



Microfilm and Microfacsimile Publications

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IT IS INDICATIVE of the relative novelty and the fluctuating state of microcopying that most reports on the subject must begin with a description of the various types available at the time of writing. How these variant forms are listed and classified depends upon the degree of progress at the time of writing and the feature and purpose being considered. It may pay the reader to compare the following with two previous *Library Trends* articles.^{1, 2}

A simplified outline of what is rapidly becoming a confusing array of micro-techniques, is as follows:

1. MICROFILM (Transparent)
 - a. Ribbon (Integral)
 - b. Sheet (Integral)
 - c. Composite Forms (Fragmentary)
2. MICROPAPER (Opaque)
 - a. Photographically Printed (Integral)
 - b. Mechanically Printed (Integral)
 - c. Composite Forms (Fragmentary)

Microfilm is the older form and serves also as the first stage in the production of micropaper. The image of the original appears, greatly reduced, on a transparent medium, which is usually cellulose acetate (safety film). It is read by means of an optical instrument which projects light through the film. Microfilm inherits the problems and techniques of its parent, the moving picture film.

In the case of micropaper, the original is photographically reduced on microfilm and then printed on paper. It is read by means of an optical instrument which reflects light from the paper.³ A micropaper reader can therefore be considered a miniature version of its cousin, the audio-visual opaque projector.

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Ribbon microfilm is at present used in three principal widths: 16 mm ($\frac{5}{8}$ "), 35 mm ($1\frac{3}{8}$ ") and 70 mm ($2\frac{3}{4}$ "). There is some validity in regarding 16 mm "duo" filming (the images are exposed down one half of the film and then up the other half) as an unsplit 8 mm width. One also hears of a proposed width to be about twice the present 70 mm, but would the purist consider this microfilm? Fortunately for librarians, most of the film they are asked to administer is of the 35 mm variety.

In this country ribbon microfilm is usually stored on reels holding 50, 100 and sometimes 1,000 feet, the length of the original determining the length of the film. In Europe the short strip ribbon frequently is found.⁴ This is usually about 210 mm ($1\frac{1}{4}$ ") long, and includes ten pages of text and a descriptive title frame. A lengthy original may demand numerous strips.

Sheet microfilm is similar to ribbon except in shape. It is, however, often made on a heavier weight film base; and it requires a different type of camera. Besides placing the exposures in a series of tandem positions, these step-and-repeat cameras must also be able to lay down a line of frames next to the row previously exposed. The sheet, or microfiche as it is called abroad, has been developed to a greater extent in Europe than in the United States.⁵ There it is found in many sizes ranging from 75 x 125 mm (3×5 ") up to 105 x 150 mm ($4\frac{1}{8} \times 5\frac{7}{8}$ "). There are even a few other non-standard sizes reported.⁶

There have recently appeared two versions of the microsheet in this country to give challenge to the established position of the integral ribbon. As the first of these is produced by laminating short strips of ribbon, usually made on 16 mm film, onto sheets of acetate, it must be considered a composite microfilm rather than an integral sheet. This is the Frederic Luther Unitized Acetate,⁷ which carries on a process begun by the Diebold Company. These are made in the standard 3×5 inch and 5×8 inch sizes, and they are used primarily for the cumulative microfilming of hospital records. The other is the Micro-Research-Card, which is a combination microfilm and punched card. It is 5×8 inches of acetate which will hold from 75 to 80 pages of text and up to 208 coding holes. At present it is used for disseminating geologic research materials.

Eastman Kodak is presently developing the Minicard⁸ which is certainly fragmentary, being only 16×32 mm ($\frac{5}{8} \times 1\frac{1}{4}$ ") in size. It is, however, an integral sheet of film made from a section of 16 mm ribbon. It will hold up to twelve frames of photographic images, filmed at a reduction ratio of sixty diameters, and about two hundred and

fifty bits of digital information. Without the photographic images it will hold 2,940 bits of information, which is about three times the capacity of the standard I.B.M. card.

The frozen nature of a hundred-foot roll of ribbon microfilm has vexed many a reader who wanted merely to look at one or two frames in the middle of the roll. The European strip film, the sheet film, the 70 mm unitized film, and the micropaper forms do not give rise to complaints on this account. For the user of 16 and 35 mm ribbon there is a way to break the chain up into its component links, which can then be rearranged. This is by use of those composite forms, the aperture and jacket cards.⁹ These come in many of the standard sizes for filing cards. The aperture card is one with a hole cut in it. This hole is framed with a band of pressure-sensitive adhesive tape (like Scotch tape), and a microfilm image can be cut out and placed in this window. There may be one aperture or more, depending on the requirements and the type of card used. If it is necessary to individualize a very short series of exposures, the jacket card is the answer. Here the strip is slid into a grooved opening in the card much as a drawer is slid into a bureau. Both of these types of cards are also available from the Filmsort Company in the marginally punched (Keysort) and electrically sorted (I.B.M.) types. Thus the condensation of microfilm is combined with the selection of the punched card.¹⁰

The Microcard is the best known form of photographically printed micropaper. This 3 x 5 inch card, which includes cataloging information as well as the microtext, is really just as much a photographic print as those made over a holiday weekend with the ubiquitous kodak. It is produced by printing onto photosensitive paper from a sheet microfilm negative or from a composite negative made from ribbon microfilm.¹¹ When spelled with a capital "M" the Microcard (a registered term)¹² remains 3 x 5 inches in size and is governed by a code of standardization.¹³ One suspects, however, that the small "m" microcard will come into our language very much as has the small "p" photostat. Be that as it may, the photo-printed micropaper will not be content to remain imprisoned in the 3 x 5 inch size. It has already appeared in the Microlex¹⁴ card which is 6½ x 8½ inches in size and carries two hundred pages of text on each side. Another producer is considering a 5 x 7 inch card, and a reading machine is available which will handle cards up to 8½ x 14 inches. Micropaper is being taken over by government and business,^{15, 16} and librarians are wondering if they should join the parade which was started by a librarian.^{17, 18}

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Mechanically printed micropaper is at present represented by the Readex Microprint¹⁹ card alone. This 6 x 9 inch sheet is made up of one hundred pages of text reduced by microfilming and then printed with ink onto paper. As ink and paper are cheaper than silver and paper, the Microprint can be produced more cheaply in large editions, once the greater composition costs are taken care of.²⁰

For those who wish to roll their own, the micropaper outlook has been rather bleak until quite recently. Microfilm has been made by the individual scholar, especially if helped by grants-in-aid,²¹ and by small libraries for a number of years. The entrance of business into the field brought the efficient machines and techniques used today.²² Micropaper has so far been the product of a few commercial agencies. With the advent of the composite Microstrip and Microtape it is possible for the small institution to prepare minimum copy editions. The Microstrip is a ribbon of micropaper, either 16 or 35 mm, printed photographically, and backed with a plastic-type adhesive. When moistened, short strips can be cemented to a file card of any size. Microtape is a similar ribbon of 16 mm micropaper laminated to a double-surface pressure-sensitive tape. It does not require moistening, merely stripping off the protective layer at the back. At present these cost about twice as much as positive microfilm, but time and competition may bring them in line.

It has been pointed out that: "With relatively minor additions to provide for physical form, the rules for cataloging books can be applied to [microreproductions of printed matter]." ²³ Classifying them is not such a simple matter nor is there general agreement about the best procedure. In 1940, most writers on the subject felt that classification of microfilm was neither desirable nor necessary, yet examination of catalog cards from twelve research libraries revealed that some sort of system, however simple, was used in almost every case.²⁴ This divergence between theory and practice may still be said to exist today.

The conflict arises from the opposition of a desire to exercise more than accession-number control over a growing collection of microreproductions and the apparent difficulties of organizing the material. Two factors may weigh against a decision to classify: (1) inclusion of more than one title per microfilm reel often makes even moderately close classification impossible; (2) the nature of microreproduction precludes meaningful browsing, one of the arguments in favor of shelving by classification order. Still, pressure for some sort of broad classification may be created if the availability of several reading

machines makes it possible to distribute the collection among a number of library divisions.²⁵

Early attempts to organize the microfilm collections at Stanford and the New York Public Library were based on a simple number arrangement.^{26, 27} In contrast, the University of Chicago Library considered subject classification of microfilm essential in anticipation of vastly expanded collections. Both letters of the Library of Congress classification (used throughout the library) were used in combination with serial numbers. Decimal subdivision provided for later additions.²⁸

The effort to avoid classifying serials gave rise to many practical difficulties at the New York Public Library. Originally, a straight alphabetical arrangement was used for newspapers, and Cutter numbers (merely another form of alphabetizing) for all other serials. Since reels were stored ten to a box, this system necessitated a good deal of shifting and relabelling to allow interpolation of new titles and current additions. When regular microfilm cabinets were obtained, it was decided to retain the alphabetical-plus-date arrangement for newspapers, but to assign broad class marks plus a number, title-by-title, for other serials. Thus open entries and long runs could be handled by single call numbers. Book-microfilm continued with class-marks plus reel-by-reel numbers.²⁹

A 1947 review of microfilm cataloging at thirteen large research libraries showed that these libraries were nearly evenly divided between using some variety of accession number alone and using such a number in connection with classification letters.³⁰ An informal survey in 1950 seemed to indicate a trend toward broad classification.³¹

The microreproduction collection at the School of Library Service Library of Columbia University offers a working example of extremely broad grouping. Six separate number series are maintained. Most monographs and all closed entry serials are arranged by accession number in the "F" series. Items to which additions must be made are in "FN". Columbia dissertations are in an "FC" series, arranged by University Microfilms number. *Short-Title Catalogue* imprints are in an "FP" series. Microprint and micro-strips are in "FS" and "FR" respectively.

The Library of Congress microfilm collection provides a striking instance of successful arrangement without any classification by form or subject. The system of using two distinct series—one for closed entries, the other for open ones—proved satisfactory even though the collection grew from 9,000 to 60,000 reels. Subsequently, the collection

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was distributed among several divisions of the library, but this was more for convenience of use than due to a breakdown of the system.³²

Although Fremont Rider had hoped to solve the problem of cataloging and storing Microcards at one stroke by filing them in the main catalog of a library,³³ practical considerations make such a plan unacceptable. Either Library of Congress or typed cards are more economical for recording Microcard holdings with necessary added and subject entries. Microcards themselves are filed in a separate catalog by author or by classification number.^{34, 35} It is not clear that the latter arrangement has a special advantage since the curling of Microcards makes them difficult to thumb through. Large-size forms of microtext present no cataloging problems essentially different from those of books. Actually many microprint issues can be treated like collected sets.

Little has been written on the servicing of users of microcopy collections, but it seems clear there are two schools of thought. The more conservative contends that the user should not be permitted to handle the microfilm, thread the machine, or change reels.³² This attitude appears to stem from the days when microfilm was less common and users frequently wrought some damage because of ignorance of the mechanics of the machines and the basic principles of microfilm care.

The opposed view is that the user should be expected to learn the operation of the machine after brief instruction. At Columbia University between one-third to one-half of the users require some briefing.

Another factor in deciding how to serve users is the location of the reading area in relation to the librarian's desk. The more conservative system has been perpetuated at the Library of Congress because the machines are within a few feet of the librarian. In many libraries, such as that of Columbia University, the readers are in the stack area beyond direct observation by the desk attendant. Under such circumstances, reader self-service is almost obligatory.

The problems of the stability and storage of microcopies are so closely related that it is impossible to discuss one except in terms of the other. Of what value is it to purchase efficient and expensive storage cabinets for microfilm, if it turns out that this film has been improperly processed and is not of archival quality? ³⁶ On the other hand, should all microfilm be considered as necessarily archival? Some of it can be used as a tool and then discarded when its usefulness is over. The major uses for microreproductions have been stated as: condensation, acquisition, preservation, distribution, and publication.³⁷ Preservation is one of this pentagon, not a necessary adjunct of the other

four. The business world is rapidly becoming aware of microfilm as a tool for everyday use.³⁸ A voice of government speaks up for microfilm "as a means of increasing efficiency, which means increasing productivity".³⁹ Whether microfilm is used for low reference material that must be kept for a long time or for high reference active files, it must still be stored under stable conditions.

The life expectancy of the microreproduction is dependent upon both the care of processing and the conditions under which it is stored. One is the responsibility of the agency producing the microcopy, and the other that of the curator. The producer should know whether the record is intended for short term (ten to twenty-five years), moderate term (ten to fifty years) or archival (over fifty years)⁴⁰ storage, and regulate his processing controls with that in mind. The librarian should be aware of the dangers of careless processing³⁶ and should let the producer know that he is so aware. In fairness to the producer, the curator should also have available the necessary storage conditions to keep the film for the period decided upon.⁴¹ He should acquaint himself with the problems that the technician must face to keep the optical quality of his film up to standard.⁴² As he is bibliographically knowledgeable and the producer is usually not so inclined, he must arrange that the necessary bibliographical controls are attended to before the filming is done.⁴³ A guide prepared by librarians in terms which the technician would understand has been prepared for the filming of newspapers, books, serials, manuscripts, and maps.⁴⁴

Microcopies inherit the physical problems and the storage solutions of their related forms. Ribbon microfilm is kin to the movie film and the audio-visual filmstrip. Sheet microfilm is a variant of the photographic negative. Photoprinted micropaper is just another type of photographic print. Mechanically printed micropaper is merely another sheet of paper printed with ink like all the others in the library. For all of these the recommended storage climate is given as: a temperature range from 60° to 80° F., a relative humidity of 40% to 50%, and freedom from dust and acidic gases.⁴⁰ But then, that is what is recommended for the people who spend their time in the library, too. In parts of the world where variations in excess of these norms are to be expected, one should take precautions which one's own comfort would dictate.

The greatest enemy of the microcopy is still the person who will administer it or use it, and carelessness is second nature to some. Periodic inspection⁴¹ and cleaning of the film will tell a good deal

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about the climatic conditions of storage, and periodic cleaning of the reading machine will prevent many annoying scratch marks. Diplomatic observation of the reader at the reading machine has saved many a film from breaking and overheating. Judicious restriction on the accessibility of the sheet microfilm and micropaper will keep mis-filing, abrasion, and bending to a minimum.

Ribbon microfilm is most frequently stored on reels of thin metal or plastic kept within labelled boxes of light cardboard.⁴⁵ These should be tight enough to keep out dust but should let in air so that the film can "breathe." In air-conditioned stacks these boxes may be kept directly on the book shelves. Where one finds extremes of relative humidity or much dust, it is advisable to use microfilm filing cases which have provision for evening out variations in humidity.

Microfilm for use is usually kept on reels of 100 or sometimes 50 foot capacity, although this is wasteful of space if the film is of shorter length. Master negative microfilms used solely for making positives are often stored on reels of 1,000 feet or greater capacity. The problems of administration have decreased the use of the shorter strips in individual pillboxes. Where these are still the practice, the filing systems developed for the miniature camera enthusiasts are often used to advantage. The 8¼ inch strip uses the pocket file⁴⁶ that it inherited from the miniature camera user also.

Sheet microfilm should be stored in protective envelopes or sleeves.⁴⁷ These should be made of paper which is as bland as possible. The chemicals in cheap paper often have a deleterious effect upon the film emulsion. The seams should not overlap excessively or they will catch during filing. The films should be inserted with the base (non-emulsion) side towards the seam so as to protect the emulsion from the chemicals in the adhesive. Side-seamed envelopes tend to cause "fanning" of the accumulated file,⁷ but center-seamed envelopes put the seam next to the data-bearing middle of the microsheet. Cabinets for storage⁵ are very similar to those in use in all libraries for filing cards. As the aperture and jacket cards come in standard filing sizes, they involve no problem of special cabinets.

The storage of the Microcard presents a conflict. As a Microcard usually has an emulsion on one side only, it tends to develop a concave curl with time. Storage under pressure will discourage this but at the same time raise the danger of abrasion as the card is withdrawn and inserted. The Microlex card with its double surface does not develop this curl. Neither does the mechanically printed Microprint sheet. Both of these come with their own storage cases.

The composite Microstrip and Microtape have not been in use long enough to show whether they will endure frequent handling. It is suspected that if hurriedly made, they may tend to become unstuck, especially if they are carelessly filed. Time and use will show whether the adhesive of the Microtape will stand up under the heat of the reading machine. If it creeps out from behind the strip, as does the adhesive on Scotch tape, it may cause problems in close storage as well as serious difficulty while in the reader.

It is at the reading machine that the library patron usually meets the microcopy for the first time. The reaction to this optical barrier between him and the text that he desires is a subjective one. If he enjoys changing the ribbon on a typewriter or takes pleasure in threading a movie projector (and libraries do have both of these), he finds the microfilm reader a simple tool. If he get headaches in the movie theatre or from a television screen, he will complain of eyestrain after a short session with the reading machine.⁴⁸ Not even the most enthusiastic advocate of microfilm will choose a microcopy over the original all other factors being equal; but as they never are equal, the consensus appears to be that the reading machine is a necessary evil along with eyeglasses, telephones, and automobiles.

One study of what the user wants in a reading machine seems to indicate that a machine for either microfilm or micropaper costing \$100.00, or a machine for both costing \$200.00 would be desirable.⁴⁹ On the other hand, another study reports that the "favorite make of reader among libraries reporting is the Recordak."⁵⁰ A machine for ribbon microfilm only which is currently listed at \$725.00. The dream of a practical reading machine costing no more than a portable typewriter has not yet been realized, but it looks as if it will not be long now. Portable typewriters are now pushing up over the \$100.00 mark, and reading machines for both microfilm and micropaper are available for less than \$200.00. When readers can be sold in quantities as great as portable typewriters, they can be sold for less.

A glance at world-wide listings of reading machines^{6, 51} seems to indicate that for microfilm the tendency is away from the translucent screen and towards the opaque screen. This bears out the observation that eyestrain appears to be greater with the translucent screen.⁵² On the other hand, a listing of the four currently available micropaper readers³ shows them all with the translucent screen.

A comparison of American reading machines with those produced abroad shows a certain analogy to a similar comparison of automobiles. Americans appear to require expensive, convenient, high-power read-

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ers. The European scholar seems willing to use a cheaper, less convenient machine giving lower magnification and using lower wattage lighting. The machines produced abroad will often take both ribbon and sheet microfilm. In American readers it is usually one or the other. The recent appearance of a sheet reader that is an adaption of an earlier ribbon model would seem to indicate that if the demand were greater, the same would be available. It is probably too early to hope for a combination reader for both microfilm and micropaper. Optically and mechanically it would be possible to make, but it would have to sell at a prohibitive price if produced in quantities to satisfy present demands.

Microreproductions have certainly made a place for themselves in the library. At times it would appear that they entered the way a burglar does, by holding a drawn gun on the librarian. The invention of the continuous web machinery that allowed paper to be made from wood pulp in such quantity and of such low durability was the foot in the door. Should microcopies be asked to stay and become useful members of the household? That is up to the librarian. It has been stated: "Librarians can do much, in an individual capacity and through their professional groups, to influence the direction of improvements in microreproduction services."⁵³ One direct way is by placing the problems and requirements of libraries before the National Microfilm Association,^{54, 55} an organization made up of producers of microfilm equipment, microfilm service agencies, and microfilm users. So far the attendance at their yearly conventions has been woefully short of librarians. The microcopies made by members of the N.M.A. will eventually repose in some form of library. The librarians should have some say about their future charges.

References

1. Fussler, H. H.: Photographic Reproduction of Library Materials. *Library Trends*, 2:532-544, April, 1954.
2. Tate, V. D.: Microreproductions and the Acquisitions Program. *Library Trends*, 3:432-447, April 1955.
3. Ballou, H. W.: Microcopying, Methods and Use. In: Doss, M. P., ed.: *Information Processing Equipment*. New York, Reinhold, 1955, pp. 67-104.
4. Pescht, Willy: Das Zeiss-Dokumantor-System für die Herstellung und Verwendung von Modernen Mikrobuchern. *Nachrichten für Dokumentation*, 3:145-151, Sept. 1952.
5. Van der Wolk, L. J., and Tonnon, J. C.: The Microcopy on Flat Film as an Aid in Documentation. *Revue de la Documentation*, 17:134-141, Sept. 1950. Part II, 17:216-238, Dec. 1950.

6. International Federation of Documentation. *Manual on Document Reproduction and Selection*. (Publication No. 264.) The Hague, F.I.D., 1953, 2 v.
7. Luther, Frederic: Microfilm in the Hospital Field. *National MICRO-NEWS*, No. 12, May 1955.
8. Tyler, A. W., et al.: The Application of the Kodak Minicard System to Problems of Documentation. *American Documentation*, 6:18-30, Jan. 1955.
9. Ellsworth, R. S.: New Horizons with Microfilm. *American Documentation*, 2:221-228, Oct. 1951.
10. Shaw, R. R.: Machines and the Bibliographical Problems of the Twentieth Century. In: Ridenour, L. N., et al.: *Bibliography in an Age of Science*. (Phineas L. Windsor Lectures in Librarianship, No. 2) Urbana, Ill., University of Illinois Press, 1951, pp. 37-71.
11. Kuipers, J. W.: Microcards and Microfilm for a Central Reference Library. *Industrial and Engineering Chemistry*, 42:1463-1467, Aug. 1950.
12. Status of Term "Microcard." *National MICRO-NEWS*, No. 10, Mar. 1955.
13. Rider, A. F.: A Possible Correlation of All Forms of Microtext. *American Documentation*, 2:152-157, Aug. 1951.
14. Teiser, Sidney: Law Books of Tomorrow: A Complete Library On a Five-Foot Shelf. *American Bar Association Journal*, 38:378-382, May 1952.
15. Bowerman, W. H.: Microprint Documents in Business and Industry. In: National Microfilm Association: *Proceedings*, Third Annual Meeting, Cleveland, 1954, pp. 28-46.
16. Gray, D. E.: Practical Experience in Microfacsimile Publication. *American Documentation*, 3:58-61, Jan. 1952.
17. Rider, A. F.: Microcard vs. the Cost of Book Storage. *American Documentation*, 2:39-44, Jan. 1951.
18. Kuipers, J. W.: Microcards and Documentation. *American Documentation*, 2:89-95, April 1951.
19. Boni, Albert: Microprint. *American Documentation*, 2:150-152, Aug. 1951.
20. Erickson, E. L.: Microprint: A Revolution in Printing. *Journal of Documentation*, 7:184-187, Sept. 1951.
21. Stevens, D. H.: The Role of the Foundation in Documentation. *American Documentation*, 6:57-62, April 1955.
22. McCarthy, G. L.: An Updated Look at Microfilming. In: National Microfilm Association: *Proceedings*, Third Annual Meeting, Cleveland, 1954, pp. 21-27.
23. Hensel, Evelyn: Treatment of Nonbook Materials. *Library Trends*, 2:187-198, Oct. 1953.
24. Tauber, M. F.: Cataloging and Classifying of Microfilm. *Journal of Documentary Reproduction*, 3:10-25, Mar. 1940.
25. Metcalf, K. D.: Care and Cataloging of Microfilm. *A.L.A. Bulletin*, 31:72-74, Feb. 1937.
26. Gerould, A. C.: Cataloging of Microfilm at Stanford. *Library Journal*, 62:682-683, Sept. 15, 1937.
27. Wright, W. E.: The Cataloging of Microfilm. *Library Journal*, 63:530-532, July 1938.
28. Fussler, H. H.: Library Photography. *Library Journal*, 66:135, Feb. 1, 1941.
29. Carruthers, R. H.: New York Public Library Changes Treatment of Microfilm Serials. *Library Journal*, 72:880-882, June 1, 1947.

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30. Jones, Helen J. and Hagan, Jeannette: Microfilm Cataloging Lacks System. *Library Journal*, 72:505-507, April 1, 1947.
31. Tauber, M. F.: Problems in the Use of Microfilm, Microprint and Microcards in Research Libraries. *Industrial and Engineering Chemistry*, 42:1467-1468, Aug. 1950.
32. Dennis, Faustine: Cataloging in the Microfilm Reading Room of the Library of Congress. *Journal of Cataloging and Classification*, 8:17-20, Mar. 1952.
33. Rider, A. F.: *The Scholar and the Future of the Research Library*. New York, Hadham Press, 1944.
34. Hensel, Evelyn: Microcard Cataloging Being Solved at Penn State. *Library Journal*, 75:344-345, Feb. 15, 1950.
35. Bacon, Grace: Handling Microcards in Libraries. *College and Research Libraries*, 11:372-373, Oct. 1950.
36. Clapp, V. W., et al.: Are Your Microfilms Deteriorating Acceptably? *Library Journal*, 80:589-595, Mar. 15, 1955.
37. Tauber, M. F.: *Technical Services in Libraries*. New York, Columbia University Press, 1954, p. 393.
38. Bassett, E. P.: Individualizing Microfilm. In: National Microfilm Association: *Proceedings*, Third Annual Meeting, Cleveland, 1954, pp. 68-78.
39. Irvine, D. D.: Storage Problems and Micro-reproduction. *American Documentation*, 2:84-86, April 1951.
40. Eastman Kodak Company. *Storage of Microfilms, Sheet Films, and Prints*. Publication No. F-43 (F-11), Rochester, 1946.
41. Noll, D. F.: The Maintenance of Microfilm Files. *American Archivist*, 13: 129-134, April 1950.
42. Rudd, R. G.: Some Factors Influencing the Quality of Microfilm Images. In: National Microfilm Association: *Proceedings*, Second Annual Meeting, New York, 1953, pp. 44-58.
43. Carruthers, R. H.: Titling of Microfilm Editions. *American Documentation*, 1:190-193, Oct. 1950.
44. American Library Association, Committee on Photoduplication and Multiple Copying Methods: A Guide to Microfilming Practices. *National MICRO-NEWS*, No. 10, Mar. 1955, appendix.
45. U. S. War Department: Records Administration. *Microfilming of Records*. TM 12-257. Washington, D.C., Government Printing Office, Mar. 1946. Supplement: Mar. 29, 1950.
46. Knigge, H. J.: Ordnung und Ablage von Mikrofilmen. *Nachrichten für Dokumentation*, 2:50-55, June 1951, 3:35-39, Mar. 1952.
47. Eastman Kodak Company. *Filing Negatives and Transparencies*. Publication No. PP-12. Rochester, 1953.
48. Tate, V. D.: An Appraisal of Microfilm. *American Documentation*, 1:91-99, April 1950.
49. Conrad, G. M.: User Needs in a Microfacsimile Reader. *American Documentation*, 2:201-204, Oct. 1951.
50. Harkins, W. G., et al.: Microfilm in University Libraries: A Report. *College and Research Libraries*, 14:307-316, July 1953.
51. Unesco. *Survey of Microfilm Use, 1951*. Paris, Unesco, 1952.
52. Clark, Walter: Document Reproduction by Photography in the United States. *Photographic Science and Technique*, 1:31-37, May 1954.

53. Randall, F. S.: Microcosmos. *Serial Slants*, 5:122-129, Oct. 1954.
54. Orgel, Lewis: A Program for Microfilming Municipal Records. In: National Microfilm Association: *Proceedings*, Second Annual Meeting, New York, 1953, pp. 7-13.
55. Carroll, C. A.: Hospital Records and the Weapons of Compression in the Battle for Filing Space. In: National Microfilm Association: *Proceedings*, Second Annual Meeting, New York, 1953, pp. 21-99.

ADDITIONAL REFERENCES

- Eastman Kodak Company. *Microfilming*. Rochester, 1952. Publication No. P-1.
- International Federation of Documentation. *Directory of Microfilm and Photocopying Services*. Publication No. 244. The Hague, F. I. D., 1950.
- Fussler, H. H.: *Photographic Reproduction for Libraries*. Chicago, University of Chicago Press, 1942.
- Greenwood, H. W.: *Document Photography*. London, Focal Press, 1943.
- McCrum, Blanche P., comp.: *Microfilms and Microcards: Their Use in Research*. Washington, D.C., Library of Congress, 1950.
- Microcard Bulletin*. Middletown, Conn., 1948—date.
- Philadelphia Bibliographical Center and Union Library Catalogue. *Union List of Microfilms*. Ann Arbor, J. W. Edwards, 1951. Supplement, 1949/1952.
- Special Libraries Association, Committee on Microfilming and Documentation. *Directory of Microfilm Services in the United States and Canada*. New York, Special Libraries Association, 1947.