Computers in special libraries: with special reference to the Scientific Studies and Research Centre, Damascus, Syria

COMPUTERS IN SPECIAL LIBRARIES:

WITH SPECIAL REFERENCE TO THE SCIENTIFIC STUDIES AND RESEARCH CENTRE, DAMASCUS, SYRIA

by

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SUMMARY

The various applications of computers to serials and reports control, cataloguing and circulation in special libraries are investigated. Special emphasis is placed on the role of minicomputers in bibliographic control in the U.K. and U.S.A.

Following this general review, the current state of Libraries in Syria, with particular reference to special libraries is outlined.

Recommendations for a computer-based system at the Scientific Studies and Research Centre Library - Damascus, Syria, are discussed taking into consideration local needs and resources.

Priorities for automating the catalogue, serials listing system and reports collection, as well as computer provision via the Institute's mainframe are examined.

Finally, a suggested distribution of Library, Information and Documentation Services for the Centre is outlined.

To my beloved

husband Haytham

and

Family

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GENERAL LITERATURE SURVEY: COMPUTER APPLICATIONS IN SPECIAL LIBRARIES

CHAPTER 1 INTRODUCTION

1.1 Minicomputers

The recent availability of the small computer with good I/O capabilities makes it economically feasible for many libraries to have their own dedicated computer system. Previously, data processing for libraries was primarily confined to those institutions that had access to large data processing centres.

A hard and fast definition of minicomputers is elusive but perhaps a suitable summing up by Jurgen is:

> "The term minicomputer is catchy but misleading. The "mini" portion of the term is generally appropriate when referring to physical size and cost - and possibly word length and memory size - but not when one is considering computer power". (1)

Minicomputers are scarcely a decade old; the first ones were introduced in 1962 for aerospace applications. (2) Commercially, birth of the minicomputer is often attributed to the first shipments of Digital Equipment Corporation's PDP-8's in 1965. (3) Other manufacturers such as Honeywell and Xerox Data System soon followed with their models in 1966. Surveys of minicomputers reveal significant changes and growth over the past years. The first Datamation minicomputer

survey was published in March 1969. It discussed hardware characteristics and minicomputer applications which were primarily in instrumentation test and control systems.

The second survey (May 1971) uncovered cost reductions and performance improvements. The 1974 survey[4] sums up the innovations in the minicomputer technolology taking into consideration cost, architecture, software, applications, marketing and business approaches.

For a description of minicomputers, likely ranges of cost, staffing and environment requirements, the reader is referred to an article by Long and Hyman.[5] Other articles appear in the literature.[6-8]

A detailed study of the use of minicomputers in libraries is a documentation of the papers presented at the 1974 Clinic on Library Applications of Data Processing.[9]

1.2 Library automation through the years

Grosch[10] traces the development of library computer systems design by analysing four generations of library systems. The first generation, characterised by punched card non-stored program systems, helped lay a foundation for librarians in system analysis.

The second generation of library systems was made possible by the arrival of the IBM 1401, the first character oriented computer to find wide commercial use in business, industry, education and government. General characteristics of the second generation of library systems are:[11]

- Specific application oriented, with input/output and files

structured for printed output in defined problem areas such as, book fund accounting, ordering, book or card catalogues, or circulation lists.

- Input and file designs, largely using fixed fields even for most variable length bibliographic data.

- Batch processing structured with limited on-line transaction recording devices normally restricted to use in circulation applications.

- Inflexible systems designs, inadequate levels of documentation and non-modular structuring of the programming driving the system, i.e. programs and data are dependent on one another.

- Rejection of many systems after installation due to lack of capability, uneconomic operational costs and inability to be easily updated or changed in the face of changing library needs.

- Output printing and input character sets restricted to the sixty-four character upper case set available on the specific computer system used.

- File storage primarily on tape in sequential array with few systems using disc storage.

- Assembly level programming primarily with limited use of compiler level languages.

The third generation of library systems (hastened by the introduction of the IBM 360, 1967) had the following characteristics:

- Application oriented but functionally comprehensive systems involving broad areas such as acquisitions, cataloguing, serials management and circulation.

- Source programming in high level languages predominantly, but with assembly level programming for some modules and systems.

- Modularity in programming and file design to permit flexibility.

- Full use of variable length fields and records coupled with complex file strucures in other than sequential array - some with hierarchical relationships expressed.

- Batch mode operation still receiving emphasis but with operational on-line data entry.

- Conceptualization and programming of on-line complex bibliographic processing systems performing a variety of tasks using a single bibliographic record.

- Bibliographic data element standardisation through the Library of Congress MARC project.

Computer output microfilm output for catalogues and printed lists of all types.

- Initial library network shared systems use.

- Limited number of on-line terminal devices suitable for library application use because of their cost and / or capability.

- Greater system software development and improved system and user documentation back-up procedures.

- Need for detailed cost/benefits analysis of both development and operational costs of systems.

The fourth generation of library systems now under development is marked by the emergence of minicomputer systems capable of handling in an on-line mode a variety of library processes.

These systems employ relatively low cost hardware coupled with data management system software specifically designed for library applications support.[12] Some characteristics are:

- Complete system environment control by the library or libraries employing the system.

- High modularity to permit addition of files, records, data elements and completely new applications with low levels of additional programming enhancement.

- Mixed vendor equipment, with more specialised input and output devices for specialised library applications.

- Commercial turnkey type systems.

- Librarian designed input and output.

- Data base content independent from programming to permit future flexibility.

Two papers by Divilbiss[13] and Corey[14] provide a background for the characteristics of minicomputers and the ways in which they can be configured to tackle library problems.

Minicomputers can either act as a terminal or stand alone as a computer. They can operate either as batch or on-line processors, but most interest centres on their use for relatively cheap on-line access. The comparative cheapness of minicomputers as against mainframes has justified their use in dedicated specialised systems such as specific library applications, where otherwise the user would have been competeting for a share of a central computing facility.[15]

The input-output structure of minicomputers and the emphasis on real time operating systems allow on-line systems to be implemented more easily than on mainframes. Because minicomputers are marketed as ranges rather than single machines it is easy to upgrade them.

Minicomputers made their first appearance in libraries in support of the circulation control function. They are also being used to support acquisitions, technical processing, cataloguing, and in some cases selective dissemination of information.

The following sections are intended to give the reader a general background to computer applications in libraries with emphasis on minicomputer based systems in special libraries. It is out of the scope of the present work to provide a comprehensive survey of the area.

References

1. JURGEN, R.K., Minicomputer applications in the seventies. Spectrum, 7, August 1970, 37-52.

2. KAENEL, REG, A., Minicomputers - a profile of tomorrow's components. IEEE Trans. Electroacost, 18, December 1970, 354-379.

3. With user demand expected to produce 20% growth in numbers, minicomputer shipments could zoom as IBM adds structure to market. EDP Industry Report, 6, (16), June 25, 1971, 1-7.

4. HOBBS, L.C., & R.A. Mclaughlin, Minicomputer survey. Datamation, 20. (7), July 1974, 50-61.

5. LONG, R.J., & M.A. Hyman, What is a mini? Program, 10, (2), April 1976, 55-59.

6. Minicomputers. Advanced Technology Libraries, 1, (10), November/December 1972, 1-7.

7. SPANGLE, C. W., Minicomputers: their expanding role. Computers and People, December 1976, 16-18.

8. OSSANA, J.F., The current state of minicomputer software. In AFIPS Conference Proc., 40, 1972, 111-118.

9. LANCASTER, F.W., editor, Applications of minicomputers to library and related problems, papers presented at the 1974 Clinic on Library Applications of Data Processing, April 28 - May 1, 1974, Illinois.

10. GROSCH, A.N., Approached to library automation: past, present and future library computer system design. In LARC series in Automated Activities in Health Sciences Libraries, 1975, 1, (2), 8-12.

11. Ibid, p.9.

12. CHOW, J.V., What uou need to know about DBMS, Part 1, Journal of Systems Management, May 1975, 22-27.

13. DIVILBISS, J.L., A hardware tutorial, a brief history of the minicomputer. In Proceedings of the 1974 Clinic on Library Applications of Data Processing, 3-10.

14. COREY, J.F., Configurations and software: a tutorial. In Proceedings of the 1974 Clinic on Library Applications of Data Processing, 11-27.

15. HYMAN, M. & E. Wallis, Mini-computers and bibliographic information retrieval, BL Research and Development Report, No. 5305HC, July 1976, 20.

CHAPTER 2

CATALOGUING SYSTEMS

2.1 Cataloguing and automation

In a recent survey documented by Bierman (1975)[1] conducted under the auspices of the Council on Library Sciences, some U.S. libraries give their reasons for setting up a computer based catalogue:

- To provide access to the complete and up to-date catalogue from many service points.
- To provide more and improved access points and search capabilities.
- To expand the availability of increased resources through the sharing of resources via regional union catalogues.
- To satisfy calls for a change of system from staff and users of the library and from external bodies, like the Library of Congress.
- To reduce some problems associated with clerical manual work dealing with card catalogues.

Different emphasis is placed on justifications for automation from country to country and depending on the type of library, sizes of collections and services provided. It was noted in the study documented by Bierman, for example, that special libraries were not interested in the co-operative approach due at least in part to the specialised and sometimes confidential nature of their material.

Since 1960 several small and medium-sized libraries have replaced

the card catalogues with some computer generated alternative and work in this area has been reported in the literature.[2-5]

Whereas in North America, academic and special libraries tend to have more computer-based systems than public libraries, in the U.K. public libraries are predominant in this field. Many large authorities like Barnet, Camden, Greenwich, merged different kinds of physical forms of catalogues, classification codes, and orders of filing.[6]

2.2 Recent trends in automated catalogues

The art of cataloguing is in a state of constant change. The capabilities of automation are leading to changes in the tools we have and the education and training we need to work with them, the calibre of staff at various stages of the cataloguing process and the physical form of the end product. Nevertheless, most notable is the co-operation among libraries on the national and international level which has become feasible as a result of the emergence of automated systems.

Examples of co-operation on the regional level in the U.K. are the Camden Public Libraries,[7] which use a VDU linked to a minicomputer; Southampton University Library Acquisition System[8] operational since 1970, an integrated system for circulation and cataloguing; and Cheshire County Library[9] operational since 1971, a system for cataloguing books and sound recordings.

Greenberg 1976,[10] describes the state of the art in cataloguing and points to recent trends which include, the Ohio College Library Centre (OCLC) system set up in 1967 serving 50 academic libraries, and using MARC records. The catalogue system was the first to be implemented with

future plans for the integration of the various library procedures of circulation control, inter-library lending and plans to allow library users access to the data base. A detailed description of the OCLC project is documented by Kilgour.[11]

An example of a large research library beginning the changeover to shared cataloguing by on-line system connected to OCLC project is the Ohio State University Library (OSUL).[12] The advantages are the immediate availability of authoritative cataloguing copy, greatly speeded card production, and the ability of precatalogue searchers to search LC card numbers and titles which has made the determination of main entry easier. The ability of remote access terminal to determine statewide holdings for interlibrary loan is another advantage.

Madden (1976)[13] reports that there are only a few minicomputer supporting acquisitions and cataloguing systems in the U.S. compared to the number of systems in the U.K. The reason is attributed to the existence of OCLC project, the facilities of on-line linkage via terminals to a large bibliographic file, and the wide use of the LC MARC distribution service which eliminates the need to convert cataloguing to machine readable form. Whereas, in the U.K. a system equivilant to the OCLC is still non existent.

Greenberg[10] stresses the role of MARC, MARC I, and MARC II in the development of the current cataloguing style, as well as the International Standard Book Description for monographs, ISBD(M), and

the International Standard Book Description for serials,ISBD(S), is a step towards the success in conceiving the concept of universal bibliographic control.

A comparison of the production cost of different physical forms of catalogue output is documented by Tucker (1974).[14]

The Birmingham Libraries Co-operative Mechanisation Project (BLCMP),[15] represents another example of the use of MARC records. The BLCMP currently supply cataloguing services to nine libraries and two foreign university libraries: the University of Aarlborg (Denmark) and the European University Institute,Florence (Italy).

Greenberg[16] indicates an interesting difference in the approach to the design of cataloguing systems for individual institutes and networks or consortia. Although they both aim on the long run towards an integrated acquisitions and cataloguing system, in the former, the first module of the system to be designed is usually the acquisitions module, either because the problems in the acquisitions department can thus be solved or because processing of materials through the library begins in the acquisitions department. In the case of networks, the module containing the bibliographic record is usually the first record to be created, the data are then extracted from the bibliographic records to make the other systems operational. Herewith, comes the importance of the accuracy and consistency of the bibliographic record. This philosophy is true of OCLC and it is the basis of

much of the planning that is being done by OCLC participants.

Greenberg (1975)[17] reports on a visiting tour which she conducted to libraries, networks, and commercial services in the United States, Great Britain and Scandinavia to study the facilities and management techniques involved in the automation of cataloguing and/or acquisition departments. Of the total number of visits, three were made to public libraries, three to commercial services (Swedish, Danish) and fourteen to academic settings. It was concluded that most of the libraries observed were still very involved in designing and implementing the technical aspects of their systems and were not yet at the point of considering the implications of automation in terms of work flow and staffing changes. The only consistent departure from conventional work flow patterns was the separation of cat-with-copy procedures from catalogue departments and making these procedures an intrinsic part of the acquisitions process.
A possibility for the future could be the merging of the cataloguing and acquisitions departments into a single technical service division with computer and staff handling all such processes.

2.3 Minicomputers in cataloguing

With the development of computer technology in the past few years, minicomputers have been given computing capabilities which have enhanced their use in library systems. These capabilities include the ability to handle variable records, recent support of higher level languages, the possibility of adding storage capacity and

power equal to medium scale computers used in the late 1960's and early 1970's at a considerably lower price.
In view of their capabilities, a significant number of minicomputers have been installed or used in development to support acquisitions and cataloguing applications.

There is a noticable boom in the use of minicomputers in cataloguing applications in the U.K. most concentrate on or include data entry. For example, the Bodleán Library at Oxford[18] is using minicomputers to catalogue 1,250,000 items published before 1920. The cataloguing data is punched onto paper tape which is processed by the University's 1906A or PDP 10. A magnetic tape of the records is then produced. The tape is loaded onto a PDP 11/20 minicomputer and all edit corrections are made on-line via VDUs, random access is used for retrieval. Correction,deletions and additions of data are processed by a line editor. Subsequent batch processing on the PDP 11 inserts tags and validates the data fields.

The library at the Leatherhead Food Research Association (Surrey,England) has an on-line cataloguing and SDI listing system running on a Texas Instrument 980 A. The system used CAIRS (Computer Assisted Information Retrieval System) is well documented in an article by Saunders (1977).[19] Entry of data is performed on-line via a VDU. The entry operation consists of two stages: the bibliographic section is entered first, consisting of author, title,reference etc., followed by the index keys usually subject keywords. Fields are variable in

length and can be expanded as required. SDI searches are made against the file either on demand (based on interest profile) or at regular intervals to produce accession number lists and acquisition lists. Although the system at the Leatherhead Food Research Association is used mainly for cataloguing and SDI, it can cater for other library applications.

The London and Southeastern Library Region, (LASER), is a library co-operative whose members are engaged in converting their separate catalogues into a union catalogue to simplify inter-library loan.(20) The system is based on a minicomputer a Data General, supporting six visual display terminals. Facilities for later 'dial-up' communication with libraries in the region are included.

A system where a minicomputer is used in conjunction with a maxi mainframe is that operated by the Camden Public Library in the borough of London. A detailed description appears in the article by Royan.(21) The minicomputer used, a Data General Nova 1200, handles data entry and corrections in addition to acquisition and cataloguing transactions of order input, material receipt, accessioning, inter-library loan, cataloguing and material expense accounting. The mainframe stores the master file, performs the updates to it and prepares most system output products. VDUs and format screens are used for inputing data and updating fields. An innovative application in the system is the security provided against file corruption, unauthorised data access and concurrent update of fields when it

is not desirable for the overall system.

Several other systems are under development in the U.K. The British Library is planning a minicomputer system for on-line input and edit of UK MARC data. Tha East Anglia University is studying an expansion of their circulation control system, currently operating on a Single System 10, to include on-line input and edit for acquisitions and cataloguing. Lancaster University, with a Data General Nova 1200 linked with their 1905F, is planning a system for on-line input and edit to support acquisitions and cataloguing.

As mentioned earlier not many installations of minicomputers exist in the U. S. One of the systems operating is at the Blackwell North Amerca Inc. which is a stand-alone data entry system on a Univac CADE 1900[22] in conjunction with a mainframe (a 360/65) for processing. Automatic field recognition techniques are used, and data is keyed directly through catalogue cards into an unformatted screen. Special characters between data elements are inserted to indicate the presence or absence of data fields. Variable length information for auther, title, etc. is recorded in as many fixed length records as needed. The batch processing on the mainframe scans these fixed length records, assigns MARC tags and creates variable length data fields and records.

The CL System, Inc. acquisition system, formerly known as the the CLSI Book Acquisition System, is a shared stand-alone minicomputer

based system. The software is modular in design so that a user may implement only those capabilities desired. The file design between all CL Systems is a consistent fixed field data structure. If a library purchases the acquisitions and the circulation systems, files may be shared which optimises the file storage.
The Kalamazoo Public Library, Michigan, has a CLSI Libs 100 system for use in book acquisition including a module for the production of catalogue cards. A detailed description of the characteristics of the LIBs 100 system is documented by Beaumont.(23)

BALLOTS (Bibliographic Automation of Large Operations Using a Time-Sharing System)(24) was implemented in 1972 at Stanford University Library. The system supports all phases of book processing, distribution of material within the library for technical processing, the monitoring and control of these books while they are in technical areas and the cataloguing of the books using MARC records. The system utilises the University's IBM 360/67 computer, and a minicomputer a PDP 11/45 with a programmable CRT display terminal controlling the 125 terminals that can be simultaneously connected to the mainframe, thus providing polling, buffering, translation, device transparency, terminal program loading and some diagnostic capabilities.
Reasons for not developing the total system on the minicomputer are given by Davison,(25) which include the availability of software and programmers expertise with the University's computer at the time, and if the system had been implemented on a computer within the library, then users of the general information retieval system, SPIRES, (Stanford Public Information System) would have been unable to access the library's files.

2.4 Examples of operating projects in cataloguing

2.4.1 The Bhabha Atomic Research Centre (BARC)

Kamath and Malwad (1971)[26] documented on computers in various organisations and intitutes in India , and their use in information handling and documentation. Special reference is made to the Bhabha Atomic Research Centre (BARC), whose important role in the research and development programmes of the Indian Atomic Energy Commission, and India's participation in the International Nuclear Information System (INIS) sponsored by the International Atomic Energy Agency (IAEA) necessitated the development of a computerised program for some of the documentation activities and library processes.

Facilities provided at the time in the Library and Technical Information Section were the in-house Honeywell 400 and CDC-3600 at the TIFR (Tata Institute of Fundamental Research). Computer programs were developed for preparing a general data base on magnetic tape for the holdings of the Library, which comprises technical reports, journal articles, books, standards, specifications, proceedings of symposia conferences, etc. Other features of the system include KWOC indexes, author and report number indexes, preparation of overdue reminders sent to borowers and preparation of monthly lists of additions to the Library.

2.4.2 Bath University Comparative Catalogue Study (BUCCS)

One of the recent evaluative studies on cataloguing was conducted by the BUCCS project.[27-28]

The main aims of the project were to:

(a) Investigate the performance of four physical forms of catalogue (line printer, card, COM film and COM fiche).

(b) Investigate the performance of four orders of catalogue (name, title, classified and KWOC).

(c) Ascertain the effectiveness of short entry catalogues.

In a paper presented by Needham in the BUCCS Seminar,[29] it was indicated that fiche and rollfilm proved the most popular forms of output, the card catalogue was the most unpopular. The KWOC catalogue approach was very successful and was prefered to the UDC Classified catalogue for most subject searches.[30]

2.4.3 Aldermaston Mechanical Cataloguing and Ordering System (AMCOS)

AMCOS[31] provides a computerised integrated system for stock control processes, and for ordering and cataloguing books. The initial information is provided either by MARC tapes or by locally generated records. Most of the scheme was developed while AWRE (Atomic Weapons Research Establishment) was part of the UKAEA (United Kingdom Atomic Energy Authority). The form of the main catalogue is in KWOC format. The main catalogue indexes include author/series index, UDC index, and KWOC index. Listings are printed or recorded on tape and subsequently processed onto COM or microfiche.[32] Inputting is done on-line. Other outputs of the AMCOS file are the catalogue supplement sorted in KWOC format and the library bulletin, which contains newly catalogued books.

References

1. BIERMAN, J., Automated alternatives to card catalogs: the current state of planning and implementation. Journal of Library Automation, 8, (4), 1975, 277-293.

2. ALA - RTSD Book Catalogs Committee, Book form catalogs, a listing compiled from questionnaires submitted to the Book Catalogs Directory Subcommittee, ALA, 1968. Library Resources and Technical Services, 14, 1970, 341-354.

3. WALFORD, H. J., Book catalogs: a survey of the literature on costs. (Santa Monica, Caifornia, Rand Corp.), 1971,27p, ED 053 775.

4. LEWIS, N. H., A literature survey on on-line access versus card access to library catalogs, (Internal report, National Agricultural Library Bulletin, Beltsville), January, 1975, 27p.

5. University of California, Los Angeles, Working Group on Public Catalogs Sub group B, Literature survey, (University of California, Los Angeles Library), April 1975, 35p.

6. TEDD, L.A., Acquisitions and cataloguing systems. In An Introduction to computer-based library systems, 1977, 65-86

7. ROYAN, B., Minicomputers in cataloguing. In Minicomputers in cataloguing and circulation, papers presented at a one-day conference on 24 October 1975, ASLIB, London.

8. WOODS, R.G., Library automation project: final report, Southampton University Library, 1975.

9. BERRIMAN, C.G., & J. Pilliner, Cheshire and County library acquisitions and cataloguing system, Program, 7, (1), 1973, 38-59.

10. GREENBERG, E., Automated cataloguing; the state of the art. Bulletin of the Medical Library Association, 64, (1), January 1975, 5-11.

11. KILGOUR, F.G., Concept of on-line computerized library catalog. Journal of Library Automation, 3, (1), March 1970, 1-11.

12. KNIESER, D.L., & B.J. MEYER, On-line computer techniques in shared cataloguing. Library Resources and Technical Services, 17, Spring 1973, 225-230.

13. MADDEN, M.A., Minicomputer applications in acquisitions and cataloguing. In Information Politics, Proceedings of the ASIS 39th annual meeting, Vol: 13, 1976, 783-790.

14. TUCKER, C.J., A comparison of the production costs of different physical forms of catalogue output. Program, 8, (2), 1974, 59-74.

15. HALL, A.R., BLCMP. Catalogue and Index, 40, 1976,7-9.

16. GREENBERG, E., op cit.

17. GREENBERG, E., Innovative designs for acquisitions and cataloguing departments, as a result of library automation. 1975, ERIC ED 096993, 33p.

18. ROYAN, B., op cit.

19. SAUNDERS, R.J.A., An on-line computer assisted information retrieval system using a minicomputer (CAIRS). Program, 11, (1), January 1977, 16-30.

20. ASHFORD, J.H., R. Bourne & J. Plaister, Co-operation in library automation, LASER, London, 1975.

21. ROYAN, B., op cit.

22. MADDEN, M.A., op cit.

23. BEAUMONT, D.N., The LIBS 100 System. In Applications of minicomputers to library and related problems; papers presented at the 1974 Clinic on Library Applications of Data Processing, 55-80.

24. DAVISON, W., Minicomputers and library automation: The Stanford experience. In Applications of minicomputers to library and related problems; papers presented at the 1974 Clinic on Library Applications of Data Processing, 80-96.

25. Ibid, 93-94.

26. KAMATH, V.A., & M. Malwad, Computerized information storage and retrieval systems in India with special reference to the activities of the Bhabha Atomic Research Centre. In International Conference on Information Science Proceedings, Tel-Aviv 1971, editor L. Vilentchuk, 1972.

27. LAMBLE, J.H., P. Bryant, S. Morris & A. Needham, Bath University Comparative Catalogue Study: Final report (9 parts), Bath University Library, 1975.

28. CAUGHLIN, C., BUCCS Seminar report, Catalogue and Index, (36), Spring 1975, 7,10,11.

29. NEEDHAM, A., Performance of four physical forms of catalogue, BUCCS Final report, paper no.3, Bath University Library, May 1975.

30. NEEDHAM,A., Performance of four orders of catalogue, Classified or KWOC catalogues, BUCCS Final report, papers nos. 5 & 6, Bath University Library, June 1975.

31. CORBETT, L., & J. A. German, AMCOS project stage 2; a computer aided integrated system using BNB, MARC literature tapes. Program, 6, (1), 1972, 1-35.

32. MACSWINEY, J.F., Facilities provided by the Aldermaston Mechanized Cataloguing and Ordering System (AMCOS), used in the AWRE Library. Aldermaston, AWRE London, HMSO, 1974, AWRE 44/47/32.

CHAPTER 3

REPORTS CONTROL

3.1 Definition of Reports

The importance of report literature lies in the fact that a substantial proportion of research information appears in the form of scientific and technical reports, abundantly stocked particularly in special libraries. Several reasons may be attributed for the appearance of information in a roport form; for example, to enable rapid dissemination, to protect information, or because the information is in some way unsuitable for inclusion in the serials or books literature.

Reports vary in form and characteristics, but initially they are submitted to a person or body for whom the work described was done and some never get any further. Restrictions are imposed on the distribution of reports, (sometimes for a limited period, sometimes forever), then they are known as unpublished reports, and in cases of research and development become the sole property of the originating organisation.

The British Standard definition of a research and development report is: 'A document which formally states the results of, or progress made with a research and/or development investigation, which where appropriate, draws conclusions and makes recommendations, and which is initially submitted to the person or body for whom the work was done. A report

is usually issued as one of a series and commonly carries a report number which identifies both the report and the producing disseminating or sponsoring organisation.' Another definition of technical reports by Weisman[1] is: 'an organised factual, and objective information on a technical or scientific subject brought by a person who has experienced or accumulated or researched, to a person or persons who need, want, or are entitled to it.'

Reports can be divided into two major sections, external and internal reports. In a National Information Centre, internal reports would include mainly, contract reports, progress reports, final reports, committee reports, annual reports, and several others. A detailed analysis of different kinds of reports is documented by Deutsch.[2]

In a company based information unit reports are also classified as internal and external reports. Internal reports would include progress reports, projects notes, "originating from almost any department within the company, production, research and development, marketing, sales advertising, finance and planning. They can contain information on current work, analysis of future trends and outlines of future plans."[3]

Two important forms of unpublished reports which need proper indexing for adequate retrieval are: minutes of committee meetings and laboratory notebooks, issued by the scientists and technicians in industrial and governmental laboratories, particularly important in

cases when the notebook is the only documented source of that piece of work.

The importance of the different kinds of external reports is based on the organisation's activities, therefore the origin of external reports cannot be categorised in any order of importance. Sources of relevant reports and means of obtaining them should be investigated by the library. Some of the main types of reports of interest to company based and research libraries, are reports of other companies and institutes, consultancy reports, government reports, conference papers, and (in some cases) university reports and theses.

3.2 Reports and automation

Many special libraries with considerably large reports collections have automated them as part of an overall plan to automate other houskeeping routines or as a first step towards automating others in the future.

A well documented article by Hall[4] discusses characteristics of reports literature and problems associated with their cataloguing, indexing and retrieval.

A review of 62 U.K. establishments by Burkett (1972)[5] reveals a variety of systems in use:

	Internal Reports	External Reports
CLASSIFICATION SYSTEMS	22.5% (incl. 14.5% UDC)	36% (incl. 26% UDC) 3% FACET 7% other systems
ALPHABETICAL SUBJECT	21%	20%
FEATURE CARDS	29%	29.5%
COMPUTER APPLICATIONS	27.5%	14.5%

Other schemes for punched-card, indexing and mechanical and computer-aided retrieval of reports literature have been described.(6-9)

Various approaches for the retrieval of reports literature include: scanning regularly produced listings, by demand search of computer tapes (batch search), and on-line retrieval. The approach libraries take, depend greatly on circumstances and resources available. Where confidentiality of reports is an essential element in the system, on-line retrieval perhaps offers the best service.

One of the earliest studies concerned with on-line retrieval of reports is documented by Drew (1969).(10) The article describes the experiments of the Lockhead Missiles and Space Company (LMSC) with an on-line reference retrieval system using a co-ordinate search . . . . strategy and the conversational approach by users through the insertion of cards in the readers. The system utilises LMSC on-line Automatic Data Acquisition (ADA).

3.3 Examples of operating systems

A minicomputer based information system in the Canadian Defense Scientific Information Service (DSIS), is described by McIvor.[11] It is based on two minicomputers, one is used for data input, the other for mainaining the master files and producing catalogue cards, COM cartiridges, KWOC Indexes, Indexed Document Digests and SDI notices. The aim of automation was to facilitate handling the increasing flow of information and the production of SDI notices with the same amount of staff. The manual system used before, consisted of cataloguing abstracting and giving subject headings by a team of information scientists. The information was then recorded on catalogue cards, and in part on loan control cards. The catalogue cards were used to announce the arrival of documents and as SDI notices. They were sorted by subject categories and passed up and photographed to form Document Digests. A problem that faced the staff at the DSIS in implementing the new system, SOCRATES, (a system for organising current reports to aid technologists and scientists) was assiging field numbers to each element of bibliographic data to assist lacation of data in the master file, and to produce a machine readable record of descriptive and analytic cataloguing data. Equipment difficulties with the paper-tape conversion led to the acquisition of the first minicomputer in 1969. The acquisition of the second minicomputer a Varian 620 was economically justifiable when compared to the costs associated with a dedicated IBM/360. Pragrams generated include a sort-merge utility program. Merged corrected data input tapes are sorted and listed as before. The updating program is broken into two phases, EDIT and UPDATE.

The Aircraft Research Association Ltd. Library holds a substantial collection of reports. Barnett[12] describes the computer based system which utilises the Association's ICL 4130 computer via punched paper-tape input.

Before automation was introduced, subject indexing was based on a semi-faceted classification schedule developed by ARA. The new system consists of a key-word classification scheme based on KWOC listing serving as the main catalogue with author and report number indexes. Extra key-words are added manually as well as 'information fields' which give a broad description as to the content of the report. Keyword listings with indexes under authors' and originators' references are used to produce a monthly accession list and monthly and annual cumulating catalogues.

The new system was economic to implement. No extra staff were needed. Nevertheless, because of computer configuration the system is not hospitable to retrospective searches or SDI.

Optical Character Recognition (OCR), a data recording scheme which greatly reduces keypunching errors and processing time, is used in the SHARP system (Ships Analysis and Retrieval Project),[13] at the U.S. Department of the Navy Ship Systems and Scientific Documentation Division. Bibliographical data for the report input is typed on standard OCR forms in the library and scanned by an OCR reader in the computer centre, resulting in a magnetic tape which is then processed by the computer.

Since 1964 when the system initially began to operate the library

faced problems of reprogramming and production as a result of utilising the UNIVAC LARC at the Centre which had certain advantages (greater storage, greater spped, and 2 central processing units) on the IBM 7090 initially used. Nevertheless, in 1968 the SHARP project was reconverted to the IBM7090, thus allowing for system refinements such as merging the bibliographical and subject files, improving the format of catalogue cards and the accessions bulletin. In 1971, the Central Data Corporation (CDC) 6700, was installed and the SHARP project was converted.

An SDI service then came into operation, resulting in a user profile file. In 1973 interactive retrieval capability was implemented as part of the system. Thus, the system consists of the following component subsystems:

- Thesaurus, which maintains the terms and their relationships.
- Subject term control for verification and control of terms to enter the data base.
- Information Retrieval which includes the abstracts and the interactive capability.
- Reporting, which provides library catalogue cards accessions bulletins and new SDI bulletins.

Another approach to inputing data into a computerised system is the direct entry approach from an on-line terminal using a visual display unit. This method has the advantage of immediate error detection on the screen by means of error detection programs, which verify the data and type of error. The Institut Textile de France

has developed the Titus System (Traitment de l'Information Textile Universelle et Selective), utilising this approach. A description of the system is documented by Bousselet.[14]

Patten[15] describes an integrated approach to the automation of library functions in the Department of Technical Information System (TIS), responsible for the flow of techno-commercial information in the Strip Mills Division of the British Steel Corporation (BSC). The system operational since 1969 utilises on-line disk storage and input via VDU's. Data bases include the Library Catalogue, Commercial Information, Technical Information, Magnetic Materials Data Bank and Research Reports. A noticable feature of the KWOC approach used for the production of research reports bulletins and indexes is linking two terms with a question mark in cases when only a main entry under the first and a subheading under the second are required. Another symbol used is the ampersand to invert two combined terms so they each appear in their own right in the index with the other term as a subheading.

The Mintech Reports Centre, at the Ministry of Technology St. Mary Cray, has a rapidly growing sellection of British and Overseas unpublished reports.[16] Users of the report centre consist of Government Departments in the U.K., Ministry of Defense Mintech, Industry in U.K., Universities, Commonwealth and Nato Governments, and U.S. Government. Its publications include a bi-monthly bulletin, R & D Abstracts and a service of leaflets on technical innovations,

backed by an enquiry service. Until 1969 the Centre's operations employed a conventional manual system of maintaining five separate card catalogues (title, personal author, originator, contract number, and UDC subject). As collections expanded a machanisation program became inevitable. The process of recording a report consists of using a standard process sheet, abstracting the report, and allocating test descriptors. The bibliographic data is then typed on a carbon-backed flimsy/card combination using Vonomatic tape-typewriters controlled by a tape program. Teething troubles were experienced with the tape-typewriters as well as intermittent failures of the punch units caused by high room ambient temperatures. To overcome this, voltage stabilizers were fitted and better room temperature control effected.

The card is used as the master record card for the report subsequent distribution and loan transactions entered on it. The flimsy is used for assembling into COSATI field and group order for an issue of the twice monthly announced bulletin R & D Abstracts.

When preparing an issue of R & D Abstracts each report paper tape is electronically 'read' through one of the tape-typewriters, automatically typing an offset litho master and simultaneously punching a continuous tape for the computer. At this stage the typist inserts any necessary corrections. The computer tapes are processed by the Central Computer Agency's computer at Norwich to produce indexes for the corresponding issue of R & D Abstracts.

An experimental SDI service is also provided using the ICL Find 2 programme package.

The Library Management and Retrieval System (LMARS)[17] is an automated retrieval system developed by the Naval Undersea Centre's Technical Library and by the Computer Scienses' Corporation personnel to provide bibliographic control of the library's technical reports collection (30,000). The catalogue produced consists of six indexes by corporate author, personal author, title, report number, subject and accession number. LMARS processing is done in batch mode on the NUC's UNIVAC 1110 computer.

The library is planning to add an on-line retrieval capability, consisting of subject retrieval, and on-line inputting. The conversion of printed catalogues from paper copy to Computer Output Microfiche is also under consideration.

References

1. WEISMAN, H.M., Basic technical writing. 3rd ed. 1974, Chapter 1.

2. DEUTSCH, A., Information work with unpublished reports. 1976, Part I, Chapter 1, 24-38.

3. Ibid, p242.

4. HALL, J.L., Technical report literature. In Handbook of special librarianship and information work, 4th ed., editor W.E. Batten, 1975, 102-123.

5. BURKETT, J., Industrial and related library and information services in the United Kingdom, 3rd ed., LA, 1972, 204-205.

6. ASHTHORPE, H.D., The punched-card indexing experiment at the library of the Atomic Energy Research Establishment. Aslib Proceedings, 4, (2), May 1952, 101-104.

7. WRIGHT, R.C. & C.W. Wilson, Classification with a peek-a-boo for indexing documents on aerodynamics; an experiment in retrieval. In International Conference on Scientific Information, Washington, 1958. Washington National Academy of Sciences, National Research Council, 1959, 771-801.

8. JOHNSON, A., Experience in the use of unit-concept co-ordinate indexing applied to technical reports. Journal of Documentation, 15, (3), September 1959, 145-155.

9. SHAW, T.N., A punched card index to technical reports. Aslib Annual Conference, Exeter 1964, London, Aslib 1964, 2-1 - 2-4a.

10. DREW, D.L., et al., An on-line technical library reference retrieval system. American Documentation, 17, (1), January 1966, 3-7.

11. McIvor, R.A., A minicomputer based information system. In AGARD, CP - 136, Advisory Group For Aerospace Research and Development, October 1973, 2-1 - 2-7.

12. BARNETT, C., Computer produced keyword indexing system for technical reports in the Library of the Aircraft Research Association Ltd. In AGARD, CP - 136, Advisory Group for Aerospace Research and Development, October 1973, 1-1 - 1-7.

13. SMITH, R.C., SHARP, experiences in library automation. Special Libraries, 65, (2), February 1974, 61-65.

14. BOUSSELET, P., Le systeme 'Titus'. Nachrichten-Nouvelle Notizie, 4a (4), 1974, 157-163.

15. PATTEN, M.N., Experiences with an in-house mechanized information system. Aslib Proceedings, 26, (1), 189-199.

16. SCHULLER, S.C., Mintech reports centre services and mechanization programme. The Information Scientist, 4, (2), June 1970, 47-62.

17. YOUEL, K. & T. Clowes, The Library Management and Retrieval System (LMARS), National Technical Information Service, NUC TP 499, February 1976,

CHAPTER 4

SERIALS CONTROL

4.1 Serials and automation

The concept of applying data processing techniques to serials began to attract attention as early as 1949 when punched-card records were used in serials acquisition at the University of Texas Library. Since then, advances in computer technology (such as on-line techniques and minicomputers) contributed to improved performance in processing serials. The development of computer-based serials systems has also been influenced by the needs of certain types of libraries, particularly special libraries with their restricted clientele often governed by needs set down by some parent organisation. The relatively small size of serials collections in a special library seems to be a factor which has contributed to the relatively large number of successful operating systems. Nevertheless, as the growing problems faced in daily routine operation of manual systems were conceived, academic and public libraries gradually turned to automated systems as a solution to their problems. Different factors such as demands of library users, availability of funds, the extent of access to computer or data processing equipment, or the availability of technical knowledge, have all effected the types of systems adopted whether they consist of listing systems, control systems or combination systems.

4.1.1 Problems in automating serials

Looking back at the history of computer applications to serials, we note four problems which have been delicately dealt with by the use of advanced instrumentation, development of on-line facilities, and the minicomputer:

(a) The attempt to correlate the computer with an uncotrolable group of materials like serials.

(b) The identification of a particular serial, and correlating to it certain bibliographic information in a form as to identify it uniquely.

(c) Currency of reports on serials, and the question of the lapse of time between the arrival of the serial to the library and the time it is available to the reader.

(d) Technology application requiring certain studies of cost benefit ratios and training personnel.

In the history of computer-based serials we note that libraries at the start, tackled one component of the total serials system, such as accounting functions or holding information, maintained in parallel with traditional operations like Kardex.

As early as the 1960's several batch systems were developed. By 1963 systems which performed bibliographic control, acquisition, or inventory control evolved. A pioneer project was that reported by Vdovin[1] at the University of California San Diego. Other projects where developed at the Washington University School of Medicine,[2] and at Purdue University.[3] The latest comprehensive study of computer-based serials control systems over the years has been documented by

Bosseau (1971).[4] Major changes have occured since the publication of Bosseau's review which include, stardisation of bibliographic information, growth of networks of users, and development of on-line facilities with or without minicomputers.

Standardisation of bibliographic data is a major issue for libraries contemplating to automate their serials collection, as this might effect its future plans for international exchange and co-operation.

Authorities for standardisation today are:

- Statement of Principles adopted at the International Conference on Cataloguing in Paris (1961) 'Paris Principles'.
- ALA (American Library Association) which follow generally the Paris Principles.
- AACR (Anglo American Cataloguing Rules).
- ISBD(s) for serials.

Brodman[5] states that compromises of MARC/NSDP/OCLC/CONSER is an indication that a step has been taken towards solving the problem of identification.

Pulsifer[6] analyses three identification code systems for serials which are:

- The International Code for the Abbreviation of Titles of Periodicals, maintained by the International Serials Data System (ISDS).
- CODEN[7] which consists of a five character code (with an optional sixth character for machine checking), maintained since 1975 by Chemical Abstracts Service.
- The International Standard Serial Number (ISSN), a seven digit code (with a required eighth digit for machine checking).

4.2 Examples of operating systems

4.2.1 The University of Minnesota Bio-Medical Library

The University of Minnesota Biomedical Library represents one of the pioneer projects in using a minicomputer based decentralised on-line system.(8) The system was developed under a grant from the National Library of Medicine (NLM). The system uses a Digital Equipment Corporation (DEC) PDP-11/40 minicomputer with an integrated software system of library operations. Automation before, was conducted in batch mode using a mainframe, which was useful in providing background of experience for library staff.

Reasons for using mincomputers were related to organisational factors, communications, problem areas within the manual system, as well as the increasing costs of centralisation, user waiting periods for new materials and duplicative, inacurate or out of date records.

The software developed is a data base management system (DBMS), which aims at minimising development time, development effort, and core requirements, and to maximise system flexibility, modularity, routine parameters, dictionary descriptions of data items, assembly time parameters, and control by user command.(9)

Grosch describes the integrated system approach which has the advantages of library control of all points in the chain of events from request of an item to its provision to the user.(10)

4.2.2 The University of California Berkeley Library

Martin(11) describes the serials system at the University of

California Berkeley Library and stresses the use of a variety of media for input and output to solve the problems connected with up-to-date display of bibliographic data as well as providing more economical means. The system accomodates for computer print-out, photocompositions, microform, and minicomputers which are used to provide library staff and users access to the multiple products of the system. Outputs consist of a key word index to titles in the data base, printed lists to payments, special lists by call number, branch library, language, and microfiche indexes used by the Payment Division.

The minicomputer, a Datapoint 2200, obtained in 1974, is used as an input device for invioce information and additions to the file. Cassettes are copied into the Datapoint's large tape drive which then interfaces with the host IBM 360/65 computer.

4.2.3 Imperial Chemical Industries

Perdex is a computerised serial record system developed originally by Organics Division of ICI.[12] It is used at the Head Office, Organics Division, Mond Division, Petrochemicals Division and Pharmaceuticals Division. The system relies on an IBM oriented set of programs and is hospitable both to Ultronic paper-tape and punched cards. Various types of listings for serials control can be produced including a Union List within ICI Divisions. The listings produced are: holding list, subject list, renewal authorisation notices, order schedules, sponsoring body list, binding check list, display list, circulated list, disposal instructions, Coden list, circulation slips,

and circulation renewal notices.

Updating of files is achieved by amendment routines so that current listings can be printed out at regular intervals or when it is necessary. The majority of input is done on cards with about 10% on Ultronic paper-tape. Data entered is not divided into blocks but is entered sequentially each title having all the relevant bibliographic information attached to it.(13)

Alterations were made at the primary stages of implementation and print-out-runs, such as a change in the sort on the first 40 letters of the title was insufficient and was changed to the first 30 letters plus coden. Also the Master File and Coden list were both in alphabetical Coden order, so the Coden list was changed to alphabetical title order.

4.3 KWOC indexing for serials

Elvin(14) describes the system at the Building Research Establishment Library for the production of various listings. The library uses KWOC programs from the COIN suit (the Cobol indexing package produced by the National Computing Centre). The computer also produces serial check-in-record sheets by line-printer. The media of input for the KWOC listings is a card pack made up from the program sheets, this becomes the Library's serial record.

Crawford(15) discusses problems of key-word indexing related to machine sorting and word recognition at the University of California, Berkeley.

4.4 Examples of batch processing systems in serials control

Combrink[16] describes the computer-based serials program at the CSIR (Council for Scientific and Industrial Research, South Africa). The system, introduced in 1964, was based on the system used by the Library of the University of California, San Diego. Some modifications connected with reprogramming were made to suite the particular needs of the library. Data is inputted by 80 column punched cards. Files consist of the Master File and Full Titles File. The system, a prediction system, based on the "expected arrivals cards", proved inefficient considering the circumstances at the CSIR Library, as most of the serials subscribed to are published overseas. Thus, postal delays contributed to the failure of the prediction system. Another problem with the prediction system, was the varying patterns of publication which required key punching and visual checking, involving manual and clerical effort. The system proved expensive and inefficient compared with the Kardex system which was operated in parallel with the automated system. Thus, in 1972 only data necessary for the production of different listings was retained.

Another library which uses punched cards for its computer-based serials system is the AERE Library. Bishop[17] describes the system in use up to mid-1971. The system was later revised and extended to produce additional and more flexible output. Reasons for changing included restrictions by previous programs, the frequency with which it had become necessary to renumber entries in order to maintain the alphabetical sequence, the need to convert subscription prices

to decimal numbers in 1971,[18] and the existing uneconomic format of records. The new programs are in PL/1 and each entry is composed of up to three parts, title, subscription rate, number of copies and other data, and locations. The revised format caters for additional data such as the correspondence file number, the 12 columns available for comment and the actual years covered by a multiple year subscription period.

4.5 Examples of on-line processing systems in serials control

The term on-line is generally used to describe a spectrum of processing modes in which the user communicates with the system via a typewriter-like terminal, and the system may actively solicit and respond to user input. The degree of interactivity of on-line system is characterised by the degree of acknowledgment, prompting responsiveness and recovery from unexpected user input.

One of the pioneer on-line serials control systems (formerly a card batch system), is that developed at the UCLA Biomedical Library and operating since 1971. Fayollet describes in three successive articles the progress of the system. The first article[19] discusses the objectives of the system, storage and maintenance concepts, including operations dealing with check-in, bindery and claims. The second article is concerned with the analysis of inverted files as a retrieval technique tool, as well as a detailed description of title structure and search scheme. Major determinants of the scheme are evaluated on performance and cost basis and a user oriented approach

to data retrieval is advocated.[20] The third article[21] compares the advantages of the former batch processing system against manual procedures. Areas which were mostly effected by the new on-line system were the interlibrary loan, reference services, claiming and bindery operations. Evaluation is based on terms of performance, user satisfaction and costs. The operation of on-line system is shown to be superior in these aspects. The interactive system provides for increased productivity and thus saving of staff working time.

Allen and Beirne[22] describe an on-line system for checking in serials called 'Journal Log In'. It is used in conjunction with an IBM system called IQRP (Interactive Query Report Processing). Advantages of the system include the use of shortened commands thus facilitating on-line coding of data, as well as using Coden. Another benefit is the production of missing issues lists in advance of bindery dates, to enable claims lists to be produced and dispatched to subscription agencies or publishers. On-line searching for missing issues is also possible. Outputs generated consist of a daily status report of all current serials, annual bindery lists, order lists for the subscription agency, and a Coden list with matching titles. Extra storage discs are provided by erasing complete files of serials after being logged in for the past one year, leaving in history one final 12 month's list.

Vareness[23-24] describes the computerised system at Laval University Library. Main features of the system include provision for record display on CRT terminals for questioning or modifying the records, and the

updating of the serials file every two or three days. Various outputs from data in variable fields on disks are produced for library staff and users.

4.6 Circulation and routing of serials

There are two aspects of circulation control which relate to serials; first 'routing' or sending an issue of a serial to a prescribed set of people in turn. This service requires the creation of a routing list, attachment of the routing slips to the individual users of a serial and a record system which monitors the progress of the issues. This service is mostly catered for in special libraries. The second aspect is charging and discharging serials from the library collection, in this case serials are treated as monographs.

4.6.1 Examples of routing systems

Routing systems can be installed independently of any other serials control system, an example is provided in the Library of Pressed Steel Fisher Ltd. in Oxford[25] where 364 serials are circulated to 239 individuals. The old method depended on the use of Addressograph-Multigraph frames with BBV embossed plates, used to print circulation labels and the record cards for a Roneodex 8 x 5 ins. visible record. The new system was implemented using a punched card file as the master file, each record representing one person on one serial list. The file is processed by the computer to produce circulation labels, the circulation list for each circulated copy and a list of serials seen by each person.

Blaire describes the computerised serials routing system at the Management Sciences Library at Arthur D. Little Inc. (ADL).[26] The library subscribes to 200 serials serving 100 professionals in the division. The system uses key punch facilities with an IBM 360/40. A computer program generates a data base of staff routing choices, prints out routing slips for each serial and priority codes for users. Outputs include bi-weekly print-outs of new or needed lists, print-outs of serials in the system, of each employee and his route choices, and various statistical listings.

Yerkey[27] describes a computer-assisted serials control system developed at Goodyear Aerospace Corporation. The system was designed to cope with renewal audit, routing and records keeping. Serial check-in is not part of the system, thus clerical work is alleviated but not eliminated. The program consists of a fixed field tape record of each serial, each record is built of up to four card images, each card image containing a certain class of data, consequently, they are tied with a unique alphanumeric code (assigned manually) which also serves to sort titles. The serial code has the advantage of enabling the librarian to move serials from their normal filing places, and to identify records on tape. A special feature of the system is the Renewal Audit by expiration date, and a list of serials routed to members of different divisions which is sent to each division manager informing him of people using the serial before a decision is made to cancel the subscription.

The system at the Rand Corporation Library described by Surace,[28]

facilitates the processing, routing and control of the library's 2,000 active serial titles. PEARL (Periodicals Automation Rand Library) system, written in PL 1, and operating on an IBM 360/65 computer, consists of two major programs (an Update and a Print Generator), as well as two sort programs run monthly to produce the outputs required. The system caters for cross references and notes for changes in titles.

The Norway Industry for Building Research Library[29] subscribes to 350 serials which are circulated to 160 staff members. Six separate print outs are produced supplying circulation lists, alphabetical lists of serials and information on the number and titles of serials circulated to individual staff.

4.7 Data Management Systems

A DMS (Data Management System) may be defined as a 'generalised computer software package adaptable to a broad range of applications involving alphanumeric files.' Most typically a DMS is run in conjunction with a large centralised computer facility utilising small special purpose files. Collins[30] discusses the advantages of using this computer software package system especially in the small or medium sized library for housekeeping operations. The main characteristics of DMS are; a permanent data base, pseudo English control language and a hierarchical file structure. Disadvantages include some processing inefficiency due primarily to the nature of the file structure of fixed field lengths and incompatibility for networking.

Collins and West[31] describe the handling and routing of serials at the Cherron Research Company Library via a computerised file, JRØUT, based on a DMS software. The hierarchical file structure and file maintenance are documented, as well as the advantages provided for the service oriented library such as the possibility of setting up their own automated files with a minimum of outside professional assistance. Other benefits are the ease of report generation, formulating, editing and requesting both catalogued and JRØUT reports.

References

1. VDOVIN, G., M.J. Voigt, D. Newman & C. Perry, Computer processing of serial records. Library Research Technology Service, 7, Winter 1973, 71-80.

2. PIZER, I.M., D.R. Franz & E. Brodman, Mechanization of library procedures in the medium sized medical library. Bulletin of the Medical Library Association, 51, July 1963, 313-338.

3. HAMMER, D.P., Automated serials control in the Purdue University Libraries. In IBM Library Mechanization Symposium, IBM, Endicott, N.Y., 1964, 138-140.

4. BOSSEAU, DON, L., The computer in serials processing and control. In Advances in librarianship, 2, editor J. Voigt, 1971, 103-164.

5. BRODMAN, E., & F. Johnson, Medical serials control by computer: a state of the art review. Bulletin of the Medical Library Association, 64, (1), January 1976, 12-19.

6. PULSIFER, J.S., The special problems of serials. Library Trends, January 1977, 341-354.

7. BATIK, A.L., The Coden system. Journal of Chemical Documentation, 13, August 1973,111-113.

8. GROSCH, A., Minicomputer systems for library management applications, a new approach to bibliographical processing. In Computers in the information data centres, editors J.A. Clifton & D. Helegson, AFIPS, 1973.

9. LOUREY, E.D., Systems design for a minicomputer-based library dara management system. In Applications of minicomputers to library and related problems; paers presented at the 1974 Clinic on Library Applications of Data Processing, editor F.W. Lancaster, 181-191.

10. GROSCH, A., op cit p.29.

11. MARTIN, S.K., Mixed media for a serial, hardcopy, microform, and CRT's. In 4th ASIS mid-year meeting, Microform and Data Processing in the Library and Information Centre, Costs, Benefits, History, Trends, ASIS, 1975, 111-118.

12. TEAGLE, J.A., Perdex computerised periodicals record system. Paper 2.2, ICI, Dystuffs Division, 1974, 10p.

13. OUTTERSIDE, S.M., Perdex. Paper B/2, ICI, Pharmaceuticals Division, 6p.

14. ELVIN, P.J., Adapting the KWOC indexing technique to produce journal listings. Program, 8, (4), October 1974, 196-201.

15. CRAWFORD, W.C., Building a serials keyword index. Journal of Library Automation, 9, (1), March 1976, 34-37.

16. COMBRINK, M.I., Mechanization of periodicals handling in CSIR Library. South African Libraries, 41, (5), April 1974, 263-266.

17. BISHOP, S.M., Periodical records on punched cards at AERE Library, Harwell. Program, 3, (1), 1969, 11-18.

18. GLEENHALGH, K.R., & S.N. BISHOP, Revision of the periodicals records system at AERE Library, Harwell. Program, 6, (3), July 1972, 248-257.

19. FAYOLLET, J., On-line serials control system in a large biomedical library: Part I, description of the system. Journal of the American Society for Information Science, 23, (5), September/October 1972, 318-322.

20. FAYOLLET, J., On-line serials control system in a large biomedical library: Part II, Evaluation of retrieval features. Journal of the American Society for Information Science, 23, (6), November/December 1972, 353-358.

21. FAYOLLET, J., On-line serials system in a large biomedical library: Part III, Comparison of on-line and batch operations and cost analysis. Journal of the American Society for Information Science, 24, (2), March/April 1973, 80-86.

22. ALLEN, A.H., & E.F. Beirne, On-line logging of periodicals by CODEN using interactive query report processor. Journal of the American Society for Information Science, 27, (4), July/August 1976, 230-234.

23. VARENESS, De, R., Computerized serials system at Laval University Library: from off-line to on-line. In Automation in Libraries: Papers presented at the C.A.C.U.L. Workshop on library automation in a pre-conference workshop of C.L.A. at Hamilton, June 20-21, 1970, 129-147.

24. VARENESS, De, R., On-line serials system at Laval University Library. Journal of Library Automation, 3, (2), 1970, 128-140.

25. CAMBELL, D.J., & M. Morton, Computerizing the recording and control of periodical circulation in an industrial information service. Program, 5, (1), 1971, 19-25.

26. BLAIRE, J., Routing slips from the computer. Special Libraries, 63, (2), February 1972, 82-84.

27. YERKEY, A.N., Computer assisted periodical routing and renewal audit. Special Libraries, 64, (3), 1973, 126-129.

28. SURACE, C.J., PEARL an automated periodicals control system. Special Libraries, 63, (9), September, 1972, 385-393.

29. KNOOP, A.T., Sirk-et arbeidsbesparende system for tidsskri ftsirkulas (Sirk a labour saving system of periodical circulation). Geir Aarflot, Bok og Biblioteko, 43,(1), 1976, 10-12.

30. COLLINS, K.A., Data management systems, part I, a model approach to automating small library files. Special Libraries, 66, (3), 1975, 121-125.

31. COLLINS, K.A. & N.W. West, Data mangement systems, part II, journal routing, an example of library applications. Special Libraries, 66, (4), 1975, 205-211.

CHAPTER 5

CIRCULATION CONTROL

5.1 Circulation and automation

There exists a wide range of circulation systems, characterised by speed of operation, capital investment, amount of labour needed, and outputs required. Where speed of operation is not critical manual systems can be used, photocharging has been found practical where rapid charging is needed. Computer-based loan systems, on the other hand, require high capital investment, thus providing for special requirements such as efficient and prompt control of reservations, overdues, and useful by-products especially needed in special libraries serving a certain clientelle.

Gull[1] identifies the three basic functions of circulation systems which are:

(a) Recording and controlling the use of all kinds of library materials.

(b) Guiding the continuing growth of the collection by processing and transfering circulation department experience to the other departments of the library so as to guide the way in which the collection is built and operated.

(c) Guiding the continuing growth and improvement of library services.

Some major improvements feasible with a computer may include:

(a) Routing of serial issues to individuals.

(b) Introduction of strict fines, maintaining a record of borrowing

patterns and recall, and establishing a fine threshold.

(c) Collection from users of information on effective use of, and need for library material.

(d) Provision for the growth of library collections by feedback from effective use and need records.

Gull describes the four minimum objectives in designing a circulation system which are; convenience to users and library staff, accessibility of operational records at all times, (accessibility being defined in physical terms as well as in terms of time), completeness and accuracy or records and finally economy of the system in relation to the total library budget.

A series of three tabulated presentations of data for operational loans or circulation systems appear in the literature. The first survey (November,1969) covered four circulation systems operational at the time in the U.K.,[2] the second (October, 1971), was related to six libraries in the Federal Republic of Germany,[3] the third survey (January, 1973) described nine libraries in the U.S.[4] A more recent review of computer-based loans systems is documented by Young,[5] who traces the spread of circulation systems from 1966, when there were only two operational systems, to the present time when there are at least 59. Young outlines the options available now for librarians contemplating to automate their systems, options available (off-line, on-line, or hybrid approaches), source of computing power, software, data collection devices, and fields to be included in records.

5.2 Circulation system equipment

There are three suppliers whose data collection equipment is widely used in circulation systems in the U.K., other equipment is used on a smaller scale.(6)

ALS (Automated Library Systems Ltd.) offer a choice of two forms of book and borrower identifiers and associated stations-card based and label based. Details of services facilities and equipment appear in Vine.(7)

Plessey's bar coded labels (Data Systems, Plessey Telecommunications Ltd.) market three types of automated library circulation systems, which may be categorised as being 'hard-wired', portable, and 'stored-program-control' (SPC). All three use the Plessey light pen as a means of data collection, though other kinds of input devices are also employed. Books and reader badges are identified by means of bar-coded labels. Details of the system appear in Vine.(8)

The hard wired system of Plessey is used at Loughborough University and is described by Senior and Yamanaka.(9)

Telepen (S.B. Electronics Systems Ltd.) is the third supplier, options and special features like the collection of alphabetic and numeric data from all stations are described by Pickles.(10)

A detailed description of the full range of equipment supplied by S.B. Electronics Systems Ltd. as well as the use of Telepen in various Polytechnics (Sheffield, Newcastle, Sunderland), and Aberdeen and Manchester Universities appears in Vine.(11)

Aslin[12] gives a list of minicomputers used, or planned in circulation systems in the U.K. at the beginning of 1976, parameters for the choice of minicomputer systems are outlined.

A survey of circulation data collection equipment used in the U.S. is described by Foil and Carter.[13] Summaries and analysis of responses from both the manufacturers and the libraries are included. Performance of systems were rated in respect to reliability, accuracy, speed, noise level, and ease of staff training. Foil and Carter conclude that the type of library, its size, the amount of service supported by the administration, available computing facilities, service and maintenance offered by manufacturers are all vital factors in the choice of circulation systems.

5.3 Minicomputers in circulation control systems

Minicomputers made their first appearance in libraries in support of the circulation control function.
In some library applications, a minicomputer is used to collect circulation transaction data and hold the data in temporary storage for a period of time before transmitting a batch for processing by a large computer, either as a standard operating procedure or as a means of providing back-up to an on-line system when the computer is down. In more sophisticated applications the minicomputer provides all necessary circulation control processing without assistance from a large-scale computer.

An advantage of a computer-based circulation system, is the immediate interaction available during the course of a circulation

transaction, where the data in the minicomputer could be examined to determine if a reservation has been placed on a returned item, or if a a patron attempting to borrow an item has overborrowed. In cases when the minicomputer system includes a video terminal or printer, the current circulation status of any item can be displayed. Dimitriades[14] points out that such a stand-alone minicomputer supported circulation control system may be more economic than an on-line time shared system connected to a central large computer, due to communication costs and prices charged by the time-sharing and because the mean-time between failure rate for a minicomputer is better than that for a large computer.

5.3.1 Minicomputer turnkey-systems

As costs of circuitry decrease due to miniaturisation of circuit units, minicomputers 'turnkey' systems that come complete with software tailored to meet specific applications are being considered by librarians as a favourable option because of the advantage of being silf contained, and of saving the purchaser (the library) the costs of research, development, programming service and maintenance which are born by the supplier or vendor. Nevertheless, the main disadvantage of the turnkey approach is that usually the supplier has control of the programs by which the behaviour of the system can be modified. Brownrigg and Bruer[15] describe the recent trend in library automation and state some criteria for assessing the need for a turnkey system, which include speed and efficiency, cost effectiveness and obsoleteness of the existing system.

An example of the turnkey system is the LIBS 100 minicomputer based turnkey system offered by Computer Library Services Inc. (CLSI). The system is a complete package of software and peripherals. Most installations of LIBS 100 have been limited to circulation control function but additional software modules are available to support acquisitions, accounting and cataloguing. Various examples of the use of the system are documented by Pearson.[16] A detailed description of the LIBS 100 System appears in an article by Beaumont.[17]

Plessey Corporation markets a turnkey circulation control system which is described by Senior and Yamanaka;[18] it is a data collection device rather than a complete stand-alone package. Circulation transaction data is transmitted from a minicomputer to a larger computer for processing and preparing listings of loans. Loughborough's choice of the Plessey Pen System rather than developing an on-line system operating on the ICL 1904A was due mainly to economic reasons. The system uses an electronic rather than electromechanical techniques for collecting book and borrower identification data, and was thus expected to be more reliable than a punched-card data collection device.

5.3.2 Minicomputers in hybrid control systems

A hybrid system works by combining the main advantages of on-line and off-line. The minicomputer is usually sited in the library building and has various data collection terminals attached to it. It is also connected to the main computer. Advantages of a hybrid system are that on-line facilities are not required continuously, an immediate current

state of the issue file, in addition to an identification of reserved books and delinquent readers can be extracted at the point of issue. The necessity for dedicated equipment on the main computer is avoided. Comparisons of off-line, on-line and hybrid costs are documented by Buckland and Gallivan (1972).[19]

Several examples of the use of minicomputers as data collection devices have been reported in the literature. An example is the IBM System/7 minicomputer at the American University described by Dennis and Stockton.[20] Data is collected from punched book cards and borrower badges, then transmitted by the System/7 over a leased telephone line to an IBM System 370/145 computer each evening for processing. A small amount of on-line storage for the System/7 holds identifiers for items that have holds placed against them and this file is examined automatically when an attempt is made to charge out or renew an item.

The BLOCS System used at the Bucknell University library, described by Rivoire,[21] uses a PDP-8/L minicomputer as a back-up for collecting transaction data when the Sigma 7 is out of service.

5.4 On-line circulation control systems

Martin[22] defines an on-line system as one in which the input data enter the computer directly from their point of origin and/or output data are transmitted directly to where they are used. The intermediate stages such as punching data into cards or paper tape

writing magnetic tape, or off-line printing are largely avoided.

Not all functions in a circulation system are time critical therefore, only portions of the system are usually on-line and others are operated in a batch mode. Some libraries may not need on-line, so considerations have to be made estimating whether it would be economically advisable to operate an on-line system. Consideration should also be taken to user, system and library requirements.(23) Burgess(24) describes two models for costing circulation systems. They can be used with decentralised or centralised circulation services or for comparisons between various circulation tasks.

On-line processes might not vary greatly from one system to another, but the supporting activities or those carried out in a batch processing mode can vary depending on the demands of the system and the objectives of the library. Poole(25) describes activities which in some cases may be necessary for the library and in others constitute additional services:

(a) In addition to essential files required to support a circulation system, libraries may develop special files to satisfy their particular requirements, for example, the Library of the Atomic Energy Establishment at Harwell which uses an on-line circulation system, maintains separate files on reports, serials, books, and pamphlets on loan as well as a CODEN file used in conjunction with the serials file for the recall of serials.(26)

An article which describes performance requirements for the Library

at the University of California, Los Angeles (UCLA)[27] states the following auxiliary files; calender file (date and time), type of loan file (that would idenify type of material available for loan), a fine schedule file and a notice text file.

(b) Collation of management and statistical data from the files. For example, the Bell Laboratories on-line circulation system utilises its history file to produce various lists. These include Titles in Demand List, a weekly reserve queuelist that identifies unfilled requests, and the subject usage by department report, which gives the librarian some help in knowing who to approach for advice on new publications for purchase and weeding purposes.

(c) Manual activities mainly the physical handling and maintenance of materials, the actual contribution of notices, the searching of shelves for items reported as missing and the discarding of material.

(d) Relation of the circulation system to other library activities. This was investigated in the surveys conducted by the Circulation Working Party of the ASLIB Computer Application Group.[2-4]

Eunson[28] describes the on-line loans control system "UPDATE" used to control 3000 items per year at the Atomic Weapons Research Establishment. New loans, extensions, and deletions are entered on-line at a teletype operating in conversational mode and records are stored in Aldermaston Multi-Access Configuration Files (AMAC), on the IBM 370/165. Recall notices for overdue items are printed on the teletype on demand as well as 'telephone action' lists of very overdue material. Waiting lists of borrowers can be maintained.

An archival 'catalogue' file is used to record deleted loans so as to reduce keyboarding.

Another interactive on-line circulation system is operated at the Ohio State University Libraries.[29] Inquiry and transaction activity is performed on-line. The system provides for traditional circulation control activities and access to catalogues via telephone. Items may be searched by an author-title search key, and additional access is provided by call number and an internally assigned control number. Other examples of operating systems which provide more than on-line data collection capability are: Midwestern University,[30] Illinois State Library,[31] and Chichester Library in England.[32]

5.5 Off-line circulation control systems

The off-line mode is a common approach to computer-aided circulation control. A batch operated system can perform the basic operations of issuing and discharging books in an economical manner, but because they operate off-line difficulties are experienced in maintaining an up-to-date overview of collections and in detecting reservations, and delinquent readers at the point of issue. Documented examples appear in the literature.[33-35]

5.6 South-Western Academic Co-operative Automation Project (SWALCAP)

SWALCAP,[36] a joint computer project involving the university libraries of Bristol, Cardiff and Exeter is an example of a hybrid

system, where minicomputers and terminals are linked to a mainframe (Rank Xerox Data System 530). The system caters for control parameters for various types of loans, user categories, as well as certain items with a library status (binding, repair). A special feature is the arrangement of records in the author/title file which can be shared by a number of item file records, irrespective of library.

References

1. GULL, C.D., Automated circulation systems. In Library automation: a state of the art review, papers presented at the Pro-conference Institute on Library Automation, June 22-24 1967, ALA, editor S. Salmon, 1979, 138-148.

2. WILSON, C.W., Comparison of U.K. computer based loan systems. Program, 3, (3,4), 1969, 127-146.

3. LINGENBERG, W., Comparison of computerized loans systems in the Federal Republic of Germany. Program, 5, (4), October 1971, 191-203.

4. McCaun, L., Comparison of computerized loans systems in the U.S. Program, 7, (1), January 1973,24-37.

5. YOUNG, R.C., United Kingdom computer-based loans systems; a review. Program, 9, (3), 1975, 102-114.

6. PICKLES, J.S., Input methods for United Kingdom computer-based circulation systems. Program, 11, (2), April 1975, 59.

7. VINE, 12, March 1975, 30-34.

8. VINE, 12, March 1975, 25-30.

9. SENIOR, K. & D. Yamanaka, The automated loans system at Loughborough University of Technology. Program, 8, (1), January 1974, 1-21.

10. PICKLES, J.S., op cit.

11. VINE, 17, January 1977, 21-32.

12. ASLIN, C.J., Minis in circulation. In Minicomputers in cataloguing and circulation. Papers presented at a one-day conference on 24 October 1975, editor J. Ross, Aslib, 1975.

13. FOIL, P.S. & B.D. Carter, Survey of data collection systems for computer-based library collection processes. Journal of Library Automation, 9, (3), September 1976, 222-233.

14. DIMITRIADES, P.B., Mini update. Journal of Systems Management, 25, (12), December 1974, 31-35.

15. BROWNRIGG, E.B. & J.M. Bruer, Automated turnkey systems in the library, prospects and perils. Library Trends, 24, (4), April 1976, 727-736.

16. PEARSON, K.M., Minicomputers in the library. In ARIST, 10 Annual Review of Information Science and Technology, editor C.A. Cuadra 1975, 139-163.

17. BEAUMONT, D.M., The LIBS 100 System. In Applications of minicomputers to library and related problems; papers presented at the 1974 Clinic on Library Applications of Data Processing, editor F. W. Lancaster; 55-79.

18. SENIOR,K. & D. Yamanaka, op cit.

19. BUCKLAND, M.K. & B. Gallivan, Circulation control: on-line, off-line, or hybrid. Journal of Library Automation, 5, March 1972, 30-38.

20. DENNIS, D. & P. Stockton, Automated library circulation system boosts service control at America University. Special Libraries, 65, (12), December 1974,512-515.

21. RIVOIRE, H., Bucknell on-line circulation system; a library staff view. Bucknell University, Ellen Clarke Bertrand Library, Pennsylvania, 12 April 1973, 64p. ED 094 698.

22. MARTIN, J., Programming real time computer systems, 1965, 12.

23. SCHMIDMAIER,D., Objectives of on-line circulation control systems. In LASIE workshop on on-line circulation control system, 6, (2), September/October 1975, 15-21.

24. BURGESS, K.T., Costing manual and computerized library circulation systems. Journal of Library Automation, 6, (2), June 1973 75-86.

25. POOLE, M., Supporting activities. In LASIE workshop on on-line circulation control system, 6, (2), September/October 1975, 10-18.

26. WILSON,C.W. & K.R. Greenhalgh, AERE Library computer-based loans system, COBLOS, Program, 5, (2), May 1971, 89-116.

27. UCLA Library, Computer-based circulation control system; performance requirements. In LASIE, 3, (5), March/April 1973, 18-19.

28. EUNSON, B.G., Update, an on-line loans control system in use in a small research library. Program, 8, (2), April 1974, 88-101.

29. GUTHRIE, G.D., An on-line remote access and circulation system. In Proceedings of the 34th annual meeting of the American

Society for Information Science, 7-11 November 1971, 305-309.

30. IBM, Data Processing Division, Online library circulation control system. Moffat Library, Midwestern University, White Plains, N.Y., 1968.

31. RUBY, H.V., Computerized circulation at Illinois State Library. Illinois Libraries, 50, (2), February 1968.

32. KIMBER, R.T., An operational computerized circulation system with on-line interrogation capability. Program, 2, (3), October 1968, 75-80.

33. McCoy, R.E., Computerized circulation work; a case study of the 357 Data collection system. Library Resources and Technical Services, 9, Winter 1965, 59-65.

34. McDowell, B.A. & C.M. Phillips, Circulation control system, Automation Project Report Number 1 (SOUL/APR1). Southampton, England, University of Southampton Library 1970.

35. COWBURN, L.M., University of Surrey automated issue system. Program, 5, (2), May 1971, 70-88.

36. HUDSON, R.F., SWALCAP-on-line circulation system; plans and progress. Program, 9, (3), 1975, 133-142.

PART II

RECOMMENDATIONS FOR THE AUTOMATION OF THE SCIENTIFIC STUDIES AND RESEARCH CENTRE LIBRARY (S.S.R.C.) DAMASCUS, SYRIA

CHAPTER 1 INTRODUCTION

1.1 Development of Libraries in Syria

Like most of the Arab countries the development of libraries in Syria was greatly affected by the national, economic and social changes. National library services have been part of the new effort to build and reorganize a new State. They were, however, an impoverished part unable to compete with other services which understandably were more important. Sheniti[1] describes the development and establishment of several libraries in the Arab speaking countries, as well as Unesco's contributions in the area. These include the introduction of a general national and regional framework for the development of library services (Beirut Seminar, 1959, Cairo Seminar, 1962, and Paris Conference 1974), introduction of the idea of documentation and documentation centres, expert advice and services, library training, professional literature, conservation of records, Unesco's book coupons, and finally materials and equipment. Recent developments in library and documentation centres in Syria are described by Istanbuli.[2]

1.1.1 Problems facing Syrian Libraries

We can summarize the main problems facing libraries in Syria by the absence of library legislation and of specific financial provision for libraries in the budgets, the absence of bibliographical control due to inadequate national libraries and lack of money, the lack of trained personnel and facilities for training. The Unesco meeting in Cairo (1974)(3) urged the need for each country in all stages of development to consider documentation and library services as integral components of a nation's economic, social and educational structure and that the systematic improvement of national infrastructures of these services should be the subject of careful planning in the context of overall development targets.

Attempts have been made in recent years to promote library and information services, and to encourage personnel training abroad, in addition to plans for building a new National Library in Damascus.

In the following sections emphasis will be made on special libraries serving research and industry with an introduction on the economic situation and the structure of libraries and documentation centres in Syria.

1.2 The economic situation

Documents show that the economic situation in Syria is good as indicated in the following table: (in millions of Syrian Liras, £ 1 = 7.25 S.L.)

Heading	Expenses 1974	Expenses 1975	Expenses 1976
Government and related sectors	477,6	768,4	1.302,8
Defence	2.060,9	3.344,8	3.690,4
Culture and information	607,6	1.056,4	1.638,7
Social security and health	77,2	97,8	144,6
Economy and finances	386,9	842,6	1.110,0
Agriculture	726,3	1.270,0	1.416,4
Industry and mines	1.583,5	3.188,4	4.646,5
Communications, services telecommunications	754,8	1.253,5	2.005,6
Stabilization of prices	300,0	630,0	606,0
TOTAL	6.976,0	12.427,0	16.561,0

The major allocations are allocated to technical sectors, especially agriculture and irrigation (the Euphrates Dam), industry, petrol and mines. Recently, new Uranium deposits have been discovered and their utilisation will start at the beginning of 1980.
Syria is at the beginning of the fourth stage of the quiquenial plan. This plan incorporates building the Euphrates Dam, utilising a great area surrounding it, as well as generating electricity.

The structure of imports and exports has been stable for a number of years. Syria exports raw material and imports mainly, industrial equipment, as indicated in the follwoing table.

(in millions of Syrian Liras)

IMPORTS 1973		EXPORTS 1973		Imports of essential food elements	
Food elements	558	Raw cotton	448	Sugar	143
Industrial equipment	445	Raw petrol	219	Cereals	121
Iron and steel	218	Textiles	178	Fruits and vegetables	56
Textiles	155	Cattle, hides, wool	161	Coffee, tea, spices	49
Cars	141	Wheat, lentils, tobacco	107	Miscellaneous	82
Paper, wood plastics	141				
Hydrocarbons	105				
Pharmaceutical products	92				

The Syrian population is increasing by an average of 38% every 10 years, (4.565.120 in 1960, 6.304.685 in 1970, and 6.890.000 in 1973). Predictions are that figures will reach 1.500.000 in 1980 (Damascus, 836.700 in 1970).

1.2.1 Scientific Research and Development

Scientific Research and industrial development has taken an organised structure. As indicated from an official report which predicts future developments, we note that the research and development budget for the third stage of the quiquennial plan 1971-1975 was 29.163.000 Syrian Liras. For the fourth stage of the quiquennial plan 1976-1980 the budget is estimated to be 57.200.000 Syrian Liras divided into the following categories:

- Scientific Studies and Research Centre 13.600,000 S.L.
- Scientific Equipments Centre 5.000,000 S.L.
- Radiation Laboratories 3.100,000 S.L.
- Naval and Oceanographic Research 1.500,000 S.L.
- Libraries and Documentation 4.000,000 S.L.
- Research conducted by Ministries 30.000,000 S.L.

1.2.2 Production development

A noticable and structured development can be traced in various areas of production whether it be agricultural, industrial or general services. This is recognised through big projects like the (Euphrates, Ghab, Sin River, Sources of Yarmouk, etc.), or by the emergence of industrial branches like the Union of Mechanical and Chemical Industries (21 associations in different factories 1973), Union of Food Industires (22 establishments), Union of Textile Insutries (15 associations).

The mining and petroleum industries are under the supervision of the Ministry of Studies and Engineering, which co-ordinates and supervises studies between them.

Agriculture and cattle production is not only restricted to local needs, but export is also taken into consideration, especially cotton exports. Embroidery, carpets and tapestries are also important export products.

Public services play an important role in the Syrian economy, such as administrative services, statistical, planning and information services. Infrastructure (water, energy, transport etc.) Education, medical and related professions, other professions (architects, engineers etc.), and tourism.

From the preceeding introduction we note that scientific information and documentation should be concentrated in the following areas:

- animal biology and veternary, agriculture and agro-industries, hydraulics, geology, mines, chemicals, construction, electronics and telecommunications, physics (particularly nuclear physics), transport and infrastructures, economical industry, organisation and methods, health and medical research, social sciences, environment and pollution, and informatics.

1.3 Structure of Libraries and Documentation Centres in Syria

The Libraries Department (Ministry of Education, Damascus) was recently set up in pursuance of Decree No. 1030/443 of 3 June 1974. It deals with all matters relating to school libraries, the main Library of the Ministry and those of its various divisions and establishes educational staandards. It has also started to prepare a union catalogue. There is also the Department of Arab Cultural Centres and Libraries (Ministry of Culture and National Planning). But no such board exists in the Higher Education Ministry for University Libraries. Syria does not have a National Library in the proper sense of the word, although a plan for the construction of a National Library in the city of Damascus is perceived in the fourth stage of the quiquennial plan (1976-1980). Pending the completion of the project under way, the El Zahiriah Library (Bab-el-Barid, Damascus) is serving as the National Library.(4) It published a national bibliography of Syrian publications and a monthly bibliographic index of accessions classified by subject. It is also responsible for applying the law governing legal deposit. The library is attached to the Damascus Academy of the Arabic Language, which comes under the Ministry of Higher Education.

The Libraries and Documents Association (Library of the University of Damascus) was established in 1972. The aims of the Association are to raise the standard of library services in Syria, run short courses of training in librarianship and organise book exhibition.

1.3.1 University Libraries

1.3.1.A Damascus University Library

The system is a decentralised one, consisting of a centralised library with separate libraries affiliated to faculties. At Damascus University there are more than 50,000 students and 500 professors and assistant professors full and part time.

The Central University Library holds 78.000 books in foreign languages, 68.000 books in Arabic, and 874 serial subscriptions.

The Central Library is important because of its role in the acquisition of material, subscriptions, exchange of documents and binding.

The staff consists of 8 qualified librarians, 2 assistant librarians, and 25 clerical staff.

1.3.1.B Aleppo University Library

A large campus surrounds this new University. Plans for building a central library are underway. It consists of 17.000 students, 450 professors and assistant professors.

A budget of 500.000 S.L. was allocated to library and documentation services in 1976. A detailed description of University Libraries in Syria appears in the literature.(5)

1.3.1.C Lattakya University Library

Lattakya University Library was established in 1971, and contains

4500 books in Arabic and 3500 books in foreign languages. It is headed by one professional librarian and two assistant librarians.

1.3.2 Libraries and Documentation Centres of Ministries

Every ministry and particularly every technical ministry has one library and/or a documentation centre. Each of the following ministries has a relatively rich library and is planning to modernise the equipment and operating system; Ministry of Finance, Ministry of Education, Ministry of Planning, Ministry of Petroleum and Mineral Resources, Ministry of Agriculture, and Ministry of Higher Education. A coordinated translation service with other Arab Countries is maintained at the Ministry of Higher Education. Translations are done by specialised personnel and printed at Damascus University Press.

1.3.3 Other Libraries and Documentation Centres

There are libraries and documentation services in factories and agricultural cooperatives, as well as in 54 national cultural centres. These centres have mobile libraries, and the acquisition system is centralised, the budget allocated annually is 160,000 S.L. Cultural Centres' Libraries, Embassy Libraries, the Library of the French Institute for the Arabic Studies in Damascus and El Zahiriah Library constitute important centres for information exchange in Syria. Microfilm and microfiche equipment are available at the Ministry of Information, the Academy of Arabic Languages, Aleppo Museum and in the Higher Council of Sciences.

Finally, we note that good documentation services are available at the Baas Journal, Radio and Television quarters.

1.3.4 Higher Council of Sciences Library

This Library contains general and specialised documents in different sciences and technologies and in methods and organisation of scientific research. It also contains large collections of microfiche and microfiche equipment which unfortunately is not utilised properly. Dulong[6] indicates that the Higher Council of Sciences Library is the best point for the convergence of a National Centre for Scientific and Technical Information within the framework of the General Information Programme (GIP) of Unesco.

1.3.5 Arid Zones Research Centre Library

This is a regional centre for specialised studies related to the Arab League, Educational, Cultural and Scientific Organization (ALECSO). The centre is situated in a building owned by the Agricultural Research Centre, in Douma. The Centre holds an important collection of serials located in different laboratories. The Centre has put forward a project for a regional documentation centre as part of the United Nations Development Programme (UNDP).

1.3.6 Agricultural Research Centre Library in Douma

The Centre is situated in the outskirts of Damascus. The library

and information services need reorganisation and development and many of its subscriptions have been cancelled since 1971.

1.4 The Scientific Studies and Research Centre (S.S.R.C.)

1.4.1 History and Objectives

The Scientific Studies and Research Centre was established in 1971. As in all developing countries a centre such as the one needs time to establish itself and build the appropriate cadre of personnel. This has been achieved mainly by sponsoring graduates from Syrian or other universities to further their education abroad and return to work in the Centre.

The structure of research is different in developing countries, there exists very few private enterprises. Most of the research done in Syria is governmental, aimed at serving and developing various aspects of industry and agriculture. The S.S.R.C. is no exception to that. Thus, it is a non-profit organisation conducting research for various governmental bodies which sometimes lack the resources and personnel.

The budget allocated to the S.S.R.C. for the fourth stage of the quiquennial plan is 13.600,000 S.L. compared for example, to the budget allocated to the Scientific Equipment Centre which is 5.000,000 S.L.

1.4.2 The Library

The stock of the Library consists of 7400 books (1977) in

different languages, mainly, English and German. There are also some Russian, French and Arabic books. The scope of the collection covers the areas of electrical, electronic,chemical and mechanical engineering, as well as chemistry and physics. The library holds a collection of technical articles and subscribes to 470 serials.

The documentation and operation of library subsystems is centralised. All procedures related to acquisition and cataloguing are carried out in the main library.

1.4.3 Staff Organisation

The staff consists of 1 senior member in charge of coordinating library processes and allocating different tasks. Other clerical staff are directly responsible to the senior member.
The Library is still building a suitable cadre of personnel, which would require a few years as there is a shortage of specialised information manpower at different levels in Syria. The Institute has started to overcome this problem by sending staff abroad to acquire qualified degrees and professional training where possible.

As indicated on page 80 the organisation of the administrative staff and their tasks is best illustrated by material division, although distribution by function especially for acquisition and cataloguing is also relevant.

1.4.4 Services provided

The primary goal of the Library is to make information accessible to the research scientists and their assistants in a prompt and effective manner. Nevertheless, as the Library is still in its early stages of development many services provided in well established research and industrial libraries are not catered for, due mainly to the shortage of qualified personnel.

The Library is investigating the possibilities for an overall organisation of its services within a general plan for the gradual automation of library procedures.

Services provided in the Library include:

- Occasional translations of technical articles.
- Accession bulletin of books and articles printed every 3 months which is distributed to the various departments in the Institute and some governmental organisations.
- Monthly accessions list of serials, which is distributed to the various departments in the Institute.
- Personal notification of the arrival of requested documents.

Microfiche and microfilm readers have been recently introduced, and the Library has started ordering some serials on microfilm and some books on microfilm and microfiche.

The annual budget allocated to the Library and Information

Services for the year July 1977 - 1978 is as follows:

(in Syrian Liras, £ 1 = 7.25 S.L.)

1. Books	
1700 - 2000 books (average of 100 S.L. per book)	170,000 - 200,000 S.L.
2. Serials	
450 - 500 subscriptions (average of 350 S.L. per subscription)	150,000 - 170,000 S.L.
3. Articles and Patents	
350 - 400 (average of 15 S.L. per document)	5,000 - 6,000 S.L.
4. Miscellaneous Expenditure	
binding, equipment, etc.	25,000
Total	350,000 - 400,000 S.L.

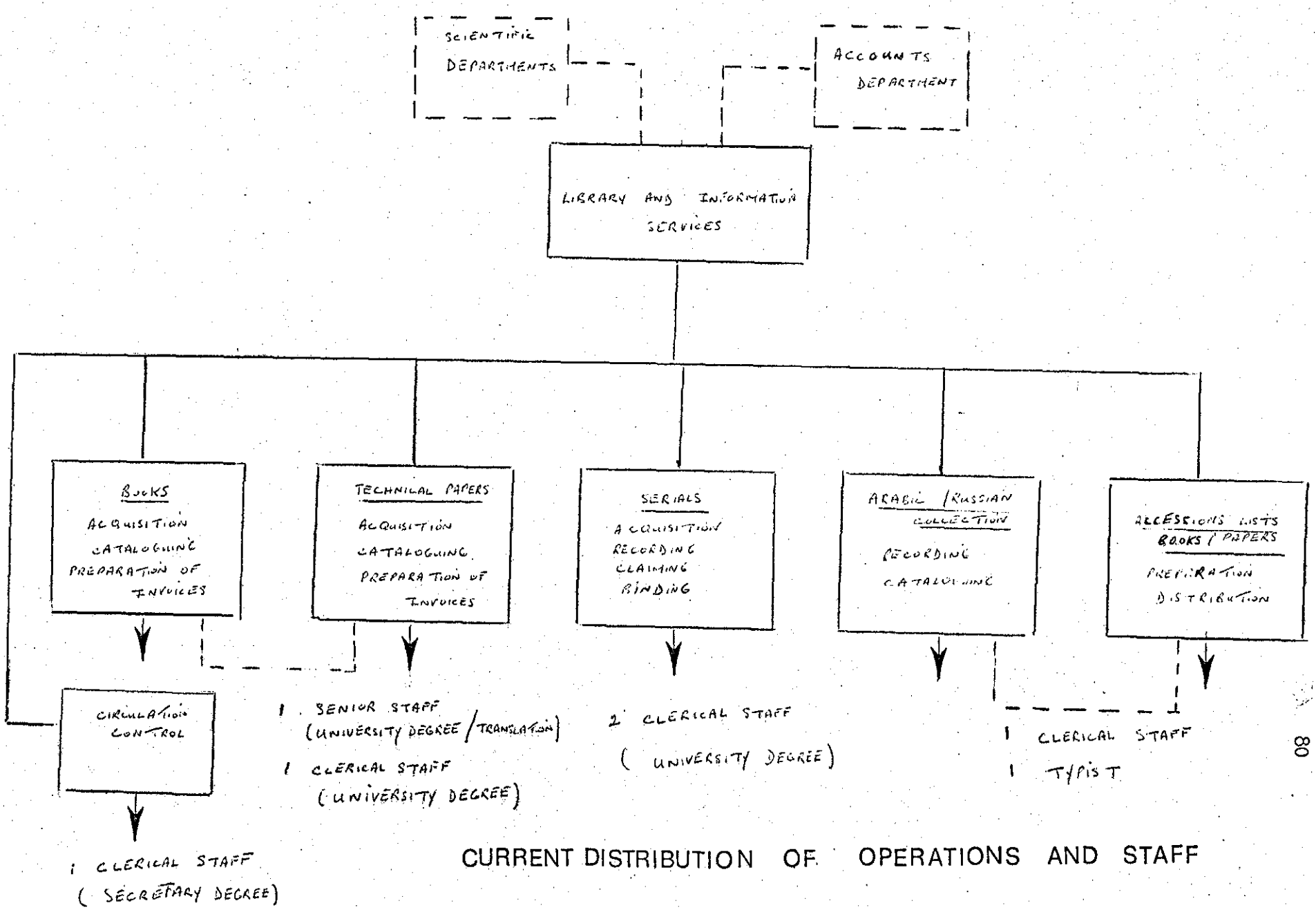
1.4.5 Circulation Control

The circulation system at the Library is manual. The system consists of stamping the issuing date of the book on two cards (kept in a pocket on the back cover of the book), the borrower then signs his name on both cards, one of which is kept in the pocket of the book and the other is filed by borrower's name. The system is partially successful but demands clerical work to sort out overdues. Improvements to the existing system could

include restricting the loan period of certain books which are always on demand. This procedure could also be practiced with recent arrivals for a limited period, especially where books are on regular demand by members of different departments, as the cost incurred by duplicating books is beyond the Library's means.

Regular users of the Library consist of 80 - 100 research scientists and their assistants. As speed of operation is not critical where charging and discharging is concerned, an organised manual system fits the needs of the Library at this stage in time. Higher priorities justifiable by the need to create essential services for Library users, puts the choice of implementing a computer-based loans system low on the priority list for automation.

Nevertheless, the advantages of a computer-based loans sytem should not be ignored and the Library should study carefully the possibilities of implementing a computerised system (whether it be on-line, or batch operated) as part of the overall automation project in its later stages.



CURRENT DISTRIBUTION OF OPERATIONS AND STAFF

1.5 General Guidlines for the Automation of the Scientific Studies and Research Centre Library (S.S.R.C.)

1.5.1 Introduction

Computerisation of libraries is developing rapidly in the more advanced countries. The time may not have come for Syria in view of the small holdings and shortage of capable libraries but even if we can not join the computerisation race at this stage in time we must at least be aware of its developments and possibilities so that we will be prepared when the time comes.

The Scientific Studies and Research Centre in view of its resources and future plans for expansion and development constitutes a suitable milieu for the experimentation and implementation of a computer based system.

In writing this study an attempt has been made to draw the broad lines for a general approach to automating specific library functions taking into consideration (where possible), both the local pressing needs for the provision of more efficient and dynamic services, and the resources available, or that could be made available for the execution of the automation project.

In the following section modes of computer provision will be investigated taking into account the advantages and disadvantages

of utilising the facilities offered by the Institute's mainframe, as opposed to the provision of a dedicated minicomputer for library operations.

Priorities for the automation of library subsystems are assessed with the aim of providing a balance in terms of the kind of services needed at the present state of time and the long term developments that could be generated as an offspring of the basic automation project.

1.5.2 Modes of computer provision

Although there are five modes of computer usage identified in the literature; a commercial bureau, shared or co-operative computer facility, British Library computer, use of the institute's computer and the library dedicated computer, only a study of the last two will be attempted. The previous alternatives are economically unjustifiable and hard to implement considering the nonavailability of commercial computer bureaux and shared computer facilities in the region.

1.5.3 Use of the Institute's computer

The availability of a mainframe in the Computer Department and its accessibility for library operations makes it worthwhile investigating the advantages of using a shared system by analysing carefully local resources and immediate and future library needs.

Reasons for adopting this approach to automation relate mainly to cost and accessibility.

Although no actual charge would be incurred by the Computer Department, an internal accounting unit could be assigned to the Library's budget. A comparison of the internal notional charge for the use of the mainframe with the cost of purchasing a library dedicated minicomputer would be difficult. (Weizman[7] recommends a ratio of the cost of purchase of the mini as equal or less than the estimated charge for three years.)

Accessibility is another important advantage of using the local computer. Library operations would be given a high priority use in the Computer Department as Management realizes the need for improved services and role a computerised environment could paly in promoting services for the Library clientele, thereby furthering the Institute's objectives.

There are several factors (unavailability of staff and resources) effecting the choice of the local computer a UNIDATA 7730 with the following configurations:

- Control Unit
- Arithmetic Unit
- Main memory
- Card reader (1000 cards/min.)
- Printer (1000 lines /min.)
- VDU console with hard copy facility

- Present capacity 72k (practical capacity)
- Two magnetic disks

The operating system supports multi programming up to 14 programs which can be run simultanuously. The operating system B.S. 1000 does not support on-line facilities.

An advantage of using the mainframe is the availability of the computer staff and the cost benefit of sharing staff and time with other users in the Centre.
An important factor in this approach is the relationship between Library and Computer staff. Nevertheless, the most time consuming part of the work still belong to the library in planning, preparing and adjusting or revising existing forms and procedures so that they are compatible to the computer program to be used.

Capabilitiies of the present system could be expanded to fit the Library's needs (at least for the next five years), by adding a special disk unit for the Library, increasing the available memory capacity and adding additional peripheral equipment when needed. Maintenance problems would be handled by the Computer Department.

The main disadvantage of sharing the mainframe facilities is the nonavailability of on-line interactive facilities.
Nevertheless the nature and requirements of the applications outlined at this stage in time are suitable for processing on the

mainframe.

1.5.4 Use of a dedicated minicomputer

The advent of minicomputers has brought the capital cost of a computer down to a level where the library could acquire its own computer.

Three points are to be considered in coming to a decision on a minicomputer system versus a shared large system; the economics of the system, the performance of the system, and the control over the system.

Although minicomputers have decreased in price, costs of small and medium sized minicomputers vary from about £ 3,000 to £ 25,000, estimates 1976.[8] Costs incurred by buying a dedicated machine for the Library would have to be analysed carefully and compared with the costs met by using the Institute's mainframe, and whether the additional facilities are worth the extra money. Cost considerations include costs of hardware, hardware maintenance, site preparation, installations, operations and software mantenance.
A detailed cost comparison of the two approaches is very difficult at this stage as costs are changing and prices in the U.K. would be different from those abroad. Nevertheless, a general outlook by the Library in justifying expenditure could be looked at in two ways. The comparison of capital and running costs of two systems (manual and automated, using mainframe/minicomputer), in which the end product is identical, and the assessment in cash terms of benefits

gained (or lost) in terms of difference between the end products of the alternative schemes. These'end products' may be either saleable commodities or services without direct cash equivilant.
Basis for the comparison of the two systems would include:

- capital cost involved, interest payments on the capital deployed and how this capital is to be recovered.
- running cost of each alternative, including both materials and labour, relative merits and demerits of each alternative other than those of pure cost.

The main advantages of developing a dedicated minicomputer system for the S.S.R.C. Library would be the on-line facilities that could not be provided on the available mainframe. A combination of on-line and batch system could then be implemented where data entry and retrospective searching (in the future) could be conducted on-line, whereas, data update, current awareness searching and index and catalogue production would be conducted by batch mode.
Benefits of a dedicated minicomputer would also include running efficiency, control over access and the system could be tailor made for the Library with capabilities for expansion.

An important factor effecting the mode of computer provision is the desired degree of control over the system, this factor is interrelated with the availability of personnel expertise in the library . Control over the system includes being able to determine the future of the system as well as assure its operational status.

An economic and appropriate arrangement for practicing a satisfactory degree of control at this stage in time, would be for the Library to utilise the available expertise in the Computer Department taking into considration the necessity of determining the needs of the system and conveying its requirements to Management and computer personnel.

In addition to cost and staff factors effecting the mode of computer provision other factors which need investigation include, the requirements of the applications to be processed, the areas of automation and the sizes of data files.

1.5.5 Batch versus on-line systems

The decision of the library to operate a batch or an on-line system would depend on the type of application, the desired speed of response and the available computer configurations.

Certain applications are more suitably operated in batch mode. These include repetitive jobs requiring large sorts and prolonged use of core memory, such as the production of indexes, catalogues and overdue notices. Advantages of batch systems include, fuller use of resources, and in cases where departments cannot warrant their own computer they could still benefit from a central computer.

On-line systems have the advantage of fast response to a

request, especially valuable in circulation and in conducting search profiles. On the other hand, they are more expensive as the machine is not normally run round the clock. It needs to be more powerful than an equivilant batch system to be able to handle the peaks that may occur in multi-terminal systems, and if on-line updating of files is required extra programming and peripherals may be necessary to prevent data corruption.
Nevertheless, these disadvantages are less relevant if a minicomputer based system is under consideration. The capital outlay and the fixed running costs of a minicomputer are smaller than those of a mainframe, so there is less need to justify them by running the machine round the clock. As core is cheaper on a minicomputer the library could upgrade the system by adding core.

By acquiring a minicomputer the S.S.R.C. Library could enjoy the many advantages mentioned. Nevertheless a more feasible approach at this stage in time, when there is a lack of expertise in the analysis and implementation of computer based systems, would be to utilise the Institute's mainframe. The initial phase of the automation project characterised by the production of various listing, such as the main catalogue, serials listings and reports catalogue could be adequately implemented on the mainframe.

1.5.6 Proposed general system description

The S.S.R.C. Library exists primarily to advance the interests of the host Institute through the provision of information.

In its overall plan for development, Management and Library personnel are investigating the possibilities of introducing computer-based services. This study is intended to give a general outline to feasible solutions in areas where services could be improved to provide a more dynamic approach to the retrieval and dissemination of information.

The gradual approach to automation would be desirable in such circumstances, as staff need time to develope experience. Priority has been given to three areas of automation after taking into consideration the library's local circumstances and needs, and the clientele's demand for services in these areas.

The three priorities chosen for this study are:

- Production of the cumulative catalogue of the Library's holdings.
- Reorganisation of the reports collection with scope for automating the foreign language collection.
- Production of a listing system for the serials collection.

It is forseen that other library procedures such as circulation, acquisition and bibliographical retrieval could be included in future stages of the automation project when resources and staff expertise are made available.

CHAPTER 2

AUTOMATING THE CATALOGUE

2.1 Description of the cataloguing system at the S.S.R.C. Library

The scope of the book collection covers the fields of electrical, electronic, chemical and mechanical engineering, as well as physics, chemistry and biology. The collection is expanding by an average of 1700 - 2000 books annually. By the end of June 1977 the Library had acquired 6700 books and the amount has since, increased by 700 books (December 1977).

German books constitute 38% of the general collection, English books 47%, French books 3% and Russian books 2%. The Russian and Arabic collections are maintained separately. There are 650 books in Arabic, 10%. The annual budget allocated to the acquisition of books is 170,000 - 2000,000 S.L., an average of 100 S.L. per book.

Many of the suggestions for acquisitions are received from library users, mainly research scientists and Heads of Divisions. In addition to scientific and technical books the Library provides a substantial collection of encyclopaedias, directories, foreign language dictionaries and reference books.

Ordering, accounting and accession routines are kept simple. When a book is first selected for purchase, it is entered

on the ordering list. Two copies of the list are typed, one is sent to the publisher or agent abroad, (mainly England and France), and the other copy is kept in the Library files. Lists of ordered books are accumulated every month (approximately) before dispatching them to publishers or agents, except in special cases where a book is urgently required by the user.

The Library also buys photocopied technical articles from backdated serials or conferences, these are maintained as part of the main classified catalogue. The catalogue consits of typed cards in card index drawers. The two main sequences are author and subject arranged in Dewey Decimal Numbers.

All cards for one book or article are the same, the different filing points being underlined. The effort required for filing cards is considerable, and the Library is hoping to introduce shortly a computer-based cataloguing system for books.

Records of recent acquisitions are kept on separate cards for each record to facilitate retrieval. Every three months, an accessions list of books and articles classified by subject is accumulated, typed and ditributed to the departments in the Institute and to some governmental organisations.

The Library has acknowledged the need to start a patent collection, and future plans for building one are underway.

2.2 Advantages of automating the catalogue

It is vital at this stage in time, after five years of the Library's establishment to ascertain the necessity of producing a cumulative catalogue of the Library's holdings.

The collection of technical and scientific books represents one of the biggest collections in special libraries in Syria. The expansion of the Centre is reflected greatly by the annual growth of documents acquired by the Library. Although there are several problems associated with converting files into machine readable form, the many advantages and facilities provided by the system would justify the extra cost of conversion.
The size of the file as well as the bibliographic data to be included in each record, are important factors in determining the cost. But it is at this stage that the Library should consider converting the file which is still considerably small and which may double in a few years.

The decision to automate is not an easy one. The costs in time and money of setting up the system, of obtaining programs, and converting existing records into machine readable form should be understood, as well as the necessity of retraining staff and of educating library users in the new system.

The advantages of an automated catalogue would include the following:

- Easy reproducability of the catalogue allowing copies to be distributed to the departments.

- Multiple use of output formats derived from a single machine record to produce different files, for example, alphabetical titles catalogue, subject catalogue, accessions list, etc.

- Ease with which corrections can be made to records within a properly designed system.

- Although there are no immediate plans for the creation of a union catalogue for special libraries in the region, the Scientific Studies and Research Centre Catalogue could provide a basis for expanding it in the future when resources and expertise are made available. In this context the automated catalogue would be a powerful instrument towards effective resource sharing and greater accessibility of regional or national holdings.

- Use of the information contained in the catalogue, together with a low cost and rapid means of retrieving it for administration and management of the Library.

The catalogue in the Library by whichever means it is produced and whatever physical form it takes remains the only unique key that the Library has to its own collection. The success with which libraries are used depends to a large degree on the quality of the catalogue and the ease with which it can be used. Thus, in addition to the advantages previously mentioned, converting the card catalogue into machine readable form and into book form would solve the problem of card misfiling.

2.3 Proposed cataloguing system

2.3.1 Introduction

At this stage in time the Library has as its first objective the production of a computer-based catalogue of its holdings. An organised frame-work has not yet been established and the Library is studying the possiblity of producing the main cataogue basing it on keywords from the original text.
When considering the kind of information which users in the Library have when approaching the cataogue, whether it be authors, titles, or subject descriptors, and their relation to words used to describe the document, we note that the most frequently used approach is by subject. Thus, the keyword type index falls within the users' approach pattern. The KWOC catalogue would provide a suitable order for retrieving the specialised technical and scientific books collection in the Library, especially as readers do not often remember the specific author and document title.

2.3.2 General system description

The availability of the Institute's mainframe and its accessibility for library operations makes the choice of the mainframe a justifiable one, especially as the processes involved in the production of the catalogue are time consuming and would suit the mainframe rather than a smaller computer.
The general principles of the system could incorporate the following:

- Production of a KWOC catalogue (Keyword-Out-of-Context) for books, monographs and articles to replace the classified catalogue as the main subject approach to users.

- The system based on an automatically prepared KWOC index could be enriched with human indexing and enhanced by certain transcription tagging conventions.

- The basis for the division of the catalogue and pattern of supplements would reflect the Library use pattern and the requirements of the departments.

- Gradual conversion of the entries in the card catalogue and closing it when the process is finished.

- Provision for cumulative catalogue supplements to the main catalogue to be updated when necessary.

2.3.3 The KWOC approach

There are several prinicples for the adoption of the KWOC approach which the Library staff should take into consideration when implementing the system.

The KWOC is based on extracting a keyword from its context and following it by the full title in its normal order. A keyword appearing in several titles would be displayed only once in the margin and all titles containing this term would be listed in alphabetical sequence by the first part of the title.

In a specialsed collection such as the one in the S.S.R.C.

Library, where a high recall relevance is desirable, the conventional KWOC indexing could generate a large percentage of non-informative titles. A solution to this could be the enrichment (if deemed necessary) of the basic citation by the indexer at the input stage. Descriptors can be based on the indexer's free choice of wording, as to the topic of the document, from subtitles directly or from contents lists directly. Rules could be set to maintain consistency in the coice to be taken as to the correct way to assign in each case. Another technique worth considering is PAIRING words which are to be regarded as single entries.

Special character tags cold be prefixed, on input, to each of the non-title items desired in the index. These tags would be carried by the system through the keyword sorting process. Since they are in the high order position for the sort, they force like items together. After sorting a print program would delete them from the left margin field. This technique could be used for the production of the various listings desirable in the system.

Because all the keywords that appear as indexing terms would be flagged at the input stage, stop lists would not be required. On the other hand, a useful stopword list of general terms having little value as indexing entries (based on frequency count data for terms appearing in titles) could be useful for indexers to avoid indexing under general terms.

To achieve the cosistency desirable in indexing terms, a machine held Dictionary of Index terms (which would include title generated keywords and enriched indexer-assigned keywords) could be held on a separate file. This file would be updated whenever new data is inputted into the system.
A file of new index terms would be generated after every run containing new entries. This file would then be scanned for desirable new terms to be added to the Dictionary of Index terms. (See page 106).

2.3.4 Record content

There are many potential elements in the bibliographic record, and it is of the utmost importance to restrict as much as possible the extent of each bibliographic description so as to achieve a balance between the necessary standard information required to identify and describe a document and the various retrieval keys by which users need to have access to the documents.

Although some libraries in the U.K. and U.S.A. have resorted to buying externally produced records such as MARC tapes, as a means of avoiding the intellectual, clerical and some computer costs of producing catalogue entries, a careful study of the local requirements of a library, long delays and costs incurred in the receipt of the MARC records should be undertaken before such a service is bought.

A more suitable approach to converting the catalogue into

machine readable form in the S.S.R.C. Library would be by analysing the local requirements of the Library and studying the local collection. A suite of programs could then be written in-house and run on the mainframe.

The aim would be to develop a catalogue, meaningful to the users and which offers flexibility of output and of access points, and which would be sufficiently flexible to be enhanced in the future.

Although it would be desirable to have an agreed format amongst libraries that might consider participating in the production of a union catalogue, it is not possible at this stage in time, as this is a long term project which requires careful planning and coordiantion.

Nevertheless, it is hoped that the Library would adopt a sufficiently flexible format suitable as a general basis for a union catalogue in the future.

The content of the machine readable record could include the following:

Book Number: The book number could act as the record identifier in the machine readable file. An additional identfier could be allocated for the copy number.

Language Code: This coding could be kept in the file for the purpose of interrogating the file and is not printed out. This facility could be used as a sort field for selective book lists in different languages.

Collection Code: For example; R : Reference

A : Article

C : Conference

Category Code: This code would indicate the physical nature of the item, for example; P : Pamphlet, MF: Microfilm

Classification Number: The Dewey Decimal Number used to classify the collection.

Author: Three or four authors could be allowed which would include editors, and compilors. Initials would be given with styles omitted.

Titles: Provision could be made for two titles, each title having four subsections, main title, sub-title, edition statement, volume statement. In cases of articles this field would be filled with information on source and date of publication.

Descriptors: Words from the text.

Enriched Descriptors: To allow for the enrichment of titles and assigned KWOC.

ISBN: The Library could consider adding a fixed field for the ISBN due to the possible implications of MARC. ISBN data could be held in the file and not printed out at present.

2.3.5 Programs

Programs should provide for creating machine-readable files, and updating the different files. Programs should also incorporate a mechanism for sorting the KWOC File into three sequences, the KWOC

title keyword derived sequence, the conference type corporate author sequence, and the single author sequence.

2.4 Outputs of the system

The scientific orientation of the Library's collection provides titles which tend to have a 'hard' vocabulary, suitable for retrieval via keywords. Outputs of the system could include the following: (See page 105 & 107).

1. Main KWOC Title Catalogue

The main catalogue could consist of three different parts. The first part would be listed by keywords of titles including enriched keywords and paired-words. The keyword would be displayed in the left hand margin and printed again in the context of the title, all titles containing the term could be listed in alphabetical sequence by the first part of the title. The full title and the following bibliographical details could be included; keyword, author(s), date of publication, Dewey Decimal Number, and accession number.

2. Personal Author Index

The author index could consist the second part of the main catalogue. The bibliographical data could include, title, author date of publication and Dewey Decimal Number.

3. Conference/Corporate Author Index

Although conferences would appear in the main part of the KWOC Title Catalogue, a separate part could be included as an additional reference tool for users who prefer to retrieve documents via conference/corporate author.

4. Updated Supplement to Main KWOC Catalogue

As merging data into the Main Catalogue is an expensive and time consuming procedure, the Main Catalogue could be updated once or twice a year, with a monthly or bimonthly cumulative supplement of recent accessions.

5. Recent Accessions List

This list could be useful to inform users of recent additions to the stock in cases when a list is required before the supplement to the Main Catalogue is updated.

6. Master File

This would include all documents listed by accession number, with all the bibliographical data related to it.

7. Dictionary of Index Terms

This would include keywords derived from titles and all entries in the Main Catalogue. This additional facility could be used for constructing on-line searches (if on-line facilities are provided in the future).

8. User Interest Profile List

This list could be produced irregularly at the request of users by conducting a keyword search, the keywords in this case representing user profiles.

9. Index of Papers

This list would indicate the collection of articles or papers and classify them by keyword.

2.5 Input / Storage Media

Converting cataloguing data can be carried out on any type of input equipment, punched card, paper tape, magnetic tape and disc encoders, optical character readers and on-line editing.

As short entries are planned for the Library catalogue, an economical procedure would be to utilise the available card punch equipment and key-punch operators, which would be suitable for the retrospective conversion and processing into the computer. Punched cards as the most often used means of converting data to a machine readable form would be perhaps the first storage medium to be considered, especially for a small collection.
But, as the stock is expanding a more suitable medium could be magnetic tape, thus storing large amounts of data in a small space.

2.6 Output Form

Factors influencing the choice of the computer produced catalogue form include the need for multiple copies, need for portability, character set, need for subsets of the total file, and familiarity of the users with the library.
Production costs and legibility and clarity of the catalogue should also be carefully considered.

Producing the catalogue by using the line-printer is suitable, for the size of the collection and the amount of copies needed. The availability of a line-printer also economically justifies its use at this stage. The print-out could then be photo-reduced to A4 size paper, if required. Future considerations for the development in catalogue production, could be COM (Computer Output Microfilm). The availability of microfilm technology in the area and access to microfilm readers should be carefully studied before any commitment is made to convert to (COM).

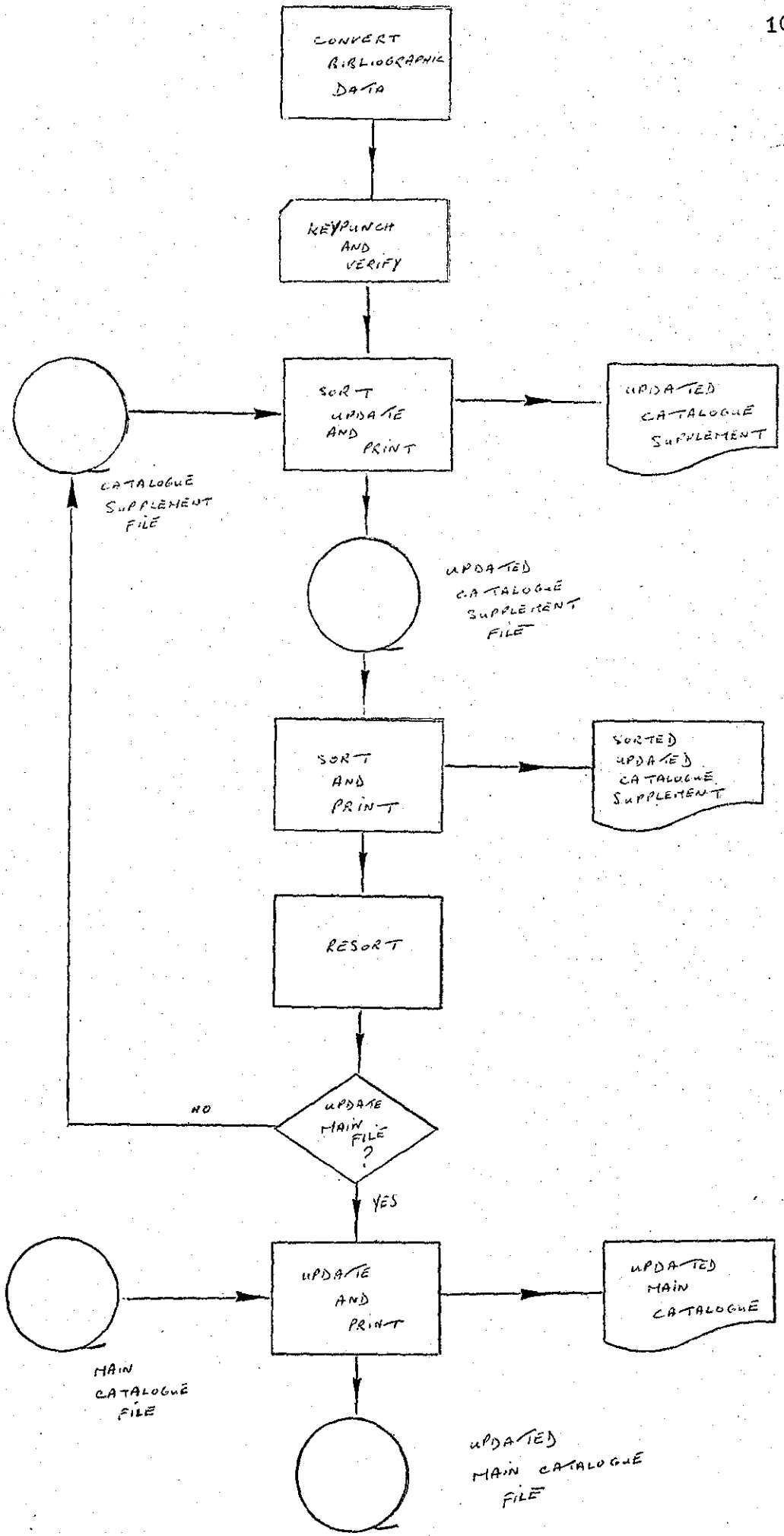
2.7 The Arabic Collection

Books in Arabic and Russian are maintained as a separate collection. Automating the Arabic collection at this stage could involve effort and money at a time when computer technology falls short of producing legible printouts. The recent size of the collection does not justify converting it into machine readable form, in addition to the fact that the manual system dealing with

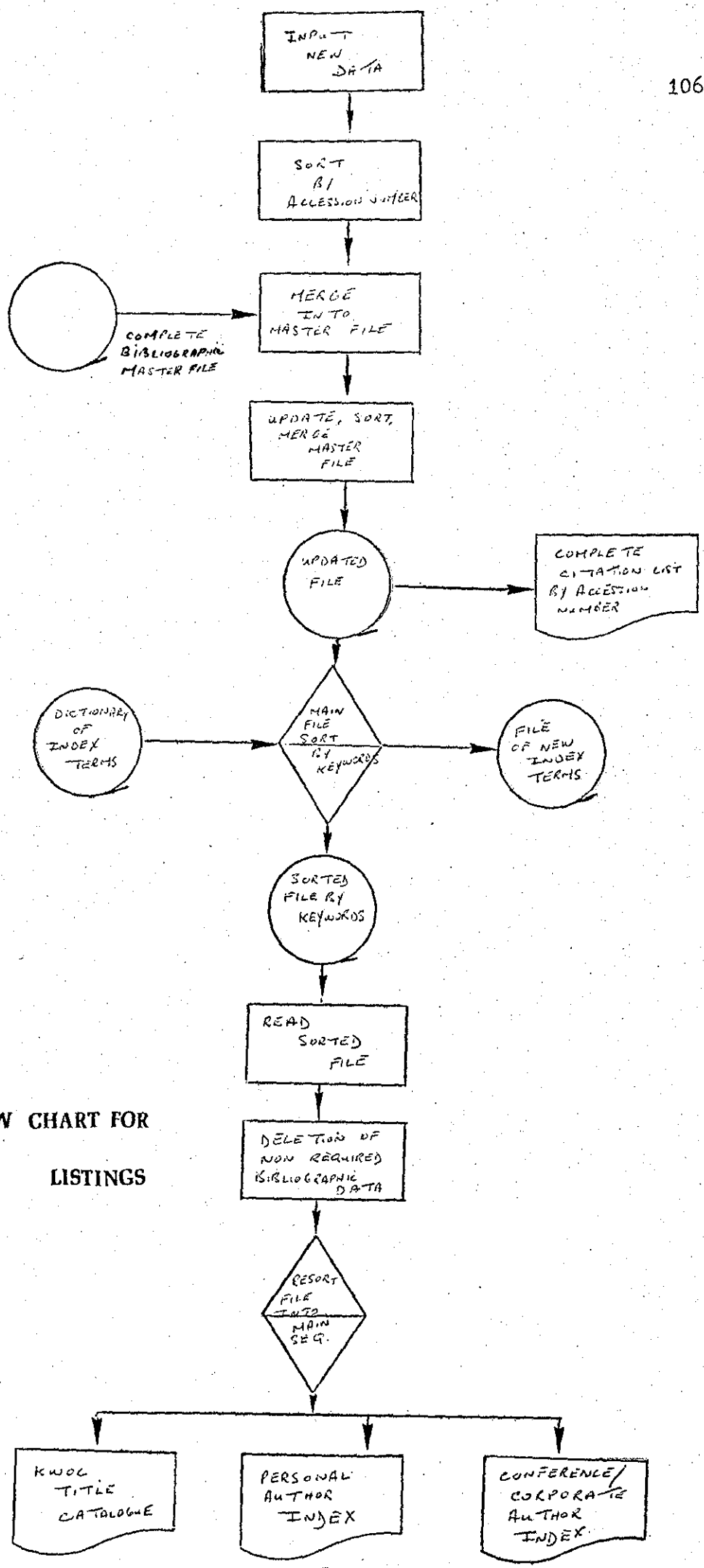
it is satisfactory.

A recent paper by Sabry and Jeffreys[9] on the Catalogue Conversion Project of the National Library of Cairo, discusses the problems of data preparation and computer printout of Arabic text, which include punching data elements as a number of separate card types. The card type containing numerical data only, was treated separately from alphabetic characters because of the characteristic of Arabic that text is read from right to left, but numbers from left to right. In cases where numbers occured in the text-cards, numbers were punched backwards, thus reading from right to left. Special programs for computer processing were written to tackle the problem of Arabic text being read from right to left. Another problem encountered with computer print out was the unavailability of a line printer for printing Arabic with all the punctuation marks and symbols required for the bibliographical data. The ICL Arabic printer used for the National Cairo Library Project imposed a problem with the aesthetic appearance and legibility of the alphabetic characters.

Transliterating the Arabic collection could be an alternative to automation, but this would involve unjustifiable effort at this stage.



FLOW CHART FOR CATALOGUE PRODUCTION



FLOW CHART FOR

CATALOGUE LISTINGS

SUGGESTED DISTRIBUTION OF CATALOGUE LISTINGS

	LISTINGS	FREQUENCY	COPIES (each time)
1.	Main KWOC Title Catalogue Library Library Office Departments (3)	2 p.a.	5
2.	Personal Author Index Library Library Office Departments (3)	2 p.a.	5
3.	Conference/Corporate Author Index Library Library Office Departments (3)	2 p.a.	5
4.	Supplement to Main Catalogue Library Library Office Departments (3)	Bimonthly	5
5.	Recent Accessions List Library Library Office Departments (3)	Monthly	5
6.	Master File Library Office	2 p.a.	2
7.	Dictionary of Index Terms	Irregular	-
8.	User Interest Profile List	Irregular	-
9.	Index of Papers	Irregular	-

CHAPTER 3

AUTOMATING THE REPORTS COLLECTION

3.1 Description of the reports collection at the S.S.R.C. Library

A large part of the Library's work is concerned with reports. External reports are catalogued and listed in the Library, then distributed to individual readers. The collection cosists of about 800 reports, basically in English. Demand for reports is growing as scientists depend greatly on the reports literature in their work.

Accession and Dewey Decimal Numbers are allocated to reports, after which they are distributed to the original requesters. Collections are kept in filing cabinets, serially numbered with no division by subject or source. No provision is made for cumulative catalogues of reports.

Internal reports are dealt with separately within each department, where they are manually typed and a security grading allocated to each. Identification is by the originating department serial number and author.
Deep indexing is not catered for which makes it difficult to retrieve the documents after a period of time has elapsed. Confidential reports are kept in their originating departments and very seldom find their way to the Library.

The Institute does not have a technical editor for its internal reports collection. The responsibility lies mainly on the author's immediate manager who ensures that the report is technically accurate, and also that its presentation meets the Institute's specifications. In-house reports are reproduced within the Institute by an office stencil machine.

3.2 Proposed system for the reports collection

3.2.1 Organisation of reports

The internal reports collection constitutes the basic and only documented source to research activities within the Institute. Types of reports include project and period reports, technical notes, memoranda etc.

Although there are organisational and personnel problems associated with the establishment of a centralised unit for handling all the reports collection (internal and external), especially at the initial stage, this approach has many advantages worth considering.

A complete collection centrally maintained , would lead to easier security control and storage, Keeping track of different copies would also be facilitated. Centralised handling would be less affected by consequences of staff turnover, experienced in cases where reports are kept in different departments.

Reports could be divided into two main sections:

1. The Arabic Collection, consisting of two sub-sections,
   - Confidential, internal/external.
   - Non-confidential, internal/external.
2. Foreign languages collection.

Suggested improvements in the work flow of reports for better control, classification and retrieval could include the following:

3.2.2 Establishing a Report Unit

The aim of the Report Unit would be to centralise all operations dealing with the control, classification, cataloguing, maintenance and distribution of the internal reports collection (confidential and nonconfidential), as well as the external reports.
This Unit could constitute part of the Information Section Unit (Part II Section 5.3.1.C).
The success of the Unit would depend greatly on persuasion and mutual confidence between Departmental Heads and Manager of the Unit. The overall objective would be for an adequate classification and retrieval system.

3.2.2.A Production of reports

One of the important functions of the Unit (where internally produced reports are concerned) would be to ensure that the manuscript is properly approved, typed and checked before issue. Staff in the

Unit would also be responsible for getting the document numbered stamped and recorded.

3.2.2.B Access/Circulation control

Centralised storage and cataloguing would assist in controlling access to reports, and overcoming problems of maintaining the desired consistency in cataloguing, when it is done in different departments. Provision for access could be made only via the Information Unit personnel who would search the catalogue and other indexes for the report. The Unit could also investigate the possibility of maintaining confidential and non-confidential reports on different indexes, to facilitate their access by different users.

3.3 Classification and numbering of internal reports (Arabic)

The first step the Unit's staff should ensure, is to separate departmental correspondence and papers which require only registry treatment from technical reports and memoranda requiring expert subject analysis and deep indexing. This separation should be undertaken when documents are issued to ensure proper indexing and retrieval of technical information of permanent value and to simplify scheduled disposal of ephemeral correspondence and papers.

Co-ordinate indexing should be provided. As most of the internal reports are written in Arabic, a thesaurus of indexing terms suiting the needs of the Institute could be gradually constructed. Both

the OECD Macrothesaurus and UNIDO Thesaurus of Industrial Terms are now available in Arabic and could be consulted.(10)

Internally produced reports and other reports which carry a security grading and bave been obtained as a result of an exchange agreement between organisations, should be indexed at a greater depth as it may be the end point of a large capital outlay.

Decisions will have to be taken whether indexing should be done centrally in the Report Unit or whether each issuing department would do its own indexing according to a standard pattern.
In decentralisation a noticable disadvantage would be inconsistency in indexing (affected partly by turnover of staff), on the other hand, it depends on the staff available and the co-ordination and communication among the various departments.
Centralisation could result in a more consistent pattern of indexing. Nevertheless, a vital element in the success of this approach is the establishment of good channels of communication, and close working relations between the information staff and scientists as this results in a greater appreciation of the total information approach. Scientists could contribute by specifying certain keywords under which the document could be indexed.

To each internally produced report a series code and number could be allocated as the sole means of identification. Reports could then be ordered and filed by the code and number.

An alphabetical designation for each department in the Institute would serve to identify the originating department.

Classification fields could include the following:

- Series Code: An alphabetical designation which identifies the originating body, the S.S.R.C.
- Alphabetical Code: Indicating the particular department responsible for the authorship of the document.
- Single Accession Number Series: There is great advantage in organising the internally produced reports collection by a single accession number series. Every report would be uniquely identified by users and Library personnel through this number. A specific block of numbers could be allocated for each department. This approach ensures that copies of the same report would hold the same number and that it is stamped at the point of production.
- Date of issue
- Type of Report: Progress report, research report, technical note or memorandum.

After agreeing on a scheme acceptable to Management, the Report Unit should publicise the scheme and ensure that proper details are allocated to each report.

3.4 Cataloguing of internal reports

Some standard guides to report cataloguing that have been produced

such as those by the U.S. Committee on Scientific and Technical Information, the Atomic Commision or the National Technical Information Service could be consulted, after which the Unit could produce a guide of its own.

The bibliographical record for an internal report could comprise the following fields:

- Series Code, Alphabetical Code, Type of Report
- Accession Number Series
- Title
- Author(s)
- Date (year/month)
- Pagination
- Subject index entries
- Security classification

An indexing system based on keywords from controlled vocabulary chosen by human indexers, who would analyse carefully the requirements for a detailed thesaurus suited to the Institute's research areas, would result in adequate indexing and subsequent dissemination of information.

An additional feature of the system could be the inclusion of abstracts covering the main theme(s) and subsidiary information considered new or worth recording to supplement the title so as to indicate the scope and nature of the document and level of treatment.

A category code could also be added, thus covering subject fields of particular interest to the Institute.

3.5 Production of lists

One of the main functions of the Report Unit would be the production of various listings for the retrieval of internally generated reports (confidential/non-confidential Arabic), as well as externally acquired reports (confidential/non-confidential Arabic). Automating the Arabic collection at this stage in time, would impose unjustifiable costs and unavailability of efficient hardware and software. (See Part II Section 2.7)
Nevertheless, establishing an organised manual system with adequate classification and retrieval facilities, would be suitable for the Library until future developments in computer technology and the availability of resources justifies automating the collection.

The Unit faces the problem of report arrangement, whether to maintain two separate catalogues, one for confidential internal/external and another for non-confidential internal/external, or to incorporate them into one catalogue.
The first choice has the advantage of better control over security gradings in connection with different user categories. A disadvantage is the extra work to keep both catalogues. The second choice has the advantage of maintaining one file instead of two and the availability of one access point for retrieval.

Taking into consideration security reasons the first approach is more desirable for the S.S.R.C. The main catalogue could consist of non-confidential internal/external Arabic reports, arranged in different categories or subject fields. The second catalogue could consist of confidential internal/external Arabic reports with a special code allocated to differentiate between them.

An additional retrieval facility would be an author index of internal reports (confidential/non-confidential), with cross references between author and report number only. (See page 123).

3.6 Advantages of automating the external reports collection (Foreign Languages)

The external reports collection is rapidly expanding, as scientists greatly depend on it in their research.
The need for better control over the collection makes the choice of automating it a valid one resulting in a more adequate retrieval system. As the collection now is relatively small, converting it into machine readable form, at this stage, would involve a relatively low initial effort allowing the staff experience and confidence for future developments.

Advantages of automation could include:

- Faster clerical input to indexes by eliminating multiple typing and checking operations.
- Production of various output lists convenient to the user.

- Ease of updating indexes and catalogues.
- Provision for a better subject approach to the collection.

3.6.1 General system description

A possible solution to the retrieval problem is the provision of a KWOC index capability for the external reports collection (mainly in English), acquired by the S.S.R.C. The system could consist of several components. The basic system would perform the maintenance and storage of the bibliographical and subject data. The sub-systems would include:

- Subject term control for verification and control of terms to enter the data base.
- Reporting, which provides library listings, accessions bulletins, and SDI bulletins.

Perhaps a suitable model for a computer-based system is that developed by the Aircraft Research Association (ARA),[11] although some modifications may be needed to suite local requirements. The major component of the system used at the ARA is the computer-produced catalogue and subject index keyword listings with indexes under authors' and orginators' references, which are used to produce a monthly accession list and monthly and annual cumulating catalogues. The keywords are supplied manually using a specially-constructed thesaurus.

3.6.2 Record content

The ARA Library uses the following record structure, which could be adopted with additional local modifications if needed. Each record consists of eight data fields, each of which may have up to fifty sub-fields (for multiple authors, report numbers, keywords etc.). Each field must be ended by the (*) and sub-fields by the semi-colon (;). The sign is used as an end-of-record marker. The eight fields must be input in order if they are not labelled in any way at the input stage. If a field is not present only its concluding asterisk need be punched. Data could be prepared on paper tape by the Library staff.

The data required and its order of input could be as follows:

- Accession Number
- Title
- Author
- Report Number (s)
- Date
- Security classification
- Keywords
- Locations (if needed)

3.6.3 Programs

The Institute could investigate the possibility of buying a commercial software package (for example, the National Computing Centre's COIN - Cobol Indexing and maintenance package)[12], or

building its own suite of programs. As programmers are available in the Computer Department, the latter approach would be more suitable and oriented towards the Library's needs and requirements. Programs should perform the following functions:

- Input and merge data
- Correct existing data
- Sort routines
- Print routines

A program should be provided which would incorporate techniques for arranging and displaying index entries according to specific formats for each index. Subject entries would be humanly assigned and the verification, sorting, final page lay-out and formatting operations (e.g. headings, number of columns, page numbers) would be carried out by the computer.

3.7 Outputs of the System

The following outputs could be generated: (See page 124)

1. Main Catalogue

The KWOC listing catalogue would constitute the basic retrieval tool to the collection. Extra keywords could be added manually at the input stage, thus maintaining a greater depth in indexing where titles are ambiguous. Keywords from titles could either be tagged manually, or a program would have to be used to extract the keywords automatically from the titles, in this case a 'stop list' of superfluous

or non-significant words would be used.

As the main keyword catalogue would be the most heavily relied on index for retrieval, an optimum layout will have to be chosen. The system at the ARA Library consists of extracting in turn each keyword allocated to a document, and a full bibliographical reference printed. As the title is the next most relevant item in the entry, printing it separately would make it clearer. A third column is allocated to the bibliographical data which includes all report numbers, authors, data, security classification and all relevant keywords to the document. The accession number is printed separately on the right hand margin and could be used for loans purposes.

The production cycle for the various outputs would depend on the quantity and the speed by which they arrive. Nevertheless, an accessions bulletin of recent arrivals could be produced on an irregular basis, to serve as a means of notification as well as a cumulative catalogue supplementing the annual catalogue.

2. Report Number and Author Indexes

As these indexes are essentailly finding lists, a full entry is not necessary. The report number index could include the report number, author and accession number. The author index could include the author, title, report number and accession number.

3. Conference Index

The system at the ARA Library does not cater for the production of a conference index. This could be a useful additional feature for the retrieval of conferences' resumes.

3.8 SDI Service

An SDI service notifying users of specific documents could be a useful output of the system. A user could enter the system by completing a form, providing identification data, his overall 'topic' and his subject interests. Data from the form would then be transferred to the 'SDI-Input Form' for keypunching and computer processing. A user profile as well as a computer-produced data bank for each participant would then be produced. Each time the master file is updated the subjects of the new documents are matched against those contained in the user profile data bank. Hits are then printed and forwarded to the individual participants.

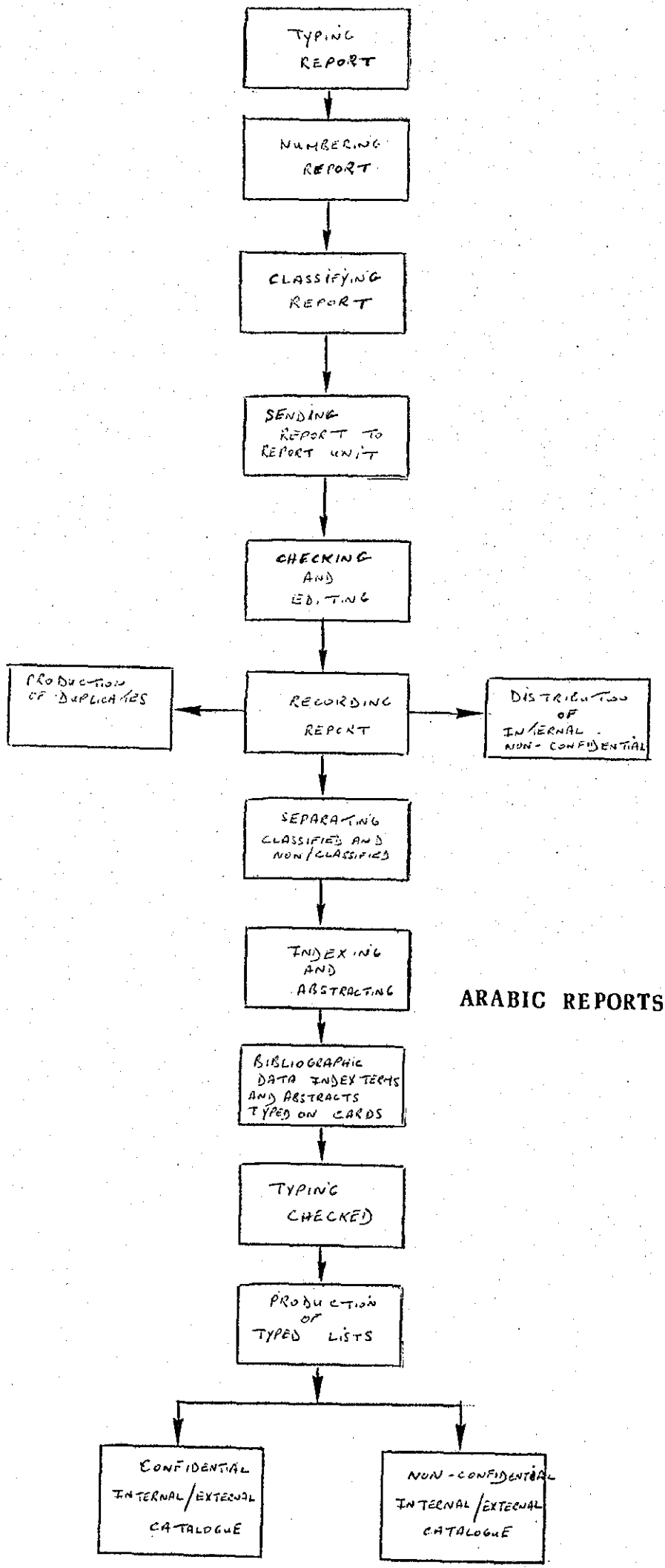
In the case of confidential reports a stricter flow channel for distribution should be devised. The following points should be taken into consideration when providing this service:

- Distribution lists should be checked by the Information Unit before reproduction of the reports.
- The author should be notified of the distribution list, and periodically of anyone requesting a copy of his report.
- Access to security documents can be achieved by informing

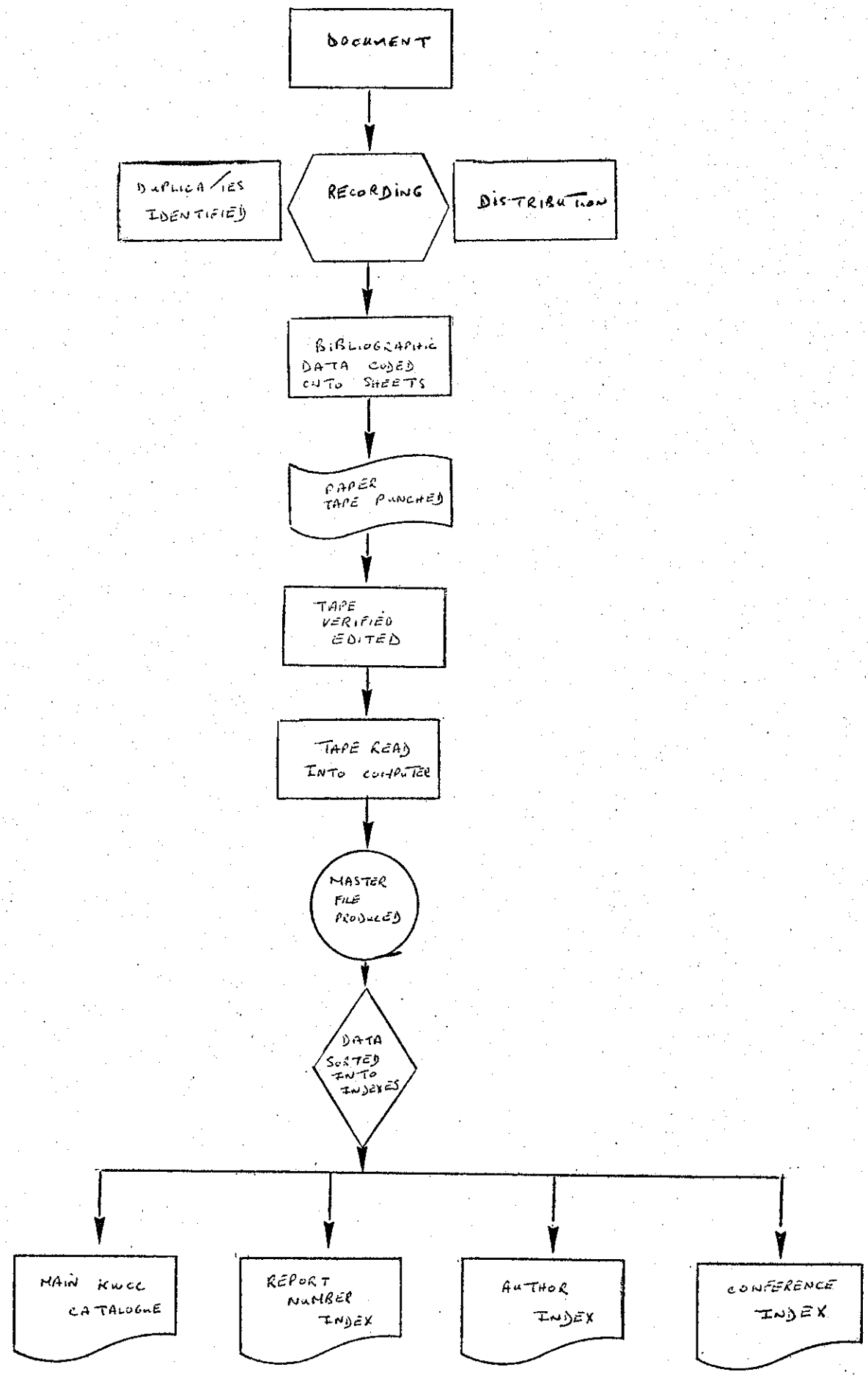
each individual in the Institute of the security grading of documents he is allowed to see. He is then issued with an appropriate order form which enables him to request a security document with the appropriate order form.

- Reviewing the grading of reports regularly is necessary, as the level of confidentiality of the report could fall with time and then the security grading should be lowered allowing the information in it to be used by a wider audience than the original.

- In referring to a specific report when necessary, the series code and serial number only should be mentioned.



ARABIC REPORTS PRODUCTION



REPORTS LISTINGS, FOREIGN LANGUAGES

CHAPTER 4

AUTOMATING THE SERIALS COLLECTION

4.1 Description of the serials system at the S.S.R.C. Library

The scope of the serials collection covers the fields of chemistry, physics, biology, electrical, electronic, chemical and mechanical engineering. The Library subscribes to 470 serials (mainly English and German), most of which date back to 1973. The Library also subscribes to some Arabic and Russian serials.

Two clerical staff are responsible for serials' checking-in and recording. A visible check-in file of one annual card per serial is maintained and filed alphabetically by title, with no subject division. Requests for subscriptions' renewal are checked manually and renewal claims are sent annually to publishers or agents abroad.
Binding lists are accumulated annually and complete volumes are sent to local binders. The Library now holds 1200 bound volumes for the years 1973, 1974, 1975.

Although staff try to provide an efficient service by recording daily an average of 40-50 serial issues, delays in postage slow the process of recording and displaying the serials.
Serials are issued out for circulation after they have been on

display for a week. Users are requested to route the serial back to the Library after which it is issued again to another user. Services to users consist of an occasionally revised typed list of serials arranged in alphabetical order. Users are also notified of new arrivals. Until now, no provision has been made for a complete and up-to-date list of serials holding and their locations.

Although there are some inconsistencies in the manual files, due mainly to turnover of staff, the existing system is adequate for the size of the collection at the present time. Nevertheless, as the stock is expanding rapidly the existing system might fall short of performing the requirements of an adequate service in terms of time and consistency of file maintanance. Automating the system at this stage carries the advantage of converting a samll data base, as well as providing for services that could not be provided as easily or as quickly in a manual system.

4.2 Reasons for automation

The increase in the number of Library users is reflected in the expansion of the serials collection. Thus, the emphasis on the importance of providing a computer-based listing system is based on the following factors:

- Need for an up-to-date and complete holdings list of serials subscribed to by the Library.

- Need to provide better control over the serials collection.

In addition to satisfying a need, the choice of a serils listing system, which is relatively low in the range of complexity, as an initial computer effort in the Library, allows the staff to build experience and confidence which can be applied to more difficult systems in the future. (For example the expansion of the listing system to include other functional aspects of receiving).

When considering to automate the control system, the Library faces the dilemma of unpredictability of the flow pattern of serials' arrival, this is often experienced due to delays in postage. Another factor is that the control system at this stage in time, operates satisfactorily, although some improvements like the provision of Kardex could result in a more accurate and readable file.

4.3 Proposed serials system

Taking into consideration the needs and resources of the Library in implementing the new system, the greatest benefit would be derived from an optimal rather than a maximal approach to automation, not attempting to automate processes more efficiently or economically carried out by the manual system.

The acquisition of all documents is carried out monthly by the Library. Claiming for missing issues of serials is practiced annually, when visual inspection indicates missing issues. Subscription renewal and budgeting of all library documents is carried out by Library

personnel after which invoices pass through the centrally located finance and accounting department of the Institute. Although experience has shown that a high degree of computer control can be expected in this area, automation cannot be justified at this stage, as the system works smoothly and clerical staff are available to carry out the routine jobs efficiently. Nevertheless, the possibility of automating the receiving, subscription renewal and budgeting functions could be taken into consideration in a future stage of the automation project. The suggested model for the automation of serials should provide for the following:

- The model should be economically within the Institute's means in both development and maintenance stages.
- It should be sufficiently flexible to allow for expansion into a more complex system in future when necessary.
- It should be a semi-manual system, where operations connected with listings' production are delegated to the computer, and other operations related to receiving, claiming, subscription renewal and budgeting left to humans.
- It should be a system that could be operated on the 7730 Unidata machine (available for the Library's use) in an off-line batch process mode.
- It should provide better means for the retrieval of information on current and non current serials.
- It should hasten the process of providing serials to users.

4.3.1 Basis for a union catalogue

Although there is no immediate prospect in the near future for processing a union catalogue of serials, if compiled, it would be an indispensible reference tool for librarians as well as researchers in finding out the essential details of a serial, along with the holdings information, i.e. in which libraries it is being received and which volume/numbers are available in these libraries.
The serials collection at the S.S.R.C.. Library constitutes one of the largest collections in a special library in Syria. Thus, a project encompassing the holdings of scientific serials held in major libraries in Syria could be very profitable in terms of resources, staff effort and money. Properly organised and coded entries for different regions once stored in machine-readable data base can be manipulated to generate any desired file and produce various printouts. Nevertheless, co-operation is a prerequisite of such a major enterprise.

4.3.2 General system description

The proposed structure for files involves the generation of a Main File (Master File) on which all the data base of serials' information of the Library will be kept. This file could be arranged in alphabetical Coden order. Because the system will be basically a listing system processed in batch mode, it would be adequate to store the files serially on magnetic tape and search them sequentially which would result in short run times.

4.3.3 Programs

Programs should cater for updating and modifying the Master File in the following areas:

- correcting a record which contains some incorrect information while genrating it.
- when there is a change in the various components of an entry.
- when a serial ceases or changes its title and so on.

Programs should also generate the relevant files and print the various listings in sorted order. (See page 137 & 138)
The information in the file may vary from record to record or from field to field, subject only to the restriction that records may not exceed a certain number of characters in length. For sorting purposes it would be more convenient if every record had the same field structure. The fields in a record must be punched in the correct order, although fields may be omitted. An indication of the end of a record should be inserted at the end of each record.

4.4 Outputs of the System

Outputs of the system could consist of the following: (See page 139)

1. Master File

This file would contain all the bibliographical data, which could consist of the following fields:

- Coden
- Main entry (title and cross references, title changes)

- Sponsoring body
- Subject heading (coded)
- Frequency code
- Country code
- Holdings (bound volumes, separate issues, missing issues,
- location of holdings, display shelf number)
- Number of copies
- Current/non-current
- Serial identification number (with intervals of 100)
- Price of yearly subscription (international currency, S.L.)
- Abstracts' code
- Value code (for serial title evaluation)
- Display code

2. Subject List

The subject list record could contain the following elements:

- Title of serial
- Current code (where a serial is currently recieved in the Library)
- Non-current code (for a serial of which there are holdings but which is no longer received)
- Coded subject headings

The output could be arranged by subject headings and alphabetically by title.

3. Alphabetical Holdings List

This list would provide information on all new additions to retrospective holdings of titles on the master file. Records could include the following fields:

- Title of serial
- Holdings details (volumes, issue numbers, year, location of bound volumes, shelf number, display shelf number)

4. Coden List

This list constitutes the key to the master file, and would be arranged in alphabetical title order.

5. Display List

This list would serve as a reference tool for Library users and would help staff to display the serials. The record format would include:

- Title of serial
- Subject code
- Shelf number

The list would be arranged alphabetically by title with issuing frequency.

6. Price List

Although the system would not provide for the claiming

processes, this list would be useful for a 'Periodical Title Evaluation' (Scrutiny), a program would list all copies in the file requiring annual review prior to renewal. This procedure would be controlled by the 'value code' assigned individually to each serial. The listing would include full title, abbreviated holdings statement and the annual cost. Given this information, users would be requested to vote for retention of items for the next year. Those not receiving sufficient votes are not renewed.

7. Sponsor List

The sponsor list would consist of the name of a sponsor body and all titles listed beneath in alphabetical order. Provision should be made for changes in the name of the sponsor body, and for titles that have two sponsors.

8. New/Cancelled Subscriptions Bulletin (Alterations Bulletin)

This bulletin could be produced monthly or bimonthly depending on the amount of data changes involved. The system should cater for the appearance of an altered record in two or three successive bulletins. Data in the bulletin concerning each record could include:

- Full serial title
- Subject heading
- Commencement date of acquisition / date of cancellation
- Frequency of publication

A copy of this bulletin for housekepping functions would include

more details about holdings and price. The bulletin could be divided into three sections; new subscriptions, cancelled subscriptions, and any alterations occuring on the data of existing records.

9. Statistics Reports

Normal operating statistics desired for administration and control of the serials operations could be readily available in a computer-based system. A big variety of reports could be generated:

Total number of items in master file (in a certain month)
" " " copies cancelled "
" " " new copies added "
" " " see reference items "

Other examples include growth statistics by month and year, number of items in given groups (e.g. subjects) completed volumes, computer run times etc.

4.5 Circulation of Serials

At its present state the Library does not operate a routing system for serials. Users can borrow individual issues for a limited period after they have been on display for a week.

There are two alternatives to providing a routing service, the reorganisation of the manual operation and automating the system. Building a sound manual system would involve creating a numbered list of titles to be routed and distributed to users who would

indicate their choices and return it to the Library, creating an index card for each serial, recording selections on serial title records and typing and reproducing routing lists. Lists could be generated annually and updated manually.
Although the initial effort might not be large, keeping up with changes of interest, staff turnover, changes in serials records could be a time consuming problem.

Automation is another alternative for routing serials,although also involving work associated with updating and maintaining files and the initial effort in coding and keypunching data.

But before deciding to automate a feasible alternative could be for Library staff to experiment in improving the existing system by providing better access to the contents of serials without the need to circulate them.
An illuminated and spacious room would encourage users to browse in the Library more regularly. Provision should also be made for an accessible photocopying machine. Users should be encouraged to use the Library, as it brings together research staff and library staff. In addition to that the circulation list for a given serial may be lengthy and some people may keep the serial a long time before passing it over. Routing a serial back to the Library after each individual may result in a firmer control on circulation but the cost would be a delay in time as well as the inaccessibility of a serial to the user who browses through the Library stock.

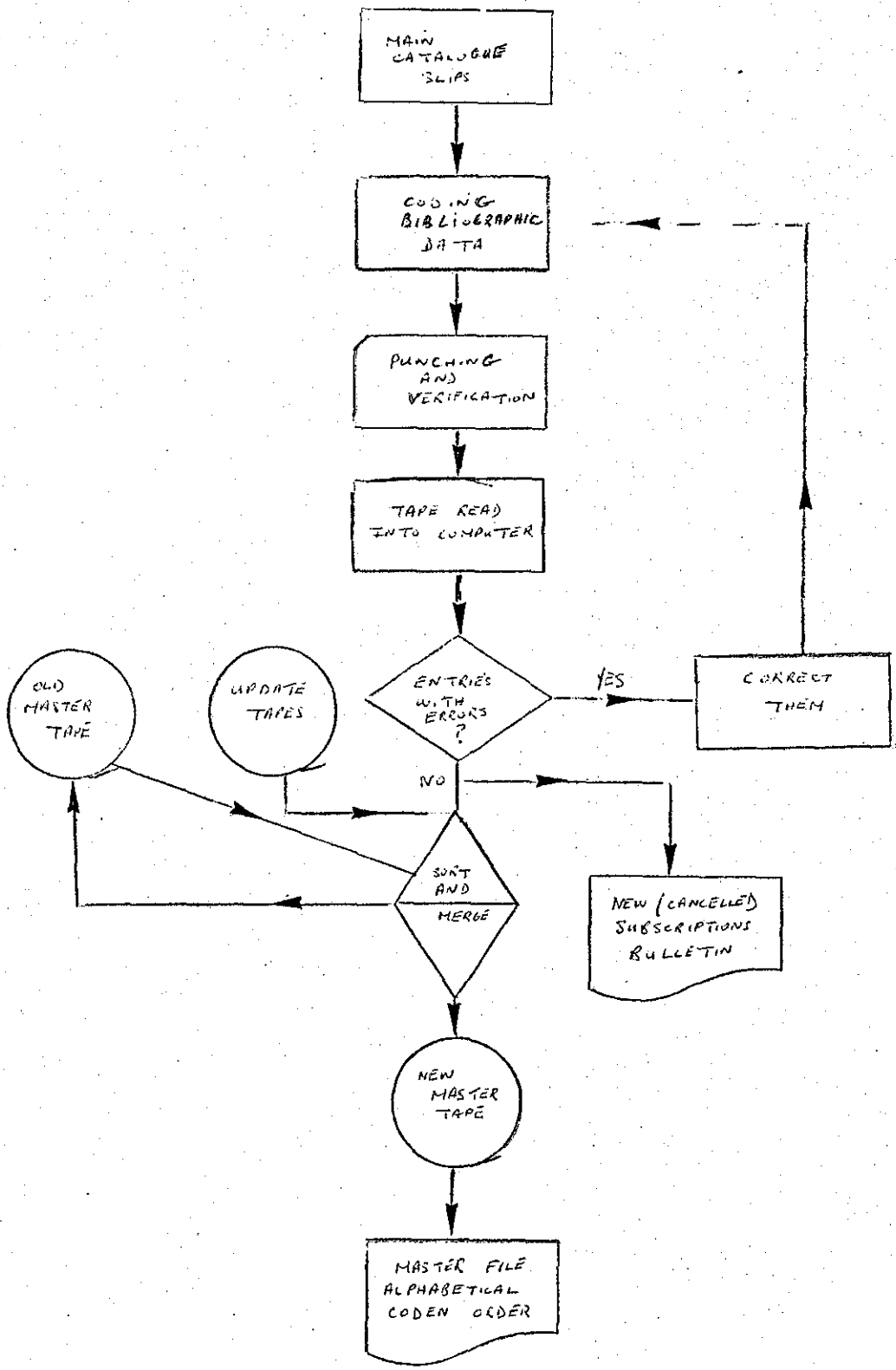
On the other hand, if the Library decides to operate an automated routing system in the future, it could be independently installed. An example of which is the 80-column punched system at the Pressed Steel Fisher Ltd. in Oxford. The file processed by the computer produces circulation labels, the circulation list for each circulated copy and a list of serials seen by each person.

Some suggestions for an improved service to users could include:

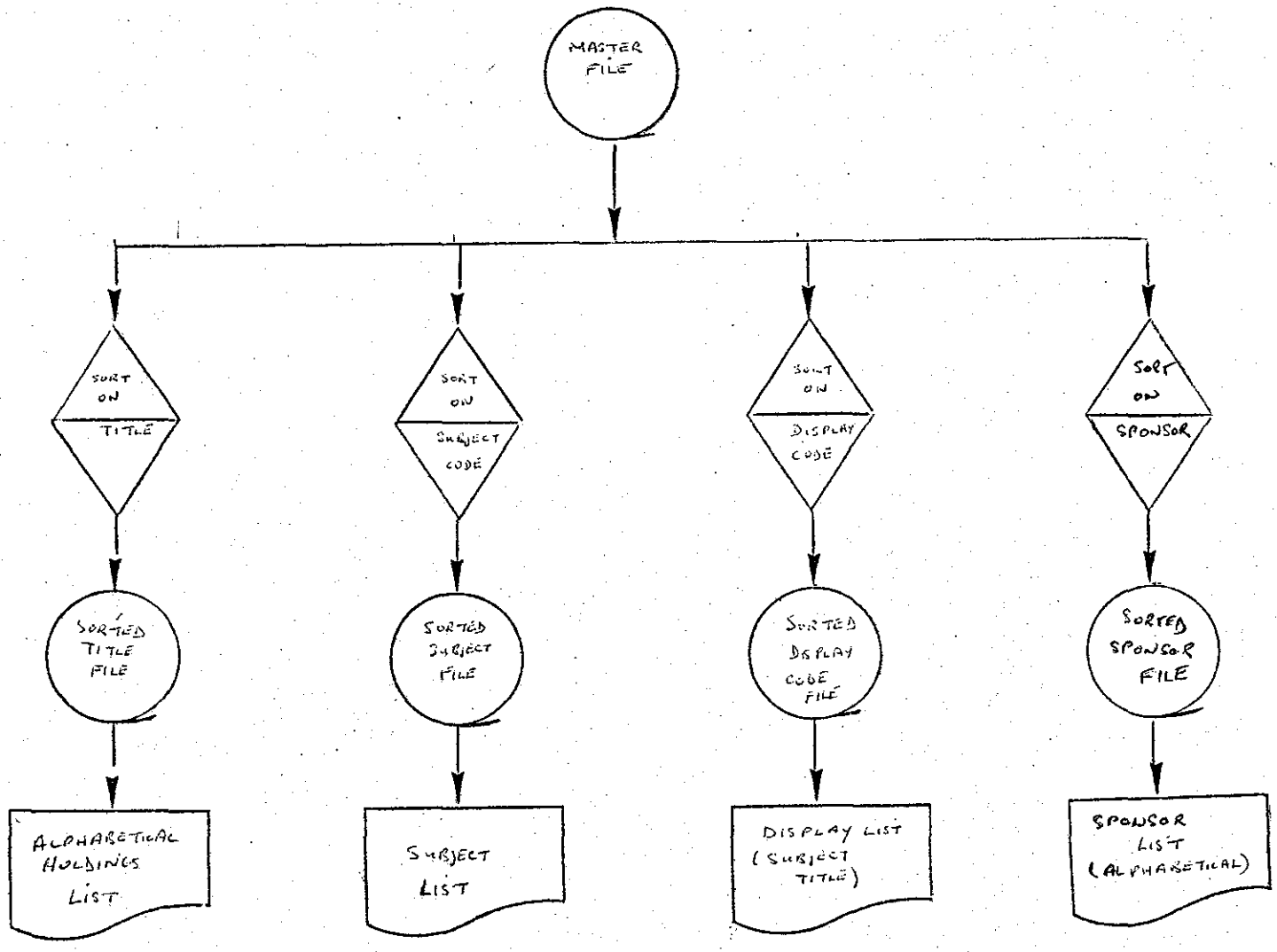
- Provision for the circulation of photocopies of contents pages which could reach recipients immediately avoiding circulation problems. If the original serial were still requested, it would be discharged as an ordinary loan for 3 days, after it has been displayed for 3 - 4 weeks.

- Another alternative involving more work but providing a better service would be to abstract or list articles in the serials taken by the Library, and publicise the results in a library bulletin, or accessions list, afterwhich photocopies of specific articles requested could be made. (See Part II Section 5.3.1.D)

- The practice of attaching a slip to the serials on display on which users could indicate the articles requested for photocopying would be another alternative.



FLOW CHART FOR SERIALS MASTER FILE



MAIN SERIALS LISTINGS

SUGGESTED DISTRIBUTION OF SERIALS LISTINGS

	LISTINGS	FREQUENCY	COPIES (each time)
1.	Master File Library Office	4 p.a.	1
2.	Subject List Library Library Office Departments (3)	4 p.a.	5
3.	Alphabetical Holdings List Library (2) Library Office Departments (3)	4 p.a.	6
4.	Coden List Library Library Office	4 p.a.	2
5.	Display List Library Library Office	2 p.a.	2
6.	Price List Library Office	1 p.a.	3
7.	Sponsor List Library Library Office	2 p.a.	2
8.	New/Cancelled Subscriptions Bulletin (Alterations Bulletin) Library Library Office (2) Departments (3)	Irregular	6
9.	Statistics Reports	Irregular	-

CHAPTER 5

PROPOSED SYSTEM OF

LIBRARY, INFORMATION AND DOCUMENTATION SERVICES FOR THE S.S.R.C.

5.1 Introduction

As the Library is still in its development stages, an administrative and organisational structure has not yet been established. Plans exist for restructuring Library and Information Services, and creating new departments to provide additional current awareness and translation services.

In designing a new structure for Library services, the availability of specialist personnel, funds, and staff training are essential factors which affect the design of departments and their related services.

There are seven staff working in the Library. (See page 80, Part II, Section 1.4.3) Six clerical staff work as a team and report to the senior member in charge of co-ordinating various services. Although Library staff are responsible for checking, preparing invoices and corresponding with vendors, the Library works closely with the Accounts Department which is responsible for handling actual payments to suppliers and maintaining records of vendor accounts.

Availability of funds, personnel, the extent to which library services will expand in the future, and the expansion of the Institute as a whole are factors which make it difficult at this stage to draw a detailed outline of the administrative hierarchical structure of the Library.
Neverthelss, an attempt will be made to draw a general proposal for the Library, Information and Documentation Services taking into consideration the needs of the users and the resources available or that could be made available in the future.

As indicated on page 155, the Library, Information and Documentation Services could be divided into five functions or sections:

- Processing Services
- Information Services
- Translation Services
- Documentation Services
- Mechanised Services

5. 2 Processing Services

The functions of the Processing Services Department could consist of all activities necessary for acquiring library material for use by its patrons, as well as cataloguing it. Other responsibilities allocated to this Department could include the preparation of all invoices connected with all types of materials, preparation and binding procedures, and informing users of recent accessions to

the Library. Co-operation with the Information Section would be desirable, especially where the acquisition process of specialised material is concerned.

5.3 Information Services

This Department could encompass all the activities necessary for providing library materials and services to the users. The core of the Information Services would consist of the Information Section, the Reading Rooms (which would include a general reference section), and the Circulation Unit responsible for loans within and outside the Institute.

5.3.1 Information Section

The Information Section could be divided into several subject groups depending on the specialised personnel available. Choosing the appropriate cadre of personnel could take some time, as it is essential that qualified people with knowledge of disseminating and processing information should be selected at the initial stage. (University graduates with suitable subject qualifications could be sent abroad to train in the Library and Information Science field).

Although the Information Section could be housed in the main Library, most of its work would be concerned with the scientific departments through organised channels of cummunication, which is of singular importance for the establishment of an effective user oriented service.

Services provided by the Information Section could include the following:

5.3.1.A Current Awareness

These services would be oriented towards the needs and interests of the scientists. There are various means by which current awareness services could be provided. Scanning current literature incoming into the Library would inform users of the existence of newly-published or newly available documents. The literature scanned could include serials, books, patents, reports, current awareness publications (both current contents publications and current awareness serials). Other responsibilities allocated to the Information Section personnel could include scanning literature on conferences and exhibitions and informaing the departments of the forthcoming conferences related to their specific interests.
Nevertheless, it should be pointed out that there are certain problems associated with scanning current literature in-house, such as, the unavailability of appropriate staff, and costs in terms of staff time and budget to access all the literature.

The Library could also study the possibility of buying current awareness services facilities related to specific fields, e.g. Engineering Index, ESRO (European Space Research Organisation for aerospace and aeronautical engineering), INSPEC (for physics, electrotechnology, computers and control) and UKCIS (for chemical science).
These commercial services could be used for getting a list of references

over recent years, or a list of the latest references in a specific field at regular intervals. (Some commercial services also supply copies of the documents).

The Library could especially benefit from such services for a period of time until a professional calibre of staff are available to produce such a service. Nevertheless, before choosing a service, of great importance is to see that it covers the literature in the particular subject field adequately, and that staff will have access to the original documents which the service identifies.

(The BLL could provide some documents.)

5.3.1.B SDI (Selective Dissemination of Information)

Specialised information services directed towards groups of users or individuals could be a function of the Information Section. These could include on demand bibliographical surveys, informal conversation and telephone calls.

A substitute for serials circulation would be a contents list. The format could vary from simple photocopying of contents pages to arrangement of titles in subject sequence.

A summing up of the responsibilities of the Information Section would include:

- Each group would be responsible for scanning serials for relevant articles matched against interest of projects of their related departments.
- Production of SDI profiles matched against personal interests of users.

- Dealing with technical enquiries for information.
- Participation in the selection of books, serials, reports, and patents needed by the various departments.

5.3.1.C Reports

The advantage of keeping the reports collection as part of the Information Section is that technical personnel could provide better subject analysis and deeper indexing. Problems related to access of confidential documents would also be overcome as the Reports Unit would constitute the only access point.

5.3.1.D Production of Bulletins

The compilation and production of various bulletins would depend greatly on the available personnel. Bulletins could include:

Reports Bulletin: Automation of the reports collection would facilitate the production of the reports accession's bulletin. A separate bulletin could be typed for in-house generated reports in Arabic. (See Part II Section 3.5)

Abstracts Bulletin: The Library should study carefully the cost-benefits of internally producing an abstracting bulletin in terms of staff availability and time. Benefits of such a bulletin are not hard to find. Whereas, the Information Unit personnel can get to know individual backgrounds and interests of the scientists and engineers, they can therefore orient the scanned and abstracted

information to fit the users needs, the commercially available services are more general in their coverage, and may not include all serials available in the Library in their coverage.

Building an in-house abstracting service immediately poses a personnel problem, where to find people and how to train them. This question of specialised information manpower in the Arab Countries was discussed in the meeting held in Cairo, 11 - 17 February 1974.(13) Participants recognised the need for personnel at two different levels, the professionals of high level (with formal academic education), and the professionals of medium level (notably with short-term courses and extensive in-service training). After examining available training facilities the meeting emphasized the need to establish schools with curricula conforming to basic international standards. As yet, there are no Library Schools in Syria, careful planning should be taken by the S.S.R.C. Management to build a cadre of qualified personnel. Opportunities could be created for training and educating staff at different levels (information officers,librarians, abstractors, indexers, translators) abroad or in neighbouring countries, such as Egypt.

Library Bulletin: An alternative to the Abstracting Bulletin could be a current awareness bulletin compiled by the co-operation of the various groups in the Information Section. The bulletin would be divided into topics of interest related to each department. Material included would be the result of scanning the incoming literature of serials' and technical articles, reports and books.

A special section in the bulletin could be allocated to inform users of recent material in specific fields which the Library could consider acquiring.

The bulletin should be attractive in printing and layout with a pre-printed heading for the first page, coloured if possible.

The items should be numbered and a form could be provided, perhaps as part of the back page, on which the reader can fill in the numbers of the items he wants to see, with his name, department, tear off and send it. Rapid sevice of these requests with photocopies of short items where possible is important. A standard list of subject headings for arrangement of items would help users of the service.

5.3.2 Main Library

As the Library stock is expanding continuously, careful planning should be undertaken in estimating the space required for unit quantities of the various materials to be stored.

Management has relised the problem of lack of space and there are future plans for centralising the Library and related information services in a new building.

A suggested distribution of materials in the Library could be for the Reading Rooms to house the following collections:

- books collection (all languages)
- Documents (in-house and regional)
- microfilm readers
- patents collection

- photocopying service
- circulation service

5.3.3 Interlibrary loan

At the present stage, interlibrary loan is practiced on a limited scale with some governmental institutes.
In its future development plans, the Library could investigate the possibility of organised co-operation in the field of documents' exchange with special libraries in the region and neighbouring countries. For photocopies of articles the Library could use the resources of existing international centres for information and documentation by opening up communication channels with such centres as the United Nations Industrial Development Organisation (UNIDO), in Vienna, the Industrial Development Centre for Arab States (IDCAS) in Cairo, the British Library Lending Division (BLL) in Boston Spa, England, etc..

5.4 Translation Services

An essential component of information services in a special research library is the availability of a translation service.
The S.S.R.C. Library recognises the need to provide a translation service in the future when a professional cadre of personnel is available.

The main responsibilities of translators would include translating

technical papers and serials articles from German, Russian, French, and English to Arabic; face to face translations and translation of contents pages. Translators could also abstract and preferably index the foreign material they are dealing with. (If they do not index indexers in the Information Section could do so).

Indexes of translations should be consulted to ensure that a translation is not already available or in preparation before any attempt is made at translating articles or books. This could be achieved by applying to institutes who hold catalogues of translations such as Aslib's Commonwealth Translations Index, and the European Translations Centre.

A list of translations could be provided monthly or bi-monthly as a separate list or as part of the Internal Reports Bulletin.

5.5 Documentation Services

The basic responsibility of this department would be to plan, organise and co-ordinate the various services and activities in the Processing Services, Information Services, Translation Services, and Mechanised Services Departments.

Other services could include:

- Conducting surveys of users needs and potential markets for new services.
- Providing a channel of communication for the Library's participation in international activities.

- Keeping up to-date with developments and information standardization of documentation and library techniques, by co-operation at regional and international levels, and through maintaining communication channels with the International Organisation for Standardisation (ISO), and the Arab League Educational and Cultural and Scientific Organisation (ALECSO).
- Liaison with other libraries in Syria.

5.6 Mechanised Services

Fundamental changes accompany the automation of library functions. These changes are noted in the redistribution of library tasks, training of existing staff and in some cases (where possible) the employment of additional experienced staff to initiate the design of the automation project.

Different tasks involving the analysis, design, computer programming and implementation of the new system could be allocated to a team that may consist of a system analyst, a system designer, a system programmer, an application programmer and a librarian.

Nevertheless, the size of the automation team would depend greatly on the complexity of the project. In cases where the project is not complex in nature, and where expertise resources are scarce, tasks could be allocated to a small team (from the library and computer department) who would share the responsibility of implementing the system.

The provision of extra personnel for the system development

process would depend on whether the Library decides to undertake an integrated overall automation project for all library functions, or whether it decides to take a peacemeal approach to automation. Another factor affecting the choice of personnel is computer provision via the Institute's mainframe or a dedicated minicomputer.

If the Library decides to use the mainframe, affiliation with the Computer Department Personnel could be attractive. Computer personnel could work on a part-time or full time basis, co-operating with Library staff and system users. On the other hand, the choice of a minicomputer for Library operations may involve staffing the Library with additional computer personnel whose main responsibility would be the development and implementation of the new system. Depending on the expertise and number of staff available in the Computer Department seconding staff permanently would be more economic than employing new staff.

A summary of the responsibilities of the automation team would be; the analysis of existing library operations, conceptual design of what is desired under an automated system, form and other output design, review of published literature and on-site analysis of selected efforts of a related nature, determination of machine configuration to support the system design, study of machine efficiency and reliability of mainframe/minicomputer plus peripheral equipment, choice of programming language, check out and debugging of programs, cost effectiveness study of present manpower, conversion analysis of

space requirements and equipment changes, staff training programs with manuals or computer aided instruction system documentation and publicity, systems programming and applications programming and project management.

5.6.1 Team organisation

The organisational unit of the automation program may be first an office then later a division when the group is larger and the function more permanent.

It is essential for the success of the project that the automation team be responsible to senior management. This higher contact level could be the Computer Department which would understand technical aspects of the job more readily. Nevertheless, involvement of Library Management is also essential. Co-operation and communication between the automation team and the Processing and Information Services Departments is important for the success of the project.

Taking into consideration staff resources and the size of the initial effort of the automation project, the team could consist of a system programmer who would work with, and write programs that would offer to the application programmers certain essential machine facilities such as terminal access, special compilers and languages for writing applications programs, an application programmer, who would write the programs which actually execute user defined tasks, an analyst/designer who would get out with the users of the sytem, the librarian, staff and readers, and would define the requirements

of the new system, and a librarian who would evaluate existing services and those proposed for the future with regard to user needs, efficiency of equipment and methods of operation.

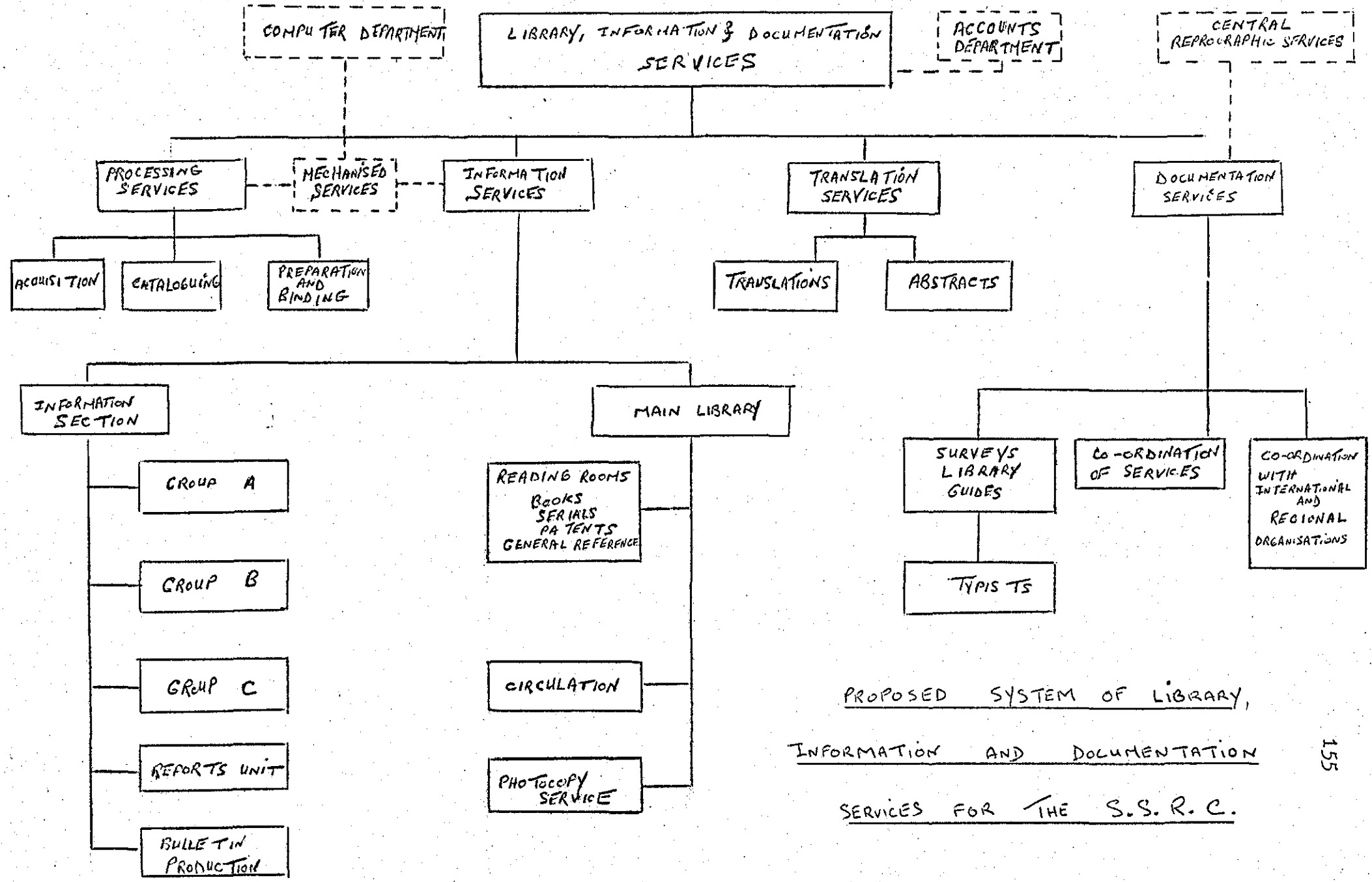
The decision of the Library to acquire a dedicated minicomputer at a future stage may involve providing new functions as part of the major project to expand the Mechanised Services Department. These functions may include:

- The data processing function, which would consist of all maintenance and application operations related to the library based computer and peripheral equipment in the Library, as well as liaison with computer facilities outside the library in order to co-ordinate activities when necessary.
- The analysis and design of data processing and information handling systems for the Library, which would include the development of general system design, application of analytical techniques to the study and evaluation of both existing systems and procedures to assigned tasks, conversion of existing operations to new ones and preparation of manuals.

5.6.2 Documentation

Documentation of the systems analysis work, design and programming is of singular importance to the success of the project, especially details for purposes of debugging, maintenance and transfer to others.

The purpose of documenting the project would be to make progress visible to Mangement Personnel in the Institute, to communicate designs for staff knowledge and participation, to record the reasons for specific logical decisions and design features, and to communicate project results to the outside world.



PROPOSED SYSTEM OF LIBRARY, INFORMATION AND DOCUMENTATION SERVICES FOR THE S.S.R.C.

5.7 Future Developments

The S.S.R.C. Library is continuously expanding, thus the developemnt of library, information and documentation sevices is of singular importance.

In this study an attempt has been made to stress the need for a gradual approach to the implementation of a computer-based system. The recommendations are to serve as guidelines for the developments foreseen for the future.
Nevertheless, it is recognised at this stage, that the initial effort would depend greatly on staff availability and resources.

Finally, it is hoped that the ensuing stages of the automation project would encompass the area of circulation control with provision of on-line facilities for library operations.

References

1. SHENITIN, M., Unesco and library related services in Arabic speaking countries. Unesco Bulletin of Libraries, XX, (5), September/October 1966.

2. ISTANBULI,M.N., Libraries in Syria. M.Sc. Loughborough University of Technology, 1975.

3. UNESCO Meeting of experts on the National Planning of Documentation and Library Services in Arab Countries. Cairo 11-17 February 1974. COM/73 CONF 611/3, p4.

4. ABDO, E., Syrian Arab Republic. Bibliography, Documentation and Terminology, XVI, (6), November/December 1976, 298-299.

5. ISTANBULI, M.N. op cit.

6. DULONG, A., Syrie, situation perspectives de l'information scientifique et technique. Unesco, FMR/SC /STI/76/125, p15.

7. WEIZMAN, S., Minicomputers systems, structure, implementation and application. Englwood Cliffs, New Jersey, 1974, p. 20.

8. HYMAN, M. & E. Wallis, Mini-computers and bibliographic information retrieval. BL Research and Development Report, 5305 HC, 1976, p.20.

9. SABREY, A.R. & A.E. Jeffreys, The catalogue conversion project of the National Library, Cairo, a progress report. Program, 9, (2), April 1975, 78-83.

10. ZAHAWI, F., Industrial information in the Arab countries. In Information Systems for socio economic development - retrospect and prospect, 1975. Brussels, Symposium, Procedings of the International Federation of Documentation 1976.

11. BARNETT, C., A computer produced keyword indexing system for technical reports in the Library of the Aircraft Research Association Ltd. In AGARD, CP - 136, Advisory Group for Aerospace Research and Development, October 1973, 1-1 - 1-7.

12. CAMPEY, L., Generating and printing indexes by computer. Aslib Occasional Papers no. 11, 1972, p.58.

13. UNESCO meeting of experts on the National Planning of Documentation and Library Services in Arab Countries, op cit.