

AN ASSESSMENT OF THE IMPACT OF COMPUTERS  
ON THE PRACTICES OF CHARTERED ACCOUNTANTS  
WITH SOME REFERENCE TO SOUTH AFRICA  
INCLUDING AN EVALUATION OF CURRENT COMPUTER  
EDUCATION FOR CHARTERED ACCOUNTANTS

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Requirements for the degree of

Master of Commerce

by

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I certify that, except as noted above, the thesis is my own work and all references are accurately reported.

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SYNOPSIS

The study is concerned with assessing the impact of computers on the practices of Chartered Accountants and relating the findings to the accounting profession in South Africa. An evaluation will also be made of current computer education for pre-qualifying and qualified Chartered Accountants (S.A.).

No special attempt has been made to define a computer because it is considered that the principles dealt with in this study are applicable to a wide range of electronic data processing equipment possessing common characteristics, i.e. input and output devices, logical, arithmetic and storage units, and a control unit.

## CHAPTER I : INTRODUCTION

"Whether the advent of the electronic high-speed digital computer will mean an evolution or a revolution is largely a matter of definition. It will certainly engender, as it gathers momentum, one of the major changes in human society."<sup>1</sup>

It was in 1946 that the world's first all-electronic digital computer (the ENIAC) was built at the University of Pennsylvania in America. Only five years later opinions were already being expressed that "once the electronic digital computer gets down to a degree of compactness and dependability, it will quickly move into office equipment and industrial controls as the integrating element or 'brain' of automatic operations".<sup>2</sup>

During the early 1950's the capability and potential of the digital computer came under close scrutiny. Numerous journal articles and books appeared, nearly all of which were unanimous in expressing the bright future for computers and computer applications.

One of the pioneering accounting articles to be published, on the subject of computers, appeared in an English journal early in 1952. Therein it

was clearly acknowledged that electronic accounting was after all, not a pipe dream of the future, but something of the present. The author called upon members of the profession to acquire an understanding of the new equipment in order to ensure that accountants are part of the ". . . forward thinkers" in this area of development.<sup>3</sup> Undoubtedly this plea fell on many deaf ears.

Over the years the accounting profession not only enjoyed statutory protection (in respect of the auditing function) but also wide-spread recognition as consultants in giving advice on all aspects of business activities. These "unofficial" monopolistic roles lulled most accountants into a false sense of security and they failed to appreciate the full implications of the computer revolution.

Within the computer industry itself technological developments were progressing at an enormous rate. An early success was the manufacture of an all-purpose computer which could handle both scientific and commercial applications - this was in contrast to the first computers which were looked upon as machines for scientists and mathematicians only. In view of this new dimension in computers, a suggestion was made in 1953 that "accountants . . . should be ready to discuss their views and requirements with the manufacturers, who are indeed anxious to know what records the profession will need of electronic machines and what safeguards, particularly from the audit viewpoint, will have to

be introduced".<sup>4</sup>

The proliferation in the number of commercial installations (and hence accounting applications) meant that changes had to be made in auditing techniques. The auditor could no longer rely on the internal control systems which were applicable in a non-electronic environment.

One early opinion was that an adequate audit trail would always exist and that principles of internal control would remain unchanged. The same author was confident that, despite the initial annoyance or confusion the computer might bring (because of changes in information handling techniques, outputs and maintenance of historical records), auditors will ". . . learn to live with the new system".<sup>5</sup>

It would appear from Toan's article<sup>6</sup>, published in May 1955, that guidelines for computer auditing were fairly well-defined by this time. He mentioned aspects with which the present day (1974) auditors are concerned on computer audits, e.g. machine checks to ensure accuracy of hardware; examination of program flow-charts; use of test-data to check the machine (programs) against pre-determined results; unintentional loss of master file information stored in a magnetic form, and the back-up necessary to re-create such information; and so on. Broad<sup>7</sup> writing in November 1955, laid down similar criteria to be used in an approach to computer auditing.

In South Africa, the auditing profession was given notice of what lay ahead when the electronic computer was introduced into the local business environment. Discussing the assistance an auditor could hope to get from mechanisation, Lamont Smith, in 1955 maintained that the electronic computer ". . . may not yet have come to South Africa, but that it will in time is beyond doubt. The alert auditor should make it his business to know sufficient about these aids to make full use of them as and when they become available."<sup>8</sup> It was over three years later that the first article appeared in a South African journal dealing with computer auditing.<sup>9</sup>

In Europe and America computers were becoming the focus of the "swelling tide of articles in the Press and of papers at conferences."<sup>10</sup> Actual 'live' applications were very limited in number but it was fully appreciated that ". . . when the advance of the robot in the office really begins, it may well gather momentum very quickly indeed, and it behoves the accounting profession, by whatever means it can avail itself of, to be prepared for the invasion."<sup>11</sup>

But what concrete steps were being taken to aid this preparation? Leaders in this respect were the English. In April 1956 the London Group was formed, ". . . in response to a wide demand for an association which would bring together, as individuals, members of widely different professional

and business activities, but all with a common interest in electronic computers, both in design and application."<sup>12</sup> It is of significance that the first Chairman of the group was a chartered accountant. Later, in April 1957, the British Conference on Automation and Computation came into being in order to provide effective liaison between professional bodies having interest in these fields. The Institute of Chartered Accountants in England and Wales together with the Scottish Institute, and The Institute of Cost and Works Accountants were among the twenty-three professional bodies represented. At the end of 1958, the first ever (European) Electronic Computer Exhibition was held in London concurrently with a Business Computer Symposium. Of the 22 papers presented<sup>13</sup> not one dealt directly with the accountancy profession!

(Earlier, in March 1958, the first automation conference took place in South Africa organised by the Institute of Cost and Works Accountants.)<sup>14</sup>

Apart from the symposium, the members of the profession in England received a pamphlet in July 1958 from the Council of The Institute of Chartered Accountants in England and Wales. This described the nature of the new equipment and the problems surrounding its use.<sup>15</sup> It attempted to explain computer developments as well as specifying the duties and obligations of the auditor in relation to Electronic Data Processing (E.D.P.).

In the early 1950's The Netherlands Institute of Accountants also realised the significance of computers. In conjunction with the Faculty of Economic Sciences of Amsterdam University, a research institute was opened in July 1958 to conduct studies into the commercial applications of computers. Other functions were to provide tuition and a library service on a non-profit-making basis. McRae<sup>16</sup> found this development to be of immense significance for the accounting profession and suggested that such a scheme should be organised in England.

Professional bodies in New Zealand and Australia soon followed developments in Europe. For example, in New Zealand 'official' recognition of the importance of computers to accountants was given when the accounting journal of the society inaugurated a regular feature section devoted to "mechanised data processing and office systems"<sup>17</sup> - this was in October 1961. The Australian accountants' society, in its official journal published<sup>18</sup> details of a 1960 survey concerned with computers in Australia, for the information of its readers. This was followed shortly thereafter by an article<sup>19</sup> dealing with the impact of computers in Australia.

The first reported course in computers specifically for qualified accountants and auditors was in England during January 1964.<sup>20</sup> This was organised by The Institute of Chartered Accountants

in England and Wales. Other courses held later in the same year show<sup>21, 22</sup> that steps had been taken to effectively identify the needs of members of the accounting profession (in relation to computers).

Following the example of the English Institute, the American Institute of Certified Public Accountants in 1966, undertook a research and education programme in computer technology. One of the objects of this project was to utilise the research findings and to organise an expanded educational programme to service the needs of the certified public accountant.<sup>23</sup>

At approximately the same time as their American counterparts, the Canadian Institute of Chartered Accountants appointed a Committee to assess the impact of electronic data processing on the profession. An intensive study was undertaken with the findings published the following year in a Special Issue of their official journal.<sup>24</sup>

The National Council of Chartered Accountants in South Africa, in November 1966, issued a Statement on Computers.<sup>25</sup> This was followed, in November 1968, with notification of continuing education courses for the qualified accountant - of the nine courses offered, six dealt with E.D.P.<sup>26</sup> A further commitment to computer education (in the widest sense) was made when National Council stated that it ". . . will continue to assist

C.A.'s in this field [computers] using local and overseas expertise and disseminating it through the medium of this Journal and continuing education courses."<sup>27</sup>

From the above it is clear that, throughout the western world, the various national accounting bodies responded to some degree to the introduction of computers.

But what of the future? It has been suggested that the time will come when all practitioners will have their work - and, therefore, the work of their clients - processed by computer through bureaux, terminals or their own installations.<sup>28</sup> In view of the general lack of appreciation of computers which exists among the accounting profession it is unlikely that this will happen in the near future. Particularly in South Africa there is a marked resistance and reluctance among accountants to get involved with computers.

However, the growth forecasts for the computer industry in South Africa are quite staggering. Average annual growth in the total value of installations is projected at 22% to reach a figure of R1 000 million in 1980 - this compares with an amount of R217,5 million in 1972.<sup>29</sup> On the computer bureau side, annual billings were approximately R15 million in 1971.<sup>30</sup> A very optimistic future is forecast for the bureau industry by Jamieson (former president of the

S.A. Computer Society) who values the immediate annual billing potential to be between R100 and R150 million.<sup>31</sup>

Naturally this expansion, even if only partly achieved, will present many difficulties to the accounting profession and in particular to practising members. To some the computer will present itself as ". . . one of the greatest challenges in recent years"<sup>32</sup> - others will see it as a threat to their very existence.

There is no doubt that the computer is here to stay and ". . . every accountant owes it to himself and to his profession to master its mysteries".<sup>33</sup>

It is not only auditing considerations which are involved here - the computer offers practitioners enormous scope for expanding their consultancy functions, as well as being very useful as a processing medium within practices themselves. The latter function can be expanded to, possibly, providing bureau facilities for clients.

Chapters II to IV are concerned with the areas of the practitioners' potential involvement with computers; these are :

- Chapter II - Auditing
- Chapter III - Consultancy
- Chapter IV - Using a computer in a practitioner's office.

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CHAPTER II : COMPUTERS AND THE AUDITOR

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CHAPTER II : COMPUTERS AND THE AUDITOR

"The installation of an electronic data processing system in a business type of operation brings with it special audit problems which do not exist with more conventional accounting systems, and makes the effects of such installations on the field of auditing a matter of concern to the whole profession."<sup>1</sup>

A. INTRODUCTION

The basic object of an audit is to authenticate financial statements produced by a company. The auditor does this by the preparation of a report expressing an opinion on the fairness of the presentation of such statements.<sup>2</sup> In most instances the auditor has a statutory obligation to express such an opinion and by so doing protects the interests of shareholders and creditors. The auditor has a responsibility to his profession which requires him to exercise a high degree of discretion, competence and independence in carrying out his functions.

In order to arrive at the stage where an opinion may be expressed, it is necessary for the auditor to :

- (1) gain an understanding and appreciation of the systems being used;
- (2) review the adequacy of various controls which ensure that the recording and processing of accounting data is complete and accurate;
- (3) confirm that the defined system and related controls are functioning; and
- (4) perform additional tests on the closing balances - the scope of such work is largely dependent upon the effectiveness of the system and its controls.

Margetts<sup>3</sup> and Horwitz<sup>4</sup> maintain that the above steps are fundamental to any audit, irrespective of the degree to which the system is mechanised.

Although the computer has not altered the objective of an audit, it has necessitated the revision of audit procedures to cope with the new environment. The nature of such changes (in relation to conventional manual procedures) varies from one installation to another and ". . . is dependent to a great extent on the level of complexity of the computer data processing system".<sup>5</sup>

The important factors which necessitate changes to traditional audit techniques upon the introduction of a computer are listed below :

- (1) 'The system of internal control<sup>7</sup> has changed' -

the centralisation of processing activities and the elimination of many of the manual checking procedures require that controls, of a different nature, be implemented in a computer environment. The audit program must be adapted to encompass checking these new controls.

- (2) 'Conventional audit procedures are slow and difficult' - the auditor may find that source documents are hard to locate because the computer and the source documents could be geographically separated. In the case of a branch which submits input data (punched cards or paper tape) to the Head Office for processing the process of following transactions through from source documents to final output might involve the auditor in having to check a long series of intermediate listings, e.g., prooflists and exception reports.
- (3) 'Gaps in the audit trail' - the computer might be programmed to suppress some details at each processing stage<sup>8</sup> as the output required by management is often on an "exception" basis. Other examples are the updating of magnetic disc files which leaves no record of the previous balance for a particular record, and cases where source documents might be non-existent as in real-time systems.

Such circumstances rule out the auditor checking in the traditional manner.

As early as 1958 this loss in visible audit trail was recognised as the ". . . danger of electronic data processing to the auditor".<sup>9</sup>

John and Nissen also draw the conclusion that the central problem faced by auditors of EDP installations is the omission to a greater or lesser degree, of the traditional audit trail.<sup>10</sup>

- (4) 'Involvement of a computer service bureau' - all, or part, of the clients' data processing might be performed by an outside organisation, and new techniques are required in order to assess the quality of these processing activities.
- (5) 'Improved audit efficiency through use of the computer' - by using the computer as an audit tool, the auditor can perform various checks on the operating programs, as well as obtaining information stored on magnetic tape or disc in the system. Porter<sup>11</sup> stresses that auditors should avail themselves of the computer's speed, accuracy and editing capabilities in carrying out their auditing procedures.

These factors have presented problems for many auditors who have not been trained in EDP. Accordingly, this chapter is directed at identifying the computer's impact on the practitioner's audit activities. The size of the subject precludes an in-depth evaluation being made of every aspect, and in these instances the various appendices

attached to this chapter, as well as the foot-  
notes, suggest where additional reference  
information may be obtained.

Sections B - E are applicable to most computer  
systems with which an auditor may be involved.  
However, there are particular circumstances where  
additional audit considerations are necessary,  
and these are referred to in section F. Finally,  
section G will cover the timing, and organising,  
of computer auditing.

B. THE ROLE OF THE AUDITOR IN THE PLANNING AND  
DESIGN STAGE

Prior to the introduction of computers into the data processing cycle of an organisation, the auditor was able to adapt his audit program in the light of the accounting system in operation at the time of his audit, and did not generally experience difficulty in carrying out a satisfactory audit. In spite of changed accounting methods, the basic elements of an audit, i.e., internal control and the audit trail, remained unchanged.

However, as noted in section A, these factors usually alter in a computer environment. Control features and the audit requirements should be built into the various operating programs and form an integral part of the entire system. The auditor will place reliance on these controls to effectively monitor the processing of data. Because of this, his audit requirements must be anticipated at the detailed system design stage.

Lobel maintains that the persons responsible for designing computer systems cannot be relied on to provide adequate controls. In support of this argument he mentions five noteworthy reasons.<sup>12</sup> In regard to the provision of an audit trail, Davis is of the opinion that this should be retained in every type of computer application largely because of management's need of enquiry trails for reference purposes.<sup>13</sup> If this need

can be satisfied, the auditor's requirements will also be met. Emphasis on providing an audit trail is also laid by Acker,<sup>14</sup> Putland<sup>15</sup> and others. In this regard, a note of warning was sounded by an American study group who stated that the accountant ". . . must realise that he cannot expect computerised systems to be modified to provide output that only he needs in order that he may perform his audit in the traditional way. [Instead] he must modify his emphasis so that he is concerned not only with the output, but with the system which produces that output."<sup>16</sup> An earlier opinion<sup>17</sup> was that requests by the auditor for special print-outs constituted an obstruction to the full development of the potential of EDP within an organisation. Accordingly, auditors had to learn to rely more on techniques that did not require these print-outs.

In terms of the above, the auditor's involvement at the pre-operational stage of a computer application can be viewed from two angles :

- (1) The contribution he can make in respect of reviewing, and possibly recommending, various control procedures which are compatible with sound data processing principles and requirements; and
- (2) The obligation which the auditor has to ensure that his audit requirements are incorporated into the system at the program development stage.

Wasserman points out that the auditor should not assume responsibility for the development of a control system, but should rather evaluate the procedures and facilities being designed. There is felt to be a danger that the auditor ". . . would lose his objectivity and, in effect, end up auditing himself".<sup>18</sup> Similarly, the auditor should evaluate the control procedures and not be responsible for enforcing them. In this way management is provided with an independent control appraisal of the future computer system.<sup>19</sup>

In order to satisfy point (2) above, the auditor should make his requirements known to the system designers at an early stage - not later than the commencement of programming. If such requirements are overlooked, the auditor may insist that the system be re-designed at a later stage to incorporate them ". . . and this could well be costly and time-consuming and lead to report qualification".<sup>20</sup> (See section 2.16 for additional information.)

There is some controversy as to exactly when the auditor should get involved<sup>21</sup> with his clients' computer system. Although no time period is stated, the Institute of Chartered Accountants in England and Wales suggests that the auditor should be brought into consultation at the earliest possible stage.<sup>22</sup> Howitt<sup>23</sup> maintains that from every viewpoint it is desirable that the auditor should be connected with the installation from its

inception. In contrast to this, results of a study<sup>24</sup> indicate that it is difficult to find the point when the auditor can usefully conduct a detailed review with the EDP planners - too early could mean reviewing systems, and even programs, which will not ultimately be used; too late a start may mean that the damage is done and changes of any consequence can only be made with great difficulty, inconvenience and cost.<sup>25</sup>

The solution proposed for this timing problem is that, on the one hand, the auditor should be regarded as part of the organisation in order for his audit requirements to be incorporated into the system; on the other hand he can be called upon, by management, to review the proposed system and its controls when the systems analyst has completed the detailed system specification - this would be prior to programming actually commencing.

(The auditor has various options available to assist this review procedure - these will be dealt with in section D of this chapter.)

From the auditor's viewpoint this involvement in the pre-installation phase can be viewed from an entirely different angle - it will provide him with an understanding and appreciation of the systems being used at his client's computer installation. Acquiring these attributes is a pre-requisite to him performing any audit work. Certainly, it would be far easier for an auditor

to learn about all aspects of a new system while it is being developed, rather than work backwards from a completed one.

The significance of the auditor's involvement is well summed up by Silk who states that "the client owes it to himself and to his auditor to call him in at the planning stage and the auditor, if not summoned, should press for an invitation".<sup>26</sup>

## C. CONTROLS IN EDP SYSTEMS

### 2.1 INTRODUCTION

The basic principles of internal control are applicable to every system of data processing, but the nature of such control cannot be uniform between different systems. Accordingly, the advent of computers has brought about new forms of control which, if correctly devised and implemented in an organisation, will ensure that information is correctly processed and protected.

An auditor needs a fundamental understanding of control techniques in computer systems to provide standards against which a client's computer system can be evaluated.

In this section the main areas of controls in computer systems are highlighted. It is not feasible to discuss these in detail.<sup>27</sup>

Additional information, on particular techniques of control, can be obtained by referring to Appendix 1 (at the end of this chapter).

### 2.2 PRE-INSTALLATION

A management decision to introduce computer processing into an organisation should be based on the findings, and recommendations, of a preliminary study. Thereafter, a sound,

well-organised approach is required prior to the actual implementation of the computer system and the installation of appropriate equipment - pre-installation controls ensure that a series of well-defined and disciplined steps are, in fact, followed.

There are three main objectives of pre-installation controls.<sup>28</sup>

- (a) To ensure that a computer is ordered only if it is likely to produce greater benefits than alternative processing media. Control techniques are necessary to oversee the studies which aim to determine whether computerisation is desirable and economical. Accordingly, one would expect to find :
  - (i) a management committee which has responsibility for initiating, guiding and reviewing the various investigations;<sup>29</sup>
  - (ii) specified objectives and terms of reference to be clearly and accurately defined for the study teams;
  - (iii) detailed and comprehensive reports submitted on the findings of the investigations.

- (b) To ensure selection of suitable facilities and services, potential suppliers should be given full specifications as to what is required (in terms of the system contemplated), and use made of selection criteria to evaluate the various proposals.
- (c) To ensure that a pre-installation plan is prepared against which results and progress can be measured, it is essential that the numerous pre-installation functions be identified and defined, and then incorporated into an appropriate plan.<sup>30</sup>

Through acceptance of these objectives and techniques, the foundations will be firmly laid for introducing a computer system at a later date.

### 2.3 HARDWARE

A computer consists of various physical components (or hardware); some are entirely electronic, e.g. the central processing unit, whereas most input/output equipment and file storage devices contain both electronic components and parts which move mechanically. A malfunction of either an electronic component or a mechanical element could cause a computer to breakdown completely or to operate incorrectly.

In order to ensure a high degree of reliability of equipment, the manufacturers build in controls, or checks. These operate as part of the normal functioning of the equipment by checking that all calculations, and information transference, within the computer, are correct. It can be accepted that "these checks will operate the whole time unless in some way they can be specifically excluded by the programmer".<sup>31</sup> The likelihood of programmer interference at this level is very remote.

Davis<sup>32</sup> classifies equipment controls into five types. Their important characteristic is that they will detect malfunctioning of the computer. If this does happen the computer will cease to operate and the nature of the error will be indicated by a printed message (in the console) or by console lights. The operator will then take the necessary action to have the fault corrected. In view of this, Pinkney maintains that the principal interest of the auditor, in relation to hardware controls, is ". . . to ensure that there are satisfactory procedures for controlling errors or faults when they are detected".<sup>33</sup>

Talbot<sup>34</sup> suggests that an auditor need not have a detailed understanding of the various hardware controls, nor need he check their operation. But he should ensure that the

computer is being regularly serviced by technicians. A very valid point is made by d'Agapeyeff<sup>35</sup> in stressing that auditors should ensure that a log is kept of all faults detected, and that this should be closely examined to assess the level of reliability of the output and records on master files.

#### 2.4 ORGANISATIONAL

Computers have brought about a centralisation of processing activities within an organisation.<sup>36</sup> This is in contrast to manual systems where processing is generally spread out among many departments and individuals. However, the fundamental aspects of organisation control remain unchanged for both systems.

The development, design and maintenance of a sound system of organisation controls should not be the responsibility of an individual, or single group, within an organisation. Management, user departments and auditors (internal and external) should actively participate in these functions.

Within a computer system the following organisational controls should be in existence :

- (a) A structured organisational chart -  
this provides the framework for segregation

of duties and functions among the EDP personnel.

- (b) The formal assignment of responsibility - job descriptions should be prepared defining all functions to be performed, as well as any other factors related to a particular work assignment.

(The personnel involved in (a) and (b) are systems analysts, programmers, equipment operators and keypunch operators.)

- (c) A separation of the functions of -
- (i) initiation and authorisation of transactions;
  - (ii) recording of transactions; and
  - (iii) safeguarding records.

(The above would be performed in the source or user departments (i); the EDP department<sup>37</sup> (ii); a computer file library (iii).)

- (d) A computer control group - this group carries the responsibility for monitoring the accuracy of processing and ensuring that no data is lost or mishandled within the department during processing. Such a group would vary in size according to the size of the installation, and should operate independently of other units, having direct reporting responsibility to the

data processing manager.

Another important organisational objective is to ensure that general management exercises effective control over the computer section.

*Management  
Supervisor*

This requires the EDP department to report to a member of top-level management who would take an active interest in its affairs.

Implied here are the development of performance standards (in systems design, programming and computer operations) against which actual achievements may be measured. Evaluation criteria would include operating as well as financial factors.

John and Nissen<sup>38</sup> regard organisational controls as ". . . the basic framework of a successfully functioning information system" in that they ensure a division of duties within the EDP department, and provide for management involvement with the whole system. These two factors contribute greatly to reducing the incidence of fraud and illegal data manipulation.

## 2.5 DEVELOPMENT

The development of the detailed systems and programs, their testing and the conversion of the existing system, requires that certain

procedures and controls be introduced. Should these not be present there is every likelihood that the installation ". . . will either not get off the ground at all, or will be grossly inefficient, or will sooner or later collapse".<sup>39</sup>

The principal methods of achieving control throughout the development phase are :

- (a) Ensuring active participation by members of the user departments - this will assist in the initial definition of the system, and in checking that the programs (once written) are providing the required output.
- (b) Segregating the systems development and operation's function - analysts and designers would thus have no opportunity for manipulating normal processing activities, and operators are limited in their ability to alter systems.
- (c) Establishing standard procedures for systems design and programming - these should be carefully defined, documented and enforced.
- (d) Providing for a method of authorisation and approval at each major stage of development - this entails a review by staff and line management of the procedures and progress within the EDP

department and continued development effort should not be made without their written approval.

- (e) Undertaking comprehensive testing of systems and programs - controls are required to ensure that any system has been fully tested before it becomes operational. Programmers, systems analysts, computer operators and user department representatives would be involved in this process.
- (f) Defining and implementing conversion procedures - stringent controls are required to control the creation of accurate and complete master files from the existing records of an organisation.

Any amendments which are required to existing programs should be subject to the same controls as the initial development. This will provide protection against unauthorised modifications.

A refinement to the general procedure for amending programs is suggested by Hooper.<sup>40</sup> This idea of maintaining a register detailing all program changes (and their possible effect on other programs) is very sound in that it evidences changes which have been made, and ensures that a formal procedure has been adhered to.

By proper attention to control procedures management can thus be assured that the high costs associated with development are used to provide and maintain an effective and reliable system.

## 2.6 ADMINISTRATIVE

Within a computer department administrative controls ensure that an acceptable standard of discipline and efficiency is maintained over the daily activities.<sup>41</sup> These controls are especially important as responsibility is concentrated in the hands of a few people, and the functions of work and control occur in a single department.

Administrative control is achieved through the following means :

- (a) Division of responsibility - this includes sharing the responsibilities of development, operation and control between user departments and the EDP department. In this way specified duties are given to groups, or individuals, who cannot exceed their boundaries of responsibility or authority.
- (b) Control over computer operators - these people are responsible for setting up and operating the computer, taking action

on halts and maintaining the operating log. In order to reduce the possibility of data manipulation during processing, and to prevent misuse of confidential information on master files, various controls can be introduced by management.

- (c) Checking procedures - a control section (see 2.4 (d) ) ensures that data is processed accurately and correctly.
- (d) File control<sup>42</sup> - stringent controls should be in existence to ensure that only the correct file can be used in a live run, and that no file can be used for an unauthorised purpose.
- (e) Sundry considerations - procedures should be defined and organised to handle :
  - (i) the problems of fire damage or other damage to equipment and/or records; and
  - (ii) essential processing activities if the computer breaks down.

(This latter aspect is a very real problem with 'real-time' systems where customers are queuing for service, e.g. in a bank or a building society. An alternative system to that of the computer must be readable and usable in such instances.)

In addition to the above, aspects such as adequate insurance cover (fire, employee fidelity, etc.) and general housekeeping within the EDP department, could also be classified as administrative controls.

Management is as concerned as the external auditor that high standards of control exist over the concentration of functions in the computer department. Implementation of satisfactory procedures to cover the aspects mentioned above will do much to achieve this end.

## 2.7 PROCEDURAL<sup>43</sup>

A data processing cycle has three distinct, yet inter-related, functions - input, processing and output.<sup>44</sup> Each of these requires control features to ensure ". . . the accuracy and propriety of the data flowing through a processing system".<sup>45</sup>

### (a) INPUT

Results of processing cannot be accurate unless the data used for input is of a high standard. Controls are therefore essential to check that :

- Ⓚ (i) source documents are accurately prepared;
- Ⓚ (ii) data is not lost while being

- transmitted from the point of preparation to the EDP department;
- R (iii) the conversion of source documents to a machine readable form (e.g. punch cards or tape) is correct;
  - R (iv) all input to the computer is authorised (particularly amendments to standing data on master files);
  - R (v) data is processed only once.

(b) PROCESSING

The essential pre-requisite to any processing activity is correct functioning of the computer equipment - this aspect was discussed in section 2.3.

Thereafter, through a combination of programmed and manual checks, accurate and reliable output will be produced by the computer. However, the following additional considerations should not be overlooked :

- R (i) an editing run is carried out prior to the live run which serves as a vital validation feature for input data;
- R (ii) computer file control is required to ensure that only the correct type and generation of files is used in an updating run;
- (iii) any rejections which occur during

processing must be controlled to ensure they are investigated, corrected and re-submitted in a subsequent run;

- (iv) various checks, e.g. balancing of run-to-run control totals, and reconciliation of input/output totals, need not be manually performed in the first instance - these can be incorporated into the computer program and checked subsequently;
- (v) processing should be carried out within a framework of sound organisation control<sup>46</sup> in the data processing area.

(c) OUTPUT

Prior to distribution of printed output it should be ". . . reviewed for obvious errors, reasonableness, and agreement with any pre-determined totals developed by the control unit".<sup>47</sup> Despite input authorisation procedures, Ziessow<sup>48</sup> maintains that it is important to check that output does not include any unauthorised alterations.

Through these means, a verification on the accuracy and validity of processing is performed.

Control procedures should also be in existence which ensure that

- ⊘ (i) output is distributed only to authorised persons;
- (ii) all output is handed over; and
- (iii) exception reports are acted upon.

A further important aspect of procedural controls is the maintenance of an audit trail. With this in mind, the Canadian Institute recommends that "there should be some method of identifying and locating the component file records and input/output documents involved in the processing of a given transaction or in the accumulation of a given total".<sup>49</sup>

The significance of sound procedural controls cannot be underestimated in a computer system as deficiencies in this area ". . . often prove the Achilles Heel in any dynamic installation".<sup>50</sup>

## 2.8 RECORDS AND FILES

Within any computer installation, there should be well-defined procedures for saving program or data files from loss or accidental destruction. In addition, precautions are necessary to overcome the problems where such loss or destruction does take place. A reconstruction plan would be necessary for

this type of situation.

(There is a divergence of opinion as to the general classification of file controls - different authoritative sources regard them as either Administrative<sup>51</sup>, Organisational<sup>52</sup> or Procedural<sup>53</sup>.

The basis of applying control techniques falls within the following categories :

- (a) Provision of physical safeguards - this includes adequate environmental control and fire protection measures, as well as security arrangements for storing files.
- (b) File storage and utilisation procedures - provision must be made for assigning responsibility to an individual for safeguarding files and issuing them to authorised people, only when the processing schedule requires them to be utilised. A 'library' type organisation could be established here.
- (c) File identification - because data stored on magnetic files is unreadable to the human eye, it is essential that clear identification of all computer files is provided. Appropriate identification is also important to prevent incorrect files being loaded onto the computer.
- (d) Overwriting precautions - through the use of read/write rings it is possible

to ensure that 'live' information is not overwritten on magnetic tapes.

- (e) Adequate back-up facilities - in the event of loss or destruction of files, there should be the ability to re-create such files without undue effort or expense. This would involve devising an appropriate retention plan for source documents, input media and storage units (i.e. magnetic tape and disc files).

Computer files are part of the assets of an organisation and it is vital that they be securely protected.

## 2.9 DOCUMENTATION

Documentation of a computer system should consist of manuals containing explanations, illustrations (especially flow-charts) and examples of documents and records used. These manuals should accurately portray the existing systems, program and operating procedures. To ensure that this is the case documentation standards must be specified by management and maintained consistently.

Because of the information and operational instructions contained in the documentation Porter<sup>54</sup> and Fontaine<sup>55</sup> regard it as one of the most important control elements available to ensure the efficient operation of a computer

system. Documentation is also used to provide management with ". . . a clear understanding of systems objectives, concepts and outputs and to ensure that their policies are adhered to".<sup>56</sup> In addition, manuals serve as a basis for an (internal or external) auditor's evaluation of control procedures in a system.

The importance of these factors requires the following standards to be implemented :

- (a) Adequate documentation should be in existence and controlled - included here are the functions of preparing, reviewing, authorising and, where necessary, updating documentation in relation to all aspects of a system.
- (b) Preparation of comprehensive system documentation - prior to programming commencing, specifications of the proposed system are prepared and appropriately authorised.
- (c) Preparation of complete program documentation - this involves preparing a narrative description of the logic and controls in the various programs; flow-charts of the programs and their interaction; computer-produced program listings; and so on.
- (d) Preparation of documentation for all

operational procedures - this would provide detailed instructions to all personnel involved in data processing.

In order to maintain a sound system of internal control, it is advisable that manuals are prepared dealing with specific aspects of the installation. Usage would then be confined to personnel directly involved with such activities.

#### 2.10 SECURITY

The provision and maintenance of a high level of security in any computer installation is very important because of the areas of vulnerability which exist. Fine<sup>57</sup> suggests four areas which are common to all computer information systems.

It is principally through the use of the various controls outlined in sections 2.2 to 2.9 above that management organises sound security arrangements. Wasserman<sup>58</sup> recommends that for an assessment to be made of the efficacy of such measures, management should be able to positively answer the following comprehensive checklist :

- (a) Do we have an overall control philosophy?
- (b) Do we have production and machine controls?
- (c) Do we control inputs, outputs and errors?

- (d) Do we have a quality control unit?
- (e) Do we control program changes?
- (f) Are our systems adequately tested?
- (g) Are adequate controls provided for conversion?
- (h) Do we have proper separation of duties?
- (i) Do we have proper security in our computer centres?
- (j) Do we have disaster procedures for files, programs and hardware?
- (k) Do we have insurance against total disaster?
- (l) Are our systems auditable?

All these points are concerned with the overview Holland gives of computer security - "prevention, detection, recovery and ratification compensation".<sup>59</sup>

The ramifications of each of these factors are considerable. Appendix 11 to this chapter contains references to leading publications on computer security from which additional information can be obtained.

The need for computer security provides the incentive for devising and implementing sound systems of control (both for 'in-house' installations and where a computer bureau is involved) and as such, is the concern of management and the external auditor.

## D. EVALUATION OF COMPUTER CONTROLS

### 2.11 INTRODUCTION

If the external auditor has played an active role in the systems design stage of a client's computer system, he should be aware of control features which constitute the internal control structure of the installation. In addition, he will have gained an understanding and appreciation of the systems in use. Taken together, these aspects would satisfy two of the four basic steps in performing an audit - such steps were specified in section A of this chapter.

In many instances, however, the involvement of the auditor is limited. Although his opinion on special audit requirements is taken into account, 'in-depth' knowledge of the operation is lacking. If this is the position it is necessary for the auditor to utilise various techniques in order to :

- (a) evaluate the organisation's system of internal control - this will indicate the reliance which can be placed on existing control procedures for producing accurate processing results, and also the manner in which the extent and scope of auditing tests and procedures should be determined;

(b) fully understand the system in operation.

This section is concerned with the various techniques which could be used by the auditor to satisfy his requirements as outlined in (a) and (b) above.

## 2.12 COMPUTER QUESTIONNAIRE

The use of a questionnaire has long been recognised as "a practical and useful device for investigating and recording the auditor's inquiries into a system of internal accounting control and internal check".<sup>60</sup>

A pre-requisite to the use of a computer questionnaire is an understanding of :

- (i) the general nature of the computer system;
- (ii) the policies and the procedures of the installation; and
- (iii) the "EDP department's place in the client's overall organisation and plans, and its working relations with the departments which use its service".<sup>61</sup>

This understanding is obtained by reviewing organisation charts and the documentation which exists, as well as conducting interviews with key EDP personnel and observing activities as they occur in the installation. Davis<sup>62</sup> insists that the knowledge obtained is

fundamental to the evaluation of the controls in operation.

The computer questionnaire is used to assist in the identification of the various controls. It is usually divided into sections, which cover all aspects of the installation, and by answering either "YES/NO/NOT APPLICABLE" to the various questions, a comprehensive picture of the system of internal control can be obtained.

In reviewing the answers, the auditor must differentiate between results which affect the evaluation of internal control, i.e. 'material findings', and those which indicate shortcomings in processing or operational activities, i.e. 'non-material findings'. The latter would not be likely to affect the audit procedure, but merely serve to highlight areas of inefficiency. These could be incorporated into a report for possible management action. On the other hand, material findings would considerably alter the scope of the audit work to be performed.

Among the advantages of using questionnaires are the following :

- (i) The nature of computer controls is common for most computer installations. This means that a well-devised

questionnaire can be re-used, perhaps with slight modification, to meet the needs of most computer installations. (It is customary to use two computer questionnaires as part of a practitioner's audit working papers - one to cover in-house installations and one for bureau applications.<sup>63</sup>)

- (ii) Oversights, or omissions, of significant internal control procedures are unlikely to occur as everything on the questionnaire (which is presumed to be fully comprehensive) must be completed.
- (iii) They are usually fairly easy to complete.
- (iv) If properly designed, it should be capable of giving the auditor ". . . a complete picture of the company's internal control in a straightforward and easily interpretable manner".<sup>64</sup>

The chief disadvantage is a possible ambiguity and lack of objectivity in the questions and the answers. This could defeat the whole purpose of the exercise. The costs involved in devising and printing questionnaires could be considerable. In addition, it is pointed out that "such questionnaires must not be used as a substitute for thinking".<sup>65</sup>

It would appear, however, that the advantages far outweigh the disadvantages.

As regards completing the questionnaire, this should normally be done as soon as practicable, i.e. at the commencement of the audit. This is because the information obtained will have a direct bearing on the planning and work assignments for the remainder of the audit. Cashin and Owens<sup>66</sup> maintain that it should be general audit practice to review the internal control system annually by completing a questionnaire. This practice should not be necessary because controls in an EDP system do not change unless the system does, or in areas of weakness if previously exposed. Once a questionnaire has been completed, it should be possible to evaluate the internal control 'by exception' - details of any changes made to the computer system are given to the auditor (perhaps in the form of an update for his copy of the system documentation<sup>67</sup>), and it is these changes which are then evaluated.

From the above, it is evident that using a computer questionnaire should be viewed as a step in the total audit process, rather than merely to serve as a source for comments or suggestions to the client.

### 2.13 FLOWCHARTING

The complexity of most computer systems precludes the preparation of an easily understood narrative description of the

information processing procedure, i.e. input/processing/output, and the various internal controls associated with each of these aspects. This does not imply that such a narrative does not exist - on the contrary, it should exist in order to explain the working of the entire system.<sup>68</sup> But, for the auditor, it is likely to be unwieldy, difficult to absorb, and present difficulties when co-ordinating the numerous aspects.

To overcome these problems, the technique of flowcharting is used. Davis defines flowcharts as ". . . symbolic diagrams of operation sequence and data flow in information processing".<sup>69</sup> Standard flowchart symbols, as developed by the American National Standards Institute, are used universally to graphically represent the stages of computer processing.

There are two types of flowcharts related to computer systems :

- (i) A system flowchart - this shows the primary input and output documents and the general flow of data in the system.
- (ii) A program flowchart - this details the sequence of operations and decisions in each of the programs used.

The preparation of such flowcharts is usually the responsibility of the systems analysts and programmers, and would form part of the general documentation. As such, they could be used by an auditor to evaluate the controls which exist. However, the system flowcharts usually contain detailed information not required by the auditor and do not give a clear breakdown of the division of duties. For these reasons an appropriate systems flowchart is usually prepared by the audit staff. (Program flowcharts are discussed, separately, in section 2.14.)

Skinner and Anderson<sup>70</sup> regard flowcharts, prepared in this manner, as being the most efficient tool for actually analyzing a system - this is apart from clearly showing the inter-relationship between the different parts of a system. Weaknesses in the system and areas where improvements could be introduced, are clearly highlighted.

Of particular significance to the auditor is the evaluation of the flowcharts in relation to :

- (i) Input - sufficient controls should be revealed to ensure accuracy of data introduced to the computer;
- (ii) Processing - control features here should include file protection procedures, operating instructions for

- operators, and segregation of functions; and
- (iii) Output - this would encompass controls over handling of all output<sup>71</sup>, including updated master files.

A well prepared flowchart can thus give the auditor a bird's eye view of the entire system and the controls which are operational.

#### 2.14 PROGRAM CONTROLS

Computer questionnaires and flowcharting might indicate areas of human weakness in operating the system. However, there should be programmed controls in existence which ensure the accuracy of processing activities.

Generally, the more sophisticated and integrated a computer installation is, the more reliance is placed on programmed controls. The loss of a visible audit trail makes the incorporation of controls into programs of considerable importance.

In order to assess the adequacy of the programmed controls, the auditor must identify that they exist and, thereafter, confirm that they operate as described.

(1) IDENTIFICATION

There are numerous methods of identifying the existence of control features in programs :

- (i) Discussions with EDP personnel - the systems analysts and programmers are well positioned to immediately acknowledge what controls are built into the system, and how they operate.
- (ii) Analysing the programs - a step-by-step critical examination of the program listing will indicate exactly which control features exist. Greene is one of the few authorities who maintains that ". . . a programme can be quickly scanned to see that the various inputs and output instructions are accompanied by tests for errors and branches to reporting routines".<sup>72</sup> The more common opinion is similar to Porter who states<sup>73</sup> that it is exceedingly difficult to go through a complex program which may contain thousands of instructions - most auditors do not have the necessary technical ability to do so, and it would be very costly.

- (iii) Examining program documentation - part of the documentation should contain a narrative description of the controls in the programs, which are also graphically represented on program flowcharts. Kaufman regards such flowcharts as ". . . the last intelligible level he [the auditor] can work with and the only convenient place to evaluate the built-in internal control".<sup>74</sup> There would appear to be much merit in this approach. However, Boni<sup>75</sup> points out that the auditor does not have any assurance of the correlation between the actual programs which are currently used and such flowcharts.
- (iv) Reviewing error reports - whenever an 'unacceptable' condition in transaction input is encountered during the course of running a computer program, the built-in control features should generate an error report. Therefore, provided that the transaction which gave rise to the report was erroneous (in terms of input specifications) the auditor can be satisfied that programmed controls are in existence. Skinner and

Anderson<sup>76</sup> regard this approach as the easiest way to find programmed controls.

- (v) Using test decks - these contain items of data intended to test (or infringe) the conditions which the programmed checks are designed to maintain. Using such a method will certainly prove the existence of programmed controls, but the many disadvantages which will be evaluated in 2(ii) generally preclude the use of this medium.

On balance, it would appear that reviewing error reports ((iv) above) is most appropriate for the auditor's purposes in these circumstances.

## (2) OPERATION

There are two methods of verifying the operation of programmed controls :

- (i). Examining error reports : In order to check that the computer program operated correctly in producing an error report, the following steps would be advisable :
  - (a) Select a few examples of a given error condition as reported on the error listing,

and trace back to the related source documents to prove they were erroneous.

- (b) Examine the computer input to ensure that the error was passed into the system.
- (c) Check from the error report and original source document to the correction of the error and its eventual inclusion in the appropriate output.

When using this method care should be taken to choose examples of differing types of errors - if the computer has rejected a particular type of error once, it will continue to do so with other similar errors.

- (ii) Using test decks<sup>77</sup> : A test deck contains test (input) data which will be processed by the computer in the same manner as 'live data' - in this way the various checks, limits and control totals, i.e. the programmed controls, are checked to ensure that they are functioning as intended.

This idea of utilising the computer

to assist auditing techniques was first suggested by Broad<sup>78</sup> as early as 1955. Since then it has become an accepted practice.

According to Boutell<sup>79</sup> the idea of using test decks was adopted by auditors from the 'debugging' techniques which are used by computer programmers to test their programs.<sup>80</sup> This can provide a useful source of test data for the auditor. Among the other sources are :

- the client's internal audit department;
- the auditor preparing his own test data; and
- 'live' data used in a particular run, which is earmarked (and pre-calculated) prior to processing.

Irrespective of the source, the test deck must be processed using the computer programs regularly used by the client. Because the results are predetermined, the output, and hence the programs, can be readily assessed for operational accuracy.

Davis<sup>81</sup> and Porter<sup>82</sup> specify similar steps to be followed in developing and using test data. A detailed appreciation of them is fundamental to this technique of auditing. A well-devised test deck should demonstrate that

- (a) valid data is processed correctly;
- (b) transactions which violate established limits are rejected;
- (c) all exceptions are recognised and reported; and
- (d) specified control totals are accumulated.

In other words, all aspects of the programmed controls should be catered for - both 'valid' and 'invalid' data is fed into the computer.

Despite fairly general agreement as to the merits of auditors using test decks, there are many disadvantages and limitations to their usage.<sup>83</sup> Chief of these is the difficulty of establishing whether the program being tested is the one currently used to process data. To overcome this, the auditor has

two alternatives - either pay a visit (preferably on a surprise basis) to the installation, and request the current programs, or request that the operating programs are left in the computer at the completion of a 'live' run.

While the use of test decks is not recommended for every computer installation, they are particularly useful in circumstances where a significant part of internal control in a system is dependent upon programmed controls.

Sections 2.12 and 2.14 have dealt with the various techniques available to assist the auditor in evaluating internal control features in computer systems. Although treated separately here, in practice they should be combined in order to ensure that a comprehensive picture of the entire control structure is obtained.

E. COMPUTER ASSISTED AUDIT PROCEDURES

2.15 INTRODUCTION

The third procedural step<sup>84</sup> in performing an audit relates to obtaining confirmation that the system and its controls are functioning correctly. Traditionally, the auditor did this by observing the operation of the system and following samples of transactions through the audit trail from source document to the entries in the books. The important requirement was the existence of a visible audit trail.

Horwitz argues that, against expectations, the computer has not dramatically altered the nature of the audit trail. Management needs detailed information of its day-to-day activities in order to deal with customers, suppliers and employees. Because of this ". . . the auditor merely walks in management's footsteps"<sup>85</sup> in performing his functions. In addition, if the computer system itself does not require any significant control steps there is little point in the auditor investigating the computer.

In particular circumstances, it would therefore appear feasible for a computer-based system to be audited without the auditor being compelled to use the computer. Davis<sup>86</sup> devotes a full

chapter of his book to this topic. Naturally, the auditor has the opportunity to use the computer, but his choice is optional.

Differing circumstances may make it obligatory for the auditor to use special computer-assisted techniques, particularly where the computer system suffers from what Pinkney<sup>87</sup> terms, 'Cloats' disease, i.e. complete loss of audit trail. Even where this loss is not complete, it is often the case that much of the information making up account (e.g. debtors or stock) balances may only be found on magnetic storage devices and it becomes essential to check these devices in order to prove balance lists and totals purporting to represent values within such files. In other instances, print-outs produced by the computer become so voluminous that an auditor has difficulty in identifying those transactions which require his attention. Finally, the increasing complexity of computer systems requires an auditor to up-date his techniques to be able to detect the type of errors to which such systems are susceptible.

It is therefore essential for auditors to appreciate the direct and indirect implications of utilising the computer. Some of these specific factors are as follows :

(a) Definition of audit objectives - using

the computer requires an auditor to carefully analyse his objectives and thereafter to design appropriate tests to meet such objectives. This is in the form of advance planning prior to the commencement of an audit. Gage<sup>88</sup> identifies this lack of planning discipline in many normal audits.

- (b) Increased audit scope - more items can be analysed during the audit because the computer can test or review much larger quantities of data than is feasible on a manual basis. In addition, complex and sophisticated tests and analyses can be made of client files, transaction histories and other financial data.<sup>89</sup>
- (c) Increased confidence in test results - because larger samples can be processed as part of the audit testing, a higher confidence level is possible. Welke and King<sup>90</sup> go so far as to suggest that in many cases the computer makes testing of all records practical, and thus the risk of sampling errors can be eliminated.
- (d) Improved audit efficiency - routine clerical tasks can be performed rapidly, accurately and efficiently, leaving more time to be applied to the judgmental aspects of the audit.
- (e) Understanding a client's system - Reid

and Demcak maintain that the auditor "gains an overview of the total system from initiation of transaction or source data through to the delivery of final financial and management reports".<sup>91</sup>

This overview is not obtained by the physical act of using the computer - the auditor is required to fully understand all aspects of the system prior to actually testing 'through' it.

- (f) Client confidence - the respect and confidence of the client is retained if the auditor is able to demonstrate that he is using modern techniques in performing his audit function.
- (g) Increased knowledge - through actually using the computer the auditor acquires a general knowledge of EDP principles and computer operations, which can be utilised to ensure effective auditing procedures in any computer environment.

Naturally, the benefits cited should not be accepted as sufficient justification for using the computer for audit purposes. There are pitfalls which exist and which must be taken into consideration and avoided. These are :

- (a) Monetary considerations - whereas staff salaries could be reduced (through computerising manual audit procedures), the outlay necessary for preparing or

acquiring and testing appropriate computer (audit) programs, and for training staff, is potentially very costly.

- (b) Technical problems - unless the audit application is carefully planned and tested in co-operation with the client, there is a risk that the computer audit application will not work. This could be embarrassing for the auditor as reporting deadlines might be awkward to meet. Apart from time there may be severe difficulties in completing the audit tests manually as previously available visible records may have been discontinued.
- (c) Increased audit time - Shaw<sup>92</sup> stresses this aspect at both the developmental stage of appropriate computer-assisted techniques, and the updating of programs or test decks to take into account changes in systems or equipment.
- (d) Audit inflexibility - necessary changes to the auditor's (specialised) programs might not be practicable because of the high costs of reprogramming.
- (e) Over auditing - unnecessary testing (in the sense of expressing an audit opinion) is made because of the ability of the computer.

- (f) Client resistance - initially this can be expected because a client might not fully appreciate why the auditor needs to use expensive computer time.

These points which can be easily avoided should not discourage an auditor from using the computer. As regards monetary considerations, it should not be overlooked that intangible benefits could more than offset the monetary outlay made. The Canadian Report stresses that "the practitioner who fails to exploit the opportunities now available in using the computer in conducting his audit work is limiting either the efficiency or the effectiveness of his audit".<sup>93</sup> However, it is important that the computer should be used intelligently and only in appropriate circumstances.

The computer can be used in a number of ways as an audit tool. Included here are functions such as :

- reading magnetic files and extracting information for subsequent manual audit checks;<sup>94</sup>
- scrutinising files and selecting exceptional items for examination;
- checking the quality, i.e. completeness and consistency, of information stored on magnetic tape or disc;

- summarising data and performing analyses useful to the auditor;
- reconstructing audit trails where they are missing;
- comparing computer data with manually kept records and printing any differences which exceed specified tolerances;
- highlighting master file changes in standing data between one period and another; and
- making special computations which could assist the auditor in his year-end verification.<sup>95</sup>

In order for these functions to be performed, special audit techniques are needed. Three basic routines are available, i.e. special printouts, test decks and computer interrogation programs. Particular circumstances will dictate which of these is to be used.

The function of this section is to review each of these techniques. Should additional information be required, the references given in Appendix 111 can be consulted.

## 2.16 SPECIAL PRINTOUTS

The auditor's involvement at the systems design stage was dealt with in section B to this chapter. The point was made that the

auditor should specify his requirements before the commencement of programming.

Such requirements would be incorporated into the final operational programs and special printouts would be produced at the request of the auditor. In other words, they will be optional printouts available 'on demand'. These printouts could also be useful to the client for his own purposes. Obvious examples here include aged analysis of debtors, selected debtors who exceed normal credit terms (this would be produced as an 'exception' report) and inventory turnover computations for the various stock items carried.

This approach would, undoubtedly, suit many auditors because they do not need to master the technicalities of either their client's computer or programming techniques. The mechanics are left to the client's own programming staff. Naturally, the auditor would be required to test that the programs are operating as specified.

However, certain problems are presented :

- (a) If additional programming time is required to incorporate the auditor's requirements, should the client charge the auditor? McRae<sup>96</sup> sees this minor difficulty easily overcome through an arrangement between the parties.

- (b) There is a lack of secrecy as to the methods and/or requirements of the auditor.
- (c) Perhaps the most important factor is that the auditor's "independence might be impaired by reliance on client's staff, equipment and software for assistance".<sup>97</sup>

These factors point to this method not being the most satisfactory for the auditor.

#### 2.17 TEST DECKS

One of the uses of test decks has already been discussed in sub-section 2.14 as being a method of checking the proper functioning of programmed controls. Test decks can also be usefully employed by the auditor to verify computer-generated totals, balances, and analyses, where no printed details are available. In principle programs are being tested in both instances, but in the latter case the auditor verifies that the end result of processing has been correctly computed. Particularly at the financial year-end, the computer programs might perform various computations in order to produce key figures for the annual financial statement, e.g. inventory valuations; depreciation of fixed assets; unearned revenue and interest owed on outstanding loans; and provisions or reserves of various kinds. These figures must

be certified by the auditor and, as explained above, test decks can be used to assist in performing this function.

## 2.18 COMPUTER AUDIT PROGRAMS<sup>98</sup>

A popular misconception concerning audit programs is that they are used to check a client's computer programs. This is not the case - what they do is to check on the results of processing activities in updated records on master files.

With the increasing complexity of computer systems and the large volume of processed data being maintained in a machine-readable medium on computer files, it is often not feasible, or necessary, for an auditor to request printouts of the records which he is required to verify and check. A technique is available which allows him, with a minimum of technical knowledge of computers, to work directly with a file of computerised records for purposes of carrying out many of his basic audit program which is regarded by Goodman<sup>99</sup> as "the ultimate goal" for a computer auditor.

Prior to the development of computer programs especially for the auditor's use, the facility existed to access records on files, but this was generally through the use of a client's own enquiry and interrogation programs. For

the reasons enumerated under 2.16, this procedure was not entirely satisfactory.

To overcome this problem, auditors developed special purpose programs for any processing to be performed in relation to a specific client's computer records. This development involved a lengthy, laborious and expensive procedure which had to be repeated for each client's application, in order to take into account differences in hardware, programming, storage facilities and so on.

The development of generalised programs was precipitated by the common features which appeared in the various special purpose programs. These gave the auditor complete program independence, and all that was needed was compatible hardware.

Initially, auditing firms developed their own generalised software and many of the packages currently in use are from this source. (Of the 15 popular packages evaluated by Will<sup>100</sup>, 11 were developed by, and are the property of, auditing firms.)

However, computer manufacturers and software houses<sup>101</sup> have also marketed software packages which manipulate, and report on, information stored on computer-readable media. Although primarily intended as a management tool, many

of these have been effectively adapted for audit purposes.

Computer programs perform activities related both to the operation of the computer system (systems programs) and to the manipulation and processing of data used for management purposes (applications programs). As such, they can be used for verifying that the programmed systems which constitute part of the internal control system, are functioning correctly, as well as examining balance sheet and profit and loss account items stored in the computer.

(A fuller discussion of the two types of audit programs, viz. specialised and generalised, will be made in sections 2.19 and 2.20.)

Farmer expresses concern at both the high cost and duplication of effort, which is taking place in developing computer audit programs. According to him ". . . they are all similar in scope and thrust and are all designed to do the same thing under the same kind of conditions".<sup>102</sup> Will<sup>103</sup> regards the lack of common purpose in designing and applying audit packages as a source of inefficiency for the accountancy profession as a whole.

Both suggest that there should be audit software devised (perhaps under the aegis of National Accounting Societies) which could be used by all auditors. Horwitz<sup>104</sup> feels that ultimately this will be the case but only after auditors have acquired far more experience of audit packages than they have at present.

In principle, this idea of a universal audit package is sound, but in practice it may be very difficult to implement. This is because it would have to :

- (a) be available for use on any type of computer;
- (b) be able to access any type of file however organised;
- (c) cater for a very wide range of sampling, extraction, matching, sorting or arithmetic operations;
- (d) be easy to use by non-specialists; and
- (e) be applicable to the large number of machine languages used by computers.

To fulfil these requirements will necessitate a joint effort of experienced computer auditors and computer manufacturers - whether either would be amenable is highly debatable.

In very general terms, computer audit programs are used by an auditor to assist in the testing of the client's system of internal control, and to aid balance sheet and profit and loss account verification. (Examples of these functions were given in section 2.15.) If a decision is made to use audit programs, the choice exists whether to use specialised or generalised software. Details of each type are reviewed below.

#### 2.19 SPECIALISED COMPUTER AUDIT PROGRAMS<sup>106</sup>

Such programs are tailored to the particular requirements of each audit and must, therefore, be written specifically to cater for the client's hardware configuration, operational programs and processing system. In addition, the specific audit requirements relating to each of these aspects, would have to be carefully defined.

Essentially, there is no difference between computer audit program and any other type of computer program. The same steps are followed in preparation, but with the former the auditor's participation is necessary during each phase of program development - this is well illustrated by Davis.<sup>107</sup>

A pre-requisite to designing the audit program is a complete grasp, and understanding, of the

client's computer system. It is insufficient to appreciate 'what goes in and what comes out'. Detailed information on the form and content of master files, the existence of programmed checks, the processing done during particular runs, the sequence of updating procedures and similar aspects, are fundamental to the building up of systems specifications.<sup>108</sup> It is within these specifications that a definition of the audit requirements is formulated.

The actual writing of the programs require an extensive knowledge of the type of computer to be used, the operation instruction codes to be used in programming, the way in which storage locations are addressed, and so on.

In addition, the testing or 'debugging' of the programs, prior to being used in a 'live' situation, could be a tedious exercise requiring experience in the operating of a computer.

The above factors point to the reality that most auditing firms will not have personnel with a sufficient level of technical expertise to be able to undertake the preparation of a specialised audit program. This does not imply that it cannot be done. On the contrary, the auditor has two additional facilities available :

- (a) Utilise the EDP staff of the client - this would appear to be a very practical solution. The staff is completely familiar with the technical aspects of the computer configuration and programming languages. All the auditor needs to do is to clearly define his audit objectives, and once the program is written, to satisfy himself that it is performing as intended.

Potential problems here include :

- (i) Cost of programming and computer testing time;
  - (ii) Client being agreeable to his staff doing 'outside' work;
  - (iii) Availability of staff and computer time at the client; and
  - (iv) Effect on the independence of the auditor.
- (b) Employ outside consultant - an assignment could be given to such a person for designing the system and thereafter programming it. This would overcome (a)(ii) - (iv) above, but other problems arise :
- (i) Considerable time, and thus money, is spent by the consultant in making himself familiar with the system and the hardware configuration;

- (ii) The client might object to his computer being used by an 'outsider'; and
- (iii) If operational difficulties arise subsequent to the audit program being prepared, the consultant might not be readily available for consultation.

It would appear that using the EDP staff of the client is preferable where an auditor is unable to prepare the audit program.

Naturally, as in the case reported by Baurle<sup>109</sup> where an audit firm has its own EDP specialists (usually as part of its management advisory services department) the necessary systems design and programming functions can be undertaken on an 'in-house' basis.

While using a specialised computer audit program, it is necessary for the auditor to be vitally concerned with control measures which ensure that the audit achieves its objective. Such measures include :

- (i) At the initial stage, a properly defined, exhaustive testing procedure to iron out any malfunctions, and also to verify that all his requirements have been catered for;
- (ii) Identification of subsequent changes made to the computer system, and

- making appropriate revisions to the audit program;
- (iii) Control over the operators who prepare individual run requirements (usually in the form of control data punched on cards);
  - (iv) Assurance that the correct data files and run instructions are used;
  - (v) Appropriate documentation standards for all aspects of the audit program; and
  - (vi) Physical control over audit programs, operational instructions and documentation to be vested in the auditor.<sup>110</sup>

A specialised audit program would appear to ideally fulfil the requirements of an auditor in relation to a client's computer system. However, being designed for a particular system and not readily transferable, use is limited to one or two clients. This fact, together with the high cost of development and of modifications that are required to adapt the program to changes in the client's EDP systems or equipment, weigh heavily against the auditor using such programs.

## 2.20 GENERALISED COMPUTER AUDIT PROGRAMS

A generalised computer audit program (GCAP) is

"a pre-written program designed to automate part of the audit by providing a selection of optional routines which can be readily adapted by the auditor to the requirements of a given audit situation".<sup>111</sup>

The immediate inference one draws is that such an audit program exists with applicability to all computer systems. As pointed out in section 2.18, this is not the case, largely because of the technical differences in the hardware of different manufacturers.

In order to remedy this situation, two forms of GCAP's have emerged :

- (1) Applicable to all clients in a particular industry - as an example of this Dill and Adams discuss a common audit program for all stockbrokers and share dealers connected with the New York Stock Exchange.<sup>112</sup>
- (2) Applicable for use on a specific computer configuration (or others directly compatible) - the majority of GCAP's fall into this category.

The definition of a GCAP (above) implies that an auditor can use the same audit package on differing client's systems, with the only

limitation being the possibility of compatibility problems arising in the hardware being used. Because of this an industry GCAP, with its limited usage, cannot be regarded as a genuine generalised package. All matters referred to below are thus concerned with the type of GCAP envisaged in (2).

All GCAP's require an auditor to specify which of the available options are to be used during an interrogation, or processing, run. The method of specification is dependent on the make of program being used, but in general terms, it could require an auditor to :

- (i) physically code his requests - this presupposes the programming ability to do so; or
- (ii) complete a checklist form - usually a 'yes' or 'no' answer is given, in similar fashion to an audit program; or
- (iii) specify the record field(s) which require analysis, and thereafter select an available routine to perform such an analysis.

These functions are usually done on standardised specification sheets from which specification (or instruction) cards are punched. These are run as part of the audit program.

Implementation of the GCAP is the responsibility of the auditor and not the client's operations staff - in this way his independence is not jeopardised. With this in mind the designers have attempted to keep the operational side at the level of the non-EDP specialist. Will's findings show<sup>113</sup> that only in one case, i.e. AUDASSIST, is specialist knowledge required. This does not mean that it is essential for the auditor to physically operate the computer; provided the processing run (using the GCAP) is under his control, it can validly take place.

While using a GCAP, the auditor must ensure that sound audit procedures are being adhered to. Included here would be :

- (i) Thorough testing procedures when the software is acquired - this would indicate any programming errors as well as give the auditor an understanding of all operational aspects.
- (ii) Advance testing of each application - to check that the required options, and the program itself, function correctly.
- (iii) Custody of the data files - the auditor should control the data files used throughout the processing in order to prevent them being tampered with or substituted.

- (iv) Controlling input details - specification sheets and instruction (or parameter) cards would remain in the auditor's custody to ensure they remain intact.
- (v) Attendance at the processing run - even if the auditor does not operate the computer, he should attend and observe processing activities using the GCAP. An especially important function here is controlling the requested output.
- (vi) Documentation - the GCAP should be fully documented and evidence kept in the working papers of all work performed.<sup>114</sup>
- (vii) Security - the audit program, plus supporting documentation, should be constantly in the auditor's custody.

The comprehensive survey done by Adams and Mullarkey<sup>115</sup> (which covered 17 GCAP's) reveals some interesting facts about the background and training auditors require to be able to utilise an audit program :

QUESTION 22<sup>116</sup>

		<u>No. of Programs Applicable</u>	
Background, i.e. required level of knowledge prior to receiving training	A computer concepts course or equivalent	9	
	No EDP knowledge	<u>8</u>	17
Length of training required <sup>117</sup>	1 Day	2	
	2-3 Days	10	
	4-5 Days	4	
	Over 5 Days	<u>1</u>	17
Use of computer in training course, i.e. 'hands-on' exposure for course participants	Yes	12	
	No	2	
	Optimal	<u>3</u>	17

These factors clearly illustrate that acquiring the ability to use a GCAP is not a very complicated matter beyond the ability of most auditors.<sup>118</sup> It is surprising that five of the training courses take place without a compulsory exposure to working with the computer. Specially prepared material is used in each of the courses which would, undoubtedly, cover the operating procedure for using the computer. But this would not compensate for 'hands-on' experience - it should complement it only. This experience is necessary even where the client's staff will operate the GCAP as it will help the auditor to maintain control.

If a decision is made to use a generalised program, an auditor has to decide which is

most suitable for his requirements. The two surveys previously quoted, viz. Wills and Adams/Mullarkey detail 21 GCAP's which are available. All of these are able to satisfy the basic audit requirements of selecting records, performing arithmetic calculations, analysing or summarising data, and printing output. No GCAP could be rated as 'the best' because ". . . all of them have their advantages and disadvantages, their weaknesses and strengths".<sup>119</sup>

Perhaps the most important characteristic to be taken into account is the technical specifications of the individual programs - these detail the type and model of computer, and the core requirements, which are necessary to utilise the program. Full details of compatible equipment, and their specifications are also usually given. Because of the world-wide domination of International Business Machines (IBM) in the computer field, most of the programs available are directed to this manufacturer's equipment. An analysis of the 21 GCAP's reveals that :

<u>Equipment Requirements</u>	<u>No.</u>
IBM only	7
IBM and other specified manufacturers	11
Other than IBM	<u>3</u>
	<u>21</u>

(The three which are not IBM compatible are FIND 11, NITA and SCORE.)

However, within the IBM range of computers there are various models available which have differing core sizes, and the program specifications must, in turn, be related to these.<sup>120</sup>

An investigation of the minimum core size requirements reveals a discrepancy, in three instances, between the two surveys :

<u>GCAP Name</u>	<u>Minimum Requirements</u>	
	<u>Will</u>	<u>Adams &amp; Mullarkey</u>
ASK 360	64K	32K
AUDASSIST	64K	32K
COMPUTER FILE ANALYZER (CFA)	65K	48K

The reason (or reasons) for this is not apparent.

There are many other technical attributes to be taken into account in assessing the numerous GCAP's but such a discussion is considered beyond the scope of this thesis. Additional information can be obtained by referring to the findings of the two surveys.

Apart from these technical attributes, there are other important factors for an auditor to consider prior to making the final decision as to which GCAP to acquire. Included here are the following :

- (i) The motivation for acquiring a GCAP - an identified need<sup>121</sup> should exist arising from the type of computer system audit which the auditor must conduct. In this way, the time and money spent directly, or indirectly, on acquiring the GCAP would be justified.
- (ii) The storage media to be audited - as processed records could be stored on disc or tape, the GCAP's ability might be limited to only one such media, leaving a conversion routine to be performed to create processing uniformity. Because of the potential complexity, the auditor "should attempt to avoid conversion problems by selecting a package that can handle the required media and/or organisation".<sup>122</sup>
- (iii) Level of skill - generally speaking, the more complex or flexible in terms of ability a GCAP is, the more knowledgeable the user must be about EDP techniques. An auditor must, therefore, assess what EDP skills exist in his firm, and then choose the appropriate 'level' of GCAP.
- (iv) Training - some form of training is required for staff and, although not critical, the course length and the pre-requisite level of EDP knowledge should be taken into account.

- (v) Audit functions - the GCAP extracts information as it passes over stored records. It is therefore important to know how many passes are required to satisfy the auditor's requirements. Horwitz<sup>123</sup> cites examples of one program requiring 30 processing passes, another 12, and a third 8 to extract the same information. The difference in processing time would be considerable in those examples.
- (vi) Audit ability - not all GCAP's perform the same range of activities. Their abilities should be reconciled with the auditor's predefined requirements.
- (vii) Audit control - these are standard features on all GCAP's, but the type of controls, e.g. revenue totals, record counts, exception reports, etc., vary considerably from one program to another.
- (viii) Availability of package - there could be commercial restrictions on the use of particular GCAP's, or they might not even be available (for any number of reasons) to an accounting firm. These aspects should be carefully determined.
- (ix) Support - at least during the initial use of the GCAP, problems and queries could arise which can only be dealt with by the supplier. With this in mind, it

is recommended<sup>124</sup> that auditors ask the following questions about support, viz. :

- How far must I go to obtain support?
- How quickly will it be available?
- What will it cost?

The above aspects are not considered here on any priority basis - they should all be taken into account.

According to Porter<sup>125</sup>, GCAP's had only a limited usage until the beginning of 1969. But the developments since then have been rapid. For example, Davis<sup>126</sup> reports the existence of more than a dozen audit software systems by mid-1970; Will<sup>127</sup> surveyed 15 such programs early in 1972; while Adams and Mullarkey<sup>128</sup> investigated 17 late in 1972. Between the two surveys, 21 GCAP's were studied.

This expansion was probably caused by the awareness, among auditors, that a GCAP could effectively be used on a client's system. Coupled to this are the increasing number and complexity of commercial applications being handled by computers - the audit procedure is often specifically directed to use the computer's ability to assist in performing a thorough examination of client's records.

As an overall assessment, the advantages of using GCAP's as part of a well-chosen, well-

devised, audit program far outweigh the disadvantages. It is anticipated that progress in this area will continue to take place, both in respect of the development of 'better' programs and wider acceptance by the accounting profession.

#### 2.21 USING A COMPUTER AUDIT PROGRAM

If the auditor has a specially-designed audit program for a particular client, its use is simple. As his audit requirements were carefully defined in the design stage of the program, he can be sure that the processing run will achieve audit objectives<sup>129</sup> in terms of output. In outline, the actual procedure involves :

- (i) Loading the data and marking files to be used on the computer;
- (ii) Feeding in the audit program; and
- (iii) Obtaining the required print-outs.

It is optional for the auditor to actually operate the computer itself - usually this is done by the client's EDP staff but under the control of the auditor. The various measures outlined in section 2.19 are appropriate here.

The procedure with GCAP's must, of necessity, differ when compared to a specialised program.

Although the operational requirements vary between the different GCAP's, it is possible to specify the procedures which are fairly commonly followed when applying a GCAP to a particular system - the differences between the two types of audit programs will then be evident. The steps listed below are intended to give an overview, rather than a definitive procedure, for an auditor using a GCAP.

- (1) Knowledge of file details - full information must be acquired as to the details of each file to be audited. Involved here would be the record layouts (i.e. the contents of the records in each file, also differentiating between alpha, numeric or alpha-numeric fields), record lengths (whether fixed, variable or blocked), record storage facilities (tape or disc) and so on.
- (2) Ability of the GCAP - the auditor should be fully familiar with the various options (or routines) available, the functions they perform, and how to bring them into operation.
- (3) Definition of requirements - in terms of the auditor's overall audit objectives, a decision is necessary as to the specific audit to be performed, i.e. options to be used, in relation to the stored records.

This is normally recorded on a specification sheet by ticking off required items on a pre-printed standardised form. Some systems require the auditor to make use of a simple programming language, and other need defined Control Statements, to instruct the GCAP as to the functions to be performed. Whatever the system involved, an input document would be prepared.

- (4) Card Punching - the input document is then transcribed into a computer-compatible media, usually punched cards. These parameter cards would thus contain details of the fields to be assessed on master files, the tests to be applied to these fields and, where satisfied, details of output requirements. Variations are normally available with specific output e.g. the GCAP might produce debtor's confirmation accounts on either a positive, negative, combined, or itemised basis.<sup>131</sup>
- (5) Preparing the computer - mounted onto the computer are the client's data files on tape or disc, a device for the working file, and the software program which is usually on tape or disc.<sup>132</sup>
- (6) Input to the computer - the parameter cards are fed into the computer memory and combined there with the instructions

read in from the GCAP to complete the program for the particular routine being processed.

- (7) Diagnostic run - an edit or diagnostic run is carried out to locate and list any errors made in steps (3) and (4). Essential information might not have been provided or, where it had been, is ". . . wrong or inconsistent with that of any other card to the extent that a successful run will not be performed".<sup>134</sup> If a diagnostic report is produced, the option often exists for the run to continue on the assumption that the conditions reported do not affect the performance of the GCAP.
- (8) Test run - if diagnostics are reported but the run is continued, or, if no diagnostic errors are revealed, it is important to perform a test run prior to the 'live' run, using a sample of the records to be worked with. This would ensure that the GCAP is performing correctly and that the file information (step (1) above) is correct and accurate.
- (9) Live run - the GCAP is now ready to be applied to a full processing run.
- (10) Output obtained - this could be printed,

written to tape or disc, or punched into cards. The GCAP usually defines the output format but certain aspects can be to the user's specification, e.g. the title to be printed at the beginning of the report, the page headings for each page of the report. Numbering and dating of each page would be a function of the program, as would be the various control totals at the end of the report.

Although it would appear from the above that using a GCAP requires far more time than a specialised program, the findings of Porter and Burton indicate that this is not the case. In order to perform similar functions, the specialised program took 220,5 hours, while a general program (AUDITAPE) took between 44,5 and 64,5 hours.<sup>134</sup>

To assist the user of a GCAP, the manufacturer supplies the programs on magnetic tape or disc, specification sheets, instructions for the computer and key punch operators, and a Manual, the latter being specifically designed to "help the user bridge the gap from his limited data processing knowledge to that of being an expert . . . user".<sup>135</sup> A detailed system description and other useful guidelines would be contained in it.

It should not be construed that the object of

sections 2.19, 2.20 and 2.21 has been to assess whether specialised computer audit programs are more useful than generalised ones, or vice versa. They are both very useful as audit tools. GCAP's do reveal enormous potential for the future but Davis makes the very valid point that ". . . it will still be necessary for specific programs to be written for smaller equipment, non-compatible systems and unusual audit tests".<sup>136</sup>

## 2.22 OTHER TECHNIQUES

Apart from the aspects reviewed above, there are two additional computer-assisted techniques which could be applicable to an auditor :

- (1) Use of manufacturer's utility programs - these perform standard functions such as file copying, printing, sorting and other similar aspects. These could be useful but Pinkney<sup>137</sup> maintains that further experience is required before these can be accepted as being of practical use to the auditor.
- (2) Automatic flow charting - programs are available which, when run against the client's programs, will generate diagrams in the form of flow charts, of the logic and processes being used. This could be

particularly useful in the instance where an understanding of the program's logic and/or workings is required, but where the client's documentation is inadequate. It could also provide the auditor with an easy means of checking if changes have been made to a client's programs - flow charts for different periods could be compared.

## 2.23 CONCLUSION

The purpose of this section has been to give an overview of computer assisted auditing and the various techniques which can be used.

While working with computer systems, the auditor should not consider the computer ". . . as an obstacle to be overcome in order to achieve his objective".<sup>138</sup> Rather, the computer-orientated techniques discussed in this section should be viewed as tools to facilitate the proper performance of the audit.

Naturally, not all computer auditing requires these tools to be used and where conventional techniques are applicable they should be retained. In similar fashion, Horwitz<sup>139</sup> (and others) argue that it is unlikely that auditors will be compelled to use the computer to effectively perform an audit - alternative procedures can be utilised which would "leap-frog

the machine system".<sup>140</sup> This viewpoint is questionable especially in relation to sophisticated, and complex, computer operating systems, e.g. 'real-time' processing.

On the other hand, McRae makes the point that if an auditor finds EDP audit work boring "it is probably boring because it is routine, and if it is routine it is likely that the computer can do the job rather more efficiently".<sup>141</sup>

The more direct benefits of using the computer were outlined in section 2.15, as were the disadvantages. On balance, the advantages outweigh the disadvantages, but in the final analysis the choice remains with individual auditors. The criteria, as specified in this section, should assist an auditor in making such a choice.

## F. SPECIAL COMPUTER AUDIT CONSIDERATIONS

### 2.24 BACKGROUND

Particular processing arrangements made by a client create the need for special audit considerations. This does not imply that the principles and techniques of computer auditing, which have been dealt with in the previous sections to this chapter, are inappropriate or inapplicable. On the contrary, they are common to all computer systems which an auditor may encounter.

However, additional responsibility rests with an auditor when processing is done :

- at a computer service bureau;
- in an 'on-line' or 'real-time' environment or in an integrated system environment;
- through the medium of time-sharing.

Each of these aspects creates problems of control and security which do not exist in the majority of in-house computer installations. This section will briefly deal with the four circumstances outlined above.

### 2.25 COMPUTER SERVICE BUREAUX<sup>142</sup>

Auditors often feel that their work is made

easier when a client uses a service bureau.  
This is because of the following factors :

- (1) A large number of clients are being handled by the bureau and, as a result, sound systems of internal control and defined operating procedures are in existence.
- (2) Security arrangements, covering such aspects as fire control and file controls, should be well conceived.
- (3) Control totals and a reasonable audit trail are usually built into processing applications handled by a bureau.
- (4) Operational control procedures over input, processing and output are impartially applied to all clients of the bureau.
- (5) The bureau has its own auditors who satisfy themselves as to the standards being maintained by the bureau.

Particularly in the instances where the controls over processing are clerically applied, e.g. control total balancing, and where only a minor portion of the client's processing is handled by the bureau, the auditor's direct involvement with the bureau will be minimal. Audit concern will be limited to ensuring that the client

maintains the following controls :

- (1) Controls over punching data in a medium suitable for input to the computer, e.g. batching procedures, punching and verifying operations, etc.
- (2) Controls relating to data handed over to the bureau, e.g. document count, (also ensuring that copies of such documents exist in the event of them being destroyed or lost while at the bureau), transaction totals and revenue totals of input, issuing of a valid receipt by the bureau when data is handed over.
- (3) Controls exercised by the edit (or prooflist) run - these ensure, through the appropriate programs, that punching and verifying have been accurately performed and that batches balance.
- (4) Controls over any changes to master files - after each live run a balancing procedure must be done to ensure that no records have been dropped. In addition, all alterations and deletions to the master file should be printed out on a special report and stored for later reference - this forms an important part of the audit trail.

- (5) Stringent controls over error corrections and re-submissions. Where exception or error reports are generated by the system, there must be defined procedures for identifying the source or reason for the error, and correcting errors on a subsequent run.
- (6) Control over output, and here three aspects are referred to :
  - (a) ensuring that the correct number of output copies are produced at each run;
  - (b) ensuring that output is distributed to the appropriate persons and securely stored within the organisation; and
  - (c) ensuring that management is involved in utilising/checking output (in order to keep an overview of the entire computer operation).
- (7) Controls which enable master files to be re-created in the event of destruction at the bureau, eg. storing data submitted to the bureau, as well as the edit run printout, and the grandfather/father/son arrangement with the bureau. Basically, these can provide back-up facilities in case of need.

- (8) Controls which ensure a smooth operation with the bureau such as run authorisations and defining run requirements.
- (9) Control over billing procedures - included here are procedures for comparing invoices with the bureau's charges as stipulated in the service contract and a method for assigning financial responsibility for any re-runs which take place.
- (10) Control over adequate levels of stationery, pre-printed or other, kept at the bureau.

The above aspects could be dealt with by using an internal control questionnaire, coupled with intelligent observation.

In the case where the major portion of a client's data processing is handled by a bureau, or where ". . . significant computer controls are built into a bureau operated system",<sup>143</sup> the auditor would be required to conduct a general review of the internal control procedures at the bureau in order to satisfy himself as to the reliability and accuracy of the client's record and output. In principle, the procedures and techniques which could be applied are the same as for an 'in-house' installation. An additional consideration of importance is that processing activities are external to the client's

organisation, raising for the auditor the problem that "his audit intimately involves a third party".<sup>144</sup>

The implications of this are as follows :

- (1) No legal relationship exists between the bureau and the auditor; thus the client is required to arrange for the auditor to visit the bureau. This could be time-consuming and would possibly reduce the 'surprise' nature of an audit assignment.
- (2) Accessibility to the service bureau might be difficult as the client is usually only one of many using the bureau, and it is impractical for every auditor to expect to undertake an examination of the bureau's operations. The service centre personnel would be generally unco-operative, or resistant, in such circumstances.
- (3) Complexity of operations - Davis makes the point that ". . . the operations performed for the client may be quite simple, but the operations of the service center may be complex".<sup>145</sup> These could be unfamiliar to either the user or the auditor.
- (4) Cost - should the auditor wish to use the

computer itself, as an audit tool, a charge will be made by the bureau. Because of this, Hollis feels that the client is going to view any such requests with a "jaundiced eye".<sup>146</sup>

- (5) System documentation may not be available - particularly in the case of application 'packages' the bureau may be unwilling for security reasons, to release full details.

These factors create very real difficulties for the auditor. Even if the controls at the client are operating effectively, the central problem of evaluating controls in the data centre has not been solved. Because of this the Canadian Committee reported that "the [accounting] profession does not now have one generally accepted answer to this question".<sup>147</sup>

In view of the above, the increasing use of service bureaux points to the necessity of clear guidelines being established in order to assist the auditor to handle the complications brought about through his client introducing a third party, i.e. the computer bureau, into his data processing cycle. Such guidelines ought to be laid down by a National Accounting Body.

This sub-section has not dealt with the circumstance where a client hires block time in the computer and uses his own staff to operate it. The controls, and hence the audit technique used, are exactly the same as in the situation where the client has full-time control over the processing equipment.

In addition, it is considered that matters relating to protecting clients' interests<sup>148</sup> fall outside the scope of this sub-section and chapter.

## 2.26 'ON-LINE' OR 'REAL-TIME' SYSTEMS

(Note : Readers are presumed<sup>149</sup> to understand the fundamental differences between these two advanced data processing (ADP) systems - a succinct background and definition is given by Shays.<sup>150</sup>)

The very nature of ADP systems creates immediate problems for the auditor :

- (1) Source documents<sup>151</sup> will, invariably, be kept at a location some distance away from the computer, and be filed in a different sequence to that of the computer - in the latter instance, updating of records stored on magnetic disc is done in random sequence. This

would considerably affect the existence of a readily usable audit trail.

- (2) Change in the system of internal control - testing of the internal control procedures is more difficult because of the extensive use made of computer equipment and complex systems of programming. Lewis suggests that this major problem "will require the development of new techniques and, perhaps, new conceptual approaches to the problem".<sup>152</sup>
- (3) Input authorisation - because most transmission devices, which access directly to the computer's central processing unit, are relatively simple to operate, the auditor may not be able to rely on their use being limited to a small number of skilled operators. The whole question of the integrity or accuracy of master file records is thus raised.
- (4) Master file balancing procedures - the procedures used with conventional 'batch' processing cannot be applied because input is continuously being made from various locations.
- (5) Program complexity - the programs used

in ADP systems are often particularly complex, exacting and lengthy with the program documentation of similar dimensions.

- (6) System complexity - ADP systems require the auditor to have a more extensive knowledge of EDP than is necessary for conventional systems.

Various control measures<sup>153</sup> have evolved through the combined efforts of designers and management which, by and large, are concerned with protecting the workings of the ADP system.

The auditor's involvement relates to checking the adequacy, and actual operation, of the various controls and other safeguards which have been instituted. Because many of the control features are embodied in the programs, particular emphasis should be laid on detailed checking of the testing procedures which were carried out on such programs. In this connection Ross refers specifically to reviewing "in detail the planning for the program check-out, the data used, and the results obtained [as well as] the results of parallel operations".<sup>154</sup> Adequate program documentation and a standard method for effecting program modifications, are also stressed.

Once the system is fully operational the auditor is able to perform a continuous monitoring of processing activity,<sup>155</sup> and in this way not limit checking of the system to a particular time period.

Standard control features (as outlined in section C) should be in operation which would also require the auditor's attention.

Despite the problems of ADP systems, conventional computer audit techniques are largely applicable. But it is evident that the auditor is required to have an extensive EDP knowledge to be able to successfully adapt them to the changed circumstances in an 'on-line' or 'real-time' environment.

#### 2.27 'INTEGRATED' SYSTEM ENVIRONMENT

An 'integrated' system is another form of advanced data processing, where a single input to the computer updates various files or records. This can be done because of "the interrelationship and interdependence of the economic functions of a business".<sup>156</sup> The operating of the system is usually on the basis of an 'on-line' or 'real-time' input procedure.

As such, the problems specified in sub-section 2.25 are appropriate here. The additional

problems which an auditor encounters is that an audit trail for particular records could be non-existent, because of the simultaneous updating of multiple records. This could also complicate reconciling control totals which are similarly automatically updated. These factors make the system very difficult to understand and complex to test for audit purposes.

Auditing experience of such systems is very limited because of the small number of computer applications which operate in this manner. The overall complexity of file organisation and balancing procedures would require an auditor to have specialist EDP knowledge to be able to fully come to grips with the system.

## 2.28 TIME-SHARING<sup>157</sup>

Computer time-sharing is "an arrangement wherein a great number of people at remote locations can simultaneously use a large computer at a central processing facility".<sup>158</sup> In a sense, such a system is an advanced type of computer bureau. Additional special controls must be in existence over and above normal controls, to take into account the nature of processing activities.

The major problem for the auditor of the computer centre relates to the complexity of

the programs being used. To understand, and test them is very difficult. As yet, a standard audit procedure for testing such systems has not been developed.

The auditor of a user of such facilities can generally satisfy himself that sufficient controls are in operation which ensure that the system is operating correctly and conventional techniques are adequate for this purpose. They are also suitable for testing the records and the files. Looking to the future it is suggested that "it is entirely feasible that the auditor may use the input-output terminal to refer to data records in the computer's random access files, and possibly even to screen them, or duplicate them and manipulate the copies in various ways for audit purposes".<sup>159</sup>

## 2.29 CONCLUSION

Rather than detail definitive audit procedures, the purpose of this section has been to 'expose' the various audit complications which exist in particular processing circumstances. Suggestions were made, especially in sub-section 2.24 as to the aspects with which the auditor should get involved. These comments do not purport to deal adequately with the auditing requirements.

This seems to be the crux of the auditor's problem - no statements, standard procedures or operational guidelines which cater specifically for these advanced data processing techniques have been issued by authoritative accounting bodies.

Indications for the future point to the increasing significance of these 'special' computer circumstances, and the accounting profession must be suitably equipped to cope with such developments. Many issues are still unresolved, and there is thus scope for a great deal of research into these areas.

G. PLANNING AND TIMING OF COMPUTER AUDITING

In the majority of cases, the visit of an auditor to a client is carefully planned and timed. This is because preliminary arrangements are necessary to ensure that :

- (i) the client's routine is not unduly disrupted;
- (ii) the auditor's requirements, as regards his work, are complied with or anticipated; and
- (iii) appropriate physical facilities are provided for the audit team.

The nature of computer auditing is such that a far greater need for advance planning exists than in other processing systems. Generally, the techniques and procedures used by the auditor require a close liaison with the client's management and staff, and it is through this channel that appropriate planning is made.

Despite the varying character of EDP installations which could require audit attention, e.g. in-house, service bureaux, on-line or real-time systems, it is possible to specify, albeit in fairly wide terms, fundamental aspects to be catered for in planning with the client.

- (1) Meetings for the completion of an Internal

Control Questionnaire and for answering other control questions can be very time consuming for the client. Accordingly, the client should be made aware of what the auditor plans to do and what his time involvement can be expected to be. In this way the client can agree the timing of the auditor's visit, and space his activities in terms of it.

- (2) As far as possible, the auditor should avoid visiting the client in a particularly busy time of the month, or "when the data processing manager is endeavouring to meet 'deadlines' or solving problems of the installation".<sup>160</sup>
- (3) Where special printouts<sup>161</sup> are required by the auditor, adequate advance notice should be given to enable them to be produced during the course of a normal processing run. This would minimise the expense involved in supplying such printouts.
- (4) If an auditor wishes to visit the service bureau processing his client's work, arrangements must be made with an appropriate bureau staff member to be available in order to satisfy the auditor's requirement.
- (5) The auditor may wish to apply computer-assisted auditing techniques to aid in the testing, or verification of programs and/or master file records. In these circumstances, attendance

of the auditor is usually imperative when processing takes place, and a convenient time should be arranged. The most suitable time would be prior to the removal of the client's files and programs from the computer, i.e. after a 'live' processing run. If this is not possible, a special run should be arranged.

- (6) Arrangements must be made with the client to ensure that all printouts produced by the computer are filed for an agreed period in a defined and logical sequence, and that such records are easily accessible. Where possible, source documents should also be kept in their input sequence. In addition, evidence must be readily available of the control total balancing done at the end of each processing run, as well as the re-input procedures to correct any rejected data or erroneous processing activity.

These points fit into the common audit framework, i.e. points (i) to (iii) above - 'appropriate physical facilities' (point (iii) ) has been interpreted here to mean 'computer facilities' which are necessary in using computer-assisted auditing techniques.

'Surprise' audits normally take place only when required by law or regulation, or if specifically requested by the client. These are directed at particular aspects and could be classed as 'spot

checks'. However, the scope and purpose of a comprehensive audit requires close co-operation between the auditor and his client - it is precisely to facilitate this inter-relationship that appropriate planning takes place.

The auditor must also plan the approach to be adopted by his staff in conducting the audit of computer records. This involves using personnel with adequate EDP knowledge, developing suitable working papers, providing training in particular aspects, e.g. using an audit package. The range of such activities is so wide that it is not possible to lay down general criteria in this area. The requirements will vary according to the size of the auditing firm, the size of the client, and the system of computer processing which is in operation.

#### H. CONCLUSION

The final phase of the audit cycle is performing additional testing of the closing balances. The scope of this work is largely dependent upon the effectiveness of the system and its related controls. What is involved is a verification of the existence, ownership and valuation of the assets for which records are maintained on the computer. This audit work could be done either from routine or special printouts. But the checking done here is largely dependent on manual effort, e.g. physical counting of stock or verifying fixed assets - as such it falls outside the computer sphere.

At the completion of the audit, a formal report should be made to the client as to the findings of the audit. Having conducted a proper investigation into all aspects of the client's computer system, the auditor would be in a position to highlight problem areas and report on the level of efficiency of the system.

This does not imply that sound systems of internal control are necessarily lacking at the client's computer installation. On the contrary, computer systems lend themselves readily to the introduction, and maintenance, of sound control procedures. The pre-requisites here are that the system is soundly conceptualised, well-devised and efficiently operated in terms of standard

procedures. But the auditor must in addition satisfy himself as to the workings, in the widest sense, of his client's computer system, and this is the dilemma facing many auditors.

It is not feasible to lay down an audit plan of action which is applicable to every client using a computer. Each case must be assessed individually with a decision being made as to the approach to be taken. To this end the auditor has a wide range of procedures and techniques available which provide sufficient flexibility to satisfy all the diverse needs. However, standards and guidelines are generally lacking in respect of "(1) the design, evaluation and testing of controls, (2) auditing systems of advanced design, particularly remote access systems and (3) auditing data processing service bureaus".<sup>162</sup>

Without a fundamental understanding of computer auditing it is not possible for standards and guidelines to be developed by the accounting profession or by individual members. This chapter has been written with this specifically in mind, and covers the principles and possible approaches which are appropriate in a computer environment.

CHAPTER II - FOOTNOTES

- (1) SHONTING, D.M. and STONE, L.D. : "Audit Techniques for Electronic Systems": The Journal of Accountancy: October 1958: p.p.54-61.
- (2) In auditing terminology this is referred to as the "Attest" function.
- (3) MARGETTS, J.W. : "The Auditor and the Computer from a Statutory Auditor's Viewpoint": The Accountant: September 6th 1958: p.p.276-283.
- (4) HORWITZ, G.B. : "EDP Auditing - The Coming of Age": The Journal of Accountancy: August 1970: p.p.48-56.
- (5) DAVIS, G.B: "The Auditor and the Computer": The Journal of Accountancy: March 1968: p.p.44-47.  

On page 45 the point is made that few changes in auditing procedures are required where the new system directly resembles the old one. However, where the system conceptually changes, e.g. from manual procedures to an "on-line" system, the approach to audit work would be dramatically altered.
- (6) Points 1 - 5 are adapted from : Committee Report: "Computers and the Accounting Profession in Canada": Published in Canadian Chartered Accountant: Special Issue: August 1967: p.p.23-32.
- (7) It is considered that a full discussion and definition of internal control is outside the subject matter under review. The reader is thus presumed to understand what the term means and its implications in the organisation.
- (8) This is especially the case once the computer systems are hardware, programs and operating procedures have proved their reliability.
- (9) SHONTING, D.M. and STONE, L.D. : Ibid: p.55.

- (10) JOHN, R.C. and NISSEN, T.J. : "Evaluating Internal Control in EDP Audits": The Journal of Accountancy: February 1970: p.p.31-38.
- (11) PORTER, W.T. : Auditing Electronic Systems: Wadsworth Publishing Company Inc.: California, U.S.A. : 1968: p.4.
- (12) LOBEL, J. : "Auditing in the New Systems Environment": The Journal of Accountancy: September 1971: p.p.63-67.

Briefly, the five reasons mentioned (on page 65) are :

1. Lack of familiarity with the various control requirements;
  2. Designers and programmers are technically, and not control, orientated;
  3. Many EDP decisions are made at a fairly low organisational level where often the people do not have sufficient overall perspective into general control requirements;
  4. Controls suggested by management are occasionally ignored or deleted from the system, particularly if no management follow up is made;
  5. "EDP staff attempt to design systems that will operate at lowest cost and greatest speed. The inclusion of internal control devices works against this objective."
- (13) DAVIS, G.B. : Auditing and EDP: American Institute of Certified Public Accountants: New York: 1968: p.130.
- (14) ACKER, L.W. : "Providing Audit Trails in Computer Operations": The Office: January 1960: Reproduced in: The Accountant's Digest: March 1960: p.p.132-133.
- (15) PUTLAND, P.H. : "Auditing Requirements": The South African Chartered Accountant: January 1969: p.p.21-23.
- (16) ROY, R.H. and MacNEILL J.H. Horizons for a Profession: American Institute of Certified Public Accountants: New York: 1967: p.p.130-131.

- (17) BONI, G.M. : "Impact of Electronic Data Processing on Auditing": The Journal of Accountancy: September 1963: p.p.39-44.
- (18) WASSERMAN, J.J. : "Plugging the Leaks in Computer Security": Harvard Business Review: September-October 1969: p.p.119-129.
- (19) A very valid point is made by Margetts (page 664) in stating that "the consequences of errors going undetected in an EDP installation could be so serious that a company does not normally require any pressure from the auditors to incorporate adequate checks". This would confirm the "reviewing" function of the auditor as described by Wasserman. See
- MARGETTS, J.W. : "Accounting by Electronic Methods with Particular Reference to the Auditor": Accountancy: December 1959: p.p.661-667.
- (20) MULLIN, T.K. and BELL, P. : "The Auditor and Computerized Accounting Systems": The Accountant: February 1st 1969: p.p.150-154.
- (21) Aspects of the auditor performing consultancy work on behalf of a client fall outside the intended meaning of "involvement" here.
- (22) Committee Report : "Accounting by Electronic Methods - an Introductory Outline": The Accountant: July 12th 1958: p.p.40-48.
- (23) HOWITT, A.W. : "The Auditor and the Computer": The Accountant: January 14th 1961: p.p.39-44.
- (24) CLEAVER, G.F. : "Auditing and Electronic Data Processing": The Journal of Accountancy: November 1958: p.p.48-53.
- (25) SILK, F.C.Z. : "The Impact of Electronic Data Processing on Auditing": The South African Chartered Accountant: March 1964: p.p.9-24.

The author expresses similar sentiments on this subject to those of the Price Waterhouse team.

- (27) The reason for this is because of the size of this subject which could provide sufficient material for a separate research undertaking.
- (28) These are adapted from :  
Committee Report : Computer Control Guidelines: The Canadian Institute of Chartered Accountants: Toronto: 1972: Chapter 1 : p.p.9-24.
- (29) There could be two such studies undertaken, viz. :  
(i) Preliminary - whether the use of a computer appears warranted in terms of the circumstances of an organisation, and  
(ii) Feasibility - a detailed study of all aspects of the organisation, in order to provide management with facts and figures about the proposed system(s) and equipment.
- (30) The most usual form of such a plan is a network diagram in which each event can be depicted and its relationship to the other expressed.
- (31) STONIER, B. : "The Impact of Computers on Auditing": The Chartered Accountant in Australia: September 1959: p.p.154-157.
- (32) DAVIS, G.B. : Ibid: Auditing and EDP: p.p. 39-40.
- (33) PINKNEY, A. : "The Problems of Auditing Magnetic Storage - 1": The Accountant: May 7th 1966: p.p.561-567.
- (34) TALBOT, A.E. : "EDP and Audit": The Chartered Accountant in Australia: August 1966: p.p.107-114.
- (35) d'AGAPEYEFF, A. : "The Accountant's Attitude to Computers": Accountancy: December 1964: p.p.1080-1082.

- (36) The reader is presumed to understand the ramification of this on traditional, i.e. manual, systems of internal control.
- (37) Within the EDP department itself, strict segregation must exist between the functions of systems designers, programmers and operations personnel.
- (38) JOHN, R.C. and NISSEN, T.J. : Ibid: p.32.
- (39) ANDRIES, V.E. : "What the auditor should know": Systems/Stelsels: July/August 1972: p.p.20,23,24,26.
- (40) HOOPER, D.W. : "The Impact of EDP on Audit Techniques": The Accountant: February 23rd 1963: p.p.217-222.
- (41) Adapted from :  
The Institute of Chartered Accountants in England & Wales: Internal Control in a Computer-based Accounting System:  
Statement on Auditing No.14:1969: para.4.
- (42) This is considered a major control feature in computer systems - a separate section (2.8) is devoted to controls over files and records.
- (43) Also referred to as "Processing" (Controls).
- (44) A very good overview of these aspects, related to a computer system, is diagrammatically represented on Figure 5-1 of the  
Committee Report : Computer Control Guidelines: Ibid: p.60.
- (45) SANDERS, D.H. : Computers in Business - An Introduction: McGraw-Hill: New York: 1972: p.503.
- (46) See section 2.4.
- (47) STETTLER, H.F. : Auditing Principles: Third Edition: Prentice-Hall Inc.: New Jersey: 1966: p.442.
- (48) ZIESSOW, B.W. : "Controls in Electronic Data Processing": NAA Bulletin: January 1964: Reproduced in: The Accountant's Digest: June 1964: p.p.223-224.

- (49) Committee Report : Computer Control Guidelines: Ibid: p.83.
- (50) ANDRIES, V.E. : Ibid: p.24.
- (51) The Institute of Chartered Accountants in England & Wales: Internal Control in a Computer-based Accounting System: Ibid: para.12-16.
- (52) PINKNEY, A. : Ibid: p.565.
- (53) DAVIS, G.B. : Ibid: p.91.
- (54) PORTER, W.T. : Ibid: p.26.
- (55) FONTAINE, R.C. : "Automation and Auditing": The Accountant's Digest: June 1967: p.p.201-202.
- (56) Committee Report : Computer Control Guidelines: Ibid: p.85.
- (57) FINE, L.H. : "Security and the Computer": The South African Chartered Accountant: September 1970: p.p.349-356.
- (58) WASSERMAN, J.J. : Ibid: p.p.120-121.
- (59) HOLLAND, G. : "Computer Security": Accountancy: March 1972: p.p.43-45.
- (60) LENHART, N.J. and DEFLIESE, R.L.: Montgomery's Auditing: 8th Edition: The Ronald Press Company: New York: 1957: p.64.
- (61) CHAPIN, D.H. and ROBERTS, A.W. : "Review and Evaluation of Internal Control in the EDP Environment: A flexible Approach": Published in Computer Auditing in the Seventies: Arthur Young and Company: 1970: p.p.16-21.
- (62) DAVIS, G.B. : Ibid: p.325.
- (63) For examples of such questionnaires, see  
DAVIS, G.B. : Ibid: p.p.226-229  
(Bureau) and p.p.326-340 (In-house)  
STETTLER, H.F. : Ibid: p.p.444-447  
(In-house).  
  
The Institute of Chartered Accountants in England & Wales: "The Audit of Computer-based Accounting Systems":

Statement on Auditing No.15: Issued as an update for the Members' Handbook: also published in The Accountant: December 18th 1969: p.p.855-864: The appendix contains a specimen in-house questionnaire.

- (64) LEE, T.A. : Company Auditing: Concepts and Practices: The Institute of Chartered Accountants of Scotland: Edinburgh: 1972: p.160.
- (65) LEE, T.A. : Ibid: p.160.
- (66) CASHIN, J.A. and OWENS, G.C. : Auditing: 2nd Edition: The Ronald Press Company: New York: 1963: p.77.
- (67) Auditors should insist on having a copy of all the computer documentation prepared by a client. Accepting that appropriate controls are in existence, any changes to the documentation would be sent to him in order to update his manual(s).
- (68) This would be useful as company procedure manuals or for describing job routines.
- (69) DAVIS, G.B. : Ibid: p.289.
- (70) SKINNER, R.M. and ANDERSON, R.J. : Analytical Auditing, An Outline of the Flow Chart Approach to Audits: Pitman Publishing Corporation: New York: 1966: p.12.
- (71) Particularly the reviewing procedures for master file changes and error reports.
- (72) GREENE, R.W. : "The Auditor Must Understand Computer Programming": Canadian Chartered Accountant: July 1967: p.p.33-37.
- (73) PORTER, W.T. : "Evaluating Internal Controls in EDP Systems": The Journal of Accountancy: August 1964: p.p.34-40.
- (74) KAUFMAN, F. : Electronic Data Processing and Auditing : The Ronald Press Company: New York: 1961: p.26.
- (75) BONI, G.M. : "Impact of Electronic Data Processing on Auditing": The Journal of Accountancy: September 1963: p.p.39-44.

- (76) SKINNER, R.M. and ANDERSON, R.J. : Ibid: p.143.
- (77) Also referred to in some publications as 'test packs'.
- (78) BROAD, S.J. : "The Progress of Auditing": The Journal of Accountancy: November 1955: p.p.38-43.
- (79) BOUTELL, W.S. : "Auditing Through the Computer": The Journal of Accountancy: November 1965: p.p.41-47.
- (80) This program 'debugging' is done through the programmer preparing hypothetical data which will test (or infringe) the programming rules. The programmer has pre-calculated the results which should be produced, and actual output is checked against it.
- (81) DAVIS, G.B. : Ibid: p.163.
- (82) PORTER, W.T. : Ibid: p.36.
- (83) The Institute of Chartered Accountants in England & Wales: Statement on Auditing No.15: Ibid: para.45-47.
- (84) The first two steps were reviewed in sections B and D above.
- (85) HORWITZ, G.B. : Ibid: p.51.
- (86) DAVIS, G.B. : Ibid: Chapter 10: p.131-157.
- (87) Editorial : "Auditing with a Computer": The Accountant: December 16th 1967: p.798.
- (88) GAGE, R.G. : "Up Computer Creek Without a Paddle": The Internal Auditor: September/October 1973: p.p.20-34.
- (89) DOHERTY, H.J. and SORENSON, J.L. : "Use of the Computer in Auditing": Computer Auditing in the Seventies: Arthur Young and Company: New York: 1970: p.p.23-27.
- (90) WELKE, W.R. and KING, K.G. : "Using the Computer as an Audit Tool": The CPA Journal: November 1972: p.p.930-932.
- (91) REID, G.F. and DEMCAK, J.A. : "EDP Audit Implementation With General Purpose Software": The Journal of Accountancy: July 1971: p.p.35-46.

- (92) SHAW, L.W. : "The use of the computer in the audit of Computer Systems":  
Accountancy: February 1967: p.p.101-107.
- (93) Committee Report : "Practising Accountants and The Computer - Section 2": Canadian Chartered Accountant - Special Issue: 1967: p.p.23-32.
- (94) This can be done on a random sample basis or as defined, e.g. every x item or every item over Rx.
- (95) Of particular interest here could be the adequacy of the provisions created for bad or doubtful debts, and estimating inventory obsolescence.
- (96) McRAE, T.W. : "Auditing EDP Systems":  
Accountancy: February 1963: p.p.115-118.
- (97) WILL, H.J. : "Computer-based auditing - Part 1": Canadian Chartered Accountant: February 1972: p.p.29-34.
- (98) The word 'Program' is synonymous with 'Software' or 'Package'.
- (99) GOODMAN, J.V. : "Auditing Magnetic Tape Systems": Accountancy: May 1965: p.p.415-420.
- (100) WILL, H.J. : "Computer-based auditing - Part 2": Canadian Chartered Accountant: March 1972: p.p.32-41.
- (101) For an explanation of the function and operation of such organisations see  
BELANGER, L.R. : "The Evaluation of software packages": Canadian Chartered Accountant: December 1972: p.p.57-58.
- (102) FARMER, J. : "Auditing and the Computer - A Suggested Program": The Journal of Accountancy: July 1970: p.p.53-56.
- (103) WILL, H.J. : "Computer-based auditing - Part 2": Ibid: p.41.
- (104) HORWITZ, G.B. : Ibid: p.54.
- (105) These points are adapted from  
SPITTLE, H. : "Software Services for Accountants": The Accountant: April 26th 1973: p.p.563-564.

- (106) Also referred to as 'Custom Audit Programs'
- (107) DAVIS, G.B. : Ibid: p.192.
- (108) The obvious means of obtaining this information is from the existing program and system documentation.
- (109) BAURLE, F.C. : "Accounting and Auditing Problems - Computer assists auditor": The Journal of Accountancy: August 1963: p.p.75-76.
- (110) Points (i) - (iv) were adapted from  
GAGE, R.G. : Ibid: p.p.32-33.
- (111) HORWITZ, G.B. : Ibid: p.53.
- (112) DILL, S.L. and ADAMS, D.L. : "Automated Auditing": The Journal of Accountancy: May 1964: p.p.54-59.  
  
With this system the audit program was prepared, and a conversion program converts the client's files into a format compatible with the particular audit program.
- (113) WILL, H.J. : "Computer-based auditing - Part 2": Ibid: p.p.39-40.  
  
Refer to Table 3.
- (114) GAGE, R.G. : Ibid: p.p.31-32.
- (115) ADAMS, D.L. and MULLARKEY, J.F. : "A Survey of Audit Software": The Journal of Accountancy: September 1972: p.p.39-66.
- (116) ADAMS, D.L. and MULLARKEY, J.F. : Ibid: p.p.62-65.
- (117) It is not the implication here that after a short training course an auditor can feel confident to audit a client's computerised records - a period of practical experience would be required to become fully adept in the GCAP's usage. However, the fundamentals would be acquired during the course.

- (118) In describing ASK 360 it is suggested that ". . . any normally intelligent auditor with some idea of what a computer is, can, without prior knowledge of ASK 360, save for his having read the manual once or perhaps twice, and having determined what are the audit requirements, complete the parameter cards for any normal audit application of average complexity inside the space of two hours." This implies that no formal training is required at all - the survey findings show a 1-day course necessary. The above quotation is from :  
CRABTREE, M.G. and OAKLEY, A.: "An Interogation Kit - a description of a generalized Audit Program, ASK 360": Accountancy: November 1969: p.p.820-828.
- (119) HORWITZ, G.B. : Ibid: p.54.
- (120) The analysis of the equipment requirements was done from :  
WILL, H.J. : Ibid: Table 4: p.40.  
ADAMS, D.L. and MULLARKEY, J.F. : Ibid: Attachment 1: p.p.64-66.  
Further details of the model/core requirements can be found here.
- (121) The presumption here is that the records stored in the computer would represent a material monetary value in relation to the client's assets or liabilities.
- (122) ADAMS, D.L. and MULLARKEY, J.F. : Ibid: p.48.
- (123) HORWITZ, G.B. : Ibid: p.54.
- (124) ADAMS, D.L. and MULLARKEY, J.F. : Ibid: p.49.
- (125) PORTER, W.T. : "Generalized Computer-Audit Programs": The Journal of Accountancy: January 1969: p.p.54-62.
- (126) DAVIS, G.B. : Ibid: p.191.
- (127) WILL, H.J. : Ibid: p.33.
- (128) ADAMS, D.L. and MULLARKEY, J.F. : Ibid: p.45.
- (129) It is not common for options to be built into such programs - however, where present, the requirements would be specified prior to the run commencing.

- (130) For an example of such a standardised form  
see  
MEIKLE, G.R. and GAMBLES, J.C. : "Auditape  
for Management and the Auditor - II":  
Accountancy: August 1969: p.p.583-591.
- (131) ADAMS, D.L. and MULLARKEY, J.F. : Ibid:  
Question 19: p.p.58-61.
- (132) CASHIN, J.A. (Ed.) : Handbook for Auditors:  
McGraw-Hill Book Company: New York: 1971:  
Section 16: p.29.
- (133) CRABTREE, M.G. and OAKLEY, A. : Ibid: p.821.
- (134) PORTER, W.T. and BURTON, J.C. : Auditing :  
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Company, Inc.: California: 1971: p.253.
- (135) LAWRENSON, H.D. and KUNTZ, W.E. : "A Key  
to the Computer": The South African  
Chartered Accountant: March 1972:  
p.p.85-89.
- (136) DAVIS, G.B. : Ibid: p.191.
- (137) PINKNEY, A. : An audit approach to computers:  
The General Educational Trust of the  
Institute of Chartered Accountants in  
England & Wales: London: 1966: p.109.
- (138) BOUTELL, W.S. : Auditing With The Computer:  
University of California Press: Los  
Angeles: 1965: p.7.
- (139) HORWITZ, G.B. : Ibid: p.55.
- (140) TOAN, A.B. : "The Auditor and EDP": The  
Journal of Accountancy: June 1960:  
p.p.42-46.
- (141) McRAE, T.W. : "Auditing E.D.P. Systems":  
Accountancy: February 1963: p.p.115-118.
- (142) A discussion of the functions and the  
advantages or disadvantages, of service  
bureaux is contained in Chapter IV -  
this background is presumed to be known  
to the reader.
- (143) HILL, M.J. : "EDP and Audit Problems of the  
Future": Accountant's Journal: August 1972:  
p.p.45-50.

- (144) ADAMS, B.H. : "Auditing EDP Systems - Internal Control Aspects of the Service Bureau": The South African Chartered Accountant: October 1971: p.p.353-357.
- (145) DAVIS, G.B. : Ibid: p.220.
- (146) HOLLIS, G. : "Data processing and the auditor": The Computer Bulletin: January 1972: p.p.32-36.
- (147) Committee Report : "Computers and the Accounting Profession in Canada":Ibid: p.27.
- (148) Included here are aspects such as :
- Knowledge of the service bureau itself being obtained to determine what risks, if any, exist of the client being left stranded by unexpected developments at the bureau, e.g. liquidation, loss of key personnel, etc.
  - Contract terms, especially rights and obligations of the parties being clearly specified and checked by the auditor.
  - Insurance cover carried by the bureau to be investigated,
- and so on.
- (149) Readers who require additional audit and general information can refer specifically to
- LEWIS, W.F. : "Auditing On-Line Computer Systems": The Journal of Accountancy: October 1971: p.p.47-52.
- ROSS, F.E. : "Internal Control and Audit of Real-Time Digital Systems": The Journal of Accountancy: April 1965: p.p.46-55.
- THORNE, J.F. : "The Audit of Real-Time Systems": Journal of Data Management: May 1970: p.p.14-19.
- Information on security aspects of advanced systems can be found by referring to Appendix 11, nos 2 and 9.
- (150) SHAYS, E.M. : "The Feasibility of Real Time Data Processing": Management Services:

July-August 1965: Excerpt published in:  
The Canadian Chartered Accountant:  
February 1966: p.116.

- (151) These source documents do not disappear but are kept, for a period of time, for control and file reconstruction purposes.
- (152) LEWIS, W.F. : Ibid: p.52.
- (153) A discussion of these is considered beyond the scope of this sub-section. By referring to the references in footnote 150 a detailed understanding of them will be acquired.
- (154) ROSS, R.E : Ibid: p.53.
- (155) This sophisticated technique uses an audit program which is added to the operational programs. See  
DAVIS, G.B. : Ibid: p.213.
- (156) DAVIS, G.B. : Ibid: p.207.
- (157) The reader requiring an understanding of the basic characteristics of time-sharing is referred to  
DAVIS, G.B. : Ibid: p.223.  
WOODS, T.A. : "Time-Sharing"; CA Magazine:  
August 1973: p.p.28-31.
- (158) WELKE, W.R. and KING, K.G. : Ibid: p.932.
- (159) HORWITZ, G.B. : Ibid: p.55.
- (160) CHAPMAN, M.G. : "E.D.P. Encounters The Auditors": The Chartered Accountant in Australia: July 1964: p.p.33-36.
- (161) Such special printouts could be part of the normal output produced, or specifically incorporated into the system for the auditor's use - the latter aspect was covered in section B to this chapter.
- (162) MOORE, M.R. : "Preparing for Computer Auditing in the Seventies": South African Chartered Accountant: October 1972: p.p.361-364.

APPENDIX 1 : SELECTED REFERENCES ON CONTROLS IN  
COMPUTER SYSTEMS

BOOKS AND SPECIALIST PUBLICATIONS

- (1) DAVIS, G.B. : Auditing and EDP: The American Institute of Certified Public Accountants: New York: 1968: Chapters 2-7 inclusive.
- (2) The Institute of Chartered Accountants in England and Wales : Internal Control in a Computer-based Accounting System - Statement on Auditing No. 14.  
(Issued as a separate document; or for updating the English Institute's Member's Handbook; and also published in The Accountant: December 11th 1969: p.p.806-812.)
- (3) National Cash Register Company : Approach to Reality in EDP Audit: N.C.R.: Dayton, Ohio: 1969.
- (4) PINKNEY, A. : An Audit Approach to Computers: The General Educational Trust of the Institute of Chartered Accountants in England and Wales: London: 1966: Chapters 2-4 inclusive.
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- (7) HOOPER, D.W. : "The Impact of E.D.P. on Audit Techniques": The Accountant: February 23rd 1963: p.p.217-22.
- (8) KAUFMAN, F. : "Effects of EDP on Internal Control": The Journal of Accountancy: June 1961: p.p.47-59.

- (9) MARTIN, G.J. and BRAGG, J.P. : "Internal Control and the E.D.P. System": The Chartered Accountant in Australia: February 1967: p.p.637-643.
- (10) PINKNEY, A. : "The Problems of Auditing Magnetic Storage-1": The Accountant: May 7th 1966: p.p.561-567.
- (11) PORTER, W.T. : "A Control Framework for Electronic Systems": The Journal of Accountancy: October 1965: p.p.56-62.
- (12) TALBOT, A.E. : "EDP and Audit": The Chartered Accountant in Australia: August 1966: p.p.107-114.

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BOOKS AND SPECIALIST PUBLICATIONS

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- (2) WARE, W.H. : Security and Privacy in Computer Systems: The Rand Corporation: California: 1967.

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- (3) ALLAN, J. : "Embezzlement by Electronics": The Accountants' Magazine (Scotland) April 1960: Reproduced in The Accountant's Digest: September 1960: p.p.29-30.
- (4) ALLEN, B. : "Danger Ahead! Safeguard your Computer": Harvard Business Review: November/December 1968: p.p.97-101.
- (5) BARTRAM, P. : "Software Security": Data Systems: December 1971: p.p.16-17.
- (6) BRAY, M. : "How Safe is Your System?": Data Systems: December 1971: p.p.12-15.
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- (12) TATHAM, L. : "Computer Systems and the Accountant": Accountancy : September 1973: p.p.46-47, 50.
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- (2) DAVIS, G.B. : Auditing and EDP: The American (57-4-15)  
Institute of Certified Public Accountants: New York: 1968: Chapter 12.
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- (4) SAMSON, T.F. : "Computer Auditing": Published in Modern Auditing : The Arthur Young Approach: Arthur Young and Company: New York: 1973: p.p.26-34.

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- (8) CRABTREE, M.G. and OAKLEY, A. : "An Interrogation Kit ; a description of a generalised Audit Program, ASK 360": Accountancy: November 1969: p.p.820-828.
- (9) DILL, S.L. and ADAMS, D.L. : "Automated Auditing": The Journal of Accountancy: May 1964: p.p.54-59.

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- (11) HORWITZ, G.B. : "EDP Auditing - The Coming of Age": The Journal of Accountancy: August 1970: p.p.48-56.
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CHAPTER III : MANAGEMENT ADVISORY SERVICES

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CHAPTER III : MANAGEMENT ADVISORY SERVICES

"It is an oversimplification to say that computers alone were responsible for the rapid expansion of management service departments; it is nevertheless true that the computer was the greatest single influence in the growth of these services and that without the computer, such a growth would have been slow, if indeed it had taken place at all."<sup>1</sup>

A. INTRODUCTION

3.1 BACKGROUND

The scope of management advisory services offered by an accounting firm extends in many directions, and is directed primarily at typical problem areas encountered by business management. Accordingly, advice may be requested on matters such as accounting, finance, administration, production, sales, personnel and computerisation.

There are a number of reasons why it is appropriate for public accounting firms to provide these advisory facilities :

- (1) Stettler<sup>2</sup> suggests that, because of the relationship which develops between the external auditor and the business

organisation, the quality of the firm's personnel and work standards is known to management. In addition, the auditing firm will have acquired a familiarity with its clients' organisational structure, operational routines and problem areas. The combination of these factors makes the auditor the logical person to turn to if management requires assistance.

- (2) Part of the training given to accountants, both on an academic and practical level, covers the principles which are appropriate to the practice of sound management in an organisation. Such principles could be applied to assist (client) management.
- (3) Through regular dealings with members of the business community, accountants acquire practical experience, and some degree of expertise, in handling business problems.
- (4) An accounting firm might offer clients a high level of analytical ability, professional independence, objectivity, integrity and technical competency.

In many ways the provision of advisory or consultancy services can be viewed as a logical extension of the audit functions performed for clients. To the practitioner

this means additional fees, and a diversification of activities away from the strict audit aspects. This enables partners (or employees) of the practice, with special skills or interests in fields other than auditing, to effectively utilise their abilities.

It is largely as a result of either inexperience in a particular area, or problems occurring, that management looks to an 'outsider' for advice. But, the situation does arise where management is unable to resolve matters because of conflicting (internal) opinions or aims, and an impartial viewpoint is required.

There are independent consulting firms which could readily assist management in any of these instances. Such firms employ professional consultants whose services would be used on specified assignments for clients. A major disadvantage with such consultants is that their responsibility ends once the assignment has been completed. On the other hand, a public accounting firm which offers consultancy services has a continuing relationship with a client because of the audit appointment. Primarily for this reason, but also because of points (1) - (4) above, it is likely that management will look to its auditors for advice.<sup>4</sup>

The American Institute of Certified Public

Accountants defined a very wide range of activities which constitute management advisory services - these include :

- "(i) The management functions of analysis, planning, organising and controlling;
- (ii) The introduction of new ideas, concepts and methods to management;
- (iii) The improvement of policies, procedures, systems, methods and organisational relationships;
- (iv) The application and use of managerial accounting, control systems, data processing and mathematical techniques and methods; and
- (v) The conduct of special studies, preparation of recommendations, development of plans and programs, and provision of advice and technical assistance in their implementation."<sup>5</sup>

Actual application areas for these activities were not specified, but the definition is sufficiently wide to encompass most non-auditing activities which accounting firms are likely to undertake.

### 3.2 OUTLINE

From the introductory quotation to this chapter, it is evident that the computer has

played a big part in the expansion of management advisory services within an accounting practice.

Consultancy services existed long before the advent of the computer. Murphy<sup>7</sup> cites the example of James O. McKinsey who, in 1925, urged that public accountants should act as consultants or advisers on some management problems. However, it was not until the 1960's that this movement really got under way.

One early opinion, in 1963, was that "the accounting profession is on the brink of an era of tremendous growth"<sup>8</sup> because of electronic data processing (EDP). Millar<sup>9</sup> and Bull<sup>10</sup> attribute this to the expansion in the number of computer installations. When this was relatively small, the manufacturers were able to train, and even supply, people experienced in the design and installation of computer systems. But, as the number of installations grew, the limited supply of qualified EDP personnel was unable to cope with the volume of activity. As a result, professional assistance was needed, and many accounting firms moved quickly to grasp this opportunity.

In this way the computer offered new areas of activity for the practitioner, and actually reversed initial fears that restrictions would be imposed on the profession because of the

technical nature of computers.

The EDP Committee of the Canadian Institute of Chartered Accountants expressed the opinion that much of the management consulting service performed by accounting firms ". . . relates to computers, particularly feasibility studies and assistance in the installation".<sup>11</sup>

Thus, the purpose of this chapter is to outline what aspects constitute 'advice' which a practitioner could offer a client in relation to computers. As such, it will not deal with the various 'services' which might be provided for a client.<sup>12</sup> In addition, no attempt will be made to define how a practice should organise, administer and operate its consultancy section - the diversity in the size of practices and range of advisory service offered makes this a subject for a separate study. As a result, the presumption is made that an accounting firm has the ability to offer computer advisory services to clients.

B. AREAS OF CONSULTANCY WORK

(Note : It is not the intention to discuss full details of each possible area of computer consultancy - rather a broad outline of each is given with footnoted references for the reader who requires additional information.)

3.3 REVIEWING COMPUTER PROPOSALS

Circumstances can arise where a public accountant is called upon to assess the findings of a computer investigation which has already been conducted on a client's behalf. Such a study could have been performed by one of the following - the client's own staff; a service bureau salesman; the hardware manufacturer; or a specialist computer consultant. No matter who performs this work, the end result would be a formal report to management.

(The actual contents of such a report will be dealt with in the next section, viz. 3.4.)

By virtue of his understanding of the client's organisation, and of the principles of data processing, the accountant is able to evaluate whether the findings, or recommendations, are appropriate.

Because of the fact that the accountant does

not pre-judge the investigation results,<sup>13</sup> nor has been involved as part of the study team in carrying out the investigation, a completely objective assessment can be made.

A review of this nature generally does not require a high level of EDP technical knowledge or experience. After all, the review is being made of work already performed and can be looked at in terms of reasonableness, comprehensiveness, effective evaluation of alternatives, and so on. An accountant is thus able to evaluate the report using criteria to which he is accustomed, and which are part of the judgement he exercises in performing his audit function.

#### 3.4 UNDERTAKING COMPUTER FEASIBILITY STUDIES

During the early years of commercial computer applications, in the 1950's, there were generally no feasibility studies undertaken to determine the implications of a computer within an organisation. Some companies installed computers as a sales gimmick; others did so to match competitors; many considered computers as an extension of existing mechanisation.<sup>14</sup> Because of this, there was a general disappointment with the results achieved and alarm at the high and unanticipated costs involved in the computer operation.

In order to remedy these shortcomings, and to derive benefit from past experience, it has become common practice for an intensive, formal investigation to be made into the implications of computerisation. Management is then in a position to assess the full ramifications of the proposed computer system prior to committing both financial and human resources.

The principle of undertaking a feasibility (or justification) study is applicable not only for organisations intending to computerise for the first time, but also where additional facilities are required, or expansion envisaged, in an existing computer operation.

In other words, a feasibility study attempts to lay down criteria ". . . for making judgements, recommendations and decisions about authorising and maintaining projects, and for assigning and shifting resources".<sup>15</sup> These criteria are then used for evaluating the project itself, as well as enabling a comparative assessment to be made between the numerous project demands of the organisation as a whole. In this way, usually scarce resources within an organisation can be optimally utilised.

An auditor's involvement in feasibility studies, either as a member of the team

undertaking the feasibility study,<sup>16</sup> or as an individual having full responsibility to conduct the study and submit a final report to management. In both these instances the auditor is called upon to utilise his experience of the organisation, but his involvement in the latter instance would obviously be far greater.

The table below sets out, in broad outline<sup>17</sup>, the differing responsibilities of the auditor/management consultant in the two circumstances :

<u>Function to be Performed</u>	<u>Responsibilities if Part of Team</u>	<u>Undertaking Full Study</u>
(i) Obtain clear statement of objectives from management		X
(ii) Assess current data processing in the organisation - relationships, information flow, document flow, problem areas, etc.	X	X
(iii) Establish priorities for change within existing structure		X
(iv) Evaluate alternative changes which could be made to existing system(s)	X	X
(v) Decide which alternative is most appropriate		X
(vi) Conceptualisation of new system	X	X
(vii) Selection of appropriate equipment - financial feasibility		X
(viii) Devise implementation plan for new equipment, systems & other requirements, e.g. premises, air-conditioning, etc.		X
(ix) Assess impact of new system(s) on existing personnel		X
(x) Ascertain and define new personnel needs		X
(xi) Present formal report to management encompassing points (i) to (x) above		X

Note : The above break-down is based on the assumption that the auditor concerns himself only with the "systems" side of the study while working as part of a team. This is in the area in which he has special ability in relation to a particular organisation. The other aspects are, basically, management decisions to be made by other team members.

Once completed, the feasibility study will result in "formal statements of objectives, system boundaries, authority, restrictions and a detailed project plan for the allocation of personnel and money within given deadlines".<sup>18</sup>

Management must then decide whether or not to accept the recommendations of the feasibility study and whether to proceed with the development work as recommended.

### 3.5 SYSTEMS ANALYSIS AND DESIGN

There are two distinct circumstances in which the practising accountant may be called upon to perform systems consultancy work for a client :

- (a) where a new business is opened and management needs assistance in developing an appropriate data processing system;  
or
- (b) where an existing system is operational

but management finds the whole system, or part of the system, unsuitable for its requirements.

Schlosser classifies the former as ". . . original system engagements" and the latter as "revision engagements".<sup>19</sup> In both these cases the accountant is the natural choice for giving advice on systems development.

The expansion in the use of computers has shifted the emphasis of system consultancy away from traditional financial accounting functions into the much wider area of the management information system of the whole organisation. Computer processing does not readily distinguish between accounting information and other types of management information, in fact, data serves as a common base for generating various types of information (in the form of reports) to management.

As a result of this development, Armstrong maintains that system work to be performed by an accountant ". . . no longer encompasses preparing a chart of general ledger accounts or even computerising the present information flow, as it once did".<sup>20</sup> Instead, it is concerned with an overall, planned approach, which takes into account the inter-relationship of the various sub-systems of a business. These, in turn, combine to form part to the

'total' system in operation. Sections of the organisation are thus not evaluated as isolated units but rather as part of the general framework of the enterprise.

Mitchell strongly advocates this overall-plan approach and puts forward nine advantages to justify its use.<sup>21</sup> Tricker also believes that the tasks to be performed by each sub-system are decided in relation to the needs of related and superior systems.<sup>22</sup> Even in the case where an integrated systems approach is not adopted, it is necessary for the analyst to specify the relationship of the proposed system to the other work being performed in the organisation.

The above aspects are part of the formal recognition of a management information system within an organisation. It does not necessarily follow that all aspects should be computerised, but it is important that a perspective is obtained into the possible ramifications of computerisation.

In all systems analysis and design work the approach must be logical and systematic. An orderly development with proper documentation and adequate stages of approval from management is essential.<sup>23</sup>

It is often the case that the auditor will not

himself perform all aspects of the analysis and design. This is because of the special skills and training which are necessary such as flowcharting techniques, designing output forms, programming techniques, etc.<sup>24,25</sup>

The auditor, although usually lacking the necessary technical ability, can employ appropriate staff to perform these functions whilst keeping overall control of the project team.

During the systems design stage, the analysts will formulate all aspects of a new system to meet management's requirements. The auditor can be particularly useful in ensuring that various controls are built into the system. Such controls are intended to check that the system is processing all information accurately, and also to provide management (and the auditor himself) with a reasonable audit trail.

Whilst it is by no means essential for the auditor to be skilled in all aspects of analysis and design, it would clearly be to the advantage of everyone concerned if he acquired at least a working knowledge of the rudiments of such techniques.

### 3.6 EQUIPMENT SELECTION

In recent years there have been enormous developments in computer technology.<sup>26</sup> For

the user, or potential user, this has manifested itself in computers which are fast and reliable, easy to program, small in size and fairly low in operating costs. Consequently, many medium and small sized firms are able to utilise "in-house" computer facilities and enjoy the benefits of EDP.

Bull<sup>27</sup> maintains that the larger the client's data processing equipment requirements, the less he needs advice from his accountant. This is because of the expertise and experience which is to be found within his computer staff. But smaller organisations need advice and assistance in choosing appropriate equipment, and are thus likely to look to their accountant for help.

It is unusual for even a computer specialist to be familiar with every type of computer<sup>28</sup> on the market, due to the ever increasing number of manufacturers producing equipment of varying capabilities and prices. Despite this, the accountant who intends advising clients has a responsibility to become familiar with the equipment of the principal manufacturers and be aware of alternative equipment available.

The accountant is likely to be involved in any, or all of the following steps in assisting a client :

- (1) Establishment of equipment parameters - here the basic configuration to be used is decided upon in principle.
- (2) Preparation of specification manual<sup>29</sup> - selected manufacturers are requested to submit quotations, taking into account the basic configuration ((1) above) and the user's requirements as defined in a specification book.
- (3) Establishment of selection criteria - since several manufacturers will be responding with proposals, it is imperative that criteria are established for determining which manufacturer and equipment best meets the user's requirements.
- (4) Evaluation of manufacturer's proposals - this is the formalised procedure for assessing the various proposals and is usually done on a point weighting basis.<sup>30</sup>
- (5) Contract negotiation - once a particular manufacturer's equipment has been decided upon, a contract would be drawn up and signed, as between the parties involved. An important consideration here is whether the equipment should be purchased, leased or rented.

According to De Paula, computer consulting assignments are often largely concerned with the physical equipment to be provided.<sup>31</sup>

The potential in this area is large, but it does call for a fairly specialised level of knowledge.

### 3.7 COMPUTER BUREAU SELECTION

Within many organisations, the need may be felt to computerise certain applications, but the limited nature of such processing is usually insufficient to justify the purchase of a computer. In such circumstances Smythe maintains that the use of a computer bureau can be the most economical alternative.<sup>32</sup>

There are many other reasons for wanting to utilise bureau facilities.

The practitioner can perform a valuable service for a client by acting as an intermediary between the bureau and the client. On the one hand he will be in a position to assess the needs of the client; on the other hand he will evaluate and select the bureau which is most suitable.

In his role as an intermediary, the accountant could be involved in carrying out the following services :

- (1) Defining the job - a detailed assessment must be made of the client's requirements and full specifications<sup>34</sup> of the proposed application(s) determined.

This is done in order to supply competing bureaux with the basis for estimating their charges.

- (2) Initial selection - three or four bureaux, within reasonably close proximity to the client's premises should be selected and asked to supply quotations for their services in relation to the specifications given to them (point (1) above).
- (3) Proposal evaluation - once quotations have been received, a comparative assessment should be made. While the financial implications are important, there are many other aspects which should not be overlooked.<sup>35</sup>
- (4) Contract negotiation - once the final choice has been made, the actual contract between the service bureau and the client should be thoroughly examined, to ensure that all rights and obligations of the parties are clearly specified.<sup>36</sup>

In many instances the practitioner could be the instigator of his client using bureau facilities. Recommendations made are aimed at assisting the client in his internal data processing activities, and perhaps improving the internal control procedures. This presupposes that the auditor is aware of the facilities offered by bureaux as well as the

availability of various processing  
"packages".<sup>37</sup>

Whether the client suggests using a service bureau, or whether the recommendation comes from the auditor is not a crucial factor. In both these cases the scope for consultancy work is big as many organisations who contemplate using bureau facilities are likely to be relatively small and will need professional assistance.

### 3.8 IMPLEMENTATION

In assessing the reasons for computer systems failing, or not coming up to expectations, Turner puts forward five reasons of which the last is "inadequate conversion planning and control".<sup>38</sup> Kellogg<sup>39</sup> maintains that often the difference between success and failure in a computer installation can be attributed to effective planning. Accordingly, management must not only plan the whole implementation phase in detail, but also continuously monitor new developments.

The signing of a contract with a computer manufacturer, or a computer bureau, is the formal commitment of an organisation to computerisation. From this stage onwards, a large number of activities have to be performed prior to the system going into use.

These activities form the basis of the planning operation.

A consultant assisting management during this critical period would, obviously, wish to have his responsibilities fully defined. The major aspects which are involved here could include :

- (1) Systems and programming work - this involves not only the detailed system specification and writing of programs to perform the various functions, but also the formulation of systems and programming standards.<sup>40</sup> Without such standards it is difficult to control the work being performed by the analysts and programmers.
- (2) Educating management and staff - to a large degree the success of a computer installation depends upon employee understanding, co-operation and acceptance. The impending changes to the existing system should be made clear to employees (at all levels in the organisation) as part of the general computer educational programme.
- (3) Converting from existing system to new system - this involves preparing a work programme detailing the major conversion activities and relating these to an

estimated time span. This is referred to as 'scheduling'.<sup>41</sup>

- (4) Developing appropriate clerical, control and operating procedures - it is usual for a user manual to be prepared which sets out full details of all operating procedures related to the computer system.<sup>42</sup> Content ranges from preparing basic input to the computer to balancing procedures to be performed after computer processing has taken place. In this way nothing is left to chance as all activities are clearly defined.
- (5) Recruiting personnel - the new jobs created within an organisation by the computer cannot always be filled by existing personnel. Advertising, interviewing and selecting of appropriate computer staff would have to be performed to satisfy the requirements of the organisation.
- (6) Training personnel - computerisation will bring considerable changes to the activities of existing personnel, especially on a clerical level. These people will basically be responsible for the day-to-day activities relating to the new clerical, control and operating procedure. Rosen recommends that special training programmes should be devised for ". . . those people who are to provide input to

the system and those utilising the output".<sup>43</sup>

- (7) Planning physical facilities - accommodation must be provided to house computer equipment as well as EDP personnel - particularly in the former instance special facilities might be required such as air-conditioning, fire extinguishers, etc.

The consultant is in a good position to provide an independent appraisal of the implementation procedures outlined above. This would be done by reviewing the decisions, in advance of implementation, and highlighting any shortcomings which appear to exist. Thereafter, a periodic assessment of the progress being achieved in implementing the new system(s) could be made by the consultant on behalf of management.

From the viewpoint of the practitioner, an active involvement at the implementation phase is vitally important because :

- (1) An understanding is gained of the whole system;
- (2) Recommendations can be put forward which will contribute to a sound and well-balanced control environment for the data processing function; and

- (3) Future audit problems can be anticipated and special requirements built into the system.

If, therefore, the consultancy function can be simultaneously combined with establishing the basis of future audit activities, both the client and the practitioner will benefit greatly. (The question of auditor independence is discussed in Section C.)

### 3.9 POST IMPLEMENTATION REVIEW

Following the implementation of the new system, it is essential to carry out a post-implementation review.<sup>45</sup> This is done in order to assist top management in evaluating the effectiveness and efficiency of the computer operation. More specifically, the results of the review will focus attention on areas which require management's attention, as well as highlighting any divergence between previously set computer objectives and results.

The responsibility for undertaking the review should not be given to persons who participated in the development or implementation of the system, or who are involved in maintaining/operating it on a regular basis. Not only would there be the danger of a conflict of interests, but also staff tend to be inward looking and possibly would not be very

constructive in their views. The above factors favour an organisation looking to an outside consultant to undertake a comprehensive review and report on the findings. In this way an independent viewpoint will be obtained.

(Because of the technical nature of some computer activities, it could be useful to have a member of the existing staff on the team undertaking the review of technical aspects, but his involvement would be limited to these aspects.)

Management is interested in the following aspects of the new system :

- (1) Overall success - the system was introduced with certain definite objectives in mind, and it is, therefore, necessary to check that these have been achieved. The criteria here are usually of a non-monetary kind concerning aspects such as improved or additional information for management, faster updating procedures, control considerations, etc.
- (2) Cost - a section of the feasibility study concerned itself with costs of developing and running the system, as well as anticipated cost savings which the new system would bring. An analysis, and explanation of the variances which have

arisen would be key indicators for management action.

- (3) Administration - the very nature of a computer operation requires strict administrative procedures to be introduced. These range from devising an appropriate organisational chart (which defines the inter-relationship of the various work units and its members) to defining, and instituting, daily operational controls. An assessment is required by management of the standards which were established, and the extent to which these are met.
- (4) Control - numerous checks,<sup>46</sup> built into computer systems, are necessary to ensure that a high standard of control exists in the entire data processing cycle. This control ensures that management (and the auditor) can rely on the output being produced by the system. It is, therefore, vitally important that a perspective be obtained as regards the adequacy of the various control features.

A post-installation review should not be regarded as a 'once-only' function to be undertaken when the installation phase is completed, and the new system has been operational for a few months. Rather, such reviews should be made regularly with the emphasis changing to

meet the differing circumstances. According to a survey into 33 computer-using organisations<sup>47</sup>, all but two of these firms conducted annual, semi-annual or quarterly reviews of their computer activities. This survey also brought to light a significant correlation between the standard, and frequency, of reviews, and the performance level of the computer-based operation.

The practitioner is in a good position to be able to review computer installations of a client, especially as regards the various control procedures which should be in existence. Management, on the other hand, would be satisfied that the results of the review are presented from an independent and impartial viewpoint.

C. CONCLUSION

There is no doubt that the computer has created many new avenues for consultancy work which could be performed by practising accountants. It would, however, be unrealistic to assume that such work is within the scope of all practitioners - in many instances specialised computer knowledge is required, and specialist computer staff is necessary to undertake the various assignments. Both these elements are often lacking in accountants' offices.

Millar recognises these inadequacies, but suggests<sup>48</sup> that all practitioners can be involved in EDP consultancy if a differentiation is made between reviewing, and actually performing, computer activities. In other words, the practitioner has the ability to undertake various assignments according to his level of computer competence. By gaining experience at the lower levels, the practitioner will be in a position to develop the necessary skills and employ appropriate staff to undertake any computer assignment.<sup>49</sup>

The question of auditor independence does arise particularly in the smaller firms where the functions of auditing and advising are usually done by the same person. (With larger firms an organisational separation of these two functions can be made - the audit relationship would thus be unchanged.) However, the official American and English viewpoints are that the auditor is better able than anybody to serve the

interests of shareholders, and promote efficient management of company affairs, by providing advisory and consultancy services to clients. This would not impair the auditor's independence but "care must be taken to ensure that it does not appear to impair the auditor's independence in the eyes of users".<sup>50</sup>

To a lesser or greater degree, all practitioners can be involved in providing computer consultancy services to clients. The opportunities which exist in this area should not be overlooked.

CHAPTER III - FOOTNOTES

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- (8) BALSER, G.S. : "EDP Widens the Scope of  
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- (10) BULL, D.V. : "The Practising Accountant and  
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- (11) Committee Report : The Canadian Institute of  
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(12) See Chapter IV for details of such activities.

(13) SMITH, S.W. : "Computer Utilisation Studies - A Review": The Canadian Chartered Accountant: January 1964: p.p.32-35.

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(14) FIELD, D. : "Computer Feasibility Study": The Accountant: November 22nd 1958: p.p.627-634.

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(15) SCHWARTZ, M.H. : "Computer Project Selection in the Business Enterprise": The Journal of Accountancy: April 1969: p.p.35-43.

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- RICHARDS, P.A. : Ibid: p.p.390-395.
- (24) These shortcomings are viewed in a very  
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why ". . . so few accountants become  
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experience of systems gives them an initial  
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MITCHELL, R. : "Computer-Based Systems and the Accounting Function, 11: The Accountant: October 4th 1969: p.p.420-424.

- (25) As early as December 1957 the potential for providing extensive consultancy service, in the direction of systems design, was recognised. It was then pointed out that "if the profession as a whole does not meet the challenge [of system design] it will forego opportunities for extending its constructive service to clients and, by default, leave the field to others who may lack the qualifications to do the job which the client really needs". See

GOURLAY, R.L. : "Aspects of the Trend Towards Specialisation": The Chartered Accountant in Australia: December 1957: p.p.269-271.

- (26) WRIGHT, R.G. : "Changing Concepts in EDP Feasibility Studies": The Journal of Accountancy: June 1962: p.p.47-51.
- (27) BULL, D.V. : Ibid: p.871.
- (28) The term 'computer' is used here to include:
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  - (c) the peripheral machinery, e.g. input/output devices of various kinds, data capturing devices, etc.
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- (33) It is considered that a discussion of these falls outside the topic under review.
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- (41) For an example of scheduling activities for  
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operations on an ongoing day-to-day basis".  
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- (43) ROSEN, R.J. : "Planning an Effective EDP  
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- (44) These special requirements were dealt with in  
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- (45) Also referred to as a post-implementation  
'audit', 'investigation', 'evaluation' or  
'appraisal'.
- (46) These were fully discussed in Chapter II.
- (47) LI, D.H. : "Computer Usage in the Manufactur-  
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- (48) MILLAR, V.E. : Ibid: p.p.41-45.
- (49) The whole approach of Millar is very realistic,  
and practitioners who are not yet involved  
are strongly advised to refer to this  
article.
- (50) DE PAULA, C.P. : Ibid: para.39.

CHAPTER IV : THE PRACTITIONER'S OFFICE

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CHAPTER IV : THE PRACTITIONER'S OFFICE

"One could say with little risk of exaggeration, that every CPA sooner or later will feel the impact of the computer upon his professional practice. Such encounters are assured by the simple fact that computer applications to accounting processes are proliferating : more and more organisations are using more and more computers in more and more ways."<sup>1</sup>

A. INTRODUCTION

The business community was not the only area in which rapid developments were made in the application of computer techniques - the accountant's practice also provided many opportunities for the utilisation of electronic data processing.

Of particular interest to the accountant were his daily practice activities. In an address to a group of accountants, Chapman maintained that ". . . data processing does have an application, whether it be in maintaining your time costing system, your payroll, debtors or creditors for your client, or a write-up system to process the ever-increasing number of books of account".<sup>2</sup>

Accountants also looked to the computer as a means

of expanding the services to existing clients, especially in the area of providing computer bureau facilities. Fear existed that if accountants were unable to properly serve their clients' needs, the clients would turn to other professions for help.<sup>3</sup> Gynther agrees wholeheartedly with this in discussing the expansion of the bureau industry in Australia. According to him ". . . I can see these bureaux taking away from accountants, not only much of their present tedious write-up work, but also a large part of the advisory work that arises out of the financial statements prepared".<sup>4</sup> Boyle viewed the American situation, in this respect, as a threat to the very existence of the accountancy profession. He makes the point that "banks, the service bureaux, the manufacturers and others who have entered the financial and advisory fields are not just providing perfunctory reporting write-up of services, but often fairly sophisticated levels of management services".<sup>5</sup>

In addition to the above factors, the following aspects also contributed to the increased usage of computers to handle practice activities :

- (a) a recognition that many of the practice functions were of a routine nature and could easily be handled by a computer;
- (b) the inability, through labour shortages, to employ qualified and experienced staff;<sup>6</sup>

- (c) advances in computer technology which resulted in cheaper computers and/or lower processing costs (if work was to be performed at a service bureau);
- (d) a tremendous expansion in service bureau activities and the development (and marketing) of "package" accounting programs by such organisations;
- (e) the appreciation, perhaps gained from clients' installations or processing activities, of the overall benefits of a well-run computer operation.

The type of applications which lend themselves to computerisation are common to most accounting practices - these are discussed in Section C. In Section B the alternatives available for computerising the practice activities are outlined, while Section D evaluates the pros and cons of operating a bureau-type computer service as an integral part of the practitioner's office.

## B. METHODS OF COMPUTERISATION

Once the concept of computerising part of, or the whole of, the practice activities has been decided in principle, the decision still has to be made by the practice as to the mode of computer utilisation. The choice is basically

- doing all processing at a computer bureau; or
- utilising terminal facilities; or
- combining with other accountants in a pooled operation; or
- having an in-house computer (which could range in size from a "mini" to a large main frame machine).

### 4.1 USING A COMMERCIAL SERVICE BUREAU

A service bureau is a profit-making organisation which provides data processing service to outside clients on a fee basis. In addition to their function of selling machine time, that is, using their equipment to process clients' data, bureaux tend towards being able to provide a complete data processing service, e.g. data preparation (converting information on source documents into a medium suitable for inputting to the computer), systems analysis and design, writing computer programs to cater for requirements of clients and providing package programs.

According to Lavery, the use of a service bureau is preferable to purchasing or renting equipment in circumstances where the present (or projected) usage required by a firm is too low to support such equipment and/or ". . . where there are periodic peaks in the volume of work to be handled".<sup>7</sup> Many accounting practices and activities within practices, fall directly into these categories.

#### ADVANTAGES

There are many advantages for accountants in using bureau facilities :

- (a) Only a portion of the total cost of an experienced and well-run computing service centre is borne by each user.<sup>8</sup> There is thus no financial commitment of a capital nature at all.
- (b) Operational costs are usually clearly defined in the contract with the service bureau. With monthly billing from the bureau, the practice is in a position to keep a tight control over administration and clerical costs.
- (c) With the assistance and advice of bureau staff, the accountant can develop and evolve his own computer-oriented office procedures.<sup>9</sup> This could be of enormous

benefit if he decides to purchase his own computer at a later stage.

- (d) By leaving actual processing activities to an outside organisation, the accountant need not divert his energies from the affairs of the practice.
- (e) Konstans sees another (indirect) benefit in the direction of the service bureau providing the C.P.A. with an effective introduction into the Computer Age and a continued education in EDP-related matters.<sup>10</sup>
- (f) Perhaps the biggest advantage is the ability of bureaux to offer packaged programs which were designed specifically to cater for common business problems and common business activities. The accountant's practice would obviously fall into the latter category. The provision of ". . . ready-made systems or packages . . . has become an acceptable and fast growing integral feature of the industry".<sup>11</sup> Naturally, all development costs of such packages are the expense of the bureau - as a user, the accountant is thus gaining the benefit of a system which has been designed, tested and (possibly) marketed to other auditing firms.

DISADVANTAGES

Points (a) - (f) above present a very favourable picture of the bureau industry but it is advisable to be aware of, and prepared for, some of the disadvantages of service bureau use. These include :

- (a) Loss of control. Smythe maintains that one of the most common criticisms of bureaux is that they take control away from the client.<sup>12</sup> As a result of this, there might be delays and missed deadlines in relation to required output caused by machine failure or poor scheduling.
- (b) Despite precautions taken by bureaux, there is a danger that security arrangements in force are inadequate to protect :
  - (i) the computer centre itself - fire hazards, control of access to the computer area, console procedures, etc.;
  - (ii) master files, transaction files, programs, source documents and system documentation; and
  - (iii) confidentiality of master file information.
- (c) Problems could arise if the accountant decides to change bureaux - these relate

primarily to lack of compatibility of programs and master files with the computer of the bureau which will take over the processing activities. (The presumption here is that the other problem of ownership of 'tailor-made' programs and master files was covered in the agreement with the previous computer bureau.)

- (d) To utilise a package program the accountant might have to alter his present procedures in order to conform with the requirements of the bureau. This could create organisational and administrative difficulties within the practice itself.
- (e) Unless the accountant has fully covered himself in a liability agreement with the service bureau, he could find himself paying for the small day-to-day catastrophes of data processing,<sup>13</sup> which were caused by the bureau's negligence. Examples here include re-creating master files, re-running jobs because of data problems or staff not adhering to operating procedures, program failures and so on.

There are thus many criteria to be evaluated in making a decision whether to utilise bureau facilities for processing activities

of the practice itself. McMinn feels that in general, users of service bureaux agree that the advantages far outweigh the disadvantages.<sup>14</sup> This view is substantiated by the growth of the bureau industry throughout the world.

#### 4.2 UTILISING TERMINAL FACILITIES

In order to utilise computer ability, it is not necessary for inputting, or retrieval, of information to be done at the locality of the computer itself. An organisation can be 'linked' to the computer by means of a terminal and thus form part of a time-sharing<sup>15</sup> network using the computer.

The accountant using such facilities is able to derive the benefits of a large computer system (such as speed, accuracy and computing power) without having to acquire the mainframe computer, incurring the costs of operating and maintaining the system. Because processing is on demand, viz. as and when required, there is no waiting to use the computer provided, of course, the data communication facilities which link the user and the computer, are operating effectively. This would appear to be of tremendous benefit in overcoming the delays of batch processing systems which are dependent on availability of computer time.

However, one must question whether in the day-to-day activities of an accountant's practice, speed of processing is a crucial factor. The type of applications likely to be computerised lend themselves to a batch environment. In addition, Sanders discusses five crucial time-sharing problems which have not, to date, been satisfactorily resolved.<sup>16</sup>

Despite these limitations, Cushing advocates that ". . . the professional accounting firm should consider time sharing as a useful tool"<sup>17</sup> for using the computer. There is no doubt that it would be very useful in a practice which offers a wide range of management advisory services - applications such as discounted cash flow computations, budgeting, production scheduling and critical path scheduling, lend themselves to a terminal-type operation.

Within the accounting profession there are relatively few practices which attract a sufficient volume of activity, in their management advisory services section, to be able to justify the high cost of an on-line system. As a result the majority of accountants will look to a different source of computer facilities to handle their activities.

#### 4.3 POOLED OPERATION

It is possible for a number of firms to 'pool' financial resources and derive the benefits of having their own computer. A pooled operation is possibly indicated where the volume of potential usage by an individual firm is too low in relation to the capabilities of a computer.

A further cost benefit to all the firms involved is the opportunity of program development expenditure - with common application areas existing in practices, it makes a lot of sense for tailor-made programs to be written. This could be uneconomic for an individual firm, but perfectly acceptable if spread over a few firms of similar size.

As early as 1963 there was a reported case of four practising accountants combining to form a data processing centre which handled not only practice activities but also served as a service bureau function.<sup>18</sup>

There would appear to be much merit in a pooled operation. In a situation where a group of accountants agree that they will share a computer rather than utilise 'outside' facilities, the advantages of a pooled operation far outweigh the disadvantages.

#### 4.4 IN-HOUSE COMPUTER

In most of the reported instances of practising accountants having their own computer, the rationale of either buying, hiring or leasing the machine was that it could be used not only to handle the practice activities but, perhaps of more importance, it was looked upon as the basis for expanding the activities of the practice. According to Boyle ". . . the increased depth of the services performed in a computer practice means a higher base amount of fees".<sup>19</sup>

It could be argued that such services could be rendered by the accountant with actual processing being done by a bureau rather than on his own computer. However, many accounting firms feel that there is much to be gained from having an in-house machine :

- (a) Overall control of processing activities is maintained within the practice;
- (b) A high level of service is assured because of personal involvement;
- (c) All aspects of security can be carefully conceived and implemented;
- (d) Practical knowledge obtained through the solving of operational problems develops an expertness which cannot otherwise be achieved<sup>20</sup>; this, in turn, can be

utilised in dealing with EDP problems posed by clients;

- (e) The 'image' of the firm is strengthened if its clients know that an in-house computer is being utilised.

Another firm maintained ". . . that, compared to people, the computer is available 365 days a year, it does not have emotional problems, it doesn't fall in or out of love, it doesn't take extended lunch hours, and it doesn't go on vacations".<sup>21</sup>

In contrast to the above, a recent article puts forward the viewpoint that the accountant should avoid ownership or rental of computers ". . . not because of his background or his capability but because . . . the CPA organisational structure in which he must operate does not accommodate itself to the demands of the computer industry".<sup>22</sup> Among the limitations of the accountant's practice were : availability of capital to frame the initial outlay and subsequent updating of the installation; employment of technical personnel to handle areas with which the accountant himself is not familiar; shortage of skilled computer staff; increase in the potential liability of the practice to an outside client; and the professional code of ethics which prohibits advertising, canvassing and all forms of marketing.

C. APPLICATIONS SUITABLE FOR COMPUTERISATION

Having reviewed the four alternatives for computerisation within an accountant's practice, it is of importance to survey the various applications which have been computerised :

4.5 TIME RECORDS

According to Putland, the making of a profit is one of the main driving forces present at any inner council meeting of partnerships engaged in public practice.<sup>23</sup> Thus, the accounting system in force in a practice should provide the following information :

- "(1) Accumulate total hours, total standard costs and billable fees for each engagement performed during the year.
- (2) Provide for a classification of the type of service rendered on each engagement.
- (3) Provide for the accumulation of fees earned by each staff member, partner or firm and provide for the accounting and utilisation of each staff member's or partner's time.
- (4) Provide adequate information for income tax and financial reporting."<sup>24</sup>

A detailed description of such a system is

provided by Dale.<sup>25</sup>

In describing a similar system of keeping time records, Lewak<sup>26</sup> emphasises the importance of the detailed information which the computer produces, and sees it of extreme relevance in a world where management information is becoming more and more important.

#### 4.6 BOOK-KEEPING SERVICES

At present many accounting firms normally write-up books of account on behalf of clients. Such work could be on a regular (monthly) basis and is of benefit to the client where the volume of entries is low - even providing a part-time employee to perform this book-keeping function is not economical. Therefore, the accountant's services are utilised. On the other hand, many private companies (e.g. investment or property companies) have their books written up annually in order to comply with the various provisions of the Companies Act.

In both these instances the accountant has to divert (usually scarce) manpower to perform what is, basically, a simple clerical function.

A survey into the accounting profession in Australia, revealed the fact that, out of

fifteen categories of engagements performed by such firms, book-keeping services were second on the list of those functions most frequently performed.<sup>27</sup>

The "write-up" has, traditionally, been a feature of the service provided by the small to medium size accounting firm and there is little evidence to suggest that this service is not regarded as one of the important money-makers for such professional firms.

It is, therefore, not surprising that the opportunity for computerising this aspect of the practice was quickly realised by accountants. The routine nature of the function, together with the carefully defined rules of double-entry book-keeping make for an ideal computer application.

As early as 1960, Govatto described the computer write-up procedure of his practice. He was especially happy with the saving of manpower which had come about - his experience indicated ". . . a reduction of from 30 per cent to 70 per cent in staff time of write-up engagements".<sup>28</sup> Subsequent to Govatto publishing his article, many other firms have similarly reported their activities in this area, and nearly all have been unanimous in recommending computerisation of the books of account and financial statements.

The provision of client services need not necessarily be confined to statutory matters. There are many other management reports which accountants have, successfully, computerised on behalf of clients. These will be discussed under the 'Service Bureau' heading on page 195.

#### 4.7 PRACTICE ADMINISTRATION

These relate to the running of the practice itself and the aspects which can be handled by the computer differ little from those in commerce or industry, viz.:

- (i) invoicing to clients of work performed;
- (ii) client (debtor) records with the production of monthly statements;
- (iii) salaries and wages of employees; and
- (iv) preparation of periodic financial statements for the benefit of the practice partners.

Many practising accountants, who have a sufficient volume of activity in the above areas ((i) - (iv)) to support computerisation, argue that the details are of a highly confidential nature which must be prevented from falling into unauthorised hands. Therefore, they persist in utilising the clerical services of a trusted employee (or employees).

This is fallacious thinking as it is possible to maintain a high degree of security in any computer system.

#### 4.8 SECRETARIAL ASPECTS

Secretarial functions for private companies are not usually of a continuous nature but this is not the case with public (stock exchange listed) companies where shareholders are continuously changing. Share transfer work has proved a popular area for expanding the activities of a practice. Hand-in-hand with this activity, the transfer office's work includes maintenance of a register of shareholders; circularising shareholders on behalf of the company; preparing and sending dividend advices and cheques; and so on.

For all these functions a computer can usefully be utilised - nowadays it is uncommon to find work of the above nature not being handled by the computer.

#### 4.9 TAXATION

The Australian survey referred to earlier,<sup>29</sup> listed taxation matters as the service most frequently performed by accounting firms in that country. A similar survey in America indicated that a large percentage of local firms engaged frequently in the preparation,

and submission, of the many statutory tax returns.<sup>30</sup> It is, therefore, not surprising that computer applications have been designed to handle this activity.

Reporting on the success of one of the earliest computer applications which handled tax returns, Cohn stated that ". . . we were able to . . . complete the preparation of all Federal and State tax returns in one-half the time required in the prior year and charges . . . were less than the billable charges for the time saved".<sup>31</sup> This was in 1962. Rylah found the computer to be of enormous assistance in helping to meet deadlines with his Government's Tax Department - subsequent to its introduction his ". . . Taxation Department extension was not used to any extent and final notices have been confined to clients who have been late in supplying information".<sup>32</sup> Burgess experienced a similar result in that all his work "can be up-to-date and thus able to meet tax deadlines with ease",<sup>33</sup> which had not happened prior to computer processing. To Hutchinson the ". . . greater control, lower cost per return, faster turnaround and late cut-off date are advantages that are hard to argue with".<sup>34</sup>

As with any computer application, there are many potential problem areas - these are clearly outlined by Berkowitz.<sup>35</sup> He also

makes the very valid point that ". . . although computer prepared tax returns are extremely helpful to the accounting profession" a large amount of "professional skill, knowledge and judgement" is still required in relation to matters of taxation.

In discussing the above applications reference has not been made to the source of computer facilities. This was done purposely because it does not matter whether they are handled at a bureau or on an in-house computer.

#### D. SERVICE BUREAU WITHIN A PRACTICE

At the commencement of this chapter it was mentioned that service bureaux were encroaching into areas which 'traditionally' belonged to practicing accountants.

##### 4.10 JUSTIFICATIONS

Some firms formed their own bureaux in response to the service bureau threat. Many other firms saw a bureau-type operation as an opportunity to enlarge their practices by being able to offer expanded management services to clients (and potential clients). In other words, the intention of establishing a bureau-type operation was not to compete directly with commercial bureaux, but rather to cater specifically for the needs of the accounting profession and its clientele.<sup>36</sup>

Initially, accountants felt that commercial service bureaux could provide them with their computer needs but, with time, this opinion changed. The biggest criticism lay in the field of the quality of service offered by the bureaux. Lennox put this quite concisely in making the statement that ". . . commercial service bureaux are often run by non-accountants whose lack of knowledge of accounting terminology and accounting systems sometimes handicaps them in producing the results

desired". Another big criticism he levied against service bureaux was that the packages used for commercial (and hence for the accountant's applications) ". . . are programmed to fit fixed formats or to produce standard reports designed by them; any deviations from their procedures results in greatly increased costs".<sup>37</sup>

(The comments of Lennox do tend to put the accounting profession in a poor light because they indicate a lack of influence which could be used in these matters.)

Harbottle expands on the argument of the design of the various systems. He maintains that accountants spend most of their lives studying and practising accountancy and computer systems must, therefore, be related to this experience. To him the ". . . really important and skilled part of the work lies in envisaging the systems required by a business and then the detailed working out of the system".<sup>38</sup> The gist of what he is saying is clear: commercial bureaux do not have sufficient experienced expertise to define the needs of the accountancy profession.

Cerullo, however, feels that there is little competition between practising accountants and service bureaux. Basing his findings on a

questionnaire sent to 160 accounting firms, he puts forward three reasons to substantiate his hypothesis:

- (1) In order for the accountant to properly service their clients most public accounting firms gladly send their clients' routine write-ups and book-keeping jobs to service bureaux. In this way time is saved which is devoted to the client in more important directions.
- (2) The staffing of the bureaux indicate that less than 10% of such bureaux employ full time accountants as systems analysts in order to provide clients with accounting systems analysis. (This corresponds with the point made by Harbottle above in relation to the design of accounting systems.)
- (3) Accountants felt that only a moderate amount of competition exists between the bureaux and themselves.<sup>39</sup>

Despite the above, he does acknowledge that service bureaux could pose a threat to the profession in the future, but feels confident to make the statement that ". . . if accountants in public practice become involved with EDP and meet the service bureau challenge, they should not lose any types of

accounting services to service bureaux".<sup>40</sup>

To Broucek<sup>41</sup> the rationale for introducing a service bureau in his accounting firm was simply because there was a need for this service which no one else was performing. He recognised that the management of smaller firms, which were clients of the practice, needed up-to-date reports for management purposes but no facility was available to provide them with such reports. Accordingly, an in-house computer was installed.

#### 4.11 POTENTIAL PROBLEM AREAS

In a report published by the American Institute of Certified Public Accountants' Committee on Data Processing Centres, attention was focussed on accountants forming data processing centres solely to handle their write-up work. The Committee's fourth recommendation was that "No CPA should consider adding a data-processing unit (whether computer or conventional tabulating equipment) for use solely on write-up work"<sup>42</sup> because of the unprofitable nature of such an operation. The use of a service bureau was recommended in these cases despite the fact that shortcomings existed in relation to quality of work and operational reliability.<sup>43</sup>

The Canadian Institute's EDP Committee looked

very closely into the question of data centres and chartered accountants. It acknowledged<sup>44</sup> two distinct reasons for operating a service bureau as an integral part of an accounting practice :

- (1) Practitioners are attracted ". . . because of their long, successful and dominant relationship to financial record-keeping"; and
- (2) The operation could be set-up because of ". . . the existence of recognised applications among the existing accounting clientele" which would provide a definite number of future customers.

Although not specifically passing an opinion about such a venture, the committee was at pains to point out the difficulties and problems which could be expected. These relate to :

- (a) Cost of equipment, operating staff, space rental, sales staff and all other expenses incidental to running a business concern;
- (b) Management of the bureau which would mean dealing with problems of a different nature from those encountered in managing a practice - the practice partners may be ill-equipped to do so;
- (c) Actual problems in operating the bureau which includes not only systems design

and programming, but also production scheduling; and

- (d) The competitive nature of the bureau industry.

Because of the above factors, the Committee concluded that a firm of chartered accountants ". . . considering the operation of a data centre as an integral part of a public practice should proceed with caution".<sup>45</sup>

#### 4.12 PROFESSIONAL ETHICS

Another area of concern to accountants in contemplating forming a service bureau, was in connection with professional ethics. Throughout the world, Accounting Institutes have promulgated a strict code of professional conduct especially in relation to accountants advertising or soliciting business in any way.

Broucek<sup>46</sup> felt that his method of operating a bureau as part of the management services department of his practice enabled him to overcome this problem and fully satisfy the American Institute's rules of professional conduct. Puder<sup>47</sup> is also of the opinion that ". . . the operation of a computer, if properly and soundly approached, can be established within an accounting firm with complete propriety [and] . . . that the Code

of Professional Ethics can be fully complied with". He substantiates his viewpoint by referring to private written opinions received from the American Institute of Certified Public Accountants as well as the opinions expressed by John L. Carey, executive director of the AICPA, in his book Professional Ethics of Certified Public Accountants.

In March 1965, the English Institute issued its statement on "Mechanised Accounting or Computer Services".<sup>48</sup> Although recognition was given to the fact that practising members should be encouraged, in the interests of clients and of the profession as a whole, to provide mechanized accounting and computer services, advertising of any sort was forbidden. Where a client had work processed by the accountant's service bureau, there should be no other accountancy services performed for such a client. Harbottle described the above ruling as ". . . very stern restrictive practices".<sup>49</sup>

The Scottish Institute was far more 'liberal' in its approach to the problem. Not only were practising members permitted to ". . . be a director of a limited company providing mechanized accounting or computer services"<sup>50</sup> but also were allowed to advertise such services. (The only limitation in this

respect was that the Scottish Council retained the right to consider any applications for permission to advertise.)

To date, National Council in South Africa has not issued a statement as to its attitude on practising accountants offering service bureau facilities. This is probably due to the fact that no accountants offer service bureau facilities to clients. It is hoped, that when a statement is required, National Council will adopt a viewpoint similar to that of the Scottish Institute. Such a step will definitely lead to an elevation, in the eyes of the public, of the accountancy profession as a whole.

#### 4.13 IMPLICATIONS FOR THE AUDITOR

McRae, in surveying computer trends in England, was astonished that "a few public accountants in the States have even gone so far as to set up their own service bureaux!". Although he did not condemn this movement totally (perhaps through insufficient knowledge or experience of this development in the profession) he certainly was not in favour of it. This can be gauged from the statement that "the ethics of auditing data provided by oneself I leave to the reader".<sup>51</sup>

This statement brings to light the other

problem area when accountants are called upon to audit the work of their clients which has been processed by the practice's own service bureau. Can an auditor retain a sense of objectivity in this circumstance? Is his independence reduced in evaluating the client's records?

There is no reason why this should be the case. The service bureau operation would, of necessity, be run on a strictly professional basis (in a similar fashion to the practice itself). All features of internal control would be strictly devised and implemented; security arrangements would be well conceived with the emphasis being placed on retaining confidentiality of processing; and management of the bureau would probably be vested in a data processing manager who has reporting responsibilities to the practice partners. In other words, a completely separate organisation is set up within the practice.

The thinking of the Canadian Institute's Committee followed along the same lines. They expressed the opinion that the clear staff division between data processing and audit functions would tend to ensure that the auditors' independence would not be jeopardised.<sup>52</sup> If practitioners introduced, and maintained, high standards at their data processing centre, there was little cause for concern in relation

to the audit function.

#### 4.14 APPLICATIONS

Apart from doing basic write-up work within the practice, there are many other computer applications which accountants have successfully introduced at their bureaux :

(1) Payroll Work

Because of the routine and repetitive nature of preparing payrolls, this field has proved very popular. Boyle<sup>53</sup> regards this as part of his ". . . bread and butter work". An extension of the basic payroll input enabled another organisation to ". . . correlate [wages] with production data and give management valuable cost and efficiency analyses".<sup>54</sup>

(2) Accounts Receivable and Accounts Payable

These have also become 'standard' packages available to clients. The (historical) master file is updated with current transactions and the client usually receives debtors/creditors statements, an aged analysis of such debtors/creditors, and other output, of a statistical nature, which is available as one of the program options and has been requested by the client.

(3) Financial Reporting

Broucek describes an extensive monthly report his firm produces on behalf of a trucking company, as well as reports ". . . for companies in the ready-mix concrete and building supplies businesses, and wholesale and retail businesses with complicated or voluminous inventory problems".<sup>55</sup>

Harbottle<sup>56</sup> outlines his applications which include a large stock control job and the handling of all registration aspects of a unit trust.

The very successful installation reported by Lennox<sup>57</sup> commenced its operation with the processing of an engineering firm's job cost cards and rapidly expanded processing activities to include small manufacturers, retail stores, heavy construction contracts, freight forwarders, engineers and surveyors, insurance brokers and suppliers of such building materials as ready-mix concrete.

In addition to some applications already mentioned above, Boyle specifies areas which he regards as ideal for the accountant's service bureau and which should dove-tail into the normal management advisory services which are offered.

These include : cash flow computations, estate planning, numerous costing applications and a program for "annualization of statements".<sup>58,59</sup>

Another interesting computer application he discusses is maintaining historical details of a client's financial reports in order to produce trends, ratios and comparisons and thus be in a position to advise management on significant financial changes.

Without giving details of the type of applications, Murrell<sup>60</sup> stated that his firm has ". . . on hand approximately 850 different program applications" all of which were developed within his computer centre.

The diversity of the above applications clearly points to the fact that accountants' computer bureaux can, and do, offer a wide range of services to clients. Combined with handling the practice activities, the computer appears to be a very valuable tool in an accountant's practice.

#### 4.15 APPLICABILITY TO THE PROFESSION

Many accountants may reject the idea of an in-house computer on the basis of their practices being too small and the costs being too high.

The implication here is that only the large practices could support a computer installation and, if small firms require computerisation for any practice activities, service bureaux should do the necessary work.

Hutchison disagrees completely with this reasoning. He sees the use of mini computers to be of particular relevance to the small practitioner and fully details how such a machine was put to use in his office "which is a three person office".<sup>61</sup> The installation described by Lennox was in a practice which had a staff of three CPA's, ten staff accountants and three clerical employees.<sup>62</sup> To Boyle, the number of clients which a practice services is an important criterion - based on his experiences with service bureaux and with his own small in-house computer, he feels that 60 clients is quite a sufficient number to make a computer useful and "if you [the accountant] have more than 60, it may be a virtual necessity".<sup>63</sup> An in-house computer, as well as a terminal linked to a time sharing computer network, are fully justified by Ivey, whose firm employed 65 CPA's and staff members.<sup>64</sup> Another writer feels that there is data processing equipment to fit every public accountant's needs - from the one-employee firm upwards.<sup>65</sup>

The cost of installing and operating an in-

house computer is high in comparison to other methods of data processing. Accordingly, a very careful financial investigation must be made to assess whether or not the venture will be profitable - involved here is an estimate of future earnings (from existing clients of the practice as well as potential clients) which is compared with the costs. In this regard it is difficult to assess what additional revenue the computer will bring to the practice. It would appear that this could be fairly substantial. Emery,<sup>66</sup> in describing an American survey of the impact of computers on the accountant-user, found that, on average, such firms reflected a doubling of fee income over a three year period. Another firm found that its gross practice billings increased by 40 per cent in the two years subsequent to installation.<sup>67</sup>

Despite the optimism expressed above, a note of caution should be sounded. The history of the bureau industry is characterised by the large number of bureaux which were opened on the basis of future client potential. In many cases this potential was not realized, with the result that bureaux went into liquidation or were closed down.

Another factor to be taken into account is that published opinion to date, describing a service bureau in an accountant's practice, tends to

highlight successful installations. Perhaps for fear of 'losing face', accountants do not want to report their bad experiences of an unsuccessful situation.

Thus, before accountants commit themselves to offering bureau facilities, a comprehensive study should be made of the implications, especially financial, of such a decision. In this way a clear perspective will be gained of the entire issue.

E. CONCLUSION

4.16 OVERVIEW

Benefits of computerisation began to be appreciated, by practising accountants, once commercial applications started expanding in the 1950's. The growth in the service bureau industry not only provided accountants with processing facilities for their work<sup>68</sup> but also revealed the opportunities in this area. The combination of these two factors gave the accounting profession the impetus to expand practice activities in relation to the computer.

This expansion is evidenced by the developments which have been outlined in this chapter.

Prior to introducing any of these aspects into a practice, accountants should undertake a thorough study in order to assess the merits, and demerits, of such activities. Particularly important here is the cost factor involved in using a computer or offering service bureau facilities.

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This article describes one of the earliest computer applications in an accountant's practice - punched tape was used for capturing source data and a bureau processed such information.

CHAPTER V : SOUTH AFRICAN CONDITIONS

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APPENDICES

- I Computer Questionnaire
- II The Body of Knowledge : Schedule V

## CHAPTER V : SOUTH AFRICAN CONDITIONS

"The present growth in the number of computer installations in South Africa makes it apparent that every future chartered accountant will be involved in electronic data processing."<sup>1</sup>

### 5.1 INTRODUCTION

The South African expansion in commercial computer usage during the 1960's followed the general trend established in the United States and Europe. Local organisations acquired computers either for 'in-house' processing activities, or to offer bureau facilities for prospective clients. This growth in the number of installations brought with it the demand and hence the opportunity, for EDP personnel, e.g. systems engineers, systems analysts, programmers and computer operators to handle the various facets of computer activity. It also affected practising accountants. These aspects were covered in Chapters II - IV, and the principles dealt with are applicable to practitioners in South Africa or elsewhere.

However, it is necessary to concentrate attention on local conditions in order to obtain a perspective of the environment in

which the practising Chartered Accountant (S.A.) works. With this as a background, the computer involvement of the practitioner can be more easily understood.

## 5.2 HARDWARE

South Africa's first computer, an ICT 1201, was installed by the Cape Provincial Administration on December 1st, 1957. By the end of 1965 there had been between 110 and 120 computers installed.<sup>2</sup> In the next four years the growth rate was enormous. According to Jamieson<sup>3</sup> there were, at the end of 1968, nearly 350 machines in operation with some 80 machines on order. This represented a total capital value of nearly R80 million. Only one year later a survey<sup>4</sup> revealed that the number of computers in South Africa totalled just on 400 with a capital value of R105 million. Such a growth in the local computer industry, viz. over a twelve-year period, was regarded as "one of the great commercial success stories of the Republic".<sup>5</sup>

An article published in Management (S.A.) in February 1972<sup>6</sup> produced details of 530 computers installed throughout the country. Information was based on questionnaires returned by users, and the private lists of suppliers and consultants (where available). Despite stating that, because of various difficulties, the list

could not be guaranteed to be 100% correct, a comprehensive picture of the users and their applications was presented. Unfortunately, no revenue value of the installations was given.

It is interesting to note that a report tabled in Hansard, early in 1972, showed the S.A. Government to be renting 33 computers at a total monthly rental of R423 998.<sup>7</sup>

Findings of a survey done in September 1972 disclosed the existence of 600 computers with a total installed value of R217,5 million.<sup>8</sup> An updating of the earlier Management (S.A.) survey was performed with the results being published in December 1973 - 660 computers are listed.<sup>9</sup>

Together with the above expansion was "the development of data communication systems and the use of these systems for on-line data entry and real-time processing".<sup>10</sup> A survey was conducted in 1972 by representatives of the South African Council for Automation and Computation, the South African Post Office and the Computer Society of South Africa. Its main object was to "establish present and future use of Post Office data communication facilities for data transmission purposes in South Africa".<sup>11</sup> Table 2 of its report<sup>12</sup>

revealed the following number of user transmission lines :

	<u>1972</u>	<u>1973</u>	<u>1974</u>	<u>1975</u>	<u>1976</u>	<u>1977</u>
Switched Networks	69	121	199	294	368	485
24 Hour Dedicated Lines	629	1138	1648	2098	2613	3162
Block Time Lines	6	15	43	57	58	68
Total	<u>704</u>	<u>1274</u>	<u>1890</u>	<u>2449</u>	<u>3039</u>	<u>3715</u>

Details were not provided of the breakdown in lines between the public and private sectors; the presumption is therefore made that growth in private sector usage will be at a reasonable rate.

These hardware developments clearly point to the expansion which has taken place in the computer industry. Among the projections for the future are :

- (i) 22% average annual growth<sup>13</sup> (this was previously referred to in Chapter I);
- (ii) "a 20%-a-year increase for the next ten years" (from 1972)<sup>14</sup>;
- (iii) "By 1980, the computer industry in South Africa should be some ten times its present 1969 size."<sup>15</sup>

Accordingly, the practising accountant should find himself involved in many more computer applications, certainly as auditor and possibly as a user.

### 5.3 COMPUTER SERVICE BUREAUX

As early as 1961 it was reported<sup>16</sup> that three computer bureaux were operating in the Johannesburg area - these were ICT, Standard Telephones and I.B.M. None of these could be regarded as 'independent' bureaux. ICT and IBM were, basically, manufacturers' organisations, while Standard Telephones only provided facilities to increase utilisation, i.e. take up slack time on its computer. It was with the opening of the Leo Computer Bureau in Johannesburg during 1962, that the era of the independent service bureau commenced in South Africa.

Very little has been published about the growth rate in the bureau industry during the 1960's. In 1971 a survey<sup>17</sup> provided details of 57 computer bureaux in the country but, according to Bischoff<sup>18</sup> there were approximately 86 bureaux countrywide at this time. (The discrepancy between these figures could perhaps be attributed to the definition of a bureau - the survey dealt with leading bureaux having their own physical premises and equipment, whereas the latter could include 'quasi'

bureaux which hire computer time from existing installations for processing activities.)

In addition to the standard batch processing bureaux, a number of commercial time-sharing bureaux have been formed. The first, Comsource, was founded in May 1969.<sup>19</sup> Marting reported the existence of three such bureaux in May 1971, with two additional organisations being operational by the end of 1971.<sup>20</sup>

No official figures are available as to the countrywide annual billings within the computer industry, or in relation to the number of customers who use such facilities. It is certain that volumes of both must be fairly substantial to justify their continued operation.

#### 5.4 SOFTWARE HOUSES<sup>21</sup>

With the increased usage of computers in the 1960's, a natural development was the establishment of service organisations, i.e. software houses, specialising in providing assistance to users or potential users of computers. This assistance is primarily in the areas of systems analysis and design, programming and implementation of systems. Assignments are handled either completely independently or in conjunction with existing staff at a client. In addition, software

houses could be involved in hiring competent staff for a client, providing in-house training on most levels of EDP, and generally providing computer support where required.

By November 1971, there were seventeen software houses in South Africa supplying a wide range of services.<sup>22</sup>

It is precisely these services which a practising accountant may require to assist in relation to an auditing assignment, e.g. in writing a specialised computer audit program. Also, having knowledge of the existence of software houses enables the practitioner to refer clients, who need computer help, to generally reliable specialists.<sup>23</sup>

#### 5.5 THE ACCOUNTANCY PROFESSION

In the early 1900's, societies of accountants were formed in the Transvaal, Orange Free State, Cape and Natal. It was not until 1927 that members of these societies were given the sole right, through legislation<sup>24</sup> to use the designation 'Chartered Accountant (S.A.)'.

Through agreement between the four provincial societies, a Joint Council was formed in 1946 - this was the forerunner of the present National

Council whose main function is to "co-ordinate the Chartered Accountancy profession as a whole at national level".<sup>25</sup>

With the passing of the Public Accountants' and Auditors' Act in 1951, a statutory body was created, i.e. The Public Accountants' and Auditors' Board (P.A.A.B.). The Board was given the power to register, control and discipline the members of the accountancy profession involved in public practice in South Africa, and to examine aspiring Chartered Accountants (S.A.). The Act also restricted the practice of public accounting to persons who registered with the Board.

By the end of 1970, membership of the four societies was as follows :

Cape	1 564
Natal	1 012
O.F.S.	163
Transvaal	<u>3 290</u>
	<u>6 029</u>

Of this number, 2 994 were registered Accountants and Auditors.<sup>26</sup> This does not mean that all such persons are in public practice - approximately one quarter are not. An analysis of the Annual Reports of the P.A.A.B. over a ten year period reveals the following figures :

	<u>Number in Private Practice</u>	<u>Number not in Private Practice</u>	<u>Total</u>
1972	2433	721	3154
1971	2369	686	3055
1970	2278	642	2920
1969	2230	586	2816
1968	2125	557	2682
1967	2015	531	2546
1966	1928	518	2446
1965	1828	514	2342
1964	1766	482	2248
1963	1725	435	2160

In addition there are non-resident registered members<sup>27</sup> who are not included in the above list. The difference in the figure mentioned by Woodhouse, i.e. 2994 and the 1970 Board figure, i.e. 2920, is accounted for by such non-resident members.

A topographical analysis as at 31st December 1970 of all Chartered Accountants (S.A.) was prepared by Bowsher. According to this, only 1593 practising Accountants and Auditors were in South Africa<sup>28</sup> - the discrepancy between this figure and the official Board figure of 2278 is not explained. Similarly, Bowsher's figure of the total number of Chartered Accountants does not agree with that given by Woodhouse, i.e. 5137 in relation to 6029.<sup>29</sup>

Considering that the 1952 P.A.A.B. Report detailed 1481 registered Accountants and Auditors in the country, the growth rate over a twenty year period has been far from impressive. Over the same period of time, 4605 candidates have passed the Board's Final Qualifying examination.<sup>30</sup>

Accounting practices in South Africa would generally fall into one of the following categories :

- (1) Branch of an international firm - there are usually offices established in the major cities.
- (2) South African based with branches around the country - an international affiliation is often in existence.
- (3) Local - the small and the medium-sized practice situated in one city or town.

Between these three groups there are obviously major differences in the size and number of clients, the training given to staff (both 'on-the-job' and in the form of in-house seminars and lectures), the approach taken in handling assignments, the range of services offered, and so on. No comprehensive survey has been conducted to obtain a profile of public practice in South Africa, and it is therefore not possible to quantify these aspects.

However, the results of the questionnaire circularised by the COBOK committee does highlight certain features of the practitioner's involvement with computers - the answer to questions 17 - 19<sup>31</sup> deal with this aspect, and the findings are based on total replies from 1178 practitioners. (All figures given here-under are from the published report.)

Whereas over 87,1% of practitioners perform write-up work for clients, only 40,6% use mechanical methods, i.e.

Accounting machines	23,0%
Punched card installations	2,7%
Computer bureaux	14,9%

On the auditing side, 53% of the replies received indicated that computerised systems were being audited or would be audited in the near future. The break-down of the type of systems being audited showed :

Client's own installation	44,5%
Bureau applications	43,0%
Shared time	12,5%

No details were asked for by the COBOK committee as to the techniques used in auditing these computer systems.

On the 25th September 1973, the Cape Society of Chartered Accountants in collaboration with the Department of Accounting, University of Cape Town arranged a one-day seminar on the subject of "The Chartered Accountant and Computers". At the end of the day, participants were asked to complete a questionnaire (see Appendix 1) which dealt, in part, with the computer involvement of practitioners. Forty-one partners of firms completed questions 10 - 18; although possibly not indicative of the profession as a whole in South Africa, the results do give an indication of the current position.

Replies to the questions (refer to Appendix 1) were as follows :

Number

- 10 23 partners work with clients who own their own computers, while 39 have clients who either own their own computers or utilise bureau facilities.
- 11 The number of clients who utilise computer facilities were detailed as follows :

<u>Number of Clients</u>	<u>Number of Practitioners</u>
None	2
1 - 10	26
11 - 30	10
31 - 50	2
Over 50	1

Number

- 12 10 partners were consulted, 10 were not consulted and 21 were sometimes consulted - this would appear to be a most unsatisfactory position. As discussed in Chapter II, section B, the auditor has an important role to play in the systems design stage of a client's installation, and/or in the situation where bureau facilities are to be utilised by a client.
- 13 32 replied positively while 8 answered 'No' - it would appear that clients do look to their auditors for advice. But it is difficult to reconcile the replies here with those given in question 12. Perhaps advice was sought, but if not satisfactorily given the client decided to 'side-step' the auditor.
- 14 Replies to the six possibilities were as follows :
- |                                   |                  |
|-----------------------------------|------------------|
| Internal control questionnaires   | <u>No.</u><br>20 |
| Test packs                        | 4                |
| Audit packages                    | 1                |
| Control balancing                 | 6                |
| Conventional (audit trail) method | 33               |
| Other                             | 4                |

These findings point to the auditor being reasonably able to audit batch controlled systems

where the fundamental elements of an audit trail are readily available. Where circumstances require the computer to be used in the audit process, Steele doubts whether "the bulk of professional auditors [in South Africa] have the experience or expertise to do this adequately"<sup>32</sup> - this is borne out by the figures above. Computers are basically being ignored in the auditing process. The question of the skill and ability of auditors to check on computer systems was raised by the Financial Mail. Surprisingly, but perhaps truthfully, no response was elicited from the profession to the allegations that with some exceptions practitioners are not sufficiently skilled to check on computer systems and, that their training ". . . does not get down to the brass tacks of computer systems and how to check the information that is processed".<sup>33</sup>

In the case where a firm is a local branch of an international concern, these criticisms are probably invalid. Through training courses both overseas and locally, a fairly comprehensive level of EDP knowledge is acquired by the staff. Where complicated computer systems are to be audited, a 'specialist' is usually in the employ of such practices.

However, for most of the practices (and practitioners) in South Africa, it is suggested that the Financial Mail is correct in its assessment.

Number

- 15 10 replies 'Yes' and 31 'No'. (The minor discrepancy from the results in question 10 is not considered important.) This result does not correspond with the comments<sup>34</sup> made by bureau managers who openly express dismay at the lack of audit work done in relation to their customer's processing activities at their bureaux.
- 16 The potential in this area was discussed in Chapter IV yet only 12 partners would consider an in-house computer. (This aspect was highlighted at the seminar and practitioners thus received an exposure to the idea.)
- 17 16 partners reported using the computer to handle practice activities.
- 18 The aspects handled were :
- |                          | <u>Number of Practitioners</u> |
|--------------------------|--------------------------------|
| Write-ups                | 8                              |
| Client (debtors) records | 11                             |
| Salaries and wages       | 8                              |
| Share transfer           | 11                             |
| Time records             | 11                             |

Replies to questions 17 and 18 do indicate that computers are being used by practitioners. There is no doubt that they will, in the future, be used in many more professional practices.

This overview of the Accountancy profession has focussed attention on practising members and their involvement with computers. Because of the increasing commercial usage of computers, it is recommended that local practitioners acquire a far greater understanding of EDP than they have at present. The means of acquiring this will be reviewed in Chapter VI.

#### 5.6 MANAGEMENT CONSULTANCY WITHIN THE ACCOUNTING PROFESSION

As outlined in Chapter III, the term "management consultancy (or advisory) services" relates to providing professional assistance to clients in respect of a potentially wide range of business activities. A study published in 1964 on the accountancy profession in South Africa found that "in addition to accepting appointments as auditors, chartered accountants . . . act as consultants on systems work, and also offer assistance in the field of financial management".<sup>35</sup> No details were given as to the number of practitioners or practices involved in such activities.

During 1965, a task committee was appointed by National Council and asked to suggest how practitioners could effectively provide services to clients in the management field. Three main suggestions<sup>36</sup> were put forward in its report, all of which ran contrary to the Rules

of Professional Conduct, (as laid down by National Council) but, despite this, National Council supported the recommendations in principle at a meeting held on 29th/30th November 1965.

In June 1967, National Council created a standing committee to promote management consultancy as a service rendered by accountants in public practice.<sup>37</sup> One of its first functions was to define the scope of consulting services - seven areas were specified of which one was "Machine Accounting and Electronic Data Processing".<sup>38</sup> The committee also published<sup>39</sup> information to assist practitioners in establishing a management consulting division within their practices. In addition, a Report was submitted (dated 19th April 1968) to National Council - Schedule A contained the wording of the proposed amendments to the Rules of Professional Conduct (which were in existence at the time).<sup>40</sup> Based on these recommendations, certain modifications were made.<sup>41</sup>

In order to promote management consultancy on a regional basis, the Transvaal and Cape Societies of Chartered Accountants in 1971 formed local Associations which were affiliated to National Council's committee.

Prior to publication of the COBOK Report, no quantitative information was available as to the

extent of management consultancy work performed by practitioners. Of the 1178 replies from practising members, the response details to the question<sup>42</sup> 'Are you consulted by audit clients on problems of general management?' was as follows :

	<u>%</u>
Frequently	30,5
Fairly frequently	31,3
Occasionally	30,2
Rarely	7,2
Never	0,8

Replies to question 25<sup>43</sup>, revealed that between the years 1965 and 1968 the percentage of practitioners providing management consultancy services increased from 16 to 18. But the actual volume of work must have expanded considerably in 1965, 307 persons were involved in supplying such services whereas in 1968 the number had grown to 410.

In an attempt to obtain a realistic picture of management consulting, and to follow up on the COBOK findings, all firms in public practice<sup>44</sup> in South Africa were sent a questionnaire by the Management Consultancy Committee of National Council early in 1971. The response was very poor - only 29 questionnaires were returned.

Based on an analysis<sup>45</sup> of these replies, the

following are some of the points which emerged :

Question No.

29 Year of commencement of consulting services :

	<u>Number</u>
1946	1
1948	1
1951	1
1960	4
1961	1
1962	2
1963	1
1965	4
1966	3
1967	3
1968	3
1969	1
1970	2
1971	2

28 Connection of consulting services with auditing practice :

	<u>No.</u>
Part of the main firm	22
A separate partnership	2
A separate company	6

(No explanation is available as to why this breakdown totals 30 whereas only 29 firms replied.)

Question No.

9 Method of obtaining consulting work :

	<u>%</u>
From audit assignments	68
From social contact	12
Via referrals	2
Through recommendations	18

24 and 25 The number of clients/assignments dealt with in the previous three years was :

	<u>Number of Clients</u>	<u>Average</u>
1968	472	22
1969	539	24
1970	617	23

	<u>No. of Assignments</u>	<u>Average</u>
1968	479	22
1969	582	27
1970	697	26

The replies dealing specifically with computer work performed show that one-quarter of the full-time staff employed deal with computers but only 4% of part-time staff are so involved.<sup>46</sup> Question 26 gave the breakdown of the type/number of assignments performed - computer and other data processing work accounted for approximately 5% in 1969 and 9% in 1970. No details were given as to the revenue value of such work, or the breakdown

within the wide range of possible computer services.

In an attempt to assess the areas of members' interest for lecture purposes, the Transvaal Association of Management Consultants sent a 'Lecture Questionnaire' to its members early in 1971.<sup>47</sup> Judging from the response obtained<sup>48</sup>, computers were regarded as a field with much potential for consultancy services - computers appear second on the list of lecture requests from members. Full details of the results, listed in 'total requests' sequence, are as follows :

	<u>Lecture Level</u>		<u>Total</u>
	<u>Elementary</u>	<u>Advanced</u>	
Budgeting	18	57	75
Computers	19	47	66
Special Techniques	33	30	63
Comprehension and Appreciation of Business	10	41	51
Marketing	10	40	50
Administration	8	33	41
Reporting to Management	2	37	39
Personnel	12	24	36
Costing	6	29	35
Merchandising	8	17	25
Production	8	15	23
Engineering	5	3	8

(A breakdown within each of these sections was also given which specified additional details.)

Later in 1971 the Transvaal Association also prepared a memorandum<sup>49</sup> dealing with the question of standards among its members. Various recommendations were proposed, and a 'Body of Knowledge' was presented in the form of five detailed schedules - the last dealt with 'Data Processing'. This can be found in Appendix 11 to this Chapter.

National Council has made a concerted effort to encourage the development of management consultancy services among practising members. In addition to forming the Management Consultancy Committee and amending certain Rules of Professional Conduct, it has also :

- (1) Published numerous articles and editorials in its official organ, The South African Chartered Accountant;
- (2) Circularised<sup>50</sup> members on the subject of 'referrals' within the profession;
- (3) Arranged two Management Consultancy Congresses<sup>51</sup>; and
- (4) Provided a direct avenue for practitioners to obtain free advice on all aspects of Management Advisory Services.<sup>52</sup>

The actual results of these efforts are not easily discernible, and it is suggested that a comprehensive research study should be undertaken with this in mind. Only in this

way will a clear picture emerge of the extent, and nature, of management consultancy among practitioners in South Africa.

#### 5.7 PRACTITIONERS USING 'IN-HOUSE' COMPUTERS

In sub-section 5.5 it was established that a fairly large number of practitioners are using computer facilities to assist in handling certain practice procedures.

However, there has been no published information as to the number (if any) of computers in South Africa which are operated as an integral part of an accounting practice along the lines as envisaged in Chapter III. The only known acknowledgements of this concept were in two articles published in the South African Chartered Accountant - one in 1966<sup>53</sup> and the other in 1974<sup>54</sup>.

Projections of future growth in the South African computer industry (and hence the market potential) could make a success of this kind of venture. "Forward regarding"<sup>55</sup> accountants might see this as an area for expanding practice activities - it is feasible for a number of accountants to 'pool' interests in such an undertaking.<sup>56</sup>

## 5.8 CONCLUSION

The lack of availability of up-to-date reference material has meant that certain quoted statistics are largely of historical interest only, and thus do not adequately reflect current trends and opinions.

Accepting this limitation in particular instances, the details given in this Chapter present a fairly concise picture of conditions in South Africa, which is the framework of the public accountant's activities.

Sub-sections 5.2 - 5.4 dealt with developments in the computer industry, while 5.5 - 5.7 were directly concerned with the accounting profession.

The overall impression which emerges is the strong probability that the practitioner's professional skill is not developing sufficiently quickly to match the expansion in computer usage which is taking place in the business community as a whole. As a result a direct gap exists (for most practitioners) in understanding, using and advising on computers and related activities. This gap can be expected to widen in view of future technological developments in the computer industry. Because of this 'knowledge' gap the ability of a practitioner to effectively audit a client's computer system becomes suspect.

These factors clearly point to the necessity for every Chartered Accountant (S.A.) in public practice to make a firm commitment to acquiring EDP knowledge, and then applying it to the whole ambit of his practice activities. Only in this way can the principles, approaches and techniques, as discussed in Chapters II to IV, be integrated into the South African accountancy profession.

CHAPTER V - FOOTNOTES

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- (10) CLARKE, J.F. : "Trends in Computing in South Africa - A Review of the Sixties": The South African Computer Bulletin: March-April 1970: p.p.16-17.
- (11) Editorial : "Data communications survey 1972 - 1977": Systems/Stelsels: March/April 1973: p.p.8-13.
- (12) Editorial : "Data communications survey 1972 - 1977": Ibid: p.10.

- (13) Editorial : "De-classified information":  
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- (14) GIBSON, E.D. and GIBSON, R.P. : "South  
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- (15) JAMIESON, R.T. : "South Africa's growing  
computer industry": Ibid: p.35.
- (16) Editorial : "New Computing Centre": The  
Financial Mail: 27th October 1961: p.560.
- (17) Editorial : "Inside Sixty Computer Bureaux":  
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- (18) Editorial : "Inside Sixty Computer Bureaux":  
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- (19) Editorial : "A computer for R75": Business  
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- (20) MARTING, V.E. : "Computers : New opportunities  
for the use of Computers. (Time-Sharing  
Bureaux, Mini-Computers etc.) for those  
using Service Bureaux, for those with their  
own Computers, and for those considering a  
change to Computers": Paper presented at  
the: National Conference of Chartered  
Secretaries: 7th May 1971: Paper 5.
- The five utilities were - Comsource, the  
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- (21) For additional background to these types of  
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Africa: February 1971: p.p.49-50.
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is outlined in
- Editorial : "For Hard Bargainers, Software  
from Professionals": Management (S.A.):  
November 1971: p.p.36-38.
- (22) Editorial : "A software house for you": Manage-  
ment (S.A.): November 1971: p.p.38,41-43.

- (23) The presumption here is that the nature of the assistance required is beyond the ability of the practitioner, or other members of the profession who could be referred to. These 'consultancy' aspects will be discussed in sub-section 5.6.
- (24) 'The Chartered Accountants' Designation (Private) Act No. 13' contained this right - it was passed by parliament in 1926.
- (25) WOODHOUSE, F.H.: "The Present Structure of the Profession in South Africa": The South African Chartered Accountant: February 1971: p.p.46-49.
- (26) All these membership figures were obtained from  
WOODHOUSE, F.H. : Ibid: p.46.
- (27) This comes about in two ways :
- (1) An overseas partner in a local (SA) firm; or
  - (2) A registered practitioner who resides outside South Africa.
- (28) BOWSHER, L.F. : "Supplementary Report of the Commissioner Appointed to Investigate the Desirability of a National Society of Chartered Accountants (SA)": Cape Town: 4th January 1972: p.18.
- (29) BOWSHER, L.F. : Ibid: p.18.
- (30) This figure was obtained from a letter written by E. NIEWOUDT (the Secretary of the P.A.A.B.) which was published in the South African Chartered Accountant: February 1972: p.69 - up to and including the 1971 Qualifying Examination, 4340 had passed.
- (31) Committee Report : Ibid: Appendix B: p.p.10-11.
- (32) Editorial : "Data entry interface": Systems/Stelsels: March/April 1973: p.p.14-15:  
STEELE, J. was a member of a panel whose opinions are reproduced in this report.

- (33) Editorial : "Computer Audits - Too few trackers": Financial Mail: 26th January 1973: p.p.285 and 286.
- (34) These emerged from personal discussions with various bureaux in Cape Town.
- (35) Committee Report: Professional Accounting in 25 Countries: American Institute of Certified Public Accountants: New York: 1964: Chapter 20: p.8.
- (36) Editorial : "Joint Council meets in Johannesburg on 21st/22nd March": The South African Chartered Accountant: May 1966: p.p.143-147.  
On page 144 the suggestions were :  
"- the condoning of fee-sharing with non-accountants in certain circumstances;  
- the development of institutional advertising of services offered by the profession but without any relaxation of the rule against advertising or touting for work by the individual;  
- the development of a system of 'referrals' within the profession, but with safeguards."
- (37) URQUHART, R.C. : "The Role of the Management Consultant in the Profession": The South African Chartered Accountant: April 1969: p.p.112-119.
- (38) Committee Report : "Management Consultancy": The South African Chartered Accountant: October 1967: p.p.369-370.
- (39) Committee Report : "Management Consultancy": The South African Chartered Accountant: March 1968: p.p.79-81.
- (40) Committee Report : "Management Consultancy Activities within the Accounting Profession": The Management Consultancy Committee of the National Council of Chartered Accountants (SA): Johannesburg: 19th April 1968.
- (41) For official confirmation of the acceptance of the principle of referrals within the Profession, together with appropriate amendments to the Rules of Professional Conduct, see : Editorial : "National Council meets in Johannesburg : 25th/26th November": The South African Chartered Accountant: December 1968: p.p.359-360.

- (42) Committee Report : COBOK: Ibid: Appendix B:  
p.11.
- (43) Committee Report : COBOK: Ibid: Appendix B:  
p.12.
- (44) JEFFERY, M.C. : "C.A. Consulting in Action":  
The South African Chartered Accountant:  
August 1971: p.p.281-283.  
Details of the background to the survey are  
given in this article.
- (45) WOODHOUSE, F.H. : "Questionnaire Report to  
the Chairman and Members of the Management  
Consultancy Committee": Johannesburg:  
2nd July 1971.
- (46) Question 6 provided this information. The  
general nature of computer assignments do  
not lend themselves to part-time work.
- (47) A similar questionnaire was also distributed  
by the Cape Association of Management  
Consultants in 1971, but the results are  
not available. However, from personal  
discussion with DR M.S. PUTTERILL (an  
ex-committee member of the Cape Association)  
the replies received were very similar to  
those published by the Transvaal Association.
- (48) Committee Report : Analysis of Lecture  
Questionnaire Distributed April 1971:  
Southern Transvaal Association of  
Management Consultants: Johannesburg:  
23rd July 1971.
- (49) CHAPMAN, D.E. and DE BEER, D.L. : Suggestions  
on standards which could be introduced by  
the Associations which must eventually be  
met by members before they are able to  
indicate to the general public that they  
are "Consulting" members of the Associations:  
The Transvaal Association of Management  
Consultants: Johannesburg : 1971.
- (50) Editorial : "National Council meets in  
Johannesburg 25th/26th November": Ibid: p.360.
- (51) The first was held at the Rondalia Buffels-  
poort Resort (near Rustenberg) on the  
25th/26th November 1971. The second was in  
Johannesburg on the 18th/19th March 1974.

- (52) Full details of this service can be found in  
Editorial : "Notes and Comments -  
Management Advisory Services Advice":  
The South African Chartered Accountant:  
April 1973: p.130.
- (53) Editorial : "Notes and Comments - Professional  
Computer Service": The South African  
Chartered Accountant: April 1966: p.p.118-  
120.
- (54) SULCAS, P. : "The Changing Role of the  
Chartered Accountant": The South African  
Chartered Accountant: February 1974:  
p.p.58-60.  
Prior to slight modifications, this paper  
was originally presented at the Computer  
Seminar arranged by the Cape Society of  
Chartered Accountants in September 1973 -  
point No. 16 of the questionnaire (see  
Appendix 1) dealt with this aspect and  
has already been referred to in sub-section  
5.5 .
- (55) BRAMWELL, W.D. : "But Can C.A.'s (S.A.)  
Plan?": The South African Chartered  
Accountant: November 1973: p.p.397-398.  
"Forward regarding" accountants are  
contrasted with "backward regarding"  
accountants who are concerned primarily  
with auditing which, by its nature, is  
historically orientated.
- (56) Contact has been made with just such a group  
of practitioners in Cape Town, and plans  
are fairly advanced in implementing their  
decision to instal a computer to handle  
practice activities, and to offer bureau  
facilities to clients.

COMPLETED AT A ONE DAY SEMINAR : 25TH SEPTEMBER 1973

NAME:.....

PLEASE PLACE A CROSS OR A TICK IN THE APPROPRIATE BLOCK(S)

1. In which area do you work?

- Accounting practice
- Commerce
- Industry
- Other (Specify)

2. What is your position at work?

- Partner
- Self-employed
- Employee

3. Did you find today's seminar

- Stimulating & Interesting?
- Interesting?
- Mediocre?
- Heard it all Before?

4. Have you attended any other computer seminars or lectures?

- Yes
- No

5. Did you find the level of the present lectures

- Complex?
- Correctly pitched?
- Elementary?

6. Are you interested in EDP because

It is part of your daily activities?

It is necessary to audit clients' systems, and advise on EDP?

To gain perspective on computers generally?

7. If additional courses are offered, should such courses

Be spread over a number of weeks (say one night per week)?

Be concentrated into seminars of two to three days' duration?

Be one-day presentations dealing with specialised topics?

8. What areas of EDP are of particular interest to you?

System analysis, design and implementation.

Programming

Hardware (i.e. machine) characteristics and capabilities.

Running an EDP operation

Auditing

Computer bureaux

9. What practical experience have you had with any aspects of computers or computer systems?

A lot

A reasonable amount

None

FOR THOSE IN PRIVATE PRACTICE:

10. Do your clients

Have their own computers?

and/or

Utilise bureaux facilities?

11. Approximately how many clients do you have who utilise computer facilities of any sort?

None

1 - 10

11 - 30

31 - 50

Over 50

12. Were you consulted prior to your clients making their decisions to computerise?

Yes

No

Sometimes

13. Do clients approach you for advice on any aspects of EDP?

Yes

No

14. When auditing your clients' computer operation do you

Fill in internal control questionnaires?

Use test packs

Use audit packages

Ensure that control totals balance (with no other audit work being performed.)?

Stick to conventional methods, i.e. follow audit trail from source documents to output?

Use methods other than described above?

15. If your clients utilise bureau facilities, have you ever visited the bureau for audit purposes?

Yes

No

16. Would you consider introducing an "in-house" computer to handle aspects of your practice as well as provide a service for your clients?

Yes

No

17. Are any of your practice's activities (as opposed to your clients' activities) handled by computers at present?

Yes

No

18. If the answer to the above is "Yes", what aspects are involved?

Write-ups (including production of year-end financial accounts)

Client (debtors) records

Salaries and wages

Other (please specify)

.....

.....

.....

FOR THOSE IN COMMERCE AND/OR INDUSTRY:

18. What is your capacity in the organisation?

Accountant

Secretary

Financial Director

Data Processing Manager

Other (Please specify).....

19. Does your organisation have its own computer (from mini-size upwards)?

Yes

No

20. Does your organisation utilise bureau facilities?

Yes

No

21. If you are not the data processing manager, to whom does he report?

You personally

Other person (please specify)

.....

SCHEDULE V

DATA PROCESSING

Data Processing Policy

Investigating existing procedures and new requirements in order to determine the scope for using computer or other facilities.

Preparing outline proposals for the systems and procedures required.

Advising on the type and size of equipments required.

Assessing development and operational staff requirements.

Preparing economic assessments of the recommended arrangements.

Equipment Selection and Installation

Preparing detailed specifications of proposed procedures for submission to manufacturers.

Evaluating manufacturers' tenders and advising on the selection of equipment.

Assisting with site planning and installation.

Data Processing Organisation

Advising on organisational and staffing requirements.

Preparing job specifications for systems, programming and operating staff.

Advising on project control and progress reporting arrangements.

Development Procedures

Developing data processing standards for systems and programming work.

Planning and supervising systems and programming development work and the preparation of procedures manuals.

Designing detailed procedures and preparing systems and programming specifications.

Ancillary Operations

Advising on operations scheduling, file library and processing control arrangements.

Preparing detailed operation procedures manuals.

Advising on methods of assessing machine performance.

Improving Unsatisfactory Installations

Identifying the causes of unsatisfactory procedures and inefficient equipment utilisation and recommending improvements in:-

- (a) equipment and related clerical procedures;
- (b) operating and control arrangements;
- (c) systems and programming methods and documentation.

CHAPTER VI : COMPUTER EDUCATION FOR CHARTERED  
ACCOUNTANTS IN SOUTH AFRICA

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APPENDICES

- I COBOK's Data Processing Recommendations
- II COBOK's EDP Audit Recommendations
- III Questionnaire to Universities together  
with covering letter
- IV Replies to Universities' Questionnaire
- V Contributed Computer Articles in the  
South African Chartered Accountant
- VI Contributed Articles in the South African  
Chartered Accountant

CHAPTER VI : COMPUTER EDUCATION FOR CHARTERED  
ACCOUNTANTS IN SOUTH AFRICA

"At the primary and secondary school levels, students are acquiring knowledge of the computer. The universities, business colleges, technical colleges are all offering instruction. The National Council of Chartered Accountants (S.A.) has even seen the light and has co-operated in establishing a course which is designed to give the practising accountant the knowledge he needs."<sup>1</sup>

6.1 INTRODUCTION

Having established in Chapter V that computers are playing an ever-increasing role in data processing activities in South Africa, and having demonstrated in Chapters II - IV their impact on practising Chartered Accountants, it follows that few practitioners will escape encounters with computers. Many already deal with clients' records which are processed and stored on computers, and a fair number utilise computer facilities to handle the administration of their practices. The need for consultancy services can also be expected to grow as the number of installations increases.

All the above factors point clearly to the necessity for practitioners to have some degree of expertise in dealing with computers and computer systems.

This Chapter will deal with the computer educational facilities available both to the trainee Chartered Accountant and the practitioner in public practice. In the former case, an evaluation will be made of computer teaching at South African Universities up to the end of 1973.

## 6.2 PRE-QUALIFYING EDUCATION

It is widely recognised that "there is no area of professional concern more important than the education and training of those who will constitute the profession in the years ahead".<sup>2</sup> Formalised education is provided by the Universities, while training in its widest sense is the responsibility of the practitioner who has articled clerks in his employ.

Standardisation in the latter area cannot be achieved at present because of the diverse nature and sizes of practices. The recommendations of the COBOK Report<sup>3</sup> do stipulate, albeit in fairly wide terms, common areas which should be covered in the undergraduate curriculum<sup>4</sup> taught at South

African Universities. The recommendations of the COBOK Report were formally incorporated<sup>5</sup> into the syllabus of the Final Qualifying Examination of the Public Accountants' and Auditors' Board with effect from 1st January 1980. This 7-year notice follows from the Committee's suggestion that acceptance of its recommendations "will involve the imposition of reasonable notice period before they can be put into effect".<sup>6</sup> Such a period was considered necessary to permit the various Universities and Accountancy students to 'come to terms' with the specified requirements.

Part III (paragraph 7) of the Report indicated, and defined,<sup>7</sup> three levels of knowledge, applicable to the various subjects to be taught, i.e. "Through knowledge", "Good working knowledge" and "General Knowledge".

A separate course in 'Data Processing' was recommended, while the audit of EDP installations was combined with other auditing requirements. In both instances, students are required to have a "Good working knowledge" of the subject with the proviso that certain areas of the Data Processing course only require a "General Knowledge".

The contents of Data Processing course can be found in Appendix 1 to this chapter, and the EDP audit recommendations in Appendix 11.

In order to evaluate the current level of computer teaching at South African Universities, a questionnaire (see Appendix III) was sent in November 1973 to all, i.e. 16, Universities. The response received was excellent. Fourteen Universities completed the questionnaire fully, one sent an official Prospectus in lieu of the questionnaire<sup>7</sup>, and only one University did not respond either to the original request or to two follow-up letters.

Full details of the various replies are contained in Appendix IV. The names of the Universities are not given because it is considered that a certain degree of confidentiality exists in the replies received. Also the purpose was not to compare one University against the other, but rather to obtain an overall picture.

An analysis of the replies revealed the following :

Question No.

- 1      13 replies indicated that existing staff do have some knowledge of computers and their applications, and only one reply revealed a staff knowledge deficiency in this area. It was not the intention of this University to appoint a

person with suitable computer ability prior to the 1975 academic year.

Comment : It would appear that the question did not specify, in sufficient detail, what comprises a suitable level of 'exposure' or 'training'. The results could, therefore, be misleading especially when assessed together with 2(a).

A breakdown of the academic qualifications of staff with computer expertise shows :

	<u>No.</u>
(i) C.A. qualification	8
(ii) Commercial degree, other than C.A.	1
(iii) Science degree	4

Comment : 7 of the 8 people with the C.A. qualification have a commercial degree as well, while one C.A. (at University No. 3) has his additional qualification in the scientific field. The major inference to be drawn from the four staff members who only have scientific degrees is that such persons are not in the full-time employ of the Accounting Departments concerned -

they are used for teaching purposes only, but 'belong' to another University Department. This would agree with the findings of 2(a).

Question No.

- 2            10 Universities appear to have separate computer courses in their C.T.A. curricula, while 5 do not.

Comment : An examination of the Prospectuses of the Universities reveals a sharp discrepancy between the course outlines given and the replies received. For example, University No. 15 had no computer courses in the curriculum given, yet the reply to 2(b) specifies that they are given in the 2nd, 3rd and 5th years of C.T.A. study. The conclusion to be drawn is that either the Prospectuses do not contain the correct (up-to-date) information, or that the meaning of 'separate computer course' has been extended to include short computer courses given as part of other courses, e.g. Auditing, Management Accounting, etc. Without personal discussion or correspondence with the ten

Universities involved here, it is impossible to determine what the actual position is.

Question No.

- 2(a) The findings were that 8 Accounting Departments rely on other University Departments to teach their students about computers, and only University No. 8 undertakes this function itself.

Comment : This would appear to be a most unsatisfactory position unless Accounting staff members have carefully defined their requirements as to what should be taught, and where the emphasis should be laid. No information is available as to whether or not this is the case. It would be very difficult for a teacher with a scientific background to appreciate what Accountancy students need to know and understand about computers. In this regard, University No. 4 prescribes Computer Science I as one of its C.T.A. courses - this will definitely expose the students to a wide area of computer knowledge, but it

is disputable as to whether future Chartered Accountants need this type of knowledge (i.e. scientific orientated). However, at University No. 15, the computer courses given are controlled by a C.A.(S.A.) who is in charge of its Computer Centre. This position is most satisfactory. Other than the two Universities referred to (i.e. Nos 4 and 15) it is not definitely known which Departments do the teaching, but the likelihood is that teaching responsibility rests with the Science Departments.

Question No.

2(b) The year of study for the separate courses was given as :

<u>Year</u>	<u>Number of Courses</u>
1	1
2	3
3	7
4	3
5	1
6	-
7	-

Comment : The discrepancy between the 10 Universities who have

separate courses and the 15 courses actually given is because of courses given over more than a one-year period. It is suggested that computer education given to C.T.A. students in their first and second years of study will be partially of academic interest only because of the students' general lack of exposure to, and appreciation of, business organisations and systems of operation. By the third year of study the student is better equipped to relate his computer education to the office work being performed. Time permitting, the fourth year of study would appear to be ideal in this regard. The figures, i.e. 11 of the 15 courses, in or after the third year, do substantiate this viewpoint.

Question No.

- 2(c) The breakdown of the number of lecture hours allocated to the computer courses is as follows :

<u>Hours</u>	<u>No. of Replies</u>
0 - 30	2
31 - 50	1
51 - 70	1
Over 70	5

Comment : These findings, taken together with the replies to question 4, clearly indicate that a significant teaching emphasis is being placed on computers.

Of the 5 Universities which stated that they do not have a separate computer course, only one does not do any computer teaching at all. (This is University No. 1 which does not, as yet, have a C.T.A. course but intends commencing such a course in 1976.) The breakdown of the shared courses for computer teaching is as follows :

	<u>Course(s)</u>
University No. 3	Auditing
University No.10	Business Administration
University No.12	Accounting Auditing Management Accounting II
University No.14	Auditing

Comment : The findings of question 2 are relevant in the context of these

answers. The results here indicate that parts of existing courses are allocated to aspects of computer teaching - the emphasis being on auditing computer systems.

Question No.

3 10 Universities have included computer questions in year-end papers and 4 have not.

Comment : No information was requested as to the percentage 'weight' given to such questions, but again it is evident that computers are not being overlooked.

3(a) The breakdown here is as follows :

<u>Year</u>	<u>No. of Universities</u>
1973	9
1972	10
1971	10
1970	6
1969	5

Comment : The trend over the last five years is evident.

Question No.

3(b) The types of questions asked were :

<u>Subject</u>	<u>No. of Universities</u>
Computer Characteristics	4
Computer Auditing	10
Computer Applications	3

Comment : As would be expected the emphasis was on computer auditing, but it is interesting to note that in only 4 of the 10 cases was this the only computer area to be covered. The other 6 Universities examined on aspects other than auditing.

4 Replies to this question were as Follows :

	<u>No. of Universities</u>
Full Course	9
Half Course	3
Part of Existing Course	2

Comment : The COBOK Report recommended a full course in Data Processing (being one of sixteen courses) and it is surprising that 5 Universities feel that the subject does not warrant such coverage.

Question No.

- 5            4 Accounting Departments have, or propose having, "in-house" computer facilities within the next five years. 10 replied 'No'.

Comment : It is important for practical computer experience to be combined with theoretical aspects dealt with on a straight lecturing basis. However, the 10 'No' replies were accompanied, in a few instances, by comments to the effect that their University has a computer which would, or could, be used if necessary.

- 6            Replies were as follows :

<u>Level</u>	<u>No. of Universities</u>
(a) too advanced	-
(b) at the correct level	12
(c) too elementary	2

Comment : Despite the rapid technological developments taking place in the computer industry, and a great expansion in the number of computer users and applications in South Africa, the overwhelming opinion is that COBOK's recommendations are correctly pitched to handle computers in 1980.

Question No.

7            4 Universities felt that COBOK has committed aspects of computers and 10 were quite satisfied with it's recommendations.    The areas specified were :

- University No. 3    Too little programming
- University No. 8    Management Information Systems
- University No. 9    Auditing too elementary
- University No. 12    Auditing too elementary

Comment : These replies do not point to omissions in COBOK but rather to areas where more emphasis should have been laid.

8            Only 2 out of the 14 Universities felt that their present level of computer teaching did not meet up to the COBOK requirements.

Comment : In view of the fact that COBOK's recommendations were only officially accepted in January 1973, this result is surprising.    Perhaps the publication of the report in November 1969 prompted Universities to increase emphasis on computer

teaching and the present position is indicative of over four years of development in this area (i.e. November 1969 to early 1974).

Question No.

- 9            Although, to date, only 1 University has given any computer lectures to qualified Chartered Accountants, the figure will rise to 4 in the near future.

Comment : Responsibility for post-qualifying education clearly rests in areas other than the Universities. Of the 3 additional affirmative replies, 2 contained the comment, 'If so requested'.

The overall findings of the questionnaire do point to the fact that some emphasis is being placed on computer teaching for C.T.A. students. This is in sharp contrast to the opinion expressed<sup>9</sup>, in 1966, that Universities are not educating non-scientific students in computer concepts.

Steele acknowledges that implementing the COBOK Report's recommendations will increase the computer level of knowledge among Accountancy students (when compared to the level in 1971).

However, he suggests that this level should have been "a basic requirement in the education of persons attempting to enter the profession for the past few years".<sup>10</sup>

Following on from this comment, it is of significance to note that as early as 1954, Gardner<sup>11</sup> made a plea for education on aspects of mechanisation, to be incorporated into the teaching given to articled clerks in South Africa.

It should not be construed that C.T.A. students had no exposure to computers prior to the COBOK Report being published. The uniform syllabus for the Final Qualifying Examination (F.Q.E.) published in 1965, specified under the Accounting requirements, "Mechanisation as an aid to accounting, with particular reference to punched card and computer systems".<sup>12</sup> However, no computer questions appeared in the F.Q.E. until 1969. This followed an announcement by the Education Committee of the Public Accountants' and Auditors' Board (P.A.A.B.) that "with effect from 1969 questions may be included in the papers for the Qualifying Examination requiring a general knowledge of computers".<sup>13</sup> Candidates were specifically referred to Statement A.3 issued by The National Council of Chartered Accountants (S.A.) on 'Electronic Data Processing Systems'.

An analysis of F.Q.E. papers subsequent to this announcement shows that in each of the years 1969-1973 (inclusive) a question on computers has appeared. Each time it has been in the third (Auditing) paper with the marks allocated as follows :

	<u>Marks</u>	<u>Total Examination Marks</u>
1969	30	600
1970	35	600
1971	25	600
1972	25	600
1973	30	600

Between the years 1963 - 1968 no questions appeared dealing with any aspect of mechanisation or computerisation; only two questions<sup>14</sup> on mechanisation were asked in the period 1958 - 1962<sup>15</sup>. The realisation of the impact of computers on the Accountancy profession is clearly evidenced by the trend in the above figures - candidates for the F.Q.E. must know about computers in order to adequately handle applications which they will inevitably encounter as Chartered Accountants.

This sub-section has focussed attention on the recommendations of the COBOK Report, the current level of University computer teaching for C.T.A. students, and the attitude of the Educational Committee of P.A.A.B. - all these directly affect the emphasis given in pre-qualifying education of Chartered Accountants in South Africa.

6.3 POST-QUALIFYING EDUCATION ORGANISED BY THE NATIONAL COUNCIL OF CHARTERED ACCOUNTANTS (S.A.)

Fundamental to the continuing competence of any profession is the requirement that its members are able to keep up with the pace of developments in the community. This directly implies that education should be a continuing process which does not terminate with the successful completion of examinations which result in a professional qualification.

Acceptance of this philosophy by the National Council of Chartered Accountants (S.A.) is evident from its statement that ". . . there is no escaping the truth that substantial further learning has to be absorbed by a practising Chartered Accountant, both to properly master the intricacies of his professional work and to keep abreast of new developments".<sup>16</sup> With this as its stated objective, a series of formal Continuing Education courses were devised and presented to qualified chartered accountants on behalf of National Council.

The first ever computer course, in this Continuing Education series, was given over five days in Johannesburg starting on 6th June 1966.<sup>17</sup> An assessment of the course content<sup>18</sup> indicates that its scope was very wide and not directly aimed at chartered accountants in either public practice, commerce

or industry. Shortly thereafter, (in February 1967) a course specifically for practising members, i.e. 'EDP and the Auditor' was presented in Johannesburg and repeated in Durban, Bloemfontein (twice) and Cape Town (twice) between February and March 1968. During 1968 a further nine presentations of this course were given in Johannesburg.

In 1969 a total of 23 courses on various aspects of computers<sup>19</sup> were given - of these, nine<sup>20</sup> were evening seminars held over a thirteen week period, while three<sup>21</sup> were given (also as evening seminars) over a period of eight weeks. The other eleven courses were of shorter duration, i.e. one to three day sessions requiring full-time attendance from participants.

It is presumed that the six courses which were presented 23 times followed directly from the statement made by National Council, in November 1967, that "a general course is being developed, and, it is hoped, courses in computer programming, systems and auditing techniques".<sup>22</sup>

During 1970, various courses were given and in July it was reported, in *The Accountant*<sup>23</sup>, that a London-based firm of management consultants was commissioned to develop a

series of special computer training courses on behalf of National Council. The first of such courses to be given by this firm (in association with a South African Accounting firm<sup>24</sup>) was on the subject of 'Computers for the Smaller Business', and was presented four times during September 1970<sup>25</sup>. Two other new courses<sup>26</sup> were given in that year, but it is not known who devised them or the number of presentations which were made.

Unfortunately, National Council has not been able to supply attendance figures for any of the above courses - the reason given being that no such figures were available. Additional information was requested<sup>27</sup> as to the breakdown between practising and non-practising chartered accountant participants but, in view of the basic facts not being available, this could not be given. Hence no information is available as to the number of practitioners who have benefited from this medium of further study in the computer field. It is also impossible to gauge the profession's response to such courses.

However, from the minutes of a National Council meeting, it can readily be seen that during 1971, the computer courses were not well patronised. The point was made that "National Council could not be expected to provide the

demand for a minimum of 15 courses in each year".<sup>28</sup> It is presumed that a high level of attendance at this number of courses would guarantee a financial break-even point. As a result all computer courses were stopped.

It was not until the announcement of the 1974 Continuing Education programme<sup>29</sup> that a computer course, i.e. "Computer Auditing" is once more offered under the aegis of National Council. This five-day session is to be given five times during 1974 in Johannesburg (twice), Cape Town, Port Elizabeth and Durban. It is based on an American-developed video-tape presentation, and is being adapted and handled by a prominent South African firm of Chartered Accountants.<sup>30</sup> Attendance at each course is limited to a maximum of 25 persons.

National Council's efforts towards the continuing education of qualified Chartered Accountants has not only been confined to a 'back-to-the-classroom' approach. It must be added that these formal courses are the most suitable media for disseminating knowledge at a particular level to a relatively homogenous group of people.

During 1970 National Council concluded that by using tape-recorded material it could ". . . make available continuing education anywhere in the Republic, at a cost significantly below that of the 'live' course, and in a form which will permit an individual or group to use it at any convenient time".<sup>31</sup> Used in conjunction with a workbook, the approach is similar to most programmed instruction courses. One of the earliest courses to be offered using this medium was a four-hour preparatory course on computers.<sup>32</sup> In addition to this type of structured course, National Council recorded interviews with experts in particular areas - these generally took the form of a question/answer session dealing with common types of problems. Computer aspects<sup>33</sup> were also handled in this way. Development of such courses is the responsibility of the 'In-Office Training Committee'<sup>34</sup> of National Council.

As with the formal Continuing Education courses no information is available as to the success, in terms of usage, of this educational method.

Another form of computer instruction for Chartered Accountants was Statement on Auditing No. A.3 - this was published in November 1966 and was concerned with 'Electronic Data Processing Systems'. All

registered Public Accountants and Auditors (and hence practitioners) received copies of this Statement for their official handbooks. Approximately two-thirds of the Statement dealt with computer characteristics and the remainder with auditing considerations. Although it served to partially satisfy both practising and non-practising members, the general nature of its content did not fully meet the requirements of either party. In addition, the approach taken to handling the subject could not cater for the technological developments in the computer industry, in subsequent (i.e. post-1966) years. Consequently, in January 1972, it was reported<sup>36</sup> that A.3 had been withdrawn by National Council and members were requested to cancel this Statement in their handbooks. Shortly thereafter a National Council 'occasional paper'<sup>37</sup> was published, but it was pointed out<sup>38</sup> that the opinions expressed therein were those of the special committee commissioned specifically for the purpose of preparing a paper on "Auditing Electronic Data Processing Systems". It was not issued as a National Council Statement - the reasons for this are not evident.

The final area of active participation by National Council has been through its official mouthpiece - "The South African Chartered Accountant". Herein, various editorial

comments, and articles written by the staff of National Council, have been published dealing with many aspects of computers and their applications.<sup>39</sup> The general bias, in writing, has been towards practising members. In addition, a number of contributed articles have been published in connection with computers.<sup>40</sup> Since the first issue of the Journal in March 1954, thirty such articles have appeared (out of a total of 503) up to, and including February 1974.<sup>41</sup> A detailed analysis of these figures is contained in Appendix V and Appendix VI.

As an overall assessment, considerable effort has been made by National Council in its attempt to educate qualified Chartered Accountants on various aspects of computers. The success (or otherwise) of this effort is extremely difficult to evaluate because of a lack of information. This points clearly to the necessity for a comprehensive study to be made by National Council in order to assess their achievements in computer education to date, as well as to obtain facts and figures as to the type (if any) of computer education which Chartered Accountants throughout South Africa require for the future.

#### 6.4 OTHER SOURCES OF COMPUTER EDUCATION

There are a fairly substantial number of

alternatives to those outlined above which are available to Chartered Accountants who wish to acquire computer knowledge. Briefly, these are :

- (1) Courses by computer manufacturers - the large hardware companies are the chief suppliers of computer educational facilities in South Africa.<sup>42</sup> They generally offer short orientation, or appreciation, courses to give clients, or prospective clients, an overview of computers - such courses are geared for middle to top management levels in an organisation; as such they are particularly suitable for the Chartered Accountant who needs an introduction to computers. In addition, detailed courses, over a much longer period of time, are given in application areas, e.g. programming, systems analysis and design, operating procedures, and so on. These are particularly useful for training staff who will be involved on an operational level at a computer installation. Few practitioners will have time to attend this type of course which is usually on a full-time basis.
  
- (2) Courses offered by Universities<sup>43</sup> - as far as can be ascertained, Witwatersrand University is the only University which

has, for some time<sup>44</sup>, offered part-time computer courses to members of the public. As an example, during 1972 two such courses were presented<sup>45</sup> - one dealt, in sixteen one-and-a-half hour lectures (from 5.15 to 6.45 p.m.) with 'Introduction to Data Processing', and in order to relate the principles taught in this course to commercial applications, the second session followed with 'Introduction to Systems Analysis and Design' (over ten lecture periods of similar duration and timing to the first course). As from 1971, a postgraduate diploma in Business Data Processing was also introduced and, according to Steele ". . . those attending [the first course] are mostly practising accountants".<sup>46</sup>

The only unfortunate part is that all these activities are centred in Johannesburg whereas practitioners throughout the country would benefit enormously from such educational facilities.

- (3) Courses given by Advanced Technical Colleges - a three year part-time course<sup>47</sup>, leading to a National Diploma in E.D.P., is available at six centres<sup>48</sup> in South Africa. However, the length of the course will generally rule out the attendance of any Chartered Accountant.

Short computer introductory courses are also periodically given by such institutions which might be of some benefit to practitioners.

- (4) Courses run by consultancy organisations and other commercial colleges cover a wide range of educational requirements, but the courses tend ". . . to be somewhat sporadic, depending solely on demand".<sup>49</sup> Throughout the country there is only one organisation, i.e. CIM Training, which offers continuous year-round computer education for programmers, systems analysts, managers and general managers. These courses vary from one to five days in duration. The CIM approach (based on overseas experience) could suit many Chartered Accountants, but here again courses given have mostly been in Johannesburg as the headquarters of the organisation is based there.
- (5) Seminars and lectures - Provincial (Chartered Accountants') Societies have attempted to assist their members by arranging seminars and/or lectures on computer subjects. In 1965 it was reported<sup>50</sup> that the Cape Society arranged a series of lectures on EDP in Cape Town. As far as can be ascertained, this was

the first reported effort in this direction.

- (6) Through correspondence tuition - by enrolling with the University of South Africa, a full set of home-study notes will be acquired. Several commercial correspondence colleges offer similar facilities but on a lower educational level than the University of South Africa.
- (7) 'In-house' training - the larger accounting firms do give formal computer education to partners and staff both on a local basis, and through attendance at various overseas courses. This type of training would naturally be most appropriate for the accountancy profession, but its scope is limited to the small number of firms who can offer such facilities.
- (8) Self-instruction - many aspects of EDP can be learnt through this medium, i.e. by reference to appropriate books and journals.
- (9) 'On-the-job' training - much can be learnt while working in an EDP installation. Relating this directly to practising Chartered Accountants, it

is evident that working with clients who utilise computers can expand the knowledge in this area.

Thus, for the Chartered Accountant, there is a fairly wide choice of where or how to acquire computer knowledge. But it does require a positive effort to be made with a resultant sacrifice of either work or leisure time.

#### 6.5 CONCLUSION

This Chapter has focussed attention on the type of computer education which is currently available for Chartered Accountants in South Africa. Particularly in sub-section 6.3, fairly extensive reference was made to an historical background of the subject, but it is considered that this was necessary in order to obtain a perspective into current conditions.

As regards undergraduate education, it would appear from the results of the survey made that most Universities are giving reasonable computer training to their accounting students. In nearly every instance a positive reply was received to the question "Would you say that your present level of computer teaching meets the COBOK requirements?". Some exposure to principles, applications and auditing techniques in relation to computers

will thus have been given. This could auger well for the future of the profession and the future Chartered Accountant in his personal capacity.

However, with qualified Chartered Accountants the position is not so clear-cut. Sub-section 6.4 dealt with a fairly wide range of sources from which computer education can be obtained but, it is submitted, that the fundamental responsibility for Continuing Education rests on the shoulders of National Council. Since 1969 various courses have been presented, but figures are not available to assess the number of practitioners who have participated. Similarly, there is no indication as to the general level of computer knowledge among practitioners throughout the country, or as to the type (and duration) of computer education which practitioners themselves feel is necessary.

In view of these factors, and of the projected expansion in computer usage in South Africa (as outlined in Chapter V), it is strongly recommended that National Council appoint a Special Computer Committee to undertake a detailed investigation into present and future South African conditions vis-a-vis computers and the Accounting Profession. Only in this way will the present knowledge level be accurately determined, and thus serve as a basis for the planning of future Continuing Education.

CHAPTER VI - FOOTNOTES

- (1) STEELE, J.T. : "The accountant the computer Truth and Fairness - its all a matter of where responsibilities end and contributions begin.": Systems/Stelsels: January/February 1971: p.p.4-7.
- (2) CAREY, J.L. : "The CPA Plans for the Future": The American Institute of Certified Public Accountants: New York: 1965: p.283.
- (3) Committee Report : Report of the Common Body of Knowledge Committee on the Knowledge Required by the Future Newly Qualified Chartered Accountant and Other Matters: The National Council of Chartered Accountants (S.A.): Johannesburg: November 1969.
- (4) Accountancy students who complete such curricula are awarded a Certificate in the Theory of Accountancy (or its equivalent) which is a pre-requisite for admission to writing the Final Qualifying Examination set by the Public Accountants' and Auditors' Board.
- (5) GOVERNMENT GAZETTE (No.3765) : 19th January 1973: p.p.5-9.
- (6) Committee Report : COBOK: Part VII: Para.81.
- (7) The three levels were defined as follows :
  - "(a) Thorough Knowledge
    - (i) Sound understanding of principles, practices and procedures.
    - (ii) The ability to apply such knowledge to the situations likely to be encountered without extensive recourse to further technical study, investigation and assistance.
  - (b) Good Working Knowledge
    - (i) An understanding of the broad aspects of principles, practices and procedures.
    - (ii) The ability to apply such knowledge

to situations likely to be encountered, to recognize the more detailed aspects which must be considered and to carry out such further studies and investigations as are necessary to come to a reasonable solution.

(c) General Knowledge

An understanding sufficient to recognize the existence or likelihood of existence of specific features and problems and to determine what further study or investigation must be undertaken."

- (8) Based on the Prospectus, a questionnaire was (internally) completed to assist in the overall analysis. However, it could only partially be answered. This resulted in discrepancies arising in the "total" column of Appendix IV. Sometimes it shows 15 responses and sometimes only 14 responses.
- (9) Editorial : "Computer Talks - Commercial needs": Financial Mail: 16th September 1966: p.p.80-81.
- (10) STEELE, J.T. : Ibid: p.7.
- (11) GARDNER, P.V. : "Mechanisation and the Auditor": The South African Accountant: September 1954: p.p.94-95.
- (12) PUBLIC ACCOUNTANTS' AND AUDITORS' BOARD : Manual of Information for the guidance of Registered Accountants and Auditors: Johannesburg: 31st January 1966: p.91.
- (13) Editorial : "Announcements by the Public Accountants' and Auditors' Board - Qualifying Examination": The South African Chartered Accountant: July 1968: p.195.
- (14) These appeared in  
Paper 11 - 1958 - 20 marks, and  
Paper 111 - 1962 - 25 marks.
- (15) Papers prior to 1958 have not been examined as these were not available in Cape Town.

- (16) Editorial : "Continuing Education":  
The South African Chartered Accountant:  
November 1968: p.315.
- (17) JEFFERY, M.C. : Personal correspondence  
with the National Council of Chartered  
Accountants (S.A.): Ref. MCJ/MO: 6th  
November 1973.
- Unless otherwise indicated, Continuing  
Education details were obtained from  
this source.
- (18) 1st Day - Introduction to Computers; 2nd  
Day - Marketing; 3rd Day - Production  
Control; 4th Day - Financial Control;  
5th Day - Application.
- (19) Full details of course content and venues  
can be found in :
- THE NATIONAL COUNCIL OF CHARTERED  
ACCOUNTANTS (S.A.) : "Continuing  
Education Courses - 1969 Programme":  
Published as a Supplement to: The  
South African Chartered Accountant:  
November 1968.
- (20) JEFFERY, M.C. : Ibid.
- The courses involved here were Part 1  
(Computer concepts and basic programming)  
and Part 11 (High level program languages)  
of the subject 'Computer Training'.
- (21) JEFFERY, M.C. : Ibid.
- This was Part 111 of 'Computer Training'  
and was covered the area of Operating  
Systems, etc.
- (22) Editorial : "National Council meets on  
27th/28th November 1967": The South  
African Chartered Accountant: January  
1968: p.p.12-14.
- (23) Editorial : "Computer Training in South  
Africa": The Accountant: July 9th 1970:  
p.46.
- (24) The Management Consultancy section of  
Schwartz, Fine, Kane and Co. was involved  
here.

- (25) Full details of course content and venues can be found in :
- THE NATIONAL COUNCIL OF CHARTERED ACCOUNTANTS (S.A.) : "Computers for the Smaller Business": Published as a Supplement to: The South African Chartered Accountant: August 1970.
- (26) These courses dealt with 'Auditing Advanced Computer Systems' and 'The Auditor and Computer Bureaux'. This information supplied by :
- JEFFERY, M.C. : Ibid.
- (27) A personal letter was written to National Council on 12th July 1973 requesting particular information which could be useful in this thesis.
- (28) Details of this minute are referred to by :
- JEFFERY, M.C. : Ibid.
- The date of this statement was not given but it is presumed to be in 1971 when the number of courses given in the computer sphere were diminishing.
- (29) THE NATIONAL COUNCIL OF CHARTERED ACCOUNTANTS (S.A.) : C.A. (S.A.) - Continuing Education 1974/5: Johannesburg: January 1974.
- (30) E.R. Syfret and Mackeurton (in conjunction with Arthur Young and Company in the United States).
- (31) JEFFERY, M.C. : "Your Continuing Education": The South African Chartered Accountant: July 1970: p.p.261-263.
- (32) JEFFERY, M.C. : "Your Continuing Education": Ibid: p.262.
- (33) A 1 to 1½ hour course has been available for some time dealing with "Computers in Accounting" with BILL CLARK being the expert who is interviewed. This was also detailed in JEFFERY's article (to which footnotes (30) and (31) refer).

- (34) Editorial : "A.D. Reporting . . .":  
The South African Chartered Accountant:  
June 1972: p.p.211-212.
- (35) This figure is obtained from the National Council statement that "only the last third of the statement relates to auditing considerations". See :  
  
Editorial : "Notes and Comments : Third Statement on Auditing": The South African Chartered Accountant: January 1967: p.p.29-31.
- (36) Editorial : "A.D. Reporting . . . " :  
The South African Chartered Accountant:  
January 1972: p.24.
- (37) Editorial : "A.D. Reporting . . . " :  
The South African Chartered Accountant:  
March 1972: p.100.
- (38) Committee Report : Auditing Electronic Data Processing Systems: The National Council of Chartered Accountants (S.A.): Johannesburg: March 1972: 'Contents' page (not numbered).
- (39) Both in this Chapter, and in earlier Chapters, many footnotes refer to these editorials and comments. It is not considered necessary to detail the aspects dealt with as these have been previously covered.
- (40) One or two of the articles dealt with aspects of mechanisation - these are included in the computer context because of the general applicability of the principles of mechanisation to computer systems.
- (41) These figures were obtained through analysing back copies of the Journal. Where articles are regularly contributed by the same author, e.g. 'Tax Notes', they have not been classified as part of the 503.
- (42) Editorial : "Computer crisis coming": The Financial Mail: 11th September 1970: p.p.956-957.
- (43) It is of interest to note that the first ever degree course in electronic computers was announced by Harvard University in 1954. See :

Editorial : "Graduating in Electronics":  
Accountancy: October 1954: p.369.

- (44) The earliest evidence of such courses goes back to 1967, see :
- Editorial : "Notes and Comments": The South African Chartered Accountant:  
April 1967: p.p.134-137.
- However, from personal discussion with Associate Professor J.R.P. Morris (an ex-Wits lecturer) it appears that as early as 1964 such courses were being offered.
- (45) UNIVERSITY OF THE WITWATERSRAND : "Courses in Data Processing": Systems/Stelsels:  
January/February 1972: p.23.
- (46) STEELE, J.T. : Ibid: p.22.
- (47) This course was worked out in conjunction with the Computer Society of South Africa, and thereafter approved by the Department of Education. See :
- Editorial : "Improving the training circuits": The Financial Mail: 16th October 1970: p.p.240-241.
- (48) Advanced Technical Colleges are situated in Cape Town, Durban, Johannesburg, Pretoria, Port Elizabeth and the Vaal Triangle. All of these offer the course in question. See :
- Editorial : "First Computer for education": Business South Africa: August 1971: p.17.
- (49) Editorial : "Computer courses": The Financial Mail: 29th October 1971: p.416.
- This statement was made by FINE, L.H., who was interviewed for this article.
- (50) Editorial : "From the Provinces": The South African Chartered Accountant:  
February 1965: p.p.25-26.

COBOL'S DATA PROCESSING RECOMMENDATIONS

- (i) Systems analysis and design:
  - The stages in a systems project, i.e. volumes, requirements, etc.
  - Problems in the design of information systems
  - Information specifications, logic flowcharting and form design
  - Alternative methods, i.e. handwritten, mechanical, punched card and EDP
  - Management service function
  
- (ii) Automatic data processing (A.D.P.):
  - Storage and retention of records
  - Creation of input and output, including methods of capturing data
  - Installation methods
  
- (iii) Computer systems:
  - (a) Methods and terminology, including:
    - Feasibility
    - Systems analysis
    - Systems design
    - Input and output
    - Processing required
    - Controls
    - Forms
    - Coding
    - Creation and security of master files
    - Random and sequential access
  
  - (b) Processing, including:
    - Classification of computers
    - Basic hardware components
    - Central processing unit
    - Data representation

(iii) (b) (Contd)

- Operation
- Peripheral units
- Software and its importance
- Implementation

(c) Programming languages:

- Function of different languages
- Elements of program development
- In respect of one high-level language:
  - Description
  - Instructions
  - Sub-routines
  - Data formatting and editing
  - Labels
- Program preparation
- Program documentation

(d) Remote terminals and on-line and real-time applications:

- Time-sharing

The following aspects only require a 'General Knowledge' level:

- Non computer equipment capabilities
- Computer capabilities
- Applications and their advantages and disadvantages, including:
  - Simulation
  - Linear programming
  - PERT
  - Forecasting
  - Inventory control
  - Mathematical tool, e.g. FORTRAN
  - Current developments in available equipment and techniques.

THESE RECOMMENDATIONS ARE CONTAINED IN APPENDIX 'C'

COBOL'S E.D.P. AUDIT RECOMMENDATIONS

The audit of EDP installations:

- Effect of EDP on audit objectives and conventional techniques
- Hardware controls
- Program controls
- External controls over processing activities, namely documentation, master file control, exception reporting, etc.
- External controls over source and user departments
- Test decks; their preparation, purpose, advantages and disadvantages
- Analysis of program logic
- Use of computer as an audit tool, e.g. audit program, loop program, etc.
- Audit planning
- Implications of bureau applications
- Special audit requirements at the design stage - audit files, print-outs, etc.

THESE RECOMMENDATIONS ARE CONTAINED IN APPENDIX 'C' : AUDITING : p 2

## UNIVERSITY OF CAPE TOWN

(WITH WHICH IS INCORPORATED THE SOUTH AFRICAN COLLEGE)

DEPARTMENT  
OF  
ACCOUNTINGTELEPHONE 23389  
ORANGE STREET  
CAPE TOWN

I am at present involved in writing a M.Com. thesis on the subject of Computers and the Chartered Accountant in private practice, with special reference to South Africa.

One section of the thesis is concerned with the computer education given, at present, to both undergraduate C.T.A. students as well as qualified Accountants. In order to assist me in obtaining relevant information on this subject, would you please be kind enough to complete the attached questionnaire and return it to me as soon as possible.

I would be obliged if, in addition, you will kindly supply me with a 1973 prospectus for your Department.

Many thanks,

Yours faithfully,

Paul Sulcas  
Senior Lecturer  
Department of Accounting

**QUESTIONNAIRE ON UNIVERSITY COMPUTER EDUCATION  
IN THE FIELD OF ACCOUNTANCY**

---

**PLEASE MARK THE APPROPRIATE SPACE WITH A CROSS OR TICK**

1. Do you have a staff member who has had exposure to, and training in, computers and their applications?

YES	
NO	

If the answer is 'YES', what academic background does this person have?

- (i) a C.A. qualification
- (ii) a commercial degree/diploma other than a C.A.
- (iii) a science degree
- (iv) possesses no qualifications


If the answer is 'NO', do you intend appointing such a person before the start of the 1975 academic year?

YES	
NO	

2. Do you have a separate computer course in the C.T.A. curriculum of your Department?

YES	
NO	

If the answer is 'YES':

(a) Is the course handled by:

- (i) a full-time member of your Department
- (ii) a part-time member of your Department
- (iii) another University Department
- (iv) other persons or organisations (please specify)


.....  
.....  
.....

(b) In what year of study is it given?

1	
2	
3	
4	
5	
6	
7	

(c) How many lecture hours per year are allocated to it?

0 - 30	
31 - 50	
51 - 70	
over	

If the answer (to question 2) is 'NO', are aspects of computers handled as part of other courses?

YES	
NO	

If 'YES' please specify:

.....  
.....  
.....

3. Did computer questions of any kind appear in any of your year-end examination papers (including supplementary examinations) during the past five years?

YES	
NO	

If the answer is 'YES'

(a) in which year(s)

1973	
1972	
1971	
1970	
1969	

(b) On what aspects of computers were such questions?

Computer Characteristics	
Computer Auditing	
Computer Applications	
Other (please specify)	

.....  
 .....  
 .....

4. What emphasis do you feel should be put on Computer teaching in your Department?

A lot - Full course	
A reasonable amount - $\frac{1}{2}$ Course	
Very little - Part of existing course	
Touch on it only	

5. Do you envisage, within the next five years, having computer facilities (e.g. an 'on-line' terminal or a computer of any kind) in your Department?

YES	
NO	

6. The COBOK report specifies minimum computer knowledge requirements for future Chartered Accountants. Do you feel these are:

- (a) too advanced for an undergraduate?
- (b) at the correct level?
- (c) too elementary?


(In completing this question, please bear in mind that COBOK requirements will only be examined in the 1980 P.A.A.B. qualifying examination and thereafter.)

7. Are there aspects which you feel have been omitted in the COBOK computer requirements?

YES	
NO	

If the answer is 'YES', please specify:

.....  
 .....  
 .....  
 .....

8. Would you say that your present level of computer teaching meets the COBOK requirements?

YES	
NO	

9. Have any courses or lectures on computer subjects been given by your Department to qualified Chartered Accountants?

YES	
NO	

If the answer is 'NO':

Is it your intention to do so in the future?

YES	
NO	

COMPLETED BY:.....(please print)

CAPACITY:.....

UNIVERSITY:.....

DATE:.....

REPLIES TO COMPUTER QUESTIONNAIRE

QUESTION	UNIVERSITIES															TOTAL
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	
1 YES	X	X	X	X	X	X		X	X	X	X	X		X	X	13
NO							X									1
(i)		X	X		X	X			X		X	X			X	8
(ii)		X			X	X			X	X	X	X			X	8
(iii)	X		X	X				X						X		5
(iv) YES							X									-
NO																1
2 YES		X		X	X	X	X	X	X		X		X		X	10
NO	X		X							X		X		X		5
(a) (i)								X								1
(ii)																-
(iii)		X		X	X	X	X		X		X				X	8
(iv)																-
Other																-
(b) 1											X					1
2					X						X					3
3				X		X	X	X	X				X		X	7
4		X					X	X					X			3
5															X	1
6																-
7																-
(c) 0 - 30								X			X					2
31 - 50		X														1
51 - 70									X							1
Over 70				X	X	X	X								X	5
YES			X							X		X		X		4
NO	X															1
3 YES		X	X	X	X		X	X	X		X	X			X	10
NO	X					X				X				X		4
(a) 1973		X	X	X			X	X	X		X	X			X	9
1972		X	X	X	X		X	X	X		X	X			X	10
1971		X	X	X	X		X	X	X		X	X			X	10
1970		X					X		X		X	X			X	6
1969		X	X				X				X	X				5
(b) Computer Characteristics				X							X	X			X	4
Computer Auditing		X	X	X	X		X	X	X		X	X			X	10
Computer Application								X	X		X					3
4 Full Course	X	X		X	X	X			X		X	X			X	9
Half Course			X					X						X		3
Part of Course							X			X						2
Touch on it																-
5 YES	X			X				X				X				4
NO		X	X		X	X	X		X	X	X			X	X	10
6 (a)																-
(b)	X	X	X	X	X	X	X	X		X	X			X	X	12
(c)									X			X				2
7 YES			X					X	X			X				4
NO	X	X		X	X	X	X			X	X			X	X	10
8 YES	X	X		X	X	X	X	X	X	X	X	X			X	12
NO			X											X		2
9 YES												X				1
NO	X	X	X	X	X	X	X	X	X	X	X			X	X	13
10 YES	X			X				X				X				4
NO		X	X		X	X	X		X	X	X			X	X	10

## CONTRIBUTED COMPUTER ARTICLES IN THE SOUTH AFRICAN CHARTERED ACCOUNTANT

(Previously the South African Accountant)

<u>YEAR</u>	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	<u>TOTAL</u>
1974	-	2											2
1973	-	-	-	-	-	1	-	-	1	-	-	-	2
1972	1	1	1	1	-	-	-	-	1	1	-	1	7
1971	-	-	1	-	-	-	-	-	1	1	1	-	4
1970	-	-	-	-	-	-	-	-	1	-	-	-	1
1969	1	-	-	-	-	-	-	-	1	-	-	-	2
1968	-	-	-	-	1	-	-	-	1	-	-	-	2
1967	-	-	-	1	-	-	-	-	-	-	1	-	2
1966	-	-	1	-	-	-	-	-	-	-	-	1	2
1965	-	-	-	-	-	-	-	-	-	-	-	-	-

(Quarterly)

1964			1										1
1963			1									1	2
1962			-										-
1961			-										-
1960			-										-
1959			-										-
1958			-									1	1
1957			-										-
1956			-									1	1
1955			-										-
1954			-						1				1

## CONTRIBUTED ARTICLES IN THE SOUTH AFRICAN CHARTERED ACCOUNTANT

(Previously the South African Accountant)

<u>YEAR</u>	JAN	FEB	MAR	APR	MAY	JUNE	JULY	AUG	SEPT	OCT	NOV	DEC	<u>TOTAL</u>
1974	8	7											15
1973	3	4	3	4	2	3	5	2	7	5	9	3	50
1972	2	2	3	2	3	3	3	3	4	3	4	3	35
1971	3	3	2	4	3	2	3	2	1	1	3	1	28
1970	3	2	3	2	3	3	3	2	3	3	3	2	32
1969	2	2	2	2	1	3	2	2	3	4	3	3	29
1968	2	2	2	4	3	3	3	3	2	4	2	3	33
1967	-	1	1	2	1	2	1	2	1	2	1	2	16
1966	1	3	1	2	1	-	3	1	1	1	1	2	17
1965	2	2	1	2	2	3	3	3	2	3	1	1	25

(Quarterly)

1964		4			4			4			4		16
1963			6			7			5			5	23
1962			5			6			5			6	22
1961			4			5			4			4	19
1960			4			5			5			4	18
1959			6			5			5			5	21
1958			6			5			6			6	23
1957			7			5			7			7	26
1956			5			4			5			6	20
1955			5			4			3			5	17
1954			5			4			5			4	18

CHAPTER VII : CONCLUSION

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## CHAPTER VII : CONCLUSION

"It seems probable that no single development will ultimately affect the profession to a greater extent than the emergence of the computer."<sup>1</sup>

### 7.1 GENERAL

Since the early 1960's the worldwide growth in computer usage for data processing has been remarkable. Although this growth rate has diminished in recent years, it is likely that the computer industry as a whole will continue to thrive. With the introduction of smaller, lower cost systems, the potential market for computers is no longer confined to large organisations; the medium-sized firm can also derive appropriate benefits. This development has opened a whole new sales area which is significant to manufacturers, and which is well suited to South African business conditions.

In addition, when the cost of an in-house computer cannot be justified, an increasing number of organisations are looking to computer bureaux to handle all, or part of, their data processing requirements.

These developments have a clear cut implication for practising Chartered Accountants - the

computer has become part of the business environment in which the practitioner works. It is not a passing phase; it will not go away; it cannot be ignored and, although many firms have as yet been untouched by the effects of computers, it is unlikely that even the smallest firm will be unaffected in the very near future. This is because of the fact that "computer applications to accounting processes are proliferating; more and more organisations are using more and more computers in more and more ways".<sup>2</sup>

Without doubt, the greatest impact of computers on accounting firms has been, and will continue to be, related to clients whose records are processed and stored on computers. The degree of this impact depends upon many aspects, i.e.

- (i) the size of the client;
- (ii) the size of the accounting firm;
- (iii) the type of processing adopted by the client (in-house, time-sharing or at a bureau);
- (iv) the method of processing (batch or on-line/real-time); and
- (v) the complexity of the client's system.

Chapter II dealt with various aspects of computer auditing. No 'master plan' for doing such auditing work was suggested because

of the difficulty, and danger, of generalisation. Each client's application should be individually assessed, with a decision being made as to the approach which will be necessary in order to verify the accuracy and reliability of the data processing system, and of the records it produces. The alternative methods of auditing available to the auditor were outlined in the same chapter.

Closely allied to the increasing use of computers and growing audit responsibilities, is the provision of management advisory services. This is an area in which a wide range of opportunities present themselves to the practitioner. As discussed in Chapter III, there are various levels on which computer advice can be requested - few demand a specialist knowledge, or even specialist staff. Naturally, there are accounting firms which employ full-time computer specialists to cater for the particular needs of clients, but these tend to be found only in the large national or international firms. Should the accounting profession be unable to provide assistance, possibly through the lack of knowledge and expertise, the client would have no alternative but to look elsewhere - this is a fear expressed by many writers, including Shaw, who suggests that "unless the auditor learns quickly how to walk with EDP he will remain immobile and increasingly ignored in

his traditional accounting seat, and will inevitably become festooned with cobwebs and other insignia of obsolescence and decay".<sup>3</sup>

Computers have also had a considerable impact on the practitioner's own office. The range of possible application areas was highlighted in Chapter IV - in essence, it was demonstrated that the computer (perhaps via a service bureau) has the ability to cater for most of a firm's data processing activities. Computer 'packages' in this area are very common. In addition, it was suggested that, subject to suitable safeguards, it is feasible for a practitioner to offer data processing services to his clients. This realisation prompted the American Institute of Certified Public Accountants to undertake a research study into the basic considerations involved in utilising computers in an accounting practice. The report, which contained guidelines and much material of interest to a professional firm, was geared to the level of accounting firms which had little or no experience with computers.<sup>4</sup>

Although there has been controversy within the ranks of the accounting profession, it is submitted that the provision of services for clients (either advisory or computer facilities) would not affect the independence and/or impartiality of the practitioner vis-a-vis

his auditing function. This point was previously made in both Chapters III and IV.

The above are thus the main areas of the computer's impact on practising Chartered Accountants. But within each area, i.e. auditing, management consultancy (advisory) services, and the practitioner's own office, the influence has been considerable as is evidenced from the contents of Chapters II, III and IV.

## 7.2 SOUTH AFRICA

It attempting to relate world-wide trends directly to South African conditions, the immediate problem which arises is in relation to obtaining meaningful information about the local accountancy profession.

The questionnaire circularised by the COBOK Committee, does give some overall indication of professional attitudes, opinions, and techniques used, but the published results reflect conditions in the country in the early part of 1968.<sup>5</sup> Since then considerable developments have taken place, especially in terms of expansion in computer usage and investment (in monetary terms) in computer equipment and systems.

In similar fashion, the questionnaire at the

Computer Seminar in Cape Town<sup>6</sup> gives some indication, on a provincial level, of the computer's impact. But the results cannot be taken as indicative of countrywide practice.

The questionnaire circularised by National Council in relation to management consultancy within the profession solicited only 29 responses from accounting firms throughout the country. This was either a very poor reflection on the profession as a whole, or alternatively, it might be construed that only 29 firms engage in consultancy activities. It is suggested that the latter is the true position, especially in view of the subsequent failure of the management consultancy 'movement' in the profession.

While recognising the lack of complete information, an overall impression of the local accountancy profession, in relation to computers and the computer industry, was given in Chapter V. The picture which emerged was not encouraging for either the practitioner or his client.

The majority of practitioners, it would appear, do not have adequate computer knowledge to effectively perform audits involving computer-produced information or records. The lack of 'hands-on' experience and the fact that Chartered Accountants are not really

trained in systems analysis, design and appreciation, could mean that aspects are being overlooked, or not fully investigated, during auditing. Although the chief responsibility of the auditor is not fraud detection, he should exercise reasonable care to ensure that irregularities are not taking place. It follows that many auditors in South Africa might be giving their 'seal of approval', in the form of an Auditor's Report attached to the year-end financial statements, without considering the full implication of the client's computer system. As yet, there has been no liability claim made against a South African auditor for negligence in this respect, but it could well come about as has happened in America.

Outside the auditing sphere, the practitioner is largely limited in his ability to offer a client advice on computers. This was recognised by National Council, and in 1967 suggestions were made to 'refer' such clients to computer specialists within the accountancy profession. In principle, this idea was sound and its intention to keep consultancy activities within the framework of the local profession was well conceived. In practice "the referrals machinery is standing idle, not because it has been found defective or incapable of use . . . but because no operators can be found willing to use it".<sup>7</sup> As a

suggestion, or an experiment, referrals have thus failed.

There is also a reluctance among South African practitioners to convert parts of their practice administration, including work performed on behalf of clients, to computer-processing. In the business community, the trend towards increased computer usage is evident, and this should also hold good for practising accountants. Most computer service bureaux have standard 'packages' available to cater for the specific needs of a practice. The cost of using them is relatively low and numerous benefits, as explained in Chapter IV, can be derived.

If, as it is suggested above, there is a crisis looming for the profession in relation to computers, the question arises as to who is responsible for the current situation.

In the first instance this blame must be shouldered by National Council. Despite its efforts, no atmosphere of urgency has been created in relation to computers. What has been lacking is an official Report on the implications and ramifications of computers for Chartered Accountants (S.A.). This could have been modelled, as in New Zealand<sup>8</sup> on the Report of the Canadian Institute<sup>9</sup> and would then clearly detail present and future conditions.

It is suggested that the various Continuing Education courses on computers have not been entirely satisfactory in that the bulk of the presentations have been in the Johannesburg area, and the duration of some of the courses, particularly in 1969, have extended over fairly substantial periods. This time factor tends to dissuade practitioners from making a firm attendance commitment. There has also been no discernible attempt made to 'tailor' computer courses to the requirements of practitioners. For example, no survey was undertaken to ascertain the direction, and level of computer education which practitioners themselves feel is necessary. The courses presented to date have not made any allowance for these factors, and have rather tended to be 'generally applicable' in design and presentation.

National Council's official publication "The South African Chartered Accountant" has contained editorial comment and contributed articles on computers. By coincidence, the percentage of computer articles in relation to total articles is nearly the same as the computer courses' weighting in the COBOL syllabus recommendations.<sup>10</sup> However, in view of the significance of computers to Chartered Accountants, it is suggested that more emphasis could have been laid on computer subjects, perhaps by publishing specially commissioned articles.

Although an 'occasional' Statement on Computers is available, it is not regarded as a National Council 'official' Statement for the Members' Handbook. It is recommended that this position be remedied in the near future. In addition, a separate Statement is necessary to cater for a situation where a change of auditors takes place at a client who uses a computer. The liability and responsibility of the new and old firms must be clearly identified.

Practitioners themselves are also to blame for neglecting computers. For many it has simply been a case of formal education terminating on successful completion of the Final Qualifying Examination. This 'educational apathy' could be one of the reasons why National Council's Computer Continuing Education courses were discontinued in 1972 and 1973.

The number of practitioners who work with computers, whether for office routines or in auditing capacities, is not known. It must be fairly large in view of the number of computer installations and number of service bureau users. Yet very few good or bad experiences, or lessons learnt, are contributed to "The South African Chartered Accountant" for the benefit of other readers. An opportunity to disseminate valuable information is thus being lost.

It cannot be accepted that practitioners are too busy in their daily activities to find time to extend their involvement with computers. If this is the case, the long-term is being ignored and, as a result, practising Chartered Accountants will possibly ". . . be reduced to obtaining from those responsible for data processing, the information that it will require to fulfil a role which . . . may well have become purely statutory".<sup>11</sup>

The direction of accountancy under-graduate education at South African Universities has been prescribed by the recommendations of the COBOK Report. A major criticism of the Report relates to the lack of definition in the specified areas of required knowledge. The scope for interpretation is wide and it is suggested that this could cause a marked discrepancy in curriculum content between the different Universities.

Considering that COBOK's computer recommendations were taken almost directly from the Canadian Institute's Computer Report<sup>12</sup>, it is regrettable that the full specifications were not published, or at least referred to, in a similar fashion to that of the Canadian Report. In this way a detailed syllabus, and not a skeleton outline, would be available to teachers of accountancy.

As in South Africa, the Canadians had a three-

tiered knowledge level for emphasising the relative significance of the various areas of knowledge. Most aspects of computer auditing were recommended at an 'Expert Knowledge', i.e. the top level, yet for South Africa the COBOK Committee recommended only a 'Good Working Knowledge', which is the middle level. In view of the computer's significance in the South African business community, it is felt that the COBOK emphasis should have been at a 'Thorough Knowledge' level.

Similarly, the Canadian Report recommended that certain aspects of computers, apart from auditing, be taught at an 'Expert Knowledge' level, whereas COBOK specified only a 'Good Working knowledge' requirement for all such aspects. The major discrepancy relates to the ". . . Methods, Terminology and Alternatives of System Design".<sup>13</sup> This is an important area for practitioners especially in relation to computer advisory services, and should be emphasised at the undergraduate level.

From replies to question 7 of the questionnaire (see Appendix III, Chapter VI) which was circularised to all Universities in South Africa, it appears that the computer content of COBOK has adequately covered education at the undergraduate level. There are no glaring

omissions in the recommendations, possibly because of the lack of precise definition of terms used. For example, no mention is made of auditing 'on-line' or 'real-time' systems, but this could perhaps be read into 'installations' in the heading to the computer auditing section, i.e. 'The audit of EDP installations'.<sup>14</sup>

The COBOK Report is dated November 1969, yet its recommendations were only formally accepted by the Public Accountants' and Auditors' Board at the end of 1971.<sup>15</sup> There appears to be no valid reason for this two-year delay. It took another full year to have the revised syllabus officially integrated into the Public Accountants' and Auditors' Act. A further time delay was the decision to examine on the new syllabus only from the 1980 Final Qualifying Examination. Hence over ten years will have elapsed since the COBOK Report was presented, and over 13 years since the Committee was constituted by National Council in 1967.<sup>16</sup> There is no doubt that over such a period of time the requirements of the newly qualified Chartered Accountant will alter drastically, especially in the computer sphere where the pace of technological development is great and the number of commercial users is increasing rapidly. It is therefore recommended that a special Standing Committee be appointed to periodically review this situation and to make definite recommendations

for changes where necessary.

It must be recognised that Accounting Departments at South African Universities do have teaching difficulties in relation to accounting students. Generally the class sizes are large; part-time students are being catered for<sup>17</sup>; the teaching year is short; and suitably qualified staff is difficult to obtain. In addition, a fairly large number of students<sup>18</sup> are enrolled on a correspondence basis with the University of South Africa. Under such circumstances the integration of COBOK's recommendations could present particular problems.

In this respect, computer teaching appears to be one of the difficulties. Although most Universities replied positively to the questionnaire that they do have a staff member who has had exposure to, and training in computers, it appears that such persons are only 'quasi' staff members, i.e. they are in the full-time employ of another Department, but conduct courses for Accountancy students. If this presumption is correct, the only conclusion to be drawn from it is that teachers directly attached to Accounting Departments are lacking in computer knowledge. To remedy this unsatisfactory position it is recommended that appropriate courses be organised<sup>19</sup> during University vacations, and that selected

staff from all Universities attend. Financial sponsorship could be obtained from the various hardware manufacturers who are keen to educate potential users. Additional funds from National Council, Accounting Departments, and the lecturer's own 'attendance fee' (which should be kept to a minimum)<sup>20</sup> could ensure that all expenses are covered.

A further practical difficulty with computer teaching relates to giving the student 'hands-on' computer experience, or even exposure to a 'live' computer system. Many students still do not have the opportunity of working with computers during their articles of clerkship, and a direct involvement is necessary to ensure that the aspects being taught in University lectures are not of academic interest only. Accordingly, visits to installations, both at the University and outside, should be arranged. Computer bureaux are usually particularly helpful in this regard, especially during 'off-peak' times. Students enrolled at the University of South Africa should make their own arrangements with such organisations.

The overall evaluation of South African undergraduate computer education is that aspects of computers are definitely being taught at the different Universities. But what is being taught, the level at which it is being taught,

and who is doing the teaching, is not definitely known. It is clear that the questionnaire circularised to determine these facts did not provide sufficient detail to be able to validly answer these questions. The University Prospectuses are also vague in this respect. Only through a 'follow-up' questionnaire, supplemented by personal discussions and observation at the Universities themselves, will the correct picture emerge.

### 7.3 THE FUTURE

There can be little doubt that the computer has had, and increasingly will have, far-reaching implications on the accountancy profession throughout the world.

The future of the profession depends on the ability of its members to adapt to changing circumstances. Should this not be done it is foreseeable that a large section will be rendered obsolete by computer technology. This is particularly relevant for public accountants whose functions, other than attestation, could easily be replaced by individuals, or groups, with computer expertise. In view of the projected number of computer users, and the development of sophisticated systems, the attest function itself will require practitioners to have a fairly specialised level of computer knowledge.

Accountants must, therefore, carefully assess the consequences of the computer's impact and prepare an educational programme for the future. Only in this way can it effectively survive by continuing to maintain its practising standards.

#### 7.4 AREAS FOR FURTHER RESEARCH

As a result of this research project, the following topics are suggested for further investigation :

- (1) Management Consultancy Within the Accountancy Profession in South Africa - its size and range of activities.
- (2) A Computer Educational Programme for Chartered Accountants in South Africa.
- (3) The Nature and Extent of the Computer Service Bureau Industry in South Africa.
- (4) Guidelines for the Auditor's Responsibility and Work Performance in Relation to a Client Who Uses a Service Bureau for Data Processing Activities.
- (5) Guidelines for Understanding and Auditing Advanced Data Processing Systems.

FOOTNOTES - CHAPTER VII

- (1) Committee Report : "Computers and the Accountancy Profession in Canada": Published in The Canadian Chartered Accountant: Special Issue: August 1967: p.p.19-20.
- (2) ROY, R.H. and MacNEILL, J.H. : Horizons for a Profession: American Institute of Certified Public Accountants: New York: 1967: p.129.
- (3) SHAW, L.W. : "The use of the computer in the audit of Computer Systems": Accountancy: February 1967: p.p.101-107.
- (4) Committee Report : "An Approach To the Use of EDP In an Accounting Practice": American Institute of Certified Public Accountants: New York: 1968.
- (5) Committee Report : Report of the Common Body of Knowledge Committee on the Knowledge Required by the Future Newly Qualified Chartered Accountant and Other Matters: The National Council of Chartered Accountants (S.A.): Johannesburg: November 1969.

Appendix A (page 4) contains details of the background to the questionnaire. It is stated here that "the combined document /i.e. the questionnaire/ was issued in April 1968, and a good response was obtained".
- (6) See sub-section 5.5 as well as Appendix 1 to Chapter V.
- (7) Editorial : "Seven Years Unlucky - referrals within the profession": The South African Chartered Accountant: March 1974: p.p.82-85.
- (8) Committee Report : "Implications of Computers and EDP for the Profession": Published in The Accountants' Journal: August 1970: p.p.2-24.
- (9) Committee Report : "Computers and the Accountancy Profession in Canada": Ibid.

- (10) Computer articles to total contributed articles is 30 to 503 which is approximately 6%. 16 courses were recommended by the COBOK Report of which 1 relates to computers - percentage here is also approximately 6%.
- (11) MORCEL, R. : "Accounting at the crossroads": The Canadian Chartered Accountant: May 1968: p.p.343-346.
- (12) Committee Report : "Computers and the Accountancy Profession in Canada": Ibid: Section 7: p.p.51-55.
- (13) Committee Report : "Computers and the Accountancy Profession in Canada": Ibid: p.52.
- (14) Committee Report : COBOK: Appendix C: Auditing: p.2.
- (15) In an unsigned roneoed letter from the Public Accountants' and Auditors' Board dated 3rd January 1972 (ref. Mr Myburgh E 5/1 E 1/8/4) addressed to 'The Head of the Department of Accounting' it was stated "This is to inform you that at a recent meeting, the Education Committee of this Board adopted a revised curriculum for the Certificate in the Theory of Accountancy."
- (16) Committee Report : COBOK: Appendix A: p.1.
- (17) Even if the student attends on a full-time basis to obtain an undergraduate accounting degree, there is still one or more years of part-time study necessary during articles of clerkship.
- (18) The exact number has not been ascertained, but it is generally known that accounting enrolment is considerable.
- (19) This could be done under the aegis of 'The Society of University Teachers of Accounting' using lecturers who have appropriate computer/accounting experience.
- (20) It is not recommended that lecturers' attendance be free. The course should be looked upon as an 'investment' on a personal level.

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