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Small Technical Libraries

by: D. J. Campbell

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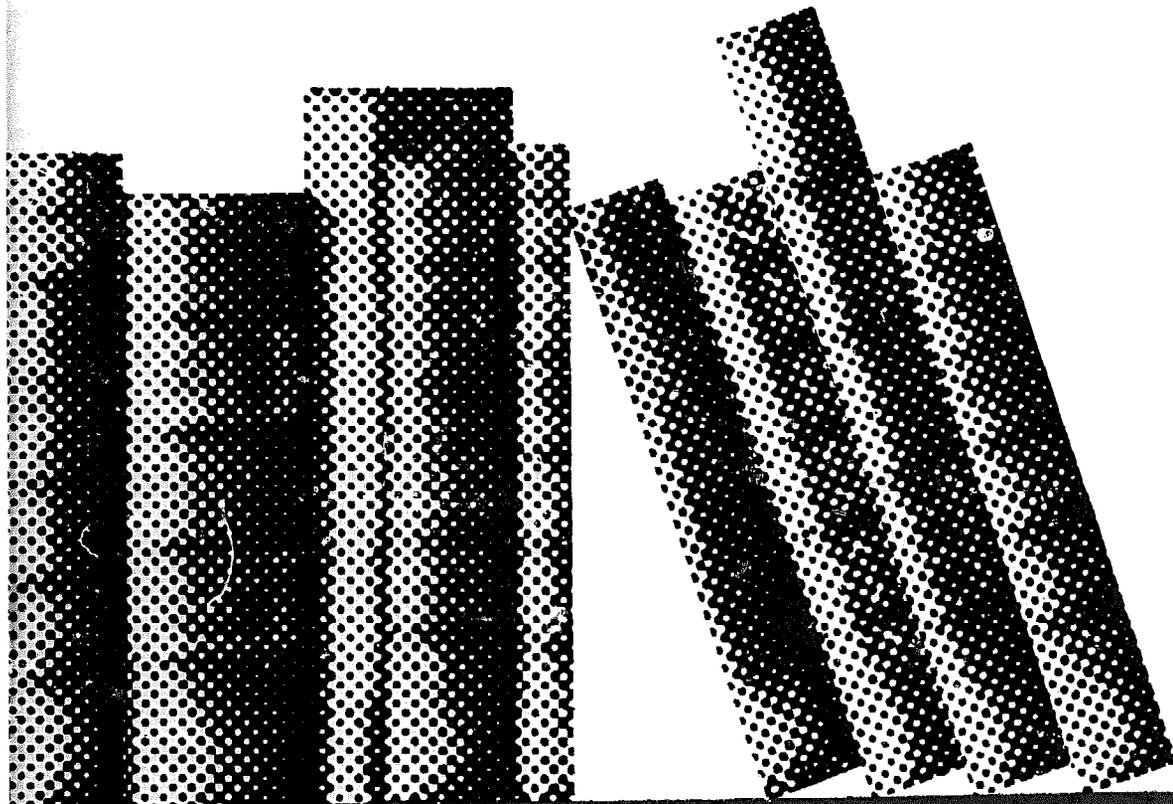
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small technical libraries

by D. J. Campbell, Ph. D.(Chemistry)



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*A guide for librarians without
technological training*

small technical libraries

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1 Introduction

This article¹ has been written to help librarians who find themselves working in technical environments, but who have no real technical background. It assumes that they are qualified, or at least trained librarians, and tries to tell them some of the points they would otherwise have to learn by experience. However, standards of qualification and training vary, and librarians come into technical work from a variety of other libraries. Some of the points discussed will be well known to many of those who read it; they may not be well known to all for whom the article has been written. In it, the words 'technology', 'technical' cover also science and scientific.

1.1 THE NEED FOR TECHNICAL KNOWLEDGE

Ideally, a technical librarian should be someone with training and a qualification in, or at least fairly long experience of, an appropriate branch of technology, who has also trained and qualified as a librarian. There are few such people, far too few to fill the need. Most technical librarians, without encouragement to study, know only what they have picked up. Consequently, they are handicapped and feel at a loss in facing technical problems; sometimes they may not fully understand the terms their users use. A technical man who senses that a librarian does not understand him will have little confidence in any information he can supply.

Because of this, in some developed countries, particularly in industry, a new profession has grown up, called 'information science' or 'informatics'. The information scientist is normally a trained scientist or technologist (in the usual sense) but may be an economist or an expert in commerce or management. He specializes in finding, evaluating and presenting information to other specialists, mostly from the literature (this activity is sometimes called 'documentation') but also from experts and any source open to him. (The work has nothing to do with commercial espionage.) Information scientists are users of libraries, not librarians, though they sometimes administer libraries, with the help of librarians. The two professions have not fully separated, and many people combine both functions.

1. It is a pleasure to thank Professor W. Ashworth, Librarian, The Polytechnic of Central London, and Denis Whale, Department of Technical Information, Tube Investments Ltd, Birmingham, who read and made many valuable comments on my final draft. I am also very grateful to P. H. Vickers, of Aslib, who informed me on the present position on microforms and microform readers and to the library staff at Aslib.

A small technical library with a staff of up to six will not often have an information scientist on its staff, though this is more likely if it is in industry.

It has been said that a special librarian need only know the literature of his subjects, not the subjects themselves. This is not a meaningful distinction; nobody can really know the first without the second. A librarian new to technology will do well to dismiss the idea from his mind. He should set out to learn as much as he can about the subjects he is concerned with, their unsolved problems, technical jargon, prominent personalities, great figures of the past, and the main organizations concerned with them (many of them valuable sources of information) in his own and other important countries. How far he can do this depends on the range of subjects covered. Everyone tends to underestimate the size and importance of subjects they are not familiar with. The technical librarian should realize that the subject content and the literature of even a small subdivision of technology, e.g. glass technology or petroleum engineering, are probably larger than those of the whole of librarianship.

He can learn much from his technical colleagues, by asking intelligent questions, and if he makes clear his desire to learn, so that he can serve them better, they will nearly always go out of their way to help him. What he can learn in this way will be disjointed and unorganized, because it is not fitted into a systematic framework, and is never enough. He should take whatever opportunities are open to him of more formal instruction, by evening classes and perhaps correspondence courses. These are virtually all aimed at getting candidates through examinations, and may not be adapted to the librarian's needs. He should supplement them by suitable reading, on which his technical colleagues will advise him if he asks. If he can get a sympathetic and experienced technologist to guide his studies, this will be a great help. He should not undertake too much at once, but should start with the subject of main interest to his employers.

Until he has made considerable progress in a subject, he will have to lean heavily on his colleagues for advice on selection and policy generally, in technical matters, and may not be accepted by them, at first, as a colleague of fully equal status.

1.2 THE TECHNICAL LIBRARIAN'S JOB

The librarian's first main job is to have in his library the most useful material, as helpfully arranged and 'guided' as possible, catalogued and indexed clearly and sufficiently to meet users' needs. He should know the stocks of other local libraries, their strengths and weaknesses, and what they will lend. He should know thoroughly the techniques of literature searching, and of dealing with inquiries. These are rather different from those of 'reference service' as practised in public libraries. There is an excellent and recent guide to them by Hanson [27]¹ which obviates the need to discuss them here.

All library rules should be considered from the users' point of view as well as the staff's. The librarian should be flexible in his approach, and will do well to take the view: 'We have as few rules as possible and will gladly break any of them if I think the circumstances justify it.' Blind adherence to rules is not consistent with a good service, on a personal basis, but is more necessary in public libraries, or when dealing with students.

1.2.1 'Selling' the service

The librarian's second main job is to 'sell' the service, to convince people of its value. It is not enough to have useful material, well arranged and catalogued,

1. Figures in brackets refer to the bibliography which appears at the end of the guide.

unless the people who could benefit from it know that it is there. The librarian must tell them. He should have an outgoing, extrovert personality, and be able to get on good terms with and earn the confidence of many different kinds of people. He and his staff should be always courteous, friendly and approachable. Smiles cost nothing and smooth many paths. In 'selling' his service the librarian will meet many curious attitudes to libraries. To some people a library is a place where mediocre people waste their time reading when they should be working, or where out-of-date books are kept, or where a dragon-like librarian does his best to prevent anybody borrowing anything. Company directors tend to have a jaundiced view of libraries, as inessential 'overhead' expenses.

The best way to get round this is to 'sell' the library, not as a library, but as an information service. Most people can get along without any great use of books, but everyone, at some time, needs information, and many people need it often. They naturally ask their near-by colleagues first, and perhaps telephone others. The librarian should persuade people that the next source to contact, almost always, is the library, because it is, or should be, the master key to information, not only in printed matter, but in people's heads, inside and outside the organization.

The librarian should ask the personnel department, or the administration, to send him the names and departments of all new staff, research workers, etc. He should send them a pre-printed postcard inviting them to visit the library and be shown round. He should make time, himself, to show them the library, and the parts of the stock of most interest to them. He should use this opportunity to learn their interests. He should explain the classification and the catalogues, and give them copies of recent lists of acquisitions, and of periodical holdings. He should explain the library's services, especially borrowing material from other libraries. He should stress that the library and information service is open to all staff and research workers (and if possible to all employees) irrespective of status, and also tell the visitor which of the library staff to contact for different purposes. (A notice should also give this information.)

In a college, the librarian will normally give a general lecture to all students on the use of the library, perhaps once a year and, however crowded the time-table, should follow this up with seminars to smaller groups, if possible with practical work, perhaps suggested by the students to tie in with their other work.

The librarian should make time, each week, to go round offices, laboratories, workshops, etc., according to a plan, getting to know people, what they are doing, and telling them about his services in a tactful way. He will pick up a lot of interesting news and information, and not a few inquiries. This regular visiting is particularly important if he controls a periodical circulation system, as he needs to keep in touch with the whereabouts of sections and departments, and in a large organization these may often change. He should be on the distribution list for details of organizational and staff changes.

It may be possible (particularly in a research organization) and is often helpful, when the library is established and working well, to have periodical meetings (say, every two years) to which the staff are invited, department by department, to discuss the library's services and possible improvements. These should not be so large as to inhibit the shy; twenty to thirty people is a suitable number. A senior person, not the librarian, should take the chair. The librarian should ask for frank opinions of the service, criticisms, and possible improvements. After some hesitation, people will open up with minor dissatisfactions, and can be led on to any grievances and criticisms, and from these to ideas for new services. The librarian should record them all, answer them if he can, or promise to consider them, unless obviously impracticable (when he should say why). Later he should tell the persons concerned what has been done. Such meetings, well handled, help to 'sell' the library service, by convincing people of the library staff's desire to be helpful. They are a great help, also, in assessing how well the library is succeeding in this.

The librarian should of course keep up with the relevant literature, not only of

librarianship, but of information science, from which he can gain ideas. The two fields still overlap considerably.

1.2.2 *Ideas from information science*

A newly appointed information scientist will visit, by appointment, senior managers or officials, heads of sections and departments, to learn their interests, current preoccupations, responsibilities, and where they fit into the 'chain of command'. He will make notes of these, and of his estimates of their characters. His object is to be one of the men best informed about the organization, as well as its main channel for information from the outside world. He should be a man capable of keeping trade and personal secrets, and needs to build a reputation for this if people are to trust him. He should never indulge in idle gossip.

One of his main duties is to disseminate information, unasked, to people who may find it useful, both broadcast (by information bulletins) and to individuals, by selective circulation of documents, and by word of mouth, usually by telephone. How far the librarian should do this depends on his technical knowledge. Unless he can, with some confidence, pick out what is new and likely to be relevant, he should not do much notification to individuals, since he will waste their time and may offend them. He may well issue general information bulletins, but to write good abstracts demands training and considerable technical knowledge. However great his technical knowledge may become (and it should be wide rather than deep) he should realise that his evaluations are only tentative, and that the final evaluation must always be made by a real specialist.

1.3 SOCIETY MEMBERSHIPS

The information scientist habitually uses experts, inside and outside the organization, and will join technical societies, attend their meetings, as well as exhibitions and 'open days', all excellent early sources of new information. The librarian, too, should join a few appropriate technical societies, if he can; some have special grades of membership for people who are interested, but not active in the field. This will enable him to borrow material from, and use in other ways, their libraries and information services. Where this use becomes heavy, then, if the society has corporate as well as individual members, the organization should be the member; otherwise it is exploiting the society. Attending meetings regularly, and asking intelligent questions, brings also the advantage of gradual acceptance by specialists as 'one of us', and such contacts can be put to good use in inquiry work.

The organization may (and usually should) be a member of a number of trade and technical associations and societies, which carries the right to use their information and liaison services, and borrow from their libraries, where they exist. The librarian should visit these and establish friendly relations with their information staffs. He should know who, in his own organization, is the official representative to each of these bodies. He should, if possible, get his name on their mailing lists to receive research reports, or lists of them, and other publications. Where this is not possible he should ask the official representative to pass these to him.

1.4 'TECHNOLOGICAL GATEKEEPERS'

The librarian will gradually get to know which of his colleagues are actively interested in keeping up with the literature and new developments generally. They may be 'technological gatekeepers', a term introduced by Professor T. J. Allen of the Massachusetts Institute of Technology [18] for people who are active in following up new ideas, who are regarded as especially expert in their fields and regularly consulted by their colleagues. These people are mainly responsible for

'filtering' the introduction of new technical ideas, materials and processes into the work of their organizations. They are the librarian's natural allies, and he should help them as much as possible. He should, where possible, put inquirers who are seeking technical advice or 'background' more than information in the ordinary sense, in touch with a technological gatekeeper, and may often save time on inquiries by consulting them himself.

An expert, when able to talk freely, is always a better source of information than printed documents; one can ask an expert questions, and get answers!

1.5 THE LIBRARIAN'S STATUS

It will be clear from all the foregoing that the librarian needs a certain status in his organization, if he is to do a proper and complete job. He should insist on this tactfully, but should also prove himself worthy of it. He should not be regarded as tied to a desk, but how much time he can spend out of the library, on the jobs already mentioned, will depend on whether he has a competent, courteous and effective assistant. In industry every manager is expected to train his successor, and the assistant, unless clearly unsuited or older, should always be regarded as a likely successor. If he is clearly unsuited, this is an argument for a better assistant. The librarian should time his absences, of course, when they will cause least inconvenience to users who need his help with problems or inquiries, and may designate certain hours when he will always be available unless prevented by illness, etc.

1.6 ATTRACTIONS OF THE WORK

The attractions of the work are in serving and keeping in touch with a wide variety of people, and earning (it is to be hoped) their respect and sometimes friendship; also in keeping up to date over a wider subject area than any true specialist can; in fact in learning more and more about more and more, not less and less. There are excellent opportunities for this. With application and experience, a good librarian becomes a key man in any organization.

2 Relations with management or administration

A library needs the understanding and support of management, particularly because its cost can easily be expressed in money terms, but the benefits can only very rarely be so expressed, and then only to the extent that, in one or two isolated examples, definite money savings can be shown. Examples in an industrial context are given in two OECD publications [13, 14].

The library may thus sometimes be an obvious target for 'economy drives', and it is not easy for the librarian to show that this may result in false economy, because he is an 'interested party', i.e. he stands to gain if such reductions in budget or staff are defeated. Where the library is widely recognized as an efficient and necessary part of the organization, as in a college or research institute, such threats are less likely to arise. But the librarian must earn the support and understanding of management, and the respect of his colleagues, by seeing that he and his staff do as good a job as possible with the resources entrusted to them. He must keep the person to whom he is responsible (called later, for brevity, his chief) aware of his problems, needs and successes. A good arrangement is to have short meetings with his chief regularly, say once a fortnight.

His chief will rarely be a person who knows much about librarianship, and the librarian should aim, unobtrusively, to inform and educate him sufficiently so that he can understand the issues involved; this demands tact. The librarian should also show responsibility, by never making unreasonable requests. Those he does make should carry obvious benefits, in speed or efficiency, to the organization he

serves, and he should be prepared with evidence, e.g. statistics, to prove this as far as he can. The chief must then decide whether they are worth the cost.

Administrators respect a man who is always prepared with plans for any likely contingency. The librarian should think ahead, and organize and record his thinking. The author used to keep (out of working hours) a 'professional diary', recording notable events, successes and failures (and what colleagues said about them), thoughts and plans. It proved its value more than once.

A librarian must be prepared to subordinate, on occasion, his ideals as to how a library should be run, to the requirements of the organization. The most perfect forms of cataloguing and classification are a waste of money if they bring no corresponding benefit to the organization he serves.

If the librarian has the misfortune to have a chief who does not believe in libraries, or like librarians, matters are difficult but not impossible. A man who could not run a library is always at some disadvantage with a man who can. Facts quoted by the librarian should be provable, and his arguments as indisputable as he can make them. These must make some impression. If the library is efficient and well run, comments to this effect are bound to reach the chief, and, particularly in a research body, the staff may demand better services.

3 Kinds of small technical libraries: their staffing, stock and finance

The main kinds of small technical library are in technical colleges, research organizations of various kinds, and in industry.

3.1 TECHNICAL COLLEGES

These differ from the other kinds in covering a much wider range of subjects, and, on the whole, at a lower level. Most of their users are also students, who stay only one to three years, may not feel much loyalty to the college or respect for its property, and their organization, for these reasons, has to be rather more formal.

The only published standard for staffing, stock and finance in technical college libraries, to the author's knowledge, is that [12] issued by the Colleges of Technology and Further Education Section of the [British] Library Association in 1971. Such libraries, it considers, should be open for sixty to sixty-six hours a week during term, and for office hours in vacations. The minimum periodical holding suggested is 100 current titles for 'a college of further education' which in Britain is a college teaching a wide variety of subjects, languages, hobbies, etc., and is not particularly technical. (It is difficult to see how even a small technical college library could serve its readers unless it took at least 250 periodicals, but this figure is not in the document cited.) A college with 'substantial advanced work' should take 600 periodical titles or more.

The basic stock of books should be at least 10,000 titles for a college not teaching to degree level, and not less than 25,000 titles for a larger college with some degree work and specialized advanced courses. Where there are several degree courses these numbers should be substantially exceeded. Multiple copies of books, and perhaps heavily used periodicals and other materials will be needed.

The staff should be one staff member for every twenty teachers when the library is 'functioning fully', and should be divided into professional and non-professional staff in the ratio 2 : 3. Three factors which may increase the staff necessary are listed: (a) separate libraries or service points, e.g. in a large or dispersed college; (b) particularly heavy demands by certain types of user, notably research workers; (c) the basic needs of staff in small colleges, i.e. there should be a staff of at least three.

Guidelines are given for the space needed for various kinds of materials. There should be one reading-place for every five technical students, and one place for every ten part-time students, with 25 sq. ft (2.5 sq. m) for non-graduates and 35 sq. ft (3.5 sq. m.) for graduates. There should also be one reading-place for every ten college staff members, and a classroom for library use of 450-600 sq. ft (45-60 sq. m) reserved for teaching the use of the library. Library staff need 100 sq. ft (10 sq. m) each (this would presumably include the materials and records they work with) plus 33.3 per cent for every service position (i.e. a position where a member of the library staff is serving directly the users of the library) working at any time. The librarian's office should serve also for small meetings and therefore needs to be of 200 sq. ft (20 sq. m).

Total library spaces of 6,000 sq. ft (600 sq. m) for a 'small college' and 18,000 sq. ft (1,800 sq. m) for a 'regional college' are suggested. (The latter would normally serve a total population of about 100,000.) Annual expenditure (excluding salaries) should be 2 per cent of total expenditure for a small college, or 3 per cent for a large college.

These standards (the original should be consulted) are certainly not reached in all British technical colleges and may not be practical at all in developing countries. They are ideals to aim at.

The technical college librarian should normally be responsible directly to the principal or head of the college, and should sit on, or at least receive the minutes of, committees determining college policy since practically every aspect of this policy affects the library in some way. All too often the librarian first hears of some extension to the syllabus only when students come into the library demanding books on it! He should rank equally with other heads of departments.

3.2 INDUSTRIAL LIBRARIES AND INFORMATION DEPARTMENTS¹

An industrial library may serve a nationalized industry, or part of it, a company or a firm (e.g. a partnership) as a whole (when it will usually be a fairly small company or a partnership), or one or more departments of it (e.g. the research and development department), or an organization, which, while not itself industrial, serves industry, e.g. a research, development or trade association. Many industrial libraries, and most of the technical ones, are thus, wholly or partly, research libraries.

There are not (and could hardly be) any generally accepted standards for industrial libraries. The Special Libraries Association (United States) in an article called 'Objectives and standards for special libraries' [35], gives a number of useful guidelines but no figures for staff, stock and finance, even as ratios to the size of staff or the total expenditure. Another article [32] gives useful methods for evaluating the performance of a library. We are left with standards put forward by experts in the field. Binns, in 1956 [22], set out standards for an industrial technical library, giving a specified range of services to two hundred research engineers and scientists, and having a staff of seven, including three trained librarians. She also goes into considerable detail about the equipment necessary. The figures she gives in sterling now need to be approximately doubled, because of inflation. These standards were on the generous side, and only reached by a low proportion of comparable industrial libraries in Europe.

A survey carried out for Aslib (United Kingdom) by the author in 1956-58, and published in 1960 [11] covering the practice of fifty-two libraries (mostly technical) in industry and commerce, showed (for thirty-six out of the fifty-two) an average ratio of one library/information worker to fifty-four people who actually used the service, with a range from below twenty to about two hundred.

Ashworth, an industrial librarian and information scientist of great experience,

1. In what follows the word 'library' is used to cover both kinds.

in 1961 suggested staffing standards to a conference organized by the British Institute of Management on new industrial libraries, and also went into some detail on what kinds of library/information staff should be used in libraries of different size. As his paper [21] is not widely available, his recommendations are reproduced here (see Table 1). Ashworth stresses the importance of four points in

TABLE 1

Number of graduate technical staff served	Suggested information and library staff
1-5	In all fields of interest one of the technical staff will need to spend from one-tenth rising to one-quarter at the upper limit of the range, of his time in liaison with research associations, and other outside sources of information.
5-10	A small library will be kept and cared for by part of the time (up to one-half) of a clerical assistant but one member of the technical staff will still perform liaison duties.
10-20	One librarian most probably a woman, who will carry out her own clerical duties (except correspondence). Little information service can be offered.
20-30	{ General engineering, chemical technology, basically repetition processes. Two. { Aeronautics, instrumentation, organic chemistry, plastics. Three.
30-50	Three.
50-100	Four generally, but five in high scientific-content industries.
100-150	Five generally, but six in high scientific-content industries.
200-300	At the rate of one in thirty generally, but one in twenty-five for high scientific-content industries.
300-500	At the rate of one in forty generally, but one in thirty-five for high scientific-content industries.

assessing staff numbers: (a) the scientific content of the field of operations of the company; (b) the efficiency of the communication network within the company; (c) the kind of service needed and its scope; (d) the size of the organization to be served.

The higher is factor (a), and the lower is factor (b), the more library staff will be needed. By 'the kind of service' Ashworth means also the speed of service. 'If a library is to be expected always to do wonders at the last moment this can certainly be achieved, but only at the expense of spending a greater amount of staff time on detailed indexing.' The distribution into kinds of library/information staff, up to a total staff of ten (the original table goes up to twenty-five) is given in Table 2. (In the present author's view, it would be better, where possible, to draw a shorthand-typist, when needed, from a 'typing pool', unless she is willing also to do copy typing and other clerical work; very few of them are!) The duties of the main kinds of staff are given in the paper.

Ashworth's main factor is the number of 'graduate technical staff' served, but this creates two difficulties. In the less science-based industries, especially some kinds of engineering, there are many senior people, doing responsible work, who are not graduates. Which of them are to be considered 'graduate equivalents'?

Job titles are not always a safe guide to responsibilities. Then many industrial staff members, even some technologists, never, or hardly ever, use a library, or use it only for scanning periodicals, which makes no demands on staff. Younger and less enterprising ones tend to read only what they are told to read. The safe rule is to take as the base figures those people, above the foreman level, who actually use the

TABLE 2

Number of information staff	Information officer	Deputy	Information assistant	Translator ¹	Librarian	Library assistant	Clerical assistant	Shorthand typist	Copy typist
1	—	—	—	—	1/2	—	—	—	1/2
2	—	—	—	—	1	—	—	1	—
3	1	—	—	—	—	1	—	1	—
4	1	—	—	—	1	1	—	1	—
5	1	—	—	—	1	1	—	1	1
6	1	—	1	—	1	1	—	1	1
7	1	—	1	—	1	1	1	1	1
8	1	—	1	—	1	2	1	1	1
9	1	—	2	—	1	2	1	1	1
10	1	1	1	—	1	2	1	1	2

1. Not suggested until staff total thirteen.

library by visiting it or telephoning it, say once a month, or who receive material disseminated from it.

The Aslib survey already quoted showed a median staff of five, with a range of one to twenty-one (when a series of figures is arranged in order, the one half-way up or down, or the average of the two half-way up, if the number of figures is even, is the median); higher figures are reached by large companies, etc.

In Ashworth's words: 'It is useless to appoint an information officer at so low a level that nobody of importance will seriously think of putting any faith in him. If a junior is employed he will be treated as a junior, approached indirectly and little or no weight will be given to his views. A colleague will be treated as an equal and will be able to help accordingly.' This is true, but it does not mean that the information officer is always approached directly. Directors have to delegate responsibilities and work, and have a habit, when in need of information, of saying to an assistant: 'Find out about this for me, will you?' The assistant will try, after his own fashion, and the library may be first, sixth or nowhere on his list of information sources. If he finds the information he will nearly always say to his chief: 'I have found out that . . .', giving no credit to the real source. Industrial librarians and information scientists should take special steps to 'sell' their services to people who work closely with directors, and the directors themselves. They may well ask, particularly if an inquiry seems to be above the inquirer's level of authority: 'Who wants this information?' What they do when they find that it is for, say, a director will depend on their relations with the director and his assistant.

Work in industry generally is distinguished by its pace, its feeling of urgency. Projects have to be completed and orders delivered on time, or someone gets into trouble. It is an old joke that directors always want information yesterday. Time is money. The librarian used to more leisured ways must adjust to this.

An industrial library may have few books, in the ordinary sense. Its stock will be mainly periodicals, reports (both from within and outside the organization) pamphlets, government publications, standards, trade literature, etc. Sometimes it keeps and indexes the parent body's correspondence, but this is unusual. Every

large industrial organization has a patents department, and patents may be stored, and information work done on them, there or in the library, depending mainly on which was first set up, and the preferences of the people in charge. A librarian unused to patent work should use the specialized knowledge of the patents staff as of other experts.

There is a great shortage of data on the financing of industrial information services, and its collection would be complicated by the diversity of accounting practices. The Aslib survey [11] showed that about three times as much is usually spent in the United Kingdom on staff salaries as on library material. It does not seem reasonable to link library expenditure to turnover, or issued capital. The number of employees is also irrelevant. The best guide seems to be to take the graduate and 'graduate equivalent' staff served or likely to be, allow library/information staff in the ratio given by Ashworth, allot a fair average salary to them, and add 50 per cent for library material, equipment, stationery and other costs likely to be charged to the library.

For a new industrial library, the minimum starting space is about 600 sq. ft (60 sq. m), but, except for a small firm, 1,000 sq. ft would be better.

3.3 RESEARCH ORGANIZATIONS

These vary enormously in size and character, from university and other institutes working on pure or applied research, through government research laboratories doing either secret or open research, to private research institutes run by societies and associations. Their research staff may range from half-a-dozen to hundreds. They may be 'discipline-oriented', i.e. concerned with a classical subject taught in universities such as physics or chemical engineering, or 'mission-oriented', i.e. having as object or goal a 'mission' such as improved space flight or the prevention and cure of cancer. Industrial research has already been covered.

The kinds of library and information work in research organizations vary as much as the organizations, ranging from just the provision of material, through this plus increasing degrees of cataloguing, indexing and aid to readers, to the provision of librarians skilled in the subjects covered, who can give a real information service.

No standards have ever been issued, so far as the author can ascertain. Herner and Heatwole [28] have suggested the application of work study methods in establishing the staff needed, but this depends on the work to be done, which they do not lay down (and could hardly lay down) except for the particular library studied. They quote United States and other authorities to show that an organization with 400 'technical persons' (this presumably includes technologists and technicians) needs a library staff of five to six people. Standards now may be somewhat higher. For the kinds of research library that approximate to industrial research libraries, Ashworth's suggestions [21] quoted above, might be used.

The book collections of research libraries will be largely confined to material of post-graduate standard, with only a few intermediate works. Multiple copies will only be necessary for a few heavily used works, and some copies will be issued on semi-permanent loan to research workers. A library serving research in applied science will collect many unpublished and semi-published research reports. These are dealt with in more detail below.

The spread of languages covered in a research library's collections will be the widest of the three main types of library. Apart from English (in which about a half of all research is published) and the language of the country, there will be periodicals and books in German, Russian and French. There will be periodicals and maybe a few books in Italian, Spanish, Japanese, and Chinese, which is growing rapidly in importance, and other languages, and the proportions will vary country by country. Some languages are important in particular subjects, e.g. Scandinavian languages in the pulp and paper industry. Smaller countries and

those whose languages are little known tend to publish pure science results in major languages, but this does not necessarily hold for applied science, particularly that of largely local interest.

A research library also needs to keep material longer than any other, except one concerned with history. Discarding is gone into in more detail below. Older editions of important treatises may still be needed, and may be kept in a less accessible part of the library.

The visible products of a research organization, especially in the pure sciences, are largely in the form of published papers and other works. The library will usually be charged with ordering, recording receipt, storage and (in conjunction with the authors) distributing 'separates' or 'reprints' of such works. These are normally ordered when the final proofs are sent to the editor of the journal or other work in which they are printed, and the librarian, after consultation with the author(s) must specify the number required.

4 Space, position and equipment

4.1 SPACE AND POSITION

The position of a library should be as convenient as possible for the people to be served. On a large site it should be near the 'centre of gravity' (or what might be called the 'centre of position') of the technical staff. Unless other reasons strongly contradict this, it should be on the ground floor (if only for reasons of floor loading) near the main entrance, particularly if some of the staff to be served are in other buildings. It should be well lit, free from noise or vibration, and if possible not immediately under laboratories, to avoid the risk of water coming through the ceiling. It should as far as possible give an impression of spaciousness: a library in mean or cramped quarters is not likely to gain the respect of users.

A useful guide is the Special Libraries Association's *Special libraries: how to plan and equip them* [29]. This includes ten 'case histories', mostly of industrial and commercial libraries, with a plan of each (see also [31]). The periodical *Special libraries* used to include plans of special libraries. Anthony [20] also gives guidance, particularly on planning the layout.

The librarian who is starting a new library must often accept whatever space is offered, but he should strongly request sufficient space, and provide evidence of what this is. Authorities are apt to think mainly of the library stock, and forget adequate working space for staff. Noisy activities, such as typing, opening and wrapping parcels, should as far as possible be in a separate room, so as to cause the least annoyance to users. It is not thought helpful to give plans in this article since any plan would be so untypical as to mislead. The space must provide for: (a) readers, for each of whom 30-35 sq. ft (3-3.5 sq. m) should be allowed; (b) library stock in the form, mainly, of shelved volumes, but including pamphlets, etc., in lateral files, a display rack for new periodicals and other material, and (especially in developing countries) microforms and 'readers' for them; and (c) staff and records, including catalogues, for which at least 70 sq. ft (7 sq. m) will be needed at the start, and more as the library records grow, up to 100 sq. ft (10 sq. m) per member of the library staff. In larger libraries there should be a service point, near the entrance, with a library assistant always on duty, and a senior member of the staff within easy call, to help users and deal with the more difficult inquiries. If there is no service point, one staff member should be so placed as to have the entrance in view, so that when someone comes in who seems uncertain what to do, help can be offered.

If a library is to be part of a new building, the librarian must have direct access

to the architect, emphasizing that the library is a service department, not a mere store, suggesting a suitable division of the space provisionally allotted, and perhaps showing him articles on, and plans of, similar libraries. It is a good idea to stress the need for unbroken lengths of wall, for shelving.

In a new research organization the library will be an important part of the initial plans. Adequate space for growth is very important, and may be earmarked for the library, but temporarily assigned to other uses, whose location is not important and can be later transferred elsewhere.

4.2 EQUIPMENT

Shelving must be adjustable, certainly to 1 inch (2.5 cm) and if possible to half this. It is impossible to have a sensible and easily comprehensible arrangement of volumes, and to change this as often as will be necessary, if certain volumes will only go in certain positions in a bay of shelving. The librarian who is offered ready-existing fixed shelving will do well to refuse it, pointing out that he is being offered poor tools with which to do his job. Wooden shelving looks better, and is available in many countries at small extra cost. But in tropical countries, and any place where termites are a problem, steel equipment must replace wooden throughout. Pest control is then necessary, and books and bindings will need special anti-fungal treatment. (The library should if possible be air-conditioned, and provided with, for example, Venetian blinds to reduce glare, and keep sunlight away from the stock.) Shelves should be 10 inches (25 cm) wide. Few technical libraries have many books wider than this, but if there are enough to justify a bay of 12-inch (30-cm) shelving, this should be obtained.

Lateral filing for pamphlet material gives better usage of space than filing cabinets. There are two main types: that with hanging pockets, into which manila files can be slid (this gives easier access than putting the documents themselves into the pockets) and that with shelves and vertical dividers. Lockable forms are obtainable.

Much of the remaining equipment, if not all, can be standard office equipment, but typewriters should be 'élite' (twelve spaces to the inch) provided with square brackets, accents and other diacritical marks according to need.

As to catalogue equipment, the librarian should remember that nobody likes card indexes, and few people use them unless they have to. Sheaf indexes, consisting of slips of paper held on rods in a 'post binder', are no improvement. Other forms exist, such as 'strip indexes' (strips of card mounted on steel panels by sliding their ends into recesses) with the panels mounted so as to swing easily. The Kalamazoo Co. Ltd, Northfield, Birmingham 31 (England), which has offices in all major cities, produces a kind of strip index in which paper strips, of various widths, are held by means of projections, fitting between strong vertical strips mounted on a cardboard 'page', and the pages can be assembled into large books, resembling, and having many of the advantages of, the 'guard book' type of catalogue used in some national libraries, and also complete intercalatability. The ability to see a number of entries at once is a great advantage. These two kinds of index may take up more space than a card catalogue, and insertion and removal of entries is not quite so easy. The lucky librarian who is starting a new catalogue might consider them. Most librarians are not so fortunate, but can also use these for special purposes, such as giving the location of periodicals.

If cards are used, entries can be reproduced by special card duplicators. It is not a good idea to reproduce entries on to large perforated cardboard sheets, which are separated to give standard cards, as this gives edges which are fuzzy, and even more difficult to manipulate than plain cards.

A microfilm/microfiche reader will be needed. These are dealt with in section 5.8, below. It will be a great advantage to have some kind of photocopying equipment, which can take bound volumes. Millard [30] and the *Library technology*

reports [19] may help with these, or the organization mentioned in section 5.8; its advice is only available to members.

5 Library materials and their special processing

Advice must be sought from technical colleagues as to what publications should be bought, but it is the librarian's job to inform himself and them of new publications, and changes in existing ones (particularly periodicals) in the library's field. He must subscribe to bibliographies in periodical form, and arrange to receive publishers' lists. These will inform him of new publications, usually before his colleagues hear of them. He must scan these regularly, and notify his colleagues of new publications in their subjects. He should receive his own country's national bibliography and those from 'favoured countries'. For aid in choosing these see Walford [68, vol. 3] and Winchell [69].

He should also provide specialist bibliographies (where available) of works, both by subject and form, e.g. dictionaries, such as the Unesco bibliography of interlingual dictionaries [67]. There is also a growing number of guides to sources of information, which include specialist organizations, information and referral centres, etc.

It is the librarian's responsibility to choose more general reference works: encyclopaedias, dictionaries, directories (both commercial and non-commercial), treatises, handbooks, etc. Guides to reference works [68, 69] will be found useful here. A full set of up-to-date telephone directories for his own country will be useful in many ways, checking names, addresses, and the existence of companies, especially if they are available also in classified editions covering companies and businesses.

5.1 PERIODICALS

These are always the most up-to-date printed source of information. Grenfell's book [40] is a valuable guide to all aspects of their treatment in libraries. Davinson's [38] is also useful.

5.1.1 *Kinds*

The following classification does not imply that the categories are mutually exclusive, but is useful as a framework for discussion:

- A Primary sources.
 - A1 Journals (publishing mainly reports of research).
 - A2 Technical periodicals.
 - A3 Trade periodicals.
 - A4 House journals.
 - A5 Newspapers, news reviews.
- B Secondary sources, i.e. periodicals which summarize and index articles, etc., in other periodicals.

Journals, as defined here, are published mainly by learned societies, and carry, usually, fewer advertisements than other groups. (The word is unfortunately often used as a synonym for 'periodicals'.) Technical periodicals serve an industry and their contents are much more varied, including some more or less popularized accounts of research. Subscriptions rarely cover the cost of production, and they depend on advertisements from suppliers to the industry. Trade periodicals may be more or less technical according to the trade, but they exist primarily to serve a trade, i.e. the distribution channels for one or more industries, and they draw their advertisements from suppliers to that trade. Otherwise, they resemble technical periodicals.

'House journals' are published, not by commercial publishers, but by large and medium-sized businesses, either for their own employees (they then rarely interest others) or as public relations media. They cover an enormous range from local news to learned papers by staff of the organization; it is impossible to generalize. They are nearly always free of charge.

The last ten years have seen a considerable growth of specialized, technical newspapers and news reviews, intended to help the busy technical man to keep up to date in the minimum time. They are distinguishable by newspaper format and layout, and almost all appear weekly. Otherwise they resemble the trade or technical press.

'Secondary sources' are the keys by which the riches contained in the 'primary sources' can be, to a large extent, found. They can be divided according to whether they merely index, or also provide summaries or 'abstracts' of articles, and the latter group into those which provide 'informative abstracts', which inform the reader of the main findings and methods used, or 'indicative abstracts', which rarely replace consultation of the original by anyone interested. Some of these periodicals index also new books, patents, standards and other published documents. An important measure of their efficiency is the time lag between publication of the original and the entry for it. This is always longer for abstracts periodicals, since the documents are normally sent to outside experts to be abstracted in their spare time. It should not normally exceed six months. Some indexing periodicals specialize in quick coverage. Others restrict their intake to periodicals from their own country. *British technology index* exemplifies both these groups.

Some of the best abstracting periodicals are in chemistry. Every technical librarian should familiarize himself with *Chemical abstracts* and *Chemisches Zentralblatt*. Some countries have abstracting systems which cover the whole of technology. *Referativnyj žurnal* (U.S.S.R.) now appears in about sixty-five parts, some of which appear also in 'cover-to-cover' English translation. The French *Bulletin signalétique* appears in forty-one parts, and covers the *sciences humaines* also.

Abstracting and indexing periodicals on this scale are expensive to produce, and carry few or no advertisements. They are therefore expensive to subscribe to. Perhaps for this reason, there are many smaller, specialized examples, covering small fields or specialized aspects of large ones, which personal subscribers can afford. It is sometimes claimed that this multiple abstracting is wasteful, and that every document should be abstracted once only; this however neglects the needs of specialist readers. An article on the chemistry of beeswax would be covered by both *Chemical abstracts* and *Apicultural abstracts*, but in very different ways.

Another kind of secondary source (it might be called a tertiary source) is the 'review of literature', published in annual volumes under such titles as *Recent advances in . . .* or *Annual review of . . .* These consist of chapters on specific subjects, by experts, which are more or less selective and critical.

5.1.2 Selection

Even the smallest library needs thirty or more periodicals. A surprisingly large number of libraries take between two hundred and three hundred titles. More than this is necessary (and possible) only in large organizations. They will take up a considerable slice of the library's budget, unless (as is common in industry) they are charged to the organization as a whole or departments, and not the library.

What kinds are taken will depend on whether the library serves mainly research (when most of its intake will be journals), teaching (when it will need journals and technical periodicals and newspapers, but little of the trade press), or industry (when it will need a mixture of all types).

The librarian should ask the technical staff to list the periodicals they wish

to see regularly, and to mark each item 1st, 2nd or 3rd according to its importance. He should compare the analysed results with standard lists [87] of important periodicals in the fields of interest, remembering that changes of title are frequent, and that people are mostly inaccurate in citing titles. This will suggest other titles, mostly foreign. A library should not take periodicals only in one language, or from one country, but will only rarely take titles which nobody can read, and then only for good reasons. A technical man can often get a good idea of the gist of an article (sufficient at least to decide whether it is worth the cost of translation) from the tables and illustrations. If the articles have summaries in a more accessible language, this is another good reason.

Abstracting and indexing journals (for lists see references [88-96], especially [90, 91]) will also be needed, to cover a wider span of literature and countries. They will be included in the lists from staff members who are wide readers (certainly in those from 'technological gatekeepers') but a wise selection is very important. Those needed only for reference, less often, need not be bought if they can be seen in near-by libraries, but the more important, and certainly any needed for scanning, must be bought, and earlier volumes must be available in reasonably long 'runs', especially if the library serves mainly research.

5.1.3 *Obtaining periodicals*

A difficulty has arisen, in recent years, over many commercially published periodicals and newspapers, both trade and technical. An increasing number of these are now on 'controlled circulation', i.e. they are sent mainly free of charge (some are also available on subscription) to named individuals who are supposed to be in positions enabling them to order, or influence the ordering of, the goods and services advertised. The argument, from the publishers' point of view, is that the profitability of any trade or technical periodical depends largely on advertising revenue, that competition is intense, and that the attractions of offering advertisers a list of 'proved buyers' is too great to be ignored.

This often makes it difficult for librarians to secure copies. Before trying to get on the mailing list for such a title the librarian would do well to take advice as to whether it is worth having. Many 'controlled circulation' periodicals have rather poor reputations. Publishers of them vary considerably in their attitude to libraries. Some will not include them in their lists: others are more reasonable. It should, in the former case, be possible to get copies from people in the organization who are on the mailing list, but this may not be dependable.

Subscription periodicals of proven worth should be ordered on 'standing order' (i.e. until countermanded) and the same may be true of those for which subscription rates are reduced on orders for three to five years. It is nearly always better to buy periodicals through two or three 'subscription agents', perhaps in different countries. They order the periodicals (which are posted direct to the library), pay the bills, and will send in accounts at most monthly and perhaps less often. There is an enormous saving of paperwork over ordering each title direct from its publisher. The value of having two or three agents is that their efficiencies can be compared, and they, knowing this, are kept alert. In choosing agents a librarian should consult other librarians of libraries similar to his own. Some agents are also large mail-order booksellers serving, mainly, libraries and scholars. They have skilled staff and bibliographical aids at hand. It is a mistake to order periodicals (except ordinary newspapers) through local newsagents, who have not.

Where an organization pays the subscriptions of staff members to societies, it should normally insist that the periodicals received are passed to the library after perusal.

5.1.4 *Records of periodicals*

The following are needed: orders and payments, receipt, completion and binding of volumes, and if circulation is done (see below) records of that. To signal non-arrival of an issue, or that the periodical has stopped coming, some form of 'visible index' record is highly advisable, and this may be combined with other records, and possibly catalogue entries, to make a separate and complete periodicals record [41]. Certainly every issue should be 'booked in' by entering its date (or volume number and part) and the date of arrival. A coloured signal should also be moved in the visible edge to one date or the other (but, of course the same, consistently). Different coloured signals should be used for different frequencies. When the record is scanned monthly, lagging signals can be spotted, and action taken. A printed postcard should be available for claiming, and details filled in. Equipment is available (Kardex, Roneodex, etc.) which provides a series of overlapping flaps arranged in pull-out trays. The edges of the flaps provide the visible edges for signals, while for each position there are two cards, one temporary, for 'booking in', circulation, etc., and the other for permanent characteristics: set held, binding cloth number, etc.

5.1.5 *Display and circulation*

Current periodicals should be displayed for a few days on or in a suitable rack, which may also take new books and other documents. They will also, usually, be circulated (United States: routed) to readers, except in a small organization, or where other 'current awareness' methods obviate the need. The periodical is a special case because technical men must see recent advertisements as well as editorial text to keep up to date. No library service can possibly fill this need. Unless, therefore, everybody who needs periodicals can and will come to see them in a central place, they must be circulated.

Circulation is a bugbear to librarians. It takes a good deal of effort, involves difficult questions of status, needs general co-operation in passing on periodicals quickly, and results in losses and later gaps in sets. The lists of periodicals from staff members provide a basic list, and the lists need frequent alteration as people retire, leave, or change jobs. The normal method is for duplicated labels with lists of names to be fastened to the front covers with special adhesive, e.g. Cow Gum. Ordinary gum or glue is inadequate; the labels come off.

Circulation in this special sense may be 'controlled' or 'uncontrolled'. (To avoid confusion with a different use, above, of 'controlled circulation' I shall in what follows use the term 'controlled routing'.) In 'controlled routing' the issue is booked out first to Mr A, its return is noted and it is booked out (in the same writing) to Dr B, its return noted, and so on. For each movement the date is recorded. In 'uncontrolled routing' the issue is sent out with a list of names on it, ending with the library, and the librarian hopes that it will return after few rather than many days. But he cannot know who has it, or even whether Mr A has handed it on to Dr B. Which method is used depends on the size of the site, and the numbers of people and periodicals. Larger sites and numbers favour uncontrolled routing, since return to the library after each person puts a heavy load on the people who do the circulation and multiple copies make this less necessary. The library can have 'reference copies' of important periodicals, which are not circulated.

A possible extension is 'selective circulation'. The 'scatter' of subject matter in periodicals is very wide. Articles on a subject appear in many more periodicals than a man can look through in two to five hours a week. By this method an information scientist, or a librarian with reasonably good technical knowledge, scans incoming periodicals, marks page numbers opposite the names of persons likely to be interested, and writes in other names of people who do not normally

see that periodical with page numbers as appropriate. To do this well demands considerable discrimination (not to overdo it), wide, but not deep technical knowledge, and knowledge of the people served, their personalities as well as their interests and responsibilities. The scanner must know what is important and new. This is well worth doing, if possible, because if it is well done, the staff will tend to look only at items marked for them, plus advertisements. There are enormous time-savings, and credit for the library. But the number of people for whom one person can do this is, perhaps, one hundred at most.

Selective circulation complicates controlled routing, because every issue goes to a different list of people. If the scanner writes, using carbon paper, two lists, one can be the label and the other the library record. But this is inefficient if the lists are largely fixed for each copy.

5.1.6 *Binding and shelf arrangement*

Binding is only justifiable for volumes to be kept at least ten years. The classification of periodicals, and particularly their arrangement in classified order is, in the author's view, a waste of time in small technical libraries. Nobody 'browses' through periodical volumes, and their classification (except possibly in broad subject groups) is an unconscious 'carry over' from practice with books. Alphabetical arrangement by title separates successive, differently named, parts of the same periodical. Any fixed method of arrangement considerably increases the work of reshelving as the library grows or when a new set of a periodical is acquired. Periodicals need not be in any order at all, if it is possible easily to find out, e.g. from a strip index in alphabetical order, the bay number and shelf letter where a particular periodical is kept, and these numbers and letters are clearly shown on the shelving and on a plan of the library. A new periodical can then go anywhere where there is room for it.

Whether this method is followed or not, it is usually preferable to shelve periodicals in a separate sequence from books, since technologists hardly ever use both at the same time. Unbound periodicals may be kept in suitable boxes with bound volumes; they may, alternatively, be kept in a special type of display rack, in which a hinged sloping surface, used to display current issues, can be lifted to reveal the issues for, say, the previous year.

5.1.7 *Building up sets*

In a new library, a special budget must be allotted for purchase of back files of periodicals, either originals, reprints or in microform. A few parts may be obtained through exchange schemes for unwanted periodicals, but it is tedious to build up sets in this way alone. It is useful to keep a list, in typewritten form, of missing parts, gaps in sets, and earlier volumes which would be useful, for checking against lists of available material.

5.1.8 *Cataloguing*

Periodicals should be catalogued under their titles, as given on the covers, omitting sub-titles. Technologists do not understand the system by which the *Journal of the Chemical Society* is catalogued as *Chemical Society. Journal*, and tend to think it absurd. The convention that a society is the author of its journal is arguable, since many people contribute to the journal who do not belong to the society, and most members never contribute.

5.1.9 *Discarding*

Material should never be discarded without getting the opinions of those who may use it. (The literatures of different subjects have different 'lives'; that of

chemistry is used for longer than any other.) How long periodical volumes are kept depends on the cost of maintenance and storage, compared with the cost and inconvenience of borrowing older volumes when needed. Records of loans from one's own stock, and of borrowings from outside, should be kept and analyses made to help in deciding such points.

5.2 BOOKS

A new, smallish technical library will need four hundred books a year for five years, and fewer thereafter. The technical college library will need at least three times as many, plus extra copies according to circumstances. Technical books, particularly the more advanced kind, are expensive, and go quickly out-of-date. The *Library Association record* publishes, in the August issue every year, analyses of the books and periodicals published in the United Kingdom, showing the cost according to subject. Average annual increases in cost in recent years have been 8-12 per cent. The *Library journal* publishes similar data for United States books.

Besides the national bibliographies, there are periodical bibliographies of technical books: *Aslib booklist* [84], *New technical books* [85], and one which indexes reviews: *Technical book review index* [86]. Ordering on reviews means waiting for months. It is often possible to get books 'on approval' and if so expert opinions can be got from staff members. Books should never be got on approval unless there is a genuine intention to buy, if suitable.

It pays to order most books, and certainly foreign ones, through one or two major booksellers specializing in supply to libraries. Small local booksellers have not the trained staff, bibliographies or other aids necessary. It is important to specify on orders, where at all possible, full and correct details of author(s), title, publisher, etc.

5.3 REPORTS

These have increased greatly in importance since the Second World War. They vary enormously in quality and in secrecy, from unpublished reports available only within an organization, or to people with a proved 'need-to-know', down to published reports easily available. They generally, but not exclusively, cover research and development, particularly government-sponsored. (The latter are called in what follows government reports.)

Reports are not handled by the book trade at all, and are normally available only from the issuing body, or from report centres normally run on a national basis, and often government-operated. These collect, catalogue, classify and make available reports, according to their secrecy and the requesting organization's need-to-know, either in full-sized copy (often known as 'hard copy') or microfiche. The librarian should early establish links with suitable centres. Foreign government reports are released by the centre or centres in the country of origin to centres in other (usually friendly) countries according to strict rules, and it is often useless to write to foreign centres for these. One must apply to the appropriate centre in one's own country, which will record the request, and supply when possible.

Non-government reports are collected by some national centres. They, or details about them, are usually sent first by the issuing body to a privileged mailing list, covering members (if any), related institutions, etc., and may be available later to the general public. Many reports, or selected parts of them, are later published in the periodical press. Practice with reports of all kinds varies so much between countries and organizations as to make generalization very difficult.

The main sources of information on United States and British reports are

Government reports announcements [98] and *R. & D. abstracts* [97]. In cataloguing reports it is very important to make entries also under report numbers, especially in large series, e.g. the AD series.

5.4 GOVERNMENT PUBLICATIONS

These are documents issued by government authority (both national and provincial or State) and mostly printed by official printers. (The term 'document' tends to be used in the United States in this sense.) Most governments issue regular lists of new publications. For titles see Walford [68, vol. 3] and Winchell [69]. Soviet government publications are listed in the *Knižnaja letopis*. Government publications should be ordered from the appropriate printer, or sometimes (especially for smaller countries) may be requested through the cultural attaché of the appropriate embassy. Some official printers will accept standing orders for all publications of a certain type, e.g. new laws.

5.5 CATALOGUES AND TRADE LITERATURE

Every library should have catalogues from important suppliers, but getting other trade literature (brochures, etc.) and weeding out obsolete material are so expensive that few small technical libraries do it on any scale. It is sometimes possible to borrow it from a central source, such as a trade or technical association. In some countries commercial services (see that heading below (5.7)) have come into existence to collect, index and make available the literature, and indexes to it, in a special field. Such services tend to have short lives.

5.6 PATENTS

These are obtainable fairly cheaply from national patent offices and are best filed, in sizeable collections, under their own countries and numbers. If the organization has a patents department or a patent attorney, the librarian should consult it or him before taking any action to collect or index patents; he may well find they are already doing this. Details of new patents can be obtained from the official periodicals published by national patent offices, but the subject indexes are rarely satisfactory. Special abstracting journals for patents by subject, covering the patents of twelve countries, in, broadly, the chemical field, are published by Derwent Publications Ltd, 128 Theobalds Road, London W.C.1, who also publish abstracting or reporting periodicals for all British, German (Federal Republic) or Soviet patents, and periodicals covering chemical patents from five more.

If required to do patent searches, the librarian should know which ordinary abstracting periodicals, like *Chemical abstracts*, index patents. He should make a special study of the subject (see [42, 43]) as it has many features and tools which cannot be gone into here.

5.7 COMMERCIAL SERVICES

This term has come into use, for want of a better, to cover a wide range of services offering either 'current awareness' services or information retrieval (finding what is known on a subject), or both, in various non-traditional forms, either instead of, or as well as, the traditional 'secondary sources' like abstracting journals. The forms vary from special 'current awareness' periodicals, to card, tape and microfilm services, and services vary also considerably in the size of field covered. The organizations providing these services are often by no means commercial, e.g. the National Library of Medicine in Washington (MEDLARS

medical information retrieval service), and the Iron and Steel Institute, London (ABTICS card service covering books and periodical articles). The forms of literature covered also vary.

These services are mostly too expensive, priced in hundreds of dollars or pounds a year, for most small technical libraries, unless they show demonstrable savings, but the librarian should know the ones which concern him, because he can use them in other libraries. A list is given [88, 89, 92-95] at the end of this article, of publications giving details of such services.

5.8 MICROFORMS [47, 48, 49]

These differ from all the above. They are forms in which any kind of material, periodicals, reports, newspapers, etc., may be reproduced in miniature to save storage space; they are also increasingly being used to produce editions of new material, e.g. reports, of limited commercial appeal.

They divide into opaque forms and transparent forms. The opaque forms include microcards and Microprint (a trade name of the Readex Corporation) which are obsolescent, but may still be met. The opaque forms of widest current interest are various types of microproduction often in book form, using low reduction ratios (the ratio between line length in normal and reduced form) so that they can be read with a magnifying glass. Transparent forms are far more important and can be divided into roll microfilm, usually of 35-mm or 16-mm gauges, without sprocket holes, and 'unitized' forms. Microfilm is used for reducing long runs of journals, archival material, newspapers, etc., so that far less storage space is required. Unitized forms are 'microfiche' (transparent but shaped like a card; the standard size is 148 × 105 mm, but others may be met) and various forms of plastic jacket containing short strips of microfilm. Unitized material is more expensive per 'page' but easier to use.

In emergency, microforms can be read on a low power dissecting or similar microscope, but this causes eye-strain. Suitable readers should be provided, in subdued lighting. The situation is changing fast, and the librarian needing advice on readers should join the National Reprographic Centre for documentation (NRCd), Hatfield Polytechnic, Endymion Road Annexe, Hatfield, Herts. (England). The 'basic service' at £10 per year entitles members to a quarterly bulletin, containing brief evaluations of new equipment, comment and articles, and to use the inquiry service. Points to watch in choosing a microfilm reader are the magnification ratio; the length of microform line covered at this ratio (to ensure that both ends of the longest line likely to be met with are on the screen at once); the availability of spares, now and in the future; and, particularly in hot countries, the film gate temperature. (In the tropics, microforms and equipment for reading them must be kept in an air-conditioned place. The same is true of microforms in very dry climates.) Good and simple readers are available, in Britain, for £70 or less. If it is possible to have a reader-printer (the cheapest now costs £235) this will be appreciated by staff and save their time. On these, the user locates the page he is interested in, presses a button, and receives an enlargement which he can take away, and refer to as often as necessary.

No reader is satisfactory for opaque and transparent microforms. If the former (in forms requiring a reader) are held, one must be provided, but few are now made.

5.9 OTHER

Collison's book [37] is still a useful guide on the treatment of many special forms of library material, including some, such as maps, which cannot be dealt with here.

6 General processing

6.1 CLASSIFICATION AND INDEXING

It is useful to contrast, first, the 'generalist' and specialist attitudes to this. The first is usually met in people who have never been concerned with information problems in a specialist environment. This school tends to think that if everyone used the same classification, material could be classified at source, perfectly satisfactorily and far more cheaply than now, when nearly all special libraries catalogue and classify their intake according to their own methods. This view had many supporters among early propagandists for the Universal Decimal Classification. Unfortunately, in a specialist environment, it simply is not true. A metallurgist, for example, working for a company which makes spinnerets (fine metal apertures used in spinning nylon and other fibres) and interested in the problem of spinneret corrosion, may well read papers on nylon spinning, not because he is interested in that subject, but to glean information on spinneret corrosion, composition, and working conditions. A librarian working for that company, and anyone scanning literature for it, should pick out and give special indexing to papers which deal with these aspects, and will neglect others. This sort of special aspect cannot possibly be foreseen or provided for in indexing at source, and often provides the main justification for a research organization or company. Also, general classifications tend not to suit special interests.

6.1.1 *The Dewey Decimal Classification (18th ed.)*

This classification, whose main framework dates back as far as 1876, is used by very few (and those rather old) special libraries in the United Kingdom, or, as far as the author knows, elsewhere in the world, except North America, where it originated. The librarian of a new technical library, however well he may be acquainted with it, would be well advised not to choose it for his library. The reasons for this are that its main framework of classes is fairly obsolete, it was intended for public libraries rather than special ones, the schedules are not detailed enough for indexing papers, etc., and the scheme lacks adequate devices to allow notations for simple subjects to be 'synthesized' into class numbers for complex subjects. It is, however, widely known. It is regularly revised, on somewhat conservative lines.

6.1.2 *The Universal Decimal Classification*

This was originally based on DC, and its schedules still reflect some of the older scheme's unfortunate placings of subjects. It has benefited by considerable international co-operation, its schedules are much more detailed and its capacity for synthesis is considerable. It has been maintained by the International Federation for Documentation, 7 Hofweg, The Hague (Netherlands), which publishes an annual catalogue of publications [9] free of charge, listing all editions published (and many other useful items). There are full editions in English, French, German, Japanese, Polish, Portuguese and Spanish, not all complete; abridged editions (suitable for collections of books) in a number of other languages; and guides to its use in English [59], French [52] and German [53]. The national centres which publish it can also usually provide 'unofficial' working drafts of sections on which work is being done. A library need not, as with DC, buy the whole classification, but only those sections of interest to it. But, owing to the many editions and drafts available, every library using UDC tends to use a slightly different version from others. For this reason, as well as that advanced as the 'specialist view' above, it is highly unsafe to assume that class numbers given to a document elsewhere are valid for one's own library.

Proposed extensions and corrections are published as '*P notes*' to invite comment

and criticism, and if they pass this test become official and appear in *Extensions and corrections to the UDC*, which appears half-yearly, cumulated every three years. The basic outline of UDC has the very considerable merit of being widely known. Few people will bother to understand an unfamiliar scheme. As with all the great general schemes, the drawback is the time taken for new subjects to be recognized and given class-marks. Literature on them, until this is done, has to be classified under the best available numbers, or more general headings, and very few libraries have the resources to reclassify this material when a proper class-mark is available. It therefore tends to be lost. Also, as with other general schemes, some libraries get 'left behind', i.e. are unable to revise their catalogues to meet changes. Many libraries still use UDC Class 4 for languages and linguistics, although it was officially 'vacated' in 1961; under the 'ten-year rule' should not now be used at all, and will later be assigned to another subject, or subjects.

6.1.3 *Library of Congress Classification*

This is much more in line with scholarly thinking, at least in the 'Western World', but is available in English only, and rather spoiled by a clumsy notation, and the way it has been 'apportioned'. There are twenty-nine volumes (containing 7,000 pages of schedules) each with its own index, but no general index or official introduction or guide to the scheme as a whole, though a general index is planned. Unlike any other general scheme, LC was designed for, and is based on the needs of, one library, for which it is named. Revision is less conservative than with DC or UDC, but is entirely by, and almost entirely for, the Library of Congress. *L.C. Classification additions and changes* appears quarterly. There is no provision for 'synthesis' though many compound subjects have their own numbers. The best guide is by Immroth [57], but the use of LC is not advised for small technical libraries for the reasons given above, and the delays in revising the technical schedules.

6.1.4 *Ranganathan and the Colon Classification*

The distinguished Indian librarian, Professor S. R. Ranganathan, was the inventor and pioneer of 'faceted classification'. This was a completely new departure, by which a subject, such as librarianship, was classified first into a 'personality facet' (libraries and their kinds), a 'matter facet' (library stock and materials), an 'energy facet' (library processes) and facets for space and time. This will seem strange and takes some getting used to; special training, not available in all countries, is needed to make and use such schemes. It has the advantage that many complex subjects, e.g. 'the cataloguing of technical reports in Indian research libraries', which in DC and LC can only be put under fairly general class-marks, and for which UDC gives a long coloned number, can be analysed into facets: 'personality' (research libraries), matter (technical reports), energy (cataloguing), space (India) and time (twentieth century). Each of these concepts has the same notation in whatever combination it appears, and the complex class number is made up by a succession of these in the order of facets PMEST. The schedules can thus be far shorter, and schemes based on this principle can fairly be called 'analytico-synthetics', since ideas are analysed in the schedules into basic concepts, and these synthesized to give class-marks which are as specific as the topic they cover.

Practice, unfortunately, has not always been as good as theory. Ranganathan has never given an explanation of 'personality' which is clear and satisfactory. His 'facet formula' PMEST has been attacked by other authors, and not convincingly defended. Its retention entails other complicated devices. The general scheme, Colon Classification [61] produced by Ranganathan and his school has been mainly a 'test-bed' for the evolution of his ideas, and is hardly used in any

library outside India. There have been sweeping changes between editions. The schedules are not easy to use, except by specially trained librarians, are remarkably poor in helpful notes, synonyms and near-synonyms, and not well developed, especially in technology. The whole scheme needs only one moderate-sized volume, but the instructions and the schedules for each class are separated by some hundreds of pages. The notational complexity is considerable. There is no guide to the scheme which starts in an elementary way, is clear and up to date, although the seventh edition of Colon is in preparation.

Ranganathan's contribution is none the less a brilliant one, though his ideas have mostly been better and more realistically developed by others. A number of special schemes on the facet principle have been made by others [63, 64]. There are two Unesco clearing houses from which lists of these and other unpublished, special schemes may be obtained, and at moderate cost, photocopies or microforms of chosen schemes. The Bibliographic Systems Center, School of Library Science, Case Western Reserve University, Cleveland, Ohio 44106 (United States) collects those in English; the Centralny Instytut Informacji Naukowo-Technicznej i Ekonomicznej, Al. Niepodleglosci 188, Warsaw (Poland) collects those in other languages. The best guide to making and using faceted special schemes is by Vickery [64].

6.1.5 *The Bibliographic Classification of H. E. Bliss*

Only one other general classification (covering all knowledge) need be considered, the Bibliography Classification of H. E. Bliss, an American college librarian. Bliss did a great deal of study and research on classification, embodied in two books. An abridged BC appeared in 1935 and the full schedules in 1947-53. Bliss died in 1955, his scheme is now out of print, and would not be mentioned here at all but for one fact, that the Bliss Classification Association, centred in the United Kingdom, has raised enough money to pay for a radical and complete revision of the classification, which is now well advanced at the School of Librarianship, Polytechnic of North London, under the direction of J. Mills, the Deputy Principal, and a well-known authority on library classification [59, 60]. It is expected to appear in 1974.

The old BC was scholarly, with a harmonious chain of main classes, with related subjects placed together, on the whole. The schedules were very full of detail and rich in synonyms, cross-references and explanatory notes. They were the first to provide alternative placings for some subjects, e.g. biochemistry could be in chemistry at CE or in biology at EH. The letter notation is well apportioned and allows short class-marks. There is an introduction to each volume.

Bliss's work found little acceptance in the United States and his scheme has been adopted by only one other library there except his own, but by about eighty in all, mainly in the United Kingdom (about forty, including the Senate House Library and others of the University of London) and the British Commonwealth, but also by a number of others. The copyright has been generously given by the H. W. Wilson Co., New York (the original publishers), to the Bliss Classification Association. The new edition will have the main classes faceted appropriately, will provide at least as much detail as LC, but will be available only in English. The present author has seen some draft schedules, which promise well. Later, the *Bliss Classification bulletin*, appearing annually, will keep the schedules as up to date as possible.

6.1.6 *Indexing*

The best way of indexing specific material, in the author's opinion, is keyword indexing. This resembles the older method using alphabetical (i.e. word) subject

headings, but keywords are shorter, normally one to three words, and are subdivided as little as possible. They should represent, as far as possible, single concepts, e.g. 'Plastics' and 'Bottles', not 'Plastic bottles'. Searching for a multi-concept subject is done by 'co-ordinating' entries for single concepts, and the method is also called 'co-ordinate indexing'. To facilitate this, a card represents not a document but a concept, and bears on it details of all the documents indexed by that concept, indicated for brevity by accession numbers. This is also called 'inverted indexing' or 'feature card indexing'; since 'feature' in this context, is another term for concept. To facilitate multi-concept searching, which entails comparison of two or more cards for common accession numbers, the numbers are arranged in columns by the *last* digit (see Fig. 1).

BOTTLES									
1	202	13	44	95	106	407	658	349	680
51	342	403	704	205	386	587	1088	689	690
651	612	543	1024	345	876	687	1358	1009	1350
1391	1092	1963	1114	825	1136	1347	1708	1489	1490
1491	1532		1394	1335	1586	1297			1630
1841				1675	1806	1777			1970
				1695					
				1805					

PLASTICS									
1	202	33	24	95	46	57	18	19	20
291	262	93	214	345	246	247	248	269	220
651	332	413	364	825	1866	367	368	399	690
1001	492	483	804	1605	1996	587	518	449	1490
1101	612	543	934			1107	648	1039	1980
1381	1432	703	1024			1437	1368	1489	
1391	1792	963	1684				1828	1759	
1871		1303	1814						
1891		1783							
1931		1963							
1981		1983							

MANUFACTURE									
41	62	63	104	105	106	17	98	79	320
61	222	103	304	265	236	87	258	239	360
651	352	123	754	355	406	207	1368	609	580
1021	492	303	974	1285	1396	367	1808	689	690
1831	532	543	1104	1615	1736	927		909	1360
	882	1033	1384	1995		1107		1429	1380
	1002	1793	1724			1727		1489	1510
	1062					1837		1629	1670
	1592								1710
	1832								1960
									1990

FIG. 1

It can fairly easily be seen that only documents 543 and 1489 cover the manufacture of plastic bottles.

All subject indexing can be considered to be co-ordinate indexing, except simple indexing using only one class-mark or subject heading per document. The words or sets of symbols representing subjects are either 'pre-coordinated' at the time of making the entry, as is usual with UDC, when the card represents the document, or they may be 'post-coordinated' at the time of search, as in Figure 1, when the cards represent individual concepts. For this reason 'co-ordinate indexing' is not a good term, and in what follows, will be replaced by 'post-coordinate indexing'. This kind of indexing can be used with classification numbers, e.g. UDC, or keywords. With UDC it replaces the colon or sign of relation.

The comparison for common accession numbers can be greatly speeded up by using 'optical co-incidence' or 'Peek-a-boo' cards. On these, a very small space represents a particular accession number; these spaces are arranged in a grid, with numbering to make it easy to find the space required. A hole is punched or drilled in the space if the document represented by that number is indexed by the concept which the card represents (see Figs 2-4).

In searching, the cards representing the concepts searched for are exactly superposed and held up to or over a light. A hole going right through the pack represents a document indexed by all the concepts. Cards with 500 to 20,000 spaces are available but 10,000 space cards are most commonly used. Makers of cards, punches, drills and viewing boxes are listed in the Appendix.

This method makes it desirable for the documents indexed to be filed by accession numbers, since any other method necessitates the user going from the post-coordinate index to another record to find where the documents are. It is so quick and easy (especially if 'Peek-a-boo' cards are used) to find documents on any combination of subjects, that the lack of helpful order does not matter.

In the keyword method, the list of approved keywords, normally containing also references from non-approved terms to approved or preferred terms, and references between related keywords, is called a 'thesaurus'. Numerous thesauri have been published. For a bibliography see [66]. The Unesco clearing houses mentioned on page 27 also collect and supply details of unpublished thesauri. If a suitable thesaurus of good quality can be found, this provides a useful basis, though it will be added to, and modified where keywords do not conform to the organization's usage.

Where no adequate thesaurus exists, it can be built up during indexing, but this demands fairly good technical knowledge, or frequent consultation of experts. The only books on thesauri at present are by Gilchrist and Soergel [55, 56, 62].

The advantage of keyword indexing is its flexibility and capacity for detail, especially with new subjects not represented in classifications. In a classification, a subject must be placed in a framework showing its relations to other subjects, and with new subjects, their relations may be far from clear, until some years have elapsed. With keyword indexing, a new subject can be assigned a keyword, and its relations inserted (in the form of references) later. If the first choice of keyword proves to have been unfortunate, it can easily be changed.

The disadvantage is that neither indexer nor searcher has a 'bird's eye' view of the indexing language, as they do with a classification. The structure of references should be as complete as possible, but even so, the thesaurus, like a list of subject headings, has a concealed classification underlying its structure of references, which it is helpful to reveal. This can be done by having classified displays of keywords.

6.1.7 *Thesaurofacet*

Another possibility, at the cost of some ease in dealing with new subjects, is to combine or 'marry' a thesaurus with a classification. This was first done by

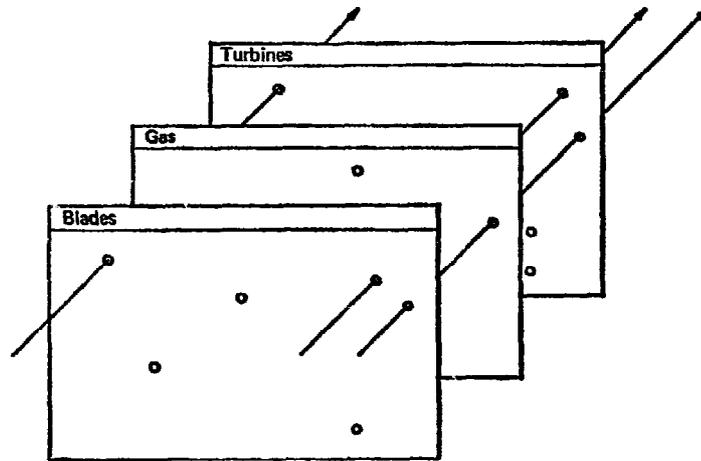


FIG. 2. Search by coincident holes.

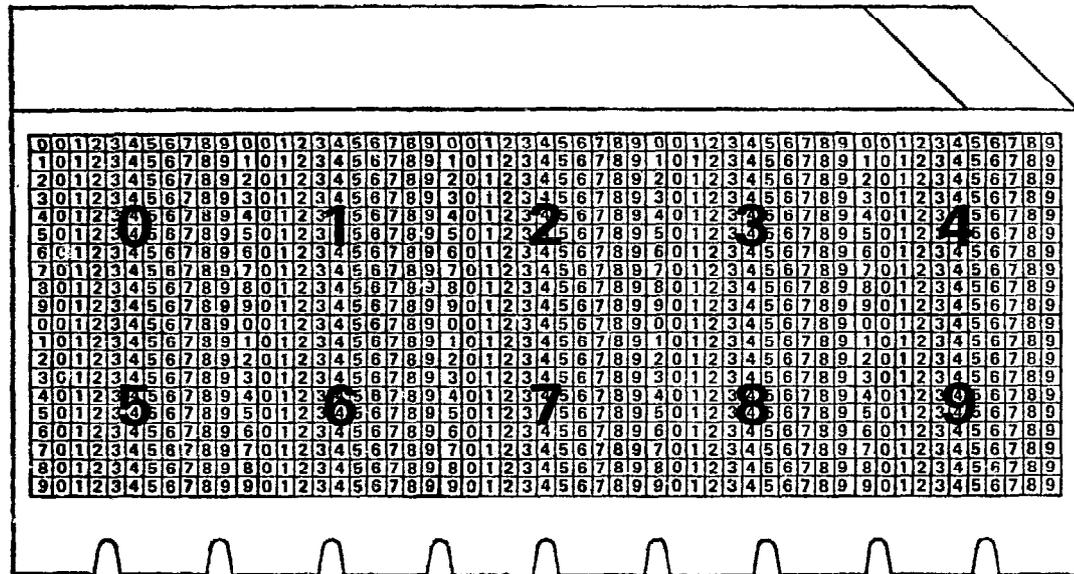


FIG. 3. Diagram of a 1,000-position peck-a-boo card.

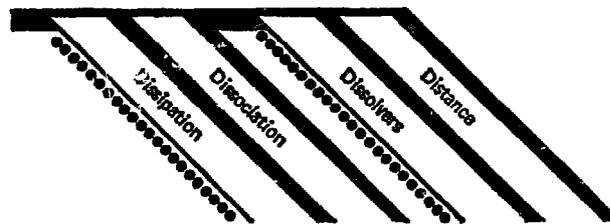


FIG. 4. Peck-a-boo file with a card removed.

Mrs Aitchison and others, then or formerly on the staff of the English Electric Co., in *Thesaurofacet* [50]. This is a very good, and completely rethought classification of physical technology and management, with outline classifications of medicine, agriculture, biology and the social sciences. It is more detailed in the subjects, which are far from being only electrical, the company is concerned with. It is faceted within fairly small subjects and so easier to use. New subjects up to 1968 are sensibly placed and subdivided. The notation is less good, and is based on a thirty-four digit 'alphabet' excluding numerals 0 and 1. The thesaurus contains about 16,000 keywords and 7,000 references from non-preferred terms, and replaces the subject index to the classification. By looking up the class number given opposite each keyword, the subject is seen in relation to others. *Thesaurofacet* can be recommended to librarians starting libraries in the physical sciences and engineering; its chemical parts are not adequate for detailed indexing.

6.2 ORDER RECORDS

The best form is 'continuous stationery', printed to order, in sets, and may be already fitted with 'one-use' carbon paper or offset carbon backings. It comes folded in boxes, can be continuously fed through a typewriter, and is perforated to allow tearing into a pack of forms for each item. The number of sets varies with circumstances. There should be at least one form for the supplier, two for the library, and one for the accounts department. The two for the library should be filed (a) by author/title to permit easy access to a known item, and (b) by the date of order, to allow checking of items slow to arrive. When an item arrives, one of these is suitably marked and sent to the accounts department to authorize payment. The other can be stamped with date of arrival, the price written on it and filed.

6.3 ACCESSION (ACQUISITION) RECORDS

The older-type hand-written accession record was costly in time. If the second library form mentioned in the last section has the accession number written on it and is filed by it, this gives an accession record for very little trouble. It may be useful to include the year of receipt in the number, e.g. 14952/72; also to have separate series of numbers for (a) books and pamphlets; (b) reports; (c) microforms, etc.

The advantages are: (a) statistics of additions and their cost, year by year, are easily compiled; (b) multiple copies can be distinguished by accession number in loan records; (c) if discarded items are noted, there is a record of the contents of the library for insurance purposes, which can be microfilmed and stored in a safe place; (d) for questioned items, details of who suggested them and approved the purchase are available; such a record is essential if post-coordinate or inverted indexing is used.

6.4 LOAN¹ RECORDS

There are many forms, and that which is chosen will depend a great deal on local circumstances. The author prefers the kind of equipment used in some shops, which takes continuous stationery, and produces at one writing, a pack of small forms. One should be filed by author/title, one by date the item is due back. (A file by borrower is rarely necessary.) The third can be used for analysis and statistics of loans. The forms need not all have the same printing, and it is a good idea if a fourth is so printed that it serves as a first recall notice.

1. U.S. = circulation.

6.5 STATISTICS

Some statistics at least should be kept of library work, as a rough measure of the work done. The number and kind will depend on the financial and management situation, and how easy it is to get permission to increase the staff when necessary. Arguments backed by figures are always more effective.

Statistics are of two kinds: those of work for library users, and the rest. Examples of the first kind are requests for originals mentioned in a bulletin; loans from one's own stock; items from other libraries—(a) requested and (b) obtained; number of inquiries received and of major inquiries and literature searches, etc., taking more than, say, one hour to answer. (The proportion of these will decline as the library improves; inquiries are rather crude material statistically.) These statistics analysed by the departments, etc., that users are in will show where 'selling' the library is still needed. The other kind of statistics are mainly of additions, e.g. the number of (a) titles; (b) copies of periodicals either taken or circulated, additions of other material of various kinds and forms.

The accuracy of the first kind mostly depends on meticulous recording all the time, and staff must be trained in this. The second kind can mostly be found by periodical counts from existing records.

7 Application of mechanized and other non-traditional processes

For a long time librarianship was, to a large extent, a self-contained field. Developments outside it often affected its raw materials, and made better tools available, but far less often affected library processes. The twentieth century has altered that.

The development of management as a subject, and of many special techniques of scientific management—e.g. work study, systems analysis, and job evaluation—has given administrators a set of tools for measuring and raising efficiency, and a few librarians have pioneered their application to their own field. The technical librarian should have a mind open to any ideas which can help him to do a better job, since only increasing productivity will raise living standards and allow better libraries. Some useful books are listed in the bibliography [25, 26, 34].

The accelerating increase in the amount of technical literature (the 'information explosion') has put heavy strains on the traditional methods of producing 'secondary sources' and on the methods by which organizations and individuals keep themselves informed. The development of computers seemed to provide alternative methods, although costly ones, and in the fifties there were confident predictions that they would provide a complete answer. The sixties showed that the problems were not so simple. As Coblans [24] puts it: 'During 1964 there were a number of such confrontations [between librarians and computer engineers]; mainly in the U.S.A. Thus the computer people have begun to see that library problems, which may appear superficially to be simple, are in reality complex. . . . Perhaps librarians are not just congenial pedants. On the other hand librarians are being made aware of their blissful ignorance of the detailed operation of their own procedures. Before the efficiency of mechanization can be assessed, the traditional systems must be meticulously followed through and described. Often that exercise alone leads to real improvement and in the final analysis justifies the retention of manual methods.'

The scale of operations in a small technical library, with a staff of six or less, will not justify on its own the use of machine or electronic methods. Where there is in the organization a central computer or other data-processing devices such as equipment using machine-sorted punch cards, it may be possible to use these for some purposes. It is very important not to try to adapt traditional processes to machines without first doing a thorough 'systems analysis'. This often shows up defects in the methods, as Coblans said.

8 Information work

The attitudes which should govern this have already been dealt with. The methods (on the scale of a small library) have not notably changed in the last ten years, except for an increasing interest in 'current awareness services'. The section 'Use of library material' in the article [33] by Redmond (an earlier version of this one) is still valid. What follows will supplement it.

8.1 LIBRARY BULLETINS AND CURRENT AWARENESS

Few small libraries can produce more than one bulletin, which should contain the material of general interest, and that which will interest a reasonable proportion (say 20 per cent) of those who receive it. Good selection is very important for periodical articles, and may be applied even to new material added to the library. The bulletin should be attractive in printing and layout (offset lithography is better for this than stencil or spirit duplicating) with a pre-printed heading for the first page, coloured if possible. The items should be numbered and a form should 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, etc., tear off and send it. Rapid service of these requests, with photocopies of short items where possible, is very important. The requests should be analysed in some detail in order to improve selection of items. A standard list of subject headings for the arrangement of items will help in this, and also help readers. Bulletins should be short enough to be looked through in about ten minutes per week, in industry; research workers and teachers are normally willing to give more time to reading bulletins.

Specialized material, or information about it, may be disseminated by circulation (as for periodicals), loan, brief hand-written notes or telephone. All have obvious drawbacks. 'Selective dissemination of information' (SDI) is a method of sending duplicated notifications, usually with abstracts, simultaneously to any number of people for whom the item matches sufficiently their 'interest profile', with a tear-off strip by which they can request originals. The profiles are collected by interview before SDI begins. Matching may be by a person or a computer. A person does it better, but a computer does it far faster, and for more people. Selection of material is very important. There are many reasons why an item may be useless to a user even though it exactly matches his profile. It may be too elementary, contain nothing new, be in a language he cannot read (and have no aids such as illustrations), be too long or badly written, or he may have seen it before. SDI will be welcomed only if the proportion of 'misses' is not too high. For one man, 25 per cent will be too high; another (e.g. a 'technological gatekeeper') will tolerate 75-80 per cent.

8.2 TRANSLATION AND TRANSLATIONS

The librarian will be asked to get articles, etc., translated. The first thing to find out is if it has been translated before. Cover-to-cover translations of some journals, mainly Russian, are published. Some large libraries collect translations, and there are indexes in some countries to unpublished translations. Chillag [36] and Geach [39] list the main ones. If a translation cannot be obtained, the next thing is to ensure that the item is worth the cost of translation. If someone with a good knowledge of the language can go through the item with the person interested, it will often be found that it contains nothing of importance, or that the translation of part of it will serve equally well. When a translation must be commissioned from an outside translator, it is vital that this be someone who understands the subject as well as the language. Otherwise ludicrous mistakes will be made. In most developed countries there are directories or registers of qualified technical

translators. A translator should never be asked to translate into any language but his mother tongue if the translation is to be published, distributed, or used for publicity purposes.

8.3 PREPARATION OF BIBLIOGRAPHIES AND READING LISTS

Some libraries prepare these on request. It is possible to spend a great deal of time on this, and to waste most of it. Many such bibliographies are put away and forgotten, or not used enough to justify the labour of preparation. It is a good rule always to question tactfully people who request a bibliography as to why it is wanted, how it will be used, and how many references are wanted. The precise subject should also be found out. If the replies are vague, and particularly if it is to contain 'all publications on' a fairly large subject, the librarian should point out that compiling a bibliography is a skilled job, expensive in staff time, and tactfully refuse.

The benefits to research workers of doing their own literature searching are considerable. In industry there is not always time for this, and many people would not know how to begin. The librarian must use his judgement. It may be better to give the inquirer a selection of material to read, and show him how he can find more for himself.

9 The future

A great librarian, L. R. McColvin, once said: 'Any good library grows: the only way to prevent this is by turning it into a bad library.' All the methods of restricting growth make material less easily available, and make libraries give a worse service. But we live in an imperfect world. Only rich countries and organizations can maintain large libraries. What are we to do?

First, we must know our stock, and the use made of it, knowledge we can get from observation and analysis of loan records. Older and less-used material can be removed, perhaps experimentally, to a 'first-remove' store, called for short a 'limbo'. If its removal arouses protests, it can be brought back. Material in 'limbo' for, say, five or ten years, apart from historical collections, may, if little used, be offered to a storage library or a national exchange. This method ensures that the shoe pinches as lightly as possible. The speed of discarding can be much greater if the library is in the area of a large city, with many libraries from which older material may be borrowed, than if it is out in the country, or in a developing country.

Second, the librarian must make the best use of space by good layout, and by using 'rolling shelving' in 'limbos' (bays of shelving on rollers so that a footway need not be left between each bay).

A third way is by co-operative acquisition and discarding, so that a group of libraries in the same or similar fields, agrees to get, or to keep, one or two copies of less used material on behalf of the group. In these days of quick communications, a telephone or telex message can transfer information from a book within minutes, or the book itself within one or two days, by parcel post.

Fourth, we must plan ahead, but our requests for more space are more likely to succeed if we can show that we have done all we can, in these and perhaps other ways, to make the best of what we have. We must plan, also, the training of staff, to see that there will be people fit to fill future positions, as far as possible, and people we can hand our burdens on to, with confidence, when retirement approaches.

No library should be an end in itself. It is a service department, helping to further the objectives of the parent organization. How well it will do this depends on the quality of the stock and the staff.

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APPENDIX
SELLERS OF OPTICAL COINCIDENCE CARDS
AND ASSOCIATED EQUIPMENT

Allform GmbH, 1 Berlin 15, Brandenburgische Strasse 27. Trade name: ALLFORM.
Anson (George) & Co. Ltd, 255-9 High Road, Ilford, Essex (England). Trade name:
VISIPOST.
Jonker Business Machines Inc., Gaithersburg, Md (United States). Trade name: TER-
MATREX.
Litton Business Systems Ltd, Sutherland House, Brighton Road, Sutton, Surrey
(England). Trade name: KEYDEX.
La Phototechnique, 6 Rue Dombasle, 75 Paris-15e (France). Trade name: SELECTO.
Jolley (L. J.) & Partners Ltd, Westbourne House, Westbourne St, High Wycombe,
Bucks. (England). Trade name: VISISCAN.
Royal McBee Corp., 850 Third Avenue, New York City 22 (United States). Trade name:
ROYAL MCBEE.
Visibell Ltd, Henley Road, Coventry (England). Trade name: VISIBELL.