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## Electronic Data Processing: The Computer As An Audit Tool

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# ELECTRONIC DATA PROCESSING

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## The Computer As An Audit Tool

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Computer-assisted auditing techniques frequently provide the auditor with opportunities to perform necessary audit procedures more efficiently and, in many instances, to perform tests of greater depth by providing freedom from the usual time and cost constraints that can exist with manual procedures. The advantages of computer-assisted techniques are especially great where the client's records are already in machine-readable form and would not otherwise have to be printed. However, even when the client's records are not computerized, the auditor may find use of the computer convenient. In those instances the computer can be used by the auditor where the calculations required by the audit are numerous and/or complicated. By applying computer techniques, the auditor can gain access to a great deal more information than would be possible under traditional manual techniques, that also can free a much larger percentage of audit time for evaluation and judgemental activities than was previously possible.

### Functional Abilities Of The Computer Useful To The Auditor

Computers can be used to perform a wide variety of routine clerical tasks rapidly and efficiently. The computer can be used to scan all records within a given file for internal consistency, completeness, and validity. This means that all records can be examined as opposed to merely a sample. At the same time the computer provides as an immediate by-product a means of checking all extensions, control totals, and cross-footings. The auditor previously may have spent many hours

performing detailed tests and computations. These can all be done rapidly by the computer at the same time that more complex and sophisticated tests and analyses of client files and other financial data can be performed.

As computer programs are used to analyze the records in a client's files, to search for attributes in which the auditor is interested, or to scan the data records for irregularities, the auditor can simultaneously be producing exception reports that can be subsequently examined in detail. In this way routine or usual items can be handled quickly and without much attention from the auditor allowing concentration on those items that are unusual. In addition, the auditor can use the computer to sort, compile, and analyze large collections of information that have been generated by the audit itself.

One of the major uses to which the computer can be put is to search and retrieve records from client files. The computer can search huge volumes of records or transactions in a very short time, identifying and selecting items that may have a particular audit significance. As long as the characteristic by which the selection is to be made can be described in an objective manner, a computer can be programmed to recognize this characteristic and select records containing the identified characteristic for further audit attention. An application of this ability of the computer to search computer files and retrieve certain records is the use of the computer in selecting and printing confirmation requests.

The computer can be used to select audit samples on the basis of any objectively defined characteristic or condition. In addition,

however, the computer can be used to formulate and select random samples. Generation of random numbers can be a time consuming manual procedure, but on the computer it can be done rapidly. Furthermore, the auditor can be aided in determining sample sizes needed to satisfy certain statistical confidence levels and to sort and print out the lists of the sample items in the numerical sequence of the records, documents, or other forms to be audited.

Another area where the computer can be of great use to the auditor is in facilitating the many mathematical computations that must be made — such as verifying the extensions, additions, and calculations of the client's records (which, incidentally, can be performed on all records rather than just a sample). Further, the auditor can use the computer for the auditor's own calculations. The speed of the computer will enable the auditor to compute a much greater variety of ratios and averages from the client financial and operating data. These figures can be used to identify deviations within the current year's results or to provide better comparisons with prior year's results. Procedures such as the aging of accounts receivable, preparation of usage requirements, and analysis of inventory for obsolescence can all be facilitated by computerization. The computer represents a great advantage in handling data files, because large-volume machine-readable files can be easily summarized and used to provide reports to the auditor in whatever detail or level of summarization may be most useful.

The ability of the computer to read rapidly through large volumes of information can also make it convenient for the auditor to use the computer to make comparisons between two or more files of data. Comparison of two generations of a file (for example, payroll) can provide a changed log against which to verify all transactions affecting the master records (such as terminations and additions to the employee rolls). The computer can also be used to compare independently collected data to client records — for example the auditor can compare the results of test counts of selected items of a physical inventory to the inventory records and very quickly identify any



discrepancy. During the comparison the computer can be calculating cost-price extensions and comparing those as well as the quantity counts, to the client records. Discrepancies can be immediately brought to the auditor's attention. Similarly, the auditor can compare the previous year's expense records to the current year's expense records selecting for further detailed examination items that show unusual variation or change.

### Testing The System vs Testing The Data

The computer can be used in two ways: first, to test the system itself; second, to test client data. In the first case, effort is concentrated on testing and validating the processing system on the assumption that if the system that produces information is complete, accurate, and well-controlled, the results that the system produces will be correct. The techniques employed in this process are compliance tests. For example, the computer can be used to process test data against existing programs to determine whether these programs and their related procedures produce predictable results.

The second approach concentrates on retrieving and verifying the data itself. Techniques to test the data may be either compliance or substantive tests depending upon the use to which they are put. For example, testing data to determine the incidence or rate of certain errors or the predictability of results is a compliance test. Using the same client data to verify the financial values represented by that data is substantive testing. In tests of client data, the auditor can use the computer to retrieve data, to tests extensions and footings, to select and print confirmations, to select and print audit samples, to compare duplicate data for consistency, to compare audit data with company records, and to perform analyses of audit samples.

Frequently, tests of compliance are closely interrelated with substantive tests. Specific auditing procedures may concurrently provide evidence of compliance with accounting control procedures as well as substantive evidence of accurate records. In some cases, actual data may be used as the auditor samples the results of processing for the existence of conditions that should

have been detected by programmed controls. While some of the compliance testing procedures may use actual data, others may introduce simulated or test data for purposes of tracing the way in which the system handles the simulated data. Whatever procedures are use, the primary purpose of compliance testing is to test the system not the data. The primary purpose of substantive tests is to verify the accuracy of the data.

Systems testing procedures include the following computer-assisted techniques: program code review using computerized tools such as automatic flow-charting programs; the use of copy utilities which allow the auditor to make copies of program code for subsequently controlled use or comparison; the introduction of test data to test the organization's existing processing system; the use of integrated test facilities (ITF); system or parallel simulation; and several procedures for analyzing program code, including the use of cross-reference systems and optimizer packages.

Computer-assisted techniques which test data always involve the use of some program (either one prepared by or controlled by the auditor) to access and analyze the data. These programs which are used to test the data may be generalized computer audit packages or generalized computer software, the latter frequently provided by the vendor of the client's processing system. Occasionally the auditor will write special programs for particular audit problems or the auditor may use built in audit routines which have been embedded in the organization's computer system.

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## Audit Languages and Programs

The most heavily used computer-assisted audit procedure is the execution of an auditor controlled program to retrieve and analyze client data from client files. The auditor controlled program is usually some form of a generalized computer audit program, although in special circumstances the auditor may find it necessary to use a controlled copy of a client program or even write a specially designed audit program for unusual circumstances.

**Generalized Audit Software**—A generalized computer audit program is a pre-written program designed to perform certain audit procedures on computer files through provision of a group of optional routines that can be selected by the auditor as the requirements of a particular audit situation dictate. A number of these generalized computer audit programs or packages are available. Some have been written by software vendors who hope to sell them for a profit and others have been written

by auditing firms for their own purposes. They have all been designed to make it easier for the auditor to use the computer in the performance of an audit. While it is not necessary to write the programs to perform the procedures desired, the auditor must still communicate with the generalized audit program in order to identify the processing to be done and to describe the data files of the organization. This is necessary because the generalized audit programs must be designed to handle many different forms of data with many different types of organizations and fields — otherwise they would not be generalized programs.

When the auditor is concerned with testing existing data for either compliance or substantive purposes, there are usually certain basic functions which are performed on that data. These functions are to search large computerized files and retrieve items that have audit significance; to select samples from computerized files using systematic random sample techniques or to calculate a sample size necessary to satisfy desired statistical confidence levels; to perform basic mathematical operations of addition, subtraction, multiplication, and division; to perform file comparisons, merges, and sorts; to summarize large volumes of data and report the results; and to output the results of these operations in some suitable form — usually printed reports. All of the generalized audit packages are designed to perform these functions.

**General Utility Programs** — The same processing functions which are usually implemented in generalized audit software (retrieval, sample selection, file manipulation, calculation, and printing) are also frequently performed for installation operations and therefore, these standard functions are frequently included in the general software support systems provided by the vendor to customers. Usually these take the form of utility programs within the vendor-provided operating systems. Where these facilities exist in the installations standard software, and the auditor has enough knowledge to use them effectively, these generalized computer packages themselves may be frequently used to perform certain audit functions.

Generalized computer audit soft-

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## The use of the computer to test itself and the data processing system is a realistic and reliable way of evaluating the system

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ware has great flexibility in handling files. However, these generalized computer software packages usually require greater user expertise than generalized computer audit software since they are designed for use by EDP personnel. This means that the auditor may need a slightly higher level of technical knowledge and must understand the functioning of the particular computer software package in order to successfully use it. Where the auditor does have this expertise however, use of generalized computer software to perform certain audit functions on client data provides access to a wider variety of systems than might be the case with generalized audit packages alone. Thus, for the variety of computing system for which no generalized audit package has been developed, use of the generalized computer software (utilities) provides a handy tool for the auditor.

**Embedded Audit Modules** — Embedded audit modules are incorporated within processing programs. These modules are sections of program code that produce special by-product information of the files or functioning of the program as the program is executed. Usually the audit module is executed only on a selected basis when activated within the program by special instruction or control message. An example of an audit routine could be an automatic logging procedure for accesses to selected and confidential files or a module which would extend the accounts receivable aging program to produce concurrently confirmation requests for the auditor.

Another use of built-in or embedded audit modules would be the implementation of the technique of tagging. In tagging, certain transactions are identified (either through a sampling procedure or because of certain attributes in the transaction) and subsequently traced through the

computer processing. An audit file could be created by logging all of the processing performed on the tag transactions. This audit file can then subsequently be reviewed by the auditor. Tagging and the use of built-in audit modules is particularly effective in large integrated processing systems where files are up-dated on-line and subsequent auditing of the transactions would be difficult.

## Computer-Assisted Techniques To Test The System

A number of procedures can be employed to verify and confirm the results of the processing system. Some of the techniques which can be employed are examination of error listings, batch control records, and authorization records to determine that the flow of information is as described. In addition, the auditor can actually trace a sample of representative transactions from the recording of source documents through whatever intermediate records exist to the output record for records produced. However, tracing actual transactions through the processing system may not be practical in those instances where the volume of information is extremely large or where the transaction is not originally recorded in manual form, or in those instances where the processing is such that the machine-produced results cannot be easily traced back to the manual record. Where these conditions exist the use of the computer to test itself and the data processing system is a realistic and reliable way of evaluating the system. There are several computer-assisted techniques which can be used to test the system. A few of these techniques are described below.

**Use of Test Data** — Test data is a set of transactions introduced by the auditor at an appropriate point in the processing system to test the operation of that system. The test data should include transactions for every possible type of condition which might have a significant impact on the accuracy of the financial records produced by the processing system. The auditor may obtain these test transactions by selecting transactions from previous client files or by generating simulated data created by the auditor. The test data are processed by the client's system and the



results produced are compared to the predictable results which should have occurred if the system is functioning properly. The use of test data can help the auditor to determine if correct transactions are properly handled and if incorrect or invalid transactions are detected by the system.

Test data can be used to evaluate more than computer programs alone. Test data can be used to test the transcription or data entry procedure, the editing procedure, and the manual correction procedure in use by the installation. The introduction of test data requires careful planning in advance to determine how and when the test data will be introduced into the system. Provision must also be made for controlling the use of the system when the test data is being processed and for controlling the use of master files during the test runs. Very careful consideration must be given to the timing of the test and the prevention of any test data from creating distortion in client files. This usually leads to some process in which the auditor obtains a working copy of client files against which to process test transactions. Further, the auditor must take sufficient care to provide assurance that the program being tested is that actually in use by the organization.

**Integrated Test Facility** — The integrated test facility (ITF) technique is basically an extension of the test data concept. The integrated test facility approach integrates permanent test data into regular master files in a way that permits the auditor to process test transactions during the normal processing of live data. The principal objective is to allow the auditor continuously to monitor the performance of the system. ITF involves the establishment of a fictitious entity in the organization's data files against which test data can be processed. This fictitious entity can be a division, a customer, and employee, or an account. Once this entity has been established, transactions can be processed against it using normal company procedures for normal transactions. By being able to intermix test data along with normal transactions, the auditor does not have to be concerned with separate runs or controlled access to the computer

system.

The ITF method seems to have potentially large benefits for those organizations for whom continual testing is desirable. This is particularly true for real-time on-line systems, where files are being continually up-dated and for which interruption of the system for more traditional audit techniques should be minimized. As a safe-guard against unauthorized manipulation of the built-in test records, these records should be regularly reviewed and analyzed. The identity of these test records should be kept secret, and both the initial introduction of the test entity into the master files and subsequent transactions to be processed should be executed through the normal authorization and recording procedures. This helps to protect the identity of the test records and prevents unauthorized personnel from generating their own test records for personal manipulation.

**Parallel Processing** — In parallel processing, the auditor develops an independent processing system or model to simulate the application processing system being tested. The same data is processed through the auditor's simulated system as is processed through the "live" application system. The results of the test and the "live" processing are compared and all differences are investigated.

The parallel simulation can be developed through several alternatives. Theoretically the auditor could write independent programs to simulate the installation's processing procedures, but this is rarely practical. More often, standard utility programs or other generalized software can be used to duplicate the processing logic of the application being tested.

**Other Procedures** — There are a number of other computerized aids which are helpful to the auditor in reviewing and analyzing the processing system. One tool which is helpful is the automatic flow-charting program. Automatic flow-charting programs are used primarily to aid the installation in documentation of programs and in maintenance of that documentation. The auditor can make use of the automatic flow-charting programs to provide flow-charts whose logic might be easier to follow than the source listing. In

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## Computerized audit procedures make it possible to expand the scope of audit activities.

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addition, the auditor generated flow-charts can be used to compare against the installations documentation.

Another facility within an installation which can be quite useful to the auditor are the program library routines of the operating system. The standard program library routines provide automatic "audit trails" in which additions and deletions to the program library are documented. The auditor can examine these records to gain insight to changes in the program library. These library facilities also frequently provide cross-references within individual programs or within program libraries which also are useful to the auditor in those instances where the auditor must make detailed analyses of the logic of particular programs.

Another program technique which might be useful to the auditor in program analysis is the use of tracing programs. In tracing, the computer points out each step in a program as that step is performed. The auditor could determine by reviewing the print-out whether processing is occurring as predicted. Mapping is a subset of tracing. In mapping, only selected decision points are printed rather than every step. The auditor may also choose certain performance analysis packages which can be used to detect unused portions of programs. Still another computer-assisted tool which might be helpful to the auditor is a test data generator which can create test files very quickly containing all specified valid or invalid conditions.

Computerized audit procedures make it possible to expand the scope of audit activities and to perform the necessary audit procedures more efficiently. As an audit tool, the computer provides excellent opportunities for testing and verifying internal controls, accessing the effectiveness of the data processing operations, and verifying the accuracy of financial and operating data.

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