CHAPTER 2

MAIN TEST PROGRAMME

The basic requirement for the test programme was to have a method which would enable an assessment to be made of the effects of the variables which had been built in to the indexing. Each group of 100 documents had some unique characteristics, and ideally it was desirable that it should be possible to evaluate the performance of each such group. In practice it was considered that, since the original main objective of the investigation was to compare the efficiency of the four systems under test, it would be reasonable to concentrate most of the testing on the final sub-programme of 6,000 documents, since it might be expected that these would have been indexed more efficiently than the 12,000 documents in the two earlier sub-programmes, due to the greater experience of the indexers in using the descriptor languages.

The only previously known work in this field of testing retrieval systems was an investigation known as the ASTIA-Uniterm test, which was made in 1953. Unfortunately this work was never fully written up, and the only generally available account is that given by D. Gull (Ref. 2). This is mainly concerned with analysing the results, but from this paper it can be gathered that some 15,000 documents were indexed by two separate teams, one being the indexing staff of the Armed Services Technical Information Agency while the other team were indexers of the staff of Documentation, Inc. The former group used alphabetical subject headings taken from the authority list established by ASTIA, while the latter group used the uniterm system, the commercial exploitation of which was at that time an important part of the work of Documentation, Inc. Having different groups of indexers, with no comparable controls of how the indexing was being done or how long was being spent on the work, the test could not do more than assess the relative merits of two dissimilar indexes, where the only connection was that the indexers covered the same group of documents. It was therefore possible for the test programme to be relatively simple. A number of questions, reputed to be 93, which had been sent to ASTIA in the normal course of their activities, were selected and both organisations carried out searches in the indexes which they had compiled. It would appear that when the searches were completed, each organisation then looked at the documents which had been retrieved and decided on those which were relevant to each particular

question. The two groups then met to compare results. Immediately they came up against the problem of deciding what was relevant and found that they were quite unable to agree on this point. Each group had its own interpretation of the question and therefore its own views as to the relevance of the documents. It appears that after some lengthy discussion, the decision was taken that each group should compare the retrieved documents and make its own analysis. The report prepared by Documentation, Inc., as discussed in the paper by Gull, would appear to indicate that the uniterm system was more successful than the alphabetical indexing of ASTIA. It also seems that the ASTIA group, as a result of their analysis, were of the opinion that the position was the reverse.

In considering the results of this test, it can be seen that even if it had been successful, in the sense that the two groups were able to produce a single joint report, the value of the work would have been limited to showing merely that the index compiled by Documentation, Inc. was superior to the index compiled by the ASTIA staff or vice versa. There having been no controls on the method of indexing or the method of searching, any such results would have had doubtful practical significance. It was the intention of the present investigation to produce some results that had more validity, which was the reason for the controls which were built in to the indexing part of the programme. However, it was the failure of the two groups to produce any kind of joint result which strongly influenced the decision on the main method of testing the four indexes which were compiled. It was quite obvious that, whatever other weaknesses the test might have, it was essential that it should not get bogged down in the quagmire of arguments concerning relevancy. Further test programmes could be used to clear up those points which the basic method of testing failed to answer satisfactorily.

In such an investigation as this, an important requirement is that the results which are obtained should be capable of being shown as being statistically valid. This matter is discussed in more detail in the next chapter, but it was considered that it might be necessary to use as many as 1,600 questions. Since searches were to be made in each of the indexes with all questions, it would have been an exceedingly large and difficult task to attempt to evaluate the relevancy of every document that might be retrieved in this multiplicity of searches. The simplest and most practical method of deciding this question of the relevant document appeared to be by using questions which were based on documents that were in the collection. Thus it would always be known that there was at least one document which would be relevant to

each question. Using this technique, it was also possible to control the compilation of questions in such a way that the documents on which they are based (now known as the source documents) were distributed throughout the collection in the required manner. Since, as mentioned previously, the testing was to concentrate on the final sub-programme of 6,000 documents, it was necessary to have 75% of the questions based on these documents with the remaining questions spread over the documents in the first two sub-programmes. The 75% of the questions based on documents in the last sub-programme had to be evenly distributed over the sixty groups of 100 documents which made up this sub-programme, so that it would be possible to find the results of different persons doing the indexing at varying time allowances, as well as the effect of different types of documents and of the other controls which had been built in to the indexing.

It will be recollected from the report of the First Stage that a number of individuals and organisations were invited to take part in the investigation by indexing documents. At the same time their assistance was also requested in compiling questions. The procedure for obtaining these questions was that, to each organisation or individual who had expressed a willingness to help, a collection of twenty sheets was sent. On each sheet was listed a minimum of twenty references. These references represented a selection of documents which was taken from a complete group of 100 documents. In Appendix 2A is given a sample group of 100 documents, the relevant sheet of selected documents which were to be used for the compilation of questions and examples of the resulting questions. A copy of the letter sent to those compiling questions, who were mainly scientists or engineers, is also included in this appendix. As will be seen from this letter, they were required to select a single document from each of the twenty sheets which had been sent to them. They then consulted the resulting documents and framed twenty questions, each of which could be satisfactorily answered by one of the selected documents. Therefore for each question which was to be used in the testing there was at least one document, i.e. the source document, which it was known would have provided, in the opinion of the compiler of the question, a satisfactory answer to that particular question. Sixty lists of references were prepared to cover the final sub-programme of 6,000 documents and a further twenty lists to cover the documents in the first two sub-programmes. Different sets of lists were sent to each person so that the questions ranged over the total collection in the desired way.

Altogether some 1,500 questions were received. Although this was slightly less than the number originally thought necessary, no immediate steps were taken to increase the number, since it was known that there would be no difficulty in obtaining further questions if the need should arise. As will be discussed later it was found that the requirements were satisfactorily met by using only 1,200 questions. There were cases where the same document had been selected by more than one person, with the result that there were two or more questions which were based on the same document. It was interesting to note the variety of questions which a single document could generate, and there was no strong reason against using a question simply because the source document was also the source document for a question previously used. However, in some cases there was a strong similarity between questions which had been based on the same document, and in this case not more than one of these questions was used.

Some form of comparable results were required at the earliest possible stage and therefore the first round of testing was limited to 400 questions. 300 of these questions were spread over the earlier sub-programmes. This meant that in each group of 100 documents there would be five source documents to answer the five questions covering that particular group. The questions for this round of testing were selected so that half of the questions covered the subject field of aerodynamics while the remainder were on other subjects. An attempt was also made to see that there was a reasonable agreement between the number of source documents which were reports and those which were periodical articles.

Before the questions were used for searching, they were submitted to a panel of three persons, Mr. T. Aitchison of English Electric Aviation Ltd., Mr. J. Rosser of Hawker Siddeley Nuclear Power Group and Mr. R. Wall of A. V. Roe & Co. Ltd., Guided Weapons Division. These gentlemen, all of whom had had several years experience in aeronautical information work, were asked to consider the questions from the viewpoint of whether they were reasonable, that is of a type which they might expect to have put to them in the course of their normal duties. As a result of their scrutiny, only one question was rejected on the grounds that it was a question which could have been more reasonably answered by consulting a scientific dictionary.

The intention was to carry out searches with these questions in all the indexes. Search would be carried on to the stage where the source document was retrieved or alternatively the searcher was unable to devise any further reasonable search programmes. Apart from the variables which were included in the indexing, it was also desired to investigate the ability of different persons as searchers. However, for the first round of testing only staff who had been working on the project were used, namely Miss Warburton, a full time member of the project staff, Mr. J. Hadlow, who had been an indexer on the project but had at the completion of the indexing stage of the work, joined the College of Aeronautics Library and C. W. Cleverdon, the Director of the project. Full records had to be kept of all the searches and for this purpose master search cards were printed. These were in four different colours, one colour for each system being tested. The 400 questions were entered on each pack of search cards so that with four search cards for each question there was a total of 1,600 search cards for all four systems (see Figs. 1 and 2). For convenience, each question was given a code number, and in addition on each search card was entered the project code reference of the source document on which the question had been based.

At this stage there was no idea of what the results were likely to be or how this technique of testing would work. It was, in fact, originally envisaged that this first round of testing might be considered as purely experimental, so that the more suitable methods could be developed. A matter of concern was whether memory would come into the searching. Hadlow and Cleverdon, in this round of testing, each did 400 searches, so by making 100 searches in each system it was possible to avoid searching for any question more than once. Miss Warburton did a total of 800 searches, 200 by each system, so the result of this was that she searched for all the questions in two different catalogues. The work was spread out so that there was at least a month between the same question being used for a second time, and we were satisfied that the results were not affected.

The search procedure varied slightly with each system but the endeavour was always as far as possible to simulate a real life situation. This was taken to be as in a normal information service where an enquirer comes in with a request for certain information. Based on this request, the librarian will formulate a search programme by deciding on the concepts and translating these into the terminology of the index.*

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* The matter of formulation of search programmes is considered in more detail in Chapter 5. The approximation given here is sufficient for the present argument.

Irrespective of the descriptor language and irrespective of whether it is being used with a card catalogue, with peek-a-boo cards or any other physical form, this action is essential, and the resulting search will bring about one of three situations:-

(a) No references are retrieved which are of value to the enquirer

(b) The search is partially successful, in that at least one of the references retrieved is to a document which partially meets the needs of the enquirer

(c) A sufficient number of references (which may be one or more depending on the type and purpose of the question) are retrieved to meet fully the needs of the enquirer.

If (c), the search has been successful; if either of the first two situations result, a second search programme must be formulated and a further search made. This again will result in one of the three situations outlined above and if necessary further searches are made until either the position is reached where:-

(i) the search is successful and the enquirer is satisfied

(ii) no further search programmes can be devised

(iii) the librarian and/or the enquirer lose their patience.

Basically the same procedure would be followed if the enquiry came by telephone or letter, or if the enquirer carried out his own search in the indexes. The only difference in the latter case is that one person would carry out both roles outlined above.

It is true that, in a real life situation, there tends to be with difficult questions a further elucidation of the question by the enquirer, thus helping the librarian in devising further useful search programmes. Alternatively, experience shows that in finding some references of slight relevance, the enquirer is able to re-phrase his question in a more precise manner and also thus help in the search. In the project this was not the situation, for the question as submitted was all that was available and there was no possibility of the project staff going back to the enquirer to find whether he could clear up any doubtful points or give a useful lead.

Apart from this latter point, which was to the disadvantage of the project group, the attempt was made to simulate a real life situation as far as possible. The basic procedure was to consider the question and devise a search programme. This was then entered on to the master card. The appropriate index would be searched and

the cards bearing the particular notation or subject headings as recorded would be consulted. If a card bearing the project code number of the source document was there, then the search was considered successful and would be entered as such, with the record of the number of other references which bore the same heading as the source document. If the search did not reveal the reference to the source document, a note was made of the number of references which were at that heading and a further search programme was then devised. The process was repeated as outlined, with records being made of the search programme and the result. This continued until finally the question could be marked as a success, stating the total number of search programmes required, or as a failure.

It might appear at first sight that this was a somewhat doubtful method of carrying out a search, in particular with regard to the fact that there was a certain card in the catalogue which could always be immediately recognised as being the required reference. To return to a real life situation, when the first search has been made, the enquirer will look at the resulting references, and form a judgement as to whether any are likely to be of value to him. This judgement will be based on a number of factors which the index card can reveal such as the name of the author, the originating organisation, the title and date of the paper and possibly the abstract. Normally the enquirer would reject some of the references and decide that other references were sufficiently interesting to justify his asking to see the actual documents. On obtaining the documents, the enquirer will then carry out a further search through these documents to find whether the required information is contained in any one or more of them. This will result in one of the three situations, (a), (b) or (c) as given above and the decision is taken either to call off the search as being successful or to make further searches. If the latter, the procedure is repeated with a new search programme, and so on until situations (i), (ii), (iii) are reached. Our method of doing the searches short-circuited this procedure, which would have been quite impracticable to carry out, and an immediate decision as to whether the search had been "successful" could be made by looking at the project number of the references retrieved.* It must be emphasised however that although it was known to the searcher

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* This claim that a search could be considered "successful" by finding a single relevant document would appear to presuppose that the enquirer does not require all available information on a subject. This aspect is considered in Chapter 6 .

that a card which bore a number such as P16327 was the card which had to be located, nothing was known about where in the catalogue this card might be found.

As had been expected, difficulties soon arose in this first round of testing but it was completed so that the necessary experience could be obtained. Certain minor problems were satisfactorily solved but two major difficulties remained. In the first place it was necessary to decide exactly what constituted a single search and what changes in the search programme meant a new search; secondly there was the decision to be taken as to how long one was justified in continuing a search. This latter problem was particularly difficult because, in that it was known that there must be a satisfactory answer somewhere in the index, it would have been possible for the searches to be broadened until every card in the index had been seen. This was not being done, but it was essential that the search procedure should be levelled as between the differing systems and between the different searches.

Two new rules were therefore devised to cover the second round of testing. For the first, a search programme was defined as being any permutation of a given set of elements, and a new search would be when any element was omitted from the original search programme or when one or more elements were changed.* Regarding the second point, it was decided that a search would not be continued beyond the stage where more than one of the basic elements that were originally considered necessary had been dropped. These two rules, while forming a basis for the later testing, could not be applied without descrimination to all four systems and can probably best be explained by giving examples of the method of application as shown by some actual test workings. Figure 1 shows the search cards in connection with question 25-07 "Comparison of alclad and unclad aluminium sheets riveted together and subjected to fatigue loading". With the Universal Decimal Classification, the search programme was devised as being 669.715 (Aluminium alloys) and 620.178.3 (Fatigue testing). The original search was made in the catalogue at 669.715:620.178.3 and was unsuccessful in that the source document was not found, although there were twelve other references having this notation. The second search was made with the figures reversed round the colon, that is to say 620.178.3:669.715, and in this case the reference to the source document was located in addition to 31 other references. It is recorded on the search card that the full notation of the source document was 669.715:620.178.3:621.884.057.2. This second search was not, under the new rule, considered as being a new search, for the same notational elements were being used. Therefore the result is given as a success on the first

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* See Appendix 2B

search, penalised to a certain extent by the fact that it was necessary to do an extra sub-search and also recorded that 43 documents were retrieved. With the alphabetical subject catalogue, the first search programme here was given as "Sheets, aluminium alloy - fatigue". This proved unsuccessful, as did the second search under "Sheets, aluminium" and the third, fourth and fifth searches. Finally for the sixth search the programme was devised as "Joints, riveted, aluminium alloy - fatigue" and in this case it proved successful. Altogether there were six searches which resulted in the retrieval of 34 other documents before the source document was retrieved. Since with each of the search programmes either new terms had been introduced or had been dropped, each search programme was counted as a new search.

With the facet system, the original search programme asked for four elements, namely Peal-a "Aluminium alloys", Rkm "Fatigue", Hvd "Rivets, Fsb "Sheets". It is shown that the first search was made in the chain index under the latest element in the notation, namely "Fatigue". The index showed that the classified catalogue did have a reference with the four notational elements requested but on looking in the classified catalogue, there was found only one reference which was not to the source document. A second search was made, this time it being decided that the first three elements could be accepted without requiring anything concerning Fsb "Sheets". Here again the chain index directed the searcher to one place in the classified catalogue and there the source document was found together with one other document. The actual location of this required reference was at Hu Hvd Peal-a Rkm Rp Vi.

With the uniterm system, the first element searched was "Aluminium". Here the source document reference number was found and the search then went to the card for "Sheets". This term had not been indexed so the search was switched to "Riveted". This being successful the next card looked for was "Alclad", this was a failure and so the search went on to "Fatigue" which was successful, then to "Strength" which was also successful. The searcher felt that we would be better if it was possible to have found something for "Plates". This could not be found but the search was adjudged as being successful, in that there had been obtained a reference covering "Fatigue strength of aluminium". The search was therefore marked as taking three separate searches in that there were two failures to find required entries during the search up to the time a satisfactory result was reached.

Comparison of document numbers on the aspect cards showed that eight references were retrieved in the course of these searches.

Figure 2 shows the search cards in connection with question 28-07, "Theoretical calculation of the performance of half-delta wing-tip controls on the tips of delta wings". The programme devised for U.D.C. was 533.693.31 "Delta wings" and 533.694.5 "Control surfaces". It is interesting to note in this case however, that the searcher agreed from the start that she would accept any further breakdown of 533.694.5. By this she gave herself more flexibility in the search but there was the probable penalty of retrieving more irrelevant documents than if she had been able to specify the search more precisely. In the event, searching under 533.693.31:533.694.5 the card for the source document was found with 25 other cards, the actual place for the source reference being 533.693.31:533.694.512 "Moving wing tip ailerons". With the alphabetical subject catalogue, the first search programme was for "Wing tips, moving"; although 14 cards were found at this heading, none of them related to the source document so further series of programmes were devised. First there was "Wings, delta - control", followed by "Wings, delta, supersonic - control", and then "Wings, delta, transonic - control". These proved unsuccessful so a further search was made under these headings with the sub-heading "Performance". The search was still unsuccessful and was at this stage abandoned.

The facet search was devised as Id "Tips", Cd(Ij) "Wings, delta" and Cp "Control surfaces". The first search was made in the chain index under "Tips", and led directly to the source document which was at this particular place with the addition of four other references. Finally, with uniterm, the first two searches for "Wings" and "Delta" were successful; "Tips" was a failure but then an entry was found under "Control". In an attempt to refine it rather more a search was made under "Performance" but there was no reference on this card. The search was considered successful, it having taken two separate programmes to reach the required stage. In addition to the source document, five other references were also found.

To go back to the two basic rules, it will be seen that it was necessary to interpret them somewhat freely. For instance, a single U.D.C. number may well be the equivalent of two or more uniterms. For this reason it was necessary to check the results between different systems to ensure that no one system had been penalised by too strict an interpretation of the basic rule. In this respect, it

quickly became obvious that the alphabetical subject catalogue was usually the yardstick. For instance, the person searching the uniterm index for the second question considered above, originally felt doubtful as to whether it was reasonable to mark the uniterm search as being successful when it was only possible to find "Wings", "Delta" and "Control". However on comparing the card with that of the alphabetical catalogue search, it was clear that it would have been accepted as a legitimate subject heading. This comparison of markings between one system and the other had to be carefully checked throughout and it made a difference to the results which were given in the original report on this first round of testing at the annual conference of Aslib (Ref. 3).

Regarding the question of the number of searches, while the decision appeared satisfactory concerning the U.D.C., alphabetical and uniterm systems, it raised some doubts in the matter of the facet system. This was due to the double nature of the search in either the classified catalogue or the chain index. A situation which frequently arises is with a question which generates a search programme such as Ncd "Laminar flow", Nfk "Boundary layer" and Ocd "Suction", the question itself being, "The calculation of the laminar boundary layer having distributed suction". It would have been possible to have added the further terms to the programme of Ya "Calculation" or (Zf) "Distribution", and it was doubtless a deliberate policy not to do this, for "Calculation", if sought in the chain index, would have involved searching through a file of approximately 1,200 cards, and it is a term that might well not have been indexed as being redundant. To a lesser extent, the same reasoning applied to "Distribution", for in this case one would have had to search through a file of approximately 400 cards. The term "Suction" was therefore taken as the entry to the chain index and in this case there were 97 cards to search. However of these there were 9 cards which included the three sought terms, these being:-

Suction: Boundary layer: Laminar flow	Ncd Nfk Okb
S.: B.L.: L.F.: Clyinders	Fq Ncd Nfk Okb
S.: B.L.: L.F.: Discs	Fqd Ncd Nfk Okb
S.: B.L.: L.F.: Flat: Plates	Ffe(Is)Ncd Nfk Okb
S.: B.L.: L.F.: Slots: Aerofoils	Cc Ct Ncd Nfk Okb
S.: Control: B.L.: L.F.: Flat: Plates	Ffe(Is)Ncd Nfk Oa Okb
S.: Distribution: Velocity: B.L.: L.F.: Flat: Plates	Ffe(Is)Ni(Zf)Okb
S.: Profile Drag: B.L.: Incompressible Flow: L.F.	Ncd Nfh Nfk Nrb Okb
S.: Skin Friction Drag: B.L.: L.F.	Ncd Nfk Nrf Okb
S.: Skin Friction Drag: B.L.: L.F.: Flat: Plates	Ffe(Is)Ncd Nfk Nrf Okb

In this particular search, the correct programme was found and, by searching under "Suction", there was the clue of "Distribution" because in the seventh entry it happened to have been brought in to qualify "Velocity" which notationally is earlier than "Suction". To have searched under "Distribution" in the chain index would have revealed a number of entries which included "Laminar flow", "Boundary layer" and Suction", but which would not have in fact revealed the source document.

Another similar situation did not work out so well. The question was "Velocity profile, heat transfer and skin friction data for turbulent boundary layers". Entering the chain index at "Heat transfer" there were over 200 cards to be searched. One card contained the four required elements in combination on their own but there were 14 other cards where the elements were combined with other terms to form such combinations as

Fm Nbm Ncf Nfk Nrf Nvf Oi St
Fu Nbm Ncf Nfk Ngc Nvf Oi St
Nbm Ncf Nfk Nrf Oi St

This involved 15 different places which had to be looked at in the classified index and in the event the source document was not retrieved. The second search programme substituted Nrf "Skin friction" for St "Heat transfer". From the chain index on this occasion ten possible locations were found, and under Fm Nbm Ncf Nfk Nrf, the required reference was found on the seventh of these sub-searches. At first it appeared somewhat difficult to justify marking this question as being successful with only two searches, seeing that it had been necessary to sort through over 300 cards in the chain index and to look at 22 different places in the classified catalogue. However to have done anything but this would have been to extend the range of our work into the physical form of the index. If facet had been used as a post-co-ordinate system,* then it would only in fact have required two

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* The term 'post-co-ordinate' is used in contrast to 'pre-co-ordinate'. Certain descriptor languages have become known as forms of co-ordinate indexing, but in fact all but the simplest descriptor languages 'co-ordinate'. The difference is that some do the co-ordination at the time of indexing, e.g. an alphabetical subject heading such as WINGS, DELTA, SUPERSONIC - Stability, longitudinal, or the equivalent U.D.C. number of 533.693.1.011.5:533.6.013.412. Others do it at the time of searching, e.g. Uniterm, where the separate elements "WINGS", "DELTA", "SUPERSONIC", "STABILITY", "LONGITUDINAL" would be co-ordinated. While some descriptor languages may be more convenient to use in one way than the other, yet all can, in fact, be used in a pre-co-ordinate or post-co-ordinate manner. The facet schedules as used in the project test were particular adaptable to either method.

search programmes to find the necessary reference.

Using these new rules, a second round of testing was carried out, again with 400 searches being made in each system. In this round the searching was carried out by the same three people as in the first round of testing with the addition of Miss A. Scott, an assistant in the College of Aeronautics Library, who had not taken any active part in the work of the project. In addition, five post-graduate students of the College spent an average of six weeks each in doing searches. The questions which they used were the same as those which had been used by the project staff in the first and second rounds of testing, and the main purpose of having such persons doing the searching was to discover whether any particular system was more or was less satisfactory when used by persons who were skilled in the subject content of the documents indexed but who had little practical experience of searching for information.

The second round of testing by the project staff proceeded quite satisfactorily and calls for no particular comment.

A minimum amount of guidance was given to the students, and consisted of merely explaining the rules of operation, what was required of them in keeping records and showing them the various catalogues and ancillary aids. While they all had a certain amount of experience in retrieving information for their own purposes prior to this test, none of them could, at the start of the test, be considered to have any special experience or qualifications which would make them unrepresentative of the normal scientist or engineer using an index.

At the conclusion of the second round the results of the searches were tabulated, and from the overall picture of the way the work was going, it appeared unlikely that more than one further round of testing would be required. Before this was done, a very detailed analysis was made of all searches which ended in failure to find the source document. This matter is discussed in detail in Chapter 5, but is mentioned here to explain the change in procedure which was adopted for the third round of testing.

As discussed earlier, the test was intended to discover something concerning the ability of various people to carry out searches. By the time that the second round of testing was completed, it was considered that reliable information had been obtained and that it was not necessary to investigate this particular matter any further. However, the analysis of the failures had shown that there were many

cases where the search had been successful in one system but had failed in another system. In such cases the reason for the failure had nothing to do with the system or the indexing but was entirely due to the fact that the person making the search in that system had not found the correct search programme, which had been used by the searcher in another system.

Also, even when searches had been successful, it appeared often a matter of chance whether the correct programme was used on the first or fifth searches.

The third round of searching, which again consisted of 400 questions in all systems, was therefore done in such a way as to eliminate as far as possible the variable of searching. To do this, Miss Warburton first searched for all questions in the alphabetical subject catalogue, keeping the usual records. The searches were then repeated in the U.D.C. catalogue using the same programmes in the same order as with alphabetical. That is to say that if, for instance, with alphabetical, the first three search programmes had proved unsuccessful, but the document had been found on the fourth search, then the searches by U.D.C. had to go through the same stages in so far as this was practical with the terminology and structure of the different descriptor languages. On the other hand, when a source document was located in the alphabetical subject catalogue by the first search programme, there would be no necessity for further possible search programmes to be generated. If in the search in the U.D.C. this single search programme failed, then further search programmes were tried, and these formed the basis when the searches were repeated in facet and later in the uniterm system.

Mrs. J. Aitchison worked on these subsequent searches and in some cases was able to generate further search programmes in cases where Miss Warburton had failed. In such cases these new programmes would be tried with all systems, so that in the end all systems had been equally treated in regard to search programmes.