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Document Reproduction : A Plea for Co-operation.

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J SAHA, *Indian Statistical Institute, Calcutta* 35.

Mentions the principal reprographic methods in current use. Indicates the value of microphotographs in the preservation of valuable and rare documents, and in inter-library loan. The problems and principles of administering a reprography department and the need for co-operation among reprography centres are emphasized. Gives data on the reprography centres in India. Suggests methods of co-operation in reprography.

0 Introduction

The uses of photographic reduction in recording documents are so obvious that the first microphotograph was made shortly after the invention of photography.

In 1853 Sir John Herschel suggested publication of microscopic editions of works of reference—maps, atlases, etc. Towards the end of the last century some libraries made full-size reproductions by photography, but microfilming activities were actually stimulated with the advent of the Leica Camera in 1924. Microphotographs are now used in many libraries ; and more and more libraries are maintaining their own reprography divisions; for, reprography is an essential ancillary to documentation service. The present paper is concerned with the managerial principles and co-operation in the utilization of the available means of reprography existing in the libraries and documentation centres in India.

1 Reprographic Method

The principal reprographic methods and equipment are briefly mentioned below.

11 MICROPHOTOGRAPHS IN LINEAR ARRAY

Perforated microfilm, 16 mm or 35 mm wide, in rolls is the standard form of microphotographs in the library as

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these are easier to handle. Microfilm strips are 35 mm film containing six frames. The first frame usually shows the title of the document and the subsequent five frames each hold two pages of the document thus giving ten pages per strip. These are much easier to handle and convenient for reading than roll microfilm but they are not suitable for continuous copying. 'Microstrip,' 'Microtape' and 'Microtak' are trade names for the different micro-opaque ribbons printed from microfilm.

12 MICROPHOTOGRAPHS IN TWO-DIMENSIONAL ARRAY

Microfiche is a rectangular sheet of 75×125 mm film carrying a set of microphotographs in two-dimensional array. Microfiche has the advantage of being in the international standard size of library cards; library filing trays can be used for filing microfiches. It is ideal for the reproduction of documents of short and medium length as a large number of pages can be reproduced on each fiche, and it is easy to handle. Micro-opaque cards contain a set of microphotographs in two-dimensional array printed on photographic paper. 'Microcard', 'Microlex', and 'Microprint' are trade names of microopaque cards developed and marketed by different commercial firms. Microphotographs in two-dimensional array are more economical than microfilm in roll or strip.

121 MICROPHOTOGRAPH AND RETRIEVAL SYSTEM

Microphotographs and information retrieval systems may be combined in such a way that the automatically selected entry for the document contains a microphotographic reproduction of the relevant document. Microcite, Minicard, Filmorex are based more or less on this principle using different sizes of microfiche. Enlargements of microfilm of microfiche negatives on photographic paper may be made with any enlarger suitable for the size of the negative. For making positive microfilm from the negative, a contact printer is necessary.

13 PHOTOSTAT AND OTHER APPARATUS

Photostat is essentially a big camera with a prismatic mirror attached to the lens. By reversing the image the mirror produces a readable copy directly on the sensitised paper loaded into the machine in rolls 350 feet long and 18 inches wide. Photostat process is suitable for producing a limited number of copies. A long range of duplicating

processes—Reflex (silver halide), Diffusion, Transfer, Diazo methods—are now widely used in libraries and offices for copying purposes. 'Verifax', 'Thermofax', 'Azoflex', 'Copy line', 'Duostat', 'Contoura', 'Burostat', 'Replicator' are the machines most commonly used. 'Kalfax' process promises to be a useful addition to the wide range of diazo copying methods.

14 ELECTROSTATIC METHODS

In recent years great progress has been made in electrostatic printing. The most popular of these processes at present are Xerography, which uses a selenium-coated plate as the photosensitive element, and Electrofax in which an electrically charged paper is used. Xerography is specially suitable as an economic process for large-scale production of enlargements from long rolls of positive microfilm which do not contain half-tone reproduction. For this purpose the Xerox Copyflo is used. In this machine in which the film moves synchronously with a drum carrying the semiconductor layer, the image is printed on a roll of paper.

15 READING APPARATUS

Every library serving microphotographs should have at its disposal at least one microfilm reading apparatus for all types of microfilm (16 mm and 35 mm) and for microfiches, and one reading apparatus for micro-opaque cards if these are also served by the library. There are many models of Reading Apparatus on the market. Recently several models, capable of being used for all variants of 35 mm microfilm, microfiches as well as micro-opaque cards have been marketed. Some Reading Apparatus have special accessories such as in "Thermofax" or "Copy-rapid", for the occasional production of enlarged prints. For recent information on the wide range of equipment and suppliers in different countries, reference may be made to the *FID Manual*. In the section 'Document reproduction,' in each issue of the *Revue internationale de la documentation*, H R Verry is giving useful information on the latest developments in reprographic equipment and processes.

2 Application in Documentation

Microrphotographs of manuscripts, printed books, periodicals, pamphlets, etc, can be used with advantage instead of the original documents. Rarely used documents may even be published in microform.

21 PRESERVATION OF MANUSCRIPTS AND RARE DOCUMENTS

Manuscripts and other valuable documents may be microfilmed to preserve them from loss and destruction and to make microcopies available to other libraries. Books and other periodicals, unusable or unbindable owing to the deterioration of the paper, can often be replaced by photographic reproduction. Microrecords are said to have a higher degree of permanence than paper of good quality.

22 PUBLICATION MEDIUM

Microphotographs are a convenient medium for publication and for republication in small editions. Microphotographs of out-of-print books and back numbers of periodicals can be of great use in building up resources, otherwise unobtainable or too expensive. Very specialized research reports and similar items, likely to have only a limited demand, may be published in microform.

23 INTER-LIBRARY LOAN

The use of microphotographs instead of the original in interlibrary loan has the following advantages. The original stays in the library ; it remains accessible, is not in danger of being lost in transit, and suffers no wear and tear. Microfilm strips and microfiches can be mailed in simple envelopes at low postage rates and allow of cheap airmail transmission. Finally, microphotographs need not be returned. Therefore they do not involve checking loan files. A cost comparison shows that in many cases the production and mailing of a microcopy is decidedly less expensive than sending and returning the original. This is especially true for short articles from bulky volumes of periodicals.

3 Management and Co-operation

31 PROGRAMMING

In a reprograph division, full employment of equipment and personnel can hardly ever be obtained. For the flow of orders is irregular and it is difficult to forecast the number of orders on a particular day or the average flow of work over a period of time. This is one of the reasons why charges for reprograph services are higher than estimated by preliminary calculation, and necessarily differ from centre to centre.

If the capacity of the reprography centre is such that there is a surplus of orders, full employment of its services will of course result. But this situation may not be entirely satisfactory, since it may often cause long delays in fulfilling orders.

32 TRANSPORTATION

It is always desirable to reduce the transport to a minimum especially of the documents to be reproduced. If possible attempts should be made to keep the documents in their places and bring the apparatus to them. In the case of small collections of rare or precious manuscripts it is obvious that there is considerable advantage in bringing a camera from the reprography centre to the collection. This is quite apart from the question of packaging and transport efficiency. It is desirable for big reprography centres to have motor transport and portable cameras at their disposal. This development, which is gradually growing but could be further stimulated, will produce a network of reprography centres covering the whole country. In this way at least the scientific libraries and specific collections of scientific or specialized material could be consulted *in situ*.

33 STANDARDIZATION

Standardized materials should be used and technical standards should be strictly followed in executing the reproduction work. Variety in the processes and in the sizes of copies should be reduced. Some variety should, however, be allowed for the convenience of the clients.

34 PRICE SCHEDULE

Uniformity in charges should also be introduced to enable the client to calculate the charge and pay in advance, on the basis of a clear schedule. The great majority of existing processes produce negative haloid microfilm copies and diazo copies from transparent masters, although now rapid copies might be produced if the services have up-to-date equipment at their disposal and could draw up schedules of charges for special purpose processes—such as haloid transfer reflex copies, diazo reflex copies, optical diazo copies, etc. Since no comparable data on cost functions are available, it is recommended that a series of case studies be made.

35 CO-OPERATION

Co-operation between centres for reproduction of documents can best be achieved in big cities where several repro-

graphy centres exist. Usually these centres are of the non-profit-making type and are therefore not competitive. However, many non-profit-making institutions give a tacit subvention to their reprography department—in other words, they work below cost price—and some other institutions may be reluctant to work at a loss for the benefit of other institutions. On the other hand, mutual help may offer sufficient compensation. Co-operation should however be based on a close calculation of the cost. Unification of the structure of price schedules should be aimed at and achieved through voluntary co-ordination between the reproduction services or the institutions to which they belong.

4 Reprography Centres in India

I shall now deal with the question of co-operation amongst the existing reproduction establishments attached to the different libraries and documentation centres in the country. But what is known about them? The answer is not an easy one.

41 INFORMATION AVAILABLE

There is no comprehensive recorded information on the availability of microfilming and photocopying services in the country. On search we find that the *Directory of special Libraries and information centres* records 28 libraries and documentation centres having microfilming and other photocopying services (See Appendix A). Certainly this record cannot be accepted as complete, as less than 50 per cent of the libraries sent their returns in the compilation of this directory. But to know with whom to co-operate and on what basis, a great deal of information is necessary which would enable us to get a better picture of typical units to be perceived. Also several kinds of factual data are required to compare one unit with others. To collect all such information, a questionnaire (See Appendix B) was designed requesting details on the availability of machines, their utilization, operation costs, service facilities, price schedule, etc. The questionnaire was sent to these 28 centres. To supplement the data, the centres were also asked to send information about other centres not recorded in the list. It is rather disappointing that only 16 libraries (57 per cent) responded and none provided information to supplement the list. The National Library has no photo-duplication service of its own, but provides such service by arrangement with a commercial firm. The data about these have been collected and incorporated in the survey results. If the librarians

had cared to be a little more co-operative in sending the returns, we could have a directory which would have been more dependable and comprehensive as a source of information. In that case I could have presented more complete data.

42 ANALYSIS OF SURVEY RESULTS

Out of the 17 centres, three replied that they have no microfilming or photoduplication of services attached to their organization. One has no reproduction unit of its own but provides microfilming and photocopying services with the help of private firms on 'no profit, no loss' basis.

421 EQUIPMENT

The range of equipment available in the 13 different centres is given in Table 1. It is rather difficult to measure the availability of the reprographic equipment in the country from this low percentage of returns and draw definite conclusions. However, out of the 13 centres six are located in Calcutta and the information available from the analysed data may be useful in designing the programme of photoduplication service in this region.

4211 Table 1. Reprographic Equipment Available.

Centres*	Microphoto-graphy	Prismatic methods	Diazo and other contact processes	Electro-static process	Enlarger
2			Contoura		
9	Graflex				Kodak precision II
12	photorecord Recordak (AH5) Graflex	Statfile		Rajah	
15	Photorecord Graflex Photorecord	Photostat	Duostat	Xerox(1358)	
16		Photostat			Omega D-II
17	Graflex		Lumoprint		Focomat 2A
	photorecord	Photostat	Transcopy		Kodak precision I
	Recordak (AH5)		duplex		Kodak precision II
	Dea-graph(CB-II)				Kodak precision II-B Printer projection type B-II

Centres	Microphotography	Prismatic methods	Diazo and other contact processes	Electrostatic process	Enlarger
19	Reprovitt II		Transcopy duplex		
20	Pentacon camera		Diplomat book-printer		Hood-type
23	Reprovitt II		Unicop		
25			Photocopying		
27	Exakta varex(II)a)		Duophoto		Kodak Precision II-B
28			Lumoprint		
			Transcopy duplex		
29	Recordak (AH) Microfilm camera (locally made)				Ensign Barnett

* Centre number is the same as the serial number of the reproduction Unit listed in Appendix A.

4212 Table 2. Equipment available in Calcutta region

	N of centres	Microfilm cameras	Photostat/statfile	Diazo and other processes	Xerox	Enlarger
All	13	13	5	10	1	11
Calcutta region	6	9	2	7	1	6

It may be noted that not only a larger number but also a larger variety of equipment including the only Xerox machine available in India are located in Calcutta region. Some of these machines have been installed very recently.

422 EXTENSION OF FACILITIES

On the question of extending the facilities to other organizations and individuals, Seven answered 'Yes', One 'Yes', but restricted to its own documents; and Five 'No'.

4221 Table 3. Service extended to outside organizations

Centre	Reply	Centre	Reply
2	No	20	Yes
9	Yes	23	No
12	No	25	Yes
15	Yes	..	(restricted)
16	Yes	27	No
17	Yes	28	No
19	Yes	29	Yes

423 IDLE MACHINE HOURS

On the question of idle machine hours, 4 centres gave no replies, 3 declared their machines to be fully (100%) engaged and utilized, the remaining 6 centres gave idle hours ranging from 30% to 90% machine hours.

4231 Table 4. Idle Machine Hours

Centre	Percentage of idle machine hours	Centre	Percentage of idle machine hours
2	30	19	not recorded
9	nil	20	not recorded
12	not recorded	23	not recorded
15	70	25	nil
16	85	27	nil
17	50	28	30
		29	90

424 UTILIZATION OF IDLE MACHINE HOURS

On the question of utilization of idle hours, only one centre seemed to have any definite proposal or scheme.

425 WORK LOAD

Analyzing the available data on the work-load, it can be safely concluded that with a little more planning and co-operation, the work-load can be easily increased twofold or more in some of the existing centres.

426 SUPPLIES OF PHOTOGRAPHIC GOODS

The most important problem connected with the re-prograph services is adequate supply of photographic goods (film, paper, chemicals, etc). The replies to the question on adequate supply of the photographic goods, dependence on local market for supplies, and arrangements for supplies from abroad, are given in Table 5.

4251 Table 5. Supply of photographic goods

Centre	Adequate supply	Dependence on local market	Import licence
2	Yes	No	Yes
9	Yes	Yes	No
12	No	No	Yes
15	Yes	No	Yes
16	No	No	Yes
17	Yes	No	Yes
19	Yes	No	Yes
20	No	Yes	No
23	Yes	No	Yes
25	No	Yes	No
27	No	Yes	No
28	No	No	Yes
29	No	Yes	No

Those assured of adequate supply (except one) hold import licences for supplies from abroad and are not entirely dependent on the local market. Adequate supply of photographic materials for which we have to depend entirely on foreign markets is a matter for first consideration for any proposal of improved utilization of the existing equipment or supplementing those for wider service. Any scheme overlooking this aspect will be no better than building castles in the air.

427 RATE SCHEDULE

On the question of charges Eight Centres replied. This rate-schedule together with supplementary information on INSDOC and IASLIC rates for photoduplication services are given in Table. To reach some sort of agreed basis to co-operate uniformity in rates is essential. Cost studies should be made to reach standard rates acceptable to all centres.

4271 Table 6. Charges or microfilm and photo copying services

Centre	Microform	Photoprint
2	.....	.....
9	.....	Rs. 1.84 to Rs 6.12 depending on sizes from 2.5'+ to 30"+53"
12	.....	..... 2.5"
15	Rs 3.00 or first ten pages and Rs 1.40 or subsequent ten pages or any portion thereof	Re 0.50 to Rs 1.25 depending on sizes 6"+11" to 17"+23"
16	.....	Re 0.50 to Rs 1.25" depending on sizes 28.0+15.5 (cm) to 59.0+43.5 (cm)
17	Rs 2.50 or first ten pages and Rs 2.00 or subsequent pages or any portion thereof.	Rs 2.00 first two pages and Rs 1.50 or each additional two pages of same paper
19	.....	.....
20	Rs 2.00 or first ten pages and Re 1.00 or subsequent ten pages or any portion thereof .	Rs 2.00 or first two pages and Re 1.00 or each two additional page
23	.....	.....
25	.....	Rs 2.00 per page of direct negative and Rs 3.50 or positive print o the size 33.0 cm + 20.3 cm
27	.....	.....
28	.....	Cost of the paper
29	Re 0.62 per exposure.	Rs 1.50 to Rs 2.00 per 100 sq inches
	Minimum rate Re 0.40 above 1600 exposures.	sq inches
INSDOC	Rs 2.00 for first strip (about ten pages) and Re. 1.00 for each additional srtp of some paper.	Rs 2.00 for first two pages and Re. 1.00 for each additional two pages of some paper
IASLIC	Rs 2.00 for first ten pages and Rs 1.37 for each additional ten pages or a part thereof.	Rs 2.00 per page for first two pages and Rs 1.50 or each additional page

428 READING APPARATUS

A large number of scholarly libraries are now provided with a variety of Reading Apparatus. The information on it and readers reaction to its use are of sufficient interest to warrant an independent survey on a larger scale.

5 Plea for Co-operation

The survey results presented a kind of natural history of existing reprography centres attached to different establish-

ments. Let us consider the necessity for co-operation among the centres for organization towards greater economy and improved services. The developments in reprography economy and the present day trends in its application as communication media make it desirable that scholarly libraries and documentation centres should have full facilities to undertake the various types of work now required of them. But even in a fairly big centre where a variety of equipment are in operation, it may not be possible to carry out reproductions of different kinds for, as in selecting the most suitable process or machine for work of a specific nature 'cost', 'quality', 'durability', 'size of copy', 'nature or original document', and several other factors need to be considered. Under the present economic conditions, Indian libraries and documentation centres can hardly be expected to be adequately equipped to produce a variety of work, nor is it desirable to attempt such equipment since this would require an excess of machines and staff which could not be kept economically employed. Great efficiency and economy can be achieved through co-operation among the establishments in the country or even among the establishments within a region. The demands of all the libraries and documentation centres when pooled together, may help programming not only a better utilization of the existing apparatus but also installation of more efficient and up-to date apparatus. This will provide scope for a wider variety of reproduction work.

51 XEROX COPYING MACHINE

It is noted that one establishment has very recently installed a Xerox copying machine. The centre has remarked that the machine will be available for internal use and may not extend the service to outside organisations due to shortage and uncertainty of the flow of photographic goods. Let us hope that in the near future one or two other Xerox machines will be available in the country to meet increased demand for reproduction work at cheaper cost.

52 MICROFICHE UNIT

There is no microfiche unit operating in the country. But microfiche camera is more efficient and economical than any other microreproduction methods. With the installation of one or two microfiche units in the country, there may be possibility to handle a larger volume of reprograph work, to make available a large number of manuscripts and

rare documents in the country for wider circulation. A typical case may be cited here that the Government of India has given permission to the International Documentation Centre in Sweden to reproduce and market microfiche edition of earlier volumes of Indian Census (1872 to 1951) and the Provincial and District Gazetteers of India, together with several other India, documents. If this work could have been handled in India we would have been in a position to earn substantial foreign exchange and not to spend hard currency to acquire these documents in microform for our use. These documents are extremely rare and of vital interest for all workers on Indian economy and culture. There would be great demand for these publications all over the world.

6 Factors for Co-operation

1 We have to depend entirely on foreign countries for supply of reprographic equipment and materials which are not only very expensive but also involve foreign exchange. Effective co-operation and co-ordination should be developed to avoid wasteful expenditure in running smaller independent units.

2 It may not only be advisable but also helpful if the resources available in the country or in a region are considered before any decision is made to purchase and install a new equipment. This will help to build up a wider range of equipment at national and/or regional levels to handle a wider variety of reprograph work if some agreement is reached as to the programme of work.

3 Standards should be strictly maintained both in the use of the material and at the operational level.

4 Uniformity in the charges should be effected by mutual agreement.

5 Plans may be made to republish rare documents and manuscripts in microform. This will ensure regular flow of work to effect greater economy. Secondly, this republication programme will help to popularise the service.

6 It is desirable to set up a co-ordination committee for advising on the programme of work, selection of machines, and reprography methods.

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APPENDIX A

Photocopying and microfilming services available in the libraries in India

Source : *Directory of Special and Research Libraries in India* issued by the Iaslic. 1962.

- 1 Bombay University Central Library, Mayo Road, Fort, Bombay 1.
- 2 British Council Library, All India Fine Arts & Crafts Society Buildings, Old Mill Road, New Delhi 1.
- 3 Central Building Research Institute Library, Roorkee, UP.
- 4 Central Drug Research Institute Library, Chattar Manzil Palace, Lucknow.
- 5 Central Electronics Engineering Research Institute Library, Pilani, Rajasthan.
- 6 Central Fuel Research Institute Library, P O Jealgora, District Dhanbad.
- 7 Central Glass and Ceramic Research Institute Library, P O Jadavpur University, Calcutta 32.
- 8 Central Road Research Institute Library, P O CRRI, New Delhi 20.

- 9 Central Water and Power Commission Library and Information Bureau, Bikaner House, Shahajahan Road, New Delhi.
- 10 Deccan College Research Institute Library, Poona 6.
- 11 Defence Science Library, Defence Science Organisation, Ministry of Defence, Government of India, New Delhi.
- 12 Geological Survey of India Library, 29 Chowringhee Road, Calcutta 16.
- 13 Iaslic, care of Geological Survey of India, 29 Chowringhee Road, Calcutta 16.
- 14 ICI (India) Private Limited, H O Library, ICI House, 34 Chowringhee Road, Calcutta 16.
- 15 Indian Council of Medical Research Library, Central Research Institute, Kasauli, Punjab.
- 16 Indian Institute of Science Library, Bangalore 12.
- 17 Indian Statistical Institute Library, 203 Barrackpore Trunk Road, Calcutta 35.
- 18 Insdoc, National Physical Laboratory, Hillside Road, New Delhi 12.
- 19 Jadavpur University Library, Calcutta 32.
- 20 Madras University Library, P O Triplicane, Madras 5.
- 21 Medical College Library, 88 College Street, Calcutta 12.
- 22 Medical Library, Directorate General of Health Services, Central Secretariat, New Delhi 2.
- 23 National Rayon Corporation Limited, Technical Library, Mohone-Kalyan (C R), Maharashtra.
- 24 Nutrition Research Laboratories Library, Indian Council of Medical Research, Taranaka, Hyderabad 7.
- 25 Patent Office (Technical) Library, 214 Lower Circular Road, Calcutta 17.
- 26 Poona University Library, Ganeshkind, Poona 7.
- 27 Regional Research Laboratory Library, Hyderabad (Dn 9.)
- 28 Saha Institute of Nuclear Physics Library, 92 Acharya Prafulla Chandra Road, Calcutta. 9.
- *29 National Library, Belvedere, Calcutta 27.

*Messrs Focal Craft a Private organization, is doing the reproduction work of the National Library on contract basis.

APPENDIX B.

Survey of Reprographic Equipment Available in the Libraries and Documentation Centres in India.

Please fill in the questionnaire in type and return it to the Chief Librarian, Indian Statistical Institute, 203 Barackpore Trunk Road, Calcutta 35.

Organization :

Address :

1 MICROFILMING AND PHOTOCOPYING EQUIPMENT

<i>Description (Maker and Model)</i>	<i>Capacity</i>	<i>Price (Approx)</i>	<i>Date from which under use</i>
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2 OTHER PHOTOGRAPHIC EQUIPMENT (ENLARGERS, ETC.)

<i>Description (Maker and Model)</i>	<i>Capacity</i>	<i>Price (Approx)</i>	<i>Date from which under use</i>
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3 Size of the photographic processing rooms :

4 Number of Staff attached to the photographic unit :

5 Annual consumption (quantity) : Microfilm ;
Sensitized paper.

6 Do you get adequate supply of the photographic goods to
maintain regular service ? Yes No

61 Do you depend entirely on local market for supplies ?
Yes No

62 Do you hold import licence or supplies from abroad ?
Yes No

7 Give average annual figures for :

(a) Requests received :

(b) Clients served :

(c) Microfilm exposed (frames) :

(d) Photoprints made (pages) :

8 Do you extend your photographic and microfilm services to other organizations and individuals ? Yes No

81 What are the conditions or extending such facilities to outsiders ?

9 Charges for photocopying services :

(a) Microfilm (per frame) :

(b) Photostat (per page) : ..

(c) Electrostatic print (per page) :

(d) Other paper print (per page) :

(e) Minimum charge per order and service charge, if any :

10 Percentage of machine hours idle :

(a) Microfilm Cameras :

(b) Photocopying equipment :

(c) Enlargers :

11 Have you worked out any scheme to utilize the idle hours ?

12 DESCRIPTION OF MICROFILM READERS IN THE LIBRARY :

<i>Maker and Model</i>	<i>Capacity</i>	<i>Price (Approx)</i>	<i>Date from which under use</i>

13 How many hours a week (average) the readers are under use ?

14 Do you find the readers adequate and satisfactory ?

15 Have you any record of readers' reaction regarding the use of microform readers ?

16 Additional comments : if you wish to add to the information given, please comment below quoting the serial number.