THE NEED FOR THE EXTERNAL AUDITOR TO RELY ON INTERNAL E.D.P. AUDITORS IN COMPLEX COMPUTERISED ENVIRONMENTS (WITH PARTICULAR REFERENCE TO FINANCIAL INSTITUTIONS).

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DECLARATION

I declare that this Research Essay is my own, unaided work. It has not been submitted before for any degree or examination in this or any other University.

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SUMMARY

Auditors need to understand the systems that they audit. Understanding the complex computer systems in very volatile financial institutions poses particular problems to many auditors. Users' changing needs, the competitive market, the critical resource shortage and increasing fee pressures are some of the reasons for increasing concern being expressed by external auditors. This essay addresses the possibility of internal auditors being used by the externals to assist in the area of auditing complex systems at financial institutions.

The head of internal audit and the internal E.D.P. auditor of five financial institutions, as well as the technical partner, the engagement partner and the computer audit partner at the seven audit firms involved in these audits were interviewed in this regard. In addition, the Information Systems manager as well as a senior executive from each of the institutions were involved in the research. Overall 27 external auditors, 13 internal auditors, 6 executive managers and 6 informations services/data processing managers were interviewed.

The interview was based upon the UK auditing Guideline AU408, which considers reliance on internal auditors. The interview form was split into two parts. The 'a' statements were treated as generalisations and the interviewees asked to give a conceptual answer on a 1-5 scale of disagreement through to agreement. The 'b' questions related specifically to the situation as it was perceived to exist between the auditor (internal or external) and the auditee. Here respondents gave a yes/no/ sometimes response.

The analysis of the responses indicated that external auditors can and should place reliance on the work done by the internal auditors; that internal audit should report to an independent body and be able to freely make contact directly with the external auditors; that internal audit departments should be subject to formal terms of reference, have a standard audit manual, include specialists in the department, have a wide range of resources available to them and be subject to planning and control. In addition, the internal audit department should be reviewed and reported on by the external auditors.

The Information Systems/data processing respondents were very negative about the auditors - they mostly had a low opinion of auditors in general and internal auditors in particular.

External auditors were adamant that, whilst they may rely to some extent on the work performed by internal auditors, the final judgement decisions were theirs alone; that internal audit tended not to be independent and that their terms of reference were not very broad.

Internal auditors were not always seen to be competent (by all the parties involved), were not sufficiently trained, and were not subject to any standards or code of ethics.

To improve their chances of being relied upon by the external auditors, the internal auditors need to address the following:

- work papers and evidence of work
- planning and control
- training
- documentation

- audit techniques
- internal audit management
- follow up on their work
- reports
- liaison with external auditors
- timing of the audits.

Additionally the attitude of both executive management and the external auditors needs to change, as well as the reporting level within the organisation of the internal audit department.

Finally, the research indicated that for the external auditors to be seen to be relevant and to be adequately auditing in the complex changing environment of information processing, it was inevitable for an increasing amount of reliance to be place on internal auditors.

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CHAPTER 1

INTRODUCTION AND FORMULATION OF THE PROBLEM

'I must create a system
or be enslaved by another man's;
I will not reason and compare;
My business is to create.'
William Blake

'The work of internal auditors cannot be substituted for the work of the independent auditor'. With this sentence, STATEMENT ON AUDITING STANDARDS No. 9 (SAS 9) seemingly eliminates the possibility of external auditors relying on the work of internal auditors. However, given that Generally Accepted Auditing Standards (AU 015) require the auditor to '...ensure that he has an understanding of the entity's accounting system and related internal controls' (even in the environment of complex computer systems), can the auditor comply with this requirement?

For the purposes of this essay a complex computer environment is considered to be one where the following are in place:

- a main frame computer
- a sophisticated operating system
- a communication network (W.A.N.) linking at least 500 terminals
- over 50% of the processing is on-line/real-time
- a not insignificant portion of the processing is transparent to the user (interest calculations, direct debits, etc.)
- five million or more transactions per month
- where the business of the firm would be significantly affected if the system went down.

It would appear that audit standards can only be complied with in this type of environment by either spending an inordinate amount of time on the audit or by relying to some extent on the internal auditor. Historically this has been seen to be unacceptable but, more recently, the Institute of Chartered Accountants in England and Wales has issued AUDITING GUIDELINE AU408, which, inter alia, says that 'certain of the objectives of internal audit may be similar to those of external audit, and procedures similar to those carried out during an external audit may be followed'. The guideline suggests that the external auditor should make an assessment of the internal audit function 'in order to be able to determine whether or not he wishes to place reliance on the work of internal audit'. The guideline goes on to indicate that the external auditor may be able to place reliance in the areas of 'documentation and evaluation of accounting systems and internal controls as well as compliance and substantive testing' (statement AU 408).

Cognisance needs to be taken of where the audit function fits into the organisation. The scope and objectives of internal audit of necessity vary widely and are, according to the statement, 'dependent upon the responsibilities assigned to it by management, the size and structure of the enterprise, and the skills and experience of the internal auditors'.

The guideline further deals with the relationship between external and internal auditors and it indicates that 'although the extent of the work of the external auditor may be reduced by placing reliance on the work of internal audit, the responsibility to report is that of the external auditor alone and therefore is indivisible and is not reduced by this reliance. As a result, all final judgements relating to matters which are material to the financial statements or other aspects being reported on,

must be made by the external auditor'. This spells out a tremendous limitation on the ability of the external auditor to place any real reliance on the internal audit function.

The guideline indicates that the external auditor's assessment of the likely effectiveness and relevance of the internal audit function will influence his judgement as to whether he places any reliance on internal audit. 'Consequently, the external auditor should document his assessment and conclusions in this respect, and he should update his assessment year by year.' Additionally, in the event that he assesses the internal audit function to be weak or ineffective, he should not rely on it and 'should inform management in writing of the significant weaknesses .... his reasons for not placing reliance on their work and his recommendations for improvement'.

The guideline then re-emphasises that 'the external auditor should be involved in the audit of all material matters in the financial statements, particularly in those areas where there is significant risk of mis-statement. High audit risk does not preclude placing some reliance on internal audit, but the external auditor should ensure that the extent of his involvement is sufficient to enable him to form his own conclusions.' However, it does not stipulate that a high risk area (like foreign exchange transactions) which is not material on the financial statements cannot be audited by internal auditors and then relied upon totally by external auditors.

On balance this guideline appears to be a far more liberal or pragmatic document than SAS9. Whilst still rejecting the concept of total

reliance through to the reporting phase, it does, in part, move towards some form of reliance.

The need for reliance on internal audit stems from the fact that the range of available computer hardware and software is extremely wide and the political climate causes concern for the continued supply of support in this area as well as a significant impact on the resources at the disposal of the auditors and their clients.

A feature of the South African computer environment (unlike the USA or UK) is that it is not dominated by a single supplier. 'Computerweek' (November 24, 1986) indicates that the projected computer-related expenditure for 1987 in South Africa is as follows:

	MILLIONS	%
ISM	460	19,0
UNISYS	290	12,1
ICL	210	8,8
REUNERT	180	7,0
OLIVETTI	120	5,0
N.C.R.	80	3,0
HEWLETT-PACKARD	80	3,0
SIEMENS	60	2,5
SILTEK	60	2,5
CONTROL DATA	60	2,5
OTHERS	800	33,6
	R2 400	100%

Additionally there is a wide diversity of hardware and software within this relatively small market. It is not easy for an auditor to become totally familiar with several environments and specialisation is not an economic option. This may well impact on the ability of the auditor to audit adequately.

A further feature of the economic and political climate today is that a supplier may well go bankrupt or withdraw his services due to sanctions. Consequently a client could have a relatively sophisticated system which is totally unsupported (with manpower or updates). The audit implications here, as well as the concept of 'going concern', need to be thoroughly considered.

The SA Institute of Chartered Accountants has issued a 'Guideline on Computer Audit Skills levels' (Appendix 4). In it the various skill levels for Chartered Accountants carrying out an audit of computerised systems are identified. Particularly pertinent is the level 3 (highest level) definition. It is as follows:

> 'A detailed factual knowledge of the topic, its background and related topics. An ability to employ original thinking, exercise flexibility and a sufficient depth of understanding in tackling complex and unusual situations.
>
> (d) Sometimes the skill levels that are necessary for an assignment could be different from those identified because of the complexities within the computer environment.'

Given the range of hardware, operating systems, complex applications, scarcity of resources and the continued downward pressure on audit fees in South Africa, it may well become very difficult for external auditors to realistically audit their major computerised clients in terms of generally accepted auditing standards.

In view of the importance of this consideration this research will establish the views of interested parties (external auditors, internal auditors and executives) in order that meaningful conclusions can be drawn on this and other critical issues. In order to focus the research, the

scope is limited to the audit environment of the larger financial institutions in South Africa all of which meet the criteria of using complex systems. At the same time they also pose significant risk considerations to their respective auditors.

CHAPTER 2

LITERATURE SURVEY

'Nobody - not the designers,
not the operators, not the users
- knows what a complex system does.'

Coates Law

Berry (1985) stresses that 'SAS No. 9 does not recognise the contribution that internal auditing as a profession is making to the external audit ... it assumes that internal auditors have a minor, passive role in the external audit when, in fact, they perform a significant portion in many cases ... the public accounting profession would do well to give professional credit where it is due.' He goes on to suggest that SAS9 was written at a time when and on the premise that internal auditors were not as competent and as independent as they should have been. However, times have changed and he suggests that internal audit staff should be evaluated the same way and with the same attitude that another public accounting firm would be evaluated when its work is to be relied upon. Berry goes on to state that SAS9 should be changed 'to portray the internal auditor as more of a partner in the accomplishment of the external audit and to eliminate the elitist position held by the external auditor.'

There are two factors which account for the lack of documented research on the reliance placed by external auditors on internal auditors. The first is that Internal Audit has only recently attained a level of full acceptability in the United States of America by the public, management and by external auditors. This has been achieved largely due to the fact that the Institute of Internal Auditors came into being in the US in 1941 and in the UK in 1947. Today their memberships are in the tens

of thousands. The I.I.A. started up on South Africa in the mid 1960s, but only really began to achieve credibility in the early 1980s. Today the membership has just broken the 1 000 barrier.

The other factor is that computer auditing is relatively 'new', having only really come into its own in the late '60s. Also the complexity of computerised financial applications has only intensified in the last decade - to the extent that companies such as financial institutions, are now totally reliant on their computer systems (from the point of view of complexity as well as volume).

Supporting the first factor is a recent survey of internal auditing in the UK by Selim (1987).

In this survey (conducted in mid-1985 by the Institute of Internal Auditors amongst 2 000 organisations in the UK) an attempt was made to indicate likely future trends within internal auditing. The response rate was 35% and the average number of years that the respondents indicated that they have had internal audit departments was 18,5. Nationalised industries, water authorities and local authorities all indicated a longer history of possessing an internal audit department, while private sector companies and financial institutions tended to have set up this department more recently. Selim indicated that:

> 'The provision of internal audit services is greatly enhanced if the management of the organisation issues policy statements covering the scope, authority and responsibility of internal audit. In the UK, 78 per cent of organisations issued such statements, while in the international surveys the figure was only 64 per cent - well below UK practice. Moreover, 85 per cent of UK internal audit departments have no restrictions in their departments' policy statements.'

A similar survey to the UK one is currently being conducted in South Africa by the Institute of Internal Auditors, Deloitte, Haskins and Sells, and the author. What the UK survey indicated is that the use of internal auditors by government and provincial bodies predated their use by commerce and industry. Since in SA only commerce and industry are audited in terms of the Companies 1973 Act, it would appear that the UK pattern will be mirrored in the South African survey. This would imply that there has been less opportunity for a close working relationship to have developed between internal and external auditors in the corporate environment. Not being solely profit motivated, but rather control orientated may have, in some way, assisted with the early introduction of a 'cost centre' department into the government/provincial sector.

Selim (1987) addresses the specific aspect of auditor relationships and indicates that it is a major area of concern. '.... in 60 per cent of the organisations the internal auditor has access to the external audit plan - up from 45 per cent in 1976. In almost all cases (95 per cent) the external auditor has access to the internal audit plan (63 per cent in 1976).' A majority of the responses indicated that the 'development of internal audit has affected the character and extent of reviews conducted by external auditors.'

The survey also considered the significant expansion in the use of computers over the last decade and the impact thereof on the auditors. Selim (1987) indicates that problems have been encountered 'in the areas of developing tools for use in testing the different controls incorporated in the system and in auditing such systems.' Most frequently computer applications and computer centre controls are the areas reviewed by internal auditors. 62 per cent of departments have installed a mini-

computer/time-sharing terminal in the internal auditing offices. 83 per cent of these have a communication facility, serving primarily audit interrogation. 14,8 per cent of audit staff are computer auditors and 56 per cent of departments use audit interrogation software - primarily FILETAB/USERTAB and EASYTRIEVE/PANAUDIT.

No mention, however, is made of any reliance by the external auditors on this work.

Harold Weiss (COMPACS Conference, 1986) argues that internal EDP audit is much stronger than external audit in the USA. His reasoning is based on the fact that internal auditors have a broader scope of activity with regard to information systems than their typical external counterparts; they are full-time on EDP audit; the economics of the situation allows them to spend longer periods on the key corporate systems than their external colleagues and they train their staff more in new technology. Internal auditors also use advanced techniques more extensively than external auditors. He believes that in the United States of America, external auditors need to rely extensively on the quality of internal EDP auditing. He also believes that the vast increase in information processing has not been matched by a similar increase in the number of EDP auditors. He also does not see the demise of the EDP auditor - at least not in the foreseeable future.

Chen (1983) says that external auditors 'in encountering large and highly integrated complex systems, whose development may have taken up to an equivalent of 100 years in total accumulated work hours, it is difficult to make a knowledgeable and through evaluation of built-in controls within the short time span typically allocated for this purpose

during an annual audit.' He goes on to say that the 'internal auditor would be an ideal person to carry out this evaluation and report on the findings to the external auditor.'

Kropatkin (1987, page 37) further develops the line of thought that internal auditors can be relied upon. He says 'External Auditors do not make sufficient use of internal audit staff or of in-house accounting or physical asset specialists. They tend to go it alone. This is neither cost-effective nor reliable. Timeliness of testing is the key ingredient of accuracy and control, and on-site personnel can assist in the examinations.'

The second factor referred to at the beginning of this chapter (dependence on computers) is addressed in a recent paper by Kralits (1987) entitled: 'Computer dependence and the external auditor's responsibilities.'

In the paper he highlights the problem of system failures in a computerised environment. Unlike a manual system, one cannot simply reassign groups of employees to manually perform the complex operations normally performed by the computer system. This emphasises the concern auditors should have for their client from a 'going concern' point of view and should require them to consider the level of 'business risk' that the client is exposed to. Business risk has been defined in the CICA's EDP Audit guideline as:

> 'Business risks associated with EDP may arise due to a lack of security over data, loss of data through equipment or systems failures where there are inadequate backup and recovery arrangements, and the unavailability of alternative compatible computer equipment in the event of prolonged equipment

> interruptions. Failures, losses, or interruptions of the types outlined above could result in serious repercussions for the client and could in extreme situations, jeopardise the client's ability to continue its operations.'

Kralits goes on to state that auditors should be required to take an active role in identifying these business risks when auditing and reporting contingencies, going concern or disclosing major control deficiencies to shareholders. Should this level of reporting be required of external auditors then their dependence on internal auditors would probably have to increase substantially.

Williams (1984) highlights the critical importance of Operating Systems and suggests that moderately knowledgeable users have complete and undetectable access to any information stored on the computer system. He indicates that auditors rely largely on user ignorance in assessing this area to be one of 'low-risk'. However, research in Australia indicates that 'auditor reliance on client ignorance is misplaced. Education and customisations encourage systems programmers and engineers to acquire the knowledge and skill to violate the integrity of the operating system.' He recommends that auditors gain familiarity with the functioning of the operating system so as to improve their ability to assess the risk element thereof. He does not give any recommendations to how auditors gain this familiarity.

A last comment on complexity comes from William Murray (1986):

> 'Let me refer once again to the words of Joe Coates. Coates's Law says that "Nobody - not the designers, not the operators, not the users - knows what a complex system does." We can take for granted that most of what a system does will be benign. If it were otherwise, the system's usefulness would be so limited that the system would be hardly noticeable, much less a problem.'

He indicates that most of the bad effects of a complex system will be limited, containable and correctable. Systems are typically fault tolerant and will work if 'most of the people do the right thing most of the time.' The risks will be acceptable if spread across all institutions, systems and users. However, a large number of systems will still have a very high risk. Management needs to ensure that their organisation is not in the high-risk group.

> 'We must now deal with multiple, connected domains in which control of hardware and software has moved to the users. We will require new functions to communicate and support our intentions. We will need new concepts that are as broad as the systems that we wish to control.'

If the everyday user does not and cannot understand the system he is using on a daily basis, what hope is there for the external auditor to come to terms with this complexity?

How is this complexity perceived in South Africa? Do the auditors believe they can adequately cope with this complex environment in its constant state of flux? How does the data processing professional see the role of the auditors?

Can the auditor effectively audit with the continued downward pressure on fees? Chen (1983) says that external auditors face a dilemma: 'How can they provide the type of service required when there is a limit to the additional expense clients are willing to absorb as part of their audit costs? This problem is exacerbated by the fast rate of technological advances.' Is the auditor able to effectively audit when the technology is changing as rapidly as it is? Garsombke and Tabor (1986) stress that there is a 'direct impact from these changing technologies on the audit

process relating to such areas as the study and evaluation of internal accounting control, the forms of audit evidence obtained, and the timing of audit tests.' They indicate that these changes have created problems for the auditor and that 'another result has been the creation of a gap between the expertise required of auditors to perform effectively in this changing EDP environment and their current expertise - and this gap is actually increasing.'

These are some of the more critical issues which need to be addressed in today's environment.

CHAPTER 3

RESEARCH PROCESS / METHODOLOGY

The purpose of this research was to investigate the perceived need for and ability of external auditors to rely on the work of internal auditors in particular situations in the South African context.

The survey was undertaken in order to establish the generalities of the issue, the extent of the problem and an overall understanding of the subject.

The approach used was adapted from that described by Simon (1979).

Research Approach

1. Statement of the Problem

2. Review of Literature

3. Formulation of Research Questions (where possible)

4. Choice of Research Method(s): Questionnaire/Interviewing, Content Analysis, etc. (whichever is best suited to problem selection and statement; and to the research objective).

5. Fieldwork (Administration of Method)

6. Analysis of Data

   - Coding
   - Computation

7. Presentation of Findings

The first two stages of the research, the formulation of the research problem and the review of the literature, have been discussed in previous chapters. The derivation and formulation of the research questions are addressed in greater detail below. The selection of the approach adopted and of the research methodology employed as well as the actual research undertaking are described in this chapter.

The research is of an exploratory nature, with the focus being on the opinions of external auditors, internal auditors and management and entailed the use of in-depth interviews. The attitudinal nature of the study resulted in a qualitative study based on a Likert scale being considered most suitable. Statements are presented to respondents and they are required to rate them according to the degree to which they accept or reject them. The opinions of the participants are elicited in this manner on a 1 to 5 scale.

THE INTERVIEWS

The interview approach to research is time consuming, and expensive, particularly if the interviews are intended to address the issues in some detail. The number of participants therefore had to be limited. The actual users of auditors' services (able to draw on their experience as opposed to mere expectations) were considered to be the critical class, justifying such an in-depth study. As such, external auditors as well as management were asked to give their opinion of internal auditors from a theoretical viewpoint as well as one based upon the internal audit department at the financial institution.

The interview technique used was a 'non-standardised, non-scheduled interview' (Simon, 1979). All interviews were conducted personally by the researcher as it was felt that an in-depth knowledge of the auditing environment was required for detailed discussions with the interviewees.

The discussion interview form was based on items highlighted in the U.K. Auditing Guideline. Five major financial institutions were approached (First National Bank, Standard Bank, United Building Society, Permanent Building Society, Allied Building Society) - see Table 1. The Chief Executive Officer of each of these institutions was contacted to seek permission to interview both personnel in the company as well as the two firms of auditors involved in the audit of each institution - see Table 2.

In addition the head of internal audit as well as the EDP auditor were interviewed. Furthermore, an executive perspective of the audit function was gained from a senior executive director as well as an I.S. manager. Contact was made with the external audit firm by discussion with a senior or technical partner and then specifically with the audit partner and computer audit partner/manager responsible for the client.

TABLE 1

ANALYSIS OF FINANCIAL INSTITUTIONS

	RANKING	INSTITUTION	TOTAL ASSETS :R M	MANAGEMENT INTERVIEWED
BANKS				
	1	First National	16 321	Yes
	2	Standard	13 166	Yes
	3	Volkskas	7 917	No
	4	Trustbank	6 307	No
	5	Nedbank	6 113	No
BUILDING SOCIETIES				
	1	UBS	7 378	Yes
	2	PERM	5 600	Yes
	3	Allied	5 227	Yes
	4	NBS	2 380	No
	5	Saambou	1 973	No

Adapted from Top Companies, Supplement to Financial Mail, May 22, 1987.

TABLE 2

ANALYSIS OF ACCOUNTING AND AUDITING FIRMS

RANKED BY NUMBER OF LISTED COMPANIES AS AUDIT CLIENTS		AUDITORS OF F.M. TOP 100 COMPANIES	PARTNERS INTERVIEWED
1	AIKEN & PEAT	21	YES
2	PIM GOLDBY	4	YES
3	DELOITTE HASKINS & SELLS	17	YES
4	ERNST & WHINNEY	7	YES
5	THERON DU TOIT	7	NO
6	COOPERS & LYBRAND	3	YES
7	ARTHUR YOUNG	3	NO
8	PRICE WATERHOUSE	3	YES
9	ARTHUR ANDERSEN	8	NO
10	KESSEL FEINSTEIN	1	NO
11	FISHER HOFFMAN STRIDE	1	NO
12	MEYER NEL ALTMANN & BRUGMAN	1	NO

Contact was also made with Samuel Thomson and Young.

Adapted from 'Top Companies' Supplement to Financial Mail, May 22, 1987.

The interview was based upon the UK Auditing Guideline AU408 which considers reliance on internal auditors. The questions listed here emanated from the guideline :

1 Is any reliance placed on internal audit in any area of material significance?

2 Is there any final judgement relating to matters which are material to the financial statements or any other aspects on which the external auditor is reporting on, made by internal audit? If so, what area?

3 Is internal audit truly independent?

4 Who do they report to in the organisation?

5 Can they freely make contact with the external auditors?

6 Is it likely that the internal auditor is subject to a conflict of interest?

7 Who is responsible for the appointment, promotion or remuneration paid in the internal audit department?

8 Are there formal terms of reference covering internal audit? If so, how wide are they? Are there any restrictions?

9 Are there 'specialists' in the internal audit department?

10 Are the internal auditors subject to planning and control?

11 Is their work adequately reviewed? By whom?

12 Are the standards laid down in the (internal) audit manual complied with? How is supervision carried out? Is there adequate quality control and what is the reporting and follow-up like?

13 How competent are the internal auditors? How are they trained? Do they have to be members of professional societies? How do they achieve practical experience?

14 How good are the reports emanating from internal audit?

15 What resources are available to internal auditors?

16 Have the external auditors ever reported on their assessment of internal auditors (or lack of an internal audit function)?

17 If the external auditor is placing reliance on the work of internal auditors, how effectively is it reviewed?

18 If internal audit is not relied on, what should be done to enable external audit to rely on their work?

19 How dependent is the company on computerised systems?

20 How often (with regard to financial systems) is a backup or alternative processing situation called into being? How is this audited?

21 Do you use the same criteria to establish the extent of compliance testing in the DP environment as you would if testing transaction controls?

The following questions were specifically directed to external auditors:

22 How do you manage to maintain or develop resources of the calibre referred to in the SAICA guideline on computer audit skills?

23 Auditing Standard AU 010 requires the auditor to 'understand the system and related controls' of the system being audited. What does this mean to you if you rely on the control? Secondly, if you do not rely on the control?

24 Do you really believe you are auditing in terms of the above definition?

25 If not, how do you justify continuing with the audit?

26 Who reviews the work of specialists in your firm?

27 In the context of internal audit work who would be responsible for reviewing their work?

28 In the area of computer auditing, do you see the SAICA as giving external auditors sufficient direction in this area?

A copy of the actual interview form used is presented in Appendix 5. The 'a' statements were treated as a generalisation whilst the 'b' statements/questions related specifically to the situation as it was perceived to exist between the auditor (internal or external) and the auditee.

The Technical Partner of the audit firms involved were only asked to respond to the 'a' statements - to give a response on behalf of the audit firm, as such, to the theoretical considerations of reliance. The audit partner responsible for the audit of the financial institution as well as the computer auditor involved were asked to respond to the 'a' statements,

the 'b' questions (in respect of the actual financial institution client) as well as the last section of the questionnaire which only related to the external auditors and their perspective of things (from statement No. 22 onwards).

Within the company the employees (auditors, computer personnel and executives) were all asked to respond to the 'a' statements and 'b' questions, but not to the last part of the questionnaire.

CHAPTER 4

RESULTS

INTERVIEW RESPONSE

A potential bias in the interview sample is recognised in that the interviews were conducted with a limited number of financial institutions as well as their auditors. These auditors and managers have had extensive experience with the process of audit and generously gave a good deal of their time for the interviews. The depth of experience of the interviewees allowed the focus of the discussions to be placed on the practical issues as well as the theoretical. Although the number of interviewees may be considered small, the emphasis in the research was on an in-depth discussion of the topic. A listing of persons interviewed is given in Appendix 6.

Overall 27 external auditors, 13 internal auditors, 6 executive managers and 6 information services/data processing managers were interviewed.

At no time did any of the companies or auditors refuse to participate in the research although some external auditors were somewhat concerned with the disclosure of information to third parties.

ANALYSIS OF DATA

The interviewees were categorised into seven different components - Engagement partner, Computer Audit partner/manager, Technical partner,

Internal Audit Head, Internal Computer Auditors, I.S. or D.P. Manager and Executive Manager.

For the purposes of data analysis, however, this was found to be too cumbersome so the respondents were regrouped into only three groupings:

- Group 1 External. This included all the external auditors - engagement, technical and computer audit.
- Group 2 Internal. This included all the internal auditors - head and computer audit - and the executives.
- Group 3 D.P. This included all the I.S. and D.P. managers.

In turn, most of the analysis was done with groups 1 and 2 - as this was the essence of the research. To facilitate the analysis, use was made of the SPSS computer Package. Appendix 7 details all the analyses performed on the data.

In the remainder of this chapter reference is made to only those items that clearly indicate a divergence of opinion or an agreement of opinion between the external and internal groups.

The 52 cases analysed were captured in two batches - one of 23 cases and the other of 29 cases. The means were compared to ensure that the samples in each case were reasonably similar and that they probably did not include aberrant responses. As the means were very similar the two batches were then merged prior to using the SPSS package (Version M, Release 9.1) to produce the analysis reports reproduced in Appendix 7.

The mean can only be considered where respondents were asked to indicate their answers on the 1-to-5 scale. Where they were asked to indicate a 'Yes/No/Sometimes' response these have been manually tabulated and the results are reported in the text that follows.

In addition to generating the means for all the respondents, discriminant analysis was initially used between the three groups as described. However, due to the fact that the D.P. group only consisted of six interviews, it was decided to use this analysis technique on only the two larger groupings - the external group and the internal group.

The result of this was to show that only one discriminant function was derived and this is plotted as a histogram (see Figure 1). The questions/statements which most discriminate the external group from the internal group were found to be the following :

2a Internal audit can make final judgements relating to matters which are material to the financial statements.

12b.1 How formally/informally is supervision within the internal audit department carried out ?

14b How good are the reports emanating from internal audit ?

17b If the external auditor is placing reliance on the work of internal auditors, how effectively is the work reviewed?

19a Sophisticated information processing is fundamental to business success.

12b.2 Is there adequate quality control and what is the reporting and follow-up like ?

11a Original work must always be reviewed.

The statements/questions put to the respondents can be grouped into the following areas:

Reliance on internal audit

1A, B; 2A, B; 16A, B; 17A, B: 18A, B

Reliance on computer systems

19A, B; 20A, B; 23A

Quality of internal audit

3A, B; 15A, B

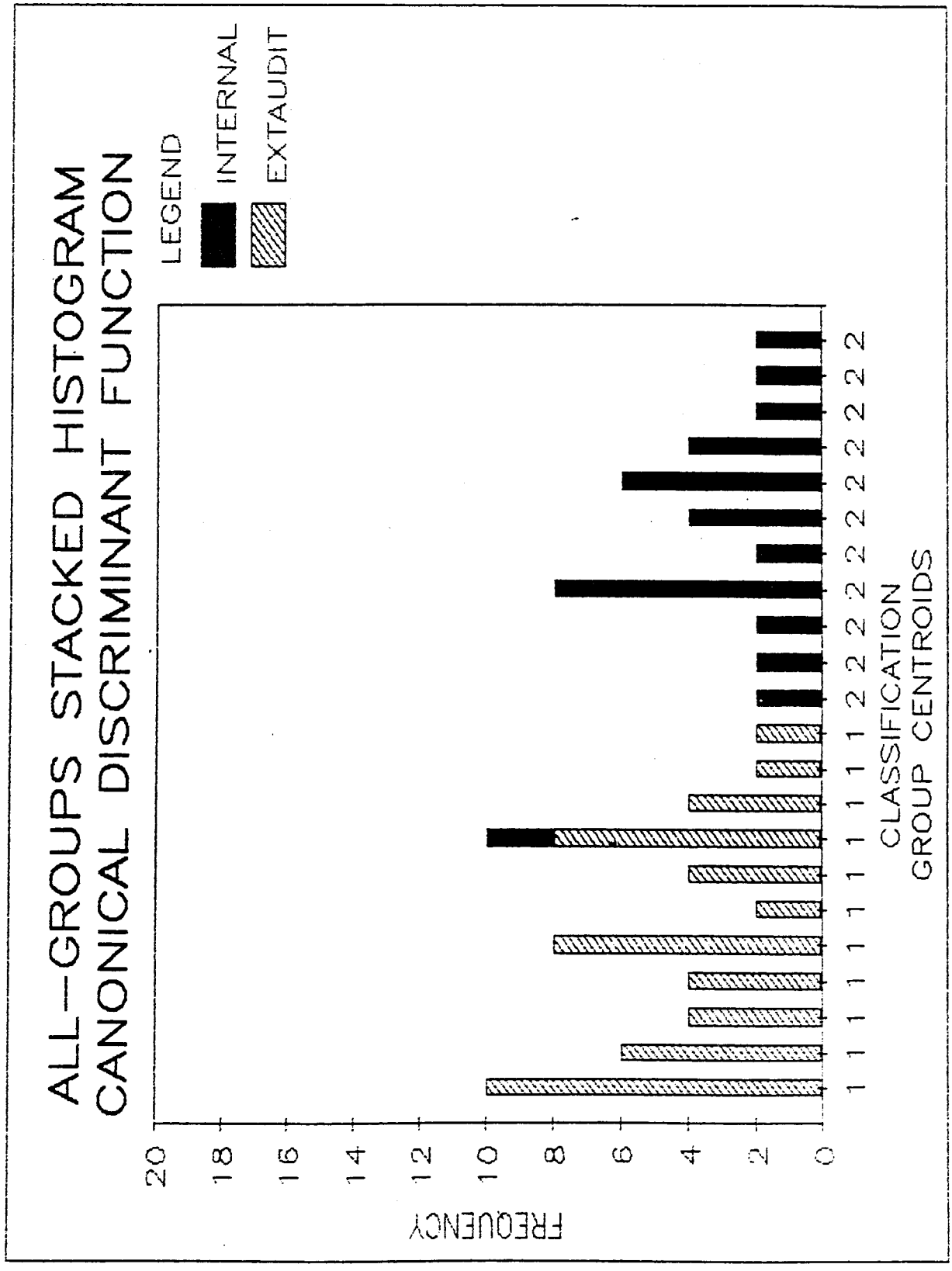
Quality of external audit

23B

Audit of data centres

21A, B

FIGURE 1


ALL—GROUPS STACKED HISTOGRAM
CANONICAL DISCRIMINANT FUNCTION
LEGEND
INTERNAL
EXTAUDIT
FREQUENCY
20
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CLASSIFICATION
GROUP CENTROIDS

Discriminant analysis can also be used as a powerful classification technique. By classification is meant the process of identifying the likely group membership of a case when the only information known is the case's values on the discriminating variables. In the case of the external group all of the 27 external cases predictably fell into that classification. However, of the 19 internal cases only 18 are classified as such with one case fitting better into the external group! Perhaps this case is related to an external auditor who has recently moved across to the internal audit department or to an executive management position at one of the institutions involved in the research.

CLASSIFICATION RESULTS

ACTUAL GROUP	NO. OF CASES	PREDICTED GROUP MEMBERSHIP 1	2
GROUP 1 EXTAUDIT	27	27 100,0%	0 0,0%
GROUP 2 INTERNAL	19	1 5,3%	18 94,7%

PERCENT OF 'GROUPED' CASES CORRECTLY CLASSIFIED: 97,83%

ANALYSIS OF STATEMENTS/QUESTIONS 1a - 21b

The areas of agreement between external and internal auditors were many. Based on the responses to questions/statements where an overall mean (from 52 responses) in excess of 4.0 was achieved, the following could be established :

- Reliance <u>can</u> be placed on internal auditors in an area of material significance. The mean for the external group was 4.0 and for the internal group a slightly higher 4.5. However, in answer to the question : 'Is any reliance placed on internal audit in any area of material significance ?' only 16 respondents said 'Yes,' whereas 7 said 'no' and 20 said 'some'.

- Internal audit work <u>should</u> be relied upon by external audit. The overall mean for this statement was 4.4 with the external group only just coming in at a lower mean of 4.4 compared to the internal groups 4.5. The external group saw the following areas of improvement to be required before reliance could actually take place :

'Improve work papers and evidence of work.'
'Improve planning and control.'
'Need more experience and training.'
'Better documentation.'
'Employ more competent staff.'
'Accept review by external auditors.'
'Improve quality - standards, training, people and techniques.'
'Report at higher level.'
'Follow up on their work.'
'Improve management of their Department.'
'Set and clarify objectives.'
'Ensure independence.'
'Improve liaison with external auditors.'
'Work with externals in designing audit programmes.'
'Specialise in key areas.'
'Improve structure and expertise.'
'Timing of audits.'

'Follow up on their reports.'
'Develop trust in each other.'
'Improve level of computer auditing.'
'Improve understanding of implications of new technology.'
'Develop a code of ethics.'

Overall it appears as if the external group need to see a dramatic improvement in the quality of internal audit staff before they could consider any form of reliance.

The internal group saw the following as being necessary :

'education of the external auditors as to the effectiveness of internal auditors.'
'Improve training of the internal auditor.'
'Improve communications - both ways.'
'Agreements on appropriate standards'
'Mesh audit programmes.'
'Internal auditors should adopt a risk related audit approach rather than a compliance one.'
'Improve quality and effectiveness of the available resources.'
'Seen to be independent.'
'Internal audit needs more definition.'
'Documentation must be improved.'
'External auditor lacks specific knowledge and thus does not appreciate usefulness of internal auditors.'
'Internal audit outlook must be broadened.'
'Effective review by external auditors of the I.A. department and work being done.'
'Establish external audit requirements.'
'Timing of internal audit work must be changed!'
'External auditors should review the I.A. methodology.'
'Use external auditors to train staff.'
'Swap staff with external auditors.'

The I.S./D.P. respondents did not have any suggestions in this area. They mostly had a low opinion of auditors in general and internal auditors in particular.

- Internal audit <u>should</u> report to an independent body. Here the overall mean was 4.4 with the external group indicating a mean of 4.2 and the

internal group a mean of 4.7. However, in answer to question 4b 'at what level does internal audit report in the organisation?' 65% indicated a '3' or lower (too low a level) and the internal group mean was just over 4.0. This could mean that internal audit is seen to be reporting to too low a level than what should be appropriate.

- Internal audit should be (and is) free to make contact with the external auditors. The overall mean here was 4.9 and 42 out of 43 respondents said this was the case in their organisations.

- Internal audit departments should be subject to formal terms of reference, have a standard manual, include specialists, have a wide range of resources available to them and be subject to planning and control. In addition there was consensus that audit departments should never be subject to a conflict of interest. However, four out of the 43 respondents said that the internal auditors were subject to conflict of interest and a further 25 said that there was 'some' element of conflict. An indication of this conflict is highlighted by the response to the question : 'Can internal audit play a role in disaster recovery ?' Whereas 20 respondents said a categorical 'Yes' and a further 11 said 'Some', 12 respondents gave an emphatic 'No'.

- External auditors should review and report on Internal audit departments. Overall the mean here was 4.2. The external group was more in favour (4.3) but the internal group was also in relative agreement with their mean being 3,9. However, if one expects the external auditors to rely on the work performed by internal auditors then it is probably not unreasonable to expect the external auditors to want to review the department.

- External auditors should review the work of the internal auditors. There was greater consensus for this aspect than the suggestion of actually reviewing the internal audit department. Here the overall mean was 4.5 with the external group indicating 4.7 and the internal group 4.3. Clearly both groups recognise benefit in this aspect. However, in answer to the question 'How effectively is the work being reviewed ?' only 33% of the respondents said 'Very effectively' (a 5 or a 4). This would indicate an area of expected improvement by both groups.

- The data processing environment should be subjected to the same level of audit and testing that the audited financial systems are. The internal group was marginally more in favour of this (4,89) than the external group (4,81).

So much, then, for points of agreement. What of conflict or disagreement? Statement 2a addressed the issue of internal auditors making final judgement decisions. Whereas the internal group scored 3.0 on the 5 point scale, the external only indicated a 1,37 level which points to major disagreement with this possibility. As indicated earlier in this chapter this was the key opinion which discriminated between the external and internal groups. Obviously the external might be prepared to rely on work done by internal auditors, but not to the extent of allowing them to make any final judgements on matters material. Only two respondents indicated that internal auditors made final judgement decisions, 7 indicate 'some' and 34 said 'no'.

Another point of disagreement occurred around the statement that internal audit can be truly independent. Here again the internal group

indicated a relatively high 4,1 mean. The external group only indicated 3,4. Overall 12 respondents said that internal auditors were in fact independent, 21 said somewhat and 10 indicated that this was not the case. Thus one could conclude that internal auditors could always be seen to be something less than totally independent.

Similarly a mean of 3,5 by the internal group indicated a perception of greater breadth/width to their formal terms of reference than the 2,4 indicated by the external group. Of interest is the fact that 15 respondents said there were some restrictions imposed on the scope of the activities of internal auditors.

In discussion with the various respondents it was apparent that there was concern about supervision, quality control, reporting standard and commitment to do follow-up work by the internal auditors. Questions 12b1 and 12b2 indicate the different perceptions that the two groups have on these important aspects. In answer to the question 'How formally is supervision carried out?' the internal group indicated a relatively high 3,9 compared to the 2,1 of the external group. Similarly in answer to the question, 'Is there adequate quality control and what is the reporting and follow-up like?' The results were 3,9 and 2,2 respectively. This is an obvious area to be addressed within internal audit departments prior to any reliance being placed on them by the externals.

One statement which drew a favourably high response from both groups was that which addressed the issue of 'original work always having to be reviewed' (11a). However, the actual responses made by the interviewees indicated that whereas in theory this was true, the reality was that there was nobody obvious to effect the review. It would appear that this

'problem' was one which is going to continue to exist as the ever increasing need to specialise continues to impact on the profession.

Another interesting side issue here is the attitude of many partners who indicated that their work (as partners!!) was not and should not be subject to review. Conclusions should be drawn on this point!

Another area which indicated a significant difference in opinion between the two groupings had to do with the competence of the internal auditors and the effectiveness of the reports emanating from the department. The external group saw internal auditors as somewhat less than competent (2,26) and not too effective at report writing (2,33). Internal group, however, gave themselves 3,84 for competence and a commendable 4,05 for report writing. Perhaps the higher ranking is justified and it is only because of poor communication that the external group perceives a level of inadequacy in this area.

The final point on the survey form completed by all the interviewees has to do with the dependence of the company on their computerised systems (19b). Here the external group indicated a total reliance on these systems (5). The executives that were interviewed, however, usually scored this around the 3 level. This could be interpreted to mean that the executive simply sees the information systems as one of a whole number of aspects on which the company is dependent (workers, cash, electricity supply, sanctions, etc.) and does not have the same obsession with it that auditors (both the internal and external) have. Alternatively the executive may simply not realise just how dependent the company is on the continued functioning of the information systems.

ANALYSIS OF STATEMENTS/QUESTIONS 22a-28b

The last section of the questionnaire was aimed specifically at the external auditors and 28 interviews took place.

Statement 22a related to the guidelines which are issued from time to time by the South African Institute of Chartered Accountants. Unlike generally accepted accounting practice (GAAP), the guidelines are not referred to in the Companies Act and thus are only recommendations and not requirements. Despite the fact that the guideline is not a requirement to be followed, 20 of the respondees indicated that the guidelines should be followed by auditors.

Question 22b then addressed the specific guideline on 'Computer Audit Skills' (Appendix 2). It appears as if the profession on the one hand finds it very difficult to comply with the expected level right through to those auditors who said it was very easy.

It is possible that the interpretation of the requirement is so different that the responses were so wide ranging, or perhaps it is just that some firms really do experience difficulties with attaining the appropriate levels whereas other firms already have the skills available and so indicated the other extreme.

Of more import is the response to question 23a. Auditing Standard AU010 requires the auditor to 'understand the system and related controls' of the system being audited. In piloting the questionnaire the researcher inquired of interviewees what the term 'understand' meant in this context.

The responses were many and varied. Collins Dictionary (1984) defines the word as follows: 'To comprehend; to apprehend the meaning or import of; to know or learn by information received; to be expert with or at by practice.' Very few auditors understood the term to imply such depth of knowledge.

Question 23a-1 inquired of the level of understanding of the system and control therein required by an auditor in the event of the auditor having (or choosing) to rely on controls in the system. 20 respondees indicated that a 'thorough understanding' (5) of the system would be required, whereas 8 respondees felt a somewhat lower understanding (4) was required.

If the auditor did not need to rely on the system the research revealed a total range of required levels of understanding. 16 respondees indicated that very little understanding (1 or 2 level) need be attained. However, 5 respondees indicated that a similar level of understanding was still required (4 or 5) as if some form of reliance was contemplated. The research shows that the majority of auditors believe that they can ignore systems (even complex ones) that they do not wish to rely on. The minority, however, feel that they must still understand the system and perhaps even 'seek out' controls in the system which may then allow the auditor some element of reliance.

Based on the above, the next question put to respondees was 'do you really believe that you are auditing in terms of your definition?' 1 respondent indicated in the negative, 4 indicated that there was 'only some' element of compliance and 4 did not answer the question.

The last area of research was to ask respondents whether they felt that the South African Institute of Chartered Accountants was giving external auditors sufficient direction in the area of computer auditing. Again the responses covered the full range of options with 13 respondents, however, indicating that the Institute was offering too low a level of support for the audit firms (1 and 2). With the impending issue of a statement on computer auditing, this criticism may fall away.

CHAPTER 5

CONCLUSION

In the past, research carried out overseas has indicated that reliance of external auditors on internal auditors is very dependent on the independence of the internal audit function and previous audit work experience of the persons within that function (Brown, 1983). Other writers refer to competence levels and objectivity. The research as carried out in South Africa would tend to indicate that there is little reliance placed on internal auditors by the external auditors because of the perception (on both sides) that internal auditors are:

- not competent
- not sufficiently trained
- not subject to any standards or code of ethics
- not independent

This would tend to bear out what has been found in other research in this area. To improve their chances of being relied upon by the externals, the internal auditors need to address the above and should improve:

- work papers and evidence of work
- planning and control
- training
- documentation
- audit techniques

- internal audit management
- follow up on their work
- reports
- liaison with external auditors

Additionally, the timing of internal audit work and the very nature of the work itself needs to be addressed.

However, it is not only the internal auditors who need to change. External auditors must realise that they should spend time and effort in upgrading the level of internal auditors as there are many areas where the externals could be placing some form of reliance on the internals. Prior to that, however, there needs to be an attitudinal change on the part of the external auditors.

Their seemingly high level of assurance ('we can cope with any level of complexity achieved by the client') needs to be addressed, as well as their lack of regard for the internal audit function. This is understandable, as there were only 3 chartered accountants and 2 BComm qualifications amongst the 13 internal auditors interviewed. In addition the internal auditors on average were at least 10 years older than the external auditors interviewed and what seemingly also emanated from the interviews was the view that age and intransigence were somehow connected.

With the continued movement of qualified staff into the internal audit department, it is possible that in time the external auditor will come to regard that function in a better light. From the research it is obvious that the externals would like to place more reliance on the function - a

mean response from the external group of 4,4 was given to the statement 'should internal audit be relied upon', whereas this dropped to only 4,0 when the question was changed to 'can you rely?'

For both sets of auditors a worrying aspect must be the very negative responses that were forthcoming from the I.S./D.P. respondees, who seemed to have a very low opinion of auditors and their capabilities. This despite the efforts of the auditing profession within the framework of organisations like NACCA which has aimed at pulling the I.S./D.P. environment closer to that of the auditors.

It is apparent that internal audit reports to too low a level in the organisation and that it is not seen to be independent. Allied to this is the potential problem of being subject to a conflict of interest. Thus internal audit should strive to report to an audit committee and be seen to be independent and free from any potential conflicts of interest.

An interesting perceptual difference occurred around dependence on the computerised information systems. Whereas all the auditors and I.S./D.P. respondees unanimously gave this a 5 (completely agree that institution is totally dependent on this), the majority of executives only scored this as a 3. The implication here is that either there are other aspects to the business that the executives deem to be of more import (e.g. industrial relations, sanctions, lack of funding, etc.), or else they really believe that the business is not that dependent on their computer systems.

It would also appear that the executives in general would expect the externals to rely on internal audit if the result was a 'better' audit.

Those respondees opposing increased reliance warn of the many attendant problems. They argue that without definitive limits on reliance, use of internal auditors' work may become a near-total substitute for the work of the external auditor. However, this should not be viewed as a problem if the internal audit group is adequately resourced and if the work is adequately reviewed by external auditors.

For the external auditors to be seen to be relevant and to be adequately auditing in the complex changing environment of information processing, it would appear that reliance on internal auditors is inevitable.

AREAS FOR FUTURE RESEARCH

It is apparent that research needs to be effected in the following areas:

- what will business information systems (and therefore auditing) be like at the turn of the century?
- what audit tools and techniques need to be developed to cope with these systems?
- what type of human resources will be needed to effectively audit this environment?
- how will this affect staff recruitment and training?
- what can be done to educate the mass of accountants and auditors who are already qualified but still need to be exposed to, possibly, totally new concepts?

APPENDICES

APPENDIX 1

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APPENDIX 2

AICPA STATEMENT ON AUDITING STANDARDS 9

Statement on Auditing Standards

December 1975

CPA

The Effect of an Internal Audit Function on the Scope of the Independent Auditor's Examination

(Supersedes Statement on Auditing Standards No. 1, section 320.74)

1. The work of internal auditors cannot be substituted for the work of the independent auditor; however, the independent auditor should consider the procedures, if any, performed by internal auditors in determining the nature, timing, and extent of his own auditing procedures. This Statement provides guidance on the factors that affect an independent auditor's consideration of the work of internal auditors in an examination made in accordance with generally accepted auditing standards.

2. Internal auditors often perform a number of services for management, including, but not limited to, studying and evaluating internal accounting control,[1] reviewing operating practices to promote increased efficiency and economy, and making special inquiries at management's direction. This Statement is applicable to the inde-

[1] See SAS No. 1, section 320.50, for an explanation of the two phases of the study of internal accounting control.

pendent auditor's consideration, in making his study and evaluation of internal accounting control, of the work performed by internal auditors. The Statement applies whether the work performed by internal auditors is part of their normal duties or is performed at the request of the independent auditor. It also applies to situations in which internal auditors perform work directly for the independent auditor (see paragraph 10).

3. When internal auditors study and evaluate internal accounting control or perform substantive tests of the details of transactions and balances, they serve a special function. They are not part of internal accounting control in the same manner as would be an individual who verifies the mathematical accuracy of all invoices; instead, they act as a separate, higher level of control to determine that the system is functioning effectively. This Statement is not applicable to personnel with the title "internal auditor" who do not perform such a function. Conversely, personnel with other titles who perform such a function should be considered internal auditors for purposes of this Statement.

4. The independent auditor should acquire an understanding of the internal audit function as it relates to his study and evaluation of internal accounting control. The work performed by internal auditors may be a factor in determining the nature, timing, and extent of the independent auditor's procedures. If the independent auditor decides that the work performed by internal auditors may have a bearing on his own procedures, he should consider the competence and objectivity of internal auditors and evaluate their work.

Reviewing the Competence and Objectivity of Internal Auditors

5. Section 320.35 of SAS No. 1, regarding the role of client personnel who perform accounting and related work with respect to accounting control, states in part:

> Reasonable assurance that the objectives of accounting control are achieved depends on the competence and integrity of personnel, the

independence of their assigned functions, and their understanding of the prescribed procedures.

6. When considering the competence of internal auditors, the independent auditor should inquire about the qualifications of the internal audit staff, including, for example, consideration of the client's practices for hiring, training, and supervising the internal audit staff.

7. When considering the objectivity of internal auditors, the independent auditor should consider the organizational level to which internal auditors report the results of their work and the organizational level to which they report administratively. This frequently is an indication of the extent of their ability to act independently of the individuals responsible for the functions being audited. One method for judging internal auditors' objectivity is to review the recommendations made in their reports.

Evaluating the Work of Internal Auditors

8. In evaluating the work of internal auditors, the independent auditor should examine, on a test basis, documentary evidence of the work performed by internal auditors and should consider such factors as whether the scope of the work is appropriate, audit programs are adequate, working papers adequately document work performed, conclusions reached are appropriate in the circumstances, and any reports prepared are consistent with the results of the work performed. The independent auditor should also perform tests of some of the work of internal auditors. The extent of these tests will vary depending on the circumstances, including the type of transactions and their materiality. These tests may be accomplished by either (a) examining some of the transactions or balances that internal auditors examined or (b) examining similar transactions or balances but not those actually examined by internal auditors. The independent auditor should compare the results of his tests with the results of the internal auditors' work in reaching conclusions on that work.

Arrangements With Internal Auditors

9. When the work of internal auditors is expected to be significant to the independent auditor's study and evaluation of internal accounting control, the independent auditor should, at the outset of the engagement, inform internal auditors of the reports and working papers he will need. He should also consult with internal auditors concerning work they are performing, since work not yet completed may also have a bearing on his examination. Also, work done by internal auditors will frequently be more useful to the independent auditor if plans for the work are discussed in advance.

Using Internal Auditors to Provide Direct Assistance to the Independent Auditor

10. The independent auditor may make use of internal auditors to provide direct assistance in performing an examination in accordance with generally accepted auditing standards. Internal auditors may assist in performing substantive tests or tests of compliance. When the independent auditor makes such use of internal auditors, he should consider their competence and objectivity and supervise and test their work to the extent appropriate in the circumstances.

Judgments on Audit Matters

11. When the independent auditor considers the work of internal auditors in determining the nature, timing, and extent of his own audit procedures or when internal auditors provide direct assistance in the performance of his work, judgments as to the effectiveness of internal accounting control, sufficiency of tests performed, materiality of transactions, and other matters affecting his report on the financial statements must be those of the independent auditor.

The Statement entitled "The Effect of an Internal Audit Function on the Scope of the Independent Auditor's Examination" was adopted by the assenting votes of nineteen members of the Committee. Messrs. Konkel and Ziegler dissented.

Mr. Konkel dissents to the issuance of this Statement because he believes that paragraph 10 could imply that the work of an internal auditor could be used as virtually a complete substitute for the work of an independent auditor's staff, without offering sufficient guidance as to the effect of such use on the scope of the independent auditor's examination. Mr. Konkel believes that when an independent auditor has properly limited his scope by using the work of an internal auditor he is relying on internal control rather than using their work as a substitute.

Mr. Ziegler dissents to the issuance of this Statement because he believes that it fails to provide substantive guidance as to the extent to which the independent auditor may make use of work performed by the internal auditor in determining the nature, timing, and extent of his own auditing procedures. He believes that the Statement should provide guidance as to when the work of the internal auditor might cease to be a supplement to and become a substitute for the work of the independent auditor. He also believes that paragraph 10 does not provide sufficient guidance as to the extent to which and under what circumstances the internal auditor may perform work directly for the independent auditor and the degree to which the independent auditor may rely thereon.

Auditing Standards Executive Committee (1974-1975)

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APPENDIX 3

I.C.A.E.W. AUDITING GUIDELINE AU 408

Reliance on internal audit

Contents

Reliance on internal audit

(Issued 7 November 1984)

Preface

This guideline gives guidance on the matters that need to be considered and the procedures that need to be followed by external auditors when placing reliance on internal audit. It should be read in conjunction with 'The auditor's operational standard', its related Auditing Guidelines, particularly the Auditing Guideline 'Internal controls', the Explanatory Foreword to the Auditing Standards and Guidelines and, in the public sector, with 'Statements on internal audit practice in the public sector' published by the Chartered Institute of Public Finance and Accountancy.

This guideline is written in the context of audits conducted within both the commercial sector and the public sector. References in this guideline to 'management' are to the board of directors in the commercial sector, and to the equivalent body in the public sector.

In certain circumstances, the external auditor may have a responsibility to report on the internal audit function. Guidance is not given in respect of such a report, but many of the principles and procedures described in this guideline will also apply in those circumstances.

Introduction

Internal audit is an element of the internal control system set up by the management of an enterprise to examine, evaluate and report on accounting and other controls on operations. It exists either because of a management decision or in certain circumstances because of a statutory requirement. 1

Certain of the objectives of internal audit may be similar to those of external audit, and procedures similar to those carried out during an external audit may be followed. Accordingly, the external auditor should make an assessment of the internal audit function in order to be able to determine whether or not he wishes to place reliance on the work of internal audit. An external auditor may be able to place reliance on internal audit as a means of reducing the work he performs himself in: 2

(a) the documentation and evaluation of accounting systems and internal controls;

(b) compliance and substantive testing.

The scope of internal audit's work will generally be determined in advance and a programme of work will be prepared. Where reliance is placed on the work of internal audit, the external auditor will need to take into account this programme of work and amend the planned extent of his own audit work accordingly. In addition, the external auditor may agree with management that internal audit may render him direct assistance by performing certain of the procedures necessary to accomplish the objectives of the external audit but under the control of the chief internal auditor, who would then have to consider the effect on his department's programme of work. 3

This guideline does not deal with those cases where internal audit staff are seconded to work under the direct supervision and control of the external auditor. This is because the guideline addresses reliance on internal audit as a function, rather than reliance on individuals within that function. The work of seconded internal audit staff should be controlled by the external auditor in accordance with the Auditing Guideline 'Planning, controlling and recording', having regard to the position of internal audit staff as employees of the enterprise. 4

Background

The internal audit function

The scope and objectives of internal audit vary widely and are dependent upon the responsibilities assigned to it by management, the size and structure of the enterprise, and the skills and experience of the internal auditors. Normally, however, internal audit operates in one or more of the following broad areas: 5

(a) review of accounting systems and related internal controls;

(b) examination of financial and operating information for management, including detailed testing of transactions and balances;

(c) review of the economy, efficiency and effectiveness of operations and of the functioning of non-financial controls;

(d) review of the implementation of corporate policies, plans and procedures;

(e) special investigations.

6 Where internal audit staff carry out routine tasks such as authorisation and approval or day-to-day arithmetical and accounting controls, they are not functioning as internal auditors and these tasks are not dealt with in this guideline; this is because these tasks are recognised as other types of internal controls by the Appendix to the Auditing Guideline 'Internal controls'. Moreover, objectivity may be impaired when internal auditors audit any activity which they themselves carried out or over which they had authority. The possibility of impairment should be considered when deciding whether to place reliance on internal audit.

The relationship between external and internal audit

7 Unlike the internal auditor who is an employee of the enterprise or a related enterprise, the external auditor is required to be independent of the enterprise, usually having a statutory responsibility to report on the financial statements giving an account of management's stewardship.

8 Although the extent of the work of the external auditor may be reduced by placing reliance on the work of internal audit, the responsibility to report is that of the external auditor alone, and therefore is indivisible and is not reduced by this reliance.

9 As a result, all final judgements relating to matters which are material to the financial statements or other aspects on which he is reporting, must be made by the external auditor.

Procedures

Planning

10 Before any decision is taken to place reliance on internal audit, it is necessary for the external auditor to make an assessment of the likely effectiveness and the relevance of the internal audit function. The criteria for making this assessment should include the following:

(a) The degree of independence. The external auditor should evaluate the organisational status and reporting responsibilities of the internal auditor and consider any constraints or restrictions placed upon him. Although an internal auditor is an employee of the enterprise and cannot therefore be independent of it, he should be able to plan and carry out his work as he wishes and have access to the highest level of management. He should also be free of any responsibility which may create a conflict of interest when he attempts to discharge his internal audit function, or of a situation where middle management on whom he is reporting is reponsible for his or his staff's appointment, promotion or remuneration. Furthermore, an internal auditor should be free to communicate fully with the external auditor, who should be able to receive copies of all internal audit reports that he requires.

(b) The scope and objectives of the internal audit function. The external auditor should examine the internal auditor's formal terms of reference and should ascertain the scope and objectives of internal audit assignments. In most circumstances, the external auditor will regard assignments as likely to be

relevant where they are carried out in the areas described in paragraph 5(a) and (b) above. He will also be interested in internal audit's role in respect of specialist areas and those described in paragraphs 5(c), (d) and (e) above, when it has an important bearing on the reliability of the financial statements or other matters being reported on.

(c) Due professional care. The external auditor should consider whether the work of internal audit generally appears to be properly planned, controlled, recorded and reviewed. Examples of the exercise of due professional care by internal audit are the existence of an adequate audit manual, general internal audit plans, procedures for supervising individual assignments, and satisfactory arrangements for ensuring adequate quality control, reporting and follow-up.

(d) Technical competence. The external auditor should ascertain whether the work of internal audit is performed by persons having adequate training and proficiency as auditors. Indications of technical competence may be membership of an appropriate professional body or the possession of relevant practical experience, such as computer auditing skills.

(e) Internal audit reports. The external auditor should consider the quality of reports issued by internal audit and ascertain whether management considers, responds to and, where appropriate, acts upon internal audit reports, and whether this is evidenced.

(f) Level of resources available. The external auditor should consider whether internal audit has adequate resources, e.g. in terms of staff and of computer facilities.

11 The external auditor's assessment of the likely effectiveness and the relevance of the internal audit function will influence his judgement as to whether he wishes to place reliance on internal audit. Consequently, the external auditor should document his assessment and conclusions in this respect, and he should update his assessment year by year. Where the external auditor concludes that the internal audit department is weak or ineffective, then it should not be relied upon. Furthermore, the external auditor should inform management in writing of the significant weaknesses in the internal audit function, his reasons for not placing reliance on their work and his recommendations for improvement.

12 Where the external auditor decides that he may be able to place reliance on internal audit, he should consider in determining the extent of that reliance:

(a) the materiality of the areas or the items to be tested or of the information to be obtained;

(b) the level of audit risk inherent in the areas or items to be tested or in the information to be obtained;

(c) the level of judgement required;

(d) the sufficiency of complementary audit evidence;

(e) specialist skills possessed by internal audit staff.

13 The external auditor should be involved in the audit of all material matters in the financial statements particularly in those areas where there is a significant risk of misstatement. High audit risk does not preclude placing some reliance on internal audit.

but the external auditor should ensure that the extent of his involvement is sufficient to enable him to form his own conclusions.

14 Having decided that he may be able to place reliance on the work of internal audit, the external auditor should agree with the chief internal auditor the timing of internal audit work, test levels, sample selection and the form of documentation to be used.

15 The external auditor should record in his working papers the extent to which he intends to place reliance on internal audit, and the reasons for deciding that extent. Furthermore, the external auditor should consider confirming with management the overall arrangements that have been agreed, either in the engagement letter or in a separate letter.

Controlling

16 Where the external auditor places reliance on the work of internal audit, he should review that work and satisfy himself that it is being properly controlled. In this connection, the external auditor should:

(a) consider whether the work has been appropriately staffed and properly planned, supervised and reviewed;

(b) compare the results of the work with those of the external auditor's staff on similar audit areas or items, if any;

(c) satisfy himself that any exceptions or unusual matters that have come to light as a result of the work have been properly resolved;

(d) examine reports relating to the work produced by internal audit and management's response to those reports.

In addition, the external auditor should determine whether internal audit will be able to complete, on a timely basis, the programme that it has agreed to undertake and, if it will not, he should make appropriate alternative arrangements.

17 At the conclusion of the audit, the external auditor should review the economy, efficiency and effectiveness of the basis of working and discuss with the chief internal auditor the significant findings and any means of improving the approach.

Recording

18 The external auditor will need to ensure that all work relating to his audit, whether performed by internal audit or the external auditor, is properly recorded. He should satisfy himself that the working papers relating to the work of internal audit upon which he is placing reliance are up to an acceptable standard. Consideration should be given to the method of recording so that relevant working papers are available and are of use to both the external auditor and internal audit.

Audit evidence

19 Where the external auditor places reliance on internal audit, whether by means of direct assistance or otherwise, he should satisfy himself that sufficient evidence is

obtained to afford a reasonable basis for the conclusions reached by internal audit, and that those conclusions are appropriate to the circumstances and are consistent with the results of the work performed. This may involve him in performing supplementary procedures. The extent of these procedures will depend on his assessment of the internal audit function, the materiality of the area or item to be tested and the risk of misstatement in the financial statements (see paragraph 13). The procedures may include re-examining transactions or balances that internal audit have tested, examining similar transactions or balances, or the performance of analytical review procedures, as well as discussing with internal audit the work they have performed.

Internal controls

Where the work of internal audit reveals weaknesses in internal controls, the external auditor should consider whether it is enough to draw management's attention to a report from internal audit or whether he should also report to management himself, particularly where he considers management response to internal audit reports is inadequate or where the weaknesses are significant. The external auditor should consider whether his own programme should be amended because of those weaknesses. 20

APPENDIX 4

S.A. INSTITUTE OF CHARTERED ACCOUNTANTS' 'GUIDELINE ON COMPUTER AUDIT SKILLS LEVELS'

GUIDELINE ON COMPUTER AUDIT SKILL LEVELS

1 Introduction

This guideline on computer audit skill levels identifies skill levels for a Chartered Accountant that carries out an audit of computerised systems. It identifies skill levels for both a general auditor and a computer auditor. Because the general auditor and computer auditor are Chartered Accountants, their work will be carried out in accordance with generally accepted auditing standards.

The skill levels for the general auditor are those levels which it is recommended he should aspire to and which should therefore serve as guidelines for his continuing education. The higher skill levels, identified for the computer auditor are those levels which it is recommended should be used to train specialists and maintain their knowledge by continuing education.

The three skill levels are defined as follows:

Level 1:
A knowledge and understanding of facts, methods, processes, trends and structures with a limited degree of interpretative ability.

Level 2:
A knowledge and understanding of the facts and their background, and the ability to apply the rules, principles, techniques and methods to a problem.

Level 3:
A detailed factual knowledge of the topic, its background and related topics. An ability to employ original thinking, exercise flexibility and a sufficient depth of understanding in tackling complex and unusual situations.

The following should be borne in mind:

(a) A computer auditor is defined for the purpose of this document as a Chartered Accountant that has specialised in the audit of computerised systems. The skill levels that have been defined are those that are desirable but where a person specialises further in certain areas higher levels of skills may be achieved.

(b) The skill levels of the computer specialist that is not a Chartered Accountant are not dealt with in this guideline.

(c) The skill levels identified include not only those necessary for stat-

utory audit work but also those which will enable the Chartered Accountant to provide his client with additional services related to computerised systems.

(d) Sometimes the skill levels that are necessary for an assignment could be different to those identified, because of the complexities within the computer environment.

The skill levels recommended for both a general auditor and computer auditor have been dealt with in separate sections and are set out as follows:

- Data centre reviews
- Review of Application systems development and maintenance
- Application reviews
- Computer assisted audit techniques (CAATS)
- Programing
- System software reviews
- Review of data processing resource management and acquisition procedures.

Within each of the sections, the technical skills have been elaborated on by the inclusion of certain illustrative points. These points are, however, not intended to be exhaustive.

3. Computer auditor

A. Data centre reviews

I. General

The auditor must appreciate the audit significance of different hardware and software configurations and processing methods and must possess the skills to suit the environment in which he is working.

The auditor must understand the elements of security and control and their relationship to audit procedures. He must recognise that risks can be reduced and control weaknesses can be overcome in many different ways, depending upon the nature of the environment.

Security of the data centre not only helps ensure the preservation of the physical assets from loss or destruction but also helps ensure the continued availability of computing resources, both hardware and software, for daily operations.

II. Objectives

Evaluate the physical security measures in place in the data centre to ensure the protection of hardware, software and data.

Evaluate the data processing operations and the practices of the data processing management to ensure proper processing and protection of the information.

Evaluate the process of making changes to the existing operational hardware and software to ensure that such modifications are carried out in accordance with acceptable standards.

III. Tasks

Review the security policies, methods and procedures relating to hardware, software and personnel and identify the control strengths and weaknesses.

Review the operating and management procedures relating to daily processing and identify the control strengths and weaknesses.

Review the procedures for preventative and corrective maintenance and identify the control strengths and weaknesses.

Develop and carry out the detailed audit procedures to verify the strengths and/or quantify the effects of the weaknesses.

IV. Technical skills and knowledge

	Level of skills Computer auditor		
	1	2	3
Types and nature of the risks to the data centre that can result in the accidental loss or destruction of data, software and hardware.			•
Physical security:			•
• site selection of the data processing centre • layout of the computer room • fire protection • emergency procedures in the event of disaster • on site and off-site storage • insurance.			
Physical access and environmental controls to prevent damage to and/or unauthorised use of software, hardware and data within the data centre.			•
Housekeeping standards.		•	
Typical organisational structure of the data centre to facilitate supervision and management review practices.			•
Need for, and application of, segregation of duties and job rotation within the data centre.			•
Roles of personnel within the data centre.			•
• data centre manager • data base administrator • quality assurance personnel • computer operators • librarians • network manager • master terminal operator • security officer • systems analysts • system software programmers • application programmers • data entry personnel • help centre personnel • internal auditors.			

	Level of skills Computer auditor		
	1	2	3
Computer operating procedures.		•	
• computer start-up			
• job initiation			
• processing			
• output			
• end of day procedures			
• review of computer produced logs.			
Backup and recovery procedures.			•
Contingency planning.			•
Hardware:		•	
• purpose and function of different hardware components			
• built-in hardware controls that could detect typical problems			
• access protection			
• planning and resource allocation.			
Data organisation and administration:		•	
• advantages and disadvantages of:			
- sequential files			
- random files			
- data base structures (hierarchical, network, relational)		•	
• storage media			
• data handling utilities			
• data access security			
• retention policies.			
Software:			•
• terminology			
• purpose and function of system software			
• purpose and function of application software			
• standards for development and maintenance			
• library procedures and controls			
• access security.			

	Level of skills Computer auditor		
	1	2	3
Terminal access:		•	
• terminal identification			
• user recognition and authentication			
• access security software			
• access violation reporting and follow-up.			
Principles of data communication and remote processing:		•	
• types and nature of threats			
• message authentication and encryption			
• public communications facilities			
• telecommunication backup practices.			
Change control:			•
• risks, exposures and controls			
• library control procedures			
• role of users			
• role of management			
• role of audit.			
Role of quality assurance in hardware, systems software and applications software.			•
The type and nature of risks in the data centre and the control implications associated with emergency maintenance.		•	
Production scheduling, facilities management and capacity planning in the data centre.			•
Chargeout procedures.	•		

B. Review of application systems development and maintenance

I. General

The auditor should have sufficient understanding of the procedures required to review a new computer system or to modify an existing system. His review of these procedures is intended primarily to ensure that adequate controls are built into new systems, that audit trails are adequate and thereafter that maintenance is properly controlled.

II. Objectives

Evaluate the project development methodology to ensure its suitability for the organisation.

Evaluate the degree of adherence to the standards and the procedures described in the methodology to ensure that systems are properly developed in accordance with laid down standards.

Evaluate the planned controls in application systems under development to:

- ensure that they meet the user's requirements
- determine the adequacy of programed controls that ensure the completeness, accuracy and authority of transaction data, and
- recommend additional controls as required.

Evaluate the process of making changes to the existing operational hardware and software to ensure that such modifications are controlled and are made in accordance with acceptable standards.

III. Tasks

Review the organisation's project management procedures and identify the control strengths and weaknesses.

Plan the audit involvement at each of the stages of the project life cycle.

Identify and select systems to test for compliance with the methodology.

Evaluate the management, programed and user controls at each stage of the project life cycle.

Review the procedures for preventative and corrective maintenance.

IV. Technical skills and knowledge

	Level of skills Computer auditor		
	1	2	3
The principles of project management and the system development life cycle:		•	

	Level of skills Computer auditor		
	1	2	3
• phases of the development life cycle • deliverable at each stage • appropriate level of detail to be provided • who it is intended to reach • approval procedures at each stage.	•		
Roles and responsibilities of the participants: • project leaders • analysts • programmers • users • management • steering committee • internal audit • external audit.		•	
Application controls: • data preparation controls • access controls • input controls • processing controls • output controls • error correction procedures • backup and recovery • management/audit trails.			•
Purpose and methodology of program and system testing: • pilot runs • parallel runs • phased implementation • integrated test facility • tracing • mapping • snapshots.			•
Quality control practices and standards.			•
Implementation procedures: • file creation and conversion		•	

Level of skills		
Computer auditor		
1	2	3

- acceptance testing
- transfer from test to production libraries.

Post implementation review objectives and methods:

- evaluation of the new systems
- on-going maintenance.

Documentation standards:

- development documentation
- testing documentation
- systems documentation
- program documentation
- user documentation
- updating documentation.

C. Application reviews

I. General

The auditor must have an in-depth understanding of the programed and user controls to be found in application systems. By applying this knowledge to a client's system, the auditor will be able to ascertain those controls upon which management and auditors may rely, and identify areas of weakness in controls on which to report. The auditor should then perform auditing procedures in accordance with generally accepted auditing standards.

II. Objectives

Evaluate the programed and user controls in existing application systems to ensure that the systems process transactions completely, accurately, timeously and in accordance with the authorisation procedures laid down by management.

III. Tasks

Understand the overall characteristics and operations of the application system under review.

Review the programed and user controls to identify the control strengths and weaknesses.

Evaluate the control, strengths and weaknesses.

Develop and carry out the detailed audit procedures to verify the strengths and/or to quantify the effects of the weaknesses.

Level of skills		
Computer auditor		
1	2	3
		•
		•
	•	

IV. Technical skills and knowledge

Typical application vulnerabilities and the various controls - programed and manual - that may be used to minimise their risk of occurrence.

System, process and data flow charts and documentation.

Nature of the processed data:

- sequential files
- random files
- data base
- batch processing

	Level of skills Computer auditor		
	1	2	3
• on-line processing			
• real time systems.			
Data storage methods.		•	
Input validation procedures.			•
Processing controls that ensure the transaction data is processed completely and accurately from the point of input to the point of final output.			•
Output review and approval procedures.		•	
Security practices:			•
• physical accesss			
• confidentiality of data			
• confidentiality of source documents.			
Types and level of access security:		•	
• operating system			
• hardware security facilities			
• support system facilities			
• program level facilities			
• access security software			
• user controls.			
Types and level of software function:		•	
• operating systems			
• teleprocessing monitors			
• database management systems			
• interpreters and compilers			
• programing languages			
• utilities.			
Nature and purpose of documentation:		•	
• technical			
• user			
• audit.			
Backup procedures.			•
Responsibility of user management to ensure the			•

	Level of skills Computer auditor		
	1	2	3
completeness, accuracy, timeliness and authority for processing.			
Responsibility of data processing management for the completeness, accuracy, timeliness and authority for processing.			•

D. Computer assisted audit techniques (CAATS)

I. General

The auditor must have a detailed knowledge of how to use computer technology as an effective audit tool. When required he should be able to write reasonably complex computer programs, primarily for extraction or other audit purposes, and/or review the work of programmers.

II. Objectives

To use the computer as an audit tool to meet particular needs.

Assess different types of CAATS for varying audit tasks to ensure that they are appropriately used.

Specify CAATS objectives to meet particular needs.

Design and implement CAATS to meet particular needs.

III. Tasks

Develop and test the CAATS.
Run the CAATS.
Evaluate the output from the CAATS.
Evaluate the CAATS written by others.

IV. Technical skills and knowledge

	Level of skills Computer auditor		
	1	2	3
The uses, strengths and weaknesses of various CAATS:			•
• test data			
• generalised audit software			
• utilities			
• report generators			
• integrated test facilities			
• specialised audit programs			
• simulation.			
The limitations and the risks of using CAATS.			•
Feasibility studies and cost/benefit reports related to the development and execution of CAATS.			•
Detailed specifications for contract, client or third party programmers to enable them to write programs for the audit.			•

	Level of skills Computer auditor		
	1	2	3
Data extraction programs, report generators, 4th generation languages or generalised audit software packages.			•
Documentation standards and procedures for CAATS and CAATS files.			•
Specialised audit software to review and analyse the system software.		•	

E. *Programing*

I. General

The auditor must have a knowledge of the concepts of computer programing in order to appreciate the operations in a computerised environment and to understand the advances in programing technology.

II. Objectives

Evaluate program source code and program documentation to ensure that sufficient evidence is kept of how the system is developed and of how controls are maintained.

Communicate with programing staff to understand the objectives of their function.

Evaluate programing practices and procedures within the organisation.

III. Tasks

Develop detailed program design specifications.

Write the program or review the work of other programmers who have completed the task.

Compile and debug the program.

Test the program.

Prepare appropriate system, program and user documentation.

Evaluate the results of the program.

IV. Technical skills and knowledge

	Level of skills Computer auditor		
	1	2	3
Be proficient in the use of at least one commercially used programing language or 4th generation language.		•	
Structured programing techniques.	•		
Data representation:			
• binary		•	
• octal			
• hexadecimal			
• decimal.			
Data handling and storage techniques:			
• organisation methods		•	
• access methods			
• types (tape, disk, etc.)			
• sequential			
• random			
• data base.			
Read record layouts.		•	
Simple JCL/control language.		•	
Source code translation process:		•	
• compilers			
• assemblers			
• interpreters			
• linkage editors.			
Debug programs.		•	
Program security techniques.		•	
Program testing practices.		•	
Program documentation standards and practices.		•	
Detailed system and program flowcharts and recognise the control implications.		•	

F. System software reviews

I. General

The auditor should have a general knowledge of the principles and the operation of system software. This is a highly specialised area of computer processing and the auditor must be aware of the need to obtain the services of software specialists. Accordingly, the auditor's technical skills and knowledge should be general and not specific to any one manufacturer's system software.

II. Objectives

Evaluate the controls over the system software administration to ensure that the information is properly maintained.

Evaluate the controls and risks inherent in the configuration of the system software to obtain an understanding of the functioning of the system.

III. Tasks

Review the procedures for the administration of the system software and identify the control strengths and weaknesses.

Understand the system software configurations and the options that have been installed and identify the controls and weaknesses.

Assess the need for specialist involvement.

Develop and carry out the detailed audit procedures to verify the strengths and/or to quantify the effects of the weaknesses.

IV. Technical skills and knowledge

	Level of skills Computer auditor		
	1	2	3
General understanding of the nature and function of system software.		•	
Specific understanding of the various components of system sofware:		•	
• operating systems			
• data base management systems			
• communication systems			
• data management systems			
• access control software			
• resource monitors			
• job entry systems			
• compilers, assemblers and interpreters			
• *utility programs.*			

G. Review of data processing resource management and acquisition procedures

I. General

The auditor should have sufficient knowledge to provide advice and evaluate the management of the client's data processing resources and the procedures for acquiring hardware and software.

II. Objectives

Evaluate the data processing plan, administrative and management practices to determine their adequacy in fulfilling the goals of the organisation.

Evaluate the use of data processing resources to determine its effectiveness and efficiency.

Evaluate the process of acquiring hardware, software and services to determine whether the organisation's economic resources are being used efficiently and effectively.

III. Tasks

Review the strategic plan of the data centre and ensure that it meets the objectives of the corporate strategic plan.

Review the planning, administration and management of the data centre to assess the effectiveness and efficiency with which the data centre utilises its resources.

Identify operating inefficiencies and under utilisation of data processing resources and personnel within the data processing department.

Review the acquisition procedures and identify the control strengths and weaknesses.

Develop and execute the detailed audit procedures to verify the strengths and/or quantify the effects of the weaknesses.

	Level of skills Computer auditor		
	1	2	3
IV. Technical skills and knowledge			
Differences between the various levels of resource planning and utilisation - strategic, tactical and operational planning.		•	
The need, composition and the role of the steering committee.			•

	Level of skills Computer auditor		
	1	2	3
The principles of the acquisition process:		•	
• cost benefit analyses • feasibility studies • capital budgeting • long term planning • short term planning.			
Advantages/disadvantages of in-house, contractually developed or turnkey solutions.		•	
Advantages/disadvantages of service bureau.		•	
Cost benefit analysis preparation.	•		
Feasibility study preparation.	•		
Preparation of request for vendor proposal.	•		
Hardware performance monitoring tools:	•		
• types of monitors and their general characteristics • risks to data integrity.			
Different performance criteria and performance indices for assessing resource management and the methods for evaluating the results of these criteria:	•		
• workload and system models • systems availability • mean time between failures • mean time to repair • preventive maintenance • disaster recovery planning • backup facilities • daily problem reports • personnel conditions • quality assurance • budgetary control.			

APPENDIX 5

INTERVIEW SCHEDULE

APPENDIX 5

1a	**Reliance can be placed on internal audit in an area of material significance.**	**Dis 1 2 3 4 5 Agree**
1b	Is any reliance placed on internal audit in any area of material significance?	Yes/No/Some
2a	**Internal audit can make final judgements relating to matters which are material to the financial statements.**	**Dis 1 2 3 4 5 Agree**
2b	Is there any final judgement relating to matters which are material to the financial statements or any other aspects on which the external auditor is reporting on, made by internal audit?	Yes/No/Some
	If so, what area?	
3a	**Internal audit can be truly independent.**	**Dis 1 2 3 4 5 Agree**
3b	Is internal audit truly independent?	Yes/No/Some
4a	**Internal audit should report to an independent body.**	**Dis 1 2 3 4 5 Agree**
4b	Who do they report to in the organisation?	Too low 1 2 3 4 5 adequate
5a	**Internal audit should be free to make contact with the external auditors.**	**Dis 1 2 3 4 5 Agree**
5b	Can they freely make contact with the external auditors?	Yes/No/Some
6a	**Internal audit departments should never be subject to a conflict of interest.**	**Dis 1 2 3 4 5 Agree**
6b	Is it likely that the internal auditor is subject to a conflict of interest?	Yes/No/Some

7a	**The financial director should not be responsible for the appointment, promotion or remuneration paid the internal auditor.**	**Dis 1 2 3 4 5 Agree**
7b	Who is responsible for the appointment, promotion or remuneration paid in the internal audit department?	Normal Personnel Policy/Other
8a	**Formal terms of reference should cover the internal audit department.**	**Dis 1 2 3 4 5 Agree**
8b	Are there formal terms of reference covering internal audit?	Yes/No/Some
	If so, how wide are they?	Narrow 1 2 3 4 5 Wide
	Are there any restrictions?	Yes/No/Some
9a	**Internal audit departments should include specialists.**	**Dis 1 2 3 4 5 Agree**
9b	Are there are 'specialists' in the internal audit department?	Yes/No/Some
10a	**Planning and control is important with regard to internal auditors.**	**Dis 1 2 3 4 5 Agree**
10b	Are the internal auditors subject to planning and control?	Yes/No/Some
11a	**Original work must always be reviewed.**	**Dis 1 2 3 4 5 Agree**
11b	Is their work adequately reviewed?	Yes/No/Some
	By whom?	
12a	**There should be a standard internal audit manual.**	**Dis 1 2 3 4 5 Agree**
12b	Are the standards laid down in the internal audit manual complied with?	Yes/No/Some
	How is supervision carried out?	Inform 1 2 3 4 5 form
	Is there adequate quality control and what is the reporting and follow-up like?	Inad 1 2 3 4 5 adeq

13a	**Internal auditors must necessarily be competent.**	**Dis 1 2 3 4 5 Agree**
13b	How competent are the internal auditors?	Not 1 2 3 4 5 Very
	How are they trained?	
	Do they have to members of professional societies?	Yes/No/Preferably
	How do they achieve practical experience?	
14a	**Management requires appropriate reports for action.**	**Dis 1 2 3 4 5 Agree**
14b	How good are the reports emanating from internal audit?	Not 1 2 3 4 5 Very
15a	**Internal audit should have a wide range of resources available to them.**	**Dis 1 2 3 4 5 Agree**
15b	How available are resources to internal auditors?	Not 1 2 3 4 5 Very
	If so, what?	
16a	**External auditors should review and report on internal audit departments.**	**Dis 1 2 3 4 5 Agree**
16b	Have the external auditors ever reported on their assessment of internal auditors (or lack of an internal audit function)?	Yes/No/Some
17a	**Internal audit work should be reviewed by the external auditor.**	**Dis 1 2 3 4 5 Agree**
17b	If the external auditor is placing reliance on the work of internal auditors, how effectively is it reviewed?	Not 1 2 3 4 5 Very
18a	**Internal audit work should be relied upon by external audit.**	**Dis 1 2 3 4 5 Agree**
18b	If internal audit is not relied on, what should be done to enable external audit to rely on their work?	

19a	**Sophisticated information processing is fundamental to business success.**	**Dis 1 2 3 4 5 Agree**
19b	How dependent is the company on computerised systems?	Not 1 2 3 4 5 Very
20a	**Back-up data processing facilities should be available for critical systems for use in the event of a disaster.**	**Dis 1 2 3 4 5 Agree**
20b	How often (with regard to financial systems) is a back-up or alternative processing situation called into being?	Not 1 2 3 4 5 Very
	How is this audited?	N/A Not 1 2 3 4 5 Well
	Could internal audit play a role in recovery?	Yes/No/Some
	How is this audited?	N/A Not 1 2 3 4 5 Well
21a	**The DP environment should be subjected to the same audit as the financial systems being produced therein.**	**Dis 1 2 3 4 5 Agree**
21b	Do you use the same criteria to establish the extent of compliance testing in the DP environment as you would if testing transaction controls?	Yes/No/Some

THE FOLLOWING QUESTIONS ARE DIRECTED AT EXTERNAL AUDITORS ONLY:

22a	**SAICA's guidelines should be complied with.**	**Dis 1 2 3 4 5 Agree**
22b	How do you manage to maintain or develop resources of the calibre referred to in the SAICA guidelines on computer audit skills?	Diff 1 2 3 4 5 Easy
23a	**Auditing Standard AU 010 requires the auditor to 'understand the system and related controls' of the system being audited. What does this mean to you if you rely on the control?**	
	Secondly, if you do not rely on the control?	

If rely; N/A Know its there 1 2 3 4 5 thoroughly conversant

Don't rely; N/A Know its there 1 2 3 4 5 thoroughly conversant

23b Do you really believe you are auditing in terms of your definition? Yes/No/Some

24b If not, how do you justify continuing with the audit?

25b What do internal audit departments need to do to improve reliance on them by external auditors?

26b Who reviews the work of specialists in your firm?

27b In the context of internal audit work who would be responsible for reviewing their work?

28b In the area of computer auditing, do you see SAICA as giving external auditors sufficient direction in this area? Insuf 1 2 3 4 5 OK

INTERVIEWEE DETAIL:

Name	Age
Company	Member of Societies
Position	Overseas experience
Professional Qualification	Seminar/Conference attendee
Academic Qualification	Language

APPENDIX 6

LISTING OF PERSONS INTERVIEWED

APPENDIX 6

PERSONS INVERVIEWED

AWBREY, J. B.Com (Hons), CA(SA), Partner, - Price Waterhouse

BAYLISS, J.W., CA(SA), Group Accountant, Allied

BASS, S.H., Senior EDP Auditor, Standard Bank.

BINTCLIFFE, D.A., Asst. Chief Inspector, Standard Bank

BOGIE, G.M., CA(SA), Partner (Computer Audit), Deloitte Haskins & Sells

BOWKER, R.J., BCom (Hons) CA(SA), Partner (Technical), Ernst & Whinney

BROOME, D.R., CTA, CA(SA), Partner, Samuel Thomson & Young

BUSSE, D.R., BCom, CAIB(SA), Deputy M.D., Standard Bank

CHRISTIE, G., Div.General Manager, Int Audit & Security, First National Ba

DICKSON, P.L., BSc CA(SA), Partner, Aiken & Peat

DUNN, M.D., CA(SA), FCA, Partner, Coopers & Lybrand

FISH, D.G.F., BSc., CA(SA), Partner - Aiken & Peat

GOLDSWORTHY, M.L., BCom CA(SA), Partner, Pim Goldby

GOODLACE, C., Manager - D.P. Integrity, Allied

HIBBIT, P., CA(SA), GM Finance and Accounting, The Perm

HODSON, P.F.J., Senior Int Audit (Computer), First National Bank

HOTLSHOUSEN, R.T. Dep. G. M. Data Processing, Standard Bank.

HYDE, W.R., General Manager, I.S. Operations, Standard Bank

KEARVALL-WHITE, B.R., BA (Hons), CA(SA), ACA, Manager-Computer Audit, Aik
Peat

KELLY, J., CA, CA(SA), Partner (Technical), Coopers & Lybrand

KIRK, I.M., B.BSc., HDip.BDP, CA(SA), FCA, CISA, Partner, Computer Audit, P
Waterhouse

KNIGHT, M., Dip. Data CA(SA), Manager - Computer Audit, Allied

LARGE, N.S., FCA, CA(SA), CIA, Audit Training Mgr, Anglo American

LYDALL, K.R., CA(SA), Partner (Technical), Aiken & Peat

McDONALD, S.A., CA(SA), General Manager, Financial Services, First Natio
Bank

MITCHELL, D., Bus.Dip.Admin., Manager - Info Systems Dev., The Perm.

MULDER, C.C., BCom (Hons) CA(SA), Education Manager, P.A.A.B.

NAUDE, D.B. Manager, Internal Audit, U.B.S.

PATTERSON, S.A., CA(SA) Partner (Technical), Price Waterhouse

PIENAAR, O.D., General Manager - Internal Audit, Allied

QUALLY, C.R., CA(SA), Partner (Technical), Pim Goldby

RAMSEY, F.S., General Manager - Information Services, Allied

SALMON, P., BCom., Snr.Int.Audit Manager (Computer Audit), U.B.S.

SHAW, H.B.C., BCom, Chief Account, Standard Bank

SHOUGH, R.A., CTA, HDip BDP, CA(SA), CISA, Partner-Computer Audit, Pim Goldby

SMITH, K.R., Senior Internal Audit, First National Bank

STORE, R.K. CA(SA) Partner, Deloitte Haskins & Sells

TENNANT, I.M., BCom. CA(SA), Manager (Computer Audit), Ernst & Whinney

TERRY, G., CA(SA), Technical Director, SA Institute of Chartered Accountants

TUCKETT, H.I.C., Manager Computer Controls, The Perm

VAN DER MERWE, J. BCom, CA(SA), Partner, Samuel Thomson & Young

VAN RENSBURG, M.C.J., BSc., GM Info. Systems, The Perm

VENTER, C., BCom., CA(SA), Partner, Ernst & Whinney

VICE, J.M., BCom. CA(SA), Partner (Computer Audit), Aiken & Peat

WALKER, J., CA(SA), Partner, Aiken & Peat

WELLS, C.F., BCom. CA(SA), Partner (Technical), Deloitte Haskins & Sells

WILLIAMS, C.J., General Manager - Audit & Secretarial, The Perm

WILSON, H.J., BCom. CA(SA) CISA, Partner (Computer Audit), Pim Goldby

WOLKE, W.J., B.Acc. CA(SA) MBA, GM, Marketing, Allied

JCF/gy
[Ford : 7]
(APP6)
1/11/87

APPENDIX 7

DETAILED RESULTS

```
:T
D=*  <4> OWNER  23 ENTRIES

 SAM FILES
 ---------
:TA1       DATA2       DATA3       DISRUN1_OUT  DISRUN2   DISRUN2_OUT  RUN1A
:N1A_OUT   RUN1B       RUN1B_OUT   RUN1_OUT     RUN2      RUN2A        RUN2A_OUT
:N2B       RUN2B_OUT   RUN2_OUT    RUN3         RUN3A     RUN3A_OUT    RUN3B
:N3B_OUT   RUN3_OUT
```

SPSS FOR PRIME 400/500. VERSION M. RELEASE 9.1. AUGUST 1. 1982

CURRENT DOCUMENTATION FOR THE SPSS BATCH SYSTEM

ORDER FROM MCGRAW-HILL: SPSS. 2ND ED. (PRINCIPAL TEXT)
SPSS UPDATE 7-9 (USE W/SPSS, 2ND FOR REL. 7. 8. 9)
SPSS POCKET GUIDE. RELEASE 9
SPSS INTRODUCTORY GUIDE: BASIC STATISTICS AND OPERATIONS
SPSS PRIMER (BRIEF INTRO TO SPSS)

ORDER FROM SPSS INC.: SPSS STATISTICAL ALGO
KEYWORDS: THE SPSS IN

DEFAULT SPACE ALLOCATION.. ALLOWS FOR.. 100 TRANSFORMATIONS
WORKSPACE 114688 BYTES 655 RECODE VALUES + LAG VARIABLES
TRANSPACE 16384 BYTES 2624 IF/COMPUTE OPERATIONS

```
  1 RUN NAME         J FORD RESEARCH REPORT
  2 FILE NAME        RUN3
  3 COMMENT          BASIC TABULATION OF RESULTS - Q1A TO 11B
  4 VARIABLE LIST    Q1A Q1B Q2A Q2B Q3A Q3B Q4A Q4B Q5A Q5B Q6A Q6B
  5                  Q7A Q8A Q8B Q8B1 Q8B2 Q9A Q9B Q10A Q10B Q11A Q11B Q12A Q12B
  6                  Q12B1 Q12B2 Q13A Q13B Q14A Q14B Q15A Q15B Q16A Q16B
  7                  Q17A Q17B Q18A Q19A Q19B Q20A Q20B Q20B1 Q20B2 Q20B3
  8                  Q21A Q21B
  9                  Q22A Q22B Q23A Q23A1 Q23B Q28B
 10                  POSITION AGE LANGUAGE
 11 INPUT MEDIUM    CDATA3]
 12 INPUT FORMAT    FIXED (53F1.0,3F1.0)
```

ACCORDING TO YOUR INPUT FORMAT. VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS	
Q1A	F 1. 0	1	1-	1
Q1B	F 1. 0	1	2-	2
Q2A	F 1. 0	1	3-	3
Q2B	F 1. 0	1	4-	4
Q3A	F 1. 0	1	5-	5
Q3B	F 1. 0	1	6-	6
Q4A	F 1. 0	1	7-	7
Q4B	F 1. 0	1	8-	8
Q5A	F 1. 0	1	9-	9
Q5B	F 1. 0	1	10-	10
Q6A	F 1. 0	1	11-	11
Q6B	F 1. 0	1	12-	12
Q7A	F 1. 0	1	13-	13
Q8A	F 1. 0	1	14-	14
Q8B	F 1. 0	1	15-	15
Q8B1	F 1. 0	1	16-	16

ACCORDING TO YOUR INPUT FORMAT. VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS	
Q8B2	F 1. 0	1	17-	17
Q9A	F 1. 0	1	18-	18
Q9B	F 1. 0	1	19-	19
Q10A	F 1. 0	1	20-	20
Q10B	F 1. 0	1	21-	21
Q11A	F 1. 0	1	22-	22
Q11B	F 1. 0	1	23-	23
Q12A	F 1. 0	1	24-	24
Q12B	F 1. 0	1	25-	25
Q12B1	F 1. 0	1	26-	26
Q12B2	F 1. 0	1	27-	27
Q13A	F 1. 0	1	28-	28
Q13B	F 1. 0	1	29-	29
Q14A	F 1. 0	1	30-	30
Q14B	F 1. 0	1	31-	31
Q15A	F 1. 0	1	32-	32
Q15B	F 1. 0	1	33-	33
Q16A	F 1. 0	1	34-	34
Q16B	F 1. 0	1	35-	35
Q17A	F 1. 0	1	36-	36
Q17B	F 1. 0	1	37-	37
Q18A	F 1. 0	1	38-	38
Q19A	F 1. 0	1	39-	39
Q19B	F 1. 0	1	40-	40
Q20A	F 1. 0	1	41-	41
Q20B	F 1. 0	1	42-	42
Q20B1	F 1. 0	1	43-	43
Q20B2	F 1. 0	1	44-	44
Q20B3	F 1. 0	1	45-	45
Q21A	F 1. 0	1	46-	46
Q21B	F 1. 0	1	47-	47
Q22A	F 1. 0	1	48-	48
Q22B	F 1. 0	1	49-	49
Q23A	F 1. 0	1	50-	50
Q23A1	F 1. 0	1	51-	51
Q23B	F 1. 0	1	52-	52
Q28B	F 1. 0	1	53-	53
POSITION	F 1. 0	1	54-	54
AGE	F 1. 0	1	55-	55
LANGUAGE	F 1. 0	1	56-	56

THE INPUT FORMAT PROVIDES FOR 56 VARIABLES. 56 WILL BE READ
IT PROVIDES FOR 1 RECORDS ('CARDS') PER CASE. A MAXIMUM OF 56 'COLUMNS' ARE USED ON A RECORD.

```
 13 N OF CASES      UNKNOWN
 14 REPORT          FORMAT=LIST TOTAL/
 15                 STRING=A(' ')/
 16                 VARS=Q1A TO Q11B(3)/
```

```
 17                HEAD='RESEARCH REPORT'
 18                     'FREQUENCIES AND BASIC STATISTICS'
 19                     'QUESTIONS 1A TO 11B'/
 20                FOOT='PREPARED BY J FORD, SEPTEMBER 1987'/
 21                BREAK=A''/
 22                SUMMARY=RELFREQ(0,5) MEAN STDEV MIN MAX MODE(0,5)/

REPORT REQUIRES      8144 BYTES FOR THIS TASK
```

RESEARCH REPORT
FREQUENCIES AND BASIC STATISTICS
QUESTIONS 1A TO 11B

Q1A	Q1B	Q2A	Q2B	Q3A	Q3B	Q4A	Q4B	Q5A	Q5B	Q6A	Q6B	Q7A	Q8A	Q8B	Q8B 1	Q8B 2	Q9A	Q9B	Q10 A	Q10 B	Q11 A	Q11 B
4	1	1	2	4	1	4	4	5	1	5	2	5	5	3	5	2	5	3	4	3	4	3
2	3	3	2	3	3	4	5	5	1	5	3	4	5	1	5	3	5	2	5	1	5	2
5	1	3	2	5	1	5	5	5	1	4	3	1	5	1	4	2	5	1	5	1	5	1

RESEARCH REPORT
FREQUENCIES AND BASIC STATISTICS
QUESTIONS 1A TO 11B

P.	Q1A	Q1B	Q2A	Q2B	Q3A	Q3B	Q4A	Q4B	Q5A	Q5B	Q6A	Q6B	Q7A	Q8A	Q8B	Q8B 1	Q8B 2	Q9A	Q9B	Q10 A	Q10 B	Q11 A	Q11 B
T	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0	0.0	17	0.0	17	0.0	17	0.0	17	0.0	17	0.0	17	0.0	0.0	17	27	17	0.0	17	0.0	17	0.0	19
1	1.9	31	54	3.8	3.8	23	5.8	3.8	0.0	81	0.0	7.7	1.9	0.0	35	1.9	5.8	0.0	48	0.0	58	0.0	35
2	9.6	13	13	65	17	19	1.9	12	0.0	0.0	5.8	27	5.8	1.9	9.6	5.8	54	0.0	12	0.0	3.8	3.8	12
3	3.8	38	15	13	21	40	7.7	7.7	0.0	1.9	5.8	48	5.8	7.7	38	17	23	1.9	23	0.0	21	3.8	35
4	46	0.0	7.7	0.0	27	0.0	17	13	9.6	0.0	17	0.0	21	17	0.0	19	0.0	17	0.0	19	0.0	23	0.0
5	38	0.0	9.6	0.0	31	0.0	67	46	90	0.0	71	0.0	65	73	0.0	29	0.0	81	0.0	81	0.0	69	0.0
M	4.1	1.7	2.1	1.7	3.6	1.8	4.4	3.3	4.9	.87	4.5	2.1	4.4	4.6	1.7	2.9	1.8	4.8	1.4	4.8	1.3	4.6	1.6
S	1.0	1.2	1.4	.90	1.2	1.1	1.1	1.9	.30	.49	.85	1.1	.98	.72	1.2	2.0	.98	.46	1.0	.40	1.0	.75	1.2
M	1	0	1	0	1	0	1	0	4	0	2	0	1	2	0	0	0	3	0	4	0	2	0
M	5	3	5	3	5	3	5	5	5	3	5	3	5	5	3	5	3	5	3	5	3	5	3
M	4	3	1	2	5	3	5	5	5	1	5	3	5	5	3	5	2	5	1	5	1	5	1
T																							
R																							
T	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0	0.0	17	0.0	17	0.0	17	0.0	17	0.0	17	0.0	17	0.0	0.0	17	27	17	0.0	17	0.0	17	0.0	19
1	1.9	31	54	3.8	3.8	23	5.8	3.8	0.0	81	0.0	7.7	1.9	0.0	35	1.9	5.8	0.0	48	0.0	58	0.0	35
2	9.6	13	13	65	17	19	1.9	12	0.0	0.0	5.8	27	5.8	1.9	9.6	5.8	54	0.0	12	0.0	3.8	3.8	12
3	3.8	38	15	13	21	40	7.7	7.7	0.0	1.9	5.8	48	5.8	7.7	38	17	23	1.9	23	0.0	21	3.8	35
4	46	0.0	7.7	0.0	27	0.0	17	13	9.6	0.0	17	0.0	21	17	0.0	19	0.0	17	0.0	19	0.0	23	0.0
5	38	0.0	9.6	0.0	31	0.0	67	46	90	0.0	71	0.0	65	73	0.0	29	0.0	81	0.0	81	0.0	69	0.0
M	4.1	1.7	2.1	1.7	3.6	1.8	4.4	3.3	4.9	.87	4.5	2.1	4.4	4.6	1.7	2.9	1.8	4.8	1.4	4.8	1.3	4.6	1.6
S	1.0	1.2	1.4	.90	1.2	1.1	1.1	1.9	.30	.49	.85	1.1	.98	.72	1.2	2.0	.98	.46	1.0	.40	1.0	.75	1.2
M	1	0	1	0	1	0	1	0	4	0	2	0	1	2	0	0	0	3	0	4	0	2	0
M	5	3	5	3	5	3	5	5	5	3	5	3	5	5	3	5	3	5	3	5	3	5	3
M	4	3	1	2	5	3	5	5	5	1	5	3	5	5	3	5	2	5	1	5	1	5	1

PREPARED BY J FORD, SEPTEMBER 1987

CPU TIME REQUIRED..... 18.30 SECONDS
DISK TIME REQUIRED..... 0.67 SECONDS
CONNECT TIME REQUIRED.. 0.66 MINUTES
09:36:27

24 FINISH

NORMAL END OF JOB.
24 CONTROL CARDS WERE PROCESSED.
0 ERRORS WERE DETECTED.

TOTAL TIMES
CPU TIME REQUIRED..... 20.23 SECONDS
DISK TIME REQUIRED..... 0.73 SECONDS
CONNECT TIME REQUIRED.. 0.70 MINUTES
09:36:27

SPSS FOR PRIME 400/500, VERSION M, RELEASE 9.1, AUGUST 1, 1982

CURRENT DOCUMENTATION FOR THE SPSS BATCH SYSTEM

ORDER FROM MCGRAW-HILL: SPSS, 2ND ED. (PRINCIPAL TEXT)
SPSS UPDATE 7-9 (USE W/SPSS, 2ND FOR REL. 7, 8, 9)
SPSS POCKET GUIDE, RELEASE 9
SPSS INTRODUCTORY GUIDE: BASIC STATISTICS AND OPERATIONS
SPSS PRIMER (BRIEF INTRO TO SPSS)

ORDER FROM SPSS INC.: SPSS STATISTICAL ALGO
KEYWORDS: THE SPSS IN

DEFAULT SPACE ALLOCATION.. ALLOWS FOR.. 163 TRANSFORMATIONS
WORKSPACE 114688 BYTES 655 RECODE VALUES + LAG VARIABLES
TRANSPACE 16384 BYTES 2624 IF/COMPUTE OPERATIONS

```
 1 RUN NAME        J FORD RESEARCH REPORT
 2 FILE NAME       RUN3A
 3 COMMENT         BASIC TABULATION OF RESULTS - Q12A TO Q218
 4 VARIABLE LIST   Q1A Q1B Q2A Q2B Q3A Q3B Q4A Q4B Q5A Q5B Q6A Q6B
 5                 Q7A Q8A Q8B Q8B1 Q8B2 Q9A Q9B Q10A Q10B Q11A Q11B Q12A Q12B
 6                 Q12B1 Q12B2 Q13A Q13B Q14A Q14B Q15A Q15B Q16A Q16B
 7                 Q17A Q17B Q18A Q19A Q19B Q20A Q20B Q20B1 Q20B2 Q20B3
 8                 Q21A Q21B
 9                 Q22A Q22B Q23A Q23A1 Q23B Q28B
10                 POSITION AGE LANGUAGE
11 INPUT MEDIUM    [DATA3]
12 INPUT FORMAT    FIXED (53F1.0,3F1.0)
```

ACCORDING TO YOUR INPUT FORMAT. VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS
Q1A	F 1. 0	1	1- 1
Q1B	F 1. 0	1	2- 2
Q2A	F 1. 0	1	3- 3
Q2B	F 1. 0	1	4- 4
Q3A	F 1. 0	1	5- 5
Q3B	F 1. 0	1	6- 6
Q4A	F 1. 0	1	7- 7
Q4B	F 1. 0	1	8- 8
Q5A	F 1. 0	1	9- 9
Q5B	F 1. 0	1	10- 10
Q6A	F 1. 0	1	11- 11
Q6B	F 1. 0	1	12- 12
Q7A	F 1. 0	1	13- 13
Q8A	F 1. 0	1	14- 14
Q8B	F 1. 0	1	15- 15
Q8B1	F 1. 0	1	16- 16

ACCORDING TO YOUR INPUT FORMAT. VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS
Q8B2	F 1. 0	1	17- 17
Q9A	F 1. 0	1	18- 18
Q9B	F 1. 0	1	19- 19
Q10A	F 1. 0	1	20- 20
Q10B	F 1. 0	1	21- 21
Q11A	F 1. 0	1	22- 22
Q11B	F 1. 0	1	23- 23
Q12A	F 1. 0	1	24- 24
Q12B	F 1. 0	1	25- 25
Q12B1	F 1. 0	1	26- 26
Q12B2	F 1. 0	1	27- 27
Q13A	F 1. 0	1	28- 28
Q13B	F 1. 0	1	29- 29
Q14A	F 1. 0	1	30- 30
Q14B	F 1. 0	1	31- 31
Q15A	F 1. 0	1	32- 32
Q15B	F 1. 0	1	33- 33
Q16A	F 1. 0	1	34- 34
Q16B	F 1. 0	1	35- 35
Q17A	F 1. 0	1	36- 36
Q17B	F 1. 0	1	37- 37
Q18A	F 1. 0	1	38- 38
Q19A	F 1. 0	1	39- 39
Q19B	F 1. 0	1	40- 40
Q20A	F 1. 0	1	41- 41
Q20B	F 1. 0	1	42- 42
Q20B1	F 1. 0	1	43- 43
Q20B2	F 1. 0	1	44- 44
Q20B3	F 1. 0	1	45- 45
Q21A	F 1. 0	1	46- 46
Q21B	F 1. 0	1	47- 47
Q22A	F 1. 0	1	48- 48
Q22B	F 1. 0	1	49- 49
Q23A	F 1. 0	1	50- 50
Q23A1	F 1. 0	1	51- 51
Q23B	F 1. 0	1	52- 52
Q28B	F 1. 0	1	53- 53
POSITION	F 1. 0	1	54- 54
AGE	F 1. 0	1	55- 55
LANGUAGE	F 1. 0	1	56- 56

THE INPUT FORMAT PROVIDES FOR 56 VARIABLES. 56 WILL BE READ
IT PROVIDES FOR 1 RECORDS ('CARDS') PER CASE. A MAXIMUM OF 56 'COLUMNS' ARE USED ON A RECORD.

```
13 N OF CASES     UNKNOWN
14 REPORT         FORMAT=LIST TOTAL/
15                STRING=A(' ')/
16                VARS=Q12A TO Q21B(3)/
```

```
17                HEAD='RESEARCH REPORT'
18                     'FREQUENCIES AND BASIC STATISTICS'
19                     'QUESTIONS 12A TO 21B'/
20                FOOT='PREPARED BY J FORD, SEPTEMBER 1987'/
21                BREAK=A''/
22                SUMMARY=RELFREQ(0,5) MEAN STDEV MIN MAX MODE(1,5)/

REPORT REQUIRES     10580 BYTES FOR THIS TASK
         23 READ INPUT DATA
```

RESEARCH REPORT
FREQUENCIES AND BASIC STATISTICS
QUESTIONS 12A TO 21B

Q12 A	Q12 B	Q12 B1	Q12 B2	Q13 A	Q13 B	Q14 A	Q14 B	Q15 A	Q15 B	Q16 A	Q16 B	Q17 A	Q17 B	Q18 A	Q19 A	Q19 B	Q20 A	Q20 B	Q20 B1	Q20 B2	Q20 B3	Q21 A	Q21 B
3	1	4	3	5	3	4	3	5	5	5	1	5	5	5	5	5	5	3	4	2	0	5	3
5	3	3	4	5	2	5	3	3	3	5	2	4	3	5	5	5	5	2	3	1	2	5	2
5	1	2	1	5	3	5	2	5	3	3	1	4	4	3	5	5	4	1	0	3	0	5	1
5	0	0	0	5	0	5	0	5	0	4	0	5	0	4	4	0	5	0	0	0	0	5	0
3	0	0	0	5	0	5	0	5	0	4	0	5	0	4	5	0	5	0	0	0	0	5	0
5	0	0	0	4	0	4	0	4	0	3	0	4	0	5	5	0	5	0	0	0	0	3	0
2	0	0	0	5	0	5	0	5	0	5	0	5	0	4	5	0	5	0	0	0	0	5	0
4	1	5	5	5	4	5	4	5	3	4	3	2	1	5	5	5	5	2	3	0	0	5	3
5	1	5	5	5	4	5	5	5	5	5	2	5	0	4	3	5	5	1	0	1	2	5	3
3	3	2	3	5	5	5	4	5	4	2	2	4	3	4	5	0	5	2	1	3	0	5	1
4	0	0	0	5	0	5	0	3	0	5	0	4	0	5	5	5	5	0	0	0	0	5	0
5	3	2	2	5	2	5	1	5	4	5	1	5	2	4	5	5	5	1	0	1	3	5	3
5	0	0	0	5	0	3	0	3	0	4	0	5	0	5	5	5	5	0	0	0	0	5	0
5	1	3	5	5	3	5	4	5	3	5	1	2	1	5	5	5	5	2	0	1	3	5	3
5	1	5	5	5	5	5	5	3	5	1	3	5	3	4	5	5	5	5	1	1	5	5	1
5	3	3	3	5	3	5	3	5	2	5	2	4	3	5	5	5	5	5	5	3	2	5	1
4	0	0	0	5	3	5	3	4	4	5	1	4	0	5	5	5	5	5	5	3	3	5	1
5	0	5	5	5	4	5	3	5	4	1	2	5	3	5	5	5	5	2	5	3	4	5	2
3	1	4	5	5	5	5	4	5	3	5	1	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	0	1	4	5	1
5	[illegible]	[illegible]	[illegible]	5	4	5	4	5	3	5	3	5	4	5	5	5	5	2	4	3	2	5	1
5	1	5	5	5	5	5	5	5	5	5	1	5	3	5	5	5	5	5	0	1	5	5	1
5	3	4	4	5	4	5	4	5	3	1	3	4	2	2	4	5	5	1	1	3	1	5	1
5	1	5	5	5	5	5	5	5	5	5	3	5	4	5	5	5	5	5	4	1	5	5	1
4	1	2	4	5	3	5	4	5	2	5	1	5	2	4	5	5	5	4	2	2	0	5	1
5	2	3	2	5	3	5	4	5	4	5	2	5	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	1	0	2	0	5	1
5	1	4	5	5	4	5	4	4	4	4	3	5	3	4	5	5	5	2	1	1	3	5	1
4	0	0	0	5	0	5	0	3	0	4	0	4	0	4	3	0	5	0	0	0	0	4	0
5	3	2	2	5	3	5	4	5	3	5	3	4	1	4	4	5	5	3	4	3	5	5	3
5	3	4	4	5	3	5	3	5	4	3	2	5	3	5	5	5	5	3	5	1	0	5	3
5	1	5	5	5	3	5	3	5	5	5	1	5	2	5	5	3	5	1	3	2	0	5	1
3	3	2	2	5	3	5	5	5	3	5	1	5	3	5	5	5	5	2	1	2	0	5	2
5	1	3	3	5	3	5	3	3	4	5	1	5	3	5	5	5	5	2	4	2	0	5	1
4	1	4	3	5	3	4	2	4	2	5	2	4	1	4	4	5	5	3	4	1	4	5	1
5	1	5	4	5	3	5	4	5	4	5	1	5	5	5	5	5	5	5	5	1	5	5	1
5	0	0	0	5	0	5	0	5	0	5	0	5	0	5	5	0	5	0	0	0	0	5	0
5	2	2	2	5	2	5	3	4	2	5	1	5	3	5	5	5	5	2	1	1	1	5	3
5	0	1	1	5	3	5	4	5	4	4	3	4	3	5	5	4	5	2	3	2	0	5	1
3	1	3	3	5	3	5	3	4	4	5	3	5	5	5	5	5	5	2	3	2	0	5	3
4	3	4	5	5	4	5	4	4	2	4	2	5	4	4	5	5	5	5	2	2	2	5	1
4	1	4	4	5	3	4	5	4	3	4	3	4	3	3	5	5	5	2	5	1	4	5	1
5	0	0	0	4	0	4	0	4	0	5	0	5	0	4	4	0	4	0	0	0	0	5	0
5	3	1	2	5	3	5	3	5	3	5	1	5	3	5	5	5	5	3	3	1	3	5	3
5	1	4	4	5	4	5	4	4	4	3	2	4	5	4	5	5	5	1	3	1	2	4	1
5	1	4	4	5	4	5	5	4	4	3	2	4	5	3	5	5	5	2	4	1	4	4	1
4	1	4	3	5	3	5	3	4	3	4	3	4	3	4	4	5	5	1	4	3	3	4	3
5	1	4	3	5	3	5	3	4	3	5	3	5	3	4	4	5	5	2	3	1	3	5	1
5	1	4	4	5	5	2	5	5	2	4	2	4	4	5	5	5	5	2	0	2	0	5	1
4	3	2	2	5	2	3	3	4	3	4	2	4	3	2	5	5	5	2	1	3	1	4	1
5	1	3	4	4	5	5	5	3	3	5	1	5	4	5	5	5	5	3	0	3	0	5	3
5	1	4	4	5	4	5	4	5	4	5	1	5	5	4	5	5	5	3	4	2	0	4	1
5	3	4	2	5	3	5	3	1	3	2	3	4	3	4	5	5	5	4	2	1	1	5	1
5	1	5	5	5	4	5	4	5	4	4	[illegible]	5	4	5	5	5	5	1	0	1	5	5	1

AFTER READING   52 CASES FROM SUBFILE RUN2A

R	Q12 A	Q12 B	Q12 B1	Q12 B2	Q13 A	Q13 B	Q14 A	Q14 B	Q15 A	Q15 B	Q16 A	Q16 B	Q17 A	Q17 B	Q18 A	Q19 A	Q19 B	Q20 A	Q20 B	Q20 B1	Q20 B2	Q20 B3	Q21 A	Q21 B
T	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0	0.0	23	19	19	0.0	17	0.0	17	0.0	17	0.0	17	0.0	21	0.0	0.0	17	0.0	17	35	19	46	0.0	17
1	0.0	48	3.8	3.8	0.0	0.0	0.0	1.9	1.9	0.0	5.8	33	0.0	7.7	0.0	0.0	0.0	0.0	19	13	38	7.7	0.0	54
2	1.9	3.8	15	15	0.0	7.7	1.9	3.8	0.0	12	3.8	25	3.8	7.7	3.8	0.0	0.0	0.0	35	5.8	21	12	0.0	5.8
3	12	25	15	15	0.0	40	3.8	29	12	29	9.6	25	0.0	37	5.8	3.8	1.9	0.0	12	15	21	13	1.9	23
4	19	0.0	29	23	5.8	21	9.6	31	27	31	25	0.0	37	13	38	13	1.9	3.8	3.8	17	0.0	9.6	12	0.0
5	67	0.0	17	23	94	13	85	17	60	12	56	0.0	60	13	52	83	79	96	13	13	0.0	12	87	0.0
M	4.5	1.3	2.8	2.9	4.9	2.9	4.8	3.1	4.4	2.9	4.2	1.6	4.5	2.5	4.4	4.8	4.1	5.0	2.1	2.1	1.4	1.7	4.8	1.3
S	.78	1.1	1.7	1.8	.24	1.6	.61	1.6	.85	1.6	1.1	1.1	.70	1.7	.77	.50	1.9	.19	1.6	1.9	1.0	1.9	.41	1.0
MI	2	0	0	0	4	0	2	0	1	0	1	0	2	0	2	3	0	4	0	0	0	0	3	0
MS	5	3	5	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5	5	5	3	5	5	3
MM	5	1	4	4	5	3	5	4	5	4	5	1	5	3	5	5	5	5	2	4	1	3	5	1

T

R

T	Q12 A	Q12 B	Q12 B1	Q12 B2	Q13 A	Q13 B	Q14 A	Q14 B	Q15 A	Q15 B	Q16 A	Q16 B	Q17 A	Q17 B	Q18 A	Q19 A	Q19 B	Q20 A	Q20 B	Q20 B1	Q20 B2	Q20 B3	Q21 A	Q21 B
T	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
0	0.0	23	19	19	0.0	17	0.0	17	0.0	17	0.0	17	0.0	21	0.0	0.0	17	0.0	17	35	19	46	0.0	17
1	0.0	48	3.8	3.8	0.0	0.0	0.0	1.9	1.9	0.0	5.8	33	0.0	7.7	0.0	0.0	0.0	0.0	19	13	38	7.7	0.0	54
2	1.9	3.8	15	15	0.0	7.7	1.9	3.8	0.0	12	3.8	25	3.8	7.7	3.8	0.0	0.0	0.0	35	5.8	21	12	0.0	5.8
3	12	25	15	15	0.0	40	3.8	29	12	29	9.6	25	0.0	37	5.8	3.8	1.9	0.0	12	15	21	13	1.9	23
4	19	0.0	29	23	5.8	21	9.6	31	27	31	25	0.0	37	13	38	13	1.9	3.8	3.8	17	0.0	9.6	12	0.0
5	67	0.0	17	23	94	13	85	17	60	12	56	0.0	60	13	52	83	79	96	13	13	0.0	12	87	0.0
M	4.5	1.3	2.8	2.9	4.9	2.9	4.8	3.1	4.4	2.9	4.2	1.6	4.5	2.5	4.4	4.8	4.1	5.0	2.1	2.1	1.4	1.7	4.8	1.3
S	.78	1.1	1.7	1.8	.24	1.6	.61	1.6	.85	1.6	1.1	1.1	.70	1.7	.77	.50	1.9	.19	1.6	1.9	1.0	1.9	.41	1.0
MI	2	0	0	0	4	0	2	0	1	0	1	0	2	0	2	3	0	4	0	0	0	0	3	0
MS	5	3	5	5	5	5	5	5	5	5	5	3	5	5	5	5	5	5	5	5	3	5	5	3
MM	5	1	4	4	5	3	5	4	5	4	5	1	5	3	5	5	5	5	2	4	1	3	5	1

PREPARED BY J FORD, SEPTEMBER 1987

```
CPU TIME REQUIRED.....    20.50 SECONDS
DISK TIME REQUIRED.....    2.31 SECONDS
CONNECT TIME REQUIRED..    0.75 MINUTES
                          09:47:23
```

```
24 FINISH

NORMAL END OF JOB.
   24 CONTROL CARDS WERE PROCESSED.
    0 ERRORS WERE DETECTED.

TOTAL TIMES
CPU TIME REQUIRED.....    22.75 SECONDS
DISK TIME REQUIRED.....    4.50 SECONDS
CONNECT TIME REQUIRED..    0.91 MINUTES
                          09:47:23
```

SPSS FOR PR1ME 400/500. VERSION M. RELEASE 9.1. AUGUST 1. 1982

CURRENT DOCUMENTATION FOR THE SPSS BATCH SYSTEM

ORDER FROM MCGRAW-HILL: SPSS. 2ND ED. (PRINCIPAL TEXT) ORDER FROM SPSS INC.: SPSS STATISTICAL ALGO
SPSS UPDATE 7-9 (USE W/SPSS,2ND FOR REL. 7, 8, 9) KEYWORDS: THE SPSS IN
SPSS POCKET GUIDE, RELEASE 9
SPSS INTRODUCTORY GUIDE: BASIC STATISTICS AND OPERATIONS
SPSS PRIMER (BRIEF INTRO TO SPSS)

DEFAULT SPACE ALLOCATION.. ALLOWS FOR.. 163 TRANSFORMATIONS
WORKSPACE 114688 BYTES 655 RECODE VALUES + LAG VARIABLES
TRANSPACE 16384 BYTES 2624 IF/COMPUTE OPERATIONS

```
 1 RUN NAME        J FORD RESEARCH REPORT
 2 FILE NAME       RUN3B
 3 COMMENT         BASIC TABULATION OF RESULTS - Q22A TO Q28B
 4 VARIABLE LIST   Q1A Q1B Q2A Q2B Q3A Q3B Q4A Q4B Q5A Q5B Q6A Q6B
 5                 Q7A Q8A Q8B Q8B1 Q8B2 Q9A Q9B Q10A Q10B Q11A Q11B Q12A Q12B
 6                 Q12B1 Q12B2 Q13A Q13B Q14A Q14B Q15A Q15B Q16A Q16B
 7                 Q17A Q17B Q18A Q19A Q19B Q20A Q20B Q20B1 Q20B2 Q20B3
 8   a             Q21A Q21B
 9                 Q22A Q22B Q23A Q23A1 Q23B Q28B
10                 POSITION AGE LANGUAGE
11 INPUT MEDIUM   [DATA3]
12 INPUT FORMAT   FIXED (53F1.0,3F1.0)
```

ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS
Q1A	F 1. 0	1	1- 1
Q1B	F 1. 0	1	2- 2
Q2A	F 1. 0	1	3- 3
Q2B	F 1. 0	1	4- 4
Q3A	F 1. 0	1	5- 5
Q3B	F 1. 0	1	6- 6
Q4A	F 1. 0	1	7- 7
Q4B	F 1. 0	1	8- 8
Q5A	F 1. 0	1	9- 9
Q5B	F 1. 0	1	10- 10
Q6A	F 1. 0	1	11- 11
Q6B	F 1. 0	1	12- 12
Q7A	F 1. 0	1	13- 13
Q8A	F 1. 0	1	14- 14
Q8B	F 1. 0	1	15- 15
Q8B1	F 1. 0	1	16- 16

ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS
Q8B2	F 1. 0	1	17- 17
Q9A	F 1. 0	1	18- 18
Q9B	F 1. 0	1	19- 19
Q10A	F 1. 0	1	20- 20
Q10B	F 1. 0	1	21- 21
Q11A	F 1. 0	1	22- 22
Q11B	F 1. 0	1	23- 23
Q12A	F 1. 0	1	24- 24
Q12B	F 1. 0	1	25- 25
Q12B1	F 1. 0	1	26- 26
Q12B2	F 1. 0	1	27- 27
Q13A	F 1. 0	1	28- 28
Q13B	F 1. 0	1	29- 29
Q14A	F 1. 0	1	30- 30
Q14B	F 1. 0	1	31- 31
Q15A	F 1. 0	1	32- 32
Q15B	F 1. 0	1	33- 33
Q16A	F 1. 0	1	34- 34
Q16B	F 1. 0	1	35- 35
Q17A	F 1. 0	1	36- 36
Q17B	F 1. 0	1	37- 37
Q18A	F 1. 0	1	38- 38
Q19A	F 1. 0	1	39- 39
Q19B	F 1. 0	1	40- 40
Q20A	F 1. 0	1	41- 41
Q20B	F 1. 0	1	42- 42
Q20B1	F 1. 0	1	43- 43
Q20B2	F 1. 0	1	44- 44
Q20B3	F 1. 0	1	45- 45
Q21A	F 1. 0	1	46- 46
Q21B	F 1. 0	1	47- 47
Q22A	F 1. 0	1	48- 48
Q22B	F 1. 0	1	49- 49
Q23A	F 1. 0	1	50- 50
Q23A1	F 1. 0	1	51- 51
Q23B	F 1. 0	1	52- 52
Q28B	F 1. 0	1	53- 53
POSITION	F 1. 0	1	54- 54
AGE	F 1. 0	1	55- 55
LANGUAGE	F 1. 0	1	56- 56

THE INPUT FORMAT PROVIDES FOR 56 VARIABLES. 56 WILL BE READ
IT PROVIDES FOR 1 RECORDS ('CARDS') PER CASE. A MAXIMUM OF 56 'COLUMNS' ARE USED ON A RECORD.

```
13 N OF CASES     UNKNOWN
14 REPORT         FORMAT=LIST,TOTAL/
15                STRING=A(' ')/
16                VARS=Q22A TO Q28B(3)/
```

```
                17              HEAD='RESEARCH REPORT'
                18                   'FREQUENCIES AND BASIC STATISTICS'
                19                   'QUESTIONS 22A TO 28B'/
                20              FOOT='PREPARED BY J FORD. SEPTEMBER 1987'/
                21              BREAK=A''/
                22              SUMMARY=RELFREQ(0.5) MEAN STDEV MIN MAX MODE(1.5)/

REPORT REQUIRES     3244 BYTES FOR THIS TASK
                23 READ INPUT DATA
```


R	Q22 A	Q22 B	Q23 A	Q23 A1	Q23 B	Q28 B
T	100	100	100	100	100	100
O	46	54	46	48	54	48
1	0.0	7.7	0.0	7.7	37	12
2	0.0	9.6	0.0	21	1.9	13
3	1.9	12	0.0	13	7.7	21
4	13	12	15	5.8	0.0	3.8
5	38	5.8	38	3.8	0.0	1.9
M	2.5	1.4	2.5	1.3	.63	1.3
S	2.4	1.7	2.4	1.5	.86	1.4
M	0	0	0	0	0	0
M	5	5	5	5	3	5
M	5	3	5	2	1	3
T						
R						
T	100	100	100	100	100	100
O	46	54	46	48	54	48
1	0.0	7.7	0.0	7.7	37	12
2	0.0	9.6	0.0	21	1.9	13
3	1.9	12	0.0	13	7.7	21
4	13	12	15	5.8	0.0	3.8
5	38	5.8	38	3.8	0.0	1.9
M	2.5	1.4	2.5	1.3	.63	1.3
S	2.4	1.7	2.4	1.5	.86	1.4
M	0	0	0	0	0	0
M	5	5	5	5	3	5
M	5	3	5	2	1	3

PREPARED BY J FORD. SEPTEMBER 1987

```
CPU TIME REQUIRED......     8.56 SECONDS
DISK TIME REQUIRED.....     0.07 SECONDS
CONNECT TIME REQUIRED..     0.31 MINUTES
                         09:55:10

                24 FINISH

          NORMAL END OF JOB.
            24 CONTROL CARDS WERE PROCESSED.
             0 ERRORS WERE DETECTED.

TOTAL TIMES
CPU TIME REQUIRED......    10.59 SECONDS
DISK TIME REQUIRED.....     1.45 SECONDS
CONNECT TIME REQUIRED..     0.40 MINUTES
                         09:55:11
```

AUDITORS' RESPONSES

BASED ON 28 INTERVIEWS

		NUMBER OF RESPONDENTS	PERCENTAGE
QUESTION 22A			
	1	-	-
	2	-	0
	3	1	3,6
	4	7	25,0
	5	20	71,4
		28	100
		MEAN = 3,45	
QUESTION 22B			
	1	4	16,6
	2	5	20,8
	3	6	25,0
	4	6	25,0
	5	3	12,6
		28	100
		MEAN = 2,96	
QUESTION 23A			
	1	-	-
	2	-	-
	3	-	-
	4	8	28,6
	5	20	71,4
		28	100
		MEAN = 4,71	
QUESTION 23A			
	1	5	17,9
	2	11	39,3
	3	7	25,0
	4	3	10,7
	5	2	7,1
		MEAN = 2,50	

QUESTION 23B

YES	19
NO	1
SOME OF THE TIME	4
DID NOT ANSWER	4

QUESTION 28B

1	6	22,2
2	7	25,9
3	11	40,7
4	2	7,4
5	1	3,8

MEAN = 2,44

JF/mcy
290987
D1: ANALYSIS

FOR PR1ME 400/500, VERSION M, RELEASE 9.1, AUGUST 1, 1982

CURRENT DOCUMENTATION FOR THE SPSS BATCH SYSTEM

FROM MCGRAW-HILL: SPSS, 2ND ED, (PRINCIPAL TEXT)
SPSS UPDATE 7-9 (USE W/SPSS,2ND FOR REL. 7, 8, 9)
SPSS POCKET GUIDE, RELEASE 9
SPSS INTRODUCTORY GUIDE: BASIC STATISTICS AND OPERATIONS
SPSS PRIMER (BRIEF INTRO TO SPSS)

ORDER FROM SPSS INC.: SPSS STATISTICAL ALGORITHM
KEYWORDS: THE SPSS INC. NE

ILT SPACE ALLOCATION.. ALLOWS FOR.. 163 TRANSFORMATIONS
PACE 114688 BYTES 655 RECODE VALUES + LAG VARIABLES
PACE 16384 BYTES 2624 IF/COMPUTE OPERATIONS

```
 1 RUN NAME        J FORD RESEARCH REPORT
 2 FILE NAME       DISRUN2
 3 COMMENT         DISCRIMINANT ANALYSIS
 4 VARIABLE LIST   Q1A Q1B Q2A Q2B Q3A Q3B Q4A Q4B Q5A Q5B Q6A Q6B
 5                 Q7A Q8A Q8B Q8B1 Q8B2 Q9A Q9B Q10A Q10B Q11A Q11B Q12A Q12B
 6                 Q12B1 Q12B2 Q13A Q13B Q14A Q14B Q15A Q15B Q16A Q16B
 7                 Q17A Q17B Q18A Q19A Q19B Q20A Q20B Q20B1 Q20B2 Q20B3
 8                 Q21A Q21B
 9                 Q22A Q22B Q23A Q23A1 Q23B Q28B
10                 POSITION AGE LANGUAGE
11     CODE        POSITION
12                 (6 THRU 8=2)
13 VALUE LABELS    POSITION
14 DATA LIST       [DATA3]
15 INPUT FORMAT    FIXED (53F1.0,3F1.0)
```

ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS
Q1A	F 1. 0	1	1- 1
Q1B	F 1. 0	1	2- 2
Q2A	F 1. 0	1	3- 3
Q2B	F 1. 0	1	4- 4
Q3A	F 1. 0	1	5- 5
Q3B	F 1. 0	1	6- 6
Q4A	F 1. 0	1	7- 7
Q4B	F 1. 0	1	8- 8
Q5A	F 1. 0	1	9- 9
Q5B	F 1. 0	1	10- 10
Q6A	F 1. 0	1	11- 11
Q6B	F 1. 0	1	12- 12
Q7A	F 1. 0	1	13- 13

ACCORDING TO YOUR INPUT FORMAT, VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS
Q8A	F 1. 0	1	14- 14
Q8B	F 1. 0	1	15- 15
Q8B1	F 1. 0	1	16- 16
Q8B2	F 1. 0	1	17- 17
Q9A	F 1. 0	1	18- 18
Q9B	F 1. 0	1	19- 19
Q10A	F 1. 0	1	20- 20
Q10B	F 1. 0	1	21- 21
Q11A	F 1. 0	1	22- 22
Q11B	F 1. 0	1	23- 23
Q12A	F 1. 0	1	24- 24
Q12B	F 1. 0	1	25- 25
Q12B1	F 1. 0	1	26- 26
Q12B2	F 1. 0	1	27- 27
Q13A	F 1. 0	1	28- 28
Q13B	F 1. 0	1	29- 29
Q14A	F 1. 0	1	30- 30
Q14B	F 1. 0	1	31- 31
Q15A	F 1. 0	1	32- 32
Q15B	F 1. 0	1	33- 33
Q16A	F 1. 0	1	34- 34
Q16B	F 1. 0	1	35- 35
Q17A	F 1. 0	1	36- 36
Q17B	F 1. 0	1	37- 37
Q18A	F 1. 0	1	38- 38
Q19A	F 1. 0	1	39- 39
Q19B	F 1. 0	1	40- 40
Q20A	F 1. 0	1	41- 41
Q20B	F 1. 0	1	42- 42
Q20B1	F 1. 0	1	43- 43
Q20B2	F 1. 0	1	44- 44
Q20B3	F 1. 0	1	45- 45
Q21A	F 1. 0	1	46- 46
Q21B	F 1. 0	1	47- 47
Q22A	F 1. 0	1	48- 48
Q22B	F 1. 0	1	49- 49
Q23A	F 1. 0	1	50- 50
Q23A1	F 1. 0	1	51- 51
Q23B	F 1. 0	1	52- 52
Q28B	F 1. 0	1	53- 53
POSITION	F 1. 0	1	54- 54
AGE	F 1. 0	1	55- 55

ACCORDING TO YOUR INPUT FORMAT. VARIABLES ARE TO BE READ AS FOLLOWS

VARIABLE	FORMAT	RECORD	COLUMNS
LANGUAGE	F 1. 0	1	56- 56

INPUT FORMAT PROVIDES FOR 56 VARIABLES. 56 WILL BE READ
OVIDES FOR 1 RECORDS ('CARDS') PER CASE. A MAXIMUM OF 56 'COLUMNS' ARE USED ON A RECORD.

```
16 N OF CASES      UNKNOWN
17 DISCRIMINANT    GROUPS=POSITION(1,2)/
18                 VARIABLES=Q1A TO Q218/
19                 ANALYSIS=Q1A TO Q218/
20                 MAXSTEPS=5/
21                 METHOD=WILKS/
22 OPTIONS         2,3,5,7,9,10,12
23 STATISTICS      1,2
```

DISCRIMINANT ANALYSIS REQUIRES 48904 (47.8K) BYTES OF WORKSPACE.

24 READ INPUT DATA

READING 52 CASES FROM SUBFILE DISRUN2 , END OF DATA WAS ENCOUNTERED ON LOGICAL UNIT # 8

FILE DISRUN2 (CREATION DATE = 09/25/87)

- D I S C R I M I N A N T A N A L Y S I S -

ON GROUPS DEFINED BY POSITION

52 (UNWEIGHTED) CASES WERE PROCESSED.
6 OF THESE WERE EXCLUDED FROM THE ANALYSIS.
6 HAD MISSING OR OUT-OF-RANGE GROUP CODES.
46 (UNWEIGHTED) CASES WILL BE USED IN THE ANALYSIS.

NUMBER OF CASES BY GROUP

POSITION	NUMBER OF CASES UNWEIGHTED	WEIGHTED	LABEL
1	27	27.0	EXTAUDIT
2	19	19.0	INTERNAL
TOTAL	46	46.0	

GROUP MEANS

POSITION	Q1A	Q1B	Q2A	Q2B	Q3A	Q3B	Q4A	Q4B
1	4.00000	1.62963	1.37037	1.29630	3.37037	1.40741	4.18519	2.51852
2	4.52632	1.89474	3.00000	2.21053	4.05263	2.21053	4.68421	4.05263
TOTAL	4.21739	1.73913	2.04348	1.67391	3.65217	1.73913	4.39130	3.15217

POSITION	Q5A	Q5B	Q6A	Q6B	Q7A	Q8A	Q8B	Q8B1
1	4.96296	0.66667	4.48148	1.66667	4.55556	4.51852	1.25926	2.40741
2	4.89474	1.10526	4.68421	2.47368	4.21053	4.63158	2.05263	3.47368
TOTAL	4.93478	0.84783	4.56522	2.00000	4.41304	4.56522	1.58696	2.84783

POSITION	Q8B2	Q9A	Q9B	Q10A	Q10B	Q11A	Q11B	Q12A
1	1.40741	4.77778	1.14815	4.81481	1.14815	4.77778	1.14815	4.44444
2	2.15789	4.78947	1.57895	4.84211	1.31579	4.47368	2.05263	4.68421
TOTAL	1.71739	4.78261	1.32609	4.82609	1.21739	4.65217	1.52174	4.54348

POSITION	Q12B	Q12B1	Q12B2	Q13A	Q13B	Q14A	Q14B	Q15A
1	0.96296	2.11111	2.22222	4.92593	2.25926	4.81481	2.33333	4.59259
2	1.63158	3.89474	3.89474	4.94737	3.84211	4.84211	4.05263	4.36842
TOTAL	1.23913	2.84783	2.91304	4.93478	2.91304	4.82609	3.04348	4.50000

POSITION	Q15B	Q16A	Q16B	Q17A	Q17B	Q18A	Q19A	Q19B
1	2.37037	4.29630	1.14815	4.74074	2.55556	4.40741	4.85185	3.29630
2	3.68421	3.94737	2.05263	4.36842	2.63158	4.52632	4.68421	4.89474
TOTAL	2.91304	4.15217	1.52174	4.58696	2.58696	4.45652	4.78261	3.95652

POSITION	Q20A	Q20B	Q20B1	Q20B2	Q20B3	Q21A	Q21B
1	4.92593	1.55556	1.62963	1.14815	1.22222	4.81481	1.07407
2	5.00000	2.42105	2.15789	1.68421	2.00000	4.89474	1.78947
TOTAL	4.95652	1.91304	1.84783	1.36957	1.54348	4.84783	1.36957

GROUP STANDARD DEVIATIONS

POSITION	Q1A	Q1B	Q2A	Q2B	Q3A	Q3B	Q4A	Q4B
1	0.91987	1.33440	1.00568	0.95333	1.27545	1.18514	1.24150	2.19037
2	0.77233	0.93659	1.45297	0.53530	1.07877	0.97633	0.94591	1.17727
TOTAL	0.89226	1.18199	1.44463	0.92025	1.23320	1.16304	1.14462	1.97729

POSITION	Q5A	Q5B	Q6A	Q6B	Q7A	Q8A	Q8B	Q8B1
1	0.19245	0.48038	0.84900	1.30089	0.84732	0.80242	1.19591	2.18842
2	0.31530	0.45883	0.74927	0.69669	1.18223	0.68399	0.97032	1.71167
TOTAL	0.24964	0.51499	0.80697	1.15470	1.00169	0.74988	1.16573	2.05445

POSITION	Q8B2	Q9A	Q9B	Q10A	Q10B	Q11A	Q11B	Q12A
1	1.11835	0.42366	1.09908	0.39585	1.13353	0.42366	1.13353	0.89156
2	0.50146	0.53530	0.83771	0.37463	0.74927	0.90483	1.02598	0.67104
TOTAL	0.98122	0.46729	1.01224	0.38322	0.98687	0.67387	1.16884	0.80847

POSITION	Q12B	Q12B1	Q12B2	Q13A	Q13B	Q14A	Q14B	Q15A
1	1.05544	1.82574	1.94804	0.26688	1.74516	0.48334	1.83973	0.63605
2	0.95513	1.10024	1.14962	0.22942	0.89834	0.68825	0.84811	1.11607
TOTAL	1.05798	1.78845	1.84783	0.24964	1.64420	0.56977	1.72506	0.86281

POSITION	Q15B	Q16A	Q16B	Q17A	Q17B	Q18A	Q19A	Q19B
1	1.84283	0.99285	1.06351	0.44658	2.04438	0.63605	0.45605	2.38287
2	0.94591	1.43270	0.91127	0.95513	1.16479	0.77233	0.58239	0.45883
TOTAL	1.65766	1.19196	1.09014	0.71728	1.72016	0.68982	0.51264	1.99952

POSITION	Q20A	Q20B	Q20B1	Q20B2	Q20B3	Q21A	Q21B
1	0.26688	1.52753	1.84283	1.02671	1.67179	0.48334	1.07152
2	0.00000	1.38707	1.83373	0.94591	2.13437	0.31530	0.97633
TOTAL	0.20618	1.51769	1.83748	1.01890	1.89393	0.41991	1.08236

FILE DISRUN2 (CREATION DATE = 09/25/87)

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ON GROUPS DEFINED BY POSITION

ANALYSIS NUMBER 1

STEPWISE VARIABLE SELECTION

SELECTION RULE: MINIMIZE WILKS' LAMBDA
MAXIMUM NUMBER OF STEPS..... 5
MINIMUM TOLERANCE LEVEL..... 0.00100
MINIMUM F TO ENTER..... 1.0000
MAXIMUM F TO REMOVE..... 1.0000

CANONICAL DISCRIMINANT FUNCTIONS

MAXIMUM NUMBER OF FUNCTIONS.....
MINIMUM CUMULATIVE PERCENT OF VARIANCE.... 100.00
MAXIMUM SIGNIFICANCE OF WILKS' LAMBDA.... 1.0000

PRIOR PROBABILITY FOR EACH GROUP IS 0.50000

---------- VARIABLES IN THE ANALYSIS AFTER STEP 5 ----------

VARIABLE	TOLERANCE	F TO REMOVE	WILKS' LAMBDA
Q2A	0.8277702	23.051	0.4451462
Q12B1	0.3615853	12.126	0.3680130
Q14B	0.3523747	7.6242	0.3362315
Q17B	0.3536161	11.739	0.3652792
Q19A	0.7923693	7.3416	0.3342365

---------- VARIABLES NOT IN THE ANALYSIS AFTER STEP 5 ----------

VARIABLE	TOLERANCE	MINIMUM TOLERANCE	F TO ENTER	WILKS' LAMBDA
Q1A	0.8803996	0.3452096	3.6386	0.2583049
Q1B	0.6085224	0.3261539	0.34725	0.2799115
Q2B	0.3024838	0.2722958	1.2698	0.2734987
Q3A	0.9029681	0.3316081	2.6264	0.2645860
Q3B	0.6067019	0.3272742	0.47672	0.2789935
Q4A	0.8329341	0.3255722	0.82627E-01	0.2818068
Q4B	0.2009491	0.2009491	0.86636E-03	0.2823976
Q5A	0.9327461	0.3471147	0.40322	0.2795139
Q5B	0.5052666	0.3390472	2.2548	0.2669691
Q6A	0.8422920	0.3360350	0.29316	0.2802969
Q6B	0.5036487	0.3204984	1.1440	0.2743564
Q7A	0.8769540	0.3427765	0.25981	0.2805350
Q8A	0.8934377	0.3509529	0.92905	0.2758330
Q8B	0.6540932	0.2595953	0.73587E-01	0.2818720
Q8B1	0.3455649	0.2996533	0.68422E-01	0.2819093
Q8B2	0.2930120	0.2531361	1.8267	0.2697683
Q9A	0.5057731	0.3382857	0.82553	0.2765500
Q9B	0.8012235	0.3375073	0.50021	0.2788276
Q10A	0.7228459	0.3322464	1.0656	0.2748930
Q10B	0.7109805	0.3074049	0.12869	0.2814751
Q11A	0.9152288	0.3284304	4.0030	0.2561157
Q11B	0.7440189	0.3244574	1.6385	0.2710176
Q12A	0.9337640	0.3463943	0.21100E-01	0.2822511
Q12B	0.7690059	0.3355607	3.4356	0.2595403
Q12B2	0.1283497	0.1262672	6.9794	0.2395367
Q13A	0.6915243	0.3523636	1.8931	0.2693304
Q13B	0.1084598	0.1084598	0.34896	0.2798994
Q14A	0.9224226	0.3492998	0.12303E-01	0.2823148
Q15A	0.9336962	0.3453192	0.86227	0.2762951
Q15B	0.2816220	0.2816220	0.51709	0.2787086
Q16A	0.9029747	0.3429096	0.49727E-02	0.2823678
Q16B	0.5567811	0.3181617	0.89302	0.2760821
Q17A	0.9273331	0.3387006	0.44775E-01	0.2820800
Q18A	0.7785811	0.3521817	0.47583E-01	0.2820597
Q19B	0.1975866	0.1975866	0.78443	0.2768357
Q20A	0.9299476	0.3433787	0.67695E-01	0.2819145
Q20B	0.5563193	0.3224987	0.56766	0.2783523
Q20B1	0.7035041	0.3381053	0.33161E-02	0.2823798
Q20B2	0.5752263	0.3074286	1.4861	0.2720375
Q20B3	0.6889478	0.3259104	0.68589E-03	0.2823989
Q21A	0.8511411	0.3517893	1.9278	0.2691020
Q21B	0.8479126	0.3406007	0.90510	0.2759985

MAXIMUM STEP REACHED.

SUMMARY TABLE

STEP	ACTION ENTERED	ACTION REMOVED	VARS IN	WILKS' LAMBDA	SIG.	LABEL
1	Q2A		1	0.684636	0.0000	
2	Q12B1		2	0.453552	0.0000	
3	Q19A		3	0.381510	0.0000	
4	Q17B		4	0.336232	0.0000	
5	Q14B		5	0.282404	0.0000	

CLASSIFICATION FUNCTION COEFFICIENTS
(FISHER'S LINEAR DISCRIMINANT FUNCTIONS)

POSITION=	1 EXTAUDIT	2 INTERNAL
Q2A	-0.4799309	1.574960
Q12B1	-2.224354	-0.3147930
Q14B	-0.6644791	0.9988236
Q17B	0.9120474	-0.8094361
Q19A	21.07370	17.84104
(CONSTANT)	-49.52979	-45.18705

CANONICAL DISCRIMINANT FUNCTIONS

FUNCTION	EIGENVALUE	PERCENT OF VARIANCE	CUMULATIVE PERCENT	CANONICAL CORRELATION	AFTER FUNCTION	WILKS' LAMBDA	CHI-SQUARED	D.F.
1*	2.54103	100.00	100.00	0.8471105	0	0.2824038	52.473	5

* MARKS THE 1 CANONICAL DISCRIMINANT FUNCTION(S) TO BE USED IN THE REMAINING ANALYSIS.

STANDARDIZED CANONICAL DISCRIMINANT FUNCTION COEFFICIENTS

	FUNC 1
Q2A	0.78452
Q12B1	0.94685
Q14B	0.79568
Q17B	-0.94557
Q19A	-0.52224

CANONICAL DISCRIMINANT FUNCTIONS EVALUATED AT GROUP MEANS (GROUP CENTROIDS)

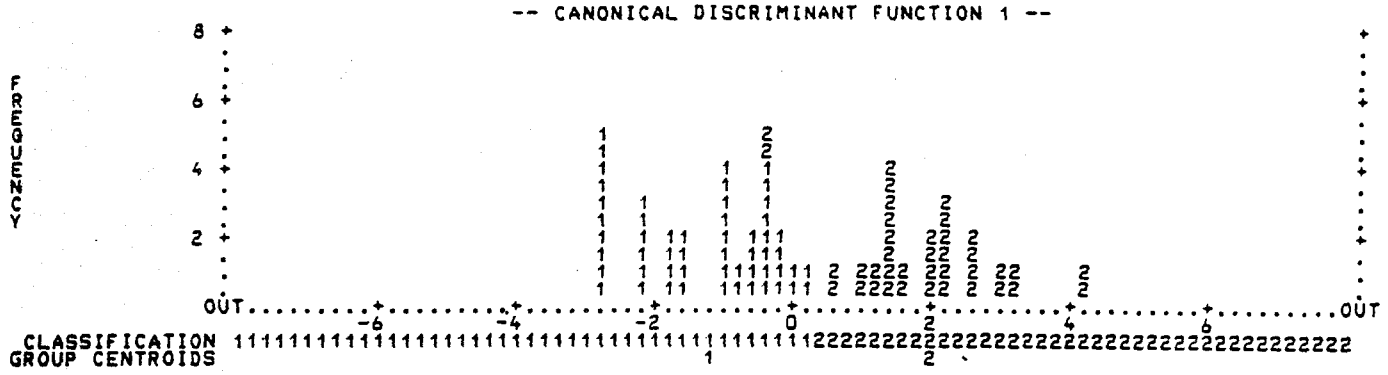
GROUP	FUNC 1
1	-1.30782
2	1.85848

SYMBOLS USED IN PLOTS

SYMBOL	GROUP	LABEL
1	1	EXTAUDIT
2	2	INTERNAL

ALL-GROUPS STACKED HISTOGRAM

-- CANONICAL DISCRIMINANT FUNCTION 1 --



CLASSIFICATION RESULTS -

ACTUAL GROUP		NO. OF CASES	PREDICTED GROUP MEMBERSHIP 1	2
GROUP EXTAUDIT	1	27	27 100.0%	0 0.0%
GROUP INTERNAL	2	19	1 5.3%	18 94.7%

PERCENT OF "GROUPED" CASES CORRECTLY CLASSIFIED: 97.83%

CLASSIFICATION PROCESSING SUMMARY

52 CASES WERE PROCESSED.
6 CASES WERE EXCLUDED FOR MISSING OR OUT-OF-RANGE GROUP CODES.
46 CASES WERE USED FOR PRINTED OUTPUT.

TRANSPACE REQUIRED.. 100 BYTES
1 TRANSFORMATIONS
3 RECODE VALUES + LAG VARIABLES
0 IF/COMPUTE OPERATIONS

CPU TIME REQUIRED..... 15.41 SECONDS
DISK TIME REQUIRED.... 1.15 SECONDS
CONNECT TIME REQUIRED.. 0.40 MINUTES
10:15:58

25 FINISH

NORMAL END OF JOB.
25 CONTROL CARDS WERE PROCESSED.
0 ERRORS WERE DETECTED.

TOTAL TIMES
CPU TIME REQUIRED..... 17.53 SECONDS
DISK TIME REQUIRED.... 1.29 SECONDS
CONNECT TIME REQUIRED.. 0.47 MINUTES
10:15:59