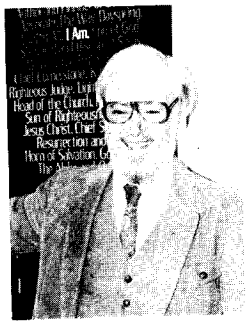
Impact of Microcomputers on Accounting Systems

BY JOHN T. OVERBEY, PH.D., JO ANN C. CARLAND, PH.D. AND JAMES W. CARLAND, PH.D.

JOHN T. OVERBEY PH.D., CPA

Dr. Overbey received his Ph.D., from the University of Texas at Austin and his MBA from Wharton. He has practical experience in public accounting, industrial accounting, and information systems analysis, design, and implementation. He has served on the EDP Technology Research Committee of the American Institute of Certified Public Accountants.



JAMES W. CARLAND, Ph.D.

Dr. Carland is highly productive in research, consulting and publishing activities. His business experience includes multiple managerial responsibilities in banks, consultant for microcomputer acquisition, and Co-founder of two microcomputer software development companies.

JO ANN C. CARLAND, Ph.D.

Dr. Carland is author or co-author of numerous publications in the area of entrepreneurship and microcomputers. She was CEO in a microcomputer software development company and is currently writing a textbook with her husband. Her areas of interest are small business computing, management information systems and analysis and design.

■ In the past twenty years, computers have increasingly penetrated the sphere of accounting. The first computers were large and expensive and, therefore, had little impact on small businesses or on most practicing accountants. With the advent of the inexpensive microcomputers, this situation has changed. The smallest business today can have its own computer. In addition, in large businesses the micro finds increasing usage as a stand-alone unit or as part of a distributed processing system. As a result of the proliferation of micros, it has become important for the designer, user, and auditor of the accounting systems used or accessed by these microcomputers to understand how such systems differ from their manual predecessors. The main areas of difference are: source document generation; order of the accounting cycle; journal/ledger structure; and techniques of internal control. This article will describe the approaches taken with regard to these areas in manual accounting systems and in microcomputer accounting systems.

Manual Accounting System

The heart of a manual accounting system consists of the journal and the general ledger. The journal is the book of original entry, and provides a chronological record of all transactions. The journal is an important link in the audit trail. From the journal, the transactions are posted to the general ledger which summarizes all transactions affecting a given account. Special journals, such as the purchases journal, the cash disbursements journal, etc., provide a refinement of the basic format, but do not affect the order of data flow or the basic underlying theoretical structure. Special journals and their summary postings do provide two important advantages. Their use reduces bookkeeping work and facilitates internal control by separation of duties: one bookkeeper can record purchase transactions while another bookkeeper can record cash disbursement transactions.

Another important part of a manual accounting system are the subsidiary ledgers. Subsidiary ledgers are maintained for any account in the general ledger for which detail beyond the summary data is required. Subsidiary ledgers require separate posting and must be kept in balance with respective controlling accounts in the general ledger. Certain columns in the special journals are posted in total to the general ledger but in detail to the subsidiary ledger. For example, the payments-on-account column in the cash disbursements journal is posted in total to the accounts payable account in the general ledger, but in detail to the accounts payable ledger which shows the organization's transactions with and obligations to each creditor. An illustration of the components of a simple manual accounting system and the flow of transactions is shown in Figure 1.

As Figure 1 demonstrates, the source document triggers the recording of a transaction and initiates the accounting cycle. The source document is assumed to have been prepared by an individual outside the firm, as in the case

A Manual Accounting System

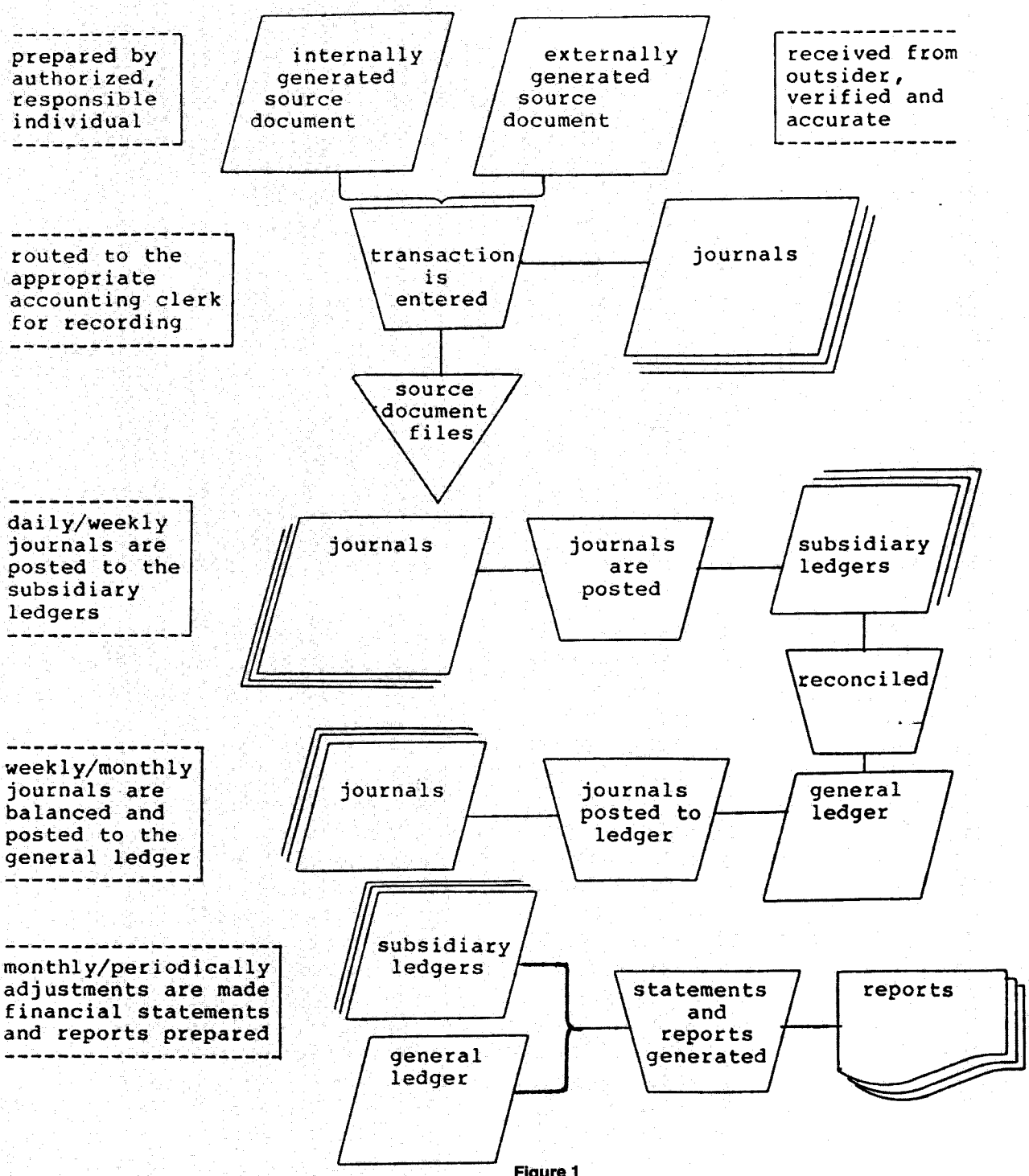


Figure 1

of a bill or statement, or by an individual in authority inside the firm, as in the case of a purchase order, or payment voucher. Internal control procedures involving the handling and preparation of source documents are designed to insure that such documents are indeed genuine, properly prepared and authorized by individuals in authority before they are posted to the journal. Thereafter, internal controls are designed to insure that errors of commission or omission do not occur in the posting of documents to journals, the posting of journals to ledgers, the reconciling of ledgers, and the preparation of financial statements and reports. The controls utilized are the traditional ones of assignment of responsibility to competent individuals and the rotation of duties, the separation of responsibility for related operations, the separation of custody and record keeping, proofs and security measures, and independent review.

Automated Accounting System

An automated accounting system has no specific base. It may be designed around a general ledger or it may be designed around a transaction log, or many other imaginable approaches. Microcomputers need no work-saving device and can actually post transactions more efficiently directly to the ledgers or storage logs involved rather than by following a cyclic approach such as that employed in the manual system.

Microcomputer accounting systems generally follow one of two formats with regard to their organization and functioning. The most prevalent type of system, and generally the less expensive system, is modular. This type of system is designed around program and data file modules which have specialized functions. Examination of a typical modular micro accounting system will reveal a transaction log in which each posting entry and information about that transaction is kept, and a data file which can be considered to be a general ledger in which summary balances are kept for each account in the system. The system will typically contain additional data files which function as subsidiary ledgers and which capture the desired detail about specific accounts. The data in the transaction log is usually sufficient to permit the construction of special journals and a detailed trial balance for a specified period. Such constructions are not required by the system, but are provided by the systems' designers to make the packages more acceptable to accountants who, for the most part, continue to view micro systems as automated manual systems. An illustration of the components of a typical, modular microcomputer accounting system and the flow of transactions is shown in Figure 2.

Accountants continue to view micro systems as automated manual systems.

As Figure 2 demonstrates, the source document may be received in the same fashion as that of the manual system if it is generated externally. If the source document is internally generated, as in the case of a purchase order or a check, then the document is frequently generated by the system itself as a by-product of the entry of the transaction. As an internal control step, the operator may be required to perform some identity or access check such as the entry of a password, after which a transaction which will be posted to the transaction log. At some future time, usually on a daily or weekly basis, the transactions stored in the transaction log are transferred to the appropriate ledgers through a separate posting routine.

In the second system format, this procedure does not occur. In integrated systems, the transaction entering process results in the direct posting of affected ledgers without the requirement for a separate updating routine. Figure 3 shows an example of an integrated system. Such systems are generally more expensive than modular systems, but are superior in terms of responsiveness and ease of use. Unfortunately, the potential damage in the event of misuse is greater in this type of system because the general ledger and subsidiary ledger files are available to the system at the time of transaction posting. This also makes internal control more difficult.

A Modular Automated Accounting System

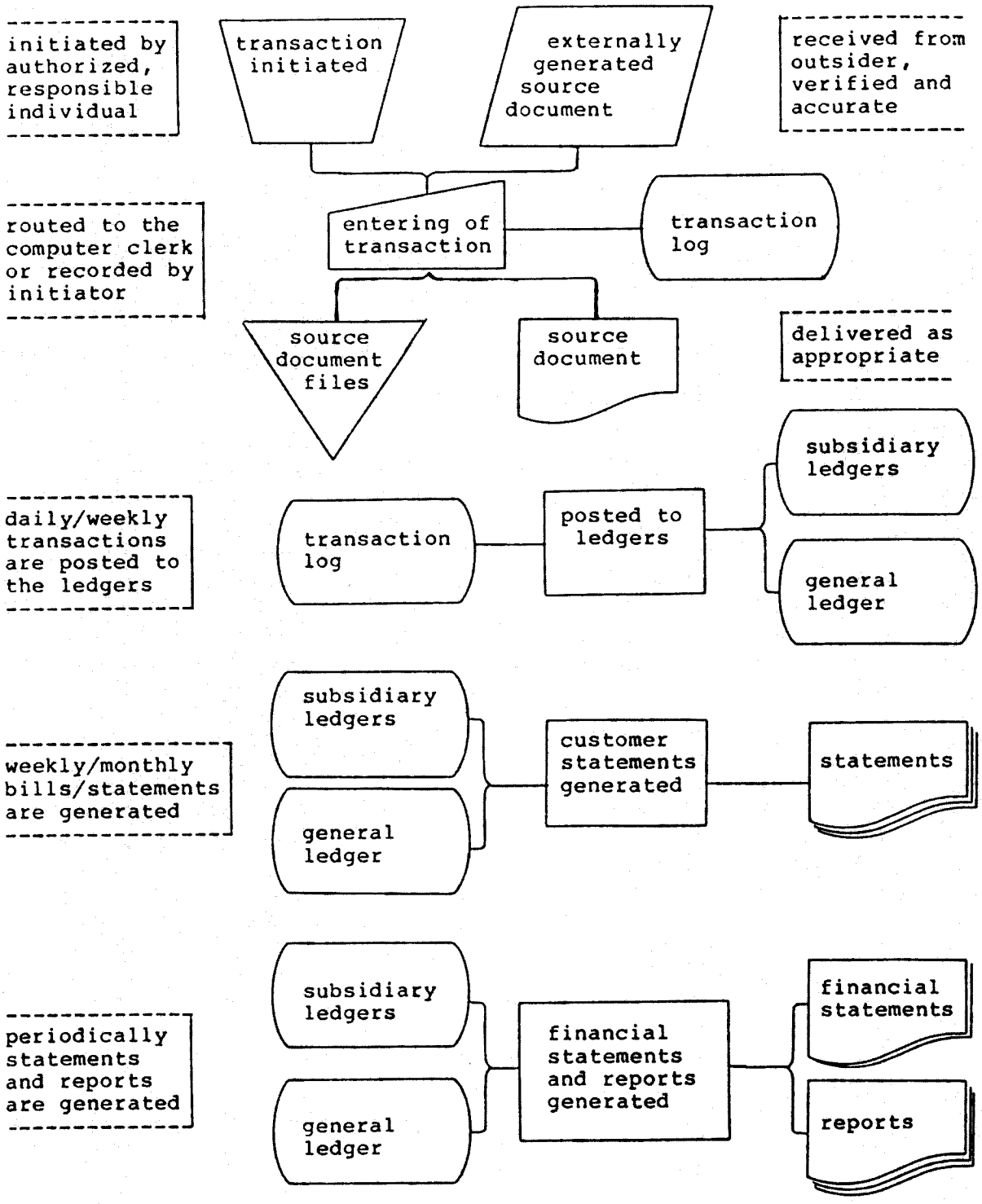


Figure 2

Differences in Approach

A comparison of Figures 1, 2 and 3 will reveal striking differences. Initially, the traditional role of source documents, as original evidence showing that transactions have been properly captured, does not hold in micro systems. Externally generated source documents continue to be available in some transactions, but internal control procedures must recognize that anyone with access to the computer and a little knowledge can generate internal source documents as a by-product of recording transactions. Protective steps which limit access such as passwords will help in this regard, but the accounting system should incorporate additional tools to prevent abuse and insure accuracy in the preparation of source documents. For example, a voucher system requiring approval signatures by responsible parties is invaluable as a control over check generation. Most small businesses have avoided vouchers because of the added complexity and other fac-

An Integrated Automated Accounting System

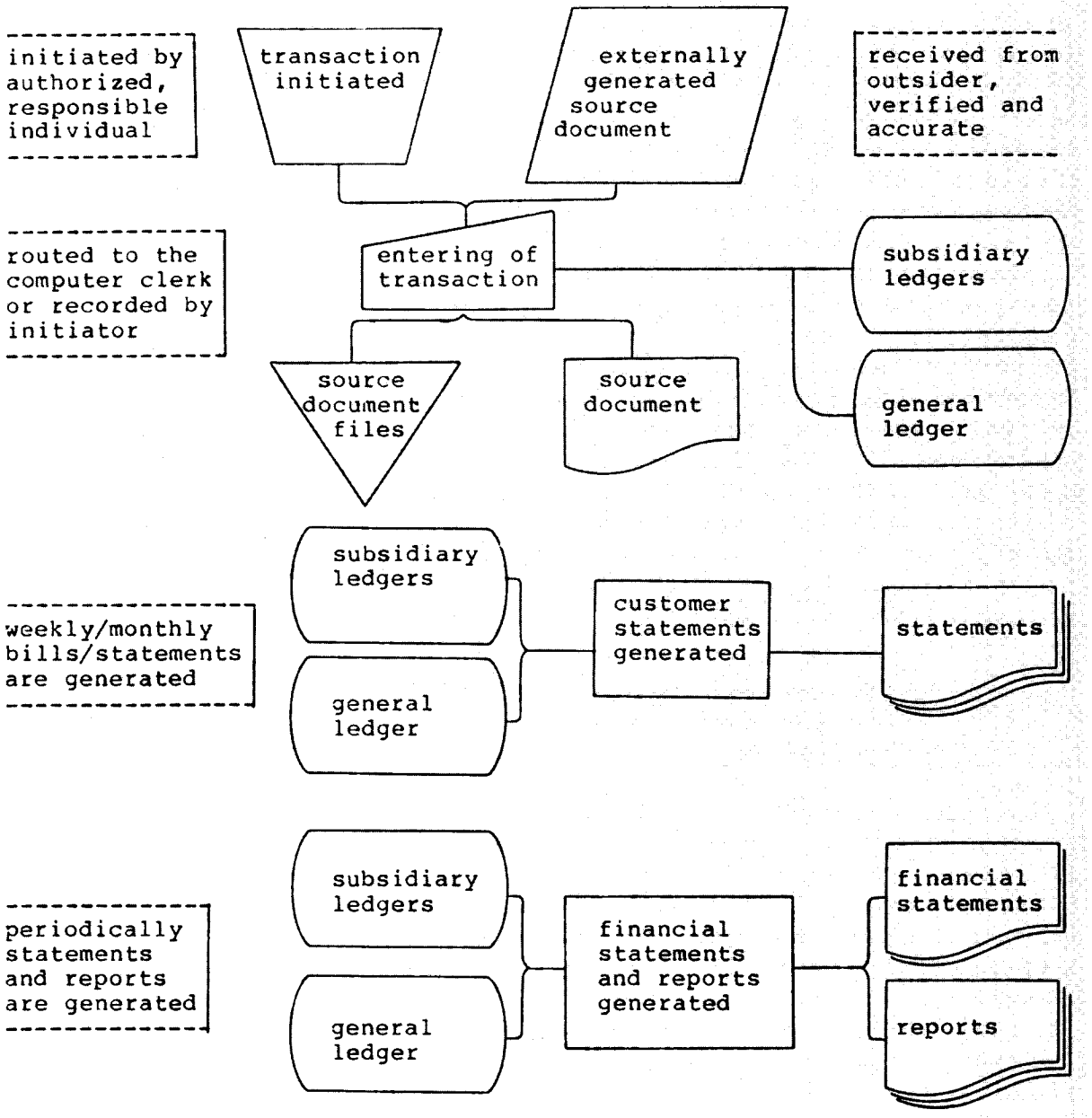


Figure 3

tors, but if a small business employs a micro system which generates checks, the voucher question should be reevaluated. It may well prove to be justifiable from the standpoint of security alone.

The second area of difference between the automated and manual systems is the order of the accounting cycle. The manual system's flow is transaction to journal, journal to subsidiary ledger, journal to general ledger, reconciliation of ledgers, and generation of statements and reports from the ledgers. The micro systems have but a single entry point. In the case of the modular system the entry is to a transaction log. Thereafter, automated routines manipulate the transactions to produce the general and subsidiary ledgers. In the case of the integrated system, the entry is directly to the ledgers. In both system formats, automated routines generate financial statements and reports. If initial internal control steps have been employed to ensure that the automated routines do in fact function properly, then further system flow concerns revolve around the scheduling of program runs and control over data and program files. For the accountant these differences mean that one of the most effective of all control procedures, the separation of responsibility for related operations, is virtually impossible in a micro system. Instead, controls must be developed which ensure the integrity of the programs themselves, schedule the running of the programs, secure the output resulting from each run and protect data files in the system.

The transaction log is often the heart of a modular system.

Manual and automated systems differ with regard to structure also. The traditional concept of journals does not hold in a micro system. Journals do not reduce workloads, do not illustrate account activity, nor provide audit trails. In a micro system the journals are generated as a result of other records. It would be wiser for accountants to abandon their reliance on journals entirely so that focus on the real records of a system might be developed. The transaction log is often the heart of a modular system. Its location, structure, and maintenance should be the primary concern of the accountant in a micro system. Account analysis using detailed trial balance is not an acceptable tool for this purpose either, because the detailed trial is generated from the transaction log. Controls must be developed to ensure the accuracy and integrity of the transaction log directly. In an integrated system the ledgers themselves are typically the heart. In order to exert control over these files, accountants must ensure that sufficient detail is captured in the files to provide an audit trail to the transaction entering process and that controls over that entering process exist which are effective.

Internal Control Differences

The traditional aspects of internal control are: assignment of responsibility to competent individuals; the rotation of duties; the separation of responsibility for related operations; the separation of custody and record keeping; proofs and security measures; and independent review. The first of these control steps is equally valid in either manual or micro systems. However, there is a major problem with microcomputers which relates to physical security. In manual systems journals and ledgers are afforded physical security. In main frame computer systems access to the computer and its software are restricted. However, companies which employ microcomputers frequently afford such machines no physical security at all. This may be a function of the requirement for quick access or a result of the multiple applications of the equipment (word processing, etc.), but it invites tampering by unauthorized personnel. If the micro system employs diskettes for record storage, then physical security should be extended to the diskettes as well. If the system employs 'hard' disks which are continuously on-line, other control procedures must be employed to restrict access to the accounting programs and records stored on those disks. Passwords are not effective in micro applications. They help, but not only is it easy in the normal course of transaction processing for unauthorized individuals to discover passwords, it is easy to discover what the passwords

are themselves with relatively minor technical skills. The same problem plagues access logs and similar devices. Such technical skills are increasingly present as the society seeks and attains computer literacy. This also means that program integrity is increasingly endangered from the same sources. There is no 'quick fix' for this problem which will intensify as systems knowledge is enhanced. Accountants should pay close attention to the security/access issue and independent reviewers should make it a major factor in audits.

Accountants should pay close attention to the security/access issue.

The rotation of duties and the separation of responsibility for related operations do not constitute strong control features for micro systems. The underlying theory of record inspection by new/different people will not suffice in a micro system because the data files themselves are not viewed in the normal course of affairs, and because those files are subject to direct manipulation given sufficient technical competency. The separation theory of maintaining the parts of transactions in separate places is also violated by the recording of all transactions in the same place. This issue of direct manipulation is not trivial. In a micro system an individual with sufficient technical skill can destroy, change or distort original records. One review tool which can be used to check for such manipulations is the making of transaction data copies on tapes or diskettes at various times and dates. As part of the internal audit and/or independent review, these copies can be checked against transaction records currently in the system. Such vertifications can be done with the computer itself. The requirement is for control over the duplication process and custody of the record copies. This should not be a major issue, since backup record-making should already be a part of the daily processing.

Separation of asset custody from recordkeeping continues to be a viable internal control procedure. However, the system access question discussed above re-emerges. In the absence of effective access restrictions, individuals with custody of assets could obtain entry to records. Effective access controls make separation of custody and recordkeeping viable.

The use of proofs of various types has long been a major tool of control in main frame computer systems. Such controls are of less value in a microcomputer system because it is 'live'. Data is not entered in 'batches' nor is data necessarily entered in any given sequence. In a micro system a purchase order might be generated, followed by a check, followed by the recording of a sale and back to a purchase order. This means that other control steps must be developed to ensure accuracy and validity of data input. If the programs have been well-designed, entry errors can be minimized by controls internal to the computer system itself. Such controls take the form of range and reasonableness tests, balance requirements, transaction completeness limits, etc. For optimum use of these features should, of course, be verified by the accountant as part of the design/review process and the integrity of the programs assured thereafter. Development of other control steps to ensure validity of entries is a repetition of the access problem. The issue is a major one which must be attacked in each company on an individual basis.

Summary

Integrity in manual systems is a constant ongoing concern. The same is true in microcomputer accounting systems. The problem is that the traditional control procedures do not apply. New processes must be developed constantly and reviewed constantly. In order for micro systems to function as desired, accountants must not assume that they are automated manual systems. Resolution of the vagaries in source document generation, order of the accounting cycle, journal/ledger structure, and internal control, must be sought by the accountant/auditor as systems become more prevalent in the realm of small business accounting. Accountants must develop an understanding of accounting information systems just as they had to develop an understanding of the manual predecessor. **•jsm**