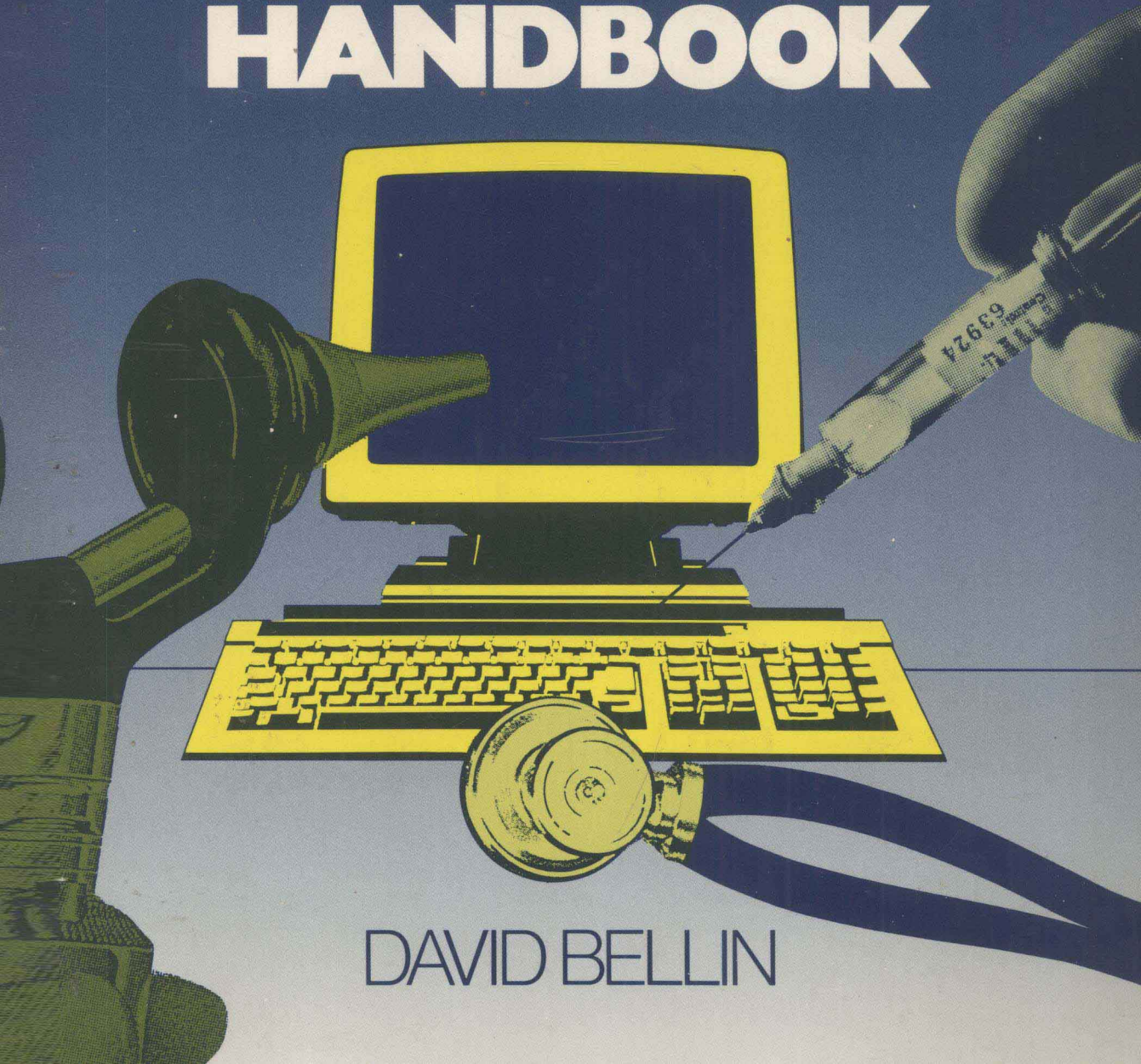
INCLUDES READY-TO-USE FORMS AND CONTRACTS

# THE COMPLETE COMPUTER MAINTENANCE HANDBOOK



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# The Complete Computer Maintenance Handbook

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*1817*

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# Preface

This book is for the serious computer user. It is designed to help you prevent problems before they begin and, when problems *do* arise, to help you resolve them quickly and with the least possible expense. Hardware problems that the average computer owner can isolate and repair are covered. Software troubles, often overlooked and harder to isolate, are covered in great detail. The important areas of security and documentation are addressed in a manner that is practical for the smaller user. Finally, this book will help you decide when the job is too complex for self-help and how to look for outside aid in such a case. Extensive forms and contracts, gleaned from years of experience, are provided.

In short, if you are using a computer in your business, this book is for you. If you are *considering* using your computer in your business, this book is for you. If you are a professional using a micro in your work, this book is for you. If you are responsible for one or more computers in your company, this book is for you. This book is also for you if you are thinking of hiring a consultant, using outside programmers, lending computer equipment, doing some programming yourself, concerned about writing down what your system really does or improving your current computer operation.

Many documents appear in the pages ahead. *Every document has been used at actual computer installations.* The contracts shown in this book are actual contracts that have been used in nearly identical form.

This book takes "inside" information out of the private hands of computer experts and lawyers and puts it into your hands. The book was written because of countless problems that could have been avoided if the procedures and forms contained in it had been used, because of misunderstandings that required

perfecting of the contracts reproduced in it, and finally, because of numerous computer systems that never had a scrap of paper to describe what they did or how they worked, resulting in the techniques described within.

With the *ideas, techniques, forms*, and *contracts* in this book, every person who uses a computer will be able to save time, money, and aggravation. A book cannot take the place of expert counsel, of course, and you should always obtain professional advice on your computer system and legal contracts. As you use this book, however, you will come to appreciate the enthusiastic response the techniques it discusses have found thus far.

## ACKNOWLEDGMENTS

I should first thank my family, Martha and Roger, for the space and freedom that enabled me to complete this book. I doubt that I could have done it otherwise.

My father, Eugene Bellin, started as a pioneer practitioner in data processing back in the days of breadboard sorting machines. Through our work together at his company, Bellin Computer Systems, he passed on a wealth of knowledge.

Finally, thanks should also go to my clients and to the clients of System-Aid Computer Control, Inc., and Bellin Computer Systems, Inc. Their experiences, both positive and negative, provided the information needed for almost all the forms and contracts in this book. There are too many to mention each name, but I trust they will know where they helped!

*David Bellin*

# Contents

# Introduction

Maintenance . . . preservation . . . conservation . . . aid—this book is a primer on supporting your own computer system without relying completely on computer experts or technological wizards. Development and maintenance of a functional computer system should be under the control of the people who use it, and this book is an attempt to help those users.

Accepting the need for hardware maintenance is not a problem for many people. Many appliances we use in our everyday lives need routine attention and occasional visits to the repair shop. After reviewing the hardware maintenance section in this book, you will see that performing routine maintenance on your computer system is no different from changing the oil in your car or keeping your typewriter working. No machine can function without some attention.

The need for software maintenance is harder for many people to accept. I am often asked what it is, and many people say, "After all, my programs never have to change!" This is exactly the mistake I hope to combat with this book. Even programs that never change may need maintenance. Programs may be inefficient or may be producing incorrect data. They may not be removing old records and thus may be progressively filling up available disk space. Even though programs do not *have* to change, it is amazing how often changes are *desired.*

There is a very practical reason to pay attention to software maintenance—that big "gray area" between problems that are strictly hardware-caused and those that are clearly software-based. Both types of problems can be elusive at times. Many experienced computer users have left their machines in a repair shop for days, only to be told, "It must be the software." And many a minicomputer user has run into the opposite response from a so-misnamed "software engineer": "It must be in

the hardware." When both the hardware *and* the software are properly maintained, this huge gray area of doubt can be reduced to a small crack. And reducing it is important: When problems arise, you will have less doubt about the cause, your problems will be resolved more quickly, and your computer will be back in operation with the least delay.

You may one day be in a situation where a seemingly insoluble problem puts your entire computer system out of commission. Such a situation can be even worse than it may seem at first glance. Not only do you lose the use of a machine that cost several thousand dollars but the value of everything you use the computer *for* is being lost as well! In other words, your whole livelihood may be in danger. Consider a few examples from my experience:

#### The Stranded Manufacturer

A manufacturer had a problem when the company from which he had purchased a complete minicomputer system went bankrupt. This computer system included many unique programs, written in a version of BASIC that was proprietary to the bankrupt company. Even worse, the manufacturer had no documentation on how the programs were constructed or what each program did. He could have used the chapters in this book on documentation and getting help.

#### The Tires That Wouldn't Roll

A tire distributor with several retail outlets turned on its computer one day only to find it would not operate. After some time, it was determined that a disk drive controller had failed. When it was replaced, the hardware functioned. Unfortunately, however, all the data on one large disk drive had been destroyed. When the backup disks were accessed, it turned out that the user had no copies of the original software programs. This company could have used the chapters in this book on backups and security.

#### Disappearing Reports

Several of my clients have been through experiences wherein long reports left printing overnight mysteriously stopped in the middle. In the morning, the computer would not work and had to be turned off and started up again. During the day, the report printed without a problem. Was the problem hardware or software, and what could be done? These computer users could have used the first two sections of this book.

#### The Computer's Florida Vacation

An equipment service company thought it had few problems with its computer system. The company never had a problem with its reports, and most monthly bills and statements were printed on time. Whenever a problem arose at a data entry screen, the office manager solved it, and the work continued. Unfortunately, when

that office manager took her vacation, data entry came to a virtual standstill within days! She was the only one who knew what to do in certain situations. The computer operators did not have a manual that described data entry screens and explained what to do if they had problems. The "manual" had gone on vacation, and with it the use of the computer! This company could have used the sections in this book on software maintenance and documentation.

### The Irritating Bugs

Another small company had spent thousands of dollars on software programs. Installation and training went smoothly until the vendor, from another state, was released from all contractual obligations. Months passed, and program error conditions began to appear. The user had to figure out how serious the problems were. Could the company's own staff correct the programs, should they retain an outside firm, or should they call back the original vendor? They could have used the discussions on getting help in the last section of this book.

### Summary

A computer is supposed to simplify and streamline your life and your business. The more important your professional interests and your business are to you, the more important it is to head off any potential problems with your computer system—and the more important it is to resolve problems effectively when they do arise. This book will help you in both of these tasks.

Keeping a computer system healthy and growing goes beyond maintenance issues, however, and I have also included some of these additional topics in the book. Simple methods of constructing your own cables may save you hundreds of dollars with little effort. Attention to software maintenance and security will increase the productivity of your operation and the accuracy of your data. Moral and ethical questions must be resolved so that you can be sure you are not violating any laws and that you are respecting the privacy of others. You will need help at times, and you must know not only when to ask for help but whom to ask and how to make sure your helpers stay under your control.

Hundreds of computer books have been published, but few have addressed all these issues. In the pages that follow, I will show you how you can take control of your computer system and help it grow.

# *one*

# SOFTWARE MAINTENANCE

*chapter* **1**

# Backups

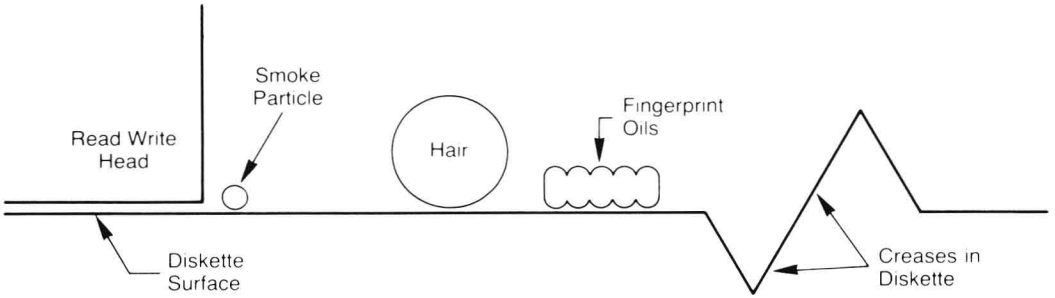
We know that it is possible for a diskette to be damaged by skin oils, creases, magnets, or a disk drive malfunction, rendering it unreadable by the programs. Even more catastrophic, your computer room might be destroyed or vandalized. To continue functioning if such damage occurs, you would need extra copies of your programs, your data, or perhaps both. Alternatives for making these copies (backups) are explored in this chapter. Later, we will discuss disk drives and the physical handling of the floppy disks themselves.

## WHY MAKE BACKUPS?

A 5.25-inch diskette rotates in its drive at the equivalent of about 100 miles per hour. The little metal head that reads and writes information from its surface is only thousandths of an inch from the surface of the diskette, closer than the width of a grain of sand or a strand of your hair. Even a smoke particle looks enormous in this context (see Figure 1.1). Perhaps hundreds of times each hour, the diskette rotation is stopped and started again and the read and write heads are moved out to contact the disk and moved away again, sliding in and out along small metal railings. Diskette doors are opened, diskettes are removed and inserted, the doors are closed, the rotation is started, and the heads read and write. The disk drive and diskettes that were cool first thing in the morning heat up by afternoon. The diskette actually expands slightly, and the oil on the mechanical parts of the disk drive becomes lighter.

This is the picture of perhaps the most mechanical and trouble-prone part of your computer system, with the possible exception of your printer. However, if your

**Figure 1.1** Possible physical dangers to a diskette.




printer is out being repaired, you can continue entering data and obtaining results on the screen. If your disk drive fails, you cannot.

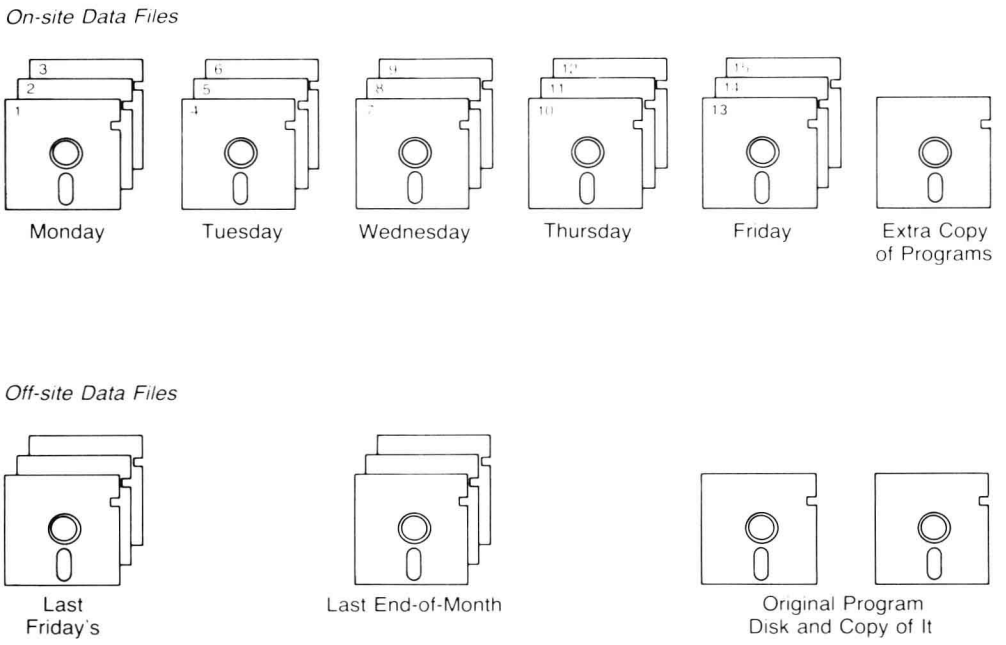
Mechanical failures of disk drive systems are not the only reason for losing data; software errors can unintentionally erase or overwrite valuable information. Such mechanical or software failure may include loss of the programs themselves. Remember, if the diskette with all your billing programs is damaged or lost, your bills cannot be produced. Rather than having to call the company that wrote the programs and pay the cost of air express and whatever the company charges for copies of the programs, wouldn't it be easier to have a copy of the diskette in your files?

When deciding how to back up your files, you will have to decide how much reprocessing you can afford to do. Some computer owners back up their files weekly, others daily; the more foolish do it monthly or not at all. Less important, you will have to decide how often you will recopy backups of the programs themselves (operating system and applications). This decision cannot be made on the basis of the cost of extra disks you will use. Even the time it takes to do backups is not important, relative to the time it would take you or your staff to reenter lost data and rerun updating programs. An even greater cost to a disabled company that has become dependent upon the computer for its daily functions may be lost business. Thus, your decision on which backup method to use must be based not on the cost of doing the backups but on the cost of not having the information on which your organization relies.

## SAFE METHODS FOR DATA BACKUP

The data backup method I recommend is the daily/weekly/monthly system (sometimes known as the grandfather system). Using this backup system, with a good backup log, you will never lose more than one day's processing. You will also be able to identify quickly which disks hold your backups. Using this method as illustrated in Figure 1.2, you will need enough disks to hold at least six full copies of your data files. (Program backups are a separate matter, discussed in the next

**Figure 1.2** Recommended backup procedure.




section of this chapter.) For example, if four disks are needed to do a full data backup, you will need twenty-four disks. Five sets are for use each day, Monday through Friday. The sixth set is used as the monthly backup, which is not reused for a full month. The procedure works as follows: On Monday, the Monday backup disks are used at the end of the day to copy the files. On Tuesday, the Tuesday set is used—and so on through the week. Now, you always have a copy of the files as they were at the end of the previous day's processing. If something should happen to the disks today, you can use yesterday's set, reprocess today's work, and continue. Even if yesterday's set is faulty, you can go back to the previous day's set. You actually have copies of the files for the previous five full days. It is unlikely that you will need them, but they are good insurance for your operation.

On the fourth Friday of each month, or on the last day of each month, or following your month-end procedure (if any), you make an extra backup. This copy is stored off-site, in another location. In the event of a real calamity, you will have this copy to use. Many firms consider it prudent to make this extra copy on a weekly basis.

Obviously, there are many possible variations of the backup procedure I have outlined. Some users do not make daily backups, instead choosing to do them only every Friday, with an extra monthly copy. This scares me to death! It is possible that they will have to reinput a full week's processing; and if the backup cannot be