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Automation of the tax practice of the '90s;

C. Eugene Prescott
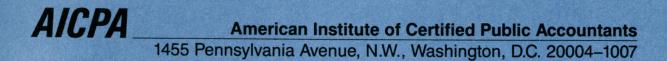
American Institute of Certified Public Accountants. Tax Division

Automation of the Tax Practice of the '90s

Tax Division

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NOTICE TO READERS

Tax practice guides are designed as educational and reference material for the members of the Tax Division and others interested in the subject. They do not establish standards or preferred practices.

Members of the AICPA Tax Division's Task Force on Automation of the Tax Practice of the '90s prepared this practice guide. The members of that committee are listed below:

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PREFACE

The convergence of computer technology, software availability, and tax complexity makes some level of automation practical for virtually every tax practitioner. However, tax-related matters are not the only area of most tax practice units that can benefit from current and future computer technology. Useful advances may be occurring faster in the non-tax areas of the tax practice unit. Firm management and administrative functions such as correspondence, electronic and voice mail, and FAX are being automated in many smaller tax practices. As these technologies become more standardized, more opportunities to blend them into a coordinated automation scheme will become available. For many firms connectivity among their various computers and devices will become mandatory. A Local Area Network (LAN) is apt to be involved in most connectivity schemes. Optimal resolution of automation needs will be a concern of every tax practice unit in the 1990s.

Even tax practitioners who prepare primarily the simplest individual income tax returns need to be concerned with electronic filing matters. Tax practitioners heavily involved with complex returns encompassing items such as the alternative minimum tax, passive loss limitations, or repeated calculations of the tax amount clearly have automation needs. This need exists even when the numerical volume of returns prepared is small. Most tax practitioners have a combination of both volume **and** complexity with which to contend. Many tax experts believe that effective computer usage will be the only way to address competent tax preparation in the 1990s.

Technology is **changing** how we conduct a tax practice. However, the best time to understand a subject may be while it is **changing**. Understanding is easier then because everything --- even the basic concepts --- is up for grabs. When we understand the whole subject there is a better chance that the decisions we make will be directed toward improvement. A goal of this guide is to help you identify and understand the overall automation issues (the whole subject) as they relate to **your** tax practice unit.

CHAPTER I - HOW TO USE THIS GUIDE

The purpose of this guide is to aid the tax practitioner in determining which computer systems can benefit practice capability and profitability. Many tax practitioners have significant experience in computer systems. Others are less experienced. Still others are inexperienced. Despite a practitioner's current experience level, **most** firms will become **more** experienced soon. This guide is organized so it is applicable to both first time users and experienced users. It also addresses computer systems, from the most basic systems that are connected only by diskettes, to elaborate systems that are connected electronically.

Each time a system is installed or changed the question arises, "What kind of system should be installed?" The answer is **always**, "It depends." This guide will identify the factors upon which the answer depends. There can be as great a divergence in **right** systems as there is a divergence in firm characteristics. There can be more than one right system for the same firm. There also can be **wrong** systems. A goal of this guide is to help tax practitioners avoid systems that do not meet the firm's identified needs.

The guide contains seven chapters, two appendices, and three checklists. Some of these apply to all readers, others to first-time computer users only, and others to experienced computer users. A guide to the sections follows:

SECTIONS APPLICABLE TO <u>ALL</u> READERS

Preface, Chapters I, II, III, VI, and VII
Glossary and Appendix B
Checklists 1, 2, and 3

SECTION APPLICABLE TO <u>FIRST-TIME</u> COMPUTER USERS ONLY

Chapter IV

SECTIONS APPLICABLE TO <u>EXPERIENCED</u> COMPUTER USERS

Chapter V
Appendix A (May be of interest to <u>first-time</u> users.)

CHAPTER II - TAX PRACTICE AUTOMATION

Overall automation of a tax practice will include different parts for different tax practitioners. For the purposes of this guide it is assumed that the functions that will be common to all firms are the preparation of tax returns and tax planning. Other functions for many firms will include, client write-up and payroll services, computer assisted tax research, and firm management and administrative activities. Some firms will have still other special purpose services or activities that can make effective use of computers. **Overall automation** in this guide means blending every firm activity that can be enhanced by using computer technology into a controlled and cohesive system.

Because of differences among firms, a specific activity in one firm that begs automation may be best suited for nonautomated methods in another firm. A key element in an effective automation process is setting realistic expectations. Some tax practitioners who have installed computer systems have been disappointed in the results because of overly ambitious expectations. It is as important not to aim too low. Many computer systems have not been exploited to their maximum levels of productivity. As each firm activity or function is being contemplated, the question whether to automate should be applied. In deciding whether to automate, the benefits and costs of each activity or function should be considered.

BENEFITS

Automation of any enterprise should be undertaken to enhance its operations. In a tax practice, automation may take several forms allow a practitioner to:

> **Perform work more quickly.** This means that analytical work will be completed using automation faster than if manual methods were employed. Schedules and reports that took hours or days to produce can be completed in minutes or hours.

> **Produce higher quality work in the same amount of time.** Because computer programs can examine more fact combinations, and will not fail to examine criteria properly programmed, the overall quality of the work product can improve. Since time is always a factor, and clients rarely grant "blank checks," reducing the time spent or increasing the quality of the product will translate directly into more fees and easier billing.

> **Consider more alternatives.** For complex situations, the number of alternative courses of action that are possible might be so great that all cannot be considered without automation. Using computers will allow a practitioner to examine a broader range of possibilities, and often allow the output to be organized for better understanding.

> **Produce a better looking work product.** Graphics, desktop publishing and the like are exciting tools to make the final work product look great. Frequently, this means that graphics are integrated into reports, or that the reports themselves are more organized and more easily understood.

While the benefits of automation can be grouped into several broad categories, most of them are of a continuing nature. These accrue every time the systems, software, or technology are used. Word processing using standard documents and report formats that are predeveloped is an example. Numerical analyses (often using spreadsheets) that are prepared in a general way and customized to meet specific client situations are also beneficial.

While it is difficult to quantify these benefits in a specific way, any saving that is reflected in reduced time for a repetitive task will yield real benefits.

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OTHER CLIENT SERVICES

Besides the functions that benefit the firm, automation also will equip firms for a variety of client services. Many firms perform client processing services such as accounting and financial reporting and payroll services. In fact, client processing services are the heart of many tax practices. Firms also gain expertise in advising clients about their automation needs. Consulting engagements involving selection of operating systems, application software, and hardware sometimes materialize. Many firms are consulted routinely about support of previously installed systems.

CLIENT WRITE-UP SERVICES

Client write-up work involves the summarization of a client's data into account totals. Even if the client does not need a financial report, the summarization of data must be done to produce his or her tax return. Some advantages from computerizing this process include:

- Time savings after the initial year's set-up.

- A more consistent preparation approach among firm staff by using a uniform or structured format.

- The elimination of many arithmetic errors.

- The elimination of redundant handwriting.

INFORMATIONAL REPORTING SERVICES

An area that is related to client write-up services is payroll processing and reporting. Sometimes these services include the generation of payroll checks. Sometimes they involve the collection of historical payroll data after the checks have been issued. Some advantages from computerizing this process include:

- Automatic generation of correct W-2 forms.

- Automatic creation and posting of applicable entries into client's general ledger system.

- Printing required payroll compliance reporting forms.

In addition 1099 reporting may be automated. Often the information to prepare these forms can be electronically transported from the client write-up system. In selecting a 1099 compliance reporting system, care should be taken to insure that the program addresses the various types of 1099s that may be required.

Both payroll and 1099 reporting should have the capability to accommodate electronic filing of the required data with the applicable governmental agencies.

DEPRECIATION SERVICES

Another related service is the preparation and maintenance of depreciation schedules. There are many programs on the market. When rating these programs consideration should be given to:

- The ease of input.

- The number of assets accommodated.

- The ability to classify assets in more than one grouping.

- The correctness of the various methods of computation.

A depreciation program should be able to produce computations for tax, book, earnings and profits, and alternative minimum tax purposes concurrently.

COSTS

The costs associated with automating a tax practice fall into one of three categories: general equipment, specialized equipment, and delivery and setup.

GENERAL EQUIPMENT

Included in this category are the computers themselves and related major peripherals. These must be purchased or rented and their cost varies generally in proportion to the capability and speed of operation.

Other specific items included in this category are video displays, printers and communications gear.

SPECIALIZED EQUIPMENT

Included in this category is:

- Equipment associated with operating a Local Area Network (LAN)

- Special communications equipment (sometimes required for tax return processing)

- Special display equipment (associated with desktop publishing)

DELIVERY AND SETUP

The process and cost of delivery and setup are always associated with the acquisition of new equipment. For first-time users, it is good to have the seller do this service. More experienced users or organizations with internal technical support can often take care of this without outside help.

Included in setup are the following items:

- Equipment configuration (assembling the correct combination of peripherals, cables, etc.; installing them, and getting the computer to recognize them)

- "Burn in" (process of running new equipment for several hours to be sure that it works and that it will perform as expected)

- Software purchased at setup time should be configured and installed as a part of the process

Setup costs vary depending on the amount of work required, and are often negotiated as a part of the purchase itself.

CHECKLISTS

Included in the guide are checklists that will help you in automating the tax planning, preparation, and research areas of your practice. These checklists are organized so each practitioner can decide the importance of specific characteristics for his or her firm. Your judgement of the relative importance of an activity or function to your practice will determine whether these characteristics are essential for you.

DEMONSTRATIONS

Checklists and structured analysis notwithstanding, it will be necessary to visit one or more real-world demonstrations. Such demonstrations can make the decision to automate a particular activity or function clear. Demonstrations can also be critical in rating a particular computer system in light of your identified needs. Vendor arranged demonstrations often lack real-world qualities. Sometimes they include processes that appear to be real, when they are not. Often the data used in vendor demonstrations is not enough to gauge through-put speeds. Demonstrations are of greatest value on actual systems being operated by someone who will not benefit from your decision to buy. The system being shown (hardware, operating system, and application software) should be comparable to the system you are considering acquiring. Be careful when evaluating demonstrations.

WHO SHOULD HAVE COMPUTERS

A key decision in the system configuration process is determining who should have computing power. A small firm that has a single computer dedicated to only a few activities or functions will likely have a few people sharing the computer. As additional activities and functions are automated, more computers will usually be shared among fewer people. Some firms have the equivalent of one computer per person. The more numerous and interrelated the automated activities and functions become, the easier it is to cost/justify significant computer power per person.

WHO SHOULD HAVE TECHNICAL COMPUTER COMPETENCE

Despite the computer-to-people ratio opted for, at least one person must have a basic level of computer technology competence. While the level of technological competence will need to be higher when multiple computers are installed, there is not necessarily a corresponding need for a greater number of computer technical people. It is normal to expect that varying levels of technical competence will evolve among tax practitioners as more people use more computers.

MINIMUM SOFTWARE TOOLS

For most tax practitioners there will be a minimum set of software tools (applications) required. Tax planning, tax preparation, word processing, and spreadsheet software should be considered by all firms. In addition, various utility software tools that improve operations are necessary. These include routines for disk management, memory management, menu systems, backup and recovery systems, communications, and data compression routines. A description of many applications is included in the Glossary and Chapter VI - First Time Users.

EVALUATION PROCESS

The process of technology evaluation is not particularly difficult, but it can be time consuming. Although software and hardware are very different, the evaluation process used for both is largely the same. There are several principles to be considered:

- No program or piece of equipment will do everything a user needs or wants, so correct prioritization of requirements and compromise are required. Computerized software review systems may help narrow the field or identify major criteria.

- The person evaluating is the only one able to assign priorities correctly and make the trades-offs required. Others can state their choices and can give general guidance, but only the evaluator can decide what is and what is not important for their tax practice.

- The way that people relate to an item of equipment or a program has a significant influence on their ability to be successful with it.

- Actual hands-on use by the evaluator is the only reliable way to strike a balance among the priorities.

When evaluating, it is usually not necessary to generate basic information yourself. There are several reliable sources available. Begin with magazine articles covering the topic of interest. The magazines might be technology oriented computer publications, or they might be technically oriented accounting or tax publications.

The articles they contain will have much basic information as well as the views of authors on subjects of general interest to the readers. Since technology is becoming so much a part of business life, many of these magazines will contain articles on technology subjects. Most of the publications have cumulative indices, so locating relevant articles is often very easy. While you cannot stop here, magazines can provide a rich background of information.

Other excellent sources of data are meetings or seminars that deal with the subject. They are an excellent place to meet and discuss issues of interest with others who have the same problems, concerns, and outlook. Their advice (generally given freely) may provide some confirmation of the magazine article information. AICPA and State Accounting Society meetings are particularly good because attendees have a common professional focus. In addition, helpful information regularly appears in the *Tax Adviser* and *The Journal of Accountancy*.

When reading articles or listening to colleagues, concentrate on the following:

- Descriptions or discussion of the equipment's or program's intended purpose. Pay particular attention to any detailed listing of features.

- Descriptions of any limitations that exist. Remember, no single piece of equipment or program will do all that is needed or wanted.

- For software, be sure to review a complete description of reports that are available, and ask about the degree of difficulty in making modifications, if necessary. For hardware, examine the degree of expandability and the ease with which change can be made as the technology advances.

- Examine the "user friendliness" of the software or hardware. "User friendliness" relates to:

  - The general ease of use and operation of the program or equipment, and

  - The degree to which a guess made by the user during its operation will prove correct and not be detrimental if wrong.

  Many programs make the most of the calculations required, but are so difficult to understand and operate that they cannot be used effectively without lengthy, complicated, and expensive training. In this situation, the richness of the available calculations or features is wasted.

- Develop a sense of the developer's or manufacturer's qualifications. What is the background, how long have they been in business, and what have they done to gain the knowledge necessary to make or develop the product? In short, why should you believe that they know enough to make and support the product(s) that they are selling?

After preliminary research, narrow the list of acceptable alternatives and then secure a copy of the software or hardware so it can be operated under circumstances that match your needs and business environment.

It is often easy to secure software for testing since the cost to produce an evaluation copy is minor, and since the market usually expects this service. Hardware is often more difficult to get, especially if you are a small or first time buyer.

One technique is to buy with a right to return within 90 days if the equipment or program does not perform as indicated. Larger users often can secure equipment on an evaluation basis for 30 to 90 days. Often 90 days are required for a thorough evaluation.

If evaluation units are not readily available from commercial sources:

- Consider borrowing from a colleague

- Using a demonstration unit that a local dealer has on the sales floor

- Visiting a booth at a regional or national computer trade show

Operate the software or hardware under circumstances that approximate the real conditions that are expected.

When initially evaluating a program, do not read the user manual cover to cover. See how far you can get before reference to it is needed. This is some measure of its "user friendliness" and of the care and attention that the developer gave to issues associated with user interaction. The farther you can get, the more the developer or manufacturer has considered the human interaction factors, and the greater the likelihood that operation of it will be successful.

Make a list of the features and classify them into

- Those that are required.

- Those that are important.

- Those that are "nice to have."

- Those that are not important or not needed.

Rate each potential item under consideration using this list, and compare the results. See Checklists.

The final step is to get and **check** references. One place to start is with the vendor trying to sell the item. The inability to produce a list may indicate a problem. It is important that actual users of the equipment or software be consulted. They can readily assess the quality and completeness of the offering, and can comment on issues like technical correctness, reliability, training, and support.

Once a final choice is made, then turn your attention to implementation. Constantly looking back and reexamining the decision is not helpful. All implementations of new equipment or programs will have some difficulty, but the best approach is to stick with it and work to overcome the problems. The biggest mistake that one can make is to give up too early.

TRAINING

"Give a man a fish, he will eat for a week; teach a man to fish he will eat for a lifetime"
- The Trainer's Creed

A firm may have the most up to date equipment and software it can afford, but if the staff does not know how to use what is available, it will be under-utilized or fail. Practitioners and their staff need to have the necessary skills to cope with the new technologies employed in a tax practice - both today and in the future. As automation advances increase in the 1990s an understanding and use of training will be required. Attention to the training process will reward the practice with increased productivity, better results, and greater efficiency in the delivery of services to its clients.

Enough time and dollars must be devoted to the training process. One should avoid allowing time constraints on-the-job to make training an expendable task. If this were to occur, it would have an impact on staff productivity, leaving even less time for billable work. The importance of the training process must be stressed by the partners and managers in their personal activities and in clear firm policy statements. It is reasonable to expect to spend up to 50 percent of the current cost of hardware and software (direct cost) in training and support for the application and system used. Hardware and software costs are likely to continue to decrease. Training costs are not likely to decrease proportionately. Training costs will recur annually even when major hardware and software costs do not.

A firm should not ignore the technical training needs of the support staff. Productivity can be increased by allowing the support staff to attend courses in computer programs, (such as spreadsheets and word processing) to gain new insights into their jobs. The content of the training for support staff will vary from that of users.

Effective training activities should:

- Allow the user to explore the products before the formal training occurs.

- Instill in managers the need to reinforce the learning experience created by the training.

- Train on how to apply the product to specific job activities.

- Monitor the staff's use of the software and give performance feedback to the user.

- Devote time to on-the-job practice.

- Challenge the user with new applications of the software.

The various methods of training will be explored in the rest of this section, beginning with the traditional methods used today and ending with the techniques of the future.

ON-THE-JOB TRAINING (OJT)

A tried and true method of training involves "hands on" experience while working on the job. When OJT is part of the training regime, supervisors must have knowledge of the application and level of experience of the trainee. They also should be aware that the trainees cannot be left to fend for themselves. When a job involves OJT, all the time expended may not evolve into billable time.

Trainees must be provided a "road map." The goal of the assignment, how the work will be done, and a series of checkpoints as work is completed must be communicated. There is a tendency for the supervisor to "do the work" when a trainee has a procedural question. This method will be detrimental to the training process and should be avoided. OJT requires coaching, **not doing**.

Before completion of the job, a review of the work should be accomplished. Because of time pressures, this important step is often ignored. Without feedback, the lessons learned in the assignment can go for naught.

With careful attention from supervisors, OJT can be an effective training method. Sometimes, because of job pressures or being uncomfortable in the role as trainer, a supervisor can destroy an otherwise efficient and cost effective method of training.

FORMAL TRAINING

Training also can be accomplished in a formal fashion, either in a classroom setting or in a self taught mode. Depending on the economics of scale, formal training can be accomplished in an in-house environment. If training is to be an internal affair, be careful to make sure the trainer is qualified - the trainer must be trained. An alternative is to bring a qualified trainer into the office to lead the training. Some vendors will supply such a person at nominal or no cost. Make sure the person doing the training is qualified and not another salesperson just familiar with the software.

Formal outside training, in a classroom environment, may be the more productive way to go. It can be more expensive than in-house training on a per pupil basis, but can be cost justified in terms of having an accomplished training organization doing the job. Off-site training prevents interruptions by clients and partners. Also good classroom training involves some hands-on application of the software. Hands-on training connotes a commitment to hardware that may not be cost effective for the small and medium sized firms.

Training courses can be developed by the firm employees, using teaching aids from vendors or those obtained from outside training organizations (the AICPA or state societies). The training program should be carefully planned, including:

- The selection of a trainer

- The choice of the site

- How long the training session(s) will last

- Evaluation of the effectiveness of the training

This section will describe some methods of training common today as well as technology-driven training advances that may be possible in the future. The constraint on the more advanced technological methods is cost. The technology exists, but the cost of the equipment and software packages needs to moderate before it can be considered as a viable approach for most firms.

The most prevalent method of formal training is in a classroom environment. Trainees listen to lectures, complete tasks, relate with the trainer and return to their jobs with a better understanding of how to do the work. The use of video and audio tape has occurred, either as a supplement to the trainer's lecture activity, or in some applications (i.e. the use of tax-preparation packages) as a substitute for the trainer.

Self-study workbooks and tutorials are another method of training. Using self-study workbooks the trainee uses a particular software application to perform a set of harder tasks to a specific application. The feedback is through a series of tests with the organization providing the course grading results. Usually completing the course leads to Continuing Professional Education (CPE) credits, which makes this form of training desirable from a cost standpoint. Tutorials are similar to the workbook approach but can be ineffective because the user does not get feedback when errors occur. As technology allows for more interaction by the user with the software, tutorials will increase in value in the training process.

As technology advances, traditional formal training methods will become less prevalent. Methods which allow for more personal self development will become more prevalent. It is up to the firm managers to keep abreast of these developments and apply the emerging methods to their firms. Knowledge of the past can be a base for the future, but reliance on past knowledge alone is not relevant in today's rapidly changing technological environment. As new technologies emerge, new learning systems will also evolve.

Multi-Media

Now the most used technologically advanced training media is multi-media. It requires a video disc player, a PC and software for each trainee. The trainee interacts through a progression of tasks as the course progresses to completion. This method allows the trainee to go at his or her own pace. Using a series of questions and answers the advancement to the next level hinges on successfully answering a series of questions at the lower level.

Intelligent Documents

Intelligent documents can end some frustration found in using software application manuals. A manual can be keyed to the individual's (trainee's) need through a series of questions based upon the experience of the user. Sometimes, with the use of multi-media capabilities, the delivery of the information can be altered to fit the need and mood of the user for that particular day. The developers of this media refer to this software as active documents. The programming technique allows the document to know its contents and know who is looking at it. Using active documents training manuals, individualized electronic textbooks or manuals can be created for each student. Manuals can be customized to each individual depending on the trainee's experience, answers to a series of questions, or past test answers.

SUMMARY

To maximize the potential use of computers, training methods will continue to be enhanced through new cost-effective technologies such as-

- CD-ROM (video-disc).

- Multi-media.

- Artificial intelligence systems.

These methods will make the training process more convenient, flexible as to location and scheduling, and time-efficient.

SUPPORT

After adequate training, there is a need for on-going support. Software, hardware and systems, while in some respects are becoming easier to use, are also becoming more sophisticated and integrated. Thus, instead of support becoming a smaller issue for most organizations, it is becoming a larger issue. Support is the resolution and prevention of problems associated with the computer itself. Support is also resolving problematic issues with the software used within the firm. Support is a direct complement to training. Typically, the better individuals are trained, the less support is necessary. But support and training are not the same thing. The response to the user question "How do I get my printer to print?" may be one of support (for example, a connecting wire in the printer cable is broken). The response also could be to refer the individual for additional training. Practices installing a new tax preparation program may offer extensive training on program use, but later need support to determine how to record the foreign tax credit.

Support costs run about 25% to 50% of the cost of a workstation, annually, and include-

- The cost of getting the system up and running.

- The cost of the user learning the system.

- The cost of supporting the user after he or she has learned the system.

Unfortunately, support is a factor that is often overlooked. The risks in overlooking support can be great and include-

- Rejection by frustrated users.

- Large amounts of downtime in critical use periods (for example, busy season).

- Data loss.

- Unsuccessful implementation.

- Inadequately trained users.

- Cost overruns.

Support costs will be reduced by choosing a few packages for use within your firm. Support also can be reduced by basing upgrade decisions on an analysis of the advantages of upgrading versus the costs.

There are three major areas of support to consider:

- Software support

- Hardware support

- Integration support

These areas of support can be covered by your staff. By using your staff for support you can control what gets supported and when. Also, you can develop skills internally that may be marketable to clients. However, to expect a single person or a small staff to cover all areas of support is probably expecting too much.

In determining which types of support services should be offered in-house and what can be outsourced, several things need to be considered. Which critical support areas cannot be entrusted to outsiders? Which support services are your staff best equipped to handle? Which services are needed on a continual basis, and which are more cyclic? Which services can be purchased?

Here are some sources of outside support for software, hardware, and integration:

SOFTWARE SUPPORT

Software support includes support of purchased software and operating systems and support of any internally developed software. Purchased software often comes with its own support. Many vendors offer direct phone support from the vendor or the reseller through which users can get answers to specific questions. For broader information about software products most vendors offer user manuals and tutorials. When purchasing new software you should determine the kind of support a vendor offers, the support costs, and the quality of the support. These factors can vary greatly. For example, phone support can be free, charged per hour, or by contract. Calls may be local, long-distance, 800 or 900 numbers.

Phone charges may be insignificant when compared to your loss of professional time when waiting for an answer to your question. You may have to wait hours or days for an answer. When you get an answer it may or may not resolve your problem. Test telephone support before purchasing software that may require heavy reliance on this service by asking other users for their opinions or by calling for support yourself.

Other outside options for support include contracting with a third-party for support (outsourcing) or user-groups and professional organizations.

HARDWARE SUPPORT

Although sometimes easy to ignore, hardware support becomes critical when your computer will not work correctly, or at all. When this occurs it is usually important to get it up and running as soon as possible. Because of the importance of timing some firms obtain on-site 24-hour service contracts guaranteeing machines will repaired in a specified number of hours or replaced. These contracts are expensive so many firms look toward alternative support methods from two or more day service contracts to contracting for hourly service after a problem occurs.

Another alternative to contracting for support is keeping backup equipment or parts available for swapping in case of failure. This method is only effective if you have the right backup equipment and someone with the knowledge to install it.

When purchasing new hardware determine the type of warranty and the type of support included. The warranty will not be adequate if you need your machine fixed tomorrow and the warranty requires that you ship the machine to a distant service center. Check the reputation of any dealers, especially mail-order companies before relying on their service guarantees.

INTEGRATION SUPPORT

Integration support includes support of network systems, software working with other software, hardware with other hardware, and software with hardware. This is this most difficult kind of support to offer and to find. The best way to find an outside vendor of integration support is to ask for recommendations from associates who use these types of services.

TOOLS FOR SUPPORT

When offering or receiving support there are some basic tools that can be very helpful. There are disk analysis tools such as Norton Utilities, Mace Utilities, and PC Tools. There are file transfer utilities such as Brooklyn Bridge and Lap Link. There are remote-control packages such as Close-Up and Remote that can help you view the user's monitor from your station, or to communicate in a similar way with the vendor. Any support area should include tools such as these. But, these tools are very powerful and should be used with caution. If used improperly they can be destructive.

CONSUMABLE SUPPLIES

All computer systems use supplies on a regular basis. It might be paper, or toner for a laser printer, or diskettes on which to record information. Enough supplies must be kept on hand to serve the reasonable needs of users.

Another hidden cost of supplies is that they are very specific. A toner cartridge for printer "A" may not fit printer "B," and diskette sizes vary, so just having diskettes may not be enough. They must be the correct ones.

The real cost of supplies lies in not having enough or not having the right ones. In these instances, work by expensive professionals may stop until the correct item is obtained. Even when the practitioner does something else in the meantime, the inefficiency of stop-and-go work can have a detrimental effect on firm productivity.

FUTURE SUPPORT

Support is a rapidly changing area. As users become more sophisticated, the need for support changes. Support tools are evolving as needs change. Expert systems support systems are one area currently showing a great deal of advancement.

Support should go beyond answering questions about printer drivers to helping users use technology more effectively. Support should include offering strategies for improving the use of applications in your practice.

SECURITY

Use of the computer is proliferating in firms of all sizes. Each firm is becoming more dependent upon the computer to function. An essential element of any tax practice automation scheme is security.

Computer system security is a complex issue that can have a significant impact upon the effective operation of a firm. Security refers to systems and procedures that prevent access to computers or data stored on them by persons you determine should be prohibited. It is rooted in several concerns:

- Much of the data contained on these computers is personal and private. In addition, if it is client information, we have an affirmative duty to protect that data from disclosure to others not authorized to have it.

- Some data is proprietary. That is, it belongs to the firm or someone else. Substantial sums of money may have been spent to develop or acquire it and that value is diluted if the data is transferred to others without proper compensation.

- We may have a legal obligation not to disclose or transfer information to others. Programs covered by license agreements are an example of information we have that should not be made available to others.

- There are people with mischievous intent who want to cause disruption and damage. Allowing them access to a system invites difficulty and disaster.

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There are several types of security:

- Physical security involves putting critical elements of the systems or data under lock and key. In this way, access is limited to those having keys. Special keys that are difficult to duplicate, coupled with other procedures can greatly reduce the chance that someone will gain access to critical data or remove information.

- Electronic security involves using computer programs to require passwords or other code before access to information is granted. These passwords can be short or long, encrypted or not, effective or almost meaningless depending upon the skill of the person designing the security system. In general, the longer the password and the more cryptic its structure, the more secure it will be.

- For systems that communicate, the security issue is even more complicated. Since access to the systems can be obtained through telephone lines, physical security is less helpful and electronic security is the first line of defense. A simple password system may be all that is required. In more critical situations, systems that will only connect to predetermined telephone numbers that are called back by the firm's systems may be needed to provide acceptable security.

- For computers connected through a Local or Wide Area Network (LAN or WAN), the security issues are complex, and are usually handled by the LAN. LANS range from the very simple to the very complex, with complexity often coming from the security features.

  Examples of security features often found on LANs include:

  - Restricting user access to specified time(s) of day

  - Restricting user access to specific computers

  - Requiring users to have passwords, and requiring that they change their passwords frequently

  - Limiting LAN access to one LOGIN at a time

  - Restricting user access to data to certain parts of the LAN hard disks, and eliminating users' ability to see other data

  - Requiring users to operate from diskless workstations, thus preventing them from copying data from the LAN to a diskette that can later be removed

  - Designating certain programs as "execute only." This will prevent users from copying programs so designated even if they have a local diskette drive

  - Granting the right to change any of the security features to only a few people

  - Use of monitoring software to detect clear security problems and to develop procedures to deal with the potential problems that have been identified

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Thinking about security issues and developing procedures to deal with those issues is very worth while. Once these procedures have been developed, communicating them effectively to the firm or organization is critical. Included in this communication should be brief explanations of the underlying reasons for the procedure unless the explanation is inappropriate.

Understanding the reasons gives users a sense of the importance of the procedures, and will help them to accept the small barriers that security procedures present to their everyday operations.

Until the threat of damage from the use of "virus" programs recedes, every firm should have guidelines on the use of software obtained from high-risk sources such as public bulletin boards or entities offering free software. Virus programs can damage software by causing the computer to replace a program's instructions with gibberish. When a program that has been infected is later run, it will fail. Another virus technique is to fill a fixed disk with characters, overwriting the good data. In both of these instances, significant programs and data may be destroyed. The process of restoration is long and difficult. An explanation of the problem and several examples of the damage that can result from a viral invasion will go a long way toward reducing the risk.

It is also important to develop other procedures to allow people in the firm to acquire software from high-risk sources and have it tested for viral infection. This is important because some software from high-risk sources is very useful and fills a real need. Consequently, it may be impossible to keep it out of the firm. Testing and control are a better alternative than ignoring the issue.

FUTURE SECURITY

In the future, the technology associated with security will include voice prints and matching to an individual user's retina patterns. While exotic today, these technologies may become commonplace in the 1990s.

DISASTER PLANNING

Equally important is disaster planning. While disasters can be caused by a breach of security, they also occur when security methods are sound. There are several types of disasters you can encounter.

LOSS OR CORRUPTION OF DATA

The most common type of disaster you encounter on a day-to-day basis is the loss or corruption of data or program files. This type of disaster is often correctable by using disk utilities to recover data files and replace data or program files from backup sources.

Among the most subtle and sometimes most difficult type of data corruption to find is caused by power problems. This usually happens as the result of the voltage dipping below a certain level but not losing power. Depending on the program, this can cause indices to get corrupted, thereby making the data inaccessible without reindexing. The only cure for power problems is to put voltage stabilizers or uninterrupted power supplies between your computer and the wall outlet.

Sometimes your data is attacked by a malicious employee. Good security on your system will restrict this type of damage to only the person's machine or work area.

As mentioned under security above, one of the most damaging and complicated types of data corruption is from a computer virus. The only cure is to replace your executable files from original diskettes (which have been write-protected). If data files have been infected with the virus, an uninfected backup is critical. The best protection is to screen all programs and files with a virus-checking program before entering any on your machine, especially any programs from bulletin boards.

HARDWARE DISASTER

All computers break down eventually, usually at the least opportune time, due to the failure of some equipment part. This means you have to either call for repairs, or replace the part or board yourself. If proper backup procedures are in place a hardware failure can be tolerated. If you have a catastrophic loss of all your equipment or site (due to fire, flood, etc.), only proper planning can help you survive the crisis.

Methods of coping with a disaster include:

WRITTEN DISASTER PLAN

A key to recovering from a disaster is to have anticipated the types of disaster that could occur. The steps required to recover from each type should be identified. This plan should be in writing. When a disaster occurs, the person most familiar with the system may not be available. Even if the person is available, reviewing a comprehensive plan before trying recovery is prudent.

BACKUP

Backup often! Often is usually defined as once a day! Daily backup is more easily accomplished with a tape drive that will accommodate more than your total fixed disk space.

Test your backup data regularly. Don't assume your backups are sound. Restore several backup files routinely to a test area on your fixed disk to determine if they are recoverable. This has an added value in training you how to do it before the panic of **having** to do it occurs. Mean time between failure roughly equals the one time backup is neglected.

Check your backup logs and tape or disk labels to make sure backups are being done on schedule. Store at least one of your backups off-site. It is important to have a bootable floppy with your system files and enough utilities to allow restoring. If your hard drive becomes unusable, your programs to restore your data are not reachable without a properly configured bootable floppy.

POWER PROTECTION

Surge protectors are inexpensive equipment insurance. They cost less than $15.00 and there is no excuse not to have one on all equipment, especially in lightning-prone areas. The protector will blow out if electricity surges, rather than expensive computer equipment.

Noise filters on trouble machines can clean up many power line problems. This is especially true in an industrial working environment.

Uninterrupted power supplies (UPS) and standby power supplies (SPS) should be used. Even if your flow of power is very uniform, a sudden outage can result in corrupt data or a corrupt hard disk. An alternate source of power that will keep the computer up until an orderly shutdown can be accomplished is a sound investment. If you can afford them, place another power source on each machine. They are essential on network file servers or shared fixed disks.

STATIC

Static electricity also can cause data corruption problems. While the vulnerability to static varies with geography (with colder climates being the most vulnerable), it often occurs when the floor covering near the computer is carpet. Regularly spraying the surrounding area with an anti-static solution offers reasonable protection.

SECURITY MEASURES

Use of computers should be restricted to certain people, such as your staff. One easy way to accomplish this is to use a front end password. If you do use passwords, use a minimum length of four characters. A longer password is better. Make sure your staff doesn't leave their password taped to the machine or written on the desk blotter, or in the desk drawer and labeled as password. Passwords need to be available and accessible by the system administrator.

USER TRAINING

Everyone should have basic computer operating system training, which would include as a minimum how to turn the machine on and off properly. This sounds elementary, but what happens if your new staff person doing a tax return turns off the machine at lunch time right in the middle of computing a tax return? Is it the staff person's error for your not teaching him or her how to exit a program and shut off the machine? Everyone should be exposed to a basic operating system tutorial program to learn how to format floppies and make copies of files and disks.

Everyone should have specific software training for the applications they will run. Many software firms, including tax application software firms, have tutorial programs that come with their packages. Some are better than others, but new people need some type of training. Thus even the worst tutorials are better than no training.

Support procedures need to be in place for everyday problems. This can be as simple as appointing one person in the firm who people can go to when they can't get the program to work. An alternative that is becoming available is an outside firm that your people can contact to ask these questions. You also have the availability of the software firm. But, if it is tax software and your question is during tax season, you will be fortunate to receive timely support from this source.

FIRM POLICY

When an accounting firm has more than one PC, they should consider having a firm policy of basic machine setup. This would include a standard directory structure, autoexec.bat, config.sys, and system critical batch files as a minimum. Responsibilities for equipment and software manuals need to be established. Procedures for reporting errors need to be set up to let all users know of problems and "work arounds." Use of firm computers should be for authorized firm business. As stated under security, you have to be constantly on guard for viruses.

As firms get bigger, an approved list of equipment that the firm can purchase should be considered from a maintenance point of view.

Maintenance contracts should be considered on at least some equipment, and perhaps all of it. Especially if you do not have a computer expert on your staff. Your computer will become a vital tool, especially during tax season, and to be without it for a long period could cause severe problems.

Establish a single version of your operating system as an office standard. Don't mix versions in the same office. Even the same versions can sometimes be different and not 100% compatible among different hardware vendors.

Start a **Computer Care Day**. Set a day each month that the employees are to clean the screens, the heads on diskette or disk cartridge drives, and the keyboard. In addition, vacuuming or changing any filters your equipment may have should be done monthly. **Dust is the devil of your equipment.** As it forms layers on the parts of your machine, it causes heat buildup which will eventually cause a component failure.

On a hard drive analyze your files monthly by date of last access. Clear out older, unneeded files. If necessary, copy these to some electronic media and file it with your workpapers. The day will come that data stored on electronic media **will be** your workpapers. Run an optimization software program on all hard drives at least once a month after a full backup has been completed.

DIFFERENT PLANNING ALTERNATIVES

There are many different computer environments possible. Therefore planning methods need to be adapted to whatever environment you have.

- A simple environment is one machine and one key process (example tax preparation). A way to protect yourself is to have access to another machine similarly equipped and put your backup on the other machine until the original problem is corrected.

- A semi-complex environment is one with many machines with different key processes. By having two machines equipped with large hard drives capable of taking the entire data backup, the users can share one machine until the other is fixed. The key is to have two such machines. If you were to have only one, you can bet that will be the one that will go down.

- In a networked environment it is especially difficult to have a contingency in place. In a large building having two networks interconnected, with adequate security and cross backup of data, you can keep computing after a short changeover. This can be accomplished with very little if any loss of data. Set up an agreement with another company for using their network to backup your data. There should be a place for several of your key employees to work on their system, or access their system through use of a modem. Remember such an arrangement is a two-way street. Your system will likely be their backup system.

METHOD OF RECOVERY

Establish your exact ending point when the disaster occurred. That is, determine what had been done since the last backup (example: whose tax returns have been processed). Immediately refer to your written disaster plan. Try to normalize the situation as much as possible. Don't let the firm come to a grinding halt. Determine the extent of the damage and correct the offending problem. Run as many diagnostic routines as necessary on the equipment to determine the cause of the problem. Memory problems appear similar to other problems. Try some recovery utilities if a hard disk was involved. If recovery using utilities is unsuccessful, restore from your backup. Run reports to determine the status of data restored and the ending point of backup. Reenter any data lost since the last backup up to the crash point. Then enter current information and continue with your process as normal.

OTHER CONSIDERATIONS

- Keep paper file printouts on your hardware containing minimal information such as manufacturer, model numbers, serial numbers, configuration and warranty information, service contracts expiration dates and covered equipment.

- If not under service contract, keep an inventory of miscellaneous user replaceable parts (monitor cards and monitors). You will need this information from time to time, and having it both in a computer file and a printout will be useful.

FUTURE CONSIDERATIONS

As we become more dependent upon technology, computer disasters will become more detrimental. So disaster plans will need to evolve concurrently with the technology. Good planning is as important as the more stimulating aspects of automation.

CHAPTER III - FIRM SERVICES

PLANNING

Tax planning is probably one of the best areas for computer usage in a CPA firm. It is also an area where you can create a positive firm image that will encourage the client to request further add-on services. Your knowledge of the tax laws and financial planning concepts mixed with the power of the various computerized tax planning programs makes for an unbeatable team. You should use a program that provides ease of use, ease of updating, an intuitive approach, and efficient use of memory. Then you can put the program on as many of the firm's computers as possible (such as portables, if desired).

Using the computer, you can make the myriad computations which, in the past, you might not have made due to time constraints. Because of these complexities, you might choose only four or five scenarios that your professional judgment has identified as the most likely to benefit your client. With a computer, you can make scores of computations in less time than even one of the previous permutations would have taken. While a computer allows for faster calculations, the practitioner should be careful to avoid information overload. Unnecessary calculations should not be done just because you have the capability of doing them.

It is important in this area to use a program with which you feel comfortable. These programs range in complexity from those that do only a one-year forward projection (as in many preparation packages), to those that can go both back in years and forward as many as seven years. The practitioner should keep in mind that the planning programs that tie in with preparation packages are not as sophisticated as stand alone packages. The more complex (although not necessarily more complicated to use) programs will allow for multiple permutations within the same year. Some programs will even tie into other programs such as general accounting programs and financial planning programs. Many will provide the ability to move data into spreadsheet programs for further manipulation. The level of sophistication needed is determined by your current client base, or the client base you wish to develop. One further caveat, there are purchased spreadsheet templates that work with tax planning. But, these may not be kept updated. Usually, these templates work best in simple cases. Commercial programs are usually more comprehensive.

The first step in approaching this area is to analyze your current clients and determine what type of planning you can do for them. The type of planning determines the level of sophistication needed in a program. This in turn determines what one must spend for the program since this is one area where you usually pay in proportion to value received. As a rule, the more sophisticated the program, the more expensive it is.

Next it is best to talk with other practitioners and review written material prepared by authors for various tax publications and the AICPA. Many computer publications also give reviews of some less sophisticated tax programs.

Once you have an idea of which programs you want to consider, look at the capabilities of the program and the qualifications of the author. Following is a list of items that should be considered:

- **Calculations made by the program** - Not every program does every tax calculation. State calculations (all 50, if possible) are an important aspect to consider. There is no need to buy the most expensive with the most extensive capabilities if your practice doesn't require it.

- **Reports available and their format-**Consider the level of detail provided in the report and also the format of the report. If it provides a summary and a well-designed report format (such as a readable 5 year format) you can give the finished product directly to the client as a record of what you discuss. This can be a big time saver. The more detail that you can get from the program, the better you are able to make the professional judgments that must accompany computerized tax planning.

- **Flexibility of Input-**Consider full-screen editing with simple cursor movement so you can see many fields and records concurrently, rather than a one line at a time display. It is useful to import data from a tax preparation file or from another source, such as a spreadsheet or financial planning program. The ability to link to and from a preparation package is a very valuable asset.

- **Ease of use or "user friendliness"** - You want a program that is consistent and predictable. So you want one that will always respond the same way to the same commands (that is, the same facts always give the same results). Programs that are clearly written, have good understandable manuals, have on-line help capability, and have references to the tax code are particularly helpful. If you have to stop to figure out what each question in the program means, you will have problems with the answers that are generated. The simple intuitive approach is usually the best.

- **Author's technical tax qualifications** - This is the most important area for consideration. You want assurance that the program was developed by someone who has the technical tax knowledge necessary for understanding the complexities of the tax law.

- **Stability of the author and the publisher** - Since you are not dealing in a static area, you must have assurance that the program will be updated at least annually. In some years the updates must be made more frequently. A program might be excellent in its initial version. But, if the author or publisher cannot keep up with the changes that constantly happen in the tax environment, you will soon have a useless program. You must understand up front what the author and publisher see as their responsibility for maintenance and update. You do not want to have to change programs frequently.

Once you have determined the programs you are most interested in, you should get demonstration copies. These should be available at low or no cost. Some of these evaluation copies are the prior years version. Some of them are the current version, but in a crippled format so it can only do one type of scenario (for example, tax filing status of single only). Often, crippled programs will not store data. By using the program with live data, where you already know the answer, you will find out quickly if this is the software you should be using.

Planning programs exist in all areas of tax, estates, partnerships, corporations, individuals, fixed assets and personal financial planning are all included in a program somewhere. You should do a little research to find the one that is best for you. New programs come out frequently. Therefore, even if you are currently satisfied with a program, you should consider others as they are released. You may not make a change, but at least you will know what options you have.

Although this section is about the use of tax planning programs for future tax situations, it should be kept in mind that a good planning program has other uses as well. An excellent use of a planning program is for checking IRS and state tax audit reports. Another good use is for testing out-of-state returns (for those situations where you need to prepare a state return for a state in which you do not normally practice). Tax planning programs are very helpful in the creation of tax provisions for corporate situations. Some planning programs will automatically search a data base to extract applicable planning data.

FUTURE PLANNING

The current tax planning programs are valuable tools. But, their value will greatly increase during the decade of the 1990s. Continuing enhancements will center on networking, interaction with other programs, and expert systems. A good planning program can pull data directly from programs such as tax preparation or financial planning. In addition, data gathered in the planning activity may be transported, when appropriate, directly to a tax preparation or financial planning program. The transferred data may then be used to make comparisons between the planned and actual result. Some programs are now achieving some of this transportability of data. This ability should be commonplace by the end of the decade.

TAX PREPARATION

When most people think of automating a tax practice they think of using tax preparation software to complete their tax returns. Levels of automation vary from using a service to file tax returns electronically with the IRS to preparation of 100% of an office's returns using tax preparation software. As more firms automate their practices, the number of automated services and their sophistication increases.

For this document, the current levels of automation are defined as:

- **Manual or computer-aided tax calculation** - returns are generally prepared manually but certain calculations for those returns may be done on the computer using a spreadsheet or another tool.

- **Service bureaus** - returns are processed off-site. Client data is either entered at the practitioner's office and sent electronically to a processing center, or input sheets are sent to be keyed at the processing center. Processed returns are either sent back electronically to be printed in the tax practitioner's office or printed at the processing center and sent to the preparer. Client data is usually stored by the service bureau. There is usually a per return processing fee.

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- **"In-house" systems**-Systems that run completely in-house. Returns are entered, processed and printed within your office. Client data files are stored and maintained in your office and client organizers are printed and sent out from your office. Typically you purchase the software for a fixed sum with no restrictions on the number of returns that can be processed.

- **"Hybrid" systems**-Typically these systems process on a computer in your office so they are similar to in-house systems. However, there is also a link to the service center. **There is usually a charge for the software and, additionally, a per-return charge.**

The decision concerning which category is right for you must be based on an analysis of your tax practice. There are advantages and disadvantages to each. But, for practices in the first level strong consideration should be given to increasing your level of automation if your volume of returns is more than nominal or the complexity of returns requires large investments of time into computations. Some advantages that can be gained by computerizing tax return preparation include -

- The saving of professional preparation time after the initial year by using computer prepared proformas.

- The ease of reprocessing a tax return with multiple schedules or forms that may be effected by changing one item.

- A more consistent tax preparation approach by all preparers within a firm by using uniform and structured methods and forms.

- The elimination of many arithmetic functions, resulting in the elimination of many arithmetic errors.

- The elimination of considerable repetitive handwriting (such as heading information).

- The increased efficiency of collecting and recording client tax information by using standardized input procedures.

- A more rapid production of K-1s for partnership, sub-chapter S corporations, and fiduciary returns, which usually includes the automatic allocation of tax return items.

- The tax information database, once in a computerized format, may be used for various types of tax planning and analysis.

- Client data is in a form that can be converted to conform to the IRS electronic filing requirements.

Some disadvantages include:

- Unrecoverable costs (for example, caused by reruns) resulting from input errors

- Capital costs of hardware, software and training

SERVICE BUREAUS

A service bureau is a company that provides data-processing services. A variety of service arrangements are available, including the conversion of input data to machine-readable form, processing the data, and physically delivering the output to the customer. In addition, to meet special requirements, a service center may offer system design and programming support.

Service bureaus have a long track record and are typically complete. The larger service bureaus process returns from all states and almost all the forms. They can take much of the administrative headache out of tax season by offering data entry, printing and client data storage services. They also usually have a large support staff that can provide training and support throughout your tax season.

The major disadvantages to the service bureau approach are cost and lack of control. Service bureaus typically charge an initial processing fee, as well as a fee for reruns, and these charges can add up. With a service bureau you are also at the center's discretion concerning when a return is processed. Turn around is often slow and your staff can waste much time trying to track down or expedite returns. An often overlooked disadvantage to the service bureau approach is the time preparers or reviewers waste on-familiarizing themselves with the return when it comes back from the service bureau. When compared to in-house or hybrid systems, this can be a distinct disadvantage.

One way service bureaus have tried to mitigate this delay is by adding a feature called remote job entry. This feature allows firms to complete their data entry and send client tax information to processing in its electronic form. A companion service to this is the ability to transfer the data back to your office electronically and print the returns on your printers. These features, while expediting the turnaround time, add some of the same administrative burdens as in-house preparation such as data entry, printing and collating.

Most service bureaus offer off-site storage of client data files that can be a boon if your office is hit with a disaster. A possible disadvantage to off-site storage and processing is less data security.

IN-HOUSE SYSTEMS

In-house systems are becoming more mature with every tax season. Most states and forms are offered by the major in-house packages. An in-house package that does most of the states, forms, and calculations that you require, offers many advantages.

A major advantage offered by in-house systems is the control given the return preparation cycle. Your firm can assign priorities to returns and enter, print, change, review, complete and send your returns to clients at your discretion. This allows for completion of a return while it is fresh in your mind and eliminates intermediate steps of sending a return to a service bureau to be processed. Clients that bring in their tax information at the last minute, but do not want to file an extension, can still be satisfied. Last minute changes can be accommodated with great ease. This increase in control and turnaround, coupled with reduced costs associated with in-house programs, adds up to sizable cost savings. Many firms have experienced increased realization of 20% and greater. These gains are not without costs; there are disadvantages to in-house preparation also.

Many in-house systems are not as complete and sophisticated as the larger service bureau systems. An in-house system may not have as many state return programs available. This may result in the separate manual preparation of state or city returns. In-house systems also may lack certain tax computations that may be present in service bureau systems. A particular system may not be able to generate or print certain forms that are necessary to your practice. If one of these systems were selected, missing forms and calculations would have to be completed either manually or with another computer system (for example, spreadsheets).

Proper hardware must be purchased to run an in-house system. These systems run best on the newer, faster machines (see hardware recommendations page 53 to page 61). You probably will also find it necessary to purchase a laser printer (the alternative is to use overlays, but that is not recommended for volume production). Necessary laser printer supplies include paper, toner cartridges, and hard or soft fonts. Many firms have also found that the greatest efficiencies are gained running in-house systems in a shared resource environment.

There are some additional administrative burdens involved with in-house programs. If using a batch entry type program, a data entry person is needed. If you now use a service that prints and collates your returns, moving in-house would mean taking on these responsibilities. Firms that process in-house also have to handle any hardware or software problems, including bugs, breakdowns, or malfunctions.

HYBRID SYSTEMS

Hybrid systems offer a combination of the above advantages and disadvantages. Control over processing is in the hands of your firm except that client data files must be downloaded by modem to your office before they can be processed. The cost is much the same as a service bureau system. A local area network is desirable because of the large amount of disk space required to hold the systems. Hybrid systems have the same administrative problems and hardware costs that in-house systems have.

PREPARATION METHOD SUMMARY

No one can tell you which preparation method is best for your firm. You must determine that yourself. You should note that the current trend is toward in-house preparation. Traditional service bureau processing methods are losing large percentages of the market every year to in-house systems.

DATA ENTRY METHODS

DATA ENTRY METHODS DEFINED

The traditional service bureau method was to use input sheets and batch entry. The new service bureau systems and the in-house and hybrid systems vary in their data entry approach. Some allow only input sheet oriented, "batch" entry methods. Others allow only IRS forms-based, "interactive" data entry. Some offer both methods. Electronic data transfer of client information is also possible.

The "batch entry" method will be familiar to those now using the service bureau central processing approach. Data entry items are typically grouped with other related items that do not necessarily appear on the same IRS tax form. Each data entry field has a unique number or tax line code associated with it.

The standard procedure using the batch entry approach is for the tax practitioner to fill out input sheets manually and then for a data entry person to enter them into the computer. Calculations are done after all the data is entered for a particular client. Often several clients are processed at once. Documents available for review include the input sheets, diagnostics, and a draft of the return printed after data entry and processing.

The "interactive entry" mode is designed to allow the preparer to enter taxpayer data directly into the computer from client records. Often the input screen looks much like an IRS form. Usually calculations are done as data is entered, and the preparer can see the results of his or her input almost instantly.

Many interactive entry programs allow the preparer to enter notes to the return from within the package. This procedure documents or draws attention to certain aspects of the return. Many also allow the user to print reports showing the data entered for that client. Documents available for review are the diagnostics, a draft of the return, and optionally, any notes or data entry reports.

Electronic data transfer programs, commonly called "bridge" or "link" programs, are prevalent among business return packages, although some individual return programs also accept electronic data. These "bridge" programs convert data from accounting or trial balance programs into a format that can be read directly by a tax program. Very little information, if any, needs to be entered in the tax preparation program itself.

DATA ENTRY METHODS - ADVANTAGES AND DISADVANTAGES

There are advantages and disadvantages to each method of data entry. The **batch entry** method is very production oriented. Data entry personnel are usually faster at entering data than tax practitioners. This method also does not require as large an outlay of capital for computers since only the data entry personnel need to have computers. The batch entry method is also the most familiar to preparers that are accustomed to a service bureau.

The main disadvantage to the batch entry method is that the preparer cannot see the results until after the return is processed. Some batch entry programs will process as you enter your data and allow you to review the return on-screen. This means the reviewer needs to do the data entry. **Since the preparers use input forms, many practitioners complain that tax staff learn how to fill out input forms, but not how to prepare tax returns.** Conversely, tax practitioners that are familiar with tax return forms may be impaired in trying to enter correctly the required coding on an input sheet for a particular tax program. It is also less efficient for most preparers to write on paper, in this case an input sheet, and then have someone else enter the information, than to enter data directly themselves, even if the preparer is not a good typist.

Interactive entry methods allow preparers to review return forms or calculations as they enter the client information. The preparer can try different ways of entering client information to find the most correct or advantageous method and instantly see the results. Often the preparer has a ballpark idea of how certain parts of the return should look. The interactive method allows the preparer to spot potential data entry or other errors without going through a lengthy data entry and calculation process. This immediate feedback saves the preparer the time it takes in a more traditional approach of refamiliarizing themselves with the return.

Many people find the interactive approach more intuitive and easier to learn. Instead of cryptic coding systems, some interactive programs present the preparer with tax return forms and on-line help. **Practitioners using interactive programs in their offices say that their staff learn how to prepare tax returns, not input forms.** This tax return orientation has an added benefit to users. Firms will find it much easier to convert user knowledge from one program to another if they decide to switch to another program that has a tax return orientation.

Offices using the interactive method tax programs will experience the greatest efficiency when every tax practitioner has a computer immediately available. This may require more of an outlay for hardware than the batch entry method requires. Another disadvantage that some offices feel is a reduction in confidence in the audit trail. Some practitioners feel better about reviewing hand-prepared input sheets than reports regurgitating data entry and notes. Other practitioners think it is inappropriate for preparers to do data entry although they are already doing manual data entry onto an input form.

Electronic data entry is a very efficient method of entering client data. It follows the maxim of using electronic data in as many efficient ways as possible. If the client data used in a tax return exists somewhere in an electronic form it is to the practitioner's advantage to use it. Usually these systems have some sort of tax coding system for account balances that only need to be set up once per client. After that is accomplished, it is simply a matter of updating the coding periodically.

The main problem with this method is finding a bridge program that works efficiently with your data. This bridge program must be able to read the data your trial balance or accounting software produces and then write it to your tax preparation program with a minimum of keystrokes and effort. A system under which your trial balance or accounting program writes directly to the tax program without requiring a third intermediary program is preferable.

DATA ENTRY METHODS - SUMMARY

There are varying opinions in the profession concerning which data entry method, or combination of methods is preferable. The trend is definitely toward interactive and electronic data entry methods. We can expect improvements to these data entry methods in the future, with the addition of new methods.

FEATURES TO LOOK FOR

When choosing a tax preparation system there are some minimum features to look for. These include:

PROFORMA INPUT FORMS OR SCREENS

Much of the data that appears on the current year's tax return is also applicable to future-period returns. Most tax preparation programs store this data from year to year. When the data is needed for a later year it is presented as proformas. The term proforma refers to input sheets or data entry screens upon which the computer has generated prior-period recurring information. By using the computer to generate proforma information, repetitive handwriting and data entry are eliminated.

Typically, the following types of information are produced on a proforma:

- Taxpayer information (name, address, identification numbers, occupation, etc.)

- Listings of sources from which dividends and interest are received

- Depreciation information

The system should provide for storage of taxpayer information to enable the preparation of proformas for later tax periods.

SCHEDULES AND FORMS

Tax preparation programs or services may not have all forms available that you consider necessary for your practice. The tax return vendors determine those forms they will offer by reviewing their customers' demands and usage. As a minimum requirement for acceptability, any computer tax preparation system must provide the forms that are generally applicable to most of your clients.

STATE FORMS

The preparation of state and local tax returns may be considered a minimum requirement. The capability of preparing such returns is available in specific systems and should be considered in evaluating the applicability of computerized tax return preparation for a practice.

ADDITIONAL FORMS

While some services do not provide for all forms, they will allow for input of the results of a form so a complete tax computation can be made. If the system accepts only the results of a form, the preparer must complete the form in a way that will allow it to be included with the filed return.

OTHER MINIMUM PROCESSING SPECIFICATIONS

Also, the following are the minimum processing characteristics considered acceptable for a computer tax return system:

- The calculations done by the system must reflect the present legislative, regulative, and administrative requirements of federal, state, and local taxing authorities.

- Every sheet of output must show the taxpayer's name and identification number. Not only is this particularly important for in-house processing to ease collating, but it is also important if pages are accidentally separated in the government's processing centers.

- All supporting schedules must be identified and referenced to the corresponding form.

- All the currently published government specifications for forms must be met, especially for the sections applicable to preprinted or substitute forms.

- The system should calculate depreciation using proper methods.

- The system should allow you to override easily calculations it does.

- The system should produce diagnostic reports that highlight possible errors or omissions from the client data.

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ADDITIONAL PROCESSING FEATURES

Certain features may be present in computerized tax preparation systems and should be considered when evaluating other systems of tax return preparation. Some of these features, which may be considered minimum specifications for your practice, include-

- A listing of the schedules and forms prepared for each taxpayer.

- A letter of transmittal to the client containing all filing instructions.

- Availability of forms (usually produced as a booklet) designed to help the client both to collect and record the information needed in the preparation of the current year's return (for example, a listing of the prior year's information and amounts with space available to enter the corresponding data for the current period).

- The sale of a group of assets at one price that enables the preparer to request automatic allocation among sections of that selling price.

- Preparation of fiscal year returns with required pro rata calculations.

- Limited cash flow statements that show income and itemized deductions with amounts and percentages.

- A worksheet comparing the various methods (for example, itemized deductions, standard deduction, and so on) used to calculate income tax.

- The automatic calculation of gains and losses, including ordinary income recapture that results from the sale of depreciable assets.

- The capability of producing multiple copies of the return.

- The preparation of worksheets (for both tax and financial planning) that can include comparisons of current to prior year's data.

- The ability to produce practice management aids, including client billings, mailing labels, etc.

- The ability to link with other computer applications.

- A system that meets the requirements of electronic filing.

- Client tax return database search capability.

- The ability to contract on a per-client basis for states in which you do not prepare many returns.

- The ability to print the IRS required supporting schedules in an acceptable format for inclusion in the return.

- The ability to print both individual returns and batches of returns.

- Control or hash totals.

- Input screens and input forms that mimic the tax forms to the greatest extent possible.

- A limit to the number of forms, entities, and amounts that is greater than your normal needs (for example, more than ten K-1s).

For situations in which data entry is accomplished, review is performed, calculation is made, or output is printed on systems in your office the features include-

- On-line system use help.

- Pop-up calculator.

- User-friendly interface.

- Reasonable disk-space requirements for the program, accessories and client files.

- Multi-user capabilities.

- Reasonable processing speed.

- Reasonable memory requirements.

- The ability to print to the printers that you own or plan to own.

- Good use of color and contrast, including user-definability.

- pOn-screen error-checking.

- Good default information (for example, FICA wages should default to the lesser of federal wages or the FICA limit).

- Fast and simple summary tax results displayed on-screen.

- On-line tax help.

- The ability to add context-sensitive notes that can be viewed or printed as a group with the return.

- Administrative features including due date tracking, work responsibility assignments and return status.

- Audit trail that includes a complete history of changes for each data entry field including who changed an item and when the change was made.

Most likely, scanning or optical recognition methods will soon be employed to read standardized client documents. Voice data entry systems and expert systems also may be used to collect client data. Better graphical user interfaces and "smarter" programs will make systems ever easier to learn and use.

The IRS's current trend of asking for more and more data electronically probably will continue until most types of returns and forms will be filed electronically. Perhaps, in time, all taxable transactions will be reported directly to the IRS from the transaction source with only exceptions required to be reported. This is not likely to occur for some time because of the current state of the IRS's systems.

With more and more client data on the computer, there will likely be a proliferation of programs to search, sort, and analyze client data. It is already possible, with the right programs, to identify clients that match certain criteria by searching your firm's client base for very specific information, and to generate a mailing to those clients. For example, you may wish to locate all clients that had luxury autos and incomes over $100,000 in a prior year to inform them of a new IRS position that applies to them. In the future these capabilities will become more sophisticated while also becoming easier to use.

Another advantage to having client data on the computer will be the availability of post preparation analysis of client data. Currently there are planning programs available with most tax preparation programs. In the future we can expect these to become more sophisticated and expect the introduction of new types of analysis programs. An example of one of these programs might be one that compares prior year data to the current year and offers planning ideas for future years.

TAX RESEARCH

As the number and complexity of tax laws increases, tax practitioners are turning to computers to perform electronic research. The following sections review the techniques, hardware requirements and software products available to add electronic tax research capability to the tax practitioner's toolkit.

ON-LINE RESEARCH

The first approach to electronic tax research is time-sharing. In a time-shared system, tax library materials are accessed through a communication link between the practitioner's office or from wherever the practitioner, a computer and a modem are all together. The centralized database of library materials is stored on a mainframe computer allowing direct access to the information and very fast searches of massive amounts of information. Since the library is centralized, it can be updated for the almost daily changes that occur in the underlying information.

The hardware needed for on-line research is no longer complex or even expensive. All that is required is a personal computer with a serial port and a modem. The serial port provides a gateway for the steady stream of data to and from the PC, while the modem converts the computer's digital output into the analog signal that is actually sent over the normal telephone line. Since a serial port is included with most personal computers, there is normally no additional cost unless the computer's serial port is already assigned to some other device (like a printer).

Modems are now available in the $100 to $500 price range, and operate at speeds ranging from 110 bits per second to 19200 bits per second. This transmission rate is referred to as the "baud rate" in honor of J.M.E. Baud, a communication hardware pioneer. The prevailing speed now is 2400 baud, although higher speed modems are becoming more common. The speed of a modem that will be used for electronic research must be coordinated with the speed of the software being used and the speed of the research service being accessed.

It is important to understand the difference between asynchronous and synchronous signalling schemes and to match this modem characteristic to the research vendor's requirements. When choosing a speed, also consider that many PC printers are relatively slow; and that if the text is to be read while being displayed on the screen, faster is not necessarily better. These factors must all be balanced when choosing a communication speed, since charges for system use are generally based, in part, on the amount of time a user is connected to the system and on the speed of transmission. Faster speeds require less connection time, but cost more to use.

One technique that can balance these factors is to record incoming information in a file, rather than printing it directly on a printer. The recording process is much faster than the printing process, and the file that is created can be read and printed later, after the connection to the on-line service has been terminated.

Successful communication between computers requires the successful combination of user efforts, hardware, and software. Communication software establishes the ground rules for how data will be transmitted between computers. It sets the speed of transmission, the signalling scheme, and the error checking procedures that will be used to assure that the information sent is actually received in the correct form.

This software can often be used to dial the number of the research service and to automatically login the user by providing the correct user account number, client charge number, and services selected. Most on-line services provide software that is custom designed to work with their system. While most of them allow access using more general communication packages (like SmartCom and Cross Talk), some of the features that are programmed into the special software may be lost.

One of the major disadvantages of using an on-line service for research is the relatively high cost of the connection time. This is especially evident in the early or learning stages when the process of identifying specific search words to be used has not yet been learned or perfected. In these situations, the charges for a search can be quite high and have actually caused some practitioners to avoid using the electronic systems for fear of the high cost.

CD-ROM RESEARCH SYSTEMS

Recently, some of the major publishers have made their tax materials available on an optical disk that is commonly referred to as a CD-ROM. These optical disks use laser technology to store large amounts of data on a single plastic disk approximately 5.25 inches in diameter. One of these disks can, for instance, contain all Tax Court cases from 1954 to the present, or it can contain an entire federal tax service with all annotations and supporting materials.

Use of CD-ROM will free users from the connection charges associated with the on-line systems, but there are drawbacks. The most important of these is the frequency with which the data on the CD-ROMS is updated. Now the update frequency is monthly, but the underlying law and cases are changing daily. This difference in update frequency may cause information used in a research project to be out of date. Users should assess the currency requirement for the information that they use so that there are no surprises at a later time.

Access time for CD-ROMS is another issue. Personal computer hard disks typically have access times in the range of 10 to 80 milliseconds, while CD-ROM access times are in the range of 400 to 600 milliseconds. This difference in access times manifests itself in perceived slowness of locating data. If the users are looking for data on a frequent basis, this delay will be noticeable, while if access is relatively infrequent, then it is of no consequence. Faster computers (for example, those based on the Intel 80386 chip) will exacerbate this problem unless the access time of CD-ROMS is reduced.

Typically a CD-ROM is an external device that is attached to a PC through an internal interface card and connecting cable. When research is being done, the disk containing the library materials is inserted into the drive. Access software that does the research is then loaded and pointed at the CD-ROM drive. Searches are started, and the results displayed on the screen or printed on paper.

Granting several users access to the CD-ROM devices is highly desirable, especially when their cost, and the cost of the library materials, is considered. Typically this "multi-user" access is given by attaching a CD-ROM to a Local Area Network (LAN). The technology to do this well is now emerging, and seems to work fairly well. Future events that improve the attachment schemes, allowing information from different vendors to be accessed using the same searching software, should be watched with interest.

MAGNETIC DISK STORAGE

In a way that is similar to CD-ROMS, tax materials are available on magnetic disks, again with monthly updates. A complete tax library will require many megabytes of disk space. Occasionally vendors choose to deal with this by providing less than all the information that is available. Be sure to check the completeness of the information that is provided so the boundaries are clearly understood in advance of reliance on the library system.

Services that represent a less than complete library may be of great value. Having electronic access to a service like CCH's Master Tax Guide can be very helpful, especially if access to it is keyed to questions that arise during tax return preparation. Most publishers of tax preparation software provide on-screen help like this that is keyed to some research system. These will become more prevalent as time goes on.

Research systems that are magnetic disk-based and keyed to return preparation system will continue to proliferate, especially as the use of LANs increases. Licensing agreements to allow multiple user access will have to be developed as will LAN attachment systems. Practitioners should be alert for changing requirements and for products that meet these ever changing needs.

RESEARCH TECHNIQUES

Electronic tax research techniques put a great deal of emphasis on the use of key words. Searching using key words may yield a severe case of information overload. To reduce this, a tax practitioner must search for key phrases or pairs of key words that are linked to each other. Of utmost importance is the tax practitioner's familiarity with the transaction being researched and its related terminology. Key words selected must be relevant, of course, but they also must be selected in a way that provides some uniqueness. This latter requirement reduces the likelihood that cases that are of no help will be located.

Learning to structure a search request effectively takes time and experience with the particular electronic research system used. Of particular importance is the use of date ranges, specific jurisdictions, and code or regulation sections. An important area for growth will be the introduction of Artificial Intelligence (or expert system) methods into the process of framing the search. While it is certainly possible to use these techniques to best frame a search, little has been done up to now. As these techniques are developed, more capable computers using the Intel 80386 and i486 chips will have a material impact upon the performance of research systems.

Today's emphasis on the "bottomline" will require that the potential cost savings of electronic research actually be realized. The long-term savings associated with its use will come both from increased productivity and from the elimination of duplicate paper-based research services. In the initial years of use, most tax practitioners will continue to buy and use hard copy tax services, but that duplication of resources will decline as the electronic systems become more reliable. The potential for real productivity increases is high.

Successful implementation of electronic tax research will require the combination of capable hardware, outstanding search software, and finely tuned research techniques. Tax practitioners offer their clients time and expertise. The use of electronic tax research will reduce the time necessary to search for information, leaving more time to think and plan. Successful research software will allow users to operate research systems with little system training, and will help them to concentrate on the task at hand instead of on the research system itself. The technology itself is not complicated or difficult to handle. The training time necessary to realize productivity gains is not great, especially with newer software that is well-designed.

FIRM ADMINISTRATION/MANAGEMENT

For most people, the automation of a tax practice focus is on client related aspects, such as planning, preparation, and research. A more comprehensive approach would be to focus on the administrative and management aspects of the practice. This covers the broad areas of:

- General office automation

- Practice management automation

- Personal productivity

- Firm policies and standards

There is some overlap within these areas, but they provide a reasonable delineation of functions and will therefore be dealt with separately.

GENERAL OFFICE AUTOMATION

WORD PROCESSING

The first area often approached by any practitioner, despite size, is word processing. In its simplest form this could merely be the use of electronic typewriters that have some memory capacity, and sometimes built-in functions such as spell-checking. (But, given today's technology, this is the least efficient method of word processing.) From here, the usage can advance to stand alone PCs, local area networks, and even to worldwide linkages. Word processing can handle anything from letters to "boiler plate" forms used in sophisticated tax planning situations. The degree of sophistication and complexity is dictated by the size and need(s) of the firm. Some word processing programs can be integrated with spreadsheet programs enabling the production of reports encompassing sophisticated financial data. There are many excellent word processing programs on the market today. The same selection criteria that are used for planning and preparation programs can be used for word processing and other office automation programs. Consideration also should be given to various add-in programs that can enhance the use of the word processing program. Spelling checkers and thesauruses are useful add-ins (although most word processing programs already incorporate these). The AICPA supports a grammar program that proof-reads the practitioner's writing and locates grammar and stylistic errors such as-

- Incomplete sentences.

- Long sentences.

- Phrase errors (such as gender-specific terms, long-winded or wordy phrases).

- Mechanical errors (such as incorrect capitalization, unbalanced parentheses, etc.).

This add-in is an example of a generally available program that has been enhanced to consider the idiosyncracies of the accounting profession.

CREATING INTERNAL FORMS

An excellent application of the use of word processing, desktop publishing, or stand alone programs is the preparation of internal forms. These forms can be used for time analysis, billing, and tracking the status of various client engagements. The forms could be generated as hard copy, or could be used on the computer system, depending upon the complexity of the system chosen. If generated as hard copy, periodic updating to the computer is necessary so the tax practitioner can easily keep track of changing situations. If the forms are resident in the computer, then the updating is done interactively as new information is furnished.

CHECKLISTS

Another area for consideration is the preparation of checklists. These are especially useful when gathering client data, checking for completion of an engagement, or evaluating the planning opportunities for a client. These checklists both help the practitioner in his or her work, and enable someone else to review the work quickly. These checklists can be generated from word processing programs, database programs, or spreadsheet programs. Many times, other practitioners will have prepared checklists which they are willing to share. Many of the checklists sent out from the Tax Division of the AICPA are available on diskette or are easily converted to computer generated forms. While this area seems rather simple, it could save a lot of time and help provide opportunities for additional services.

CALENDARS

The use of calendars is an increasingly popular addition to any office automation plan. There are myriad calendar programs on the market. Many are stand alone programs that can be used as "pop up" programs while others are available as add ins to other programs. Some of these programs also contain calculators and other useful functions such as phone books and automatic dialers. In its simplest form, the calendar takes the place of your pocket or desk calendar. It records your appointments and other notations and can even sound an alarm to remind you of a specific appointment. Many calendars allow printing capabilities so you can take a hard copy of your calendar with you.

In its most sophisticated form, such as a network environment, the calendar program can connect you with the calendars of others in your organization so you can determine when people are available. You would not be able to know the specifics of their appointments (without proper authorization), but you would be able to know what time has already been blocked out. This is especially useful when trying to set up a meeting with more than two people. Some programs become, in effect, personal information planners.

ELECTRONIC MAIL

From here the logical progression is to electronic mail. This type of program enables the practitioner to transfer data, messages, or images instantly between any users on your network. In fact, some systems allow you to go outside of your network by various public utilities. Any type of material, whether generated from word processors, spreadsheets or data bases, can be transferred to someone else so they can review the material and make changes. This is far superior to fax because it is:

- faster, and

- provides the ability to edit

Usually a message flashes on the screen of the receiving person and you can build in a receipt function so you, as the sender, can be certain the person at the other end actually did receive the material. You can also have copies sent to many people at the same time.

FACSIMILE (FAX)

Fax is an important aspect of any office automation process. Fax machines have become increasingly useful in the stand alone environment. People have become very dependant upon fax for moving information between offices and between the practitioner and the client. One caveat - while fax is very important and useful, other areas such as electronic mail and courier services should be explored before faxing voluminous information. This is a consideration for saving both time and money. The decision may well be to still use fax, but the question should be asked whether or not fax is the most efficient and cost effective method for transmitting the particular information. With fax boards and modem pools, you can even set up your PC to be a fax station. In this case you might also need a scanner for those forms and images which are not computer generated. Again, a voluminous fax will tie up your equipment for some time.

VOICE MAIL

Voice mail has become a necessity for many practices. Voice mail allows the practitioner to receive accurate messages from co-workers and clients at virtually any time of the day. Even during business hours, if you are tied up and your secretary is busy, you can be sure that an important message can still reach you. More sophisticated systems allow you to give the same message to many people on the same system at one time. For those who want a human response, that option can be built into the system.

MICROGRAPHICS

Micrographics is the final area to be considered in this section. This usually involves a more sophisticated system and allows you to store work papers, documents, etc. on various media from microfilm and microfiche to optical disks. Once stored, you can search for these "images" and display them on a screen, or print them. Remember that information stored this way is stored in image (or bit mapped) form. It cannot be altered without converting it to a workable form (which is not easy to accomplish). Images, rather than words and numbers, are stored. This can be very useful either as a backup storage system or as a main filing system. This can allow the destruction of some older files or the transfer to off site storage of older, but still necessary, files (for example, those with original signatures on critical documents).

PRACTICE MANAGEMENT AUTOMATION

This area encompasses those functions that allow you to manage your tax practice in an efficient and effective manner. The main thing to remember is that any system that you have been using manually to track elements of your practice can be converted to an automated system. While this is not always necessary, you will find that the more you do on the computer, the more you will feel comfortable with it, thereby utilizing it more effectively.

TIME, BILLING, AND ACCOUNTS RECEIVABLE

The most obvious areas to be considered are the time, billing, and accounts receivable areas. Properly designed, these can flow into each other. Time can be captured manually and entered into the system by a secretary, or it can be entered directly on the computer by the professional. This is a critical function for the firm since bills can go out sooner if time is entered as quickly as possible (daily is best). This in turn causes collections to come in faster. A system that allows for an accurate estimate of time spent on a tax return enables the practitioner to send a bill with the client's tax return. In a networked situation, the professional can enter the time information directly rather than rewriting it. In a non-networked situation, or in a situation where the professional refuses to do the entries, a computer generated form can be filled out that the secretary can use either to type the information into the system or to scan it into the system. This is the raw material from which bills are generated and accounts receivable created and tracked. By utilizing the computer, it becomes easier to perform any type of management analysis desired. Time can be tracked by client and combined with billing and collections to determine profitability by client or practice area. Reviewed on a timely basis this can help determine areas of the practice to concentrate on or to cut back on. The proper selection criteria can enable the practitioner to choose reports that will help in determining as quickly as possible whether a client is going to give you trouble with collections, or if you are going way over budget on an account. This information can also serve as a tool for setting up budgets for next years work.

STAFF SCHEDULING

In a firm with more than three or four people, a staff scheduling programs can be very useful. This allows you to match available staff time with client needs. These programs also show whether you are over or under budget by professional, allowing you to adjust workloads or shift work.

HUMAN RESOURCE MANAGEMENT

Useful computer tools have become available for human resource management. These programs allow you to track the myriad details which you need for EEOC (Equal Employment Opportunity Commission) reporting and for your own information. They can track review dates for-

- Staff compensation.

- Levels of education.

- Foreign languages.

- Tax specialty areas.

- Benefits information.

- Emergency information.

- Information required by the government.

- Your client's or your expectations of what is useful from a full human resources management system.

The final area in this section is again an important and useful area - firm accounting and financial reporting. As a practitioner, you should do for yourselves what you do for your clients. By installing computerized accounting systems for your clients you have shown them the value of an automated system. The same reasoning that went into convincing the client to automate applies to your own practice. You will get a faster, more accurate set of information that will enable you to manage your practice better and prepare your own tax returns. Payroll reports, financial statements for banks and general information for yourself or your partners is worth the cost of the system alone.

PERSONAL PRODUCTIVITY

This area encompasses anything that enhances the tax practitioner's personal ability to serve your clients and yourself better. Word processing saves time in the preparation of draft reports, presentations, letters, etc. You are not dependent upon dictation or limited to working on certain items only when your support staff is present. You can prepare anything from first drafts to final products depending upon your own skills. Spreadsheets can be used to help you track your time or productivity. There are also several personal information managers on the market which help the practitioner remain organized.

Presentation aids enable everyone to have graphics at their fingertips. This provides you the ability to make more effective and meaningful presentations to clients, business groups, etc. It serves as a helpful tool in marketing as well as client service. Many studies have been done regarding the use of graphics, (most notably by Dr. Irwin Jarrett), and the conclusions have been that graphics, if used properly, can greatly increase a clients understanding of simple or complex financial and management data. However, the practitioner must be careful not to be misleading in the use of graphics, or to lose the reader by using the wrong type of graphics (i.e. pie charts where comparison bar charts would be better).

Accounting and audit aids enable you to do sophisticated computer work on client data. This can help give reliability to data obtained from your client. Simple items like depreciation and amortization programs can be extremely useful. Lengthy depreciation and amortization schedules are ready in minutes and can then be used to assist in the planning and preparation processes that you are following for your clients. Anything that increases efficiency, such as the calendars and calculators discussed above, fits into this category.

FIRM POLICIES AND STANDARDS

UNIFORMITY

As in any area, office automation requires policies and standards if the system is to operate efficiently. These standards range from stipulations concerning what programs may be used to conventions for handling specific situations within the programs. The former is needed to ensure the compatibility of work done throughout the office, or firm. The latter is necessary for uniform treatment of documents (most commonly seen in the use of macros within word processing in order to achieve consistent formats). Limiting the use of programs is usually done-

- To be sure proper internal support for any programs used on your system.

- As a security measure to prevent viruses (which can come in through downloaded programs from bulletin boards, etc.).

- To reduce wasted time (in the form of games).

Although some of the policies and standards may seem restrictive, it is important to set standards rather than allow everyone to do their own thing. However, the procedures and standards that are established should still allow people to be creative in looking at new programs and methods of handling information. If a particular program or method is valuable enough for someone to ask that it be included in the office standards, it is best to get everyone to agree on usage (especially for support and ease of data handling).

TSRs

If you decide to use TSR (Terminate-and-stay-resident) programs, standards and policies again are important. These programs are designed to remain in your computer's memory so they can be activated with a keystroke even when other programs are in use. These programs can include calendars, calculators, print spoolers, RAM disks and keyboard enhancers, to name a few. The need for standards and policies is important because in the DOS environment one program could invade the memory space of another thus causing problems. (This problem is diminished in OS/2 and UNIX/XENIX where there is memory protection). Therefore, only approved TSR programs should be used. You should be wary of any programs that you get from bulletin boards or receive from friends.

LOADING SEQUENCE

Another consideration when using TSRs is the loading sequence. Most programs will tell you, in their instructions, the sequence in which they should be loaded. The order is important so that one program does not interfere with the operation of another. Because some of these programs are memory hogs, there are times when you must consider removing them from memory. Therefore, you should also be familiar with the procedures for removal. If a program is removed in the wrong sequence, you can also have problems with other programs. TSRs can be extremely useful - just be careful in their usage and follow instructions carefully.

TRAINING

Training becomes a very important area when considering firm standards and policies. Successful use of the various programs demands that people be thoroughly and consistently trained. This training can be accomplished in house by utilizing personnel who are well versed in the program. If possible, this is probably the best, and least expensive way of accomplishing uniform training. This also ensures that all the idiosyncracies of tailoring the program to your firm's usage are followed. Free training is also available from many vendors and should be explored. The next best way is to hire an outside trainer to come in. This way you can still have the course geared to your specific needs. It is more expensive, but worthwhile if you have a large enough staff and nobody in your organization is familiar enough with the program. Going to outside courses can also be useful, especially if there are just a few staff members and you are just getting started. This enables you to get the ideas of others as you determine the standards and policies that you wish to follow in your practice unit. Self-training is also available (by video cassettes or interactive programs), but this is usually not the most effective method of learning.

SUPPORT

Hardware and software support are critical to the efficient and effective management of an automated practice. Depending upon the size of the practice, this support can be either internal or external or a combination of both. A smaller practice unit will need to make arrangements for timely preventive maintenance of all hardware. Formal or informal arrangements should be made for emergency servicing of equipment (tax season is not the time to find out that it will take more than a few hours to get equipment fixed). Larger practice units may want to have people on their staff who are trained to handle all hardware problems themselves. This would also mean that an inventory of spare parts would also be maintained. Even those practice units with in-house capability might still want to have service contracts for the more difficult repair jobs.

Software support is easier to handle in-house even for the smaller practice units. Basically, you need someone who is interested enough to learn all the idiosyncracies of any program in use. If you do not have someone like that, arrangements should be made with an outside vendor who is familiar with the programs used by your firm. This vendor can then handle updates and operational questions as they come up. In larger organizations, different individuals might be assigned to different programs. These people then become responsible for all maintenance of those programs.

The key message here is that proper arrangements must be made to ensure that your hardware and software is always operational. Size of firm is not important. Support must be there for the largest and the smallest of practice units. The only difference depending upon size is how you provide that support.

FUTURE ADMINISTRATION/MANAGEMENT

The future of office automation is bright for the 90s. By the end of the decade the tax practitioner will find that all programs necessary for the efficient operation of a practice will be integrated. The interaction of these programs will enable even those practitioners who have a limited knowledge of the computer to use it effectively. The practitioner will be able to jump from a preparation or planning program to a word processing program for report generation.

While doing this, the individual's calendar will be available as well as the ability to integrate with all areas of the practice. The future even holds the possibility of voice recognition that would enable a person to sit at his or her desk and speak conversationally to request files, to issue commands, to create documents, and to input data. This would be done in the same manner that a request is currently made of a secretary, staff person, or paraprofessional. The desired information could then appear on a screen without anyone ever accessing a keyboard.

The preceding scenario may sound farfetched, but it isn't. The technology exists, and over the next few years will be refined. The future of office automation will involve extremely complex technology and software that will appear extremely easy to the end user. This will not only make office automation easier, but it will also make training in the use of the programs easier.

CHAPTER IV - FIRST-TIME COMPUTER USERS

The process of effectively automating a tax department can be complex, and perhaps the most important principle to follow is "walk before you run". As we cannot successfully go from "couch potato" to marathon runner in one step, we cannot successfully go from little or no automation to full automation in one step either. Another crucial point to recognize is that simply having a computer on everyone's desk is not effective automation.

METHODOLOGY OF PLANNING

The best approach for a first-time user is to develop a sound plan that will result in effective automation of a tax practice, if it is accomplished in a series of gradual steps. This will assure that you do not move too quickly, and that you do not take on new aspects of automation until the current ones are working. Once a plan is developed, follow that plan, not moving to the next step until success with the current step has been achieved.

PITFALLS

But be warned... it is difficult to stick to such a plan since early success often leads to the erroneous conclusion that this "automation stuff" is not really all that hard; so moving ahead rapidly will reach the goal even sooner. By keeping the number of things that can go wrong to a minimum, you reduce the amount of time required to identify and resolve a specific problem, making progress actually faster.

INVENTORY AREAS TO AUTOMATE

Developing such plan is not as hard as it might seem. The first step in any good plan is to take an inventory of the current state of firm automation, including equipment, personnel, skills, and the like. The next step is to examine the practice to identify areas that might benefit from automation. These might include-

- Tax planning services.

- Tax return preparation services.

- General word processing.

- General analysis (spreadsheet).

- Presentation graphics.

- Desktop publishing.

- Administration.

- Billing; work in process; receivables.

- To do lists.

- Staff scheduling.

- Return due dates.

- Telephone call logs.

- Client master files.

- Prospective client lists.

There are many sources of information on how others have dealt with automation in these areas. The AICPA provides a series of practice aids to help members understand the issues involved. This series includes surveys detailing what members are doing about automation and what tools they are using to solve their problems.

In addition, many of the computer publications regularly contain product reviews and analyses to aid in the determination of the best tools to be used. State CPA societies also have technical materials and meetings that cover some of these topics. The meetings in particular are a great source of information. Speakers on related issues can help in developing general directions, and other practitioners can and very often do share their experiences in managing the process.

SUGGESTED PLANNING STEPS

- Secure agreement of the partners

- Put someone in charge

- Set schedules

- Establish review points and procedures

- Define success

- Be realistic

- Avoid automation projects in February, March and April

SECURE AGREEMENT OF THE PARTNERS

Partners are the owners of the firm, and their agreement on what is to be done, the timetables set up and the cost of automation is essential. They do not need to be involved in all the technical aspects, but they must understand and support the effort.

PUT SOMEONE IN CHARGE

While many people may work on an automation project, someone must be responsible to the partners for the success of the project. In firms with a management committee, the person should be someone from that committee. It should be a person with decision-making authority and an interest in the introduction of technology into the practice. That person should:

- develop the technology plan

- present it to the partners, and

- secure their agreement to proceed and their continuing support.

SET SCHEDULES

Plans that proceed one step at a time are the most likely to succeed. Target dates help all concerned achieve the desired results. Therefore, try to set dates that are realistic in light of the technical analysis that is required, the availability of equipment and software, the availability of support from those providing the equipment and software, and the time requirements of the practice.

ESTABLISH REVIEW POINTS AND PROCEDURES

It is important to establish periodic times and procedures for review. This will establish deadlines for those involved in the automation effort, and allow for early detection of the inevitable difficulties that creep into the process. For these reasons, the scheduling of meetings, periodic demonstrations, and written reports (in some circumstances) may all be very helpful.

DEFINE SUCCESS

It is important to define what is meant by success. It is often measured in financial terms, but criteria like operations improvement, increased quality of life for firm members, and others may be important. The definition of success will vary from firm to firm, and need to be clearly spelled out to tell whether the goals sought have ever actually been achieved.

BE REALISTIC

One of the major reasons for failure of a technology plan is excessive optimism on the part of the planner. If too much is required too soon, the plan will not come together and it simply will not work. On the other hand, if too little is expected, automation will never be accomplished. A first-time user should not acquire their system through mail order sources. The need to have access to a vendor for support and perhaps to modify how the system is configured is of greater value than the discount available through mail order outlets.

AVOID AUTOMATION PROJECTS IN FEBRUARY, MARCH AND APRIL

For example, if a step under consideration is the use of automation in the tax return preparation process, planning and work should be started immediately after the end of the current busy season (for example, in May), with the systems installed and running well by November. It is important to remember that the economic health of the practice is most important, and that automation is being done to increase both the quality of services provided to clients and the efficiency with which they are provided.

DETERMINING CONFIGURATIONS

If automating a practice from the beginning, the best approach is to select the applications and software first, and then purchase hardware that is known to run that software. This will insure that the overall systems put into place will accomplish the desired tasks. It is possible to acquire great hardware, but without the correct software it may not meet the firm's needs.

BUYING TIPS

When purchasing software and hardware, always buy at least partially for the future. The needs of users always increase as they discover what can be accomplished. This increased usage will put added stress on the systems unless they have been planned with existing excess capacity or the ability to grow. In some cases, this means buying computers with more memory or disk storage than is needed today. Frequently, purchasing excess capacity is the safest course of action for the long term.

SOFTWARE

Selection of good, mature software is important in any installation, but is critical to the first-time user. The new user has a number of issues to contend with. Misbehaved, buggy, or deficient software should not be one of them. The term "software" includes operating systems, application software, and utility software. Each play a vital role in a successful system.

NEWLY RELEASED SOFTWARE

The business of software development is very difficult, and not all software developers are successful. To reduce the risk of an inappropriate selection, be sure to examine the developer's qualifications to see that he or she has the requisite knowledge and skill to design, write, and maintain quality software in a professional and timely manner.

Remember that the software being selected will be used in a business, so quality, proper development and enhancement cycles, and company stability are very important factors. While all users should be especially careful when choosing newly released software, a good rule of thumb for first-time users is **never to buy the first version of anything.**

Deferring acquisition of a particular program until the second version has the advantage of allowing difficulties to surface and to be corrected. It will also provide important clues to the speed with which the developer recognizes and corrects a problem. Since "bug-free" software generally does not exist, the developer's interest in, and ability to fix, unexpected problems is very important.

OPERATING SYSTEMS

Ideally, the choice of a particular operating system (the collection of programs that make the computer work) should not concern users. Because of the widely differing capabilities of these systems and the need to run a great variety of programs under a single one, the issue is very real. A necessary part of the preliminary planning process is to review and select the operating system that is capable of running most of the software planned for use. The best way to attack this is to list the specific operating systems required to run each of the programs planned for use. This might include spreadsheets, word processors, tax return preparation programs, graphics programs and the like. After the list is made, select the operating system that will run a majority of these programs.

Some software selections may have to be changed to accommodate the operating system of choice, but making the change will result in the selection of a system that can run all the desired software. Also remember that increasing the functionality and flexibility of the operating system will increase the cost of both the software itself and the hardware required to run it.'

Selecting operating system versions is tricky in some situations. Different versions have different features, see system memory in different ways, and format fixed disks differently. Mixing operating system versions in an office is one sure way to have "unexplainable" problems and program failures. For these reasons, it is very important to keep the versions synchronized. See Appendix A for more information regarding operating systems.

CURRENT VERSIONS AND UPGRADES

Software developers are constantly upgrading and enhancing their products. These new versions often bring increased functionality and more efficient performance. They are usually larger than the versions that existed before, increasing the demands upon the computer system operating speed and memory.

Before upgrading software that is running successfully, make sure that the new program will run on the equipment in use; that the new features are ones that are needed and will be used; and that the change is worth the cost. The cost to upgrade is measured by the price of-

- the upgrade software itself.

- the cost of additional equipment that may be required (memory, for instance).

- the administrative time actually required to install the upgrade on the firm's computers.

- the cost to convert work created under the previous version of the program to the new version.

- the cost of training current users to operate the new version.

Sometimes it makes sense to skip an upgrade because the added features are not needed. But there is a subtle cost associated with this decision. Usually the upgrade price is a small fraction of the retail cost of the new program. If an upgrade is skipped, and the features of a later and even more expensive version are desired, the normally inexpensive upgrade may not be available. In these instances, the full cost of the later version must be paid. This may be considerably more than the cost of both interim upgrades.

BACKUP

By far, the most important process in a computer user's life is backup. Backup refers to the periodic copying of important data and programs to a storage media other than the hard disk on a user's computer. These copies can be safely stored on another disk, diskette, or tape, and are available if a problem resulting in the loss of either data or programs on the user's computer occurs.

Backup procedures and frequency can vary a great deal from user to user and from program to program. Some programs contain their own backup routines, while others rely upon the user's proper use of the backup routines contained within the operating system itself. Backup may be as simple as making a copy of a file under another name on the disk or diskette normally used. Or it may consist of making a copy of an entire hard disk on either a series of floppy diskettes or on tape.

Hard disk failure is, by far, the most common problem plaguing users. In this situation, a disk fails for one reason or another and the data becomes unreadable. If proper backups have been made on a regular basis, the backup copy of any lost data can be loaded onto the disk of a new machine (or onto the new hard disk installed in the old machine). The data copied from backup may not reflect 100% of the changes made by the user before the disk failure, but it will certainly be better than reentering all of the data.

DISK MANAGEMENT UTILITIES

As hard disks grow in size, the tasks of locating and organizing data stored on them increases geometrically. Several hard disk management utilities and recovery programs are available to help. The organization programs aid users in-

- locating files.

- scanning data within files.

- moving files from one place to another on the disk.

- viewing data without loading the application program that uses the data.

Some of these management programs can even be loaded into memory and left there to be "popped up" at the touch of a key. Hard disks become disorganized from the continued storing and restoring of files that are constantly increasing in size. As this occurs, these files become fragmented. That is, the information contained within them is not stored together, but is stored at various locations on the disk. This fragmentation results in increased retrieval time as the disk drive must locate and then transfer the data from these various locations.

Programs to optimize a hard disk will reassemble fragmented files, increasing performance. These same utility programs can measure the degree of fragmentation of a disk, thus indicating whether the process is required. They are not expensive and should be run at least monthly. Disk recovery programs and disk "unformatters" are utilities that can help in the data recovery process and are readily available. While these programs are excellent, and can adequately protect a user from the effects of certain kinds of problems, they will not protect a user against the complete mechanical failure of a hard disk. Problems like the failure of the circuit board controlling the disk motor, the failure of the device that moves the disk read heads back and forth across the surface, or actual contact between the disk read heads and the disk surface can only be properly protected by making a copy of the data somewhere else.

THINGS AFFECTING COMPUTER PERFORMANCE

There are many factors that affect the performance of a computer system. The interaction of all of them complicates the process of determining the result. The first of these factors is the speed of the central processor itself. Simply put, this is the rate at which the computer's central processing chip (the 8088, 80286, 80386, etc.) operates.

If a program (like a spreadsheet or a word processor) is running in memory and

- making computations,

- moving data in memory, or

- generating reports on the display from data in memory,

then the speed of the processor is important and will be the primary determinant of performance. If, on the other hand, a program is getting data from disk and putting it back on a regular basis, then the speed of the data movement between the processor and the disk, and the access time of the disk drive itself will probably determine the computer's performance more than the processor speed. Database programs and some tax return preparation programs are good examples of programs that operate like this.

It is also important when making comparisons to understand whether the program(s) in question can themselves operate at a higher speed. Some earlier programs (and some of the poorly designed ones today) rely upon specific timing routines that are keyed to the performance of certain computers. Software designed this way will often cause difficulty when it is moved onto a newer, faster computer and may even not operate.

Another factor affecting performance is the presence of a Math Co-processor chip. This chip is designed specifically to do mathematical operations much faster and more efficiently than the computer's main processor. If the chip is installed in a computer, and if the software will make use of it, all math operations will speed up (some more than others).

These chips are matched by type and speed to the central processor. That is, an 8088 processor requires an 8087 math chip, an 80286 processor a 80287 chip, and a 80386 processor a 80387 chip. In addition, chip performance can be optimized by matching the operating speed of the match chip to the speed of the central processor.

TRAINING

Most computers and programs require some training if the user is to become proficient. Training can take one of several forms, and no single method is the best in all situations. Users can also teach themselves, although that method is not particularly efficient.

Many programs come with user manuals that contain tutorial training. Tutorial training uses examples that the user creates while reading the book (or in some cases while listening to an audio tape). These can be supplemented by instructor-led training sessions in which users are taught the software. In other situations video tape is used. Generally, for tax processing software, the developer is the best source for training materials and classes since the software is so specialized.

For more generalized software like spreadsheets, databases, word processors and the like, a variety of companies develop and offer training courses. These courses last from two hours to several days and can be well worth the investment. Local computer retailers can be an excellent source for this type of training. Using this method also has the advantage of getting the people to be trained out of the office. While this can be slightly disruptive, the quality of the training (which is not free) is better if there are no interruptions.

Training can take several forms. There is the initial training when the software is first obtained. It is designed to introduce the features and operating procedures. The second type of training is for the enhancement of the software. Here the emphasis is on new features and special tips on how to handle the more difficult situations that come up.

There is also the repeated initial training that must be given to new staff people who are hired either to expand the staff or to replace others who have left for opportunities elsewhere. This training is critical to the success of the automation effort and is generally welcomed by the new employees.

UNDERSTANDING HARDWARE

CENTRAL PROCESSING UNITS AND MEMORY

Central processing units (CPUs) are the chips that actually make the computer run. They control the flow of data both to and from the CPU and within the chip itself. In addition, they perform all the computations and data manipulations that are required.

Original IBM personal computers were designed using an Intel 8088 central processing unit (CPU) with 64kb (64 thousand bytes) of memory. Then came the IBM PC/AT which used the faster Intel 80286 chip and had 256kb (256 thousand bytes) of memory. The 80286 represented a significant advance in both the total amount of memory than could be used and in its speed of operation. It was designed to be completely compatible with the earlier 8088-based computers, so the 80286 had significant limitations. One of these was the method used to switch from the 8088 operating mode (called the real mode) to the 80286 mode (called protected mode). The only way to accomplish this is to restart the computer. The newer Intel 80386 chip is a radical departure from the older design, and it is even faster than the earlier chips. It can directly address much more memory that the earlier CPUs and can move that information about (both within itself and to or from other parts of the computer) with much greater speed. These additional capabilities mean that 80386 computers are a better buy in terms of the future than either the 8088 or the 80286. An 80386 with at least 4mb (4 million bytes) of memory should now be considered the minimum acceptable system.

Real Mode and Protected Mode -- Methods of Addressing Memory Space

Any discussion of real and protected mode must start with an explanation of the three basic kinds of memory - **conventional, extended,** and **expanded** memory. The distinction between the three has nothing to do with the memory chips themselves. It involves how the microprocessor at the heart of the personal computer communicates with the memory chips. A simple IBM-type PC or IBM XT-class machine uses the 8088 type microprocessor. These processors are not designed to create memory addresses higher than 1 megabyte. This range of addresses is called the **chip's address space.** When the IBM and Microsoft engineers designed DOS there was a big debate about how much memory would be available for programs. It was finally decided that 640 kilobytes would be available for programs. The rest of the one megabyte of address space would be used for such things as video display, including the mapping of images onto the video display. This one megabyte of memory is divided into 16 blocks--each 64 kilobytes in size. This total (64kb x 16 blocks) is the one megabyte or 1,024 kilobytes which DOS is limited to directly recognizing.

Conventional Memory:

Conventional memory is called RAM and it is generally 640 kilobytes. Conventional memory ranged from as low as 64kb to 256kb in the earlier machines. Some computers may have an additional 64 kilobytes available for a total of 704kb.

Extended Memory:

Later microprocessors, starting with the Intel 286 and then the 386 and 486, are designed to include a different addressing system known as the protected mode. These faster microprocessors can exactly emulate the earlier 8088 or 8086 with their limited addressing systems. When they are doing so, they are running in **real mode.** Most DOS programs today run in real mode, and therefore are limited to 640 kilobytes of RAM (random access memory). If the (286, 386, and 486) microprocessor is not running in real mode but in protected mode, then it can read and access large amounts of random access memory. **Any memory accessible above 1 megabyte is extended memory.**

Uniqueness of the 286 Microprocessor:

Since the designers of the 286 wanted it to be more than just a fast 8088, they gave it two distinct and almost contradictory modes. It can run as a fast 8088 with full compatibility (real mode) or it can run in protected mode where it acquires features such as memory management and memory protection.

80386 Flat Model Large Segment 4 Megabyte Addressing

On the 80386 microprocessor, segments can be as large as 4 million kilobytes--so that entire programs can run in as little as 2 segments. 80286 segments are limited to 64 kilobytes and therefore take many more segments. The process of reducing 8086/80286 large segment programs to 80386 "flat model" programs can produce dramatic increases in execution speed. Compilers have a hard time generating optimal segmented code while dealing with 64 K segments in the 80286 environment.

Expanded Memory versus Extended Memory:

Expanded memory is a special system for giving more memory to programs that run under DOS and are ordinarily confined to 640kb. Software must be specially designed to handle **expanded memory.**

Up to 32 megabytes of memory may be added to a PC XT or 286 machine using expanded memory techniques. Unlimited amounts may be added to 386 and 486 machines. Operating Environments like **Windows, Desqview,** or **Carousel** can use large programs in memory all at once with expanded memory. Expanded memory goes by several names including "Expanded Memory Specification" or "EMS." This standard was invented by three companies - Lotus, Intel, and Microsoft. Therefore, expanded memory is referred to as the **LIM** standard. Earlier versions required a contiguous 64kb block in memory in order to utilize any memory above 640kb. Today the LIM 4.0 standard does not require contiguous 64kb blocks in memory. **Instead it can use different 16 kilobyte blocks of memory located in different parts of addressing space in the high memory area above 640kb .**

The Importance of the Protected Mode

There are alternative addressing systems to that of the 8088 and 8086 microprocessor that are inherent in the engineering design of the Intel 286, 386, and 486 chips. These alternative addressing systems allow these newer and more powerful processors to reach extended memory. This memory has a maximum value of 16 megabytes when considered in addressing schemes for the 286 chip.

386 Microprocessors and Protected Mode

The 386 microprocessor can access up to 4,096 megabytes (4 gigabytes) of RAM and the 486 has an even larger addressing system. Current versions of OS/2 are not designed to run in full 32 bit protected mode. This is because the 386 and 486 machines have 32 bit data buses which move data internally in larger units per unit of time than the 8088, 8086, or 80286 Intel Microprocessors that had 8 and 16 bit data buses, respectively.

The Role of Computer Data Bus

The term bus is often used and misused. A **computer bus** can be thought of as the row of expansion slots in the back of your computer which can receive computer expansion cards. This bus has been referred to as "slots", "upgrade slots", "expansion card slots" or the "ISA" bus. ISA or Industry Standard Architecture is the bus standard used in today's DOS computers. The original bus in the 8088 PC was an 8 bit bus (thought of as 8 bits of data per unit of time being processed simultaneously). When the IBM 286 AT was introduced, it had an extra 8 bit slot, thereby creating the double slot 16 bit ISA bus. There is downward compatibility so that you can plug an 8 bit card into a 16 bit slot but not vice versa. With the advent of the 386 microprocessor-based machines, the ISA bus has posed some problems for the performance enhancement that is inherent in 386 technology.

Two Solutions to the 16 Bit ISA Bus Limitations:

A.   The IBM Approach

IBM came out with a proprietary 32 bit slot bus called MCA, or Micro Channel Architecture bus. The principal problem with this solution is that it is not compatible with the AT ISA type bus cards, so in effect it creates a new standard not compatible with the approximately 40 million IBM (and compatibles) microcomputer users. MCA specifications call for a board short enough to fit into a PS/2 case. PS/2 is the new generation of IBM computers that will ultimately be designed for the MCA bus--using OS/2 operating systems. Since only IBM makes and licenses MCA--you will pay for it---possibly two times over. You'll pay once for the technology, and once again for the right to use it. As of early 1991 there is no overwhelming market acceptance of the MCA bus standard.

B.   The EISA Bus

Other IBM compatible computer manufacturers faced with being locked out of the marketplace by a proprietary licensed successor standard formed an alliance and developed an alternative 32 bit bus standard which goes by the name of EISA. This is a short abbreviation for "Extended Industry Standard Architecture." The gang of nine, which included Compaq, AST, ALR, Tandy, Wyse, Hewlett Packard, and Dell, came up with a new bus standard that brings the ISA users along with them.

Particular Advantages of the EISA Bus

The EISA slot is designed to accept ISA cards, hence, you can take your application cards with you when you migrate to a 386 or 486 machine with an EISA bus. In addition, EISA specifications will allow for cards the same size as the AT 16 bit bus cards. IBM MCA standard cards, as pointed out, **won't fit in anything but PS/2 computers or clones that have licensed the MCA bus from IBM.**

Advantages Common to EISA and MCA:

Both MCA and EISA use a scheme called "bus arbitration" which lets more than one microprocessor share the bus at the same time. This means that you can plug more than one microprocessor into the bus or just very smart expansion cards. **These can use your computer's RAM, video, serial ports, modems, etc., at the same time the computer user and the microprocessor are using it.** This technology holds the key to efficient **multi-tasking.**

Both technologies avoid memory and port conflicts, and Dual In Line Package switches are eliminated (The DIP Switch Setting Problem).

Disadvantages of EISA and MCA

More than one expert has pointed out, already, that a misbehaving ISA card that is not running under strict ISA rules can crash the whole EISA system. ISA cards, by their very nature, will slow down an EISA bus. MCA technology has not been readily adopted in the market, and those who have licensed the technology from IBM have not reported any outstanding market receptivity. Costs for the 32 bit bus technology are in excess of the ISA bus machines.

Computers using the even newer Intel 80486 (now called the i486) are starting to appear. They will have a positive effect on the price of 80386 computers (that is, 80386 prices will come down) and they will also provide even more processing capability. As additional software is written to take advantage of the special capabilities of the i486, that will become the chip of choice.

STORAGE OF DATA

Practitioners will generate significant amounts of data that must be stored for future use. Examples include:

- client monthly and annual financial statements

- tax return information

- audit working papers

- client letters

- billing information, etc.

The question is how to store all this information, and how to locate within it the items that are wanted on a specific basis.

Common storage devices include paper or copies of paper, magnetic tape, and personal computer magnetic diskettes (5.25 and 3.5). The legal system has not yet accepted magnetic media as evidence, preferring instead to rely upon paper. Even in the area of electronic funds transfer, the law requires that the electronic transfers be followed by paper confirmations.

Magnetic disks are high performance devices. On the commonly used "Winchester" drives, data are stored in magnetic patterns on the surface of metal disks. The density of the data depends upon the physical characteristics of the disk itself, but standard 5.25 wide drives typically hold between 20 and 650 million bytes on a disk that fits into a personal computer. Using various compression techniques, drive manufacturers will be able to substantially increase the storage levels of these devices.

Access time is the time it takes to locate and retrieve data from these devices, and it varies from 10 to 80 milliseconds. Generally these disks are not removable, and are therefore referred to as "fixed disks". They are mechanical devices and they can be damaged by dust, by severe treatment that causes a read head to strike the disk surface, or by exposure to a strong magnetic field.

A newer approach to data storage uses optical disks, commonly referred to as CD-ROM or, in some cases, WORM drives. These units use plastic disks that are read by laser beams reflecting from the surface. The reflection patterns can be reliably and consistently interpreted as data patterns. Now these devices can store approximately 600 million bytes of information on a single 5.25 inch platter that costs from $500 to $1,000. The plastic disks that are inserted into the drives can be mass produced at a manufacturing cost of about $2 each.

Besides having low manufacturing cost, the data that is contained on these disks is much safer than data that is recorded on a magnetic disk. The plastic platters are not subject to damage from magnetic fields, nor are they easily damaged if dropped. The data is stored by altering the plastic surface, and it is read using a laser beam to reflect from the surface. Error rates for magnetic media are about one error per million characters stored, while the error rate for optical media is about one error per billion characters stored.

WORM drives allow users to "Write Once Read Many." This means that users can place information on the surface of an optical disk once, and can read it repeatedly. This capability, plus the inherent safety of the data once it is stored on the optical disk makes this an ideal media for some types of information. These advantages partially offset the somewhat slow access time of these devices.

Even newer technology that allows users to write, read, and erase data on optical platters is of great interest. These new technologies along with others that are still in the labs will bring to tax practitioners a wide range of options for the storage of data. This will help greatly with the proliferation of data in a tax practice.

FIXED DISK STORAGE SYSTEMS

When the original IBM PC was introduced it did not have a fixed disk. Instead, it came with one single sided 5.25" floppy diskette drive, which was quickly replaced with a double-sided one. Later came the 10mb (10 million byte) fixed disk drive. This appeared to be all that we would ever need.

Larger and more complex software was designed and the typical user needed to have access to a much larger array of programs, so fixed disk requirements increased. As this occurred, prices of fixed disk drives dropped. Today it is not uncommon to see 40mb drives, and they should be considered the absolute minimum in any IBM type systems.

The speed of a hard disk drive is sometimes an issue. "Access time" statistics are often quoted in advertising and refer to the time delay between the computer's request for data from the disk and the disk's ability to locate that data. In general, the shorter the delay, the faster the computer will operate. For comparison, the original IBM PS/2 model 50 computers had an access time of 80ms (thousandths of a second), but access time of under 30ms is now commonly available and often useful.

To understand whether this is important, one needs to examine the programs that will be used on the computer. If they access the disk often (like database and tax return preparation programs), then a low disk access time is important. On the other hand, if the programs retrieve and save information infrequently (like spreadsheet and word processing programs), then the fast speed is not needed and the extra expense may not be justified. **For tax practice use, a computer with both a fast disk and a fast CPU is required.**

DISPLAY SYSTEMS

The same dramatic change that occurred with CPUs and disk drives also occurred with display systems. The first ones were either monochrome (one color but with a very clear picture), or color but with a picture that was not very clear. The newest display type is called VGA (Variable Graphics Array), and it produces a picture that is both colorful and sharp. VGA should be considered the minimum standard since much of the software that is being written will make extensive use of color to communicate with the user.

These new high resolution displays also make possible the use of graphics for the presentation of information. In many cases a graphic presentation is better than a more conventional one, and software developers are now writing programs that take advantage of this fact. These new displays also allow users to run a whole range of new applications like desktop publishing.

FLOPPY DISKETTE DRIVES

The original 5.25 inch floppy diskette drives that held 160kb (thousand bytes) of data have now been replaced with 5.25 inch drives storing 1.2mb (million bytes) of data. These so-called "high density" drives make operations like backup and software transfer easier. In addition, newer 3.5 inch rigid "floppy" diskettes have been developed. These come in either 720kb (thousand byte) or 1.44mb (million byte) versions, and certainly are more convenient than the older 5.25 inch ones.

Until the profession has settled on a standard, however, it is wise to have a machine available containing **both** types of drives. This will allow data to be readily transferred between diskette types with a simple command. It is also a good idea to get a computer with a "smart" drive that can sense the diskette type and read or write correctly to the 5.25 inch 360kb or 1.2mb sizes and the 3.5 inch 720Kb and 1.44mb sizes.

PRINTERS

Because there are so many available types and brands, the selection of a printer is often far more complex than it ought to be. Dot matrix printers are very fast and produce excellent "draft" quality printed material. Letter quality impact printers, on the other hand, produce a much higher quality report, but are slower.

For tax return processing, however, the choice is easy. Laser printers, (i.e., printers that feed blank paper and use a laser to produce a completed tax return [form and data] at the same time) are the best choice. Price declines and increasing capabilities make laser printers a better choice. Users of laser printers for tax return processing should be aware, however, that all laser printers are not alike. The internal languages used by the printers to produce the forms are not the same, and software designed to work with a Brand X laser may not work with Brand Y. Publishers of tax return software can provide information

concerning the printers supported by their software. Their recommendations should be followed.

Laser printers also make excellent general purpose printers, especially when connected to a Local Area Network (LAN) or a UNIX system. In this environment all users share the laser, thus spreading its functionality and reducing the cost to the firm.

Another way to share a printer among several computers is with a printer sharing device. These relatively simple devices connect several computers to a common printer and route information with a command.

SECURITY

Security is a continuing issue since much of the information with which we deal is sensitive. We have a professional responsibility to protect the confidentiality of that data since it reflects the financial, business, and personal affairs of our clients. Often the most effective security is an old-fashioned lock. In this scenario, data is kept on diskettes under lock and key. Data is not kept on computer hard disks and is erased from those hard disks in a special way if it is ever stored there even on a temporary basis.

Unfortunately this method, while very secure, is also very inconvenient. Instead it is usually easier to leave some of the data on the hard disks of computers even if it can be accessed by inappropriate people. In these situations, additional security is needed. Passwords can be used to control access to computers and, in exceptional situations, data files can be encrypted (scrambled). These encrypted files, even if viewed, will produce useless data without the code that was used in the encryption process. Secure the code and you secure the data.

Controlling access to computers has been a requirement in the mainframe world for years, and with other computers now becoming involved in true data processing uses (like tax return processing), limiting access to these other computers is becoming important as well. Computer rooms with combination locks and supervised access can go a long way toward preventing later problems.

Limiting the access of employees immediately upon their termination of employment, and noting behavior that sometimes precedes or signals the existence of other more serious personnel problems, can go a long way towards reducing the risk. As noted above, the existence of off-site backup copies of important programs and sensitive data will go a long way toward reducing the risk of even the intentional destruction of data by a disgruntled employee.

DISASTER PLANNING

The best plans occasionally encounter unforeseen difficulties. These can take the form of natural disasters like earthquake, fire, flood and the like; or they can take the form of the interruption of business by civil disturbance, strike, and disruption in electrical or other utility service. In these situations, a carefully prepared plan is necessary to get things restored to operating condition.

First, copies of all critical programs and data should be maintained in an up-to-date condition at a site that is away from the office. This will allow the resumption of operations in a relatively short time should the office become unusable for any reason.

In addition to maintaining the data, plans should be made for an alternate worksite, if needed. For a local problem, it may be possible to make arrangements with a non competing business located nearby. That business may be pleased to work out a reciprocal arrangement under which they could use your facility in the event of a problem in exchange for your agreement to let them do the same.

Arrangements should also be made with someone located even farther away (perhaps an office of the firm located in a distant city) in the event of a more widespread disaster. Consideration should also be given to negotiating a standby rental arrangement for the required equipment, or to keeping one or more portable computers at a secure location.To be successful, do not wait until the disaster occurs. At that point, you will be joining all the other unprepared people in the pursuit of very scarce computer resources. Adequate consideration should be given to identifying the key personnel required to run the systems in the event of a disaster, and to the establishment of a set of procedures that will be used for business operations.

Plans for communication should be made and distributed, again well in advance. In disaster situations, communication systems may be badly stressed, and making even a simple call to staff letting them know where to go or what to do may be impossible.

SYSTEMS NOT INCLUDED IN THIS ANALYSIS

Since Apple Macintosh computers used in tax practices represent such a small percentage of the installed hardware base (1% according to the Greenwalt Research 1989 Tax Survey), they are not addressed in this guide.

MINIMUM CONFIGURATION (RECANTED)

- RAM Memory   4mb
- Hard Disk Capacity   40mb
- Floppy Disk Types   Access to both 5.25 inch and 3.5 inch media
- Monitor   VGA
- Keyboard   Full 101 keys
- Printer   Laser
- Backup Device   Tape

CHAPTER V - EXPERIENCED USERS

UPGRADE DECISIONS

SOFTWARE

Existing users have several additional considerations over first-time users when evaluating software. If a new package is being contemplated to replace an existing package, consideration has to be given to the investment in the data created with the existing package. A tax practice with several hundred individual tax returns on disk should consider the cost of re-keying all of the transferable data from the old package to the new. Part of this cost consideration will include the time of the year the re-keying occurs. Re-keying during the peak filing period will be more costly than re-keying during a less hectic period. Some packages will include routines for automated transfer of data captured by other packages. The completeness and accuracy of these transfer routines should be evaluated. Conversions from DOS to UNIX systems warrant careful research about porting data. Generally data in spreadsheets, word processors, and database programs are more transferable than data in elaborate custom written applications such as most tax preparation packages. If an installation is considering a LAN with a central file server, then software that best takes advantage of LAN capabilities should be investigated. While single user software can generally be operated on a LAN work-station, often many of the reasons for installing the LAN are compromised.

HARDWARE

Most existing users have already experienced the phenomenon of vanishing free disk space. Many systems that had seemingly adequate disk space at acquisition have become handicapped by inadequate disk space well before the system's normal expected life cycle ends. There are several reasons for the increasing lack of disk space:

- As the average hardware increases in processing power, programs tend to get more elaborate and physically larger. Consequently, the stored programs generally consume more disk space with every release.

- More useful programs are being developed, so more applications are often installed than originally contemplated. Additional programs consume additional disk space.

- Because improved hardware and more sophisticated software can address more elaborate processes, the data itself often consumes more disk space after updates than the original programs required.

- As firms use computers for more years, the data that gathers on-line tends to grow.

There are several methods available to cope with the vanishing disk space phenomenon:

- Data-compression routines work well on small data files or large files if they are not accessed frequently. The compression/decompression time on a small file is insignificant. However on a large file the compression/decompression time may be counter productive if the file is frequently accessed. In addition most compression routines use temporary disk space in the process, therefore requiring significant free space to compress and decompress a large file.

- Efficient archiving routines can remove unnecessary files from the system's main disk(s).

- Additional disk space can usually be added at a reasonable cost.

Because of the universal demand for disk space, upgrade decisions should generally provide significantly more disk space than can now be foreseen. As images stored on disk become more prevalent, the amount of space and the speed of access become more critical.

Similarly application software routines generally are becoming larger, requiring ever increasing amounts of internal memory to run. In DOS systems, 512kb programs are becoming the norm. As methods to break through the current DOS barrier of 640kb appear (such as Windows 3.0 and OS/2), the programs will become even larger and more functional. Configurations that use memory switching routines to accomplish some aspect of multi-tasking work more efficiently if large amounts of memory are available. UNIX systems automatically use whatever memory is available with the result that more memory generally means faster through-put. Upgrade decisions should generally include more memory than the current utilization requires.

CONNECTIVITY

The two most prevalent ways of achieving connectivity will be via LANs or UNIX. A detailed analysis of these concepts is included in Appendices A and B. However, if connectivity is part of an upgrade scheme, there are issues to consider beyond the characteristics of the two methodologies. Current DOS installations can connect via DOS-based LAN technology with a minimum of application software changes. Assuming each connected DOS station has adequate disk space and processing power, existing software and file organizations can remain as they are. If connectivity is obtained from a central file server type LAN running on top of DOS, some application software upgrades are likely. This will generally entail additional software acquisition costs but little if any additional application usage training assuming the upgrade is with the same vendor. If the upgrade entails moving from DOS to OS/2 or UNIX, extensive software changes will be required. The goal of connectivity should be carefully established, since the direct cost and transition cost between the varying levels can be substantial.

MANAGING EXPECTATIONS

Not only does the goal of connectivity need to be carefully analyzed, the total goal of upgrading needs to be defined. Incurring significant costs to acquire gee-whiz systems without defined needs will normally lead to dissatisfaction. As the defined needs identify the most frequent users of the system, consideration needs to be given to who these users are. If partners and senior managers are the most frequent users, configuring shared printers and developing backup schemes may be different than if junior accountants, paraprofessionals, and clerical staff are the most frequent users. Who the users are and their billable rates is generally more important than the number of users in determining how many users should share a printer.

As higher firm members (partners, etc.) regularly utilize a system, the system's capabilities and limitations need to be more clearly formulated and communicated. It is inherently less desirable for partners to be unhappy with the performance of the system than someone you can fire.

MANAGING OBSOLESCENCE

As system components become more standardized, it is often possible to "upgrade" by adding or changing components of existing hardware. Making a current 8086 machine into a pseudo 80386 machine by adding a 80386 expansion board may be adequate and cost effective in some circumstances. However as new technologies evolve, for instance if the EISA bus technology should become the standard, an upgraded 8086 machine may not be able to be repetitively upgraded in a cost effective manner. So it may be more prudent to assign machines that become technologically outdated to more mundane tasks and functions. A 8086 machine with good software will be able to perform many types of word processing functions adequately indefinitely. Similarly, matrix and character printers that are superseded by laser printers can be assigned as dedicated printers of special forms such as labels. Apparently not many PC-type computers have been taken completely out of service. There is scant evidence of a major PC graveyard.

CONTINUING MAINTENANCE

Maintenance involves both software and hardware. Software maintenance is important if the application is important. While upgrading to later releases is sometimes time consuming, failing to upgrade could eventually prohibit the capability. However, due to the ever present risk that the upgraded software contains bugs not in the previous release, consideration should be given to performing upgrades on a slightly delayed basis. Of course if some capability that is being added by the upgrade is essential, then delaying may not be satisfactory. It is not prudent to become dependent upon a software package that cannot be supported. If a vendor of an important package fails or discontinues support, immediate plans should be implemented to move to a supported product.

Whether and which components of hardware to keep under a maintenance contract varies depending upon the system characteristics and implementation. A firm with multiple hard-disk based PCs running identical or similar applications may elect not to carry a maintenance contract. If a particular machine fails the work load can be shifted to another machine(s) while repairs are being performed or the machine is replaced. Conversely, a firm with a primary file-server hard disk serving the entire firm cannot afford to be without some method of coping with a failed disk. A maintenance contract may be essential. While most electronic components require little day-to-day maintenance, many systems will have components that have fans blowing through air filters. Frequent cleaning of filters will prolong the component's life.

CHAPTER VI - BEHAVIORAL CONSIDERATIONS

ERGONOMICS

Computerizing a tax practice certainly includes the purchase of computer equipment and software, but that is not all that is required. Another often overlooked consideration is the environment surrounding the interface between the user and the equipment. Ergonomics is the application of biological and engineering data to the design of systems, programs, and devices in order to adapt them to human requirements, to the tasks that they are to perform, and to the environments in which they are to be used. When installing computers for use in an accounting practice, ergonomics should be considered.

Does it really makes any difference? Yes! An extreme example is the U.S. West case. U.S. West is a telephone company in Denver. The company employed approximately 500 directory assistance operators. These operators sat at a video display terminal (VDT), similar to most computer screens, and answered inquiries from customers. Of the 500 operators, 189 were diagnosed with VDT repetitive motion illness. The results to the company were a two million dollar cost to introduce ergonomic equipment, two million dollar loss on medical treatment costs, and on million dollar loss on legal consultants and training. If ergonomical impact had been considered at the start, the human suffering and related costs could have been avoided.

Ergonomics may be divided into three areas of concern:

- Physical ergonomics

- Cognitive ergonomics

- Socio-technical concerns

PHYSICAL ERGONOMICS

Physical ergonomics is concerned with the workstation -- the monitor, keyboard design, lighting, furniture, break schedules, exercises, and potential injuries. The primary disease of concern is carpal tunnel syndrome (CTS), similar to "tennis elbow." Other problems concern back and neck strain, the risks of exposure to radiation that has been associated with higher than normal occurrence of miscarriages, and a higher level of stress. While the CPA has little control over the design of the equipment, there are decisions to be made that will impact the potential CTS problem. For example, some newer monitors are designed to reduce the amount of radiation that is transmitted during use. Others are designed to reduce the amount of glare from light. If the monitor is to be used for long periods, the extra cost is well worth it.

Another concern relates to the furniture that is used with the computer. Often, the computer is simply placed on existing furniture, with little planning. The cost of ignoring these configurations is significant. Factors to consider include:

- Height of keyboard
- Viewing distance
- Angle of view
- Angle of arms
- Angle of wrist
- Leg room

Cognitive ergonomics deals with the relation of the work typically done by practitioners (it is primarily a form of intellectual-processing that uses your head more than the sweat of your back) and the increased use of technology. The result is an increase in technology-related stress. In a recent article ("Stress and Technology," November, 1989, *USAIR*), Dr. Bruce A. Baldwin identified seven ways that technology has effected our lives. While not directly related to the practitioner, each applies to the work of the tax practitioner.

- Technology has produced a shift to cognitive labor. This is true for the practitioner. Practitioners spend their day thinking actively, solving problems, coping with new information, adapting to change, and making many decisions. When work is done in your head, it is difficult to get away from it.

- Technology produces the necessity for constant learning and change. For tax practitioners, this is nothing new. The impact of technology is that besides the changing tax law, the method of accessing that law is also changing. The result is a feeling of never being able to be "up-to-date" on anything.

- Technology requires dealing with abstract information. In the past, tax practitioners would review the tax return on paper. Today, with the technology of tax preparation, it is not uncommon for the review to be on a screen. Increasingly the tax information provided by the client is on electronic media (a fax transmission, a file or image on a disk, an on-line access to the client's computer files). Instead of dealing with paper records, the tax practitioner is forced to deal with abstract electronic media. The result is a potential lack of personal attachment to the product resulting in a lack of good feelings about the work.

- Technological sophistication has produced an era of specialists. As tax practitioners become reliant on technology to get their work done, the they have less control over their tools. During tax season, the fear of a breakdown with no expert available to fix it becomes an added source of stress and increases feelings of helplessness.

- Technology encourages polyphasic activity. Basically polyphasic activity is nothing more than doing two or more things at one time. The productivity gains are great. However, the stress problems arise from the inability to relax and do only one thing. The human brain needs rest as much as any muscle. With technology induced polyphasic activity, the brain is accustomed to working on more than one task at a time, thus the needed rest is more difficult to achieve.

- Technology intrudes into fun and relaxation. As the saying goes, "nothing is simple anymore." It used to be that to go fishing requires only a pole, line, and boat. Now you need ten hours of training on your sonar equipment, depth finders, fish gauge, etc. before you leave the dock.

- Technology makes it more difficult to separate from work. With technology, you can do your work from anywhere there is a computer (which you can carry with you) and a telephone line. Accordingly, it is more difficult to get away from the stressful work place.

The bottom line for the tax practitioner is to recognize the potential for added stress and plan his or her leisure activities to escape not only the clients, but also the technology. The option of eliminating the technology is not available; the productivity gains are real and required in the competitive world the tax practitioner meets each day. Thus, the only choice is to "stop and smell the roses."

SOCIO-TECHNICAL CONCERNS

In the automated tax practice of the 1990s direct interpersonal relationships will be reduced. When the individual workstations are electronically networked rather than connected with shoe leather, personal contact may be reduced. The result may be a reduction in feelings of belonging to the firm and a feeling of less connection to the firm. The personal relationships may suffer. An electronic mail request "Please bring me the Jones file," will appear colder than the same message stated verbally. Software that is available to trace the use of the computer may be viewed as unnecessary monitoring or invasion of privacy. The focus of control may shift from a person to person control, to the impersonal computer report showing errors made.

Shifting from a manual to automated office only changes the use of technology. The personal relationships built over the past years will not be effected. Personnel need to be given a variety of duties. The repetitive data entry work that is common with automated techniques should be passed around in order to keep the staff interested and to generate feelings of belonging.

SUMMARY

When the personal computers come out of the box is not the time to decide where to put them. In planning the workstation, ergonomic factors must be considered. The required steps are to-

- Discuss with all users the need and purpose for the new technology.

- Identify the repetitive work to be done and be certain to spread it around if possible.

- Teach users of the relationship between technology and stress. Encourage users to plan their leisure activities accordingly.

- Carefully identify the furniture that is to be part of the work station. Insure that the furniture is adjustable to the user. Do not force the user to match the furniture.

- Involve the user in the design process, in both the design of the workstation and the design of the system to be used.

- Impress on all users, including yourself, that no one knows all the answers all the time. It is OK to ask about the technology. Be certain that all users have the various support or hotline numbers for all software that is used in the firm. Encourage users to ask questions, not give up and do it the old way.

CHAPTER VII - FUTURE SYSTEMS

As George Gilder explains in **Microcosm**, "a billion switches on a chip means that one free mind plus a workstation can outperform any array of regimented minds. Using computational subroutines, one mind can do work that in the past required dozens of subordinate minds devoted to routine tasks."

THE FUTURE

The best time to understand a subject is when it is changing. Understanding is easier then because everything -- even the basic premise structure -- is up for grabs. When we understand the whole subject there is a better chance that the changes will be directed toward improvement. Technology is changing what business is (including the tax business) and how we are to conduct it.

It may be possible to conduct a tax interview with a client while each person is in their office. A real-time image of each person will appear in a window on each computer. Document images will be scanned and transmitted -- both ways. The assimilation of the information obtained in the interview will occur with such speed, that the historical "follow-up" interview will become just the next question. Often, results will be available at the end of the interview. Research of tax services and client files can occur while the interview is progressing. Perhaps neither party will be in their office. They may be at home or traveling. When the connection with each office is made it is automatically routed to the actual site of each person. Neither person will necessarily be aware that the other is not at the office.

A firm staff meeting could occur without all the staff being physically present at a single office. Beyond current teleconferencing capabilities, each person could participate with whatever spontaneity the firm policy provided. As each person speaks, his or her likeness will appear on each remote participant's screen. During a discussion of the firm's policy regarding a recently issued tax pronouncement, someone asks for a listing of existing court cases addressing the subject. A graph appears on each screen showing the relationship of cases supporting positions favorable to taxpayers, unfavorable to taxpayers, and cases with some elements of each. Listings of cases, categorized by position, are sent to an available printer at each participating site. Each listing includes cites these cases make to other cases. The number of copies appropriate for each participating site is automatically produced. Someone asks whether the latest case on point is included in the listing. Confirmation of the latest decided case is displayed on each screen with annotations of pending docketed cases not yet decided. In response to a question of when the next staff meeting is scheduled, a review of each participant's electronic calendar is made and potential available dates identified. As members identify potential dates that are not suitable, they drop out of the listing. If all dates are dropped out before a suitable date is selected, the date(s) with the fewest conflicts is automatically recalled. Whenever a date is agreed upon, each calendar is automatically updated.

In preparation for a closing session with an internal revenue agent finishing an audit of a client the CPA of the future will-

- Load all applicable years' tax returns into a computer. Whether the computer is a desktop or laptop will depend on several factors. If the conference will be held at a location that will permit a local computer telephone connection, the data will likely be on the CPA's personal desktop. If a local telephone connection is not possible or perhaps not desirable, the data will likely be loaded on a laptop and physically transported to the conference. "Loading" will consist of retrieving the historical archived client data into a program that will handle multiple years' (perhaps as many as seven) tax calculations. Control calculations (comparing to the latest filed return) will be performed on the data to insure correctness.

- Research all known issues of law and prepare listings that are stored in an accessible computer of cites by case name and cite reference number.

As the agent raises issues about the return, cites are immediately available. Via an expert system a method of "scoring" the cites indicates the relative strength of the taxpayer's position. As the revenue agent suggests an adjustment, the tax impact of the adjustment is immediately calculated. The combination of the tax cost, the strength of the taxpayer's position, and the taxpayer's view toward contesting an agent's report gives the CPA significant insight into negotiations.

EMERGING TECHNOLOGIES

Several emerging technologies exist that prohibit cavalierly discounting these scenarios. There is a personal super-computer network (PSCN) taking shape! Not in the "ultimate mainframe" sense, but in the sense that more powerful processors are infiltrating all levels of society and have the capability to be connected and to interact. How we are connected to the PSCN will become one key to future success. The future of computing lies in faster processors working in harmony. The evolving technology will achieve levels of vision, voice recognition, and artificial intelligence that can yield radically new powers.

Digital technology will advance in such quantum leaps that analog technology will lose its last area of dominance, the television set. As affordable PSCNs become video-processing machines connected by fiber-optic cable, unlimited amounts and kinds of information will become accessible. Since a significant part of this "information" will be for our entertainment, these affordable computer videos also will be in our homes. Consequently the potential for meaningfully connecting all businesses and all homes exists throughout the universe!

The capacity to store data in terms of giga-bytes is becoming affordable in both magnetic and optical disks. Data compression techniques are being developed that will achieve greater storage capacity per byte. The speed of retrieval and decompression will appear to be instant. In addition techniques for long-term storage of data on chips without a power source show promise. Consequently, storing and retrieving "images" as efficiently as we store and retrieve text is becoming practical. Voice recognition techniques exist. So verbal commands can find a stored image and present it on a screen or printer with phenomenal resolution and clarity. The combination of life-like on-screen images that move and participate in voice interchange will change how we work.

EXPERT SYSTEMS

To meet the challenges of increased efficiencies, increasingly complex tax regulations, an increasing volume of tax pronouncements, and increased competition for clients, practitioners are escalating their reliance on automated tools. One tool in which there has been a recent resurgence of interest is the "Expert System."

An expert system is a computer program that incorporates the knowledge of an expert or group of experts on a particular subject. It incorporates the logical rules and steps the expert(s) use to solve specific problems. Usually these rules can be expressed in logical "If-then" statements. These rules are called a "knowledge base" and include the known facts and concepts about the particular subject area. In addition "rules of thumb" that the expert has developed over the years may be incorporated.

A complex set of instructions called an "inference engine" is then used to compare user supplied data to the knowledge base in a manner similar to human reasoning processes. An expert system is designed to provide the suggestions, advice, or solutions that a human expert(s) would produce given the same user supplied data. Most systems can explain themselves by backtracking through the logic used to arrive at a conclusion.

Because of the recent availability of prepackaged shells that run on personal computers, the technology is now affordable for most businesses. The shells contain the elements needed to build an expert system knowledge base. The development of a custom expert system will have a significant cost associated with generating and loading the logic and should be weighed against the potential benefit.

Potential benefits would include:

- **RETAINING EXPERTISE** - Expert systems can be used to collect and preserve the knowledge of firm personnel who retire, die or leave the firm.

- **OBTAINING EXPERTISE** - Experts are usually hard to find and expensive. By using a computer based expert, a practitioner can apply expertise when a human expert is unavailable or too expensive. Expansion into new markets or practice areas may be achievable in the future.

- **IMPROVED PRODUCTIVITY** - Providing junior personnel with expert systems and appropriate supervision can help them in completing engagements that otherwise would entail more experience, training, or personnel.

- **INCREASED QUALITY CONTROL** - Expert systems that include the practitioner's standards for an engagement will augment focusing on key issues.

- **EDUCATION** - Personnel can gain knowledge by using expert systems as practice aids and computer-based training tools.

As the capabilities of expert system shells increase, coupled with interfacing with spreadsheets, data bases, and automated tax and audit packages, their use will proliferate. The user supplied data that the expert system builds upon may be all the information needed to produce a client product such as a tax return.

Tax practitioners have been in the business of creating, managing, and selling information for years. The practitioner that recognizes that the change is inevitable at ever increasing rates will have the opportunity to create, manage, and sell information for years to come.

Politics and government will be greater obstacles than producing the technology at affordable prices. Deciding who does (or does not) have control over whatever replaces current broadcast and print news and entertainment media will overwhelm politicians of all persuasions. Lobbying by those who are currently in control will be immense. The interdependency of politicians and media guarantees strong resistance to such radical technological change. However, since the creation, managing, and selling of information is one of the few areas in which the United States still maintains an international advantage, it behooves those who thirst for power to allow the change to occur. So while the evolution will be economically painful to some, it will be an economic bonanza of great magnitude to many others. We all will have direct access to a variety of perpetually updated compendiums of data. Ownership rights created by access to these collections of data will become an issue. Related to who owns the data will be who has the right to charge user fees, and what uses may be made of the information obtained.

WHAT BUSINESS IS

Gilder believes that the most valuable capital now is the capital of human mind and spirit. This phenomenon from an era in which capital was represented by material things is a result of what he refers to as the microcosm. According to Gilder, the United States did not enter the microcosm through the traditional channels. In a sentence so long it challenges the Internal Revenue Code, he adds, "From immigrants and outcast, street tough and science wonks, nerds and boffins, the bearded and the beer-bellied, the tacky and the uptight, and sometimes weird, the born again and born yesterday, with Adam's apples bobbing, psyches throbbing, and acne galore, the fraternity of the pizza breakfast, the Ferrari dream, the silicon truth, the midnight modem, and the seventy-hour work week, from dirt farms and redneck shanties, trailer parks and Levittowns, in a rainbow parade of all colors and wavelengths, of the hyperneat and the sty high, the crewcut and khaki, the pony-tailed and punk, accented from Britain and Madras, from Israel and Malaya, from Paris and Parris Island, from Iowa and Havana, from Brooklyn and Boise and Belgrade and Vienna and Vietnam, from the coarse fanaticism and desperation, ambition and hunger, genius and seat of the outsider, the downtrodden, the banished, and the bullied come most of the progress of the world and Silicon Valley."

Perhaps a paraphrase would be that ideas (where economic value now resides) are not confined to any predetermined pattern, whereas economic value in the recent past was confined to the production of things. In the production of things economy (the so-called industrial era), creative thinking was secondary to producing something tangible. As the world's business is related more to ideas than things, how we do business necessarily changes. The main world commodity of today and the next decade is information (a collection of ideas). The digital computer will be increasingly essential to managing information. Business has become the exchanging of information more so than the exchanging of things. Consequently how we move information (via the computer) is more important than how we move things (forklifts, ships, trains, etc.).

OFFICE OF THE FUTURE

To date, most automated managing of information has been relegated to characters rather than images. The letters of this document represent characters; a photograph represents an image. The conversion of an image to bits (so that a digital computer can deal with it) consumes huge amounts of electronic storage space. Electronic storing of images has been inhibited by space and cost constraints. Also a large amount of processing power is needed to convert an image to bits and then back to an image. Additionally there are legal considerations relating to the validity of a representation of the stored bits as an image. Is a recreation of a signature a signature? The technology is advancing and the legal restraints seem to be crumbling (the IRS is increasingly accepting electronically transmitted images as valid data). Consequently, significant amounts of historically paper documents (from tax services to client files including handwritten notes) will become electronically stored data. This data, once correctly filed, will remain correctly filed despite the frequency of use. Paper documents, from books to scribbled notes, have an imbedded propensity to erroneous filing. The more frequent the use the more frequent the misfiling. The savings in physical storage area, the time required to retrieve and to refile manually, and the time consumed searching for erroneously filed documents represents significant savings to the tax practice.

Perhaps the main inhibitor to effective computer use today has been the time, effort, and attributes required to deal with the myriad hardware platforms, operating systems, programming languages, and applications. The lack of consistency in blending these diverse elements together in a predictable (intuitive) manner has kept users from fully exploiting computer technology as it evolves. It has also kept many potential users from being users at all. Of course it has also provided a livelihood to a few highly skilled persons who intuitively deal with the un-intuitive systems. In the office of the future the user will not be too concerned with how the thing works. Their relationship with their computer workstation (PSCN) will evolve similar to their relationship with a good friend. As oral and written conversation progresses over time, both the employee and the PSCN will gain an increased level of insight and understanding of each other's likes, dislikes, and peculiarities. Each will sometimes modify behavior because of the other. Consequently, identical systems will not behave identically. The PSCN will become an extension of the user and will behave in a manner the user finds congenial. Your neighbor, of course, may think your PSCN is a little ill-behaved - similar to his notion of your children compared to his notion of his children. Just as many people will be involved with a PSCN on a daily basis as are involved in child-rearing.

PUSHING OUR IMAGINATIONS

While it is difficult to predict how future technological advances will be put to practical business applications, there does appear to be a trend developing. The business computer of the future will be able to take in everything an office now receives - paper documents, computer information, pictures, graphs, mail - and then store it, massage it, change it, and redistribute it. Besides converting paper-bound images to electronic data, technology will allow users to manipulate these documents on-screen. Through some storage technology, perhaps "jukeboxes" of optical disks, all the data that exists in the company, entire filing system will be available on demand. Paper will **finally** become just another means of display, not the primary vehicle for conveying data.

This will be accomplished by orchestrating multi-media sources into seamless accessibility. So whether information were to originate via voice, a keyboard, or paper, it will become data. That data will be accessible to anyone in a work group. Individuals and work groups will be connected, probably via fiber optics, with other individuals or work groups throughout the globe. Connectivity also will be available throughout the universe through multi-faceted methods (fiber optics, metropolitan area fiber-optic networks [MANS], microwave transmissions, satellite transmissions, etc.). Your "computer" may be housed in something similar to a headset. Your screen may be similar to a part of the lens of a pair of bifocal glasses and be attached to your "headset computer." Consequently, you will be able to move around your office at will while working at your computer. Your headset computer may be connected to your PSCN via radio transmission. Your PSCN may be the size of a credit card. However the PSCN of the future manifests itself, it will be smaller, more powerful, easier to use, more reliable, and much less costly than the personal computers we consider a business bargain today. This evolution will be radical. The process will become a brick wall to some of our current technology leaders and a bonanza for a fresh group of emerging technology leaders. Since there will be winners and losers among the technology providers, there also will be winners and losers among the technology consumers, such as tax practices. While predicting the future direction of technology is sure to be at least partially in error, ignoring the evolution would be shortsighted.

CHAPTER VIII - OTHER SECTIONS

GLOSSARY

ADDITIONAL FEATURES - Functions performed by the computer that are not included in a standard package.

ANALOG TECHNOLOGY - Technology that uses analog techniques. Analog pertains to data consisting of continuously variable physical quantities. Analog technology may be contrasted with digital technology. Examples of analog technology is the traditional telephone.

APPLICATION SOFTWARE - A computer program designed to meet specific user needs.

ARTIFICIAL INTELLIGENCE (AI) - The capability of a device to perform functions that are normally associated with human intelligence, such as reasoning, learning and self-improvement. Expert systems is a subset of AI.

ASYNCHRONOUS - Without regular time relationship; unexpected or unknown with respect to the execution of program instructions. In programming, it refers to a modula that may occur at any time while the program is operating. In communication, it refers to a transmission that is fixed in time length (accompanied by a start bit and a stop bit). Distinguished from synchronous. A type of computer operation in which a new instruction is initiated when the former instruction is completed. Thus, there is no regular time schedule, or clock, with respect to instruction sequence. The current instruction must be complete before another is begun, despite the length of time the current instruction takes to reach completion.

ASYNCHRONOUS COMMUNICATION - A way of transmitting data serially from one device to another. Each transmitted character is preceded by a start bit and followed by a stop bit.

AUTOEXEC.BAT - A special MS-DOS batch file that performs a set of start-up procedures each time the system is booted. This file can be customized by the user. "BAT" files instruct the PC to perform a series of steps that may be performed in DOS, one step at a time.

BACKUP - To make a copy of a file(s) or disk(s) for safekeeping. The files may be backup on magnetic tape or other disks. Backing up is accomplished by an application program designed for that purpose.

BATCH FILES - Normally a file with the file type "BAT." A common example is the AUTOEXEC.BAT file. In a BATCH file, each line of program coding is executed one line at a time.

BATCH ENTRY - Entry of data after accumulation of data as opposed to immediate entry of data.

BIT MAPPED - A technique used to display an image or text on a computer screen. Bit mapped refers to each screen position (pixel) being handled individually. Character based screens handle a character at a time. Bit mapping is required for graphical displays. Generally bit mapping results in slower screen refreshing than character based screens. With the Intel 386 and higher family of processors, the speed differences are becoming negligible.

BOOTABLE FLOPPY - A floppy disk that has the system files copied on it so that it will start the PC (i.e., it will boot the PC).

BRIDGE -

- A computer application that enables information from unrelated sources to be assembled into a computer program. Also referred to as "linking software."

- A combination of software and hardware that will allow two PCs to exchange files directly from one PC to a second. The transfer is typically through a serial port.

BURN-IN - A prolonged period of time when the computer and/or other hardware is turned on to test for component failures. Similar to a break-in period of a car. Some vendors offer to "burn-in" a PC prior to delivery.

CALENDARS - A PC program that allows users to electronically store their schedule on a disk. Some calendar programs are "RAM resident" (i.e., they copy all data and instructions into the random access memory of a PC).

CD-ROM - A method of storing data on compact disc (laser technology) so that a user can only access information (read only memory) and not alter the information on the disc.

CENTRAL FILE SERVER - A computer on a network that acts as a host to other computers (nodes) on a LAN. The server generally handles file management, input/output control, and network security. It typically has a very large fixed disk.

CENTRAL PROCESSING UNIT - The part of a computer that includes the circuits that control the interpretation and execution of instructions. Also referred to as the "CPU" or the microprocessor.

CHARACTER PRINTER - A printer that will only print text materials. It will not print graphs or diagrams.

CHIP -

- A shortened version of memory chip or other microchip.

- In micrographics, a piece of microfilm smaller than a microfiche containing microimages and coded identification.

CLIENT WRITE-UP - The process of providing general ledger services for clients. Service often includes the preparation of compiled financial statements. Normally, service involves use of general ledger software.

COGNITIVE ERGONOMICS - A branch of ergonomics that deals with the impact of use of a computer on the behavior of its operator. Also included in the concept of "human factors."

CONFIG.SYS - A special MS-DOS file that defines how the system is configured or set up. This file automatically runs during the boot process and can be created or modified by the user.

CONNECTIVITY - The coupling of one or more computers or devices together.

CPU - The chip that controls a PC, the microprocessor. If Intel, CPUs are usually 8086, 8088, 80186, 80286, 80386, 80486 (i486).

DATA COMPRESSION - A programming technique that permits more data to be stored in the same or less space than the original data. Many techniques for compression exist, but all use some method of identifying redundancy in the data and then representing the redundant data in a more compact form. An example is the removal of unused areas (blanks) in a file. To use a compressed file, the file must be decompressed.

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DATA BASE - Storage of information in a manner that allows a user to be able to extract parts of information meaningful to the job on hand. Generally considered to be a group of related files.

DESKTOP PUBLISHING - The use of PC application software to integrate text, charts, and pictures; and to design, display, and print high-quality documents comparable to typeset documents printed by professional publishers. Requires the use of advance word processing software, graphic software, and a laser printer.

DEVICE - Any hardware that can be connected to a computer such as a terminal, printer, disk drive, keyboard, mouse, modem, etc., to do a specific task. In MS-DOS, DEVICE is also a CONFIG.SYS statement that tells DOS to load an add-on device driver at system startup.

DIGITAL TECHNOLOGY - A general term that encompasses the use of computers to store data in the form of digits. It may be contrasted with analog technology. Digital technology supports the use of binary representation of data. Data is represented by a series of 0's or 1's (technically, low voltage or high voltage).

DISK MANAGEMENT UTILITIES - Software that helps the user to organize and access files stored on a fixed disk (or hard disk).

DISKETTE - A flat piece of flexible plastic coated with magnetic material and, when prepared with a FORMAT command, used to store data.

DOWNLOAD - Transfer of files from a shared computer to a personal computer. Also, used to refer to copying a file from a fixed disk to floppy disk.

EISA - Extended Industry Standard Architecture. A standard method of designing PCs that utilizes a "bus" to transfer data on the system board.

ELECTRONIC FILING - Transmitting a tax return to the IRS in electronic form. In the early 1990s, only form 1040s could be filed electronically. Files transferred are in ASCII format.

ELECTRONIC DATA TRANSFER - The transferring of data using computers. Generally, the transfer is over a communication line, such as a telephone system.

ELECTRONIC MAIL - Electronic mail refers to systems or processes which allow one or more computers or terminals to share data electronically with the other(s). The transmitted data is usually stored in the disk or working directory of the recipient. The "mailed" data can be reviewed on screen or printed to a printer. Mail messages can be deleted after their usefulness has been accomplished.

ELECTRONIC TAX RESEARCH - Use of computers to research the tax impact of either proposed or completed transactions. The research involves accessing tax related court cases, IRS rulings and publications, and congressional publications. This legal data may be stored on magnetic disks, ROM disks, or other electronic media.

ERGONOMICS - The study of the interface between the user and a computer. Includes the physical environment in which the PC is used and the human factors relating to use of the PC.

EXPANDED MEMORY - A method of increasing the amount of internal memory (RAM) that is usable by a PC. The extra memory is used by switching between the expanded memory and a portion of the basic 640 Kb (which is a part of the 1 Mb of memory that is addressable by DOS). With the availability of extended memory, expanded is not an important as it used to be.

EXPERT SYSTEM SHELL - Also known as a knowledge-based development tool, this permits a software developer to write expert system applications for end users. The only part of the expert system missing is the knowledge base.

EXPERT SYSTEMS - A software application that helps an end user in solving problems that require expertise in a particular subject.

EXTENDED MEMORY - A method of increasing the amount of internal memory (RAM) that is usable by a PC. Basically, changes the limitation of the 640 Kb that did apply to DOS. Extended memory is all available at once; no switching between parts of it is required.

FACSIMILE TRANSFER or FAX - The transmitting of images from one site to another. Group 3 (current state of the art technology) FAX machines can dial the destination site, transmit the document, check to see the document was received, and notify the sender of the success or failure in transmission.

FIBER-OPTIC - A type of cable that is used to connect computers and other devices.

FRAGMENTATION - A condition where there are many scattered areas of storage that are too small to be used productively. Also referred to as storage fragmentation.

GIGA-BYTE - A measure of storage abbreviated Gb. One giga-byte is two to the thirtieth power bytes, i.e. 1,073,741,824 bytes.

GRAPHICAL USER INTERFACE - An interface between a user and the PC where the user selects applications by moving to an icon and pressing enter. MiscroSoft's WINDOWS utilize a graphical user interface (GUI).

GRAPHICS - The making of graphs or pictures. Distinguished from characters (i.e., text and numbers).

HARD FONTS - Fonts refer to the way letters are printed by an application program. If the font is built into a printer, it is referred to as a "hard font." If the printer must load the font from disk storage or other storage, it is referred to as a "soft font."

HARDWARE - The equipment that makes up a computer system, not to be confused with the programs or software.

HASH TOTALS - The result obtained by applying an algorithm to a set of heterogeneous data for checking purposes. Used in storing data to a disk and retrieving that data.

HYBRID TAX SYSTEMS - Tax preparation software is generally of two types: in-house and service center. The major difference is where the tax return is processed or computed. With a hybrid tax system, some parts of the return may be processed locally in the accountant's office and some parts of the return may be processed at the service.

IN-HOUSE TAX SYSTEMS - All processing of a tax return is processed locally in the accountant's office. Processing refers to the use of the microprocessor to calculate or otherwise manipulate the tax data.

INFERENCE ENGINE - The part of an expert system that details how the rule base will act upon the data to produce a solution. It includes the way in which any solution search will be accomplished, what type of reasoning will be used, how pattern matching will be done, how uncertain information will be handled, and how to define a best solution.

INK JET PRINTER - A non-impact printer in which the characters are formed by projecting a jet of fast-drying ink on paper in the form of characters.

INTELLIGENT DOCUMENT - A document that knows both its contents and the skill level of the person looking at it. The document modifies its presentation complexity according to the skill of the user.

INTERACTIVE DATA ENTRY - If an application alternatively accepts data entry and responds with the result of that data, it is said to be interactive. With the appropriate programming, the response may be reviewed or compared to expected data prior to entry into the data base. Thus, with interactive data entry, on-line editing of data is possible.

JUKEBOX DISKS - A slang term that refers to a disk storage device that allows the automatic selection of one of a variety of disks. Resembles jukeboxes used with records or CDs.

KNOWLEDGE BASE - The part of an expert system that represents the knowledge of a subject matter expert. Usually structured in rule form (i.e., If Then or If Then Else rules), it acts upon the facts and information fed into the application to determine a solution to a problem.

LAN - A system of multiple, interconnected electronic devices in a small geographic area (local).

LAPTOP - A portable PC, usually weighing 15 pounds or less, that can run on battery power and that can be used while travelling. The laptop normally has a keyboard and a liquid crystal display (LCD screen).

LASER PRINTER - A non-impact printer that creates latent images by directing a laser beam onto a photo-conductive printing medium. Toner particles, attracted to the energized latent image, make the image visible. Output from a laser printer is very high quality. Laser printers may print graphic and character data.

LINK - A programming term that refers to a program that interconnects items of data or portions of one or more programs. An example is the ability in Lotus 1-2-3, Release 3, that allows a change in one worksheet to automatically update another worksheet.

LOCAL AREA NETWORK - See LAN.

MAGNETIC DISK - A flat circular plate with a magnetizable surface layer on which data can be stored by magnetic recording. Magnetic disks are the primary storage devices used with computers.

MAN - Municipal Area Network. Larger than a LAN, but smaller than a WAN.

MATH COPROCESSOR - An optional auxiliary processor used to speed up complex math operations.

MATRIX PRINTER - A printer in which each character is represented by a pattern of dots. Also referred to as a dot matrix printer.

MENU SYSTEM - A listing of available commands or programs. Functions selected from the list will automatically execute. The underlying syntax to execute the function is pre-determined and associated with the corresponding item in the listing. Once the item is selected the appropriate command is executed.

METROPOLITAN AREA FIBER-OPTIC NETWORK - A network of computers connected with fiber-optic cabling that covers a metropolitan area. Fiber-optic cable has the capability to transmit voice (like telephone transmissions), video (like television), and data or computer transmissions.

MICROCOSM - A little world; especially, man as a supposed epitome of the exterior universe. As applied to technology, the computer is the center of tax practice in the 90s.

MICROGRAPHICS - The process of storing images on microfilm, microfiche, or optical disc. This enables the user to search and extract images to the computer screen or printer.

MICROWAVE TRANSMISSION - Transfer of data between two computers by using microwaves.

MINIMUM FEATURES - Devices of a computer system that are needed to do basic work with the computer. This report concludes that the minimum features include a 40 Mb fixed disk, 4 Mb RAM, and an 80386 SX processor.

MODEM - Acronym for modulator/demodulator. A modem converts data from a computer (digital) to analog signals that can be transmitted through telephone lines, or converts the signals from the telephone lines (analog) into a form that the computer can use (digital).

MULTI-MEDIA - Use of presentation software that has the capability of combining graphics, videos, text, and other data stored on a variety of storage media.

MULTI-TASKING - Ability of an operating system to perform two or more tasks at the same time. Typically, the two tasks are two separate programs. For example, the ability to run a tax planning software at the same time you are running a tax preparation software.

NANOSECOND - One thousandth millionth of a second. The speed of memory chips is normally measured in nanoseconds. It is a very short time.

NETWORK SYSTEMS - A connection between two or more computers that allows information and/or devices to be shared.

ON-THE-JOB TRAINING (OJT) - A process of teaching a user to do a task while working on actual client information. Typically, the teacher is also the supervisor. Opposed to classroom training.

OPERATING SYSTEM - A group of programs that translates commands to the computer. Usually handles system management facilities such as scheduling, input/output control, disk storage management, and a multitude of related services.

OPTICAL DISK - Disk that allows images (such as pictures) to be stored. A printed page may be stored as an image. Access (retrieval) times are generally slower than the comparable time for conventional hard disks.

OPTICAL CHARACTER RECOGNITION - A form of scanner technology that will read characters. Referred to as an OCR scanner. Scanners involve hardware using optical technology and software to interpret the optical images scanned.

OPTIMIZING UTILITIES - A group of programs that are designed to improve the user's ability to use the PC to run application software. Among the utilities that are used include memory managers, magnetic disk compression and decompression utilities, utilities to remove fragmentation common on fixed disks, and print spoolers to hold print jobs until the printer is ready for them.

OVERALL AUTOMATION - Blending every activity that can be enhanced by using computer technology in a controlled and cohesive system.

PAYROLL SERVICES - A practice area that focuses on the preparation of checks for personal services and the relating tax and financial accounting. Includes preparation of required IRS forms.

PC - Common acronym for "Personal Computer." A personal computer is defined in a variety of ways. A commonly used definition is a computer that is used by only one person at a time. However, a PC networked to other PCs becomes a shared device.

PEER-TO-PEER LANS - A form of networking software and hardware where each PC on the network may act as a server to any other PC on the network. Peer-to-peer lans are useful for a small number of users. An alternative is a network with a dedicated server.

PERIPHERALS - Any device that is connected to the CPU. Examples include printers, monitors, disk drives, keyboards, tape drives, and modems.

PERSONAL SUPER-COMPUTER NETWORK - A network of personal computers that are able to act as one computer processing the same problem. Thus, the network is similar to a super computer.

PHYSICAL ERGONOMICS - The furniture and office environment that surrounds the use of a personal computer.

POLYPHASIC ACTIVITY - Performing two activities at the same time. For example, talking on the telephone and entering data into a computer at the same time.

POP-UP CALCULATOR - A software utility program that is stored in RAM (i.e., it is RAM-resident). The software emulates a simple ten-key calculator. Normally, the calculator program is activated by pressing a key combination.

PRINTER DRIVER - Special software that controls how the computer and printer interact. The program is essential to effective use of a printer.

PRO-FORMA - A partially completed form. Also, an example of a completed form.

PROTECTED MODE - The mode of the computer processor which allows all extended memory to be accessed directly.

PSCN - An acronym for Personal Super Computer Network.

PUBLIC DOMAIN BULLETIN BOARDS - A bulletin board that may be accessed by the general public at no cost. Typically provided as a service by personal computer clubs and serves as a source of shareware.

REAL MODE - The processor mode common to MS-DOS computers. This mode is the only mode available for computers with less than 1Mb of extended memory.

RECOVERY - The ability to get back data that has been lost due to machine or user errors.

REMOTE - A term used to refer to devices that are located at sites away from the site of the computer.

SATELLITE TRANSMISSION - Transfer of data between two computers by using a satellite.

SCANNING - Converting data printed on paper to an electronic media (on a disk) by using optical technology.

SERIAL PORT - Hardware port used for communication with serial devices (such as printers and modems) accessed through the I/O addresses stored in the BIOS data area.

SHARED RESOURCE ENVIRONMENT - An office where the computer resources are equally available to all who work there.

SOCIO-TECHNICAL ERGONOMICS - The impact of technology on the social organization of an office, or the sense of belonging to the office.

SOFT FONTS - A font that is placed in printer memory from a disk. The font must be reloaded from disk storage each time it is used to print a document.

SOFTWARE REVIEW SYSTEMS -
- A management system design to review the purchase and use of software within an organization.

- Also refers to a family of software that is designed to help a user review the characteristics of the software.

SPREADSHEET - A tool used to analyze information that consists of a matrix of rows and columns. An electronic spreadsheet is software that allows the power of a microprocessor to help analyze data in the electronic spreadsheet.

SPS - Superscript character, to be distinguished from a comic script character.

STAND-BY POWER SUPPLY - An uninterruptible power supply that provides a constant source of electricity with a constant voltage. The power supply may be activated only when the normal source of power varies in an unacceptable manner.

STANDARDIZED - Using similar or compatible technology.

SURGE PROTECTOR - A device that detects irregular electrical patterns to prevent electrical damage to a computer or device.

SYNCHRONOUS - A type of computer operation in which the execution of each instruction or each event is controlled by a clock signal (evenly spaced pulses that enable the logic gates for the execution of each logic step). A synchronous operation can cause time delays be causing waiting for clock signals, although all other signals at a particular logic gate were available. See Asynchronous.

TAX PRACTICE UNIT - This term includes small tax practice firms as well as the individual offices of some multi-office firms that are organized similar to an individual tax practice firm.

TAX RESEARCH - Examination of tax law source documents to determine the tax impact of a transaction (proposed or contemplated). Source documents include the Internal Revenue Code and related Regulations, Federal court cases concerning tax matters, IRS Notices, Rulings, and other pronouncements. In addition to source documents, editorial comments about the tax laws may also be consulted.

TAX SERVICE BUREAU - A company that sells the use of its software and/or hardware to tax preparers. Other services, such as collating and copying services, may be provided in addition to the use of software and hardware.

TAX PLANNING - Examination of tax law to determine the tax impact on a PROPOSED transaction.

TAX PREPARATION - All steps required to complete any tax return in compliance with the applicable tax law.

TIME SHARED TAX RESEARCH - Access of tax source documents through an on-line computer service. Charges typically involve a small fixed access charge and a variable charge based upon time connected to the computer.

TSR - A Terminate and Stay Resident program. Such a program initializes itself, hooks up to system resources it wants to monitor (for example, the keyboard interrupt so that it can "pop-up" later), reserves some memory for itself, and then returns to the DOS prompt. Also referred to as a RAM-resident program.

UNINTERRUPTIBLE POWER SUPPLY - See UPS.

UNIX - A multitasking operating system that is widely used in networked personal computer installations.

UPS - A device that maintains electrical current for a predetermined period of time. It allows continuing operations for a sufficient time to shut down the system or until normal electrical power is restored.

USER FRIENDLY - An attribute of software that indicate how easy it is to use.

VIRTUAL 8086 MODE - A mode of the 80386 processor chip that has the following two characteristics:

- Real mode DOS programs can run without modification, and

- Extended memory can be mapped into the first megabyte of address space. See also Protected Mode and Real Mode.

VGA - Video Graphic Array.

VIDEO DISPLAY - A television-like device that the computer displays information on. A synonym for display, monitor, CRT.

VIRUS - An unauthorized program that attaches itself to a computer system and damages the system.

VOICE DATA ENTRY - A form of entering data to a computer system by speaking into a microphone. The voice input is converted into digital media. As we enter the 1990s voice data entry is in the early developmental stages.

VOICE PRINTS - The unique pattern of voice that differs with each individual, thus it is similar to a finger print. Voice prints may be used in voice recognition input devices.

VOICE MAIL - Voice mail refers to systems that records voice messages much like an audio recording device. The major difference is that a group of people are sharing the same answering and recording device. Each person usually has a password to prohibit unauthorized persons from mail access.

WAN - Wide Area Network. A system of computers that are connected and may share computer resources, but are located over a large geographical area.

WIDE AREA NETWORK - See WAN.

WINDOWS 3.0 - A graphical environment (it uses a graphic user interface) which enables a user to work with software applications, running more than one application at a time. In this environment information can be transferred between applications. Files created with the applications can be organized and managed in a graphic manner as opposed to character based management.

WORD PROCESSING - A class of programs that focuses on the processing of words or text data. Included in the family of word processing software are print utilities (software that support the use of a printer), spell checkers (software that will compare a word as entered to an electronically stored dictionary), style checkers (software that compares the combination of words and characters with stored examples of grammatically correct language), and other utilities relating to communication by the printed page.

XENIX - A version of UNIX originally developed by MicroSoft but subsequently transferred to The Santa Cruz Operation (SCO). It was the first version of UNIX to become popular on the Intel family of processors.

Source: Several of these definitions are based upon definitions in <u>Dictionary of Computing</u>, published by IBM, 1987, and are used with permission.

APPENDIX A - OPERATING SYSTEMS

I. Background on Common Characteristics of Operating Systems

A. What Are the Functions of All Operating Systems?

Operating systems take care of housekeeping tasks. They read and write files, maintain disk directories, allocate memory to application programs, and usually handle mechanical chores such as reading the keyboard when you press keys and updating the screen when something needs to be displayed. These tasks require a surprising amount of software and every computer requires software to do these jobs.

Sharing Code By Using Systems Calls In Efficient Operating Systems

The sharing of code is a major reason for having an operating system. Nearly every application program (word processor, spreadsheet, etc.) must do at least one housekeeping task and probably all of them when it runs. Rather than require every application program to include the necessary detailed instructions for these tasks, the application program simply requests that the operating system perform these tasks. This is known as making a system call. The result is that your application program can be much simpler and smaller. More importantly, your entire computer system is more reliable because every program on the computer is using the same procedure for handling disks, screens, and keyboard.

B. Operating Systems and Applications Programs

Due to close-knit cooperation between operating systems and applications programs, each application program must be designed to work with a particular operating system. All operating systems do essentially the same thing but they do it in different ways. This means that an application program may work with all operating systems.

When a programmer rewrites an application program so that it can work with another operating system the process is called <u>porting the program</u>. Some applications have been ported several times and are available for many different operating systems. At least one popular spreadsheet programs are available for a variety of different operating systems including MS-DOS, UNIX, OS/2 & VMS. However, each version will not run directly on all operating systems. For instance, MS-DOS versions of spreadsheets will not run on a Unix system without a DOS emulation software resident. Consequently different versions of the same application program are often required if different operating systems are used.

Role of the Microprocessor

Inside your computer there exists a maze of electronic components---the most vital being the microprocessor. Within the microprocessor are literally thousands of **microscopic electronic digital circuits, embedded or engraved on a single piece of silicon.** Each of these circuits serves a different purpose within the microprocessor--but these circuits have one common denominator. Each is capable of **binary** (zero/one, on/off, yes/no, or low voltage/high voltage) type decisions. These electronic circuits, called gates, connect so that the actions of one affects others. Software controls the opening and closing of the gates.

Binary Code and the Role of the Programmer and the Program

Machine instructions, machine code, or binary code are different names for the software instructions that a computer understands and executes. Programmers assemble binary code into meaningful sequences. The finished result is a program. The binary logic writes digits as zero or one. Zero is the "off state" and one is the "on state." This is often called in the literature the "low" and "high" voltage states. Computer instructions are just different combinations of zero-bits and one-bits. The microprocessor responds differently to different combinations and arrangements of these bits, or "on/off" states.

C. User Interfaces

The part of the operating system that you actually see and use is called the **user Interface.** User preference dictates which interface is selected. An accomplished typist might favor a text or typing kind of user interface offered by some operating systems. Others may prefer icon (small graphic symbols) interfaces with graphic symbols appearing on the computer screen. The icons can represent disks, files, programs, etc. You instruct your computer to carry out commands by using a device (mouse) to point to either an **icon** or **command** listed in a menu of choices.

D. Starting Your Operating System

When you turn on your computer, the small integrated circuit chip in your computer contains a very basic program. This **ROM** or **R**ead **O**nly **M**emory chip is designed to hold a small program like a disk. Because a ROM chip is a hardware component of your computer, programs stored in ROM are often called **firmware.**

Turning on your computer starts a process of reading a specific file and executing an instruction it finds there. This in turn loads files that are the core of your operating system. The first instruction in the operating system file contains enough code to instruct the microprocessor to continue to load the rest of the operating system into your computers memory. This sequence of a simple program starting a complex program that starts still more complex programs is called **"bootstrapping"** or **"booting."** The term bootstrapping comes from the phrase "to pull oneself up by ones own bootstraps." This means that the computer is loading its own operating system without outside help.

E. Compilers, Language Interpreters, and Assemblers

Computer programming languages (Cobol, Fortran, C, Pascal, Basic, etc.) bear more resemblance to the English language and contain such words as "print, read, write" and conditionals like "if,..then or if,..then,..else", to describe what the programmer wants the computer to do. But we already know that the computer doesn't understand english commands. The function of a language translation program is to convert the programmer's instructions (source code) into the appropriate binary machine instructions. Depending on which particular programming language is used, the translator may be called either a compiler, an interpreter, or an assembler.

An assembler will translate programs written in assembly language into binary instructions. A compiler also converts a file of programming language instruction into a file of executable binary instructions. Interpreters read instructions written in a programming language and convert them into one or more binary instructions as they encounter each programming instruction.

Generally an **"Interpreted"** program will not run as quickly as a **"compiled"** program since it must be translated on the fly. Compiled programs generally cannot be modified and thus are more secure from unauthorized changes. The ability to change or modify a program is sometimes critical. Interpreted programs contain the source information, and therefore can be changed, but are more vulnerable to

unauthorized tampering. The differences in execution speeds are not always discernible on fast processors such as the Intel 80386.

II. A Short History of the Evolution of MS-DOS

A. Microsoft Disk Operating System (MS-DOS) Version 1.0

MS-DOS was the result of a request by IBM to Microsoft to develop a **disk operating system** for the IBM PC. This computer was developed in the early 1980s by IBM. Microsoft selected a Seattle engineer, Tim Paterson, who sold them full rights to the product SCP-DOS. This system ran on the 8088 microprocessor that Intel had developed, and became the heart of the **IBM PC**. Microsoft purchased full rights to the product and its source code and used it as the focal point of the development of MS-DOS 1.0. Released in August 1981, it consisted of 4000 lines of assembly language source code and ran in 8 kilobytes of memory.

Shortly after that, in 1982, MS-DOS version 1.1 was released and worked with double-sided 320kb floppy disks. Versions of DOS marketed by IBM are called IBM-DOS or PC-DOS.

B. MS-DOS Version 2.0

When IBM began development of a 10 megabyte hard disk, Microsoft began work on the development of version 2.0 of DOS, which would be designed to support the hard disk. Up to this point, DOS 1.0, in keeping with its heritage had been designed for a floppy disk environment. One of the major limitations in DOS 1.0 is that its directory is limited to a maximum of 64 files. MS-DOS version 2.0 would be so designed as to include a hierarchically designed file system, A **hierarchical file system** is significant in that any directory can contain both files and other subdirectories. Hierarchical file systems were already in use in the Unix operating system, which was used as the development platform of the MS-DOS/IBM-DOS operating system. In effect some of the underlying concepts of MS-DOS are similar to their counterparts in Unix.

C. MS-DOS Version 3.0 to 4.0

Version 3.0 was released in August of 1984 to support the IBM PC/AT. Version 3.1 was released in November 1984 and contained networking support. The January 1986 version 3.2 supported 3.5 inch disks. In 1987 IBM version 3.3 followed, with the principal purpose of supporting the IBM PS/2 line of computers. The MS-DOS version of 3.3 added many new features and commands. Compaq version 3.31 of DOS allowed for hard disk partitions larger than 32 megabytes.

MS-DOS version 4.01 also reads partitions greater than 32 megabytes. Originally issued as MS-DOS 4.0, some minor bugs resulted in upgraded version 4.01 being issued with various fixes. This version added full screens, a menu-driven interface called **DOS SHELL**, and extra support for Expanded Memory Specifications (Lotus/Intel/Microsoft Expanded Memory Specification).

III.   Multitasking

Multitasking Versus Task Switching

Normally, you use a personal computer to accomplish one specific task at a time. The industry standard operating system of choice for personal computers, DOS, was designed to accomplish one task at a time-whether writing, calculating, drawing, etc. A specific application program is used for each application (like word processing). You must stop using one application and start running another to perform a different application (like spreadsheets). Some operating systems, however, allow you to run more than one application program at the same time. This feature is called multi-tasking.

Multitasking is to be contrasted with task switching that does not allow programs (switched away from) to continue processing in the background. A task switcher suspends the switched away program and resumes only when it is recalled. An example of a task switcher is SoftLogic's Software Carousel.

Various Operating Systems Support Multitasking:

Operating systems that support multi-tasking do so in different ways. Some allow you to switch instantly between applications by pressing keyboard combinations on your computer keyboard. The outgoing application will instantly be replaced by an incoming application that displays new information on the screen. Other operating systems divide your computer display screen into rectangular windows, so that all the applications you are currently using will display their information within windows. In the true multitasking environment you can observe program instructions being executed in these windows. Windows are small screens within the computer screen that allow you to see various applications simultaneously. DOS does not directly support multitasking.

Operating Environments - Desqview and Windows 3.0

Operating environments make DOS easier to use, and add additional features to DOS. The two operating environments most widely used currently are Microsoft's **Windows 3.0** and Quarterdeck's **Desqview.** Besides offering a DOS shell-type interface (with DOS commands in a menu structure), they let you load and run more than one program at the same time, practically speaking. Desqview and Windows also provide the means for transferring data between programs (cut and paste features), and they make as efficient a use of your extended and expanded memory as your application programs will allow. Installed memory permitting, these environments specifically tailored to 80386 and 80486 microprocessors, can allot 640kb of memory to each of several DOS programs that are loaded simultaneously into RAM.

Principal Differences Between Windows 3.0 and Desqview

Prior to the release of Windows 3.0, Desqview was one of the few true multi-tasking programs in a DOS environment. Desqview's windows use the computer's text graphics character set. **Windows 3.0,** on the other hand, is characterized by a **GUI** or graphical user interface.

Windows looks for extended memory, and converts it into expanded memory by an XMS (an Expanded Memory Specification) driver. Desqview, on the other hand, recognizes and uses DOS extenders to access memory above 1 megabyte.

The Three Modes of Windows 3.0

Windows 3.0 operates in three modes. One is the **386 enhanced mode.** This mode allows true multi-tasking and can run several applications--even non-Windows character-based programs. Most literature and instructions coming with the program recommend at least 2 megabytes of memory to run Windows in enhanced 386 mode.

Standard mode, on the other hand, operates as if Windows is running on a 80286 machine. Here Windows does multitasking only with its own specially designed programs--Excel, Word for Windows, etc. **Please note--** Non Windows programs will not multitask in the standard mode.

The last available mode is **real mode,** which uses only conventional DOS memory--640kb of RAM. Although it is not recommended, if you have expanded memory on your PC-XT, **and** if you use that as a RAM drive or disk cache for Windows, you can run Windows on the slower older computers. Furthermore, if you have the newer, faster 80386 computers, but you are short on extended memory, to operate Windows you may be forced to run Windows in real mode.

The criticisms of Windows come about because the Windows environment, while rich with programming functions and features, does not leave enough RAM to run larger applications. Lack of RAM can cause sluggishness in Windows when its memory manager shifts application code to disk. Windows looks for Extended Memory--above 1 megabyte, but converts it to LIM 4.0 EMS memory. Windows supports a standard called DOS Protected Mode Interface, or DPMI which is a way for Windows applications to get the large "flat address space" of 4 megabytes instead of the 64kb block segments accessible to a 80286 running in real mode.

IV.   The OS/2 Multi-tasking Operating System

The Power of OS/2

Early versions of OS/2, designed to use the power of the 80286 Intel chip, have these advantages:

- The DOS execution environment coexists with the OS/2 execution environment. This means OS/2 will run DOS programs as well as OS/2 specific programs.

- OS/2 will support large amounts of virtual and real memory.

- OS/2 supports memory overcommitment. This means that an application can have more memory than DOS allows directly. OS/2 accomplishes this by swapping. Swapping is the process of moving memory segments to disk when they are not being used. Once the segments of memory are swapped out to the hard disk, the real memory space they were using can be reused by other segments of memory brought in from disk.

- OS/2 allows multiple applications to run concurrently. This means that users can significantly increase their productivity as they use their computers in smarter ways. Data can be obtained from a remote source, using a communications program, while a large spreadsheet is simultaneously being calculated. At the same time the user has a text editor in the foreground where a memo or business letter is being typed.

- Multitasking is also a characteristic of OS/2. This feature allows applications to coexist and execute concurrently without interference with each other. The basic unit of work executed in OS/2 is called a thread. This is a series of program instructions. A thread is similar to a simple

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DOS program. The basic unit of system resource ownership in OS/2 is called a process. Each process can consist of one or more threads. Multiple threads of the same process share a common set of system resources. In the DOS environment there can never be two sets of program instructions being executed simultaneously or "asynchronously". In OS/2, all sets of program instructions executing asynchronously are called "threads".

The Significance of Multi-tasking on Tax Preparation in the 90s

The full development and utilization of the key components of the OS/2 operating system have the potential for great productivity enhancement in the tax preparation field. The ability to run two or more tax returns and other related applications simultaneously could be a significant productivity enhancer for the tax practitioner in the 90s. In the early 1990s OS/2 tax applications have not yet been perfected. Tax application software will likely be developed for Windows 3.0 before it is available for OS/2.

Drawbacks In Adoption of OS/2 as the Operating System of the 90s

- **Market acceptance of OS/2** Currently the market has not adopted this operating system in a volume sufficient to induce developers to write applications supporting this new system. Since IBM is backing the system, there are indications that it will ultimately become the successor to DOS. In the early 1990s this has not yet happened. As discussed earlier, the principal impediments to the adoption of OS/2 revolve around the outdated technology that OS/2 embraces-the so called 80286 chip limitations.

- **Costs of hardware and memory** Considerably higher amounts of memory, at greater costs, are required. Conservatively, 4 megabytes of memory are required to run the OS/2 extended edition--8 megabytes are recommended. As memory prices continue to decrease, this impediment will diminish.

V. The Salient Features of UNIX Operating Systems

If UNIX were a person, it would be old enough to drive, vote, and drink. The Unix Operating System is characterized by shared use of the microprocessor. While the original versions of UNIX served multiple character-based terminals from a central processor, today many common UNIX systems include networks of PCs or workstations connected on local-area networks. While the individual PC or workstation is often running under DOS, the file server is usually controlled by a different operating system such as UNIX or Novell Netware. A primary reason for this is the multi-tasking character of these server operating systems.

UNIX multi-tasking is built around processes. It is generally helpful to break complicated things into small chunks. A UNIX process is a small unit. This is also the idea behind threads, which are basic units of computing smaller than processes. Many multi-tasking attributes of OS/2 are very similar to multi-tasking in UNIX.

Since UNIX is more mature, and rich in features, it also comes in more flavors. In addition, for most of its evolution, UNIX ran on larger computers. With the arrival of the Intel 80386 and the Motorola 68000 series of processors, the ability to run UNIX on small systems materialized. However, the primary systems that UNIX was developed upon were not in the business application world but in the scientific and advanced mathematical computations worlds. Consequently for much of the evolution period very little attention was given to user friendliness. As UNIX installations on 80386 platforms proliferate, much of the technical complexity of UNIX is not becoming as apparent to end users.

UNIX User Interface Developments

Original versions of UNIX were not desirable from the viewpoint of the average computer user. Cryptic commands had to be entered with no particular consistency from one command to the next. The newer versions of UNIX addressed these problems by providing a variety of graphical user interfaces. No single **graphical user interface has emerged as dominant.** These interfaces have a similar look and feel to other (Windows 3.0) graphical user interfaces prevalent on microprocessor based systems.

The Future of UNIX

A potential benefit of UNIX-based systems is the portability of software across multiple hardware platforms. Still, due to the variety of UNIX versions in use, simple portability has remained elusive. Future versions of UNIX are likely to achieve actual portability. When selecting a UNIX system for a business environment, support is a key consideration.

In the early 1990s there are two primary developers of UNIX systems. These developers each represent a consortium of hardware and software vendors. While these developers are extremely competitive for market share, both are writing to a common group of standards. Consequently problems relating to incompatible versions are likely to diminish greatly. As installed UNIX systems proliferate in business installations, there is an increasing pool of UNIX support personnel evolving. Therefore obtaining support for UNIX systems is also becoming less formidable. UNIX systems may become the central hub of larger installations.

Parts of the Unix Operating System

Operating systems incorporate 4 basic elements or parts. Briefly stated they are-

- **The Shell** that communicates with users via some kind of interface. In DOS the user shell is contained in the Command.com file. In Unix the shell is the interface between the user and the operating system. It interprets any command typed at the terminal and converts such command into terms understandable to the "kernel".

- **The File System** in Unix is similar to the DOS hierarchical-type system (actually DOS was patterned after Unix). An extensive set of file commands is available in Unix going well beyond the extremely limited commands available in DOS.

- **The Utilities Commands** are used less often, and are called system utilities. Some of these are intrinsic (built into the kernel) and some are external. There are many more and more powerful utilities in Unix than in DOS.

- **The Kernel** is the portion of the Unix system that resides in RAM and performs functions similar to the hidden files in DOS. These functions include managing memory, storing data on disks, scheduling requests for process services, and the running of processes, as well as handling interrupts and error messages and arbitrating the flow of data between memory and peripheral devices such as printers and terminals.

Basic Kernel Processes

Besides user processes, the kernel has processes of its own. These processes execute automatically as the system boots and initiates a process that manages the other processes. One of these processes manages virtual memory, deciding the most efficient use of memory. It accomplishes this by swapping out processes that are not currently in demand to disk.

"Buffer to disk" flush processes and "buffer map" flush processes periodically write all data in system buffers to hard disk. This protects the UNIX system from an imbalance or mismatch between data on disk and corresponding data in the buffers, should a system failure occur. Because of these attributes UNIX is not as vulnerable to loss of data due to a system failure as DOS.

Swapping or Memory Over Commitment

UNIX is also a virtual memory operating system. Therefore, like OS/2 and Windows 3.0, it is possible to run multiple processes that together use more memory than the amount physically installed on your computer. An area of disk is set aside called "swap space". When the memory requirements of the current process reach a greater absolute amount than available RAM, the system swaps out to hard disk the process that is least likely to be active. That could be shutdown, or a print process, etc. Performance under UNIX is optimized because the most active processes are left in RAM, while those least likely to be used are swapped out. Getting a process from RAM is often faster than swapping it back from disk. When RAM is insufficient for the typical job mix, excessive swapping will occur. Performance will be noticeably degraded, and this may signal a need to install more **RAM**. A good way to induce a system crash in a UNIX system is to underestimate your swap space. **Thrashing** is the term used to describe excess swapping of tasks or processes to disk. When swapping is working efficiently, 2 megabytes of RAM and two megabytes of swap space on disk can function almost as efficiently as 4 megabytes of actual RAM.

The Advantages of UNIX

Power: Unix is an operating system that takes full advantage of the 80386 chip performance. You can run DOS under UNIX in the Virtual-86 mode using DOS shell programs like VP-ix or Merge 386. However, it is not practical to run most current tax preparation packages in a multiuser DOS under UNIX configuration. This is because of decreased through-put performance, a higher vulnerability to errors in software code, and a demand for significantly more memory on the host system. In the early 1990s there are not many tax preparation software packages that run on the SCO XENIX versions of UNIX.

Multitasking: UNIX can run multiple programs simultaneously as opposed to DOS programs that do not.

Multiuser: UNIX is also a multiuser system, while both DOS and OS/2 are not. In a multiuser environment a single microprocessor is shared by all connected users. Connected peripherals are also shared. This differs from a LAN where the host microprocessor(s) are not shared. In many business situations multiuser systems are very cost effective.

Communications: UNIX supports networking and has a rich set of communications functions--both internal and external to the local networked system. With the popular UUCP UNIX command you can copy files between a local UNIX system and a remote Unix system across the country (or across the office). This popular communications command operates with low-cost RS-232 telephone cabling-- operating at 1200 to 19,200 baud rate.

Portability: Perhaps the strongest calling card of UNIX involves the ability to move the C-Language based UNIX operating system from one type of processor (for example Intel 80386 to Motorola 68000) to another. As of now, System V-Release 3.xx does not have features sufficient to allow system migration to alternative processors, like the Motorola 88000 chip series. Some portability claims are currently as much fiction as fact.

Commonality With DOS Commands: There are some commands within UNIX that are named like and perform similar to, DOS commands. UNIX does not directly recognize uppercase letters in the command line mode, only lowercase letters; but since UNIX was the platform on which DOS was developed, there are many areas of similarity. UNIX, however, is a much more powerful system with richer command features.

The Disadvantages of UNIX

Limited Tax Practice Software: While there is a significant and growing amount of general office automation software available under UNIX, there is not as much tax practice specific software available.

More Hardware Resources: The UNIX operating system itself consumes significantly more disk space than DOS. Similarly there is a greater RAM memory requirement for a minimum configuration. Until enough users are attracted to diminish effectively the cost per user, a UNIX installation can require greater hardware costs than a similar DOS installation.

More Complicated System: Due to the maturity and richness of the large group of programs and utilities that comprise a UNIX system, there is potentially more for a user to learn. When users are learning UNIX without the benefit of a graphical user interface or a menu system, the cryptic command line choices also make UNIX more difficult to master. But it is not clear that UNIX is more complicated than a major LAN system such as Novell Network.

VI. Local Area Networks -- LANs

LANs or local area networks can be described in at least three ways:

● It can be a group of personal computers connected to share information and resources (files, storage, printers, etc.).

● It can be a system used to transmit information within a confined physical area, like a building, that is characterized by a shared computer communication.

● It also may be described as a communication solution that allows connected computer devices to intercommunicate over a common medium.

Key Reasons For Connectivity of Computers

Enhancement of Productivity. LANs have enhanced sharing computer resources thus enhancing productivity. LANs provide for the sharing of printers, disk drives, and a more uniform and controllable method for backup. More sophisticated forms of connectivity include a dedicated modem pool on a LAN network that serves to reduce the need for a modem dedicated to each user. Shared mass storage devices are also evolving.

LANs also allow sharing software, information, and data files. Programs can be stored in a central place and be accessed by authorized users. Besides saving disk space by eliminating redundant copies of the software, networking also provides better control and ease in updating new versions of software. Networks enhance the functionality of many applications such as calendars, messaging (E-mail) systems, and public databases.

Many popular software packages are now available in network versions. Network-specific software often provides mechanisms for preserving the integrity of data stored on the LAN. While single user versions of software can be used on a LAN, they usually do not provide these mechanisms that prevent two or more users from accessing the same data file making inconsistent changes.

Network Operating Systems (NOS). Software includes "server" and "shell" components. Server software runs on a designated computer (server PC), generally the "big guy" computer in the system-- with high microprocessor speed, large disk storage capacity with fast access time. The server NOS then serves the function of traffic director, determining who gets instant attention for resource requests and who "lines up" to wait. Shell software is installed on the users PC called a node. These are connected to the network--defined as the server, or the other **NODES** (personal computers) in the network.

Components and Functions of Network Hardware

Each networked PC, or **NODE**, has a **Network Interface Card** that connects it to the network cabling system. Network cabling system brings together the Nodes, through interconnection techniques and equipment. Hubs are often used with Lan systems to concentrate and replenish network signals.

HOW DOES A LAN NETWORK WORK--THE MAIL CARRIER ANALOGY!

A LAN is much like a US Postal mail carrier, except faster. The LAN routes requests from individual NODES to the address of the resource that is being requested. That resource may be a printer, hard disk storage, modem, or software access.

Sources of Requests For Resources

A request for a resource may have it's origin in an individual PC, a plain terminal--keyboard and monitor, or a modem. The reaction of the shell software installed in a network member work station, defines what action is to be taken. Alternatives include, acting on the request, or shipping it to another LAN resource. The process of shipping the request to the correct address has been described as packetizing and mailing the request to the proper addressee.

Main Designation of Requests For Resources

The File Server acts like the main post office, receiving and opening the packages of "requests", performing the required task, repackaging it, and sending it back to the addressee. The shell software resident on the NODES is critical in determining destination of the request, and routing of the request.

Novell Netware's Shell Software Approach to Destination and Routing. With Novell Netware, the part of the "shell software" that determines the destination of a request--is called **NET/n** (where n=applicable DOS version). The portion of the shell software that determines the route it will take to get to the destination is called IPX. The NET/n either passes the request on or processes it internally by sending it to DOS on it's workstation, or NODE. The **IPX** portion says go to station x, or the file server, etc.

CABLING USED TO CONNECT NODES IN THE LAN.

There are three commonly used types of LAN cabling--**twisted pair, coaxial, and optical fiber.** RS-232 cabling connects simpler LAN types, using the serial communications port of the PC. This type is okay in linking just a few computers in a low-cost manner, and large amounts of data are not routinely moved over the connecting lines.

Factors to Evaluate In Selecting Cabling

Is there existing cabling? What type of Network Interface Cards will be used? What distance will there be between member NODES? What level of performance is expected from applications? Transmission rates, depending on the cable type selected can range from 2.5 megabits per second to 100 megabits per second for optical fiber cabling.

The Layout or Topology of an LAN Network

Topology describes the way the **cable** is routed. There are four standard topologies:

> **Bus Topology:** This form uses continuous linear cabling with each device hooked up, transmitting on the common bus, and hearing all other transmissions. This system may not be as secure or reliable as other topologies.

> **Ring Topology:** This form of topology relies on each device being connected to the preceding and succeeding device. A continuous closed path usually circulates all messages in the same direction; hence, it is not usually bi-directional as in the bus topology. In addition, if one device is disconnected, or breaks down, then the ring is broken, and will not function without some kind of emergency relay.

> **Tree Topology:** This uses a hierarchical grouping with multiple branching, so that devices communicate only with higher level nodes that are either ultimately connected with a hub or server. This type of topology emphasizes the one-way flow of information and requests upward toward the "server." This topology is more secure than the bus or ring topologies.

> **Star Topology:** This topology is generally characterized by a hub with all devices routing connections through the hub.

Physical and Logical Topology Distinctions

Physical topologies describe how the wiring is connected--bus, star, tree, or ring configuration. **Logical** topologies describe how the signalling flows. Physically, you could have a LAN wired as a star--with routing through a hub, while in reality the system could function as a ring topology.

THE TELEPHONE ANALOGY TO DESCRIBE THE WAY PC'S TALK ON A LAN!

On a LAN the cabling is similar to a telephone line, with addresses needed, which are the member nodes. The data link protocol, similar to pulse or tone type telephones, is usually either Ethernet or Token Ring. Once you connect with the data link protocol and deliver the data, it must be understood by the **Transport** protocol. The most common transport protocols are **IBM Netbios, Netware's IPX, and TCP/IP.**

WHAT DOES THE NETWORK OPERATING SYSTEM DO?

Standard NOS functions include the following:

- Routing packets by destination address

- Performing file and print sharing functions

- Providing multiple access to files using appropriate multiple access protection procedures

- Performing security functions-including file access, user access, and read/write privileges

- Administration including adding users, removing users, and setting priorities

Dedicated and Nondedicated Servers

Dedicated server Network Operating Systems do not allow the server to perform as a NODE or workstation but are generally faster and more efficient to administer. Nondedicated servers function as both client and server--acting as both server and workstation. Generally nondedicated servers are not as efficient, since they may have to interrupt requests from clients while acting as a client.

In smaller LAN installations it is feasible to install peer-to-peer networks. Peer-to-peer servers perform as servers and workstations concurrently. Since the total network traffic is usually not heavy in small installations, the overhead associated with the dual role is not significant. Most peer-to-peer networks can be characterized as DOS based. That is, generic DOS is still in control. Most dedicated server networks can be characterized as NOS based. That is, the network operating system is in control even when performing DOS-like functions.

Repeaters, Bridges, Routers, and Gateways--Their Role in LANs!

- **REPEATERS** -- extend the maximum length of a cable and regenerate signals without corrupting the contents of a packet or mail signal. Where one or more are located at some substantial distance from the rest of the system, then depending on the transmission limits imposed by certain type cables this device can boost the signal strength while in route to the addressee on the LAN.

- **BRIDGES** -- connect separate LANs, while allowing individual nodes to communicate across different LAN networks--which could be worldwide. Generally, both "bridged" LANs must have a common NETWORK OPERATING SYSTEM or NOS--such as Novell or the UNIX TCP/IP protocol.

- **ROUTERS** -- work like a **bridge** but have the intelligence to connect several LANs and select the optimal route to send a "packet". **Intelligent Routers** select alternative routes when connections are impaired.

- **GATEWAYS** -- the most versatile and flexible have the unique ability to connect LANs with different **Network Operating Systems** by functioning as a translator between different protocols.

The proper application of "Gateways" to a computer operating system suggests that all operating systems - DOS, Unix, OS/2, and LANs - can come together so that optimal use of computer resources within the tax practitioners environment may involve the use of the systems discussed in this study.

APPENDIX B - SOURCES OF INFORMATION

Information on using computers in your tax practice comes from many different sources. The following deal with both the operation of the computer as well as specific tax and accounting uses of your computer.

I. AICPA Publications

Various groups within the AICPA publish documents that deal with the use of computers in the accounting profession. Publications of interest to tax practitioners are listed below. A more complete listing is contained in the <u>AICPA Catalog of Publications and CPE Materials -1991</u>. This catalog also includes CPE computer courses. Some of these courses are software packages that run on PC compatibles. Additionally, the AICPA publishes and markets accounting and tax software, also listed in the catalog. For example, trial balance software is available that can interface with other non-AICPA tax preparation software packages for corporations and small businesses. Another package calculates IRS interest amounts on tax underpayments and/or overpayments. There is also practice management software available that can help manage audit engagements, etc. To place an order or for further information call the New York office order department at 1-800-334-6961 or 1-800-248-0445 (New York state residents).

Tax Division Publications:

<u>Annual Survey of Computer Usages in Tax Practice</u> - This item is a survey of Tax Division members asking for the names of tax software packages they use and their rating of each using various criteria.

MAS Division Publications:

	Year Published
<u>Larger Computer Systems</u>	
System Planning and General Design	1982
Software Package Evaluation and Selection	1984
Assisting in Software Contract Negotiations	1984
Implementation of DP Systems Using Mainframes or Minicomputers	1989
Assisting Clients in the Selection and Implementation of Dedicated WP Systems	1984
<u>Microcomputer Systems</u>	
Introduction to LANS Concepts and Terminology	1984

Microcomputer Security	1990
Using Graphics in MAS Presentations and Reports	1991
Conversion to a Microcomputer- Based Accounting System	1989
Microcomputer Training (CA)	1991

Technology

Introduction to Artificial Intelligence (IT)	1987
Natural Language Processing (IT)	1990
Mass Storage Technology (IT)	1990

Mass Brochures

Connecting Your Business with the Right Computer System	1990

II. Computer Industry Publications

Books and Periodicals - Almost countless books and periodicals are available at local bookstores that deal with virtually every aspect of the workings of personal computers. These range from introductory level to complex and include topics on operating systems and network concepts to auxiliary user manuals for software packages such as word processors or spreadsheets. On tax and accounting related matters the *Tax Advisor* and the *Journal of Accountancy* publish articles on computer usages periodically, and in the past the *Journal of Taxation* has had excellent review articles of tax software every October and November.

III. Other Practitioners

Another good source of information for both the general workings of your computer and its tax specific uses are other users. Almost all areas of the country have "user groups" that communicate through either meetings of electronic bulletin boards on various computer-related questions. Through local or state CPA societies a practitioner can have access to other CPA computer users to discuss topics specific to accounting and tax practice.

IV. Shareware

"Shareware" is a software marketing system that allows the user to freely copy the shareware program and pass it to a subsequent user who is asked to register and pay for the program if they find the program useful. This marketing approach allows users to "test drive" shareware programs without an upfront financial commitment and allows the user to pay on an "honor system." Many excellent programs are available through this system and range from simple word processors to helpful PC utilities.

CHECKLIST 1 - TAX PLANNING SOFTWARE

(Based on Current Technology as of December 31, 1990)

The following checklist will help the practitioner to decide which tax planning package to use. Once the choice has been narrowed to two or three packages, the practitioner should try the packages to determine which package he/she feels most comfortable using. (Note: It is assumed that if even one client needs planning and you need to do more than one scenario, computerized tax planning is warranted.) Because planning is very individual, the practitioner must decide which items are minimum requirements for his/her practice and which are nice to have, but not necessary.

Enter an Identifying description over applicable Yes/No columns--->>>>>

	PACKAGES EVALUATED					
	YES	NO	YES	NO	YES	NO

Does the package allow for multiple years or cases simultaneously?
How many?

Are all filing statuses used?

Are the following calculations done:
List the most important calculations for your practice:
Regular Tax
Alternative Minimum Tax

Are the following carryovers and limitations calculated:
List the most important carryovers and limitations:
Passive Activities
Capital Gains
Charitable Contributions

Does the package allow for multiple worksheets with sub-worksheets (in order to build detail)? That is, must income and deduction items be entered in lump sum or can they be entered individually?

Are state taxes calculated for your state?

Are state taxes calculated for the following states?
(List all states in which you practice)

Enter an identifying description over applicable Yes/No columns--->>>>>

Can calculate back in years as well as forward?

On line math function?

On line tax help (reference to CCH, RIA, P-H, etc.)?

Pop up calculation screens?

Are changes to worksheets immediately reflected in tax liability?

Can amounts be set to automatically grow in multiple scenarios?

Can itemized deductions be forced?

Can data be imported from a preparation or financial planning program?

Is output assembled in easily readable format?

Are summaries of input and output prepared?

Are the following credits considered?

_____

_____

_____

_____
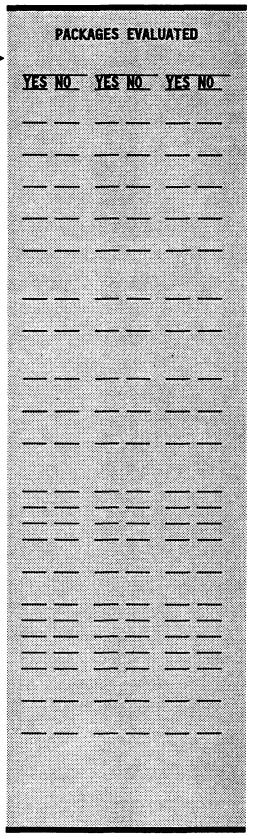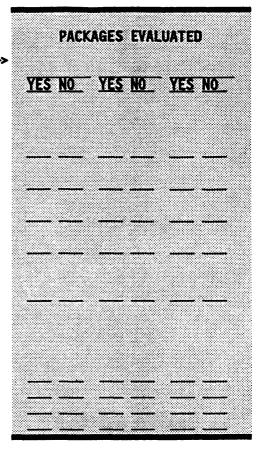
Is the program menu driven?

Can you control:
  Colors?
  Printer Selection?
  Reports?(Expanded or summary)
  Printing and display of reports?
  Output to other programs?

Is the program network compatible?

Is the manual understandable?

Enter an identifying description over applicable Yes/No columns--->>>>>

	PACKAGES EVALUATED					
	YES	NO	YES	NO	YES	NO
Is there on line help (not tax technical)?	—	—	—	—	—	—
Can you change default settings?	—	—	—	—	—	—
How long has company been in business?	—	—	—	—	—	—
Was the program written by a CPA or Tax Qualified Individual?	—	—	—	—	—	—
Are updates prepared during the year to accommodate changes in tax laws?	—	—	—	—	—	—
Does the program accommodate the following income and expense items: (List those items most necessary to your practice)						
_____	—	—	—	—	—	—
_____	—	—	—	—	—	—
_____	—	—	—	—	—	—
_____	—	—	—	—	—	—

Note - This same basic checklist can be used for any planning program, Estate, Corporation, etc. Just change to items to reflect those calculations important to your practice.

CHECKLIST 2—TAX PREPARATION SOFTWARE EVALUATION

Under today's scenario the greatest tax preparation efficiencies are gained using systems with interactive data entry modes that grant immediate feedback to the preparer entering the data. This checklist is designed to evaluate those systems.

	Importance/ Desired Level	Product A	Product B	Product C
Product				
Name				
Company				
Contact				
Phone #				
Company				
Years in business				
Years this product				
Development team size				
Number of users				
Output				
Print to:				
HP lasers				
Xerox lasers				
Printing modes:				
Individual				
Batch				
Produce:				
Proformed input sheets				
Proformed client data collection sheets				
Mailing labels				
Filing instructions				
Cover letters				
Diagnostics				
IRS required supporting Sch's				
Supporting schedules properly indexed and referenced				
2-year comparison				
Control or hash total				
Next year depreciation				
Tax preference depr				
Taxpayer's name and ID on every output sheet				
Forms printed according to government specifications				
Federal tax returns in sequence prescribed by the IRS				
The required number of copies				
List of the schedules and forms prepared for each taxpayer				
Letter of transmittal				
Limited cash flow statements				
Comparison of various Income Tax calculation methods				

CHECKLIST 2—TAX PREPARATION SOFTWARE EVALUATION

	Importance/ Desired Level	Product A	Product B	Product C
Other Processing Features				
Links with other computer applications:				
Electronic filing				
Planning				
Trial balance interface				
Projections				
ASCII interface				
Client tax return database search capabilities				
Per−client contracts for low volume states				
Calculations				
Reflect present tax laws				
Ability to easily override				
Optimizations (e.g. Joint vs. MFS)				
AMT				
Passive loss				
Carryforwards (incl credits):				
Capital loss				
NOL				
Investment credit				
Passive loss				
Depreciation (all methods)				
AMT depreciation				
Non−business % to Sch A?				
Ownership indication				
Depletion				
Expatriate				
Multiple states				
Earned income				
Estimates				
Sch SE & R automatic				
2106 auto limits				
SE health ins limit &				
Reduction to <50% business				
Allocation of selling price for Form 4797				
Gains and losses from the sale of depreciable assets				
Fiscal year returns with prorata calculation				
Installment sales				

CHECKLIST 2—TAX PREPARATION SOFTWARE EVALUATION

	Importance/ Desired Level	Product A	Product B	Product C

Schedules and Forms

Tax preparation programs or services may not have all forms available that you consider necessary for your practice. Tax return vendors determine which forms they will offer by reviewing their customers' demands and usage. As a minimum requirement for acceptability, any computer tax preparation system must provide the forms that are generally applicable to most of your clients.

Federal Individual Forms				
1040				
1040ES				
Sch A				
SCH B				
SCH C				
SCH D				
SCH E				
SCH F				
SCH R				
SCH SE				
1116				
2106				
2119				
2210				
2441				
3468				
3800				
3903				
4136				
4255				
4562				
4797				
4835				
4868				
4952				
4972				
5329				
6251				
6252				
8283				
8582				
8606				
8615				

CHECKLIST 2-TAX PREPARATION SOFTWARE EVALUATION

Federal Business Forms	Importance/ Desired Level	Product A	Product B	Product C
1120				
1120S				
1065				
Sch A				
Sch L				
Sch Ms				
Sch D				
Sch K				
Sch K-1				

State Forms

The preparation of state and local tax returns may be considered a minimum requirement. The capability of preparing such returns is available in specific systems and should be considered in evaluating the applicability of computerized tax return preparation for a practice.

Separate or integrated				
Fed/State/Exempt indication				
Multistate calculations				
State forms needed				

Limits

Programs often limit the number of schedules or transactions that the system will allow per client or the number of digits for certain items such as client numbers. The program you choose should have a limit to the number of forms, entities and amounts that is greater than your normal needs (e.g., more than 10 K-1s).

Sch C's				
Sch E's				
4797's				
K-1's				
Wages				
Sales				
Interest				
Dividends				
Security transactions				
Depreciable assets				
Client numbers and format				

CHECKLIST 2-TAX PREPARATION SOFTWARE EVALUATION

	Importance/ Desired Level	Product A	Product B	Product C

In-house Processing Features

Features for situations in which data entry is accomplished, review is performed, calculation is made or output is printed on systems in your office:

	Importance/ Desired Level	Product A	Product B	Product C
Input screens and/or input forms like tax forms				
Reasonable disk-space req.				
Multi-user capabilities				
Reasonable processing speed				
Reasonable memory req.				
Administrative features:				
Due date tracking				
Work responsibility assignments				
Return status				
Audit trail				

Features for situations in which data entry, review or calculation is performed on systems in your office:

	Importance/ Desired Level	Product A	Product B	Product C
User-friendly interface				
Good use of color and contrast, including user-defineability				
On-screen error-checking				
Good default information				
Tax results displayed on-screen				
Summary return quickly displayed				
On-line tax help				
On-line system use help				
Context sensitive help				
Printable notes				
Pop-up calculator				
K-1 schedule entry				
Interactive data entry mode				
Batch data entry mode				
On-screen review				
Review returns				
Logical screen flow				
Logical cursor movement				
Point & shoot selection				
Auto advance of cursor when data entry field is filled				
Easy client setup				
Uncomplicated installation				
Easy client maintenance				
Simple client selection				
Ability to easily add entry fields when required				
Easy access to detail schedules & forms				
Ease of calculation				

CHECKLIST 2—TAX PREPARATION SOFTWARE EVALUATION

	Importance/ Desired Level	Product A	Product B	Product C
System				
network version*				
network compatible*				
Program size				
Memory				
Disk space				
Per client size				
Language(s) used to write the program				
Calculation time for 25 page return				
Hardware requirements				

Fill in your network type.

Other

Will supplies be available on a timely basis?				
Security features				
Support issues				
Training				
Manual quality				
Conversion				
Updates				

Notes:

CHECKLIST 2–TAX PREPARATION SOFTWARE EVALUATION

	Importance/ Desired Level	Product A	Product B	Product C
Pricing				
Main				
Laser				
States				
State Laser				
Network version				
Proformas				
Electronic filing				
Planning				
Manager				
Early discount				
When discount				
Site license				
Add'l hardware:				
Tax Font				
Coprocessor				
Modem				
Shipping updates				
1st yr total				
2nd yr total				
Total price				

CHECKLIST 2— Cost/Benefit Analysis Worksheet — Tax Preparation Software

Use this worksheet as a general aid to compare the estimated cost of your current system to the estimated cost of alternative systems. When completing this worksheet reasonable estimates are appropriate.

Direct Costs of Tax Return Processing	Current System	Alternative Systems		
		_ _ _ _ _ _	_ _ _ _ _ _	_ _ _ _ _ _
Personnel:				
Additional	$	$	$	$
Overtime				
Temporary Help				
Hardware:				
Computers or terminals				
Communication devices				
Backup devices				
Printers				
Duplicating Equipment				
Assembly Equipment (e.g., collator)				
Storage Equipment				
Supplies:				
Printer cartridges or toner				
Input forms				
Output forms				
Computer media (e.g., tapes, disks)				
Computer Software and/or Programming Expense				
Service Center or Timesharing Fees				
Total Direct Cost				
Present System Costs		( )	( )	( )
Savings (Expense) (A)				

CHECKLIST 2– Cost/Benefit Analysis Worksheet – Tax Preparation Software

Potential Benefits	Current System	Alternative Systems		
		_ _ _ _ _ _ _	_ _ _ _ _ _ _	_ _ _ _ _ _ _
Increased Professional Staff Productivity:				
Preparer training	$			
Client interview				
Research				
Input preparation				
Return preparation				
Conceptual tax review				
Clerical accuracy review				
Ease of making changes				
Elimination of duplicate manual entries				
Increased Clerical Staff Productivity:				
Interview material typing				
Data entry (e.g., keypunching)				
Return typing				
Return reproduction				
Return assembly				
Instruction typing				
Filing				
Improved Client Service:				
Consistent preparation approach				
Assured mathematical accuracy				
Automatic tests of tax alternatives				
Faster turnaround time				
Better final product appearance				
Improved Management Capability:				
Better staff scheduling				
Avoidance of peak load problems				
Control of return preparation cost				
Improved reaction to client needs				
Total potential benefits (B)				
Present system benefits		( )	( )	( )
Total direct benefits				
Total savings and benefits (A + B)				
Less amortized conversion costs				
Residual savings and benefits				

CHECKLIST 3 - TAX RESEARCH MEDIA

The purpose of this checklist is to highlight the major concerns in considering the type of electronic tax research materials you plan to acquire. There are two levels of electronic tax research. At the low level, the tax accountant is looking for a reminder of a law or tax related rate. These types of short questions are commonly supported by the "tax help" feature of tax preparation software and are not considered here.

Tax research at the higher level requires access to code, regulations, case law, rulings etc. Automated support of this level of tax research requires stand alone tax research software and databases. The primary reason to use electronic tax research is to increase the speed of access and the availability of tax research materials. The options vary primarily by storage media and include: CD-ROM Tax Materials, Magnetic disk Tax Materials, and Off-site On-line Tax Materials. While the normal procedure is to continue using a paper tax service, during the 1990s, paper services may decrease or disappear.

Complete the checklist by identifying the importance of the factors below to your practice by allocating 800 points between the listed factors. If you would like to add additional factors, allocate points to the added factors. Multiply the weighting by the rankings and total for each electronic tax research option. (A rating of 3 is the most desirable type for the given factor; 1 is the least desirable.) The highest total is the best alternative type for you. Once you have determined the type of media for your electronic tax research, you need to identify the vendors of that type of product. To analyze the various products, use the same factors listed below.

FACTORS TO CONSIDER:	Example Weighting (a)	Your Weighting (b)	RANKINGS AND TOTALS Magnetic Disk (c) b*c	CD ROM (d) b*d	Off-site On-line (e) b*e
SPEED	200	_____	3 __	1 __	2 __
FIXED COST OF SERVICE	50	_____	1 __	1 __	3 __
VARIABLE COST OF USE	150	_____	3 __	3 __	1 __
COST OF ADDITIONAL HARDWARE	50	_____	2 __	1 __	3 __
EASE OF USE	150	_____	3 __	1 __	1 __
COMPLETENESS OF TAX COMMENTARY	50	_____	1 __	1 __	3 __
COMPLETENESS OF SOURCE DOCUMENTS	100	_____	2 __	2 __	3 __
TIMELINESS OF UPDATES	50	_____	2 __	2 __	3 __
EXAMPLE TOTAL (Example weighting * rankings)	800				
YOUR TOTALS (Your weighting * rankings)		800	2,050	1,350	1,600