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FEASIBILITY STUDY OF COMPUTER-BASED AUDITING :
AN EMPIRICAL APPROACH

by

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ABSTRACT

The changing accounting environment and the
innovation of computer technology have altered audit
techniques. Currently, more than thirty packages are
used by auditors. In view of the similarities, the
"Audit Command Language" (ACL), aimed at combining and
extending the features of present packages, was developed.
The M.B.A. thesis research presented here focuses on a
feasibility study of auditing with audit package systems
and on the implications for ACL. An empirical approach
was used and sets of questionnaires were distributed to
three hundred and one firms of various sizes and industries
throughout Canada and the United States of America.

The thesis presents a discussion of the costs
that should be considered and the benefits that could be
gained from the use of audit packages (AP's). Other
benefits are discussed as well. It can be concluded from
the study that there are many advantages in the adoption
of the systems. AP's are more efficient than other
techniques in auditing EDP records. It is desirable and
feasible to develop ACL provided that the actual cost of
developing and implementing it does not exceed the expected
benefits and returns. The optimum cost of ACL cannot be
determined here because the average cost of developing a
similar package cannot be determined from this study due
to insufficient data.

Finally, some practical problems may be encountered. Nonetheless, these are solvable in one way or another. In conclusion, it should be feasible to develop ACL as the professional audit command language of the future.

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CHAPTER I

INTRODUCTION

This chapter gives a brief introduction to auditing, including its evolution and relation with computers, and the current trends of accounting-auditing relations. The purpose and scope of this empirical research will be outlined as well.

Chapter II briefly describes audit packages (AP's). The analysis of the collected data, together with conclusions concerning the various aspects of the packages is discussed in chapters III and IV. The efficiency, effectiveness, desirability, justifiability and feasibility of an Audit Command Language (ACL) is presented in chapter V, while chpater VI summarizes the features that should be included in future developments and chapter VII is a summary chapter.

AUDITING

The word AUDIT originates from the Latin word <u>auditus</u> meaning "a formal or official examination and verification of books of accounts ... " [1]. The term has further been extended to include the "examination of any

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[1] Philip Babcock Gove (ed-in-chief), <u>Webster's Third New International Dictionary of the English Language, Unabridged</u> (Springfield, Massachusetts: G & C, Meriram Co. Publishers, 1965).

records to ascertain whether they correctly record the facts ... extends the usage to statements prepared as summaries of records ... " [2]. Nowadays, auditing has become " a branch of accounting that deals with the examination and verification of accounts or books of accounts and with making the financial reports" [3].

The law, as stated in the 1965 Canada "Companies Act and Amending Act", requires the performance of audits. As representatives of the shareholders, auditors inspect and examine the books in order to express an objective judgement and unbiased opinion on the financial position of the corporation [4]. Other than legal requirements, the various Canadian Stock Exchanges and the Provincial Securities Commissions require audited financial statements for listing purposes. Chartered banks, country banks, creditors and potential investors are also interested in statements that are reviewed and scrutinized by a professional auditor.

Evolution of Auditing

Auditing is a by-product of accounting. The first

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[2] Committee on Terminology, Accounting Terminology Bulletins, No. 1, Review and Resume, American Institute of Accountants (Madison Ave., N.Y., 16, N.Y.).

[3] Gove, op. cit.

[4] See Section 124 of Canada Corporations Act.

appearance of auditing can be dated back to 3600 B.C. [5] when the earliest reference to record-keeping was found as well [6]. Accounting can be traced back to the time of ancient Babylonia and Eygpt [7] and as far back as Yu of the Hsia dynasty (2260 B.C. - 1766 B.C.) of China [8]. By that time, the limited amount of transactions and the means of recording made detailed examination of accounts feasible. After the thirteenth century, when the double-entry book-keeping system originated, [9] the accounting technique gradually developed over time to meet the contemporary equipment and machines. These changes were also caused by a series of economic events such as the appearance of corporations, the Industrial Revolution, the growth in trade and industry and technological changes.

Concurrently, auditing underwent a series of changes both in the stated objective and the extent of

[5] Williard E. Stone, "Antecedents of the Accounting Profession," The Accounting Review, Vol. XLIV, No. 2 (1969), p. 284.

[6] Stone, ibid., p. 284.

[7] Stone, ibid., p. 284.

[8] Philip Fu, "Governmental Accounting in China During the Chou Dynasty (1122 B.C. - 256 B.C.)," Journal of Accounting Research, 9, No. 1 (Spring 1971), p. 40.

[9] A. C. Littleton and B. S. Yamey (ed), Studies in the History of Accounting (Homewood, Illinois: Richard D. Irwin, Inc., 1965), p. 1.

verification. Brown [10] made a study on these gradual

changes up to mid-sixties of the twentieth century. His

result is presented in table I. The earliest audits, long

before the sixteenth century, were aimed at prevention and

detection of fraud with partial emphasis on internal control.

Rules were not set by governments on the necessity of

attesting. Criteria, standards and procedures were not

established. There were no definite rules or steps to

follow. It was not until the second day of November 1862

that the first English Companies Act came into effect. As

more and more daily transactions were involved, auditors

began to realize in the early twentieth century that

certain techniques such as testing and emphasis on the

review of internal control have to be employed.

After World War II, the human data processing

capacity was further extended by the invention of computer

hardware. Integrated accounting systems are replacing the

traditional manual double-entry system. Auditing is

therefore complicated by the development of Electronic

Data Processing (EDP) and computerized Management

Information Systems (MIS's).

Auditing EDP Records

The use of EDP in accounting caused the development

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[10] R. Gene Brown, "Changing Audit Objectives and Techniques," The Accounting Review, Vol. XXXVII, No. 4 (1962), pp. 696-703.

Table I [11]

STATED AUDIT OBJECTIVES AND
EXTENT OF VERIFICATION
UP TO 1960

Period	Stated Audit Objectives	Extent of Verification	Importance of Internal Control
Before 1500	Detection of fraud	Detailed	Not recognised
1500 to 1850	Detection of fraud	Detailed	Not recognised
1850 to 1905	Detection of fraud and detection of clerical error	Some tests, primarily detailed	Not recognised
1905 to 1933	Determination of fairness of reported financial position and detection of fraud and error	Detailed and testing	Slight recognition
1933 to 1940	Determination of fairness of reported financial position and detection of fraud and error	Testing	Awakening of interest
1940 to 1960	Determination of fairness of reported financial position	Testing	Substantial emphasis

[11] Brown, *ibid.*, p. 696.

of a new auditing technique. The traditional manual audit is becoming inefficient or incapable of being carried out by the profession. The records stored on magnetic tapes, paper tapes or disks can hardly be understood and read without the aid of the computer. At present, there are mainly two complementary techniques for auditing EDP records, namely (1) "auditing around the computer", and (2) "auditing with the computer" [12].

In "auditing around the computer", the auditor performs the audit without directly employing the computer. He asks assistance from programmers or EDP experts in the retrieval of records, and he mainly works with the reports and/or data that are computer-generated by the client or his assistants. However, not all auditors depend upon the programmers or EDP experts since some of them are able to do the programming themselves. On the other hand, in "auditing with the computer", the auditor works with the computer which aids his auditing. He works directly with the stored data. Hence, the main difference of the two techniques lies in the sources of data to be scrutinized. Secondary sources from the computer are available for "auditing around the computer" while primary sources are obtained and reviewed in the other technique.

Figure 1 gives a simplified diagram depicting the

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[12] Some classify the two techniques as "auditing without the computer" and "auditing with the computer".

Computerized Accounting Records

Computer Hardware → Accounting Data/Reports

Reports/Financial Statements

AUDITOR

Users of Accounting Information ← Audit Report

(1) "Audit Around The Computer"

Computerized Accounting Records

Computer Hardware

Retrieval & Analysis Programs

Computer Hardware

Reports/Financial Statements

AUDITOR

Users of Accounting Information ← Audit Report
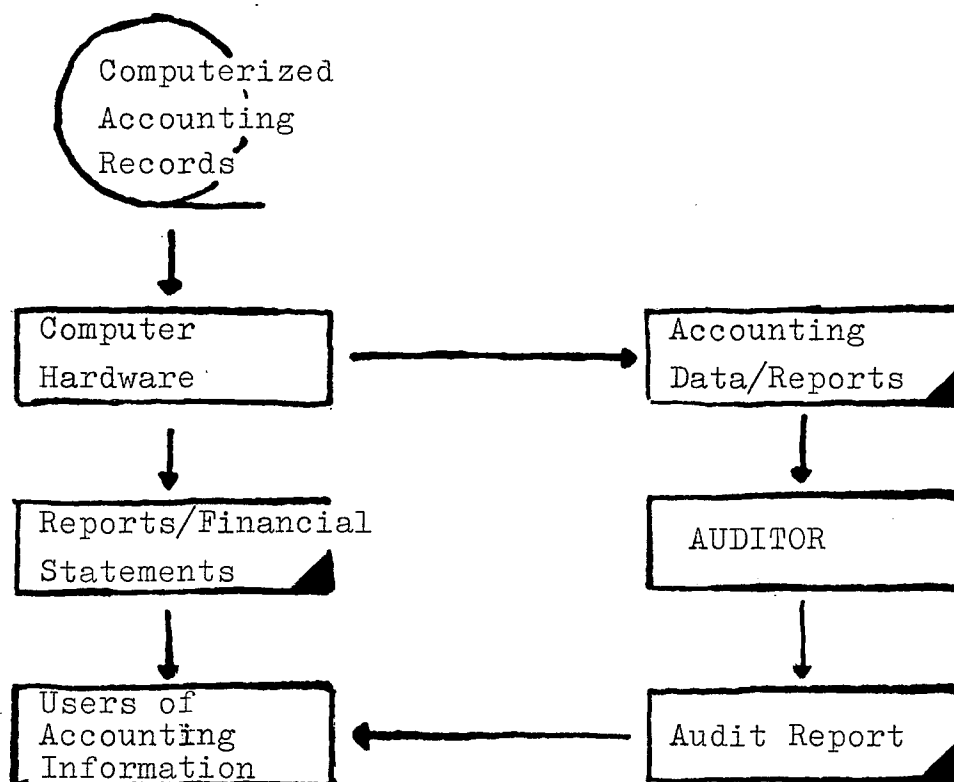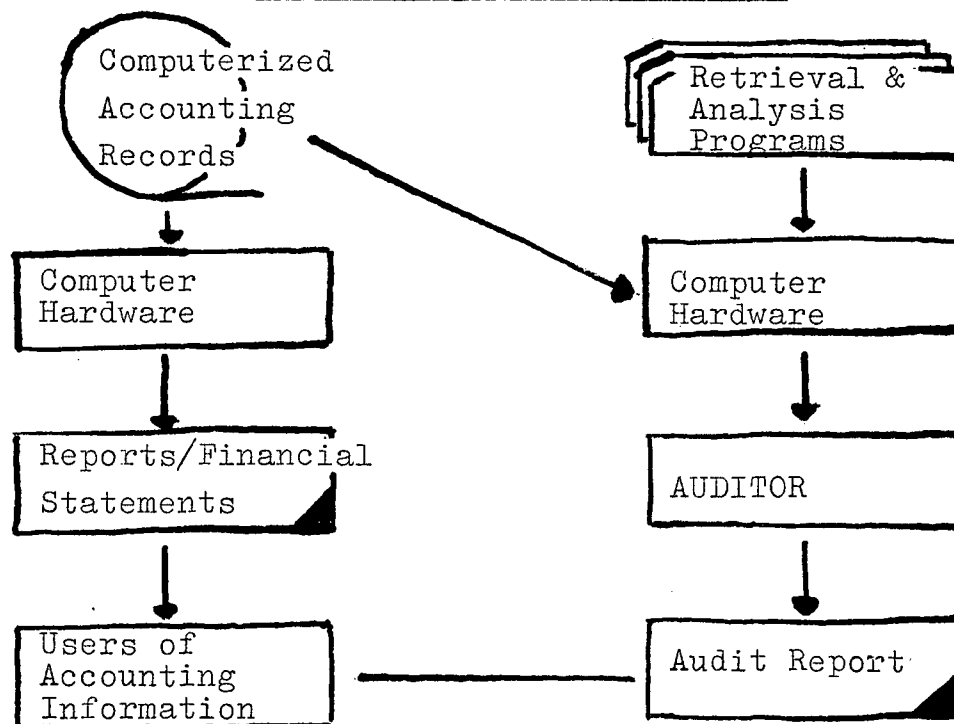
(2) "Audit With The Computer"

Figure 1

TWO TECHNIQUES IN AUDITING EDP RECORDS

two techniques.

Current Trends: Accounting-Auditing Relationships

According to the information collected in this study, the computer has been utilized mostly for such accounting subsystems as general ledgers, cash (receipts and disbursements), accounts receivable, sales, billing and invoicing, inventory and accounts payable (see table II). Furthermore, most of the firms predicted that there would be an increase in the application of computer technology in accounting. Many of these subsystems are to be computerized in the next two to five years (see table III).

This growth should enlarge the adoption of audit packages. According to the analysis, many audit and industrial firms favor the application of AP's to most of these accounting subsystems (see table IV). In other words, there exists a need and demand for computerized auditing in the future.

NEED FOR EMPIRICAL RESEARCH

Purpose

The innovation of computer technology and its fast development in terms of software and hardware have broadened human capacities. Many people are affected. Business transactions and recordings are influenced. Management information systems are changing as well. To keep pace

Table II

AN AVERAGE PERCENTAGE OF COMPUTERIZED
ACCOUNTING SUBSYSTEMS

Accounting Subsystems	Percentages [13]
General Ledgers	55.7%
Cash (receipts & disbursements)	54.4%
Accounts Receivable	63.9%
Sales, Billing & Invoicing	54.5%
Inventory Accounts & Control	51.8%
Fixed Assets	48.3%
Depreciation & Amortization	40.5%
Repairs & Maintenance	21.9%
Purchasing	24.8%
Production & Cost Allocation	28.4%
Accounts Payable	55.8%
Payroll	86.2%
Pension Plans	43.9%
Loan Accounts	29.8%
Debentures & Bonds	20.2%
Fund Accounts	14.3%
Capital Accounts	25.3%
Share Registration	27.2%
Budgeting & Forecasting	41.1%
Reports & Control	2.4%
Journal	2.9%
Analysis	1.2%
Miscellaneous	3.6%

[13] The figures under this column heading are the numbers of responses to the corresponding subsystems expressed as percentages of the total number of 34 answers by the participating and responding firms.

Table III

SUMMARIZATION OF RESPONSES TO THE COMPUTERIZATION OF
ACCOUNTING SUBSYSTEMS IN THE NEXT 2 TO 5 YEARS

Accounting Subsystems	Percentages [14]
General Ledgers	96.6%
Cash (receipts & disbursements)	89.8%
Accounts Receivable	84.8%
Sales, Billing & Invoicing	79.7%
Inventory Accounts & Control	86.4%
Fixed Assets	88.1%
Depreciation & Amortization	83.0%
Repairs & Maintenance	61.0%
Purchasing	76.3%
Production & Cost Allocation	76.3%
Accounts Payable	84.8%
Payroll	96.6%
Pension Plans	67.8%
Loan Accounts	61.0%
Debentures & Bonds	45.8%
Fund Accounts	49.2%
Capital Accounts	52.5%
Share Registration	44.1%
Budgeting & Forecasting	81.4%
Deposit	3.4%
Trust	1.7%
Reports & Control	1.7%
Journal	1.7%
Analysis	1.7%
Miscellaneous	6.8%

[14] The figures under this column heading are the
numbers of responses to the corresponding subsystems
expressed as percentages of the total number of 59
answers by the participating and responding firms.

Table IV

SUMMARIZATION OF RESPONSES TO THE AUDIT
BY COMPUTERIZED AUDIT PACKAGES

Accounting Subsystems	Percentages [15]
General Ledgers	72.9%
Cash (receipts & disbursements)	77.1%
Accounts Receivable	83.3%
Sales, Billing & Invoicing	75.0%
Inventory Accounts & Control	83.3%
Fixed Assets	77.1%
Depreciation & Amortization	70.8%
Repairs & Maintenance	45.8%
Purchasing	60.4%
Production & Cost Allocation	58.3%
Accounts Payable	83.3%
Payroll	95.8%
Pension Plans	58.3%
Loan Accounts	54.2%
Debentures & Bonds	39.6%
Fund Accounts	41.7%
Capital Accounts	43.8%
Share Registration	35.4%
Budgeting & Forecasting	52.1%
Deposit	2.1%
Journal	2.1%
Miscellaneous	10.4%

[15] The figures under this column heading are the numbers of responding firms to the corresponding subsystems expressed as percentages of the total number of 48 answers by the participating and responding firms.

with this changing environment, auditing is, to a certain
extent, modified by the advent of audit packages.

The idea of Dr. H. J. Will of the University of
British Columbia in developing a generalized ACL motivated
me to research the effectiveness, efficiency and feasibility
of computer-based auditing with partial emphasis on ACL
itself.

Many times, problems which are encountered only
in practice, would hardly be considered in theory. To
study the feasibility, one of the best methods is the
empirical approach. In this way, opinions and suggestions
of those who are practically-experienced in computer-
based auditing can be obtained.

Scope & Sample

Three hundred and one sets of questionnaires were
distributed to firms all over Canada and the United States
of America. The name list was obtained from participants
of seminars of "computer-based auditing" (or similar
seminars) sponsored by various institutions and associations.
The list is fairly representative and includes large and
small accountant firms (Chartered Accountants, Certified
Public Accountants and Certified General Accountants) and
firms of various sizes from other industries, all of which
showed great interest in computer-based auditing concepts
and techniques. A breakdown of the firms by various
industries is shown in table V.

Table V

BREAKDOWN FO FIRMS BY INDUSTRIES [16]

Industries	Outgoing		Returned	
Bank, trust & finance companies		36		14
Chemical industry		9		2
Data Processing		9		6
Educational		4		1
Energy		9		1
General diversified industry		21		3
Governments, governmental agencies		15		8
Health science, hospitals & laboratories		8		1
Insurance		13		6
Manufacturing:				
General	12		4	
Specific	2	14	0	4
Mining & oil:				
Ferrous metal	2		1	
Non-ferrous metal	4		2	
Petroleum	9	15	4	7
Transportation & communication		7		3
Utilities		5		4
Others (restaurants, film & entertainments, etc.)		40		15
TOTAL NON-ACCOUNTING FIRMS		205		75
Accounting firms		96		18
TOTAL		301		93

[16] Firms may belong to more than one class, for example, a chemical industrial firm may belong to a manufacturing firm, but is only classified as a chemical industrial firm.

Returns

        There were ninety three respondents of which only ninety could be analysed because of lack of data contained in the other three replies. The breakdown into industries of the ninety three firms is also presented in table V (on previous page). Also, according to the information provided, they can be categorized into four different types of firms by their sizes and the breakdown is as follows:

International Firms	42	(46.6%)
National Firms	18	(20.0%)
Regional Firms	15	(16.7%)
Local Firms	15	(16.7%)
TOTAL	90	(100.0%)

        Several questions were not completely answered and conclusions from or summarization of these questions would thus be misleading. Such questions with insufficient data include questions eight, nine, ten, nineteen and twenty (see Appendix B). The first three of the above numbered questions intended to show how each industry stood among other industries in computer-based accounting systems and how far they have been audited by various auditing techniques. They were also intended to counter-check other questions. Questions nineteen and twenty asked the firms to give the number of their personnel having various qualifications. Those numbers furnished by firms with AP's were intended to compare with those numbers given by firms without AP's. Unfortunately, many did not submit answers or they gave inappropriate answers.

Motivation

During the whole process of data collection, analysis and the writing of the report (thesis), all data were kept confidential. This confidentiality was stated in the introductory letter to the firms to encourage more participation. The questionnaires will be destroyed after the completion of the thesis. For reference purposes, a list of participating firms is included in the appendix and a summary of results will be distributed to those interested in them.

SUMMARY

With the gradual evolution of accounting systems, auditing techniques are changing. Computer facilities are utilized in attesting the large amount of data stored. In auditing computerized accounting records, two techniques have been developed which depend mainly upon the originality of records to be audited. In "auditing with the computer", the auditor or audit team actually uses the computer and looks more carefully into the internal control systems of the corporation than is the case in "auditing around the computer". The two techniques do not replace each other however, and many times they have to be performed concurrently.

CHAPTER II

GENERALIZED COMPUTERIZED AUDIT PACKAGES

There are two means to achieve "auditing with the
computer": (1) "specific auditing programs" and (2) audit
packages. In fact, the former can be considered a subset
or component of the latter. Every time we wish to retrieve
and examine data from a storage medium, we could write a
program in one of the programming languages such as FORTRAN,
COBOL or PL/I to accomplish this. The larger the program,
the higher will be the probability in making mistakes. In
order to be more economical and to minimize errors, the
more frequently encountered programs are pre-written, thus
composing the elements of an audit package. In this way,
only a small programming effort is required for carrying
out the work of a large program.

AUDIT PACKAGES

An audit package (AP) is a system consisting of a
set of generalized computer programs for retrieving
information from a computer-based accounting system, with
extended analytical testing and reporting capabilities.
It can be used with complete independence from the client's
programs. Any data-retrieval system used in auditing is
therefore included in this study as well. In fact, these
computer program packages are tools for assisting the

auditor in his work. They are so designed that many of the routine audit tasks can be performed quickly.

Present Packages

A review of the audit packages by Mr. Oakley [1] showed that there were eight packages by 1969 and another five were under development by that time. In early 1972, Dr. Will [2] listed fifteen developed and available packages. The development is rapid [3] and, according to the data collected, by the end of 1972, there were thirty such retrieval systems which are listed in table VI. The list is by no means a complete one since some known packages were not included in the analysis.

Components

The primary objective of developing and implementing these packages is similar. Many of the auditors in the past were (and even today are) not experts in programming and they had little or no knowledge in electronic data processing, programming, computer technology and facilities.

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[1] A. Oakley, "Analysis of Packages," Report of Proceedings - Computer Audit Packages: Information Retrieval & Specialized Audit Features (Portland Place, London: The British Computer Society), paper 6, p. 69.

[2] H. J. Will, "Computer-Based Auditing - Part II: Comparison of Generalized Computer Auditing Packages," Canadian Chartered Accountant, March 1972, p. 33.

[3] Donald L. Adams and John F. Mullarkey, "A Survey of Audit Software," Journal of Accountancy, September 1972, pp. 39-65.

Table VI

LIST OF AVAILABLE AUDIT PACKAGES

Name of Packages	Developing Firms
ASK 360	Whinney Murray & Co. and Thompson McLintock & Co. (UK)
AUDASSIST	Alexander Grant & Co. (US)
AUDEX	Arthur Andersen & Co. (US)
AUDIT	Chase Brass & Copper Co.
AUDITALL	Informatics & Leidesdorf
AUDITAPE	Haskins & Sells (US, Canada)
AUDITFIND	Dataskil (US)
AUDITPAK	Lybrand, Ross Bros. & Montgomery (US)
AUDITRONIC-16	Ernst & Ernst (US)
AUDIT-THRU	Computer Resources Corporation (US)
AY AUDIT/MANAGEMENT SYSTEM	Arthur Young & Co. (US)
BUG	Computer Task Group Inc. (US)
CARS	Computer Audit Systems, Inc. (US)
CFA	Price Waterhouse & Co. (US)
DATA-MAN	
EDP AUDITOR	Culliane Corporation (US)
EXTRACTO	Aquila Bst Ltd.
FILETAB	National Computer Centre Ltd. (US)
FIND	International Computers (UK)

Table VI (continued)

Name of Packages	Developing Firms
GENERAL RETRIEVAL SYSTEM	Program Products Incorporated (US)
GRIP	Gulf Oil Canada Ltd.
GRS	
INTERROGATOR	
MARK IV	Informatics
MIRALL/AUDIT	
NITA	National Computer Center (UK)
PROBE	Computer Resources Corporation
SCORE	Programming Methods Inc. (PMI) (US)
STRATA	Touche Ross & Co. (US)
SYSTEM 2170	Peat Marwick, Mitchell & Co. (US)
TABGEN	Sun Life Assurance Co. of Canada
TRAP	Touche Ross & Co. (Canada)
UCANDU	Gulf Oil Canada Ltd.

Moore and Yocom [4] wrote:

> ... one of the most frustrating experiences for the non-EDP technician is to attempt to get prompt, concise, useful reports from an EDP systems.

Before, auditors had to depend upon EDP experts. Misunderstandings were common and this resulted in errors and waste of time.

Due to the fact that all of these packages function similarly, and that they all aim at efficient training and usage, a general description may suffice. They consist of a program or set of programs designed to extract accounting data from the client's computerized accounting files. These programs are mostly stored on tapes and some packages are available in more than one version to fit the clients' machines and systems.

During the retrieval, manipulation of files and fields such functions as calculating, sampling, sorting, stratifying and testing may be carried out as desired. In many systems, printing or reports in various formats is a built-in function as well. Confirmation letters (either positive or negative, or both) may also be produced.

Figure 2 is a simplified diagram showing the general procedure of a computerized audit package system. It should be noted that the detailed procedures of different

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[4] Michael R. Moore and Richard H. Yocom, "AY Audit/ Management System: An Information Tool for Auditors and Managers," Computer Auditing in the Seventies (Arthur Young & Company), p. 29.
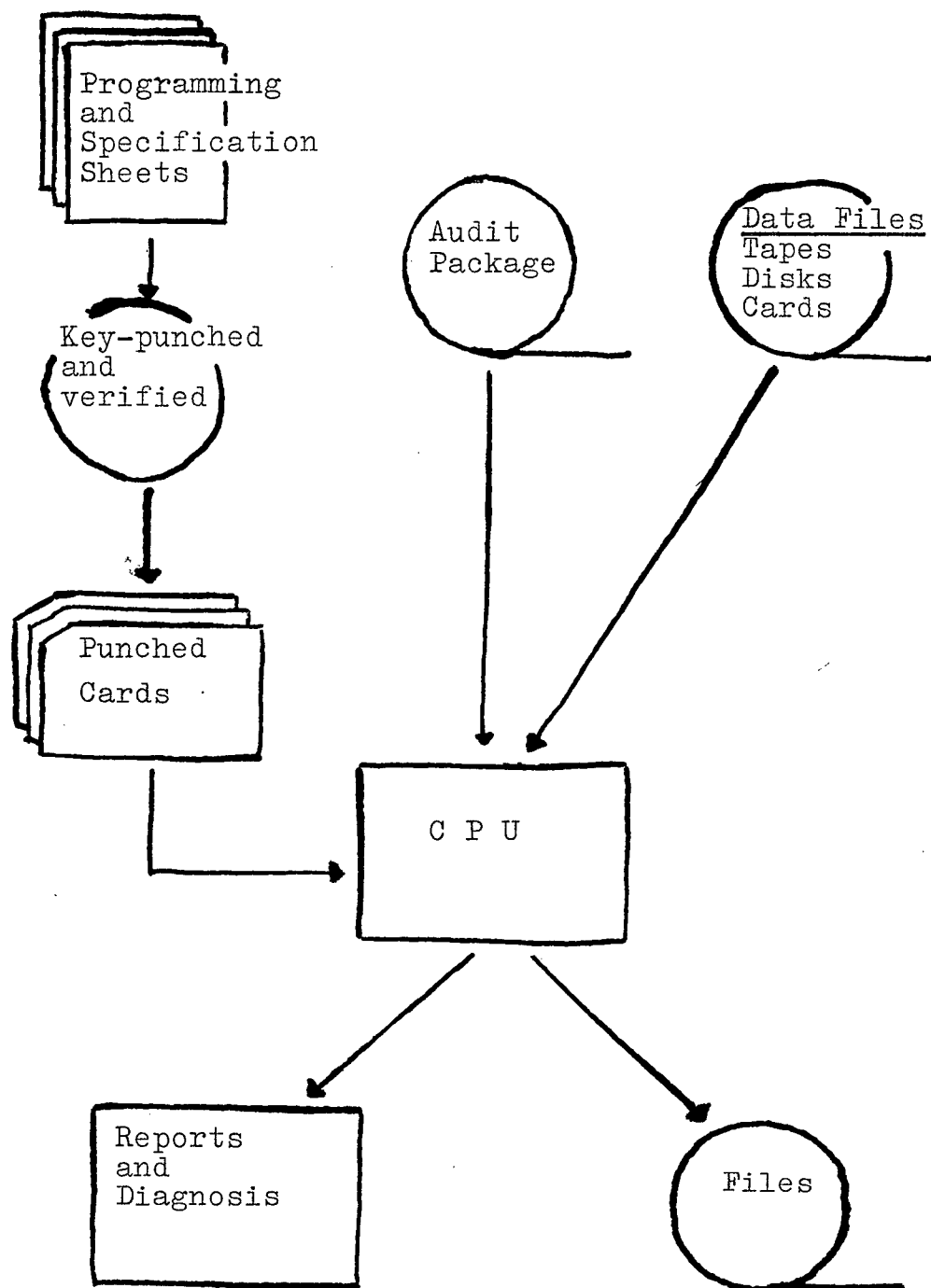
Figure 2

A SIMPLIFIED DIAGRAM OF THE GENERAL PROCEDURE
OF A COMPUTERIZED AUDIT PACKAGE

packages varies due to the designs of the systems.

Information from specification sheets is converted into punched cards. These so-called specification sheets are pre-printed forms and the auditors fill them out by using pre-determined codes. The specification sheets represent the source program for retrieval and analysis. The exact method of completing them depends upon their format. In general, four kinds of design are employed: (1) coding, (2) checklist/questionnaire, (3) structured sets of forms, and (4) interactive audit command language.

Functions

The required routines are extracted from the package; in turn, either singly or together with other punched cards, they perform what is "commanded". The most common routines that are incorporated in the present packages are summarized in table VII. All these functions can be categorized as follows:

     (1) access,

     (2) testing,

     (3) reorganization,

     (4) selection and analysis,

     (5) calculation,

     (6) reporting, and

     (7) miscellaneous.

It is not intended to give a detailed description of the various packages in this study. This information

Table VII

THE MOST COMMON ROUTINES
OF AUDIT PACKAGES

Features	No. of Responses	Percentages [5]
ACCESS		
(File) Creation/Generation/ Reformatting (Extraction)	32	84.2%
(File) Selection (no reformatting)	23	60.5%
(Input) File Editing	29	76.3%
TESTING		
Aging	31	81.6%
Comparison of Fields	36	94.7%
Comparison of Files	32	84.2%
Table-lookup	27	71.0%
Field Classification	28	73.7%
Include/Exclude	34	89.5%
Match/Merge	34	89.5%
Sequence Checking	30	79.0%
REORGANIZATION		
Insert (Add data into a file)	26	68.4%
Move (Transfer data from one field to another)	29	76.3%
Reformat	31	81.6%
Sort	32	84.2%
Stratification	34	89.5%
Summarize	38	100.0%

[5] The figures under this column heading are the numbers of responses to the corresponding items expressed as percentages of the total number of 38 answers by the responding firms.

Table VII (continued)

Features	No. of Responses	Percentages [6]
SELECTION & ANALYSIS		
The Search	27	71.1%
Block Selection	26	68.4%
Systematic Sampling	33	86.8%
Attribute Sampling	27	71.1%
CALCULATIONS		
Accumulation	37	97.4%
Basic Mathematical Operations	38	100.0%
Footing & Record Counts	37	97.4%
Ratio Computation	23	60.5%
Subtotal	37	97.4%
Percentages	28	73.7%
Averages	26	68.4%
REPORTING		
Listing	34	89.5%
Print Names & Addresses	32	84.2%
Print Titles & Headings	33	86.8%
Punch Cards	27	71.1%
Positive Confirmation Letter	25	65.8%
Negative Confirmation Letter	23	60.5%
Tabulate Reports	25	65.8%

[6] The figures under this column heading are the numbers of responses to the corresponding items expressed as percentages of the total number of 38 answers by the responding firms.

could be obtained from the pamphlets or booklets of the
various systems. Furthermore, there is no attempt to
compare these systems. Studies in this area had been
done and published under the heading of "Computer-Based
Auditing" [7] in the Canadian Chartered Accountant and under
the title of "A Survey of Audit Software" [8] in the Journal
of Accountancy.

SUMMARY

This chapter presents the outline of what an audit
package is, what it is composed of, and how it works. The
programs or subprograms are summarized in table VII which
lists only those common and important functions [9].

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[7] H. J. Will, "Computer-Based Auditing," Canadian
Chartered Accountant, February and March, 1972.

[8] Adams and Mullarkey, op. cit.

[9] See pages 97-9 of appendix B for a more complete
list.

CHAPTER III

COST-BENEFIT ANALYSIS

INTRODUCTION

The primary factor to be considered in the design, development and implementation of a system is its cost-benefit relationship. Insufficient cost data made this analysis of audit packages infeasible, but a discussion of the costs that have to be considered and the benefits that would be gained from the utilization are presented in this chapter.

COSTS

Two categories of costs have to be taken into consideration: (1) direct costs and (2) indirect costs [1].

Direct Costs

Direct costs include (1) the cost of design, (2) the cost of development and implementation, and (3) the cost of improvements and amendments.

Cost of design. The size and quality of the team in designing the system and the time incurred form the elements of this cost.

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[1] Here, direct costs refer to those directly relating to the audit package systems.

Should the wage of the i-th employee who worked
T_i unit time in this task of design be W_i dollars and should
there be n employees, then the total cost of design would
be the sum of "F" and n products of $W_i T_i$ where "F"
represented miscellaneous expenses incurred. These expenses
would include stationery charges, fringe benefits of
employees and other special allowances in connection with
this task. Should there be a loss in revenue due to the
transfer of an employee from one department to this task,
then the wage of the employee should include this
opportunity cost of loss in revenue.

Cost of development and implementation. In
addition to the two main components considered in the cost
of design, the computer charges have to be included. These
would include the computer dollars involved in the testing
and debugging of the programs (routines) and the rental
and/or purchase costs of the hardware and software. The
total cost would be the sum of the cost of design and the
computer charges.

Cost of improvements and amendments. Future
periods have to be involved. This cost is a bit difficult,
but not impossible, to measure. An estimation of future
cahs outlay has to be determined. In fact, this cost can
be considered as future "development and implementation"
cost. If the cost of improvements and amendments in the
j-th period is C_j , discounting with a rate of r percent
which is pre-determined, the present value of the total

cost of improvements and amendments will be:

$$\sum_{j} \frac{c_j}{(1 + r)^j}$$

Indirect Costs

Training cost. The main indirect cost is the
training cost. In most firms, a training program is
usually provided and a salary is paid during the training
period. In order to facilitate future "auditing with the
computer", initial training is important. One way to
minimize the cost of training is to shorten the training
period without changing the potential efficiency. Dis-
regarding the educational background, the most common
training period is forty working hours. The training
period may, however, be as short as one day and as long
as few months. Of course, it all depends upon the person
to be trained and the package to be used. Also, the levels
of familiarity of the trainees with packages differ. In
general, less than one week in training is all that is
necessary.

Miscellaneous costs. Any costs that are not
related directly with the packages are included in this
category. Such costs would include those caused by errors
made during initial applications and stationery costs such
as expenses incurred in specification sheets, punch cards,
papers and pencils.

Summary

The costs described above may not be able to be distinguished sharply among one another. They may belong to more than one category. At any rate, the estimated total costs would be their summation.

BENEFITS

There are various benefits that would be gained from the use of AP's. These include: (1) future cost reduction, (2) higher efficiency, (3) reliability, (4) ease in input, (5) effective reporting, and (6) improved human relations.

Future Cost Reduction

Audit packages are primarily designed for the retrieval of data from the files and for performing the desired data manipulations, with the expectation of reduced costs when compared with other (non-computerized) approaches. The machine performs a task in a matter of minutes, whereas the audit team would have spent hours, if not days, on the same job. For example, "a typical retrieval program will examine 5,000 accounts in three minutes – no clerk can match that" [2]. The prime factor

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[2] B. G. Jenkins and P. M. Benson, "Computer Audit Packages, An Introduction," Report of Proceedings – Computer Audit Packages: Information Retrieval & Specialized Audit Features (Portland Place, London: The British Computer Society), paper 1, p. 2.

causing the cost reduction is the time in the performance
of audits that may be reduced.

Time reduction. Usually time is saved in audit
with the aid of an AP. From the sample population, only
3% stated that there was no time reduction in the performance
of clerical work, while 25% did not answer. Table VIII
gives a summary of the responses to the percentages of
time saved.

The second column of the table gives the number of
firms with AP's that responded to the various answers.
The figures in the third column are the total number of
responding firms while the last column summarizes in the
form of percentages expressed in relation to the total
number of participating firms.

The amount of clerical work reduced varies because
of the types of audit tasks carried out in an audit.
Different firms place different emphasis on the various
tasks. Some firms reported that due to the time saved, a
more comprehensive examination is possible. Performing
the same job, clerical time is saved, or with the same
amount of time, more work can be performed.

Higher Efficiency

The use of AP's saves time and energy in training
and input. The AP's guarantee that every record the
auditor is looking for has been printed out (subject to
correct programming). They enable the auditors to spend

Table VIII

SUMMARY OF THE RESPONSES TO THE PERCENTAGE OF TIME SAVED BY AUDITING WITH AN AP

Amount	Firms With AP's	Firms Without AP's	Total	Percentages [3]
No time saved	0	3	3	3.4%
Less than 10% of time saved	5	9	14	15.6%
10-25% of time saved	9	9	18	20.0%
25-50% of time saved	10	9	19	21.2%
More than 50% of time saved	6	7	13	14.4%
No idea	14	9	23	25.5%
TOTAL	44	46	90	100.0%

[3] The figures under this column heading of "percentages" are the numbers in the third column (under the heading of "Total") expressed as percentages of the total number of 90 participating firms.

their time where it is most useful. Besides, communication is more effective. The auditor is no longer spending an inordinate amount of time making his needs known to data processing personnel. He is "placed in direct communication with an audit-oriented computer facility. The need to communicate with data processing personnel apart from obtaining basic information relating to the organization of their computer records is largely by-passed" [4]. The possibility of misunderstanding is reduced substantially.

In general, audit packages yield higher audit efficiency than any other techniques. Obviously, it requires less time than preparing specific programs for each audit situation. On the average, it appears to be more efficient than auditing around the computer. 77% of those participating firms which use AP's stated that auditing with an AP was more efficient. The result of the responses can be seen from table IX.

Table IX indicates that some firms were either unwilling to answer this question or not sure of the comparison between the efficiency of an AP-audit and an around-the-computer audit. However, they comprise a very small portion of the whole subset. On the whole, the use of AP's is considered more efficient than auditing around the computer or applying a specific programming language.

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[4] Richard Webb, "AUDASSIST," Journal of Accountancy, November 1970, p. 54.

Table IX

RESPONSES OF VARIOUS TYPES OF FIRMS
TO THE COMPARISON OF EFFICIENCY
OF VARIOUS AUDIT TECHNIQUES

	International Firms	National Firms	Regional Firms	Local Firms	Total
Audit around the computer	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%)	0 (0.0%) [7]
Audit with the computer	15 (34.1%)	9 (0.4%)	2 (4.6%)	5 (11.3%)	31 (70.4%)
Both are more or less the same	1 (2.3%)	1 (2.3%)	0 (0.0%)	0 (0.0%)	2 (4.6%)
No idea	6 (13.6%)	1 (2.3%)	4 (9.1%)	0 (0.0%)	11 (25.0%)
TOTAL	22 (50.0%)	11 (25.0%)	6 (13.7%)	5 (11.3%)	44 (100.0%)

[7] The figures in parenthesis are the corresponding numbers expressed as percentages to the total number of 44 answers by the responding firms.

Reliability

"The system should be designed to check the reliability and accuracy of financial data, minimize error ... " [6]. In using an AP, most routine clerical work is carried out by the machine, thus minimizing humen-errors. At the same time, fraud can be detected more easily and quickly. Hence, the result of the audit can be more reliable than the traditional manual audit.

Ease In Input

Ease in commanding the computer. In designing a system, the ease of inputting data and commands has to be considered. This is one of the reasons for the development of AP's.

The so called "audit language" used in AP's is much simpler than any other programming language. They are very near-English or even format-free. Some only require the checking of squares or boxes. This simplicity in input would minimize the amount of errors. Any mistakes in programming incur costs and, thus, the input design of the AP's can be a cost reduction factor as well. With the audit package, the auditor needs only fill in a set of pre-printed specification sheets.

The most common and easiest to complete is the

[6] James B. Bower, Robert E. Schlosser, and Charles T. Zlatkovich, Financial Information Systems: Theory and Practice (Boston: Allyn and Bacon, In., 1969), p. 40.

checklist/questionnaire form. It merely requires filling
in boxes or squares on a pre-designed narrative form.
Another one is the structured set of forms. More details
may have to be given, but comparatively speaking, it is
much simplier than other computer languages. Coding is
more narrative in form than the previous two. It is a
language similar to abbreviated English. Least common,
but very efficient is the interactive audit command
language. It provides a direct communication with the
computer [7].

Effective Reporting

Timely and accurate reporting are pertinent factors
in the design of a system. They "should be designed to
permit effective reporting" [8]. By utilizing an AP, out-
standing exceptions can easily and quickly be detected and
printed within minutes. The speed of detection and printing
make this report benefit another source for time reduction
which has been discussed above [9].

Improved Human Relations

The interest, support and competence of those who

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[7] H. J. Will, "An Interactive ACL (Audit Command
Language) Prototype," Proceedings of the Annual Conference
of the Canadian Information Processing Society, Session
'73, pp. 63-88.

[8] Bower, op. cit., p. 222.

[9] See "Future Cost Reduction" on pages 29-31.

work with the system should be taken into consideration.
It depends upon the need for training and the ease of
programming. The longer the training, the better will the
employees be equipped. However, this means more costs.
Fortunately, on the average, the training period is less
than a week [10].

Another human factor to be considered is motivation.
Among the essential motivating forces, (1) the urge to
succeed and to achieve, and (2) the urge to avoid failure
and disappointment are the most significant ones as far as
auditing EDP records is concerned. These two are, none-
theless, easily attained by the use of AP's because of the
ease in using the systems as discussed in the previous
section [11].

Learning affects the morale of the users. Should
the learning process be too long, users may lose interest
before they actually use the system. Their frustration
may in turn affect their performance of other audit tasks.
At the same time, a long training program may incur a hugh
cost [12]. The short training period and the ease in learning
to command or program solves the problem.

Finally, the analysis covers the ideal qualifications
for mastering an AP. The result should be of interest to

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[10] See "Training cost" on page 28.

[11] See "Ease In Input" on pages 34-5.

[12] See "Training cost" on page 28.

many firms since this gives an indication of future
recruitment and training requirements. The result of the
responses to the question of the ideal qualification for
mastering an AP is summarized below:

```
(A) Basic programming knowledge              20.6%
(B) Basic data (file) organization knowledge 35.0%
(C) Basic computer knowledge                 25.0%
(D) Other                                    13.8%
(E) No idea                                   5.6%
        TOTAL                               100.0%
```

In answers to 'D', others include good logical and
analytical mind, basic knowledge of systems, accounting
and auditing knowledge. These are required by an auditor
regardless of his decision to use an AP in his audit; how-
ever, they indicate the user-orientation among the
professionals rather than technocratic tendencies.

SUMMARY

This chapter concentrates on the cost-benefit
analysis of audit packages. In considering the costs,
both direct and indirect costs should be included. These
are expenses incurred in the processes of design,
development and implementation, and improvements and
amendments. Training cost is another cost factor. On
the other hand, there are benefits gained from the
utilization. The analysis of the collected data gives
six advantages in this chapter, being future cost reduction,
higher efficiency, reliability, ease in input, effective

reporting and improved human relations. The following
chapter will consider and discuss other merits.

CHAPTER IV

ANALYSIS - CONTINUED

INTRODUCTION

Considerations directly affecting the development
of packages have been discussed in the previous chapter.
This chapter will concentrate on other factors such as
the change in the emphasis of various audit tasks, the
aid in achieving the audit standards and the effect upon
employment when AP's are used.

AUDIT STANDARDS

In the pursuit of greater clarity and conformity,
auditors have sought to draw up a definite code of standards.
At the meeting of the American Institute of Accountants
(AIA), now the American Institute of Certified Public
Accountants (AICPA), in 1948, as a result of preliminary
work by an institute committee, ten statements of standards
grouped under three main categories were adopted under the
headings of "general standards", "standards of field work"
and "standards of reporting".

The "standards of reporting" include:

(1) The report shall state whether the financial statements
    are presented in accordance with general accepted
    principles of accounting.

(2) The report shall state whether such principles have
been consistently observed in the current period in
relation to the preceding period.

(3) Informative disclosures in the financial statements
are to be regarded as reasonably adequate unless
otherwise stated in the report.

(4) The report shall either contain an expression of
opinion regarding the financial statements, taken as
a whole, or an assertion to the effect that an opinion
cannot be expressed. When an overall opinion cannot
be expressed, the reasons therefore should be stated.
In all cases where an auditor's name is associated
with financial statements the report should contain
a clearcut indication of the character of the auditor's
examination, if any, and the degree of responsibility
he is taking.

Reporting is a summarization of the extent of
verification, the findings and the conclusion. Reporting
has to be completed by the auditor or an equivalent person
and is not built into AP's. The four statements under
"standards of reporting" cannot be assisted by AP's
although the compliance with standard number one can be
tested with AP's.

Satisfaction of the other standards will also be
assisted by the use of AP's.

General Standards

(1) The examination is to be performed by a person or persons having adequate technical training and proficiency as an auditor. - Disregarding whether an AP is used or not, present day auditors have to possess some knowledge of EDP. This has been reflected in the study towards any accounting designation. Knowing how to master an AP indicates that the auditor has been trained in this area and in turn makes him more technically trained and more proficient as an auditor.

(2) In all matters relating to the assignment an independence in mental attitude is to be maintained by the auditor or auditors. - A lack of knowledge of EDP will require an auditor to depend upon other specialists. He is thus less independent. The use of AP's enables the auditor to retrieve and analyse directly the data and is thus more independent than "auditing around the computer".

(3) Due professional care is to be expected in the performance of the examination and the preparation of the report. - EDP records are more complicated than other accounting records and it would be impossible to carry out the attest function without due professional care.

Standards of Field Work

(1) The work is to be adequately planned and assistants, if any, are to be properly supervised. - It is not

possible to command an AP without planned assignment and the computer takes the role of an assistant that can easily be supervised.

(2) There is to be a proper study and evaluation of the existing internal control as a basis for reliance thereon and for the determination of the resultant extent of the tests to which auditing procedures are to be restricted. - The increase in accounting records caused the shift from detail examination to the emphasis of internal control [1]. With computer-based accounting systems, internal control plays the major role particularly because they are not readable without the aid of a computer. Hence study and evaluation of the existing internal control is indispensable in the use of AP's in auditing.

(3) Sufficient competent evidential matter is to be obtained through inspection, observation, inquiries and confirmations to afford a reasonable basis for an opinion regarding the financial statements under examination. - The computer has brought with it new methods of accounting systems documentation, such as flowcharts and diagrams. Using AP's facilitates the obtaining of these new documents in addition to the previously obtained evidence in expressing opinion upon the financial statements.

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[1] See "Audit Tasks" on pages 47-51.

The opinion of the participating firms in connection
with audit standards and computer-auditing is tabulated
and appears on page 44. Roughly speaking, more than 50%
agree that the packages meet the audit standards, particularly
the third "standard of field work", because sufficient
competent audit programmes are most frequently used in
meeting the standards of field work requiring obtaining
and analysis of competent evidential matter.

Another question arises from the use of AP's, namely
whether new standards are required. Table XI presents the
proportion of respondents replying to this question. More
than 50% state that new standards are not required. Only
22% do not agree. In fact most of the latter group do
not give any strong reasons. Followings are some of the
few explanations:

    Yes — auditor must become more involved and
    knowledgable with computers ...

    Yes — to audit effectively one must understand
    what one is doing ...

    Yes — ... non-data processing personnel do not
    understand how the audit package works ...

How much should an auditor know about the computer
is questionable. It is true that some auditors do not
understand how the system works. However, an auditor does
not have to bother about this since his main concern is
expressing an opinion upon the examined financial statements.
He should be alert to what he is doing at all times. AP
is only a new auditing technique and standards specify

Table X

RESPONSES TO MEET VARIOUS AUDIT STANDARDS

Standards	Firms With AP's		Firms Without AP's		Total	
Audit by trained and proficient auditors	26	(60%) [2]	18	(39%) [3]	44	(49%)
Independence in the auditor's mental attitude and approach	28	(63%)	31	(67%)	59	(65%)
Due care in the performance of the auditor's work	25	(57%)	19	(40%)	44	(49%)
Work being adequately-planned and supervised	22	(50%)	16	(35%)	38	(42%)
Proper study and evaluation of internal control	23	(52%)	28	(60%)	51	(57%)
Sufficient competent evidential matter obtained	35	(79%)	35	(76%)	70	(78%)
No answer	5	(11%)	2	(4%)	7	(8%)

[2] The figures in parenthesis under this column heading are expressed as percentages to the total number of 44 responding firms with AP's.

[3] The figures in parenthesis under this column heading are expressed as percentages to the total number of 46 responding firms without AP's.

[4] The figures in parenthesis under this column heading are expressed as percentages to the total number of all 90 participating firms.

characteristics of the end result, not the tool. Hence, new standards are not necessary.

It is not surprising to receive more than 50% answers as "not required". The use of AP's is so far only a change in the auditing technique, a new approach and practice to facilitate auditing in the environment of new accounting techniques, and not a change in standards!

Using AP's has changed the means but the end objective of verifying the accounts and expressing opinion on the fairness of the financial statements is not altered. However, there are about 20% of the replies which indicate that new standards are required. By reviewing the comments and explanations, an extention of the present standards is

Table XI

SUMMARY OF FIRMS RESPONDING TO THE
REQUIREMENT OF NEW STANDARDS

	Firms With AP's	Firms Without AP's	Total	
"YES" Answers	10 (11.1%)	11 (12.2%)	21 (23.3%)	[5]
"NO" Answers	28 (31.1%)	24 (26.7%)	52 (57.8%)	
No Answers	6 (6.7%)	11 (12.2%)	17 (18.9%)	
TOTAL	44 (48.9%)	46 (51.1%)	90 (100.0%)	

[5] The figures in parenthesis are the corresponding numbers expressed as percentages to the total number of 90 participating firms.

deemed necessary. They want tighter standards than
presently exist. In fact, they argue that new standards
should be coded for more rigorous analysis and in order to
guarantee objectivity, accuracy and reliability, as the
following replies show:

> ... This is a new technique and requires
> control. Considerations to guarantee its
> objectivity, accuracy and reliability ...

> ... Standards should be expanded to
> require more rigorous analysis ...

However, all these can be met with one or more of the
present standards. Auditors, having adequate technical
training and proficiency (general standard number one)
should be able to determine the amount of tests and the
detail of verification.

FEES (COSTS CHARGED)

Is there any effect upon the fees charged to the
clients? (For internal auditing, this would be the effect
of the allocation of costs.) The responses should reflect
somewhat the cost-benefit to the firms. Unfortunately,
the responses were so few that a conclusion could hardly
be drawn from the data.

Among the replies, some considered that the fees
(or charges) would be affected. They argued that time
was saved in clerical work and the cost was diminished.
Some stated that the initial application of the system
was even more expensive while later applications would

definitely reduce the cost. On the other hand, there were disagreements. The main reasons for the unaffected fees were:

(1) There was no significant reduction in cost.

(2) The reduction in cost could hardly be quantified.

(3) AP was only a tool which should not affect the fee.

AUDIT TASKS

An audit can be staged according to the kinds of tasks to be performed. Mainly, these tasks are:

(1) pre-audit negotiations,

(2) review of internal controls,

(3) retrieval of documents and data,

(4) analysis of documents and data,

(5) reporting, and

(6) miscellaneous.

Only nineteen firms completed this question. The result is not very representative since the population is too small. Despite this, the approximate percentages of various tasks are summarized on pages 48-50. Table XII and XIII give the mean, median, mode, maximum and minimum percentages for various tasks in using the conventional manual audit and in using the package audit respectively. Table XIV shows the various statistical figures for the differences between the two techniques. From table XIV, attention is drawn to the point that time saved from retrieval of documents and data had been switched to the

Table XII

STATISTICS OF RESPONSES TO THE ALLOCATIONS OF
VARIOUS AUDIT TASKS WHEN USING THE
MANUAL AUDIT (IN PERCENTAGES)

Audit Tasks	Mean	Median	Mode	Standard Deviation	Maximum	Minimum	Range
Review of internal controls	26.5	20.6	20	15.0	60	5	55
Retrieval of documents and data	29.2	26.8	40	13.9	50	7	43
Analysis of documents and data	35.5	38.2	40	10.5	50	10	40
Reporting	6.8	2.3	0	12.5	40	0	40
Pre-audit negotiations	0.0	0.0	0	0.0	)0	0	0
Miscellaneous	1.9	0.3	0	7.1	31	0	31

Table XIII

STATISTICS OF RESPONSES TO THE ALLOCATIONS OF VARIOUS AUDIT TASKS WHEN USING THE PACKAGE AUDIT (IN PERCENTAGES)

Audit Tasks	Mean	Median	Mode	Standard Deviation	Maximum	Minimum	Range
Review of internal controls	31.8	37.2	40	20.2	75	2	73
Retrieval of documents and data	21.7	15.3	5	20.2	78	5	73
Analysis of documents and data	35.0	34.8	20	17.3	85	11	74
Reporting	7.1	2.3	0	12.6	40	0	40
Pre-audit negotiations	1.0	0.6	0	4.6	20	0	20
Miscellaneous	3.3	0.5	0	12.4	54	0	54

Table XIV [6]

STATISTICS OF DIFFERENCES BETWEEN THE ALLOCATIONS OF
VARIOUS AUDIT TASKS WHEN USING THE
MANUAL AUDIT AND PACKAGE AUDIT
(IN PERCENTAGES)

Audit Tasks	Mean	Median	Mode	Standard Deviation	Maximum	Minimum	Range
Review of internal controls	+5.3	+10.0	0	24.7	+45	-53	98
Retrieval of documents and data	-7.5	-14.2	-20	25.8	+56	-45	101
Analysis of documents and data	-0.4	-0.5	0	18.2	+45	-30	75
Reporting	+0.3	+0.1	0	1.2	+5	0	5
Pre-audit negotiations	+1.0	+0.6	0	4.6	+20	0	20
Miscellaneous	+1.4	+0.2	0	5.3	+23	0	23

[6] Positive figures represent increases in percentage of time allocation when changing from manual audit to package audit.

review of internal control. This is because of the current emphasis of internal control.

EFFECT OF AP'S ON AUDITORS

AP's aid auditors in various ways. The more common ones are:

(A) I can do more audit work in the same amount of time.

(B) I have gained professional independence in the field of EDP.

(C) I can use computers for much of the clerical audit work.

(D) I can use special selection and analysis routines with ease.

(E) I can concentrate on exceptions.

(F) I can interface with computer files.

(G) I can quickly become "bilingual" in auditing and EDP.

(H) I do not have to be a professional programmer.

The mean, mode and median of the answers to the effects on auditors are summarized by the table on page 52. The figures in the last column, the numbers of firms replying, do not add up to ninety due to the fact that not all statements apply to every firm.

EFFECT ON EMPLOYMENT

Business entities are part of the economic system. Accounting firms and firms with internal audit departments are concerned about the social impact of utilizing audit

Table XV

STATISTICS OF RESPONSES TO THE EFFECT OF [7]
AUDIT PACKAGES ON AUDITORS

Effects	Mean	Median	Mode	Numver of Responses
I do not have to be a professional programmer	5.61	5.9	8	75
I can use computers for much of the clerical audit work	3.69	3.4	2	77
I can interface with computer files	3.95	4.0	5	76
I can quickly become "bilingual" in auditing and EDP	6.29	6.9	7	73
I can use special selection and analysis routines with ease	3.78	3.7	2	78
I can concentrate on exceptions	3.40	3.2	2	78
I can do more audit work in the same amount of time	3.43	3.2	1	79
I have gained professional independence in the field of EDP	4.59	5.1	1	73

[7] "1" represents the most appealing to the auditors, "2" the second, ... and so on till "8" the least.

packages. In recent years, people, especially those in trade unions, have projected the image of automation and other data processing means as one of the main causes for unemployment. Some even suggested that such automation should be stopped in order to prevent further unemployment increase [8].

Table XVI and XVII give a summary of the effect of AP's upon the number of audit staff. The majority of firms, whether possessing an AP or not, considered that there would be no change in employmnet. Some even considered an increase.

SUMMARY

According to the study of the various packages and together with the answers from the participating firms, "auditing with the computer", especially with an audit package, is more effective, more efficient, more economical and more beneficial than "auditing around the computer" in the following ways:

(1) It performs a lot of clerical work.

(2) It can do more in less time.

(3) It facilitates recalculations, tests and sampling.

(4) A more detailed, more extensive search is possible and even the total population can be tested.

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[8] William G. Carlos, "Automation In Theory And Practice," <u>Business Topics</u> (Autumn 1960), p. 7.

(5) More confident - 100% checking is possible (though it may hot be economical) with fewer (human) errors.

(6) It allows the performance of various functions simultaneously.

(7) It allows auditors to concentrate more on internal control.

(8) Because of its ability to review, summarize and list exceptions in a short time, auditors can conduct audits on an exception basis.

(9) It enables auditors to gain better knowledge of files and operating systems.

(10) It is more unbiased.

(11) It permits the use of audit techniques not normally feasible in a manual auditing environment. Use of this technique, along with the speed of the computer, makes this procedure considerably more effective than "auditing around the computer" in many situations.

The advantages of AP's over specific programming for individual situation include the followings:

(1) Simplicity as a training aid.

(2) One can quickly become "bilingual" in auditing and EDP.

(3) One can use special selections and analyses with ease.

(4) One can gain professional independence from the field of EDP.

Table XVI

EFFECT OF AUDIT PACKAGES UPON THE NUMBER OF
AUDIT STAFF ON AN AUDIT TEAM

Change In Staff	Firms With AP's		Firms Without AP's		Total	
+50%	1	3.8%	0	0.0%	1	1.7%
+25%	0	0.0%	1	3.0%	1	1.7%
0%	23	88.5%	15	75.8%	48	81.4%
-5%	1	3.8%	0	0.0%	1	1.7%
-10%	0	0.0%	2	6.1%	2	3.4%
-15%	0	0.0%	1	3.0%	1	1.7%
-20%	0	0.0%	1	3.0%	1	1.7%
-25%	0	0.0%	1	3.0%	1	1.7%
-33%	0	0.0%	1	3.0%	1	1.7%
-35%	1	3.8%	0	0.0%	1	1.7%
-60%	0	0.0%	1	3.0%	1	1.7%
TOTAL	26	100.0%	33	100.0%	59	100.0%

Table XVII

EFFECT OF AUDIT PACKAGES UPON THE NUMBER OF
AUDIT STAFF OF THE WHOLE FIRM

Change In Staff	Firms With AP's		Firms Without AP's		Total	
+40%	0	0.0%	1	3.0%	1	1.7%
+20%	0	0.0%	1	3.0%	1	1.7%
+15%	0	0.0%	1	3.0%	1	1.7%
+10%	1	3.8%	1	3.0%	2	3.4%
+2%	0	0.0%	1	3.0%	1	1.7%
0%	21	80.8%	26	78.8%	47	79.7%
-5%	2	7.7%	1	3.0%	3	5.1%
-10%	2	7.7%	0	0.0%	2	3.4%
-60%	0	0.0%	1	3.0%	1	1.7%
TOTAL	26	100.0%	33	100.0%	59	100.0%

CHAPTER V

FEASIBILITY, DESIRABILITY AND JUSTIFIABILITY
OF AN AUDIT COMMAND LANGUAGE (ACL)

The study and analysis show a number of advantages
of audit packages over the other techniques. Although a
specific quantitative analysis with actual indexes to show
whether an AP would be desirable is necessary, the benefits
discussed above allow a qualitative conclusion - that is,
it is worthwhile to audit computerized accounting systems
with audit packages.

This chapter will summarize the responses which
indicate whether, from their practical point of view, it
is worthwhile to develop and possess a package, and whether
it is feasible, desirable and justifiable to develop one
common generalized Audit Command Language.

IS IT WORTHWHILE TO DEVELOP AN AP ?

Out of the ninety firms participating, there were
seventeen accounting firms (Chartered Accountant firms,
Certified Public Accountant firms and General/Public
Accountant firms). Only five of these firms and thirty six
of the other types of companies (less than 50% in total)
responded to this question. The responses to this are
tabulated in table XVIII.

Table XIX classifies these forty one firms in a

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Table XVIII

RESPONSES OF FIRMS TO THE WORTHINESS OF
DEVELOPING THEIR OWN AUDIT PACKAGES

Types Of Firms	Worth-while	Not Worth-while	Total
Accounting Firms	2	3	5
Other Industrial Firms	23	13	36
TOTAL	25	16	41

Table XIX

RESPONSES TO THE WORTHINESS OF DEVELOPING
THEIR OWN PACKAGES (BY SIZE)

Firms	Worthwhile		Not Worthwhile		Total	
International Firms	12 (75%)	29.3%	4 (25%)	9.8%	16	39.1%
National Firms	2 (30%)	4.9%	5 (70%)	12.2%	7	17.1%
Regional Firms	6 (67%)	14.6%	3 (33%)	7.3%	9	21.9%
Local Firms	5 (55%)	12.2%	4 (45%)	9.8%	9	22.0%
TOTAL	25	61.0%	16	39.1%	41	100.0%

different way. They are re-classified into four categories:
(a) international firms, (b) national firms, (c) regional
firms, and (d) local firms. It indicates that 75% of the
international firms and more than two-thirds of the regional
firms considered that it was worthwhile to develop their
own packages. However, the majority of the national firms
(70%) responded negatively. On the whole, more than 60%
of the firms are in favor of the development.

We could gain further insights by summarizing their
reasons for and against the development. The main point
brought out against the development was their ability and
desire to purchase or rent a package. One firm commented
that it was too costly at present since most clients were
not of such a size to warrant this cost. By looking into
the future, we could forecast the need for an AP [1]. Some
firms, however, would prefer to modify or adapt the present
package used by their public accounting firms. One wrote
that it would not develop their own AP but it was worthwhile
for a software firm to do so. This again indicates that
there is and will be such a need.

On the other hand, those who are in favor of
developing an AP considered that it was a necessity since
it could provide a lot of benefits. The followings are
some of the comments from the participating firms:

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[1] See pages 8-12.

... You can increase your audit coverage without drastically increasing staff. New computer sophistication requires new auditing methods ...

... because of the ability to do more work in the same time and also to concentrate on only the exceptions found ...

... "auditing around the computer" is no longer adequate. AP is one of several necessary tools ...

... (a) ability to "audit visibly" other departments more frequently, (b) more freedom from clerical tasks ...

... acquiring and implementing an audit package will (1) assist us in bringing own field auditors closer to Electronic Data Processing operations and, by association, to more knowledge of this increasingly important field (2) free own EDP auditors from more prosaic computer tasks and permit them to allot more time to analysis of internal program controls and safeguards ...

The above quotations summarize the benefits of AP's [2]. However, the cost has to be weighed against the returns and it would be worthless to develop a system if the cost is unreasonable. One firm made the following comment:

... It is certainly worthwhile to develop ... as you then have the rights to modify and increase its potential. However, the costs of development must be carefully weighed against the rental or purchase of a vendor package ...

The opinions expressed, except the cost consideration, indicate that an AP would be beneficial. Financing seems to be the only problem. Nonetheless, it is worthwhile and necessary to have AP's as an audit tool.

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[2] See previous chapters (III and IV) for more benefits.

AUDIT COMMAND LANGUAGE ?

Standardization facilitates training, learning, modification and understanding. Many tools have already been standardized. Procedures are to a certain degree standardized. Audit standards are stipulated and coded. Now, we have to consider whether it is desirable and justifiable to develop one common computerized audit language (ACL).

The response to this question is quite satisfactory. There were seventy-three firms (80%) answering. Table XX summarizes the answers and it seems that, at first glance, ACL is not desirable and justifiable. However, a conclusion cannot be made at this point. Out of the forty firms which considered ACL undesirable and unjustifiable, more than 50% possess an AP. To protect their own package from being obsolete and to prevent a loss of their market, they are unwilling to see the development of any package which would be more efficient, more effective and more beneficial than the one they are possessing. On the other hand, by analysing the other group, more than 50% of those having no AP were in favor of ACL. They suggested this by reasons of standardization, similarity of most packages, ease of application and standardized report.

To look at this from a different angle (table XXI) more small firms (regional and local) were willing to see such a development while most national firms were against

Table XX

RESPONSES TO THE DESIRABILITY AND JUSTIFIABILITY OF
THE DEVELOPMENT OF AN AUDIT COMMAND LANGUAGE
(BY POSSESSION OF AN AP)

Types Of Firms	"YES" Answers	"NO" Answers	Total
Firms with AP's	13	23	36
Firms Without PA's	20	17	37
TOTAL	33	40	73

Table XXI

RESPONSES TO THE DESIRABILITY AND JUSTIFIABILITY OF
THE DEVELOPMENT OF AN AUDIT COMMAND LANGUAGE
(BY SIZE OF FIRMS)

Types Of Firms	"YES" Answers			"NO" Answers		
	With AP's	Without AP's	Total	With AP's	Without AP's	Total
International	7	7	14	10	7	17
National	0	2	2	10	3	13
Regional	3	6	9	2	3	5
Local	3	5	8	1	4	5
TOTAL	13	20	33	23	17	40

this development. The international firms are divided.

The tables XX and XXI present a combined response

to both desirability and justifiability. A firm could have

responded both negatively, or one positively and the other

negatively, or both positively. A seperate analysis

follows therefore.

DESIRABILITY

Firms responding to this question did not comment

on the reasons for undesirability. They merely stated why

it was not feasible, not practicable and/or not justifiable

to develop one. On the other hand, thirty-two out of the

thirty-three firms with affirmative response did explicitly

state their reasons [3]. The reasons were largely identical

to those cited in the previous sections. Although slightly

less than 50% [4] considered it both desirable and justifiable

by giving specific reasons for their position, it might be

concluded that ACL is desirable, because there were no

definite reasons for the undesirability.

JUSTIFIABILITY

The problem of justifiability and feasibility (or

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[3] Desirable... does not have to be justifiable for
reasons such as cost and marketability. Similarly,
justifiable does not necessarily mean desirable due to,
for instance, competition.

[4] See tables XX and XXI on page 62.

practicability) is to be considered now. The arguments
and opinions expressed, both for and against, are summarized
as follows:

FOR:

(1) The audit profession would then have another body of
common knowledge giving it more strength and independence.

(2) Difference of various packages are mainly in "sales-
manship". Thus it seems that a common language, if
flexible enough, would serve all purposes.

(3) It would assist in training of staff and spread under-
standing among all accountants.

(4) Simplify programming applicable to divergent data
processing companies' hardware and software.

(5) Ease of implementation because terminology would be
standardized.

(6) Similar rationale that prompted the use of COBOL and
FORTRAN as machine independent languages.

(7) For the same reasons that general computer programming
was standardized in COBOL, FORTRAN, etc., that is,
better communication, portability of training and
experience from one firm to another, and from one AP
to another.

(8) Audit standards can only be applied uniformly if all
auditors have the same capabilities - a common audit
language is one of these capabilities.

(9) When the auditor changes jobs, he will not have to
force himself to learn new languages, because of this

standardization.

AGAINST:

(1) Varied auditing purposes - more AP's allow user to
    select the most appropriate one to meet their needs.

(2) Differences in audit philosophy is difficult to over-
    come.

(3) Vast disparity in the available facilities and personnel.

(4) There are too many machines and systems.

(5) Cost is too much - benefits would not be worth the
    monumental effort required.

(6) Time to develop is too long.

(7) Too many people are involved to come to an agreement.

(8) More than one AP provides competition that can improve
    quality of packages.

Since the reasons for and against the justifiability

of ACL are unweighted, it is hard to come to a conclusion

on the issue. Some of the problems encountered with AP's

could justify the large-scale implementation of ACL. For

instance, according to one reply, it is possible for more

than one firm to design a package:

> ... From our experience in developing
> amendments to (name of package), it is possible,
> if difficult, for a number of firms to produce a
> specification which will meet all their needs ...

I believe that some firms are unwilling to change

to a new system for one or more of the following reasons:

(1) too satisfied with their present package,

(2) unwilling or difficult to write off the cost of the

present package,

(3) unwilling to co-operate in designing and developing a
new system, and

(4) prestige – their package is the best and thus unwilling
to share the success with others either for commercial
reasons or for fear of loss of leadership in this area.

FEASIBILITY (PRACTICABILITY)

It may be both desirable and justifiable but not
practicable to develop ACL at a large scale. The main
problem seems to lie mainly in the money already invested
in the present packages and in its amortization. The
developers seem to be afraid of the loss of a market for
their packages. However, they overlook that no matter how
efficient their present packages are, none of them satisfies
all present and future needs. They will sooner or later
become obsolete or require extensive amendments and im-
provements. Since every AP designer spends money on
similar research, I see great advantages in combining
these efforts, personnel, expertise and future outlays to
develop and implement one standardized package. The result
should be much better.

There is another practical problem encountered.
Although it seems difficult at present to come to a mutual
agreement on all features of the package, this is by no
means impossible. Truly, this would be more efficient and
better accomplished if, as suggested by some firms, this

would be carried out through institutes such as universities, foundations, the Canadian Institute of Chartered Accountants, the American Institute of Certified Public Accountants, and other accounting institutes, either alone or working together.

Another problem is the marketability. A firm asked, "Who would buy it?" This question was answered by another reply, "The most likely market would be the smaller CA offices who do not have their own systems or the resources to develop one." Small and medium-sized firms are potential users too. The large firms would shift to adopt this system as well, provided it was well-designed, comprehensive and more economical.

Competition should not be a problem. Standardization has many benefits that it could override those from competition. As mentioned above, more money could be spent in concerted research resulting in a comprehensive and well-researched design that could be implemented in different language versions and modes of operation.

From the information, opinions and suggestions gathered, it seems desirable to implement ACL at a large scale. Nevertheless, a more detailed quantitative analysis including the costs of development and the number of personnel involved is required. Such an extensive research warrants the full co-operation of the firms in disclosing relevant information and of the national institutes to sponsor the efforts. The benefits seem well worth the costs.

CHAPTER VI

AUDIT COMMAND LANGUAGE

INTRODUCTION

Consideration has been given to the costs and
benefits of AP's, the effects of such a utilization, and
the desirability, justifiability and possibility of
development, this chapter discusses the source languages
of AP's. This aims at aiding the design and development
of the ACL (or similar package systems). Finally, the
range of actual and expected periods of development and
implementation will be discussed.

INPUT COMMAND

Chapter II has introduced the different types of
source language . These are:
(1) coding: It is a language similar to an abbreviated
          English where the auditor needs to do some
          programming. It is similar to COBOL or PL/I
          but much simpler.
(2) checklist/questionnaire: It is a pre-designed narrative
          form. What the auditor needs to do is to fill
          in the boxes. Simple and clear explanations
          appear by the side of the squares which require
          only a letter or a figure to be inserted.

(3) structured sets of forms for special audit functions:

It is somewhat between coding and checklist.

Some writing is needed, but not as much as

coding. Besides, the forms are pre-designed.

(4) interactive audit command language: It is similar to

coding but provides a command structure for

direct communication with the machine via a

display terminal or CTR. Printed results

could be obtained from a printer. Such inter-

active auditing can be more efficient since

direct communication is possible. The cost

does not have to be higher [1].

(5) others: The answers to this can be summarized as:

(a) It all depends upon the capabilities of

the users since all types above are not

preferential to one another.

(b) A combination of the four types above

would be preferred.

More people prefer coding or checklist (see table

XXII). Interactive ACL is less welcome at present since

it is more advanced and less known. Table XXII gives a

summary of the responses of preference to various input

command languages.

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[1] See H. J. Will, "Interactive Auditing With ACL,"
(Unpublished paper, the University of British Columbia,
June, 1973).

FEATURES

From the information collected, those routines that would be needed in the future are tabulated on pages 71-2.

- When compared with table VII on pages 23-4, only the following features were considered less important in the future audits:

(1) field classification,

(2) insert (add data into a file),

(3) block selection, and

(4) punch cards.

In addition, there are other features that appear in some present packages but which are currently considered by a majority (60% or more) as not essential or significant

Table XXII

SUMMARY OF RESPONSES TO PREFERENCE TO
VARIOUS INPUT COMMAND LANGUAGES

Types Of Input Command Languages	Preference	
	Number	Percentages
Coding	31	35.6%
Checklist/Questionnaire	29	33.3%
Structured Sets of Forms for Special Audit Functions	15	17.2%
Interactive Audit Command Language	8	9.2%
Others	4	4.6%

Table XXIII

ROUTINES OF AUDIT PACKAGES THAT ARE CONSIDERED TO BE
ESSENTIAL IN THE NEAR FUTURE

Features	Percentages [2]
ACCESS	
(File) Creation/Generation/ Reformatting (Extraction)	83.33%
(File) Selection (no reformatting)	68.52%
(Input) File Editing	81.48%
TESTING	
Aging	75.93%
Comparison of Fields	88.89%
Comparison of Files	83.33%
Table-lookup	79.63%
Include/Exclude	83.33%
Match/Merge	92.59%
Sequence Checking	90.74%
REORGANIZATION	
Move (Transfer data from one field to another)	77.78%
Reformat	74.07%
Sort	87.04%
Stratification	77.78%
Summarize	92.59%

[2] The figures under this column heading are the
number of responses to the corresponding items expressed
as percentages of the total number of 54 responding firms.

Table XXIII (continued)

Features	Percentages [3]
SELECTION & ANALYSIS	
The Search	72.22%
Systematic Sampling	88.89%
Variable Estimation Sampling	68.52%
Attribute Sampling	75.93%
CALCULATIONS	
Accumulation	90.74%
Basic Mathematical Operations	88.89%
Footing & Record Counts	90.74%
Ratio Computation	72.22%
Subtotal	79.63%
Maxima	61.11%
Minima	61.11%
Percentages	87.04%
Averages	79.63%
REPORTING	
Listing	81.48%
Print Names & Addresses	77.78%
Print Titles & Headings	83.33%
Positive Confirmation Letter	75.93%
Negative Confirmation Letter	68.52%
Tabulate Reports	70.37%

[3] See footnote number 2 on previous page.

enough for the performance of audit to be included. These
are:

REORGANIZATION:

    (1) Update (59.3%)

SELECTION & ANALYSIS:

    (2) Sample Evaluation (59.3%)

    (3) Special Sampling Plan (44.4%)

    (4) Correlation Analysis (44.4%)

    (5) Frequency Distributions/Histograms (48.2%)

    (6) Regression Analysis (35.2%)

    (7) X-Y Charts (24.1%)

REPORTING:

    (8) Bank Reconciliation (42.6%)

    (9) Computer Flowcharting (25.9%)

   (10) Graphic Presentation (29.6%)

   (11) Visual Display (29.6%)

   (12) Bar Charts (25.9%)

OTHER FEATURES:

   (13) Label Checking (in various files) (55.6%)

   (14) Program Charting (of various clients' programs)
        (25.9%)

   (15) Tracing (22.2%)

The figures in parentheses are the numbers of answers to
the corresponding items expressed as percentages of the
total number of fifty-four responding firms.

TIME OF DEVELOPMENT AND IMPLEMENTATION

Table XXIV indicates that the majority of firms
with an AP developed and implemented the package in a
relatively short time, often less than two years. These
packages are still under improvement and the time indicated
is the span until initial utilization of the system for
auditing. The table gives a feel for the number of years
needed for designing a system and should be of interest
to future design.

VARIOUS PACKAGES

Some firms commented that a general package could
hardly fulfill the needs of all audit functions, especially
among various industries. They suggested that separate
pakcages for various industries should be developed. This
was a good idea. However, there should be common features
among auditing various industries, such as editing, aging,
summarizing, sorting and calculating. The suggested ACL
should be capable of handling all these common routines
for most of the industries.

Table XXIV

SUMMARY OF RESPONSES TO THE TIME OF
DEVELOPMENT AND IMPLEMENTATION

Time	Firms With AP's		Firms Without AP's		Total	
Less Than 1 Year	16	36.4%	16	34.8%	32	35.6%
Less Than 2 Years	4	9.1%	7	15.2%	11	12.2%
Less Than 3 Years	1	2.3%	6	13.0%	7	7.8%
Less Than 4 Years	3	6.8%	2	4.0%	5	5.6%
More Than 4 Years	1	2.3%	12	26.1%	13	14.4%
No Answer	19	43.2%	3	6.5%	22	24.4%
TOTAL	44	100.0%	46	100.0%	90	100.0%

CHAPTER VII

SUMMARY

The unwillingness or inability of some participating firms to disclose some facts fully made some analyses impossible. At any rate, some important conclusions can still be drawn as follows.

It is beneficial and feasible to use AP's in auditing. The only consideration that was left out in the analysis due to insufficient information is the cost. Cost includes both present and future, direct and indirect.

Other benefits in the use of AP's in auditing include the short training period, the meeting of future needs, good service, the meeting of the audit standards, more extensive search, error minimized and clerical time saved.

These benefits do not necessarily guarantee the development. Demands for such systems have to be considered. The accounting subsystems that are expected to be computerized in the near future and that could be audited by means of AP's are tabulated in chapter I and it seems the needs warrant the development.

It has been concluded that it is desirable and feasible to develop ACL. Nevertheless, a more quantitative research on the cost of implementing ACL at a large scale should be carried out. Such a recommended study might affirm (or reject) this conclusion. The suggested research

depends upon the full co-operation of the firms and could probably be best accomplished if sponsored by the various professional institutes.

Additional prototype research seems warranted if one is willing to accept ACL as a valid concept. These have been summarized by Will [1] as follows:

(1) Further research into and implementation of additional Basic ACL commands: sampling, reporting, multiple file processing.

(2) Research into and implementation of Advanced ACL commands: flexible reporting, confirmations, regression and correlation analyses.

(3) Further study and possible development of separate dialogue styles, e.g. prompting, choice and tutorial.

(4) Alternative language formats and user interfaces (scanners) for ACL: narrative-procedural, questionnaire, fixed coding form, decision tables.

(5) Implementation of Full ACL commands: test data generation, tracing, flow charting, display.

(6) Research into the interface problem of ACL with large-scale, integrated data bank systems.

(7) Research into the feasibility of implementing ACL by means of extensible language systems.

(8) Design schedule development for large-scale implementation

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[1] H. J. Will, <u>Proceedings of the Annual Conference of the Canadian Information Processing Society, Session '73</u>, p. 83.

of ACL.

(9) Implementation of ACL subsets on various computer
    hardware and operating systems.

(10) Empirical and theoretical research into the behavioral,
     professional and didactic implications of ACL.

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APPENDIX A

LIST OF PARTICIPATING FIRMS

1. Alexander Grant & Company

2. American Hoechst Corporation

3. Aquitaine Company of Canada Ltd.

4. Arkwright-Boston Manufacturers Mutual Insurance Company

5. Arthur Andersen & Company (Chicago)

6. Arthur Andersen & Company (Vancouver)

7. Arthur Young & Company

8. B. C. Hydro & Power Authority

9. B. C. Telephone Company

10. The Bank of Canada

11. Blue Bird Coach Company

12. Blue Cross & Blue Shield of Virginia, Inc.

13. Blue Cross of Florida, Inc.

14. Blue Cross of Southern California

15. Brown Company

16. Canada Post Office

17. Canadian National

18. Central Pennsylvannia National Bank

19. Chase Brass & Copper Company

20. Chevron Standard Ltd.

21. City of Vancouver

22. City Parish of East Baton Ronge

23. Colorado Interstate Corporation

24. Computer Resources Corporation

25. Computer Science Corporation

26. Conley, McDonald, Sprague & Company

27. County of Orange Auditor-Controller

28. Deloitte, Haskins & Sells

29. Depositors Corporation

30. Du Pont of Canada Ltd.

31. Dunwoody & Company

32. Eastman Kodak Company

33. Ernst & Ernst

34. Esco Corporation

35. Excise Systems Research, Department of National
    Revenue, Customs & Excise

36. Farm Credit Administration

37. Federal Home Loan Bank

38. Federal Reserve Bank of Chicago

39. Federal Reserve Bank of New York

40. The First National Bank of Chicago

41. Flatiron Service Company

42. Gifford-Hill & Company

43. The Goodyear Tire & Rubber Company of Canada, Ltd.

44. Gorden Harrington & Osborn

45. Greb Industries Ltd.

46. Greenwood Mills

47. Gulf Oil Ltd.

48. H. E. W.

49. Honeywell Ltd.

50. Imperial Oil Ltd.

51. Informatics Inc.

52. Information Science

53. Interlake, Inc.

54. The International Nickel Company of Canada, Ltd.

55. Lybrand, Ross Bros. & Montgomery

56. MacMillan Bloedel

57. Massachusetts Mutual Life Insurance Company

58. McDonald Corporation

59. Mills Laboratories, Inc.

60. Mutual United of Omaha

61. Nanaimo School Board

62. National City Bank of Cleveland

63. Naval Audit Service

64. Office of the Auditor General

65. Ontario Hydro

66. Paccar, Inc.

67. People's Savings Bank

68. The Port of New York Authority

69. Price Waterhouse & Company (Vancouver)

70. The Proctor & Gamble Company of Canada, Ltd.

71. Republic Software Products

72. Puritan Life Insurance Company

73. Raymond Chabot, Martin, Pape & Associates

74. Saskatchewan Power Corporation

75. Seattle First National Bank

76. Security Trust Company

77. Seidman & Seidman

78. Shell Oil Company

79. State Street Bank & Trust Company

80. Sunlife Assurance Company of Canada

81. Thorne Gunn & Company

82. Title Insurance & Trust Company

83. Touche Ross & Company (Chicago)

84. Twentieth Century-Fox Film Corporation

85. Union Bank

86. Union National Bank of Pittsburgh

87. Walton Joplin Langer & Company

88. Western Union Telegraph Company

89. Westinghouse Electric Corporation

90. Wolf & Company

91. Wolverine World Wide, Inc.

92. Workmen's Compensation Board

93. 3M Company

APPENDIX B

THE QUESTIONNAIRE

_____ Please check here if you would like a summary of results of the questionnaire to be mailed to you.

NAME OF FIRM: _____

Do you possess an audit package *? _____

Name of the AP used: _____

Please circle the appropriate answer(s) for the following questions:

(1) Is your firm a/an:

        (a) international firm
        (b) national firm
        (c) regional firm
        (d) local firm

(2) In your opinion, what is/are the ideal qualification(s) that enable(s) one to master the AP:

        (a) basic programming knowledge
        (b) basic data (file) organization knowledge
        (c) basic computer knowledge
        (d) other (please specify): _____
        (e) no idea

(3) Answer (a) or (b):

        (a) If you posess an AP, how long did it take to develop and implement the present AP?
        (b) If you do not possess an AP, how long do you think it would t; to develop and implement an AP to meet your needs?

                (1) less than 1 year
                (2) less than 2 years
                (3) less than 3 years
                (4) less than 4 years
                (5) more than 4 years
                (6) no idea

        Please specify the number of man - months: _____ man

---

* An audit package (AP) is a system consisting of a set of generalized comp. programs for retrieving information from a computer - based accounting sy. with extended analytical testing and reporting capabilities. It can be used with complete independence from the client's programs and any data retrieval system used in auditing is included as well.

(4)   Answer (a) <u>or</u> (b):

    (a)   If you use an AP, how much clerical time is being saved in auditing with it on the average?

    (b)   If you do not use an AP, how much clerical time do you think could be saved by using one?

          (1)   none
          (2)   less than 10%
          (3)   less than 25%
          (4)   less than 50%
          (5)   more than 50%
          (6)   no idea

(5)   Answer (a) <u>or</u> (b):

    (a)   If you use an AP, in your opinion, which of the following traditional audit standards are <u>met</u> by using it?

    (b)   If you do not use an AP, in your opinion, which of the following traditional audit standards would be <u>met</u> by using one?

Personal/General Standards:

    (1)   Audit by trained and proficient auditors
    (2)   Independence in the auditor's mental attitude and approach
    (3)   Due care in the performance of the auditor's work

Standards of Field Work:

    (4)   Work being adequately - planned and supervised
    (5)   Proper study and evaluation of internal control
    (6)   Sufficient competent evidential matter obtained

(6)   If you have used an AP, which alternative yields higher audit efficiency:

    (a)   auditing around the computer
    (b)   auditing with the AP
    (c)   both (a) & (b) are more less the same

(7)   Which of the following type of audit programming do you prefer:

    (a)   Coding - a language similar to an abbreviated English where the auditor needs to do some programming
    (b)   Checklist/Questionnaire - filling boxes on a pre - designed narrative form
    (c)   Structured sets of forms for special audit functions
    (d)   Interactive audit command language
    (e)   Others (please specify):

Please check or give the appropriate answer on the tables for each of the following questions:

- (8) In the 1st column of the table on pages 8 & 9, give the approximate number of your current clients** in the various industries.

- (9) In the 2nd column of the table on pages 8 & 9, give the approximate number of audit clients** in the various industries that have an accounting system which can be audited by computers (e.g., punch card, paper tape and magnetic tape).

- (10) In the 3rd,4th and 5th columns of the table on pages 8 & 9 give the approximate number of clients** in the industries identified that are audited in the following ways:

    - (a) Generalized AP
    - (b) Special computer audit programs
    - (c) Audit around the computer

- (11) In the 1st column of the table on page 10, indicate the approximate percentages of your clients'** accounting subsystems that have been computerized.

- (12) In the 2nd, 3rd and 4th columns of the table on page 10, give the approximate percentages of the computerized accounting subsystems identified that are audited in the following ways:

    - (a) Generalized AP
    - (b) Special computer audit programs
    - (c) Audit around the computer

- (13) In the 5th column of the table on page 10, check the various accounting subsystems that you think will be computerized in the next 2 to 5 years.

- (14) In the 6th column of the table on page 10, check the various accounting subsystems that you think are, will and/or should be audited by computerized audit packages.

- (15) If you use an AP, check in the 1st column of the table on pages 11, 12 & 13 the those various features that are included in your present AP.

- (16) If you possess an AP, and if you plan to develop and improve it, give in the 2nd column of the table on pages 11, 12 & 13 the estimated approximate cost*** of developing and implementing the various additional features that are not included in the present AP, but will be implemented.

** This implies subsidiaries, divisions, or departments for internal auditors.

*** The cost would include the salary paid to employees in the study, design and implementation of the system, and any other expenditure incurred during the development and implementation stage.

(17) Answer (a) <u>or</u> (b):

      (a)   If you possess an AP, <u>check</u> in the 3rd column of the table on <u>pages 11, 12 & 13</u>, those features that you think will and/or should be included in future audit packages.

      (b)   If you do not possess an AP, and supposing you are going to develop and implement one, in the <u>3rd column</u> of the table on <u>pages 11, 12 & 13</u>, <u>check</u> those features that would be included as subsystems in the package.

---

(18) Rank the following statements about audit packages according to their appeal to you ("1" for the most appealing, "2" for the second next, etc.):

    _____ I do not have to be a professional programmer

    _____ I can use computers for much of the clerical audit work

    _____ I can interface with computer files

    _____ I can quickly become "bilingual" in auditing and EDP

    _____ I can use special selection and analysis routines with ease

    _____ I can concentrate on exceptions

    _____ I can do more audit work in the same amount of time

    _____ I have gained professional independence in the field of EDP

(19) How many members of your audit staff have the following qualifications:

    (a) basic programming knowledge   _____

    (b) basic data (file) organization knowledge   _____

    (c) basic computer knowledge   _____

    (d) both (a) & (b)   _____

    (e) both (a) & (c)   _____

    (f) both (b) & (c)   _____

    (g) all of the above   _____

    (h) none of the above   _____

(20) How many of your audit staff are:

    (a) EDP "specialists" for internal control evaluation   _____

    (b) EDP "specialists" for AP support   _____

    (c) EDP "specialists" for both internal control evaluation and for AP support   _____

    (d) Programmers for special purpose audit programs   _____

    (e) "General auditors" and users of audit packages

(21)   Answer (a) <u>or</u> (b):

      (a)   If you possess an AP, how much did it cost*** <u>approximately</u>
          to develop and implement the present AP System? $____

      (b)   If you do not possess an AP, how much do you think it would
          cost*** to develop and implement an AP? $____

(22)   Answer (a) <u>or</u> (b):

      (a)   If you use an AP, do you think the use of the AP affects
          the number of audit staff?

      (b)   If you do not use an AP, do you think that the use of an
          AP would affect the number of audit staff?

            (1)   of the whole firm   increase/decrease   _____%

            (2)   of the typical audit team   increase/
                                         decrease _____%

(23)   If you possess an AP, on the average, for one to be able to master
      the use of currently available package, how many hours/days of
      training is required for:

      (a)   a university graduate without EDP knowledge   _____

      (b)   a university graduate with EDP knowledge   _____

      (c)   others without EDP knowledge   _____

      (d)   others with EDP knowledge   _____

(24)   If you have used an AP, what is the <u>approximate</u> percentage of the
      total audit time allocated to the various audit tasks when using
      the conventional MANUAL audit or the PACKAGE audit.

		MANUAL	PACKAGE
(a)	Review of internal controls	_____ %	_____ %
(b)	Retrieval of documents & data	_____ %	_____ %
(c)	Analysis of documents & data	_____ %	_____ %
(d)	Others (please specify):	_____ %	_____ %
	_____	_____ %	_____ %
	_____	_____ %	_____ %
	_____	_____ %	_____ %
	_____	_____ %	_____ %

*** The cost would include the salary paid to employees in the study, design
    and implementation of the system, and any other expenditure incurred during
    the development and implementation stage.

(25) Do you think that new audit standards are required for the use of AP?

_____

_____

_____

_____

_____

(26) If you have used an AP, in what way and to what extent would you consider the AP as more effective than auditing around the computer?

_____

_____

_____

_____

_____

(27) If you have used an AP, has the use of the AP affected the audit fees charged to the client? Please comment on the reason for and the degree of any change.

_____

_____

_____

_____

_____

(28) If you do not possess an AP, do you think it is worthwhile to develop and implement an audit package?

_____

_____

_____

_____

(29) At present, there are numerous audit packages available. Is it desirable and justifiable, in your opinion, to develop and implement <u>one single common</u> computerized audit language? Please, state your reasons, pro or con.

_____

_____

_____

_____

_____

(30) Other comments and suggestions.

_____

_____

_____

_____

_____

INDUSTRIES	Q. 8	Q. 9	Q. 10 (a)	(b)	(c)
Advertising Companies	___	___	___	___	___
Banks	___	___	___	___	___
Broadcasting Corporations	___	___	___	___	___
Charitable Organizations	___	___	___	___	___
Clubs	___	___	___	___	___
Contractors & Construction Companies	___	___	___	___	___
Department Stores	___	___	___	___	___
Finance & Trust Companies	___	___	___	___	___
Governments	___	___	___	___	___
Hospitals & Health Cares	___	___	___	___	___
Hotels, Motels & Resorts, etc.	___	___	___	___	___
Information Processing Corporations	___	___	___	___	___
Insurance Companies	___	___	___	___	___
Mining, Oil & Gas Producing Companies	___	___	___	___	___
Newspapers & Publishing Companies	___	___	___	___	___
Professional Sports	___	___	___	___	___
Public Utilities	___	___	___	___	___
Real Estate Companies	___	___	___	___	___
Retail Trades	___	___	___	___	___
Stockbrokers, Dealers & Investment Companies	___	___	___	___	___
Theaters, Movies, etc.	___	___	___	___	___
Transportation Companies	___	___	___	___	___
Unions	___	___	___	___	___
Universities & Educational Institutions	___	___	___	___	___

INDUSTRIES (cont'd)	Q. 8	Q. 9	Q. 10 (a)	(b)	(c)
Wholesale Trades	___	___	___	___	___
OTHERS (Please Specify)					
_____	___	___	___	___	___

ACCOUNTING SUBSYSTEMS	Q.11	Q.12			Q.13	Q.1.
		(a)	(b)	(c)		
General Ledgers	___	___	___	___	___	___
Cash (Receipts & Disbursements)	___	___	___	___	___	___
Accounts Receivable	___	___	___	___	___	___
Sales, Billing & Invoicing	___	___	___	___	___	___
Inventory Accounts & Control	___	___	___	___	___	___
Fixed Assets	___	___	___	___	___	___
Depreciation & Amortization	___	___	___	___	___	___
Repairs & Maintenance	___	___	___	___	___	___
Purchasing	___	___	___	___	___	___
Production & Cost Allocation	___	___	___	___	___	___
Accounts Payable	___	___	___	___	___	___
Payroll	___	___	___	___	___	___
Pension Plans	___	___	___	___	___	___
Loan Accounts	___	___	___	___	___	___
Debentures & Bonds	___	___	___	___	___	___
Fund Accounts	___	___	___	___	___	___
Capital Accounts	___	___	___	___	___	___
Share Registration	___	___	___	___	___	___
Budgeting & Forecasting	___	___	___	___	___	___
OTHERS:						
___	___	___	___	___	___	___
___	___	___	___	___	___	___
___	___	___	___	___	___	___

FEATURES	Q. 15	Q. 16	Q. 17

ACCESS

(File) Creation/Generation/Reformatting (Extraction)	_____	$_____	_____
(File) Selection (no Reformatting)	_____	$_____	_____
(Input) File Editing	_____	$_____	_____

TESTING

Aging	_____	$_____	_____
Comparison of Fields	_____	$_____	_____
Comparison of Files	_____	$_____	_____
Table – Lookup	_____	$_____	_____
Field Classification	_____	$_____	_____
Include/Exclude	_____	$_____	_____
Match/Merge	_____	$_____	_____
Sequence Checking	_____	$_____	_____

REORGANIZATION

Insert (Add data into a file)	_____	$_____	_____
Move (Transfer data from one field to another)	_____	$_____	_____
Reformat	_____	$_____	_____
Sort	_____	$_____	_____
Stratification	_____	$_____	_____
Summarize	_____	$_____	_____
Update	_____	$_____	_____

FEATURES	Q.15	Q.16	Q.17
SELECTION & ANALYSES			
The Search	____	$____	____
Block Selection	____	$____	____
Systematic Sampling	____	$____	____
Variable Estimation Sampling	____	$____	____
Attribute Sampling	____	$____	____
Sample Evaluation	____	$____	____
Special Sampling Plan	____	$____	____
Correlation Analysis	____	$____	____
Frequency Distributions/Histograms	____	$____	____
Regression Analysis	____	$____	____
X - Y Charts	____	$____	____
CALCULATIONS			
Accumulation	____	$____	____
Basic Mathematical Operations	____	$____	____
Footing & Record Counts	____	$____	____
Ratio Computation	____	$____	____
Subtotal	____	$____	____
Maxima	____	$____	____
Minima	____	$____	____
Percentages	____	$____	____
Averages	____	$____	____

FEATURES	Q.15	Q.16	Q.17
REPORTING			
Bank Reconciliation	_____	$_____	_____
Computer Flowcharting	_____	$_____	_____
Graphic Presentation	_____	$_____	_____
Listing	_____	$_____	_____
Print Names & Adresses	_____	$_____	_____
Print Titles & Headings	_____	$_____	_____
Punch Cards	_____	$_____	_____
Positive Confirmation Letter	_____	$_____	_____
Negative Confirmation Letter	_____	$_____	_____
Tabulate Reports	_____	$_____	_____
Visual Display	_____	$_____	_____
Bar Charts	_____	$_____	_____
OTHER FEATURES			
Label Checking (in various files)	_____	$_____	_____
Program Charting (of audit clients' programs)	_____	$_____	_____
Tracing	_____	$_____	_____
OTHERS			
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____
_____	_____	$_____	_____