



FASHION DYNAMICS RESEARCH UNIT:
A STUDY OF MALE FASHION

Research Report No. 6

Computer Systems for the Analysis of Sales Data





The views expressed in this report are solely those of the author as endorsed by the Fashion Dynamics Research Unit. They in no way reflect the views of the School of Management or any other body connected with this project.

Computer Systems for
the Analysis of
Sales Data

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This report was specially prepared for circulation to all those organisations taking part in the project.

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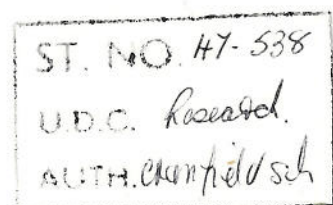
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SUMMARY

Report No. 6 outlines the methodology to be used in the manipulation of the large amounts of sales and style data available to the research team. Details are included of both the coding scheme used to convert verbal information into quantitative data, and of the principal computer programs to be used in analysing this data. Throughout attention is directed to the prime practical aim of the research - the improvement of sales forecasting - and to that end various proposals are made. The most important of these is contained in Section 10, where some tentative suggestions for a "model" management information system are put forward.

INTRODUCTION

This report is designed to outline the overall scheme which will be used to analyse the style and sales data released to the project by participating companies. At present data relating to 348 garments is available but further statistics are on call should they be required.

While actual programs are not given their design specification, flow charting and operation will be described, along with various other considerations. Section 1 explains the basic philosophy behind the data manipulation proposed, Sections 2 and 3 outline the intended analysis scheme and Section 4 details the coding system used to translate verbal style information into numerical computer input. Sections 5, 6 and 7 give the specifications and flow charts of the programs concerned, and Section 8 some information on the operation of the whole system. Section 9 contains a brief progress report on this aspect of the research, in essence a supplement to Report No.5.

In Section 10 some proposals for future research are put forward. In particular for the design of an illustrative model of a possible management information system, which it is hoped to produce before the end of the project.

The appendices, containing complete coding and operational instructions, are included both for the sake of completeness and because the report will be used internally in the conduct of the research.

While this particular document may be of more interest to those involved in the quantitative and computational side of the industry, it is hoped that it will give all those assisting in the project some idea of how it is intended to complete this area of the research. It is also hoped that the report as a whole, and Section 10 in particular, may stimulate some interest and thought on the possibilities for improved management information systems in the retail sector.

SECTION 1 DATA STORAGE

The data obtained will be stored in the Institute's computer complex using a magnetic disc/tape system. A series of magnetic tape files have already been opened for this purpose and a magnetic disc work file has been allocated to the project. A program (to be described later) has been written to dump the data onto the disc file, the contents of which are subsequently dumped to magnetic tape. Similarly a magnetic tape can be dumped back to disc and the information used by other programs. The advantages of this system are convenience of operation and the elimination of lengthy tape scanning processes. Once on disc any specific piece of information can be readily located. The data relating to each organisation will be written to a specific tape.

The disadvantages of the above are primarily in relation to file security in that anyone can gain access to a file. However, the mechanism used for writing to a file, plus the fact that the data will already be coded into a unique format, means that it would be very difficult for an unauthorised person to gain access to any meaningful information. As a further safeguard, each file contains a different access code which has to be quoted or all the programs concerned automatically delete themselves. Once all the data has been written to tape files only one written copy of this and the access codes will be retained (under lock and key). Any other member of the team requiring data will have to proceed via the author, who will access the system to extract the relevant information. The stored data will contain no explicit reference to contributing organisations. It is considered that the above scheme fulfills the obligation of confidentiality, an obligation under which all the statistical information was obtained.

The data will be stored "by garment", i.e. a discrete set of information will be stored for each individual garment. This set will comprise an identification code (relating back to the written copy of the data), a code giving garment type, a series of codes giving a style description, and finally, the sales figures. It will also be necessary to include information on the number of the latter, the time periods used in their compilation and the actual dates of the sales. The actual coding scheme is given in more detail in Section 4 and Appendix 1.

Such a coded data system will allow the data on any specific garment to be readily accessed, but more importantly, will allow a suitable computer program (see Section 6) to carry out complex analyses between garments, and to build up garment categories such as "3-piece 2-button pinstripe wool suits over £30".

It would also have been possible to store a textual description of each product; indeed it would have been feasible to store all the information in verbal form, and to manipulate it by a list processing language. The author, however, was not convinced of the need for this level of sophistication in processing style information. The system outlined, involving coding into categories such as flared/parallel, 2-button/3-button, etc., will not obscure too much information. All that will be lost will be minor detail on pockets, trim and some truncation of colour description, e.g. "sea-blue" would become "blue". The analysis programs themselves are perfectly capable of being extended to process such information, the limitations have been imposed purely for the sake of speed and the avoidance of core storage problems.

The advantage of the system described herein is that the data is kept almost in the original form, yet can be readily assembled into any information set it is wished to study. Thus the data format does not constrain the analysis and can be used in the future as more types of analysis occur to the research team.

SECTION 2 PRELIMINARY ANALYSIS METHODOLOGY

Regrettably the data obtained is not comprehensive in terms of either market coverage or time span. The statistics fall into two distinct categories - mail order and "up-market" retail. Neither of these categories are representative of the total market, and also they are not likely to be comparable with each other. The mail order consumer purchasing process being somewhat different to that of the retail customer on several important factors. Further, the bulk of data relates only to the last 18 months/two years, making long-term style analysis impractical. The nature of the available data thus forces the author to a number of conclusions:

- a) That the data should be analysed primarily with regard to the sales patterns both of individual garments and of categories of garments. These latter categories will be formed on the basis of qualitative style factors, i.e. flared/parallel, etc. The analysis of the way style evolves over time is best left to future research.
- b) The style data is not quantifiable in any respect, it only allows the formation of categories and does not lend itself to the more traditional "fashion cycle" approach (see Report No.5 page 5.).
- c) It would be wise to bear in mind the source of each data set. Comparisons should be made mainly amongst garments from one source, though perhaps also amongst all "retail" or all "mail order" garments. Comparison between different sources is likely to be hazardous, particularly as all the sources collect statistics in a different manner.
- d) The inaccuracies in the data given to the project are extremely difficult to assess. There are all the normal problems with sales figures; e.g. lags between actual purchase and recording the sale, possible clerical errors, etc. It would, therefore, be wise to draw only qualitative conclusions from the analysis, and to point out the sensitivity of these conclusions to different error assumptions.

With these constraints in mind the following scheme of analysis is proposed. However, before detailing this it should be pointed out that the data-imposed limitations do not prevent the achievement of the research objective - which is to seek evidence for or against the diffusion hypothesis. This remains perfectly feasible, though perhaps in a less "quantitative" manner than was originally envisaged. What

the limitations do preclude is any more sophisticated analysis of the style-demand relationship in terms of the evolution of style dimensions. In many ways this is not a bad thing since it centres the research effort around the key task and allows for no "academic" digressions.

The proposed scheme of analysis falls into two phases, the preliminary and the secondary. The latter is dealt with in the next section.

The preliminary analysis will be made using the stored coded data. The scheme is designed to show how many garments fall into a wide variety of different categories (categorised by both style and other factors) and what sales patterns these categories exhibit. Essentially the preliminary phase will be a very detailed inventory and tabulation of the data.

Commencing with data relating to Company A in year X (or years X,Y,Z, etc.) and with a particular garment type, categories will be formed ranging from the most global to the more specific. For a simple example, starting from all suits (and a tabulation of all the style data relating to suits) the first split might be made between those with wide lapels and those with more conventional lapels. All the data on these two groups would then be tabulated, and the two sales patterns examined. The next split might be between all wool suits and all other fabrics - leading to four categories and four sales patterns. This process would be carried on until the stage of very specific categories was reached, e.g. "suits with wide lapels, flared jackets, flared trousers with belts, no-turnups, two pieces, 3-button, all wool, blue/grey check and over £30." Thus the preliminary analysis scheme can be represented as the familiar "tree" diagram and figures 1, 2 and 3 present the first few categories that will be formed. At each stage all remaining information will be printed out, and in some cases this itself may suggest the next split category.

It is as well at this point to remember the objectives of the method. To date, it is not entirely clear, to the research team at least, just exactly what an "innovation" in the fashion market is. Whether it is every garment introduced at the start of the season, whether it is the season's "new image" itself or whether it is a more general entity such as "flared trousers", is still to be determined. Initially the sales patterns of every available garment will be examined to see if any exhibit the classic "adoption" curve. From this the research team will move to examine categories as outlined above and to examine sales over longer periods of time than one season.

Figure 1
Possible Suit
Categories

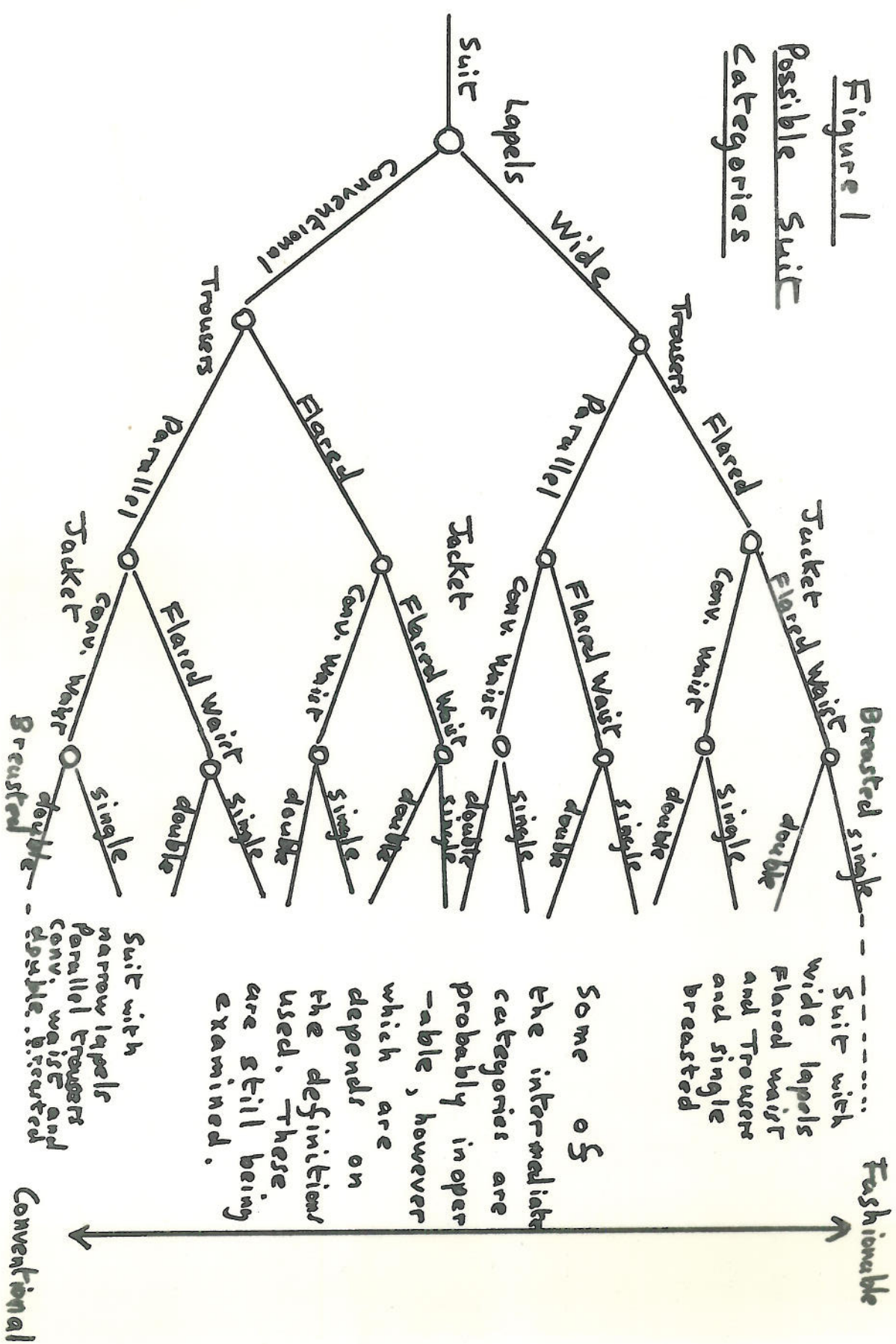
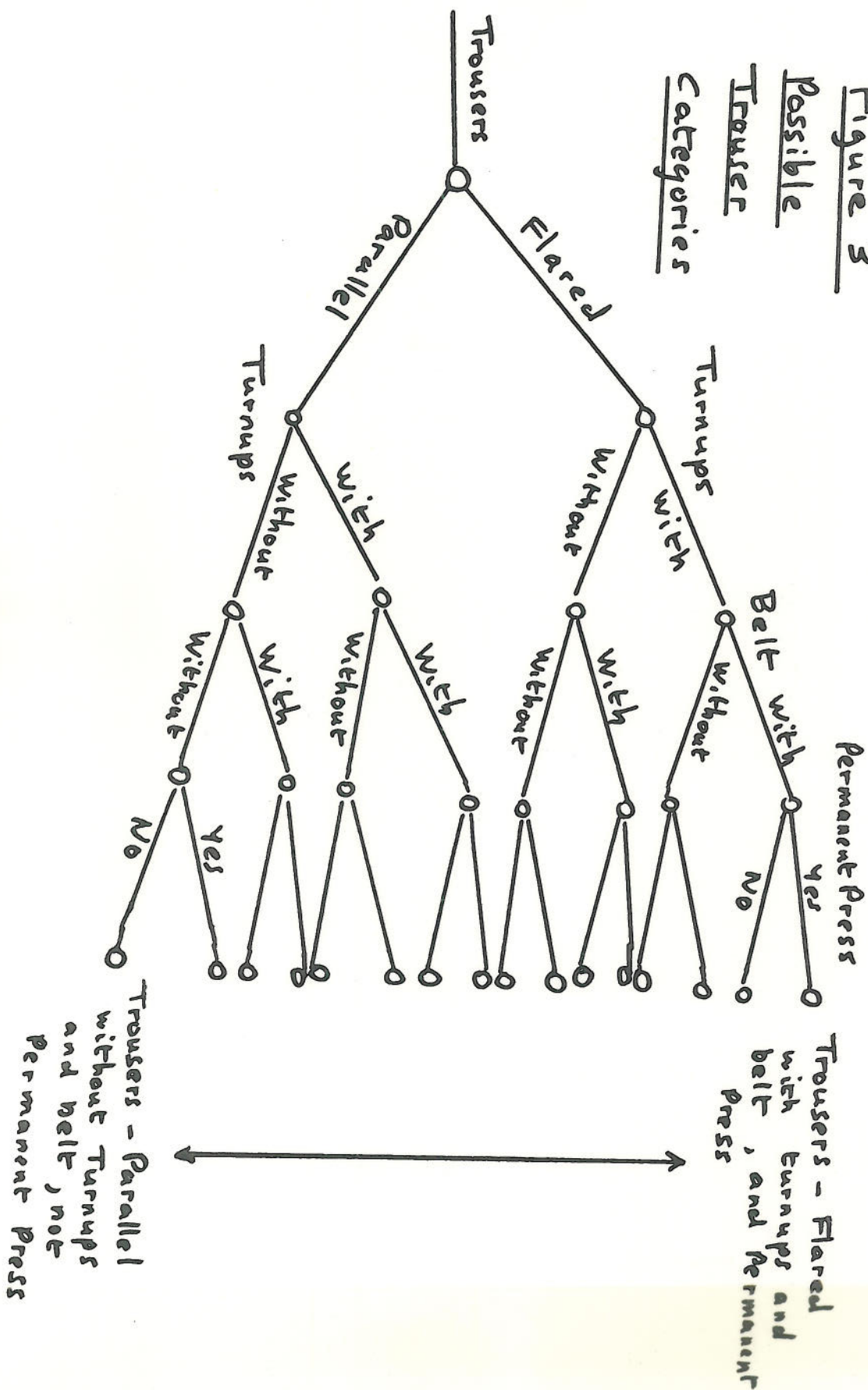


Figure 3
Possible
Trouser
Categories



For instance, the recent type of suit characterised by flared jacket, flared trousers and wide lapels immediately suggests itself as a logical candidate for "an innovation". Therefore, as detailed in Figure 1, this hypothesis will be one of the first to be tested out. The conclusion of this task is likely to be some tentative suggestions on the nature of innovation in fashion, and the beginnings of a definition of "an innovation".

Parallel to this is the problem of trend-detection as it relates to managerial decision making. To some extent this is covered by the above innovation analysis but there is perhaps a distinction to be made in that there may be many non-innovation trends of considerable importance from the forecasting point of view. This will be particularly relevant if "an innovation" turns out to be a global category such as "flared trousers". While an important piece of knowledge in that it sets the framework within which sales will occur, this would not be of much use by itself. It would then be necessary to examine sub-trends within the overall adoption curve before any useful forecasting techniques could be devised. Therefore, on the completion of the first two stages of the preliminary analysis the data will be re-examined in the light of trend detection and managerial forecasting requirements.

To summarise, the preliminary analysis will consist of four stages as follows:-

- (i) To examination and analysis of the sales of individual garments with respect to the adoption curve.
- (ii) The formation of categories of garments, both on an a priori and an on-going basis, and the analysis of the sales of these against the tenets of diffusion theory.
- (iii) A re-examination of all the data from a trend-detection and forecasting point of view.
- (iv) The drawing of conclusions on the nature and definition of an innovation, and on the problems of forecasting.

SECTION 3 SECONDARY ANALYSIS METHODOLOGY

Following the preliminary phase the sales patterns of both individual garments and categories of garments will be analysed using one or more of five basic techniques.

a) Graphically - the sales patterns of individual garments can be placed into different categories, and reasons suggested for these categories. (NB. this is not the same as in the preliminary analysis where garments were categorised on the basis of style dimensions and then their patterns studied. Here the garments are being categorised on the basis of their sales pattern). The aim of this technique relates to forecasting problems in that it might be possible to associate certain sales patterns with certain garment characteristics. If this could then be generalised from year to year it might form the basis of a valuable forecasting technique.

b) An extension of (a), where the existence of different patterns is determined more rigorously, utilizing methods similar to Polli and Cook* in their study of product life cycles.

(a) and (b) follow on directly from stage (iii) in the preliminary analysis. In fact, that stage will partly be a manipulation of the data to input into the above.

c) Social integration indices can be extracted, using the method developed by A. Mendez**, and these will point to the relative importance of interpersonal communication. (Basically, Mendez argued that the more an adoption curve diverges from the S-shape, the less interpersonal communication. Divergence is measured by regression techniques).

d) The diffusion model due to Bass*** can be applied to gauge its applicability and the evidence for the diffusion mechanism.

e) The diffusion model due to the author**** can be applied, for similar objectives to (d) but also to show the relative importance of interpersonal communication.

* Polli & Cook "Validity of the Product Life Cycle". Journal of Business Vol.42. Oct. 1969.

** Mendez A. "Social Structure and the Diffusion of Innovations". Human Organisation. Vol.27. Fall 1968.

*** Bass F.M. "A New Product Growth Model for Consumer Durables". Management Science Vol. 1969.

**** An epidemic diffusion model not as yet published.

In (a) and (b) the analysis will be conducted on individual garments and, as stated above, is aimed solely at the forecasting aspect of the project. The techniques (c), (d) and (e) can be applied both to individual garments and to the innovation categories arising out of the preliminary analysis stage. The aim of these latter would be to strengthen and clarify the evidence for the applicability of diffusion theory in this field, and to produce some suggestions on the nature and extent of interpersonal communication. They are therefore secondary in that they will be used to investigate conclusions arising from the preliminary stage in a more systematic manner. Since all the above (e.g. (c) to (e)) will require considerable computer time it is better to proceed in this manner rather than apply them on a broadscale basis to all 348 garments. At this stage it also seems likely that they will be applied to categories rather than individual garments, though this conclusion has still to be supported by the preliminary analysis.

To summarise, apart from the forecasting aspects, the secondary analysis will be performed on specific cases where it is thought that diffusion is operating. Any other cases will be investigated on an ad hoc basis as they arise and suggestions put forward as to the mechanism operating and the reason for any differences. This concludes the description of the analysis scheme, before describing the actual programs it is first necessary to outline the coding scheme in a little more depth than previously.



SECTION 4 THE CODING SCHEME

The purpose of this section is merely to give a brief introduction to the coding scheme utilized.. More detail will be found in Appendix 1. Basically, the coding scheme converts all the verbal style information into numerical data which can be handled more easily by the computer programs. The information was arbitrarily divided into two types:-

- (i) fixed length, i.e. style codes etc.
- (ii) variable length, i.e. sales data.

This was arbitrary in that it was decided to describe the style aspects of every garment on a fixed set of dimensions, irrespective of the type of garment concerned. Sales information was of necessity "variable" in that different organisations collect sales statistics over different time periods and for different lengths of time. Naturally the rationale behind the choice of a fixed number of style dimensions is to make for ease of comparability. Both fixed and variable length information sets are headed by an identification number (any integer between 1111 and 9999) which is unique to each garment and allows back reference to raw data*.

Thus the style and sales data associated with one garment are handled independently and indeed stored in different areas of the disc and tape files. This is considered more efficient, in terms of disc scanning times, than "lumping" the two together, since it will be very seldom that the two types of information are required simultaneously.

Fixed length information consists of a 26 by n array, where n is the number of garments concerned (n varies from organisation to organisation). Each garment is, therefore, represented by a column of 26 elements which describe the relevant style dimensions. For example, the second element (the first being the identification number) is the garment type - code 1 for a suit, 2 for a jacket, or 3 for trousers. The seventh element is the jacket type, code 1 for single-breasted, or 2 for double-breasted. The complete coding scheme is given in Appendix 1.

* Subject to the previously mentioned security constraints.

The different types of garments are catered for by the use of code 0 for inapplicable dimensions. Thus, in the above example, if the garment had been a pair of trousers the seventh element (jacket type) would have been coded 0.

It should be re-emphasised that the choice of 26 dimensions to completely describe any garment is completely arbitrary and based solely on what the author considered was relevant and sufficient. It would be a relatively simple task to re-program to account for greater or fewer dimensions.

Variable length information (sales data) is stored in a 60 by n element array. Again, each garment occupies a column. The first element in each column is the identification number, the second the number of sets of sales data, the third the length of period over which sales data is compiled (i.e. weeks, months, etc.) and the fourth element a code for the starting date. The remaining elements contain the actual sales figures period by period for as many periods as are necessary. The restriction of a maximum of 56 sales figures is to conserve core space in analysis. Should any set of sales data come to more than this it would have to be truncated. As the data available stands at present this case does not arise.

It would also be possible to handle data on price rises in a similar fashion to the above. However, while space has been left in the programs to accommodate for this sophistication, it has not been put into operation to date.

The coding scheme remains close to the raw data and, therefore, does not obscure much style information. It was designed so that the data could be handled in arrays using a direct access backing storage system (see ICL Manual: ALGOL Compiler Library Procedures). This means that by the use of matrix operations the data can be very easily assembled into any set that it is required to study. There now follows a description of the programs designed to store and analyse data coded in the above format.

SECTION 5 PROGRAM SPECIFICATION: INSERTION OF DATA TO
MAGNETIC STORAGE.

In evolving the program specifications it was decided to treat the task as a "one-off" situation, and to develop a batch processing approach. Obviously in a management context a data base system, with on-line terminals and provision for file interrogation, would be more appropriate. However, the actual construction of such a sophisticated system does not lie within the terms of reference, or indeed the resources, of the project and it was, therefore, decided to adopt a simpler technique. Since the research team fully understand the objectives and operation of the proposed analyses it was not necessary to overcomplicate any of the programs. In essence they are all "one task" batch processed programs, though some flexibility is allowed.

The question of management information systems will be raised again in Section 10.

To achieve reasonable results in the relatively short time available, the programs were developed and tested on a simple module building scheme. The preliminary phase involves 3 programs, one to insert the data to magnetic storage, one to read the raw data (without interpretation) and a third to perform the preliminary analysis (as outlined in Section 2). This latter is dealt with in the next section. Here only the insertion program will be described, since the reading program is too trivial to devote space to and was only designed to assist in the "debugging" stage.

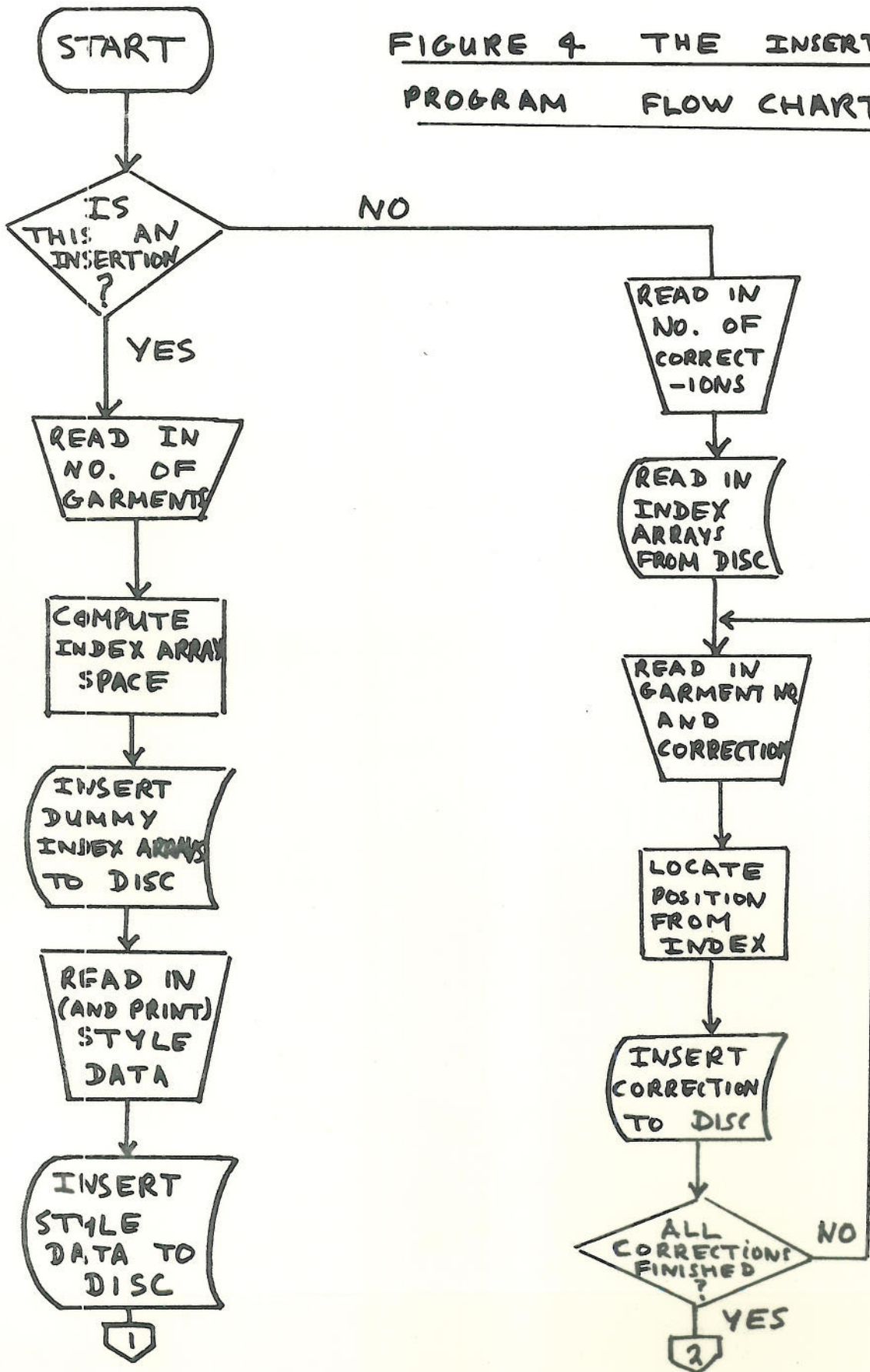
The insertion program was designed from the following specification (Internal document November 1972):-

"This program will read in (from punched cards) all the information on style, sales and general description and store it on disc. The program will also compile an index of the information. A facility will be provided to allow any mistakes in coding to be corrected without re-insertion (of all the data). The program will list the information as it is stored (coded form only, no interpretation). It will also print the index (interpreted)."

In the sense used here "interpretation" means the reconversion of the coded data back into verbal information.

The operation of the present version of the program is completely specified by the flowchart given in Figure 4.

FIGURE 4 THE INSERTION
PROGRAM FLOW CHART



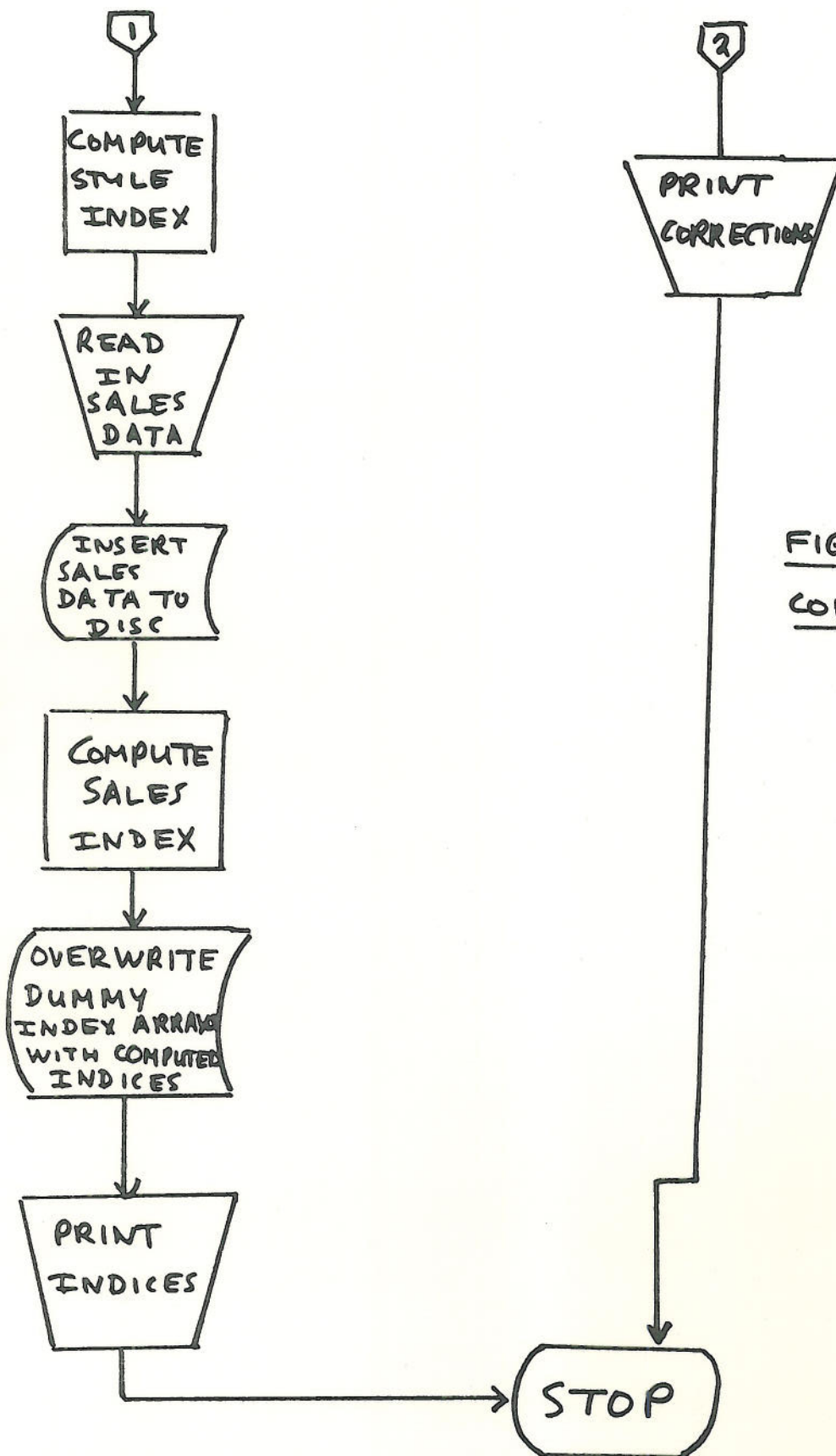


FIGURE 4
CONTINUED

Actual control data input modes are given in Appendix 2. There is insufficient space here to give examples of the output, basically they consist of printouts of the raw data plus an index stating the type of information and where this information (for each individual product) can be found on disc. If in correction mode both the old raw data and the new corrected entry are printed.

To summarise, the program reads in the coded style and sales information, places into arrays and stores these arrays on the disc file. Concurrently a set of indices are computed which give the precise position of every set of stored information. These indices are finally stored at the head of the disc file - so they can be readily accessed by later programs. The handling of information once placed on disc file is described in Section 8. It need not concern us as far as the operation of the analysis scheme goes. The program also generates a set of check figures which can be manually compared against the indices and any errors detected.

SECTION 6 PROGRAM SPECIFICATION: PRELIMINARY ANALYSIS
OF THE CODED DATA.

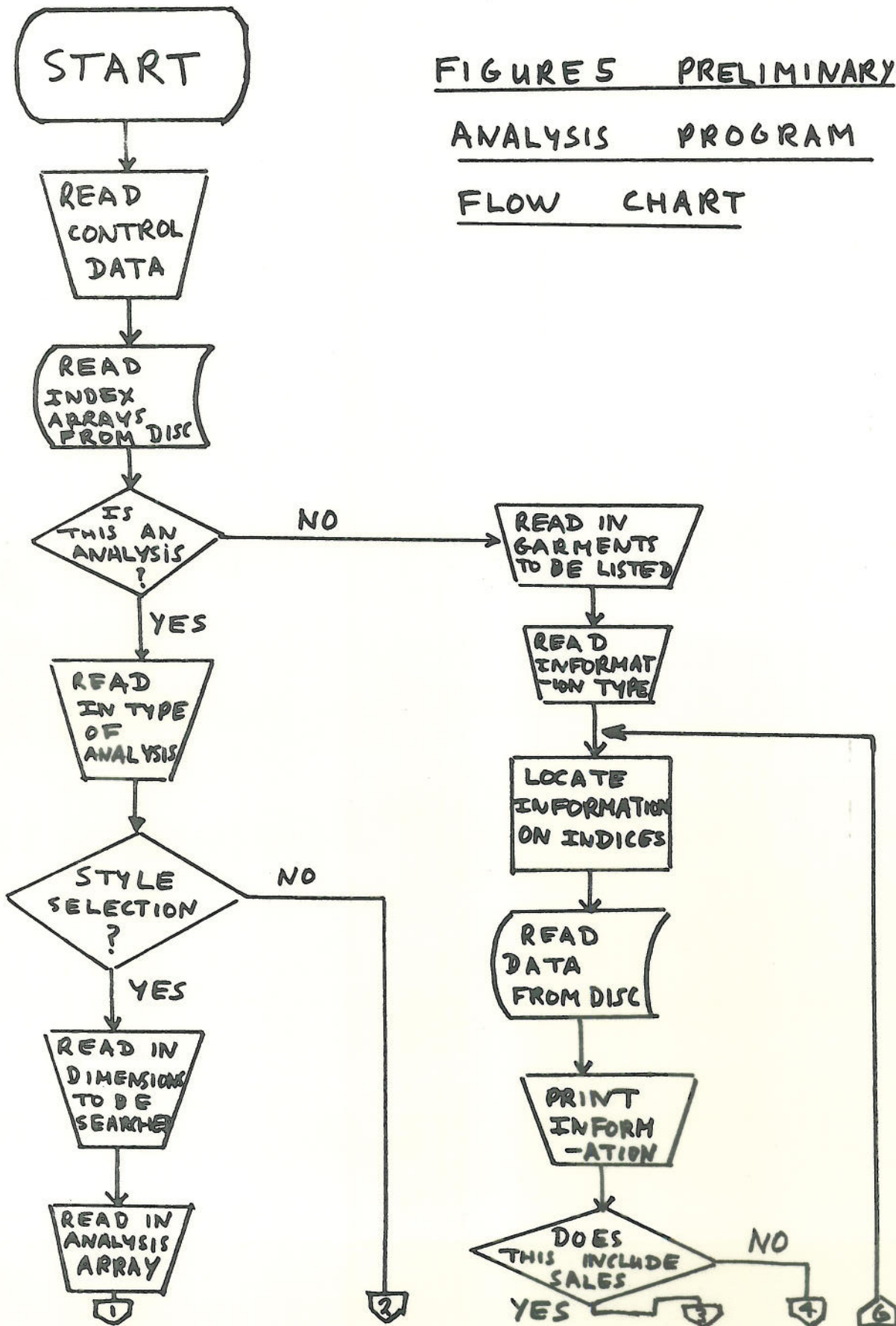
The specification of this program was as follows:

"This (the preliminary analysis program) will read the data from the disc file and allow various analyses to be performed on it. Firstly the information relating to any one (or more) garments can be extracted. Secondly a garment type(s) can be specified and the information relating to all garments of this type located and output. Thirdly a garment type or category can be specified and a sales pattern for this category computed. Output will be fully interpreted, and sales patterns will be output as line printer graphs." (Internal document November 1972).

The flowchart for the program is given in Figure 5. In its primary mode of operation the program is designed to select all the garments contained within a specific disc file that are identical to a given command specification. In order to do this the index information is first read in, so that the style information can be located. The command specification is then set up in the following way. It will be remembered that the style information relating to any garment is completely given by 26 codes. The first requirement in establishing the search procedure is to specify how many of these 26 dimensions it is required to use. For instance, it might only be necessary to search for suits with wide lapels. In that case, only the "suit" dimension and the "lapel" dimension should be investigated, it would clearly be inefficient to search all 26. Next the search, or analysis, specification is input - this is a 26 element array corresponding to the style information of an individual garment. Using the same example, the "suit" element would contain the code for a suit (as opposed to jackets or trousers) and the "lapel" element would contain the code for "wide" lapels. It would not matter what the other 24 elements contained since they would not be used in the analysis. The program then proceeds to input all the style information (on all garments) and to compare individual garments with the above analysis specification. Every time a garment was located which fulfilled the specified criteria on the specified dimensions ("suit with wide lapels") a record would be kept of the identification number of that garment and where the relevant information could be found again. At the end of the run the information would be located again and output - in an interpreted form. To oversimplify somewhat the program selects garments by comparing the actual garments with the specified garments.



FIGURES PRELIMINARY
ANALYSIS PROGRAM
FLOW CHART



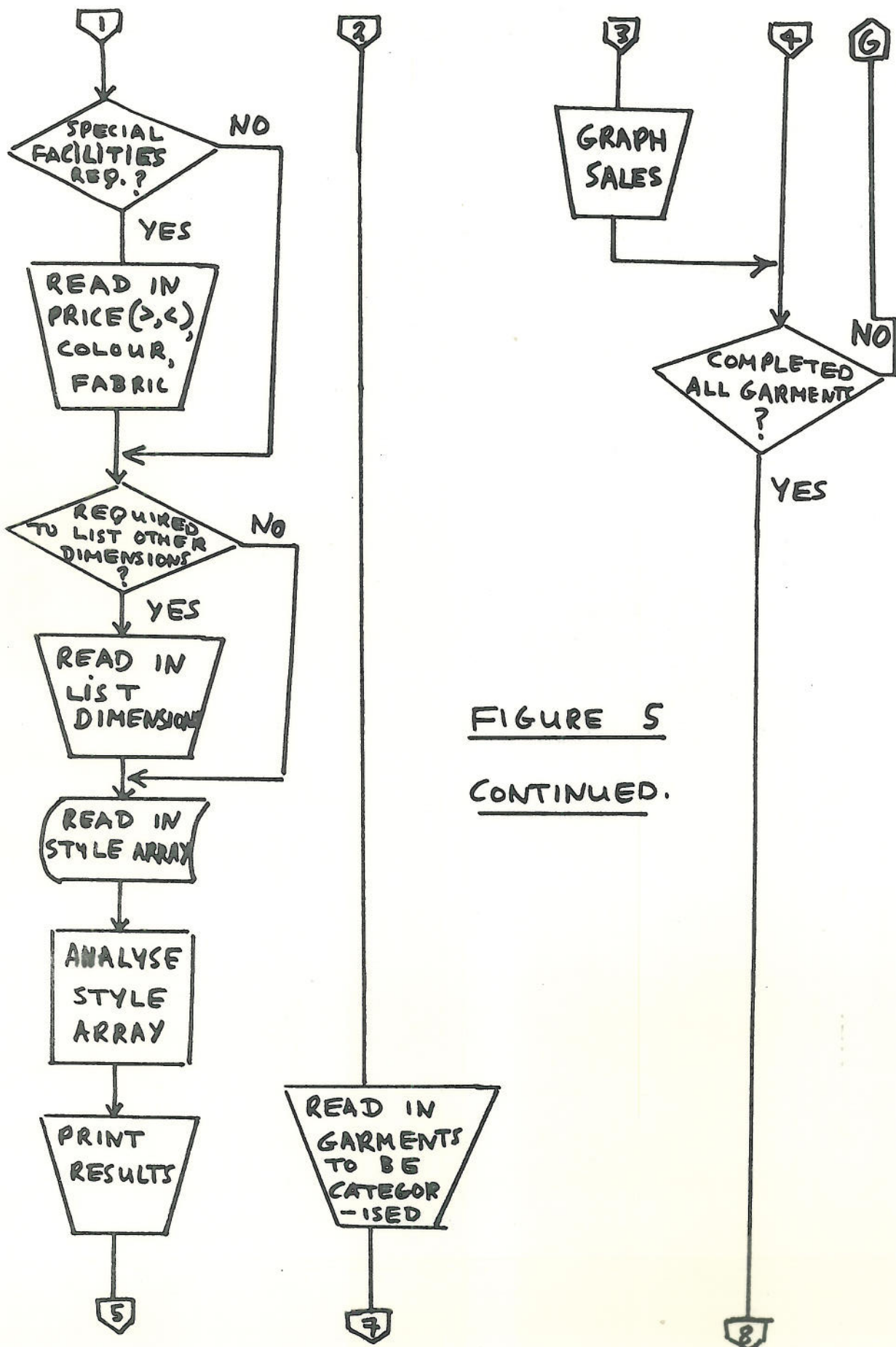


FIGURE 5

CONTINUED.

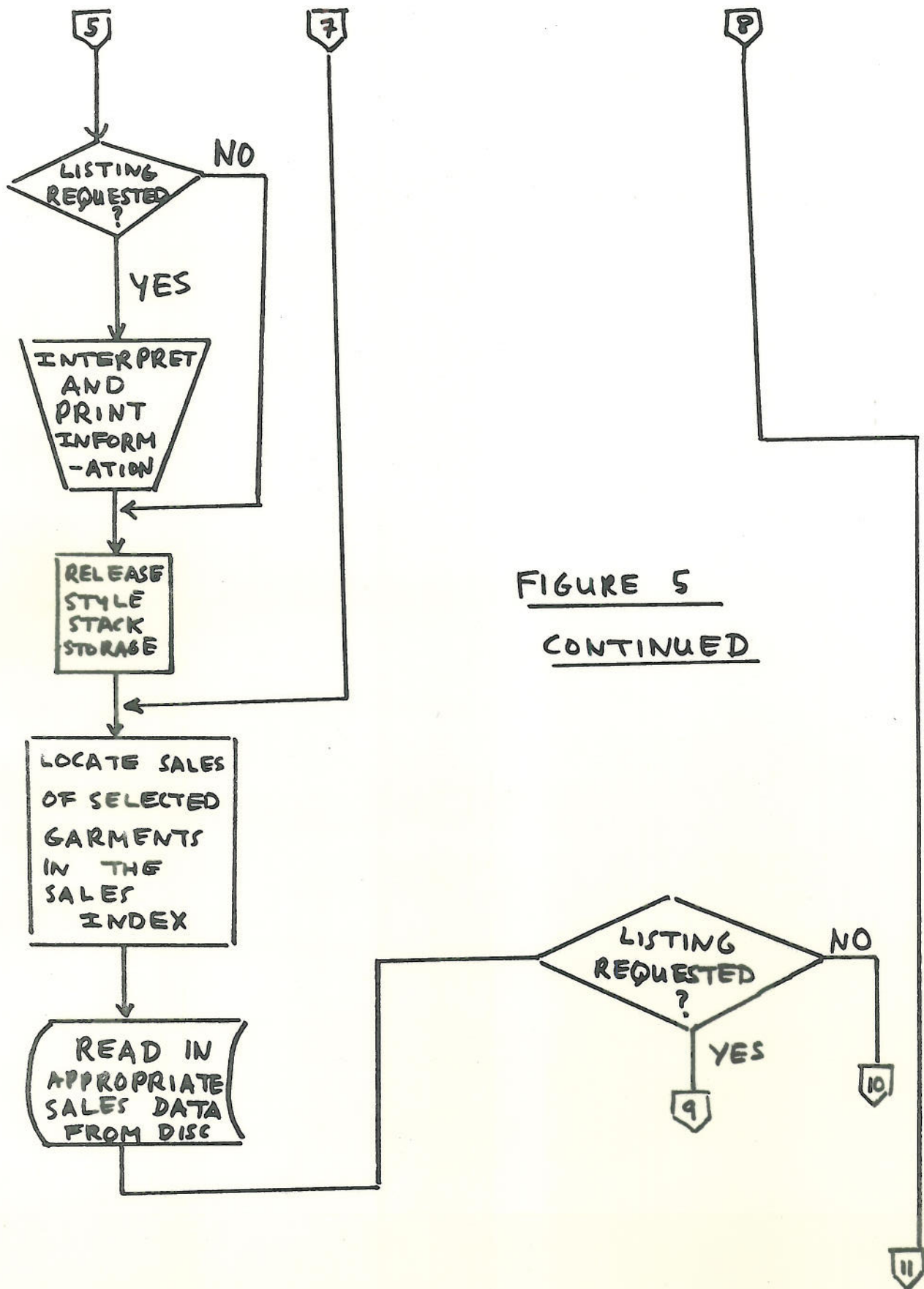
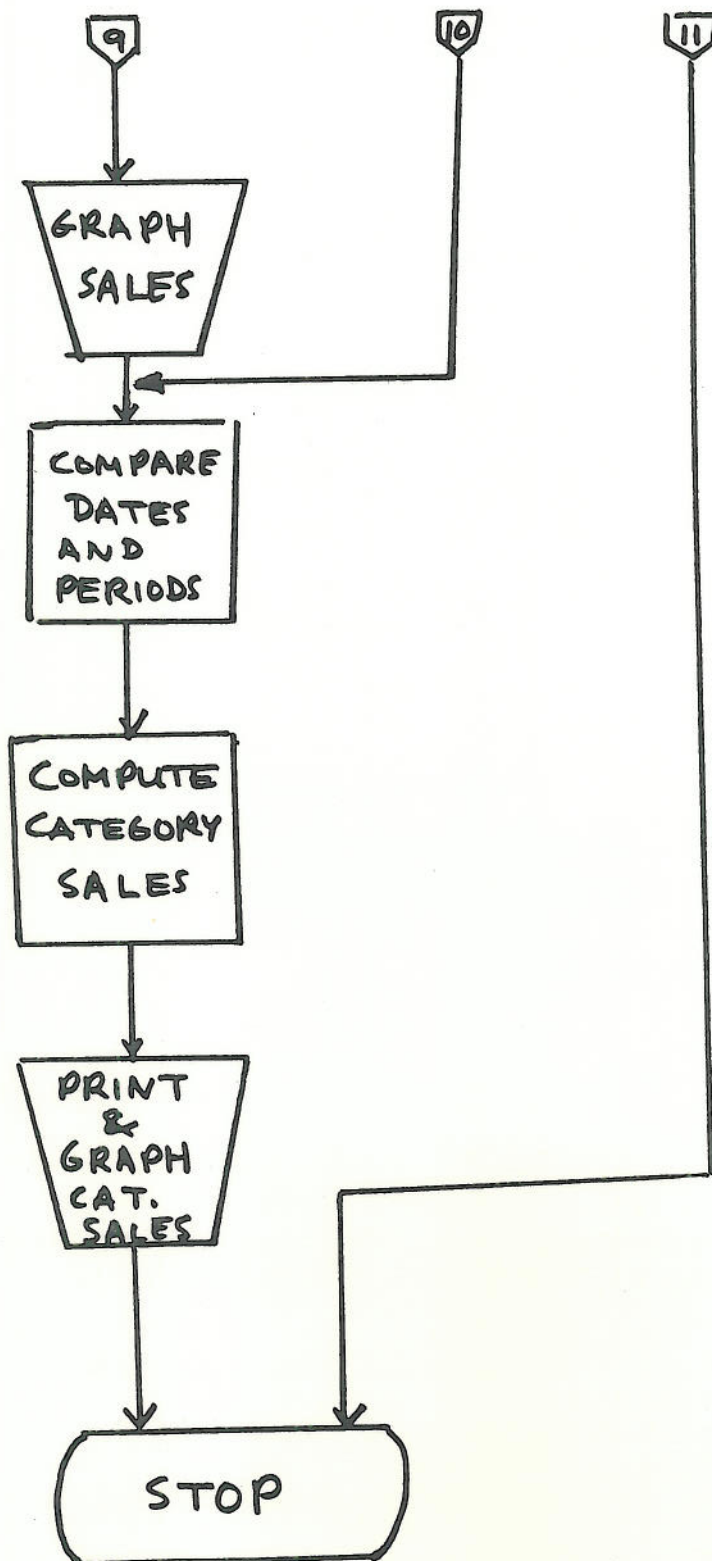


FIGURE 5
CONTINUED

FIGURE 5
CONTINUED.



In the actual operational program another level of sophistication is available in that it is also possible to request that garments above, below or equal to a certain price are selected and that a wider range of colour and fibre can be found. The latter, which is performed by complex array comparison techniques, means that instead of having to conduct several runs to find identically styled garments with different colours and/or fibres this can be done on one run. In other words with our example it is possible to locate suits with wide lapels that are blue or green or grey or ..., etc. and that are wool or crimplene or wool/terylene or ..., etc. in one instead of several runs. The rationale behind the above is merely to make it possible to form categories with restricted colour or fabric types (rather than all types) in a shorter time. For instance we might wish to look at all blends containing terylene, the above means that this can be performed in one run rather than (maybe) 7 or 8.

Another special facility is that the output can be limited i.e. if we were interested in what proportion of suits with wide lapels had belts on the trousers then the search would be conducted on two dimensions ("suit" "lapels") and only one other dimension would be printed out, in this example the "trouser belt" dimension. There is complete flexibility on output, from 1 to 26 dimensions, though obviously the search dimensions are not output since we know what the results on those are - having originally specified them.

Continuing in the primary mode the program then notes the numbers and the positions of the selected garments, deletes all style information (in order to conserve core storage) and locates the corresponding sales figures. If requested these figures can be both printed and graphed garment by garment before the program proceeds to form the category sales pattern. In doing so dates and data collection periods are examined and if found inconsistent a warning message printed. Finally the category sales are printed and output as a line printer graph.

In its secondary mode of operation two facilities are provided. The first is the simple location and interpretation of the information concerning specified garments. Here only garment numbers need be input whence the program locates the required code information reconverts it to verbal information and outputs it. Sales figures can also be output as graphs. The second facility allows categories to be formed in a similar manner to primary mode operation but in this case the garments to be aggregated are specified by the user instead of being selected by the program. The rationale behind this was to enable the author to form categories where the initial primary mode selection uses considerable computer time i.e. complete searches can readily be split into two computer runs. Also there is a possibility that it might be required to form

ad hoc categories of certain garments.

The preliminary analysis program is therefore capable of assembling the stored data into almost any required format, and also of outputting this information in a form reasonably close to the original raw data (both verbal and quantitative). Obviously some information is lost in the process of coding and interpretation of the codes but as far as the author can judge at this point in time this loss is not significant. Obviously also the method can be extended or reduced to handle any number of style dimensions. As a byproduct of the analysis it is hoped to suggest just what the most relevant dimensions for any management information system might be. We now turn to look at the program specifications for the secondary analysis phase.

SECTION 7 PROGRAM SPECIFICATIONS: SECONDARY ANALYSIS
OF CODED AND/OR CATEGORISED DATA.

Here the content of the section will differ from the last two in that this phase of the research has not yet been reached and no detailed program specifications have been drawn up. At this point in time it is hoped that as much as possible of the secondary analysis will be conducted via standard program packages on time-sharing computers. The remainder of the analysis will be performed either manually or by very simple time-sharing programs designed by the author. In this way great flexibility of approach will be preserved without making excessive demands on the project's resources, particularly time.

It will be remembered that five basic techniques were suggested in Section 3 for application both to individual garment sales and later to category sales. These techniques will now be examined in turn.

- a) Placing sales patterns into categories (of pattern types). This requires the identification of different types of sales curve and since the human brain is the most efficient pattern recogniser known to date this task will be performed manually. The task can essentially be seen as a preliminary stage to b).
- b) Having identified possible curve types in a) it is possible to recheck and confirm their existence by specifying the appropriate curve and testing it against all curves. This will be carried out using standard curve fitting programs. More importantly the exercise should lead to usable curve formulas to be used in forecasting. Thus technique b) quantifies the subjective conclusions manually extracted in a).
- c) Social integration indices. It will be remembered that these are measured by regression techniques, hence they can be extracted using a standard statistical package on a time-sharing computer.
- d) Bass's diffusion model. This will require the construction of a small program but as the model is relatively simple this should raise no difficulties.
- e) The author's diffusion model. A program exists for this at present, however it requires an excessive amount of computer time so that ways are being investigated to make it more efficient. In the event these are not successful the model will only be applied to a few selected sales patterns.

It is possible that other techniques might occur to the research team before the secondary analysis is conducted. In particular the results of the preliminary analysis may suggest better ways of proceeding further.

SECTION 8 OPERATIONAL CONSIDERATIONS

This brief section is merely to describe the overall handling of the data and to delineate some of the operational problems likely to be encountered. In previous sections the scheme of analysis has been described and the coding scheme illustrated. Sections 5 and 6 detailed how the coded data was inserted to disc and how the preliminary analysis program located, extracted and used this data. However it is not possible, at least at Cranfield, to have permanent disc data files and hence the data has to be kept on magnetic tape files. One permanent disc file has been allocated to the project (name: PROGRAM V30A) for use as a workstore. The advantage of disc storage is, of course, the speed at which the relevant information can be located and read into the core store of the computer. Data can be located on a disc much faster than on a tape and in order to capitalise on this, and use the ICL disc array handling package, the following system is used.

In the first case the insertion program places coded data onto the disc datastore PROGRAM V30A. On completion of the run this information is "dumped" onto magnetic tape, that is the contents of the disc are copied onto the tape. Subsequently when it is required to analyse this data the reverse dumping procedure is used and the contents of the tape copied onto the disc file. The analysis program can then speedily access and use the information. One advantage of the system is that a permanent tape copy of all the information is kept and since magnetic tapes are allocated to one user, and stored in a separate area to be loaded when requested, there is less likelihood of another user, or a system malfunction, destroying the information. The disadvantages are the amount of copying back and forth between disc and tape files. However, since this latter occurs before and after an analysis run it does not slow down the actual analysis. A further complication is that it was thought desirable to have the information from different organisations separated in some way and to achieve this several tapes are used. This is somewhat wasteful of magnetic tape, in that none are utilized to anything near their capacity, but it avoids complicated "dumping" procedures and the consequent possibility of error.

The last possible difficulty is that the turnaround of computer runs at Cranfield is somewhat slower than at Bradford and it will be necessary both to exercise care in deciding which runs are needed, and also to run several jobs simultaneously, or else timing problems may arise.

SECTION 9 PROGRESS ON THE COMPUTER PROGRAMS

As was alluded to in Research Report No. 5 the problems with the analysis of sales data have resulted in considerable delays in the overall project. These problems primarily arose because of the transfer from Bradford to Cranfield since although the computing hardware at both institutions was almost identical the software was not. At Bradford, perhaps because of the size of the student body and the numbers of academic staff, the software was sophisticated and capable of handling large amounts of work. It was also relatively easy to edit and correct programs, there were no difficulties in storing data and many complicated operations could be specified by simple instructions (run macros). This is not the case at Cranfield which has smaller staff numbers and consequently underdeveloped software. Despite smaller student numbers this results in run turnaround problems as well as difficulties in handling data and programs. The author was forced both to learn basic techniques and to modify the programs to run at Cranfield.

At this point in time the status of the programs is as follows.

The insertion program is fully debugged and operational. A start has therefore been made on the coding of the data and all the information should have been inserted by the end of September. The preliminary analysis program still has a few minor "bugs" in it but it is hoped that by the time this report is circulated these will have been overcome. It should therefore be possible to commence analysing the data sometime in September and complete the task by January 1974. As mentioned previously no work has yet been done on the secondary analysis side of the research, it is hoped to commence this shortly with the aim of having all the techniques operational by December.

To conclude despite some considerable problems these aspects of the research are now proceeding reasonably smoothly and there appear, at least, to be no major problems left to be overcome. No doubt there will still be many technical problems to solve in the next few months but all the methodological points have been resolved. We now turn to examine the possibilities for the last stage of the research.

SECTION 10 MANAGEMENT INFORMATION SYSTEMS - THE FINAL
PHASE

It has become increasingly clear, to the author at least, that the final result of the total project will not be one statistical or quantitative forecasting technique, nor indeed will it be a simulation model of the fashion market, rather it is likely to be a combination of many methods and techniques. In essence it will be a management information system involving the analysis of past sales, the detection of trends in the market place by market research and the judgement of experienced merchandising executives. From this will come the forecasts so necessary as an input to production planning.

Now the construction of an actual system lies outside the scope of this project; for one thing it would require much larger resources (in terms of personnel), and for another it falls outside the terms of reference of the SSRC grant. Leaving aside the academic results, which will be disseminated via the final report to the SSRC, it seems that the most practical result would be a set of recommendations and guidelines for the construction of actual management information systems. This we intend to do, and these recommendations will be contained in Report No. 11 (June 1974). As an addition to this we feel that it would be worthwhile to construct a very simplified information system to use as an educational and illustrative tool. Such a device would enable practising managers to grasp the possibilities of real systems and to be more able to evaluate such possibilities in terms of their own organisation. Naturally the model system will be neither as sophisticated nor as comprehensive as the real thing but it is hoped that it will demonstrate all the main points arising from the research, and from the recommendations. We hope to convene a short conference or seminar late in 1974 to which all contributing organisations will be invited; and at which, apart from discussing our findings, the model system will be demonstrated.

However before designing such a model information system it is first necessary to decide on the objectives of the system and also what its design specification should be. Naturally the latter can only be somewhat vague at this point in time, once all the various analyses are completed then a more detailed design specification can be drawn up. It is possible though to discuss the objectives, and to make some comments on what effect they will have on the system specification.

From the start the practical aim of the project has been to improve the sales forecasting of the retail sales of the range of garments marketed by an individual organisation.

It is also necessary that such forecasts must be made in sufficient time to be managerially useful. Though the latter is obvious it does lead to some important observations. It appears to the research team, on the basis of the yet to be completed research, that to make forecasts for a season's sales on the basis of incoming sales for that season is only of marginal use.* The reason for this lies in the long production delays inherent in the textile industry. Such data can be used for revising forecasts but a demand figure for a season is required prior to actual sales. Given the above there are three basic ways to obtain this estimate (i) analysis of past sales (ii) market research and (iii) executive judgement. These will now be discussed.

(i) Analysis of past sales:- this can be used in two ways, firstly to project basic trends in the sales of garments of different styles. Information which is of use in deciding the product range to be offered. Secondly once this range has been determined similarities can be sought between the new range and past sales in order to get some estimates of demand.

(ii) Market research:- this can be used both to investigate the market of a particular organisation and also to detect trends in consumer preference for different styles. Such information can be used to select future styles, to estimate potential demand for various styles and for strategic decisions should the market of the organisation be changing.

(iii) Executive judgement:- it is recognised that the experienced merchandising executive is well qualified to assess trends and to place figures on these trends. What can be said is that there is room for improvement both in the way information is collected and presented to the executive and in the way his experience and judgement is capitalised on. Any information/decision making system must allow the merchandise executive considerable scope for creatively employing his fund of experience. The difficulty of course is that the problem of forecasting market behaviour is immensely complex and probably beyond the comprehension of the human mind unless assisted by various techniques and devices. Here the information system can be of use in both reducing the size of the problem and enabling the decision maker to quickly analyse the incoming information.

At present the author's view is that all three of the above methods should be used and if possible in an ordered manner. This would seem the best way of ensuring more

* this is not true for many other industries where the product life is somewhat longer.

accurate forecasts. The preceeding has raised the question of just what objectives should the information system have, particularly in the way it interrelates with the executive. It also raises the question of how much assistance the system itself provides in the actual forming of a decision. Should we merely provide a pool of information and a battery of analysis techniques which the executive can apply as and when he wants to or should we structure the relationships between the information and the analysis techniques so that decisions are made within a framework? Further do we merely present analyses of the information and allow the executive to form his own decision or do we aid and structure the decision process? If the latter how far along the road to complete computerisation should we progress?

Again the author's view is that a structure should be provided for the analysis of the information. If the diffusion theory hypothesis is tenable then a framework of interrelations between past sales data, market research techniques and analysis techniques can be fairly readily formulated. Analysis of information within this framework would then provide a good trend detection and monitoring technique. Within this framework it would also be possible to provide an analysis method to compare new garments with past in order to provide early demand estimates. Such estimates could be constantly up-dated as more data was collected. The link between the analysis and demand estimates would be the executive - who would therefore retain the control of actually making the estimate albeit on the basis of the analysis result. A further sophistication the author proposes is that the executive would make his estimate in a probabilistic form; in effect he would be asked for his most likely, most pessimistic and most optimistic sales estimate and these would be combined and weighted by the computer. The best method of performing this is by a short checklist questionnaire which ensures the person concerned evaluates all the necessary factors. If more than one individual makes an estimate then the various estimates can be readily combined by standard statistical techniques. Past experience has shown the above to be a valid and reasonably reliable method. Finally the system records results and uses them to adjust estimates in the future, that is if someone is always pessimistic the computer program makes a proportionate increase in his future estimates. Such "weightings" can be constantly revised in the light of experience.

In the scheme proposed demand estimates would have to be constantly up-dated as more "hard" information was collected. Initially the executive would commence with fairly "qualitative" information on general style trends derived from both a detailed analysis of past sales and from market research data. From this the next season's range could be selected and compared with the sales of similar garments (if

any) in the last available season. From the conclusions of the comparisons the first tentative demand estimates would be made (this could also be a continuous process in that having located similar garments these might project adverse trends leading to a reconsideration of the garment range). As the season approached the executive would receive continuous market research data and/or updated analyses of the past/present sales and be asked to make new probability estimates. The estimates would thus be constantly modified until actual sales for the season began to occur and more standard forecasting techniques became applicable. Hence in the above system while the executive retains the control of making his own actual estimates all the collection, analysis and computation of sales forecasts is performed for him. The selection of the new season's garment range remains entirely at the discretion of the merchandise executive.

Since any merchandise function must be simultaneously handling this season's sales and planning for future seasons then the management information system must be capable of providing accurate information for both tasks. Having made this last comment it becomes possible to propose a tentative set of objectives for the management information/decision-making system. These are as follows.

- (1) To provide frequent and continuously revised demand estimates simultaneously both for the present and future season(s).
- (2) To continuously collect and analyse sales and/or market research data to ensure both that objective (1) is met, and that the estimates become more accurate as the season in question approaches.
- (3) To continuously project style trends and facilitate the comparison of future garment ranges against past sales (wherever possible) in order that the garment ranges may be selected on a systematic basis.
- (4) To allow for individual judgements of likely demand to be made, combined where necessary and weighted according to past performance.
- (5) To provide for ad hoc analyses and future analysis techniques by recording the data in as disaggregated format as possible.
- (6) To monitor the performance of the system against the environment and to provide for self-adjustment of the system so that it remains related to reality.

Objectives (1) to (4) have already been discussed. Objective (5) merely says that the data should be recorded

in as "raw" a form as possible so that it can be used for ad hoc analyses; and more importantly that should new analysis techniques become available, or the structure of the analysis be changed, then past data is still of some use. Objective (6) only means that it is possible that the environment we are trying to predict may alter and it is desirable to have a system which corrects for this as much as is possible. There are obvious limits to such self-adjustment but it should be possible to cope with minor alterations without having to re-design the system.

As far as can be judged at present the above objectives necessitate the information system being maintained on a time-sharing computer with frequent updating of the data files. The reason for proposing a time-sharing computer program is that the executive needs to be able to interrogate the system, ask for analyses and make decisions on the basis of these. Whilst it would be possible to design a program for a batch-processing computer there would be considerable inherent delays in obtaining results by this method and further, interrogation of the system would not be in a "conversational mode".* In the author's opinion these disadvantages preclude the use of batch-processed programs since they would mean interposing a computer programmer between the decision-maker and the information system, an arrangement which would inevitably lead to major problems. The use of a time-sharing system means that the executive can "talk" to the system via a terminal, obtain information and make decisions immediately.

The frequency of updating of the data files is really dependent on the organisation in question. Obviously sales data should be revised continuously, probably once a week, but market research information can probably be collected less frequently. It is difficult, however, to make precise statements about the above until more of the research has been completed. When this has been accomplished the next step will be to draw up a tentative design for the model information system and begin to investigate possible alternative formats and structures for the decision-making process. Great care will need to be exercised so that the information is condensed as much as is possible without obscuring major trends - the decision-maker must not be overloaded or the system will be useless.

The above is about all that can be stated at present. The author would be extremely grateful for any comments on the proposal; particularly as they relate to the organisational context for the system, but also on any other aspects.

* Conversational mode means that input to, and output from, the program would be in English or at least a close approximation to it.

FASHION DYNAMICS RESEARCH UNIT :

MALE FASHION STUDY

APPENDIX 1

STYLE AND SALES DATA

CODING MANUAL

D.F. Midgley.

June 26th 1973.

Version 1

I) Purpose

This short manual gives full instructions for converting the verbal information contained on the company data sheets into numerical information on a computer coding sheet. Examples are given at the end of the manual. The information will then be put onto punched cards and stored in the form required for analysis.

II) Instructions (General)

1. We have collected two types of data from the various co-operating companies, i.e. style information and sales information. These are to be put onto different cards but it is suggested for each garment that firstly the style information is coded, and then the sales, before proceeding to the next garment. Since certain information is common to both this will save some effort. To achieve the separation, two sets of coding sheets will be prepared - clearly marked as to which type of data they refer to.
2. Numbers on the coding sheet are separated by a comma (,) except at the end of a line where nothing is required. A line ends in column 72 UNDER NO CIRCUMSTANCES MUST ANY OF THE COLUMNS 73 TO 80 BE USED.
3. Style information will always go on one line, sales information may sometimes require two.
4. Please write carefully and, above all, legibly since mistakes will mean repunching the card concerned.
5. The coding scheme is designed to suit all types of outer garments, e.g. suits, jackets and trousers and obviously not all the style aspects are relevant to a particular garment. For instance, there is a column for whether trousers have turn-ups or not, if the garment in question is a jacket this would be nonsensical! In such cases the code 0 is used, i.e. if the column does not apply to that garment an 0 is placed in it.
6. Similarly if the data for a particular column is not known, ie. it was not available or we have overlooked it, then code 9 is placed in that column.

III) Instructions (Specific) - Style Information

1. The first element of information: the identification number.
This is a number between 1111 and 9999 (you will be

assigned blocksof numbers to attach to specific sets of garment data*) which is to be put into columns 1 to 5** e.g. 2137,

2. The Second element: garment type

Suits 1,
Jackets 2,
Trousers 3, as appropriate to go in
Columns 6 & 7.

3. Third element: Market

Retail 1,
Mail Order 2,
Columns 8 & 9.

4. Fourth to Fourteenth elements: Style Code

(4) Overall description

Conventional 1,
Fashionable 2,
Anomalous 3,
(Fads, etc.)

This will be already noted on the verbal information sheets.
Columns 10 & 11.

(5) Market Aimed at (from Promotion)

General 1,
Younger 2,

This will be already noted on the verbal information sheets.
Columns 12 & 13.

(6) No. of pieces

1,
2,
3,

Columns 14 & 15.

Obviously for a pair of trousers or a jacket this would be 1, however a suit can be 2 or 3.

(7) Jacket type

Single breasted 1,
Double breasted 2,

(Trousers code 0,)

Columns 16 & 17.

* Whilst doing this it will be necessary to note the identification number you have given to a garment and the corresponding company product no. on a sheet which will be handed back to the project leader.
** Including the comma - as will all the following instructions.

- (8) No. of buttons
2 buttons 2,
3 buttons 3,
single button 1,
(Trousers code 0,)
Columns 18 & 19.
- (9) Vent position
Centre 1,
Side 2,
(Trousers code 0,)
Columns 20 & 21.
- (10) Lapels
Conventional 1,
Wide 2,
(Trousers code 0,)
Columns 22 & 23.
- (11) Waist (of Jacket or Suit Jacket)
Conventional 1,
Flared 2,
(Trousers code 0,)
Columns 24 & 25.
- (12) Trousers: turnups
With turnups 1,
Without turnups 2,
(Jackets (only) code 0,)
Columns 26 & 27.
- (13) Leg (of Trouser)
Conventional 1,
Flared 2,
(Jackets (only) code 0,)
Columns 28 & 29.
- (14) Belt (Trouser)
With belt 1,
Without belt 2,
(Jackets (only) code 0,)
Columns 30 & 31.

- (15) Fifteenth and Sixteenth elements: Colour both (15) & (16) from

Blue	▽ 1,	
Brown	▽ 2,	
Bronze	▽ 3,	
Charcoal	▽ 4,	▽ stands for
Grey	▽ 5,	a blank column
Lovat	▽ 6,	
Black	▽ 7,	
Green	▽ 8,	
Olive	▽ 9,	
Fawn	10,	
Navy	11,	
Burgundy	12,	
Other (not element 16)	13,	

e.g. Bronze-Lovat would be ▽ 3, ▽ 6, if there is only one colour code put it in columns 32 & 33 (element 15) and put ▽ 0, next, e.g. black would be ▽ 7, ▽ 0, in columns 32 to 37.

- (17) Seventeenth, Eighteenth, Nineteenth and Twentieth elements: Fibre (17) & (18) from

Wool	▽ 1,
Terylene	▽ 2,
Worsted	▽ 3,
Rayon	▽ 4,
Nylon	▽ 5,
Fibro	▽ 6,
Sarille	▽ 7,
Trevira	▽ 8,
Mohair	▽ 9,
Polyester	10,
Cotton	11,
Cotton cord	12,
Viscose	13,
Dacron	14,
Courtelle	15,
Crimplene	16,
Cashmere	17,
Denim	18,
Other (not element 18)	19,

Identical method to that for colour, e.g. ▽ 2, ▽ 3, is Terylene/Worsted.

▽ 1, ▽ 0, is Wool, and so on.
in columns 38 to 43.

- (19) Cleaning Type

Conventional	1,
Permanent Press	2,

Columns 44 & 45.

(20) Construction (of fibre)

Woven 1,
Knitted 2,

Columns 46 & 47.

- (21) Price: quoted price rounded to the nearest pound, e.g. £12.70 becomes £13,
£12.50 " £13,
£12.43 " £12,

Columns 48, 49 & 50.

At this point you look at the sales data to determine

- (22) No. of sets of sales data: e.g. if sales are collected every month for 12 months this will be 12,
(leave a blank column if less than 10)

Columns 51, 52 & 53.

- (23) Length of time periods over which sales are collected.

Week 1,
Month 2,
Quarter 3,

e.g. if sales figures are given for each week code 1,
Columns 54 & 55.

- (24) Twenty-fourth to twenty-sixth element:
Starting date e.g. when the garment was first put on the market (taken as the date of the end of the first period for which data was compiled).

This will be already on the information sheet.
An example would be

▽ 1, 10, 1956 (again leave blank column if less than 10 - e.g. ▽ 4, ▽ 2, 1970)

No comma is needed at the end of the date since this will be the end of one line of data.

Now proceed to:-

IV) Instructions (Specific) - Sales Information

On a separate coding sheet and a new line commence with:-

1. The identification number as before.
Columns 1 to 5.
e.g. 2137,
2. No. of sets of sales data as before (if less than 10 leave a blank column - e.g. ▽ 7,)
Columns 6, 7, & 8.
e.g. 12,

3. Length of period as before.
Columns 9 & 10.
e.g. 1,
4. Starting date - a slight difference here, only a 5 figure code is necessary and will be given on the sheet.
Columns 11 to 16.
e.g. 11056,

From here on merely enter the sales figures as they occur, terminating each with a comma until you reach the end of a line. If there should be still more figures relating to the same garment continue on a second, and, if necessary, a third line.

(N.B. If you get to column 72 and you are in the middle of a number, just carry on on the next line - the computer will sort it out).

When completed find the next garment and start coding the style information onto the next line of the style data coding sheet, and so on as above.

V) Examples

The above, no doubt, seems extremely complicated; in fact the method is inherently simple and to illustrate this an actual example will now be outlined.

The following are extracts from the verbal information sheets for one garment - a suit.

"45555 s.b., 3.b., c.v., wider lapel, flared trousers, 2 piece, younger, fashionable, 14.20, Terylene/Worsted, blue, woven, conv. clean, NTU (no turnups), no belt, conv. waist." &

"45555 Feb. 751 Mar. 309 Apr. 274 May 402 June 189
July 205 Aug. 55, 40270 (Starting date code).

These sheets relating to mail order data, sales figures collected every month, starting date 28, ∇ 2, 1970.

Starting with style data this would be coded as in Figure 1. (assuming 1346 is used as the identification number). The sales data is coded in Figure 2, the sales figures (e.g. 751, 309, etc.) should be coded as shown without worrying about blank columns.

In some cases a piece of information may not be recorded on the sheets, if so take the alternative which best fits the remaining description. Data which is not known will be specifically marked as such for code 9. If in doubt seek advice, but it will usually be fairly obvious what the correct choice is.

This should have given you a good idea of how the scheme works. However, the above is somewhat clumsy for use in actual coding. The appendices contain a simplified coding scheme and complete instructions.



Figure .1.

CC CRANFIELD COMPUTING CENTRE

ccc/223

NAME		D. Midgley	
DATE		26 th June 73	
PAGE		1 of 2	
APPLICATION		Data	
PUNCHING INSTRUCTION			
1	2	3	4
5	6	7	8
9	10	11	12
13	14	15	16
17	18	19	20
21	22	23	24
25	26	27	28
29	30	31	32
33	34	35	36
37	38	39	40
41	42	43	44
45	46	47	48
49	50	51	52
53	54	55	56
57	58	59	60
61	62	63	64
65	66	67	68
69	70	71	72
73	74	75	76
77	78	79	80
81	82	83	84
85	86	87	88
89	90	91	92
93	94	95	96
97	98	99	100

Figure 2.

CC CRANFIELD COMPUTING CENTRE

ccc/223

NAME		MIDGLEY		APPLICATION		Data		PUNCHING INSTRUCTION	
DATE	26th June	PAGE	1 of 2						
1	2	3	4	5	6	7	8	9	10
11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
51	52	53	54	55	56	57	58	59	60
61	62	63	64	65	66	67	68	69	70
71	72	73	74	75	76	77	78	79	80
81	82	83	84	85	86	87	88	89	90
91	92	93	94	95	96	97	98	99	100

APPENDIX A -

Coding - Points to Watch

- a) Two sets of coding sheets, one for style data the other for sales data.
- b) Style data goes on one garment to a line, sales data may require a second or third line - the next garment's sales data starts on a new line.
- c) Never use columns 73-80.
- d) Terminate all numbers by a comma (,) except at the end of a line of data where it is left blank.
- e) As identification nos. are issued to garments record this no. against the manufacturer's code on one sheet of paper - return this to the project leader.
- f) Code 0 for inapplicable, 9 for data not known.

Coding Scheme - Style Data

Columns	1 - 5	Identification No.		
	6 & 7	Suit 1, Jacket 2, Trousers 3,		
	8 & 9	Retail 1, Mail Order 2,		
	10 & 11	Conventional 1, Fashionable 2, Fads 3,		
	12 & 13	General 1, Younger 2,		
	14 & 15	No. of pieces 1, 2, 3,		
	16 & 17	Single breasted jacket 1, Double 2,		
		Trousers 0,		
	18 & 19	No. of buttons 1, 2, 3, Trousers 0,		
	20 & 21	Centre Vent 1, Side Vent 2, Trousers 0,		
	22 & 23	Conventional lapel 1, Wide 2, Trousers 0,		
	24 & 25	Conventional Jacket 1, Flared Jacket 2,		
		Trousers 0,		
	26 & 27	With Turnups 1, Without Turnups 2,		
		Jackets (only) 0,		
	28 & 29	Conventional Trouser leg 1, Flared leg 2,		
		Jackets (only) 0,		
	30 & 31	Trouser belt 1, No belt 2, Jackets (only) 0,		
	32 - 37	Colour, from:-		
		Blue ▽1,		
		Brown ▽2,		
		Bronze ▽3,	eg. Bronze Lovat	
		Charcoal ▽4,	▽3, ▽6,	
		Grey ▽5,		
		Lovat ▽6,	Black	
		Black ▽7,	▽7, ▽0,	
		Green ▽8,		
		Olive ▽9,	Other	
		Fawn 10,	13, ▽0,	
		Navy 11,		
		Burgundy 12,		
		Other 13,		
	38 - 43	Fibre, from:-		
		Wool ▽1,	Cotton 11,	
		Terylene ▽2,	Cotton Cord 12,	eg. as
		Worsted ▽3,	Viscose 13,	colour.
		Rayon ▽4,	Dacron 14,	
		Nylon ▽5,	Courtelle 15,	
		Fibro ▽6,	Crimplene 16,	
		Sarille ▽7,	Cashmere 17,	
		Trevira ▽8,	Denim 18,	
		Mohair ▽9,	Other 19,	
		Polyester 10,		
	44 & 45	Conventional Clean 1, Permanent Press 2,		
	46 & 47	Woven Fabric 1, Knitted 2,		
	48 - 50	Price (to nearest pound).		
	51 - 53	No. of sets of Sales Data (e.g. 12, or ▽7, etc.)		
	54 & 55	Data for every Week 1, Month 2, Quarter 3,		
	56 - 65	Starting date (given)		
		e.g. ▽1, 10, 1956		
		or ▽4, ▽2, 1970		

APPENDIX C -

Coding Scheme - Sales Data

Column	1 - 5	Identification No. - as before.
	6 - 8	No. of Sets of Sales Data - as before.
	9 & 10	Data for every - ? - as before.
	11 - 16	Starting date code (given) e.g. 11056,
	Remainder	Sales Figures.

APPENDIX 2

THE PROGRAM OPERATION MANUAL

(giving the control data format
for operating the programs)

INSERTION PROGRAM

Control Data Format

- (1) The number of garments on the magnetic tape (specifies array size).
- (2) Boolean 'TRUE' for an insertion of data, 'FALSE' for a correction of data.

Insertion

Correction

- | | |
|--|--|
| <ol style="list-style-type: none"> (3) Type of data to be inserted, code 1 for style data, 2 for sales data and 5 for both types. (4) Start position on Disc (K value in backing storage package). | <ol style="list-style-type: none"> (3) No. of garment entries to be corrected. (4) Authority to correct. (5) For each garment, its identification number and a code - code 1 for style entry correction, code 2 for a sales entry correction. |
|--|--|

Style

Sales

Both

- | | | |
|---|---|---|
| <ol style="list-style-type: none"> (5) All style data garment by garment, 26 codes for each garment (see coding manual). | <ol style="list-style-type: none"> (5) All sales data garment by garment (for format see Coding Manual, information can be any length up to 56 sales figures plus 4 identification codes eg 60 nos.) | <ol style="list-style-type: none"> (5) All style data garment by garment 26 codes for each garment (see coding manual). (6) All sales data garment by garment (for format see Coding Manual, information can be any length up to 56 figures plus 4 identification codes eg 60 nos.) |
|---|---|---|

Style Correction

Sales Correction

- | | |
|--|--|
| <ol style="list-style-type: none"> (6) The corrected 26 code entry. | <ol style="list-style-type: none"> (6) The corrected variable length entry. |
|--|--|

(N.B. corrections are performed garment by garment.)

PRELIMINARY ANALYSIS PROGRAM

Control Data Format

- (1) The number of garments on the magnetic tape (specifies array sizes).
- (2) The authorization code for the particular tape (file security).
- (3) Code 1 for analysis, 0 for listing.

Analysis

Listing

- (4) Code 1 for style selection
0 for categorization.
- (4) Number of garments to be listed (max. 50).

- (5) The identification number and a code for each garment. Code 1 for style information, code 2 for sales information.

Style Selection

Categorization

- (5) A set of 26 numbers specifying the search dimensions.
 - (5) The number of garments to be categorized.
 - (6) A set of 26 numbers specifying the analysis specification (garment type to be selected).
 - (6) Their identification numbers.
- (Then to sales analysis)

- (7) Code 1 for special facilities, code 0 for no special facilities.

Special Facilities

No Special Facilities

- (8) Code 1 for price facility
Code 2 for colour facility
Code 3 for fabric facility

Price Facility

Colour Facility

Fabric Facility

- (9) The price
- (9) a 13 by 13 matrix of colours (see coding manual)
- (9) a 19 by 19 matrix of fabrics (see coding manual)
- (10) The price direction
Code 1 for garment price greater than (9)
Code 2 for garment price less than (9)

