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Electronics and the Internal Auditor

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The accelerating trend toward the use of electronic data-processing equipment in the office raises some questions of concern to all auditors — internal or independent.

1. Can we assume that business electronic data processing (called EDP) will not require a change in our auditing methods or our auditing standards?
2. Under EDP will some documents which are now utilized as audit-trace media disappear?
3. Does the concentration of many critical operations in one powerful machine system increase problems of internal control?
4. How much do we really have to know about EDP to do an effective job of auditing?

As we explore some of the answers to these questions we arrive at some rather startling conclusions.

A review of the applications presently being accomplished on EDPM indicates that the accounting procedures followed are not essentially different from those of the past. The accounting framework with which we all are familiar has been preserved. Source documents, books of original entry, ledgers, and detailed lists of transactions with their respective summaries form parts of the new system. Under such a framework it seems that our present auditing methods and standards are still valid.

Nevertheless, there will be elements of substantial change. Our evaluations will require modification of our techniques, our examination schedules will become more exact, and some of our audit thinking will be changed — but, on the whole, our coverage of subject matter and our measures for performance should remain the same.

These conclusions are based on some case studies completed recently where medium- and large-scale electronic data processors are being used for business applications. In each case the approach to EDP has been to transfer to the electronic machines an already highly mechanized accounting application. Under such an approach, the

auditor has no problems which are fundamentally different from those experienced previously under punched-card systems.

INTERNAL AUDITING CONCEPTS UNDER ELECTRONIC DATA PROCESSING

The first designs of EDP systems had two basic concepts of particular concern to auditors:

1. Integrated data processing.
2. Management by exception.

Integrated Data Processing

An ideal integrated data-processing concept would be a true "write-it-once" system. This means that any transaction would be recorded manually only at its inception. This recording could be performed on a machine which would produce a continuous tape recording of all pertinent data. For all future uses of this data within the accounting structure of the company, the tape would supply all necessary information. There would not be the conventional series of manual and machine transcriptions. There would not be the usual records showing the pathway by which the transaction traveled to its destination in some final summary or report to management. The contents of the original tape would be digested by a computer and computer decisions would direct the data without benefit of human assistance or hindrance. Integrated data processing has as its objective the abolishment of unnecessary paper shuffling which constitutes a major portion of the clerical effort within the modern accounting office. The by-products of this abolishment of intermediate records would be the elimination of transcription errors, the elimination of lost documents, the elimination of certain reference files, and the elimination of the many inefficiencies built into present systems.

Under this concept, then, there would disappear many of the control records now used by the auditor in tracing transactions for accuracy and classification.

Management by Exception

A similar situation would exist under the concept of management by exception — as applied to electronic data-processing systems. The proponents of this method believe that the most effective use of the powers and abilities of this electronic equipment can be achieved only by changing our traditional accounting methods and techniques of reporting. Under this concept, there would be complete reliance on the electronic hardware to function in such a manner that only those items

requiring the attention of management would be included in the output reports of the computer. It sounds most reasonable for example, to propose that it is unnecessary to print out an entire stock-status report for all items in the inventory when only a small percentage of items need any type of action. The items requiring action would be the only ones on the periodic print-outs. On the other hand, is this not a rather drastic departure from our traditional reliance upon complete, visible records? It seems to me that at this time we are in an early stage of record evolution. Accordingly, we will be slow to accept in entirety any of these plans which do not offer us more concrete assurance of reliability than the flickering-neon pilot lights and spinning magnetic-tape reels.

When more completely integrated systems come into being and when electronic systems are adopted based on the principle of management by exception, we, as auditors, will have to reexamine our audit programs and incorporate therein some rather extensive changes. This, however, will be no sudden action. Extensive modifications of accounting systems are difficult to accomplish within short periods of time. Current evidence indicates that we shall have plenty of time to adjust our audit programs so that we shall still be able to express an opinion as to the fairness of the representations in the financial statements based on data processed by electronic equipment.

EVALUATION OF INTERNAL CONTROL UNDER ELECTRONIC DATA PROCESSING

The one area in presently installed electronic systems which poses an immediate problem to us is that pertaining to the study and evaluation of internal control. We have been accustomed to the generally accepted method of achieving effective control by the arrangement of various individuals. The work of one individual or department is controlled by the independent work of another individual or department. Where electronic data processors are used, this approach will no longer be feasible, in most cases.

Where internal control has been obtained within an electronic system by means other than the segregation of duties, will we be competent to judge the efficacy of such controls? This would appear to require some knowledge of controls built into the machine's program of instructions, of the data modification possible from the operator's console, of the extent of access to intermediate results stored in invisible form, and of the general reliability of this new equipment.

Stored-Program Control

The automatic operation of electronic data-processing equipment is controlled by the stored program. The auditor should know of the means by which it would be possible to modify or manipulate this program — either during the processing of data or while the program is held for use on magnetic tape or punched cards. Here the auditor must first ascertain just what controls are possible over the programs. Once these controls are designed and built into the program and have been tested, they must be safeguarded and retained over the entire period of use of that program. Tests at intervals should be made to ascertain that the controls have not been altered fraudulently or accidentally. It must be realized that within an EDP system there must be control over the work of the console operator if protection of the program is to be realized. From the console it is possible to enter data into the system and to revise data stored within the equipment. Accordingly, the auditor should ascertain if there exists a situation wherein the operator could gain some advantage by fraudulent manipulation of the data under process. Where there exists such a situation special care must be taken to establish equipment controls in order to prevent reruns of certain tapes, such as those for payroll checks. At least the same degree of care should be exercised over the tape reels containing important records as was formerly exercised over their more conventional counterpart. Machine operation should be such that all entries made from the console are programmed so as to print out on a supervisory printer. This would permit visual inspection of all manually entered information. Print-out of this type should be retained as part of the records of the data-processing center.

Input Control

The input and output of the EDPM should be controlled in the same manner as document control is exercised in our present punched-card systems. Where this input consists partially of previously processed data stored on magnetic tape, the control of tape reels, mentioned above, should be combined with a control-record system which would provide quantitative proof of that portion of the input. New-data input should be under batch-control until proof of these totals by independent controls has been established. These quantitative controls should then be incorporated in the data-processing center control record. These are the controls intended to safeguard the input against error or the subsequent entry of previous data or the loss of a portion

of a record. These are the input controls, then, which must be evaluated by the auditor.

Output Control

The auditor must also be concerned with all classes of machine output. Where output is in the form of familiar, visible records, the control may be rather conventional. However, it must be realized that in direct print-outs from tapes, the printed totals originate on the tapes and are not a result of addition on the printing device. Those familiar with punched-card printers will recognize this difference in method of obtaining totals. The validity of the tape-recorded totals rests solely with the internal functioning of the electronic central processing unit. Where output on magnetic tapes is to be used for data storage in that form, and not printed out, there is another control problem involved. It may be desirable in such instances to accumulate and print out for each reel a unit record count and some other quantitative amounts for comparison with the control record. The auditor should be concerned with the method of using this control record to ascertain that the magnetic record is not altered between the time it is prepared and the time it is again used in the electronic processor.

General-Reliability Control

It will not be easy for the auditor to resolve the problem of the general reliability of a particular electronic system. Any such opinion would have to be based on a certain amount of technical knowledge not previously attributed to accountants. Electronic-system reliability in producing results free from error stems from various sources.

Probably the most important of these is the circuitry built into the equipment. This is usually designed so as to provide for checking the data as it moves from place to place within the equipment. It starts with parity-check bits placed on the magnetic tape automatically by the recording mechanism. As the bits forming the binary-coded character speed through the system they pass checking stations watching for missing bits. Error signals flash after the machine has tried, automatically but unsuccessfully, to reread any troublesome message. Duplicate circuitry is used in some equipment. Here everything is done twice in a parallel action with check stations all along the lines. In some printing devices, echo checks are used which send back a signal from the type bar asking if the correct one is being actuated. Without a knowledge of these technical construction features, how can an audi-

tor form an opinion as to machine reliability? The answer is probably that he can not.

Another source of machine reliability stems from the self-auditing steps built into the program. These are subject to examination and test by the internal auditor. They are in the form of recomputations of arithmetical functions and comparisons of results; or, are in the form of routines programmed into the machine for storing checked data temporarily in a section of the equipment so that all work can be backed up to that proven point and started from there if an error occurs; or, are in the form of many predetermined totals stored within the system for testing at programmed check points.

Machine reliability is dependent also on rigid schedules of planned maintenance. This maintenance is usually in the form of overload tests under marginal conditions. All parts exhibiting weakness under these tests are replaced. Adherence to the specified maintenance schedule and observance of replacement standards are the concern of the auditor where machine reliability is under scrutiny.

Summary of Internal-Control Evaluation Process

All of these matters, then, are within the auditor's sphere of responsibility as it relates to the acquisition of knowledge of internal control:

1. Possibilities for programming controls into the equipment and possibilities for alteration of those controls.
2. Controls necessary outside of the equipment for data stored on magnetic tapes and proper methods for using physical and quantitative control of the tape record.
3. Reliability limits of the equipment and steps necessary to insure constantly reliable operation.

The internal auditor, concerned with one system and one set of electronic machines, is in the most favorable position to arrive at a sound evaluation of the controls within the machine system.

INTERNAL APPRAISAL ACTIVITY UNDER ELECTRONIC DATA PROCESSING

Internal control is but one phase of the responsibilities of the internal auditor. Quoting from your Society's "Statement of the Responsibilities of the Internal Auditor" -- "Internal Auditing is the independent appraisal activity within an organization for the review of the accounting, financial, and other operations as a basis for protective and constructive service to management. ...The overall objec-

tive... is to assist management in achieving the most efficient administration of the operations of the organization----".

Possible Modifications in Auditing Techniques

If this appraisal activity must be accomplished within an electronic data-processing system, what modifications are necessary in our conventional audit techniques? These techniques are such procedures as:

1. Analysis and review.
2. Observation.
3. Inspection.
4. Confirmation.
5. Inquiry.
6. Computation.

Analysis and Review

Analysis and review is performed on historical records and source documents. Under some concepts previously mentioned, it may be that certain of these records and documents may be eliminated from the system. At least some will be converted to magnetic tape. Within the electronic system there will probably be a requirement to print out account totals only and not show transaction detail or source references. This would be most efficient for the equipment but most baffling for the auditor.

Where there is not a continuous print-out of each transaction, the system will possibly provide for each transaction to be stored on a cumulative transaction tape arranged in some logical sequence. It is this transaction tape which is eventually processed against the master tape to accomplish the up-dating procedure. It is customary, also, to retain processed transaction tapes for a few generations of tape use. This would mean that the auditor would have the opportunity of requesting a print-out of detail from the last two or three processed transaction tapes. These print-outs could be used in the analysis of the master tape items for the periods involved.

Another approach to this problem of analysis and review would be the month-by-month comparison of account totals for evidence of irregularities. Where fluctuations are found which are not reasonable there would be a possibility either to request maximum detail print-out from the master-record tape or, where master records show no detail, to resort to the source documents or to some input data in mechanized form. With respect to the latter, where transactions have been entered

into the electronic system by means of punched cards or perforated paper tape, it would be possible to locate source documents by reference data information on the cards or tape. By sorting the punched cards for the appropriate period by account number, for instance, it would be possible for the auditors to obtain a set of cards representing all postings for that period.

All of this type of thinking leads to the question of just what we, as auditors, are going to require of this new electronic system. What will be the minimum which we will be willing to accept with respect to the preservation of conventional records for our review? I believe that we will adapt ourselves to this new approach by being satisfied if, at a given point in time, we can use available documents and tape records to verify selected current items. We would probably limit the extent of tests required of less current items which might offer serious resistance to reconstruction.

Observation

There is every indication that our auditing technique of observation will be more significant under electronic system design than it has been in the past. This technique refers to the practice of being present to observe the manner in which prescribed procedures are being followed or violated. This implies that a knowledge of computer routines and job schedules has been acquired by the auditor so that he can observe intelligently. During this audit phase there would be obtained evidence of the function of the internal controls previously mentioned. The manner in which tape files were controlled, the use of records within the data-processing center to control accuracy, the obtaining of periodic print-outs for machine checking — all of these activities could be observed for conformity with authorized practices. This would be an evaluation technique.

Inspection

Probably the auditing technique most familiar to all of us is inspection — inspection of cash, of inventories, or property, and particularly the inspection of documents and records. Behind this inspection procedure is the desire to ascertain the existence of the item and, in most cases, the authenticity of the item. While the physical assets should not disappear through the use of electronic data processors, we have a feeling that some documents may be missing after an electronic system is installed. Outside of the system there will still be the familiar invoices from vendors, disbursement checks, copies of bills,

and the like. However, the paper created internally — the time cards, journal entries, registers, directives, etc. — may not remain where a highly integrated system is adopted. The disappearance of these may not bother us particularly, but may force a redirection of effort since we have been in the habit of using them as evidence of accuracy of management authorization, or of conformance to a plan. We are so accustomed to relying upon signatures, initials, or other evidence of approval that we will find it is not easy to abandon this visual proof of authenticity.

Inspection of documents retained in the system may become more difficult under the electronic approach. This would be due to a change in filing methods which might result from data-handling routines in the system. Where it is no longer necessary to sort documents manually before translation into machine language, it has been suggested that it may no longer be necessary to sort the documents for filing. This presupposes that it would be possible to assign a document number to each piece of paper in its random order of entry into the data-processing system. This document number would then become the reference number for all subsequent identification. Any change of this nature would be of concern to the auditor, since it relates directly to the ease of performing the audit function.

Confirmation

Confirmation procedures might change considerably where the records are maintained within the electronic data-processing system. Routines will have to be developed for choosing the items for confirmation, especially where such items will require special handling, such as duplicate copies or print-outs on special forms. It seems, also, that there will be a need for definite pre-arrangements so that the auditor will know exactly when he must be present to control his confirmation procedure. Except for this requirement for closer scheduling, however, there do not appear to be any particularly difficult problems relating to our confirmation technique.

Inquiry

Our technique of inquiry will be of value in ascertaining the extent of the use of electronic equipment. It will aid in defining the scope of investigation necessary. By inquiry it will also be possible to gain an understanding of the methods used to achieve results on the data processor. The information gained through inquiry could be verified

by brief tests designed to simulate authentic data but for which predetermined results have been prepared.

Computation

Use may also be made of specially constructed test routines for verification of the computational functions which are said to be programmed for a particular application. Because of the computational ability of these electronic devices we could curtail our work with respect to standards of accuracy to tests of this sort. This would assure us at least that the machine was using the proper formula for the job under review. By timing the visit of the auditor to the processing center, it might be possible for him to assume immediate control of certain reports as they emerge from the printers. This procedure, combined with the aforementioned machine tests, should eliminate the necessity for subsequent footing of these particular reports.

Summary

This mention of some of the modifications which might be made in auditing techniques is not intended to be anything more than suggestive of the possibilities which exist under electronic data processing. For the most part, these are the same techniques which have been used in the audit of conventional accounting systems. The significant changes will be in our methods of applying these techniques.

AUDITING PROCEDURAL MATTERS UNDER ELECTRONIC DATA PROCESSING

Let us turn our attention, then, to some of the procedural matters deserving of our attention as auditors under electronic data processing.

For the most part, the present electronic systems are in the thinking, designing, or installing stages. The veteran systems are probably not much over one year in age. This should be an interesting period for the internal auditor. He should be in close contact with the systems and procedures group. He might even be a member of the group. At the very minimum he should be included in the weekly, or periodic, coordination meetings held by the group responsible for designing the electronic data-processing system. His purpose in attending should be twofold. He can make valuable suggestions as to methods of including controls in the new system. He will become familiar with the new system as it is constructed and will be in a position to plan audit strategy based on this knowledge.

New Audit Program

After the new system has been designed and checked on the computer, the auditor should observe the operation of the system while it is undergoing its parallel test. During this period he should revise his former audit program where it is affected by the electronic system. He should devise checking routines for his own use where this appears desirable. He should also set forth in his audit papers the control methods established in the data-processing center and a program for checking these controls. The auditor should include in his survey a list of any special reports which he will require for audit purposes at certain intervals. A list of these reports should be given to the EDP supervisor so that they can be included in his work schedule. The audit program should suggest a schedule of attendance in the data-processing center for observation of particular reports while they are in process of preparation. Any special forms for confirmations or transaction registers should be designed and adequate supplies ordered.

Observation of Change-over

After the parallel operation has been accomplished and a change-over procedure begins, the auditor should be in attendance at the computer center sufficiently often to observe the functioning of the controls and their effectiveness in obtaining accurate and complete results. He should be available for consultation on the matter of any system or control revisions. Any tendency to over-control should also be evaluated since the controls should not be a road-block to the electronic system.

By the time that the new electronic data-processing system is in operation and new applications are being planned, the auditor who follows procedures such as these would be completely in step with the whole program and adjusted to it. He would be in a position to carry out his responsibilities to management.

Program of Education

An important unanswered question is, "What should the auditor be doing now to enable him to participate in such procedures?" There is a matter of competence involved here. I believe that all of us who are concerned with the examination of accounts, records, or procedures where electronic equipment is now being put into use or where such systems are contemplated should be following a definite program of self-preparation.

This program should include as a minimum a study of the fundamental theory of stored-program machines. This is most easily ac-

complished by attending a short course in electronic data-processing machines as presented by the machine manufacturers. The courses in programming are the best way to find out how the equipment works. It would be possible to acquire a reasonably good knowledge of computers by reading one of the textbooks now in print on this subject. It does not seem practicable to attempt to learn about EDPM by attending technical meetings. The fundamentals are usually ignored at these gatherings in favor of the more specific problems relating to this new development. Courses in this subject are now being offered at university extension divisions and business schools. These vary considerably in content and should not be attended without first determining if the course includes material designed to meet your level of requirements. During these next few years every auditor will have to acquire some knowledge of electronic equipment if he is to retain his stature in the field of auditing.

BROADENED RESPONSIBILITY

The role of the internal auditor as an essential instrument of business management has broadened significantly during the past few years. I sincerely believe that his responsibilities will be even greater under the concept of electronic data processing. We are just through the threshold of this new frontier of office automation but there is already an indication that the internal auditor will be the only person in a position to conduct a continuous and timely appraisal of the electronic systems. From now on there will be a more insistent need for even greater coordination of the work of the internal auditor and the certified public accountant. Those of us in public practice look forward with pleasure to this closer relationship.