usually a personality clash with one employee that hampers a lone tutor's efficiency), and possibly a programmer on call or on account at all times. Even casual home users should have the numbers of at least two reliable tutors or system hackers.



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Let the buyer beware

A tough job made tougher



When you select a licensed mechanic, you have at least some assurance of competence. Don't expect the same security with computer support. The industry is young and prone to inexperience and immaturity. Even the most competent troubleshooters occasionally make mistakes and encounter problems they don't understand. Different support pro's deal with this problem in different ways.

There is also a powerful mystique surrounding computers that infects all but the humblest professionals from time to time and stops them from admitting it when they're wrong, trusting their judgment when they're right, or calling for outside help when they're in over their heads. And still others know a great deal about a great many things, but they fear their own knowledge and the possibility that they could do less than perfect service for their client. What if their advice was made obsolete by a new product that they never heard about? It probably was, but they can still get the job done. What if there's a better solution to the problem they're facing? They're probably is, but those who know it are likely charging twice as much per hour.

Then again, the same things could be said about auto mechanics.

Have a Sharp Eye



Choose your support professionals with the same breathless caution and keen eye for personal integrity you'd use when checking out a mechanic for the family car. Programming skill, certification, degrees and number of years' experience are no substitute for deductive logic, communications skills, the creativity to solve problems never seen before, and the guts to admit when help can't be offered.

You'll find plenty of people who fill the first set of requirements, but our friends and clients report severe shortages of everything in the second list.

At this time the market is wide open to techno-jocks with lousy people skills who bill themselves as tutors, and reckless fly-by-nighters with consultant on their business cards. This is a field where anyone with a few skills and enough nerve can hang out a shingle and collect \$50 to \$100 per hour from people who probably won't even know if they're getting good service.

This industry-wide epidemic of mistrust and self-doubt has had a profound effect on the way otherwise competent support pro's conduct themselves. It's a sad commentary on the industry that at this moment in time, you probably shouldn't expect total honesty from a dealer or a support pro until you're a paying client.

This lack of honesty often has less to do with integrity than it does with good people defending themselves against a bad situation. The truth is often so demoralizing and the market so confusing that many consumers will accept a seductive lie over painful facts.

Who would you rather give your business to?



Who would you rather give your business: someone who guarantees that their systems are 99 percent trouble-free? Or someone who tells you that regardless of what precautions they take

or who you buy from, your brand-new system has a one in ten chance of needing service in the first six months? How much more likely would you be to fall for the lie if you were told that the industry's own estimates are closer to one in *five*?



The sad truth is that the latter number is probably the most accurate, and until they've been burned once, most people will choose to buy from the person who withholds the whole truth.

This is just one of the ethical dilemmas faced by support pro's and vendors attempting to establish themselves in today's market. The next few years will almost certainly see increased demand for stricter licensing, a bevy of lawsuits, and -- as operating systems become increasingly sophisticated -- even your neighborhood tutor may need (or at least want) to carry malpractice insurance.

Free support: often worth even less than the cost

To illustrate this point, there seems to be an increasing number of vendors and consultants who offer free advice as a way of pulling in future business. Much of it is useful, but we've heard people offer free advice to novices that involved hardware configuration and software hacking at depths where novice users can cripple their computers.



If free advice from a friend, neighbor or helpful vendor results in damage to your data or hardware, you usually have no recourse except through the courts. On the other hand, if a paid professional troubleshooter can't help you, at least they'll know how to restore your system to normal. No competent support pro will leave you worse off than you were when you called for help.



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The crunch: what it costs



Here's an idea of what you can expect to pay for support of these types at various levels. Please keep in mind that any figures offered here are based solely on the authors' experiences in the Vancouver, Canada area. There should be little difference between the dollar amounts in Canada and the US, but rates may vary widely from one locale to the next.



Tutors



Classroom training



Troubleshooters



Contracted support



Shop service



The tutoring market ranges from college students willing to teach operating system basics and productivity applications at beginner to advanced levels in their homes for as little as \$10 per hour to on-site commercial trainers specializing in a single program who may charge upwards of \$75 per hour.

Classroom training also varies widely, from as little as \$5 per session for introductory lessons in DOS, Windows and telecommunications offered by schools, clubs and service groups to upwards of \$40 per session for small-group training in specific programs. The quality of classroom training varies as widely as individual tutoring. You're less likely to find an incompetent instructor teaching a computing class than you are to run into a fly-by-night tutor, but you're more likely to get less learning for your time in a classroom setting, particularly if each student isn't provided with their own computer.

Troubleshooters usually bill their services at \$40 to \$150 per hour depending upon their level of expertise and specialization. You can often negotiate lower rates for long-term or contract service and on-account support, particularly from self-employed independents and newer consulting firms hungry for business.

Contracted troubleshooters and trainers hired through service depots, training centers and hardware vendors cost anywhere from 30 to 100 percent more than independents. The extra cost of contracted troubleshooting usually includes greater assurance that your problems will get solved one way or another.

On the other hand, contracted trainers don't usually come with a guarantee that the human interface will be user-friendly. There doesn't seem to be a way of insuring the people you hire will have good people skills.

Shop service for your hardware problems ranges from \$30 to \$65 per hour, once again depending upon the level of expertise required by the job and whether the service tech is independent or subcontracted.



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Where to find the right people

Matching the person to the job



Although the components are highly sophisticated, computers themselves can be assembled by anyone who has the organizational skills and dexterity to put together a model railroad. Most tutors and troubleshooters can perform simple jobs like installing CD-ROMs, additional memory, modems and new video cards; tracing loose connections and restoring crashed hard disks; and they'll often do it at a lower price than a retailer or service depot.

If fast turnaround is critical to you, and your budget can't support using a commercial service depot, the best way to insure prompt hardware service is to buy your hardware from a small mom'n'pop or basement vendor with a good reputation for customer service. Small size usually translates into greater ability to respond quickly to individual emergencies.

There are many more tutors working independently than there are support pro's. It doesn't necessarily make finding a good one any easier, but it often means you'll wind up paying a much lower rate than you will if you go through a training center. Private computer tutors with strong communications skills and the patience to work well with novices are still in the minority.

A company position is no guarantee of skill



Many of the best support pro's don't work for the hardware vendors, training centers or service depots who get the lion's share of the training business. Be aware that many of the worst are also independents, usually because no one else will hire them. If misjudging someone's competence has cost you time or money in the past, you may have better luck finding someone through a medium-sized consulting firm or training center, where they will have been screened for competence.

People often complain that there aren't enough good people in the field to serve everyone who needs help. The fact is that there are thousands of competent, compassionate and often brilliant techs and tutors who are barely eking out a living. You simply have to know where to look. Unfortunately, the best fishing holes are seldom the best-known.

University and college notice boards are often filled with ads from service depots, students offering tutoring, vendors and private consultants. Many independents advertise in newspaper or magazine classifieds, and the best people for providing compassionate, individualized service are often the worst at writing good ads for themselves.

If all else fails, ask for referrals



Larger training centers and consulting firms can be located through the business section of daily newspapers or through computer publications. Local colleges may keep phone numbers of tutors on file for their students, and they'll often give out this information to the general public. If all else fails, ask friends and colleagues who they have found helpful. If you need help for your business, talk to contacts with other firms in your field to find out who they're using and how they like the service. There are so many bad reports floating around these days that any good report is a lead worth following up.

Regardless of who you select, check the firm or individual through the Better Business

Bureau. Business users should have a non-disclosure agreement ready to be signed by anyone working on their office systems. It's also a good idea to ask your prospective support pro for client references, although some reputable consultants working in sensitive fields may refuse to supply them.





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What to expect from your support professional

Don't be seduced by paper



There are at least three ways to do just about everything in a graphical operating environment such as Windows or Macintosh's System/Finder, and there are more hacks for command line environments such as DOS and UNIX than people have been able to count. It's unlikely any one person can teach you the best way to do everything you want to learn. If you're really keen on becoming an expert, you'll eventually need several tutors. But the same is true in just about any field.

Don't be seduced by degrees and certificates. software and hardware change so rapidly that a two-year-old certificate is practically useless today except as a status symbol. It's more important to find someone with whom you can communicate in comfort than someone with a mountain of knowledge.

You'll retain more of what you learn if the atmosphere is casual and intimate. One of the most common complaints about private tutors is that they work far too quickly and expect too much of their students.

The most valuable quality in a support person: adaptability



You can reasonably expect a private tutor to be able to teach you any program you may wish to learn...provided they have access to a copy of the software to train on themselves and the will to learn it, and most have the will.

As long as they're far enough ahead of you to teach what you're ready to learn, it doesn't matter how much experience they have with a given program. We know several consultants and tutors who have trained many people -- and trained them effectively -- in programs and procedures they had neither seen nor used until the night before the lesson.

Most professional tutors have enough basic operating system knowledge to handle maintenance chores on home systems. Their services are generally billed at one-half to one-third the cost of a full-fledged troubleshooter, making them a good first choice for service for PC users on a tight budget.

You have the right to expect that the service you pay for translates into increased knowledge and productivity. Far too many support pro's overload their clients with information and leave them feeling more confused and less capable than when they arrived. That's not just bad service. It's irresponsible teaching.

The blurred line of free support



Most tutors will provide at least some telephone support between lessons as a way of helping clients to cope with the information overload most people face at one time or another in the learning process. Many consultants and troubleshooters will encourage you to make between-service calls when you run into trouble, but some charge extra for this. Ask beforehand to

make sure you have this kind of access to help when you need it. It's an important aspect of both regular maintenance and any ongoing training program, and worth the cost of a retaining fee.

Don't expect anything for nothing...

On the other hand, you can wreck a relationship with a talented support pro by taking advantage of the situation. If you're concerned that you might be asking for too much between-visit support, ask them how they feel about it. There are no standards for this, and most support pro's have only their own gut feelings to go on. Often it's not until they've been thoroughly used by a demanding client that techs and trainers start to impose limits on telephone support.

...although you might be surprised



Don't expect to call a support pro for the first time and get even the simplest question answered over the phone for free. Many will offer this sort of help, especially as a way of demonstrating their expertise to a prospective client, and most independents have done this at some point in their careers. The free advice phase usually ends the moment they realize that the same people who expect no-charge telephone support won't return the favor by giving them cash business when they need real help, or when paying clients keep them too busy to handle an hour a day of *pro bono* work. Expect to be billed for \$20-40 even for fifteen minutes of general question-and-answer. It's worth it if it solves your problem.

If you need this kind of help on a regular or semi-regular basis, you can usually buy blocks of telephone support time ranging from one to ten hours, usually for a little less than the person's regular rate.

The "bag of tricks"



Most consultants and many tutors carry a bag of tricks with them which includes updates, bug fixes, handy freeware and shareware utilities, perhaps a few of the latest shareware games, and preferably (but, alas, not legally) emergency copies of the operating systems they work with most. These are usually provided as a client courtesy or to make troubleshooting easier for the technician and less costly for the client.

Some troubleshooters also carry dozens of patch programs, bug fixes, driver files and updates for operating systems and popular programs such as Word and CorelDraw, and popular hardware such as ATi video cards and Sound Blaster audio cards. Most service-oriented retailers and service depots maintain large libraries of these files.

But no one, not even the largest software repositories on the Internet, keeps current copies of every update and bug fix, so don't be surprised if you're directed to your dealer or the manufacturer for bug fixes and updated drivers.

Also be aware that more and more support pro's are refusing to work in offices that don't have legally registered copies of all their software, including a registered copy of the operating system for every computer.

"You are a registered user, aren't you?"



In fact, unless you're using an old or dreadfully obscure piece of software, don't be surprised if a

technician refuses to troubleshoot your system if you don't have the original installation disks. After all, consultants aren't perfect, and if they make a mistake, they might have no way of reinstalling your most critical software.

On the flip side of this coin, many support pro's still believe it's okay to set you up with pirate copies of applications software and utilities. But ask yourself this: if they're willing to cut corners with the law, what corners will they cut with your precious data?

Some consultants may refuse to work on your system until you update your software or acquire a bug fix, and they may charge for their time if you expect them to track it down for you. This is not an unreasonable demand, especially since they didn't write the software or sell it to you, and in fact acquiring a bug fix program on your own may eliminate the need for service altogether.

You should expect your support pro to have diagnostic software to uncover basic problems and, with some exceptions, the appropriate files for rebuilding your operating system if it has been trashed. You can also expect to be charged for their time even if they don't have proper diagnostic software, provided that they have helped or offered advice in other areas.

A guarantee of service...not results



Few consultants or tutors guarantee results. It's fair to insist that any consultant who can't help you refer you to someone who can if they expect to be paid for their service.

During the service call, you may be surprised to see your support pro use your telephone to call a vendor's product support line for help. Don't tear up their cheque! You're paying as much for their ability to ask the right questions of the right people as you are for what they actually know. A capable consultant will know how to pump a support person for information in seconds that might take you half an hour to acquire.

Many consultants will refuse to give estimates for troubleshooting no matter how well you describe a problem over the phone. This is because almost everyone's system is different, and they have no way of knowing what's in store for them until they actually see your system. It's not uncommon for fixes which normally take ten minutes to take ten times longer on systems with strange configurations or hardware anomalies.

Expect the first visit to be costly...and worth it



It's even more common for them to fix one problem only to discover several others which the client didn't even know existed. Unless you specifically state that you only want certain problems fixed, you can usually expect your first visit from a support pro to last several hours. An ethical support pro will not want to leave you in a vulnerable position, and vulnerabilities tend to accumulate over time on any heavily-used system.

Get a second (and preferably a third) opinion if you suspect that you're being talked into service you don't need, but get them quickly in case your system really is an accident waiting to happen.

Speaking of second opinions, be aware that it's rare to hear the same answer to a technical question from two different support pro's. In many cases they'll both be right. Many common problems have more than one solution. Your task may be to decide which of the two answers feels most comfortable or makes most sense to you.

Going with your own needs



You'll find the same inconsistency from person to person at every level, from the tools they use to the philosophies that drive their techniques. Here are two examples from an experienced consultant:

"I'm a firm believer in backups, and I'll even insist upon a full backup before commencing work on a fidgety system I believe could crash at any moment. I make backups a priority with all my clients. But I know consultants who won't even raise the issue unless the client expresses a concern.

"These consultants probably have clients who have gone for years without ever losing a file and others who suffer catastrophic data loss every time the seasons change. I have clients who have wasted five to ten minutes a day for months, even years, and never needed a single byte of the data they backed up, and others who have been very glad they were meticulous in their backups.

"When it comes to training I set no achievement goals for my students. I prefer to let them tell me what they want to know. Many tutors believe a certain level of proficiency is critical and insist that their students acquire specific skills before allowing them to choose what they want to learn.

"Who's wrong? Certainly not the client. It's up to the support pro to determine the level and type of need for each individual client rather than set hard and fast rules about how any activity should be conducted."

A job more demanding than it might seem



But the fact is that no one short of a saint or a yogi can provide this level of service day in and day out, and there are precious few of either in any field. In order to function at this level most consultants would have to limit themselves to two hours of actual service per day, refuse to work on any day when they felt a little bit off their game, spend no fewer than four hours a day doing nothing but upgrading their skills, and boost their hourly troubleshooting and tutoring rates to \$150 or more.

Not many will pay that kind of money even for top-drawer service, so most competent career support pro's rely upon a system, a philosophy and set of tools and techniques which get them through most situations.

Any method of providing service that relies upon systems and specific techniques is doomed to fail a good percentage of the time, but it's still the best we have. And the results are usually far better than no service at all.





Who do you call?

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The 'local hero'



The least expensive -- and all too often the riskiest - course of action is to call in a friend, neighbor or relative who knows computers. These local heroes tend to be called upon for a lot of free advice, so exercise courtesy and good judgment.

It's a good idea to offer some sort of compensation if you need more than a few minutes of their time. Let them know that you won't mind being referred to a professional for things that can't be easily solved over the phone.

Call a friend or neighbor who 'knows computers':

when you've lost a file or can't run a program that ran fine yesterday.

Remember that you're dealing with a talented amateur, so don't expect more than a fifty percent success rate. Very often these kinds of problems require expert troubleshooting.

when you want a few ideas on good entertainment or leisure software.

We choose our friends based on mutual interests, and friends are much better advisors on leisure software which will be suited to you than a salesperson or consultant. They are seldom good people to ask about productivity software.

when you want to learn how to use a bulletin board or a new game.

These are fairly basic skills which can be taught in a few minutes. Don't expect them to help you learn WordPerfect or teach you operating system maintenance; these are jobs for professional tutors or third-party manuals.

when a game has you stumped.

Bulletin boards are often a better source of game hints. If hint files aren't available for download, try leaving your question in a gamer's echo or general chat area if you don't mind waiting a few days for a reply. Services with online chat, or Internet Relay Chat -- if you can access it -- can give you real-time access to the answers you need, and live connections with people who don't know you or care about you in the bargain. Think of game hints over the net as an element of the game itself...part of the fun will be finding out whether the help is actually helpful!





Who do you call?

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Bulletin boards, Internet and online services

All-purpose support that might be cheap and effective



If your problem seems fairly basic and you don't mind waiting a few days for a solution, you might be tempted to post a cry for help on the technical or help echo of a local BBS (bulletin board system). Be aware, though, that the boards are not always well-policed for accurate information, and this sort of advice could get you into more trouble than you had to begin with, particularly if you're not experienced enough to know bad advice when you see it.

Help echoes on BBS' and the local nets can be havens for know-it-alls who have just enough technical knowledge to be downright dangerous. Moderated USENET newsgroups tend to be much more disciplined and better policed for accuracy. Even technicians and retailers have been known to post bad advice on public echoes, and if you suffer damage as a result of this advice you have virtually no recourse.

Don't overlook BBS' and online services as support tools in other areas, though. One of the best preventive maintenance practices you can adopt is insuring that you keep on top of the latest updates and bug fixes for your software and hardware.

Online support in the corporate world



Companies with more than one computer can save themselves headaches and money on service calls by having an employee do a regular monthly online check for updates and patches for the operating systems, device drivers and applications software used on all office systems. It's a fairly easy job now that most major publishers have Web sites, and increasing numbers of manufacturers and publishers use BBS' and online services to distribute bug fixes and program updates to their customers.

Among them are Creative Labs and Gravis (sound card drivers and software); WordPerfect and Lotus (printer and video drivers); ATI, Trident, Cirrus and Paradise (video drivers); Logitech (mouse and other device drivers); Hewlett Packard and NEC (printer drivers); Microsoft, Apple and IBM (updates and bug fixes for operating systems and applications); Apogee, Sierra and Microprose (bug fixes for games and applications).

BBS operators: computing's "backyard mechanics"



BBS' can be just as useful for their owners as they are for the advice of users or the files they offer. Amateur bulletin board operators tend to be among the most knowledgeable users you'll ever meet. Most of them don't want the responsibility of being paid professional troubleshooters, but if you can find one who will accept your business, it's a gift on par with finding a first-rate backyard auto mechanic.





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Vendor product support lines



In many cases you paid for this service when you bought the software or hardware, but as prices continue to fall on productivity applications more and more vendors are moving toward a pay-for-play system. You may be limited as to the number of calls you can make or amount of support you can receive without paying.

Regardless of how customer support is set up, expect to wait on hold for anywhere from several minutes to an hour or more if you want to talk to a live operator. Several hours is not unheard-of. This can be excruciating if you don't have a speaker phone and something to occupy your time while you wait, and doubly painful if you discover that the support person can't help you.

Be prepared for the worst when you pick up the phone. In my experience, you'll get satisfaction only about two times in three. If you need better service than this, many service depots and independent troubleshooters provide on-account telephone support for a wide range of situations.

Never call a product support for game hints, help with software you borrowed from a friend, for public domain software, freeware, or for shareware you haven't yet paid for unless the documentation specifically states that you may do so.

Call vendor support lines:

-  when a specific piece of software or hardware is giving you problems and there is no obvious solution in the manual.***
-  when your problem has your local hero, your dealer, tutor and/or troubleshooter stumped.***
-  when repairs, adjustments and software troubleshooting haven't helped.***
-  when your best hunch tells you that the problem is related to their product and you need help right now.***





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Hardware and software vendors



Expect to either wait for an answer or be required to take your system to the shop when you use dealer service. You may get a few freebies, particularly if you've been a regular customer, but don't take them for granted!

Call your dealer or vendor:

 ***when you have problems with the hardware or software which came with a system you purchased from them, and the system is still covered under their warranty.***

Your dealer may still refer you to the manufacturer's or publisher's product support line for further help. They may also refuse to help you for free if you have added hardware or changed software since buying from them. You can't hold them responsible for problems they didn't cause with products they didn't sell.

 ***when you've just bought a CD-ROM, modem, motherboard or other component and can't get it to work.***

If you're not already familiar with the hardware, pay to have your dealer install and set it up. This also goes for video accelerators, new monitors and even printers, mice and joysticks if you're not comfortable with installing new software. It goes double for additional hard disks, tape backup systems, memory upgrades and audiovisual interfaces.





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Private tutors and troubleshooters

Call a tutor or troubleshooter:

for help in learning how to create and manage files and backups.

It takes more time to teach these skills than you should reasonably expect from a friend or neighbor.

when you want your custom menus changed or updated.

Your local hero might consent to do this for you, but customized menus are an optional accessory, like automatic transmissions. Don't expect to get them for nothing. Programmers will charge thousands to create custom menus for corporate systems; PC's are a lot simpler but it's still dull work.

when the manual makes no sense to you.

All too often software and hardware manuals seem to be written by a committee of bureaucrats. A tutor with compassion can bridge the communication gap between you and your computer in ways no manual can.

when you purchase a first family computer.

Find a tutor patient enough to deal with the whole family at once and gather everyone around the computer while they show you its stuff. One of the nicest features of whole-family training is that no one needs to take it too seriously or work too hard at it. Almost without exception, if one member of the family has forgotten a particular command, another will have remembered the needed information. Family training seems to work that way if everyone is interested.

when you need your hard disk pruned.

Everyone accumulates useless data over the years. Trimming this excess can extend the useful life of a shrinking hard disk, and anything you can do to postpone an upgrade will save you money. Don't attempt this job on your own unless you've made a full backup of your hard disk and you're prepared to do at least one complete restoration. First-timers almost always scrub a few essential files by accident. Windows programs are particularly intrusive and difficult to remove without the help of uninstall software or a qualified expert. (By the way, removing icons from Program Manager does not remove the software from your system. You have to manually erase the files.)

when you need your system cleaned and tuned for efficiency.

Tutors and consultants accumulate large collections of performance and comfort tips from colleagues and clients, nuggets they'll gladly share with a paying client. Any competent support pro can leave the average system functioning more efficiently than they found it. Physical cleaning isn't a major concern with today's PC's. Most systems will only need cleaning, tune-up and file pruning once every year or two.

when you need advice on productivity applications.

A wrong choice in this area will cost you lost time, money, and perhaps even a promotion or your job. Be very wary of advice from anyone who is not familiar with your field or with current trends in business software. Even the advice of colleagues in your own industry should be taken with a handful of salt unless you're sure that they thoroughly investigated their options before offering an opinion.

 **when you don't know which hardware or software is causing a problem.**

Most problems are software-related, even when they look like hardware errors. Vendors tend to be less qualified to fix software problems than troubleshooters and professional tutors.

 **when you find two or more programs exhibiting the same erratic or unwanted behavior and the problem is not happening with a brand-new system.**

If this sort of problem crops up on a new system, refer to your dealer for warranty service.

 **when you've purchased a new system or done a major upgrade and want things set up for maximum efficiency and ease of use.**

This sort of work is best performed by a qualified tutor or consultant. It won't be long until we have support pro's who specialize in nothing but optimizations. It's okay to watch them work and have them explain their modifications as long as you don't mind paying for the extra time this usually takes. Ask to have them record what they've done in a text file so that anyone working on your system in the future will have a record of what was done in the past.

 **when you want to learn how to navigate the Internet.**

You can pick up the basics in no time if you've already done some BBSing, but making effective use of the net's intricacies and available resources takes time, patience, and probably some expert guidance on software, sites and etiquette. The resource guides alone are literally hundreds of printed pages in length, and not even our First Train for the Internet can truly see you as a unique individual and focus specifically on what *you* want. It *can* take you a long way, but there's nothing like your own private guide for really getting to know the sights.





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Classroom training

Sign up for classroom training:

if the social experience is worth at least as much to you as the training you'll receive.

Adult students tend to retain very little of their classroom training in comparison to in-home tutoring. This is frequently a poor choice for advancing your computing skills.

if a job you want requires certification.

Even then, you'll probably score better on tests by sleeping through classes, learning hands-on at home with a good third-party manual, and getting a few advanced tips before the exam from a private tutor.

if you can't find two good books on the software or procedures you want to learn.

Why two books? Because the second will usually offer useful explanations for aspects and procedures covered poorly by the first. Why books over a human trainer? Because hands-on training on your own system with a good third-party manual is usually more effective, more efficient, and a lot cheaper than classroom training.

if you learn better as an anonymous observer than through personal attention.

Some people seem to have difficulty responding to one-on-one instruction but thrive in a classroom setting. If this sounds like you, by all means opt for classroom training over private tutoring. It's your time and money, and it's up to you to get the most from it.





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Computer clubs and special interest groups

SIGs and computer clubs are private organizations and not consumer resources, although increasing numbers of them offer fee-based services to the general public. If you want the benefits, expect to pay or them with your time, knowledge, or donations of money or supplies. It's through member efforts that these organizations survive.

Join a computer club or special-interest group:

when you can't find a consultant or tutor who can match your level of expertise.

Once you've achieved a high degree of proficiency in a particular application, tutoring on advanced subjects may be difficult or impossible to find. At this level, special-interest groups (SIGs), either on BBS' or through computer clubs are your best hope for finding a talent pool and knowledge level to match your own.

when you can't find help elsewhere for your particular needs.

Larger centers support a number of clubs dedicated to users of old or unusual hardware and operating systems, everything from the ancient Adam and TI99-4A home systems to FORTRAN and COBOL programmers to artificial intelligence and genealogy. Check the back pages of your local computer magazine or newspaper for listings of SIGs.





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Learning to be a teacher: how to bring a novice up to speed painlessly



This section is specifically designed for those who find themselves in a position to help others. Chances are good that that's going to mean you. The Internet is still doubling in population every few months, and by the time you have a pretty good idea of what you're doing, you won't just be a competent Internet user...you'll be a net veteran. Unless you're reading this well into 1998, you can almost count on being called upon to help someone else.

You owe it to yourself, those who ask for your help, and your fellow Internet travellers to not take this responsibility lightly. Here's a guide to assisting new users which you should find most useful. Just don't expect your "students" to be grateful...the *best* teaching leaves the student both competent and feeling like nothing is owed to the teacher.



[Learning to be a teacher](#)



[Twelve tips for smoothing out the learning curve](#)



Tutoring tips

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Learning to be a teacher

Less like a handshake than a hazing



Many new users still find their first experience with a personal computer less like a handshake than a hazing. but there are ways to make the introduction easier.

I'm not incompetent. I'm not perfect, either. But that's no consolation to someone whose most expensive toy has just rejected a software transplant for reasons only a programmer could know.

I don't know everything. And I can't find a software solution to every problem. Try telling that to someone who was sold more computer than they need by a salesperson who swore that the software you want is out there.

The fulfilled promise of cheaper, more powerful computers has created millions of new home and small business users in a very short period of time. The market for service, training and software support is simply too large to be filled by the available talent. The field is so diverse and growing so quickly that no one can keep current with more than one or two small areas of the industry.

This creates problems for users and service professionals alike.

The geek mystique



Computing is still haunted by an air of mysticism and a false belief that anything is possible. Too many new users are being hurt by self-styled experts who can't admit the limits of their knowledge and professionals who have a stake in perpetuating myth and misinformation. The result is frightened users who don't know who to trust, know-it-all novices who believe they know more than they do, and lost productivity and enjoyment for everyone concerned.

It's the odd week when I don't meet someone who has been soured on computing by a trainer who didn't have the patience to deal with a beginner or an advertiser whose claims of reliability and support weren't matched by performance. I spend a lot of time rebuilding people's confidence, deflating overblown egos and generally cleaning up after irresponsible professionals and know-it-all hackers.

It's the rare computer veteran who doesn't have an arsenal of new-user horror stories. Graeme Bennett of The Computer Paper even elevates some to the status of urban legends. Gerry Craig, who for several years assisted novices in the Vancouver area through a users' group mentor program, used to wade through other people's messes on a regular basis.

I personally know very few people who didn't survive at least one unpleasant episode early in their computing careers, but here are three which demonstrate the depth of the problem.

A few horror stories



I have a small business client who let a friend help them upgrade from DOS to Windows. But they didn't just get Windows. They got the much more complex Windows for Workgroups, plus Norton Utilities, Stacker, Microsoft Publisher, Adobe Type Manager, SpeedCache...virtually every IBM-compatible power tool available at the time, all to use WordPerfect and a

straightforward DOS database. These utilities were integrated so deeply into the system that they couldn't even format disks from DOS any more.

I was brought in to add some shareware and remove unused files from the hard disk. The system went down with a stroke of the Enter key. Almost everything was pirated, so we couldn't even reinstall the software. The person who set up the system had left these people completely dependent upon his expertise, and he still blames me for messing up his friends' business.

Last summer I encountered was a password-protected menu installed by the neighbor of an elderly client. This fellow needed help changing the menu so he could add new software. Unfortunately the neighbor moved away without giving him the password. My client was left with the unpleasant choice of learning a new menu system or living with the same six programs he'd had for over a year.

This man didn't know me from Adam. His neighbor had no business padlocking his computer, but why should he believe that? How could he know that I wasn't angling him for business? After all, his neighbor had helped him for free.

The Great Equalizer or Great Humiliator?



Well-meaning hackers are one thing, but what really smolders my collar is that more than half of my clients who tried the idiot books felt even more incompetent after reading them. And it's nothing short of tragic when MS-DOS' online help system still doesn't tell users how to run programs or install new software. Computers were supposed to be the Great Equalizer, not a way to humble less technically-minded people.

All of us who have been around computers for more than a year are eventually going to be called in as consulting physician when one of our friends or relatives buys their first computer. This is the best place to start undoing the bad publicity, to relearn good habits we've forgotten over the years and to give a new user the kind of introduction we wish we could have had.





Tutoring tips

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Twelve tips for smoothing out the learning curve

How to make someone's first experience with a PC easier than it was for you



Here are some guidelines for de-stressing the learning process and making the computing experience less like having a new problem and more like owning a new toy.

 **1.** Never, ever allow someone to be dependent upon software they don't own. If you're installing an unregistered operating system, that's software theft and you deserve every panicked phone call you get when the system has problems...and eventually every system has problems.

 **2.** Force every new user to learn the two-backup habit unless they're too poor to afford all the floppies or tapes. One set should be stored off the premises so it won't be lost if anything happens to the computer. Create a clean boot disk for use if problems occur with the hard disk, and remember that even the new Microsoft Backup is far too cryptic for novices. Stick with simple file backups which a new user can restore from a batch file, and use the backup time to teach the basics of file and directory structure everyone eventually needs to know.

 **3.** Keep the boot setup simple and avoid third-party software. The average user needs only about a half-dozen standard device drivers and TSRs to keep the system running smoothly. New users will willingly sacrifice speed and a bit of memory for simplicity and reliability.

 **4.** You won't be the only person to service the system in its lifetime, so avoid cryptic program setups and complex menus which others may find tricky to change. MS-DOS users should stick with simple batch menus. Windows, OS/2 and Mac users don't need third-party front ends until they gain experience.

Any special software you add to the system should be commented in the AUTOEXEC.BAT, CONFIG.SYS, or a SVC_READ.TXT file saved to the root directory. Make allowances for gaps in others' knowledge or you may leave your student vulnerable to problems only you can solve.

 **5.** Give your charge room to grow by carefully housecleaning unneeded system files and obsolete software. If there's plenty of room on the hard disk, configure Delete Sentry or a safe delete system to protect against accidental data loss.

Casual users don't usually exit Windows properly. It's not uncommon to accumulate ten megabytes of .TMP files every month. Adding...

```
DEL C:\DOS\~*.TMP
```

...to AUTOEXEC.BAT will eliminate this clutter permanently.

 **6.** Start by teaching what the user wants to know, not what you think they need to know. Avoid housecleaning chores until they can run and install new programs. The first lessons most home users need are executing programs, printing and reading text files, modeming and processing compressed archives.

 **7.** Idiot-proof the system. I often make three copies of a program with three different names so the user will be sure to remember one of them. Renaming programs to reflect their

functions helps most users do more with less training.

Add the root and UTILS directories to the PATH statement so that any needed programs can be run without path syntax. Install simple, one-touch utilities -- graphical if possible -- to take the place of the clunky disk and file functions built into most operating systems. List all of these changes in the README file so they can be restored later.

 **8.** The goal of effective training is to teach people how to take care of themselves. Once a user knows how to install programs and save data, teach them how to uninstall software and identify what can and cannot be safely erased. Users usually need one-on-one help with modem configuration, downloading procedures, processing compressed archives, formatting documents and passing parameters to programs, no matter how thorough the manual might seem.

 **9.** Panic-proof a new user by creating a few harmless crashes and system errors. There's seldom any reason to panic unless the whole system collapses, but error messages of any kind scare the daylights out of most novices.

 **10.** Take your diplomatic duties seriously. If your student wants to modem, introduce them to BBS ethics and rules of behavior. If they plan on trading software, it's your job to make them aware of the differences between shareware, freeware and illegal pirated software. And shame on anyone who instills virus terror in a novice. Trojans and viruses are never more than a rare annoyance to anyone who regularly backs up their data.

 **11.** Remember your first month at the keyboard and treat your charge accordingly. Talk in terms and analogies the user can understand, let them set the pace, and never leave them hanging between lessons with half the skills needed for a task. In return, you have the right to expect appreciation for your efforts and to limit the number of panicked phone calls you'll accept. Good teachers don't have all the answers; instead, they teach their students how to find their own answers using the resources available.

 **12.** If your charge is still confused and desperate after the eighteenth emergency phone call this week, remind them that there's always the manual.

Ah yes, the manual...but, as they say, that's a nightmare tale for another dark evening.





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So you want to computerize your business...

This first-person article, prepared in 1994 by one of our editors for magazine publication, still has validity even in 1996. We hope this comes as help before-the-fact rather than a reminder of what you should have done. This is a long article; you may wish to print a hard copy of this topic.

Ever have one of those months?



My client wanted a turn-key package, a complete invoicing and bookkeeping system designed for a small trucking business whose employees had never used a computer before. No problem, I thought. I quoted software, setup and training for under a thousand dollars. It looked like a low-stress job I could finish in a week or two.

Ten hours and two dozen phone calls later, I began to sense that the fairly simple needs of my client were not so simple in the eyes of small business bookkeeping developers. Ah, well, it was just a matter of plugging away until I hit the right package.

Thirty hours and twenty software packages later I began to feel rather panicky. Every package was missing one or two essential features. I began mumbling none too quietly about the mid-four-figure base costs for custom database programming and clients who expect a Jaguar at Chevy prices. My client started asking why computers were making his life more difficult, and I didn't have a good answer for him.



A colleague had told me I was insane to accept the job for the money involved, but I knew there were dozens of excellent shareware programs available for business use. I wasn't beaten yet. I stepped backward, to complete DOS freight management package I found on a local bulletin board. I talked the client into accepting the extra training time it would require as a DOS program as the tradeoff for complete integration at a low price. But when we called the developer to register the program and find out how to uncripple it, he actually refused to sell us the software! Seems there was too much money to be made from custom programming to bother with piddling \$150 shareware fees. I was tempted to call the FTC.

After ninety hours and seventy -- yes, *seventy* different software packages -- we're talking major compromise. My client has lost another two days this month to manual invoicing, and I'm out two weeks' work which I can't even bill.

This is not the home front



I usually work with home users, and when they ask me whether I have a shareware program which can do this or that, I always say yes before they can tell me what they need. And I've never had to eat my words. But I have learned that my experience with the trucking firm is fairly typical in small business consulting. Functional you can get for peanuts. Useful costs more...and takes time. Nobody really understands why, but it does.

Don't get me wrong. Without question, it's easier now to computerize a business than it has been at any time in the past. You can exchange data freely between most programs at the

touch of a button...and the buttons will even tell you their functions. Training time is shorter, interfaces are slicker, everything is faster and the variety and quality of data you can maintain and generate gets better all the time.

But we don't live in Oz...not yet. Going digital is not as easy as clicking your heels together and saying "there's nothing like RAM" which is what a lot of the advertising seems to suggest. The obscurity and diversity of small business software is why good consultants make excellent money and work constantly.



The transition will be a lot less frustrating if you know what you're getting into ahead of time and remember where you're starting from, which in most cases is babe-in-the-woods territory. A day or two of homework might sound like a lot when you can shop for hardware in less than an hour with nothing more than a newspaper and a telephone, but this effort can save you hundreds, perhaps even thousands of dollars in consultants' fees and trim untold man-hours from your transition period and eventual workload.

It will also maximize the efficiency of your transition and help you make better use of the professionals you do employ. And unless you're already a proficient computer user, you will need professional help at some point.

Twelve tips for midwifing your small business into the digital world

1. Know what you need

 Hardware is usually easy to select and won't cause you too much lost time if you overbuy or underestimate your needs. Not so with software. Write down exactly what you want your business software to do, and in as much detail as you can. Apply your imagination to your needs. Your software must be able to grow with your business.

2. Brace for disappointment

 Don't expect to find a complete turn-key package available off-the-shelf for your specific business. Chances are that any ready-made package will lack a few vital features which will require either additional software, manual record-keeping or the inability to merge your data in one or more areas. It's a joyous occasion to discover a popular, inexpensive accounting or database package at the local disk-and-drive shop which does everything you need, and for the time it takes to check it out, it can't hurt to start with the obvious. But be prepared for disappointment. You'll probably find few local retailers up to meeting the specific needs of a small business. In my experience, salesman are often lacking even in basic product information.

3. Expect some extra homework

 If what you want isn't available locally, check out the small back-page ads and classifieds in your field's trade publications. There is an astonishing range of specialty software available for just about every type of business, but you won't find these packages advertised in computer publications. Most of them are only available by modem or mail order. In many cases you can purchase them directly from the developer, meaning easy access to someone who knows the software inside-out, and usually the option to have a custom package created for much less than you'll probably pay for a package created from scratch.

Make sure the developer can provide you with a demonstration version of the product before offering your credit card number, because you may not always be able to get a refund if the software doesn't perform up to expectations. It's a simple matter for the developer to hack

a crippled demonstration version of a program which demonstrates all of its features without allowing you to make heavy use of it. If the developer won't provide this kind of support, look upon this as a sample of the support you can expect as a user of their product and shop elsewhere.

4. Network

💎 If your field isn't hyper-competitive or paranoid about operating procedures, find out from your competitors what they're using and how well it works. It might also pay you to see if anyone else in your field is in the market for software. If you find you need expensive specialized software or a custom creation, the developer might offer a reduced rate if you can throw two or more clients their way at one time.

5. Take your deadlines and toss them

💎 Don't expect to convert your business in a week unless you or your staff are already computer-literate. Moving from manual to computerized record-keeping is like switching from a bicycle to a car. The rules of the road are the same, but you'll need time and training to harness the increased power at your command. The conversion will probably require you to learn new skills or think differently about your business. You might even want to warn friends and loved ones when the changeover starts, because a degree of mental or emotional disorientation can often be expected. This is no joke, but a fact of life when you attempt to force a lot of new learning on an old body.

This disorientation can be lessened considerably with a little attention to your own learning style or the styles of employees who will actually be using the system. In my experience, entrepreneurs in particular are extreme people who generally fall into two categories as students, nibblers and crammers, with little room for middle ground. Nibblers prefer to learn one simple skill at a time and master it before moving on. Crammers prefer to be overwhelmed with new information. They want to know everything yesterday and don't mind making mistakes or walking around with mud-brain until the new learning settles. Most consultants and tutors are more effective with one of these types, and you might need to quiz the teacher to discover a consultant's individual strengths in this area.

Even software has features better suited to the different types of students. Nibblers tend to be intellectual types who prefer the straight-line simplicity and rigidity of DOS or UNIX. Crammers tend to be more creative and sometimes they can't even function in a non-graphical environment.

Be prepared to experience as many unpleasant surprises as pleasant ones as you feel out the performance of your hardware and software, and if you've been sold by a hardware dealer who promised you that the software you need is easy to find and dirt simple to learn, brace yourself for a few shocks. Hopefully you won't experience them, but it's more likely that you will. Hardware reliability improves every year, but if this is your first new computer keep in mind that you stand about a chance in six of needing service in the first month. IBM-compatibles in particular are at least as recall-prone as new cars.

You can ease the transition for both yourself and your employees by keeping a selection of entertainment and personal use software on the system during the break-in period. I find I can reduce client training costs by pinpointing an area of leisure interest and starting each employee out with a selection of free or shareware fun software to help them learn computing basics. Training takes less time because people learn faster and with much less distress when they're enjoying themselves, but this sort of introduction also whets the appetite for more fun...and there's an unending supply available.

I usually expect that ten hours of playtime by a novice user will chop five hours' training from the client's bill. After the first ten hours or so there doesn't seem to be a benefit, so you

might choose to have the fun stuff removed once everyone has been trained.

6. Don't bank on computers to free up more time

◆ Now and forever more, forget any ideas you may have that your computer will free up more time for business or leisure. Unless you're highly disciplined, it will do exactly the opposite. The computer is a labor-saving device, but the labor it saves leaves a hole in your life which needs to be filled. Make plans for that time and exercise the needed discipline to follow through with those plans. If you don't, you can resign yourself to losing that extra time to mahjongg, modeming or machine-gunning bad guys. I have to accept this tradeoff to live with what I do. Every time I put a copy of Solitaire, Wolfenstein or Astrology for Windows on a business computer I feel not unlike a drug pusher.

7. Automate everything that can be automated

◆ Have your consultant or tutor set up simple programs to automate any daily business chore which can be automated. This is one of the least time-consuming tasks involved in converting a business to computer, because all it requires is simple batch programming skills or configuration of existing software. But it's also one of the most rewarding for the end user. All popular operating systems, from DOS to Mac to UNIX, have plenty of readily-available and inexpensive software for automating tasks such as daily file backups, reports, employee or project scheduling and much more. It can take as little as ten minutes for a consultant to configure a free or five-dollar program to execute a task with just a couple of keystrokes, but this can often result in several hours of time saved over the course of a year.

Automation is nice, but beware of over-reliance upon it. Just as every driver should know how to check the oil and change a tire, every business needs at least one employee who knows the basics of the operating system used by the business. Slight changes to a Windows or DOS setup can play havoc with heavily-automated task management. A simple mistake can literally cripple a business until the consultant arrives.

I've encountered automated boot setups and menu systems so complex that the installer was the only one who could service the computer. This creates an expensive and unnecessary dependency and a high level of fear in the user. In this day and age, with ease of use at an all-time high, the goal of computerization ought to be self-reliance.

There are manual-free shareware and public domain training systems for DOS, Novell Netware and other systems which will teach employees the basics of the operating system, and these ought to be provided by every consultant to every new user.

8. Avoid dinosaur and "boutique" software

◆ Future problems with data compatibility could render your records worthless if your software becomes obsolete or too limited for your growing business. Eventually you'll have to upgrade, and the data you create with oddball software might not convert to new file formats. Insure that your data is future-proof by sticking with software which creates or exports its data in an industry-standard file format. These formats include Lotus, dBASE, Rich Text and ASCII among others. No developer of custom software worth their fees will leave you with a system which won't write or convert to an industry-standard format, but I've seen expensive specialty software which lacks this essential flexibility.

It seems sensible that incompatibility can be avoided by using what everyone else is using. But we're talking about computers here, and this world often demonstrates a reality which defies everyday logic. The vast majority of small businesses in Canada use Accpac for bookkeeping, but many businesses will discover that it has severe limitations not found in less popular packages such as QuickBooks or M.Y.O.B. And it will come as a painful shock

to many people when they discover that files created on the junior version of a widely-used business package cannot be directly transferred to the high-end version. More shocking is the fact that the developer apparently has no plans to build this compatibility into future versions.

Inexpensive packages tend to be the most prone to incompatibility. Don't skimp on software or you may some day have to convert years of data by hand to a new format or lose a lot of your records due to incompatibility. It's a big step up from a basic accounting or spreadsheet package at \$75-150 to full-featured software at \$400 and up, but compare that to the cost of re-keying three years' worth of data.

9. No piece of software will do all you need it to do

 Chances are you'll need several different programs to accomplish everything. The only way around this is to invest heavily in a complete, customized turn-key system created by a professional database programmer. This isn't the fault of the software. It's not necessarily even a problem. The best stereo systems and TVs are modular, so why shouldn't the best software setup be modular as well? What's important is that everything works well together. A do-it-all accounting package might make a great ghetto blaster point-of-sale package for a small bookstore but it probably won't have enough power or definition for the distributors who supply them.

I personally have separate programs for time management, bookkeeping and invoicing, advertising, promotion and planning, and I'm just one man working out of my home. On average I find it takes from five to eight different packages to properly automate and integrate a small owner-operated business.

Fortunately there's shareware to ease the financial burden. If you have a modem and some computing experience, try a few of the many shareware databases, time managers, point-of-sale and accounting packages before deciding on anything. There are free and shareware packages available for everything from babysitting and dating services to restaurants, body shops and dentists. The quality ranges from spotty to downright astonishing.

You probably won't get all your needs met this way, but time spent testing shareware won't be time wasted. Familiarizing yourself with features, limitations and interfaces will cut your training time and help you make much wiser buying and planning decisions. On the other hand, if you don't know what's available, or what's possible, you could settle for something less than you really need at at cost of hundreds of hours' work every year.

It's been my experience that every small business will find at least one or two shareware packages which meet their specific needs better than anything available off the shelf. At prices ranging from \$5 to \$300 business shareware isn't always cheap, but it's always available for a thorough test-drive. You can't often say the same for retail software.

These packages can be obtained not from specialized software dealers, but from local bulletin boards, online services and specialty shareware vendors. A lot of consultants look down their noses at shareware, but there are some who carry sizeable collections. In fact, if I need something fairly specialized I'll look through shareware libraries before consulting any retail source. More often than not I find exactly what I need.

10. Don't skimp on the human help

 If your needs are fairly basic and your heart is set on giving your business to someone local, hunt down a software dealer who truly understands small business. Virtually every retailer carries the most popular accounting, database and time management packages, but that doesn't qualify them as professionals or experts.

In my experience, it's the odd salesman who has better than a basic understanding of

more than one database or spreadsheet. The tidal wave of ignorance and misinformation is so enormous that even the support staff for major publishers can't always be trusted. I was told by one telephone support person that their product wouldn't perform a needed function. I only learned of this error when I ran into a salesman who let me examine the manual. Sure enough, it did exactly what we needed it to do.

There's never enough product information supplied with any software and no substitute for a test-drive or a browse through the manual. That often means opening the package, and there are still many dealers who won't do this for anyone but their regular customers. The alternative? Buy a package, install it, test it out, and when it doesn't meet expectations, exchange it for another. You can waste whole weeks playing this game, or you can spend an afternoon browsing manuals and program screens right in the store. It all depends upon the retailer's level of commitment.

11. Conform or be isolated

 If you're an island, you can do as you please and cut every corner you wish. File formats won't matter five years from now; you'll be able to scan a printout or convert files from just about any piece of business software no matter how obscure it might be.

But if you farm out parts of your operation out to other people, you have more than your own needs to consider. You might save a lot of time and money if you can provide your hired guns with data in a format they can use. Check with your bookkeeper, printer, advertising consultant and everyone else who assists your business operations to see which file formats they prefer. If it comes down to a choice between two packages, this information can make the decision much easier.

12. Brace for the break-in

 Remember that the worst part of computerizing a small business is the break-in period. But once you're out of boot camp you'll wonder how you got along without it.



Oh, and if you still think this case was unique, let me tell you about my latest client. Believe it or not, it's a computer shop. As astonishing as it may sound, the owner hasn't been able to find a suitable point-of-sale accounting package. Just like my trucking client, everything he's tried is missing one or two essential features. Frankly, I'm shocked. The developers haven't even done journeyman service to their own suppliers!

This time I'm prepared. I've just spent two weeks testing software.





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The PC Owner's Survival Guide

Part 2: Maintenance



This section is by no means complete, but it will provide you with the tools you'll need to deal with a large number of potential problems and perform most of the basic maintenance needed by the average PC.

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 [Section 1: System and software troubleshooting](#)

 [Section 2: Do-it-yourself hardware maintenance](#)

 [Section 3: *Back it up!*](#)

 [Section 4: Upgrades and updates](#)

 **Important Note:** If any of these jobs seems confusing or frightening to you, leave them for a serviceperson or a friend or relative whom you trust:

- a) not to harm your data, and
- b) to be able to recover from any problems that may occur while they are trying to help.



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Maintenance section 1: System and software troubleshooting

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;ambulanc.bmp}The hardware is only as good as the software that runs on it. And the simple fact is that no matter how trouble-prone IBM-compatible hardware might be, the average user is far more likely to suffer software problems than hardware glitches. Fortunately the most common software problems are entirely preventable, and here are several simple do-it-yourself software fixes and hardware trouble-stoppers you can perform without knowing -- or caring -- what goes on "under the hood".

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 [Making emergency start-up boot disks \(Windows 3.1\)](#)

 [Making emergency start-up boot disks \(Windows 95\)](#)

 [DOS and Windows backup disks](#)

 [Checking your hard disk for errors or damage](#)

 [CMOS data and battery replacement](#)

 [Clock batteries: what they are and how to replace them](#)

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Maintenance section 2: Do-it-yourself hardware maintenance

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;toolbox.bmp}Computerdom is a land where fear often rules over common sense. Some of the do-it-yourself maintenance discussed in the next section is actual under-the-hood work which can be done even if you've never seen the inside of a computer. Even if you do decide to leave the engine work to real mechanics, there are still plenty of simple things you can do to keep your system trouble-free.



Dust buildup: what to do...or not do



Chip creep: when old chips decide to walk away



Basic floppy drive maintenance



Tape drives, CDs and backup floppies



Printers: easy to please (well, most of them)



Monitor maintenance...or not



Important Note: If any of these jobs seems confusing or frightening to you, leave them for a serviceperson or a friend or relative whom you trust:

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Maintenance section 4: Upgrades and updates



This is one of the biggest minefields in computing. It's time to get used to the idea that computer ownership is much like car ownership. Some people *like* a new car every year or two. Most of us prefer to stay with what we have. The same is true of your computer hardware and software. Here's some useful information on the "upgrade trap" and a checklist to help you avoid falling head-first into it.



[Upgrading how-to's, when-to's and when-not-to's](#)



[An upgrading checklist](#)



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Making emergency start-up boot disks

A must-have accessory for Windows and DOS



No user should be without an emergency boot disk. An emergency boot disk is a floppy disk you can use to start up your system when you can't get it to boot from the hard disk. You may need a serviceperson or a local hero to restore your hard disk to normal functioning, or it could just be a temporary glitch that takes care of itself (these things still happen!). Either way, an emergency boot disk will let you access your system in a limited way until you can restore your computer to normal functioning.

The procedure outlined below is automated in two procedures called F-A-S-T Emergency Windows Backup and **DOSBACK** which are included as part of First Train. It is recommended that you read the rest of this section to get an idea of how these two procedures do their stuff.

You can make an emergency boot disk with almost every version and brand of DOS by using the **sys** command from your c:_prompt, or by clicking **Disk** from the top menu bar, selecting **Format** and choosing **Make System Disk** from Windows File Manager. You can also use your DOS installation disks as an emergency restart kit, but it's a time-consuming, confusing and potentially risky way to get restarted.

Two disks are better than one



Actually, it's usually best to have two emergency boot disks, one which will start your system from floppy disk just the way it starts from the hard disk, and a second clean boot disk which does nothing but start DOS.

A full-featured emergency boot disk

The best way to create your full-featured emergency boot disk is to type these commands at the c:_prompt after inserting a blank, formatted disk in Drive A. The first command copies the needed system software to the floppy. The command you type is:

```
sys c: a:
```

...and press **Enter**. This command creates a plain boot disk, and once you've done that, remove the disk and tuck it away in a safe place. For your second emergency boot disk, you should type:

```
sys c: a:
```

...and press **Enter** again.

The next set of commands adds your configuration files for DOS and Windows to this disk. These are very important files and you should keep backups of these. The commands are:

```
copy c:\config.sys a: ...and press Enter, then type:
```

```
copy c:\autoexec.bat a: ...and press Enter again.
```

Once these files are on your floppy, your system should start from a floppy disk the same way it did from the hard disk...*provided* nothing is seriously wrong with the system.

(Often it's just the DOS system files which are damaged or missing, or a misplaced copy of AUTOEXEC.BAT or CONFIG.SYS.)

Saving critical Windows and DOS files



This next set of commands copies all of your important Windows and DOS files to the floppy disk. If you don't understand these commands, that's okay. If you have these files, your serviceperson will be able to restore all or part of your system just the way you had it before, making it worthwhile to keep them around. These commands will work on all standard DOS and Windows installations, but if your installation was not done in the normal way they won't work properly. If you DOS reports File not found when typing these commands, don't worry. It just means there were no appropriate files where DOS is looking for them.

These commands are typed at the c: _ prompt from DOS.

```
md a:\windata
md a:\dosdata
copy c:\*.bat a:\dosdata
copy c:\*.ini a:\dosdata
copy c:\*.cfg a:\dosdata
copy c:\windows\*.ini a:\windata
copy c:\windows\*.grp a:\windata
copy c:\windows\*.dat a:\windata
copy c:\windows\*.cfg a:\windata
```

You'll need to create a fresh, clean boot disk every time you upgrade to a new version of DOS, and you should create a fresh, full-featured boot disk every time you install one or more new programs on your system.





(ewc HLP256,HLP256_TILE,MAINMARK.BMP)

Making emergency start-up boot disks

Windows 95 makes it easy



Windows 95 gives you the option of creating an emergency start-up disk when you first install it on your system, and if you didn't do it then you can make one any time you like. Here's how.

1. Click the **Start** menu and select the **Settings**.
2. From the new menu that appears, select Control Panel.
3. When the icons appear for Control Panel, double-click on **Add/Remove Programs**.
4. At the top of the window that pops up you will see a tab on the far right called **Startup Disk**. There's only one button to press and no options...it couldn't be easier.
5. Store your emergency startup disk with your other utilities. If you start playing around with Windows 95's configuration (and if you spend much time using it eventually you'll want to do just that), you are almost certain to need it at some point.



While we're on the subject of damage and emergency restarts, you *do* have your original DOS and Windows disks, don't you? If your dealer sold you a system with DOS and Windows installed, they are breaking the law if they did not supply you with the manuals and either the original disks or images of those disks which you can make into disk copies using a program pre-installed on your computer for this purpose.

If you paid for DOS and Windows when you bought your system, you have a right to the disks and manuals. A large number of novice users will need these disks to reinstall DOS or Windows at least once in their first year of computing.



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Checking your hard disk for errors

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;compun2.bmp}Early in DOS' evolution Microsoft added a repair tool for hard disks and floppy disks called CHKDSK.EXE with their brand of DOS, and every other DOS manufacturer has since come up with their own version. Newer versions of DOS and now Windows 95 include a more full-featured repair tool called Scandisk. This program checks your hard disk for errors and corrects most of those it finds. Sometimes the errors are so serious that they ruin a whole software package. Sometimes only a document is damaged, and if you're lucky the damage might occur with a file you'll never need.

CHKDSK.EXE is a very important procedure, and it should be done once a month even if you only use your system casually. It's important because these errors can -- and do -- happen at any time for almost any reason. A stray gamma ray from the sun can damage a file. A glitch in DOS, Windows or one of your programs could do it. It could simply be old age catching up with your computer. But eventually almost everyone has disk errors.

A program Windows doesn't like



You can't run CHKDSK.EXE from Windows, or even by double-clicking the MS-DOS icon from Windows and typing CHKDSK. Even if you have Windows 95, you will need to have the Windows version of Scandisk to use it from Windows. In order to run CHKDSK.EXE you must quit Windows completely to do it, and you need to see the c:_ prompt and the flashing underline cursor.

The command you type to use CHKDSK.EXE as a repair tool and not just as a diagnostic test is:

```
chkdsk /f
```

...and press **Enter**.

Run with the all-important /f parameter (for "fix"), CHKDSK.EXE will check the disk for errors and fix any errors it finds. If you see messages saying entry truncated or crosslinked clusters while the program is working, you have file damage and CHKDSK.EXE is doing what it can to fix it. Don't panic unless your programs stop working or begin to behave strangely, because most of the errors CHKDSK.EXE will find are harmless. If it finds "lost allocation units", it will ask you if you want to save them to files. Always answer [**Y**]es. You may never need this data, but if you do, it will be there for a technician to fix, and often this data can be used to repair a lost document in a fraction of the time it would take to recreate it.

Scandisk vs. CHKDSK.EXE



If you have MS-DOS 6.2 or higher, or Stacker, DOS will also ask if you want to run Scandisk to check for physical errors. This is because CHKDSK.EXE only looks for file errors, which is digital garbage. Scandisk looks for actual damage to the disk.

Any time DOS or Windows tells you it can't find a certain sector, run Scandisk. Otherwise it's usually safe to run it only about twice a year, or as often as four times a year once your system reaches three years of age. Consult your DOS manual for more detailed information on Scandisk and CHKDSK.EXE errors and their meanings.



If you don't have MS-DOS 6.2 or higher, you don't have Scandisk. You can use Norton's Disk Doctor for this job if you have a copy of Norton Utilities or the Fix-it Disk that might have come with Norton Desktop for Windows.



(ewc HLP256,HLP256_TILE,MAINMARK.BMP)

CMOS Data and Battery Replacement

The CMOS is a chip inside your computer that holds important data regarding how your system is set up. Particularly important is information about your hard disk, such as the number of heads (like the heads on your tape deck), the number of sectors and tracks (usually called cylinders on a hard disk, although that's not what they actually look like) and a few other things. All too often dealers won't supply you with the manual for your hard disk when they sell you a computer, and that's often the only place you'll find this information. Some dealers are nice enough to put the data on a sticker on the back of your computer, but most don't do this, so you'll have to get this information yourself.

If you'd like to do the CMOS information backup exercise yourself, we suggest printing this topic by clicking **File** and selecting **Print Topic**.

A safeguard against catastrophe

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;killcptr.bmp}Why do you need this information? If you ever suffer a catastrophic failure, change your main circuit board (motherboard) or the clock battery in your computer dies, you'll probably lose this information and have to put it back by hand. If you've noticed that your system is losing several minutes or more a day when it never did before, it's a warning to get a copy of your CMOS system data right away, because your battery is probably on its last legs.

There are many ways to get this information, and several utility programs claim to give it to you on disk, but if you can't get into your computer after a catastrophic failure, how will you ever read the information from the disk? You should also have it on paper.

How to get to your CMOS data

As you boot your system, you'll probably see a message that says:

Press to run Setup

...or a similar message that tells you how to get to the computer's built-in setup or configuration program. Do whatever the computer tells you to do to get to the setup program. On some systems, you don't get this message. You can force the computer to show you its setup screens by pressing and holding any key on the keyboard while it's booting up, and if that doesn't work, try pressing **Ctrl+Alt+S**, or any three-key combination of **Ctrl+Alt+Shift** plus **Escape** from the C:_ prompt. If none of these work, you may need help to get the important CMOS information.

On most systems from 286 to Pentium, there are two or more set-up menus. There's usually a standard menu and an extended menu. On 386 and 486 systems, you may also see an advanced chipset menu which comes with all kinds of warnings. We're going to move carefully here and not change anything, so don't worry about the warnings.

The first CMOS menu screen

Enter the standard CMOS menu first. If the information is meaningless to you, don't worry about it. It will have meaning to a serviceperson or computer handyman. Turn on your printer and press the **Print Screen** or **PrtSc** key on your keyboard and see if you can print the information on this screen. If you can't, try **Shift+PrtSc**. If that doesn't work either, you'll have to copy the information down by hand.



You can stop after this first screen if you have a 286 or 386, because you now have the most important information. If you have a 486 or Pentium, it would be wise to get some more information. Press the **Escape** key to exit the setup screen (or whichever key the computer tells you will exit without making changes) and you're done.

Other CMOS screens



Now enter the extended CMOS screen and print that screen too, and then print the advanced chipset screen as well.

When you're done, either press the reset button on the front of the computer or -- if you understand what this means -- exit **Setup without saving**, and your computer will restart normally. File this information with your computer's manuals so you have it handy in event of an emergency. It has saved thousands of people the cost of a service call or shop visit.

The next topic describes the most common circumstance where most users need this information.





(cwc HLP256,HLP256_TILE,MAINMARK.BMP)

Clock batteries: what they are and how to replace them

How to save a fifty-dollar service bill on a five-dollar replacement part



Almost all IBM-compatible computers come with a built-in rechargeable battery that keeps the clock active and stores the CMOS system data on a chip when the computer is turned off. But like all rechargeable batteries, these wear down and eventually need replacing. One day they'll simply refuse to take a charge and that's that.

These batteries are soldered directly to the computer's main circuit board and they're not usually considered replaceable. Instead, you purchase a CMOS battery pack, which is a small pack which holds four AA-cell batteries, has a self-adhesive sticker on the back, and a clip for attaching to the computer's main circuit board, for about \$5.00. These are becoming scarcer, and the more common type of replacement battery is a \$15.00 five-year lithium battery. If you can find the appropriate spot for it on the circuit board, just plug it in, stick it to a metal surface on the computer's case and you're finished.

The plug confuses many users because it's usually not labelled, but if the connection posts on the motherboard say **Battery**, don't worry if you plug it in wrong. It won't damage anything to plug it in backward, but it won't work either.

An important warning



On the other hand, if the connection posts are *not* labelled and you aren't sure where the plug should go, leave the job for someone else. It is unlikely, but possible, that you could attach the battery plug to the wrong pins and accidentally fry a piece of hardware.

One of the flakiest parts on any PC



We have seen ten-year-old systems with rechargeable batteries still going strong and two-year-old top-of-the-line 486s whose batteries were already refusing to take a charge. It's like a flat tire; you never know when, or if, you'll ever need a repair, and if you don't feel confident doing that, a serviceperson or serious hobbyist can do the job for you in about fifteen minutes.



If your battery dies before you can get the CMOS data copied down and you can't get the information you need from your dealer or serviceperson, MicroDrives Canada has a toll telephone line where they offer important technical data on virtually every kind of hard disk you're likely to see. The number is 1-900-451-3036. The cost is CDN\$5.00 for the first minute and CDN\$3.00 for each additional minute. If you open your computer and get the make and model number (for example TEAC SD-3105 or Seagate ST-535) before you call, you can usually get the information you need in less than two minutes. You might also ask your dealer if they know of a less costly 1-900 line where you can get this information.





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Dust buildup: What to do...or not do

We disagree with a lot of technicians about cleaning PC's. In our opinion, internal cleaning of most older PC's simply isn't necessary in most cases. Well-made systems will run for a decade and collect a quarter-pound of dust, lint and build-up, and by that time they're worth about the same as it costs for a professional cleaning. Newer PC's are another matter. Dust buildup contributes to heat buildup, and 486 and many Pentium computers create a *lot* of chip heat.

Goodbye to the worries of yesteryear



Most of the concerns of a few years ago (for example never smoking near a computer or discarding any floppy disk you've touched with your fingers or brushed with a hair) simply don't apply nearly as much today. Disks, floppy drives and circuit boards are much more durable today, and it's not uncommon for five-year-old systems owned by chain smokers to have a visible brown film of tar on the circuits and never miss a heartbeat.

The parts most likely to fail due to dust buildup are floppy disk drives, tape drives and power supplies. Aside from the switches on the front of the case, these are probably the only components in your computer with moving parts...except for your CD-ROM drive, which can be cleaned with the same accessories you use for your home and car CD player.

A simple do-it-yourself procedure



All that's required to clean dust out of a PC is to remove the case screws (there are usually five on a desktop case and six on a tower case), disconnect the electrical cable and *external* device cables, take off the cover, carry the computer's chassis outdoors and either blow or fan the excess dust away. When you finish blowing, push open the drive doors on the front of the two floppy drives and blow into them to clear any dust that may have settled there. All that will be left is tar, if there are smokers who live or work near the computer; and/or a thin film of build-up on the circuit board. This can cause short-circuits and partial circuits in *some* instances,

The only possible problem with this procedure is that blowing (or, for that matter, vacuuming) away the dust may leave small particles of debris on the floppy disk heads. It's a good idea to run a cleaning disk through your floppies for five to fifteen seconds after a blow-out.

Even this simple cleaning shouldn't be needed more than once a year, once every two years if you have a clean work area or an air filtration system.

Old PCs: better left alone?



There's some question about whether you should remove dust from an old PC at all, particularly if it's not showing any problems. All too often, office systems that sit stationary for years suddenly develop problems with cable connections and chip contacts when they're moved for cleaning or transport to another location. Some servicepeople who have encountered this problem will avoid cleaning old 286 and XT systems unless their clients insist upon it.

If you do decide to blow dust out of an old PC, take the opportunity to check cable and card connections while the machine is open, and chip connections as well. Areas of high humidity tend to cause earlier corrosion of contact points on cards and cables where they connect to the main circuit board of your PC, and sometimes they like a little jostling back and forth to scrub away the corrosion.





(owc HLP256,HLP256_TILE,MAINMARK.BMP)

Chip creep: when old chips decide to walk away



Chips that sit in their own sockets (as opposed to those which are soldered directly to the circuit board) occasionally run into a peculiar problem known as *chip creep*. The pins for these chips sit in spring-loaded sockets. As the computer heats and cools every time you turn it on and off, these chips have a tendency to walk out of their sockets.



When and if you ever you open your computer for dusting, it wouldn't hurt to hunt down every socketed chip in your computer that you can easily get at with a finger or thump a and firmly press these chips back into their sockets. You don't need to be gentle about this; you can press with about the same force you'd use on a thumb tack or push-pin. You'll hear a squeaking sound as the pins reseal themselves if the chips have in fact climbed partway out of their sockets

An important caution



Be very sure when you do this job that your computer is ***plugged in*** so that it's grounded, that the power is ***turned off*** so you can't be electrocuted or accidentally short-circuit any components, and that you have ***at least one finger*** resting at all times on the metal case so that static electricity can't damage the chips with a sudden spark from your finger.

Newer 80386, 80387, 80486 and Pentium chips use a special pin layout called a pin grid that you will almost never need to bother with. It's only the centipede-like DIP components that have a tendency to creep out of their sockets.





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Basic floppy drive maintenance



On some PC's, dust or cigarette tar will eventually stop a floppy disk drive from functioning. It's not the disaster it was in days when replacing these drives cost several hundred dollars. In most cases you can restore a non-functioning floppy disk drive by running a head-cleaning disk through it for ten or fifteen seconds. You can buy these disks for \$2.00-\$5.00 just about anywhere where computer supplies are sold.

A warning about old-style cleaning disks



If you're cleaning a 5-1/4 drive, don't use the old-style cleaning disks with the green cleaning surface. The surface can be like sandpaper and will literally grind away your tape head, particularly if dirt particles have already accumulated on the surface from previous cleanings. The new white-fabric-surface cleaning disks cost all of four dollars and are much gentler on your disk drive. This is important to remember if you want to keep your old drive, because used 5-1/4 drives are becoming scarce.

To clean or not to clean?



The manufacturers of these cleaning disks recommend you use them every month or so. We recommend using them only when you're having more difficulty than usual reading your floppy disks. It seems that some brands of disk drives come from the factory with a protective lubricant on the heads that may be removed by the solvent and the scrubbing action of the disk. We do know that many disk drives which have had no problems for years seem to become addicted to weekly cleanings once they've been cleaned for the first time using a cleaning disk with fluid.





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Tape drives, CDs and backup floppies

Retensioning backup tapes



Have you ever taken out an old cassette tape you haven't played in a couple of years, popped it into the tape deck and noticed echoes in the music that weren't there before? Those echoes are known as print-through. If you're a rock fan, you may remember the pre-echoes on early Led Zeppelin and Black Sabbath albums. They were the result of magnetic print-through contaminating layers of the master tape.

Manufacturers recommend rewinding tapes every year or so whether they are played or not as a way to prevent this print-through. Tape drives aren't supposed to have this problem, but they do suffer from other imperfections and require annual re-tensioning.

If you use a Conner, Colorado or other popular brand of tape backup, you should see an option on the backup software's menu for re-tensioning the tape. There may also be an option for checking the integrity of the data, and if you have tapes in long-term storage, they should be checked for integrity before and after retensioning, and the data recovered if errors occur.

Floppy disk life expectancy



Depending on their quality and density, floppy disks have a life expectancy of about five years. Cheap no-name disks tend to last about half that long. Tapes seem to expire at the whims of the fairies, but should last at least a year or two. When important backup data reaches the end of the disk or tape's life expectancy, it should be backed up again to new media. Keep both the old and the new disk or tape just in case the new disk dies of a defect before the old one...it happens more often than most people imagine!

The first sector on the disk is usually the first to die, and regrettably it's also the most important. If this part of the disk is damaged, you will often need to hire a data recovery expert at \$50 an hour or more to get your data back for you. Not a pleasant surprise when it's your 1989 diary, the novel you almost finished in '91 or last year's tax return.

Compact disks: not a good long-term bet



Compact disks are also prone to age, and if you want mass long-term storage on a custom-made CD, it would probably be a good idea to get two copies of the CD made at the same time. The cost of the second copy is usually considerably less than the first, and areas that may show wear on the first copy five years from now will probably be okay on the second.

Custom-made "one-off" CDs are particularly finicky. This media is supposed to last for decades, but many corporate archives suffered disastrous early corruption when it was discovered that the material underneath the lens of the CD decayed in as little as two years, making the data unusable.





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Printers: easy to please (well, *most* of them)



If you have a laser or inkjet printer, there's not much you need to do in the way of maintenance aside from the same cleaning you'd give any other appliance. These are sophisticated units and should only be serviced by experienced professionals or a fairly competent handyman, but here are a few things you can try on your own if you own a laser printer with the Canon SX engine. (Hewlett-Packard LaserJets and many others use the Canon engine.)

Jams, fades, voids and specks



Have you been experiencing frequent paper jams? One jam every two or three hundred pages is normal, but one in twenty is a real problem. If there are no torn bits of paper in the paper path, you could try replacing the toner cartridge, particularly if it's getting on in years. Poor quality, too-thin or too-heavy paper can also cause jams, and if none of these ideas solve the problem, get professional service.

Print that is too light is a sign that your toner cartridge is just about used up. Replace it before it dies completely, because a cartridge low on toner will leave excess toner deposits on the printer's fuser roller which binds the toner to the paper. This will result in spotty or distorted prints even after the cartridge is replaced.

Vertical streaks, smears, blotches, voids, specks and print drop-out are all signs that a professional cleaning is needed.

Dot-matrix printer maintenance



Dot-matrix printers use ribbon cartridges rather than toner cartridges, and they generally only need cleaning every year or two. Window cleaner can be used to clean the roller, and the best way to clean the print head is with a dry, worn-out ribbon. Dot-matrix printheads tend to be self-cleaning. The ink used in all factory-specification ribbons contains a special lubricant to make sure that ink deposits don't build up on the print head's pins.

Print a self-test page (your manual will show you how to do this) with a worn-out ribbon, and this will usually clear any ink deposits from your print head's pins. If it doesn't, you may need a new print head, and unless you need your dot-matrix printer for multi-part forms, a new print head will probably cost more than your printer is worth. Used dot-matrix printers are seldom worth more than \$100 and usually less than \$50 unless they're heavy-duty units for commercial use.

Dust can be cleared from dot-matrix printers the same it is cleared from inside a computer: remove the ribbon cartridge, take the unit outside and blow into it.



Monitor maintenance? Well, let's see...how often do you take your TV set in for routine maintenance? Never? Then why do it with your monitor? They can be cleaned of dust every couple of years if needed, but aside from that the only real maintenance they need is an occasional wipe of the screen with some window cleaner.

There is one exception. If you are concerned about electromagnetic and x-radiation from the picture tube, you should have the monitor's flyback adjusted every year or two by a technician with the proper measuring instruments. Even low-radiation monitors may be well above government standards for emissions after a couple of years of use.





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Upgrading how-to's, when-to's and when-not-to's

Overpaying for underperformance



There are literally millions of people who have spent too much (often *far* too much) on hardware or software for the job at hand. Many were coerced into upgrades they didn't need. When work bogs down because of a slow system, it's obviously time to step up, but don't make the mistake of upgrading for upgrading's sake.

Thinking realistically



If you are productively using Lotus 1-2-3 for DOS or WordPerfect 5.1, think long and hard before jumping on the Windows bandwagon. Yes, studies have shown that there are performance benefits, but other studies have shown that there are minimal gains to be made by switching from DOS, and lost productivity in the learning period could wipe out any time savings you might expect over the following year. The point is that no one except you or a consultant familiar with your work can say unequivocally that yes, you will come out ahead with an upgrade.

Upgrading operating systems: a crap shoot



Been told that you have to have that new version of DOS? The simple fact is that most businesses don't need anything more than MS-DOS 5.0 or PC-DOS 5.1. In most cases, the benefits of DOS' newer features are barely noticeable on office systems running DOS or Windows. Home systems seem to prefer DOS 6.0 or higher mainly due to the enhanced memory management needed by many games.

```
{ewc LZANI.DLL,LZANIMATE,GRAPHICS.DAT;oldtrn1.bmp}
```

If, on the other hand, shrinking hard disk space is your biggest current problem, an operating system upgrade to MS-DOS 6.22, with built-in DriveSpace disk compression; IBM or Novell DOS 7.0, with the superior Stacker compression software; will add an enormous amount of new free disk space, saving you the cost of upgrading hard disks until you need a whole new computer system. Windows 95 also offers disk compression, but this is one the worst possible reasons for choosing it as an upgrade.

As for Windows, look hard at the real benefits of Windows 3.11 or Windows 95 on a home or office system before jumping from the version you're using. The performance increase promised by the Windows for Workgroups Add-On has often been far less than spectacular, and its extra software is generally useless to people who do not compute on LAN-type networks.

Version X.0 anything (especially 1.0) is a gamble



Treat software upgrades like new model cars: give the manufacturer time to work out first-run bugs before taking the plunge, unless the promised improvements are so great that you can't resist. Improved features often come at the expense of serious bugs that don't show up

until the product is out in the marketplace. Let those users who have to have the new product troubleshoot it and suffer the growing pains so that you don't have to.

As a general rule, give a new program six months and see if the manufacturer doesn't release an intermediate upgrade to fix bugs. MS-DOS 6.0, CorelDraw 4.0, and IBM-DOS 5.0 and 6.0 were prime examples of new-release nightmares. According to many insiders, the Windows 95 upgrade released in September of 1995 had many bugs -- some serious -- that Microsoft allegedly knew were there when they shipped the software.

Bigger is not necessarily better



The newest releases of most popular IBM-compatible productivity applications are horrendous overkill. They all seem to have far more features, hooks, extras and gadgets than any user will ever need. The standard line in the industry these days is that you'll only use ten percent of your software, but that wasn't always the case. Choose functionality now over room to grow for the future....because at the rate the industry is going, there might not *be* a future.

Computer hardware loses value so quickly that it only makes sense to buy "in advance of need" with inexpensive components with non-silicon-based operation. These components include cases, monitors and disk drives. Virtually everything else will drop dramatically in price as newer, bigger and better comes to the marketplace.

The worst news of all: most upgrades are downgrades



The dirty secret in the computer industry is that hardware is not keeping pace with software. Software is a consumable, something we are expected to buy on an annual or biannual basis. Not so with computers, and as a consequence software has become much more complex and full-featured (many believe *over*-featured) than the hardware can handle.

More and more users are learning -- the hard way -- that the only way to make peace with these new "monster applications" is to buy them big, comfortable homes. software upgrades often demand hardware improvements, but the size, complexity and power of today's industry standard applications frequently demand top-of-the-line hardware before they're usable for any serious work.

Don't believe it? Try running a new word processor on a standard Pentium machine with Windows 95 and comparing various operations with the speed of a standard 386 machine running a word processor of its day and Windows 3.0 or 3.1. Granted, some operations will be quicker on the new machine, but you might be very surprised -- and dismayed -- at how slowly many others are performed. Oh yes, the Windows 95 Pentium machine will be more full-featured, but how many of those features will you actually use?

An industry seduction



Five years ago this curse was reserved for elite versions of productivity programs which might have sold for thousands of dollars instead of hundreds...or less. Rapidly expanding home and business markets have permitted publishers to offer their top-of-the-line products at economical prices. This means greater access to quality software, but all too often the product is monstrous overkill. How many users need the complexity of a Quattro Pro or a WordPerfect, even at less than \$100? Most users can survive quite comfortably, and all too often more efficiently, with the spreadsheet or word processor packaged with a works suite.



There is still a strong public perception that you *need* the industry standard applications to be competent and compatible. But think about this. If you could suddenly buy Greyhound luxury touring buses for the price of a tent trailer, could you afford the gas, maintenance, licensing and driving lessons it would require? Make no mistake, when high-end applications go on offer at bargain-basement prices, you face the same sort of dilemma.





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An upgrading checklist

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;caulk.bmp}Here's an antidote to upgrade insanity. The next time you consider an upgrade to your productivity software or utilities, ask yourself the following questions. Print this topic if you like to have it as a ready reminder. If you can't answer yes to question 7 and at least four others, think twice about upgrading until you feel a definite lack in your efficiency or comfort. Stick with what you have, with what you *know*, and your productivity will benefit. It's particularly important as a new Internet user to keep an eye on the challenges you give yourself because making the most of the net will require a fair bit of learning.

You should also notice a side benefit from the increased comfort of staying with what you have: greater creativity. Nothing saps creativity like too much new information and too little knowledge to put it to use.

-
1. Can your hardware take the performance hit you're almost certain to suffer with any major upgrade? If not, will it be cost-effective to upgrade both your hardware and your software to accommodate the demands of these new features?
 2. Very few major upgrades are truly plug-and-play. Even if it's only the interface which has changed, you'll still need time to adjust to it. Can you afford the time and stress required to learn the new features?
 3. The more system hooks, utilities and replacements you use -- and there are hundreds available for every popular operating system -- the greater your chances of incompatibility with your existing set-up. Are you willing, or even able, to troubleshoot these problems? If you're not sure, answer no.
 4. Your competitors might still be using a 1983 version of VisiCalc on an old Apple [system, and using it effectively. Do the demands of your work truly necessitate the improvements this new version will offer?
 5. No ethical consultant will advise an upgrade unless there are clear productivity benefits or the client is feeling restrained by their current software. Are the new features things you already know how and where you'll use, or goodies you've been craving for some time? Are you sure they're not gadgets you'll play with for a day or two and never find a use for?
 6. Many, if not most consumers, purchase top-of-the-line software because an advertisement, a colleague or a consultant hyped them into believing they needed it. Were you suffering before you heard that the latest version does things you can't do now?
 7. When you buy productivity software, you're essentially purchasing a slave. Its references ought to meet the same standards you'd apply to any prospective employee. Have trusted colleagues or industry professionals proven to you that the new version will faithfully perform the tasks you expect of it?





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Right computing for the 1990s and beyond



This section might be a touch too "bleeding-heart" or touchy-feely for some readers. You might want to skip this part of the PC Owner's Survival Guide, but we felt that since the information was available and since such a large number of people are currently interested in these issues that we'd include the section for those who might want it.

The present generation of personal computers is still a long way from the ideal of a human-friendly appliance with the promise of being a great equalizer of culture, intelligence and creativity. The image of computers as the domain of the misanthropic and the disenfranchised still prevails, and this image is often fostered by the industry itself. Love them or hate them, the beasts have valid reasons for being. They save time, enhance creativity, keep better records, and offer unparalleled opportunities for low-cost education and entertainment. But if you expect to achieve these benefits at a minimal cost to your soul and your health, be prepared to spend a little more time and money than the most owners. Responsible technology always seems to demand more than simple consumption.

Many of the topics discussed here are dealt with in considerably more depth in [The Ergonomics Report](#).



Software



[Legal issues regarding software and copyrights](#)



[Software publishing: information marketing or cybertraffick?](#)



Hardware



[Letting go of the Joneses](#)



[Radiation and emissions protection](#)



[Visual stress reduction](#)



[Noise reduction](#)



[Gas-off from new computers](#)



Right computing

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Legal issues regarding software and copyrights

Software piracy: playing in moral grey areas



Self-honesty is usually the best place to start. When it comes to PCs the average owner is far more likely to fudge on their own ethics when it comes to software than perhaps any other area of their life.

software piracy -- the use of illegal copies of copyrighted commercial software -- is a serious concern to the industry. Several years and tens of millions of dollars have been spent searching for ways to combat loss of revenue without alienating the public. It's a battle they won't soon win. Piracy is the norm among home and business PC users, not the exception, and that's not likely to change in the near future.

So where do your rights begin and end? Simply put, you do not own software outright unless the author has expressly given you that right, just as you don't own the music in your album collection. What you own is a license to use it. Terms of individual licenses vary, but most programs permit you the use of a single copy on a single computer. You can't legally have one copy of the DOS or Windows operating systems on both your home computer and your notebook, even though you can only use one computer at a time. But you can legally use the same copy of most applications and utilities on both computers, provided that both systems aren't running the same program at once.

Morality aside, there's also the addiction issue



If you're not clear about your own ethics, it's all too easy to watch a software habit spiral out of control. It's not uncommon for hobbyists and professional users alike to build collections of dozens of programs worth thousands of dollars, only own licenses for a few, and only *use* a select handful for more than a couple of days. Veteran users tend to agree that there's nothing morally wrong with borrowing a program you only need to use once or twice. The same is usually true about purchasing an upgrade version of a popular package at a fraction of the cost of the full version even if you don't own an older copy of that program.

Industry-watchers aren't shedding many tears over the lost revenues of the Microsofts, Novells and Lotuses of this world. Instead they mourn the effect piracy has had on smaller developers. There are literally tens of thousands of skilled programmers who create useful software and distribute it either as shareware or in short production runs by mail order or through distributors. The sad truth is that the average user is far more likely to pay \$500 for a package they'll use less than once a week than to mail a \$25 registration cheque to the publisher of the program they've used every day for a year to connect with the Internet. The shareware segment of the industry has suffered enormously due to piracy.

The low-tech, free software alternative



There are thousands of programs available with no-cost licenses to do most of the things you want to do, from spreadsheets to chess games, but tracking them down isn't easy. Giving up

full-featured pirateware for freeware usually means giving up a lot of nice features. Erasing expensive programs you only need once or twice a year and can't afford to buy can feel like unnecessary self-denial. The registration fees for every shareware program you've used enough to warrant payment could easily total several hundred dollars. Going legal is a tough choice that often involves compromise and hair-splitting, and the decision is actually made more difficult by the behavior of the same companies that scream the loudest about piracy.





Right computing

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Software publishing: marketing or trafficking?

Victims of the hype



If you saw Microsoft's Christmas 1994 television ad campaign (This stuff is powerful...use it!) and sensed a strong similarity between their appeals and the seductive come-on of a drug pusher, you're not alone. What other consumer product industry refers to its target market as users? The industry has succeeded so brilliantly in creating the illusion of need for a product that didn't exist twenty years ago that it has public sanction to label first-time owners dummies.

The ethics of many top industry players are considered so bad by industry-watchers that there have been campaigns encouraging boycotts, government-mandated sell-offs, class-action suits and public anti-copyright revolt, variously centered around Apple, IBM, Intel and Microsoft. And when you look at the facts it's not hard to see why.

It's hard to resist the temptation to write your own rules when you control your market as well as these firms have. It's doubly difficult to resist the temptation of pirating a copy of DOS, Windows 95 or MS Office when you hear insiders refer to Microsoft over coffee as "cyberthugs" and toss off the phrase almost casually, as if Microsoft is only one of a dozen firms they could mention. (Our legal advisors have cautioned us against attributing this epithet to the person who actually used it or continuing in this particular vein. Suffice it to say that he/she is one of the best-known computer spokespeople and consumer advocates writing today.) In fact, piracy can seem downright virtuous when you realize that the reality of a Windows-dominated world leaves the consumer with little alternative choice. Apple has been slammed nearly as hard for their own business practices, and the complexity of OS/2 leaves the average consumer with almost no other viable choices.





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Letting go of the Joneses

Ah, those good old 16-bit days...



One of the easiest ways to get around the copyright dilemma is to voluntarily remain in dinosaurland, to stay behind the times as a conscious choice. You can purchase an old Mac or IBM-compatible 286 or 386 for a few hundred dollars. Privately-sold used systems usually include plenty of software, and most of these older systems are more than adequate for most jobs.

A non-color 286 system might sell for one-tenth the cost of a comparably-equipped Windows system. An older Mac II with software could be as little as one-fifth the cost of a new system. It's common to find used copies of WordPerfect for DOS, Bedford Accounting and dBASE at pennies on the dollar. We often see them at garage sales for a dollar to ten dollars a copy.

Other benefits of low-tech

Older hardware may have benefits beyond low cost. The industry has made significant advances in providing inexpensive, energy-efficient, low-emission products. Most new software is designed for high-powered processors and color monitors, and many find that these produce uncomfortable levels of several types of pollution. Lurid color overstimulates the visual cortex. Electromagnetic radiation from chips, picture tubes and power supplies plays havoc with immune function. Printers and fans make noise. Some claim that even the gyroscopic effect of a hard disk can have harmful effects. Older and less powerful systems tend to produce significantly less radiation than newer units. Unfortunately they also tend to produce a lot more noise.





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Radiation and emissions protection



Processor chips and other components emit extremely low frequency (ELF) electromagnetic emissions of a type that is difficult to protect against without lead shielding or expensive devices such as the Tesla ELF-shielding watch. The World Health Organization issued cautions about ELF exposure more than a decade ago. Some monitors protect against this type of radiation, but power supplies and even a computer's electrical cables can also produce significant amounts of this radiation.



This button connects with the section of the **Ergonomics Report** included with the kit which talks in much more depth about radiation-related issues regarding computers and high-tech.





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Visual stress reduction

Flicker



Color monitors in particular are prone to flicker. Monitor flicker is an optical and nervous stressor that some allege has negative effects on our thought processes by encouraging abnormal brainwave frequencies and resonances. Older amber and black-and-white monitors produce flicker at a much lower intensity; older color monitors on the other hand can be extremely stressful in prolonged use.

Newer non-interlaced monitors often claim to eliminate flicker...provided they're configured properly. Many are not. Even a perfectly tuned LR/NI (low-radiation, non-interlaced) monitor doesn't actually eliminate flicker. Instead it reduces the *perception* of flicker by decreasing intensity and increasing frequency beyond the visible threshold. It has been theorized, but not proven, that increasing refresh rate (the rate at which the color guns repaint the whole screen) turns a high-intensity 30-cycle-per-second visual and nervous stressor into a low-intensity 60cps stressor which affects psychic function. If true, color picture tubes of any kind will not be conducive to developing one's subtler senses.



The only affordable alternative to traditional cathode ray tube (CRT) monitors at this time is the LCD (liquid crystal display) screen found on laptop and notebook computers which don't flicker at all. LCD screens produce dimmer but much crisper images, and most people find them less visually appealing than CRT monitors. In recent conversations with computer professionals we have uncovered a large number of closet LCD-lovers who wait anxiously for the day when these screens become the norm in home computers.





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Noise reduction

Taming the digital din



Laptops are also very quiet, and computer noise can be a serious stressor for sensitive or creative people. Practically every new desktop computer available today comes with two cooling fans, one for the power supply and another smaller fan for the central processing chip. They also have hard disks that whine incessantly unless they're configured to shut down after a period of time. (The new Green PC standard allows monitors, CPUs and hard disks on properly configured IBM-compatibles to automatically power down to save energy after a few minutes of inactivity.) Low-noise fans are one option, but disconnecting the fans permanently will eliminate noise problems.

Any capable serviceperson can disconnect both fans in less than half an hour, but most will strongly advise against it. You will likely be told that reduced cooling will almost certainly result in early chip failure. Who cares? After five years the average PC has lost at least 80 percent of its value, and most heat-sensitive components have life expectancies of more than ten years in normal use. A fanless power supply might fail much sooner than a CPU chip, possibly in under a year, but once again, who cares? What artist or teacher will object to an annual \$100-\$125 power supply replacement for the sake of as much as 40dB less background noise in their workspace?

Airing your computer's guts



IBM-compatibles can be effectively ventilated fan-free by removing plastic covers from unused disk drive bays on the front of the case and unscrewing card slot flanges and connector knock-outs from the rear. The top half of the power supply's housing can be permanently removed to improve ventilation and prolong life. Chip fans can be replaced with less efficient, noiseless heat sinks for just a few dollars. (Many 486 and Pentium processors will behave strangely without a heat sink of some sort.) Desktop cases can be turned on their sides like tower-style cases, and the convection currents created by chip heat will take care of the rest.

Removing the fans will eventually make you painfully aware of the noise made by the average hard disk, particularly on older XT's and 286's. Much of it is resonant whine from the drive vibrating the computer's metal case; hard disk whine isn't nearly as noticeable on the average laptop. You can't eliminate this noise without unbolting the drive and encasing it in a Styrofoam block, which makes the drive too hot to be viable. But there's no reason why a home system that never gets moved can't have its hard disk unbolted and held up by two small strips of foam to allow air to circulate around its housing. This can eliminate up to 80 percent of hard disk noise with almost no significant increase in operating temperature.



Both of these procedures are safe if performed by a competent serviceperson, but be aware that they will probably void the manufacturer's warranty.

Virtually noise-free computers can be purchased for basic work, as long as you don't mind the hassle of loading everything from floppy disks. Second-hand Atari 1040STs and older Macs without fans or hard disks can be had for as little as \$100. Both offer excellent high-

resolution black-and-white screens which are more than adequate for word processing, drawing, everyday desktop publishing, games and bookkeeping. The data these older systems create will usually be convertible for use with newer Mac and Windows software, and high-quality software can be purchased for them for pennies on the dollar.





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Gas-off from new computers

The computer stressor no one talks about



New computers have an additional drawback most people don't consider until they get the beasts home: gas-off. Newer PC's tend to generate far more waste heat than their ancestors did, and power supplies work harder to keep up with the increased demand of high-resolution color monitors and powerful processors. Any component that generates enough heat will evaporate nearby chemical residues from the manufacturing process. Plastic parts give off residues for anywhere from weeks to years after manufacture, and heat will accelerate the gas-off rate. Some sensitive noses may even detect paint odor from a new computer's metal case.

Manufacturers and retailers are not likely to consider these fumes any more harmful than body odor, but many people report increased sensitivity and physical symptoms during the first few weeks of ownership. The only solution, aside from purchasing a used machine or a demo unit, is to leave a new computer running constantly in a warm, well-ventilated area with the monitor on and a screen saver activated for as long as it takes for fumes to drop to tolerable levels, usually one to six weeks.





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Random jottings



This section of tidbits may not save your soul, your sanity or your data, but we did have the material lying around, and since it takes up so little space, relatively speaking, in the kit, we decided to add it for your enlightenment and amusement.



[**DOS 6.0's buggy disk compression**](#)



[**Cleaning out those useless files**](#)



[**Delete protection: how to reclaim your own trash**](#)



[**Reclaiming DOS memory**](#)



[**Better sound without better speakers**](#)



[**Two timeless Windows tips**](#)



[**If DOS won't verify your data, who will?**](#)



[**Transferring old data to new computers**](#)



[**Silence is golden, not necessarily deadly**](#)



[**Surge protectors: no best-before dates here**](#)



[**Did you know...\(a collection of truly random tips\)**](#)



If you're using MS-DOS 6.0 with DoubleSpace compression software and haven't upgraded to MS-DOS 6.2 or 6.22, do it *now!* Beg, borrow or steal a copy of the DOS 6.2 or 6.22 upgrade. Microsoft only released this update after users lost thousands of files due to serious bugs in the software, and class action suits were actually launched against Microsoft as a result. Retail update disk packs are nearly sold out (you may find them at parts depots and a few mom-and-pop computer outlets), but the needed files can usually be obtained free from your regular support person. They may also be available from Microsoft's FTP site at ftp.microsoft.com.



Random jottings

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Cleaning out those useless files



This section might be a little too technical for some users. If you do not have experience working with DOS or Windows' File Manager you may wish to skip this section until you have a little more ability in the area of file management.

Pruning the deadwood

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;clutter.bmp}There's nothing like a ton of deadwood on a hard disk for scaring PC owners into believing they need upgrades that often aren't necessary. It's not uncommon for a well-used 386 to accumulate more megabytes of useless Windows files than useful data. It's often possible to prune enough dead weight from a hard disk to postpone the need for an upgrade for to another two or three years.

The precision pruning usually done by support professionals and technicians is usually too risky for the average user, but freeing an extra 10 to 50 megabytes of free space on a tight system is easy for any intermediate-level user once they know where the deadbeat data hangs out. In fact, useless data is so prevalent on IBM-compatibles that it's usually possible (but never advisable) to trim as much as 25 percent of the data on a system that's never been used without ever affecting its performance.



Many publishers have capitalized on this and created several automated routines for clearing out this useless data. CleanSweep is now available for old and new versions of Windows. Newer versions of Norton Utilities contain duplicate file killer utilities. Several other useful utilities are available as shareware. But if you don't want to spend the money on a dedicated hard disk cleaning utility there is usually a lot of trimming you can do yourself with a little guidance.



Click the printer button to print a copy of this topic as a reference in case you'd like to try it on your own.

Being your own maid



The first files to go should be Windows temporary files. In almost every case they're a complete waste of space. If you've used any serious Windows application for more than a month, you probably have useless .TMP files on your system which are doing nothing but taking up space. Users who turn off their computers before properly shutting down Windows can accumulate literally hundreds of dead .TMP files a year.

Depending on how the system was set up, .TMP files could be hiding in the c:\DOS directory, c:\WINDOWS, c:\TEMP, or a TEMP directory tucked inside of WINDOWS. These files are distinguishable as trash by the characteristic " ~ " at the front of their name and .TMP at the end (e.g. ~WRI3125.TMP). Using File Manager, DOSHELL or DOS' dir and cd commands, find the directory containing these files and delete every file beginning with ~ and ending in .TMP. If you're working from the DOS prompt and you're in the directory containing the useless files, use this command to erase them all at once:

```
del ~*.TMP
```



It's important that you only erase .TMP files, because .EXE, .DOC and other files with the same "~" character might be needed later. Don't risk losing them for the little space they usually take up. If you know what you are doing, you might want to check the dates on these files, and if they are more than a couple of weeks old you can usually consider them safe to delete.

A permanent end to temporary clutter



Here's a trick for making sure you never have to do the job again. Start Notepad and **Open** AUTOEXEC.BAT by typing `c:\AUTOEXEC.BAT` in the **File Name:** box (top left corner). Add the following at the very start of the file:

```
del c:\dos\~*.tmp
```

...then press **Enter**, **Save** the file, and **Exit**. (If you found the .TMP files in `c:\TEMP`, type `del c:\temp\~*.tmp` instead; if you found them in a TEMP directory inside of the Windows directory, type `del c:\windows\temp\~*.tmp`, etc.) From now on, every time you start your computer DOS will make a lightning-fast check of the directory where .TMP files are stored and automatically erase any deadwood it finds. If there's nothing to erase, DOS will display a congratulatory **File Not Found** message, letting you know that you quit Windows properly the last time you used it and no stray .TMP files were left over.

Erasing leftover DOS versions

The next best place to look for deadwood is in old DOS directories. If you've upgraded DOS since you bought your computer, you probably have from one to ten megabytes of leftover DOS versions you'll never need again.



MS-DOS versions 6.0 and higher have a new tool for dealing expeditiously with this waste. If after a month or so you've discovered no reason to switch back to your previous DOS version, you can erase your dud DOS directory by typing `DELOLDOS` at any command prompt (`C:\>_`, `C>_`, `C:\WINDOWS\>_`, etc.) or by clicking **File** and then **Run** from Program Manager and typing `DELOLDOS` in the **Command Line:** box.

Erasing an unwanted version of DOS 5.0 might free up as much as 3Mb; unneeded versions of DOS newer than 6.0 are probably using up at least 4Mb and possibly as much as 10Mb each. No small potatoes if you're still tied to a 120Mb hard disk.



Sometimes you'll have several OLD_DOS directories on your system. If so, you can erase them quickly by highlighting any OLD_DOS directory from File Manager, pressing **Delete**, and telling Windows to erase everything when it asks about specific files.

A faster burial for dead DOS

You can also trim a lot of fat from your current DOS directory without causing serious problems, particularly if you have DOS 6.0 or higher.

 Don't use the built-in antivirus program? You'll free up well over a megabyte by killing all files in the `c:\DOS` directory starting with **MSAV** and **MWAV**.

 Don't use Microsoft Backup? Clear nearly two megabytes by erasing all files starting with **MSB** and **MWB**.

 Don't use **DOSSHELL**? Erase all files starting with **DOSS** and as much as another

megabyte is freed up.

◆ Don't want disk compression? Kill all files starting with **DRV** and **DBL** for another half-megabyte or more.

◆ Use PC-DOS, DR-DOS or Novell DOS? Check the manuals...they also have goodies you don't need which could be taking up precious hard disk space.

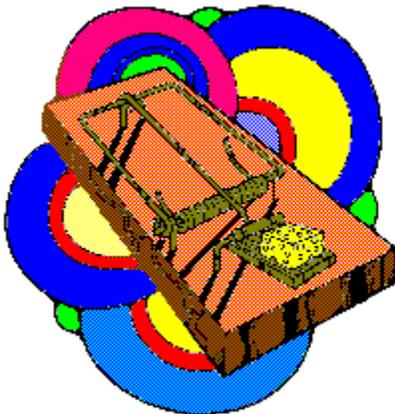


In most cases it's wise to stop your DOS pruning here, but you can usually erase a lot more files from MS-DOS 6.0 or higher without ever noticing it...as long as your system is not a laptop, has a VGA or SVGA monitor, and you don't use DOS HELP or any DOS programs older than 1992. The files most users will never miss include all files starting with A, ED, EG, FA, G, HELP, I, K, L, N, Q, R and X; as well as **COUNTRY . SYS**, **DELTREE . EXE**, **DISKCOMP . COM**, **DISPLAY . SYS**, **DRIVER . SYS**, **FASTHELP . EXE**, **FASTOPEN . EXE**, **FC . EXE**, **FIND . EXE**, **MOVE . EXE**, **SORT . EXE**, **SUBST . EXE**, **TREE . COM**, **VSAFE . COM** and **XCOPY . EXE**.



Just to be on the safe side, make a DOSTEMP directory, move these files into it, and wait a month before deleting them just to be sure you're not erasing something you were never told you needed. Add another meg and a half of free space if you can do without the whole list.

A data diet for Windows



The **WINDOWS** and **WINDOWS\SYSTEM** directories probably contain several more megabytes of files you'll never need, particularly if you use Windows for Workgroups and don't use any of the Workgroups features such as mail, scheduling or fax.

Never erase a Windows file you don't recognize and expect things to operate properly. *Always* move potentially expendable files to a temporary dumpsite directory and wait a month or two before deleting them. In general it's best to leave Windows pruning to an uninstaller program designed for the job or a technician who knows which programs need which files.

Goodbye to backups



The next space hog to seek out is the **.BAK** file. Many applications preserve backup copies of your work in case you're not satisfied with your most recent revision, and it's surprising how many users never realize they exist. Over a year or two, **.BAK** files can chew up dozens of megabytes on a well-used office computer. There's no quick way to get rid of them from DOS. Hunting through every directory with File Manager or **DOSSHELL** is probably the quickest manual method if you don't have access to one of the many freeware programs that do the job

automatically.

However, if you have **PKZIP.EXE** on your system -- an extremely common "technician's leftover" from service or setup, and an essential modem's accessory -- here's a lightning-fast set of commands for removing every .BAK and .BKP file on your hard disk. It works by building a list of all such files on your system, getting **PKZIP.EXE** to move every file on the list to a central location, including duplicate files with the same name, and then deleting the whole garbage heap in one fell stroke. This routine doesn't actually compress the data but only moves it, so it's almost as quick on a 286 as a Pentium.

```
dir /b /s c:\*.bak>c:\ziplist
dir /b /s c:\*.bkp>>c:\ziplist
pkzip -e0 -m -r -P c:\trash.zip @c:\ziplist
del c:\trash.zip
```



This routine is an excellent tool for sweeping out many other types of deadwood. Don't have a sound card to play .WAV or .MID files? You can erase them just as easily with the same commands by substituting *.wav or *.mid for *.bak in the above script. If you've switched virus scanners, you can clean up old, unneeded Microsoft Antivirus checklists by replacing the dir commands with `dir /b /s c:\chklist.ms>ziplist` and using the same **PKZIP.EXE** command.



Don't get carried away with your pruning...a lot of files with unusual extensions or characters such as .\$\$\$ or .OLD might be more useful than you'd guess from their names. As long as you have the space, it's usually advisable to keep anything that holds any promise of being useful later. Files no one but an expert should erase include all old **AUTOEXEC.BAT**, **CONFIG.SYS**, **WIN.INI** and **SYSTEM.INI** files. These old duplicates often have cryptic extensions such as **WIN.NDW**, **SYSTEM.SYD**, **CONFIG. \$\$\$** or **AUTOEXEC.UMB**. They take up very little space, and could provide a technician with a valuable paper trail for diagnosing software conflicts at some time in the future.

One last measure to insure against disaster



Finally, remember to wait a week or two before running **DEFRAG**, **SDEFRAG**, **SPEEDISK** or any other hard disk optimization program once you've finished pruning. If you've erased a needed file, you may still be able to get it back using an undelete utility.





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Delete protection

How to reclaim your own trash



Delete protection can be a lifesaver. There's nothing worse than sitting down at your computer and discovering that a file you erased last week is critical to a job you need done today. It's such a common problem that dozens of delete-protection schemes have been created for the commercial and shareware/freeware market, and virtually every operating system on the market today comes with delete protection software. Unfortunately, you don't usually get this protection until you specifically ask the software to provide it.

The Windows undelete programs included with recent DOS versions and all-purpose utility packages can easily be configured to preserve both deleted files *and* directories from premature loss. MS-DOS' undelete is considerably less versatile and doesn't allow for undeleting directories. Consult the manual for your DOS or utility package for details on configuring delete protection, or try configuring it yourself by double-clicking on an undelete application icon.



If you have a recent DOS plus a multi-utility package such as Norton Utilities, Norton Desktop or PCTools on the same computer, it's important to install only one delete-protection program. Accidentally configuring a second delete protector could have unexpected results, such as flooding your hard disk with useless data that refuses to be deleted.

Setting up delete protection



Generally speaking, you can set the protection schemes to handle file number and directory size limits as large as you like on newer systems. Limits of 1,000 files and up to 50Mb of space for the trash directory are not necessarily excessive on a new 1.2Gb drive. Most schemes will automatically "take out the trash" after a certain number of days to prevent overloading your system with dead data.

It's usually wise to set the delay on purging or "flushing" to at least 30 days, particularly if there are functions or programs you only use once a month. If your hard disk has the space and the program lets you do it, you might want to set the delay as long as a year.



You can often successfully recover deleted files without installing delete protection, but full-time protection offers a much wider margin of safety because it actually preserves an exact copy of the original file. This level of protection is virtually a necessity in homes where both parents and children use the same computer.





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Reclaiming DOS memory

Still stuck in the DOS trap



Windows 95 and OS/2 Warp both come with nifty updates to DOS that make significant improvements in the amount of memory available and the way your computer handles it. Nowhere is this more important than when it comes to good, clean (or dirty) fun...games. The high-speed, high-resolution graphics and sound in today's games consume enormous amounts of processor speed and system memory, and all too often stress your system beyond its limits.

Most of us are still stuck with a stand-alone DOS and Windows 3.1/3.11. There's nothing worse than getting your new game home and finding out that it won't run until you find a way to clear another 75 kilobytes of DOS memory or create one of those dreaded boot disks.

It's not much easier when you use your computer for a living. There always seems to be one essential program that insists on EMS and plays havoc your carefully-optimized DOS setup by chewing up a whopping 64k of precious upper memory for the EMS page frame.

Making use of what you have



Fortunately you can work around these problems quite easily with virtually all DOS packages released in the last two years.

The easiest way to handle most "out of memory" problems is with a garden-variety "clean boot", a boot configuration which loads nothing but DOS and allows the game full access to all the memory your system has available. You clean-boot DOS by pressing the F5 key within two seconds after seeing the "Starting DOS..." message displayed onscreen at boot-up.

Sometimes a program will insist on HIMEM.SYS and nothing else. No problem...well, not much of one. Another recent feature is called "interactive boot". Pressing the F8 key when you see the "Starting DOS..." message will cause DOS to ask you for confirmation of every command in the boot process.



This can be a royal pain in the backside with the average multimedia setup, but it doesn't need to be. HIMEM.SYS is usually the first command executed, so you can simply press "Y" to load that particular driver and then press and hold the "N" key, quickly bypassing all other boot commands, until the c:\> prompt appears, and backspace out the leftover "N"s at the command prompt.

EMS on demand



Handling the occasional need for EMS memory is a bit trickier, but still a lot less trouble than it used to be. The new DOS' now allow you to select or reject an individual driver or command at boot-up with the simple addition of a question mark in the command.

First you'll need to load CONFIG.SYS into Windows' Notepad or a text editor. Next you create a duplicate copy of your EMM386.EXE statement (the line that begins DEVICE=C:\WINDOWS[or DOS]\EMM386.EXE) on the line directly below the original command. Next you change both copies so that they each have question marks and one allows for EMS memory

while the other does not. If your original statement looked like this:

```
DEVICE=C:\DOS\EMM386.EXE NOEMS
```

...your new setup would have two statements that look like this:

```
DEVICE?=C:\DOS\EMM386.EXE NOEMS
```

```
DEVICE?=C:\DOS\EMM386.EXE RAM
```

The first command provides upper memory, no EMS, and up to 64k more DOS memory. The second command gives you access to EMS when you need it.



The next time you boot DOS, it will ask you with a [Y,N] ? prompt whether to execute the particular command. Simply type "Y" after the one you want and "N" after the one you don't want. Presto...EMS on demand.

Be sure to check your DOS manual before making these changes. Different brands of DOS may want the question mark placed at a different location in the command.

Custom boot menus: hackers' heaven, novice hell

{ewr LZANI.DLL,LZANIMATE,GRAPHICS.DAT;runsymb.bmp}If these relatively simple solutions doesn't satisfy you, you can always take an evening or two and learn the wonderful intricacies of custom configuration menu programming. Beginning with the most recent DOS versions, you can now tailor several completely different DOS boot setups and select them individually from a push-button list each time you boot. Be sure to have an emergency boot disk handy with copies of your original AUTOEXEC.BAT and CONFIG.SYS files before tackling this job. If this is your first stab at programming, you're almost guaranteed to need this protection at least once before you get the job right.

The biggest drawback to custom DOS boot menus? Your next operating system upgrade will probably handle memory problems well enough to make most of your programming skills obsolete.

The second-biggest drawback? Once you get used to programming boot menus, hacking these menus often becomes more fun than using the programs the menus were programmed to accommodate.





(ewc HLP256,HLP256_TILE,MAINMARK.BMP)

Better sound without better speakers

What your retailer won't tell you



Want better sound from your multimedia kit but don't want to pay for special speakers for your PC? If you have a stereo system in the same room, you should be able to make its speakers and amplifier do double-duty. All you need is a special cable that connects from the LINE OUT jacks of the sound card to the AUX IN jacks on your stereo receiver. Ask at your home entertainment accessory dealer for a *1/8" stereo male to RCA stereo male adapter cable*.

These cables are usually three feet or shorter, not nearly enough to reach from the average CPU to the average bookshelf stereo receiver. If their in-stock unit is not long enough, a walkie-style headphone extension cable will probably give you the length you need.



Most experts caution against using regular stereo speakers, which are usually unshielded (meaning they will emit some electromagnetic interference when you use them), as multimedia speakers for your computer. The argument is that speaker magnets play havoc with hard disks and floppy disks and could also interfere with the operation of the computer's circuitry. They're right on both counts. But if you have a quality sound system in the same room as your computer, it's likely that the speakers are at least four feet from your CPU and that you already play your stereo at times when you use your computer. At that distance your data and circuitry should be safe from all but the most monstrous sub-woofer magnets.

Two minor cautions



This setup shouldn't cause problems as long as the speakers are kept well clear of the computer and any cables connecting your peripheral accessories, and you don't accidentally set your floppies down too close to the speaker enclosures. The combination of a real stereo amplifier and quality speakers should give you a quality of multimedia sound you'll find much more pleasing to both the ears and the pocketbook than dedicated multimedia speakers.

This warning is more for your esthetic sense than your equipment: jacking a cheap sound card into a quality stereo system, or even a good set of headphones, will make any deficiencies in the card glaringly obvious.





(owc HLP256,HLP256_TILE,MAINMARK.BMP)

Two timeless Windows tips

Permanently personalizing Program Manager



Here are three very basic Windows tricks known to almost every veteran user which never fail to delight and amaze new users, particularly those who avoid manuals like the plague, which is most of us.

Tired of having the look of your Program Manager change on you every time you boot your computer? If more than one person has access to your computer, you are probably faced with an ever-changing icon layout. It can be especially irritating if you have to hunt for the icons for your most-used programs because they keep changing position on you.

There's a simple solution for the problem. Start by disabling **Save Settings on Exit** from Program Manager's **Options** menu. Next, arrange group windows and icons in the manner that appeals to you. Now click on **File** and then click **Exit** -- and here's the big secret -- while at the same time *holding down the Shift key*. You'll see the hourglass flash for a moment, but Program Manager won't kick you out of Windows. Instead, "**Shift**"-**Exit** saves your current desktop to disk. The next time you start Windows, your Program Manager will look exactly as you saw it when it was saved.

Finally, to make sure it *stays* that way, tell no one who might mess with your handiwork how you did this.

DOS in a window



Another surprise to novice Windows users is that most DOS programs that don't use graphics (text-only) can run either as a window or covering the full screen, allowing for cut-and-paste of text and viewing of other windows while working in the DOS program. Some DOS programs don't allow it, most notably WordPerfect, but in most cases holding down the **Alt** key and pressing **Enter** (**Alt+Enter**) will convert a full-screen DOS program to a windowed program with smaller screen text and more intuitive access to the rest of Windows.

Okay, let's make it three...



Once you become handy enough with Windows to want to hacker -- or at least study -- your configuration files, there's a secret utility you'll find lurking in the SYSTEM directory of Windows called **SYSEDIT.EXE** that you'll probably find very handy. It isn't normally installed into the Program Manager setup of Windows 3.1/3.11, perhaps to keep novices from inadvertently messing up their systems. That means you'll have to dig it out and install it yourself.

System Configuration Editor is a quick, slick hybrid version of Notepad which loads **AUTOEXEC.BAT**, **CONFIG.SYS**, **WIN.INI** and **SYSTEM.INI** (others as well depending on the version of Windows), into separate windows in the same program for easy cross-referencing and editing. Windows 95 includes this utility too...and no, you can't get it to load into your **Start** menu unless you do it manually.

If it is available on your version of Windows, System Configuration Editor is available as an option from the main menu of F-A-S-T Emergency Windows Backup if you cannot find it on your system.

...and one for DOS



If you ever get a hankering to hacker DOS (and despite the dire predictions, there will be benefits from doing so for many years yet), you might not know that literally hundreds of obscure features have been added to the DOS utilities over the years that your manual may never mention and the HELP menu won't even hint at. You can uncover these switches, options and built-in help screens by using the /? parameter with most .EXE and .COM files in the DOS directory. Try typing **SMARTDRV /?** at the DOS prompt for a potentially rewarding taste of what you can find with just one DOS program.





{owc HLP256,HLP256_TILE,MAINMARK.BMP}

If DOS won't verify your data, who will?

The risk you don't hear about

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;bothends.bmp}One of the dirtiest secrets about DOS is that it doesn't check the integrity of your data while writing it to either your hard disk or a floppy disk unless you specifically ask it to. It's a secret because in most cases you don't need to know. It's a *dirty* secret because by the time you find this out, you usually wish someone had told you about it sooner.

The reasoning behind this decision was fairly sound. Hard disks are generally pretty reliable, and disk reads and writes have always been the most time-consuming aspect of computing. If DOS has to make a second pass on every bit of data written to a hard disk or floppy disk to insure that data was recorded accurately, it increases the time taken for disk writes by as much as 60 percent. Normally you'll only want verification on the occasions when you're writing to a floppy disk. Even then some experts say the risk is negligible.

Others say it's serious enough to warrant using verification all the time. Longtime users all seem to come around eventually to the notion that one should never trust no-name floppy disks, even new ones, and after a year or two not even brand-name floppies should be trusted to be accurate. Even high-quality floppy disks develop errors at rates as high as ten percent per year. Hard disks are much more reliable, but some technicians consider any hard disk to be a high-risk candidate for physical defects after three years of regular use.

It's ten o'clock. Do you know where your data is?

{ewl LZANI.DLL,LZANIMATE,GRAPHICS.DAT;holmes.bmp}If you frequently need to copy data to floppy disks, it's a good idea to have verification turned on at least temporarily until you're sure data has been properly stored. If you're running an old XT, 286 or 386 and you're concerned about the security of your hard disk's data, it might be wise to have verification on all the time.

Permanently changing DOS' write verification to ON is a simple task. All you do is open Notepad or a text editor, load in your AUTOEXEC.BAT file from the c:\ directory, and add a line of text reading VERIFY ON to the top of the file, making it the first command. You can also turn verification on and off at will from the c:\> prompt by typing VERIFY ON or VERIFY OFF and pressing **Enter**, and it's a good idea to do so when writing to a floppy disk. Unfortunately, you can't do this from Windows unless you open a DOS window first or have a Windows program which provides this feature for you.

If all you want to verify is your backup disks, check to see if your backup software has a verification switch built into it before adding permanent VERIFY ON to your configuration.



You can make the verification switch simpler and available from both DOS and Windows by typing these two DOS commands:

```
echo VERIFY ON>c:\dos\on.bat  
echo VERIFY OFF>c:\dos\off.bat
```

Configuring write verification in Windows



Once you have executed these commands, they will create two small batch programs which will allow you to quickly turn verification on or off from DOS simply by typing **ON** or **OFF** and pressing **Enter**, and from Windows by using the **Run** command in File Manager or Program Manager and typing **ON** or **OFF** in the **Command Line:** box. It's rare, but possible, that these commands will conflict with a normal DOS/Windows setup, but it's unlikely you have software on your system that uses an **ON** or **OFF** command directly from DOS or Program Manager.



Turning on verification before copying files to a floppy disk is a good habit to adopt at any time. It's also devilishly difficult to remember if you've been copying without a safety net for several years.





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Transferring old data to new computers

New life for your old work



You might have data on disks from a stone-age computer which you've been told cannot be recovered or moved to your IBM-compatible. Perhaps the files were created on an old Franklin, Tandy Color Computer, Apple II or Commodore 64, or use one of the very early DOS formats which are no longer readable on new computers without special drives. These files can probably be recovered more easily than you think, particularly if it's just text that you want.

There are free and shareware programs available from shareware CDs, bulletin boards and flea markets which will allow you to read all these data types and probably others as well. The easiest way to tackle the job is to find a local hobbyist with the type of computer the disks came from who also has a modem. The files can then be loaded onto their computer and emailed back to you in a form you can handle, avoiding the problem of incompatible disk formats; or transferred directly from one computer type to another through a modem connection or null modem cable.



If this sounds too technical, don't worry. Anyone who has the gear will probably know how to do the job, and you can bank on data transfer rates charged by a hobbyist to be a fraction of what commercial firms charge for the same job.

If in doubt, fake it



There are even programs, which can literally turn newer computers into copies of dinosaur CP/M, CoCo II/Dragon, Amiga 500, C-64, Atari XE, Adam, Apple II, TI-99/4A computers and many others as well. This allows you not only to have your old data on your new IBM-compatible, but to run your old programs too.

These "emulator" programs are rarely perfect, and their cost usually reflects their quality. Many of them are freebies that were released after the developer got tired of trying to perfect the software, and in this stage they're often little more than highly ingenious "toys". The emulator you need may not allow your IBM-compatible to read disks created by your old system, and may not run the program you most need it to run. But when they do work they usually run at a reasonable speed and may allow you to use old software until you can find an inexpensive way to convert your data to a more recent and compatible format.

New life for old floppies



Dealing with single-sided IBM-compatible floppies and other strange formats isn't nearly as troublesome. The same places where you'll find the emulator programs should also offer a free utility kit from Germany called FDFormat which allows most -- but not all -- newer IBM-compatibles to read and write to obsolete or unusual PC floppy disk formats.



Be very wary about contracting for data conversion unless you have a guarantee that the data will be fully compatible with industry-standard formats such as ASCII or DOS text, Lotus 1-2-3 spreadsheet, or standard database-import formats. Converting and cleaning up an old client database or book manuscript created with oddball software on an ancient system could cost

hundreds of dollars if you're unlucky enough to have used a little-known software package.

There are conversion programs for virtually every well-known application for virtually any computer made in the last fifteen years, but the cost of someone who knows can use this software -- and knows where to find it -- may be prohibitive if the data isn't very valuable on its own.



Most of the programs suggested here are publicly available for free, but there may be a fee charged for the disk on which they are provided. An excellent all-purpose source for most of these programs, and virtually any useful utility you might ever need, is the SimTel CD-ROM from Walnut Creek. It's a huge collection of 10,000-plus DOS programs updated two or three times a year from the most popular Internet repository of non-entertainment DOS software.





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Silence is golden, not necessarily deadly

Going fanless: is it worth the risk?



The noise generated by the latest generation of PC's can be a serious stressor for sensitive or creative people. Virtually every new desktop computer available today has two cooling fans, one for the power supply and another smaller fan for the central processing chip. Low-noise fans are one option, but disconnecting the fans permanently will eliminate noise problems once and for all, and may be the only viable option for a computer used in a quiet workspace.

Any capable serviceperson can disconnect both fans in less than half an hour, but most will strongly advise against it because reduced cooling will almost certainly result in early chip failure. Who cares? After five years the average PC has lost at least 80 percent of its retail value, and most heat-sensitive components have life expectancies of more than ten years in normal use. A fanless power supply might fail much sooner than a fanless CPU chip, possibly inside of a year, but once again, who cares? Few artists or teachers will object to an annual \$100-\$125 power supply replacement for the sake of as much as 40dB less background noise in their workspace.

Airing out the guts



Most IBM-compatibles can be effectively cooled without a fan by removing unused disk drive bay covers from the front of the case and unused card slot flanges and knock-outs from the rear. Most of the power supply's housing can be permanently removed to improve ventilation and prolong life. "Chip fans" can be replaced with less efficient, noise-free "heat sinks" for just a few dollars. (Many 486 and Pentium processors behave strangely without at least a heat sink.) Desktop cases can be turned on their sides like tower-style cases, and the convection currents created by chip heat will take care of the rest.

Removing the fans will eventually make you painfully aware of the noise made by the average hard disk, particularly on older XT's and 286's. Much of it is resonant whine from the drive vibrating the computer's metal case; hard disk whine isn't nearly as noticeable on the average laptop. This noise can't be eliminated without unbolting the drive and encasing it in a Styrofoam block, which makes the drive too hot to be viable. But there's no reason why a home system that never gets moved can't have its hard disk unbolted and held up by two small strips of foam to allow air to circulate around its housing. This can eliminate up to 80 percent of hard disk noise with almost no significant increase in operating temperature.

Doing it sensibly



Both of these procedures are safe if performed by a competent serviceperson, but be aware that they will probably void the manufacturer's warranty if you have a fairly new computer. You should also avoid going fanless if you have a fairly high-end system, a Pentium rated higher than 60MHz or an older Pentium with heat generation problems, or have added a lot of extra cards to your system which could be additional heat sources.

We have heard of some hopped-up systems which ran so hot that the case could barely be touched with bare fingertips, and obviously such a system needs all the cooling it can get. Your system probably never gets more than slightly warm to the touch. So if your

serviceperson still insists on a chip fan, ask why most notebooks don't include them. If they insist on a power supply fan, ask why the fanless power supplies on older Macs, Ataris and Amigas last so long.





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Surge protectors: no best-before dates here

Stripped power strip?



If you've been using an inexpensive four- or six-outlet power strip (power bar) with a built-in surge suppressor as protection against power line inconsistencies, you may not be as safe as you think. Surge protectors work by sensing sudden increases in power such as those caused by lightning strikes of power lines and quickly "clamping" the voltage, or greatly reducing its level, faster than it would normally take for a fuse or breaker to blow. When the crisis has passed, it allows normal line-level voltage through to the outlets again. If a surge is sudden enough and large enough, it can fry electronic components before fuses or breakers have a chance to shut off the power.

The actual surge protection is provided by a round disk the size of a quarter, called a varistor, which is soldered inside the power block or strip between the outlets and the plug. It's not commonly known that this disk degrades with time and use. According to some tests, they have a life expectancy of two years at most, and many will fail after the first high-voltage spike they receive regardless of their age.

You can buy replacement varistors for a couple of dollars at parts depots such as Radio Shack, but it's usually more trouble than it's worth, especially since you can't easily tell whether or not the component is reliable.

Yet another disposable product



Brand-new power strips with surge suppressors can be had for as little as \$4.00, so replacing an old varistor may be pointless unless you're conservation-inclined and have no other use for a power strip. Some technicians believe that cheap power strips shouldn't be relied upon for surge protection at any time. At best they will only suppress a powerful spike, possibly allowing less-powerful but still damaging voltage levels to reach your equipment.

Longer life, solid-state surge suppressors start from \$30 and run as high as \$150. You can purchase units that protect phone lines and electrical outlets as well as modems and fax machines. (It's possible for electrical spikes to travel through phone lines as well.) Some manufacturers of commercial grade surge protectors, also known as "power conditioners", will even warrant your equipment against electrical spike damage while it's plugged into their product.

Power line surges strong enough to damage electronic equipment are fairly rare in most urban areas. In rural locales with inconsistent power, or in certain businesses where high-voltage power leaks are possible, power conditioning may be essential. If you really need that protection, don't trust your electronics investment to anything less than quality solid-state surge suppression units.



And if you're particularly health conscious, you can purchase conditioners that correct anomalies in the current, reducing the level of ELF electromagnetic radiation emitted by the electrical cables themselves. The World Health Organization cautioned us to reduce exposure to ELF radiation as far back as 1984.





(ewc HLP256,HLP256_TILE,MAINMARK.BMP)

Did you know...

...that with an inexpensive adapter plug, you can plug almost any IBM-compatible keyboard into your laptop or notebook computer, and connect your home system's VGA or SVGA monitor directly into it for better look and feel?

...that you can often use inexpensive cables to plug your sound card into your stereo system and often save a small fortune on high-performance computer speakers?

...that in most Windows programs and functions with lists, including Program Manager and the Open and Save boxes, you can usually find the file or program you're looking for much more quickly by typing its first letter? It's called command completion or file name completion, and more new programs use this all the time.

...that adding a second hard disk to your computer might be the most time- and cost-effective backup system you can buy? With recent price reductions, a second 500Mb hard disk may be as cheap as an internal tape backup unit and a couple of tapes, and will back up your data much more quickly. Not recommended if you work in a high-crime area or are at risk to have your computer stolen.

...that you don't need an expensive utility such as LapLink or File Shuttle Express to synchronize your notebook and desktop computers? You can buy inexpensive file shuttle cables from most dealers which connect two PC's using fairly fast printer port connections. MS-DOS 6.0-6.22 comes with baby network software called Interlink which lets you use the second computer's hard disk more or less as if it were in your own system, and IBM and Novell brands of DOS have their own intelligent file synchronization utilities included. If you're sticking with MS-DOS and want something easier than Interlink, ask your shareware dealer about two free synchronizer programs, one for DOS called ElseWare and one for Windows called SAMESAME.





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The Virus Awareness Kit



Before continuing with this section, we strongly recommend reading two other sections. The first is our short explanations of the exact meanings of [virus and trojan](#), and the second is a close look at **[Computer Virus Myths](#)**, recommended if this is a subject that really worries you.



[Computer Virus Myths](#)



[Introduction: Flat tires and broken fanbelts](#)



[Viruses, trojans and the Internet](#)



[Trojans: a greater worry than viruses](#)



[A seven-point battle plan](#)



[Backups and antivirus software: minimize your risk of infection](#)



Virus awareness

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Flat tires and broken fanbelts



We like to think of viruses and trojans as the flat tires and broken fanbelts on the Information Highway. They can put a fast end to your fun with almost no warning. But in most cases, the problems they cause are completely preventable with a little common sense and preparation. All you need are good, up-to-date antivirus software and a regular habit of making thorough backups of your most important data. Most veteran computer enthusiasts don't fear infections at all, although they do respect the threat.

It's true that a virus can destroy every bit of data on your system, wiping out months or years' worth of work. But it's also true that a flat tire can kill you...if it happens at the wrong time and in the wrong place. A little common sense and prevention will go a long way toward insuring that, just like a flat tire, even the most destructive viruses will never cause you more than a minor inconvenience.

Yes, you read that correctly. *Even the most destructive viruses need never cause you more than a minor inconvenience.* Ignorance is the root of all fear, and in the case of viruses and trojans ignorance has been perpetuated for far too long and hurt far too any people.

Virus panic



Virus panic has scared literally thousands of people away from the online world. In fact, the effects of the panic can be worse than the infection itself. Steve Winter, one of the authors of this software, became so concerned at the discovery of his first infection that he erased several dozen good floppy disks in an attempt to stamp it out. He only discovered later that it was just one disk which was infected, and some of the erased software was never recovered.

Virus panic is a damnable shame, because it simply doesn't have to happen. Period. If you're ready to learn the facts about viruses and trojans, put virus panic behind you once and for all, and enjoy the mountain of free and free-trial software on the Internet, we have two prescriptions which should cure you for good if you've been afflicted with this dreaded illness.

The first prescription for sanity



First we recommend browsing the Computer Virus Myths section by clicking this highlighted hotspot. This piece, created by two experts on viruses and released to the computing world as a public service, is one of the sanest and most informative introductions to computer viruses and virus panic that we've ever seen. It contains a lot of information you might not care about, so feel free to browse only the sections of interest to you.

The second prescription



Secondly, pay close attention to the sections on backups and antivirus software. They are your best line of defense against *all* kinds of damage to your data.





Virus awareness

(gwc HLP256,HLP256_TILE,MAINMARK.BMP)

How safe is the Internet?



The average Internet user will be lucky (or unlucky, depending on your point of view) if they *ever* see a virus. You can't get viruses from email, and any trojan contained in an email message will look like garbage and be trashed instantly anyhow. You can't get viruses from browsing pages on the Web, not yet at least, so Netscape, Mosaic and other such programs are quite safe. You can't get viruses from USENET newsgroups unless you are actively taking software, not just text messages, from these newsgroups. In other words, nearly all of the sights, sounds and especially the text documents are as close to being completely safe as you could expect.

The reason these things are so safe is because anyone spotting this nastiness is likely to go well out of their way to stamp it out in a big hurry. Trojans spread using text, sound and pictures have been rare and generally confined to very small groups. But that's not to say that nasty things can't be stowed away in pictures, sounds and text.

The real risk comes with obtaining programs from the Internet, because a program is by far the easiest thing for a virus to infect. Even then, if you're even moderately cautious, you might spend every hour of every day for a year surfing the net and never stumble upon a single virus.

Play safe, play sensibly



As with all things in life, you're as safe as you make yourself. It's just that simple. If you take care of your body, you won't get sick nearly as often. If you take care of your software, it won't get sick as often either. But just as you can't completely protect yourself against colds and flu, you can't completely protect against viruses and trojans. It's possible -- extremely unlikely, but possible -- that every copy of Windows ever created contains a trojan planted by a disgruntled ex-Microsoft programmer which will destroy data on every hard disk where it is installed on August 24, 1998 at 12:00 p.m., and no one might know about it.

It's also possible that you could be hit by a meteorite as you sit and read this. The odds on either of these two occurrences are extremely low.

So the choice is yours: you can play safe and sensibly, use preventative measures and endure the relatively low risk for the enormous potential rewards of the net, or you can hide.

The ultimate fun-killer



Nothing takes the fun out of getting new software from the Internet like the fear of a virus infection. Fortunately, your risk of infection from popular sites on the net is very small. How often have you heard of major infections from the Internet lately? Not often, we'll bet. If this was a common occurrence and a lot of people were being hurt by it, you'd better believe that the media would never shut up about it. You might remember the media hubbub over Michelangelo and the Internet worm. A serious destructive virus outbreak on the net would have the tabloid news programs talking about it for weeks and the government making even louder noises about regulation.

In fact, this type of reaction is precisely what happened with the infamous Michelangelo virus, which was designed to activate on a specific date. Tens of thousands of computers suffered data loss because the virus was only discovered a few -- too few -- days before it was

set to go off. Servicepeople still get calls every year on March 6 when it "goes off" from distressed users who have lost the use of their computers. We still know of companies that refuse to turn on their computers every March 6th for fear of a fresh outbreak, which is a reaction born of ignorance.

Alas, even though people still get nailed every year by Michelangelo it's just not news any more. Virus outbreaks on the Internet, though...now there's a headline writer's dream. If it was a serious problem, you'd know about it.

Viruses and trojans: no more than a minor annoyance



The risk of being infected by new DOS and Windows programs you find on the net is nothing more than a minor annoyance if you take the precaution of making regular backups of your important data. You can access the guide to backups from the PC Owner's Survival Guide main menu, and if you're still worried after browsing it we strongly recommended that you read the Computer Virus Myths section if you have not already done so. The sober, reasoned statements and sound advice offered there by Messrs. Rosenberger and Greenberg should calm most of your fears.

Never underestimate the cleverness of virus writers



On the other hand, never forget that virus programmers are smart people. They will test every antivirus program on the market to make sure that their new creation won't get noticed. No one, and we mean *no* one, can honestly promise 100 percent protection from viruses and trojans. Viruses have appeared in shrink-wrapped packages containing some of the most popular programs in the world. Even the major publishers get embarrassed from time to time by infections that escape their detection.



This point gets a double growl. It's not well-known to most intermediate-level users that one of the most common methods of spreading viruses is to *infect an antivirus program*. Fortunately, most Internet sites, online services and private bulletin boards are rigorously checked by the administrators.

Non-UNIX users are well-protected from Internet viruses and trojans



As a Windows/DOS user, you are protected from most of the serious destructive programs spread over the net. When virus programmers spread their destruction on the net, their target is usually the UNIX-based systems that do most of the Internet's grunt labor.

There has never been a known UNIX virus which could harm an IBM-compatible that was running DOS and/or Windows.

Let that sink in. A virus that infects your Internet provider is unlikely to cause you any more harm than a day or two of lost email and a short wait while they clean up their own mess.





(c:\windows\help\hlp256\hlp256_tile\mainmark.bmp)

Trojans: a greater worry than viruses

A much higher rate of destructiveness



Trojans are actually a much greater concern than viruses. A trojan horse is a piece of destructive program code that hides out in an otherwise harmless-looking file. Trojans don't usually spread themselves (they depend on you and I to spread them around), so they have a very short lifespan in the computing world. But unlike viruses, which can be relatively harmless, trojans are almost always highly destructive.

In fact, as a Windows user, trojans are virtually the only method viruses have of infecting your system via the Internet. A virus can't infect your software until you run a piece of software that spreads the infection, and in order to run the software, you have to get it from some other location. Unless your Internet connection is a true network connection, meaning that your disk drives are shared with the rest of the Internet, you can't be infected by activating a program on someone else's system. You can only do it by downloading that program to your computer and running it from there.

A trojan horse can be anything from a small utility that reformats your hard disk instead of tuning it as promised to something so clever and sophisticated that it might paint obscene messages on your computer-generated artwork. Trojans are much easier to create than viruses (we could create a trojan in ten seconds from a standing start, but we have no idea how to program a virus) and trojans often escape the detection of antivirus programs until they are reported to the antivirus' author.



The best protection against trojans is the exact same protection you use against viruses: regular, well-planned backups and common sense.





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Steps you can take to minimize the risk



This is war -- guerrilla war -- and no war can be easily won without a battle plan. Here are the steps we recommend to protect yourself against possible infection not just on the Internet, but in all your computing.



[A seven-point battle plan](#)



[An important primer on backups](#)



[Antivirus software: which to choose?](#)

 **Virus awareness** **Reducing the risk**

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A seven-point battle plan

- 1. Have the latest version of a virus-checking program, such as McAfee's **SCAN.EXE** or F-Prot's **VIRSTOP.EXE** running on your machine at all times by adding its name and path to your **AUTOEXEC.BAT** or **CONFIG.SYS** file so that it runs every time you start your computer. Good antivirus software is widely available on the Internet, and some of it is free for personal non-commercial use.
- 2. Exercise extreme caution when attempting to use new software posted to the alt.binaries newsgroups. This software often cannot be checked before it is cleared for public consumption, and viruses and trojans are quite common. If you don't trust your virus protection software, we recommend waiting 48 hours before running any new program found in one of these newsgroups, and then checking the newsgroup to find out about any virus warnings. If someone was infected by a publicly-posted binary file, you can be sure you'll see a message about it.
- 3. Stay away from "pirate" newsgroups. Any newsgroup with **warez** in its name is, believe it or not, specifically set up for the illegal exchange of software, and your provider might have these newsgroups available on their server. These groups are known for sloppiness and dirty tricks tactics, and viruses and trojans are very common among the posted software. Experienced users of these newsgroups consider this risk to be part of the price they pay for access to free commercial software. In fact, we know of one pirates' newsgroup where you can expect to find at least one infected file every week.
- 4. Never ever run any program that looks "too good to be true" without having it checked out by an expert first, or at least waiting for an expert's opinion. A prime example occurred in mid-July 1995 when a program was posted to several alt.binaries newsgroups which was supposed to allow older 80486 microprocessors to emulate the functions of the newer, faster Pentium. In reality this was a program that formatted your hard disk without asking.
- 5. If you haven't already done so, create a "rescue disk". If you have Norton Utilities, PCTools or another full-featured disk utility package, one of the programs included will probably be able to back up critical information about your hard disk and system which could be corrupted by one of the more common viruses. If you don't have such a package, you can make a rescue disk using the ThunderByte antivirus package described in the section on antivirus software, but be sure to follow the instructions for creating this disk carefully.
- 6. Have your virus scanner check every new program you install on your computer that does not come from a site you trust. People's personal home pages might offer links to software located on obscure FTP sites where software is not checked for safety and integrity before it is made available to you.
- 7. Never FTP files from a site's /incoming/ directory. These files have not been cleared by the site's administrator and could contain anything, from a harmless damaged file to a trojan that damages your video card.



Before browsing the topic on [backups](#) you might want to create a [bookmark](#) for this section so you can easily find your way back. The [backups](#) section is fairly long and found in the PC Owner's Survival Kit which is a separate module.

Click the bar below to browse the section on [backups](#); click anywhere else to resume.





Risk reduction

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Antivirus software



Good antivirus software is just as important to your peace of mind as good backup habits, and it's critical that you know exactly what your antivirus software can and can't do. In most cases, people who believe they're safe don't have nearly the protection they think they have. Here's how to insure that your protection ranks with that of the most knowledgeable users.



[Problems with antivirus software](#)



[Our picks of the best: all available free or for free trial](#)



[The importance of being new and improved](#)

 Risk reduction

 Antivirus software

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Problems with antivirus software

Chinks in the armor



Antivirus software has been spotty since it first appeared on the market. It's no secret among veteran computer enthusiasts that antivirus programs all seem to have holes in them. They just plain miss some viruses.



Others scare people to death with false positive readings (reports of potential virus activity where there is no infection). Some report so many false positives or "potential viruses" which are actually safe files that one consultant we know used five different antivirus programs and made it a habit of ruling out virus infection unless two or more gave a positive diagnosis.

Problems with your hard disk, a missing file or stray byte of information, an old virus scanner, and even installing a clean update to a good piece of software can all produce false positive readings in some programs.

Fortunately most authors of antivirus software keep extensive records of data types that produce false positive readings and attempt to minimize their frequency or warn you about them when you perform a virus scan.

False negative readings: another serious problem



Unfortunately, false *negative* readings can be equally common, and they *ought* to concern you. There's nothing worse than being told you are safe and later discovering that your hard disk was a disaster waiting to happen.

The most common cause of false negative readings is old antivirus software. The antivirus that came with your Norton Utilities or DOS package was obsolete months or even years ago and won't detect the newer "strains," or variations of existing viruses created by mischievous programmers. It's nice to have this older software as a second line of defence, but we don't recommend relying on it as your primary method of detecting infections.

What to look for in antivirus software



Selecting antivirus software is a fairly easy chore. There are few "bad" antivirus'. One thing you might want to watch for though is "special purpose" antivirus software designed to detect or kill only certain types of viruses or trojans. Monkey virus was extremely common in Vancouver in 1994 and 1995, and many people relied on a program called **KILLMONK.EXE** to detect and remove it. Unfortunately, some of those people also used it as their first line of defense against *all* viruses and trojans, and sadly some paid the price for using such a limited tool.

In other words, you need antivirus software that detects a wide range of viruses.



We don't recommend any virus software that can't be regularly updated by the user. If you plan on sharing programs and files with others on the net, or participating in the binaries newsgroups, it's important to:

- a) keep your virus software up-to-date, and

- b) if you can possibly arrange it, keep *two different* virus programs active in your system at all times. Most quality antivirus programs include behind-the-scenes monitoring modules that pick up any strange behavior and check that behavior with a database of virus "signatures".



 **Risk reduction**

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Three free or low-cost antivirus packages

It seems everyone has their favorite virus program. New contenders appear on the market every few months. Our favorites are the ThunderByte and F-Prot programs. We're suckers for ease of use, and while these two are primarily DOS programs, they're as simple to use as anything we've seen. Try Web searches using the names of these programs to find copies of the most recent versions on the Internet.

 **LATE NOTE:** ThunderByte was reported missing in action Dec. 31/95; we've left the links intact in case this is a temporary problem. At presstime we were unable to download or locate the software on the Internet.

McAfee, Norton and Central Point are also good choices...*provided* you have the latest updates. ThunderByte, F-Prot and McAfee are all widely available on the net, and F-Prot is free for non-commercial users. If you have an active Internet account and the Tourist Class or Business Class version of First Train, you'll find point-and-click links where you can instantly obtain up-to-date versions of all three packages from the Virus Prevention Page of First Train online.

F-Prot



Our first choice for antivirus is a program called F-Prot, developed in Iceland by Fridrik Skulason. It is one of the easiest antivirus' to use and also one of the most thorough. It's a DOS program that can also be run from Windows and Windows 95, and best of all it's free to private non-commercial users. (It's also very cheap for commercial users, with licenses as low as one dollar per computer, and free updates four times a year.)

It's not quite as easy to use as the antivirus included with your DOS, but this version will be more recent and worth the time to learn if you plan on downloading files from USENET newsgroups or making a fair bit of use of anonymoust.FTP.

ThunderByte



Our second choice is ThunderByte, an antivirus program from the Netherlands which is exceptionally fast and versatile. Unfortunately it will take a little more time to learn to use this program than it will to learn F-Prot. This too is a DOS program. TBAV (*tee-bav*), as it's known to the online world, also has a Windows interface if you'd prefer a simpler, more familiar layout, which is available from the second set of buttons. The two do not come in the same package. ThunderByte is shareware, and it has a commercial counterpart called Look which uses the same ultra-fast detection "engine". TBAV is probably the scanner of choice for those who demand raw speed in an antivirus.

McAfee Scan and Clean



Our third choice is McAfee's excellent set of virus utilities. These have been considered the standard in North America for several years now. You should find TBAV and F-Prot to be quite sufficient for most needs, but McAfee comes with its own built-in Windows shell program.

Windows 95 versions of Scan and Clean are also available now, but be aware that many users have reported possible conflicts with Windows 95's operating system. These problems

will probably be fixed by the time you read this.



 **Risk reduction**

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The importance of being new and improved

Antivirus software: less valuable with age



It's critical for your own safety that you keep your antivirus software constantly updated with the latest and cleaning options. New strains, variations and families of viruses and trojans appear all the time, and your antivirus should tell you when it is outdated. Most antivirus' flash a warning at you if the software is more than three months older than the date used by your system clock.

At this time we know of only one program which will reliably identify viruses which have not yet been created, a shareware program called Invincible which is not yet supported by First Train for the Internet and is not covered in this guide. Sure enough, some adventurous cracker will eventually break through its protection. The moral? Don't depend on *any* single program.

Updating shareware antivirus'

Antivirus updates are so important that they are routinely posted for IBM-compatible users on or about the day of release to the comp.binaries.ibm.pc newsgroup as uuencoded binaries. Just so you know, the moderators of this group are ruthless about checking for viruses on software posted to comp.binaries newsgroups...it's the alt.binaries newsgroups you need to watch out for.

Updating NAV, CPAV, MSAV, IBM Antivirus and others



If you have the full commercial version of Norton Antivirus, Central Point Antivirus, Microsoft Antivirus, IBM Antivirus, or any other popular antivirus, and it is not a trial or junior version included as part of another package, the price you paid for the software probably includes free access to updates for at least a year.

The antivirus' manual or on-disk documentation should include FTP locations or URLs for acquiring the latest updates. The signature file, the database of virus and trojan information the software uses to tell good data from bad, needs to be updated as new viruses are created and unleashed on the public. Every popular antivirus publisher has a site on the Internet where you can obtain the latest version of their program or signature file, or information on how to obtain it if these updates require advance payment.



If your antivirus of choice was included with your computer or with your DOS or Windows software, or was included as an added extra in another software package, you are probably not entitled to receive free updates.

Don't change your clock as protection from viruses



A very common -- and very effective -- trick for avoiding problems with some destructive viruses set to "go off" on a certain day, is to set your system date back a week or two. But if you plan on being a *participant* on the net and not just a consumer, *don't do it!* Not unless you can remember to set your clock properly every time you log onto the net.

Once you're on the net, your email and newsgroup postings are usually "time-stamped"

according to the time and date on your computer's system clock. If your clock is set a week behind, your newsgroup posts may not be allowed by the server. Even if they are, they may wind up buried so deeply in the newsgroup that no one ever reads them.

Don't allow your system clock to get more than a few hours out of sync with the correct local time, or you may have problems getting the server to accept your postings or messages. Even if you *can* get your postings through they may be buried several days deep in others' databases and never get read.



There's another reason not to mess with your system clock. Antivirus software will usually warn you when it is due to be updated. If your system clock is set a year behind, you may not get those warnings. Fortunately most antivirus' are smart enough to recognize a system clock set too far ahead or behind and will warn you about changing it.





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The Computer Virus Myths File

(10th Edition: October 4, 1993)

by Rob Rosenberger with Ross M. Greenberg



This document, included here as part of your pre-travel medical package, is one of the finest myth-busting articles we've ever seen. With the kind permission of the authors, we present it to you in its entirety.

 **Note:** Some of this material addresses rather technical myths held by computer enthusiasts who have more buzzwords than experience. You'll find this section much easier reading if you stick with the specific concerns *you* have about viruses. Click the topics in order to view the sections of this article.



[Introduction](#)



[Definitions](#)



[Contents: 21 Computer Virus Myths](#)



[How to protect yourself](#)



[About the authors](#)



Virus myths

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Computer Virus Myths



Now you know the differences between a bug and a Trojan horse and a virus. Let's get into some of the myths. Click the title for an explanation of each of these myths:

-  [All purposely destructive code spreads like a virus.](#)
-  [Viruses and Trojan horses are a recent phenomenon.](#)
-  [Viruses are written by teenage hackers.](#)
-  [Viruses infect 25% of all IBM PCs every month.](#)
-  [Only 500 different viruses? But most experts talk about them in the thousands.](#)
-  [A virus could destroy all the files on my disks.](#)
-  [Viruses have been documented on over 300,000 computers \(1988\).](#)
-  [Viruses can hide inside a data file.](#)
-  [Some viruses can completely hide themselves from all antivirus software, making them truly undetectable.](#)
-  [BBSs and shareware programs spread viruses.](#)
-  [My computer could be infected if I call an infected BBS.](#)
-  [So-called `boot sector' viruses travel primarily in software downloaded from BBSs.](#)
-  [My files are damaged, so it must have been a virus attack.](#)
-  [Donald Burleson was convicted of releasing a virus.](#)
-  [Robert Morris Jr. released a benign virus on a defense network.](#)
-  [The U.S. government planted a virus in Iraqi military computers during the Gulf War.](#)
-  [Viruses can spread to all sorts of computers.](#)
-  [My backups will be worthless if I back up a virus.](#)
-  [Antivirus software will protect me from viruses.](#)
-  [Read-only files are safe from virus infections.](#)
-  [Viruses can infect files on write-protected floppy disks.](#)
- 

A number of myths have surfaced about the threat of computer viruses. There are myths about how widespread they are, how dangerous they are, and even myths about what a computer virus really is. We want you to know the facts.

The first thing you need to learn is that a computer virus falls in the realm of malicious programming techniques known as Trojan horses. All viruses are Trojan horses, but relatively few Trojan horses can be called a virus.

That having been said, it's time to go over the terminology we use when we lecture.

Wrong. Remember, Trojan horse describes purposely destructive code in general. Very few Trojan horses actually qualify as viruses. Newspaper magazine reporters tend to call almost anything a virus because they often have no real understanding of computer crime.

Trojan horses have existed since the first days of the computer; hackers toyed with viruses in the early 1960s as a form of amusement. Many different Trojan horse techniques have emerged over the decades to embezzle money, destroy data, fool investors, etc. The general public really didn't know of this problem until the IBM PC revolution brought it into the spotlight. Banks still hush up computerized embezzlements to this day because they believe customers will lose faith in them if word gets out.

Yes, hackers have unleashed viruses -- but so has a computer magazine publisher. And according to one trusted military publication, the U.S. Defense Department creates computer viruses for use as weapons. Trojan horses for many decades sprang from the minds of middle-aged men; computer prices have only recently dropped to a level where teenagers could get into the act. We call people wormers when they abuse their knowledge of computers.

You shouldn't fear hackers just because some of them know how to write viruses. This whole thing boils down to an ethics issue, not a technology issue. Hackers know a lot about computers; wormers abuse their knowledge. Hackers as a whole got a bum rap when the mass media corrupted the term.

If 25% suffer an infection every month, then 100% would have a virus every four months -- in other words, every IBM PC would suffer an infection three times per year. This mythical estimate surfaced in the media after researcher Peter Tippett wrote a complex thesis on how viruses might spread in the future.

Computer viruses exist all over the planet, yes -- but they won't take over the world. Only about 500 different viruses exist at this time; many of them have never existed in the wild and some have since been completely eliminated from the wild. You can easily reduce your exposure to viruses with a few simple precautions. Yes, it's still safe to turn on your computer!

The virus experts who claim much larger numbers usually work for antivirus companies. They count even the most insignificant variations for advertising purposes. When the Marijuana virus first appeared, for example, it contained the word legalise, but a miscreant later modified it to read legalize. Any program which can detect the original virus can detect the version with one letter changed -- but antivirus companies count them as two viruses. These obscure differentiations quickly add up.

And take note: the majority of new computer viruses discovered these days are only minor variations on well-known viruses.

Yes, and a spilled cup of coffee could do the same thing. You can recover from any virus or coffee problem if you have adequate backups of your data. Backups mean the difference between a nuisance and a disaster. You can safely presume there has been more accidental loss of data than loss by all viruses and Trojan horses.

"Viruses have been documented on over 300,000 computers (1988)."
"Viruses have been documented on over 400,000 computers (1989)."
"The Michelangelo virus alone was estimated to be on over 5,000,000 computers (1992)."



These numbers originated from John McAfee, a self-styled virus fighter who craves attention and media recognition. If we assume it took him a mere five minutes to adequately document each viral infection, it would have taken four man-years of effort to document a problem only two years old by 1989. We further assume McAfee's statements included every floppy disk ever infected up to that time by a virus, as well as every computer involved in the Christmas and Internet worm attacks. (Worms cannot be included in virus infection statistics.)

McAfee prefers to estimate his totals these days and was widely quoted during the Michelangelo virus hysteria in early 1992. Let's do some estimating ourselves by assuming about 80 million IBM PC-compatible computers around the world. McAfee's estimate meant one out of every 16 of those computers not only had a virus of some type, it specifically had the Michelangelo virus. Many other virus experts considered it an astronomical estimate based on the empirical evidence.



Data files can't wreak havoc on your computer -- only an executable program file can do that (including the one that runs every time you turn on or reboot a computer). If a virus infected a data file, it would be a wasted effort. But let's be realistic: what you think is data may actually be an executable program file. For example, a batch file on an IBM PC contains only text, yet DOS treats it just like an executable program.

This myth ironically surfaced when certain antivirus companies publicized how they could detect so-called Mutation Engine viruses. The myth gained national exposure in early 1993 when the Associated Press printed excerpts from a new book about viruses. Most viruses have a character-based signature which identifies it both to the virus (so it doesn't infect a program too many times) and to antivirus software (which uses the signature to detect the virus). A Mutation Engine virus employs an algorithm signature rather than a character-based signature -- but it still has a unique, readily identifiable signature.

The technique of using algorithm signatures really doesn't make it any harder to detect a virus. You just have to do some calculations to know the correct signature -- no big deal for an antivirus program.

BBSs and shareware programs spread viruses.



Here's another scary myth, this one spouted as gospel by many experts who claim to know how viruses spread. The truth, says PC Magazine publisher Bill Machrone, is that all major viruses to date were transmitted by (retail) packages and private mail systems, often in universities. (PC Magazine, October 11, 1988.) What Machrone said back then still applies today. Over 50 retail companies have admitted spreading infected master disks to tens of thousands of customers since 1988 -- compared to only nine shareware authors who have spread viruses on master disks to less than 300 customers since 1990.

Machrone goes on to say bulletin boards and shareware authors work extraordinarily hard at policing themselves to keep viruses out. Reputable sysops check every file for Trojan horses; nationwide sysop networks help spread the word about dangerous files. Yes, you should beware of the software you get from BBSs and shareware authors, but you should also beware of retail software found on store shelves.

By the way, many stores now routinely re-shrinkwrap returned software and put it on the shelf again. Do you know for sure only you ever touched those master disks?



BBSs can't write information on your disks -- the communications software you use performs this task. You can only transfer a dangerous file to your computer if you let your software do it. And there is no 300bps subcarrier by which a virus can slip through a modem. A joker who called himself Mike RoChenle (micro channel, get it?) started this myth after leaving a techy-joke message on a public network. Unfortunately, some highly respected journalists got taken in by the joke.

This common myth -- touted as gospel even by experts -- expounds on the supposed role bulletin boards play in spreading infections. Boot sector viruses spread only if you directly copy an infected floppy disk, or if you try to boot a computer from an infected disk, or if you use a floppy in an infected computer. BBSs deal exclusively with program files and don't pass along copies of boot sectors. Bulletin board users thus have a natural immunity to boot-sector viruses in downloaded software. (And since the clear majority of infections stem from boot sector viruses, this fact alone exonerates the BBS community as the so-called primary source for the spread of viruses.)

We should make a special note about dropper programs developed by virus researchers as an easy way to transfer boot sector viruses among themselves. Since they don't replicate, dropper programs don't qualify as viruses. These programs have never appeared on BBSs to date and have no real use other than to transfer infected boot sectors.

It also could have happened because of a power flux, or static electricity, or a fingerprint on a floppy disk, or a bug in your software, or perhaps a simple error on your part. Power failures, spilled cups of coffee, and user errors have destroyed more data than all viruses combined.

Newspapers all over the country hailed a 1989 Texas computer crime trial as a virus trial. The defendant, Donald Burleson, had released a destructive Trojan horse on his employer's mainframe computer. The software in question couldn't spread to other computers, and prosecuting attorney Davis McCown claimed he never brought up the word virus during Burleson's trial. So why did the media call it one?

David Kinney, an expert witness testifying for the defense, claimed Burleson had unleashed a virus. The prosecuting attorney didn't argue the point and we don't blame him -- Kinney's claim may have actually swayed the jury to convict Burleson.

McCown gave reporters the facts behind the case and let them come up with their own definitions. The Associated Press and USA Today, among others, used such vague definitions that any program would have qualified as a virus. If we applied their definitions to the medical world, we could safely label penicillin as a biological virus (which is, of course, absurd).

Robert Morris Jr. released a benign virus on a defense network....

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It supposedly may have been benign, but it wasn't a virus. Morris, the son of a chief computer scientist at the U.S. National Security Agency, decided one day to take advantage of bugs in the software which controls Internet, a network the Defense Department often uses. These tiny bugs let Morris send a worm throughout the network. Among other things, the Internet worm sent copies of itself to other computers -- and clogged the entire network in a matter of hours due to bugs in the worm module itself. The press called it a virus, like it called the 1987 Christmas worm a virus, because it spread to other computers. Yet Morris's work didn't infect any computers.

A few notes:

-  Reporters finally started calling it a worm a year after the fact, but only because lawyers on both sides of the case constantly referred to it as a worm.
-  The worm operated only on Sun-3 VAX computers which employ the UNIX operating system and which were specifically linked into Internet at the time of the attack.
-  The 6,200 affected computers cannot be counted in virus infection statistics (they weren't infected).
-  It cost way less than \$98 million to clean up the attack. An official Cornell University report claims John McAfee, the man behind this wild estimate, was probably serving (him)self in an effort to drum up business. People familiar with the case estimated the final figure at slightly under \$1 million.
-  Yes, Morris could easily have added some infection code to make it both a worm and a virus if he'd had the urge.
-  Internet gurus have since fixed the bugs Morris exploited in the attack.
Morris went on trial for launching the worm and received a federal conviction. The Supreme Court refused to hear his case, so the conviction stands.



The U.S. government planted a virus in Iraqi military computers during the Gulf War.

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U.S. News World Report in early 1992 claimed the National Security Agency had replaced a computer chip in a printer bound for Iraq just before the Gulf War with a secret computer chip containing a virus. The magazine cited two unidentified senior U.S. officials as their source, saying once the virus was in the (Iraqi computer) system, ...each time an Iraqi technician opened a `window' on his computer screen to access information, the contents of the screen simply vanished.

Yet the USNWR story shows amazing similarities to a 1991 April Fool's joke published by InfoWorld magazine. Most computer experts dismiss the USNWR story as a hoax -- an urban legend innocently created by the InfoWorld joke.

Some notes:

USNWR continues to stand by its story, but did publish a clarification stating it could not be confirmed that the (virus) was ultimately successful. The editors broke with tradition by declining to print any letters readers had submitted about it.

Ted Koppel, a well-known American news anchor, opened one of his Nightline broadcasts with a report on the alleged virus. Koppel's staff politely refers people to talk with USNWR about the story's validity.

InfoWorld didn't label their story as fiction, but the last paragraph identified it as an April Fool's joke.



The design of all Trojan horses limits them to a family of computers, something especially true for viruses. A virus written for IBM PCs cannot infect an IBM 4300 series mainframe, nor can it infect a Commodore C-64, nor can it infect an Apple Macintosh.

But take note: some computers can now run software written for other types of computers. An Apple Macintosh, with the right products, can run IBM PC software for example. If one type of computer can run software written for another type of computer, then it can also catch viruses written for the other type of computer.

No, they won't. Let's suppose a virus does get backed up with your files. You can restore important documents and databases and spreadsheets -- your valuable data -- without restoring an infected program. You just reinstall the programs from master disks. It's tedious work, but not as hard as some people claim.

There is no such thing as a foolproof antivirus program. Viruses and other Trojan horses can be (and have been) designed to bypass them. Antivirus products also can be tricky to use at times and they occasionally have bugs. Always use a good set of backups as your first line of defense; rely on antivirus software only as a second line of defense.

This common myth among IBM PC users has appeared even in some computer magazines. Supposedly, you can protect yourself by using the **ATTRIB** command to set the read-only attribute on program files. Yet **ATTRIB** is software -- what it can do, a virus can undo. The **ATTRIB** command cannot halt the spread of most viruses.

Another common IBM PC myth. If viruses can modify read-only files, people assume they can also modify files on write-protected disks. However, the disk drive itself knows when a floppy has a write-protect tab and refuses to write to the disk. You can't override an IBM PC drive's write-protect sensor with a software command.



Virus myths

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How to protect yourself



We hope this dispels the many computer virus myths. Viruses do exist, they are out there, they *want* to spread to other computers, and they can cause you problems. But you can defend yourself with a cool head and a good set of backups.

The following guidelines can shield you from viruses and other Trojan horses. They will lower your chances of getting infected and raise your chances of recovering from an attack.

Be religious about backups



Implement a procedure to regularly back up your files and follow it religiously. We can't emphasize this enough! Consider purchasing a user-friendly program or a tape backup device to take the drudgery out of this task. You'll find plenty of inexpensive programs and tape backup hardware to choose from.

Rotate between backups



Rotate between at least two sets of backups for better security (use set #1, then set #2, then set #1...). The more sets you use, the better protection you have. Many people take a master backup of their entire hard disk, then take a number of incremental backups of files which have changed since the last time they backed up. Incremental backups might only require five minutes of your time each day.

Set your BIOS to bypass floppy drive seek at boot



Many IBM PC computers now have a BIOS option to ignore floppy drives during the bootup process. Consult your computer's documentation to see if you can set this option. It will greatly reduce your exposure to boot sector viruses (the most common type of computer virus).

Watch where your software comes from



Download files only from reputable BBSs where the sysop checks every program for Trojan horses. If you're still afraid, consider getting programs from a BBS or disk vendor company which obtains files direct from the authors.

Let a newly uploaded file mature on a BBS for one or two weeks before you download it (others will put it through its paces).

Use UP-TO-DATE antivirus software



Consider using a program that searches (scans) for known viruses. Almost all infections involve viruses known to antivirus companies. A recent version (no more than four months old) of any scanning program will in all probability identify a virus before it can infect your computer. But remember: there is no perfect antivirus defense.

Consider using a program that creates a unique signature of all the programs on your computer. Run this software once in awhile to see if any of your program files have been modified -- either by a virus or perhaps just by a stray gamma ray.

Don't panic!



Don't panic if your computer starts acting weird. You might have a virus, but then again you might not. Immediately turn off all power to your computer and disconnect it from any local area networks. Reboot from a write-protected copy of your master DOS disk. Don't run any programs on a regular disk -- you might activate a Trojan horse. If you don't have adequate backups, try to bring them up-to-date. (Yes, you might back up a virus as well, but it can't hurt you if you don't use your normal programs.) Set your backups off to the side. Only then can you safely hunt for problems.

If you can't figure out the problem and you don't know what to do next, just turn off your computer and call for help. Consider calling a local computer group before you call for an expert. If you need a professional, consider a regular computer consultant first. (Some virus removal experts charge prices far beyond their actual value.)

If you discover a new virus or trojan, tell the world



We'd appreciate it if you would mail us a copy of any Trojan horse or virus you discover. (Be careful you don't damage the data on your disks while trying to do this!) Include as much information as you can and put a label on the disk saying it contains a malicious program. Send it to Ross M. Greenberg, Software Concepts Design, Virus Acres, New Kingston, NY 12459. Thank you.





{ewc HLP256,HLP256_TILE,MAINMARK.BMP}

About the authors



Ross M. Greenberg writes both shareware and retail virus detection removal programs. (Products aren't mentioned by name because this treatise isn't the place for advertisements.) He serves as a sysop for the Virus Security RoundTable on GEnie and is also currently working on a number of other products having nothing to do with computer viruses.

Rob Rosenberger serves as lead sysop for CompuServe's SHAREWARE forum. He has researched computer virus myths hoaxes since 1988. His research on the cause of the Michelangelo virus scare of 1992 has been reprinted in ISPNews (a computer security industry newsletter); and he has consulted on computer virus data security books written by Janet Endrijonas, Pamela Kane, and Richard B. Levin.

These men communicated entirely by modem while writing this treatise.

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(owc HLP256,HLP256_TILE,MAINMARK.BMP)

Virus Myths: Definitions

-  **BBS (Bulletin Board System)**
-  **Bug**
-  **Hacker**
-  **Shareware**
-  **Trojan horse**
-  **Virus**
-  **Worm**
-  **Wormers**

If you have a modem, you can call a BBS and leave messages, transfer computer files back forth, and learn a lot about computers. (What you're reading right now, for example, most likely came to you from a BBS.)

An accidental flaw in the logic of a program which makes it do things it shouldn't be doing. Programmers don't mean to put bugs in their programs, but they always creep in. Programmers often spend more time debugging programs than they do writing them in the first place. Inadvertent bugs have caused more data loss than all viruses combined.

Someone who really loves computers and who wants to push them to the limit. Hackers have a healthy sense of curiosity: they try doorknobs just to see if they're locked, for example. They also love to tinker with a piece of equipment until it's just right. The entire computer revolution itself is largely a result of hackers.

A distribution method for quality software available on a try before you buy basis. You must pay for it if you continue using it after the trial period. Shareware authors let you download their programs from BBSs and encourage you to give evaluation copies to friends. Many shareware applications rival their retail-shelf counterparts at a fraction of the price. (You must pay for the shareware you continue to use -- otherwise you're stealing software.)

A generic term describing a set of computer instructions purposely hidden inside a program. Trojan horses tell programs to do things you don't expect them to do. The term comes from the legendary battle in which the ancient city of Troy received a large wooden horse to commemorate a fierce battle. The gift secretly held enemy soldiers in its belly and, when the Trojans rolled it into their fortified city, well, you know the story.

A term for a very specialized Trojan horse which spreads to other computers by secretly infecting programs with a copy of itself. A virus is the only type of Trojan horse which is contagious, much like the common cold. If a Trojan horse doesn't meet this definition, then it isn't a virus.

A term similar to a Trojan horse, but there is no gift involved. If the Trojans had left that wooden horse outside the city, they wouldn't have been attacked from inside the city. Worms, on the other hand, can bypass your defenses without having to deceive you into dropping your guard. An example would be a program designed to spread itself by exploiting bugs in a network software package. Worms usually come from someone who has legitimate access to the computer or network.

What we call people who unleash Trojan horses onto an unsuspecting public. Let's face it, these people aren't angels. What they do hurts us. They deserve our disrespect.

Viruses, like all Trojan horses, purposely make a program do things you don't expect it to do. Some viruses will just annoy you, perhaps only displaying a Peace on earth greeting. The viruses we worry about will try to erase your data (the most valuable asset of your computer!) and waste your valuable time in recovering from an attack.

American Standard Code for Information Interchange (ASCII)

A standard character-to-number encoding widely used in the computer industry. Originally the numerical control (NC) tape punch format with odd parity (odd number of holes per tape row) used when paper tape was the common method used for storing computer information. Now used mainly to define the set of characters used in most computers as keyboard-enterable characters (a total of 256)

anonymous FTP

Anonymous FTP allows a user to retrieve documents, files, programs, and other archived data from anywhere in the Internet without having to establish a userid (a unique user name for the specific system) and password. By using the special userid of "anonymous" the network user will bypass local security checks and will have access to publicly available files on the remote system.

Ashton-Tate dBASE

Ashton-Tate is the American firm responsible for dBASE, the most popular database management system in existence still for IBM-compatibles even though a Windows version was not released until 1994. Dbase is also used as novice slang for any database management system.

baud

Operational cycles per second in a communication network. This is often confused with *bytes per second* or *bits per second*. For practical purposes they have the same meaning but they do not refer to the same type of measurement; it's just a coincidence that the successful transmission of one bit of data was also a baud measurement. Bits per second on a serial connection is actually the baud *rate*. This term comes from J.M.E. Baudot (1845-1903), a French pioneer in printing telegraphy.

If in doubt, think of baud as the actual number of bits transferred or transferrable via *hardware* between the remote and host computer, and bits per second as the number of bits transferrable via *software*. Data compression techniques allow 14.4Kbaud modems to transfer up to 57.6Kbps of data, but remember that this data is *compressed*. The modem itself will only allow 14.4Kbps of data to pass through its hardware.

bookmark (hotlist)

A bookmark is a saved location on the Internet used to reference a specific document, or a URL saved to a file. Hotlist items are the same as bookmarks. The use of each of these terms depends on the individual program; hotlists are usually associated with NCSA Mosaic and bookmark with Netscape.

browser

Software designed for the purpose of examining the contents of files, usually text or table data, in an understandable fashion. Commonly refers to Web browser, or World Wide Web browsing tool, although it can mean anything from a program designed for reading text files to a viewer for graphical images.

Byte Information Exchange (BIX)

BIX is an online information service designed for readers of Byte! Magazine which was quite popular in the late 1980s and survives to this day.

Center for Innovative Computer Applications (CICA)

Located at the University of Indiana, this computing research center is best known as the home of the **CICA Windows Archive**, the most complete and best-maintained Windows software archive on the Internet in 1994/95. Mirrored at several sites around the world, CICA has practically become synonymous with Windows software on the Internet, in spite of the fact that the SimTel Windows archive is actually better-organized for World Wide Web users in particular and by the time you read this, may actually have a larger database.

client

A computer system or process that requests a service of another computer system or process. A workstation requesting the contents of a file from a file server is a client of the file server. [Source: NNSC] Also a program which processes data retrieved from a remote system, or the purchaser of online access services.

CompuServe Information Services

One of the oldest and certainly the most venerable of the commercial online services, CompuServe has boasted the largest subscribership of any American commercial online service for years. Like America Online, CompuServe came under fire from veteran Internet users for opening a net gateway through CIS with what was looked upon as less than an ideal introduction to Internet customs and behavior.

cracker

A cracker is an individual who attempts to access computer systems without authorization. These individuals are often malicious, as opposed to hackers, and have many means at their disposal for breaking into a system. The term was coined circa. 1985 by hackers in defense against journalistic misuse of the term "hacker".

Also refers to hackers who attempt to break copy-protection and registration schemes in software, as in "This new game was cracked to work without registering it". Also refers to software used in the software cracking process.

Data compression

Data compression is the process of reducing the storage requirements of data through the use of algorithms and mathematical formulae while still leaving the data useful. Compressed data is uncompressed using software designed for the task when the data is needed by the system.

Data compression is used primarily to reduce disk space requirements for data so that it can be archived in less physical space, but more recently the growth of the Internet has made reduced transmission time at least as important.

Two classes of compression

There are two basic classes of data compression: **lossy** and **lossless**. Lossy compression reduces the level of detail in the data being compressed and provides no facility for restoring that lost detail at a later date. It is used primarily with audio and video data where some loss of detail can be tolerated for the sake of reduced space requirement or transmission time. JPEG, GIF and MPEG are examples of lossy compression.

Lossless compression stores all information about the data being compressed so that it can be restored to its complete, unaltered original form at a later date. PKZIP, Doublespace/Stacker and compressed backup sets are examples of lossless compression.

Several types of compression

Compression can either be performed on individual files, multiple files (also known as archiving) or whole areas of a disk or other storage medium (also known as disk compression).

Data compression often refers to a method of compressing data for transmission over telecommunications circuits such as modems. Most modems have data compression software encoded directly into their chips, and the use of this software, which is usually recommended for modem communications, allows modems to send and receive data at much higher than their advertised baud rate. Using data compression, a 28.8kbaud modem can send and receive even files which have already been compressed at a rate of up to 35 kbaud, and send and receive text at up to 115kbaud.

 [!CloseWindow\('morehelp'\)](#)

download/upload

Refer to the process of copying a file from a host system to another computer or medium. There are several different methods, or protocols, for downloading files in telecommunications, most of which periodically check the file as it is being copied to ensure no information is inadvertently destroyed or damaged during the process. Some, such as XMODEM, only let you download one file at a time. Others, such as batch-YMODEM and ZMODEM, let you type in the names of several files at once, which are then automatically downloaded.

Transferring newsgroups and email messages is also referred to as downloading; as is transferring data from one source to another, for example downloading files for backup to a floppy disk.

electronic mail (email)

A system whereby a computer user can exchange messages with other computer users (or groups of users) via a communications network. Electronic mail is one of the most popular uses of the Internet. [Source: NNSC]

File Transfer Protocol (FTP)

A protocol which allows a user on one host to access, and transfer files to and from, another host over a network. Additionally, with command-line interfaces such as DOS and UNIX, FTP is usually the name of the program the user types to execute the protocol. It is defined in STD 9, RFC 959.

GEnie

General Electric's international online service. A serious competitor with CompuServe for many years, GEnie's market share has dropped considerably in the 1990s, and while it is still much loved by users it is no longer considered to be in the top three.

Graphics Interchange Format (GIF)

A format for coding computer graphic images using data compression copyrighted by CompuServe. Until 1996 the most common graphics format used on the Internet; CompuServe asserted its copyright late in 1994 and while end users may make use of the format without payment to CompuServe, commercial users may not. GIF is a bitmapped graphics format capable of 256 colors and unique features such as embedded commenting and interlacing. Soon to be replaced in popularity by formats such as PNG (Portable Network Graphics).

GZIP

GNU ZIP , a file compression utility created and released by the Free Software Foundation which can be used on a variety of platforms without the royalty payments required by PKZIP and most other popular file compression schemes. GZIP archives usually have a .GZ extension, or simply a .Z extension, and may also be preprocessed with tar.

host

A computer that allows users to communicate with other host computers on a network. Individual users communicate by using application programs, such as electronic mail, TELNET and file transfer protocol (FTP) . [Source: NNSC]

Internet Relay Chat (IRC)

A world-wide "party line" protocol that allows one to converse with others in real time using keyboard input. IRC is structured as a network of servers, each of which accepts connections from client programs, one per user. [Source: The Jargon File 3.0.0]

Internet service provider

A firm or organization that provides access to Internet services such as email, newsgroups, IRC and World Wide Web. Generally refers to a provider offering a full range of Internet services as opposed to a gateway.

Joint Pictures Experts Group (JPEG)

This acronym is more often used to refer to the graphics compression standard developed by JPEG than to refer to the JPEG organization itself. JPEG is a form of lossy compression with a number of possible options which allows reduction of true-color (16 million color) graphics data to a fraction of its original size. It represents the next stage in graphics processing for transportability, speed and archiving from GIF's compression, offering average reductions of as much as 1/24th original size.

JPEG is known as a lossy compression scheme because it reduces the level of detail in the image as a part of the compression process, and this detail is not restored when the image is uncompressed for viewing. JPEG is the second most popular graphics format on the World Wide Web next to GIF.

link (hyperlink)

Telecommunications: a way to connect two Internet resources via a simple word, phrase or graphical object on which a user can click to start the connection. [Source: "EFF's Guide to the Internet"]

General computing: refers to the same process when used in hypertext documents such as this helpfile; the hotspots in this helpfile are links.

Also: programming term used to refer to methods of joining bits of code so that the compiler knows how to read the code required for building a program.

Linux

A free version of a clone of the UNIX System V Release 3.0 designed specifically for use on IBM-compatibles. Created by Linus Torvalds of Norway, it was exceptionally well-received and supported with help, source code, applications and other contributions - most of them also free - to the point where it has become the operating system of choice for low- to medium-volume Internet providers. It is available free on bulletin boards, FTP sites and inexpensive CDs (US\$20 and under, more with manuals) containing the full operating system and a huge array of applications, utilities and source code are widely available.

Local Area Network (LAN)

A data network intended to serve an area of only a few square kilometers or less. Because the network is known to cover only a small area, optimizations can be made in the network signal protocols that permit data rates up to 100Mb/s. [Source: NNSC] Usually used to refer to small and medium-sized office-type networks or to large networks contained within a single physical location.

mailing list

A list of email addresses, used by a mail exploder, to forward messages to groups of people. Generally, a mailing list is used to discuss certain set of topics, and different mailing lists discuss different topics. A mailing list may be moderated. This means that messages sent to the list are actually sent to a moderator who determines whether or not to send the messages on to everyone else. Requests to subscribe to, or leave, a mailing list should *always* be sent to the list's "-request" address (e.g., ietf-request@cnri.reston.va.us for the IETF mailing list).

Microcom Network Protocol level 5 (MNP-5)

A protocol for communications developed by Microcom that allowed data compression on data transmission (usually) over telephone lines. Still found in many newer modems, replaced by CCITT protocols such as V.42. There are several versions of MNP error correction; the only one in common use other than MNP-5 is MNP-4.

mirror

Two common meanings. With PCs, mirror refers to the act of copying the contents of a disk or section of a disk to another disk for purposes of archive storage or backup. It was not commonly used on PCs due to the high cost of hard disks, but with newer hard disks priced at half or less the cost per megabyte of floppy disks, many users now use a second or third hard disk as their backup unit.

On the Internet, mirror can refer to either the act of mirroring a disk or part of a disk to another disk (often thousands of miles away) for the purpose of duplication, or to the site where the mirror is stored. For example, many popular FTP sites mirror their archives to several different mirror sites every night. Having multiple copies of a popular archive allows the host site to spread the workload among several remote sites so it is not constantly tied up with people attempting to download.

Mosaic (NCSA and other)

The first high-quality World Wide Web browser program to use a graphic user interface and allow viewing of graphics on the screen instead of using an external picture viewer. Developed by the **National Center for Supercomputing Applications (NCSA)** at the University of Illinois, this was the standard by which browser software was measured until the release of Netscape 0.87 in 1994.

As of late 1995 it was still considered to be one of the three best programs of its kind, and is available for all major computer platforms. Even as late as fall of 1995, Web browsers were often referred to as "mosaics" and the term (uncapitalized) appears to have passed into common usage as indicating a World Wide Web browser.

NCSA's Mosaic code has been used as the core software for several of the most popular browsers available today.

Multipurpose Internet Mail Extensions (MIME)

An extension to Internet email which provides the ability to transfer non-textual data, such as graphics, audio and fax. It is defined in RFC 1341. MIME is the transmission protocol used to transfer non-text data associated with formatted HTML text over the World Wide Web. (In other words, graphics and sound are transmitted as MIME and decoded at the remote computer prior to use.)

National Security Agency (NSA)

A US government agency whose purpose is to protect the internal security of the United States. Next to the Republican National Caucus, the most feared group of all among knowledgeable American Internet users. The agency most ardent in their push for the institution of the Clipper chip.

Netscape

Usually refers to Netscape Navigator, the most popular Internet interface program in use in 1995. Also refers to Netscape Communications, the company responsible for designing and distributing Netscape Navigator. Netscape markets a wide range of Internet software for both end users and providers at all levels, from their consumer-level browser to the most popular secure commerce server in use by private Internet service providers to high-end vendor distribution servers and databases costing upwards of \$100,000.

Also used as an adjective to describe features of HTML coding and Web page design which were made possible by extensions to the HTML formatting language proposed and first implemented by Netscape Communications.

network

A computer network is a data communications system which interconnects computer systems at various different sites. A network may be composed of any combination of LANs, MANs or WANs.

online, offline

Connected or disconnected from a network or resource. When your hard disk is disconnected from your computer, it is "offline".

online service

A service, either networked or stand-alone, set up to provide information, messaging, or other forms of information for a group of people and managed by a central organization. Usually used as a generic term for any pay-for-play dialup information service. Examples of consumer-oriented online services include GEnie, CompuServe, America Online and Prodigy. May or may not provide Internet services or Internet gateway services, usually offered and advertised as self-contained databases.

page

In general computing, page has two meanings.

A page usually refers to a block of data designed to be moved in and out of memory as needed. The size of this block depends on the application creating the page. EMS uses pages of memory 64K in size to manage applications needing more than the base 640k of memory allowed by DOS. ROM's also use pages to accelerate the movement of ROM data to and from the computer, improving the performance of the system. Text mode DOS also uses a page, 4096 bytes in length, for handling text graphics.

It can also refer to a screenful of text information in DOS text mode. A single screen of data is referred to as a **screen page** .

In telecommunications, page can refer either to the act of requesting a response from someone via a remote device, or a formatted document available on the World Wide Web. All HTML-formatted documents on the Web are referred to as pages.

port

Networking: A port is a "transport layer demultiplexing value". Each application has a unique port number associated with it. Commonly used port addresses for Internet applications are port 21 for FTP, port 80 for HTTP (World Wide Web), port 6667 for Internet Relay Chat (IRC) etc.

Personal computing: ports are also physical addresses in PCs designed to increase the flexibility of the computer; e.g. the average personal computer has at least three hardware ports available at all times: two serial ports (usually one for modem and one for mouse) and one parallel (usually used for the printer).

Serial ports are used for devices that accept information one bit at a time. Parallel ports are used for devices that accept information eight bits at a time and are generally faster than serial ports. You can assign network paths to a port; for example, if you are printing to a network printer.

Portable Network Graphics (PNG)

A format for graphics images gaining in popularity and expected to replace GIF (Graphics Interchange Format) as the graphics format of choice on the Internet some time in 1996/97.

posting

A submitted email message or newsgroup article. So named, because like posting to a bookkeeping ledger or sending letter through the post office, once it's sent, it can't be taken back.

root

The top level of a disk drive or directory structure. In DOS, `c:\` is considered to be the normal root on the vast majority of PCs. Root can also refer to the directory to which a user of a shared computer system is directed to automatically upon login regardless of where that directory might be on a particular computer. Can also refer to the superuser or system administrator's account on a shared system.

search engine

Technically speaking, software on a host system designed to handle database queries by remote users and return the results to the remote user via a network connection.

Slang: the interface between a remote user of a database and the database itself; as in "Just fill in the form on this search engine and it will tell you what you can find here."

shell account

A special type of account available from most Internet service providers. Allows direct command-line access to the host system. Advantages: the ability to work directly with the host computer as if the user was sitting directly in front of it. Disadvantages: difficulty in acquiring and implementing software designed for more advanced graphical user interface (GUI) features of the World Wide Web.

signature

The three or four line message at the bottom of a piece of email or a USENET article which identifies the sender. Often used as a method of personalizing USENET postings and email. Many include quotes, small ASCII drawings or advertising. Large signatures (over five lines) are generally frowned upon.

SimTel

SIMTEL20 is the White Sands Missile Range which used to maintain a giant collection of free and low-cost software of all kinds, which was "mirrored" to numerous other ftp sites on the Net. In the fall of 1993, the Air Force decided it had better things to do than maintain a free software library and shut it down. But the collection lives on, now maintained by a Michigan company. [Source: "EFF's Guide to the Internet"] SimTel is the world's most popular Internet archive for MS-DOS software and one of the two most popular archives for Windows; the other is CICA at the University of Indiana.

site

Generic term; a location -- *any* location -- where data is stored or where users can log into the net or parts of it. Site and domain are not the same thing. If you are online right now, you are currently connected to your provider from your own client site, or *remote* site, to the provider's *host* site. From there you can access other host sites.

spike, line surge

A sharp, short-term increase in voltage through electrical circuits, feared by computer users due to the capacity of a line surge to fry electronic components.

Sun Microsystems

Manufacturer of high-powered microcomputers based in the US, their workstation computers have been the computers of choice for high-end graphical applications and commercial Internet service providers (the IBM-compatible has become more popular in recent years thanks to the growth of the Linux and BSD operating systems and the advent of parallel processing with the Pentium series chip).

sysadmin/admin

System administrator; person who maintains a network or computer system.

sysop

System operator; refers usually to the operator of a bulletin board system.

terminal

Refers either to a diskless workstation (a monitor, keyboard and perhaps a mouse and a minimal processor) connected to a network or a hardware pin or connector end. Usually confused with terminal emulator; a terminal emulator is what most PCs use for connecting to dialup networks such as BBS' and Internet.

terminal emulator

A program that allows a computer to emulate a terminal. The workstation thus appears as a terminal to the remote host. [Source: MALAMUD] On PCs terminal emulators are needed for connecting to BBS' and TELNET sites. Terminal emulators are often incorrectly referred to as "terminal programs" or "modem programs"

Uniform Resource Locator (URL)

An Internet address, generally offered in World Wide Web-compatible syntax. Follows a standard format, which includes the protocol, followed by a colon and two forward slashes, followed by the domain, followed by the physical or *aliased* address of the file or program requested.

Example:

```
http://www.netfolks.com/total/farsighted.html
```

http:// signifies that the protocol is hypertext transfer; *www.netfolks.com* specifies the host computer where the resource is located, and */total/farsighted.html* specifies that the resource is a file called *farsighted.html* located in a directory either called *total* or aliased so that *total* will direct the user to the appropriate directory.

urban legend

A story, which may have started with a grain of truth, that has been embroidered and retold until it has passed into the realm of myth. It is an interesting phenomenon that these stories get spread so far, so fast and so often. Urban legends never die, they just end up on the Internet! Some legends that periodically make their rounds include "The Infamous Modem Tax," "Craig Shergold/Brain Tumor/Get Well Cards," and "The \$250 Cookie Recipe". [Source: LAQUEY]

USENET (Netnews)

The sum total of a collection of thousands of topically named **newsgroups** (public messaging discussion groups devoted to a particular topic), the computers which run the protocols, and the people who read and submit USENET news. Not all Internet hosts subscribe to USENET and not all USENET hosts are on the Internet. [Source: NWNET] Archaic: Netnews.

V.xx data conversion standards

V.xx denotes the standard for data conversion used by a given modem and indicates its capability for built-in error correction and data compression. Standards for V.xx are laid down by CCITT.

V.14 : A standard in data conversion used in all V.32 and V.32*bis* modems

V.17 : The CCITT standard that specifies fax transmission and reception at 14,400 bps.

V.21 : The CCITT standard that specifies modem transmission at 300 bps.

V.22 : The CCITT standard that specifies modem transmission at 1200 bps with a fallback rate of 600 bps. (Fallback rate is the transmission rate used by both ends of the connection if they fail to achieve a stable connection at the highest transmission rate.)

V.22*bis* : The CCITT standard that specifies modem transmission at 2400 bps.

V.32: The CCITT standard that specifies modem transmission at 9600 bps with a fallback rate of 4800 bps.

V.32*bis* : The CCITT standard that specifies modem transmission at 14,400 bps with a fallback rate of 12,000 and 7200 bps.

V.32*terbo* : An unofficial standard that specifies modem transmission at 19,200 bps with a fallback rate of 16,800 and also the rates supported by V.32 and V.32 *bis*.

V.34: A CCITT standard that specifies modem transmission at 28,800 bps with many fallback rates.

V.42: A CCITT error correction protocol which includes MNP levels 1-4 and supports LAP/M error correction.

V.42*bis* : A CCITT standard for data compression. A modem equipped with V.42 *bis* also includes V.42 error correction and MNP-5 data compression. Almost all new modems being sold today comply with V.42*bis* .

V.FAST: An unofficial standard that specifies modem transmission at 28,800 bps with fallback rates. This is also known as V.FC, a standard proposed and marketed by US Robotics and not supported by the industry. Most consumer experts recommend avoiding high-speed V.FAST modems which are not upgradeable with software.



warez

Hacker slang for pirated (illegal or unlicensed) software. Warezing is the practice of trading in pirated software, usually as a hobby but often as a means of acquiring software tools the user would not otherwise be able to afford or wish to purchase.

World Wide Web (WWW or W3)

A hypertext-based, distributed information system created by researchers at CERN in Switzerland. Users may create, edit or browse hypertext documents. One of the newest Internet services, it has grown in a very short time to become the most-used service on the net. Many novice users mistakenly refer to the Web as the Internet itself, when in fact it is only one of several available services.

Most WWW documents incorporate graphics, and the limit as to what such documents may incorporate (e.g. sound, animation, etc.) is virtually unlimited. The clients and servers are freely available, and many commercial implementations are also in use.

The 80x86 Chip Chart

80x86 is a generic term used to refer to the part number designation for the Intel line of microprocessors used as CPUs in IBM-compatible computers and other electronics. The same numbers have been used by other manufacturers, including Cyrix, AMD, Texas Instruments and others to describe their versions of chips with virtually identical characteristics and performance.

The following is a table of the most popular chips in the series and their relative capabilities. Select the chip number to see more information or simply scroll through this topic to see information about all chips on this list.

8088	8086	8087	80186
80286	80287	80386SX	80386DX
80387	80386SL	80486DX	80486DX2
80487DX	80486SX	80486DL C	80586, 80686
P-5	P-6	P-24	

8088 : First IBM-PC CPU chip; operated at a speed of 3.5MHz on an 8-bit bus. Engineered to address a maximum of 1Mb of memory; can address up to 32Mb with expanded memory cards. Also known (slang) as the PC chip.

8086 : Next generation IBM-PC/XT (Extended Technology) CPU; operated at speeds of 4.77MHz to 10MHz depending on the model and manufacturer (some clone chips were somewhat faster). First chip to offer two-speed operation; the faster speed is known as "turbo", and this two-speed capability continues up to the 486. Also known (slang) as the XT chip .

8087 : Math coprocessor chip for 8088/8086 CPUs, and also usable on systems up to and including many 80386's which contained sockets for these chips. Floating point math processor offered a significant performance increase for CAD and spreadsheet operations and made these applications barely livable. Usually cost more than the CPU itself.

80186 : First IBM-PC/AT (Advanced Technology) CPU; operated at speeds of 6MHz to 12MHz on a 16-bit bus . Intel's limp response to Motorola's 68000 microprocessor; short-lived in the marketplace since the 286 was released soon afterward and 186 motherboards were prone to buggy behavior and early failure. Introduced extended memory; the ability to add memory above 1Mb and address it through the use of software memory managers . Also known (slang) as the 186.

80286 : First *serious* IBM-PC/AT CPU. The chip that truly set the AT standard. Operated at speeds of 6MHz to 30MHz on a 16-bit bus. Permitted the same extended memory capability as the 286.

80287 : Math coprocessor chip for the 80286 series. Beginning with the 80287, the coprocessor had to be speed-matched to the CPU chip, meaning that an 80287 16MHz would not ordinarily be usable when matched with an 80286 12MHz CPU. These coprocessors were also usable on many 386 motherboards as inexpensive alternatives to true 80387 math coprocessors. Usually cost as much as the CPU itself.

80386SX : Next in line after the 80286; operated at speeds of 16MHz to 33MHz on a 16-bit bus. Originally introduced on IBM's Personal System/2 computers. Introduced the facility for Shadow RAM (the ability to map ROM memory into RAM for higher system performance). The

chip that made GUI's on IBM-compatibles possible years after everyone using the Motorola 68000 had them. Also known (slang) as the 386 or 386SX.

80386DX : Offered twice the potential power of the SX and made Windows a viable operating system. Also allowed for two types of memory at two different speeds, specifically for "cache" memory to accelerate most-used functions such as screen display rewrites and disk access. Operated at speeds of 20MHz to 33MHz (Intel models) and up to 40MHz (AMD clone chips) on a 32-bit bus. The chip that made OS/2 a viable operating system for the IBM-compatible. Also known (slang) as the 386DX or 386; still used in some home electronics (e.g. microwave ovens); no longer manufactured for PCs by Intel as of 1994.

80386SL : The L was usually said to refer to Laptop, but in reality it stands for Low power consumption; designed for laptop computers. Functionally identical to the 80386SX.

80387 : Math coprocessor chip for the 80386 CPU series. These made fractals, raytracing and other high-quality graphics and animation livable on IBM-compatibles. Beginning with the 80387, the coprocessor had to be not merely speed-matched to the CPU chip but bus matched as well, meaning that an 80387DX 20MHz coprocessor (32-bit bus) would not ordinarily be usable when matched with an 80386SX 20MHz (16-bit bus) CPU. Usually cost slightly less than the CPU.

80486DX : The original 486 chip; true 32-bit operation, includes a built-in math coprocessor. Operated at speeds ranging from 20MHz to 50MHz. Significant speed improvements over the 386 are due in part to the coprocessor and also in part to an ultra-fast 8K cache housed in the CPU itself which processed the most frequently accessed instructions at speeds much higher than RAM memory. The chip that made Windows 95 possible and OS/2 livable. Early models of 486DX chips were known for excessive heat and early failure, and most 486DX chips require cooling devices of their own for reliable operation.

80486DX2,3 or 4 : A 486 CPU chip with supposedly a more durable construction to allow its processing speed to be tied to a system clock running at double or triple its normal rated speed. (DX4-100 chips are not DX-25 chips quadrupled in speed, but rather are DX-33 chips tripled in speed).

80486SX : A chip that was never supposed to exist. Operated at speeds of 25Mz to 50MHz. Originally created by clone manufacturers (not Intel), this is a 486 chip without the math coprocessing circuitry. Intel responded by offering their own 486SX chips which were essentially 486DX chips whose math coprocessors had been short-circuited at the factory. Made 486 computers at 386 prices a reality.

80487DX : The chip that never existed, and a very ugly tale. (See crippleware for details)

80486DLC, 80486SLC, 80486DRX2 etc. : 80486 clone chips manufactured by Texas Instruments, Cyrix, AMD and others. Various performance and compatibility specifications. "LC" usually stands for "low consumption" (of power) and while these chips were designed for laptop and notebook computers, many found their way into home computers as well.

80586, 80686 : Not acknowledged by Intel to be true model numbers for this series of chip, since Intel failed to trademark the numbers. Used by some clone chip manufacturers and sellers to describe their Pentium-level CPUs. See P-5, P-6, Pentium, Pentium Pro.

P-5 (Pentium) : Original name for the Pentium microprocessor, successor to the 80486. In addition to the 486's features Pentium offered speeds ranging from 60MHz to 133MHz, a 64-bit memory data bus and a larger internal cache (16K) than the 486. The first production runs of 60MHz chips were the ones with the famous math flaws; no other speed of Pentium chip was affected. Early models of Pentiums were also known for excessive heat and early failure.

Among its other performance-enhancing features are branch prediction, which tries to guess program instructions and pre-execute them to save time (just in case the prediction is right), and superscalar construction with the equivalent of over three million transistors.

P-6 (Pentium Pro) : Just released at this writing as the Pentium Pro , supposed to be the successor to the Pentium but provides an improvement in performance more in line with a hopped-up Pentium than a new generation of microprocessor.

P-24 : Pentium Overdrive chip designed to operate on 32-bit bus motherboards (specifically upgradeable 486 motherboards) to improve performance. Supposed to be direct plug-in replacements for the 486 but do not provide nearly the improvement in performance of a Pentium chip on a Pentium-oriented 64-bit motherboard.



adapter

Two primary meanings in regard to computing; an additional meaning applies to personal computers.

Adapter usually refers to hardware used by a peripheral device to "adapt" it to the system on which it is installed. *Adapter card* is used interchangeably with *peripheral card* to refer to circuit boards installed in computers to connect peripheral devices.

Devices used to convert one type of connection to another type are also referred to as adapters. For example, adapters exist to convert the standard IBM-compatible keyboard plug type to a smaller plug type for use with a notebook computer, or for converting nine-pin serial port plugs and sockets to 23-pin and vice versa.

Adapter can also refer to a power supply adapter transformer used for hardware attached to a computer. Many speaker systems used by home PCs require "power packs" or "adapters" (sometimes called wall pack adapters by manufacturers) to supply power in place of batteries.

Adobe Type Manager (ATM)

This is a software product developed by Adobe for IBM-compatible, UNIX and Macintosh computers that permits a type of scalable font that conforms to the Adobe Postscript Type 1 specification to be used on that system by one or all programs capable of using scalable fonts. Next to TrueType, it is the most common scalable font format in use today, but lags far behind TrueType's popularity thanks to TrueType being the Windows standard.

algorithm

A predetermined set of instructions for solving mathematical problem in a given number of steps. Algorithms function by applying a step-by-step procedure that insures a specific outcome or solution a specific problem. An essential aspect of computer programming.

Amiga

The successor to the Commodore C-64, the Amiga was Commodore's flagship computer until they concentrated on becoming primarily IBM clone manufacturers early in the 1990s. The Amiga was based on Motorola's 68000-series chip and offered a graphical user interface as well as command-line operation (AmigaDOS), making it more versatile in that respect than the Macintosh or Atari ST, but never a serious contender to Mac's supremacy in the 68000-based PC class. It was a superb graphics and game computer with capabilities which were never fully exploited in the marketplace and suffered unfortunate operating system bugs. It was the first popular PC brand capable of multitasking.

The Amiga still maintains a loyal following of users. It is primarily used today in commercial video production.

analog

In computing terms, any thing or event which is not expressible in terms of integers, i.e. 0's and 1's, or fixed states, i.e. on/off.

annotation

Annotations are usually personal notes or comments attached to a Windows helpfile. For example, a note could be added to this helpfile by clicking Edit and selecting Annotate. Windows displays a Notepad-like text box where you can type and save your notes. The next time you view the helpfile, that note is visible in the helpfile as a paper clip you can click to view the annotation. Create a test annotation now to see how this works.

Apple Computers

Sunnyvale, California-based Apple Computers are best known today as manufacturers of the Apple Macintosh PC, a graphically-based, integrated PC with a proprietary operating system. For more than a decade it has been considered "the" alternative to IBM-compatible/Microsoft PC computing.

Trivia:

Apple began as the American dream: two young whiz-kid hackers named Steve Jobs and Steve Wozniak who essentially built the first Apple computers in a basement. The Apple][went on to become the first popular home computer and a market leader until the introduction of Commodore's C-64, thanks to the low price and high performance of these computers, which came standard with an unheard-of 32K of memory.

application

A program that performs a function directly for a user. FTP, mail and TELNET clients are examples of network applications. Spreadsheets, word processors and games are examples of personal applications.

archive bit

One of the bits in a file's attribute byte; used mainly to store a file's backup status; i.e. the bit is set to 1 if the file has been backed up and to 0 if the file has not been backed up. DOS and Windows automatically restore a file's archive bit to the NOT SET state (meaning not backed up) when changes are made to it unless specifically instructed not to do so.

Atari (extended topic)

A California computer manufacturer (yes, a computer manufacturer) taken over in the early 1980s by the Tramiel family who had been at the helm of Commodore during the heyday of the Commodore C-64 and for a time during the development of the Amiga.

The company was, and still is, known primarily as manufacturers of computer games, such as the arcade machines Centipede, Battle Zone and Missile Command, and the home game machine Atari 2600 which was the first popular cartridge-based game console.

Atari is better known in Europe as manufacturers of the Atari ST, STe and TT lines of personal computers, which were top-ranked products behind the IBM-compatible and ahead of Macintosh in Europe for many years. Many people felt the ST/STe/TT line could have been the great hope for inexpensive, high-performance GUI-based home computing, but it was not to be.

These elegant, compact machines featured an implementation of DRI's GEM interface, an enormous range of high quality software (particularly considering the size of the user base), built-in MIDI and digital sound capabilities as early as 1985 when the first STs were released, and the lowest retail prices of any comparably-powered PCs until the release of the TT line.

Some believe price was the eventual undoing of Atari, particularly in North America. Many developers claimed Atari users were less willing to pay for quality software than users on other platforms, although this point is a matter of much dispute.

According to insiders, Atari instead fell victim to top-level management mistakes, and the ST/STe/TT line died a quiet death in the early 1990s. Today Atari is best known as manufacturer of the 64-bit Jaguar game system, a fact lamented by many ex-users including this writer. [- Cub Lea]

attribute

Generally speaking, a particular characteristic of a file or piece of data. Used most common to describe the state of a disk file. DOS and Windows use byte 11 of the file's directory entry and store a file's alterability (read/write), hidden or visible, system status and archive bit.

AutoCAD, Autodesk Inc.

AutoCAD, produced by Autodesk Inc., is considered industrywide to be the standard for vector graphic design, and has a price to match its reputation (basic AutoCAD packages for professional use have always run in the thousands of dollars).

Used for everything from high-end drafting and design to engineering, animation, simulations and both still and three-dimensional graphic arts, it is an extremely versatile and exceptionally well-supported product which appears likely to remain the industry standard through the end of the century.

AUTOEXEC . BAT

A file used on DOS-based personal computer operating systems to configure system and software settings and parameters at boot-up. CONFIG.SYS, operating system, disk operating system (DOS)

backup

Strictly speaking, backup refers to an archived copy of a file or set of files, regardless of where this archive is stored. Practically, backup also refers to the process of creating archived copies of data, and is used as one word, "backup", rather than two, as in "When are you going to backup that hard disk?"

The high vulnerability of magnetic and optical media to damage makes regular backups a critical part of routine file management for all computer users, since the data created on a computer is usually much more valuable and difficult to replace than the programs used to create that data.

Ideally, all important data should be backed up twice, and one copy of the backup stored a safe distance from the location of the computer to protect against loss of backup media in the event of theft or damage to the computer.

Basic Input Output System (BIOS)

The software and hardware which govern a PC's data input-output functions. These are usually controlled by specific chips in the computer which store semi-permanent information about the system's configuration. Many BIOS functions are also managed by software in more advanced operating systems capable of taking over these duties. Pertains to all data coming into and going out of the CPU, including data from disks, RAM, video, audio and any other forms.

batch

A collection of commands. Batch is also known as the rudimentary programming language on a command line operating system in which groups of typed commands can be combined into a text file. This text file, when executed as if it were a program, executes the commands on the list in the order presented.

battery (CMOS battery)

On a PC, refers to a small cylindrical or disk-shaped battery usually located at the back of the motherboard or connected to the motherboard by a short cable. This battery is used to preserve time, date and hardware configuration while the computer is powered down. Believed by many industry watchers to be one of the dumbest design components of the IBM-compatible, since memory chips to hold this information can be created which do not require battery back-up to store their information.

Borland

American software giant responsible for a number of extremely popular programs, among them the Quattro Pro spreadsheet, Paradox database, and the most popular C and Pascal programming packages in use for Windows and DOS.

bug

Unwanted or unexpected response from a piece of hardware or software. Stems from an incident with an early Mark I computer at Harvard University in the 1940's. U.S. Navy officer Grace Murray Hopper found the remains of a moth blocking an electrical switch and disrupting the operations of the computer. Since then, the process of filtering out unwanted program responses has been known as "debugging".

bundle

A computer marketing term that refers either to a package of separate products offered as part of a larger package or the act of creating such a package. Bundling is standard practice in the industry as a competitive measure, and even operating systems now come as software bundles. For example, Windows 3.1 came not just as an operating system, but bundled with a paint program, a word processor and a card game. In turn, computer retailers bundle Windows 3.1 or Windows 95 with their computers when they are sold to the public.

byte

Bits organized together into a "word" to hold a symbol letter/number. On most PC's, Eight zero's or one's; eight "bits" of information (not to be confused with "nibble". (Byte is a flexible term; some computers use byte sizes as high as 36 bits.) A byte is eight bits, or a combination of eight on-off switches. It sounds pretty meaningless until you see bytes as similar to LED letters and numbers. Think of each segment is a bit, and the combination of these segments, on or off, make up all the letters and numbers in your computer's alphabet.

Software cache (extended topic)

There are two main types of caches in use on most modern PCs: hardware caches and software caches. (Hardware caches are covered in the internal and external cache topic.)

A software cache reserves a block of memory reserved for use outside the normal function of the operating system. Caching is used primarily as a method of dedicating areas of memory to specific functions as a means of speeding up the operation of the whole system or specific parts of it. Caches usually operate transparently, meaning that the operator never notices them in use except insofar as they improve or degrade system performance.

In most cases, a cache is an intermediate temporary storage dump for data destined for a specific output device.

Print caches store data destined for the printer and feed that data to the printer port during times when the system is not otherwise in use, a handy feature with operating systems such as Windows 3.1 that dedicate the whole system to input/output when jobs such as printing and disk writes have been requested. Disk caches store data destined for the hard disk or floppy disk and wait for free system time just like print caches, allowing the operator to return to work without waiting for the system to write data.

Read-ahead caching is often used on hard disks to accelerate their performance as well. Blocks of data from the CD are read into memory or written to the hard disk where they can be accessed much more quickly when needed.

Caches are not always beneficial to the system; the amount of improvement or degradation of performance they provide depends on how they are used and the amount of memory available on the system for other tasks.



carpal tunnel syndrome (CTS)

A painful nerve disorder suffered by people who work with computers. CTS gets its name from the narrow tunnel in the wrist connecting ligament and bone. The median nerve, which carries impulses from the brain to the hand, and the tendons that open and close the hand are found in the carpal tunnel. When undue pressure is put on the tendons, they can swell and compress the median nerve, causing numbness, weakness, tingling, and burning in the fingers and hands. Usually caused by poor keyboard posture, lack of support for hands and wrists, and believed to be made worse by deficiencies of specific nutrients, most notably Vitamin B-6. Once a true positive diagnosis is made, there is no known long-term solution other than surgery to the affected ligament to relieve the pressure and remove tissue.

As early as 1992, the US National Institute for Occupational Safety and Health was claiming that thousands of Americans were already afflicted. It was only in 1994 that the term became widely known. Some experts believe that CTS is severely overdiagnosed, and that most of those who have been diagnosed with CTS actually have a less severe and reversible, but no less uncomfortable, disorder known as tendosynovitis.

cathode ray tube (CRT)

The display tube used for computer generated graphics and/or text; also used in televisions. So named because the device is a vacuum tube with one or three electron "guns" that fire cathode "rays" at the phosphorescent coating inside the front of the tube.

CBM

Commodore Business Machines

central processing unit (CPU)

The heart any computer, comprising arithmetic, control, and logic elements. In Macintosh's the CPU is usually a Motorola 68000-series (e.g. a 68040); in IBM-compatibles there are several possible brands, usually referred to as xxx86 chips (e.g. AMD 80486-DX 80MHz, Intel 80486-SX 25MHz, Cyrix 80486-DC 33MHz, etc.)

chip

A computer chip is actually only a small fragment of what most people think of as a chip. The chip itself is a small wafer of silicon fractions of an inch in size housed in plastic or ceramic material and surrounded by a grid of wires or connector pins that allow it to interact with other components.

chipset

Two or more large-scale integrated circuits used to perform a set of functions in a PC which must be present together in order to work. Usually refers to the chips on a motherboard used by the hardware for memory and bus management.

CHKDSK . EXE

A DOS program used for cleaning up hard disk errors, essential for most Windows 3.1 users. DOS file management requires opened files to be closed by the operating system when a program ends so that their beginning and endpoints can be recorded in the file allocation table (FAT). Unfortunately, when the system is turned off without closing all programs or after a fatal crash of Windows, these files are usually not closed properly. When this occurs, stray data is left on the disk which could interfere with the integrity of other files or, at the very least, take up unwanted space. **CHKDSK . EXE** is the program designed to correct such problems as well as several other errors in file and directory structure.

CHKDSK . EXE does not detect or correct errors in the magnetic media of a disk itself. In DOS 6.0 and higher this job is reserved for Scandisk, which also includes **CHKDSK . EXE** 's features.

clone

The term originated in genetics to indicate an exact genetic copy of a specific organism, but it has since passed into common usage as slang for *identical copy*. In computing it has specific meaning. When discussing hardware, it means hardware that precisely mimics the capabilities of a specific make and model of hardware which has become a standard but (usually) without violating copyright or patent laws.

The most common use for clone in computing is when referring to an entire computer. Originally the common term was *IBM clone*, meant to indicate that the computer was 100 percent compatible with IBM's specifications for that particular type of computer.

Clone can also refer to software that mimics a common piece of more expensive or better-known software, although the term is usually reserved for software which mimics *all* of the original program's features.

cluster

A group of sectors on a hard disk or floppy disk. Floppy disk clusters are usually two sectors (one on each side of the disk) but because hard disks can include several actual disks or platters, the cluster size of a hard disk is usually the size of a sector times the number of platters times two. Newer, more sophisticated hard disk formatting techniques now allow most hard disks to have two-sector clusters regardless of the number of platters.

cold boot

To start, or boot, a computer from a power-off state; physically "cold". This is usually the last resort when restarting a computer, as most functions can be reset using a warm boot in less time and with less potential loss of data.

Commodore C-64

Until the IBM-compatible came into its own as an affordable home computer, Commodore's C-64 series of personal computers were the most popular personal computers in history, and until very recently were the single biggest-selling make and model of computer ever, despite being out of manufacture for nearly a decade.

The C-64 featured a then-enormous 64K of memory, and Commodore's massive marketing effort insured an enormous amount of support from software and hardware developers. As its popularity grew it gained a graphically-based operating shell called GEOS which is still implemented in some PC software, mouse and modem support, superb game play for products of this era, and literally tens of thousands of programs were available for it. Considered by some to be the first true family PC, it fell out of market favor with the release of the Macintosh, Atari ST and Commodore's own Amiga line and reductions in the relative cost of IBM-compatibles in the mid-1980s.

compact disk read-only memory (CD-ROM)

Optical disk used as data storage medium. High storage (600Mb-plus per CD is possible now; several gigabytes will be common in a few years), short shelf life (the recorded surface begins to decay within a year or two).

complementary metal-oxide semiconductor (CMOS)

Type of electronic circuitry. This circuitry is used in IBM-compatible computers for storage of critical information about the system's configuration.

Computer Graphics Adapter (CGA)

Describes both the type of circuit board or video card needed for CGA compatibility, and the type of software emulation needed to view it. Few colors, low resolution, obsolete.

CONFIG.SYS

A file used on DOS-compatible personal computers to to configure system and software settings and parameters at boot-up, mainly concerning hardware/software interfacing.

Control Program for Microcomputers (CP/M)

An early microcomputer operating system written by hacker Gary Kildall for 8080- and Z80-based machines, very popular in the late 1970s but virtually wiped out by MS-DOS after the release of the IBM PC in 1981. Legend has it that Kildall's company blew its chance to write the OS for the IBM PC because Kildall decided to spend a day IBM's reps wanted to meet with him enjoying the perfect flying weather in his private plane. Many of CP/M's features and conventions strongly resemble those of early DEC operating systems such as TOPS-10, OS/8, RSTS, and RSX-11. [Source: The Jargon File 3.0.0]

copy protection

A method of encoding data so that it cannot be duplicated as a method of preventing unauthorized use of the software. Considered by most experienced users as a troublesome and often stupid method of maximizing revenues to software producers, as the vast majority of users of unlicensed software would not or could not pay for the software whether it was protected or not.

crash, crash recovery

A sudden, usually drastic failure of a program, operating system or piece of computer hardware.

Crash recovery refers either to the act of recovering from a crash or the facilities of a particular piece of software or hardware for dealing with a crash. For example, Windows 95 offers enhanced crash recovery over Windows 3.1 because it often allows the user to save data in their program before closing a program which has crashed an area of memory.

Creative Labs Inc., Sound Blaster

Manufactured by Creative Labs, the Sound Blaster set the standard for digital sound on the IBM-compatible, and despite its Yamaha-licensed FM synthesis being almost a decade behind modern synthesis methods, it continues to be the standard which other manufacturers must meet when developing for the IBM-compatible. Sound Blaster peripheral cards provide the ability to use CD-ROM drives as players for music CDs, recording and playback of digitized sound samples, internal (and, on some models, external) MIDI music compatibility and a built-in synthesizer capable of FM-type synthesis.

crippleware

Software or hardware that has some important functionality deliberately removed, so as to entice potential users to pay for a working version, or which has been deliberately crippled, and can be upgraded to a more expensive model by a trivial change (e.g., cutting a jumper or connecting a cable).

Crippleware usually refers to fully-functional software distributed freely which cannot have all of its features activated until the user pays for a license and receives a serial number designed to activate the crippled features. Loosely speaking, *PC/Internet Lexicon* could be termed crippleware.

An excellent example of crippleware is Intel's 486SX chip, which is a standard 486DX chip with the co-processor dyked out (in some early versions it was present but disabled). To upgrade, you buy a complete 486DX chip with working co-processor (its identity thinly veiled by a different pinout) and plug it into the board's expansion socket. It then disables the SX, which becomes a fancy power sink. Don't you love Intel? [Source: The Jargon File 3.0.0]

cursor

Strictly speaking, it's the horizontal or vertical line (or, in some DOS and Windows programs, the vertical block) that indicates the current "focus" or active location of the screen where text may be entered, commands may be given or menu items typed in. The mouse arrow is also considered to be a cursor.

cylinder

A cylinder is a "ring" of data on a hard disk. Hard disks can have hundreds of tracks, which are magnetic regions similar to the rings seen in the cross-section of a tree trunk. Hard disks may use several stacked metal platters, not just a single disk, and a cylinder refers to all tracks in the same location on all platters in the hard disk.

database

A structured collection of information, usually on a related subject, maintained as a unified whole which may be accessed in a variety of ways by the user.

debug

The act of tracing and correcting errors or unwanted output in a process or program.

Also: **DEBUG.EXE** , a DOS program designed for accessing the operating system, programs and hardware directly from the command line for purposes of alteration and investigation. Specialized programs designed for this purpose are also referred to as debuggers.

defragment

Over time, files which are changed or added to, or data which is added to the system, becomes fragmented, meaning that files may be split into sections spread over several areas of a hard disk. Accessing a fragmented file takes longer than accessing a contiguous file, or one which is laid out end to end on only one area of the hard disk. Defragmentation is the process of reorganizing a disk (almost always a hard disk) so that all files are contiguous.

Defragmentation also usually involves reordering directory data so that it sits at the front of the disk where it can be accessed more quickly and with less stress on drive mechanisms, and can also involve moving all files to the front of the disk where they can be accessed with less drive head movement.

Defragmentation is routine maintenance for home and business PCs which should be done at least three times annually to insure that the system runs at peak performance.

Defragmentation can also prolong the useful life of some hard disks by reducing the workload on the drive head mechanisms.

desktop

In a graphical operating environment (GUI) such as Windows or OS/2, the combination of elements that make up the visible display, including windows, icons, background graphics, and any custom features added to the display by the user, are referred to as the desktop. Virtual desktops are also possible with GUI's, and these permit work areas or display areas which extend off the sides of the visible screen to be included in the activities performed by the system.

desktop publishing (DTP)

A generic term used to refer to any kind of word processing or document formatting work designed for publication which can be done practically on a desktop. Typing a newsletter on a manual typewriter for a local club is DTP, as is developing a popular international publication for consumer use on a high-end PC or workstation.

device driver

These are programs (DOS or Windows) which enable a specific piece of hardware to communicate with the operating system. Without a device driver installed and running in active memory, the software cannot communicate with the hardware device. Many standard device drivers are included directly with the operating system on older operating systems such as DOS and Windows 3.1; Windows 95 has its own unique device drivers for virtually every part of the hardware including the floppy disks.

digital

Any thing or event which is expressible in terms of integers or fixed states; i.e. 0's and 1's, on/off.

disk operating system (DOS)

Refers to any such system, not necessarily the IBM-compatible DOS', although it is generally used to indicate IBM, Novell or Microsoft's general-purpose, low function, disk memory oriented operating system. Has come to be synonymous with MS-DOS, or Microsoft DOS, the product that built the Redmond, Washington software giant into the world's largest software publisher.

DMF

Data Manager Function : IBM PACS disk/storage resident data structures and organizations

Also: **Distribution Media Format** : a floppy disk format that allows 1.44Mb 3.5" disks to be filled with 1.68Mb of data for purposes of more efficient distribution. The floppy disk version of Windows 95 uses the DMF format.

Doom, Wolfenstein

Two breakthrough games from shareware games producers ID Software (formerly associated with Apogee) which used revolutionary 3-D virtual perspectives and unparalleled violence and gore for a widely available computer game. Castle Wolfenstein, known to most simply as Wolfenstein, set the standard which Doom surpassed and reset, and turned ID into the single most successful shareware publishing house in history. Probably the two most popular video games released since Pacman and Donkey Kong, and perhaps the most popular ever. Both have been cited on numerous occasions as factors in firings, divorce suits, negligence actions and software censorship and content labelling discussions.

dot matrix printer

The most common type of personal computer printer until about 1994. Dot matrix printers are characterized by a print head made up of usually nine or 24 pins laid out in a matrix. The pressure of some or all of these pins on a typewriter-style film ribbon makes the impression on the paper and produces the printout. Dot matrix printers are notorious for being slower and much noisier than inkjet and laser printers but have the benefits of high reliability, low cost, the ability to print multi-part forms, and ease of maintenance. It is not uncommon for dot matrix printers to be used daily for five years or longer in a clean environment and require nothing except the occasional ribbon change.

Dot matrix printers are a type of device known as an impact printer because the pins must impact the ribbon onto the paper to produce a visible result. They differ in functionality from daisy wheel printers, which create much crisper text, in their ability to print graphics.

dot pitch

The amount of space between the dots, or small windows, of phosphor at the front of a picture tube. A .28mm dot pitch means that there are .28 millimetres of unused space between each dot on the screen.

double-density, high density, DS/DD, DS/HD, SS/DD

The three surviving floppy drive density identifications common to IBM-compatible computers, soon to become two since single-sided double-density (SS/DD) is almost never used now that double-sided drives can be purchased used for as little as \$5.00.

The density refers to the amount of data that can be packed onto the surface of the disk. Floppy disks originally started out as single-sided, single-density disks since the recording media and heads had a tendency to "bleed" onto nearby tracks and could not reliably write on both sides of a disk. Eight-inch floppies originally allowed only forty tracks of data; modern 3.5" floppies allow up to 82 tracks on both sides of the disk thanks to improvements in the precision of disk drives, reduced costs for two-head floppy drives and improvements in the magnetic media used in manufacturing the disks.

DS/HD stands for high density, which allows up to twenty sectors per track over the usual nine or ten on a 3.5" floppy.

The same acronyms are used to describe format and density for 5.25" disks as well, but the storage capacities differ on these disks.

DR-DOS

Digital Research Inc.'s **DOS** operating system; had some popularity in the late 1980s but never gained popularity. Later purchased by Novell and now sold with considerable changes and enhancements as Novell DOS. Infamous for incompatibility problems.

dual inline package, DIP switch

In everyday usage, DIPs are usually thought of collections of several tiny on/off switches mounted on a frame that looks like a computer chip housing. They are usually designed to be set once to match a device to its host hardware.

Strictly speaking, DIP actually refers to any integrated circuit with two sets of connectors on either side of the chip housing, whether there are four pins or a hundred and four. Old-style RAM chips are DIPs. The earliest IBM-compatible CPU's, the 8088 and 8086 chips, also came packaged as DIP ICs. DIPs are the common centipede-like components most people associate with computer chips.

emulator, emulation

Emulator is used to refer to any software or hardware which is designed to mimic the function of other hardware or software, particularly when the emulation is of the "they said it couldn't be done" variety. Emulator usually refers to a program or peripheral card which expands the capabilities of a computer to encompass other computers or operating systems. Examples of emulators are Mac-in-DOS, a card which allows a Macintosh to perform as if it is a 486DX series IBM-compatible; and Executor, a PC program that allows IBM-compatibles to run Mac software. Emulators based on software generally do not run at top speed; emulators based on hardware tend to run faster than the devices they are emulating.

Emulation is usually used to refer to the act of mimicking any hardware or software function regardless of the difficulty. For example, all 386 and higher PCs are easily capable of using onboard memory as expanded memory, but because a separate memory card is not being used, expanded memory created with software memory managers is referred to as expanded memory *emulation* .

Emulator is not to be confused with the EMUlator, a digital musical sampling instrument used in music and film production.

end user

The person you see when you look in the mirror. Many industry watchers are upset by the use of the term "user" to describe a computer owner. According to some, it connotes aspects of drug use, and represents a tendency within the industry to treat the consumer as an addict in need of a fix or a better high.

Enhanced Graphics Adapter (EGA)

The IBM enhanced PC graphics adapter card was the standard for several years in the mid to late 1980s. It allowed 256 colors at low resolutions, 16 colors at high resolutions. Obsolete. EGA's top end is identical to the Microsoft Windows *standard* VGA display resolution of 16 colors at 640x480 pixels.

Hacker slang: "**Enhanced Graphics Ain't** ", signifying the disappointment that EGA lagged far behind comparable display resolutions available on other PC platforms. In spite of the complaints, it was EGA that first gave the IBM-compatible a serious shot at being a true home entertainment center, not just a workhorse.

ergonomics

Strictly speaking, ergonomics is the study of biotechnology. Practically, ergonomics relates to anything concerning the combination of safety, comfort and productivity of a person in a particular environment. Ergonomics as it concerns computers has lately become equated with the effort to stem the rising incidence of repetitive strain injury and other afflictions associated with long-term intensive use of a computer through the use of exercise, posture, furnishings and workplace layout.

Expanded memory (EMS)

Expanded memory is memory which resides outside of conventional memory but can be mapped into one or more conventional memory areas, using a 64K page "frame" located between the 640K DOS limit and the 1Mb "conventional" limit. This frame moves 32K (but more commonly 16K) blocks of memory in and out of conventional memory for use by the program, essentially "cheating" the system.

Greater flexibility for slow PCs

Expanded memory was designed to allow older 8088 and 8086 PCs to make use of more than one megabyte of memory. Extended memory was introduced as a new standard with the 80286 CPU, but EMS stuck around due to its popularity and is still used by many programs, most notably Lotus 1-2-3 for DOS.

The Expanded Memory Specification

The EMS stands for Expanded Memory Specification. This specification was first set down by a consortium consisting of Lotus, Intel and Microsoft and is still referred to as the LIM-EMS specification. Early versions used 16K and 32K page frames; the 4.0 spec still in use allows a 64K page frame.

The Enhanced Expanded Memory Specification (EEMS) was refined by Ashton-Tate, AST and Quadram to allow more access to memory than the original specification, which was limited to 32Mb.

Expanded versus extended memory

EMS memory offers the option of configuring some or all of the available memory as additional memory for programs that can make use of it; extended memory uses all available system memory but is also considerably faster than expanded memory.

expanded memory manager, Lotus/Intel/Microsoft (LIM), extended memory (XMS), page, conventional memory



Extended Graphics Array (XGA)

Video standard developed by IBM as the successor to VGA. One of many graphics standards introduced by IBM which didn't quite make it.

extension

Refers to the final characters in a filename after the period. DOS and Windows prior to Windows 95 were limited to filenames of up to eleven characters, up to eight of which appeared before the period and up to three of which appeared after. The characters after the period, or dot, are referred to as the extension and are usually used to indicate what the file is used for.

For example, plain text files without special formatting usually have **.TXT** extensions. Programs have **.EXE** extensions, and in DOS can also have **.COM** extensions. File extensions are used as an organizational tool, and in Windows to help the operating systems automatically load certain types of files into their related programs.

Windows 95 no longer limits files to eleven characters but still makes use of three-character file extensions for auto-loading documents.

extract

Although it can have a number of fairly obvious meanings, it most often refers to the process of uncompressing files contained within a compressed archive file, such as an individual file in a backup tape or disk set, or uncompressing files in a compressed archive file obtained from a BBS, online service or Internet site.

extremely low frequency electromagnetic radiation (ELF)

Electrical lines pulsing at 45 or 60 cycles per second are an example of ELF radiation. also the Earth has its own pulse of about six cycles per second. Used in context of measuring radiation and interference in electrical circuits, particularly computer monitors and power lines; also in ergonomics and workplace safety.

Although there has been considerable debate over whether ELF radiation poses any threat to public health and safety, the World Health Organization has been quite clear about their position on the matter:

"Exposure to ELF (extremely low frequency) electric fields can alter cellular physiological and behavioral events...At present, studies serve as a warning that unnecessary exposure to electric fields should be avoided.

"It is recommended that efforts be made to limit exposure, particularly for members of the general population, to levels as low as can be reasonably achieved."

- Environmental Health Criteria: 35, Extremely Low Frequency (ELF) Fields, World Health Organization, Geneva, 1984, pp. 18 and 88. -

facsimile (FAX)

An ancient form of communication in computing terms, traceable to 1842 when Scottish inventor Alexander Bain developed a machine for transmitting simple images over short-distance telephone connections. Facsimile transmission is, as it might seem, transmission of a facsimile of the original document over a phone line or other networked data connection.

Most modern FAX transfer is done with stand-alone FAX units which are essentially baby photocopiers. They include scanners for creating digital images of the documents to be transmitted and printing facilities for creating hard copies of the documents received.

This trend is expected to be reversed by the end of 1996 as virtually all new modems come equipped with facilities for sending and receiving FAX and more and more document processing is being done on computers rather than by hand or with typewriters.

file

A contiguous block of data with a beginning and an end that is stored on a disk as a single unit and has an assigned name.

flicker

Caused by a low refresh rate or interlaced screen display, this describes the flashing effect created by inexpensive monitors set to higher color resolutions than the monitor or video card is designed to handle. A stressor to be avoided.

font

More commonly known to most people as a synonym for typeface, which is not strictly true. Fonts differ from typefaces in that they are only single sets of characters. A font is a graphical representation of a character set such as the numbers 0-9 or the alphabet. There are now literally tens of thousands of graphical variations on the standard typewriter-style and newspaper-style fonts which were virtually ubiquitous for decades, and these can be applied to virtually any document on almost all graphically-based operating systems.

front end

The hardware or software that acts as a non-processing interface to hardware or software which actually does the processing. A banking terminal is an example of a hardware front end. When Windows is used to copy DOS disks, Windows acts as the front end for DOS.

glitch

From the German "glitschen", to slip, via the Yiddish "glitshen", to slide or skid. A sudden interruption in electric service, sanity, continuity, or program function. Sometimes recoverable.
[Source: The Jargon File 3.0.0]

hack

Two primary meanings in computerdom: to create a quick and dirty solution to a problem (i.e. to "hack together" a program that does a specific task) or the act of studying, experimenting with, or otherwise learning about a particular piece of software or hardware (e.g. "I'll stick with my word processor; I don't have the time to hack spreadsheets.")

Capitalized, Hack refers to a dungeons'n'dragons game from the late 1970s that became popular on all platforms and as a network-playable adventure.

hard disk

Hard disks are the primary long-term high-speed storage devices used on PCs. They are designed to store anywhere from several dozen to several thousand times the contents of a floppy disk and provide access to data at several times the rate of reading from floppies or CDs. Hard disks are usually hard metal platters in hermetically sealed cases. They use sensitive read/write heads similar to the heads on a cassette deck which ride a millionth of an inch above the surface of the platter, which is why early hard disks were so sensitive to movement. A single hard disk can contain several platters, and most PCs have only one hard disk. All modern PCs can support a minimum of two hard disks, four with special software.

Archaic: hard drive

heat sink

A hardware component used to cool other hardware components which are adversely affected by heat. A heat sink literally drains away excess heat energy by absorbing it and dissipating it into the surrounding atmosphere. Heat sinks are traditionally made of conductive materials such as aluminum or cast iron, and usually have ribs to assist in dissipating heat. Heat sinks are most often found on computers attached to CPU chips or power conversion devices in the power supply's housing.

Hewlett Packard (HP)

Manufacturer of a wide range of computer equipment; best known for their laser printer products; also refers to the ability of certain printers to behave in the same fashion as (emulate) HP printers.

HGC/HGA

Hercules Graphics Card or Hercules Graphics Adapter: For many years early in IBM-compatible development considered high-end graphics. Allowed early PC's with monochrome monitors to display graphics other than text characters and emulate CGA graphics in monochrome (with the addition of third-party software). Hercules still manufactures high-end graphics hardware but has little consumer presence in recent years.

home page

Strictly speaking the top level, root or index page of a World Wide Web site, generally the page with the shortest URL, as in "You can find the strawberry jam recipe at <http://chef.com/food/jams.html> , but I recommend you browse the home page first at <http://chef.com> to get an idea of everything they have on the site". Home pages usually have the file name `index.html` .

hotspot

A "clickable" area of text or graphics. Hotspot refers to an area of text, or part or all of an image, which, when selected by an input device such as a mouse, allows the user to move to another part of a document or program. The highlighted "" words in this help tool are hotspots. So are the abbreviations and terms used in the main screen of the lexicon.

hue, shade, tone

Hue refers to the position of a color in the visible spectrum of light, as opposed to shades and tones of color which are variations in the intensity of a given color. Yellow and red are hues, whereas pink and crimson are shades of red. Shade refers to the amount of black in a given color; tone refers to the amount of white light or reflected white light.

Hypertext Transport Protocol (HTTP)

The specification for connecting World-Wide Web resources to each other and to users via the Internet.

IBM (extended topic)

IBM is an acronym for **International Business Machines**, the most venerable name in computing and the driving force behind the development of personal computing in the late 1970s and early 1980s. They also manufacture larger computer systems for business and institutional use and publish software, including their own brand of DOS, OS/2 (a competitive operating system with Windows), and more specialized applications for business and institutional markets.

It is IBM who are responsible for the IBM-compatible specification being the standard used by more than 80 percent of all computers in existence today. When they first released the IBM PC, they chose to make the specifications for this computer available - and usable without royalty - to all interested parties, a move that surprised and pleased industry-watchers. It was partly a way of opening the door for other manufacturers to build hardware which could be added to the PC, but many manufacturers chose to build their own hardware. IBM stuck to their guns and did the same with the release of the XT and AT-class computers, and the industry followed suit. Apple, on the other hand, chose to keep the specification for the Macintosh to themselves and in a very short time the low cost of IBM "clone" computers insured that the IBM-compatible/DOS computer would be the personal computing standard for at least a decade.

IBM survived partly on the strength of its name but more on the quality of their product, which was usually higher than most competitors'. That reputation sagged with the release of several less than ideal products (e.g. IBM PC/jr and PS/2) and the adherence to software and hardware standards the rest of the industry chose not to follow (e.g. OS/2 and MicroChannel Architecture). Today IBM is less dependent for revenues on consumer-level products than for their industrial and institutional products, although that has changed somewhat with their 1995 acquisition of Lotus.

IBM PC/XT, IBM PC/AT, IBM-compatible, clone, Apple, Macintosh, MicroChannel Architecture, Lotus



IBM-compatible

One of the most over-used and under-comprehended terms in computing. Strictly speaking, IBM-compatible means compatible with the specifications laid down by IBM for a specific model of computer, usually the IBM PC-AT series specification upon which DOS and Windows PCs are based.

Unfortunately, when it comes to hardware in particular, compatibility with IBM specifications does not necessarily mean the hardware will be compatible with other hardware which also claims to be IBM-compatible. The specification does not allow for the possibility that separate pieces of hardware compatible with the AT will not be compatible with each other.

IBM-compatible is also used to refer to software designed to run on an AT-class machine or better, but what it usually means in this context is that it will run on a machine capable of running MS-DOS (usually version 3.1 or higher), whether it meets the AT specification or not.

icon

Something that represents something else. In Windows and other graphical operating systems, including the World Wide Web, icons are generally small graphical objects linked to programs, documents or specific functions which can be loaded, started, fetched or otherwise processed by clicking or double-clicking on the graphical image.

import

To bring data created with one type of software into another type of software. A very common method of combining the results of two programs. For example, data created with one database program can be added to a different database using different software by importing it. Different file types can also be imported, for example a graphical object can be imported into a word processing document for addition to the formatted text.

inkjet (Bubblejet) printer

Inkjet refers to a type of printer that uses fine sprays of precisely-directed liquid ink to print, first marketed at a reasonable consumer price by Hewlett Packard and used first in their ThinkJet and later the enormously popular DeskJet printers. Bubblejet refers to Canon's inkjet technology, which is virtually identical in function. Inkjet printers are much quieter than dot matrix and daisy wheel printers, cost much less than laser printers, and have a print quality which is correspondingly between the two. Unfortunately, the ink cartridges are expensive and require frequent replacement, making inkjet printers the costliest per-page investment and a poor choice for high volume printing.

integrate

The process of getting things to live, work and cooperate with each other. A critical term in all facets of computing. Integrated circuits are components housed in the same casing designed to function as a discrete circuit. Integration of software and hardware is the process of getting it to communicate with other software and hardware in the system.

Due to the complexity of modern hardware and software, true integration is viewed by most in the industry as either a myth or an ideal to be strived for, not a reality.

Intel

American high-tech firm responsible for developing most of the most-used microprocessors in PCs for more than a decade. Designed and developed the first 8088, 8086 and 80186 through 80486 microprocessor chips as well as the Pentium chip.

interactive

Refers to software that responds to user input with actions appropriate to the response. For example, answering a questionnaire is not an interactive activity, but answering a questionnaire whose questions change depending on the answers you give would be interactive. This help tool, because it responds to your requests for information and does not operate independently of your requests, is interactive software.

interface

The connection between the user and the used; generally refers to software and/or hardware designed to prompt a user for input and recognize input. Also, the act of making such a connection.

Interfaces are also known as front ends, as opposed to back end which usually refers to the operating system and/or the hardware.

interlacing

Interlacing refers to the way a monitor displays data on the screen. An interlaced display refreshes the screen in two passes, drawing only every other line in each pass. This results in a flickering effect. Non-interlaced monitors draw the entire screen in each pass, resulting in less visible flicker...but only if the monitor's refresh rate is high enough.

Non-interlaced refers to a display or a display mode which writes the whole screen in one pass.

Interlacing is also used with certain graphics formats, in particular the GIF format, to allow previewing of large or memory-intensive graphics while they load. Interlaced graphics may require as many as six passes to fully display on the screen.

jaggies

The "stairstep effect" shown by graphical objects when sloped lines or curves are shown on a pixel-mapped display. (Most computer monitors are pixel-mapped.) Also refers to a similar effect displayed by bitmapped graphics, particularly after they have been resized or stretched in one direction.

joystick

A joystick is a an input device. The actual control is a stick, rod or handle designed to control two devices called potentiometers at the same time. The actual controls in a joystick are like twin volume controls or balance controls on a stereo system, and function in exactly the same way. Joysticks are usually spring-loaded so that the "balance" always returns to zero when the stick is released.

jumper (shunt)

A small metal clip with a plastic sheath, usually about three-sixteenths of an inch square, designed to connect two pins on a circuit board. The proper term is shunt, but jumper has become the accepted term for this device. They are also known as Berg post jumpers or shorting posts.

laptop, notebook, subnotebook

These terms have absolutely nothing to do with a computer's power, but instead concern size alone, and even then they are fuzzy at best. Laptop refers to a portable computer with a rechargeable onboard power supply which can be carried relatively easily. Laptops can be the size of a briefcase. Notebook is generally used to refer to a computer that meets the above criteria and fits easily within a briefcase. Subnotebook is smaller still, usually referring to a computer that takes up the same or less room as a 1-1/2" three-ring binder.

Laser printers (extended topic)

Laser printers offer the highest quality of printout of all consumer-level PC printers, and are now affordable enough to make them viable as first family printers.

These printers function essentially like photocopiers scanners. The computer tells the printer the layout of the ink on the page, and the printer responds by reproducing the image on paper. Lasers do not use ink, but a dry powdered substance called toner which is also used by photocopiers. This toner is dispensed from the toner cartridge onto a small rotating drum, where it has a positive electrostatic charge. The laser uses the instructions given by the computer to fire onto the drum, discharging the dry toner onto the paper. This deposited toner is then bonded, or fused, to the paper with a second roller which operates at very high temperatures. Once the toner dries the image is smudge-free and extremely sharp, especially if the paper is designed specifically for photocopiers or laser printers. There are also special, costlier papers for making ultra-sharp printouts which really show off the printer's precision.

Laser printers offer the twin benefits of having the best print quality and the lowest cost per page, with the disadvantages of having a relatively high initial cost and a need for fairly regular maintenance. Depending on the print quality desired, type of connection used (parallel is preferred over serial), and amount of memory required by the printout, lasers are also the fastest of the common types of PC printers.

dot matrix printer, inkjet printer, daisy wheel printer, toner, resolution



launch

Synonym for start or run. Launching an application or document is the same as running it.

LHArc

LHArc: Lempel-Ziv/Huffman Archiving. This is a type of data compression software designed for archiving data that needs to be restored to perfect original condition in future, and uses two separate compression schemes to achieve maximum reduction of file sizes. No longer in popular private use; still extensively used in software development as a space-saving tool.

license

In computing, the terms and restrictions assigned to a user of a given piece of software. The license to use a book, recording or piece of software -- not the words, music or software itself -- is what is purchased by the consumer. This is an important distinction, and it is equally important to note that most software licenses are limited and may be revoked at any time by the copyright holder whether the person is in possession of a purchased copy of the software or not.

light-emitting diode (LED)

A device which gives off visible light when current passes through it. Once a standard readout device on electronic and computer equipment; now used only when actual light is needed or desirable. Most LED operations designed to display characters (segmented displays) now use LCDs.

liquid crystal display (LCD)

The successor to the LED, a device for displaying variable information in a fixed space. LCDs function by the application of electrical current to a crystalline material suspended in a film of other transparent material. The crystal itself turns from being transparent in comparison to the medium in which it is contained to being visible when electrical current is applied. LCDs can be either monochrome, as is the case with most digital watches; or full-color, as is the case with newer laptop screens.

LCDs are made from different types of materials and use different sources of illumination depending on the circumstances in which they are used. Most laptops use light sources located behind the screen.

Grids of thousands of LCDs on a single panel are used for the displays in laptop and notebook computers. Basic LCD displays work on a simple on/off switching procedure and these are known as **passive matrix** displays, as opposed to active matrix which uses powered transistors to control the segments and refresh the screen more frequently, allowing for crisper animation and better mouse visibility.

Lotus

American software giant best known for making "spreadsheet" part of the popular lexicon through the enormous sales of its 1-2-3 spreadsheet; now part of IBM. Also known for other products including Ami Pro and Notes.

Macintosh

Apple's long-lived GUI-based personal computer built around Motorola's 68000-series CPU chip and the only serious contender to IBM-compatible market supremacy for nearly a decade. Introduced in the mid-1980s as an alternative to the IBM PC-compatible, the Mac featured high-resolution graphics, integrated component structure, a 3.5" floppy disk drive as standard equipment, a mouse-driven interface, and a wide range of other enhancements and alternatives to the PC and last-of-the-line CP/M computers of the day.

Although many people believe the Mac is inferior both in value and performance to the Commodore Amiga and Atari ST as a PC implementation of the Motorola 68000-series CPU, Apple's marketing has managed to keep the Mac at the forefront of GUI-based computers, and its ease of use and simple maintenance have insured it an ongoing place in the PC market. These last two features have made it especially popular with educational institutions.

mainframe

Term originally referring to the cabinet containing the central processor unit or "main frame" of a large computer. After the emergence of smaller 'minicomputer' designs in the early 1970s, the traditional big iron machines were described as "mainframe computers" and eventually just as mainframes. The term carries the connotation of a machine designed for batch rather than interactive use, though possibly with an interactive timesharing operating system retrofitted onto it; it is especially used of machines built by IBM, Unisys, and the other great dinosaurs surviving from computing's Stone Age. [Source: The Jargon File 3.0.0]

megabyte (Mb)

1,024,000 bytes of computer data. A megabyte is greater than a million bytes because memory in blocks of 1,000 bytes or higher are measured in multiples of 1,024. This is done because 1,024 is an exponent of two, which makes more computer sense and is easier to work with than 1,000 which is an exponent of 10.

megahertz (MHz)

One million cycles (Hertz) per second.

memory

A widely misunderstood and misused term with novices. Memory, strictly speaking, is any type of computer data storage, permanent or temporary, including RAM, disks and tapes.

Practically speaking, however, disks and tapes are almost never referred to in terms of memory, but instead are referred to in terms of their *storage capacity*. This distinction prevents a lot of confusion, since memory is usually used to refer to the hardware's physical capacity for running programs and processing data at normal computing speeds. Chip memory is thousands of times faster than storage memory.

To make matters even more confusing, virtual memory allows hard disks and other storage media to be used as slow forms of memory.

In short, memory refers to the chips on the system that store or process data, not to disks and other media designed primarily for storage.

microprocessor

A generic term that usually refers to a large-scale integrated circuit; a hardware component consisting of multiple transistors or switches miniaturized to allow several dozen to several million components to fit within a single housing, which includes instructions for processing data.

Microsoft (MS)

Microsoft, a software publishing firm headquartered in the US and led by Bill Gates III. Developers of MS-DOS and Windows as well as many consumer and business-level software products in wide if not nearly universal use. Responsible for more than 80 percent of the IBM-compatible operating system market.

Also (ms): abbreviation for manuscript.

mode, MODE . COM

State or attitude. Concerning computers, the state or configuration of a piece of hardware or software (e.g. "Windows usually boots in enhanced mode to provide access to its multitasking features, but you can also use standard mode, which will get a single task done faster.") As hacker slang, the current state of mind or attitude of the individual (e.g. "I've been up all night taking care of a problem I didn't cause, so be warned: I'm in vengeance mode right now.")

MODE . COM is a DOS program designed to set many device parameters, including keyboard layout and international alphabets, printer and serial port settings.

monochrome

Having only one color. Indicates that a program or computer monitor can only display one color: with monitors, usually white, orange, amber or green.

motherboard

The main circuit board on a computer which houses the CPU and to which all other peripheral devices used by the computer must be connected.

Motion Pictures Experts Group (MPEG)

Known mainly to computer users as the body responsible for developing the MPEG compression standard used for full motion video on computers. This compression scheme usually requires hardware in order to display video at a reasonable resolution and in full-screen mode as opposed to a small window, but it is usable on most 486-plus computers for small animations and videos.

MPEG has also developed data compression schemes for audio as well, which allow near-CD-quality audio in as little as 1/20 the space normally required. This allows artists to offer full-length songs in stereo for download on bulletin boards and the Internet in files just a few megabytes in size, instead of the dozens of megabytes required for full CD audio quality. MPEG-encoded audio files usually have the MP2 extension.

MPEG is expected to be the standard for computer video for the next several years.

Norton, Peter Norton

Peter Norton is legendary as the developer of Norton Utilities, the most popular PC utilities package in history, now marketed by Symantec. Other extremely popular products bearing Norton's name are Norton Commander, a much-loved DOS command shell; Norton Desktop, a favorite Windows utility package and interface replacement; and Norton Navigator, a series of extensions for Windows 95. Norton Utilities are considered to be the most useful and essential utilities package in existence for serious PC tinkerers.

"Norton" products are published by Symantec, which in 1994 merged with Central Point software, their closest competitor.

Novell, Novell Netware

American software giant responsible for the world's most popular Local Area Networking software for the DOS operating system, which is known as Netware. Also involved in consumer-level marketing as publishers of Novell DOS and now as the owners of WordPerfect.

null modem cable, nullmodem

A "modem-eliminator adapter", an inexpensive cable designed to connect two computers via their serial ports, occasionally used for file transfers but more often used for low-speed networking via serial ports.

operating system (OS)

Operating systems are the programs or collections of programs which act as translators between a computer's processing chips and programs designed to run on them. They are pretty useless on their own, like an empty house with no furniture. They only become useful when other programs apply them to specific tasks.

Examples of operating systems are DOS, Windows, OS/2, UNIX and Macintosh's System/Finder. Because of the way they are packaged, many people confuse operating systems themselves and operating system *packages*. Windows' Notepad and Paintbrush are not part of the operating system, but rather are bundled programs designed to be used with it.

Operating System/2 (OS/2, Warp)

IBM's successor to MS-DOS and Windows, originally a joint project between Microsoft and IBM. Microsoft later decided to develop Windows as an operating system in its own right. Said by hardcore hackers to be a vastly superior operating system to Windows, both OS/2 2.1 and OS/2 3.0 (also known as Warp) suffered from an inability to walk novice users through elementary tasks at even Windows' poor level, and thus never became the serious challengers to Windows which industry watchers had hoped.

OS/2 is a superb platform for many memory- and processor-intensive applications; a bust as a consumer-level operating system. Another victim of Betamax syndrome; often derogatorily referred to by ardent Windows fans as "half the operating system".

overlay

Refers to part of a DOS program that resides in a separate file from the main program file and is loaded into memory as needed for its functions. Overlays are used to get around DOS' 640K memory limit and allow DOS programs to perform functions or groups of functions which would otherwise require more than the maximum available amount of DOS memory.

pack, unpack

These are usually used as slang terms for archive and unarchive which have fallen into common usage. Packing refers to processing a file or set of files using data compression or backup software for the purpose of archiving, copying or transmission. Unpacking, naturally, refers to the process of extracting the compressed data.

Not to be confused with **PAK.EXE**, file compression software from NoGate Consulting; or **PKPAK.EXE/PKUNPAK.EXE**, programs by PKWARE which are designed to process specific types of compressed archives.

parameter, argument

Refers to a legal value used by a specific piece of software or hardware, but it is also used to refer to commands designed for inputting these values. For example, Windows Help offers several optional commands for loading helpfiles. The command `winhelp -i port pclex.hlp` will take you directly to the definition for "port", because that's how the software was created. However, "-i" is a command, not a parameter, since it tells **WINHELP . EXE** to jump to a specific topic. The parameters are "port", the topic; and "pclex.hlp", the specific helpfile containing that topic.

Argument and parameter are often used interchangeably, although strictly speaking an argument is a variable command that is fixed while a parameter is considered to have a potential range of values. Arguments also refer to commands issued in actual programming which have one-way, fixed values.

In casual conversation, parameter and argument are both often used to refer to all additional commands added to a program launch command. While this is not technically correct, as shown above, it is still very common.

paste

Refers to working with the clipboard. Data copied or cut from one file is placed into another by pasting from the clipboard.

patch

Either a fix for an existing problem, a file used to replace code in an existing product for purposes of fixing bugs or updating features, or the act of fixing a bug.

Path types (extended topic)

A path is the "street address" of a file or directory, and specifies the route that must be taken through the disk's directory structure to get to it. It functions like a street address in reverse, with the "country" name (drive) first and the street number (name of the specified file or directory) last. Paths are usually referred to one of four ways: full path, directory path, absolute path and relative path. Refer to the extended topic on path types. for more information on path syntax for DOS and Windows.

There are four main methods of describing paths in DOS and Windows: full path, directory path, absolute path and relative path.

Full path: the complete path of a file. Includes all directories above the file and the full name of the target file. For example:

```
C:\WINDOWS\SYSTEM.USER.EXE
```

... is the path to a file used by Windows called **USER.EXE**.

Directory path: the complete path of a file or directory but without the name of the file itself. Directory paths are usually used to point to a directory where files are to be saved or where a specific file or group of files may be found. For example, Windows system files are usually located in the directory path:

```
C:\WINDOWS\SYSTEM
```

Under standard DOS and Windows syntax, a directory path does not always have to include the trailing slash, although the rules regarding this syntax vary from program to program.

Absolute path and relative path: used in relation to the directory in which the user is working. Absolute path includes the full path or directory path including the drive letter. For example:

```
C:\WINDOWS\SYSTEM\USER.EXE
```

...is the *absolute path* for the file **USER.EXE** regardless of the current working directory.

However, if the user is currently in the `c:\DOS` directory, the *relative path* would be written as an "up-and-over" path, like so:

```
..\WINDOWS\SYSTEM\USER.EXE
```

The two dots here stand for "up one level of directories".



PGA

Pin grid array , an arrangement used for contact pins on many newer CPU chips (80386 and up) in which the pins on the chip are laid out in a grid that looks a little like a bed of nails. This arrangement allows for easier connection of chips that need a large number of contact points with the circuit board.

Also: **Professional Graphics Adapter** : a graphics hardware and software standard introduced by IBM in 1984 and designed for high-end desktop publishing, graphics and CAD work, it was so advanced the graphics card used a more powerful processor than the computer itself. The first 256-color standard, but it was so expensive that it was never widely accepted.

piracy

Piracy is the act of making illegal or unlicensed copies of a piece of software in violation of the author or publisher's copyright. Technically in the US it is a civil matter below a certain dollar value (generally believed to be around \$2,000). Piracy is a very serious issue with publishers, who believe billions are lost each year to unlicensed use of software. In an attempt to minimize the illegal use of software, many publishers have implemented copy protection schemes at one time or another, but this has largely gone by the wayside due to the inconvenience to authorized users.

Many industry watchers believe a large part of the industry outcry over the alleged billions lost to piracy is a scare tactic, as those who routinely pirate software generally would not pay, or be able to pay, for their unauthorized copies; and those who do not understand the concept of illegal use of software are generally willing to pay for their software once they understand the concept of licensing.

pixel (pel)

A defined area on a graphic display (computer monitor). Most computer graphics are measured in terms of their pixel size, which varies depending on the size and type of the monitor display. The standard sizes for IBM-compatible, Macintosh, and high-resolution Atari and Amiga displays are 480 pixels in height by 640 pixels in width. Not to be confused with *dot*, which is an area on a computer screen itself...a single *pixel* of data can cover several *dots*.

PKZIP (extended topic)

Believed by many to be the single most common IBM-compatible software program in use in the world (excluding programs included as part of operating systems such as DOS and Windows). Archiving software designed to combine and compress files for ease of storage and transmission.

PKZIP is the brainchild of Phil Katz, an American programmer. He began his career by developing an archiving and unarchiving program with superior performance to the then market leader, SEA (Systems Enhancement Associates) ARC. He named the program PKARC, but lost a suit with SEA and thus the right to use the name ARC. He subsequently renamed the program to PKPAK, and while ARC software is now obsolete, PKUNPAK is still in wide use for processing the tens of millions of ARC-compressed files still in existence.

Katz later refined the ARC compression routines into his own unique compression scheme known as PKZIP. Its speed, efficiency and versatility soon made it the clear market leader. PKZIP's supremacy was threatened for a brief time in the early 1990s by rival upstart ARJ, created by Robert K. Jung, and the free LHA program created by Haruyasu Yoshizaki. Both offered superior compression results until the 1993 release of PKZIP version 2.x, at which time Katz' software regained and at this writing retains supremacy in the world of IBM-compatible file compression.



program

A set of binary instructions executed by a computer for a given purpose, also the act of creating a set of binary instructions for execution. Alternatively, from the Jargon File: "A magic spell cast over a computer allowing it to turn one's input into error messages." As opposed to data, which is the raw material for programs to mangle and destroy.

public domain (PD)

Refers to a work whose copyright has either expired over time or been released to the public by the copyright holder. Property of the public; freely usable in any otherwise legal form.

Random Access Memory (RAM)

The basic term for the chip memory used on all computers for running programs. The "random" comes from the fact that RAM chips are designed to be accessed at any point by the CPU with virtually the same amount of speed. The 500,000th bit of a one megabit chip can be accessed just about as quickly as the first bit. RAM differs from ROM (read-only memory) in that RAM can be erased and rewritten thousands of times a second whereas data in ROM is permanent.

readme, README files

According to many veteran computer users, these files are so named because people *won't* read them. These are text files containing important information either included with a software package or left in the root directory of an Internet FTP site for the benefit of users. Not intended to be ignored or chuckled at...but to be *read*. In the case of shareware and freeware software, the **README** may be the only documentation available for the program.

repetitive strain injury (RSI)

Exactly what it would appear to be: injury which occurs as a result of repeated strain to the same tissues (bones, muscle, skin, etc.). RSI is used specifically in terms of computing because of the high risk of RSI faced by those who work with computers on a daily basis. The simple act of typing on a standard QWERTY keyboard places strain on the hands and wrists, which is worsened by improper wrist, elbow and shoulder support.

The result of long-term repeated strain is injury to the wrists, hands or shoulders, and there are many varieties of RSI suffered by typists and computer operators. It is believed the most common is tendosynovitis, inflammation of tendons in the wrist which results in pain in the hands and forearms. Less common, but far more publicized, is thecrippler carpal tunnel syndrome, in which actual physical damage has been done to the wrist.

RSI's can be avoided or reduced in severity through the use of proper typing and mouse posture, supports to the hands, wrists and shoulders, frequent breaks, and according to recent reports, vitamin B6 as a treatment for inflamed nerve endings.

resolution

Resolution in computing terms is a measure of clarity and sharpness, and is applied to both printers and video displays. The two types of hardware use very different methods of measuring resolution; see the individual definitions for details.

routine

A routine is a sequence of instructions issued by a program with a beginning, a middle, and an end, that does not necessarily need the rest of the program to function. For example, the display of this topic by Windows Help is a routine, and it could be accomplished as a separate, much simpler program if it was all that was necessary for the program. Most usable software is composed of groups of routines, which are also referred to as subroutines.

screen saver, screen blanker

A piece of software designed to prolong the useful life of a computer monitor by monitoring computer activity and altering the display when no activity is detected for a period of time. Screen savers usually monitor mouse and keyboard but can also be configured to watch printer and modem as well.

The most elementary form of screen saver is a screen blanker, which simply replaces the image on the screen with a blank screen until activity at the monitored devices is detected. Screen savers can be extremely sophisticated, and some, such as Razzle Dazzle and After Dark, have become popular "toy" programs in their own right.

Screen savers prolong monitor life by preventing fixed objects on a screen, such as a window which stays in a fixed position for a long period of time each day, from "burning into" the phosphor at the front of the monitor until the image becomes a permanent part of the display. This effect can be seen most vividly on old coin-operated video game units, but the greenish color on older television sets is also a result of burn-in.

script

Series of instructions, usually text, used to control the processing of data by an application; usually refers to user-generated instruction sets. **AUTOEXEC.BAT** and **WIN.INI** are examples of scripts. Macros are also referred to as scripts, although not all macros require scripted text files in order to function.

Scripting is also a term used to refer to programming in languages such as PERL or BASIC that use interpreters to process instructions rather than building compiled binary executables. Many telecommunications programs include their own scripting languages.

sector

A sector is a fraction of a track, and the smallest physical measurement of disk usage.

All files are assigned specific sectors on which they can store their data, and while a file can share part of a track with another file, it cannot share free space in a sector. While tracks are laid out on a disk like rings on a cut tree trunk, sectors are laid out like sections of a track, somewhat similar to divisions on a clock face. The standard size for sectors on floppy disks is 512 bytes, or an area one ninth of one of the eighty tracks on a 1.44Mb floppy. Most hard disks have sector sizes of 2,048 bytes, but this size can vary depending on the type of formatting and data access used.

Sector can also refer to a division of a given area, such as a part of a playing field or three-dimensional representation, and the sector is usually represented by its x , y and (3D only) z coordinates.

self-extracting archive (SFX)

A compressed archive which has been specially processed to turn it into a runnable program. The procedure adds a small amount of code to the start of the archive file so that it can be extracted and used by the end user without the need for a local copy of the necessary decompression software.

Long shunned in telecommunications because of the ease with which viri and trojan horses could be attached to the executable code, SFX's are rapidly becoming the preferred form for distribution of software via Internet, and particularly for Microsoft Windows, because of the ease of use of this particular type of file.

shareware

A method of software distribution developed in the early 1980s as a means of allowing free distribution of commercial-quality software on BBS', online services and via low-cost disk sales which allows the author to still be paid for their work.

Shareware originally meant any software offered expressly to be shared between users but has since become a term synonymous with try-before-you-buy. The idea is to allow the user a free trial period of the software (usually 30 days) before requiring that payment be made for the software if it is kept.

Shareware typically offers bonuses to those who pay to register a license for the software, since it is traditional not to cripple try-before-you-buy in any fashion, and without an incentive to purchase most people will not register the software. This help tool was originally shareware.

spreadsheet

Spreadsheet refers either to a piece of software designed to allow for virtual viewing of data, usually numerical or mathematical. The term can also refer to a table of data created with such software, although the term worksheet is used here instead so as not to confuse the software and the data it creates.

Spreadsheets derive their name from the fact that the visible "sheet" of information can spread beyond the screen boundaries of the computer or terminal on which the data is viewed. Spreadsheet tables might have only five visible columns or rows onscreen but have several dozen more spread to the right past the visible boundary of the monitor, and these are accessed by shifting the view of the spreadsheet to the desired columns and rows.

The most common application for spreadsheets is the organization of financial data, although they can be used for statistical analysis of virtually any kind of numerical data. Modern spreadsheets also often contain databasing and word processing features. These are not technically part of the spreadsheet itself, but merely extensions to it.

Stacker

Prior to Microsoft's MS-DOS 6.0 release, which included Doublespace disk compression software, Stacker was the most widely used disk compression software on the IBM-compatible. Developed by STAC Electronics, Stacker has featured superior compression, speed and reliability to all competing products for several years.

Trivia

Industry-watchers widely credit STAC for Microsoft having to release several updates to MS-DOS 6.0. Microsoft left serious, data-destroying bugs in the first version of Doublespace and in 1994 were successfully sued by STAC who claimed that Doublespace violated STAC's copyright. Microsoft denies all such claims, of course.

Super VGA (SVGA)

Consumer graphics display standard for the mid-1990s. Allows color depth higher than the 256,000 color maximum provided by VGA and a screen resolution of 800x600 pixels (the VGA standard is 640x480).

system clock

A calibrated quartz crystal used as the computer's internal timing device. Depending on the shape of the crystal, it vibrates at a constant rate with the application of electricity providing a stable pulse that the system uses to time various functions. The speed of a system clock is measured in megacycles or megaHertz, and this speed is usually used as the rating speed for the CPU on 386's and higher (e.g. a 486DX-33MHz uses a 33MHz. system clock)

SYSTEM.DAT, USER.DAT

Two critical new system files used by Windows 95 to store a wide range of information. Collectively they are known as the registry. Most of the information contained here was formerly contained in the **WIN.INI** and **SYSTEM.INI** files used by Windows 3.11 and earlier. These files are so important that they should be backed up daily by anyone who makes frequent changes to their system, as virtually every new Windows 95 program makes some kind of change to these files, and personalized system settings are also stored here.

tape backup unit

A peripheral device for archiving data in a tape format. Tape backup units can either be built-in or external units which use tape cartridges a little smaller than an audio cassette to create backup copies usually of hard disk data. These units were usually reserved for business use due to their high cost but around 1994 costs came down to the point where a large percentage of home computers now have tape backup.

These devices have capacities ranging from 20Mb (older style) to over 500Mb, and are the most cost-effective archive storage method in use today for the average computer owner. They have one drawback: speed. Copying and retrieving backup data on tape is a slow process.

task

Geek speak for "chore". Each program or process within a program is represented to the operating system as a task to be performed, hence "multitasking" and "task switching". A single Windows application can have several tasks running at once; most DOS applications only have one.

To see which tasks are running at any given moment within Windows, press and hold the Ctrl key and tap Esc. A program called Task Manager will pop up. Unfortunately this will not give you a true picture of the tasks running within Windows, since many applications run certain tasks hidden from the operator.

In Windows 95, Task Manager is called with Ctrl+Alt+Delete, which is *not* a key combination to be used with Windows or DOS, since it may reboot the computer.

task switching

Often confused with multitasking. Task switching is the ability of an operating system to allow more than one application in memory at the same time and permit the operator to switch between them. It is not multitasking, although the line is a very thin one. For example, Windows 3.0 allowed the user to have many programs in memory at once and switch between them at will, but it did not permit more than one program to perform operations.

Windows 3.1 is allegedly a multitasking operating system, but since it assigns processor time to one application at a time in tiny slices, technically it is still a task switching operating system; it only *looks* like true multitasking because the switching happens so rapidly.

terminate-stay resident (TSR)

A personal computer program designed to be run once which then remains in memory for the use of other programs; this permits its features to be accessed without the need for individual programs to duplicate the functions of this program. TSR's are designed both to eliminate the need for extra code in other programs and to improve or augment the performance of existing programs.

text editor

A program designed for the creation or modification of text-only (non-binary) datafiles.

text file, ASCII file

Generally speaking, a file containing readable text with only the standard typewriter characters and no special characters or formatting, although it can loosely refer to files which contain IBM graphical characters such as bars and line drawing symbols. Such files are also referred to as ASCII files.

trackball

This device is an alternative input device to the mouse which functions essentially in the same way. Trackballs are used where desk space is not sufficient for the use of a mouse, especially with laptops and notebooks, where the user may have difficulty moving the wrists due to injury or other constraints (smaller trackballs can be held in the hand and do not need a flat surface), or where there is an ergonomic need for an alternative input device, such as in the case of repetitive strain injury.

trojan horse

A computer program which carries within itself a means to allow the creator of the program access to the system using it.

upgrade, update

These two terms are widely misused by consumers. Upgrade generally refers to a major improvement or major change (as many users discover, upgrades are not always improvements) in a piece of hardware or software. Update usually refers to an improvement designed to fix or patch a bug or to accommodate changes in software or hardware which the particular product is frequently used with. For example, Windows 95 is an upgrade over Windows 3.1, but Windows 95 is only an update to the Windows 95 beta test version which had been available for over a year before Win95's release.

US Robotics

The world's most successful modem manufacturers since the late 1980s. Known as manufacturers of high quality modems at reasonable consumer-level prices, their Sportster model has been the single largest-selling line of modems in history. Also famous for the notorious HST protocol and for their higher-end Courier modems. Loved by users and servicepeople alike for their ease of use, reliability and overall simplicity of installation; hated for their tendency to develop new high-speed data transmission standards that don't become adopted industry-wide and limit the compatibility of their hardware.

utility

Usually used to distinguish a type of program from an application. Utilities are usually said to perform functions related to the maintenance of hardware and data rather than direct data manipulation. Utility can also be used to refer to any program which alters data in files but does not necessarily create new, usable data, or which is designed for the purpose of maintenance and/or tuning of the computer. A fuzzy term with no precise meaning.

UUE/UUD (uucode/uuencoding/uudecoding)

A method of encoding binary (non-text) files into a format using standard characters used in text messages and a fixed line length of 62 characters to enable transmission of binary data on networks such as email or USENET which do not normally permit transmission of non-text data. Frequently used to post binary files to newsgroups.

version, revision

Version and revision are used interchangeably to describe the state of a given piece of technology, and version numbers are the computer industry equivalent of model years for cars. Version and revision are also used as slang terms for the act of applying version and revision numbers to products (e.g. "When Microsoft versioned Windows in 1992 to 3.1, many people felt they should have versioned it 4.0 because of its improvements over 3.0."). Version numbers are not always sequential. For example, Microsoft released Word for Windows 2.0 and then released their next version as 6.0. There was no version 3,4 or 5 on the Windows platform.

There are few standards used for versioning, but revisioning is usually done using dates, or revision dates. For example, a program named SuperStuff might be versioned Superstuff Revision 0495 to indicate that it was last updated April of 1995. Some programs are revision dated down to the hour.

Video Graphics Array (VGA)

The successor to EGA and the standard from the late 1980s to about 1994 for personal computer graphics. Originally introduced as the IBM color graphics standard used on Personal System/2 (PS/2) series of home computer models, the standard has undergone several updates and enhancements.

Virtual Address Extension (VAX)

The most successful minicomputer design in industry history, possibly excepting its immediate ancestor, the PDP-11. Between its release in 1978 and its eclipse by killer micros after about 1986, the VAX was probably the hacker's favorite machine of them all. [Source: The Jargon File 3.0.0] Manufactured by DEC.

VisiCalc

The first widely-used spreadsheet program, available for UNIX, Apple][, CP/M and many other platforms of its day. Obsolete. spreadsheet, Lotus, Apple, CP/M, UNIX

warm boot

To restart an operating system without physically shutting off power to the computer. The components are still "warm", or receiving electricity, while the computer is restarted. Usually faster than cold booting and often a method of recovering data since a warm boot does not erase the contents of certain types of memory. Warm boots are always reboots.

wizard

A term apparently concocted by Microsoft to describe a type of walk-through help developed initially for their Microsoft Office suite of applications (Word, Excel and PowerPoint) and now implemented on a wide range of Windows 3.1 and Windows 95 applications. Wizards are designed to assist novice users through step-by-step processes, ranging in complexity from the installation of new software to the creation of complete desktop publishing documents, without requiring the use of the manual or any prior knowledge of the program.

This topic is also the first screen of a demonstration wizard created to show how the process works. Click the **Next Topic** button to continue with this short demo.

WordPerfect

Refers either to WordPerfect Corporation, an American software giant most notable for their WordPerfect software. Wordperfect is also novice slang for any word processing program (e.g. "What kind of wordperfect do you use? I prefer Word for Windows myself.")

word processing

The act of formatting a text document which may also contain graphics for purposes of viewing or printing, usually by others. The line between word processing and desktop publishing has become blurred in recent years; the sophistication of modern word processors now gives them facilities once reserved for desktop publishing software and vice versa.

word processor

A piece of software designed to process text into documents for printing or transmission. Word processors are used for both the development of new documents and the alteration and reformatting of existing documents.

workstation

A network term that refers to a computer designed both for stand-alone work and connection with a network. Also a generic term referring to high-end UNIX PCs such as those made by Digital Equipment Corp. and Sun Microsystems.

Slang: can also refer to the operating environment or *workspace* where such a computer is located.

write-protect

Write protection is the application of a measure to any writable storage medium to prevent data from being written to it. Write protection usually refers to floppy disks. 3-1/2" floppy disks can be protected against accidental writes by closing a small window on the disk by sliding the tiny black tab designed for the purpose over the window. 5-1/4" disks use a different type of write protection. These disks have square notches in the sides of them, and covering this notch with adhesive tape of any kind will prevent it from being written.

Hard disks can also be write protected, but this requires special software and in most cases this kind of protection isn't practical since Windows needs to be able to write to its swapfile quite frequently on most systems with less than 12Mb of memory.

xBase

A generic term used to refer to any database or database management software which is compatible with the industry standard dBASE format developed by Ashton-Tate. Packages that use the dBASE file format are said to be xBase products, and there are literally tens of thousands in use. dBASE is currently at version V (5); the base industry standard for xBase is dBASE III compatibility. dBASE was the first widely-used database products to provide full relational database capability on the PC.



(ewc HLP256,HLP256_TILE,MAINMARK.BMP)

Essential computing terms and concepts

What exactly is meant by...

 [Introduction](#)

 [Modem?](#)

 [UNIX?](#)

 [Virus and trojan?](#)

 [Hard disk and floppy disk?](#)

 [Memory?](#)

 [SIG?](#)

 [Hacker?](#)

 [DOS and Windows?](#)

 [Bits, bytes, kilobytes and megabytes?](#)

 [Boot?](#)

 [Prompt?](#)

 [File and directory?](#)

 [ZIP or compressed archive?](#)

 [Installation, setup and configuration?](#)

 [Format?](#)

 [Shell?](#)

 [Software and program?](#)

 [BBS or Bulletin Board System?](#)

 [Path?](#)



This is a collection of important words and concepts every computer enthusiast needs to know. In this section, you'll be offered detailed explanations of many critical concepts and terms useful to anyone computing in the late 1990s. You'll also be offered other resources to enhance your understanding and skill. As always, go as far with this as you feel necessary for the task at hand. There's probably far more information here than you need, but better to have it and not need it than to need it and not have it.

Even if you're not a beginner, you'll probably find a lot of interesting trivia and computing facts you didn't know before. This page will help you get a lot more out of the hardware and software you have by letting you focus less on what it is and more on what it does.

What are bits, bytes, kilobytes and megabytes? (pic:HL.P256.HLP256_TILESECMARK.BMP)



A bit is the smallest amount of data you can have on a computer. A bit can be either a 0 or a 1. It's like a switch...one switch...that can be on or off.

A byte is eight bits, or a combination of eight on-off switches. It sounds pretty meaningless until you see bytes as similar to LED letters and numbers. Think of each segment is a bit, and the combination of these segments, on or off, make up all the letters and numbers in your computer's alphabet.



Here are all eight bits shown as **on** or **1**, which might represent the switches necessary to display all segments in our eight-piece (8-bit) LED display. It appears here as an 8 with slashes in the two loops. Naturally if they were all set to **off**, all segments would be invisible, creating a blank or "null" character. (Every computer's alphabet reserves at least one such character.)



Here, two segments have been turned to **off** or **0** to create the letter R.



And here, three segments have been set to **0** to make a 6 character.

These eight segments combine to make all the letters in the most basic PC alphabet: the eight-bit *character set*. This isn't a perfect example of how it works, because some of the characters made from combinations of these segments won't look like anything you would recognize as a normal character. What's important is not so much that you understand all 256 possible combinations, but that your computer does. Most software simplifies the translation so that all you need to know are the alphabet, numbers and punctuation keys on your keyboard.



 [More info?](#)

Here's where things get a little strange (http://www.hlp256.hlp256_tile.secmark.bmp)



A kilobyte might logically seem to be 1,000 bytes. It isn't. Instead, it's 1,024 bytes, and it's interesting the way this works. These multiples are actually exponents, or powers of 2. 8 is 2 cubed (2 to the 3rd power); 1,024 is 2 to the 10th power. Here's where it gets interesting (not to mention confusing) since kilo- almost always means 1,000 in other contexts.

A megabyte is a million-plus, or 1,048,576 bytes, or 2 to the 20th power.

Gigabyte, the current level of measurement used for PC hard disk storage, is a billion-plus; 1,073,741,824 bytes or (you guessed it) 2 to the 30th power.

Terabyte, more often used theoretically than practically, represents a trillion-plus bytes; 1,099,511,627,766 to be exact. *Tera* here has nothing to do with three, since it represents 2 to the 40th power.

What's interesting is how close these base-2 exponents come to being base-10 large round numbers, and how each three additional zero's is exactly 10 powers of 2 higher than the previous three. It stems from the fact that 1024 is 2 to the 10th power.



What is memory...exactly? (pic: HLP236.HLP236_TILE.SECMARK.BMP)



There are more than a dozen types of memory in the average PC today, including static, extended, video, shadow, upper, cache, virtual, and a few others. But there are two specific types of memory you need to know about. If you don't know about them, then you can't know your computer's capabilities.

 [RAM memory](#)

 [Storage memory](#)

 [Short-term and long-term memory](#)



RAM memory



The first type is called RAM memory (Random Access Memory), or chip memory as it is sometimes referred to elsewhere in this guide. RAM or chip memory is a collection of millions of switches stored on the computer's chips. These are extremely fast switches, able to turn on or off millions of times a second, and they require electrical current to stay fixed in either the on or off position. The contents of your RAM disappear every time you turn off your computer.

RAM memory exists to help programs run and run quickly enough to be usable to you. It is possible to have a working computer without RAM memory chips, but it would be dreadfully slow.



Storage memory



The second type is storage memory, and almost no one calls this memory any more. It's simply called storage, disk storage, or disk space, because this type of memory uses your hard disk or floppy disks to hold data rather than the chips themselves.

If your computer had to process information using only your disks, it would take at least 100 times longer for almost every computing task, so this type of memory is only used normally for long-term storage of data.



Short-term and long-term memory



Think of your computer's chips as short-term memory that changes in content thousands of times a second with each new task the computer performs, and disappears every time you turn off the computer. Think of disks as long-term storage that might only change a few times a day. In fact, most of the data on your disks will never change at all.

Your computer can use chips to store some data over the long term, but long-term chip storage is extremely expensive. A 1.44Mb floppy disk costs about fifty cents. A megabyte (a million bytes) of hard disk storage costs between thirty and fifty cents. A meg of RAM in chip form (almost all PC RAM chips are sold as modules called SIMMs, or Single In-line Memory

Modules) cost about \$50 in July of 1995.



What's the difference between a hard disk and a floppy disk? ...

HP1204/HP1204_T1E.SECMARK.BMP



If you've never seen the inside of your computer, you might not know that there is another disk drive inside that you can't access by hand and will usually never see from the front panel. This hard disk (also called a hard drive by some oldtimers) is actually one or several metal disks -- not the flexible plastic type -- usually about three inches around and vacuum-sealed in a steel case.

The difference between these hard metal disks and the floppy disks and compact disks you feed your computer from the front panel is a lot like the difference between a cheap audio tape and a high-performance metal cassette. Metal tapes sound better on a tape player because they can store more audio information in the same amount of space. Metal disks work faster in your computer because they can store more data in the same amount of space than regular floppies. In fact, today's hard disks can store the equivalent of the contents of thousands of floppy disks.



Storage for now, storage for later



"Data expands to fill the container"



Maintenance-free media



Storage for now, storage for later



The hard disk is the disk you use most often for storing your files. The hard disk is what holds Windows, DOS and all of your most-used programs. Floppy disks are only commonly used today for keeping backup copies, distributing new software, moving files between computers, and sharing data with friends or colleagues.

Floppy disks are also much slower than hard disks. If your computer had to start Windows from data stored on floppy disks instead of a hard disk, you might have to wait up to five minutes before being able to run programs from Windows 3.1's Program Manager or Win95's Start menu, and wait an additional minute to five minutes when running any new programs from Windows.

Both floppies and hard disks are usually defined by how much data they'll hold, or how much disk space they provide for storing files. Hard disks can come in dozens of different sizes, floppies in just a few. Storage space is measured using the same units as memory -- bytes, kilobytes and megabytes -- because disks are nothing more than a way to store information that can't be stored permanently on your computer's memory chips.



"Data expands to fill the container"



Five years ago, 20 to 40 megabytes (20Mb) was considered a standard size for most hard disks, and people wondered how they could ever fill that much space. Today, most experts recommend a minimum of 500 megabytes of total hard disk space on your system if you plan to run Windows or OS/2 and at least 100 megabytes if you just use DOS. The latest version of

WordPerfect alone will overflow an old 20Mb hard disk, and it can consume twice that amount of space if you install the Windows version rather than the DOS version.

There's an axiom among computer professionals: "data expands to fill the container". Essentially what this means is that if you spend much time with your computer, it won't matter if you have 100Mb or 10Gb...eventually you'll run out of room. We recommend that serious Windows users have hard disks of at least 500Mb, and you will probably find anything less than 300Mb difficult to work with if you get serious about using the Internet.



Maintenance-free media



Hard disks are maintenance-free. They are hermetically sealed and extremely sensitive to dust, so in most cases they'll never need cleaning and can't be repaired if they break down. Fortunately hard disks have become extremely durable over the last decade, to the point where you might be able to drop a brand-new hard disk on solid concrete and still use it. Ten years ago, people were afraid to even touch their computers while they were running for fear of damaging delicate hard disk mechanisms.

Floppy disks are also considered to be maintenance-free. When either a floppy disk or a hard disk stops working, it's almost always cheaper to dispose of it than to make any attempt to repair it.



There is an extensive guide to understanding floppy disks and formatting available at the section linked to this button.



What are format and formatting? (pic: HLP256,HLP256_TILE.SECMARK.BMP)



Formatting has two meanings in computerdom. The first has to do with the arrangement of data on a disk, and the second concerns the arrangement of data inside of other data. The only type of formatting you need to worry about for your first month or two with a computer is disk formatting, and hopefully you won't even need to deal with that.

The format is the layout -- or floor plan if you prefer -- that disks use for arranging their files and data. Floppy disks and hard disks need a magnetic floor plan so that the data stored on them can be arranged in an orderly manner. Tapes used in tape backup drives and CDs also need a format. (In a sense, even your computer's memory chips need a format, but this is something you'll probably never need to know about.)

Formatting is usually a once-in-a-lifetime experience for a hard disk or floppy. Once it has been done, it rarely needs to be redone. Disks are magnetic media, just like cassettes and videotapes, and all magnets tend to weaken with time and use. But by the time a floppy or hard disk's magnetic strength drops below useful levels, the hard disk is usually so old and so small compared to the latest products that it's usually more sensible to dispose of it than to reformat it.



The different types of formats (www.HLP236.HLP236_TILE.SECMARK.BMP)



Each different computer type has its own method or "formula" for formatting floppy disks and hard disks. A disk formatted for an Apple Macintosh won't work on an IBM-compatible running DOS, Windows, UNIX or OS/2 without re-formatting or the use of special software designed to read Mac disks. The same is true of IBM-compatible disks read on a Mac.

There is only one surviving standard size of floppy disk in use on today's IBM-compatible, down from four standard sizes used no more than a couple of years ago. There are still billions of floppies in three other sizes in common use though, and it may eventually be useful for you to know what these standard sizes are.

Hard disks on the IBM-compatible don't have a storage size standard since they aren't generally transferred from one computer to another. Each manufacturer decides based on their own test results the ideal size and format will be for their hard disks, and these special parameters are applied by your computer's hardware when the disk is formatted. Don't worry about your hard disk's floor plan though. If it wasn't already formatted, you wouldn't be reading this page.



There is an extensive guide to understanding floppy disks and formatting available in the PC Owner's Survival Guide section linked to this help button.



What is the difference between software and programs? (http://www.hlp200.com/HLP200_TILE.SECMARK.DMP)



Let's start by defining what makes up a program. A program is a chain of commands that get carried out by a computer. It's a series of instructions that starts, does its thing, and stops. It can perform its duties this either with or without further instructions from you, depending upon how it was designed.

-  [Software](#)
-  [Programs](#)
-  [Binaries and executables](#)
- 
- 

Software



Before we define software, let's look at hardware first. The bolts that hold a door on its frame are hardware, but practically speaking so is the rest of the house, from the concrete foundation to the roofing tiles. A bolt on its can't do anything. You can't normally use it to eat ice cream, talk to it or make it do your dishes. It has one purpose and one purpose only: holding up your door. But the whole house is something you can work and play with, something you can apply in many different ways.

Software in your computer is like the hardware that makes up your home. It has a specific purpose, and the sum total of all your software is what gives your computer the power to do all the many things it does for you.



Programs



A program is like an automatic door latch. The latch may open and close at your command, but it needs the bolts and other hardware which make up the sum total of the door and latch mechanism before it all functions properly. The automatic latch by itself is useless without a door to attach it to.

The latch mechanism is a piece of hardware, but of naturally not all hardware is latch mechanism. In the same way, programs are all software, but not all software is a program. In fact, most software isn't a program.

Picture files and word processing documents are both software, but you can't run a picture file or start a word processing document because they normally have no mechanisms in them for starting on their own. What you start is the program designed to handle that particular type of data. Just like you apply the latch to the task of opening and closing the door on cue, you apply a program to the task of viewing or altering data. (This is why programs are often referred to as applications.)



Binaries and executables



Two other terms used to describe software are *binaries* and *executables*. Executable is just another word for program. A binary file is generally considered to be any non-text type of file. There are a total of 256 characters available in the alphabet of today's PCs, Text generally uses only the first 128 characters in that alphabet. The other 128 characters are either considered special characters for text formatting or used for creating non-text data files.

Binary, of course, means "composed of bits", or 1's and 0's, but the term has more or less passed into common usage as meaning data which is non-text in nature.



What is the difference between DOS and Windows?

(pic: HLP25L.HLP25L_TILE.SECMARK.BMP)



Both DOS and Windows qualify as programs. But they are special types of programs known as operating systems. They have to follow the rules laid down by your computer, but unlike most other programs, they are also allowed to make the rules for how other programs must behave when running on your computer. Think of operating systems as a digital dwelling and your software as the furnishings.

Operating systems are the programs or collections of programs which act as translators between your computer's chips and disks and your programs (or, if you like, applications). They are pretty useless on their own, like an empty house with no furniture. They only become useful when other programs apply them to specific tasks.



DOS versus Windows



How do you tell the difference between DOS and Windows?



Confused? Blame the advertising agencies!



Until Windows 95, you needed both Windows and DOS



DOS versus Windows



DOS and Windows are both different types of operating systems. DOS is the granddaddy of personal computer operating systems, and Microsoft's MS-DOS is still the most popular OS in the world.

The difference between DOS and Windows is much like the difference between a tent trailer and a ranch home. DOS is the tent trailer. It can be dressed up in many ways, moved easily from place to place and made livable, but it's hardly a place where most people will feel comfortable setting down roots. Windows, on the other hand, provides all the comforts of suburban living, with the main disadvantage of being difficult to transport from place to place. You can copy the basics of the DOS operating system to a floppy disk in about ten seconds, and have room left for many programs. You can't even fit the absolute basics of Windows on a single floppy disk.

DOS will do just about everything Windows will do, for all practical purposes, except run more than one program at the same time. Like a tent trailer, it becomes uncomfortably crowded with more than one occupant. With a little fancy interior decorating you can make DOS look like Windows and feel like a ranch home, but eventually you run into the severe limitations of such an illusion. Unless you have highly sophisticated software designed for the purpose (DesqView is one such program), you can't run two programs at once in DOS. Windows will easily allow you to run two programs at once -- or twenty -- provided it has the real estate, or memory, to work with.



How do you tell the difference between DOS and Windows?



It's actually very simple once you have seen both systems in operation. DOS and Windows

have two very different appearances. When your computer first starts up, everything you see until the hourglass appears on your screen is DOS activity. You can also run DOS programs from within Windows. You can tell you are running a DOS program in most cases because all of your normal windows will disappear while the DOS program is running and be replaced by a much less pleasing-looking screen layout.

```
{ewc LZANI.DLL,LZANIMATE,GRAPHICS.DAT;dos.bmp}
```

```
{ewc LZANI.DLL,LZANIMATE,GRAPHICS.DAT;window.bmp}
```

```
{ewc LZANI.DLL,LZANIMATE,GRAPHICS.DAT;window95.bmp}
```



Confused? Blame the advertising agencies!



Understanding the differences between operating systems, and the difference between the OS and the software it is designed to use, is made considerably more difficult by the way DOS, Windows and nearly all other OS' are sold. The actual operating system software for DOS and Windows need only a select few files. But there's no glamour in selling an operating system you can't do anything with.

Think of it from the publisher's point of view. If you had just invented the house, how would you market it? A big, empty house will look pretty meaningless to people who have spent their lives in tents or sleeping outdoors. What will make the house appealing is showing how it can be put to use, with furniture and decorations. We all grew up understanding what houses and apartments are and how they are used. Most of us did not grow up with an understanding of the difference between operating systems and software.



For more than a decade it has been traditional for publishers to package new operating systems as fully-furnished homes, complete with bundles of programs you can use right away. DOS comes with an editor, games, a simple programming language and a range of file manipulation tools. Windows comes with word processors, simple databases, games and a paint program. But Paintbrush and Program Manager are not part of Windows, not strictly speaking. Instead, they are applications or furnishings, ways you can apply the Windows operating system in a useful manner.

Internet can also be thought of as a new operating system, even though in practice it is actually more like a bundle. In order to make it appealing to you, since you probably have no idea how to make productive use of it, most providers supply you with a suite of furniture to make it livable right away.



Until Windows 95, you needed both Windows and DOS



Here's where things become especially confusing. Until the release of Windows 95, Windows itself wouldn't operate on the average home computer unless you also had DOS. This arrangement was like having a two-bedroom home that could only be entered through your tent trailer. The idea behind this arrangement was to allow Windows to be fully compatible with

your old software, so that you could dispose of your army cot and folding chairs and purchase a queen-sized bed and livingroom suite when you were ready to do so.



Unfortunately, this arrangement also made many of Windows' operations ugly and, quite literally, as slow and cumbersome as having to use a tent trailer to gain access to your ranch home. You can be glad those days are over...provided you can afford enough memory "real estate" to give Windows 95 a nice yard to sit in.



What's the difference between files and directories? (@VIC_HLP235_HLP235_TILESECMARK.BMP)



Practically speaking, the difference between a file and a directory is the same as the difference between a letter and an envelope or file folder. A file is like a letter. It's what holds your information. The directory is the envelope or the file folder. Its sole purpose is to organize individual documents and files.

Technically speaking, a file is any sequence of useful data that has a beginning and an end, can be altered, and can be moved from one place to another in one piece. A directory is nothing more than a marker on your disk that allows you to quickly locate specific files or groups of files.

It is only an accident of history that resulted in files and directories being called by these names. If computers had developed in a different way, we might be calling them parts and boxes, objects and containers, particles and molecules, or even soldiers and platoons. All these models have the same underlying meanings, and any of them could have passed into common usage.



How files and directories are organized [PWC_HLP256_HLP256_TILE_SECMARK.BMP]



Think of a floppy disk or hard disk as a big filing cabinet. You can put all kinds of letters and objects inside of it. It can even contain other envelopes that hold still more objects. Every directory on your hard disk is like an envelope, and every one of these digital envelopes has its own label that describes what it contains. Files also have labels, or names, so that they can be identified as easily as directories can.

Your **WINDOWS** directory is one example of a directory which contains other directories. In fact, it is probably the fattest file folder in your hard disk's filing cabinet. Inside of your **WINDOWS** directory, you will find literally hundreds of files, plus at least one other directory -- another file folder or envelope -- called **SYSTEM** which contains even more files needed by Windows and Windows' programs.

A directory can never be a file, and a file can never be a directory. There are ways to make them pretend to behave like each other, but down on the surface of your hard disk where it counts, directories are never more than markers that behave like containers for data.



The origins of the file/directory model (HWI_HLP256_HLP256_T1E_SECMARK.BMP)



The idea for the file and folder model came from the origins of computers. They have largely been developed and refined on university campuses and the research departments of industry, and the most similar models to computers in both environments are the mountains of paper the employees of these institutions are required to manage. Most of the developers were somewhat insulated from the day-to-day business of the institutions that employed them and probably had less experience with file folders and filing cabinets than they had with directory listings and catalogs, so directory came into popular usage rather than file folder.



By the mid-1980s, developers began to realize that the notion of directories confused many people, and several new computers that emerged at that time, in particular the Apple Macintosh and Atari ST, chose to use a file, folder and cabinet model to describe files, directories and disks. Unfortunately, the directory concept stuck on the IBM-compatible and lingers to this day, and many people still look at this as proof of how inferior products can still find ways to dominate the market.

Remember Sony's Beta videotape? Many experts believe it is still a better system than VHS.



What is a shell? (pic:HLP256.HLP256_TILE.SECMARK.BMP)



You already know what a seashell is. It is designed to hold the creature who lives in it and make its life easier. In terms of your computer, shells have pretty much the same purpose. They are programs whose reason for existence is to make other programs easier to live with.

DOS itself is a shell...a shell for the chips in your computer. But even if you were a DOS expert, you would be totally lost if you had to communicate directly with DOS. You would need to think and communicate in a completely different way in order to use your computer. So DOS uses its own shell program, a program called **COMMAND.COM**, as an interpreter. **COMMAND.COM** traps your mistakes so that you can't bring DOS to a crashing halt by typing the wrong command at the wrong time. It also traps the mistakes of other programs, and for exactly the same reason. Most useful of all, it communicates, or at least tries to communicate, with you in something that might occasionally look like plain English.

Shells within shells...



Windows has its own unique shell. In fact, it uses several. Program Manager is the shell that sends start program messages to the Windows operating system. But when Windows 3.1 wants to talk to your hard disk, it has to talk to DOS first. When you run a DOS program from within Windows, there is another layer of shell between the program and DOS itself. DOS talks to Windows which in turn talks to DOS again.

Even this software uses a shell, a program called **WINHELP.EXE** which loads helpfiles such as this one into it for browsing.

If all this is a little too confusing, think of shells as interface software or interpreters. Regardless of how they look, all shells are designed for this basic function: to make your communication with the software or hardware that much easier and more intuitive.



What is a path? (src: HLP216.HLP216_TILE.SECMARK.BMP)



A path in computer-ese is just what you probably expect it to be: the trail that leads you to the data you're looking for on your hard disk. What's confusing about paths is the way they're described.

Let's start with a real-life example of how paths work. Imagine that you are standing on the corner of 1st St. and 1st Ave. in your home town and you want to go to the bakery, which is at 1772 13th St. The streets and avenues in your town are numbered in sequence, so as long as you know the street address, you can figure out how to get just about anywhere from anywhere else. To get to the bakery you have to walk to 13th Street, turn, and walk sixteen blocks down to number 1772. The address of the bakery is also a path for you to follow.

Your hard disk works in the same logical fashion, except that your hard disk probably behaves more like your real hometown. The bakery probably isn't on 13th street, and 1772 may not be sixteen blocks from 1st Avenue. It may be at 1772 Main St., meaning that you have to know how to get to Main St. before you can find the bakery.



A practical example (\msc_HLP216_HLP216_TILE_SECMARK.BMP)

Here's an example of a path for a file you have on your system right now called **USER.EXE**.

C:\WINDOWS\SYSTEM\USER.EXE

It's just like a street address in reverse. **USER.EXE** is the bakery, the specific location you want to get to. **SYSTEM** is the part of town it resides in, Windows is like the borough, and **c:** is like the state or province.

Getting to **USER.EXE** from where you are now is like getting to the bakery from another state or country.

Your starting place is your keyboard. First you have to enter your **c:** drive, then proceed to your **WINDOWS** directory, then into another directory called **SYSTEM**, and finally stroll through your **SYSTEM** directory until you spot **USER.EXE**.



Two types of paths? Not really...but... (pic:HLF256\HLF256_TILE.SECMARK.BMP)

[C:>] A path is a path, but the water has been muddied a lot over the years. Sometimes you'll hear something referred to as a partial path or a directory path and other times you'll hear of full path. In the example we just used, `c:\WINDOWS\SYSTEM` is the directory path because all it does is point to the directory, or street if you prefer, where the file is located, not the full address of the file itself. Full paths also include the name of the file.

Can you handle a little bit more mud? There are also two ways to type directory paths: with and without the final backslash. And the worst part about it is that you never know whether you were supposed to type the last backslash until the program tells you whether or not you've made an error. If you want to play it safe, don't use any trailing backslash when typing paths to directories where you want to hunt for files. Just type the name of the directory and leave it, like so: `c:\WINDOWS\SYSTEM`

Can you handle a bit *more* mud? Here's where DOS plays a really rotten trick on all of us. If you were looking for a file called **SYSTEM** in your **WINDOWS** directory, you'd type it exactly the same way as you would type it to look for the directory called **SYSTEM!**



Believe it or not, this particular feature of DOS was actually intended to make it *easier* to use.



What are zip and archive files? (\win\HLP258\HLP258_TILE.SECMARK.BMP)



Archive files are data files which have been specially processed for long-term storage or transmission. Archives are created either by joining a large group of files together into one single file which can be split up later, or by shrinking one or more files using special software so that they take up less space on a disk or require less time to transmit over a network or telephone line.

ZIP files are compressed archive files created with a particular program designed for the job. This program is usually called **PKZIP.EXE**, but there are other programs which can do the same type of job in Windows much more easily, such as Stuffit Expander and Winzip.



How compressed archives work (img:HL.P256.HL.P256_TLE.SEEMARK.BMP)



Archive compression programs shrink files before joining them so the archive file will use less space than the original. It's like a form of digital trash compacting. But unlike a real trash compactor, compression software used for archiving can uncompress the original data to its original, usable state whenever you want to use it.

Compressing files for archive purposes takes time, but it saves disk space. It has become less of a concern since disk storage has gotten so inexpensive, but it is still important in areas when time and data transmission speed are uncomfortably slow. This is why almost every piece of new software you get from the Internet, including the graphics which make up Web pages such as this one, are transferred to your computer in compressed form.



If you'd like to learn more about how data can be reduced in size and restored to its original form without loss or change, [click here](#) to browse a much more detailed guide to data compression wizardry located elsewhere in the PC Owner's Survival Guide.



What is meant by install, uninstall, setup, and configure? (img HLP256.HLP256_TILE.SECMARK.BMP)



Think of it this way. You install your new VCR by putting it on the right shelf. You set it up by connecting the cables. You configure it by programming the remote control.

With software, installation is the process of putting the files that come in a particular software package in their proper locations on your hard disk. Depending on the package, you may have had to install it from floppy to hard disk, and then install it a second time to its proper destination directories.

Uninstallation is the same as removal. uninstalling refers to removing the files and setup information for a software package from your system.

Setup is the process of properly connecting the software to your computer...linking it to the right printer port, the right printer, the mouse or joystick, setting the menu type, choosing which monitor to use, selecting the Windows or DOS version, video card type, amount of memory needed, and arranging all of the other basic operating features that might be required by the program to work most effectively on your system. (By the way, most programs will only require you to know about one or two of these particular features.) Setup is also known as initialization, so called because during this process the software is figuring out what its initial settings will be before getting its final customizing touches.



And customizing is what configuration is all about. It's where you, the user, get to tailor the software to your tastes to whatever degree the programmer has allowed. Common configuration options include: warnings or no warnings for certain operations, custom colors for different parts of the screen, sound or no sound, window size, mouse cursor shape, and the overall look of the program's window.



What's a prompt? (@vnc:HL/P256/HL/P256_TILE/SECMARK.BMP)

Prompts, in DOS and Windows, are your computer's way of asking you *What now?* Newsmen use prompters to remind them of the next part of the story they're reading when they don't have it memorized. Teachers prompt students for answers by asking them questions about the current topic to jog their memories.

DOS and Windows prompt you for responses in several ways. Most of the better software makes it easy for you to tell when you are being prompted, but not so the ordinary DOS prompt.



Prompts you'll recognize (pic HLP256.HLP256_TILE.SECMARK.BMP)

[C:>] If your computer hasn't been configured with a built-in menu system, you'll see this every time you boot:

C:_

It might also look like this:

C:\WINDOWS_

...or even as complex this:

C:\GAMES\GOLF\PGA_TOUR\COURSES\MYCOURSE\BACKNINE_

(The section on paths will tell you what this strange code means.)

This is called the DOS prompt, but it is also known by users as the C prompt (or the A or B prompt if it's a floppy disk drive). Technically it's called a command prompt, because it's DOS' way of prompting you to give it some sort of command. Many people feel it would have been a lot more effective if it looked something like this:

I'm ready in the C:\WINDOWS directory. Type your command on the line below. If you need help, just type HELP. What now? _

(Unfortunately, it was Friday afternoon at 4:00 p.m. when the research department brought this particular idea up at the product development meeting...or so the story goes.)

All you really need to know about the DOS prompt is that whenever you see it, you are probably not in a program. (Type **EXIT** and press the **Enter** key if you want to find out for sure. You might be "shelled out" to DOS by the program you were just using.) Sometimes you will get DOS prompts from within programs by accident if you press the wrong key, and you might think you've quit your program when in fact you've simply run another program -- the DOS shell called **COMMAND.COM** -- from inside it.



What's a boot? (src: HLP256.HLP256_TILE.SECMARK.BMP)



Boot is actually short for an ancient computer term (if any computing term could truly be called ancient) called bootstrapping. When a boot is happening, the computer or program is running its own internal software -- pulling itself up by its own bootstraps, so to speak -- to prepare itself to work for you.

Boot, in computer-ese, isn't a thing. It's an action. Booting is the act of starting a program, a part of a program, or your whole computer system. You can boot programs, hardware, or procedures which are offered within individual programs.



Whenever you double-click a Program Manager icon, you're booting a program. Whenever turn on your computer's power switch, you're booting the hardware. Each of individual messages you see while the computer goes through its boot process are readouts of how parts of the software themselves are booting.



A little about system booting (pic: HLP256.HLP256_TILE.SECMARK.BMP)



System booting is an important term for every user. When you boot your system, you are turning on the hardware and starting the software. There are two ways to do this on most computers, and they are known as cold booting and warm booting.

A cold boot starts with the power switch off, in other words with the system's hardware cold. A warm boot is used to restart a system which is already running. When you press the **Reset** button on your computer's case (it's not a **Power** switch), you are warm booting your system. You can also warm boot from the keyboard by pressing the **Ctrl**, **Alt** and **Delete** keys all at the same time (also known, not very affectionately, as the "three-fingered salute"). This restarts most of the internal software without turning off the fan, the power supply, the central processor chip (CPU) or hard disk, and it's a much faster process than cold booting.



A cold boot requires you to turn your computer's power switch off and turn it back on again. Most modern computers don't need to be left off for several seconds as many oldtimers suggest except when you're cleaning up a virus infection. You may have heard that you can also perform a cold boot from the keyboard by pressing **Ctrl+Alt+Delete** plus the **Shift** key, but this will not usually clear out bad data in things like modems and sound cards. You have to completely power down to reset those components.

If it helps, think of it this way. Powering down your computer completely to restart it is like giving it a cruel, cold boot to the backside. Pressing the less violent **Reset** switch is like a more forgiving, *warm* boot to the behind.

Just a reminder: if you ever have your computer crash while you're online with your provider, all the warmth in the world probably won't reset your modem.



What is a modem?(c:\hc\hp256\hp256_tile.secmrk.bmp)



Modem, strictly speaking, stands for MOdulator DEModulator. Unless you have a direct Internet connection through a digital phone line or cable connection, a modem is the device either attached to the outside of your computer or mounted inside of it which connects your computer to the telephone system and ultimately to your Internet provider.

Almost everything that happens inside your computer is a series of 1's or 0's being moved from place to place to accomplish various tasks. Phone lines don't take well to binary information, but right now they're the best means we have of connecting with Internet providers.

Modems were developed as a means of converting digital computer data into an audio signal that can be sent through a telephone line. You've probably heard the sound created by your modem; it sounds a little like radio static. What the modem does is encoded the 0's and 1's that make up all computer information into a MOdulated audio signal. The modem at the other end of the line DEModulates the signal and DEModulates it back into its original binary form.

Modems use the same basic principle used to carry music over radio waves. You might recall that AM stands for Amplitude Modulation and FM for Frequency Modulation.



Modem trivia...(pic HLP20K.HLP20K_TILE.SECMARK.BMP)



Modems will probably be all but obsolete in the next five years as telephone and cable systems rewire themselves for digital transmission. In the meantime, they are the best means we have of getting Internet and other online services into in our homes.

The fastest modems in common use are almost one-tenth as slow as the digital phone lines available in areas where the phone company has the hardware installed. The reason they're so much slower is that the phone system is designed to handle a narrow frequency range. All the trebles and basses are cut out of your phone signal. Basses interfere with signals on other lines, and trebles are too fragile and require too much technical precision to be transmitted reliably. If telephone lines had the kind of frequency response you hear on a reasonably good stereo, we might all be using 100kbaud modems by now instead of the 14.4 and 28.8kbaud modems which are the current market standard.

If that's not fast enough, some of the better-equipped Internet providers have a surprise for you later this year...128k ISDN grade modems which will operate right through your phone line. It might make choosing between cable Internet, when it comes, and Internet through your phone lines a tough decision.



What is UNIX?

(pic: HLP256,HLP256_TLE.SECMARK.BMP)

Here's the straight scoop on UNIX from **The Jargon File**:

UNIX: /yoʊˈnɪks/ [In the authors' words, A weak pun on Multics] *n.* (also `Unix') An interactive time-sharing system invented in 1969 by Ken Thompson after Bell Labs left the Multics project, originally so he could play games on his scavenged PDP-7 (a very old model of computer). Dennis Ritchie, the inventor of C (a programming language), is considered a co-author of the operating system. The turning point in UNIX' history came when it was reimplemented (meaning rewritten or re-coded) almost entirely in C during 1972 to 1974, making it the first source-portable OS. (*Source stands for source code, which is the basic text information used to create almost all computer programs from scratch.*) UNIX subsequently underwent mutations and expansions at the hands of many different people, resulting in a uniquely flexible and developer-friendly environment. By 1991, UNIX had become the most widely used multi-user general-purpose operating system in the world. (*DOS is a single-user operating system.*) Many people consider this the most important victory yet of hackerdom over industry opposition.

They explained it better than we could. The only thing we might add to this explanation is that most Internet service providers of note in North America use UNIX, or a variation of it, as the operating system on their host computers. One of the most popular is Linux, a free (no kidding) "clone" of UNIX originally developed and still maintained by Linus Torvalds which is in use around the world and designed specifically for use on IBM-compatibles.



What is a BBS (Bulletin Board System)? (pic: HLP20K.HLP20L_TILE.DECMARK.BMP)



Strictly speaking, a BBS is any central computer designed for exchanging information between users. It's not the same as a server because it is meant more for interactive exchange of information than for use as a fixed, unchanging database.

Practically speaking, BBS' are the most basic level of online service. They are usually dialup services which you access with a modem and an ordinary terminal program. Once you are connected you can send and receive messages with other users and exchange text and non-text data without having to connect one-on-one. BBS' generally offer the same features as the Internet but on a much smaller scale.

 [Where the online adventure began](#)

 [Over 100,000 little online services](#)

 [BBSing joins the Internet](#)



Where the online adventure began



For most online veterans, BBS' was where their adventure began. Long before there were inexpensive dialup Internet services, or even online services such as GEnie, CompuServe and America Online, there were thousands of companies and private computer owners who offered their computers for public or invitation-only access using a modem. Most corporate and hobby BBS' were open 23 hours a day (the other hour was reserved for system maintenance and for retrieving inter-BBS mail) year-round, and offered their services either free of charge to all or at a nominal fee which was used to pay for the hardware and telephone bills.

BBS' remain popular alternatives to online services for many reasons. Besides the obvious reason (most are free if you have a modem and a local telephone line), they are usually highly specialized and offer a volume and quality of information and discussion on certain subjects that can't be equaled by commercial online services. A local bulletin board devoted to automotive hobbyists, for example, might contain several times the total amount of information available on automotive topics from even the largest online service. This occurs because the owner/operator and the users of the board dedicate their efforts to collecting and sharing information on just this topic.



Over 100,000 little online services



How popular are BBS'? According to some estimates, there have been at least 100,000 public and private BBS' in continuous operation North America for several years now, and probably many more than that. It's safe to say that at least a million bulletin boards have come and gone over the past decade. You name it, from brownie recipes to accountants who deal exclusively with the medical community, either there is or was at one time a BBS devoted to that specific subject.



BBSing joins the Internet



BBSing has been a culture unto itself for many years with its own codes of conduct, language and traditions. But the BBS scene is changing rapidly. It is now possible to open up BBS' to low-cost TELNET connections via the Internet, many of the most popular BBS' are going international where before they were once almost exclusively local.

Making a board available for TELNET access costs money for the operators, and telephone rates even for hobby boards have skyrocketed in recent years since phone companies began charging a higher rate for BBS line rental. More and more BBS' are asking for donations before they allow you to access the more interesting areas of their boards.

These fees are often well worth the investment. Increasing exposure via the Internet for BBS' devoted to unusual subjects can only result in an improvement in the variety and quality of the information they offer.



What are viruses and trojan horses? (vnc HLP206.HLP206_TLE.SECMARK.BMP)



There are few more misunderstood subjects in computing than viruses and trojans. Let's clear this up once and for all.

A computer virus is program code which is created for the purpose of spreading itself. Viruses don't have to be destructive to data or hardware. All they have to do is spread. A virus could be as simple as the many joke viruses which have been circulated, which do nothing more than pop up on your screen for a few seconds, say something like:

HAHAHA! Gotcha!

This virus was created by the Parting Shot Group.

BOYCOTT PANTS!

...and then disappear forever, without doing a trace of damage to anything but your nerves.



Some viruses, such as the dreaded Michelangelo, can erase every bit of useful data you have in the time it takes to boot your computer. And unless you have antivirus software to detect the problem, you won't know what until it's too late.

Continue to the next topic to learn about trojan horses



What is a trojan horse? (img: HLP256.HLP256_TILE_SECMARK.BMP)

A trojan horse is a program which carries data designed to operate without the user's knowledge. Remember the original trojan horse, the Greeks' gift to the King of Troy which carried soldiers sent to destroy the city? A trojan might be just as harmless as the example shown above, or so deadly that it can actually damage your hardware and destroy your data.

Most trojans do not carry viruses and do not reproduce themselves except when you copy or share the program containing the destructive code. Trojans tend to be more common today than viruses.



This button will take you to the superb **Computer Virus Myths** document by Greenburg and Rosenberger, one of the all-time classic ghostbuster articles on viruses and trojans.



This help button leads to the **Virus Awareness Kit** which will tell you much more about what viruses and trojans are, how they work, how safe you really are, and show you precisely what you can do to protect yourself.



What is a hacker?

(www.HLP256.HLP256_TILE.SECMARK.BMP)



Hacking is usually defined as the process of finding out how things work and what can be done with them. It is believed that the term came into popular use with computers because learning to use some of the earlier software and hardware often felt a lot like hacking one's way through heavy underbrush with a machete.

It is generally agreed among veteran computer users that the term hacker is more synonymous with daredevil, tinkerer or explorer than prankster, vandal or spy. Right now, you are hacking your way through Internet, so technically speaking that makes you a hacker.



Hackers are not demons in human flesh whose only purpose in life is to cause problems or other computer users. The correct term for that type of user is *cracker*. The media has weighted its coverage heavily on the side of destructive hackers and paid very little attention to constructive hackers. This imbalance has become so severe that the mere mention of the word hacker can strike fear into the hearts of average people. But don't get the idea that hackers are magicians who can be relied upon to solve your computing problems on request. Most hackers have been "free-advice'd" to death.

To put it another way, there are users and there are hackers, and practically anyone getting involved with Internet at this point in time can consider themselves to have more than a little hacker blood in them.



What are SIGs? (pic: HLP216.HLP216_TILE.SECMARK.BMP)



Sig has two computing meanings, one specifically Internet-related and the other related to computing in groups. This help button will take you to the first definition which is located on a different page.

SIG is an acronym that stands for Special Interest Group. SIG is also spelled lower-case as sig, and the term is used to describe any group of computer enthusiasts who gather to share information about a common interest. That interest is usually computer-related, but sigs can be formed for virtually any purpose.

Message areas on bulletin boards and online systems are often referred to as sigs when the messages are about specific topics. Computer clubs often have many sigs to encourage the various interests of its members. It's not uncommon for large clubs to have more than a dozen, including sigs for programmers, novices, gamers, Mac users, OS/2 users, graphics fans and MIDI/music lovers. USENET newsgroups are also occasionally referred to as sigs (many feel that this is not a correct usage of the word) since they tend to focus on specific topics and issues.



