STANFORD RESEARCH INSTITUTE
MENLO PARK, CALIFORNIA

Proposal No. IE-62-217

Mr. W. C. Myers
Electronics Division
National Cash Register Company
1401 East El Segundo Boulevard
Hawthorne, California

August 17, 1962

A Proposal for Research

POTENTIAL MARKETS FOR THE NCR PHOTOCHROMIC MICRO-IMAGE DOCUMENT STORAGE AND RETRIEVAL SYSTEM

Introduction

The National Cash Register Company, which has long been a leading supplier of many types of office machines, is developing document retrieval equipment capable of photographically reducing microfilm images, storing the data, and then enlarging, displaying, and printing the information as needed. The equipment will provide a 200-to-1 linear image reduction, permitting 2,500 documents to be recorded on a 3 × 5 inch film. The equipment, called "photochromic micro-image" equipment, utilizes the special characteristics of certain photochromic materials as a storage medium. These materials change color when exposed to light; are immediately visible upon exposure; can be edited, erased, and reused; and have high resolution. In order to preserve the photochromic images, the film containing the photochromic dyes must remain at a low temperature (0° Centigrade). Permanent copies of the film images may be made by photographic methods. The permanent copies may be placed in equipment which will permit selection of a specific image and viewing of that image. Reproduction of the image so as to make hard copies is also possible.

The National Cash Register Company (NCR) has explored, to a limited extent, possible markets for the photochromic micro-image equipment. An experimental viewer is being built by NCR for the Navy and will be used to refer to parts catalogue information stored on micro-image cards. The U.S. Patent Office is monitoring the results of these efforts. Company announcement and institutional-type advertising has evoked considerable interest from a variety of sources; however, no organized attempt has been made to categorize or investigate the specific problems which stimulated the requests for additional information.

NCR is interested in determining the potential size of the market for this equipment and in determining specific systems or equipment configurations which would permit profitable entry into the market. Stanford Research Institute has been asked to submit this proposal for a research project to assist in analyzing possible markets.

Objectives

The basic objective of this proposed study is to determine the nature of the potential market for the NCR document storage and retrieval system using photochromic micro-image equipment and materials being developed by NCR. Specific objectives for this study are to:

1. Categorize and describe the functional requirements of major applications that appear to be potential markets for this system.

2. Estimate the present potential U.S. market for this system, including the market for camera recorders, contact printers, viewers, and viewer-printers.

3. Estimate the present potential annual market for the photochromic films and hard copy papers used with this system.

4. Describe additional products which may be desirable, in addition to the above, to fulfill the market needs of potential users.

5. Indicate the effect of variations in the pricing and performance of the equipment and materials upon the market potential.

6. Describe the type of marketing organization which could effectively distribute this system to the potential users.

7. Describe the principal competing document storage and retrieval systems and indicate their relative importance.

Scope

This project will be national in scope and will include a consideration of potential markets for document storage and retrieval systems in federal, state, and local government agencies, as well as in industrial and commercial organizations. The research will be concentrated on those applications most suitable for the NCR type of system, such as parts catalogue operations of automobile and other manufacturers; mail order businesses; military supply operations; and large document file operations of title insurance companies, county assessors, life, fire and casualty insurance companies, credit agencies, police departments, newspapers and magazines, hospitals, banks, manufacturers' purchasing departments, production control and engineering departments, and various types of libraries.

The present market potential for the NCR system will be estimated for each major type of application, and a breakdown will be made of the market potential for each of the components of the NCR system, and of the annual requirements for the materials used. Each application will be further analyzed to indicate what influence the pricing of equipment and materials would likely have upon the market potential. Where a different equipment performance (such as a 100-to-1 image reduction instead of 200-to-1) appears to be desirable from a market standpoint, the possible increase in market potential will be indicated.

The market potential will be estimated primarily on the basis of economic factors such as cost of the NCR system as compared with the cost of other systems, either already on the market or announced as being in the final stages of development. Such factors as convenience, storage space, and access time will be considered as secondary factors in determining market potential, except in those cases where one or more of these factors is determined to be of primary importance. The data from which costs of using the NCR system are to be derived will include proposed sale and lease prices supplied by NCR, standard labor and office space costs, and operator time as derived from NCR data. Where cost data cannot be supplied by NCR, estimates will be made by Institute personnel. Such factors as total number of documents stored, access and copy rate, access time, quality of reproduction, and type of input medium will be reported for each application.

Systems with which the NCR system might compete will be described, and their costs will be reported where such data are available and pertinent. The reaction of potential customers to the NCR system and to competitive systems will also be reported to the extent that such information is obtained during the study.

Method of Research

The Institute will assemble a team headed by a full-time professional market analyst from the Electronics Industry Economics Research group. The team will include systems analysts and systems engineering specialists who are highly experienced in the data handling and information retrieval field. These specialists will assist in the economic analysis of the various document-handling applications under study. In addition, other specialists, such as those in graphic sciences, will join the research team as the need arises.

In conducting the study, the Institute team will first meet with NCR personnel to discuss the approach to be taken in this research. At that time, all pertinent data available at NCR regarding possible users of the NCR document retrieval system and cost factors will be obtained, as well as brochures and samples of materials. The team will review information currently available at NCR regarding organizations contacted by NCR, will examine the inquiries received as a result of news releases and advertising, and will discuss with NCR personnel the types of applications for which the contemplated equipment is being developed. From a listing of applications prepared on the basis of these and Institute sources, a representative sample of users will be selected for depth analysis. Members of the team will interview these prospective users to learn the nature of their document storage and retrieval systems and problems, to determine the costs of their present systems, and to obtain information necessary to estimate the costs of using the NCR system. In addition, other factors which may affect their possible use of the NCR system will be noted, as well as their interest in the concept of the system, in additional equipment for the system, and in variations in equipment and process quality. It is estimated that approximately 30 interviews will be required to develop the necessary information. Telephone interviews and questionnaires will be used as necessary to provide supplemental information.

During the course of the study, contact will be maintained with NCR in order to keep management informed concerning the status of the work and so that the work can be redirected if necessary. Following the interviews, the team will analyze the information and make projections

of the total potential market for the NCR system for each type of application. Estimates will be made of the potential market for each type of equipment and for the various materials used.

Upon completion of the gathering and analysis of information, the results will be summarized, evaluated, and presented to NCR in an oral report. It has been the experience of the Institute that an oral presentation of the findings is of great value in interpreting and explaining the characteristics of a market to the client; it permits a complete discussion of the many aspects of the research effort and ensures that the client has a clear understanding of the findings.

A written report will be submitted approximately one month after the oral report. The written report will summarize the findings of the research and will include a description of the methodology used in the study, list of field contacts, and tabulation of supporting information.

Qualifications of Stanford Research Institute

Stanford Research Institute is a not-for-profit, nonendowed organization, chartered in California, engaged in supplying research services to industry and government in the fields of engineering, physical and life sciences, management sciences, and economics. The Institute has conducted numerous studies in the fields of data origination, information storage and retrieval, and application of graphic sciences. The Institute's development of methods and equipment for the rapid handling of unit documents, such as checks, has continued for over ten years. The Institute has designed large, complex information-handling systems and communication networks. Research in color television basic theory, multiple gun cathode ray tubes, and video recording have developed a proficiency at the Institute in film recording and color techniques. Research studies in microfilm presentations of radar screen phenomena and other optical systems have been undertaken for various government and commercial sponsors.

One of the outstanding features of the Institute's research activity is the drawing together of specialists in economics, engineering, and the physical and life sciences when all are required for a particular study. The proposed research for NCR will be conducted by the Electronics Industry Economics section of the Industrial Economics Division, but the research team will include specialists from the departments of Graphic Sciences, Electronic Data Processing Systems, and Systems Engineering.

The Electronics Industry Economics group has conducted many studies of the economic feasibility of film and electronic storage of information and its retrieval for potential users, as well as studies of the markets for such equipment for developers or manufacturers. Typical studies conducted by this group are: A Study of the Applicability of Certain Systems to Business Data Handling; Potential Applications for a High-Density Information Storage System; and Opportunities in the Information Retrieval Market.

The Systems Engineering Department of the Engineering Sciences Division is engaged in the analysis, design, and evaluation of large-scale information systems encompassing three closely related program areas: Data Processing Systems, Man-Machine Information Systems, and Communication Networks. Members of this department have participated in the design of a nationwide airlines space-reservation system comprising automatic data processors, remote agent sets, and communication links, and a nationwide system for automatically processing and disbursing bank checks. Titles of some Systems Engineering Department projects are: Design of a System for Review and Retrieval of Scientific Information; Graphic Information Processing Using Digital Computer Techniques; and Preliminary Study of the Requirements, Criteria, and Measure of Performance of Information Storage and Retrieval Systems.

Biographies of several members of the various divisions are attached, illustrating the type and qualifications of personnel who would be available to participate in the project.

Time and Cost

The estimated time required for this project is four months. The Institute could begin work on the study immediately after acceptance of the proposal.

The charge for this research, including a final written report in five copies will be $28,000. Invoices will not exceed this amount without approval of the client. To provide the working capital requirements for this project and to simplify invoicing procedures, the initial payment due upon acceptance of this proposal will be $14,000, to be followed by two equal monthly payments of $7,000.

Project Authorization

This research project can be established at the Institute on the basis of a letter accepting the proposal together with any modifications that may be agreeable to both parties. A formal research agreement will not be required; however, certain provisions of the Institute's official research agreement as quoted on the attachment are incorporated as a part of this proposal.

Acceptance Period

This proposal will remain in effect until September 15, 1962. If a decision on the proposal requires a longer period, the Institute will be glad to consider a request for an extension of time.

Respectfully submitted,

Allan E. Lee

Allan E. Lee, Program Manager
Electronics Industry Economics

Approved as an official proposal
of Stanford Research Institute by:

H. E. Robison

H. E. Robison, Director
Industrial Economics Division

Attachments: Excerpts from Standard Research Agreement

Biographies - Bourne, Gilmour, Hackley, Lee

EXCERPTS FROM STANDARD RESEARCH AGREEMENT

The Institute agrees that all information obtained through work on the projects defined above shall be made available to the Research Client at any time subject to the terms and conditions of this agreement, and that the Institute will communicate promptly and without request all information which it deems pertinent to the project as it progresses.

The Institute agrees to make full disclosure to the client of all matters of a patentable or inventive nature first conceived or reduced to practice in the prosecution of this work. The Institute further agrees, upon request, to make full assignment to the client of its rights in said subject matter.

The Research Client agrees that it will not use the name of the Institute either expressed or implied in any of its advertising or sales promotional material. In the event the Research Client intends to distribute outside of its own organization any report issued under this project, such report shall be used in its entirety, unless any proposed summary or abridgment of the report has been first approved by the Institute. The Institute agrees it will not publish or make known to others the subject or results of said research investigation or information obtained therefrom without approval in writing from the Research Client.

STANFORD RESEARCH INSTITUTE
PROJECT AUTHORIZATION

PROJECT NO.
IE-4239
MASTER & SUBS
B1(223)-4239

SUBS ESTABLISHED SUB -4 ESTABLISHED, FUNDS REALLOCATED

Client Client Confidential
Classification Client Confidential
Client Authorization Ltr dtd 9-11-62
Project Supervisor A. Lee
Project Title Client Confidential
Project Leader
Starting Date 9-11-62
Proposal No. IE 62-217
Termination Date 1-31-63
Project Funds $28,000.00 Fixed Price
Issue No. 1 2 3 **Date** 9/20/62/ 10/30/62 2-11-63

FISCAL INFORMATION

This is a fixed price contract. For cost control purposes use the following rates:

Overhead	110% of direct labor plus payroll reserve of 16.5%
Development	15%

CLIENT CONTACT AND ADDRESS

The National Cash Register Company
Dayton 9, Ohio
Attn: Mr. R. G. Chollar, Vice President, Research & Development

BILLING INSTRUCTIONS

Initial payment $14,000. Bill second invoice for $7,000 Nov. 1962 and third invoice for $7,000 in Dec. 1962. Send billing to above address.

SCOPE:

Sub numbers have been established as follows:

Number	Leader	Funds
B1(223)-4239-1	Hackley	5,000.
B1(256)-4239-2	Murrish	15,000/ 10,800.
B1(643)-4239-3	Bourne	5,000/ 9,200.
B1(256)-4239-4		3,000.

1 March 63

Charlie Goldman
Frank Lange
Hank Katz
Sam Sobow.

SEI report should suggest that we continue working in the IR area. The latest developments could perhaps find many applications in commercial market - invent new systems.
Confirmed NCR's previous thought. — NCR agrees with conclusion — wants to be sure that other readers don't draw wrong conclusions & inferences from our conclusions. I.C. notes the conclusions that can be reached - that are hereit reached or recorded —.

Is it worthwhile going to
Next steps — ~~If we want to~~ 110.1 ? — Functional & cost questions?

January 16, 1963

Mr. W. C. Myers
Director of Research
Electronics Division
National Cash Register Co.
1401 E. El Segundo Blvd.
Hawthorne, California

Dear Will:

I would like to summarize our conversation on the phone yesterday morning and also to respond to your letter of January 10 regarding the programming of the remaining time and funds on the research project.

As was discussed on the phone, we plan to devote the balance of our time to the following:

1. Preparation of additional cost analysis to show the break-even point of PCMI for catalog publishing.

2. Preparation for and attendance at the January 22nd meeting in Hawthorne.

3. Presentation of the final oral report of the research in Dayton on or about March first.

4. Other discussions in Hawthorne prior to March first in addition to the January 22nd meeting if so desired.

5. Thorough documentation of the research findings, including a detailed description of the requirements of each application area investigated and an analysis of PCMI's capability to satisfy these requirements.

We believe that the research will be of the most value to NCR if the operational and economic requirements of each application area is thoroughly documented. Such documentation will provide both a thorough understanding of user requirements and a realistic basis for the evaluation of the capability of future NCR systems to satisfy these requirements.

It is regrettable that the study has not uncovered any applications that appear to be well suited to the unique characteristics of PCMI. As we have already discussed there appear to be four general reasons why the results of the study are negative:

1. It has become clear only in the last year or so that all present approaches to mechanized information retrieval, including PCMI, do not satisfy user requirements sufficiently to indicate that they ever will command a market of significant size.

2. No company, including IBM and Kodak, has been successful in selling more than a few highly specialized and expensive image retrieval systems.

3. There is an increasing industry-wide realization that major changes in both technical and system approaches must be developed if user requirements are to be satisfied. It has been difficult for manufacturers of image retrieval equipment to understand that these changes are needed because:

   a. the complexity of the requirements of the operational systems that image retrieval must service

   b. the diversity of the requirements that must be met if an image retrieval system is to be accepted as a general purpose system

   c. initial enthusiastic response to dramatically new techniques tend to obscure the need for comprehensive system analysis

   d. it is difficult to obtain user feedback on the small number of large mechanized information retrieval systems that have been installed because of the security restrictions surrounding most of these applications.

In summary, many companies in the industry have been unsuccessful in developing a product or technique because of insufficient knowledge of the market requirements. The results of this study should enable NCR to recover sooner and much less expensively than has been the experience of many companies.

We are looking forward to a more detailed discussion on January 22nd and the chance to review the findings of the research with you again.

Sincerely,

Richard H. Randall, Manager
Electronic Industry Economics Research

RHR:vw

bcc: Art Dana
Charles Bourne
Allan Lee
Dick Randall

NCR THE NATIONAL CASH REGISTER COMPANY

ELECTRONICS DIVISION

1401 EAST EL SEGUNDO BOULEVARD • HAWTHORNE, CALIFORNIA • TELEPHONE 757-5111

10 January 1963

Mr. R. H. Randall
Senior Economist
Stanford Research Institute
Menlo Park, California

Dear Dick:

The purpose of this letter is to confirm and amplify my telephone conversation held yesterday with you and Al Lee. Since the meeting with you and your staff at our laboratory last Thursday, we have been attempting to analyze the preliminary results that SRI has obtained to date on the PCMI contract. We are also concerned with determining the most optimum manner in which to direct the SRI research efforts for the balance of the contract period. Henry Kent and I propose that we hold a joint meeting to review the contract on Tuesday, January 22nd at the NCR Electronics Division and Mr. Kent will plan to be present.

I would first like to draw your attention to page two of SRI's original research proposal (No. IE - 62 - 217) to NCR on the PCMI problem. Paragraph two contains the following statement:

> "NCR is interested in determining the potential size of the market for this equipment and in determining specific systems or equipment configurations which would permit profitable entry into the market."

Further, although not stated in the proposal, it appears that SRI has assumed the following:

1) That PCMI in its present state (i.e. equipment, format, and elementary system configuration*) is a marketable product.

2) That PCMI, from an applications viewpoint, is a relatively direct replacement for microfilm.

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* As described in the article, and especially Figure 3 of A. S. Tauber and W. C. Myers, "Photochromic Micro-Images, A Key to Practical Microdocument Storage and Dissemination", American Documentation, 13, p 403 (Oct., 1962)

Now, based upon the results obtained and reported by the SRI field team, it appears that we must carefully re-examine the above.

First, we appear not to have a marketable product with PCMI in its present elementary form. Therefore, the statement from page two of the SRI proposal should more properly be reworded as follows:

> "NCR is interested in determining specific systems or equipment configurations which would permit the profitable entry into the (microform image processing) market. If one or more specific application areas are found for PCMI technology, then NCR is interested in determining the potential size of the market."

Next, the initial field trip results appear to clearly indicate that the two assumptions regarding PCMI cited above are not valid.

This brings us to the objectives of the SRI proposal which are stated upon page two of the proposal. The general objective is stated as follows:

> "The basic objective of this proposed study is to determine the nature of the potential market* for the NCR document storage and retrieval system using photochromic micro-image equipment and materials being developed by NCR."

After this are outlined seven "specific objectives" for the study, the first of which is:

1. "Categorize and describe the functional requirements of major applications that appear to be potential markets for this system."

With the possible exception of the seventh specific objective, the remaining six objectives are actually only academic unless positive results are obtained from the work done on the first specific objective. Now, unless the answer by SRI is totally negative with respect to the first objective of the contract, it appears that we do not have available as yet a single major application for PCMI technology wherein the functional requirements of the application are categorized and described in a quantitative manner. Until one or more potentially valid application areas are found (and spelled out) for PCMI techniques it appears to be academic to worry about the potential size of the market.

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* Underlining is mine.

In attempting to analyze the work done by the SRI staff to date on this contract, I have reached certain conclusions, which, of course, may or may not be correct. To begin with, I personally don't believe that we begin to fully appreciate the possible applications which may exist by virtue of the special properties and characteristics made possible by applying existing PCMI technology. There is a tendency sometimes in system studies to assume that additional features and/or technological improvements on a proposed system are required before commercial application can be accomplished. For example, with PCMI there is a tendency to criticize the two-step reduction process, and to automatically assume that a single-step reduction would be greatly superior.

Perhaps the most important single feature, or capability, of PCMI technology in its present form is that of dissemination in microform. In a sense, this represents a new systems freedom which has actually not been available before (at least upon economic grounds). There are other features not immediately obvious such as the guarantee which can be given to the original copyright owner that PCMI disseminable copies cannot be reproduced by the consumer such as ordinary microfilm can be.

In my opinion, practical realization of PCMI technology will require extensive systems analysis to be completed prior to the design and specific mechanization of equipment. This analysis must in turn result in a plan for a practical and economical balance of man-machine efforts in the total system. Further, if the result of such a systems analysis does not outline precise performance specifications with respect to the user's requirements as well as to equipment characteristics, the proposed application will have a low probability of success. The difficulties will be related less to the equipment than to the lack of proper preparation for the use of the system elements under consideration. Premature attempts at application are often combined with a lack of the necessary emphasis on total system requirements.

Unfortunately, particularly for the purpose of this contract, we at NCR have had little opportunity so far to seriously consider the systems aspects of PCMI technology. We have concentrated our efforts almost entirely upon reducing the PCMI concepts to working hardware. To that end we early in the program established two very important PCMI system parameters, namely, a reduction ratio of 200:1 and a physical format of 3 x 5 inches for the disseminable copy. The preliminary results of the SRI study indicate that we should seriously reconsider these parameters, in particular the 200:1 reduction ratio. At the present time, several of us here at NCR are taking a look at what we might achieve by using a reduction ratio of only 100:1. I believe this is one topic for the January 22nd meeting that might provide some very interesting discussion.

Other topics that I would like to propose for discussion at our next meeting are the following:

a) An analysis by SRI of why the results of the study are negative to date. (This analysis should be in as quantitative terms as possible.)

b) NCR would like SRI to review in detail how the field interviews were conducted. We would also like to inspect the props that were used during the interviews.

c) An outline by SRI of their plans for implementing the first specific objective of the original research proposal, namely, to "categorize and describe the functional requirements of major applications that appear to be potential markets for this (PCMI) system".

d) A discussion by SRI of the comparative analysis of Lodestar with the current PCMI mechanization. As a word of caution here, it is recognized by the writer that from a strict systems standpoint, this may be tantamount to comparing apples and oranges. Therefore, an economic analysis per se without a parallel functional and systems analysis would only be misleading.

e) A detailed discussion by SRI, if the data exists, of the microform publishing and distribution costs of the five leading microform publishers cited by SRI. (Incidentally, we would also like to know why none of these five organizations were included on the initial field trips.)

f) A general discussion by both SRI and NCR personnel, if time permits, of the potential advantages which might occur by adding PCMI capabilities to conventional aperture card technology.

From the discussion items suggested above, plus any additional subjects which may be generated in the interim, it is hoped that the present negative results of the study can be counterbalanced by one or more positive directions in which to proceed for the balance of the contract period. From my viewpoint, while the results to date of the SRI contract are not encouraging for the short-term, they are not necessarily discouraging to the long-range potential future of PCMI technology. By these remarks I do not wish to imply that NCR is dissatisfied with the work accomplished to date on the contract. Quite the contrary is true. We feel that, as a first step, the results are both meaningful and important. What the results indicate to me is that our PCMI technology is too different and novel to be marketable without a lengthy systems analysis along the lines indicated earlier in my letter. Further, it appears that this systems analysis will be

3. Microphoto Division of Bell & Howell, Cleveland, Ohio

4. Microfilm Service and Sales Company, Dallas, Texas

5. Microcan (affiliate of J. S. Canner & Company), Boston, Massachusetts

About $1 million in microform publications are available from the above.

None of the publishers has adequate capitalization to afford high cost equipment or processes. The several devices that have been invented such as Minicard, Walnut, etc. have been poorly accepted by potential customers.

The copyright problem appears to be a major difficulty in microform publication. The IRE, the ACS and McGraw-Hill are uncooperative with regard to giving permission to copy. The Council on Library Resources and the NSF are studying copyright problems for microform publication.

The number of images on PCMI cards appears to be too high for a unit record, and the error correction feature is not considered worth while on smaller units. A question arose as to whether an advantage might accrue to printing in PCMI one book per card together with a visible abstract or other data.

Many customers already have microfilm readers available.

SRI is to make a comparison between PCMI and Lodestar.

R. Randall added that the present microform market is approximately $250 million/year, mostly labor costs for conversion. About $20 million of the cost is for equipment and a similar figure for supplies. The market appears to be expanding at about 10 to 15 percent per year. He stated that marketing must include intensive distribution efforts and service and training as well as hardware. There exists a lot of well entrenched competition in both microfilm and microfiche or microcard as well as aperture cards. Service bureaus appear to be a must for preparing some customers' records.

A. Dana discussed file applications and pointed out the more general relations between various file characteristics. The critical points appear to be high updating rates associated with high activity files and adverse conversion cost on low activity archival files.

Too many images per card do not appear desirable on catalog applications due to queuing problems.

The general conclusions that were drawn were:

1. Unit records should be 300-500 images (error correction less significant here).
2. Space reduction over microfilm insignificant.
3. Too costly for archival files.
4. Too slow on updating (at quoted set-up time) for high activity files.
5. Most contacts would like to see automatic processing as well as storage.
6. Generally considered not economically competitive to microfilm in the areas discussed.

To PCMI File

Subject Meeting with Stanford Research Institute Personnel, 1 January 1963

 7 January 1963

QUESTIONS RAISED BY W. MYERS FOR FUTURE CONSIDERATION

I. Arbitrary: 200:1 on 3" x 5" Should we reconsider?

II. In its present format, are there any economically useful applications of PCMI?

III. Competitive analysis of PCMI vs. Lodestar (RAIR) and any other commercial microform system.

IV. Future direction of NCR's PCMI R and D? Eliminate microfilm to obtain one step process?

V. Carefully define what is meant by the potential marriage of PCMI technology with EDP. "Image manipulation" ≡ microstorage, dissemination, retrieval, merging, sorting, purging, indexing, etc.

VI. Should PCMI be redirected toward the engineering drawing application?

VII. Analyse why results of study are negative to date.

VIII. Define large capacity digital memories.

TO: Project 4239 File

FROM: C. P. Bourne

SUBJECT: Individuals and Organizations Contacted

Dr. Ray Wakerline, Supervisor
Technical Information Division
Lawrence Radiation Lab
Berkeley and Livermore, Calif.

Mr. Alfred S. Tauber
Staff Engineer
Houston-Fearless Company
Los Angeles, Calif.

Mrs. Barbara N. Yanick
Head Librarian
Nalco Chemical Company
Chicago, Illinois

Mr. Gerald Sophar
Vice President
Jonkers Business Machines
Gaithersburg, Md.

Mrs. Zula Melup
Exerpta Medica Foundation
New York

Mr. R. R. Gulick
Biological Abstracts
Philadelphia, Penn.

Mrs. Margaret Jeramaz
Office of Central Reference
Time-Life, Inc.
New York City, New York

Mr. Charles M. Stearns, Program Director
Office of Science Information Services
National Science Foundation
1800 K Street
Washington, D.C.
(ST 3-2140, Ext. 447)

Mr. Joe Becker
Mr. Doug Duffy
Department of Defense
Washington, D.C.

Mr. Ralph O'Dette, Program Director
Office of Support of Scientific Publications
National Science Foundation
1800 K Street
Washington, D.C.
(ST 3-2140, Ext. 635)

Dr. L. B. Heilprin
Council on Library Resources
1025 Connecticut Avenue, N.W.
Washington, D.C.
(DI 7-8877)

Dr. Richard Orr, Director
Institute for the Advancement of Medical Communication
9650 Wisconsin Avenue
Bethesda, Md.
(656-2900)

Mr. Seymour Taine, Chief of Bibliographic Services Division, and
Editor of Index Medicus
Mr. Ed. Miller, Deputy Chief
Reference Service Division
National Library of Medicine
8600 Wisconsin Avenue
Bethesda, Maryland
(656-4084, Ext. 6217)

Mr. H. E. Sutcliffe, Manager
Marketing Research Department
Sweets' Catalog Service
(A Division of F.W. Dodge Co., owned by McGraw-Hill)
119 West 40th Street
New York 18, New York
(OX 5-3000)

Mr. R. C. Duff, Vice President
Thomas Publishing Company
461 Eighth Avenue
New York 1, New York
(OX 5-0500)

Mr. John Markus
Technical Information Research Staff
McGraw-Hill Publishing Co., Inc.
330 West 42nd Street
New York 36, New York
(LO 4-3000)

Mr. Walker Stone, Editor-in-Chief
Engineering-Science-Mathematics
John Wiley and Sons, Inc.
440 Park Avenue, South
New York 16, New York
(MU 9-7630)

Dr. Elmer Hutchinson, Director
Dr. Hugh C. Wolfe, Director of Publications
American Institute of Physics
305 E. 45th Street
New York 17, New York
(MU 5-1940)

Mr. E. K. Gannett
Managing Editor
Institute of Radio Engineers
1 E 79th Street
New York City, New York
(LE 5-5100)

Mr. Chester Lewis, Head
Central Reference Department
New York Times
(Author of Microrecording: Industrial Applications)
229 W. 43rd Street
New York City, New York
(LA 4-1000)

Mr. W. J. Casey
(Member, Board of Directors of Kalvar Corp. and Langan Aperture Cards, Inc.)
Hall, Casey, Dickler, Hawley and Brady (law offices)
500 Fifth Avenue
New York City, New York
(LO 4-1505)

Mr. W. E. Cunningham, Vice President
Sales Promotion
Shepard's Citations
Colorado Springs, Colorado

Mr. Roy Nielson
University of California, Radiation Lab
Berkeley, California

TO: Project 4239 File

FROM: A. W. Dana

SUBJECT: Individuals and Organizations Contacted

Mr. Robert J. O'Keefe
Assist. Vice President
Systems and Procedures
Chase Manhattan Bank
1 Chase Manhattan Plaza
New York, New York

Mr. Earl J. Butler
Manager Records Administration
Metropolitan Life Insurance Company
1 Madison Avenue
New York 10, New York (North Building)

Mr. John Garner, Manager Data Processing
Reuben H. Donnelly
466 Lexington Avenue
New York, New York

Mr. N. M. Spiva
Manager Methods and Research
Dun and Bradstreet
99 Church Street
New York 8, New York

Mr. McMahon
Program Administrator
Spiegel, Incorporated
1040 West 35th Street
Chicago, Illinois

Mr. Karl Adams
President
Micro Dealers, Inc.
1560 Trapelo Road
Waltham, Massachusetts

Mr. Charles Hughes
Records Management Department
Veterans Administration
Veterans Administration Building
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Major Ormerod
Station APCAS - Administrative Services
Room BF 873, Pentagon
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Mr. O. D. McCool
Director Records Management
USAAG
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Mr. Artel Ricks
Records Management Department
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Mr. Ganley
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Mr. John Mitchell
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Mr. Norman D. Mears, President
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Mr. W. E. Mulvihill
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Chrysler Corporation
341 Massachusetts Avenue
Detroit 31, Michigan

Dr. A. D. Hestenes
Manager Electronic Data Processing Systems
General Motors Corporate Staff
General Motors Building
Detroit, Michigan

1/3/63

Project Review

I. Research Progress to date (Dana)

(a) Definition of operating and cost characteristics of PCMI System

(b) Definition of application areas to be studied

(c) Field interviews - Selection of organizations
Interview approach
Contact List

(d) Preliminary - Summarization of field data - cost analysis - conclusions

(e) Preliminary analysis of market

II. Microform Publishing (Bourne)

(a) Description of industry: Number of publishers
Type of publications
Estimated Sales Volume

(b) Copyright problems why won't publishers allow [illegible]? What are they afraid of? Gentlemen's Agreement?

(c) Summary of field data

(d) User attitudes and preferences people still somewhat looking at some of the earliest equip. I have returned a bad impression that must be overcome.

(e) Cost analysis — Bound Publication
On Demand Publication

III. File Applications (Dana)

(a) Definition file characteristics

(b) Low activity files

(c) High activity files > Matrix summary of field data

(d) Generalizations and conclusions

IV. Other Applications (Dana)

(a) Buckbee-Mears

(b) Military

V. Preliminary Analysis of Market (Randall, Bourne)

(a) Structure of market - Recordak, Bell & Howell
Microdealers
Independents

(b) Type of marketing skills and organization needed
- Intensive distribution
- Service and training as well as hardware

(c) Size of market

(d) Competitive systems and equipment

VI. General Discussion

November 12, 1962

Mr. W. C. Myers
Electronics Division
National Cash Register Company
1401 East El Segundo Boulevard
Hawthorne, California

Dear Will:

Here, in draft form, are some summaries of the basic times and costs of using PCMI equipment for publishing in microform. These figures, representing our current understanding of the basic times and costs, will be used as the basis for our cost analyses of operating the PCMI system under varying situations. I will wait for your concurrence and agreement on the costs and assumptions before I start any of the calculations, and would appreciate learning of your agreement or exceptions as soon as possible.

You probably have some industrial engineers in your organizations who are trained in time and motion study techniques. It would be a useful check if they could review the times of some of the manual operations that have been noted.

As a side note, I notice that the NMA article on PCMI was reprinted in American Documentation. This is excellent timing for me since many of the people that I planned to talk to are members of ADI and subscribers to that journal. They should be well prepared for further discussions.

I'm looking forward to hearing from you.

Sincerely,

Charles P. Bourne
Research Engineer

CPB/rt
Enclosures

SRI

COMPANY CONFIDENTIAL

MEMORANDUM

THE NATIONAL CASH REGISTER COMPANY
ELECTRONICS DIVISION

To: D. E. Eckdahl

From: W. C. Myers

Subject: Discussion and Recommendations for a Course of Action for NCR with Respect to the Verac Proposal of the U.S. Patent Office

Date: October 30, 1962

At your request a meeting was held on Tuesday afternoon, October 30, 1962 to review the pros and cons of the recently received proposal from the U. S. Patent Office.[4] The following personnel participated in this meeting: Messrs. Carlson, Abbott, Young, Lebow and Myers from NCR, ED, and Messrs. Art Dana and Charles Bourne from SRI. As might be expected, a great many factors were brought up for discussion. The contents of this memo represents my impressions of what the group felt were the most important factors to be considered. Because of the time element involved in the preparation of this memorandum, it has not been possible to review its contents in advance with the other individuals involved.

To begin with, it appears that the principle questions which require resolving are almost all of an economic or policy nature rather than technical. A good technical description of Verac[6] is available in the NCR Library. A brief system description[5] is also available. What is not available at the present time are the following:

1) A thorough systems analysis of Verac, particularly in relation to competitive systems such as the IBM Walnut and FMA's File Search.

2) Prices of Verac units and/or Verac system combinations.

3) A market analysis for Verac, e.g., size, areas of application, competition, distribution of market between commercial and government, etc.

4) Information as to how reliable various elements of the Verac system operate, particularly if the assumption is made that a reliable memory plane was available.

Consider next the Verac system requirement for a reduction ratio of 140:1. This ratio is not compatible with NCR's existing PCMI Camera-Recorder design of 200:1. Complete redesign of our optical system would be required to meet the 140:1 ratio. Another incompatibility is the 10" by 10" memory plane format of Verac vs. the 5" by 7" maximum size possible with NCR's current Camera-Recorder. (Note: this is a less-serious problem since the larger plane could be fabricated in sections if the optics were compatible.) Therefore, it is estimated that, unless Verac could adopt its system to a 200:1 reduction ratio, NCR would have to design and build a special Camera-Recorder to do their job. Because of the very long lead time required to obtain the special optics, it is estimated that it would require about eighteen months to deliver such a unit to Avco. It is further assumed that such a unit would have to be production engineered.

An additional hardware unit required would be a contact printer for making both the photographic master from the photochromic plate and the dissemination contact prints from the master negative. A rough preliminary estimate for such a program would be on the order of $200,000 and eighteen months.

Some of the questions which occur at this point are the following:

1) Who would provide the $200,000?

2) If we assume that Verac cannot be made to work without the photochromic capabilities of inspection and error correction, then can NCR negotiate a royalty arrangement on all Verac sales?

3) Since Avco's current business is essentially military in nature and not in the information retrieval or data processing fields,(3) who would market Verac?

4) Should NCR consider a license to manufacture and/or market Verac system?

5) Since Verac, using PCMI techniques, might not be available for three years, how competitive as an IR system is it apt to be at that time?

Assuming satisfactory answers to the above questions, some of the possible pros of considering a working arrangement with Avco are:

1) NCR might obtain financial support towards the production engineering costs of the PCMI Camera-Recorder and the contact printer.

2) NCR might get into the automatic micro-image retrieval field (with a product) sooner.

3) If Verac becomes a successful product, then NCR would be the deciding factor because of its PCMI contribution and we gain economic rewards as well as favorable publicity. If Verac fails as a system, even though PCMI technology provided satisfactory memory planes, then NCR still has a Camera-Recorder production engineered (although possibly at 140:1 reduction ratio).

Some of the less attractive aspects can be listed as the cons of the question:

1) Does Avco want to cash-in on the NCR name and reputation in the office equipment and data processing fields? In other words, there is a considerable risk involved in associating NCR's name with Avco and Verac unless we are adequately protected in advance.

2) NCR's current PCMI staff at Hawthorne is completely saturated with the job of completing the Navy contract for the Bureau of Accounts and Supplies until at least April 1963. No surplus of trained (i.e., technical) manpower exists which could be used to start the Avco job. Also, hiring of manpower with the right combination of skills is almost impossible because of the pioneer nature of the work. Therefore, to attempt to start on such a program at Hawthorne Research before April of 1963 would be extremely difficult.

3) If Verac's performance was less than satisfactory, even though the PCMI-produced memory planes were not at fault, NCR could be damaged by association with the program.

4) Does NCR want to save a potential competitor?

5) It would appear to be far better institutional advertising for NCR to arrive at the market place first with a high reduction ratio image storage and dissemination system than to have Avco be first.

In conclusion, the following points and recommendations are made for your consideration.

1) It appears to be premature at this time for NCR to consider entering into any agreement with a competitor for the following reasons:

a) The Navy PCMI contract at Hawthorne research is a very important first effort to answer a number of technical questions concerning PCMI's practicality. Answers will not be available before the latter part of March 1963.

b) NCR has retained SRI to do a preliminary market analysis of its PCMI technology. Results of this study will not be available until the first week in March 1963.

c) The applicability of 200:1 PCMI techniques to patents as input media will not be known until some time in the first quarter of 1963.

d) NCR has yet to decide upon a future course of action concerning PCMI as a potential product line.

2) Since there has been a long (over a year) sustained interest in having NCR assist Avco, it would seem that NCR could delay action on the Patent Office proposal until April of 1963 without seriously compromising its position. It is therefore recommended that the various parties be informed that NCR needs this length of time to evaluate its position.

3) It is further recommended that SRI be specifically instructed, within the scope of the existing PCMI study contract, to evaluate the market potential of Verac and/or its PCMI equivalent.

4) If, in April, NCR declines to participate in the Avco program, we should be in an excellent technical position to submit a detailed alternate proposal to the Patent Office to do their on-demand problem with a PCMI system. In theory, this can be drafted today, but we do not have the hardware (experimental) answers that we will have by April 1963 to back up such a proposal.

References

(1) Letter from Mr. D. E. Eckdahl to Mr. R. G. Chollar (26 October 1962) concerning Patent Office proposal on Verac.

(2) Letter from Mr. H. B. Fay, Assistant Commissioner of Patents to Mr. D. E. Eckdahl (dated 18 October 1962, received 23 October 1962) suggesting NCR and Avco collaborate on Verac through a third party, namely, The Council on Library Resources. Letter also contained a seven-page proposal outlining the reasons why such a cooperative effort should be considered by the parties concerned.

(3) O'Connor, J., "Avco Names Mihalic Head of Three Divisions", Electronic News (October 22, 1962).

(4) Myers, W. C., "Memo to File" (October 10, 1962) describing a telephone call with Patent Office personnel concerning Reference (2) above.

(5) Kounty, Dick, "New Avco Storage Device Yields Data Via Dial Code", Electronic News (December 18, 1961).

(6) Bowker, J. K., et al, "Technical Investigation of Elements of a Mechanized Library System", Final Report No. EW-6680, 110 pp, Avco Corp., Crosley Division, Electronics Research Laboratories, Boston, Mass. (January 11, 1960) (Council on Library Resources support of $201,531).

Wilbur C. Myers
Director of Research

WCM:wc
cc: D. E. Eckdahl (3)
J. T. Matlago
M. F. Harris
S. G. Lebow
SRI

Table_____

Representative Costs of Micro-Opaque Card Publications

Form	Type of Publication	Approx. Cost/page (cents)	Total Cost	Reference
Microcard	Microcard in general	0.33 to 1.0	--	11
"	Microcard in general	0.5 average	--	8
"	First Six Million Prime Numbers (book)	0.73	$35.00 for 4800 pg.	4
"	Union List of Publications (book)	2.16	$7.50 for 346 pg.	4
"	French A.E.C. Reports	--	25 cents/card side	4
"	Annual reports of 1084 members of New York Stock Exchange	--	24-26 cents/card of 100 images or less; $272/yr. for about 1090 cards	5, 24, 26
"	Complete set of all U.S. patents issued each year	--	22 cents/card (about 6 patents/card; thus about 3½ cents/patent). For approx. 48,000 patents this is about $164/yr.	6
"	U.S. chemical patents	--	25-26 cents/card (about 4 cents/patent). Total about $250/yr.	6, 26, a
"	U. S. chemical patents	--	26 cents/card	9 pg. 65
"	U.S. electrical patents	--	25 cents/card (about 4 cents/patent). Total about $250/yr.	6
"	U.S. & Canadian pulp & paper patents	--	about 3.1 cents/patent. Total $100/yr. for about 3200 patents	9 pg. 65
"	Mechanical, Transportation, and miscellaneous patents	--	25 cents/card (about 4 cents per patent). Total about $1450/yr.	6
"	U.S. patents in Electrical Arts	1.0+	60 cents/two-sided card (card total of 60 pages to hold about 10 patents)	7
"	French chemical patents	--	70 cents/card	9 pg. 65
"	Newsweek	--	$15./vol.	9 pg. 24
"	Saturday Review	--	$8.50/yr.	9 pg. 24
"	Science		$10.00/vol.	9 pg. 60
"	American Documentation	0.792	$25.00 for Vol. 1-11 (3157 pg.)	9 pg. 68

Form	Type of Publication	Approx. Cost/page (cents)	Total Cost	Reference
crocards	Proc. Int'l Conf. on Peaceful Use of Atomic Energy	0.778	$70. for 16 vol. of about 9,000 pgs.	9 pg. 60
"	A.E.C. unclassified Reports for 1960	--	$2765	9 pg. 60
"	I.G.Y. Meteorological Data	--	$5000 for 24 trays	12
"	I.G.Y. Meteorological Data	5.45	$5990 for 220 vol. of 500 pages each (in a press run of 50 sets)	13

Table —

Representative Costs of Microcard Publications

Type of Publication	Approx. cost/page (cents)	Total Cost	References
Medieval Christian Hymns	2.0	$300. for 15,000 pp.	18
Eichmann Trial Transcript	0.822	$37. for 4500 pp.	19
Documents of the Organization of American States	-	$0.70 per two-sided card	20
French Chemical Patents	-	$0.70 per two-sided card	21
Annals of French Chamber of Deputies	0.95	950. for 100,000 pp.	22
Annals of German Reichstag	0.87	975. for 112,000 pp.	22
Ill. State Bar Assoc. Bull.	-	25 cents per card	23 pg. 42
Hoover Commission Report	-	12.5 cents per card	"
Various books & periodicals	-	20 cents per card	25
N.Y. Law Journal, U.S. Patent Office Official Gazette, U.S. Federal Register		21 cents per card side	26
U.S. Supreme Court Records & Briefs		25 cents per card	27

Form	Type of Publication	Approx Cost/Page (cents)	Total Cost	Ref.
Readex Micro-print cards	Proc. Int'l Conf. On Peaceful Users of Atomic Energy	0.555	$50. for 16 vol. of (about 9000 pg.)	9 pg. 66
Readex Micro-print cards	Nt'l Bibliography of Cuba	.504	40.00 for 7946 pg.	9 pg. 68
"	Nt'l Bibliography of Latin America	.508	24.00 for 4724 pg.	"
"	Nt'l Bibliography of Mexico & Guatemala	.505	58.00 for 11,503 pg.	"
"	Nt'l Bibliography of the Phillipines	.510	23.00 for 4501 pg.	"
"	Nt'l Bibliography of Portugal	.502	42.00 for 8368 pg.	"
"	Nt'l Bibliography of South America	.506	52.00 for 10,274 pg.	"
"	Nt'l Bibliography of Spain	.520	22.00 for 4245 pg.	"
"	Bibliography by Medina	.49	75.00 for 15,300 pg.	9 pg. 69

Table _____

Representative Costs of Roll Microfilm Publications

Type of Publication	Approx. cost/page (cents)	Total Cost	Reference
common periodicals	0.25	--	1, 10
common periodicals	0.30	--	2
books	0.30 to 1.0	—	28
dissertations	1.25	--	3
Saturday Review	--	9.65/yr.	9 pg. 24
Science	--	9.90/yr.	9 pg. 60
Physics Abstracts	0.562	$11.70/yr. for est. 2080 pages	9 pg. 60
Short-Title Catalog of Books: 1641-1700	0.55	$~~440~~ 550 for 100,000 pg.	9 pg. 69
American Documentation	--	? for Vol 1-11 (3157 pg.)	9 pg. 68
Mexican archives	1.66	$5000 for 300,000 pg.	14 pg. 13
U. S. Chemical Patents	--	$275/yr.	9 pg. 65
U. S. Chemical Patents (film strips in acetate jackets)	--	$450/yr.	"
Jewish newspapers and periodicals	--	18 cents/ft. of film	15
Facts on Film	1.625	$1500 for 84 rolls of 1100 frames	16
Texas Historical Newspapers	1.315	$329 for 25,000 pages	17
American State papers	--	$325 for 38 rolls of 35mm film ($8.55/roll)	17
Texas Confederate master cards	0.141	$120 for 85,000 cards on 16mm film.	17

Table — (cont.)

Representative Costs of Roll Microfilm Publications

Type of Publication	Approx. cost/page (cents)	Total cost	Reference
Oklahoma State Bar J.	-	$6.66 per roll	23 pg. 42
Minnesota Bar J.	-	2.00 "	"
Minnesota Bar J.	-	7.50 "	"
Hoover Commission Report	-	3.00 "	"
Alabama Lawyer	-	10.00 "	"
Los Angeles Bar Bull.	-	15.00 "	"
Crime, Law, & Social Science (books)	3.1	16.45 for 531 pp.	23 pg. 43

Table_____

References for Microform Publication Costs

1. F. L. Meeks and W. T. Johnson, "We Chose Microfilm," College and Research Libraries, pp. 223-228, May 1960.

2. "The Problem of Periodical Storage in Libraries," pg. 2-4 in brochure No. 12 by University Microfilms, Inc.

3. Dissertation Abstracts, pg. iii (September 1962).

4. Microcard Bulletin No. 20 (January 1960).

5. "A New Microcard Service: Corporation Annual Reports," sales brochure of the Godfrey Library (1953).

6. "New Enlargement of Our Microcard Patent Service," sales brochure of the Godfrey Library (1957).

7. "U.S. Patents on Microcards," sales brochure from Microcard Foundation (1960).

8. A general statement, "The cost of Microcards usually averages less than ½¢ per reproduced page," appeared in an undated brochure, "Microcards" by the Microcard Foundation.

9. Subject Guide to Microforms in Print: 1962-1963, A. Diaz, Ed., (Microcard Editions, Inc., Wash. D. C., 1962).

10. E. Power, "Microfilm as a Library Tool," Special Libraries, Vol. 51, No. 2, pp. 62-64 (February 1960).

11. "Some General Information About Microcards," undated single-page brochure from Microcard Foundation.

12. V. Clapp, "Journal Publication in Microform," Science, Vol. 127, No. 3307 pg. 1145 (16 May 1958).

13. O. M. Ashford, "Collection and Publication of IGY Meteorological Data," Rev. Doc. Vol. 25, No. 3, pp. 74-78 (1958).

14. A Catalog of Selected Microfilms, Micro Photo, Inc., Cleveland Ohio (September 1962).

15. letter from the American Jewish Periodical Center.

16. price list from Southern Education Reporting Service, Nashville, Tenn.

17. price list from Microfilm Service and Sales Company, Dallas, Texas

18. brochure 62.8.15 from Microcard Editions, Inc.

19. brochure 62.8.20 from Microcard Editions, Inc.

20. brochure 62.1.1 "

21. " 62.1.10 "

22. " 62.10.19 "

23. Annual Report of the American Bar Foundation.

Table — (cont.)
References for Microform Publication Costs

24. "Periodical Sets on Microcard" catalog of Microcard, Inc.
25. Catalog of Louisville Free Public Library
26. Price list of Godfrey Memorial Library.
27. ~~Price~~ Catalog of Matthews Barden & Co., Inc.
28. S. Rice, "Publishing in the Microforms," Proc. 1962 Conv. Natl. Microfilm Assoc. pp. 271-276 (Natl. Microfilm Assoc., Annapolis, Md., 1962).

Table —
Representative microfilming Costs

Type of Service	Approx. Cost per page (cents)	References
microfilming books & journals for subsequent Xerox printing or preparation of distribution positive	2.0	1
ditto	≅ 1.75	2
microfilming books for subsequent Xerox printing (filming done at the main plant)	0.5	3
microfilming books for subsequent Xerox printing (filming done away from the main plant)	2.0	3
35-mm negatives from books	3.5 – 4	4

References: 1. Micro Photo Inc., Bulletin (July 1960).
(MP = University microfilms)
2. E. Power, "Microfilm as a Library Tool," Special Libraries Vol 51, No. 2, pp. 62 – 64 (Feb. 1960).
3. E. Power, "D-P Books: a Library Breakthrough," American Documentation Vol. 9, No. 4, pp. 273 – 276 (October 1958).
4. E. Lower, "microfilm – the versatile academic Tool," in Microfilm as media for Publication pp 10-26 (1960)

Prepared by Tom Lebow - NCR

No. of Pages	3000 (1 card)	30,000 (Contract)	60,000 (Break-Even)	300,000 (Total APL)	45,000 (Revised Estimate)
PCMI					
Fixed Costs					
Camera Contact Printer File	35,500	35,500	35,500	35,500	25,800
Viewers	1,200,000	1,200,000	1,200,000	1,200,000	1,000,000
Maintenance	360,000	360,000	360,000	360,000	300,000
	1,595,500	1,595,500	1,595,500	1,595,500	1,325,800
Variable					
Microfilm	1,200	12,000	24,000	120,000	12,600
Material	4,010	40,100	80,200	401,000	48,000
Labor	500	5,000	10,000	50,000	7,500
Postage	400	4,000	8,000	40,000	6,000
	6,110	61,100	122,200	611,000	74,100
TOTAL	1,601,610	1,656,600	1,717,700	2,206,500	1,399,900
Present	163,320	1,633,200	3,266,400	16,332,000	2,449,800
Microcard					
Fixed	178,330	178,330	178,330	178,330	178,330
Variable	73,200	732,000	1,464,000	7,320,000	1,098,000
TOTAL	251,530	910,330	1,642,330	7,498,330	1,276,330
Recordak					
Fixed	759,990	759,990	759,990	759,990	759,990
Variable	42,730	427,300	854,600	4,273,000	640,950
Total	802,720	1,187,290	1,614,590	5,032,990	1,400,940

PCMI - 2000 copies 4 X yr.

1-21-63

PCMI (At Lodestar Viewer $)	3000	30,000	60,000	300,000	45,000
Fixed Costs					
Camera, Printer, File	35,500	35,500	35,500	35,500	
Viewer	759,990	759,990	759,990	759,990	
	795,490	795,490	795,490	795,490	
Variable	6,110	61,100	122,200	611,000	
TOTAL	801,600	856,590	917,690	1,406,490	

Sears - Lodestar					
Fixed	340,000	340,000	340,000	340,000	340,000
Variable	42,730	427,300	854,600	4,273,000	640,950
Total	382,730	767,300	1,194,600	4,613,000	980,950

NAVY #2

not valid no subscription by Thomas

THOMAS REGISTER (BASIC CATALOG = 60,000 pps 3500 DISTRIBUTION)

Microfiche	1 x per year Subsidized	1 x per year Non-Sub.	Non-Subsidy 50% Expansion pps	Non-Subsidy 50% Expansion pps 2 x per yr.	Non-Subsidy 50% expansion pps = 90,000 50% expansion Users = 5,000 2 x per yr.
Fixed Cost	433,330	433,330	433,330	433,330	433,330
Variable	325,500	640,500	955,500	1,911,000	2,715,000
Total	758,830	1,073,830	1,388,830	2,344,330	3,148,330
PCMI					
Fixed Cost	2,765,500	2,765,500	2,765,500	2,765,500	2,765,500
Variable	45,230	45,230	67,845	135,690	228,000
Total	2,810,730	2,810,730	2,833,345	2,901,190	2,993,500
PCMI (at 1500 Viewer)					
Fixed Cost	2,310,500	2,310,500	2,310,500	2,310,500	2,310,500
Variable	45,230	45,230	67,845	135,690	228,000
Total	2,355,730	2,355,730	2,378,345	2,446,190	2,538,500
PCMI (Lodestar Viewer)					
Fixed Cost	1,365,500	1,365,500	1,365,500	1,365,500	1,365,500
Variable	45,230	45,230	67,845	135,690	228,000
Total	1,410,730	1,410,730	1,433,345	1,501,190	1,593,500

PATENT OFFICE - DISSEMINATION (With Patent Gazette)

(6,000 pps per week)

(18,000,000 pps = Total File) (2,000 Users)

	Initial Investment					Annual Cost				
	Viewer		File		Total	Viewer Main.		Microform		Total
PCMI	1800	+	4,560	=	6,360	180	+	80	=	260
Microcard	237	+	55,800	=	56,037	10	+	968	=	978
Recordak	995	+	32,000	=	32,995	48	+	556	=	604

Appendix 5-6

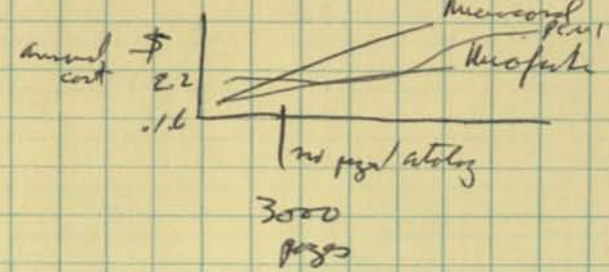
Derivations of ~~Equations~~ Expressions for Costs of alternate Publication Methods for systems with 2000 users.

Define: N = No. of pages in the publication
U = No. of users that receive single copies of the publication

1. Paper System

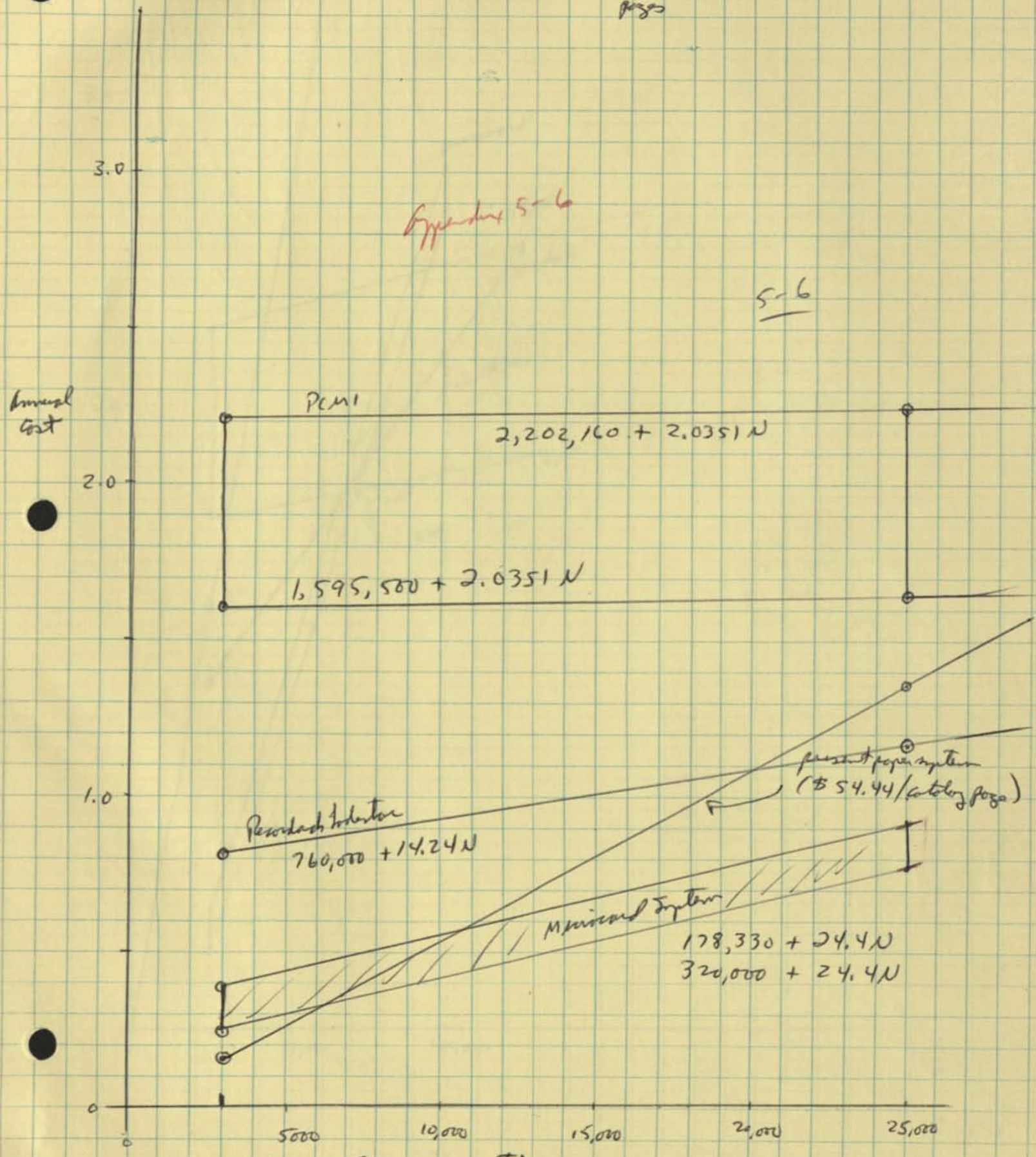
use copy of 5-7, but replace U with 2000.

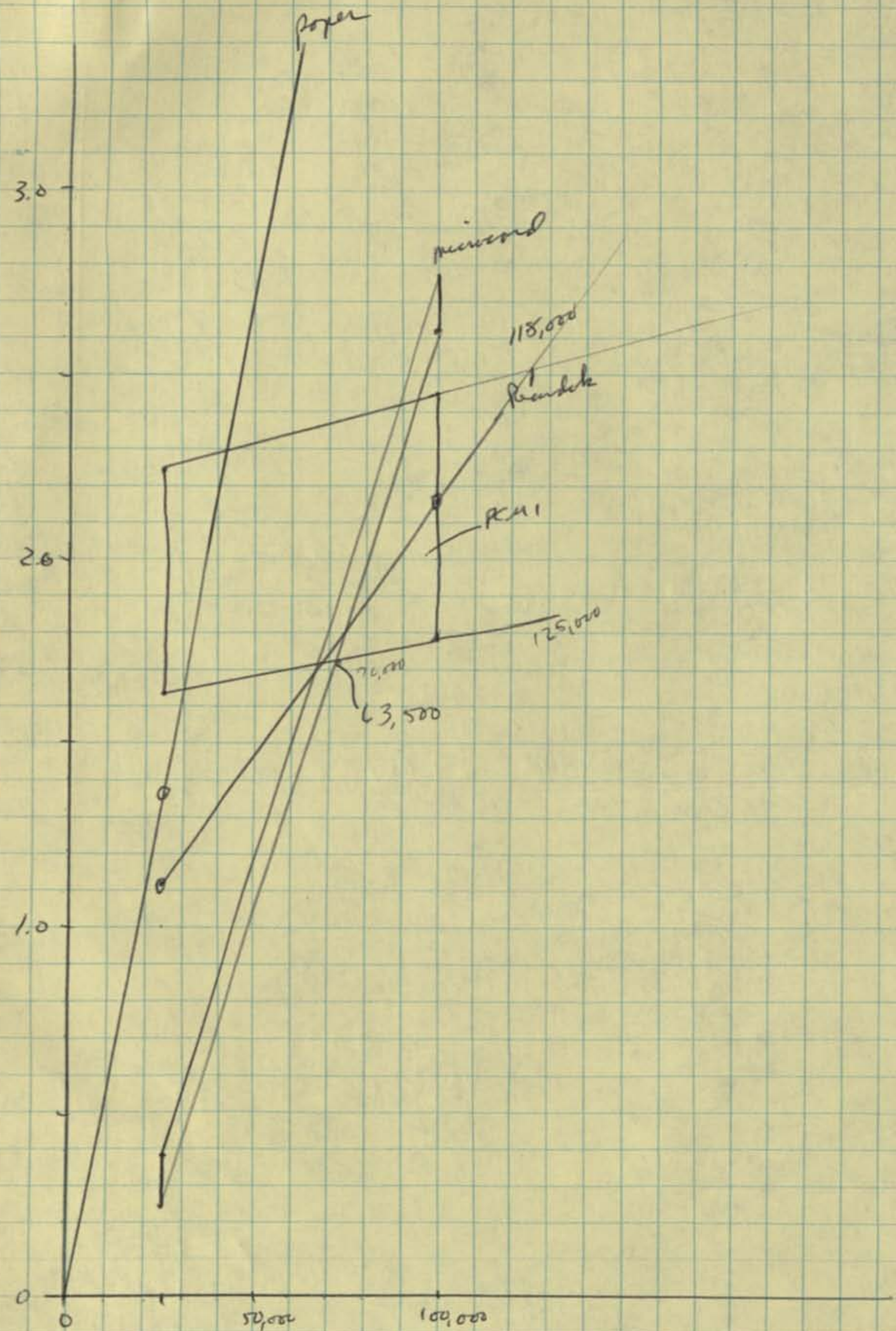
2000 users
quarterly publication



Appendix 5-6

5-6





3.0
2.0
1.0
0
118,000
125,000
63,500
0
50,000
100,000

For Many catalog w/ 15,000 pgs/issue

Paper system

15,000 negatives @ ₮1. = ₮15,000
15,000 plates @ ₮1.25 = 18,750
15,000(2000) pages @ ₮0.002 = 60,000
₮93,750

Printing Cost/issue = (₮6.25 per page)(no. pages in the catalog) = ₮6.25N
Annual printing Cost = 4(₮6.25)N = ₮25/₮ catalog page

Postage Cost/issue = (₮0.0046 lbs/pg)(₮0.8/lb)(2000) = ₮7.36/page
Annual postage cost = 4(7.36) = ₮29.44 / catalog page

Total Annual System Cost = ₮54.44 / catalog page

N	₮
3000	163,320
15,000	816,600
25,000	1,361,000
100,000	5,444,000
55,200	3,000,000

negs 1.0 N
plates 1.25N
paper = 0.002₮U (2000)
4.-

Keyword System

Printing cost = ($0.003/delivered page)(2000 users)(4 visits/yr.) = $24/subscriber

Viewing (min) = ~~178,330~~ 106,660 /yr.

Viewing (max) = 320,000 /yr.

Postage cost = (0.1 oz/card)(1 card/100 pages)($0.05/oz)(2000 users)(4 visits) = $0.4/subscriber page

Total annual system cost (min) = $ ~~178,330~~ 106,660 + 24.4N

" " (max) = 320,000 + 24.4N

N	$ min	$ max
3000	~~251,530~~ 179,860	393,200
25,000	~~788,330~~	930,000
100,000	~~2,618,330~~	2,760,000
~~115,100~~ 118,500	3,000,000	$3 —
109,000	—	3,000,000
0	~~178,330~~ 106,660	320,000

Cardoke Industries System

Filming cost = ($0.02475/page)(4 mins/yr.) = $0.099/catalog page

Kodamatic indexing = ($7.00/3000 pages)(4 mins/yr.) = $0.00933/catalog page

contract printing = ($3.50/3000 pages)(2000 users)(4 mins/yr.) = $9.3333/catalog page

Magazine shipping = ($1.60/3000 pages)(2000 users)(4 mins/yr.) = $4.2666/catalog page

Prof. Variable cost = ~~$63,330~~ $760,000/yr.

min Variable + Fixed cost = 369,990/yr.

postage cost = (4 oz/3000 pages)($0.05/oz)(2000 users)(4 mins/yr.) = $0.5333/catalog page

Prof. Total cost = $760,000 + $14.24N

min. = 369,990 + 14.24N

323,330
46,660
369,990

N	$ (prof)	(min)
3000	802,720	412,720
25,000	1,116,000	
100,000	2,184,000	
0	760,000	369,990
157,000	3,000,000	-
185,000	-	3,000,000

EM1

recording equip. cost/unit = $35,500

viewer cost/unit (min.) = ~~$200,000~~ $1,560,000

viewer cost/unit (max) = ~~$1,166,660~~ $2,166,660

material cost = ($2.50/master/3000 pgs)(4 mins/pg.)(2000 users)
+ ($0.5/3000 pages)(4 mins/pg.)(2000 users) = $1.3360/catalog pg.

camera labor = (~~3.415~~ hrs/3000 pages)($9.00/hr.)(4 mins/pg.) = $~~0.1139~~ 0.0410/cat. pg.

camera saturates when load exceeds (440 hrs/mo)3 = 1320 hrs/quarter
at ~~4~~ 1.138 hrs./other pgs. This means saturation at ~~200,000~~ 1,160,000 pages

contact printer labor = ~~(37,320/3600)(hrs/~~
($10.35 hrs/3000 pg) in 2000 copies = ~~10.35/~~ $3.45 \cdot 10^{-3}$ hrs/page
$(3.45 \cdot 10^{-3}$ hrs/page)($9.00/hr.)(4 mins/pg.) = $0.1242/cat. page

contact printer saturates when load exceeds 1320 hrs/quarter.
at $3.45 \cdot 10^{-3}$ hrs/page, this means saturation at 383,000 pages/catalog

total labor = $0.1652/catalog page.

original filming cost = ($0.10/page)(4 mins/pg.) = $0.40/catalog page

postage cost = ($0.05/3000 pages)(2000 users)(4 mins/pg.) = $0.1333/cat page

Total annual system cost (min) = 1,595,500 + 2.0351 N

" " (max) = 2,202,160 + 2.0351 N

N	$ min.	$ max
3000	1,601,610	2,208,270
25,000	1,646,377	2,253,037
100,000	1,799,010	2,405,670
0	1,595,500	2,202,160
160,000	1,920,500	2,527,160
200,000	2,002,500	2,609,160

Archives	Catalog or ~~Hain~~ Publication	~~Others~~

Archives

US Army Records Center - St. Louis & Wash DC
(6½ mill. records)

AFCAS, - Wash DC
(personnel folders)

Title Ins. & Trust - L.A.
(1.8 mill. land parcels)

A.F. Finance Center - Denver
(530 file cabinets, & growing)

CIA - Wash DC
(large micro file)

Foreman Co. - Plymouth, Ind.
(in the newspaper microfilming business)

Jobbers - Gerry Soghar (formerly Sales Dir. of Microcard) - Wash.

Peter Scott - MIT.

CB to handle micropublishing
eng. drugs.
special & regular libraries

and genl. business records.

Catalog or Publication

USN Bur. of Supplies & Accounts - Wash DC
also Navy Supply Depot at Mechanicsburg, Pa.
(47,000 catalog pages)
≈ ½ mill annual printing costs

NASA - Doc Inc. - Wash DC
5x8 sheet film publ. of NASA reports
20,000 titles/yr.

McGraw-Hill - N.Y.
Tech Info Centers

DATA VZ Found file

Sweets' Catalog Service - N.Y.

USAF Logistics Command. WPA -, Dayton
(60,000 Tech. orders → 20 locations
≈ 50 pages ea.)

U.S. Patent Office - Wash DC
(publ. of Patent Gazette & other total collections)

Microcard Editions, Inc. - Wash.

Micro-Card Corp. - Salem, Wisc.
(publisher of microform)
e.g. Thomas Register, AEC

Thomas Publishing Co. - N.Y.
(publishers of microform catalogs)
e.g. 27,000 copies of their directory

Vendor Specs ~~microfilm~~ Micro-File - Denver
(microfilm catalogs: 160 installations)

J.S. Canner - Library Booksellers - Boston
(sells periodicals & libraries)

Microtext Publishing Corp. - N.Y. & Wash.

University Microfilm, Ann Arbor, Mich.
(7000 theses/yr)

Background Data

Bay Microfilm - Micrographic - Palo Alto
basic costs to microfilm various types of records
availability of associated 35-mm microfilm equip., & users of this type of film
suggested applications for microform publication.

Publishers - A.E.C. Western Catalog File - S.F.
(Building Product Reference File)

Books - Dender-Moss Co.
(law books publisher)

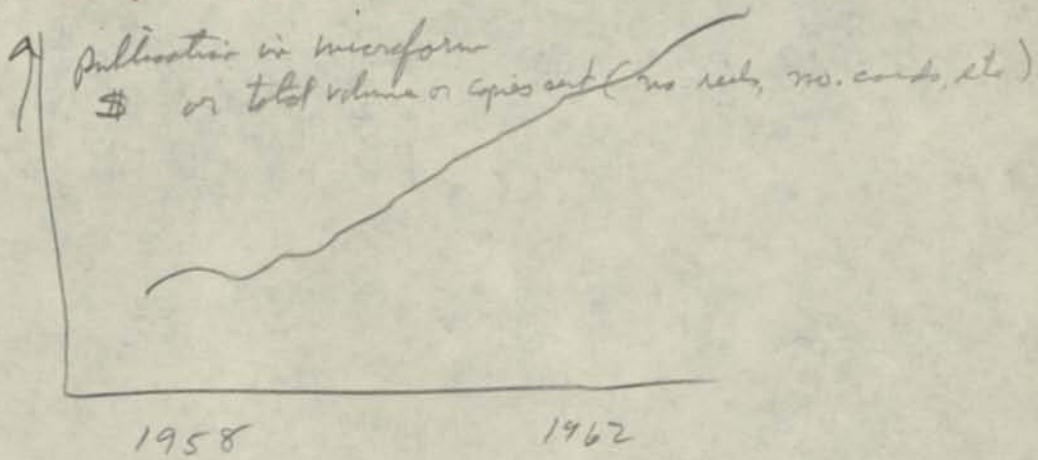
:

Logical listings in "Publishers" S.F. phone books

see also "catalog + manual compilers"

Cost to publish in microform from a users draft?

Computability + convertibility w/ existing microform publications



Examine potential of proposed microform publication - e.g. Corporate Annual Reports
determine relative advantage of Microcard vs. NCR (folding, cost, etc)

Possibility of publishing prepared 3M: 1 as Microcards or that Microcard Corp. can utilize NCR equip?

(RD-1) 3660-2 31 May 1961

Notes on a visit with a representative of University Microfilms, Inc. (UM)

~~He~~ this gentleman was interviewed at his exhibit booth at the SLA Convention. At no time did I disclose that I was working for Kodak or doing any type of survey work.

UM is presently the largest microfilm publisher & is growing rapidly every year. They are reported to be the largest Kodak customer for microfilm. ~~that Kodak has~~ They have an arrangement with the publishers of ~~approximately~~ approximately 1200 journals to provide microfilm copies ~~the~~ of their publications. They provide microfilm copies of journals, newspapers, dissertations, & special collections of material. Because of the terms of their agreement with the publishers, they would not make any comments about the number of subscriptions or amount of film that they used. However, they did say that they ~~furnished~~ filled several thousand orders per year for copies of dissertations. At present, more than 100 colleges provide dissertations for microfilming, & over 7000 dissertations have been filmed to date.

UM furnishes positive or negative silver prints (positive prints preferred for viewing) at the same price. They would like to use Kodak or Diazo film to achieve some cost reduction, but are not convinced that it will provide archival quality film. Since they are concerned with archival type applications, rather than throw-away copies, they feel that the silver film is the only proven film to date. They believe that there has been some trouble with fading & poor quality images of the other films.

(OVER)

UM originally started selling to large universities, then to smaller colleges & junior colleges, & lately to high schools. They cite the information explosion, increased school populations, increasing storage costs, & lack of storage space, & some of the reasons for their present & future success.

There are currently about 41 organizations publishing material in microform (microcards, microfiche, microfilm, etc.). Approximately 10,000 different works are currently available from these publishers in microform.

For <u>selective distribution</u>, the significant publishers are

AEC — catalog distributors

NASA

ASTIA

I Airbrary 200:1 , 3×5

II Is it pseudo prompt, are there any ~~useful~~ PCMI applications that are economically useful for NCR?

III Competitive analysis of PCMI vs. Foto-Star (RAIR) & any other commercial microfilm systems

IV Future direction of NCR's PCMI R&D? (sole I step question?)

V Carefully define what is meant by the potential marriage of PCMI technology w/ EDP? "Image manipulation" ≡ micro-storage, dissemination, retrieval, merging, sorting, purging, indexing, etc.

VI Should PCMI be directed toward eng. drag. application? (charge forced or composing table for graphic arts?

How far could you reduce eng. drag.? 10 times more than microfilm

What can PCMI be used for, when not restricted to present formats.

$$
\begin{array}{r}
296 \\
812\overline{)255537} \\
1724 \\
\hline
8313 \\
7758 \\
\hline
5557
\end{array}
$$

$$
\begin{array}{r}
71 \\
274\overline{)19601} \\
1918 \\
\hline
421 \\
274 \\
\hline
147
\end{array}
$$

72.50
132.
280.
484

20/yr.

14
20
280

Viewer - printer maint. = $750/yr. (light source $125 for 1600 hours) — does this include replacement costs? NO — is this a percentage?

Viewer - microfilmer maint. = ?

— Camera - recorder maint. = ?
contact printer maint. = ?

time to make hard copy print from viewer = ?

op. time delay 5 sec seems fast / appearance

samples of hardcopy output?

ref. to Battelle report on Human Factors Study of the Use of Microforms

→ Diazo mtl cost

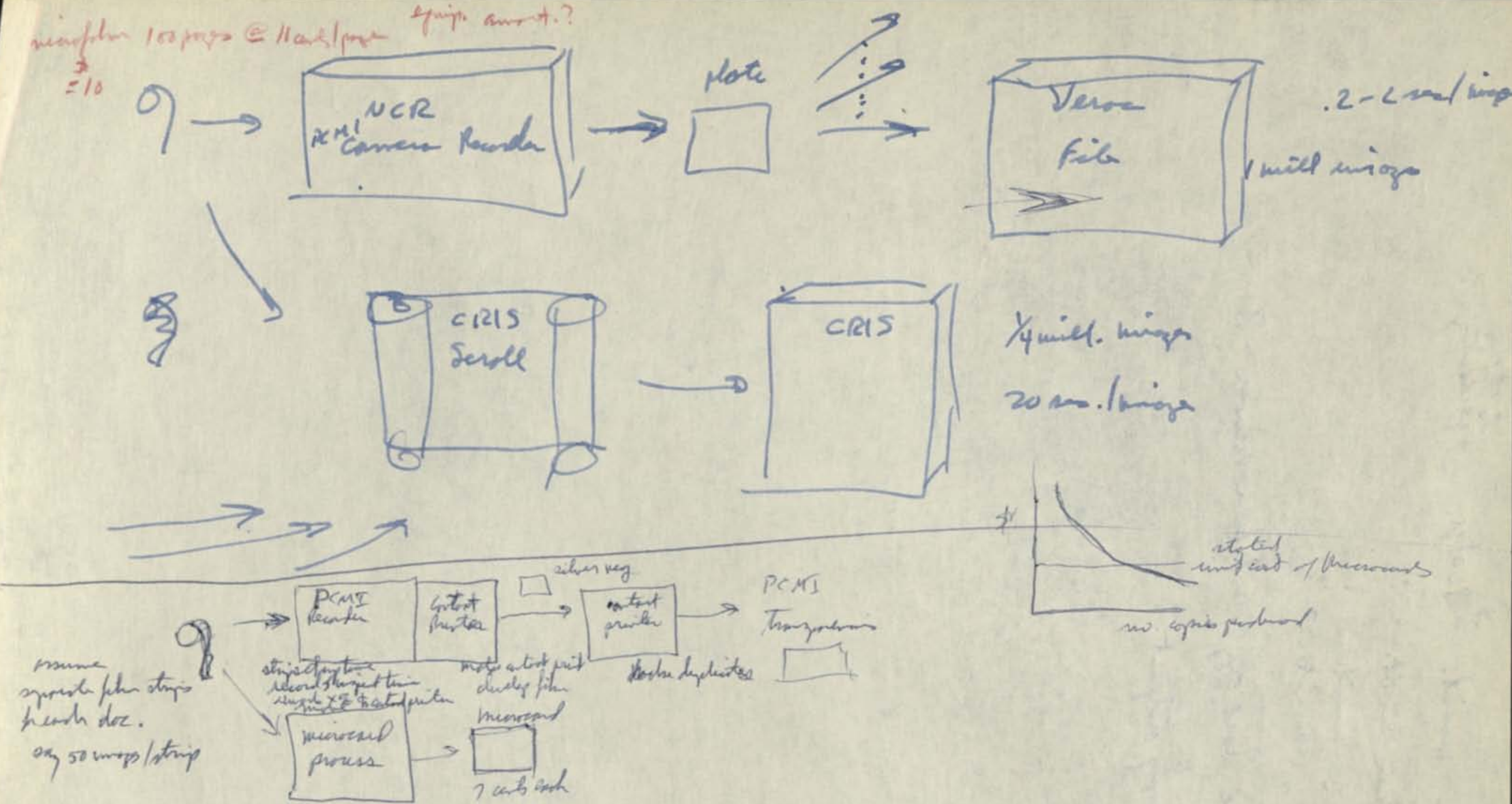
Call report for Chernowitz visit to Houston Fearless. ↔

need new SRI stencil - furniture.

→ NCR phone 757-5111

4239-3

questions phoned to Ty Abbot on Friday 11/2



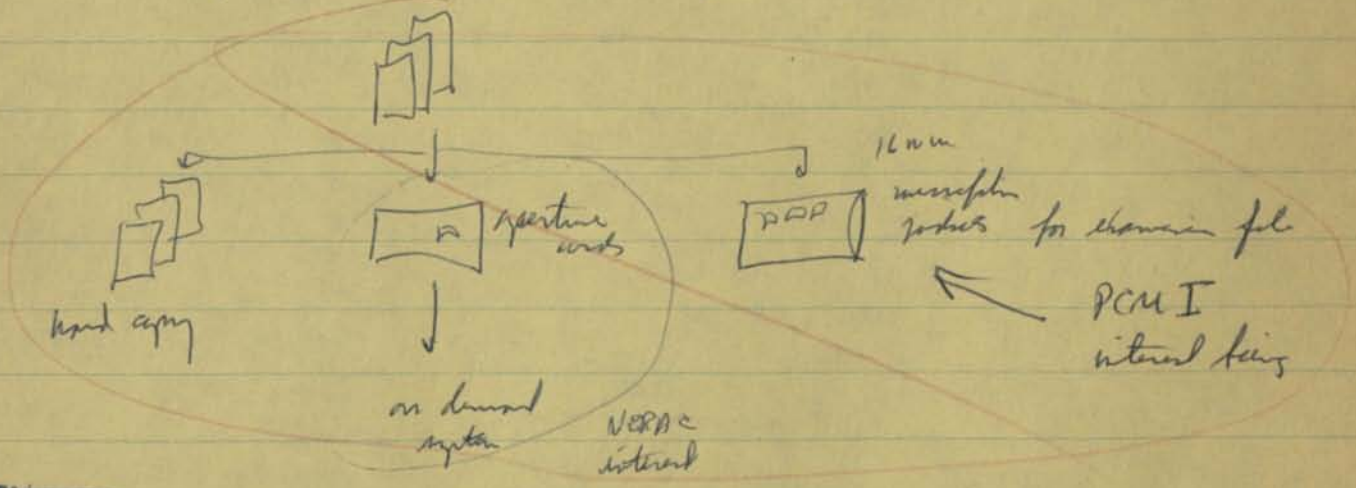
microfilm 100 pages @ 1[illegible]/page
equip. amort.?
=10
NCR
PCMI Camera Recorder
plate
Xerox
File
.2 - 2 sec/image
1 mill image
CRIS
Scroll
CRIS
1/4 mill. image
20 sec./image
stated
unit cost of [illegible]
no. copies produced
silver neg
PCMI Recorder
contact printer
contact printer
PCMI
Transparencies
diazo duplicates
assume
separate film strips
for each doc.
say 50 images/strip
microcard
process
microcard
7 cards each

Notes of 10/31 meeting at NCR

Legal assoc - NCR - AVCO. joint equip. sales?
Will VERAC do Patent Office job?
Is there a better PCMI approach?
100:1 OK for patents of present system.
200:1 marginal.
some 8 point print on patents unless it marginal.
lines per field is a better gauge of micro quality than lines/mm.

Patent Office Ward & Urbach. they proposed a complete analysis of on demand
Urbach has an AVCO proposal (several years ago) for solution of demand printing.

Asked what to use his document retrieval system - ie WALNUT or AVCO - for microfilm output. (to Cypress) Need 7 Cypress towers because of 150,000 pages/day. - Primarily for demand printing.
Verac not especially suited for Hammermill problem.



Thomas Built. 4x6 transparencies now being made by Micro Photo in Cleveland. - which was recently purchased by Bell & Howell.

know about AVCO visit by ca Monday

PCMI applications

1. Duplicating Library
2. Micro Image Publishing
   A. Index + Microform Publishing
      + known
      NASA, AEC, USMF
   B. Microform Publishing
      Wildlife Service
3. On Demand Printing
   NCM
   ASTIA
   Patent Office
4. MEMEX

Co. in L.A. 64 11801 West Olympic Blvd.

Check Houston Fearless for film chip system. Disc Acquisition + Integration
System IAI System 6 sec access to 8 mill images.
RADC support (Defense) 850 images + listing on 3 x 4 in. card
Device is used to us.

contact printer for publication or distribution decks. Throughput rate.
1 print every 15 sec. say 200 sheets/hour for continuous printing
of 1 image.

quality control check on film + skin. 2 hr test run once/week.
½ hr elapsed time to get 1st image out.
½ hr " to

distribution decks are pos. silver film.
why not negative diazo film.

1800 - 2500
100 100
1900 Tc 2600
500 1000
2400 3600

~~Ozalid~~ diazo contact printer - 5K - 10K

diazo mtl. cost. ? they will check.

Kodak checked this — silver film cost guessed at 50 cents.

→ diazo film may fade in viewer because of the concentrated energies being put on organic dyes.

viewer recorder for on demand printing. 1 copy on roll microfilm for camera viewer.

load card on viewer, select 1st image, & focus 15-20 sec.

say 35 mm recorder.

↘ Can make 100 key marks from PCMC plate w/o disturbing it.

must refocus ~~often~~ for each frame. (or $5000 + 500 for auto focus)

total effective time to ~~app~~ make copies = 15 sec/image.

price of this new equip. add 1000 to viewer cost. ?

time to pull = ? say 5 sec

time for address lookup say 5 sec., time to re-file PCMC card.

automatic advance (step & copy) say 2 sec per frame — cost ≈ $100.

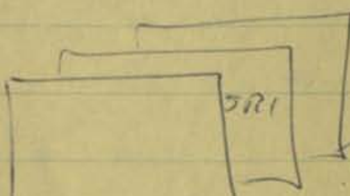
Keyboard w/ mechanical linkage to get 1st copy & 1st image location. cost $500-1000

if printing is done at viewer.

P112 — heat erasable } both needs some synthesis

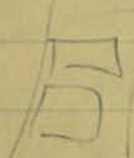
P113 = prints — light erasable ⟵ maybe better to concentrate on this one.

25 2
10



PCMC
plate on bottom extend & leave out.

feed VR
2 sec/frame
25-30 5
10
35-40 7 min



→ yellow filter

flash again. —

? for index

etc. — Camera working again. 5x5 matrix of 25 pages. - representative pages & test charts.

Approach to Interviews — Legal Probs.

Quotations

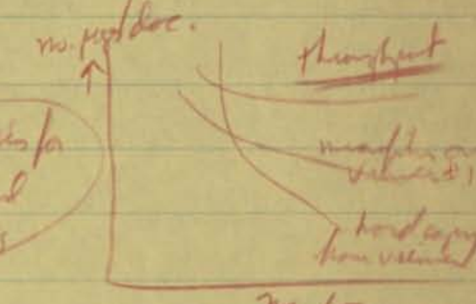
~~Dr~~ NCR does not furnish samples of material.
Can repeat anything in NCR papers. — except ASTIA report also NSF #10' 58 212 lead away from
no secret about Navy Bureau catalog project. — since it is exploratory,
we (NCR) don't know ~~about so~~ what results — de-emphasize
should not mention Patent Office participation in Bu-Sanda project.
if asked expected delivery times — don't know — still experimental.
we can release equip. prices to people that ask. —
e.g. "If we had a system for 75-100^k, could you use it?"
many not reduce costs very much by going from 200:1 to 100:1

Meyers suggest we
see McGraw Hill — see NSF, see Becker, see FBI fingerprint files

avoid Bell Tel.
— avoid Navy in general
LA Title & Trust. — use your own judgement
— Patent Office
~~[illegible]~~ Soc Security

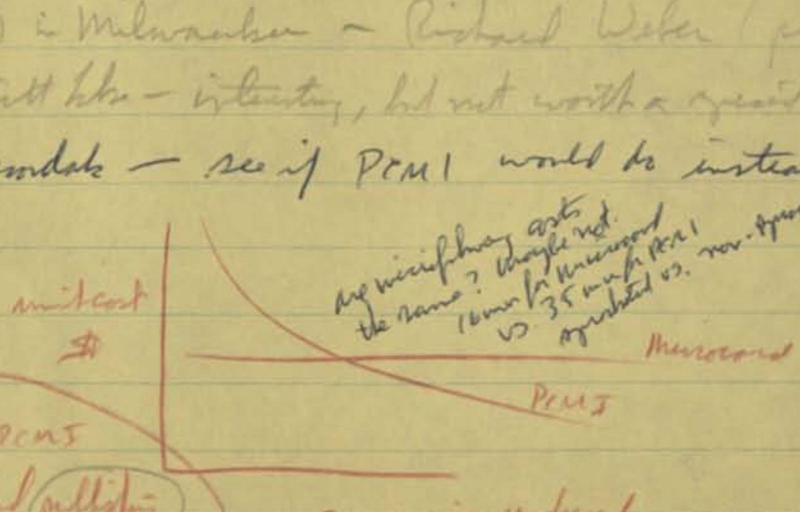
they have been informed

analyses for on-demand printing



avoid Micro-Books (?) in Milwaukee — Richard Weber (people?)
Mormon Church - Salt Lake — interesting, but not worth a special trip.

check who is using Recordak — see if PCMI would do instead.



are microfilming costs the same? Roughly not. 100 mm for Microcard vs. 35 mm for PCMI. vs. sophisticated vs. non-sophisticated

royalty costs the same.

for comparing PCMI and Microcard publishing

Under what conditions should NCR go to automated retrieval of varying degrees? Stick to manual system? Philosophy discussion useful for report.

Notes of visit to NCR Oct 6

John Mattago - Patent attorney

- New type of photo film can be re-written as PCI mtl, during recording, but can then be fixed so that it no longer needs refrigeration, & can not be re-worked. - It can also be used to make contact prints.

VSMF Product News (Vendor Forms Manufacturing Inc)

Mr. Thomas E Fahey, Director of Catalog Sales
Dbo. Vendor Services, Inc.
800 Acoma St.
Denver 4, Colo. CHerry 4-4661

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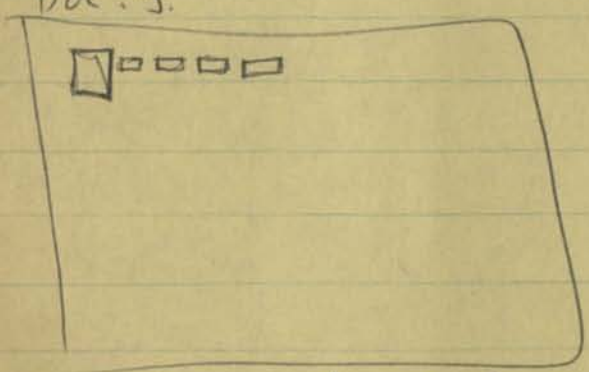
they have grain-free film, because of the continuous anneal in billing procedure?

- Doc. I.



200:1 2 mils wet → ½ mil color dry, 400: need
400:1 problem is ~~the~~ mechanical: focusing, registration,

6-8 weeks before field work.
field test - 35 mm slide
3x5 contact print
copy of flowback

Reprints of NMA papers

- precision marking - see Buckbee Mears
check on 10 degrees centers

Ty: Recorder specs
specs for microfilming
microfilm costs & proposals
AVCO error or re-work rate

others ≥ 1000.
3M 625. cheapest
V[illegible] [illegible]
[illegible] from [illegible]
of [illegible] [illegible].

Lebow
Sam [redacted]

Costs:

Camera - Recorder 50K or 75K

glass discs
microfilming costs
contact print film
spherical lenses, diffusers, light bulb (40 - 70 - 100 each for

prepare original microfilm
load microfilm reel
expose 1 frame
examine 1 frame
finish reel of card
transfer card to 2nd chamber
make contact print
store card in interim refrigerator
move contact print to developing area
process silver film negative
make ~~copy~~ addl film copies

Viewer-Printer 1000 - 1500 or 2000. - 2500.

paper cost
replacement costs (lamp, etc.)

objective = 100.
lamp 20.
[illegible] 20.
light source 70. - 100.

→ Wet printer - 5 cents / sheet. ←
automatic scan for density & focus

user needs clean room & developer - fixer to get his silver copy.

look at feasibility & copy of ~~the~~ auto scanning system (re. work time & error rate info needed)

10% degradation of contact printing - regardless of reduction (even to 1200 lines/mm)

Pete Seitz — after 6[30]

Shelf life estimated to be several years.
un-exposed film can be stored unrefrigerated - just keep it in the dark.

7:15 Bar Blue
Supper Club - Intermission

Catalogs

(1) many kinds of pubs

37,000 titles ~~25,000~~

1/4 mill pages

500 to 5000 copies.

(2) Bur Ships

tech manuals for ships

(1-22 vol. each)

~~6~~ 1,000 pubs.

Vol's vary from 50-500 pgs/vol

~~max of 20~~

20 to 1000 sections presently microfilmed

need distr. of pressures

Bu Weapons – 20+ types of aircraft

Manuals over 1/6 mill dollars investment. on 1 plane

A2S

more than 20,000 pg. of manuals on this plane

1500 – 2000 copies

~~90 day~~ revision cycle.

VCR Games

How many BUSANDA users?
300,000 pgs. yearly?
2000 days? down-
any other large catalogs?

ASTM printing Vol.?
Mfg. reports?
1.4 mill reports/yr.
ASTM printing only?
Clearwater says 2½ reports/yr.

Flight chart.

Central office – Vol. of on-demand printing? No. reports/yr.? 3.8 mill

25,000 pages/day
5 days/week?

250
25000
125000
500
6250000

NCR Notes 1 Aug 62

Ty Abbot - Will Meyers - Hank [Long Range Product Planning] ——, Sam [Systems] —

PCMI photochromic microfilm 20:1 400:1

200:1 40,000:1

materials

reversible color [upon exposure to light], immediate visibility, erasable & re-usable, high resolution [measured 1000 lines/mm], variable persistence recording.

re-usable — for several thousand cycles.

film [print or why?] on film because of error correction capability.

studied economics of error correction? alternate indexing route in this context?

10:1 reduction to (synchronized) 35 mm film. 2500 pages were put on 1 roll.

Lippmann emulsions -10°C. good for several years life.

not thinking of ASTIA, Patent Office, etc. — these are not typical users — they are more interested in the mass markets.

viewer-printer — microscopic lens system · tungsten lamp. (300 w bulb)

silver halide type of paper seems the most attractive — want to get grey scale (not avail. on electrostatic).

3M, etc. tried. Worried about the expense of this unit.

3. 35mm has ≈ 80-90 lines/mm resolution. — System gets could be designed for any set of requirements.

5-mil base + 5 mil coating — the coating will keep the dust out of focus + also make it difficult to contact print finished cards (good for copyright problems).

Kodak + Transfer Modulation char. of films — NCR (Carl Carlson) having some more analysis & design of the optics. —

Proposed Scope of activity /

Supplies market?
How much? what market? How marketed?

What possible market for this equip.? We have done some preliminary market work
(publishing - economic advantages for multiple copies;
have not done very much market or system study
what are trade-offs in parameter (3+5 card - resolution requirements, limitations
because 35mm microfilm is required input - file conversion prob.
hard copy output needed? what kind?
what cost is modularity req'd. Do you need a printer in all
applications?
What are extensions to this market? - eg data processing - should NCR
be in this now (some customers, sales e.g. computer industry of other products generally PCM)
Market strategy? Can existing market force sell this line? what
advertising would there be w/ publications, etc.?

credit bureau, police, title insur.,
Patent Office, ASTIA, catalog printing, hospital files, libraries .... have been considered
to limited extent (archive? use)
Advantages over competitors?

No equip. price estimates made yet: one give ranges:
P.O. prob. — on demand printing - they published a booklet some time ago that
describes the file size & activity — cost of traffic. — looking for a system.
NCR suggested dissemination of all US patents to interested parties - would save wear & tear of
Patent Gazette. 20% of inquiries stem from Gazette notice +
P.O. is now revising their requirements.

P.O. may incorporate the microform as an alternate mode of publication.
possibility of setting up a service bureau for publishing in microform. ?

→ Catalog publishing – BOSANDA – to explore ships catalogs (hundreds of thousands of pages) carried on board ship – w/ microform. Cost & control advantages to microform. – Navy contracts in house now to take simple catalog segments (Allowance Parts List - Provisioning List) 140,000 parts listed – they had been offered of microfiche –
DCR Provides reader & 30,000 images (8½×11) – put on image cards (2½×10) and a viewer
Field trial will study how this can be indexed & used in the field.
to deliver in March 1963. – Navy thinks this may reduce dissemination & printing cost. – also study techniques for updating. 6000 revisions
$2500 additions, – probably have to go back to original plates & selectively update. – this should provide some economic data.

Microcard study – tentative conclusion – better have large no of images on the card – or the Microcard would be just as effective. Desk-size 3000 images – about the same technique is used.

study → Book publishing, etc in Microcard (potentially DCR market) is competitive for DCR. If Microcard isn't successful, yet – why should DCR be?

Police dept. 47 covering 1 mill. population. – RAP sheets
auto mfg. parts catalogs. eg Ford has 10,000 capture dealers & need a catalog w/ changes for each car line. –
Sears catalogs

Market approach – get it into the plans w/ capture markets (eg Navy, Ford) –
to get acceptance, experience, field testing, etc.
May want to steer away from eng. drawings, etc. for now. there have special probs.

Record ≈ 20 frames/min. - auto focusing of optics

10 point type at 200:1 is now present problem area.

start to find most immediate customers - optical market - look at them in detail - possibly simulate to find design choices over competitors. - then find extendible areas that equip. can handle by modular expansion.

Look for "natural" tie in if there is market enough to get going.

Navy jet is a real good prototype for industry. What are potential catalog customers similar to Navy's problem?

Need more prod. of selling their right w/ statement of potential market to customer

Would be satisfied w/ a statement of market potential in immediate applications 5-10 years. What are odds of competitors coming out w/ better equip.

thinking of 1 3-6 mos SRI project. + Something before the end of the year. ~~its depts.~~

→ identify market possibilities, their size, the marketing approach.
relate to NCR long range plans
what is major competition
suggested system changes & sensitivity to market.

get copy of cost estimate - Mariscorde, etc?
description of Diebold report on no. of police files, etc. ...

3-5 bits/mm observation size - current microfilm standard - now work background to set optics specs. Viewer & other optics hinge on resolution required of film the price goes a bit.

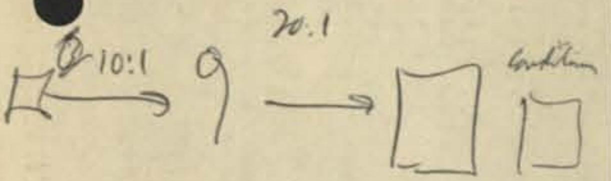
char. reader - 2 out of 5 stroke logic - there was logic - used 7 times on error rate & then stop for manual entry or marking. - now cleared to workset.

Hank "
Identify workset areas
Determine some costs of proof gains to show how much we put in.
Workset potential (for equip, supplies, ...)
Competition in these areas.
Effect of changes in system design & operating parameters. (eg reimes of operation)
logical extension of this product line
overall relation to NCR product line. - ~~Total~~ as these evident
benefits to NCR being in the micro-image area. Is it related to present customers, equip, paper, etc. ...

①

description of modes of operation of camera-recorder. (stepping intervals, etc.)

possibility of incorporating a viewing screen instead of microscope



½ particles filtered out. controlled focused flying.

hold to run automatically.
what sampling of pictures can be made here.?

Can be made to stop at several points along the recording (e.g. frame, each line every n^{th} line, etc.) — Sound of format

tungsten source for viewing in camera id dual lens microscope.

check for voids, contrast, frames etc.
counting auto frames check density worthwhile (will need these checks. have to inspect for agency)

error in taking entrances. — haven't had done enough pictures.

②

AVCO worried about mechanical stability etc. — don't know what this is. (15 sec/frame mostly etc.?)

If fault in one plate — how to step over to next zone. Erase entire frame at a time. — Equip. is too elaborate to do this.

① ONR paper
NMA

so much light energy is required to activate photochromic well that it would not be practical for illuminating & filming original full size pages.

after exposure, plate goes to 2nd chamber for contact printing.

for contact print developing of silver (primary) emulsion — need clean darkroom. — Dirt is a problem.
i.e. need special facilities.

③

Viewer —
need power supply 2 or more bulbs
table top design
air or vacuum supply to hold and down

printer — of photo stability process
refer holds
5½ cents/sheet paper cost
Photo Paper
Polyclair (France) }
Poly Viewer (both developer)
using Guillemint paper.
explain → these viewer would need bottles, etc. —
would need fixing (bottles etc.)
if image is to remain over 6 mos.
∴ 20 sec total time (fairly long)
not too expensive
fix in hypo & wash. —

other alternatives (e.g. 3M paper electrochemical) look promising — I haven't investigated them

NCR system is low contrast ∴ can handle tone qualities.

2 ~~xx~~

John Tyrode

Photochromic use for Photon or other composing systems

mass publication } OB
library applications
archival use — reference only & status change
business records
sales slips, etc.
title insurance
masks & screening

photocomposing & graphic arts) some OB

Misc. comments

Viewer in library should be placed right in the shelves or stacks w/ file items. File microfilm w/ books, or at least don't make it a separate collection or catalog.

H.W. Wilson Co., N.Y. Cumulative Book Index - possible candidate for PCMI
Mr. ~~Elbo~~ Coulburn, Vice Pres, Advertising
Howard Haycraft, Pres.

Microcard - N.Y. Mr. Yerbar (name mentioned by Chester Lewis)

See Law Library J. Vol. 55 #4 p. 55, article on copyright question.

send sample card to Chester Lewis if possible

PCMI or any microform no good for publications that require flipping pages back & forth to find something (e.g. "see") - as in Eng. Index.

Mort Taube (Doc Inc) interested in microform publication - sniffing at N.Y. firms for computer index & microform storage job.

If you assume that user would accept the concept of microform publication for primary journals - would they accept 200:1 ? Probably not - - limited access to viewers most individual users (such as subscribers to Wildlife Disease) could not afford the viewer.

Consider PCMI cards the same as a closed library stacks. You need some catalog or index to get to an item. (i.e. to gain access)

No. of pages/PCMI card is critical to its success. Q. What applications fit a page? Patent office or any serialized file. How many are there? Post Office, AEC, ASTIA, OTS

microfilm viewer-printers not much more expensive than other office equip.
(e.g. typewriters, office copiers)

Unlike a PCMI is a closed-stack opac. If you are used to this type of opac, & if this is suitable, then PCMI may be acceptable. If, however, you are used to the open-stack mode (browsing, looking through mags, etc.) then PCMI may be too drastic a change.

27 Dec 62

Al Cook S.F. Recordak representative

Recordak service bureau – $ varies w/page size 8½ x 11 | $ 24.75 / thous. exposures

Kodamatic indexing system extra say 7.00/hr. for indexing on film. numeric say 7.00

~~[illegible]~~ magazine 1.25 ea. in single lots
~~$ [illegible]~~ 90 for 150 for magazines

loading charge = 1-9 mag. = $ .75 ea.
10-24 .70
25-over $ .65 per mag.

duplicate contact prints 16mm: 2,000' or less 5 cents / ft. 100 ft reel max.
– 4999 4½ "

20:1 red. normal mode. for 8½ x 11 this gives ≈ 2500 images / 100 ft
normally 100 lines/mm

precision filming: instead of 24.75, use 93.00 / thous.
16 or 35mm

120 lines/mm., 100% inspection, film refrigerated for 24 hrs., indexing

\+ \+ \+ \+ \+

Cost Analysis - Recorder Indexer

Viewer Printer = ₹ 2650.

filming - planetary camera 120 d. km for indexer coding = ₹60. per thousand exposures at 100% magnification

6. /100
60 cents/10
6 cents ea.

for 3000 exposures, this = ₹ 180. filming charge
= 1 roll @ 24:1

release prints = 5 cents/ft × 10 ft/roll = ₹ 5.00/roll

charge to load in magazine = ₹ 1.00 / roll.

for 1 roll / 3000 images, cost = 180 + (1)6 = ₹186.

cost/image = $\frac{18600}{3000}$ = 6.2 cents

for 50 rolls, cost = 180 + 50(6) = 480

cost/image = $\frac{48,000}{3,000(50)}$ = $\frac{16}{50}$ = .32 cents

for 100 rolls, cost = $\frac{180 + 100(6)}{3000(100)}$ = $\frac{78000}{3000(100)}$ = .26 cents

asymptote = $\frac{6.00 \text{ cents}}{3000 \text{ images}}$ = $\frac{6}{30}$ = .20 cents

---

for 100 exposures, filming = 6.00
print = 5.00 $(\frac{1}{30})$ = 16.7 cents (roll)
load mag. 1.00 (roll

for 1 roll cost = 6. + 1.17 (1) = $\frac{7.17}{100.}$ = 7.17 cents/image
for 50 rolls cost = 6 + 1.17 (50) = $\frac{6450 \text{ cents}}{5000 \text{ images}}$ = 1.29 cents/image
for 100 rolls cost = 6 + 1.17 = $\frac{12300 \text{ cents}}{10000 \text{ images}}$ = 1.23 cents/image

Recordak representative at ADI Convention

journal single sheets 8½ × 11 — 5000-6000 / ~~8000~~ sheets/hr. through RS rotary — 85-90 lines/mm — 24:1 (any)

roll:
- auto feed — 5.00 / thous. exposures — rotary
- hand " — $9-12 / "
- planetary " — 40. / thous (2 page exp) — for Lodestar coding, Kodamatic & image count — 20 / thous exposures } 120 + lines/mm
- 50-60 / thous. if 100% inspection & other. — precision programming

intermediate print = & release — 1-10,000 ft = 5 cents / ft. on 16 mm; 25,000 — " ; 100,000 — " } proposal — 3000 pages/roll at 24:1

5-7% res. loss each step.

load magazines 94 cent ea. in quantity — 1.00 commercial

loading device ≈ $70. load 100 magazine in ½ day

15 ~~30~~ sec avg search time to any frame in reverse
5 sec avg time for frame in mag.

20 sec to print. — paper ≈ 8 cents/page.

RECORDAK

RECORDAK LODESTAR READER-PRINTER • MODEL PES

$ 2650

rental?

The *Recordak Lodestar Reader-Printer Model PES* combines, in one unit, information retrieval speed with push-button printing and automatic processing of enlarged paper facsimiles of microfilm records. In less than one minute a document image can be located on the reader screen and a high quality 8½" X 11½" paper print automatically exposed, developed, cut-to-size and delivered.

Operation of the *Lodestar Reader-Printer* is simple. Insert the film magazine into the reader. This automatically illuminates the reader screen and starts the film drive motors. A flick of the speed control lever automatically threads the film into the machine and regulates the film advance or rewind at variable speeds up to 600 feet per minute. Average look-up time is approximately 5 seconds and the operator's hands never touch the film.

With the desired image centered on the screen, press the print button and the automatic exposure, print-processing cycle is set in motion. A photo-accurate, cut-to-size paper print emerges from the front of the unit within 30 seconds after the button is pressed. Image search can be resumed or additional prints started within 17 seconds after the first cycle has begun.

The *Recordak Lodestar Reader-Printer* is ideally suited for microfilm applications in which frequent reference to microfilm records and fast, automatic paper facsimile production are required.

FEATURES

MAGNIFICATIONS . . . Reader – 23X; Print – 21X

READER SCREEN . . . Translucent, tinted, daylight type measuring 13" by 13". A scale on the side is a guide for locating indexed film images. Screen is removable from the front.

FILM MAGAZINE . . . Self-threading, reusable, 4" square by 1" deep – Tenite with a capacity of 100 feet of 16mm film. One side of magazine is slotted to retain an index-to-content label or card.

FILM TRANSPORT . . . Can be controlled for varying speeds from slow-scan up to 600 feet per minute, for fast information retrieval and rapid rewind. Film transport lever can be locked for constant film speed.

CONTROLS . . . ON-OFF switch, Focusing lever, Film transport lever for advance or rewind, speed lock, print button, exposure control knob.

SENSITIZED PAPER . . . Supplied in 8½" wide rolls 150 feet in length.

PRINTING CYCLE . . . Prints are automatically exposed, cut, processed and delivered squee-gee dry at the front of the unit above the reader screen hood.

PRINT ACCESS TIME . . . 30 seconds for the first print and 17 seconds for additional prints of the same film image. Search can be resumed 17 seconds after the print button is pressed.

PROCESSING SOLUTION . . . Monobath type – can be used for approximately one week or 150 prints . . . whichever comes first.

ELECTRICAL REQUIREMENTS . . . 117 ± 10% volts, 60 cycles, AC only, 300 watts.

SIZE AND WEIGHT . . . 31" high; 16" wide; 28½" deep. Wt. 143 lbs.

RECORDAK® CORPORATION • 770 BROADWAY, NEW YORK 3, NEW YORK
SUBSIDIARY OF EASTMAN KODAK COMPANY
A-985A 15M 7-62
Printed in U.S.A.

12059 **Document reproduction,** H. R. Verry. *Rev. Doc.*, **28** (4) November 1961, 177–180.

A considerable number of letters which are being sent to the public are of the same general pattern. Such letters can be automatically produced by the Multigraph or a similar type of machine. With automatic typewriters the principle is very different in that a paper roll or a wide paper tape is employed. The speed is up to 130 per minute and a number of machines can be controlled by one girl. A photocopy method which is available for the first time in the United Kingdom is known as *Drycopy*. The copy is made by passing the original, a sheet of carbon and the copy paper through a machine containing infra-red heat and when completed is said to be permanent, smudge, light and heat proof. W.A.G.A.

12060 **Xerox Copyflo at Harvard University Library: a study of the costs and problems,** Allen B. Veaner. *Lib. Resources*, **6** (1) Winter 1962, 13–24. Table, diagrs., bibliog.

Xerox Copyflo has been hailed as an inexpensive means, via microfilm, of gaining access to collections beyond the capacity of other reproduction methods. The writer would challenge the claims that paper copies of out-of-print books can be produced for $.03 per page for ordinary paper. This is based on various assumptions—that more than one copy of the book will be required; that suitable microfilm has already been made, that the page size will not exceed 6in. by 9in. Other assumptions are that there will be no difficulty in microfilming, that the films are of adequate technical quality, that delivery time may have to be sacrificed for economical operation of the Copyflo machine. These assumptions are examined and challenged, based on the use of the machine at Harvard. Harvard's price per page for books up to 8½in. by 11in. is $10 per page, including microfilming. J.A.T.

12061 **Library experience Xerox 914 Copier,** Rolland E. Stevens. *Lib. Resources*, **6** (1) Winter 1962, 25–29. Bibliog.

Xerox 914 is commonly used for copying from loose sheets, bound books and unbound material on to regular, untreated copypaper. The number of copies desired can be dialled automatically on the machine. The article surveys the use of the machine in several libraries. The machine is so simple to use that Harvard Medical Library allows its patrons to make their own copies. Four or five exposures per minute can be obtained. Costs vary from 5½c. to 7½c. per copy. The quality of the copy may sometimes be better than the original, though half-tones cannot be reproduced. While the operation of Xerox 914 is simple, a maintenance operator, trained by Xerox is essential. J.A.T.

12062 **The robot and the librarian,** Eleanor A. Ferguson. *Florida Libs.*, **12** (3) September 1961, 3–5, 21–28. Photo.

A survey of the applications of machinery to librarianship, and a discussion of some of the problems which arise. Three causes of misunderstanding about work in information retrieval are isolated, and brief definitions are given of the terms 'hardware', 'programming', and 'soft' and 'hard copy'. Also included are brief descriptions of the use of machines in various library tasks: (i) scanning of books, periodicals, pamphlets, and microfilms in the production of coded information; (ii) transmission of information by closed-circuit television; (iii) automatic book stacks; and (iv) automatic translators. The basic principles of automatic translation are described. The writer suggests that the use of machines

Heilprin's NMA paper

∴ no import ~~conversion~~ opns; only ~~than~~ file conversion.

1. No salvage value considered
2. exponential rather than linear growth incorporated (but only tested with static file i.e. no growth)
3. considered Digit. Library Opns or on-demand publication. Not concerned w/ file searching.
4. Described Economic model for on-demand library dissemination.
5. Also considered increasing needs for equip. additions w/ system saturation.
6. Divided model into 2: (1) purchased: (2) leased equip.
7. Model considers interest, but only tested with zero interest.
8. Model described by equations. Not so by CD
9. ~~[illegible]~~

means for the establishment of the relationships between functions and criteria. This is frequently useful in such problems as determining the scope of investigation, the extent of detail required, the arrangement of component functions and the treatment of incompatible criteria. In addition to these advantages it frequently provides a simple method of locating fundamental stresses in a system requiring concentrated analysis and acts as a catalyst in describing complex relationships in an understandable way.

WEDNESDAY AFTERNOON, 2:00-5:00 — MICHIGAN ROOM

Session 63: Invited and Contributed Papers on

Information Retrieval

Chairman: JOSEPH BECKER, University of California at Los Angeles

631*. **Economic Model of Duplicating Library.** L. B. HEILPRIN, *Council on Library Resources, Washington, D. C.*

The effort in fabricating a "permanent" record has decreased since prehistoric times. It is approaching a "break point" such that either the original record or a copy is expendable. Corresponding to this change, the *C* (circulating) library has begun to evolve into the *D* (duplicating) library. This paper presents a model for the economic theory of a *D* library. A set of dimensions is introduced adapted to computations for the new situation. For example, the *C* library unit for measurement of the size of a collection has been the "volume". In the *D* system it is the page. This corresponds to rising demand predominantly for duplication of short articles and excerpts ranging from one to several pages in length. The model predicts the cost per page per retrieval, given certain easily estimated parameters. Methods of estimation are illustrated. Optimum operation of a *D* library occurs when the cost per page per retrieval approaches the output cost per page to within a negligible amount. This can occur if any one of three conditions is fulfilled: (1) the activity level is sufficiently high, (2) the size of the collection is sufficiently great, or (3) the expected life of the collection is sufficiently long. The analysis suggests that radically altered economics of libraries are emerging. Not only may the costs and losses of circulation be sharply cut, but segregation of inactive material in separate low-cost archives may be unnecessary. Under optimum conditions the cost of retrieval may be almost independent of the cost of large-scale memories and duplication equipment.

632. **The Storage and Retrieval of Material.** HUGO E. MAYER, JR., *Engineering Research Center, Western Electric Company, Princeton, New Jersey.*

At one or more stages of the manufacturing process it is necessary to place material in a state of storage and subsequently retrieve it. Such storage and retrieval

of material is especially apparent in job-shop manufacturing. In this paper we develop a mathematical model which enables one to appraise the performance of material handling equipment, and the utilization of the available storage space. We assume that: (1) the material is handled in the form of unit loads; (2) each load is randomly assigned to its location in storage; (3) the movements of the material handling equipment are restricted to rectilinear motion.

633. **Let's Design An Information System.** RAY D. GREENWAY *and* MARY V. RUSSELL, *Information Systems Section, Defense Systems Department, General Electric Company, Washington, D. C.*

The complex requirements of today's information storage and retrieval systems present many diverse and challenging problems. Designers of modern information storage and retrieval systems must specify the techniques and equipment configurations which will provide optimum storage and retrieval capability within the boundary conditions of the user's environment. As a result, many attempts have been made to develop devices which will solve the problems of handling large quantities of information through mechanization, and numerous variations of fundamental indexing techniques have been publicized during the past decade. However, it is a fact that no single device or technique will solve the problems of information storage and retrieval for all situations. This paper discusses the complex interrelationships which exist between techniques for indexing and devices for machine search and retrieval of indexed information. A generalized approach to indexing is used to show the equipment requirements as a function of system requirements. The future of mechanized information systems is discussed briefly.

634. **Selective Dissemination: Report on a Pilot Study.** C. B. HENSLEY, T. R. SAVAGE, A. J. SOWARBY, *Advanced Systems Development Division and* A. RESNICK, *Research, IBM, Yorktown Heights, New York.*

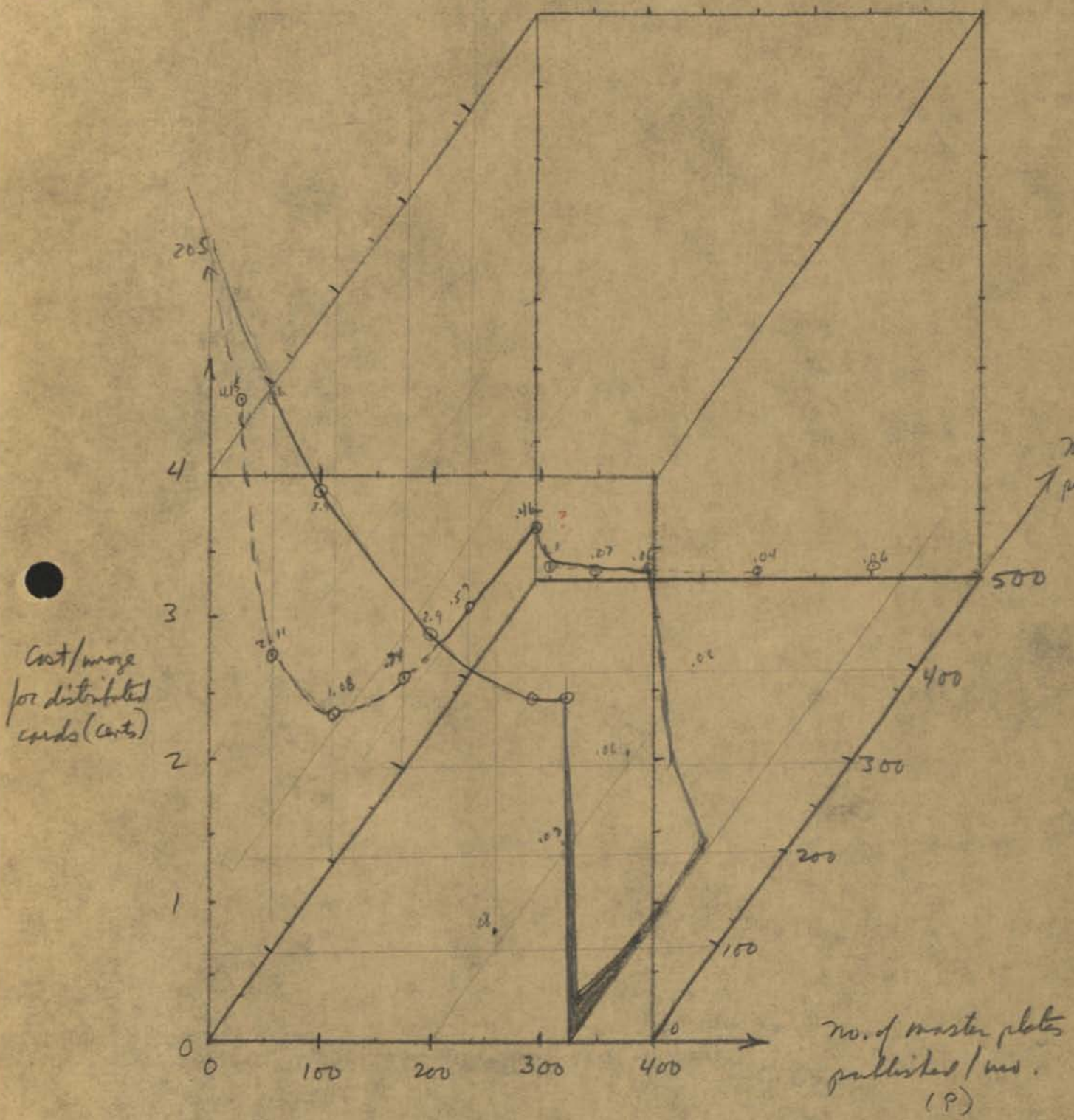
A first pilot test of a system to selectively disseminate pertinent documents to individual persons has been tried using IBM Research personnel and a variety of document sources. A detailed study of the user populations was made by means of diaries, interviews, and a mail survey. The effectiveness of the system is measured by (i) the percentage of unwanted or 'trash' documents sent to the user, and (ii) the percentage of documents the user wants but are not sent by the system. User responses to systematically and randomly selected documents, both integral parts of the system, were used to estimate these parameters. The effectiveness was good, particularly in light of the primitively simple procedures for matching lists of keywords selected from text. Cost figures are given for the pertinent parts of the pilot operation.

635. **Interfile Identification.** ALLEN V. BUTTERWORTH, *General Motors Research Incorporated, Warren, Michigan.*

One problem of data handling is the selection of an acceptable rule generating the identification of an item in a new file from the identification of that item in an

BY _____ DATE _____ SUBJECT _____ SHEET NO. _____ OF _____

CHKD. BY _____ DATE _____ JOB NO. _____



Manufacturer: *Eastman Kodak Co.*
343 State St.
Rochester 4, N.Y.

Distributor: *Recordak Corp.*
415 Madison Ave.
New York 17, N.Y.

Model Name: *Recordak Lodestar Reader Model PS*

Date Introduced:

Film Width: *16 mm.* Film Length: *100 ft.*

Sheet Film ☐ Unitized Cards ☐ Opaques ☐

Maximum Size of Card:

Frame Size Illuminated:

Screen Size: *13-1/2 in. x 13-1/2 in.*

Color: Translucent [x] Opaque ☐

Lens: Relative Aperture:

Magnification Ratio: *23X* Variable ☐ Continuous ☐

Image Rotation—
(degrees): Mechanical ☐ Optical ☐ Scanning ☐

Type of Flats—
Retracting ☐ Stationary ☐ Rotating ☐ Glassless [x]

Lamp Specifications: *32 v, 3-1/2 amps.* Brightness Control ☐

Power Requirements: *117 v, plus or minus 10%, 60 cycles, A.C. only, 300 w.* Heat Filter ☐ Blower or Fan ☐

Speed Forward: *1 to 120 ft./min.* Speed Rewind: *10 sec.*

Power Drive for Rolls [x] Mechanical Stage for Cards ☐

Provisions for Making Enlargements ☐ Indexing [x]

Film Loading—:
Cabinet Top ☐ Side [x] Inside ☐ Under Screen ☐

Floor Model ☐ Table Model [x] Portable ☐

Dimensions: *25 in. high, 16-1/2 in. wide, 29 in. deep.*
Weight: *90 lbs.*

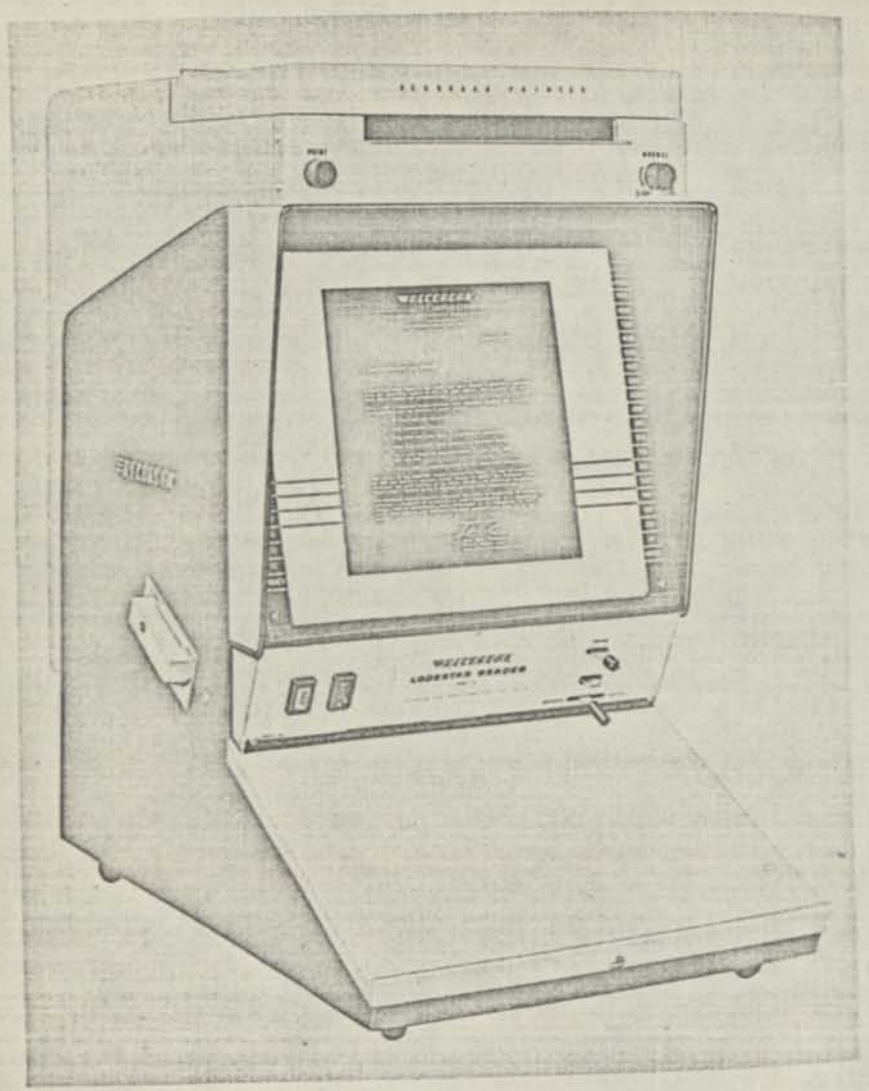
Accessories:

Special Features: *Film is loaded in a magazine. Provision is made for visual coding. Film motion control handle with scanning and winding speeds.*
Lodestar PS-1 Model has image rotation of 270°.

Price (Single Lens): *PS—$995*
PS-1—$1,395

Extra Lenses:

Date: *4 January 1962*



Manufacturer: *Eastman Kodak Company*
343 State Street
Rochester 4, New York

Distributor: *Recordak Corporation*
415 Madison Avenue
New York 17, New York

Model Name: *Recordak Lodestar Reader-Printer, Model PES*
Date Introduced: *January 1962*

Film Width: *16 mm.* Film Length: *100 ft.*
Sheet Film ☐ Unitized Cards ☐ Opaques ☐
Maximum Size of Card:
Frame Size Illuminated:

Screen Size: *13-1/2 in. x 13-1/2 in.*
Color: Translucent [x] Opaque ☐

Lens: *27.5 8 mm. f/3.5, lumenized* Relative Aperture:

Magnification Ratio: *Reader 23X* Variable ☐ Continuous ☐
Image Rotation— *Printer 21X*
(degrees): *None* Mechanical ☐ Optical ☐ Scanning ☐
Type of Flats—
Retracting ☐ Stationary ☐ Rotating ☐ Glassless [x] *None*

Lamp Specifications: *32 v, 3-1/2 amps.* Brightness Control ☐

Power Requirements: *117 v, A.C. 60 cycles* Heat Filter [x] Blower or Fan [x]
Speed Forward: *600 ft./min.* Speed Rewind: *12 seconds per 100 ft.*
Power Drive for Rolls [x] Mechanical Stage for Cards ☐
Provisions for Making Enlargements [x] Indexing [x]
Film Loading—:
Cabinet Top ☐ Side [x] Inside ☐ Under Screen ☐

Floor Model ☐ Table Model [x] Portable ☐

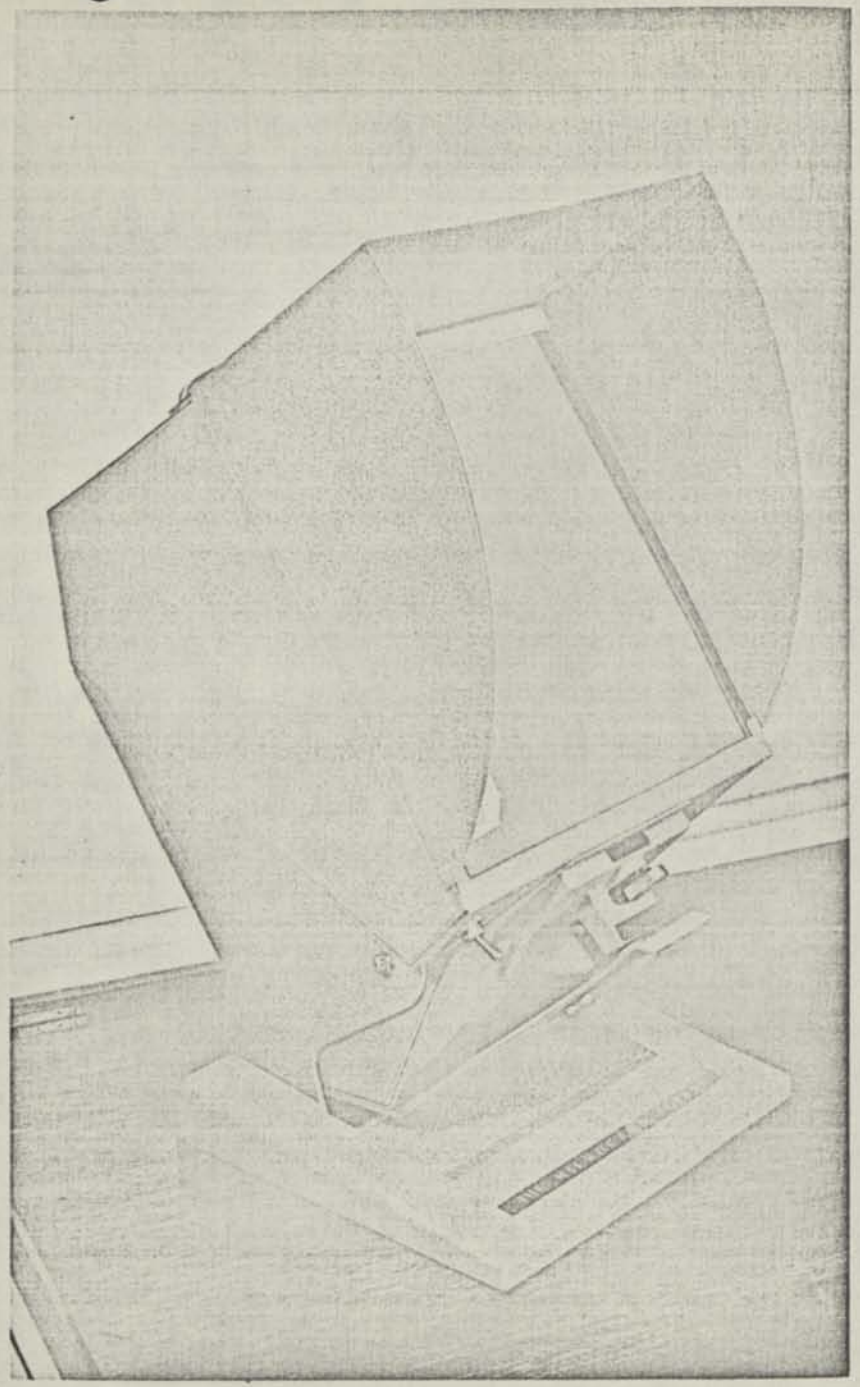
Dimensions: *31 in. high, 16 in. wide, 28-1/2 in. deep*
Weight: *143 lbs.*

Accessories:

Special Features: *Film is loaded in a magazine. Provision is made for visual coding. Film motion control handle with scanning and winding speeds. Print out hard copy is produced in less than 1 minute with a high quality 8-1/2 in. x 11 in. print automatically exposed, developed, cut-to-size and delivered.*

Price (Single Lens): *$2650.*
Extra Lenses:

Date: *15 January 1962*



Manufacturer: *The Microcard Reader Corporation*
West Salem, Wisconsin

Distributor:

Model Name: *Microcard Reader Model 5B*
Date Introduced: *March 1954*

Film Width: Film Length:
Sheet Film ☐ Unitized Cards ☐ Opaques ☒
Maximum Size of Card: *5 in. x any length*
Frame Size Illuminated: *10 mm. x 10 mm.*

Screen Size: *Approx. 10 in. x 10 in.*
Color: Translucent ☒ Opaque ☐

Lens: *Flat-field Ektar* Relative Aperture: *f/3.8*

Magnification Ratio: *23X* Variable ☐ Continuous ☐
Image Rotation—
(degrees): Mechanical ☐ Optical ☐ Scanning ☐
Type of Flats—
Retracting ☐ Stationary ☒ Rotating ☐ Glassless ☐

Lamp Specifications: *150 w* Brightness Control ☐

Power Requirements: *110 v, A.C./D.C.* Heat Filter ☒ Blower or Fan ☐
Speed Forward: Speed Rewind:
Power Drive for Rolls ☐ Mechanical Stage for Cards ☐
Provisions for Making Enlargements ☐ Indexing ☐
Film Loading—:
Cabinet Top ☐ Side ☐ Inside ☐ Under Screen ☒

Floor Model ☐ Table Model ☒ Portable ☒

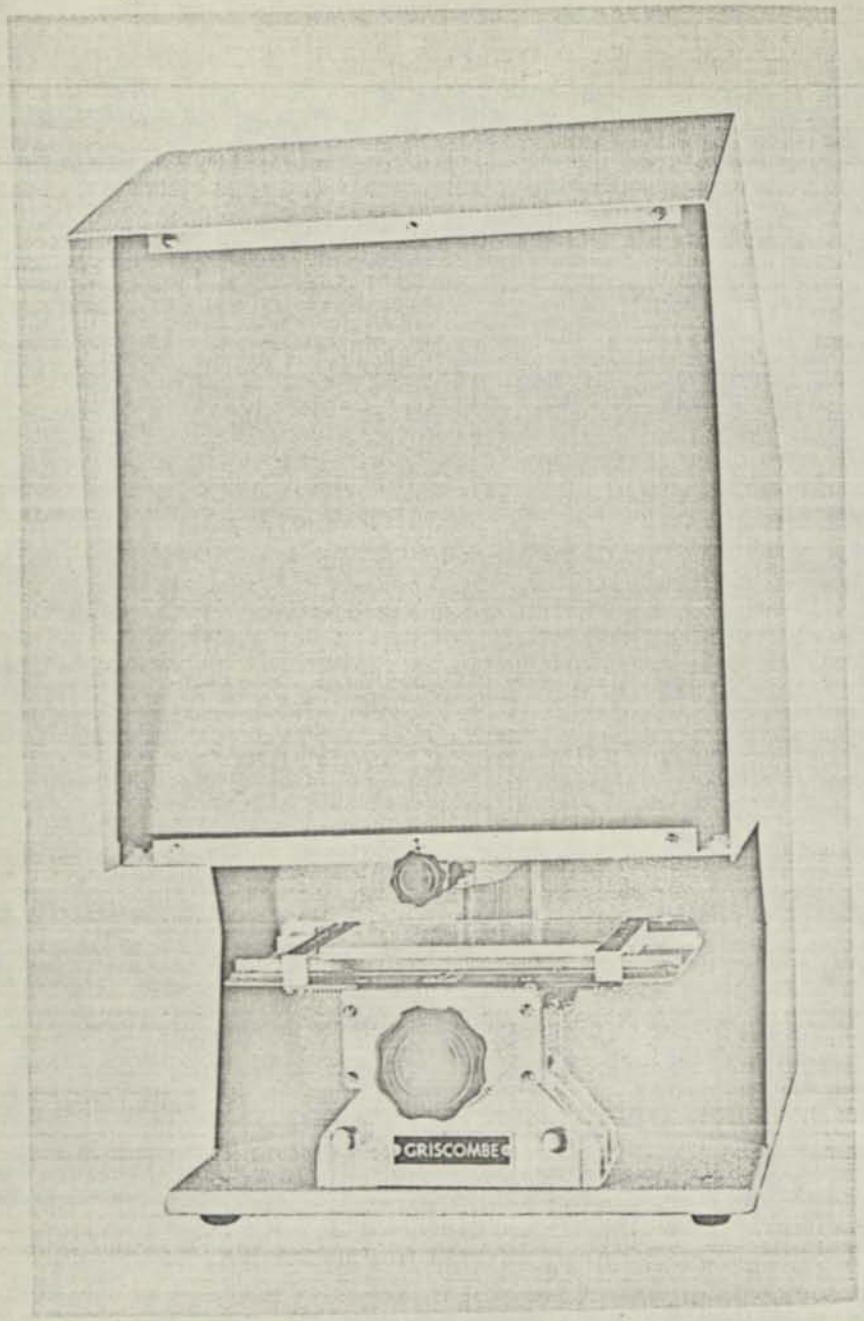
Dimensions: *17-1/2 in. high, 10-1/4 in. wide, 15 in. deep.*
Weight: *20 lbs.*

Accessories:

Special Features:

Price (Single Lens): *$237.50*
Extra Lenses:

Date: *23 January 1962*



Manufacturer: *Griscombe Products Corp.*
133 West 21st St.
New York 11, N. Y.

Distributor: *Griscombe Products Corp.*

Model Name: *Filmcard Reader, Model KL*
Date Introduced: *February 1962*

Film Width: *16, 35 mm.* Film Length:
Sheet Film [x] Unitized Cards [x] Opaques [ ]
Maximum Size of Card: *4 in. x 6 in.*
Frame Size Illuminated: *1/2 in. x 1/2 in.*

Screen Size: *12 in. x 12 in.*
Color: *Green* Translucent [x] Opaque [ ]

Lens: *Tessar Type* Relative Aperture: *f:3.5*

Magnification Ratio: *24X* Variable [ ] Continuous [ ]
Image Rotation—(degrees): Mechanical [x] Optical [ ] Scanning [x]
Type of Flats—Retracting [x] Stationary [ ] Rotating [ ] Glassless [ ]

Lamp Specifications: *1503—6v* Brightness Control [ ]

Power Requirements: *115v, 1/2 amp.* Heat Filter [x] Blower or Fan [ ]
Speed Forward: Speed Rewind:
Power Drive for Rolls [ ] Mechanical Stage for Cards [x]
Provisions for Making Enlargements [ ] Indexing [ ]
Film Loading—:
Cabinet Top [ ] Side [ ] Inside [ ] Under Screen [x]

Floor Model [ ] Table Model [x] Portable [ ]

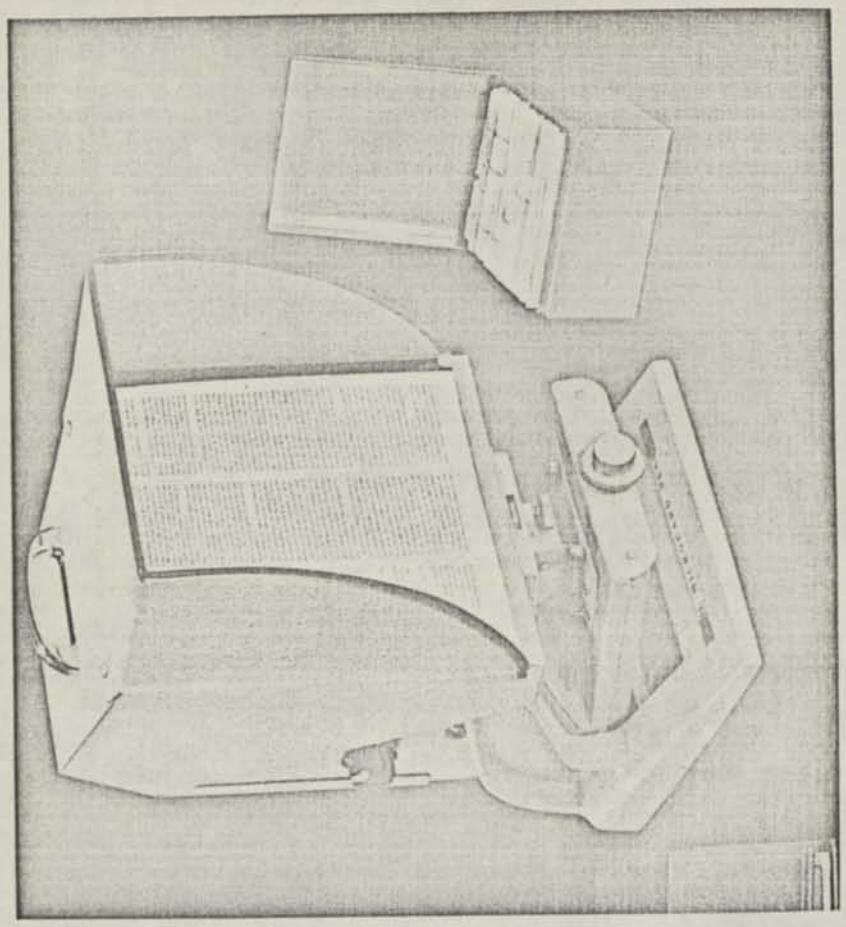
Dimensions: *12-1/2 in. wide x 23 in. high x 22-1/2 in deep.*
Weight: *35 lbs.*

Accessories:

Special Features: *Constant focus scanning; scratch proof film carrier; high level brightness; exceptional legibility*

Price (Single Lens): *$350*
Extra Lenses:

Date: *25 January 1962*



Manufacturer: *Microcard Corp.*
West Salem
Wisconsin

Distributor: *Microcard Dealers*

Model Name: *Mark VII Microcard Reader*

Date Introduced:

Film Width: Film Length:

Sheet Film ☐ Unitized Cards ☐ Opaques ☒

Maximum Size of Card: *5 x 8*

Frame Size Illuminated: *10 x 10 mm.*

Screen Size: *9-3/4 x 10-1/2 in.*

Color: *White* Translucent ☒ Opaque ☐

Lens: *Ektar* Relative Aperture: *f/3.8*

Magnification Ratio: *23X* Variable ☐ Continuous ☐

Image Rotation—(degrees): Mechanical ☐ Optical ☐ Scanning ☐

Type of Flats—Retracting ☒ Stationary ☐ Rotating ☐ Glassless ☐

Lamp Specifications: *300 wall CWD* Brightness Control ☒

Power Requirements: Heat Filter ☒ Blower or Fan ☒

Speed Forward: Speed Rewind:

Power Drive for Rolls ☐ Mechanical Stage for Cards ☒

Provisions for Making Enlargements ☐ Indexing ☐

Film Loading—:

Cabinet Top ☐ Side ☐ Inside ☐ Under Screen ☒

Floor Model ☐ Table Model ☒ Portable ☐

Dimensions: *10-1/4 in. wide, 15 in. deep, 17-1/2 in. high*

Weight: *24 lbs.*

Accessories:

Special Features: *Tilting screen, double heat glass, precision card mover, easy change lamp, comfort control.*

Price (Single Lens): *$450 f.o.b.*

Extra Lenses:

Date: *18 August 1961*

Appendix 5-3

General Assumptions for PCMI Cost Analysis

1. None of the units of equipment operate more than 20 hours per day, 22 days per month.

2. The machine operator can work interchangeably on either the camera-recorder or the contact printer. It will be assumed that he does not have to work on two jobs simultaneously, and the only point to be considered here is the total number of man-hours labor required to run all of the equipment.

3. The full cost of the equipment will be charged to the cost of preparing the cards, regardless of the degree to which the equipment is used.

4. Labor cost will be charged only for the actual time that the operator is required to be with the machine.

5. The equipment is to be amortized over a period of ~~5 years~~ 40 months at 0% rate of return.

6. Direct Labor Cost = $3.00 per hour for PCMI camera and contact printer operators, and $2.00 per hour for clerical help if required

7. Overhead Cost = ~~100%~~ 200% of the direct labor cost.

8. The assumed equipment, maintenance, and material costs, as well as the equipment operating times are noted on the system drawings.

9. The equipment will not be run unattended. Each minute of machine time (for each machine) will require a corresponding minute of labor time.

10. There are no extra labor costs (premiums) for working second and third shifts.

11. The PCMI equipment operator can perform the necessary ~~repairs and maintenance~~ minor maintenance and replacements.

PCMI PUBLICATION COSTS

Labor Costs

1. PCMI Camera-Recorder Operator

setup and handling = 20 min/master plate = 1200 sec/plate
recording and inspection after each line =
(2 sec/image)(N images/plate) = 2 N sec/plate
where N = No. of images per master plate.
rework = (17 sec/reworked image)(0.1 N reworked images/plate) = 1.7 N sec/plate

Total = 1200 + 3.7 N sec/plate

2a. Contact Printer Operator (for master negative)
total time to prepare silver neg. master = 20 min/plate = 1200 sec/plate

2b. Contact Printer Operator (for distribution positives)
setup time = 2 min/plate = 120 sec/plate
effective print time at 200 copies/hr. =

$$\frac{1 \text{ hr.}}{200 \text{ copies}} \times \frac{3600 \text{ sec}}{\text{hr.}} \times \frac{C \text{ copies}}{\text{print run}} \times \frac{1 \text{ print run}}{\text{plate}} = \frac{18C \text{ sec/plate}}{}$$

TOTAL ≃ 1320 + 18C sec/plate

3. Misc. labor for handling and packaging = negligible

Note: Direct labor cost = ~~$3.00~~ $9.00/hr.
With O.H. = ~~100~~ 200% D.L., loaded labor cost = ~~$6.00~~ $18.00/hr.

PCMI PUBLICATION COSTS

Other Fixed Costs

1. Refrigerated file box = $1,000
   for ~~5 years~~ 48 months amortization at 0% rate of return, this = ~~$16.67~~ 25.00 per month

2. Service and maintenance costs of PCMI
   Camera-Recorder = $2,000/yr = 166.67 per month

3. Service and maintenance costs of Contact Printer=$200/yr. = 16.67 per month

TOTAL = ~~200.01~~ 208.34 per month

PCMI PUBLICATION COSTS

Material Costs

1.	blank PCMI master	$2.00 per plate
2.	silver Lippman film for master negative	.50 per plate
3.	silver Lippman film for distribution positive	.50C per plate

where C = No. of distribution copies per print run

Total (dollars per master plate) = 2.50 + 0.5 C

Prices to make 35mm negative films of bound library materials
from 97 Library Photoduplication Services in U.S., Canada & Mexico
(Directory of Library Photoduplication Services in the United States, Canada, & Mexico, C. Bridges (Univ. of Chicago Library, Chicago, Ill., 1962).

5	6	3.8	5
4	7½	4	5
4	4	4	5
7	4	4	5
7	4	4	5
4½	5	5	5
5	3	5	4
5	4	5	3
5	5	5½	4
2 to 4	2	4 to 6	4
2 to 4	5 to 10	5½	5
4	4	3	3
4	6 to 8	5	5
7	4	5	
3½ to 8	5½	4	
5	5	4 to 8	
5	2½	5	(very little?)
5	6	4½	
4	3	5	
3	2	5	
3½	5	5	
4	3 to 5	4	
4½	2	3	
3	4	5	
2½	3	3	
5	3½	2 to 3	
5	5	5	
3 to 4	5	2	

N = no. pages / catalog

U = no. users = no. copies to be made = press run

Appendix 5-7

Paper System

printing cost:

- cost of film negatives = ($1 per page)(N pages/catalog) = $1.0N$ $/yr.
- cost of film plates = ($1.25 per page)(N pages/catalog) = $1.25N$
- cost of paper = ($0.002 per page)(N pages/catalog)(U catalogs/year) = $0.002NU$

postage cost = ($0.8 per lb.)(0.0046 lb./page)(N pages/catalog)(U catalogs/yr.) = $0.00368NU$

Total cost = $2.25N + 0.00568NU$

$$\boxed{C = N(2.25 + 0.00568U) \text{ dollars/yr.}}$$

check: $U = 2000$ users

$N = 12{,}000$ pages/catalog/yr. (= 3000 for each quarterly)

$C = 12{,}000\left[2.25 + 5.68 \cdot 10^{-3}(2 \cdot 10^{3})\right] = 12 \cdot 10^{3}\left[2.25 + 11.36\right] = 12 \cdot 10^{3}(13.61) = \$163{,}320$/yr.

Microwave Systems

printing cost = ($0.03/page)(N pages/catalog)(U catalogs/yr.) = 0.03 N U $/yr.

Viewer amount (min) = $ 106,660 per year.

Viewer amount (max) = $ 320,000 /yr.

postage cost = (0.1 oz/card)(1 card/100 pages)($0.05/oz.)(N pages/catalog)(U catalogs/yr.) = $5 \cdot 10^{-5}$ N U

Total cost (min.) = $106,660 + (3.05 \cdot 10^{-3})$ N U dollars/yr.

Total cost (max) = $320,000 + (3.05 \cdot 10^{-3})$ N U

Check. U = 2000 users

N = 12,000 pages/yr.

~~$C_{min} = 106,660 + (3.05 \cdot 10^{-3})(12 \cdot 10^{3})(2 \cdot 10^{3}) = 931,200$~~ 106,660 + 73,200 = 179,860 (OK)

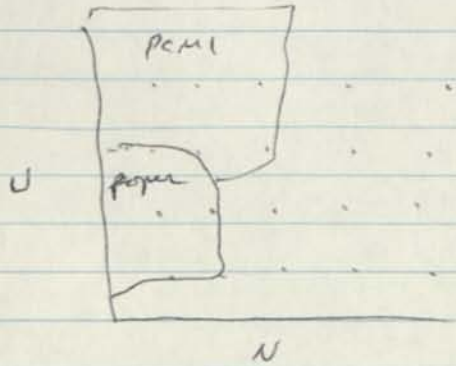
Viewer cost (min.) = 1/3 (U viewers @ $130) = $43.33 U

Viewer cost (max) = 1/3 (U viewers @ $450) = $150 U

Viewing weird. = $10 U

Total Cost (min.) = 53.33 U + $(3.05 \cdot 10^{-3})$ N U

Total Cost (max) = 160 U + $(3.05 \cdot 10^{-3})$ N U



Records System

Filming = ($0.02475/catalog page)(N pages/yr.) = 0.02475 N dollars/yr.
Kolaritic inking = ($2.33·10^-3/page)(N pages/yr.) = 0.00233 N "
contact printing = ($1.166·10^-3/page)(N pages/yr)(U users) = 1.166·10^-3 N U
mopping & loading = ($ 0.533·10^-3/page)(N pages/yr)(U users) = 0.533·10^-3 N U

postage cost = (1.333·10^-3 oz/pg)($0.05/oz.)(N pages/yr.)(U users) = 66.6·10^-6 N U

Viewer cost (max.) = 1/3 (U viewers @ $995) = 331.66 U
Viewer cost (min.) = 1/3 (U viewers @ $485) = 161.66 U

viewer maint (max.) = 1/3 ($145/U viewers @ $145) = 48.33 U
viewer maint (min.) = 1/3 (U viewers @ $70) = 23.33 U

Total cost (min.) = 185 U + N[27.08·10^-3 + (1.765·10^-3) U] dollars/yr.

Total cost (max) = 380 U + N[27.08·10^-3 + (1.765·10^-3) U] "

check N = 12,000 C = 370,000 + ~~412,684~~ 42,684 = 412,684 (OK)
U = 2000

PCMI System

recording equip & maint. = $35,000 / yr.

Viewer cost(maint) = 1/3 (U viewers @ $2500) = $833 U
Viewer maint. (maint) = U viewers @ $250 = $250 U
} 1083 U dollars/yr.

Viewer cost(min.) = 1/3 (U viewers @ $1800) = 600 U
Viewer maint.(min) = U viewers @ $180 = 180 U
} 780 U "

postage cost = ($16.66 · 10^-6 / page)(N pg/yr)(U users) = 16.66 · 10^-6 NU "

original filming cost = ($0.10/page)(N pages/yr.) = 0.10 N

PCMI Camera labor = (1.138 · 10^-3 hrs/pg)($9.00/hr)(N pg/yr.) = 10.245 · 10^-3 N

PCMI printer labor = setup time = 1320 sec/card; print time = 18 sec/card

each setup = (1320 sec / 3600 sec/hr.)($9.00/hr) = $3.3/printer

each print = (18 sec / 3600 sec/hr)($9/hr) = $0.045/card

printer labor = ($3.3/card)(N pages / 3000 pages/card) + ($0.045/card)(N pages/3000)(U users)

= N[1.1 · 10^-3 + 15 · 10^-6 U]

Material cost: ($2.50/card)(N pages / 3000 pages/card) + ($0.50/card)(N pages/3000 pages/card)(U users)

= N[0.833 · 10^-3 + 0.166 · 10^-3 U]

Total cost(max) = 35,000 + 1083 U + 0.1122 N + 0.1983 · 10^-3 NU

Total cost(min.) = 35,500 + 780 U + 0.1122 N + 0.1983 · 10^-3 NU

OK

21 Jan 63

John Person. Recordak –

Philco –

UAL – 4 magazines limited test
illustr parts catalog 1 aircraft
58-60 readers in the system
175 – 190 readers eventually
30 or 40 magazines

most 1/2 & 1/2 reader vs reader-printer

$995 base Lodestar
w/ PES 2650 w/printer → 2650

Starlet PTA $485

avail for – chart type. Sears
designed for trucks
magaz. 21:1 instead of 23:1
smaller screen. 11 1/2 instead of 13"
slower motorized drive – 100' in 18 sec
→ 12 sec for Lodestar

2200 Lodestars for Sears
1000 Starlets

rept to agent Soc. Sec. several hundred viewers

Denver (Info Handling Service) – 700-800 readers – special jobs.
formerly Thompson Eng.

≈ 5000 viewers in field. – prep. of film
San Fran 350 Mission St.

Philco – tech manual.

→ County Recorders use these devices.

John Crosby – SX1 Recordak ..

80
20

3:00 Eckdall –

Orders 2300 - 2500/mail at 24:1

Del Ballard phoned this info on 8 Dec 62

Mazagines 150/carton 142.50 = 95 cartons. .65/1.60

loading = 65 cents each

2000 rolls to be printed @ 3½ cents/ft.

could run original plates @ no charge

$995. simple reader - $1345 copy reader $2650 automatic pf

1 yr. maint. contract - free for 1st yr. 2nd yr maintenance $72.50 yr. for manual system.

$100/yr. for data

many catalogs now monthly, but may go quarterly.

Mazagines = 4 oz each. ∴ mail 8000 oz./issue or 32,000 oz./yr.

First class mail

~~3~~ now 5 cents/oz ∴ $\frac{32{,}000}{20}$ dollars/yr. = 1600.

$\frac{1}{20} \times 2000^{100}$

Recordak Todestar Publication Costs

Basic filming cost for 8½ x 11 inch pages = $24.75 per thousand exposures (normally at 100 lines/mm and at a 20:1 reduction which results in about 2500 images per 100 ft. roll)

If Kodamatic indexing is to be put on the film, this is to be done at the rate of $7.00 per hour for the labor time involved. For simple serial number coding, assume a cost of $2.00 per roll.

Duplicate 16mm rolls are provided at a total cost of 5.0 cents per foot of film for orders of 2000 ft. or less, 4.5 cents per foot for orders of 2000 to 5000 ft., and special quotes above 5000 ft.

Film magazines cost $1.25 each in single lots, 90 cents each for lots of more than 150.

Cost to load the magazines is 75 cents each for lots of 9 magazines or less, 70 cents each for lots of 10 to 24 magazines, and 65 cents per magazine for lots of more than 25 magazines.

Precision microfilming for 8½ by 11 inch pages (120 lines/mm on 16mm or 35mm film, 100% inspection, film reprojected before filming, film indexing, etc.) costs $93.00 per thousand exposures instead of $24.75.

I. 2500 images per roll

Cost to prepare master roll (with Kodamatic indexing) = (2500 images)(24.75 dollars / 1000 images) + 7.00 dollars/roll

$= \$68.88$

1.

Cost to prepare a single roll for distribution:

contact printing = (5 cents/ft)(100 ft) $= \$5.00$

magazine = 1.25

magazine loading = .25

7.00

Total cost to publish and distribute one copy = 68.88 + 7.00 $= \$75.88$

Cost per magazine $= \$75.88$

Cost per distributed image = 7588/2500 = 3.03 cents

2. Cost to prepare 10 rolls for distribution:

original filming cost = $\$68.88$

contact printing = (5 cents/ft)(1000 ft) = 50.00

magazines = (10 rolls)(0.90 per roll) = 9.00

magazine loading = (10 rolls)(0.70 per roll) = 7.00

134.88

Cost per magazine $= \$13.49$

Cost per distributed image = 1349/2500 = 0.54 cents

3. Cost to prepare 20 rolls for distribution

original filming $ 68.88
contact printing = (4.5 cents/ft)(2000 ft) = 90.00
magazines = (20 rolls)(0.90 per roll) = 18.00
magazine loading = (20 rolls)(0.70 per roll) = 14.00
190.88

Cost per magazine = $9.54
Cost per distributed mag = 954/2500 = 0.381 cents

4. (insert from back of this page)

~~5~~ 4. Cost to prepare 100 rolls for distribution

original filming $ 68.88
Contact printing = (4.5 cents/ft)(10,000 ft) = 450.00
magazines = (100 rolls)(0.90 per roll) = 90.00
magazine loading = (100 rolls)(0.70 per roll) = 70.00
678.88

Cost per magazine = $6.78
Cost per distributed mag = 678/2500 = 0.271 cents

~~6~~ 5. Cost to prepare 200 rolls for distribution

orig. filming $ 68.88
Contact printing (4.50/roll)(200 rolls) = 900.00
magazines ~~$~~ 200 @ 0.90 = 180.00
magazine loading: 200 @ 0.70 = 140.00
1288.88

Cost per magazine = 6.44
Cost per distributed mag = 644/2500 = 0.258 cents

4. Cost to prepare 50 rolls for distribution

orig. planning =	₱ 68.88
content printing = 50 @ 4.50 :	225.—
magazine = 50 @ 0.90 :	45.—
magazine loading = 50 @ 0.70 =	35.—
	373.88

Cost per magazine = ₱ 7.48

Cost per distributed wing = 748/2500 = 0.299 cents

6. Cost to prepare 500 rolls for distribution

orig. filming	$ 68.88
contact printing: ~~4.50 @ 500~~ 500 @ 4.50	= 2250.00
magazine = 500 @ 0.90	= 450.00
magazine loading = 500 @ 0.70	= 350.00
	3118.88

Cost per magazine = $ 6.23

Cost per distributed image = 623/2500 = 0.249 cents

8.

7. For precision microfilming, the original filming cost goes from $ 24.75 to $ 93.00 per thousand exposures. Consequently, the cost to prepare the master roll goes from $ 68.88 to $ 232.50. the ~~monthly charges~~ new unit costs ~~are~~ resulting from this change are:

No. rolls distributed	Total Cost	Cost/distributed roll	Cost/distributed image
1	$ 239.50	$ 239.50	9.60 cents
10	298.50	29.85	1.19
20	354.50	17.72	0.71
50	537.50	10.75	0.43
100	842.50	8.43	0.34
200	1452.50	7.26	0.29
500	3282.50	6.56	0.26

Cost per distributed image (cents) for package with 2500 images

No. Rolls Distributed	Recordak Industar (basic filming)	Recordak Industar (Premium filming)	DCMI
1	3.03	9.60	
10	0.54	1.19	1.23 - 1.39
20	0.38	0.71	0.63 - 0.70
50	0.30	0.43	0.26 - .30
100	0.27	0.34	0.14 - 0.16
200	0.26	0.29	0.08 - 0.09
500	0.25	0.26	0.05

TIC

RECORDAK

Automated Information Retrieval

A "RAIR" system using the new LODESTAR Reader-Printer with KODAMATIC INDEXING lines and TERMATREX®

RECORDAK® Automated Information Retrieval

This Recordak Automated Information Retrieval (RAIR) system utilizes the Lodestar Reader-Printer with Kodamatic Indexing on 16mm film in magazines for the storage and retrieval of document images.

The index to the subject content of the documents is maintained in a Termatrex File.

In this system the documents are assigned accession numbers and filmed as soon as they are received. Subsequent indexing operations result in document accession numbers being recorded in selected term cards in the Termatrex File.

Information retrieval in this RAIR system is achieved by:

1. Selecting specified term cards from the Termatrex File;
2. Stacking the selected term cards in a Termatrex Reader;
3. Listing the accession numbers (from the selected term cards) of all documents that contain the specified terms;
4. Using the list of document accession numbers to select and place the proper film magazine(s) in the Lodestar Reader-Printer and using Kodamatic Indexing to locate the desired images on the reader screen;
5. Viewing the images and, if desired, making high quality paper prints.

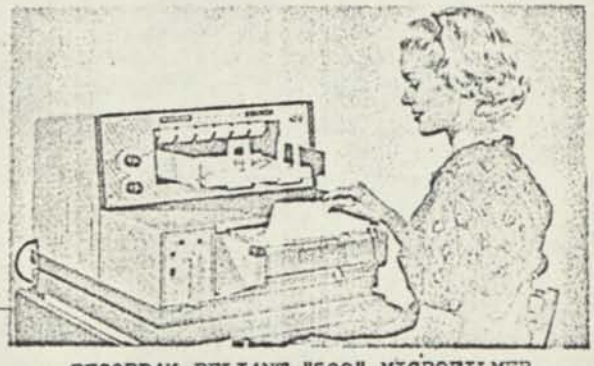
This is one of a number of RAIR systems. These systems are modular in concept and vary in application and equipment.

film it first

Incoming documents are photographed as soon as they are received; this overcomes a number of problems which plague many storage and retrieval operations --incoming documents often are not returned to the file room when circulation has been completed, documents are not available on a demand basis until returned to files or until they subsequently are photographed, indexing operations often are carried on prior to filming thus delaying the photographic operation, etc.

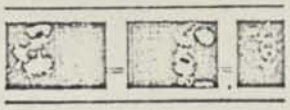
A document accession number is assigned to each document prior to the microfilming operation.

The documents are recorded on Recordak 16mm unperforated microfilm. Documents up to 11" x 34" can be recorded at a reduction ratio of 24:1, 32:1 or 40:1. From 2500 to 3000 letter-size pages can be recorded on one 100-foot roll of film.

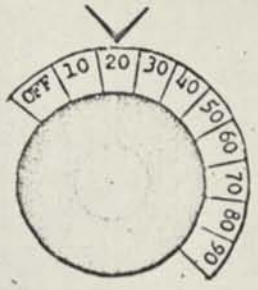


RECORDAK RELIANT "500" MICROFILMER

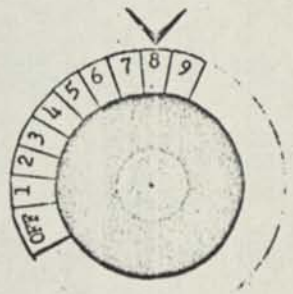
Simultaneously with the microfilming operation, Kodamatic Indexing lines are recorded lengthwise on the film between page images. The position of these lines provides an indexing means for rapidly locating document images on a reader while the film is in motion.



The Recordak Reliant "500" Microfilmer provides built-in Kodamatic Indexing that permits the operator to record up to 100 separate index code line combinations on the film. By dialing a desired code number the Kodamatic Indexing is recorded automatically and continuously on the film in the form of a pair of short lines between the microfilm images.

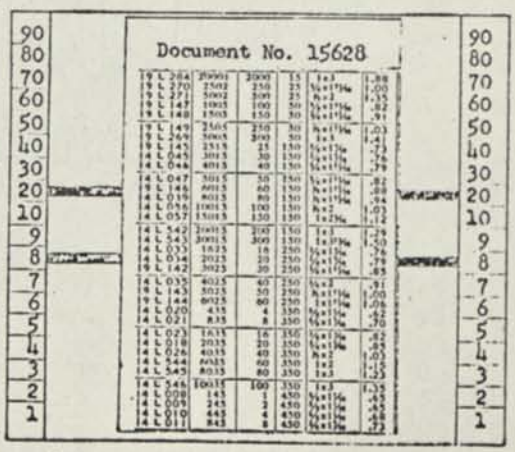


A scale alongside the screen of the Lodestar Reader-Printer is numbered to agree with the positions of the Kodamatic Index lines so that a pair of code lines can be read as the code number which was dialed during the microfilming of the documents. When the film is projected and moved rapidly through the Lodestar Reader-Printer, these lines appear continuous on the screen and coincide with the scale on the reader screen.



There are numerous ways in which the Kodamatic Index lines can be used to index document accession numbers. The use of the Kodamatic Index lines in this RAIR system is based on the assumptions that:

1. Documents are filmed in consecutive sequence by document accession number.
2. Documents vary from one to about twenty pages each and average five to six pages.
3. From 2000 to 3000 letter or legal-size pages will be recorded in one magazine of film.
4. A separate pair of Kodamatic Index lines will be used for each document accession number. The Kodamatic lines will represent the units and tens position of the document accession number.
5. The numbers on the scale of the reader screen, reading from bottom to top, are: 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 20, 30, 40, 50, 60, 70, 80 and 90.

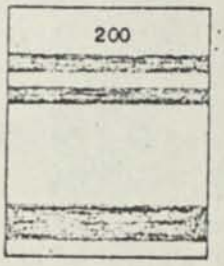


As the documents are recorded on film, the operator sets the two dials to the units and tens positions

of the accession number of the document being recorded. Document accession number 15628, for example, would be dialed as "20" on the upper dial and "8" on the lower dial. The next following accession number would be dialed as "20" and "9."

Since as many as 600 documents may be recorded in one magazine of film under the above assumptions (3000 pages per magazine divided by an average of five pages per document) the 100 Kodamatic classifications for tens and units position of document accession numbers may be repeated six times in one magazine--once for every 100 documents recorded. When the film is projected and moved rapidly through the Lodestar Reader-Printer, the code lines will move from the bottom to the top of the screen once for each 100 documents on the film.

In this particular RAIR system it is suggested that special pages be recorded several times between each 100 series of accession numbers. These special pages will contain horizontal lines to indicate the 100 series of accession numbers that follow. For example: the page that precedes the 200 series may contain one wide line across the bottom of the page to indicate a 100 series divider and two parallel lines across the middle of the page to indicate the 200 series. The number "200" may be written in large numbers at the top of the page. If one of the special divider sheets is recorded twenty consecutive times, the horizontal lines on the sheets will appear on the reader screen for approximately 1/15 of a second (time enough for recognition) when the film is being moved at high speed (10 feet per second) in the Lodestar Reader-Printer.



load film magazines

After exposure, the microfilm is processed and loaded in Recordak Lodestar film magazines. A label identifying the magazine and its film contents (first and last document accession numbers in the magazine, for example) is placed on each magazine.

Often it is desirable to make duplicate film copies for distribution to branch offices or

other agencies. When this is the case an intermediate positive is made by contact printing the camera negative. The intermediate positive is used to print the desired number of high quality, duplicate negatives to be loaded in Lodestar magazines for distribution.

index documents

After the document has been assigned a document accession number and microfilmed, the subject content of the document is indexed according to the user's desires. A set of descriptive words or numbers may be associated with each document; this set may vary from a single term, name or number to a complex group of terms and relationships that may include any one or more of the following:

Document Accession Number
Name of Author
Names of Other Persons mentioned in the document
Name of Company or Organization
Drawing or Photo Number
Part Number
Type of Material (Aluminum, brass, etc.)
Branch Office Code
Date of Report
Date of Information
Originator's Document Number
Security Classification
Release Restrictions
Subject (Keyword, Descriptor, Term, etc.)
Subject Modifiers
Geographic Area (Country, City, etc.)
Latitude and Longitude

Indexing terms, codes or descriptors are recorded on a form that is often referred to as a code sheet or transmittal sheet or transcript sheet. Each application will have its own rules for indexing analysis and the filling-in of the code sheet.

Many users will develop their own codes and classification systems for use in their storage and retrieval operations. Some applications may be self-indexing and require no special classification system. The "Guide to the SLA Loan Collection of Classification Schemes and Subject Heading Lists," published by the Special Libraries Association, New York City, provides guides to cataloging and indexing materials in special subject areas. At present, the SLA Loan Collection contains about 800 classification schemes and subject heading lists. (The program of the Special Libraries Association includes an annual convention for the discussion of common problems by experts in various fields of activity; consultant services on the organization and administration of special libraries; publication of professional and bibliographical tools; support of a translation center that collects and supplies unpublished translations; and maintenance of a Loan Collection of Classification Schemes and Subject Heading Lists.)

Indexing may be accomplished concurrent to, before or after any action taken relative to the document, including dissemination or circulation.

prepare term cards

The completed code sheets are sent to the Termatrex file where the indexing information is recorded in term cards.

In a Termatrex system there is a term card for every term (descriptor, subject code, key word, etc.) used in the indexing system. The accession numbers of the documents are "punched out" on these term cards. For this purpose, each term card has a numbered position for every document accession number. Each document has the same numbered position on every term card. (Termatrex equipment and services are offered by Jonker Business Machines, Inc., Gaithersburg, Maryland.)

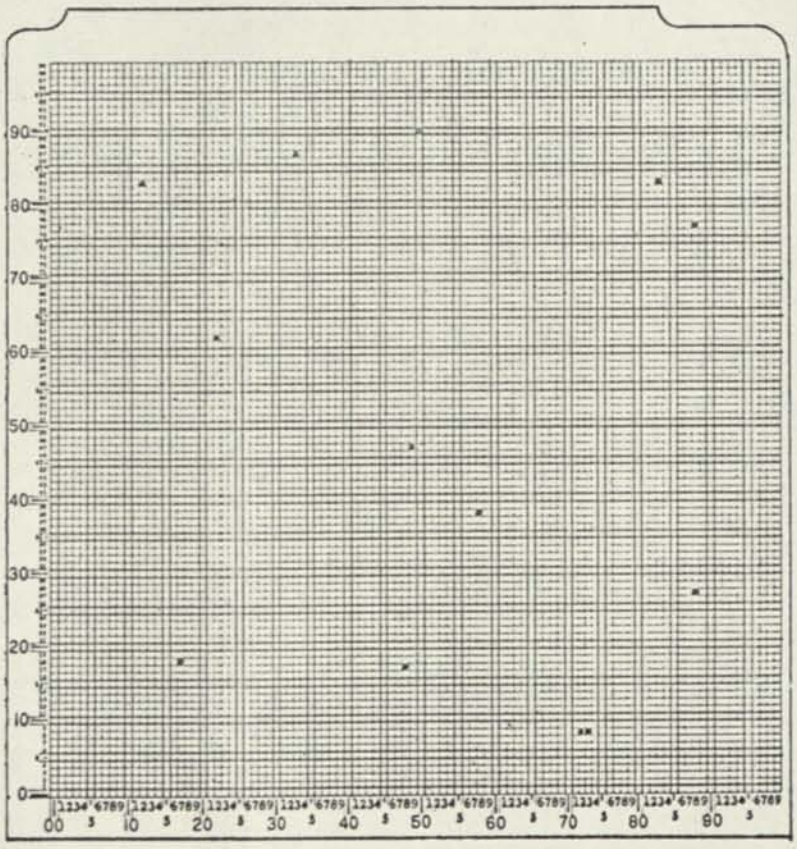
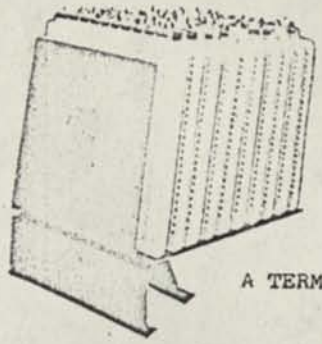


Illustration of a term card with 13 holes which represent 13 document accession numbers.

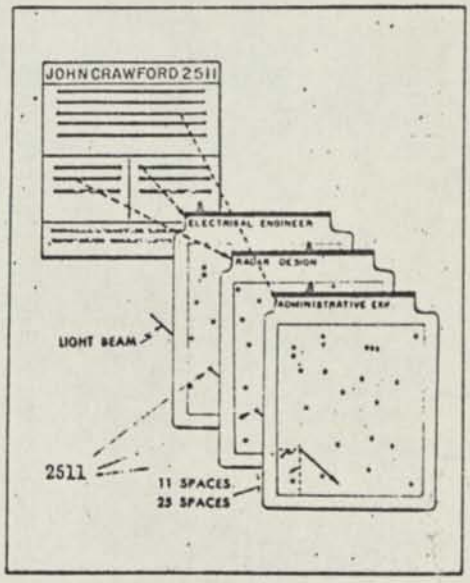
Termatrex illustrations in this brochure were supplied through the courtesy of Jonkers Business Machines, Inc.

In general, RAIR systems with the Termatrex Index may have anywhere from 500 to 5000 term cards. These cards are kept in open files. To enter a document into the system, all of the term cards describing the subject content of the document (as specified by the code sheet) are pulled from the file, stacked in a Termatrex drill machine, and a hole is drilled in all cards simultaneously at the numbered position representing the accession number of the document. The term cards then are returned to the file.



A TERMATREX FILE

Assume that the results of personnel classification procedures in a Personnel Department are recorded in a Termatrex Index. John Crawford, an electrical engineer with radar design and administrative background, might be assigned employee number 2511 (document accession number as used herein).



To store John Crawford's characteristics in the Termatrex Index, the term cards for "Electrical Engineer," "Radar Design" and "Administrative Experience" are pulled from the Termatrex file and placed in a Termatrex drill machine where a hole is drilled in position 2511 in all three term cards simultaneously.

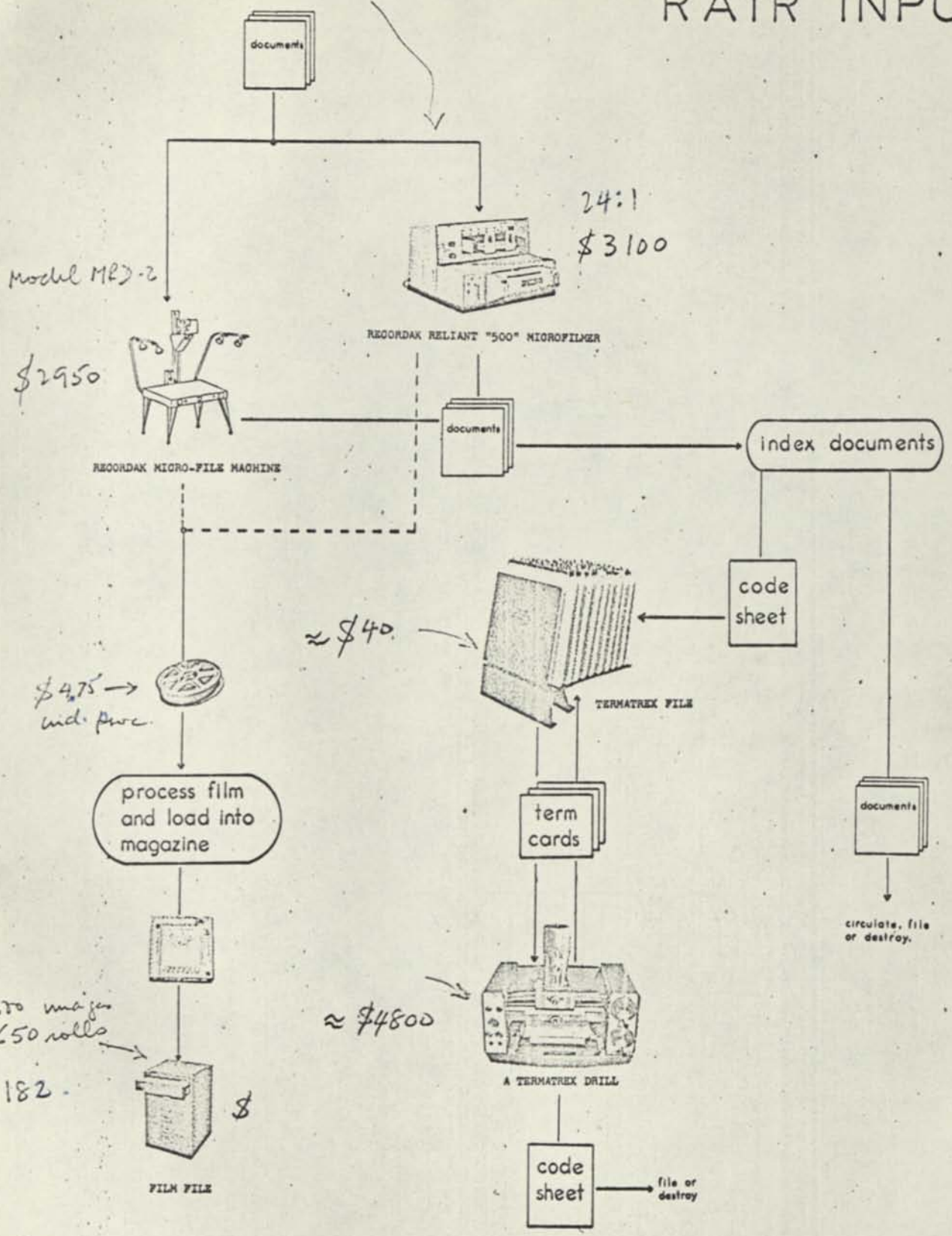
retrieval

A person seeking information about a particular subject (only one term from the Termatrex file) selects the corresponding term card, places it in a Termatrex reader and lists the serial numbers of the holes in the term card. These serial numbers are the accession numbers of the documents that may contain the desired information.

If a person is seeking information about two or more related subjects, he first describes his requirements in terms used in the Termatrex system. Then he selects the corresponding term cards and stacks them in a Termatrex reader. Light, from a source in the base of the reader, will show through holes that are in the same position in all the term cards; thus each coinciding

RAIR INPUT

8½ x 11

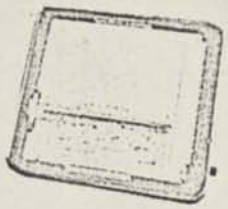


hole will appear as a light-dot. (Holes in one term term card that do not match holes in the other term cards will not show light-dots.) A grid or coordinate system allows the serial number of each light-dot to be read. These serial numbers represent the accession numbers of documents that may contain the desired information as described by the search terms.

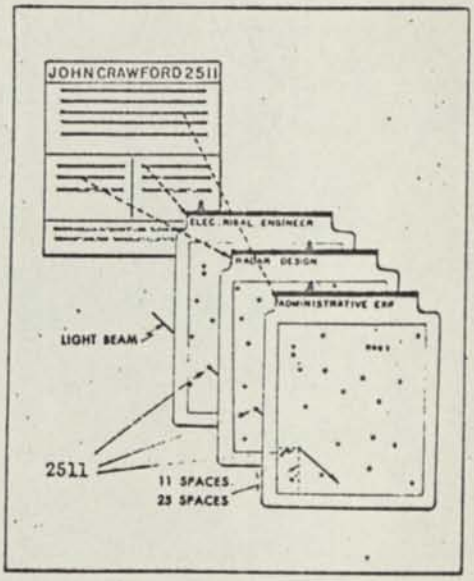
Returning to the example of the Personnel Department, suppose that the personnel manager is seeking from his files the records of an electrical engineer with radar design and administrative experience. By superimposing the term cards "Electrical Engineer," "Radar Design" and "Administrative Experience" in a Termatrex reader, only those holes which correspond to the individuals meeting all these specifications will show as light-dots. (Note that holes for "Electrical Engineers" without "Administrative Experience" will not show as light-dots.) The serial numbers of the light-dots are listed. John Crawford's number, 2511, will be one of the serial numbers listed.

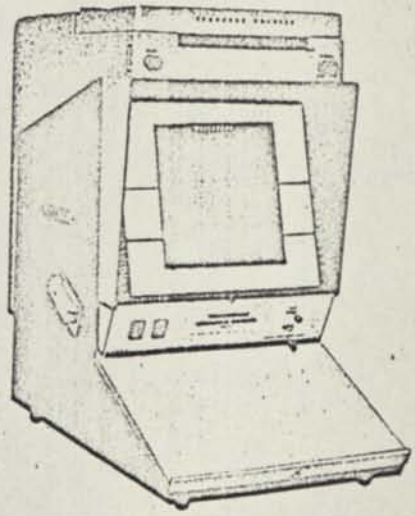
A member of the Personnel Department, using the list of serial numbers, selects and places the prescribed film magazine in the Lodestar Reader-Printer. He advances the film until the Kodamatic Index lines on the film match numbers on the edge of the screen that indicate the number of a desired document. The number assigned to John Crawford, 2511, will be one of the numbers located.

Average look-up time is less than ten seconds per document. With the desired image centered on the reader screen, the requester may press the print button to obtain a high quality paper print.



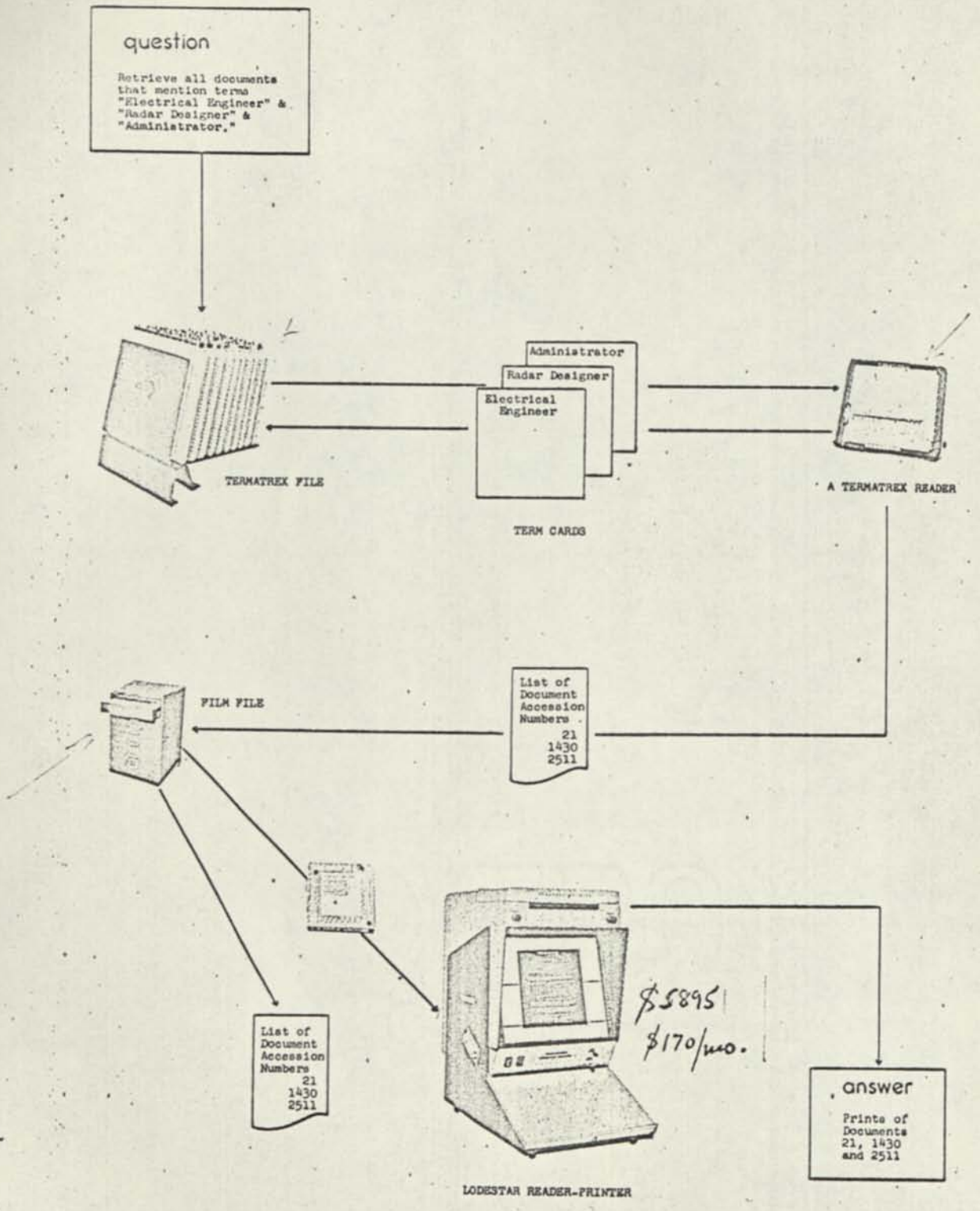
A TERMATREX READER





LODESTAR READER-PRINTER

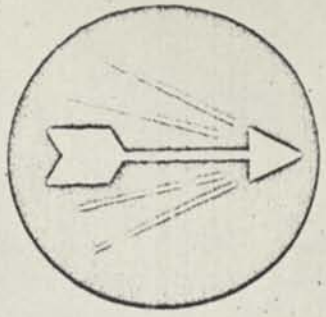
RAIR OUTPUT



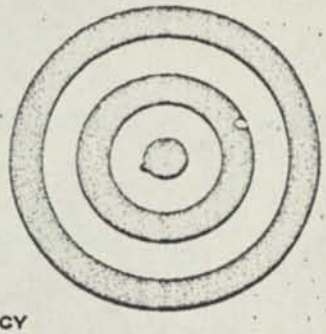
Total Equip
$13,977
+ supplies.

advantages

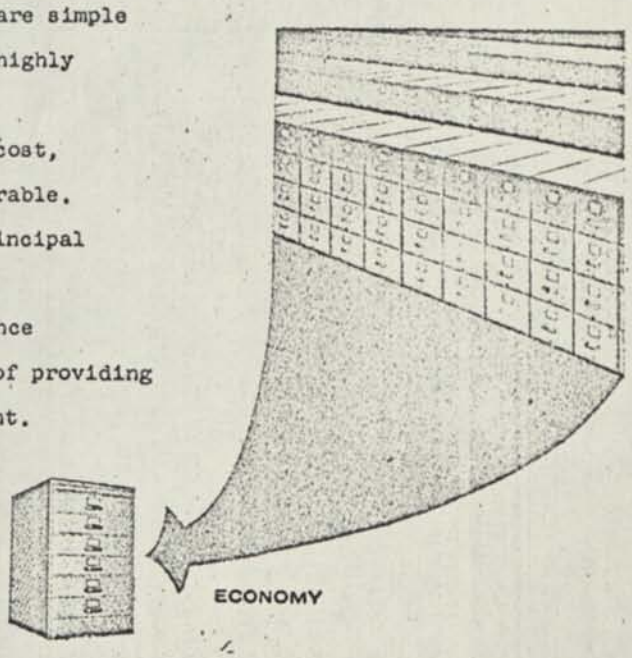
1. Lodestar magazines and the Lodestar Reader-Printer with Kodamatic Indexing provide quick access to documents.
2. Space savings are accomplished at a ratio of approximately 170 to 1 when reducing paper in this system to 16mm microfilm.
3. The availability of every document is guaranteed. Documents cannot be misfiled nor can they become "dog-eared" or soiled when reduced to microfilm.
4. Microfilm is readily reproducible either as microfilm or as paper prints.
5. Many identical libraries can be established in remote locations by virtue of the rapid reproducibility of both the Termatrex index and the Lodestar microfilm of the documents.
6. Numerous variations of the Lodestar equipment, the Termatrex equipment and the index configuration are possible.
7. All equipment is economically priced, "off-the-shelf," dependable and widely used. All machines are simple to operate and, therefore, do not require highly skilled operators.
8. Supplies required in RAIR systems are low cost, standard stock items, and are easily procurable.
9. The Recordak Corporation has offices in principal cities in the United States.
10. The Recordak nationwide equipment maintenance organization is well known for its record of providing excellent service for all Recordak equipment.



SPEED



ACCURACY



ECONOMY

saves Time...Space...Dollars

RECORDAK —*Microfilming at its finest!*

The history of Recordak is the history of modern microfilming. Recordak originated modern microfilming; and over the years has paced the progress of the industry... helping it to effect vast economies in time and effort through simplified business systems. Today, Recordak microfilm systems are regarded as fundamental to modern business.

Your business, too, can profit through adoption of a simple Recordak microfilming system. Why not ask for a survey of your operation today? It's entirely free, and there is no obligation. A staff of highly trained Recordak Systems Representatives stand ready to show you how easily you can improve your existing operations, reduce routine and lower your costs.

RECORDAK —*Service at its best!*

With a nation-wide chain of 38 film processing stations and branch offices to serve you, Recordak assures you the swiftest of service. Trained technicians operate professional processing equipment; films are processed skillfully, and mailed back promptly. And Recordak's staff of experienced service technicians are always available to check your equipment... to consult... and to see that you always get the best results with Recordak.

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MISSOURI
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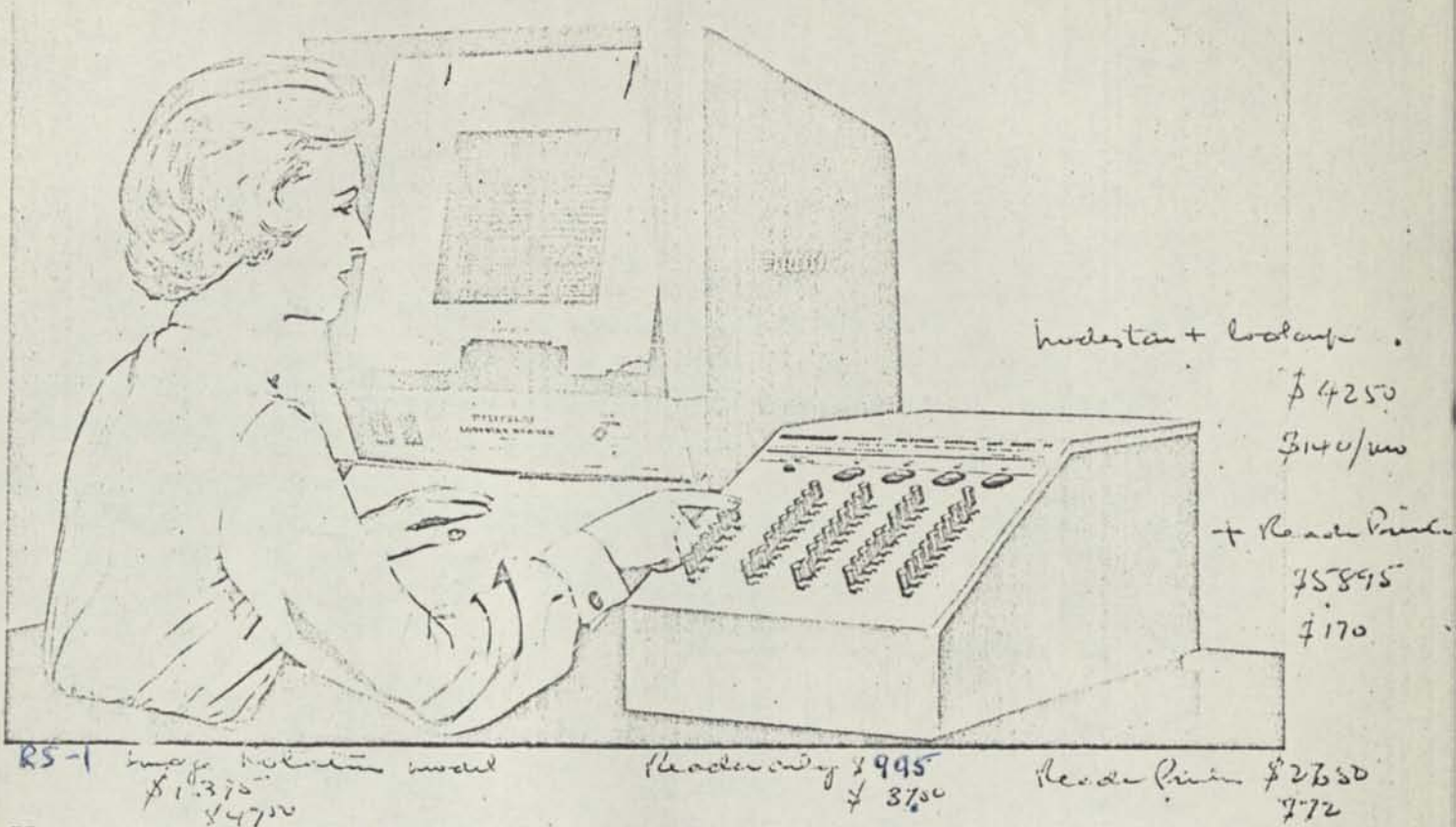
RECORDAK OF CANADA LTD. 105 Carlton Street, Toronto 2, Ontario

London Ottawa Vancouver
Montreal Toronto Winnipeg

FSR 2-300-762

Printed in U. S. A.

RECORDAK IMAGE CONTROL KEYBOARD



The *Recordak Image Control Keyboard* is an electronic accessory which is combined with the automatic Recordak Lodestar Reader to reduce roll microfilm file search to the simplicity of a push-button operation.

From the millions of records accessible within arm's reach of the operator at a central work station, primary selection of a desired file-on-film can be accomplished with split-second speed. The microfilm file is contained within visually indexed plastic magazines, each with a capacity of 100 feet of film. The operator merely inserts the magazine into the slot of the self-threading Lodestar Reader, keys the index code number into the Image Control Unit, and the desired image is automatically searched and displayed upon the reader screen. Search speed is at the rate of 600 feet of film per minute, so that image location and display per image search average 5 seconds from input of the code index number to the keyboard.

Provision is made in the Image Control Keyboard for low-speed film travel at 12 feet per minute, so that successive images may be scanned by the operator when desired. Controls are provided so that film travel can be "push-button" selected for high or low speed, in film advance or film rewind directions.

The Recordak Image Control Keyboard is readily adaptable to systems employing random filing methods. Provisions for add-ons to the individual film roll can be accommodated up to the maximum 100-foot capacity of the individual magazine. The Recordak Image Control System is ideally suited to applications in which fast information retrieval of individual records from huge information files, compacted to finger-tip accessibility on microfilm, is required. Centralized and frequently referenced customer files of insurance, communications, retail credit, transportation, banking and other organizations are especially well-adapted to the advantages of the microfilm file center and to the time-saving economy of fast information output made possible by the Recordak Image Control Concept.

As an added advantage, the Recordak Image Control Keyboard can be combined with the Recordak Lodestar Reader-Printer to provide not only faster speed of information retrieval, but also comparable speed in producing enlarged facsimile prints from microfilm images as desired, and again with push-button automation.

See other side for detail features

FEATURES

FILM MOVEMENT

Search: High Speed — 600 feet per minute
Search: Low Speed — 12 feet per minute
Single Frame Advance and Back-Space Controls
Rewind Speed — 600 feet per minute

MAIN UNIT CONTROLS

Keyboard Selector — four column 40 key console (units, tens, hundreds, and thousands) with 10 push-button positions in each column.

Film Selector — two-position slide switch to select for positive or negative film.

Selector — six-button key column.

"A" Advance Button. Film is advanced out of magazine from beginning of roll at high speed, with automatic stop cycle to pre-selected frame.

"+1" Single Frame Advance Button.

"−1" Single Frame Return Button.

"+" Slow Speed Advance Button.

"−" Slow Speed Rewind Button.

"R" Rewind Button. Film rewinds completely into magazines at high speed.

POWER REQUIREMENTS . . . 115 Volts. 0.6 amperes, 60 cycles AC only. Installation by Recordak Service Representative is required.

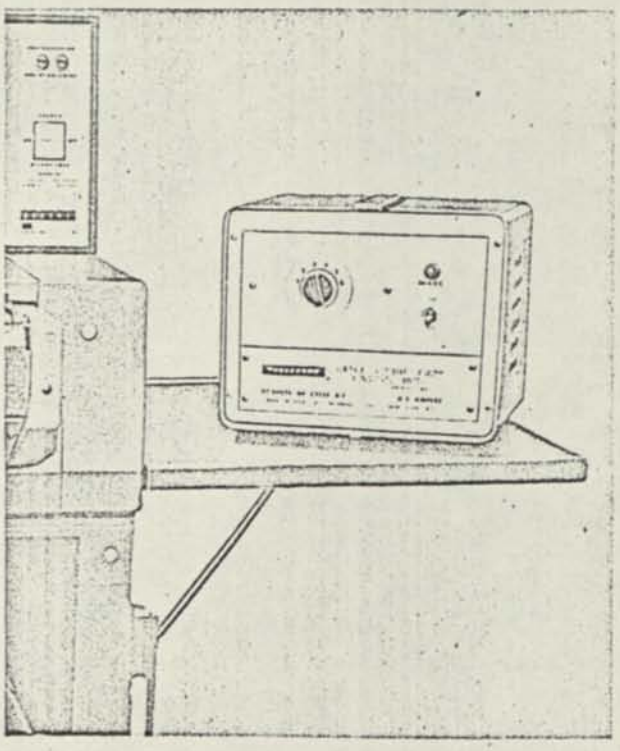
PHYSICAL CHARACTERISTICS . . . Height 9½ inches, depth 24⅛ inches, width 12 inches, color light gray. Weight uncrated 28½ pounds.

REDUCTION: Letter-sized documents photographed at approximately 21:1 to 23:1. Unit will function with documents of varying sizes and reductions with special programming.

Recordak Image Designator Mark Kit

The facility for automatic exposure of image code formats, simultaneously as documents are microfilmed at high speed, is provided by the Recordak Image Designator Mark Kit. This accessory unit is especially designed for use with the high-speed automatic Recordak Reliant Microfilmers, Models RM-1 and RS. Microfilm for use with the Recordak Image Control System can thus be produced simply and as a by-product of normal microfilming operations, without loss of the top speed and efficiency of which Recordak Reliant Microfilmers are capable.

The Recordak Image Designator Mark Kit is engineered for field installation with Recordak Reliant Microfilmers, Model RM-1 or RS, with no major disruption of daily microfilming schedules already in effect with these Recordak models.



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A987 5M 4-62
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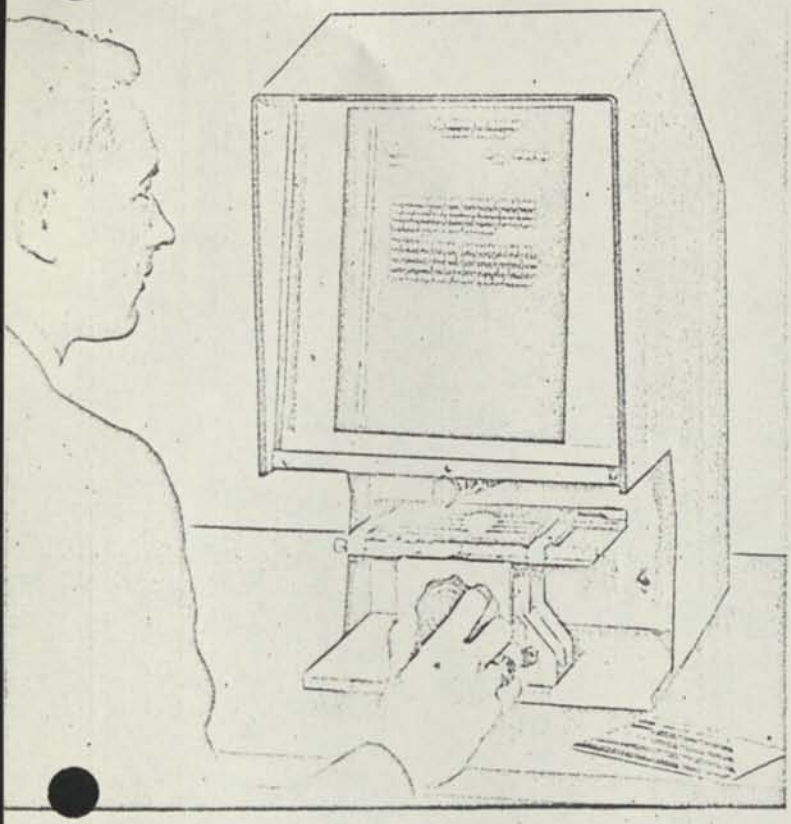
RECORDAK UNITIZED FILM READERS • MODEL PKL-46 & MODEL PKL-58



THE NEW Recordak Unitized Film Readers, designed especially for reference to microfilm images retained in transparent file jackets, are available in two sizes. The Model PKL-46 will accommodate 16 or 35 mm. film jackets measuring up to 4" x 6". The Model PKL-58 accepts microfilm file jackets in larger sizes up to 5" x 8". The readers are designed also for reference to microfilm images mounted on aperture cards or reproduced on sheet film cut to file card size in dimensions up to 4" x 6" or 5" x 8".

The optical systems in Recordak Unitized Film Readers provide for uniform illumination over the entire 12" x 12" screen surface at the fixed magnification of 24:1. When required, vertical or horizontal scanning of any segment of the film image is facilitated by a single control knob within easy reach of the operator. Alignment guides assure proper centering of the projected image on the ground glass screen, which is green-tinted for operator comfort during extended viewing periods.

Constant focus of the projected image is maintained by glass flats which enclose the microfilm jacket and serve to hold the film in a fixed plane for optimum clarity and sharpness of the projected image. A heat-absorbing filter is incorporated in the condenser system to prevent distortion of the image due to film buckling or curling.

Recordak Unitized Film Readers are of rugged metal construction which helps to assure constant alignment of all optical and mechanical elements and continuing satisfactory performance. Design features include a screen hood for shielding the projected image against extraneous light, fast, easy replacement of the prefocused projection lamp, and all controls within finger-tip reach for maximum operator convenience.

FEATURES

SCREEN . . . 12" x 12" — tinted green for viewing without eye strain.

MAGNIFICATION . . . 24 to 1.

SCANNING . . . A single knob controls image movement on the screen . . . push-pull for row selection and twist right or left for horizontal image selection and adjustment.

OPTICAL SYSTEM . . . Lumenized *f*/4.7 lens. Uniform overall illumination on the screen is provided by a GE1503, 50 candlepower, 6 volt, candelabra prefocused lamp. Film damage is prevented by a heat-absorbing filter in the condenser system. Image remains in constant focus during film movement.

FILM JACKET SIZE . . . Model PKL-46 accepts jackets up to 4" x 6". Model PKL-58 accepts larger jackets up to 5" x 8".

DIMENSIONS . . . 23" high, 12½" wide, 22½" deep. Weight—39 pounds.

ELECTRICAL REQUIREMENTS . . . 100-120 volts, 50-60 cycle, 100 watts.

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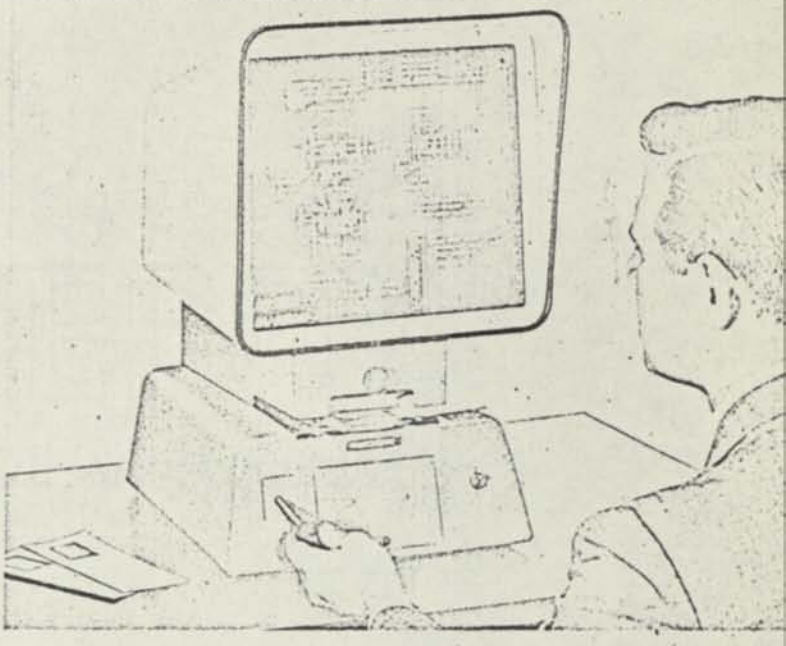
RECORDAK PORTABLE APERTURE CARD READER • MODEL MKR



THE NEW Recordak Portable Aperture Card Reader is introduced in answer to the increasing demand for a compact, low-cost Film Reader built to quality standards for reference to engineering drawings on microfilm. It occupies slightly more than a square foot of desk space and, weighing 31 pounds, is readily movable from drafting table to drafting table for individual engineer reference as required.

This new Recordak Portable Reader is solidly constructed for enduring satisfactory performance, and is optically designed to project images of exceptional clarity and sharpness on its 10½" x 12" screen, especially for use in brightly illuminated drafting rooms.

It is easy to operate. The aperture card is inserted between a pair of glass flats which then close upon the aperture to secure the film against scratching, buckling, or heat damage during extended viewing of the projected image. A universal, single-control scanning lever permits instant positioning of the image on the screen by finger-tip control. A focus control knob is conveniently centered at operator hand level immediately below the screen. The image remains in constant focus on the screen at all times for ease of scanning and viewing.

The ground glass, plastic-coated screen is green-tinted to minimize reflection and glare. Images are projected at a fixed magnification of 15 to 1, with uniform brilliance of detail at the center and in the corners, without sparkling or hot-spotting effects.

With many design features and functional advantages which are usually found only in the larger and more expensive reader units, the Recordak Portable Aperture Card Reader, Model MKR, is precision engineered for dependable efficiency and versatility in making engineering records on microfilm immediately enlargeable for detailed inspection, without the delays and high costs involved in the production of reference prints.

FEATURES

SCREEN . . . 10½" x 12". Transmits the light evenly, sharply and without reflection or sparkling effects.

MAGNIFICATION . . . Fixed at 15 to 1.

SCANNING . . . Viewing any desired segment of a 35mm film aperture is easy and rapid. A single lever controls scanning direction up and down, sideways or diagonally.

OPTICAL SYSTEM . . . Lumenized *f*/2.8 lens. High level illumination with a minimum of radiated heat. Film is protected from heat damage by a heat absorbing filter in the condenser system, as well as by the protective glass flats which enclose the film during projection.

FILM CARD SIZE . . . Accepts Military D and other EAM aperture cards of standard size.

ILLUMINATION . . . 50 candlepower, 6 volt, candelabra prefocused lamp (GE 1503).

DIMENSIONS . . . 21¼" high, 12½" wide, 13" deep. Weight—31 pounds.

ELECTRICAL REQUIREMENTS . . . Operates on 115 volts, 50-60 cycles.

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November 1962

LET'S COMPARE...

...Thumping on a typewriter! Hauling and lifting 19 pound books! Transcription errors! Guessing illegible signatures!

Standing for long periods leafing through volumes -- stacking them higher and higher -- because the wall won't bulge and more space is required each year!

And -- "Putting all the eggs in one basket", from a security viewpoint! No copies in the event the pages are destroyed by fire, water, or even a more extreme disaster!

...With a modern-day approach. Although most people think a nickel won't buy much today, it is a fact that 5 cents will pay the recording cost of one legal size page and the following plus features of the Recordak System:

A Security Film Copy -- a photographically accurate record of the original document, for maximum protection against loss or destruction.

A Duplicate Film Copy -- for quick, easy reference. Two books weighing 38 pounds and containing 1,600 pages can be compacted into a 100-ft. roll of microfilm, weighing only 4 ounces. In roll form, a 98% reduction in filing space and equipment is realized. When unitized in acetate jackets, 75% less space and equipment is required.

A Faster, more Authentic, yet Easier Method of Copying.

And the 5 cents includes all direct and indirect costs in creating two film images. When desired, an enlarged photographic facsimile can be made from the film in 20 seconds for 9 cents...considerably less than your present method of producing a certified copy.

So many of your colleagues in County Offices have set new standards of efficiency and economy with the Recordak System, that the whole story would fill a book. A few selections are enclosed as an introduction.

To learn more about the Recordak System, simply fill in the enclosed postage-paid reply card and drop it in the mail. A Recordak representative will be happy to arrange an appointment at your convenience -- without obligation.

Sincerely yours,

John Kolb

JK:eb
Enc.

John Kolb, Manager
State, County and
Municipal Gov't. Sales

Another microfilming "First"...

THE RECORDAK LODESTAR

MAGAZINE LOADING FILM READER

Model PS = $995.
Model PS-1 = $1395 has image rotation of 270°

Reader (Printer) Model PES
$2650

- *Magazine-loading*
  Self-threading
  Fast-moving film
  reduces look-up time to seconds!

The Recordak Lodestar Reader introduces a completely new principle of speed and simplicity of reference to 16mm microfilm records. Now—for the first time—*pre-indexed* film is enclosed in convenient reusable magazines which make possible a filing medium of finger-tip accessibility . . . and a look-up operation that is all but automatic.

Insertion of the magazine in the Reader-Slot automatically turns on the reader. At the flick of a single control, the film is set in motion at high, intermediate, or slow-scan speed at the will of the operator.

Indexing of the film is keyed to code symbols shown on index-scales on the side of the reader screen. Code lines on the film itself flash across the screen at speeds as high as 600 feet-per-minute and enable the operator to locate a desired image in a matter of seconds. To reverse the direction of the film the control key is merely switched to the rewind position. The film is guided only by its edges as it is propelled through the optical path and into the receiving chamber in which it festoons itself. No take-up spool is necessary . . . threading and re-threading are eliminated. Wear and tear on film surfaces is far less than on even the finest conventional spool readers.

Catalogs, Parts Lists, and Other Publications—*on Film!*

The Recordak Lodestar Reader is ideally suited for applications requiring fast and frequent look-up of published material. It was initially designed to meet the requirements of a large mail-order and retail organization faced with the problem of replenishing libraries of parts catalogs for its hundreds of retail outlets throughout the country. High mortality through constant use of the paper editions over the years, had reduced replenishment stocks to the point of near exhaustion.

The question of whether to republish in paper form, or to microfilm, provided its own answer in the economy of converting some 35,000 pages of text, illustrations, and exploded drawings to the photographic fidelity of Recordak microfilm. As a result, space requirements have been *reduced by more than* 91%—from 17 feet of shelf space required for the bound parts-list books down to 18¼ inches in "Microfilm Library Form." Average look-up time has been cut to a mere 20 seconds!

Best of all, damaged or missing pages and misfiled books no longer thwart the objective of fast efficient service to customers. In film form the page sequence is permanently fixed in unalterable continuity. Enclosed in magazines, the film itself is safeguarded against damage and deterioration through repeated or careless handling. In the Lodestar Reader, the self-threading film is never touched by the operator.

Equipment or appliance parts lists, directories, periodicals, rate schedules, manuscripts, academic papers, and other types of periodically published material are examples of a wide variety of applications for the Recordak Lodestar Reader. Because a single magazine can contain thousands of pages in photo-exact microfilm form, millions of pages can be filed within arm's reach for quick reference and accessibility. Retrieval of information is reduced to a matter of seconds.

A Recordak representative will be glad to arrange for your inspection of the Recordak Lodestar Reader at a nearby installation. His experience and cooperation—backed by more than 30 years of Recordak specialization in microfilming applications—are at your disposal without obligation of any kind.

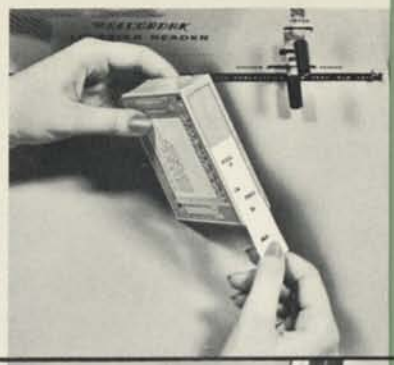
MAGAZINE LOADING

LODEST

● Fast reference to index-coded roll film attains a new plateau of time-saving convenience.

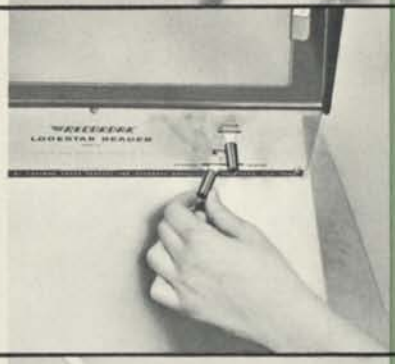
● Recordak microfilming . . . indexed by either a special technique, or automatically by the Recordak Reliant Microfilmer with Kodamatic indexing, is accomplished at high speed by precision equipment, faithfully reproduces every detail of the original. And the Recordak Lodestar Reader brings the photographic image back to original or larger than original size, for scanning or extensive study without eyestrain.

● Index card on magazine identifies *contents* . . . card on edge carries index *number*.



● Insertion of magazine automatically turns on screen lighting and film-driving motors.

● Controls placed right below screen. One control focuses image . . . other advances film and rewinds it back into magazine.



● Translucent daylight type tinted screen. Scale on side is guide for locating "indexed" film images.

● Magnetic drive provides hold-back tension during film advance . . . prevents back-lash.

● Film stops automatically before end of roll, leaving trailer in magazine . . . ready for high-speed rewind.

AR READER

● Film magazine fits in palm of hand, yet contains thousands of sharp and clear images.

● Advancing film festoons into a chamber . . . eliminates need of take-up spool and threading.

Just a few . . .

examples of periodically published . . . and frequently referred to . . . information which the Lodestar will find quickly and easily on microfilm!

1. Equipment and appliance parts lists.
2. Directories . . . by name, address, type of business or product.
3. Pricing lists and guides.
4. Professional library material.
5. Rate schedules and routing schedules in:

Telephone Companies	Railroads
Public Utilities	Airlines
Insurance Companies	Trucking Companies
Travel Agencies	Shipping Companies

6. Credit authorization in E.A.M. and electronic accounting systems.

Whenever you need fast "Look Up" . . . you need a

RECORDAK
MAGAZINE LOADING
LODESTAR READER

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See your
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representative

. . . he is trained to help you set up a Lodestar system custom-tailored to your problem.

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CALIFORNIA
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Denver
CONNECTICUT
Hartford
DISTRICT OF COLUMBIA
Washington
FLORIDA
Jacksonville
Miami
GEORGIA
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ILLINOIS
Chicago
INDIANA
Indianapolis
LOUISIANA
New Orleans
MARYLAND
Baltimore
MASSACHUSETTS
Boston
MICHIGAN
Detroit
MINNESOTA
Minneapolis
MISSOURI
Kansas City
St. Louis
NEBRASKA
Omaha
NEW YORK
New York
Rochester
NORTH CAROLINA
Charlotte
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Cincinnati
Cleveland
OKLAHOMA
Oklahoma City
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Portland
PENNSYLVANIA
Philadelphia
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Dallas
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San Antonio
UTAH
Salt Lake City
WASHINGTON
Seattle
WEST VIRGINIA
Parkersburg
WISCONSIN
Milwaukee

A-902A 5M 5-62 Printed in U. S. A.

RECORDAK

J. N. PERSON

RECORDAK CORPORATION

SUBSIDIARY OF EASTMAN KODAK COMPANY

350 MISSION STREET
SAN FRANCISCO 5, CALIF.
GARFIELD 1-7938
AREA CODE 415

RECORDAK

RECORDAK STARLET Film Reader

PTA

$485. purchase + $14.00 rental/mo. + 35¢/yr. after 1st year maint.

The RECORDAK STARLET Film Reader is the first low-cost motorized model developed for viewing 16mm microfilm images.

The STARLET accepts microfilm spooled in Recordak Reader Magazines, and can be adapted to accept microfilm spooled on conventional reels. This versatility—plus its light-weight mobility—allows organizations using both types of spooling to view all microfilm records quickly and easily. The exclusive Recordak Magazine Reader concept—combined with Kodamatic indexing on the film itself—is especially useful for reference to catalogs, price lists, parts lists and directories, when speed of operation and frequent data retrieval are important.

Special construction of the film gate and take-up reel permits quick threading of the film. The operator simply drops the film leader behind an open film gate and slips it into a notch in the take up reel.

Motorized starting, stopping and direction of the film travel are controlled by a single lever. 100 ft. of film may be advanced or rewound in approximately 16 seconds. Framing and slow scanning are accomplished by a rotatable knob on the side of the cabinet.

Model PTD special.

FEATURES

CONTROLS . . . All operator controls are at desk level. Starting, stopping, and direction of film travel are controlled by a single lever for simplicity of operation. Motion of images on the screen is in the same direction as the movement of the control. Individual image framing and scanning are accomplished by a single rotatable knob. A simple lever control is used for critical and individual focus.

MAGNIFICATION . . . Fixed at 20 times with a 27mm., f/3.5 lumenized lens.

WEIGHT and DIMENSIONS . . . weight 32 lbs., height 21½", depth 19½", width 14". Reading screen 10⅝" x 12".

FILM GATE . . . A nylon quick load gate holds film only at the edges. A threading guard over the gate and lens prevents loading film improperly.

ELECTRICAL REQUIREMENTS . . . Model PTA—117 volts A.C. Model PTD—12 volt D.C. automotive electrical system.

INDEXING . . . A code scale is located on cabinet adjacent to screen for viewing film with Kodamatic indexing.

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SUBSIDIARY OF EASTMAN KODAK COMPANY
Printed in U.S.A.
A-979 10M

RECORDAK Corporation announces a new automatic information retrieval system with the Recordak Image Control Keyboard, an electronic accessory, combined with the Recordak Lodestar Reader which enables the operator to locate by push button any microfilmed document from among millions. The operator inserts the film magazine in the self-threading Lodestar Reader, keys the index code number into the Image Control unit, and the desired image is automatically located and appears on the reader screen. Film is searched at 600 feet per minute and average time for location of a document on the 100 feet of film in a magazine is five seconds, according to Recordak; slow speed visual scanning also is possible with the new Keyboard Control Unit. The Image Control Keyboard is designed for heavy reference application where location of individual documents from among millions is required. The new unit may also be combined with the Reader-Printer to provide an enlarged facsimile print of any desired document. •••

RECORDAK

RECORDAK IMAGE CONTROL KEYBOARD

The *Recordak Image Control Keyboard* is an electronic accessory which is combined with the automatic Recordak Lodestar Reader to reduce roll microfilm file search to the simplicity of a push-button operation.

From the millions of records accessible within arm's reach of the operator at a central work station, primary selection of a desired file-on-film can be accomplished with split-second speed. The microfilm file is contained within visually indexed plastic magazines, each with a capacity of 100 feet of film. The operator merely inserts the magazine into the slot of the self-threading Lodestar Reader, keys the index code number into the Image Control Unit, and the desired image is automatically searched and displayed upon the reader screen. Search speed is at the rate of 600 feet of film per minute, so that image location and display per image search average 5 seconds from input of the code index number to the keyboard.

Provision is made in the Image Control Keyboard for low-speed film travel at 12 feet per minute, so that successive images may be scanned by the operator when desired. Controls are provided so that film travel can be "push-button" selected for high or low speed, in film advance or film rewind directions.

The Recordak Image Control Keyboard is readily adaptable to systems employing random filing methods. Provisions for add-ons to the individual film roll can be accommodated up to the maximum 100-foot capacity of the individual magazine. The Recordak Image Control System is ideally suited to applications in which fast information retrieval of individual records from huge information files, compacted to finger-tip accessibility on microfilm, is required. Centralized and frequently referenced customer files of insurance, communications, retail credit, transportation, banking and other organizations are especially well-adapted to the advantages of the microfilm file center and to the time-saving economy of fast information output made possible by the Recordak Image Control Concept.

As an added advantage, the Recordak Image Control Keyboard can be combined with the Recordak Lodestar Reader-Printer to provide not only faster speed of information retrieval, but also comparable speed in producing enlarged facsimile prints from microfilm images as desired, and again with push-button automation.

See other side for detail features

FEATURES

FILM MOVEMENT

Search: High Speed – 600 feet per minute
Search: Low Speed – 12 feet per minute
Single Frame Advance and Back-Space Controls
Rewind Speed – 600 feet per minute

MAIN UNIT CONTROLS

Keyboard Selector – four column 40 key console (units, tens, hundreds, and thousands) with 10 push-button positions in each column.

Film Selector – two-position slide switch to select for positive or negative film.

Selector – six-button key column.

"A" Advance Button. Film is advanced out of magazine from beginning of roll at high speed, with automatic stop cycle to pre-selected frame.

"+1" Single Frame Advance Button.

"–1" Single Frame Return Button.

"+" Slow Speed Advance Button.

"–" Slow Speed Rewind Button.

"R" Rewind Button. Film rewinds completely into magazines at high speed.

POWER REQUIREMENTS . . . 115 Volts. 0.6 amperes, 60 cycles AC only. Installation by Recordak Service Representative is required.

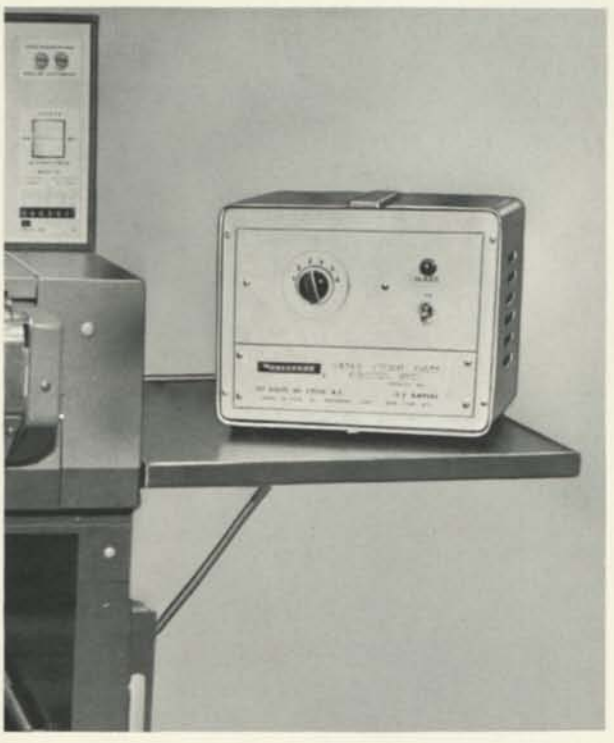
PHYSICAL CHARACTERISTICS . . . Height 9½ inches, depth 24⅛ inches, width 12 inches, color light gray. Weight uncrated 28½ pounds.

REDUCTION: Letter-sized documents photographed at approximately 21:1 to 23:1. Unit will function with documents of varying sizes and reductions with special programming.

Recordak Image Designator Mark Kit

The facility for automatic exposure of image code formats, simultaneously as documents are microfilmed at high speed, is provided by the Recordak Image Designator Mark Kit. This accessory unit is especially designed for use with the high-speed automatic Recordak Reliant Microfilmers, Models RM-1 and RS. Microfilm for use with the Recordak Image Control System can thus be produced simply and as a by-product of normal microfilming operations, without loss of the top speed and efficiency of which Recordak Reliant Microfilmers are capable.

The Recordak Image Designator Mark Kit is engineered for field installation with Recordak Reliant Microfilmers, Model RM-1 or RS, with no major disruption of daily microfilming schedules already in effect with these Recordak models.



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A987 10M 9-62
Printed in U.S.A.

$995. purchase $37.50 rental/mo. $72.50/yr. — after mount.

Another microfilming "First"...

THE RECORDAK LODESTAR

PS

MAGAZINE LOADING FILM READER

PS-1

- *Magazine-loading*
  Self-threading
  Fast-moving film
  reduces look-up time to seconds!

The Recordak Lodestar Reader introduces a completely new principle of speed and simplicity of reference to 16mm microfilm records. Now—for the first time—*pre-indexed* film is enclosed in convenient reusable magazines which make possible a filing medium of finger-tip accessibility . . . and a look-up operation that is all but automatic.

Insertion of the magazine in the Reader-Slot automatically turns on the reader. At the flick of a single control, the film is set in motion at high, intermediate, or slow-scan speed at the will of the operator.

Indexing of the film is keyed to code symbols shown on index-scales on the side of the reader screen. Code lines on the film itself flash across the screen at speeds as high as 600 feet-per-minute and enable the operator to locate a desired image in a matter of seconds. To reverse the direction of the film the control key is merely switched to the rewind position. The film is guided only by its edges as it is propelled through the optical path and into the receiving chamber in which it festoons itself. No take-up spool is necessary . . . threading and re-threading are eliminated. Wear and tear on film surfaces is far less than on even the finest conventional spool readers.

Catalogs, Parts Lists, and Other Publications—*on Film!*

The Recordak Lodestar Reader is ideally suited for applications requiring fast and frequent look-up of published material. It was initially designed to meet the requirements of a large mail-order and retail organization faced with the problem of replenishing libraries of parts catalogs for its hundreds of retail outlets throughout the country. High mortality through constant use of the paper editions over the years, had reduced replenishment stocks to the point of near exhaustion.

The question of whether to republish in paper form, or to microfilm, provided its own answer in the economy of converting some 35,000 pages of text, illustrations, and exploded drawings to the photographic fidelity of Recordak microfilm. As a result, space requirements have been *reduced by more than 91%*—from 17 feet of shelf space required for the bound parts-list books down to 18¼ inches in "Microfilm Library Form." Average look-up time has been cut to a mere 20 seconds!

Best of all, damaged or missing pages and misfiled books no longer thwart the objective of fast efficient service to customers. In film form the page sequence is permanently fixed in unalterable continuity. Enclosed in magazines, the film itself is safeguarded against damage and deterioration through repeated or careless handling. In the Lodestar Reader the self-threading film is never touched by the operator.

Equipment or appliance parts lists, directories, periodicals, rate schedules, manuscripts, academic papers, and other types of periodically published material are examples of a wide variety of applications for the Recordak Lodestar Reader. Because a single magazine can contain thousands of pages in photo-exact microfilm form, millions of pages can be filed within arm's reach for quick reference and accessibility. Retrieval of information is reduced to a matter of seconds.

A Recordak representative will be glad to arrange for your inspection of the Recordak Lodestar Reader at a nearby installation. His experience and cooperation—backed by more than 30 years of Recordak specialization in microfilming applications—are at your disposal without obligation of any kind.

MAGAZINE LOADING

LODEST

● Fast reference to index-coded roll film attains a new plateau of time-saving convenience.

● Recordak microfilming . . . indexed by either a special technique, or automatically by the Recordak Reliant Microfilmer with Kodamatic indexing, is accomplished at high speed by precision equipment, faithfully reproduces every detail of the original. And the Recordak Lodestar Reader brings the photographic image back to original or larger than original size, for scanning or extensive study without eyestrain.

RECORDAK

RECORDAK LODESTAR READER-PRINTER • MODEL PES

purchase $2650 72/mo. rental Maint. - not specified yet cost

The *Recordak Lodestar Reader-Printer Model PES* combines, in one unit, information retrieval speed with push-button printing and automatic processing of enlarged paper facsimiles of microfilm records. In less than one minute a document image can be located on the reader screen and a high quality 8½" X 11½" paper print automatically exposed, developed, cut-to-size and delivered.

Operation of the *Lodestar Reader-Printer* is simple. Insert the film magazine into the reader. This automatically illuminates the reader screen and starts the film drive motors. A flick of the speed control lever automatically threads the film into the machine and regulates the film advance or rewind at variable speeds up to 600 feet per minute. Average look-up time is approximately 5 seconds and the operator's hands never touch the film.

With the desired image centered on the screen, press the print button and the automatic exposure, print-processing cycle is set in motion. A photo-accurate, cut-to-size paper print emerges from the front of the unit within 30 seconds after the button is pressed. Image search can be resumed or additional prints started within 17 seconds after the first cycle has begun.

The *Recordak Lodestar Reader-Printer* is ideally suited for microfilm applications in which frequent reference to microfilm records and fast, automatic paper facsimile production are required.

FEATURES

MAGNIFICATIONS . . . Reader – 23X; Print – 21X

READER SCREEN . . . Translucent, tinted, daylight type measuring 13" by 13". A scale on the side is a guide for locating indexed film images. Screen is removable from the front.

FILM MAGAZINE . . . Self-threading, reusable, 4" square by 1" deep – Tenite with a capacity of 100 feet of 16mm film. One side of magazine is slotted to retain an index-to-content label or card.

FILM TRANSPORT . . . Can be controlled for varying speeds from slow-scan up to 600 feet per minute, for fast information retrieval and rapid rewind. Film transport lever can be locked for constant film speed.

CONTROLS . . . ON-OFF switch, Focusing lever, Film transport lever for advance or rewind, speed lock, print button, exposure control knob.

SENSITIZED PAPER . . . Supplied in 8½" wide rolls 150 feet in length.

PRINTING CYCLE . . . Prints are automatically exposed, cut, processed and delivered squee-gee dry at the front of the unit above the reader screen hood.

PRINT ACCESS TIME . . . 30 seconds for the first print and 17 seconds for additional prints of the same film image. Search can be resumed 17 seconds after the print button is pressed.

PROCESSING SOLUTION . . . Monobath type – can be used for approximately one week or 150 prints . . . whichever comes first.

ELECTRICAL REQUIREMENTS . . . 117 ± 10% volts, 60 cycles, AC only, 300 watts.

SIZE AND WEIGHT . . . 31" high; 16" wide; 28½" deep. Wt. 143 lbs.

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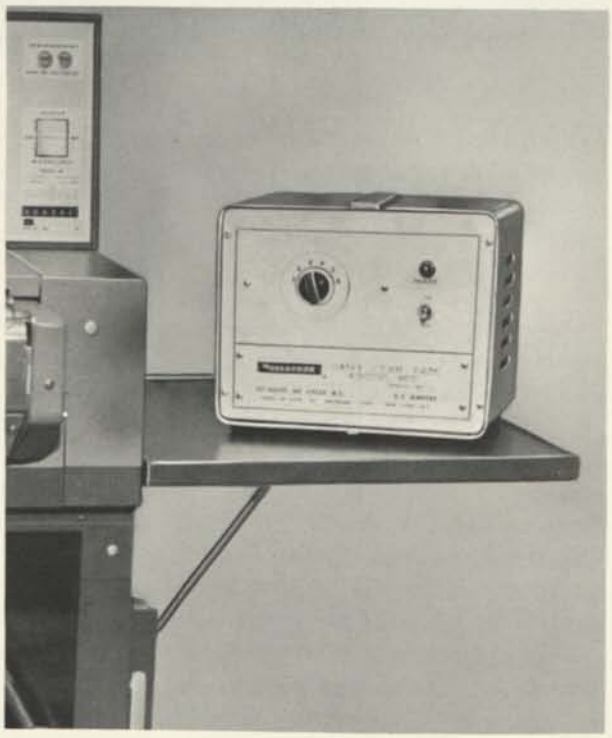

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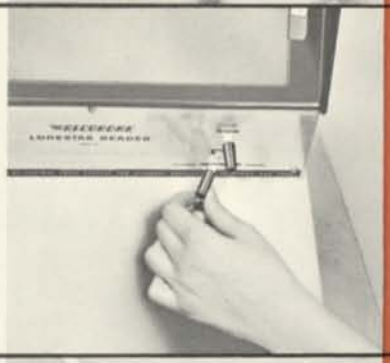
● Index card on magazine identifies *contents* . . . card on edge carries index *number*.

● Insertion of magazine automatically turns on screen lighting and film-driving motors.

● Controls placed right below screen. One control focuses image . . . other advances film and rewinds it back into magazine.



● Translucent daylight type tinted screen. Scale on side is guide for locating "indexed" film images.

● Magnetic drive provides hold-back tension during film advance . . . prevents back-lash.

● Film stops automatically before end of roll, leaving trailer in magazine . . . ready for high-speed rewind.

AR READER

● Film magazine fits in palm of hand, yet contains thousands of sharp and clear images.

● Advancing film festoons into a chamber . . . eliminates need of take-up spool and threading.

Just a few . . .

examples of periodically published . . . and frequently referred to . . . information which the Lodestar will find quickly and easily on microfilm!

1. Equipment and appliance parts lists.
2. Directories . . . by name, address, type of business or product.
3. Pricing lists and guides.
4. Professional library material.
5. Rate schedules and routing schedules in:

Telephone Companies	Railroads
Public Utilities	Airlines
Insurance Companies	Trucking Companies
Travel Agencies	Shipping Companies

6. Credit authorization in E.A.M. and electronic accounting systems.

Whenever you need fast "Look Up" . . . you need a

RECORDAK
MAGAZINE LOADING

LODESTAR READER

RECORDAK
CORPORATION
(Subsidiary of Eastman Kodak Company)
415 Madison Avenue New York 17, N. Y.

A-902 5M 4-61

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See your
RECORDAK
representative

. . . he is trained to help you set up a Lodestar system custom-tailored to your problem.

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Birmingham
ARIZONA
Phoenix
CALIFORNIA
Los Angeles
San Francisco
COLORADO
Denver
CONNECTICUT
Hartford
DISTRICT OF COLUMBIA
Washington
FLORIDA
Jacksonville
Miami
GEORGIA
Atlanta
ILLINOIS
Chicago
INDIANA
Indianapolis
LOUISIANA
New Orleans
MARYLAND
Baltimore
MASSACHUSETTS
Boston
MICHIGAN
Detroit
MINNESOTA
Minneapolis
MISSOURI
Kansas City
St. Louis
NEBRASKA
Omaha
NEW YORK
New York
Rochester
NORTH CAROLINA
Charlotte
OHIO
Cincinnati
Cleveland
OKLAHOMA
Oklahoma City
OREGON
Portland
PENNSYLVANIA
Philadelphia
Pittsburgh
TENNESSEE
Memphis
TEXAS
Dallas
Houston
San Antonio
UTAH
Salt Lake City
WASHINGTON
Seattle
WEST VIRGINIA
Parkersburg
WISCONSIN
Milwaukee

Further info on Recordak costs — from SF rep. — 29 Jan 63

Kodamatic indexing = $41.00 per thousand images (instead of $7/roll)

Require (2200) 8½ by 11 images per roll. not 3000. they need the space between images for coding.

Printing costs:

No. ft of film	cost per 100 ft roll
2000 – 50,000	$ 4.50
50,000 – 75,000	4.25
75,000 – 100,000	4.00
100,000 – 200,000	3.75
over 200,000	3.50

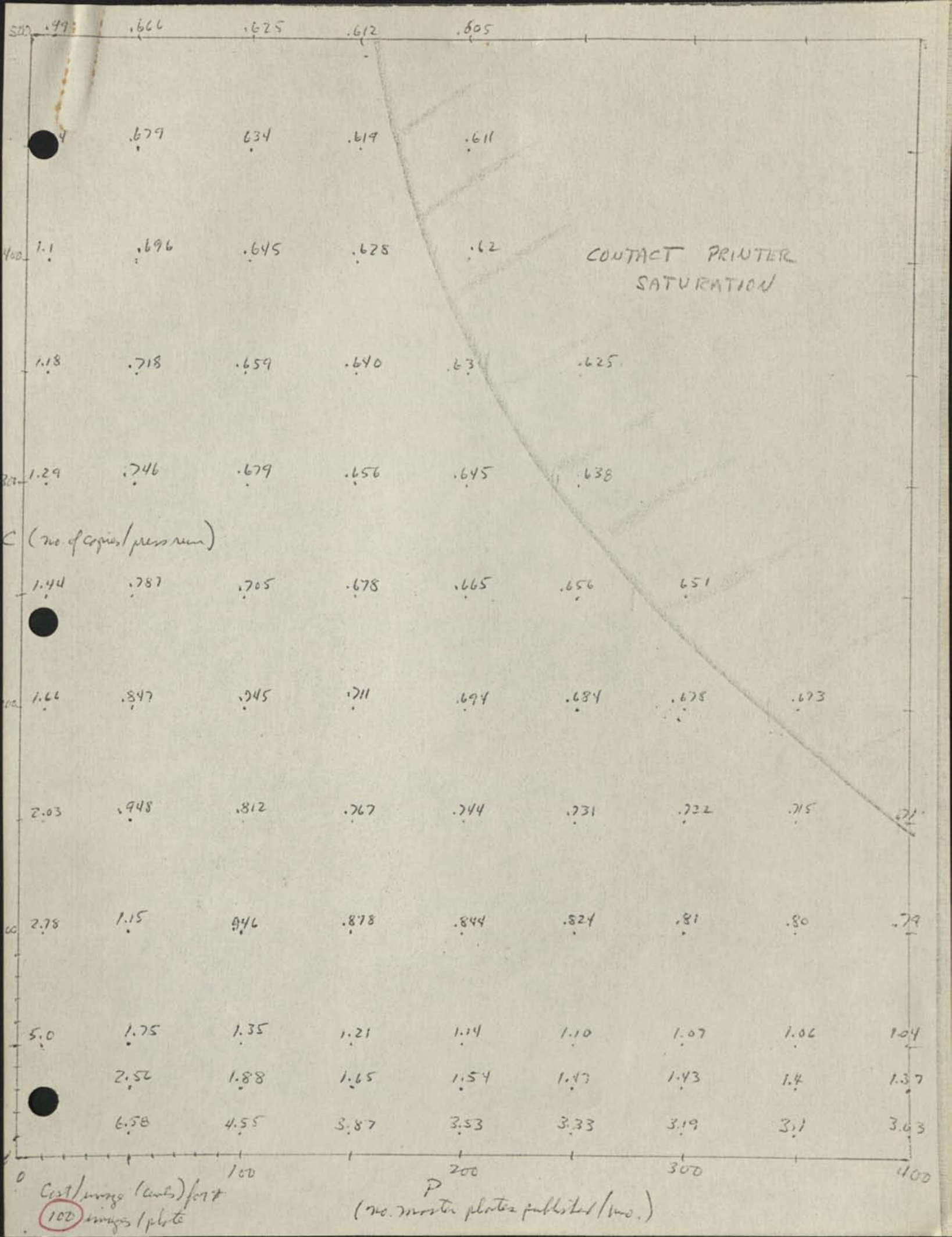
CONTACT PRINTER SATURATION

C (no. of copies/press run)

C \ P	0	50	100	150	200	250	300	350	400
500	1.9	1.38 ~~1.3~~	1.27 ~~1.23~~	1.23 ~~1.2~~	1.21 ~~1.19~~				
	2.06	1.33	1.24	1.22	1.2				
400	2.18	1.36	1.26	1.23	1.21				
	2.33	1.51 ~~1.4~~	1.34 ~~1.29~~	1.28 ~~1.25~~	1.26 ~~1.23~~	1.24 ~~1.22~~			
300	2.54	1.46	1.32	1.27	1.25	1.24			
	2.83	1.53	1.37	1.31	1.29	1.27	1.26		
200	3.23	1.82 ~~1.64~~	1.53 ~~1.44~~	1.43 ~~1.37~~	1.38 ~~1.33~~	1.35 ~~1.31~~	1.33 ~~1.3~~	1.32 ~~1.29~~	
	3.99	2.07 ~~1.92~~	1.68 ~~1.55~~	1.54 ~~1.46~~	1.47 ~~1.42~~	1.44 ~~1.39~~	1.41 ~~1.37~~	1.39 ~~1.36~~	1.38 ~~1.35~~
100	5.44	2.56 ~~2.19~~	1.97 ~~1.76~~	1.77 ~~1.65~~	1.67 ~~1.58~~	1.61 ~~1.54~~	1.57 ~~1.51~~	1.54 ~~1.49~~	1.52 ~~1.48~~
	9.74	4.03 ~~[illegible]~~	2.84 ~~2.47~~	2.45 ~~2.2~~	2.52 ~~2.07~~	2.13 ~~1.99~~	2.06 ~~1.93~~	2.0 ~~1.9~~	1.96 ~~1.86~~
		4.75	3.4	2.95	2.72	2.58	2.5	2.43	2.38
		12.1	8.0	6.65	5.98	5.57	5.3	5.1	4.96
0			100		200		300		400

Cost/image (cents) for (50) images/plate

P (no. master plates published/mo.)


500
400
300
200
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.49
.666
.625
.612
.605
.4
.679
.634
.619
.611
1.1
.696
.645
.628
.62
CONTACT PRINTER SATURATION
1.18
.718
.659
.640
.63
.625
1.29
.746
.679
.656
.645
.638
C (no. of copies/press run)
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.656
.651
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.745
.711
.694
.684
.678
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100
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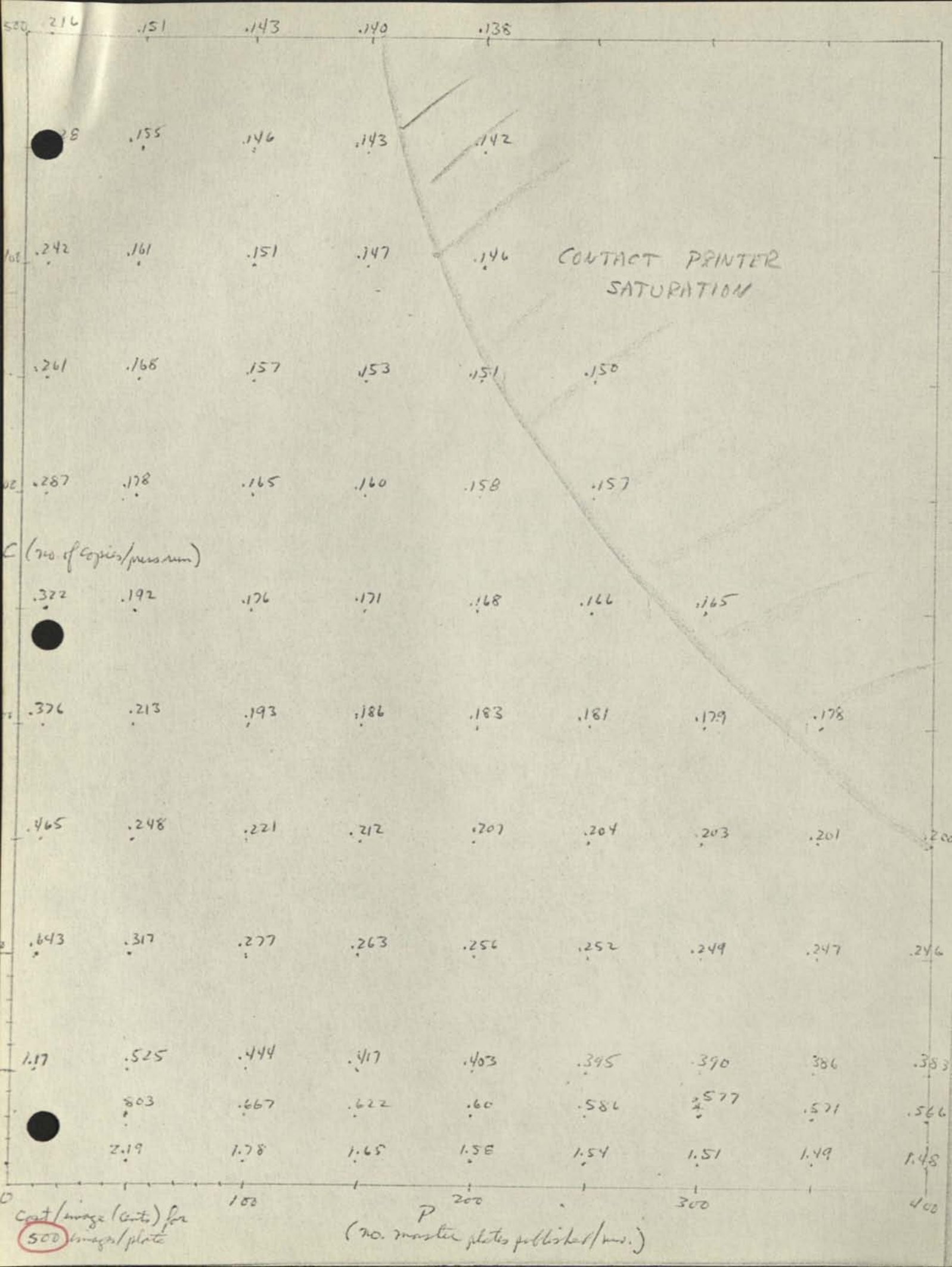
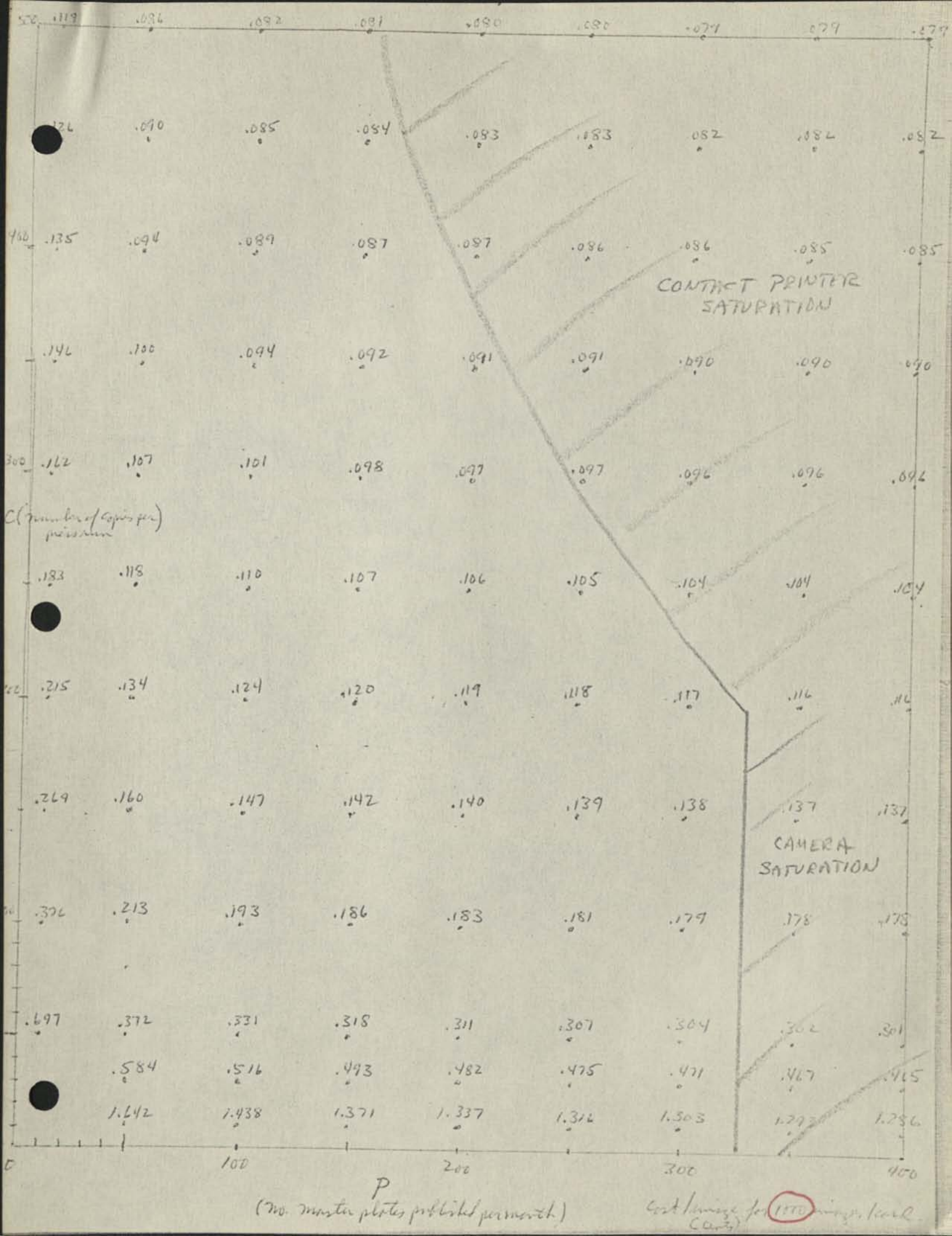
P
(no. master plates published/run)
Cost/image (cents) for 1
100 images/plate


.216 .151 .143 .140 .136
.155 .146 .143 .142
.242 .161 .151 .147 .146
CONTACT PRINTER SATURATION
.261 .168 .157 .153 .151 .150
.287 .178 .165 .160 .158 .157
C (no. of copies/press run)
.322 .192 .176 .171 .168 .166 .165
.376 .213 .193 .186 .183 .181 .179 .178
.465 .248 .221 .212 .207 .204 .203 .201 .200
.643 .317 .277 .263 .256 .252 .249 .247 .246
1.17 .525 .444 .417 .403 .395 .390 .386 .383
.803 .667 .622 .60 .586 .577 .571 .566
2.19 1.78 1.65 1.58 1.54 1.51 1.49 1.48
0 100 200 300 400
P
(no. master plates published/mo.)
cost/image (cents) for 500 images/plate


.119 .086 .082 .081 .080 .080 .079 .079 .079
.126 .090 .085 .084 .083 .083 .082 .082 .082
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.146 .100 .094 .092 .091 .091 .090 .090 .090
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C (number of copies per press run)
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.215 .134 .124 .120 .119 .118 .117 .116 .116
.269 .160 .147 .142 .140 .139 .138 .137 .137
CAMERA SATURATION
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.697 .372 .331 .318 .311 .307 .304 .302 .301
.584 .516 .493 .482 .475 .471 .467 .465
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(No. master plates published per month)
Cost/image for 1000 images/run
(cents)

CAMETRA SATURATION

C (no. of copies/press run)

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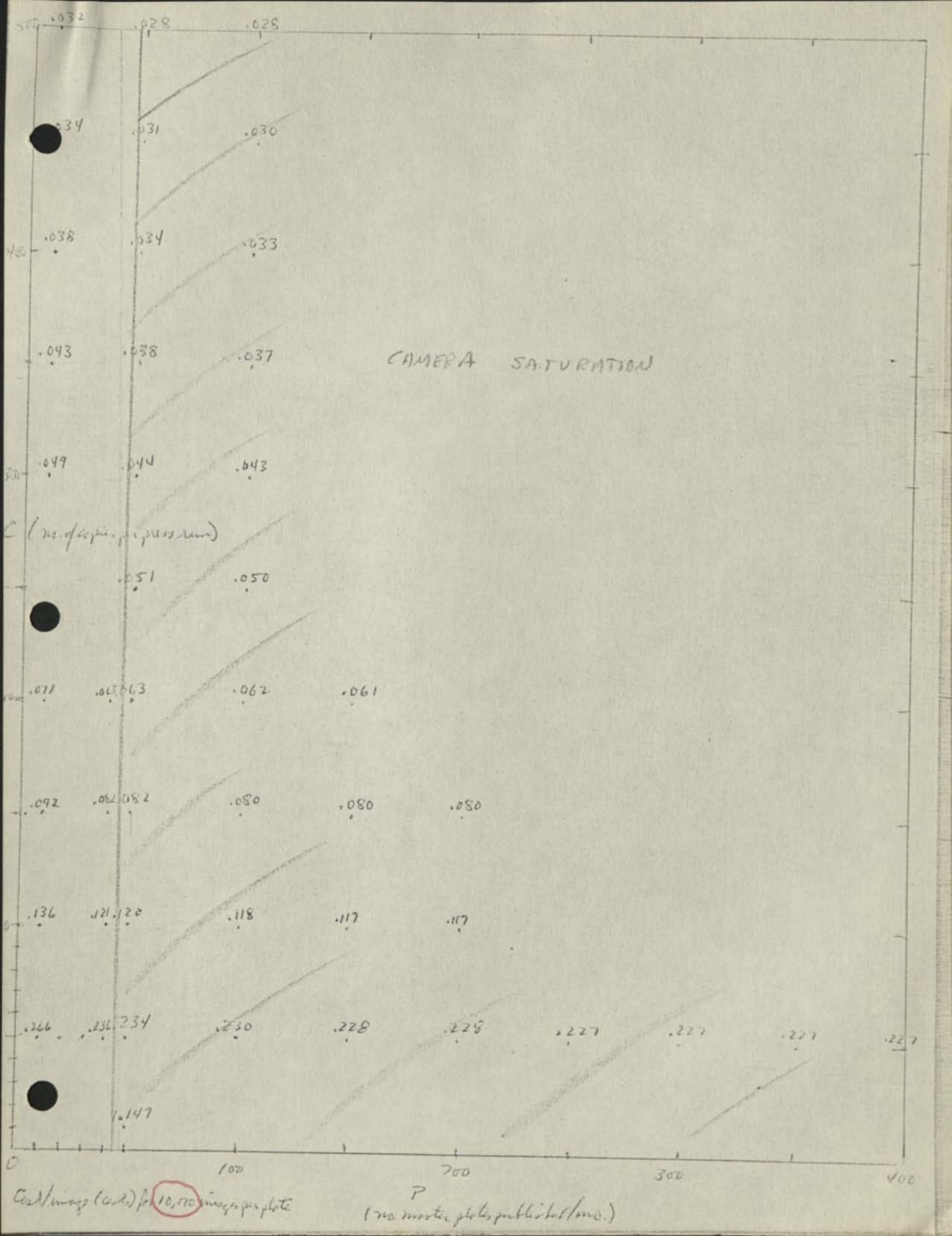
200	.063	.050	.048	.047
300	.07	.054	.052	.052
400	.062 ~~.078~~	.059 ~~.066~~	.058 ~~.058~~	.057 ~~.057~~
500	.09	.068	.066	.065
700	.108	.081	.078	.077
1000	.138	.108 .102	.097	.096
1500	.198	.147 .15 ~~.144~~	.14 ~~.137~~	.137 ~~.135~~
2000	.378	.288 .282 ~~.27~~	.262 ~~.256~~	.256 ~~.252~~ .252 ~~.249~~
3000		.437	.415	.407
5000		1.27	1.21	1.18

Cost/image (cents) for 3000 images/plate

(no. master plates published/mo.)


CAMERA SATURATION
C (no. of copies per run)
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(no. master plates published/mo.)
Cost/image (cents) for 10,000 images per plate
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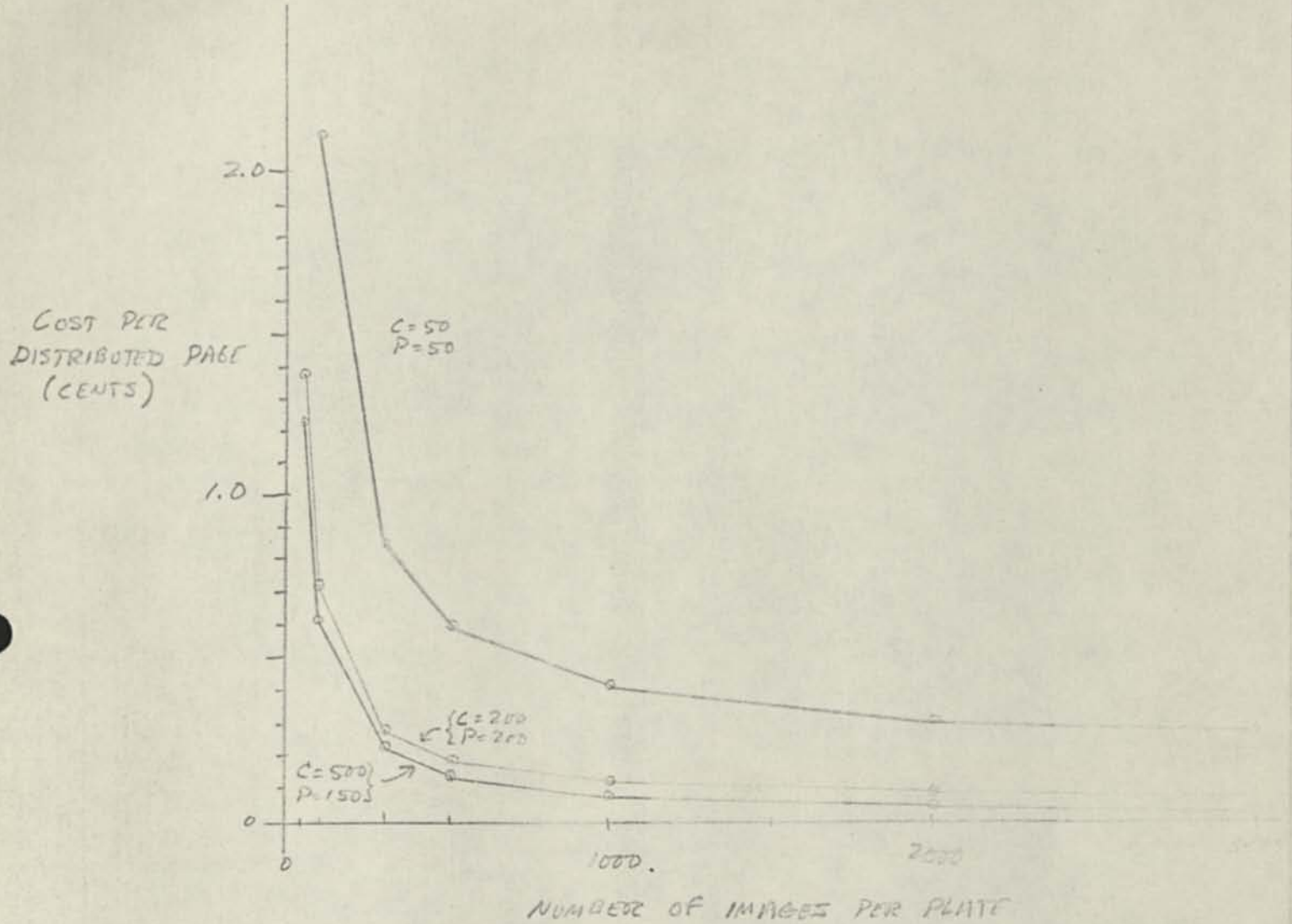
COST PER DISTRIBUTED PAGE (CENTS)
2.0
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C=50
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2000
NUMBER OF IMAGES PER PLATE

wings/plate	C	R	cost/wing
50	50	50	4.03
	200	200	1.38
	500	150	1.23
100	50	50	2.12
	200	200	.72
	500	150	.62
300	50	50	.85
	200	200	.28
	500	150	.22
500	50	50	.60
	200	200	.19
	500	150	.14
1000	50	50	.41
	200	200	.12
	500	150	.08
2000	50	50	.31
	200	200	.09
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3000	50	50	.28
	200	200	.08
	500	150	.04

9/62

Call

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PCMI On-Demand (Micro-Sheets) Printing Costs

Equipment Costs

1. Contact printer = $10,000
   for ~~5 years~~ 40 months amortization at 0% rate of return, this = ~~$166.67~~ 250.00/mo.
2. Maintenance and repair = $200/yr. = 16.67/mo.

$ ~~183.34~~ 266.67/mo.

Material Costs

1. Contact film and chemical cost = 50 cents/sheet

Labor Costs

1. Setup time (read order card, pull master film from file, load master film in printer, start the machine) = 3 min./film sheet
2. Effective printing time @ 200 cards/hr. = 0.3 min/film sheet
3. Cleanup time (replace master film in file, collate request with finished print) = 2 min/film sheet
4. Total = 5.3 min/film sheet

Maximum no. of items copied/mo. = (440 hrs./mo.)(1 card/5.3 min.)(60 min/hr)
= 4981 film sheets

Extra Assumptions

1. All information for a given item is on a single card (ie. ignore the possibility of any extra setup times during the printing of a file item).
2. Each print request is for a single copy (i.e. a press run of one copy).
3. Negative 3x5 film sheet is already available. the cost to prepare this sheet is not included in this analysis.
4. Total loaded labor cost = ~~5~~ 9.00/hr.

NASA Reports

Doc. Inc. is operating a microfilm facility to prepare 5 x 8 inch transparencies of NASA reports. Expected production is about 25,000 to 30,000 documents / yr. Reduction ratio is 15½ : 1, thus permitting 70 pages to be put on each transparency. Transparencies were selected because:

1. ease & economy
2. good image quality
3. compatibility w/ existing reader-printers
4. long film life

A commercial version, Docuform is now being marketed in conjunction with a newly-developed file system.

Required Info Centers

US Govt. Research Reports now covers unclassified reports of AEC, NASA, and ASTIA. this supersedes 902, of Govt. unclassified tech reports. A reference collection of all reports covered by USGRR has been maintained for some years in the Library of Congress. Eleven more depository centers were established in mid-1962 in selected universities & libraries throughout the U.S., under direction & coordination of OTS, ~~with NSF funding~~.

Report Center	Location
LC	Wash. D.C.
Georgia Inst of Technol	Atlanta, Ga.
MIT	Cambridge, Mass.
John Crerar Library	Chicago
SMU	Dallas, Texas
Univ. Colo.	Boulder, Colo.
Linda Hall Library	Kansas City, Mo.
UCLA	L.A.
Columbia Univ.	N.Y.
Carnegie Library	Pittsburgh, Pa.
UC	Berkeley, Calif.
Univ. Wash	Seattle,

the NSF Office of Data & Dep. Services has provided initial funding ($156,000).

Sweet's Catalog Service
Division of F.W. Dodge Corporation

119 West 40 Street
New York 18, NY
telephone:
OXford 5-3000

November 21, 1962

Mr. Charles P. Bourne
Research Engineer
Stanford Research Institute
Menlo Park, California

Dear Mr. Bourne:

Except for Friday, December 7 it will be convenient for me to meet with you during the week of December 3. As a matter of fact, I look forward to it. Please give me a call when you arrive in town so that we can set up a definite time.

Cordially,

Harold E Sutcliffe

HES/rk

H. E. Sutcliffe
Marketing Research Dept.

COUNCIL ON LIBRARY RESOURCES, INC.
1025 CONNECTICUT AVENUE
WASHINGTON 6, D. C.
DISTRICT 7-8877

November 16, 1962

Mr. Charles P. Bourne
Stanford Research Institute
Menlo Park, California

Dear Charlie:

Your letter of 14 November received. I will probably be here on December 7 and 10, probably not on the 11th. Will be glad to discuss NCR and PCMI system potential as far as I can.

In regard to your P. S. on J. W. Diseases -- publication of an evaluation has been postponed. In general, however, Mr. Carlton Herman, the main moving force behind it, appears to think it has been quite successful. I understand the membership of the society has grown from a few hundred to over two thousand. The mystery: why haven't others followed suit?

I will mail you in a few days the draft copy of the COI report for 1961-2 for correction and/or alteration.

Sincerely,

Laurie

Laurence B. Heilprin

LBH:pl

Thomas
Micro-Catalogs Thomas Publishing Co. 461 Eighth Ave. N.Y.1 • OX 5-0500

November 19, 1962

Mr. Charles P. Bourne
Research Engineer
Stanford Research Institute
Menlo Park, California

Dear Mr. Bourne:

Peryour letter of November 13th, we would be happy to have you visit with us during the week of December 3rd to discuss the study your institute is conducting for a major data processing equipment manufacturer.

If you will just give me a call a couple of days in advance we can arrange an exact time.

Looking forward to hearing from you, we remain

Yours very truly,
THOMAS PUBLISHING CO.

R. C. Duff
Vice President

60,000 pages on 4x6 transparencies (positive), 84 pgs each by microcard
total cost = $250 (incl viewer, cabinets, cards)
$175. for the viewer
$175 for next years subscription.

RCD:mk

distribution limited to 3500 units in shorter pgs.

Publishers of
Thomas Register

letter also to Wilbur Stone - Wiley
Larry Heilprin - CLR

November 14, 1962

Mr. John Markus, Technical Director
Technical Information Research Staff
McGraw-Hill Book Company, Inc.
330 West 42nd Street
New York 36, New York

Dear John:

Thank you for your letter about the costs of publishing an abstract journal. What might the costs be for publishing a journal for 3,000-4,000 circulation instead of the 500-1,000 that you mentioned?

I will be in New York on December 3-6 before the ADI convention, and would appreciate an hour or two of your time if that is possible. I can call after I arrive to arrange a specific appointment. Is this timing in conflict with any of your schedule?

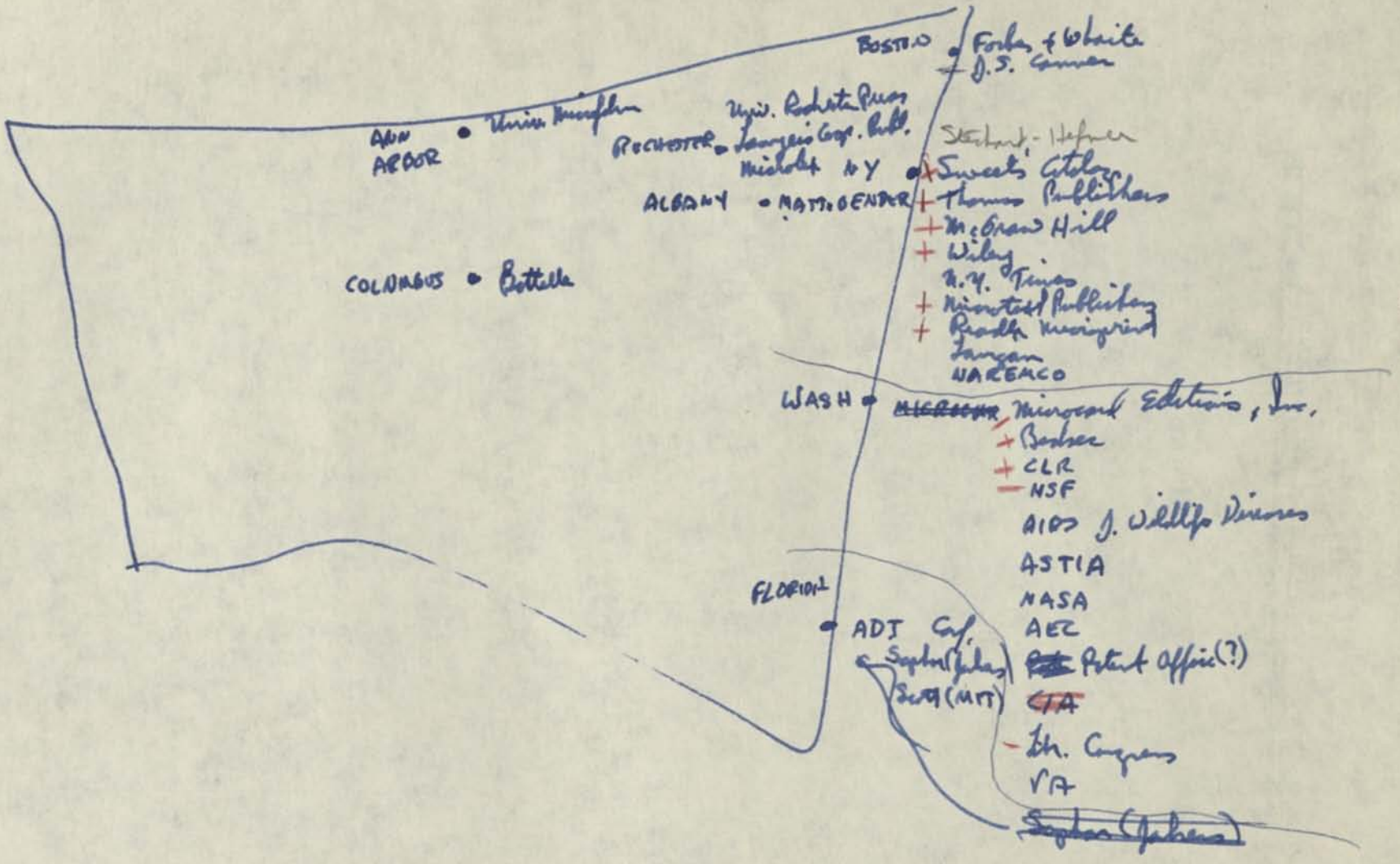
My main reason for coming East a week before the ADI convention is to do some field work for a current SRI project. I am working on a study of the potential applications and limitations of a high-density optical storage system, and am investigating its possibilities for microform publication, on-demand printing, and other tasks. (See a description of the NCR PCMI system in the latest American Documentation). I would like to get your reaction as to how this microform technique and equipment might be used within your organization.

Let me know if these dates are OK.

Sincerely,

Charles P. Bourne

CPB/gge


BOSTON
Forbes & White
D.S. Cameron
ANN ARBOR
Univ. Microfilms
ROCHESTER
Univ. Rochester Press
Lawyers Coop. Publ.
Mitchell NY
Sterling - Hafner
Sweet's Catalog
ALBANY
NATL. CENTER
Thomas Publishers
McGraw Hill
Wiley
N.Y. Times
Microtext Publishing
Readex Microprint
Lanpar
NAREMCO
COLUMBUS
Battelle
WASH
Microcard Editions, Inc.
Becker
CLR
NSF
AIDS J. Williams Divisions
ASTIA
NASA
AEC
FLORIDA
ADI Cal
Stanford (Lukes)
Patent Office (?)
Berg (MIT)
CIA
Lib. Congress
VA
Stanford (Lukes)


Sam Tebow
Wil Meyers

Wash. - Potential Calls

Mr. R. A. Jenson, Exec. Secy.
NFSAIS
301 East Capitol St.
Wash. 3, D.C.

Mr. Chas Stearns, Program Director
Research Data & Information Services
NSF
Wash 25, D.C.
(studies by A.D. Little; CIER; Datatrol; Org. lit. patterns; [illegible])

Mr. Ralph E. O'Dette, Progr. Dir.
Mr. Alan J. Sprow, Assist. Progr. Dir.
Support of Scientific Publications
NSF

Wash. - Potential Calls

Dr. Carlton M. Herman, chief
Section of Wildlife Disease & Parasite Studies
U.S. Fish & Wildlife Service
Patuxent Wildlife Research Center
Laurel, Md.
(Editor, J. Wildlife Diseases, member of Conference of Biological Editors)

Seymour D. Paine, chief
Bibliographic Services Div.
NLM
Bethesda, Md.

Richard Orr
Inst. Adv. Med. Comm.

Bethesda, Md.

John Sherrod, chief
Sci & Tech Div
L.C.
Wash 25, D.C.

Phyllis V. Parkins
Assistant Director for Editorial Affairs
Biological Abstracts
3815 Walnut St.,
Phila 4, Pa.

New York - Potential calls

Hubbard W. Ballou, Chief
Photographic Services
Columbia University Libraries
New York, N.Y.
(edited Guide to Microreproduction Equipment)

Robert Shiff, Pres.
NAREMCO Services, Inc.
New York, N.Y.

this ~~went~~ orig +1
this letter ~~goes~~ to:

~~Sweet's Catalogs~~
~~Thomas Publishers~~
~~[illegible]~~
~~Microtext Publ.~~
~~Readex~~
Microfoto ?

McGraw
Wiley
N Y Times
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A163

1. Mr. Harold E. Sutcliffe, Mgr.
Marketing Research Dept.
Sweet's Catalog Service
119 West 40 St.
New York 18, N.Y.

2. Mr. R.C. Duff, Vice Pres.
Thomas Publishing Co.
461 Eighth Ave.
New York 1, N.Y.

3. Sales Mgr.
Microtext Publishing Corp.
115 Liberty St.
New York 6, N.Y.

4. Sales Mgr.
Readex Microprint Corp.
5 Union Square
New York 3, N.Y.

4239-2

~~this letter - with [illegible]~~

November 5, 1962

Dear Mr.

Stanford Research Institute requests your help in a study it is conducting for a major data processing equipment manufacturer. The Institute has been asked to perform a product planning and application study to define the needs of industry and government relating to a new high-density optical technique for storing, retrieving and disseminating both written and graphic information.

I would appreciate a chance to visit with you or a knowledgeable member of your systems staff to discuss possible applications of this technique to some of your organization's information handling problems. I am particularly interested in obtaining a description of your present requirements (written or graphic) for the storage, retrieval and dissemination of information, as well as any present or planned methods of meeting these requirements.

Current plans should bring me to your city between _____ and _____. I will telephone your secretary to arrange a more precise time for my visit when I arrive in the vicinity.

We hope our visit might prove as stimulating to you as we are sure it would be to us.

Sincerely yours,

Arthur W. Dana, Jr.
Systems Analyst

AWD:jh

November 13, 1962

Mr. Harold E. Sutcliffe, Manager
Marketing Research Department
Sweet's Catalog Service
119 West 40 Street
New York 18, New York

Dear Mr. Sutcliffe:

Stanford Research Institute requests your help in a study it is conducting for a major data processing equipment manufacturer. The Institute has been asked to perform a product planning and application study to define the needs of industry and government relating to a new high-density optical technique for storing, retrieving and disseminating both written and graphic information.

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Current plans should bring me to your city during the week of December 3rd. I will telephone your secretary to arrange a more precise time for my visit when I arrive in the vicinity.

We hope our visit might prove as stimulating to you as we are sure it would be to us. Would you please let me know whether or not this time is convenient for you. Thank you.

Sincerely,

Charles P. Bourne
Research Engineer

CPB:etm

November 13, 1962

Mr. R. C. Duff
Vice President
Thomas Publishing Company
461 Eighth Avenue
New York 1, New York

Dear Mr. Duff:

Stanford Research Institute requests your help in a study it is conducting for a major data processing equipment manufacturer. The Institute has been asked to perform a product planning and application study to define the needs of industry and government relating to a new high-density optical technique for storing, retrieving and disseminating both written and graphic information.

I would appreciate a chance to visit with you or a knowledgeable member of your systems staff to discuss possible applications of this technique to some of your organization's information handling problems. I am particularly interested in obtaining a description of your present requirements (written or graphic) for the storage, retrieval and dissemination of information, as well as any present or planned methods of meeting these requirements.

Current plans should bring me to your city during the week of December 3rd. I will telephone your secretary to arrange a more precise time for my visit when I arrive in the vicinity.

We hope our visit might prove as stimulating to you as we are sure it would be to us. Would you please let me know whether or not this time is convenient for you. Thank you.

Sincerely,

Charles P. Bourne
Research Engineer

CPB:etm

November 13, 1962

Sales Manager
Microtext Publishing Corporation
115 Liberty Street
New York 6, New York

Dear Sir:

Stanford Research Institute requests your help in a study it is conducting for a major data processing equipment manufacturer. The Institute has been asked to perform a product planning and application study to define the needs of industry and government relating to a new high-density optical technique for storing, retrieving and disseminating both written and graphic information.

I would appreciate a chance to visit with you or a knowledgeable member of your systems staff to discuss possible applications of this technique to some of your organization's information handling problems. I am particularly interested in obtaining a description of your present requirements (written or graphic) for the storage, retrieval and dissemination of information, as well as any present or planned methods of meeting these requirements.

Current plans should bring me to your city during the week of December 3rd. I will telephone your secretary to arrange a more precise time for my visit when I arrive in the vicinity.

We hope our visit might prove as stimulating to you as we are sure it would be to us. Would you please let me know whether or not this time is convenient for you. Thank you.

Sincerely,

Charles P. Bourne
Research Engineer

CPB:etm

November 13, 1962

Sales Manager
Readex Microprint Corporation
5 Union Square
New York 3, New York

Dear Sir:

Stanford Research Institute requests your help in a study it is conducting for a major data processing equipment manufacturer. The Institute has been asked to perform a product planning and application study to define the needs of industry and government relating to a new high-density optical technique for storing, retrieving and disseminating both written and graphic information.

I would appreciate a chance to visit with you or a knowledgeable member of your systems staff to discuss possible applications of this technique to some of your organization's information handling problems. I am particularly interested in obtaining a description of your present requirements (written or graphic) for the storage, retrieval and dissemination of information, as well as any present or planned methods of meeting these requirements.

Current plans should bring me to your city during the week of December 3rd. I will telephone your secretary to arrange a more precise time for my visit when I arrive in the vicinity.

We hope our visit might prove as stimulating to you as we are sure it would be to us. Would you please let me know whether or not this time is convenient for you. Thank you.

Sincerely,

Charles P. Bourne
Research Engineer

CPB:etm

Modified 11/5/62

CALL LIST ARRANGED BY APPLICATION AREA

Description of application areas considered and representative organizations that may be contacted. List will be expanded to include any new worthwhile leads uncovered during interviews.

I. Micro-Form Publication of Formal Literature.

(publications in microfilm, Microcard, or other micro-image media, of books, theses and dissertations, periodicals and journals, newspapers, and other similar material.) The following list is a complete directory of all the U.S. microform publishers of this type.

Publisher	Location
American Bar Foundation	Chicago, Illinois
American Chemical Society	Washington, D.C.
American Jewish Periodical Center Hebrew Union College - Jewish Institute of Religion	Cincinnati, Ohio
Matthew Bender & Co., Inc.	Albany, New York
J. S. Canner & Co., Inc.	Boston, Roxbury 20, Mass.
The Catholic University of America Press	Washington 17, D.C.
Chronicle of United Nations Activities	New York 1, New York
Consultants Bureau Enterprises, Inc.	New York, New York
Arthur H. Clark Co.	Glendale, California
Facts on Film, Southern Education Reporting Service	Nashville, Tenn.

Dr. Carlton M. Herman, Editor (J. Wildlife Diseases)
Chief, Section of Wildlife Disease & Parasite Studies
US Fish & Wildlife Service
Patuxent Wildlife Research Center
Laurel, Md.

Publisher	Location
Falls City Microcards	Louisville, Kentucky
Godfrey Memorial Library	Middletown, Conn.
Institute of Paper Chemistry	Appleton, Wisconsin
N. A. Kovach, Microfilm Dept.	Los Angeles, California
Lost Cause Press	Louisville, Kentucky
Louisville Free Public Library	Louisville, Kentucky
Massachusetts Historical Society	Boston, Mass.
Meade Natural History Library Zoology Dept., Tulane University	New Orleans, La.
The Michie Company	Charlottesville, Va.
Microcard Editions, Inc.	Washington, D.C.
Microfilm Service & Sales Co.	Dallas, Texas
Microlex Corp.	Rochester, New York
~~Micro Photo, Inc.~~ (recently bought by Bell & Howell)	Cleveland, Ohio
Microprint Publishing Co., Division of Dakota Microfilming Service	Denver, Colorado
Micro-Research Corp., c/o American Antiquarian Society	Worcester, Mass.
Microtext Publishing Corp.	New York, N. Y.
New York Public Library	New York, N. Y.
The New York Times, Library Services Dept.	New York, N. Y.
Newsweek Corp.	New York, N. Y.

avoid Micro-Books (?) in Phila. area (Retired Value)

Publisher	Location
Readex Microprint Corp.	New York, N. Y.
Research Microfilms	Annapolis, Md.
Science	Washington, D.C.
Peter Smith, Publisher	Gloucester, Mass.
Society of Exploration Geophysicists	Tulsa, Okla.
Stechert-Hafner, Inc.	New York, N. Y.
U. S. National Archives and Records Serv.	Washington, D.C.
Universal Microfilming Corp.	Salt Lake City, Utah
University Microfilms, Inc.	Ann Arbor, Mich.
University of Alabama	University, Ala.
University of Chicago Press	Chicago, Ill.
University of Florida Library	Gainesville, Fla.
University of Kentucky Press	Lexington, Kentucky
School of Health & Physical Education, University of Oregon	Eugene, Oregon
University of Rochester Press Rush Rhees Library	Rochester, N. Y.
University of Wisconsin Press	Madison, Wisconsin
Wildlife Disease Assn., American Institute of Biological Sciences	Washington, D.C.
Mc Graw-Hill	New York

II. Microform Publication of Nonformal Literature.

(manufacturers' catalogs and other data)

Publisher	Location
Sweet's Catalog Service	New York (thinking about starting a microfilm issue of their catalog)
Thomas Publishing Co.	New York
Vendor Specs Micro File	Denver

III. Microform Publication for Captive Audiences.

(U.S.N. ships' catalogs and part lists such as those of Bureau of Supplies and Accounts, part catalogs of auto dealers, USAF Logistics Command Tech. Order distribution, airplane manufacturers maintenance manuals, telephone directories.)

Organization	Location
USAF Logistics Command	Dayton
Douglas Aircraft	Santa Monica, California
Lockheed Aircraft	Palo Alto and Los Angeles
~~Bell Telephone System~~	~~New Jersey~~
~~U.S. Bur. of Supplies & Accounts~~	~~Washington, D.C.~~
NASA	Washington, D.C.
Government Printing Office	Washington, D.C.
AEC	Washington, D.C.
ASTIA	Washington, D.C.
DSA	Washington, D.C.

Organization	Location
GSA	Washington, D.C.
Logistics Management Institute	Washington, D.C.
Battelie Institute	Columbus, Ohio
R. H. Donnelly	Chicago, Ill.

IV. ~~Engineering Drawings.~~ OMITT

(engineering and architects' drawings)

Organization	Location
Lockheed (and other local companies)	Palo Alto, California
Jet Propulsion Labs	Pasadena, California
Bell Labs	New Jersey
U. S. Army Signal Supply Agency	Philadelphia
Westinghouse	Pittsburgh, Pa.
Langan Corp.	N.Y.C., New York

V. Archives.

(large storage or reference files with relatively little activity, e.g. U. S. Patent Office, A.F. personnel records file, Weather Bureau Records, title insurance, tax and property records, ~~U. S. Geologic Survey~~)

Organization	Location
~~U. S. Geological Survey~~	~~Palo Alto, California~~
A. F. Finance Center	Denver
Title Insurance & Trust Co.	Los Angeles
U. S. Army Records Center	St. Louis and Washington, D.C.
County Recorders	San Francisco and other local counties
U. S. Navy Bu Pers	Washington, D.C.
A.F.C.A.S. (personnel folders)	Washington, D.C.
CIA	Washington, D.C.
Treasury Dept. (Bond files)	Washington, D.C.
U. S. Patent Office	Washington, D.C.
Library of Congress	Washington, D.C.
Council on Library Resources	Washington, D.C.
Civil Service (personnel records)	Washington, D.C.
U. S. Weather Bureau	Washington, D.C.
Social Security Administration	Suitland, Md.

VI. Commercial and Legal Business Records.

(where the documents are used as part of the current business operation, e.g. retail sales, credit agencies)

Organization	Location
Retail Stores	
Broadway-Hale	Los Angeles
J. C. Penny	New York
Speigel, Inc.	Chicago
Insurance Co.	
Metropolitan Life	New York
Prudential Life	Newark, N.J.
Firemans Fund	San Francisco
Hospitals	
V.A. Administration	Washington, D.C.
Credit Agencies	
Dun & Bradstreet	New York
Credit Bureau of Greater N.Y.	New York
Banks	
Bank of America	Los Angeles
Chase Manhattan	New York
Law Enforcement	
FBI	Washington, D.C.
N.Y.C. Police Dept.	New York
L.A. Police Dept.	Los Angeles

VII. Special Military Applications.

(storage and dissemination of plans, [redacted] logistical information, intelligence data, crypto keys)

Organization	Location
Mitre Corp.	Bedford, Mass.
NSA	Ft. Meade, Md.

VIII. Miscellaneous.

Service Centers

Microdealers, Inc.	Walthan, Mass.
Western Microfilms	San Francisco
Bay Microfilm-Micrographic	Palo Alto

Knowledgeable Individuals & Organizations

G. Sophar - Jonkers Bus. Mach.	Washington, D.C.
Peter Scott - MIT	Boston
National Records Management Assoc.	New York

Hubbard W. Ballou, Head, Photographic Service
Columbia Univ. Library
New York 27 (Morningside Heights)

IX. Special Applications Requiring Additional Equipment.

Marking-Photo Etching

Buckbee-Mears	St. Paul, Minn.

Label Addressing

R. H. Donnelly	~~Chicago~~

Printed or Integrated Circuits

?

The MICROCARD CORPORATION

30 EAST 42nd STREET • NEW YORK 17, N. Y. • Telephone: TN 7-2493

February 25, 1963

Mr. Charles P. Bourne
Stanford Research Institute
Menlo Park, California

Dear Charles:

Many thanks for your February 14th letter. Thirty copies of the Planning Guide are being sent to you under separate cover. They may be a little late, since I am waiting now for some microfiche copies.

There are somewhere between 5,000 and 10,000 readers in use today. The exact number is difficult to determine, since some of the readers would be quite old now. There are most certainly an equal number of Microcard and microfiche collections. Perhaps you will also be interested in the enclosed Microcard catalog, which will give you an idea of the extent of the available publications.

Microcard prices have not changed significantly over the past few years. We do not normally estimate prices without having some idea of what is involved, as they will change with different customer requirements. However, in general, Microcard prices will run about 2/3¢ per reproduced page for 10 copies, about 1/4¢ per reproduced page for 100 copies and about 1/5¢ per reproduced page for 1,000 copies. Microfiche can run as much as 25% more per reproduced page.

Please let us know if we can be of further assistance.

Very truly yours,

THE MICROCARD CORPORATION

Charles P. Yerkes (srn)

Charles P. Yerkes
Director, Contract Sales

CPY:srn
Enc.

February 14, 1963

Mr. Charles P. Yerkes
Director, Contract Sales
The Microcard Corporation
30 East 42nd Street
New York 17, New York

Dear Charles:

I enjoyed reading your recent booklet, "Planning Guide for a Miniaturized Technical Document Distribution System," and would like to use this booklet as one of the texts in a graduage course in Documentatinn that I am currently giving at the University of California School of Librarianship. Would it be possible for you to send me 30 copies that I could use in this way. For this class it would serve as a useful introduction to Microform publication.

As a further point of interest, could you give me an indication of the number of microcard readers that are installed in the United States, and how many of the university or industrial libraries have Microcard or microfiche collections of some sort?

In a recent publication by C. D. Gelatt (in Microtexts as Media for Publication) the selling price for Microcards was quoted as $1.95 for the negative and 7.2 cents per Microcard print. Is this still your current rate for service bureau Microcard production? (Does this mean that a double-side card requires two negatives and 7.2 cents per side printed?) Now that you are doing microfiche printing, what is your service bureau quote for microfiche printing?

I look forward to hearing from you.

Sincerely,

Charles P. Bourne
Research Engineer

CPB/rt

The MICROCARD CORPORATION

30 EAST 42nd STREET • NEW YORK 17, N. Y. • Telephone: TN 7-2493

AMERICAN DOCUMENTATION ANNUAL CONVENTION

December 11 through December 14, 1962

For the recent ADI Convention in Hollywood, Florida the Microcard Corporation prepared a booklet entitled:

PLANNING GUIDE FOR A MINIATURIZED TECHNICAL DOCUMENT DISTRIBUTION SYSTEM

Copies were available on one of the tables in the exhibit area. You probably obtained one, but in the event you did not, please complete this form and return it to our New York office. A copy will be sent to you immediately.

Very truly yours,

THE MICROCARD CORPORATION

Charles P. Yerkes

Charles P. Yerkes
Director, Contract Sales

CPY:srn

Dear Charles,

I enjoyed reading your recent booklet entitled, "Planning Guide for a Miniaturized Technical Document Distribution System". I would like to use this booklet as one of the texts in a graduate course ~~taken~~ in Documentation that I am giving at the University of California School of Librarianship. ~~It would be~~ I feel that it would be a good way for newcomers to get an introduction to the various microforms.

NAME Would it be possible for you to send me 20 copies that I could use in this way.

COMPANY

ADDRESS

As ~~a~~ a further point of interest, could you give me some indication of the number of microcard readers that are currently installed in the U.S., & how many of the university or industrial libraries now ~~subscribe to~~ have Microcard ~~collection~~ or microfiche collections of some sort?

I'm looking forward to hearing from you.

Sincerely

CS

cite cost formula · sub for microcard + microfiche formulas

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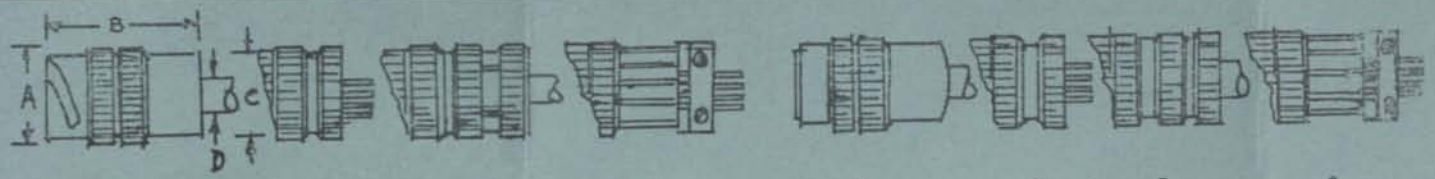

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Elizabethtown News
17 Dec 62
P 30

AMC to Use Rapid Retrieval

File System for Parts, Specs

By BOB WARD

HUNTSVILLE, Ala. — A new documentation system which is expected to save time and money in Army missile development by reducing duplication in the area of components design will be implemented next month by the Army Missile Command.

The system records groups of photographs of missile parts and their full specifications on microfilm. Design engineers will use film reader/printer machines to consult the file, which catalogs some 110,000 components.

This "rapid retrieval" process is already in use by a number of industries as a substitute for stacks of bound catalogs, an Army Missile Command spokesman pointed out. But its introduction next month by AMC will mark the first time any Government agency has compressed its documentation into such a compact, readily available package, he said.

The missile command, headquartered here at Redstone Arsenal, will send a 65-reel set of the filmed documents to its major contractors and "subs" at 20 locations throughout the United States. The film cartridge (Recordak Model PES2) will fit several different makes of reader/reproducers, it was said.

In effect, the system will enforce Army components standardization among the command's own design engineers as well as those of its contractors, the spokesman noted. AMC value-analysis specialists estimate it will save $3,000,000 the first year, and they predict efficiency will be increased by 10 per cent per year per design engineer through use of the new [illegible]

After the innovation is worked [illegible] conventional, the selection of a component design, review of the action, and approval — a procedure now requiring 30 days or more — can be accomplished in less than a day, the command spokesman said.

It is called the VEMF (vendor specification microfilm file) system and was developed for the missile agency by Information Handling Services, Denver, under a $300,000 contract.

The system groups missile components of similar type by functional characteristics.

Using the system was described as quite easy. For instance, an engineer designing a missile guidance system who needs a gear assembly will consult a small printed index listing alphabetically the names of all Army missile parts and the numbers of the appropriate microfilm cartridges.

The reel that contains drawings and descriptions of gear assemblies is located, and inserted into the microfilm viewer. It then is a simple matter for the design engineer to move from a picture of one component to another, comparing the desirable and undesirable features of each, and finally to select the part best suited to his needs.

The microfilm system, said the AMC spokesman, is a space-saver as well as a time-cutter. One cubic foot cartridge contains as much material as can be held by two large filing drawers of engineering drawings.

The missile agency film files each contain more than 75,000 secondary-items drawings. In addition, there is a set of military standards—more than 30,000 parts [illegible] used by all the services included in the documentation package.

list only the names, city, & state. omit street, Zone, telephone, & other i/s

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Chronicle of United Nations Activities, ~~234 W. 26th St.~~, New York 1, N. Y. ~~WAtkins 4-7775 /UN/~~

Constitutions Bureau Enterprises, Inc., 227 West 17th St., New York 11, N. Y. ALgonquin 5-0713 /CB/

Arthur H. Clark Company, 1264 South Central Ave., Glendale 4, Calif. CHapman 5-1444 /AC/

Facts on Film, Southern Education Reporting Service, Box 6156 Acklen Station, Nashville, Tenn. CYprus 1-1262 /F/

Falls City Microcards, 512 Emery Rd., Louisville 6, Kentucky. TWinbrook 6-9864 /FC/

~~Godfrey Memorial Library, Middletown, Conn.~~ ~~Diamond 6-4375 /G/~~

~~Institute of Paper Chemistry, Appleton, Wisconsin~~. REgent 4-9251 /IPC/

N. A. Kovach, Microfilm Department, 4801-09 Second Ave., Los Angeles 43, Calif. /KO/

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110	30			380	6	
120	37			390	2	
130	22	(156)		400	4	
140	26			410	6	
150	25			420	3	(14)
160	24			430	1	
170	26	(86)		440		
180	14			450		
190	17			460	1	
200	17			470	1	(5)
210	12			480	3	
220	11	(62)		490	1	
230	11			500		
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250	12			520	1	(4)
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91-100	8.60	2.25
101-110	9.10	2.50
111-120	9.60	2.50
121-130	10.10	2.75
131-140	10.50	2.75
141-150	11.00	2.75
151-160	11.50	3.00
161-170	12.00	3.00
171-180	12.50	3.00
181-190	13.00	3.00
191-200	13.50	3.00
201-210	14.00	3.50
211-220	14.50	3.50
221-230	15.00	3.50
231-240	15.50	3.50
241-250	16.00	3.50
251-260	16.50	4.00
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2. Special paper stocks not in our inventory.
3. Other sizes not covered above.

WARRANTY: Micro Photo necessarily must limit its liability for the quality of the prints to the controllable limits of the process, the quality of the original material filmed, or the quality of the film sent to us. Micro Photo reserves the right to return any material not suitable for filming or Xerox reproduction.

MINIMUMS apply for each item of a separate magnification, width, and type of paper.

PRICES SUBJECT TO CHANGE WITHOUT NOTICE. ALL WORK DONE ON OUR PREMISES. TERMS: NET 30 DAYS, F.O.B. OUR LABORATORY

Are you doing your own microfilming for Xerox reproduction? See other side for instructions.

MICRO PHOTO DIVISION
BELL & HOWELL COMPANY
1700 SHAW AVENUE · CLEVELAND 12, OHIO · AREA CODE 216 761-5758

MICROFILMING FOR XEROX COPYFLO REPRODUCTION

MICROFILM POSITION CHART

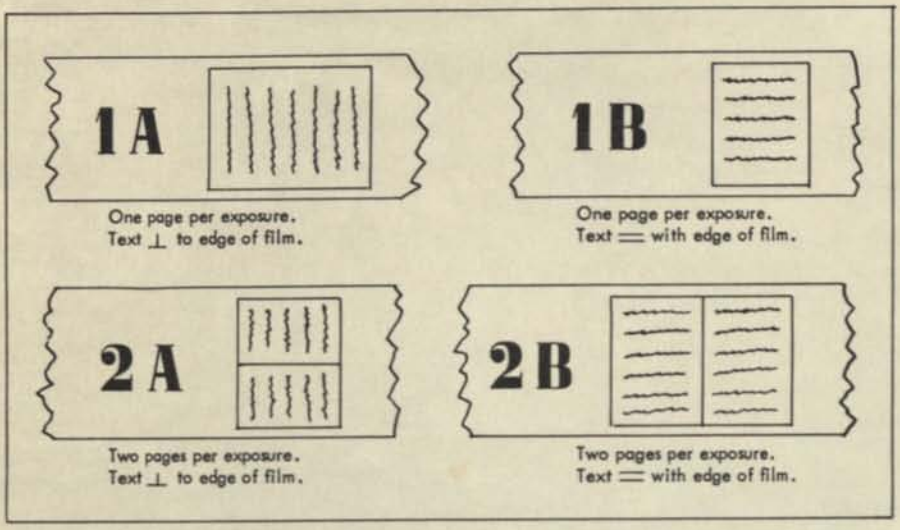


IMAGE SPACING AND POSITIONING

Code	Indicates
1	-- one page per exposure
2	-- two pages per exposure
A	-- text perpendicular to edge of film
B	-- text parallel with edge of film

BOOKS OR MANUSCRIPTS

Position: Bound material printed on both sides of the page can be microfilmed in either position 2A or 2B. Single-sided material such as a typed manuscript can be microfilmed in either position 1A or 1B.

Size Limitation: Position 1A or 2A allows a maximum reproduction width of 11". Position 1B or 2B allows a maximum reproduction height of 11".

Reduction Ratio: Reduction ratios of 7 to 22 can be used. For best results, however, reduction ratio should be kept as low as possible. Note dimensions of original material in title block.

Spacing: Spacing between frames should be kept to a minimum, allowing only for trimming or binding edges of Xerox copy.

Density: Correct density is important. If there is any question, send us a sample with a notation of light setting. We will advise changes if indicated.

Alignment: Maintain position of material carefully. With bound material, align gutter of book with letter F of finder light image. Check after every 10th exposure.

DUOPAGE Reproduction: Write for special instructions if DUOPAGE two-sided reproduction is desired.

LARGER MATERIAL (Maps, charts, foldouts, etc.)

Use position 1A, 1B, or 2B with smallest side across the width of the film. This will allow a maximum reproduction width of 11" by any length.

OFFSET MASTERS

Write for special instructions. Describe original material, number of copies required, and the equipment to be used in printing, as well as size of master required.

See other side for pricing Schedule

WRITE US IF YOU HAVE ANY SPECIAL PROBLEMS.
WE WILL DO OUR BEST TO HELP SOLVE THEM.

MICRO PHOTO DIVISION
BELL & HOWELL COMPANY
1700 SHAW AVENUE · CLEVELAND 12, OHIO · AREA CODE 216 761-5758

AMERICAN BOOK PUBLISHING RECORD
(October 31, 1962)

Pure Science

406,64 pages 154 books

Technology Section 254 books

735,82

40664	154
73582	254
52624	182
88667	272
255537 pages	862 books

⇒ 296 pages/book

AMERICAN BOOK PUBLISHING RECORD
(November 30, 1962)

Pure Science

526,24 182 books

Technology Section 272 books

886,67

min. = 2 pages
max = 8011 pages

Total number of pages of all AEC reports recently distributed to the AEC depository at SRI

196,01 pages

274 reports
min. = 1 pages
max = 601

⇒ 72 pages/report

Dissertation Abstracts 9/62

No. of pages/dissertation

range: 34 – 885
avg.:

89	142	92	134	235	108	201	259
151	78	137	80	137	120	223	200
169	111	76	107	136	220	249	206
98	157	107	48	83	60	171	119
251	134	84	150	76	158	236	274
117	78	92	55	126	68	194	111
124	108	178	96	90	162	281	106
115	97	80	101	137	70	164	366
77	183	86	144	113	87	153	120
114	64	94	126	219	161	581	207
121	79	132	100	86	262	176	125
162	105	57	159	75	96	215	125
206	167	109	192	176	91	352	141
125	111	72	143	144	47	179	173
221	248	267	94	95	113	248	84
121	311	69	61	93	117	239	231
189	141	57	116	93	176	301	315
190	183	145	94	219	104	177	142
170	216	137	115	72	89	242	105
105	62	126	117	70	69	255	221
112	68	52	114	201	166	157	294
275	66	111	138	208	80	290	164
72	92	46	84	94	658	from 101	191
73	87	181	123	210	396	349	551
81	95	79	174	139	340	175	141
128	115	403	100	93	276	414	150
150	141	139	161	90	103	386	197
124	103	165	174	71	285	292	358
95 1/1025	125 3/647	63 3/1130	72 3/3372	163 3/1746	148 1/1830	276 3/1277	530 6/1081

184	191	188	189	144	75	259	405
284	129	183	145	40	260	283	562
176	72	190	110	86	885	262	188
232	601	291	208	109	227	280	218
357	198	103	96	134	124	284	207
215	116	189	87	131	83	419	150
143	208	357	235	70	141	190	104
223	48	142	185	70	114	109	130
167	266	292	80	111	85	319	105
213	101	131	146	106	160	263	34
411	412	124	121	123	250	213	140
256	90	373	156	104	255	474	79
314	87	362	351	133	165	155	49
195	334	295	169	129	176	157	36
295	377	175	167	110	118	410	106
307	218	345	218	88	387	267	48
338	98	227	142	151	428	412	117
378	72	232	267	39	91	357	50
257	193	155	242	54	279	307	79
103	347	150	78	256	146	204	61
73	242	246	125	177	222	520	126
222	82	235	165	157	484	275	80
211	202	142	210	149	304	268	124
172	181	192	173	358	326	290	55
165	315	169	161	319	439	244	80
135	122	204	122	429	543	490	762
144	343	157	87	93	329	543	172
78	279	134	60	139	294	152	178
6248	5924	5983	4515	4002	7410	8406	4449

101	124	175	85	380	384
131	159	488	115	350	168
97	108	305	33	308	73
105	88	93	107	306	282
76	124	164	122	99	342
68	83	124	53	326	468
108	159	186	41	105	235
263	99	58	108	137	198
272	126	129	52	156	60
263	103	75	91	99	94
563	191	100	65	93	101
62	252	92	197	198	49
69	159	102	97	141	239
152	102	401	45	176	53
122	73	160	130	362	203
173	71	128	246	202	110
113	122	139	365	322	72
110	154	43	363	223	92
122	89	63	748	269	258
200	394	144	347	231	78
141	587	120	377	249	480
144	422	172	280	96	761
56	273	36	177	384	99
57	380	112	249	320	60
101	402	108	367	190	4959
69	282	250	189	582	
116	306	38	280	222	
62	281	268	377	105	
3916	5713	4263	5706	6640	

620 items

grand total = ? 114,542

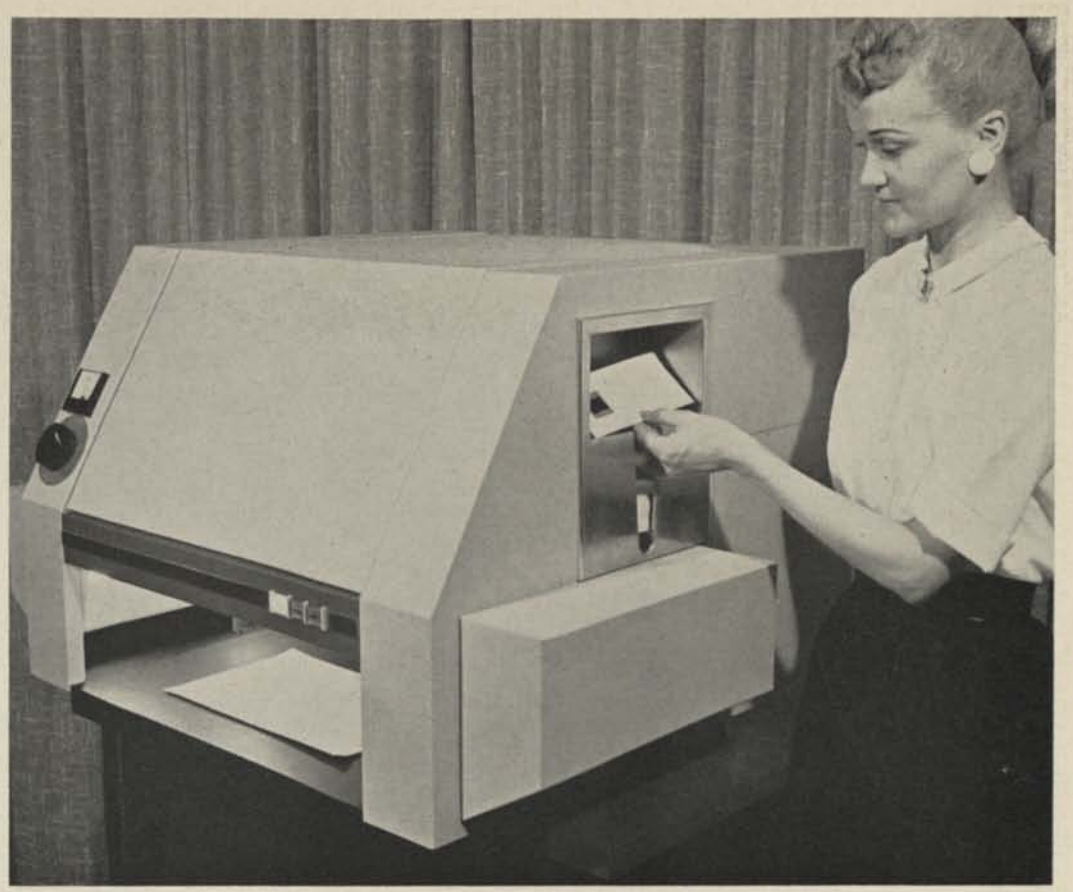
average = 5206

grand total = ?

620

$\frac{114,542}{620} = 185$

avg.



Filmsort 1000 processor-camera manufactured by 3M will film, process and deliver fully exposed and developed microfilm mounted in aperture cards in less than a minute.

Processor-Camera Makes Aperture Cards

Product Preview

THE Filmsort 1000 processor-camera can convert an original record to space-saving microfilm in less than a minute. The unit has been introduced by Minnesota Mining and Mfg. Co. and performs the functions of three different pieces of equipment: a camera, a processor and a film mounter.

A cartridge containing up to 500 Filmsort camera cards is loaded into the machine from the left. Cards contain previously mounted and ready-to-expose frames of 35mm silver microfilm. The document to be filmed for reproduction is placed in position on the copyboard portion of the machine. Pressing a button (at the front of the machine) will cause the unit to automatically film the copy, process the film and deliver fully exposed and developed microfilm mounted in the aperture card. Cards are removed from the right of the machine, ready for immediate use or storage.

The unit has a fixed reduction ratio down to 16 diameters or it can take copy up to 18x18-in. in size. Since each camera card contains its own supply of unexposed film, no film rolls, splicing or mounting are involved.

The equipment works in a fully lighted office, thereby eliminating any need for a darkroom.

Filmsort aperture cards can be viewed in a reader-printer, can be copied, or can be used to produce a reproduction master. With a 3M Uniprinter 086 copier, a Duplicard copy card can be made.

Aperture cards can be used for engineering drawings; retention and retrieval; billing; accounts payable; and numerous other business applications.

The Filmsort 1000 will be available in 1963 for approximately $1,995. It will have the capability to film the front and back of an 8½x11-in. form from one "C" aperture card, and will make microfilm available for immediate distribution and reproduction without time lags for either the processing or film mounting cycles. Circle No. 101

A N N O U N C I N G

VariTyper® FotoList®

THE NEW MODEL 90

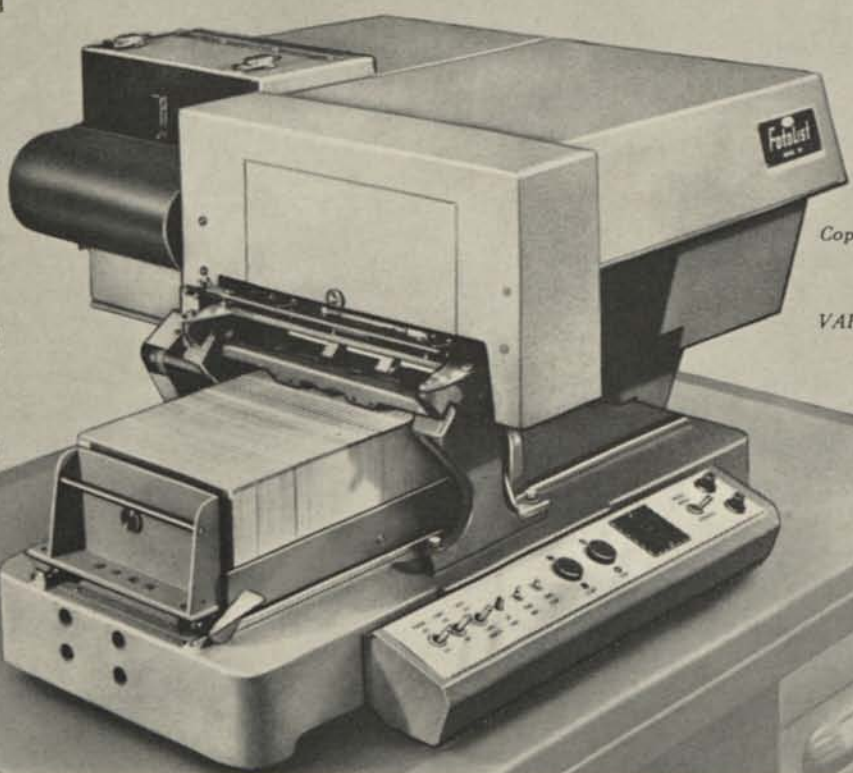
SYSTEM

A Low Cost Sequential Card Camera With Desk-Top Operating Simplicity

◀ AUTOMATICALLY COMPOSES FILE CARD DATA INTO SEQUENTIAL LISTS ON READY-TO-PRINT NEGATIVES ▶

Here is a complete, automatic sequential listing system for little more than **HALF** the cost of any other list-composing method on the market. The new, compact FotoList model 90 is profitable for part time use as well as round-the-clock duty, producing attractive, typographically-correct lists or galleys of text from card file data--bypassing 'hot-type' methods and cost. The coupon will bring all the facts.

parts lists
price books
indexes
catalogs
inventories
directories
stock data



Copy for this entire 'Ad' was composed on VARITYPER equipment.

VariTyper Corporation

A SUBSIDIARY OF ADDRESSOGRAPH–MULTIGRAPH CORPORATION

720 FRELINGHUYSEN AVENUE • NEWARK 14, NEW JERSEY

Please send VARITYPER Book F-93

NAME .....

COMPANY .....

ADDRESS .....

CITY ..... ZONE...STATE .....

For More Information Circle Reader Service Card No. 191

MICROCARD FOUNDATION
901 TWENTY-SIXTH STREET, N.W., WASHINGTON 7, D.C.

SOME GENERAL INFORMATION ABOUT MICROCARDS

MICROCARDS are 75 x 125mm (approximately 3"x5") opaque cards upon which are reproduced micro-images of printed and related materials. They are essentially positive photographic prints made from film negatives. Microcards contain up to 80 pages reduced by a factor of between 1/17 and 1/23, can be shelved 85 cards to the inch (1020 per foot), and cost 1/3 to 1 cent per reproduced page. Two-sided Microcards contain up to 160 pages and can be shelved 65 cards to the inch.

MICROCARD editions of original and reprint materials are published by the Microcard Foundation and by a number of other publishers.

MICROCARDS AND MICROCARD READERS are manufactured by the Microcard Corporation, West Salem, Wisconsin. "Microcard" is a trademark registered in the U. S. Patent Office by this firm. A micro-opaque card based on photographic processes may be produced by anyone having the equipment and technical knowledge - but only cards manufactured by the Microcard Corporation may bear the word "Microcard".

MICROCARDING is an edition process, that is, an efficient way of producing multiple copies. It is a means of publication, not a copying method. The savings offered by Microcards are not generally realized unless an edition of at least 15 copies is produced. Microcarding, therefore, is not a suitable method for producing single copies.

MICROCARDS offer the following advantages over materials published in a conventional manner:

(1) Savings in original purchase price, especially in the case of out-of-print works.

(2) As a means of publishing original materials, Microcards offer tremendous savings in that the author's manuscript, including photographs, charts, and drawings, can be filmed directly, thus eliminating typesetting, proofreading, and other costs associated with printing.

(3) Elimination of binding costs.

(a) It costs approximately $3. 50 to bind a 1000-page volume. By discarding, for example, an original journal after two or three years (the period of greatest use) and replacing it with the Microcard edition, savings are effected in that the cost of the Microcard edition will generally be less than the cost of binding the original. Two-sided cards effect even greater savings as they can hold up to 160 pages of text and can be filed 65 to 70 cards to the inch.

(4) Reduction of storage costs by 95%

(a) One Microcard can hold up to 80 pages of conventional text; 85 to 100 Microcards can be filed in an inch of drawer space; thus 6800 pages, or ten 680-page volumes, can be filed in one inch of drawer space.

(b) It costs approximately 50 cents per year to store a 1000-page volume. This cost is almost entirely eliminated when Microcards are used.

MICROCARDS offer the following advantages over other forms of microreproduction.

(1) Microcards and catalog cards are equal in size (75 x 125mm) and therefore can be stored in the same cabinets. Microcards can also be stored in standard 3"x5" card files.

(2) Two-sided Microcards are now (1959) available. These cards will not curl and they provide additional space savings as they are thinner than two one-sided cards.

(3) Microcards are easy to distinguish, one from another.

(a) Each Microcard contains, in type legible to the naked eye, the author and title of the work reduced upon it.

(b) Microcards are numbered so that each card and the material it contains can be quickly and easily identified. These numbers appear in legible type as follows: Card 5 (of 15) - p. 200-280.

(4) Microcards provide savings in cataloging and classification.

(a) When available, the Library of Congress Card is reproduced on the first Microcard of a given work. (This applies to cards issued by the Microcard Foundation beginning in 1959.)

(b) The first Microcard also contains full author, title, and imprint information in legible type.

(c) When possible, the Library of Congress and the Dewey decimal classification numbers are included on this first Microcard, as well as the Library of Congress card number.

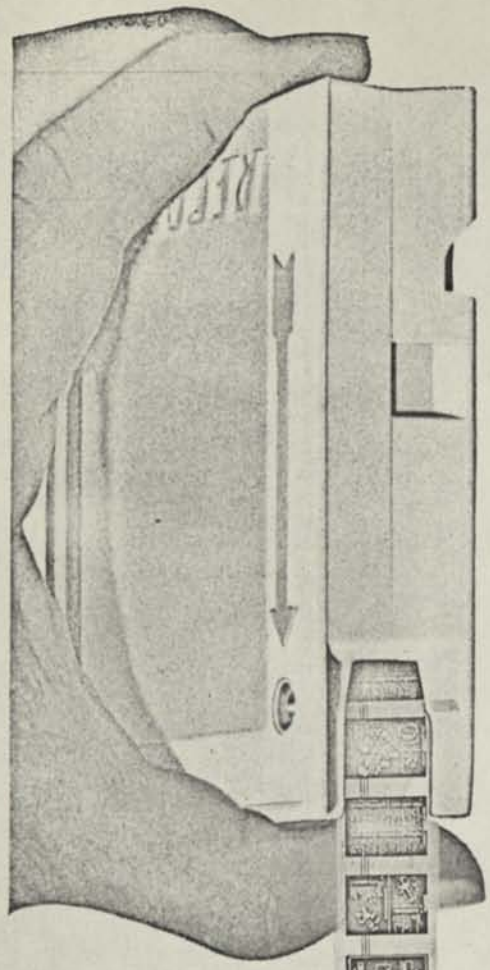
(d) In cases where Microcard is the original and only means of publication, the Library of Congress is requested to pre-assign a catalog card number.

(5) Microcards do not require special heat and moisture controls for preservation.

(6) Microcards are made on permanent paper stock and will remain clearly legible indefinitely.

(7) Microcards are produced photographically -- the images will not rub off or smudge.

(8) Microcard Readers occupy little space, are easily portable, provide a clear, sharp image, and are simple to operate.



Any microfilm record out of millions displayed in less than 20 seconds!

New from RECORDAK . . . an ingenious concept in data retrieval that lets you refer to microfilmed records with incredible ease and speed. No more fumbling with carton flaps, no more threading of film in reader.

Just slip film magazine containing thousands of microfilmed and indexed office records, catalog pages, or decoded computer data into RECORDAK LODESTAR Reader. It flashes on, threads film automatically. Even though film is advanced at speeds up to 600 ft. per minute, the index lines on the 16mm RECORDAK microfilm are easy to follow . . . lead right to the pictures you want.

On-the-job studies show that it actually takes less than 20 seconds for an operator to select a magazine . . . insert it into the RECORDAK LODESTAR Reader . . . and locate any record out of millions which can be kept on microfilm within arm's reach.

Mail coupon today for free folder giving details on interesting applications in business.

RECORDAK®

(Subsidiary of Eastman Kodak Company)

First and foremost in microfilming since 1928

IN CANADA Recordak of Canada Ltd., Toronto

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RECORDAK CORPORATION, Dept. A-4, 770 Broadway, N.Y. 3, N.Y.

Send free folder describing RECORDAK LODESTAR Reader. 11-1

Name_____ Position_____

Company_____

Street_____ City_____ State_____

Circle No. 519 on Post Card

return to CB.

MICROCARD EDITIONS, INC.
901 TWENTY-SIXTH STREET, N.W., WASHINGTON 7, D.C.

JOURNAL OF THE CHEMICAL SOCIETY (LONDON) ON MICROCARDS®

Order now, save $215.00, and get a reading machine* free

Microcard Editions, Inc. will publish a Microcard® edition of the JOURNAL OF THE CHEMICAL SOCIETY, 1847-1950, if a demand is evident.

The price is $1499.00 to those placing orders prior to June 30, 1963.

As an added inducement subscribers to the entire set will receive a Micro III Reader free of charge.*

Orders received after the above date will be filled at the publication price of $1714.00. (Does *not* include a Micro III.)

Advance orders for partial sets will be accepted as follows—a Micro III is *not* included

Volumes 1-82 (1847-1902), including indexes for 1873-1902	$554.00
Volumes 83-122 (1903-22), including indexes for 1903-22	$546.00
Volumes 123-128 (1923-25), and the volumes for 1926-50 (these volumes are not numbered)	$444.00

* *The Micro III Reader is a portable machine which reads Microcards and other micro-opaques—with an accessory clip-on film illuminator (not included in this offer) it also reads microfiche and jacketed microfilm. We will be happy to send you a descriptive leaflet on request. PLEASE NOTE THAT OUR OFFER IS OPEN ONLY TO THOSE WHO PLACE ADVANCE ORDERS FOR THE ENTIRE SET AND THAT IT EXPIRES ON JUNE 30, 1963.*

TO: MICROCARD EDITIONS, INC. 901 26th Street, N.W. Washington 7, D. C.

Please enter our advance order for ..... set(s) of the Microcard® edition of the JOURNAL OF THE CHEMICAL SOCIETY (LONDON) at the stated pre-publication price: ..... 1847-1950 at $1499.00—as subscribers to the entire set we will receive a Micro III Reader free of charge. ..... vols. 1-82 (1847-1902) and indexes at $544.00; ..... vols. 83-122 (1903-22) and indexes at $546.00; ..... vols. 123-128 (1923-25) and the vols. for 1926-50 at $444.00. Subscribers to partial sets will *not* receive a Micro III.

Name and title ..... Date .....

Institution .....

Address .....

.....

..... Please send me information about the Micro III. This is not a purchase order.

63.1.22

Systems Mgt 1/63

MICROFILM SYSTEMS

Missile Parts Specs Travel on Microfilm

Missile Command uses cartridge system for supplying contractors.

The Army Missile Command began this month to employ cartridges of roll microfilm and a compact catalog of their contents in a program that will make photographs, specifications and other information about missile parts readily available to the engineering departments of missile contractors throughout the nation.

A comprehensive and easily searched file of missile components on microfilm not only assists contractors in their design efforts, but it also enables them to make better use of component designs already in use. Missile Command personal will thereby be able to cut down on duplication in missile design.

First Government Use

The system, developed by Information Handling Services of Denver, groups photographs of components and their specifications on reels of microfilm. Called the VSMF (Vendor Specs Microfilm) system, it is already in private use by defence contractors as a substitute for stacks of catalogs, but this is the first time that a government agency has used the system. Thirty-five sets of approximately 65 cartridges of film each are being sent to missile contractors.

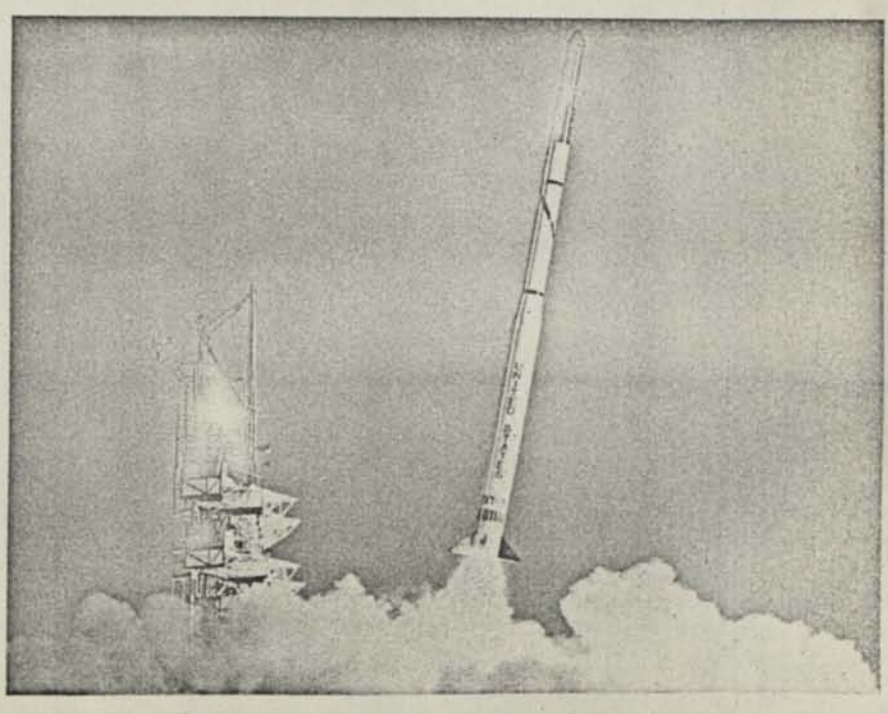
Missile Command value analysis personnel who combined the VSMF system with Army documentation are enthusiastic about the man hour and cost reduction involved. They estimate a cost reduction of more than $3 million or efficiency increased by 10 per cent per design engineer by using the system. Review and approval of missile equipment design can now be accomplished in less than a day, compared with 30 days with previous methods.

Using VSMF is easy. Suppose an engineer is designing a missile guidance system and needs a gear assembly. He consults a small printed index that provides the names, common and regional, of all Army missile parts in alphabetical order. From the catalog he locates the cartridge that contains drawings and descriptions of gear assemblies. It is a simple matter to check pertinent component photographs on a reader, compare good and bad features and search for the part best suited to do the job.

One cartridge of film holds as much material as two file drawers of engineering drawings. Missile Command cartridges contain more than 75,000 secondary items drawings. In addition, a set of military standards, more than 30,000 parts in common use among all the services is included in the Missile Command film set. These microfilm files are updated monthly to keep drawices, is included in the Missile Comvances in design. They are completely refilmed every four months to place the contents of the monthly cartridges in their proper place in the file.

One of the most important contributions the new data system will make is increased standardization of missile parts, a goal towards which Army procurement specialists are constantly working. With every contractor reading off the same cartridge of film, design engineers will avoid unnecessary addition of new items by choosing components already available in Army missile systems.

The VSFM system is a great improvement on former practices that involved time consuming and not always foolproof check and recheck procedures. Sources varied for each engineer or branch and from company to company. Personal files were often the authority for selection of a new part. A variety of commercial vendor catalogs have been available, but their number and bulkiness limits their usefulness to engineers designing modern missiles. □



copies are being prepared for the Library of Congress. The initial shipment containing some 2340 frames includes letters from many important personages of his era has been received in the Manuscript Division. Additional shipments will follow.

XEROX CORPORATION ACQUIRES UNIVERSITY MICROFILMS

Xerox Corporation of Rochester, N. Y. announced that it acquired University Microfilms, Inc. of Ann Arbor, Michigan on February 20. According to Joseph C. Wilson, president of Xerox and Eugene Power, president and principal owner of the Michigan firm, University Microfilms will operate as a wholly-owned subsidiary of Xerox Corporation under the continued direction of Mr. Power.

Xerox will pay slightly more than 1% of its current outstanding common stock on which the 1961 profit after tax of University Microfilms and related enterprises equalled more than $3.50 per share. Under the terms of this agreement Xerox will also receive Mr. Power's majority interest in University Microfilms, Limited of England.

A rapidly growing company with sales now at an annual rate of $2,000,000, University Microfilms employs 110 people.

Established in 1938, the company has pioneered in the use of microfilm technology for the preservation and reproduction of out-of-print books, periodicals, scientific and technical journals and other printed material. Through microfilm and xerography, an instantaneous, dry imaging process which uses ordinary paper, University Microfilms makes available on demand to scholars and librarians, rare and otherwise inaccessible books or documents. The success of this enterprise has resulted in the rapid growth of a revolutionary new concept in the publishing industry, publishing in editions-of-one.

In order to obtain original material for microfilming, Mr. Power has established working arrangements with 120 of the leading publishing houses in the United States and with the world's most distinguished universities and libraries. His microfilm files now contain approximately one half million "titles," including some of the first books ever made on an English printing press in the 15th century, to 1500 popular magazines and technical journals published today. He is able to supply on demand a precise duplicate of a 200 page original manuscript or out-of-print book for about $7.00. In addition, 80% of the doctoral dissertations accepted by educational institutions in the United States each year are published by this technique of production on demand.

NMA Micro-News 2/62

"This acquisition," said Mr. Wilson, "represents an extraordinary opportunity for Xerox Corporation to render service to civilization and at the same time to participate in a new way in another great growth market, the generation of knowledge. For years we have been seeking a closer relationship between xerography, in which we are the pioneers, and the world of scholarship.

"Now we have joined Eugene Power in his brilliant effort to preserve and, more important, make more useful to man the records of our civilization. The increase in population has created an explosion in world scholarship. The demand for more information of every description is staggering, a demand which simply cannot be met by libraries today. Mr. Power's idea of publishing in editions-of-one has in our view a big potential and the structure of Xerox suits unusually well the development of this publishing innovation for it complements our long range plans for growth.

"Xerox Corporation is a world wide organization and through its affiliations in Europe and the Far East (Rank-Xerox, London and Fuji-Xerox, Tokyo) is doing business in every corner of the globe. From a network of offices we will make available easily and inexpensively to scholars, librarians and to the world's scientific and business communities, literature of all kinds that has hitherto been inaccessible. Mr. Power has already made a significant contribution to universities and libraries and we hope to help him carry forward his work throughout the world."

"This is a red-letter day for University Microfilms and for me," said Eugene Power, "because in joining the Xerox family we are pooling our resources and our efforts to the further accomplishment of the goals we have held for so long.

"The microfilm technique which we have used for 25 years combined with the exciting possibilities offered by xerography, makes it natural that we should join with Xerox to achieve these goals more quickly.

"The union of microfilm and xerography means that any book or manuscript which can be brought within the reach of a microfilm camera can be "in print" and thus made available to scholars and others who want it at modest cost."

FIRST INTERNATIONAL CONGRESS ON REPROGRAPHY

The German Photographic Society in cooperation with the Fédération Internationale de Documentation is in the process of organizing the first International Congress on Reprographie (documentary reproduction) which will be held in Cologne, Germany in October, 1963. Exhibits as well as an extensive program will be featured. Manufacturers, technicians and users are welcome. Further information may be secured from the Congress-President, Dr. W. Schürmeyer, Deutsche Gesellschaft für Photographie, E. V., Neumarkt 49, Köln, W. Germany.

MICROCARD CORPORATION PRODUCES 20 MILLIONTH MICROCARD FOR AEC; TO HONOR AEC'S TECHNICAL INFORMATION MICRODOCUMENTATION PROGRAM

The Microcard Corporation produced in January the 20,000,000th Microcard for the U. S. Atomic Energy Commission's Technical Information Program.

Microcard President C. D. Gelatt said the company will honor the AEC's Office of Technical Information, its extension office in Oak Ridge, the company's on-site Tennessee installation and others involved in the 10-year microdocumentation program.

"This is the first time, to our knowledge, that a unitized microform has ever been used as a publishing medium to the extent and scope of the operation at the Atomic Energy Commission." "It is a significant milestone for the rapidly-growing micropublishing industry," he noted, "and a major share of credit for this development goes to far-sighted, cooperative officials of the AEC who fostered such a program."

He explained that the Microcard program, begun in 1952, has been designed to facilitate rapid and inexpensive dissemination of AEC unclassified research/development reports to libraries/depositories, other federal agencies, AEC contractors, universities, 88 foreign countries and others qualified to receive such data.

The program works this way: all unclassified R/D reports are delivered by the AEC to Microcard's 10-man production facility at Oak Ridge; the reports are then photographically-reduced in an 18 to 1 ratio on an opaque, 3" x 5" (75 mm x 125 mm) card which contains 48 page images each plus an eye-legible heading; an average of 300 copies of each report are produced and distributed to a regular mailing list; the recipient then reads the report on a reader/enlarger.

Advantages of using the Microcard printing processes, the company executive said, have meant a storage space reduction of

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95%... substantial cost and time cutting in printing and duplication ...postage weight saving...and permanent legibility, among other things.

Mr. Gelatt listed some interesting figures and comparisons of the AEC's decade-long Microcard program:

1. Approximately 12.5 million copies of AEC reports and 700 million pages are now on the 20 million Microcards.
2. Current production and distribution of Microcards for the AEC is three million annually.
3. Stacking one Microcard on top of another, the 10-year AEC production would rise four miles in the air—or an equivalent of 40 Washington Monuments.
4. Laid end to end, the 20 million Microcards would stretch 1,600 miles—or from Oak Ridge to Las Vegas, Nevada.
5. The 20 million Microcards would fill an average 15' x 15' living room while the full-size AEC reports would have to be placed in a 150' x 100' warehouse.

MICROFORUM

Establishment of MicroForum, which will provide a service and an educational facility unique to the microfilm industry, has been announced by Minnesota Mining and Manufacturing Co. (3M), St. Paul.

MicroForum will offer for the first time a completely integrated microfilm installation where representatives of business, industry, science and government can have their document reproduction and retrieval problems analyzed and programmed. They can film their own original drawings or documents, program electronic data processing cards, microfilm aperture cards; work out distribution systems and set up a satellite area for reference and reproduction.

No such facility exists in the microfilm industry today. As many as five and more separate suppliers of microfilm equipment must be consulted to obtain essential facts and requirements for establishing a microfilm system. To provide a complete facility, 3M has incorporated equipment of other manufacturers as well as its own.

MicroForum will be officially opened March 5.

The installation, which is located in the Graphic Products Research Center in St. Paul, includes an input area to make up the distribution of engineering data with aperture and copy cards, a satellite area for reference and reproduction of both aperture cards and copy cards and a conference area in which to plan the program.

LAW LIBRARY JOURNAL
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Library Photocopying and Copyright: Recent Developments

by VERNER W. CLAPP, Council on Library Resources, Inc.

Archives would have come into being even if no document had ever existed in more than one copy. Libraries, by contrast, owe their existence to the arts of multifolding. This was true even in the dawn of library history when it may be supposed that the competition for authors' original manuscripts was less keen than now: even Assur-Bani-Pal in the 7th and Ptolemy Soter in the 4th centuries B.C. had to be content with copies in order to develop their great libraries at Nineveh and Alexandria.[1] Libraries, in consequence, may be said to exist by virtue of copying. It may also be said that libraries exist for the purpose of copying; and—if it is permissible to extend somewhat the meaning of the word "copy"—it can be maintained that libraries exist solely for the purpose of copying.

Certainly none would maintain that libraries exist merely as dead stores of books, never to be used. They exist for use; but successful use involves copying in one form or another, the extent or accuracy of such copying being related to the user's need and interest.

If the need and interest be small, the extent and accuracy of the copy may likewise be low. An inattentive reader might have pored all day over a cuneiform tablet of Gilgamesh in the library at Nineveh, and have gone home at the end of the day with but a hazy impression of what he had been reading. In his case the retained image could only by courtesy be called a copy, much as courtesy is required to characterize as a copy the blurred and obscure product of some of the office-copying devices. Meanwhile another reader might have gone home at the end of his day with the entire Gilgamesh legend "engraved" forever on his memory with an exactness and clarity emulating the photographic, and quite sufficient to enable him to repeat the tale to his descendants or even (as has recently happened with some of the manuscripts of the New York Public Library) to produce a pirated edition of it in his bedroom! In what respect, it may be asked, did this reader's remembered version fail to meet the definition of an excellent copy?

Considered in this light, all use of books involves taking some kind of a copy, of which the mental copy is merely the first level. It is only when memory is deemed insufficient that mechanical is substituted for mnemonic copying. And, because mechanical copying is laborious, improvements have been brought to the work as fast as they have been developed—stylus and tablet, reed and papyrus, pen and parchment, pencil and paper, the typewriter; the photo-

1 6 *Libri* 225,228,234 (1956); E.A. Parsons: *Alexandrian Library* [1952] 163 ff.

graphic processes, which—now in their heyday—probably outnumber all that have gone before; and so on to electronic copying.

From earliest times, then, libraries have existed as places where books are assembled and organized in such fashion as to facilitate the copying which is an essential of use. Nor was such copying questioned until it repeated the history of authorship itself.

Authorship, though several thousands of years old, was of no particular interest to the law until a few hundred years ago, when it became the basis of a mass-production industry. Only then was it necessary to develop a separate body of legal principle and practice to govern the relations between authors, publishers and users of books, and to find a formula, balancing private against public interest, for the regulation of the natural monopolies which result from literary creation.

Similarly with copying in libraries. This was of no particular moment until it began to employ methods like (and in some cases identical with) those of mass production. So long as copying is mnemonic it is unlikely to incur much notice, unless—as in the New York Public Library instance—mnemonic copying becomes a step toward piracy. (Yet it is interesting to speculate how the rhapsodists of ancient Greece, who used to go about the country giving professional recitations of Homer from memory, would be treated under present copyright doctrine. Would their performances be treated like dramatic productions, or would compulsory licensing put them in a class with juke-boxes?)

So long, too, as copying was limited to pencil and paper, little of it could have extended beyond a few pages at a time; and furthermore, such a copy was not a facsimile and did not lend itself to the multiplication of further copies. The typewriter sped but did not greatly alter the situation. The copying camera and the Photostat made enormous strides; they copied a whole page at a time, and the product was a facsimile which lent itself to further reproduction, although the expensiveness of these processes, in comparison with the cost of a copy of a printed book, may be supposed to have limited their use. In any case, when the less expensive photographic methods arrived—microfilm and the more recent full-scale copying processes—the amount of copying increased enormously. And the products of these later techniques can almost invariably be used for the production of further copies, all more or less faithful facsimiles of the source copy.

Before the advent of microfilm in the 'twenties and 'thirties, few American librarians had occasion to think of copyright, except as a vague but commendable doctrine, intended for the encouragement of authors and the discouragement of plagiarism. Its connection with copying performed on the library premises was remote. But awareness increased rapidly, even perhaps traumatically, during this period. It was a shock to librarians to see for the first time in the Copyright Act its unqualified denial, except to

the copyright owner, of any right to make any copy whatsoever of a copyrighted work. "Have we been violating the law?" the librarians asked. "Possibly not", they were answered; "what you have been doing may well have been excusable under the doctrine of fair use." "What and where is this doctrine?" was the obvious retort; it got for answer, "Fair use has no statutory basis; it is a doctrine which enables the courts to live with a law which contains a misstatement of fact so palpable that, if interpreted and enforced literally, it would involve them in absurdities contrary to the public interest. But, since there is no way of predicting what a court might deem absurd, it is impossible to give a satisfactory definition of what constitutes fair use."

The result was to leave the librarian of the 'twenties and 'thirties in a quandary: whether to continue blindly to do as he had been doing, trusting to luck as to the result; or to play safe by prohibiting all copying on his premises of any text covered by a copyright notice.

The Joint Committee on Materials for Research of the American Council of Learned Societies and the Social Science Research Council was not content to leave matters in this posture. It attempted to develop a working definition of fair use for purposes of library photocopying through agreement with the trade association of American book publishers. The well-known Gentlemen's Agreement of 1935 was the result.

This Agreement, while iterating the prohibition against copying "any part" of a book by any means without the written permission of the copyright owner, provided an "exemption from liability" to libraries making a single photographic reproduction or reduction of a part of a book or periodical volume in lieu of loan or manual transcription, solely for purposes of research, and after compliance with certain other conditions.[2] This Agreement was also the basis of a Materials Reproduction Code prepared for the Association of Research Libraries and adopted by the American Library Association in 1940.[3]

However, the Gentlemen's Agreement did not settle the matter. In the first place, its claim that no part of a copyrighted work might be copied by any means without the written permission of the copyright owner did not square with actual practice as recognized by the courts. In the second place, the "exemption from liability" extended by the Agreement provided no real protection to a librarian in any particular case, especially one involving a publisher not a member of the group with whom the Agreement was reached. In the third place, the very use of the word "liability" implied an admission of wrong-doing which librarians were not prepared to accept.

Fourthly, the Agreement extended its "exemption," not as flowing from rights already possessed by librarians, but as an act of grace on the part of the copyright owners who would by this Agreement charitably diminish

2 (2 *Journal of Documentary Reproduction* 29-36, March 1939)
3 (35 *ALA Bulletin* 64, February 1941)

their own rights and suspend the infliction of pains and penalties in the enforcement of them. And this reasoning was the more curious in that the Agreement recited the very rights already possessed by librarians from which the right of library photocopying might have been expected to flow. Specifically, the Agreement permitted copying "in lieu of loan . . . or in place of manual transcription." The librarian's right to lend was herein implicitly acknowledged. The fact that "a student has always been free to 'copy' by hand" was later explicitly stated. And besides this, mention was made in the Agreement of the fact that "the courts have recognized the right to a 'fair use' of book quotations." But all these considerations were introduced quite incidentally and the total effect of the Agreement was to deprive the librarian of existing rights, making him the recipient of the bounty of the copyright proprietor rather than to clarify the scope of rights already possessed.

Finally, the Agreement severely limited the application of the extended "exemption." Copying might be performed only in lieu of loan or manual transcription, solely for the purposes of "research", and then only in compliance with certain formalities. Libraries were specifically warned, for example, from copying out-of-print material, even for their own use, without permission.

For all these reasons, the search for a more acceptable basis for library photocopying did not cease, and was taken up vigorously with the advent of the new crop of copying devices.

In 1954 the late Arthur Fisher, then Register of Copyrights (whom I had consulted on this matter) suggested to me that a basis for library photocopying might be found in the "law merchant" of library work—specifically, in the traditional and acknowledged practice of libraries of making it possible for their users to obtain copies of materials in their collections. Because modern copying devices obviously facilitate abuse of copying (in the sense of damaging the copyright owners' interests), it was Fisher's view that the asserted trade practice should to a degree be policed by the trade, i.e., by the organized library world, to prevent the rise of abuses which might endanger the exercise of the right.

This idea was carried to the Association of Research Libraries, which established the Joint Libraries Committee on Fair Use in Photocopying, representing itself, the American Association of Law Libraries, the American Library Association and the Special Libraries Association. The Committee, with assistance from the Council on Library Resources, retained as counsel the New York firm of Webster, Sheffield, Fleischmann, Hitchcock & Chrystie. Edward G. Freehafer of the New York Public Library has served as chairman of the Committee continuously since its establishment.

The Committee's first undertaking was to review the historical, theoretical and legal bases for library photocopying. Its next was to examine the actual practice of photocopying as conducted in a number of large libraries. To this end it assembled the

actual records of photo-duplication orders placed, executed and refused in each of these libraries during a sample period, and carefully analyzed these data (using IBM punched-card sorting equipment) so as to show the subject matter of the materials copied; their form (books, periodicals, maps, etc.); publishers (governmental body, learned society, commercial publisher, etc.); dates of publication; origin (domestic or foreign); number of pages copied; whether or not advertising figured prominently in the material; whether or not copyrighted; by whom requested (individual or corporate body); reason for refusal (if refused). These studies convinced the Committee that "the present demand [for photocopies] can be satisfied without measurable damage to publishers or copyright owners."

The Committee's report, containing the conclusions resulting from its investigations, the opinion of its legal advisers and its own recommendation, was published with some abbreviation in 52 *Special Libraries* 251-255, May-June 1961, and with some additional abbreviation in 55 *ALA Bulletin* 571-573, June 1961. The report was approved by all four of the national library associations represented on the Committee in June-July 1961.

The recommendation of the Committee is, simply, "that it be library policy to fill an order for a single photocopy of any published work or part thereof." The Committee bases its recommendation on the traditional characteristics of library service, and not upon any exemption from or subordination to other rights.

It is probable that the last word has not been said on the matter. It is noteworthy that, in announcing the American Library Association's action on the Committee report, the Executive Director of the Association reminded its members that the report "does not relieve any librarian of his legal and ethical responsibilities with respect to photocopying," and exhorted them "to continue to deal with the problem carefully and responsibility as they have in the past."[4]

Meanwhile, the need for freeing library photocopying from the strangling effect of the unqualified assertion of exclusive right contained in the Copyright Act is evidenced in the recommendations contained in *Copyright Law Revision. Report of the Register of Copyrights on the General Revision of the U. S. Copyright Law*[5] submitted to Congress in June 1961 and printed by the House Committee on the Judiciary. Provision is there made for library photocpoying, together with other kinds of fair use, under certain conditions, as an express limitation upon the copyright owner's right.

Meanwhile, too, the informal group incorporated in Washington, D. C. as the Committee to Investigate Copyright Problems Affecting Communication in Science and Education (also known as the "Meyerhoff Group" from the name of its chairman, the Executive Director of the Scientific Manpower Commission) has been investigating the photocopying prob-

4 (55 *ALA Bulletin* 680-681, September 1961)

5 House Committee Print.

lem from the point of view of the individual scientist (or other scholar) rather than from that of the librarian. This group is inclined to favor an ASCAP-like arrangement whereby an automatic royalty would be paid for each photocopy of a copyrighted publication into a fund for the benefit of copyright owners.

Meanwhile, also, the National Science Foundation, necessarily interested in the relationship between copyright and scientific communication, has commissioned an exploratory study "of the relationships of U.S. copyright law to the dissemination of scientific information" from the firm of George Fry and Associates.[6]

The copyright-in-photocopying pot continues to boil!

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[6] National Science Foundation: *Scientific Information Notes* 3:15, December 1961-January 1962.

The Understanding Soul . . .

. . . Each must in the long run decide how he is going to try to make himself clear. And he should, out of simple humanity, take pity on editors. If editors are often seen muttering to themselves and seem embittered, it may just be that they have been subjected to inhuman doses of indigestible prose. Let's not add further to their travail, but keep in mind that when Anthony Hope cautioned, "Unless one is a genius it is best to aim at being intelligible," he was giving good advice to most catalogers and other librarians who write for publication. . . .

From Edwin Castagna
"Please Help me to Understand"
5 *Library Resources and Technical Services* 301, 306. (Fall, 1961)

A. M. Spence
Director of Publications
Department of the Navy
Washington, D.C.

Pres. 8th annual NMA meeting

THE PRINTER LOOKS AT MICROFILM

A. N. Spence

The book you see in my hand is a Navy technical publication. It is an operating manual and comprises 186 pages. This manual has a history and it poses a problem. As to its history: It was printed in November 1958. The text was composed in hot type from which reproduction proofs were pulled. The proofs were stripped up in page form and photographed. Each page image was then transferred from the photographic negative to a metal plate. Finally, the plates were gathered into books and side stitched.

This particular manual tells how to operate a naval aircraft. Copies of the manual were delivered simultaneously with the delivery of the aircraft and a stock of a few hundred copies of the manual was put in bulk storage. Already some of the copies which were delivered with the aircraft have been lost or worn out - and these books get a lot of wear because, as you know, Navy personnel is subject to rotation and there are always new aviators coming on board. As a result, our bulk-storage depot has been getting requests for additional copies. These have been pulled from stock and shipped. Now stock of this particular publication is about to run out and the Navy is going to have to print more copies.

One of the problems we face in reprinting is that some modifications have been made in later deliveries of this aircraft and so the operating manual needs to be brought up to date. We don't think, however, that we are going to need many more copies

of the manual so our requirement is probably not going to be more than 100 copies. In many operating manuals we reprint only 25 copies. Think of the cost of printing a revised version of this manual for only 100 copies!

You may say, "Why worry about a few hundred dollars when we're spending millions?" If only one manual was involved, we wouldn't worry, but when you multiply this cost and this effort by the number of such manuals Navy has to reproduce, the cost and the effort become staggering.

The fact of the matter is that when one adds up the operating manuals, the maintenance manuals, the training manuals, the illustrated parts booklets, the stocklists, and all the other types of technical publications which the Navy needs in order to operate and maintain the extremely complex electronic and mechanical gear which is the basis of our Navy today, one arrives at the astounding total of at least 75,000 titles.

Literally miles of bin shelving are utilized to store the stocks of these publications. So, as I said before, this publication has a history and it poses a problem.

As to the solution to this problem, we think this little roll of microfilm which I am holding will provide the answer. Of course, this microfilm is not the full answer but merely one of the building blocks in a structure which we call our Microfilm Common Language System.

This microfilm roll which I have here actually contains the same number of frames as the manual does pages, and of course there is nothing new or startling about that. The use of microfilm as a storage medium is an old story. Millions of dollars have been spent

on developing equipment to provide an enlarged photographic reproduction of microfilm copy, which of course requires wet development and drying. Production versions of such equipment deliver the finished product in roll from which must be cut into page size by hand and, so far as I know, will print copy only on one side of the paper.

Recently, it has been possible to do the same sort of job using the Xerox process and, whenever the Xerox process is used, one of course can prepare paper masters which can be put on an offset press.

But Navy has perhaps 15,000,000 pages! What we should like to do is to get rid of our miles of bin shelving, to get rid of our inventory control problems, to get rid of our replenishment printing problems, and to substitue for all these a system which will let us take a microfilm like this and produce a book like this when we need it!

Not only do we want to do this but we think we are going to be able to do it. To be sure, no equipment which will do this job now exists, but the elements of the equipment needed are available. The principles are proven and the techniques have been tried. As a matter of fact, we look forward to being able in the very near future to take a microfilm roll like this, put it on a machine, and turn out a book like this printed two sides, side stitched and ready for mailing, in not much over two minutes time. When we can do this, there is no question about being able to get rid of our miles of shelving and our warehouses full of books.

But not all of our books are the same kind nor do they all have the same reproduction problems, so we are searching for and finding answers to a wide variety of problems which at one stage or another

incorporate the microfilm as an intermediate in the graphic arts process. Our ability to do this depends upon two factors, one psychological and one technical.

The psychological factor is a peculiar one - and that is customer acceptance of the final product. This is a matter of quality. For the various kinds of publications that I am talking about, however, Navy has a captive audience. The publications are essential tools in the performance of the daily work of the people who use them, not pieces of literature that are read because they are printed and bound in a manner that makes them more attractive than something else that might catch the eye. They are as essential to the performance of duty as a pair of pliers, an electronic test circuit device, or a table of logarithms. A primary essential then is that the material be readable and readily so, but it need not be representative of the highest quality of printing.

The related technical factor is the ability to produce a printing plate by enlargement directly from a microfilm frame. I suppose that the search for a projection-speed emulsion for use on either metal or paper plates is akin to the ancient search for the Holy Grail. At this period we are still in the search phase and we haven't found what we are seeking, although I am told by those who ought to know that perhaps the answer may not be too far distant. This is particularly important to us for we have recently completed a number of installations to produce 105mm negatives, primarily for reduction of engineering drawings and subsequent quantity half-size offset reproduction. If plates with projection-speed emulsion were available, we could use this equipment to excellent advantage and could

save half or more on our negative and platemaking costs. At the rate we make negatives, the saving would be more than substantial. For example, in one plant alone we make nearly 100,000 negatives per month. Right now, however, the only feasible method of making a printing plate from microfilm is through the use of the electrostatic process, as typified by the COPYFLOW and COPYTRON processes, or through a silver enlargement. But none of these equipments is suited to the reproduction of millions of pages, either in terms of paper plates or of hard copy.

The real breakthrough in this field is the new VIDEOGRAPH under development by A.B. Dick and, before many more months have passed, we hope to have an engineering model with which to experiment. We already know certain things about the capability of the VIDEOGRAPH. First, we know that it may be adapted to use hard copy, roll microfilm, aperture card microfilm, or magnetic tape input material. On the output side we know that reproduction can be accomplished at the high rate of 180 feet per minute, and in terms of flat sheets that is approximately 200 pages per minute. Nor is there anything technically infeasible in reproducing on both sides of the sheet.

It doesn't take very much imagination to see the bombshell effect of this development in the solution of at least one of Navy's reproduction problems. The VIDEOGRAPH becomes a missing link between this roll of microfilm and this publication. This is the bomb which can put an end to our publications warehouses, our miles of bin shelving, and many of our inventory controls. It will let us substitute for all these a bank of microfilm records which are almost instantaneously translatable into finished publications ready for issue!

The product will not be of outstanding quality but it will be acceptable and suitable so long as it is being produced for a captive audience.

I am sure that it is clear to everyone that attainment of this end result will not be simple and that there must be a great deal of work before we have an operating system. Nor is this the answer to every Navy publication reproduction problem.

I said earlier that Navy has what it calls a Microfilm Common Language System. When I use the term "common language" I mean that source material of any nature (and this includes punched cards, manuscript copy, printed pages, standing type, and even magnetic tape) must fit into a system which can utilize microfilm as an intermediate between the source and the finished product, the finished product being either publications which are produced on printing presses in volume or single copies of publications produced for issue upon demand.

Basically, our problems break down into two categories: First, the reproduction of copy which has already been produced; and, second, the generation of new copy. In the second field, the problem largely lies in the area of the reproduction of the output of computers and electric accounting machine equipment. But let me talk about the first problem first - that of reproducing material which has already been produced.

I said earlier that we have perhaps 75,000 technical publications, and these may comprise as many as 15,000,000 pages. If you had the task of microfilming these publications and completing the job before the publications themselves became obsolete, how would you tackle it? I don't know what your solutions would be but I can tell you how we

at Navy think the problem can be solved.

Let's assume that this publication is ready to be put into the hopper. What we would propose to do would be to trim off the gutter edge so that the pages would become separate sheets. Then, placing these sheets in a receiving tray, an automatic feeder would pick up each sheet in sequence, feed it into a carefully aligned position, microfillm it front and back, discharge the sheet, and stack it on the other end.

If this publication were one susceptible to revision and had to be reissued periodically to include revisions, we would, after appropriate development of the film, mount each frame on an aperture card, thus establishing the page as a basic building block for this publication. At this stage we can have either or both roll microfilm and aperture cards. This would permit us to utilize our aperture cards as the basic building blocks, to make page changes, and to insert new aperture cards to effect these changes. Since the VIDEOGRAPH utilizes the electrostatic process, it is of course entirely feasible to produce paper masters for short-run reproductions of publications, and I think that you will be interested to know that Navy has already ordered its first completely automated printing press.

This automated press will be designed to accept paper masters in a stack. In sequence it will feed a paper master, cycle the preparatory steps in the make-ready operation, run off a preset number of copies, stop, discharge the master, feed in a new master, and start the cycle all over again.

Insofar as the production of completed individual publications is concerned, we foresee the attachment of a stitcher on the output end of the VIDEOGRAPH which will be automatically actuated on the completion

of microfilming. Since the VIDEOGRAPH will reproduce microfilm frames in sequence, and since the output is flat sheet and not roll stock, that output will be already collated in the correct order.

As I said before, the elements of this system are all available and the techniques have been proven, but the specific pieces of hardware are not yet available. For instance, we know of no automatic microfilmer which will feed copy in and produce roll microfilm on a completely mechanized basis. One of of the very important considerations in this process is the maintenance of precise register - and this relates to the location of the image on the microfilm frame, and, in the case of aperture cards, the location of the microfilm frame on the card if the finished hard copy is to be in even approximately accurate placement. So much for the question of reproducing material which has already been produced.

The developments in the field of producing newly generated copy are, if anything, more startling than those that I have just related. It almost seems the world has gone nuts over computers. "Data processing" and the initials "EDP" have assumed an almost magical and mystical significance. But any way you look at it, we do know that the computers of today are producin information which was never before available, informati which is needed by numerous people, and information whi so far, if it must be reproduced for distribution, must alas, stop being automated at the point of printout from the computer and must utilize pedestrian rather than mechanized processes during the remaining stages of reproduction.

There are two problems about this. First, the printout from computers is especially wasteful of space The typography itself utilizes nearly twice as much

linear space as does a good printer's typeface. Second, there is a rigidity in format imposed by the nature of information input which is just as wasteful, if not more wasteful, than the typeface itself. Navy is tackling both of these problems. We think we are going to be able to use the "magic brains" of the computers themselves to program the output in such a way that we can eventually employ proportional spacing for typography, use upper and lower case letters, and produce double- or triple- column page layouts. All of this programing will result in codes on magnetic tape which could actuate the character generation system in a microfilmer.

We are happy to say that Eastman Kodak Company is coming close to achieving many of these objectives in its new DACOM equipment. This equipment accepts magnetic tape directly from the output of a computer and produces as its product a microfilm image. And it does this at the rate of 16,000 characters per second. In the realm of dancing on "Cloud Nine", they are now working to speed this process to about 60,000 characters per second. Navy has been working closely with Eastman in the development of the process to meet new needs and we are extremely hopeful that before very many months pass we shall be able to have this equipment. I think you would like to know about one type of project on which we think this system has a real application.

Navy has a most complex problem in attempting to develop and maintain parts lists and allowances of spare parts to be stocked aboard ship. As you know, a ship is a mass of equipment and every piece of equipment has its own repair parts allowance. But every ship is different. For an average ship, under present procedures, it takes about 2,000 pages to

portray the allowance parts list for the ship. Then there are about 50 places in the Navy (shipyards, repair facilities, supply depots, etc.) that need to have a copy of parts breakdowns for each piece of equipment used by Navy. The master list, when it is completed, is likely to comprise several hundred thousand pages of list material, but initially there is need for only three copies of the list as it applies to each individual ship. Basic information on components, repair parts allowance quantities, and which components are installed on which ships, are fed into the IBM 705 computer. This computer digests, sorts, and analyzes all of this material and produces, for each piece of equipment, an allowance list of parts - and for each ship a list of which components are aboard that ship. And I might say that there is a very substantial problem in revising these allowance parts lists. The basic problem, though, is one of maintaining the individual parts list as a common denominator, and of devising a system for assembling the applicable parts lists into books to represent the allowances for a specific ship, and then to consolidate the quantities of the parts common to several pieces of equipment to produce a consolidated allowance list. To solve this problem DACOM can be used to produce the microfilmed allowance parts list, which can then be mounted in aperture cards to give random access for the assembling of applicable parts lists to produce a coordinated shipboard allowance list. From the aperture cards we can of course produce electrostatic paper masters which can go on our automatic printing press to produce copies of the allowance parts list needed for general distribution. If we had available, as we soon hope to, a card-to-roll printer using the diazo process for our

aperture cards, we could produce individual rolls for each list quickly and cheaply and utilize the 11" XEROX COPYFLOW to produce paper masters for our mass distribution. To produce the ship's collection of allowance parts lists, we can select mechanically from the available aperture cards those parts lists needed for the ship, and we can produce hard copy on the VIDEOGRAPH. This hard copy will be already collated and ready for insertion in the looseleaf binder.

There are several techniques which we can use to print on both sides of the sheet to overcome the present deficiencies of equipment available for electrostatic reproduction. As soon as typographic and format programing techniques can be incorporated into the DACOM process, we believe that we can cut the present size of these ships' allowance lists by nearly one-half. Certainly we can speed the production of them, cut the costs of reproduction, and by maintaining the basic records on microfilm in page units provide a simple means for effecting revisions cheaply and quickly.

I wish I had time to tell you of a number of the other developments to which Navy is looking forward, all of which, put together, constitute a revolution in graphic arts reproduction. In some of these new developments microfilm plays a part, while others I must confess are far removed from microfilm techniques. But I think I have told you enough to make it clear that microfilm has at last jumped the barrier and has really entered the graphic arts field with implications far beyond the initial start in the field of reproducing engineering drawings at half size.

It is of course obvious that, until such time as a projection-speed emulsion can be developed, the

invasion of microfilm into the graphic arts field will be limited in large measure to those areas where the printed image is a necessary medium of communication rather than a competitive medium of communication. But with the development of such new instruments as the A.B. Dick VIDEOGRAPH and Eastman's DACOM, microfilm has an obvious and highly important role to play in the field of administrative printing, and this is a lot of printing!

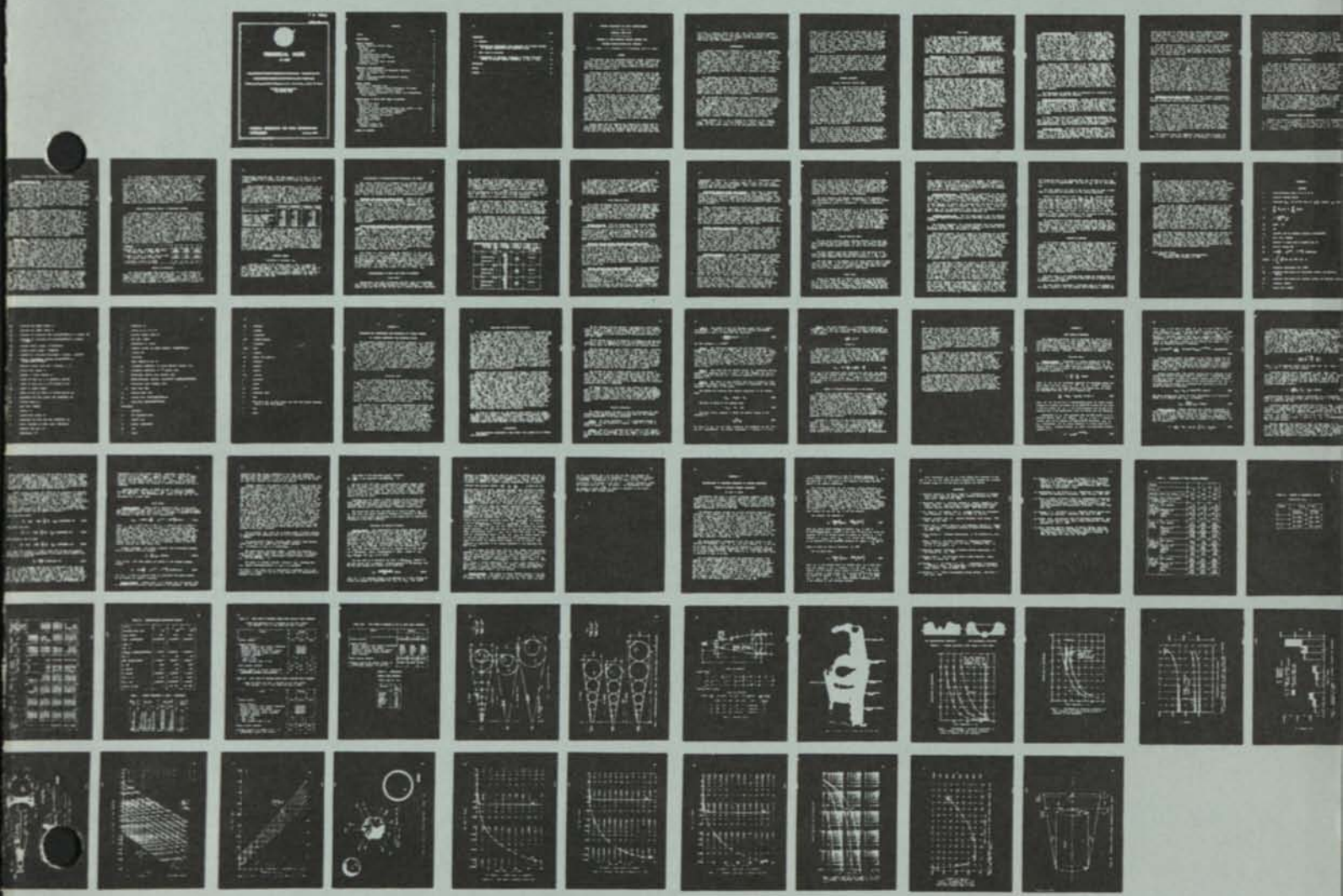
But the problems in this field are not yet all solved. Much remains to be done, so I suggest that those of you who want to keep up with the trend should put on your thinking caps, unlimber your budget pencils, build up your research and development programs, and get on with the show!

MICROFILM SYSTEMS

Microfilm Card Is Information Medium For Space Agency

M. 27-29

10 cents/sheet for the film stock



Reprinted from November 1962 issue of Systems Management

RECORDAK planetary Camera used in Filming technical information for NASA.

MICROFILM SYSTEMS

Microfilm Card Is Information Medium For Space Agency

by DAVID P. WAITE
President
Information Dynamics Corp.

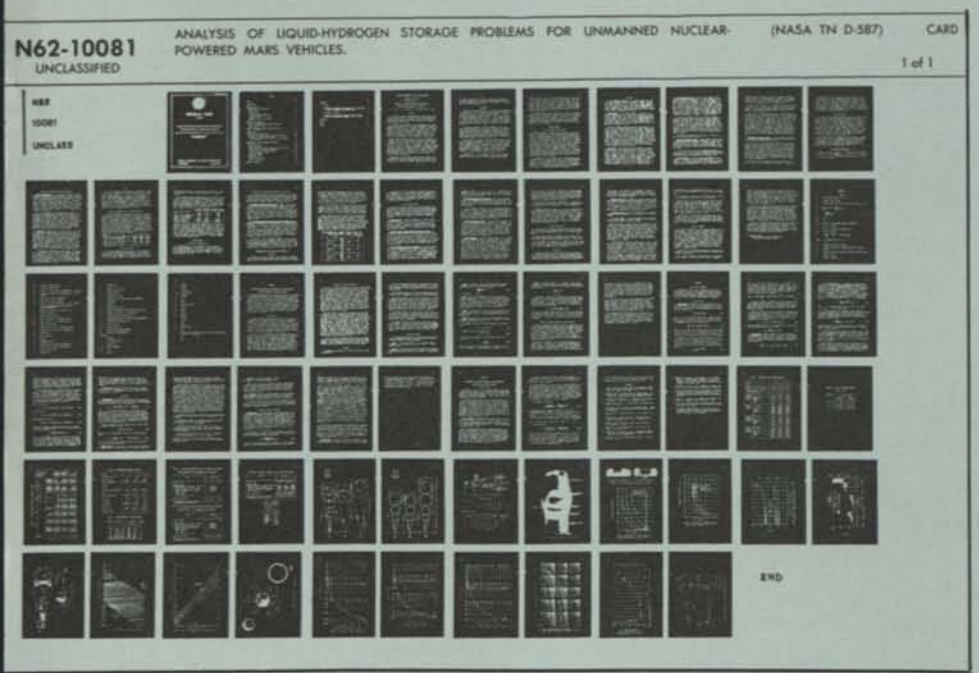
NASA employs single sheet of film to hold big technical reports.

Distribution of technical information to various offices of the National Aeronautics and Space Administration and its contractors is now being greatly speeded by the use of a 5″ by 8″ film sheet or "microfiche." A single film sheet, easily mailable and duplicated, can hold a lengthy technical report.

These reports originate in Bethesda, Md., where NASA's Technical Information Facility develops the information in the course of examining 25,000 to 30,000 technical reports each year. Services performed include abstracting, indexing and announcement of reports; reference, retrieval and literature searches in addition to automatic dissemination of lengthy documents.

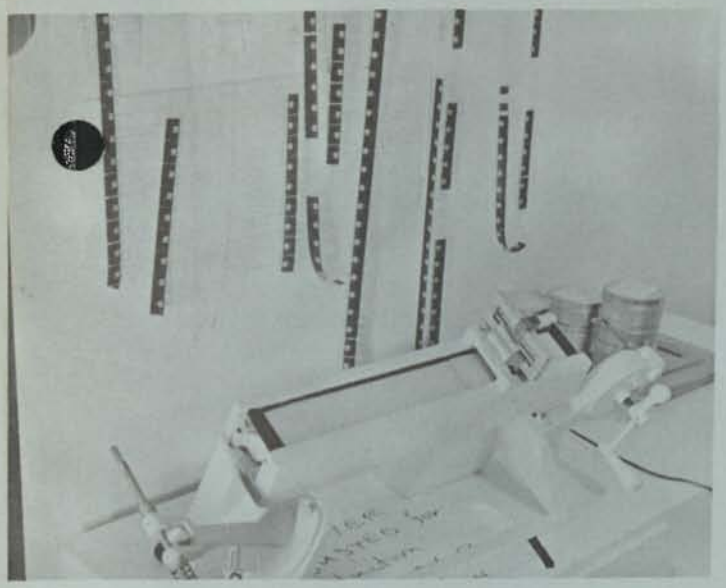
A major requirement in setting up this NASA microfilm project, was for a microform to distribute full-text reports that averaged 50 pages each. This microform had to handle each report as one unit record. It had to be easily reproducible in the field and at the central facility. The highest compatibility with equipment existing in the field was naturally desired.

Documentation, Inc., of Bethesda, Md., operator of the facility for NASA, contracted the services of Information Dynamics Corp.,* Wakefield, Mass., a systems engineering firm specializing in microreproduction and other technical aspects of information systems, to design the NASA microfilm system and build the reproduction plant. After a detailed systems study, it was decided to use the 5″ by 8″ film sheet made of "Actifilm",

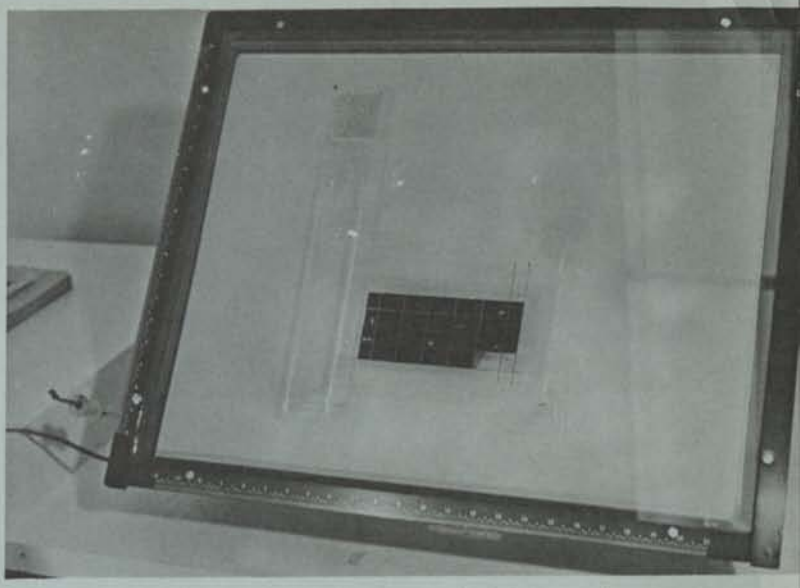


SAMPLE of 5- by 8-inch microfilm sheet used by NASA. It can hold up to 82 pages of 8½- by 11-inch size. Identifying tab at top is visible without enlargement.

*Information Dynamics Corp. was formerly known as Forbes & Waite, Inc.



CUSTOM-BUILT slitter for cutting away excess from 35mm microfilm during the preparation of the microfilm card which will allow mailing of an 80-page document on one sheet.



ACTUAL MASTER microfilm card can be shown taking shape on the stripping table. When complete this 5- by 8-inch master can be used to make diazo intermediate masters and then copies for circulation.

Ozalid's diazo duplicating film.

The format design started with a selection of reduction ratio. IDC's previous experience with systems for technical reports showed that adequate image quality of marginal originals could not be obtained in blowbacks made from third generation micro-images at reductions greater than 16:1 with present microfilm equipment in widespread use. Reduction ratios lower than 14:1 seemed unnecessary for the preservation of image quality and would waste film and storage space. A value of 15.5:1 was chosen so that the 14.5:1 magnification of the Xerox 1824 printer would fit three pages of 8½" width into 24 inches.

Once the reduction ratio was fixed, the statistics on the page count of NASA's technical reports made it a relatively simple matter to examine the suitability of the "standard card sizes" of 3" x 5", 3¼" x 7⅜" (tab card) and 5" by 8". A careful study at this point showed that relatively few reports require more than one 5" x 8" microform. The illustrated NASA microfilm card has one right hand column of images omitted to provide for contact printing to tab card size.

NASA's objective was to place full text copy within quick and easy access to all system users at the time reports were announced in its "Technical Publications Announcements". In order to stay within reasonable production quantities (estimated to be over 1,200,000 per year), the distributed cards would often be used to make contact duplicates in the field when recipients needed several copies of the same report.

After all technical considerations were critically examined, the newer continuous-tone diazo microfilm Unit-Gamma Ozalid material was the choice for the microfiche design. The importance of microphotographs necessitated that reasonable continuous-tone quality be preserved. The lower contrast photographic properties were also needed to prevent excessive contrast build-up when making successive contact duplicates.

The non-reversing photo properties of diazo were important so that successive cards of every generation made would be negative and could be used in the same way to produce positive blow-back prints from the reader-printers now in wide use in most contractor plants. Contractors wishing to make their own contact diazo microfilm duplicates could do limited quantities with an Ozalid Microline Model 58 contact printer and a supplementary ammonia processor.

A desire of the system designers was to make the NASA microform as compatible as possible with user equipment in the field. A survey concluded that the 5" x 8" microfilm card was compatible with nearly every reader-printer if fitted with commercially available adaptors for sheet film, except those designed especially for aperture cards. Microfilm readers without facilities for making hard copies are so varied in design as to make it virtually impossible to produce a microform compatible with all existing readers. Where flat film of any size beyond aperture cards could be used, the 5" x 8" size was found to be as compatible as any of the other "standard sizes".

The planetary microfilm cameras used are Recordak Model D units in which selected MRC-4 camera lenses have been substituted. Modifications in the pull down mecha-

CARBON-ARC printer for the production of intermediate Diazo masters.

nism have been made to minimize spacing variations that otherwise occur from frame to frame. Counters have been added to assist the camera operators to keep track of six exposures (two pages each) to be stripped up in rows to make the master.

With a reduction ratio of 15.5:1, the standard 11″ sheet size results in a micro-image of about 20 millimeters. A 35-millimeter camera film is used. The excess is slit away after processing while the film is still in roll form.

After the hundred foot rolls of film are processed in a Remington-Rand Unipro processor and the slitting is done, the master is stripped up. First to be stripped in is the title block also on film. Each row

XEROX 1824 and FILMAC 200K equipment used for making blow-back copies from microfilm cards whenever necessary.

of micro-images is stripped to a supporting acetate frame on a sloped light table surface equipped with a transparent fixture which locates the acetate frame and facilitates alignment of the individual micro-image row strips.

The resultant masters handled as a unit are stored separately in manila folders. Batches of folders are then transported from operation to operation in the process of making intermediate diazo duplicates and the second generation diazo contact duplicates to be distributed. Stripped-up masters are returned to manila folders for file storage.

To facilitate ease of handling and to minimize wear and tear on the camera negative, an intermediate diazo duplicate master is made from the camera negative for the production of subsequent duplicates in quantities averaging fifty for each report.

Intermediate Masters

A Miller-Trojan carbon arc printer is used to make intermediate diazo masters. Image quality in excess of 228 lines per millimeter is easily obtained with about a two-minute exposure. The diazo masters are then processed in batches in a Microline ammonia card processor. Duplicates for distribution are made card to card fashion by use of a "Super Ozamatic" rotary white print machine built and modified by Ozalid.

Before distribution the duplicates have a white backup opaquing applied in the title block to facilitate reading. Without this backing titles are difficult to read in file drawers. A hot stamp machine is used in production although a lower cost silk screen method can be employed in the field with successful results.

Batches of cards are then sorted into temporary inventory and sets of microcopy reports distributed according to specific distribution lists. They are mailed for direct use by recipients without protective envelopes or separators other than cards used for numerical series identification at the beginning of each set of 100 cards.

The Scientific and Technical Information Facility will also supply full size copy of reports. Storage for more full size report copies than necessary is undesirable so an additional system requirement was to provide for economic full size reproduction.

The Xerox 1824 with the new scanning head and viewer screen for alignment was chosen to give low cost xerographic prints for line copy. Twenty-four inch sheet length is used to print out three pages per scan. Where continuous tone blow back copies are necessary, the Filmac 200 electrolitic print back process provides satisfactory continuous tone replicas. The Filmac 200R was chosen so that it could also be used for inspection of 35 millimeter roll film.

All of the techniques utilized are simple and require a minimum of experience in operating personnel. The maintenance of satisfactory image quality is built around quality control standards used in a daily measurement cycle by the technician in charge to assure proper resolution and density throughout the system.

The ability of the card-shaped microform to handle 78 report pages makes this format attractive for many other applications where the smaller film area of the aperture card becomes limiting. Although it was not designed primarily around an automatic machine sort capability, it is compatible with modern high volume information storage and retrieval systems where the index search function is filled by manipulation of a separate index storage media such as punch cards or magnetic tape. It could become a companion to the aperture card for handling multipage reports. □

COMPACT storage bin can hold a vast quantity of information as orders for distribution are made up.

Printed in U. S. A.

Government Microfiche Programs Now Shifting into High Gear

Standardization meeting in Washington has paved way for wide use of unit microform systems in government, industry.

A new trend is developing fast in the design of microfilm systems. Spurred in large measure by an enthusiastic reception from Federal Government information specialists, the "microfiche", or transparent microfilm card, has in a short period of time become a standard medium for the distribution of information on defense technology and the aerospace industry.

According to Charles Yerkes, of the Microcard Corp., a firm which recently organized a microfiche information system for the Atomic Energy Commission, the AEC and the National Aeronautics and Space Administration will together distribute 9,000,000 microfiche transparencies during the current year. The Department of Defense is expected shortly to begin using microfiche in its technical information services.

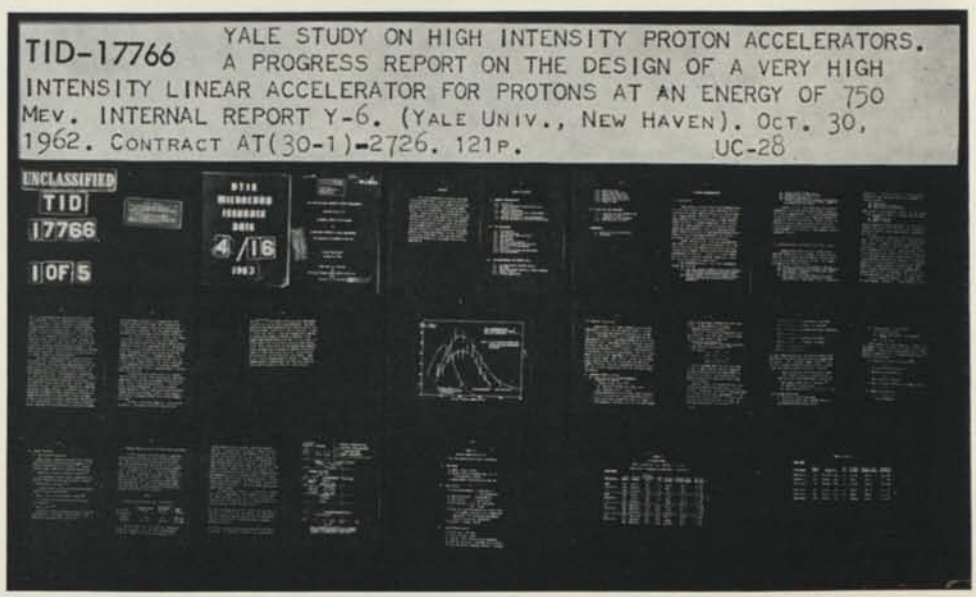
Because of fast-growing interest, manufacturer members of the National Microfilm Assn. and Federal Government representatives held a special two-day meeting in Washington early this month to develop equipment standards which will make various microfiche systems compatible with each other to the degree that material can be processed and read by the same equipment.

The problem becomes apparent when one considers that the Government is reportedly desirous of standardizing on four sizes of microfiche; 3 by 5 inches, 4 by 6 inches, 5 by 8 inches and tabulating card size. The NASA system mentioned above uses a 5 by 8 card which holds more information but is not nearly as compact as the 3 by 5 card adapted by the AEC. The NASA microfiche program was covered in detail in the article on the agency which appeared in the Nov., 1962, issue of SYSTEMS.

Because of the growing conflict between different microfiche systems in Government, DOD, NASA and AEC officials recently announced agreement on standards for compatible microfiche procedures in the production of documents on research and development. This led to the meeting with NMA about equipment.

While the actual findings of the NMA and Government group meeting in Washington were not known at press time, it is believed by Mr. Yerkes that the group will recommend standardization of equipment so that processing, reading and the making of hard copies can be done for the four sizes of microfiche mentioned above with the same equipment as far as possible. How this standardization will be accomplished is explained in diagrams provided by Mr. Yerkes that accompany this article.

He feels that the microfiche is perfectly designed to meet the most important requirements of modern information systems in a way not accomplished by other microforms.



TYPICAL three- by five-inch microfiche transparency used by the Atomic Energy Commission to distribute technical information. This is the first card of a set and can hold up to 30 pages. Subsequent cards, without full heading, can hold 40 pages.

SYSTEMS

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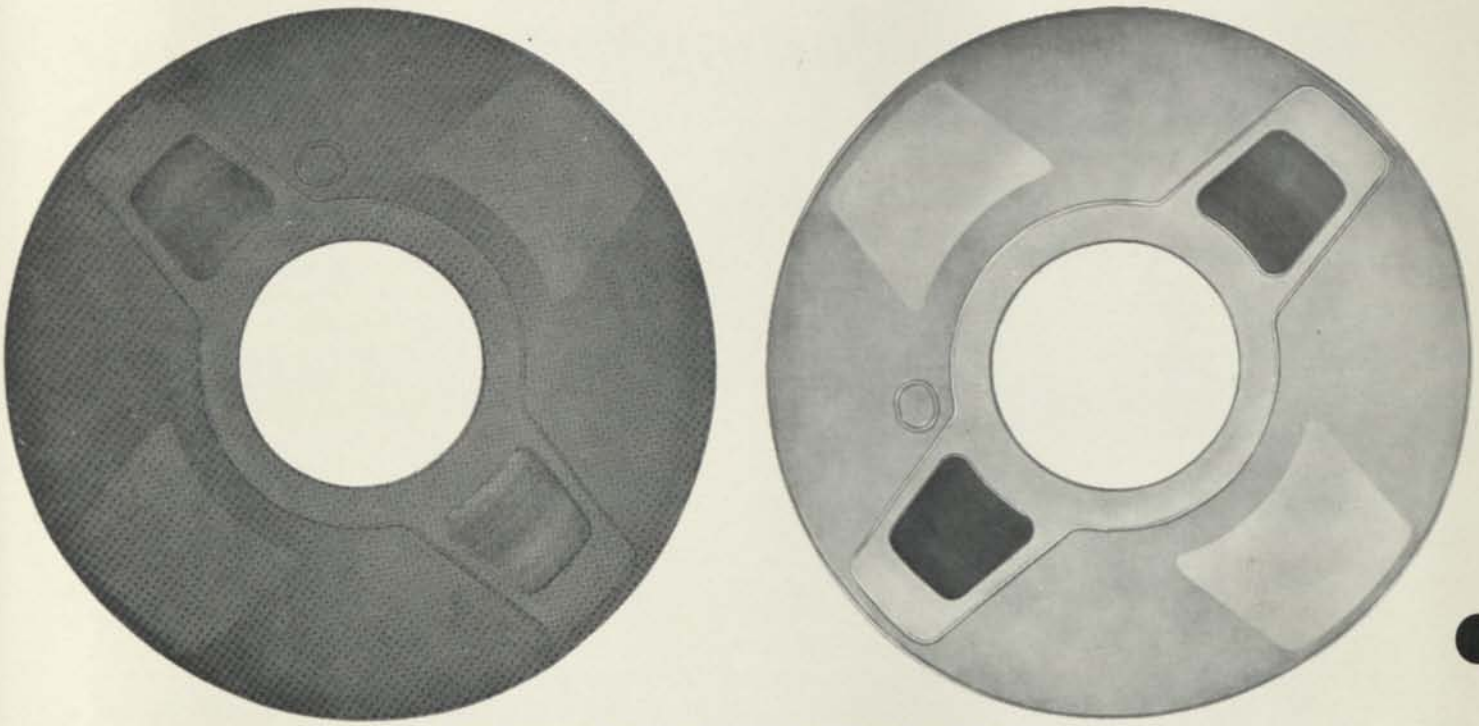
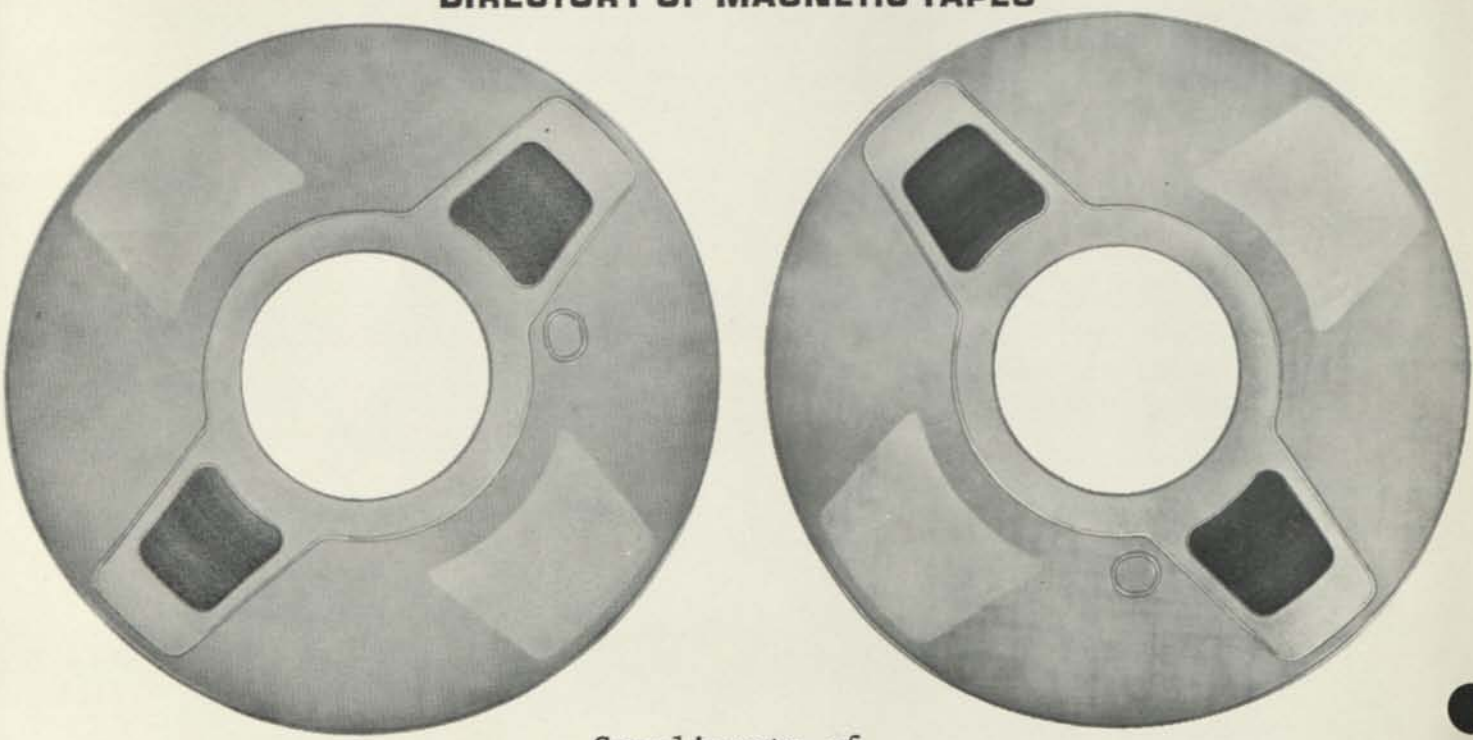
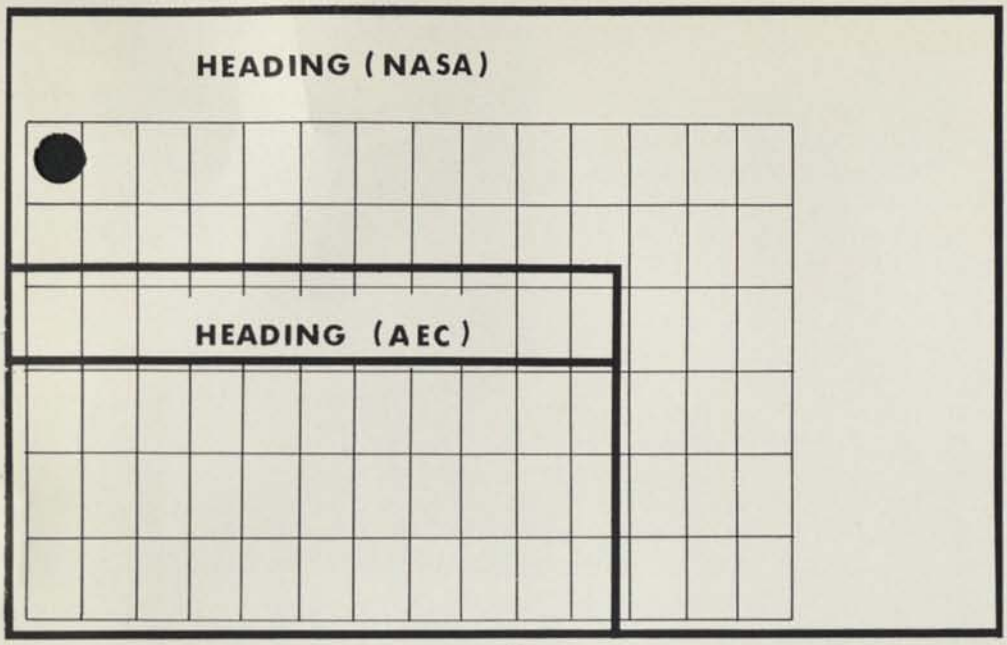


DIRECTORY OF MAGNETIC TAPES





METHOD by which varying sized microfiche transparencies will be standardized for processing, reading and blow-up is illustrated above. When registered at left and bottom, as shown above, the images on the larger NASA microfiche and the smaller one used by the AEC are exactly superimposed. This makes possible convenient processing and use in the same equipment. Each rectangle shown above represents one 8½-by 11- inch page at 18X reduction.

The well-known aperture card, he believes, is ideally adapted to the filing, retrieving and updating of engineering drawings, but it does not offer the advantages of the microfiche in the compressing, distribution and duplication of vast amounts of lengthy technical manuals, research reports and other information also required by scientists and engineers.

With additional manufacturers of microfilm readers, reader-printers and printers either offering or getting ready to market equipment designed for use with microfiche, it is expected that this medium will become increasingly important in wide areas of private business, as well as among government and defense suppliers.

The best way to illustrate how a microfiche information program can provide speed and flexibility in the handling of a heavy volume of complex and fast-changing information is to examine applications. One of the first important industrial uses of transparent microfiche cards in the U.S. was in the widely distributed Thomas directory of suppliers of industrial materials for which a microfiche distribution program was launched nearly two years ago. Prior to this, microfiche was employed mainly in Europe.

A variation of the microfiche idea, the Microcard, also manufactured by the Microcard Corp., West Salem, Wisc., has of course been in use for some years, and a large catalog is available outlining publications available on Microcards. These opaque cards bear a microfilm image on white photosensitive paper. It will be noted later that they are used along with microfiche in the Atomic Energy Commission Information program.

A good example is the Atomic Energy Commission's information facility that was referred to earlier. The AEC, along with NASA and the Departments of Defense and Commerce, conducts one of the nation's four major technical information programs. AEC's working information center at Oak Ridge is known as the Division of Technical Information Extension. It is headed by Robert Shannon who works under the overall supervision of Edward J. Brunnenkant, director of the Division of Technical Information.

Basis of the DTIE's distribution is some 300 depository libraries here and overseas. In many cases, these libraries need several copies of technical reports for secondary distribution. Approximately one-third of the reports received by the AEC are printed, and of the 40,000 titles the Commission acquires each year, some 15,000 are distributed in full-sized printed form. The remaining 25,000 titles are miniaturized and reproduced in microfiche form. The documents, in micro size, are then distributed to the depository libraries where they can either be enlarged and viewed on a reader or reproduced as hard copy.

The system for producing microforms and demand hard copy at DTIE was designed and is operated by the Microcard Corp. AEC's microform and hard copy plant is on site at the Division of Technical Information Extension, Oak Ridge.

Step and repeat cameras and step and repeat enlargers designed and built by Microcard are key pieces of equipment here. The step and repeat enlarger is used to produce enlarged duplicates of the original document where only the micronegative exists. It is fully automatic and reproduces page for page in sequence from the unit negatives.

Self-Contained Unit

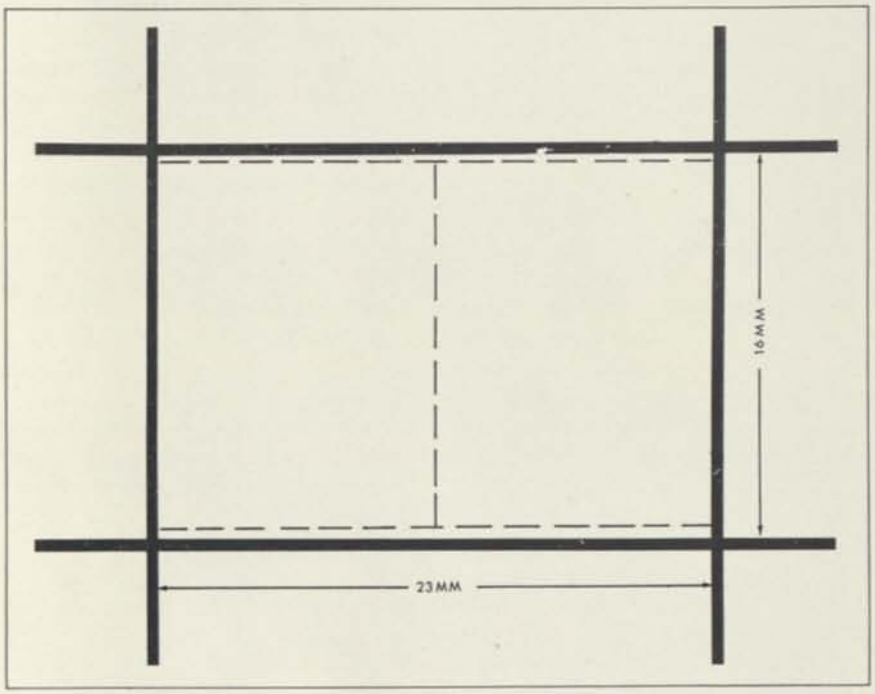
A unit microform or a unit record implies that the unit is self-contained. The technical document or technical report in its original form is the unit being contained within its front and back cover. This same technical report can be reduced in size and contained within one microfiche. AEC technical reports are reduced 18 times, and each is placed on a sheet of film. The filmsheet with the report pages is made more usable by putting the title, author and other pertinent information in normal-size type at the top of the sheet of film.

Microfiche is the generic term for such a unit record. The same record on an opaque card is a Microcard. These miniaturized unit records are considerably less expensive to produce than the full-size printed copies, less expensive to distribute, take up only 1/20th the space required for the original material in a library, are easy to file and retrieve, and hard copy can be produced at will from them on any standard reader-printer.

Although field use techniques depend on the report being a unit record either in full-size or microform,

the production of the microfiche transparency makes use of roll techniques. The most efficient processing can be done while the material is still in a roll form. In the DTIE facility, unit records are transferred to a roll for processing wherever possible. The production steps are as follows:

The document is filmed on the step and repeat camera. The camera automatically places the pages in sequence on the master negative. The Microcard-designed step-and-repeat camera automatically places the title information in normal-size type at the top of the negative. Although technical reports are filmed page by page and unit by unit, the camera film itself is in 100-foot rolls. One 100-foot roll makes more than 200 unit negatives. The film is processed in roll form and automatically chopped into units after processing. These units are the master negatives from which others are reproduced.



DIMENSIONS of the two-page frame exposed in the step and repeat camera.

Both Microcards and microfiche are printed from the unit negatives. The number of copies of each negative varies according to the distribution requirements. Some reports may require a distribution of 50 microfiche and 250 Microcards, where another report may require a distribution of only 20 Microcards and 70 microfiche. Both Microcards and microfiche are printed from the master negative onto a roll of paper or film.

At Oak Ridge, the Microcard Corp. is currently using Recordak fine grain print film for microfiche. This print film is developed by a reversal process, so that a negative image can be printed directly from a negative image. At its West Salem plant, Microcard Corp. uses both diazo and silver film for microfiche, depending upon the use and the production requirements. Silver film was chosen for the Oak Ridge operation. Microcards are printed on photographic paper and have positive images.

After the Microcards and microfiche are produced, the master negative is returned to the file. If a user wants hard copy, he may either ask his local depository to print a copy from the locally available microfiche or he may request a full-size copy from DTIE at Oak Ridge. At the local level, the hard copy would be produced on a standard reader-printer. At Oak Ridge, where the production requirements would be far too great for a standard reader-printer, a hard copy is produced on the Microcard step-and-repeat enlarger, which produces about 1,000 pages an hour and does so automatically once the unit negative has been placed in the enlarger after it has been programmed. Pages are enlarged onto a 500-foot roll of photographic paper.

STEP AND REPEAT enlarger designed and produced by Microcard Corp., used by AEC.

That's the way the microfiche program works at the AEC. According to a recent letter to government agencies from Jerome B. Weisner, scientific advisor to the President, the Committee of Scientific Information of the Federal Council has recommended the compatible microfiche standards mentioned at the beginning of this article to all agencies of the government. □

DOCUMENTS being filmed by step and repeat camera. Console at right of operator gives control over negative.

TECHNICAL PROPOSAL
FOR THE FIELD EVALUATION
OF THE SUITABILITY OF USING
MICRO-IMAGE TECHNIQUES FOR
NAVY SUPPLY CATALOGS

Proposal No. ED 1050

13 February 1962

Prepared by

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Bureau of Supplies and Accounts
Department of the Navy
Washington, D. C.

Technical Publications No. 6433

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THE NATIONAL CASH REGISTER COMPANY
ELECTRONICS DIVISION

Technical Proposal for the Field Evaluation of the Suitability of Using Micro-Image Techniques for Navy Supply Catalogs

SECTION I

INTRODUCTION

PURPOSE

This proposal is for a field test to determine the suitability of using photochromic micro-image techniques for navy supply catalogs. The program includes the fabrication of a micro-image viewer-printer, the preparation of a micro-image catalog, and a field evaluation to determine feasibility.

For the purposes of this proposal a micro-image is defined as a document page that has been reduced 200:1 on a diameter or 40,000:1 on an area basis.

The program through installation of the micro-image system at the field test site will take nine (9) months. NCR will agree to supply additional support Bi-Monthly and on an "as needed basis" for an additional six month period after installation.

SCOPE

Scope of the work covered by this proposal is:

1. The preparation of 10 to 15 micro-image cards containing approximately 30,000 recomposed supply catalog pages.
2. The fabrication, checkout and delivery of a micro-image viewer-printer similar in function to a traditional microfilm viewer-printer.

3. The providing of supervision at a commercial microfilm organization during the preparation of the input microfilm of the catalog pages.

4. The updating of up to 3 micro-image catalog cards, within a period of six months after installation to demonstrate the ability to readily update catalogs within the framework of the technology.

5. The delivery, installation and training for the viewer-printer within the confines of the continental United States.

6. To perform maintenance Bi-Monthly and "as needed", and to perform reviews of customer's use of the micro-image system in order to determine feasibility for a six (6) month period after installation of the viewer-printer.

SECTION II

BACKGROUND

PREVIOUS WORK

NCR has conducted Research and Development in Photochromic Micro-Image Techniques for several years.

The results of its feasibility work were reported in a paper enclosed as Appendix I, which was presented at the Symposium on Large Capacity Memory Techniques for Computing Systems, May 1961, sponsored by Information Systems Branch of Office of Naval Research, entitled "The Photochromic Micro-Image Memory".

Since that time further work has indicated the practicality of producing 3" x 5" micro-image cards containing 2,625 page document micro-images by contact printing to high resolution photographic film. This mass production technique provides a new system freedom - that of document dissemination at very low cost. (See Appendix II brochure, entitled "Photochromic Micro-Images").

Fundamental to a successful micro-image system are the unique capabilities of Photochromic Film;

1. Image visibility on exposure providing immediate inspection.
2. Erasability and rewriting providing the error correction routine that is basic to any successful operating system.

CURRENT NCR SPONSORED PROGRAM

The current NCR sponsored program consists of the following phases:

1. Design, development, and fabrication of a camera-recorder, to generate 3" x 5" micro-image cards containing 2,625 micro-images of full page documents.

2. The design, development, and fabrication of a contact printer. The contact printer will produce a photographic micro-image negative from the master photochromic positive produced in the camera-recorder. This master photographic negative will be used to produce by contact printing the 3" x 5" cards containing the micro-image catalog that will be disseminated.

3. Development and a fabrication of a micro-image viewer-printer laboratory prototype.

4. The development of overcoating techniques for the disseminated micro-image card which will permit the cards to receive normal human handling and filing without affecting the ability to view the micro-image document.

5. The development of photographic film processing techniques oriented to the requirements of a micro-image system.

CAMERA-RECORDER

A camera-recorder capable of recording 3" x 5" cards is currently being fabricated and assembled and will be completed by April 1, 1962. See Figure 1 for a schematic of the camera-recorder. This unit will work from a microfilm input containing images reduced approximately 10:1 and produce a 3" x 5" photochromic plate containing 2,625 micro-images. The recorder will have the following set of specifications:

RECORDER SPECIFICATIONS

20:1 reduction from microfilm

800 lines per millimeter or greater resolution on the photochromic plate.

Smallest Type Size on Original

a) lower case 8 point fully resolved

b) lower case 6 point resolvable

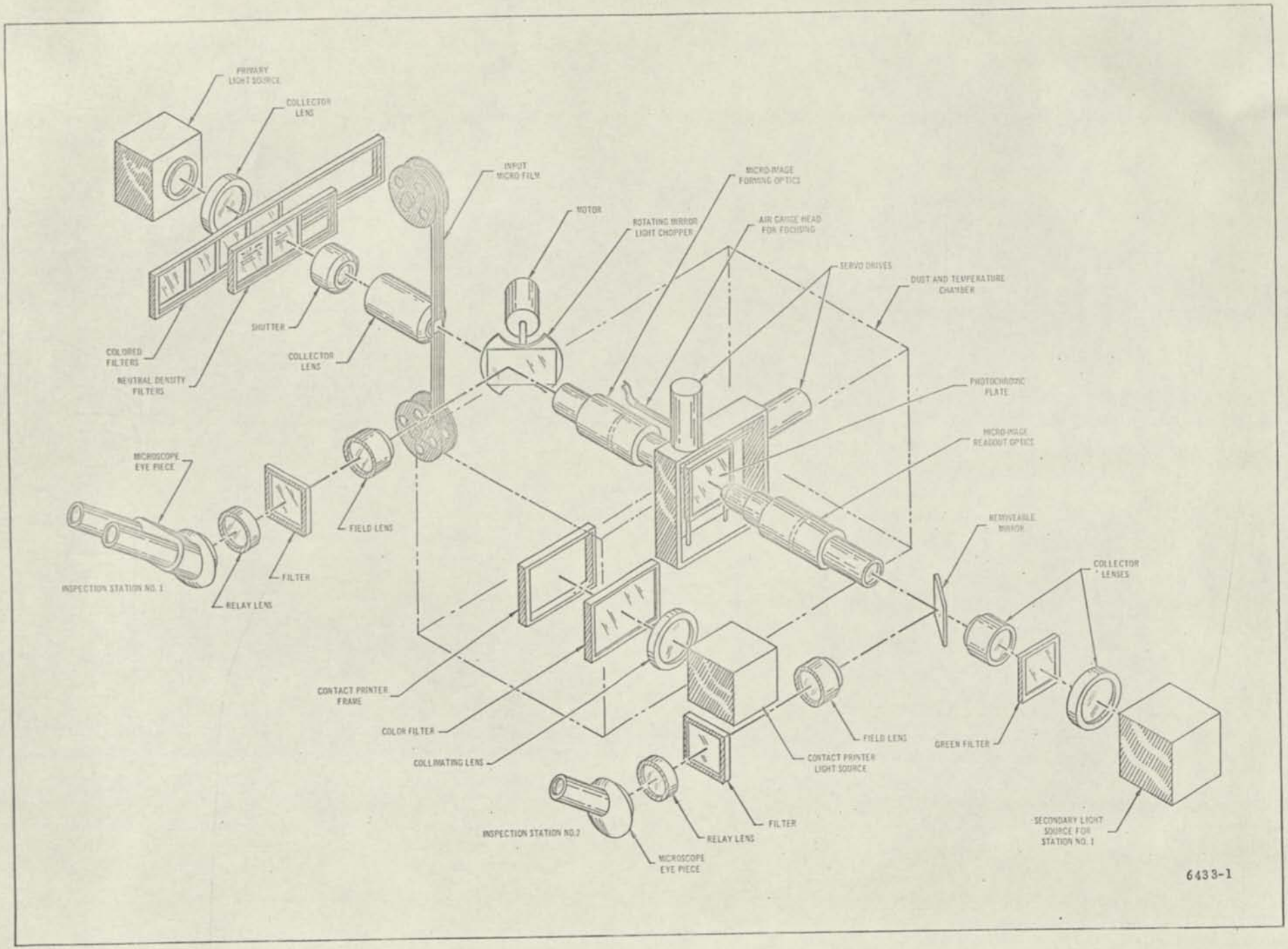

Figure 1. Micro-Image Recorder.

Negative or Positives Recorded

a) erase images into colored field
b) color images into clear field
c) any images can be erased and rewritten

Recording Sequence Automatically Controlled

a) automatic microfilm advance
b) automatic photochromic plate advance
c) automatic focusing
d) optional stopping of the cycle before and after recording each image or after a number of images for inspection
e) automatic or manual control of exposure time

Time for Recording (fully automatic not including inspection time)

0.5 sec exposure
0.5 sec plate and microfilm advance
1 sec timer operations
0.5 sec plate return time per picture after recording a row
2.5 sec per picture

Card Size

3" x 5" inches
2,625 images

MICRO-IMAGE 3" x 5" CARDS

The micro-image card that will be available for dissemination will be the size of a traditional library catalog card 3" x 5" and contain 2,625 micro-images in the configuration shown in Figure 2. The 2,625 images will be contained in an area of approximately 8 square inches of the 15 square inches that the card provided. The remaining area can be utilized for index information at the size which is human readable by the unaided eye. The micro-images will be recorded in 35 horizontal rows. Each row will contain 75 images.

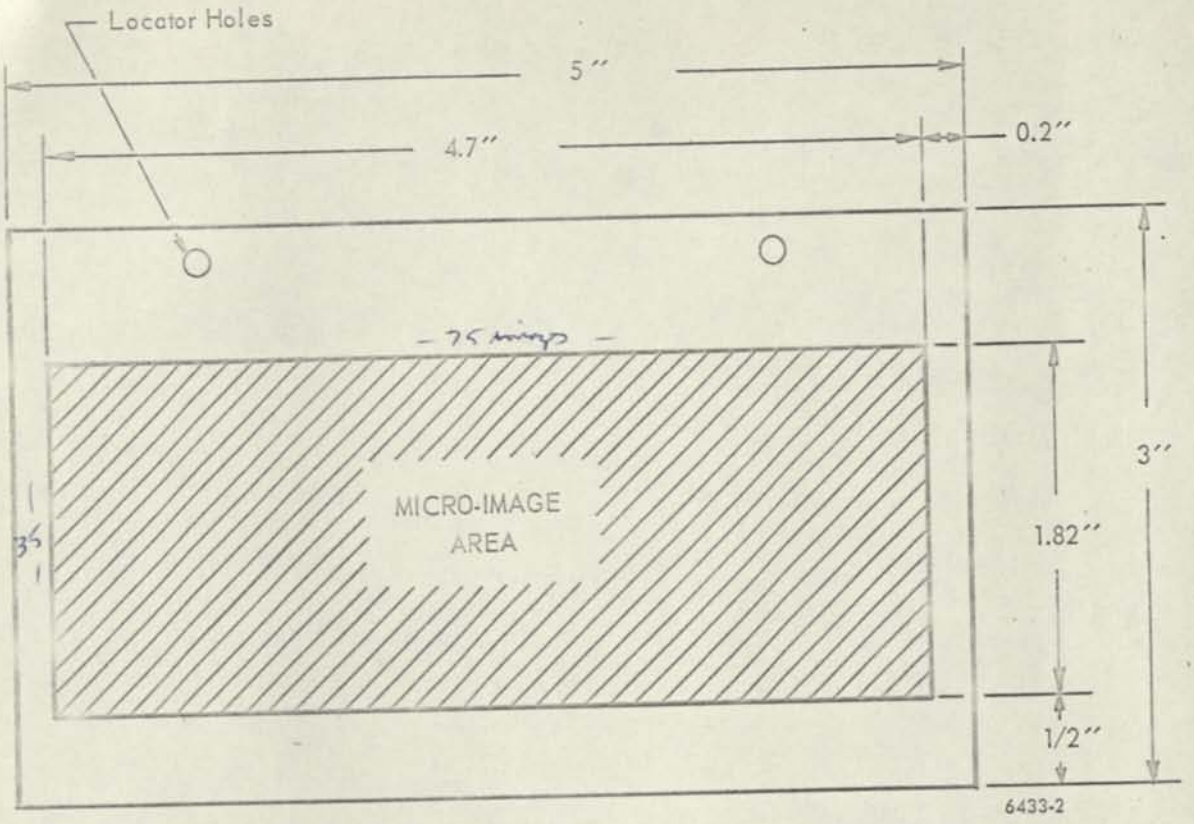

Figure 2. Micro-Image Card Specifications.

CONTACT PRINTING

In the normal course of its research and development work done over the past several years, contact prints at the micro-image level have been made both as negatives and positives and for as many as eight or ten generations. The micro-images supplied as samples within the framework of this proposal are third generation micro-images produced by contact printing and evidence resolution in excess of 600 lines per millimeter.

MICRO-IMAGE VIEWER

The present laboratory micro-image viewer that was used to demonstrate feasibility and is being used for developmental purposes, consists of a commercially available Nikon comparator modified by

SECTION III

TECHNICAL DISCUSSION

PRESENT NAVY SUPPLY CATALOG SYSTEM

The present catalog system is motivated by the desire to minimize printing costs and the physical handling problem associated with the present catalogs. This results in catalogs printed with what is effectively 5 or 6 point print which are difficult for people to read. Another consequence of these motivations results in non-uniform distribution of catalogs. An attempt is made to individualize the catalog to the ship or installation. Updating of catalogs is not effective as individual random changes are not successfully integrated into the users catalog. As a result the user operates with an obsolete catalog creating later data processing problems.

SYSTEM IMPLICATIONS OF A MICRO-IMAGE CATALOG

The following are some of the potential advantages that the Navy can receive by use of a micro-image catalog:

1. Removal of space limitations both in publishing and use of the catalog. Every ship could have the entire catalog. Similiarly the catalog can contain more information such as descriptive information permitting the user to evaluate substitute items.
2. Cost Savings. A preliminary study has indicated that micro-image publishing has a cost advantage of 18 to 1 for Navy catalog publishing. See Figure 3 and Table I.
3. Updating can be readily accomplished by replacement of the entire catalog.
4. Multiple catalogs can be provided aboard ship optimizing catalog utility and availability.

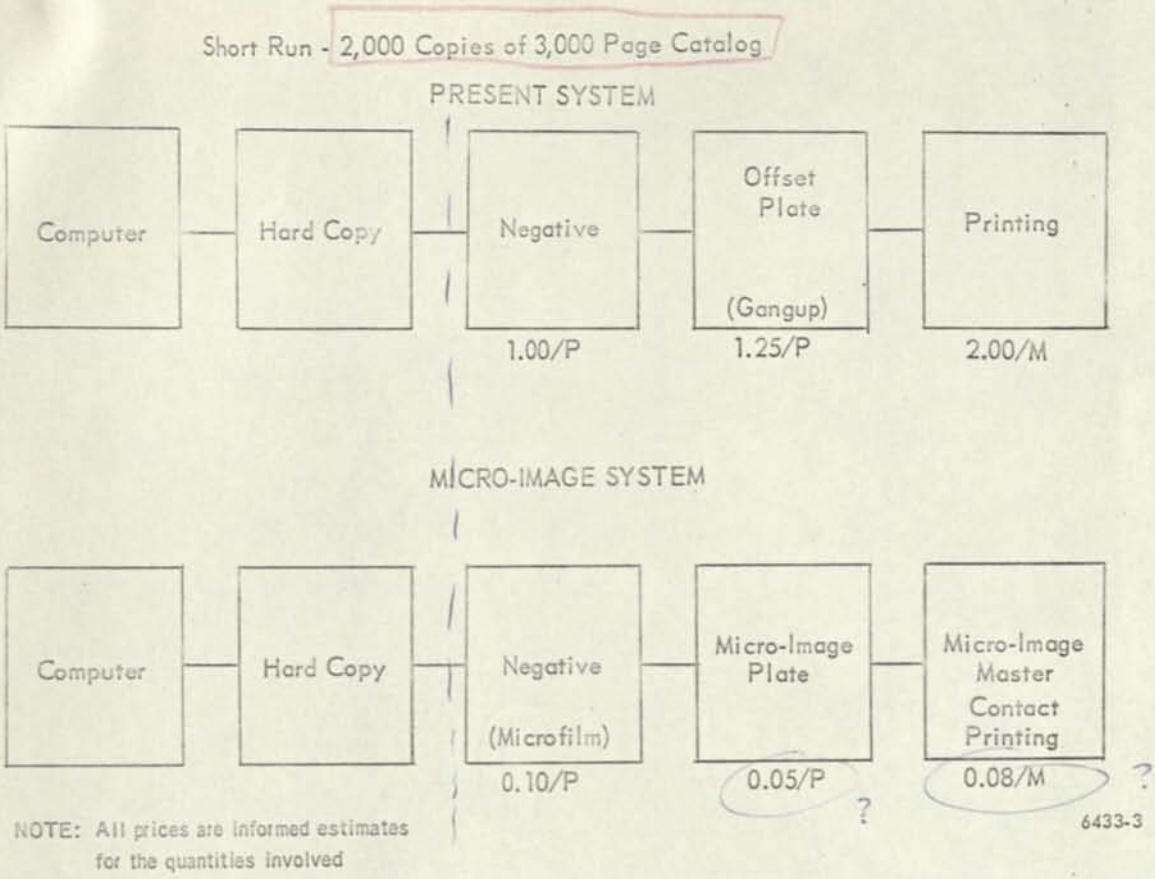

Figure 3. Catalog Publishing

TABLE I

PRESENT COSTS

3,000 Negatives	at	$1.00	$ 3,000
3,000 Plate Cost		1.25	3,750
3,000 Pages x 2,000 copies		2.00/MP	12,000
Total			$18,750

Plus Binding and Mailing

MICRO-IMAGE COSTS

3,000 Negatives	at	$ .10	$300.00
3,000 Plate Cost		.05	150.00
3,000 x 2,000 Pages		.25/3 MP	500.00
Total			$950.00

No Binding - Minimum Mailing Cost

Note: All prices are informed estimates for the quantities involved.

5. The potential exists within the technology of automating the supply requistion system and thus reducing the error rates that are inherent in a manual system. This can be accomplished by such techniques as catalog page print out and the potential marriage of the scan pen technology with the micro-image technology.

SELECTION AND PREPARATION OF CATALOG PAGES

Certain restraints must be considered in selecting navy catalog pages for the micro-image field test.

NCR RESTRAINTS

It must be recognized that the camera-recorder being developed with NCR funding was oriented to the recording for an 8 1/2" x 11" page, bearing 10 point print with 6 point print the limit of the system. The catalog page commonly produced by the Navy high speed printer is 12 1/2 inches by 17 1/2 inches containing 10 point print.

NAVY RESTRAINTS

The current standard for the Price List and Management Data Catalogs which determines the width of the printed information on the output of the high speed printer (12 1/2 inches) cannot reasonably be altered.

Within the framework of these restraints a recomposed page, which would preserve the present width of 12 1/2 inches and reduce the length of the page to 10 inches, would meet both of the limiting factors.

Recomposing can be done in the microfilm process by masking the present catalog page. Similarily, the pages can be recomposed at the high speed printer in the event that it is determined that a new run would be warranted for the field test.

In a Navy supply catalog system, which would be oriented to the micro-image technology, both the construction of the recorder and the printing of the page would be optimized to provide the most efficient overall catalog.

PREPARATION OF MICRO-IMAGE CATALOG CARDS

The mutually acceptable recomposed catalog pages are reduced in a microfilm step of approximately 12:1 to a field diameter of 1.36 inches. This in turn is further reduced at a reduction step of 20:1 in the micro-image camera-recorder to a field diameter of 68 mils and written on the photochromic plate.

The micro-images are recorded in a step and repeat fashion with 75 consecutive pages being written in a horizontal line. The images are continuously inspected during the process of recording. In the event an imperfect image is recorded, use of the error correction procedure, which consists of erasure, and rewriting, will be instituted. In this manner, a high-quality photochromic micro-image plate is prepared.

Exposure control is provided during the recording process to assure that the recorded micro-images are of uniform density. A photographic master is prepared from the photochromic micro-image plate by contact printing. Subsequent micro-image duplicate cards are produced by contact printing from this photographic master.

MICROFILMING OF THE ORIGINAL CATALOG PAGE

The microfilming will be supervised by NCR and performed by a commercial microfilm organization. The documents will be microfilmed on sprocketed 35 millimeter film. Future systems can eliminate the use of sprocketed film if this proves to be necessary. A high degree of control over the microfilm operation is desirable, because it can be a limiting factor in determining the output quality of the system.

VIEWER

The optical schematic shown in Figure 4 is representative of the type

O = micro-image specimen
L = light source
APM = exit pupil of the projector
Ok = eyepiece
S = field of view diaphragm
APO = exit pupil of the objective
Ob = objective
K = condenser
APK = aperture diaphragm of the condenser
LB = radiant field stop
Ko = collector

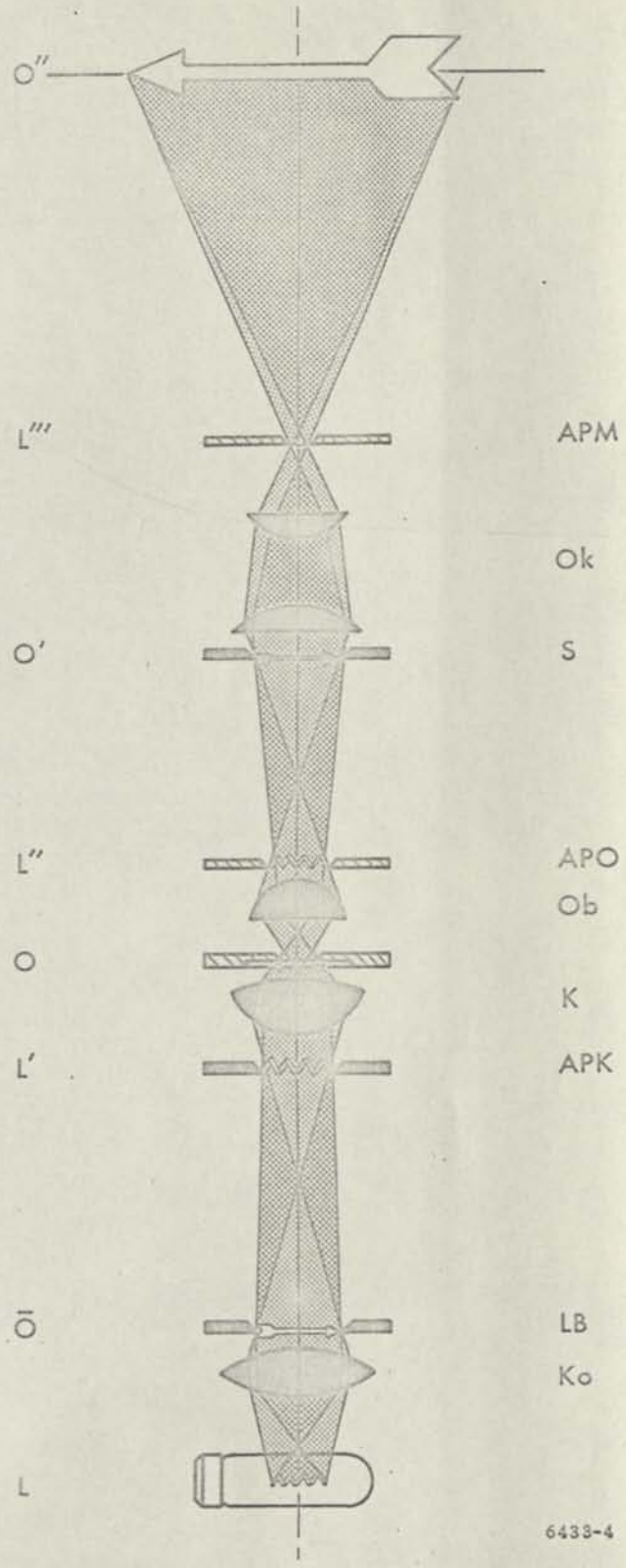

Figure 4. Optical Design for Micro-Image Viewer.

of optical system to be used in the viewer. This optical system is similar to that used in Zeiss microscopes and uses a Koehler condensing lens system.

A card holding platform will be provided. The card will be positioned on the platform through the use of two locator pins. The card holding platform will be moved in X and Y under manual control. The present position of the image being viewed will be made known to the operator by some suitable indicating device. In the case where the operator desires to go to a known frame on the micro-image card he will be able to move the platform in X Y directly to that location by use of this indicator. In a situation where the user would desire to browse the catalog he will be able to readily move from image to image with the micro-image plane remaining effectively in continuous focus. The degree of refocussing required from image to image will be similar to that now required in commercially available microfilm readers. The viewer will be equipped with the ability to produce page size hard copy using standard microfilm viewer-printer techniques.

The viewer will be human engineered to suit the requirements imposed by viewing a supply catalog page. This will be in terms of man machine interaction, X Y card control, and visual human factors.

INSTALLATION AND TRAINING

The viewer will be shipped knocked down and NCR will provide for assembly, installation and maintainance at the field test site, provided that is within the continental United States. It is anticipated that one days training time will be the maximum amount of time required.

MAINTAINANCE

A preventative maintainance program is envisioned in which a representative of NCR visits the field test site once every two months for a period of six months. Emergency repair will be provided on an as needed basis, during the six months field test.

PERIODIC REVIEWS

Periodic review at the Bi-Monthly preventative maintainance visit to the field test installation will be performed. A review of customer use and acceptability will be made to gather feedback information.

UPDATING

Three different approaches will be investigated for updating supply catalogs. In each case the new pages will be microfilmed in the normal manner.

1. The micro-image photochromic plates will be stored under refrigeration. Prior research has indicated that images can be preserved for long periods of time without degradation under refrigeration. The cards will be removed from the refrigeration chamber, placed in the camera-recorder, the appropriate page erased, and the updated page written in.

2. Reverse contact printing will be used. The photographic micro-image master will be contact printed to the photochromic plates. The page to be updated will be erased and the new page written into its place.

3. The original input microfilm will be used to write a new photochromic micro-image master with blank spaces being left for those pages which are now obsolete. The updated pages will be written in these blank positions.

In all of these methods, once the new master photochromic micro-image plates have been generated, new contact photographic masters will be produced and from them the duplicate 3" x 5" cards.

MICROFILM SPECIFICATIONS CHART

COMPANY AND MODEL NUMBER	PRICE	CAMERAS: Type — Planetary	Rotary or Flow	Film Size Used — 105mm	70mm	35mm	16mm	8mm Duplex	Lines Per Resolution	Reduction Ratio	Acceptable Document Size in Inches — Minimum	Maximum	Indicator — By Foot	By Frame	Film End Warning	Interchangeable Magazine	READERS–ENLARGERS–PRINTERS: Reads	Enlarges	Prints Maximum Size	Works With These Forms — 105mm Film	70mm Film	35mm Film	16mm Film	8mm Duplex	Aperature Cards	Jacketed Film	Micro-Opaques	Rate of Magnification	Film Drive — Has Rotating Film Head	Hand	Motor	For more data circle numbers on the Reader Service Card
BELL & HOWELL CO.																																
575 (10)	(6)		o				o		Min. 100	26:1	6½" x Any Length	15" x Any Length	o		o																	199
210K (16)	(6)		o				o	o	Min. 95	44:1	3¼ x 4¼"	3¼ x 7⅛"	o		o																	
205F (11) (12)	(6)		o				o	o	Min. 95	44:1 or 24:1	2" x 2"	11" x Any Length	o		o		o	o					o	o				44x or 24x		o		
205G (12)	(6)		o				o	o	Min. 95	44:1 or 24:1	2" x 2"	11" x Any Length	o		o																	
206 (2) (8)	(6)																o	o				o	o	o				24x or 37x	o	o	o	
CHARLES BRUNING CO. INC.																																200
Dea-Graph CA7	$4,750.-	o				o			120	6 to 30x		37½ x 52"				o																
Dea-Graph CA6	3,200.-	o				o			120	4 to 19x		23 x 34"				o																
Copytron 1000	9,750.-																	o	18 x 24"			o			o			8, 12, 14, 16x	o	o		
DOCUMAT, INC.																																
Mark II (208)	850.-																o	o	8½ x 11			o	o		o	o		10.5, 13.4, 20.1, 33.8, 27.9	o	o		201
Mark II (208H)	895.-																o	o	8½x5½			o	o		o	o		10.5 8.4 20.1 33.8 27.9	o			
"U" (203)	400.-																o					o	o		o	o		15x 24x 35x	o	o		
"D" (204)	375.-																o					o	o		o	o		15x 24x 35x	o	o		
"R" (205)	345.-																o					o	o					15x 24x 35x	o	o		
"F" (206)	295.-																o					o	o		o	o		15x 24x 35x	o	o		
FEDERAL MFG. & ENG. CORP.																																
Micromate 24	$ 765.-																(2) o	o	18 x 24			o	o	o	o	o		to 16.5	360	o		202
Micromate 14	445.-																(2) o	o	8½ x 14			o	o	o	o	o		to 12	360	o		
Reader R-14	99.50																(3) o																
Printer Processor K-40	3,750.-																		35mm Roll to Roll	o		o						1:1			o	
MF 16A Camera	795.-		o				o		24	Any	12⅛" Width		o		o																	
GRISCOMBE PRODUCTS CORP.																																
A-1	$1,195.-	o				o			120	16x	Any	20 x 24"	o		o																	203
A-3	1,495.-	o				o			120	16x	Any	20 x 24"	o		o																	
PA-Series	200.-																o					o	o	o				17, 23, 30, 43				
KD Series	475.-																o				o	o	o	o	o	o		15, 20, 24, 30, 43				
KE Series	250.-																o				o	o	o	o	o	o		17, 23, 30, 43				
KGA (7)	850.-																o				o	o	o	o	o	o		15				
KJ (7)	250.-																o				o			o				15				
KL 46(7)	350.-																o				o	o	o	o	o			24				
KL 58	(6)																o				o	o	o	o	o			24				
IDEAX CORP.																																
Microcopying Kit	$275.-	o				o				1:1, 18:1	24 x 36mm	20 x 30"										o		o		o						204
ITEK BUSINESS PRODUCTS DIV., PHOTOSTAT CORP.																																
Portable Camera	$850.-		o				o			22.5x	3"	11½" x Any Length				o	o																205
A-1 Camera	1,195.-	o				o				16x	Any	20 x 24"	o		o																	
42 Camera-Enlarger	9,950.-		o			o	o			20, 24, 30, 35x	Any	42" x Any Length		o	o			o	42" x Any Length			o	o					20, 24, 30, 35x				
18-24 Reader Printer	2,980.-																o	o	18 x 24"			o			o	o		14.5x				
Autofocus Reader	1,195.-																o					o	o					23x to 35x		o	o	
Contact Film Printer	1,895.-																														o	
12.12 Reader	225.-																o						o					24x	o	o		
KALVAR CORP.																																
Kalfile Printer	$ 199.50																			o	o	o	o		o					o		206
[illegible] Enlarger	K45																			o	o				o						o	
16 E Printer-[illegible]	3,750.-																					o	o								o	
THE MAGNAVOX CO.																																
Model CA110	(6)	o				o			125	30	None	9 x 15"	o	o	o																o	207
Selector-Reproducer Model 3R1117 (15)	(6)																		9 x 15				(15) o					30			o	
MICROFILM CENTER—REMINGTON RAND SYSTEMS																																
Film-A-Record 8.1	$1,540.-		o			o	o			12-19-25-40	3"	12"	o		o																	208
Film-A-Record 555	2,585.-		o				o	o		25-35-42	3"	12"	o		o																	
F 1028M	6,150.-	o				o				8 to 30		37½ x 52"		o	o	o																
Abstractor 1100	1,400.-	o				o				16-24		20 x 24"		o	o	o																
Film-A-Record F72	475.-																o	o				o	o	o				15, 20, 24, 30, 43				
Film-A-Record AO	1,175.-																o					o	o	o				23 & 40				
F468 Reader Printer	850.-																o	o	8½ x 11"			o	o	o	o	o		10.5 to 33.8				
F440 Reader (8)	250.-																o								o			15x				
F458 Reader (9)	350.-																o								o	o		24x				
MICROREADER MFG. & SALES CORP.																																
Microskaner	$14.95																o			o	o	o	o	o	o	o	o	20x				209
MINNESOTA MINING & MFG. CO.																																
"Filmac 100"	(1) $629.-																o	o	8½ x 11			o	o		o	o		1, 9, 13, 19, 26 Fixed	360	o		210
"Filmac 200"	(1) 1,200.-																o	o	18 x 24			o	o		o	o		15 Fixed		o		
"Filmac 200R"	(1) 1,485.-																o	o	18 x 24			o	o		o	o		15 Fixed		o		
"Filmac 300"	(1) 3,600.-																o	o	11 x 14			o	o		o	o		8-20 Variable	360	o		
RECORDAK CORP.																																
Reader Printer	(1) $850.-																o	o	7 x 9"		o	o	o	o	o			11, 13, 20, 28, 34	o	o		211
Lodestar PS-1	1,395.-																o	o	8½ x 11"				o					23:1	o		o	
Starlet	485.-																o						o					20:1			o	
Recordak 310	395.-																o						o					20, 24, 32, 40 90	o			
Reliant 500 (4)	2,895.-		o				o	o		24, 32, 40-1	12"	Any Length	o		o																	
Portable RP-1 (4)	895.-		o				o			20-1	12"	Any Length	o		o																	
MRD-2 (5)	2,950.-	o				o	o			5:1 to 21:1	8½ x 11"	26 x 36½"	o		o																	
XEROX CORP.																																
Copyflo II																	(13) o		11" x Any Length			o	o					(13)		o		212
1824 Printer																	(15) o		18" x 24"			o	o		o	o		14.5:1		o		
Copyflo 24C																	(14) o		24" x Any Length			o	o		o			15x, 15y		o		

1. Price includes lens.
2. Can be used as wall projector.
3. Can be used with all Federal projectors and enlargers.
4. Interchangeable film unit gives any reduction.
5. Has built in exposure meter coupled to split image focus finder.
6. Price on request.
7. Mechanical Scanner.
8. Has scanning device.
9. Has movable stage.
10. Designed to film unburst fanfold forms.
11. Micro-Twin combination recorder-reader.
12. Endorser optional.
13. Prints from positive or negative roll microfilm onto ordinary paper, vellum or offset master. Enlargement range is from 7-24 diameters in 15 magnifications at 20 linear feet a minute.
14. Prints from positive or negative roll microfilm or aperature cards onto ordinary paper, vellum or offset master at the rate of 20 linear feet a minute.
15. Works with 16mm and 32mm film chips, automatically locates and makes hard copy from filmed data.
16. Feeds signs, dates, indentifies microfilms and stacks tab cards or punched card checks.

Technical Publications Announcements

A Biweekly Publication of the National Aeronautics and Space Administration

Volume 2 Number 15

October 25, 1962

Introduction

Technical Publications Announcements, Volume 2, announces and indexes documentary information of significance to aeronautical and space science and technology. The coverage of reports and documents includes those resulting from NASA and NASA-supported investigations, as well as others received by NASA in this subject field. The coverage is comprehensive and includes reports received under NASA's world-wide information exchanges.

Technical Publications Announcements is published every two weeks and contains two major sections. Section I is a listing of items arranged in general subject categories for ease of scanning. Section II comprises four separate indexes to these abstracts: Subject, Corporate Source, Personal Author, and Report Number.

Each document announced by NASA is given a number representing the order of accession by NASA in the year indicated (e.g. N62-10234). In Section I the items are arranged in subject categories and, within each category, in order of increasing accession number (not necessarily in consecutive sequence).

In using the indexes, it is necessary to note both the accession number and the category number in which a desired citation may be found. Introductory notes at the beginning of each Index describe their characteristics and use in greater detail. The detailed Subject Index provides multiple approaches to the subject content of each document. It is suitable for use both as a retrospective searching tool and as a current scanning device to assist users in identifying newly announced items of significance in specific areas. Quarterly, Semiannual, and Annual cumulations of these indexes will be published.

Information regarding the publication and availability of this biweekly journal may be obtained from the National Aeronautics and Space Administration, Office of Scientific and Technical Information, Washington 25, D. C.

AVAILABILITY OF DOCUMENTS ANNOUNCED IN TECHNICAL PUBLICATIONS ANNOUNCEMENTS

NASA Documents

NASA documents listed in *Technical Publications Announcements* are available from NASA, without charge, to those whose work is in support of, or of direct interest to, the NASA research, development and operational efforts in the aeronautical and space fields. This service is normally extended to research, manufacturing, and consulting firms which hold NASA contracts, to NASA consultants, and to recipients of NASA grants. It is also available to U.S. Government agencies and their contractors; to universities, colleges, and public libraries; and to foreign governmental organizations and domestic or foreign private organizations which agree either to exchange scientific and technical publications of value to NASA, or to maintain depositories of NASA publications for public reference. Except for commercially available publications as noted in the Section below, this availability applies to those documents in *Technical Publications Announcements* that carry an indication of either NASA origination or NASA support. Those who wish NASA publications for their personal use, or for programs not sponsored by the Government, may purchase NASA *Technical Reports* from the Superintendent of Documents, U.S. Government Printing Office, Washington 25, D.C. Other NASA documents for sale to the public may be purchased from the Office of Technical Services, Department of Commerce, Washington 25, D.C.

Non-NASA Documents

Non-NASA documents listed in *Technical Publications Announcements* are available from NASA to NASA activities, NASA contractors (and subcontractors and grantees), and to others working in direct support of NASA programs. All other activities and individuals should request them from the source or from such information services as the Office of Technical Services and the Armed Services Technical Information Agency. Exceptions to this practice exist only with regard to British and Canadian reports, and AGARD reports announced in *Technical Publications Announcements;* NASA will continue to provide these categories of reports to qualified requesters on the same basis that NASA documents are furnished.

Commercially Available Publications

Priced publications listed in *Technical Publications Announcements* as being for sale by commercial publishing firms, colleges, and university presses, and professional societies and institutes should be obtained directly from the source, or through bookdealers and libraries. The listing of such publications is for announcement and indexing purposes only. Journal articles reporting NASA or NASA-supported work are also announced and indexed in *Technical Publications Announcements,* primarily for reference purposes.

Document Requests

Requests for documents listed in *Technical Publications Announcements* should be made on NASA Form 389 (Request and Transmittal Form) and should indicate the NASA accession number (e.g., N62-12345) of the desired document. Requests should also give the number of the contract, or identification of other formal support, under which the document is required. (Note preceding paragraphs on availability of NASA and non-NASA documents.) All requests should be addressed as follows:

National Aeronautics and Space Administration
Office of Scientific and Technical Information
Attn: Code AFSS-A
Washington 25, D. C.

Detailed information on NASA's distribution policies and procedures, as well as copies of all NASA forms, can be obtained from the above address.

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A subject scope note is included at the beginning of each category in the abstract section.

Technical Publications Announcements, Volume 2, is prepared by the Scientific and Technical Information Facility, operated for the National Aeronautics and Space Administration by Documentation Incorporated. Information regarding the publication and availability of this journal may be obtained from the National Aeronautics and Space Administration, Office of Scientific and Technical Information, Washington 25, D. C.

Use of funds for printing this publication approved by the Director of the Bureau of the Budget, September 6, 1962.

Technical Publications Announcements

Volume 2 Number 15 October 25, 1962

01 GENERAL

Includes management, planning, programs, progress, policy; space law and legal matters; and symposia of a broad or general nature.

N62-15685 Northwestern U. Transportation Center, Evanston, Ill.

THE STRUCTURE OF TRANSPORTATION NETWORKS. Transportation Forecast and Prediction Study Progress Report.

[W. L. Garrison and D. F. Marble]. May 1962. 104 p. 30 refs.

(Contract DA 44-177-TC-685)

(TCREC TR-62-11)

Studies discussed are: (1) regression analyses of nation-to-nation variations of indices in relation to levels of economic and technical development; (2) components analyses of properties of intranation network structures; and (3) simulation of network expansion. The indices provide effective ways to measure network properties. (Author Abstract)

N62-15959 Research Lab. of Electronics, Mass. Inst. of Tech., Cambridge.

QUARTERLY PROGRESS REPORT NO. 63. [Period Ending Aug. 31, 1961].

H. J. Zimmermann, G. G. Harvey, and W. B. Davenport, Jr. Oct. 15, 1961. 251 p. 130 refs.

(Contract DA-36-039-sc-78108)

A review of work includes the following: physical electronics; plasma dynamics; solid state physics; microwave spectroscopy; nuclear magnetic resonance and hyperfine structure; microwave electronics; molecular beams; statistical communication theory; processing transmission of information; physical acoustics; speech communication; linguistics; communications biophysics; neurophysiology; neurology; and computer components and systems. (J.R.C.)

02 AERODYNAMICS OF BODIES AND COMPONENT COMBINATIONS

Includes aerodynamics of complete aircraft, spacecraft, reentry bodies, ablation, and the study of shapes.

For related information see: Other aerodynamic headings, Fluid Mechanics, Hydrodynamics, and Stability and Control of Aircraft and Spacecraft.

N62-15422 National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

LOW-SPEED LONGITUDINAL CHARACTERISTICS OF AN AIRPLANE CONFIGURATION INCLUDING EFFECTS OF CANARD AND WING TRAILING-EDGE FLAP CONTROLS IN COMBINATION.

Bernard Spencer, Jr., and William C. Sleeman, Jr. Washington, NASA, Sept. 1962. 49 p. 8 refs. Supersedes NASA Memo-4-22-59L.

(NASA TN D-1397) OTS: $1.25.

A model whose planform of canard control was identical to that of the wing, which had an aspect ratio of 3, a taper ratio of 0.14, and an unswept 80-percent-chord line, was investigated in the Langley 300-MPH 7- by 10-foot tunnel. Effects of canard-surface size and longitudinal and vertical position were studied for the model, with only the canard surface as a control. Supplementary trim or control was studied by use of wing trailing-edge flaps and by addition of an auxiliary horizontal tail behind the wing. (Author Abstract)

N62-15533 Weapons Research Establishment (Australia).

SUPERSONIC LIFT OF QUASI-CYLINDRICAL BODIES WITH CUBIC CAMBER LINES.

L. M. Sheppard. Jan. 1962. 32 p. 5 refs.

(Tech. Note HSA-88)

Existing results of supersonic linearized theory are used to obtain the forces and moments on a quasi-cylindrical body of circular cross section. The lift and pitching moment of a body having a cubic camber line are considered in detail. Asymptotic results for long bodies are deduced and the general results applied to a number of simpler cases, including the case where the local incidence varies discontinuously. (Author Abstract)

N62-15630 National Physical Lab., Teddington (Gt. Brit.)

SOME MEASUREMENTS OF THE EXCITATION DUE TO VORTEX-SHEDDING OF A SMOOTH CYLINDER OF CIRCULAR CROSS-SECTION.

D. E. Walshe. May 1962. 7 p. 3 refs.

(NPL Aero Rept./1016)

The excitation, caused by vortex-shedding of a smooth-circular cylinder, is measured to determine its dependence on amplitude of oscillation of the cylinder. This is done by measuring the excitation at nondimensional velocity, $V_r = 5.07$, on a 22.9-cm diameter smooth-circular cylinder at a Reynolds number of 1.2×10^5. It is found that when the amplitude of oscillation (η_0) is between 0.0018 and 0.04 the variation of excitation with amplitude of oscillation can be adequately described by $-k\alpha\eta_0 = 0.55$. Results give a Karman lift coefficient $C_L = 0.27$ which is independent of amplitude. (R.C.M.)

N62-15845 Aeronautical Research Council (Gt. Brit.)

EXPLORATORY WIND TUNNEL INVESTIGATIONS ON A BLUFF BODY CONTAINING A LIFTING FAN.

W. J. G. Trebble and J. Williams. London, HMSO, 1962. 33 p. 3 refs.

(ARC-CP-597; previously issued as RAE-TN-AERO-2754, ARC-23059)

Available from HMSO: 5s.

The results from a series of wind-tunnel experiments on a bluff body containing a simple lifting fan are discussed. The body width only slightly exceeded the duct diameter and the body length was only two or three time the fan duct diameter. For favorable mainstream interference effects on lift, a relatively large duct diameter and aft location of the duct axis proved beneficial. Both the drag and nose-up pitching moments due to fan operation with an upper surface intake were significantly larger than estimates derived by elementary intake momentum arguments. Side-intakes alleviated considerably the moment problem, but the lifting efficiency became poorer. (Author Abstract)

REGIONAL TECHNICAL REPORT CENTERS

Twelve universities and libraries have been selected as Regional Technical Report Centers to make more widely available the unclassified results of Federally-sponsored research and development. Three agencies that produce an estimated 90% of the Government's unclassified technical reports--the Department of Defense, National Aeronautics and Space Administration, and Atomic Energy Commission--have agreed to provide copies of their reports for deposit in each of the 12 centers. Direction and coordination of the system of centers will be carried out by the Office of Technical Services of the Department of Commerce, in accordance with its statutory mission. Funding and other assistance is being provided by the National Science Foundation through its Office of Science Information Service.

This new system is designed to ease the problem of disseminating results of Federally-sponsored research to the scientific and technological communities. It has long been recognized that there was no reliable and systematic means by which U. S. scientists and engineers could obtain access to a complete, organized collection of the Government's unclassified scientific and technical reports. The Foundation therefore, in October 1960, initiated a study of ways to correct the situation. Cooperation of OTS, NASA, AEC, and DOD was secured, and all agencies agreed jointly to the establishment and operation of a Federal system of report centers.

Twelve institutions were selected throughout the country to maintain the centers and make available on a regional basis the documents deposited in them by the Government. Each center will:

Receive from OTS or other Federal agencies, and their contractors and grantees, copies of unclassified technical reports and other appropriate bibliographic and reference publications;

Organize and maintain a cumulative library collection of all material received;

Furnish to the general public in its geographical region such services as personal reference, interlibrary loans, and assistance to users in obtaining retention copies where appropriate.

To expedite communication and provide better user services, each center will be "tied" to all others through a teletype system.

The twelve centers were selected on the basis of such factors as geographic distribution; proximity to major concentrations of scientific, industrial, and educational activities; convenience of access; availability of adequate transportation and accommodations

for transient visitors; availability of required library facilities and resources; willingness and capability of the library to cooperate fully in performing the services required; and experience in handling scientific and technological report-type literature.

The Office of Technical Services will coordinate operation of the system to ensure its maximum effectiveness, foster participation by other Federal agencies, serve as central liaison for the U. S. Government, provide management surveillance of the system, and initiate action to correct any deficiencies that may occur.

The twelve centers selected to participate in the system, and the regions they cover, are as follows:

Atlanta, Georgia--Georgia Institute of Technology
(serving Alabama, Florida, Georgia, Mississippi, South Carolina, and Tennessee)

Cambridge, Massachusetts--Massachusetts Institute of Technology
(serving Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont)

Chicago, Illinois--John Crerar Library
(serving Illinois, Indiana, Michigan, Minnesota, and Wisconsin)

Dallas, Texas--Southern Methodist University
(serving Louisiana, Oklahoma, and Texas)

Boulder, Colorado--University of Colorado
(serving Colorado, New Mexico, North Dakota, South Dakota, Utah, and Wyoming)

Kansas City, Missouri--Linda Hall Library
(serving Arkansas, Iowa, Kansas, Missouri, and Nebraska)

Los Angeles, California--University of California (Los Angeles)
(serving Arizona and Southern California)

New York, New York--Columbia University
(serving Connecticut, New Jersey, and New York)

Pittsburgh, Pennsylvania--Carnegie Library of Pittsburgh
(serving Kentucky, Ohio, Pennsylvania, and West Virginia)

San Francisco, California--University of California
(Berkeley Campus)
(serving Hawaii, Nevada, and northern California)

Seattle, Washington--University of Washington
(serving Alaska, Idaho, Montana, Oregon, and Washington

Washington, D. C.--Library of Congress
(serving Delaware, District of Columbia, Maryland, North Carolina, and Virginia)

Production and Uses of Microfilm in the Library of Congress Photoduplication Service

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THE LARGE RESEARCH libraries in the United States are both users and suppliers of microfilm. The recently published *Directory of Institutional Photoduplication Services in the United States*[1] lists some 77 institutions that offer a photocopying service. All of the institutions listed have microfilming facilities. When speaking of library uses of microfilm, therefore, it becomes necessary to separate, on the one hand, the acquisitions and reader service and, on the other, the production of microfilm.

This paper will be devoted to the latter aspects of microfilm uses, with emphasis on recent applications as exemplified at the Library of Congress Photoduplication Service. My discussion will narrate briefly the more traditional uses of negative microfilm in the area of documentary reproduction in library and research institutions and will conclude with descriptions of more recent techniques employed in the Library of Congress Photoduplication Service.

Operation of Photoduplication Service

As a starting point in this discussion of the more traditional uses of microfilm in the area of documentary reproduction, it may be well to summarize briefly some of the routine procedures followed in the Library of Congress Photoduplication Service.

All correspondence is routed by the Office of the Secretary of the Library to the Photoduplication Service Business Office. There a staff member analyzes every piece of correspondence. Analysis at this point includes the preparation of an order blank and assignment of a control number. In addition to carrying a control number, the order blank describes the exact type of photoreproduction ordered and lists the bibliographic citations.

Once clerical processing of each request is completed, the order blank, together with all correspondence, is made available to a crew of searchers whose duty it is to locate the requested document, remove it from the shelf, mark the appropriate pages and forward it together with the order blank, to the microfilm laboratory. Depending on its format, the document may be microfilmed on a flat-bed or rotary camera, both of which are rated to produce microfilm conforming to American Standards Association standards. The annotated order blank is filmed at the beginning of each order. This is essential for later identification of each order, since quantity production is achieved by microfilming literally dozens of orders on each 100-foot roll of microfilm and developing it on a continuous type processor.

After successful completion of processing the microfilm negative is ready for inspection to determine its adherence to bibliographic and technical specifications and finally for packaging into the individual order. Although every effort is made to employ mass production techniques from receipt of the request until mailing of the completed microfilm, the keynote of the entire operation is individual attention and service. The amount of personal attention to details re-

1. Compiled by Cosby Brinkley, Head, Photoduplication Service, University of Chicago Library, under the auspices of the Copying Methods Section of the American Library Association's Resources and Technical Services Division. Chicago: University of Chicago Library, 1959. $1.

quired for even a routine request is substantial. It is literally true that the raw materials of three feet of microfilm are still "cheap," but what goes into the production of those three feet is relatively expensive.

The majority of microfilm orders placed with the Photoduplication Service are for short runs of material—generally a chapter or section in a book, an article in a periodical, selected manuscript letters and the like. The negative microfilm prepared is supplied to the purchaser, since the microfilm represents only a fragment of a document and would have little value to anyone other than the purchaser.

There are, however, occasional orders for an entire book or periodical or newspaper file or manuscript collection, the negative microfilm of which should be retained—either because the original material would not permit another filming or because of its inherent research value and scarcity. When this is the case, the Library of Congress retains the right to supply the purchaser with a positive microfilm copy. The negative is retained for the Permanent Record Microfilm Collection.

Although the 30,000 rolls of microfilm in the Library's Permanent Record Microfilm Collection may loom large in the eyes of the casual observer, production of this type has not, in general, bulked large in the operations of the Photoduplication Service. This is true too of other library and research laboratories. The bulk of long-run microfilming is handled by commercial microfilm laboratories and, in one instance, as a cooperative venture of subscribing libraries. This venture, known as the Association of Research Libraries Foreign Newspaper Microfilming Project, provides for the acquisition of approximately 100 leading foreign newspapers on a current basis.

In contrast to occasional large scale projects, the Library of Congress Photoduplication Service has made itself readily available to serve research needs by producing microfilms of materials in the Library's collections for which there is only limited demand. Such materials are microfilmed on an advance subscription basis, with the cost of preparing the relatively expensive negative fully amortized among subscribers. By way of example, the Service has in this way microfilmed the papers of several of the Presidents, including Polk and Jackson, and, more recently, 13 early Soviet newspapers, four nineteenth century District of Columbia newspapers, 16 Chinese journals and, lest they be lost to posterity, the proceedings of the Democratic and Republican Party National Conventions. The proceedings of both parties, incidentally, have proved to be exceptionally popular items.

Microfilm as a Means to Micro-opaques

Up to now I have discussed the more traditional and familiar applications of microfilm in the area of documentary reproduction. At this point, I wish to begin the discussion of a different and ever growing use of negative microfilm. Whereas the production of microfilms for their own sake at one time constituted the major uses among research, it is now true that the production of microfilm for "procedural" use is rapidly gaining a position of prominence —that is, microfilm produced as an intermediate step in the production of micro-opaques or, more especially, in the production of enlargement prints either on photosensitive paper or by the electrostatic process.

Experience in the Library of Congress Photoduplication Service indicates that the place of micro-opaques in library and research institutions' microfilming facilities is often misunderstood by librarian and layman alike. In reply to the question, "Do you make Microcards in the Photoduplication Service?" the answer, "No," initially elicits an expression of bewilderment and shock, followed by a look of regret that the Library of Congress is so out of step with the times. A short discussion on the philosophy of micro-opaques, however, speedily sweeps away the image of a photoduplication service still living in the "Dark Ages" of roll microfilm.

To be economically feasible, the production of a micro-opaque is generally predicated on the processing of a "published edition." Such publication, even in seemingly dwarf-size editions if compared with most published books, implies an element of

speculation and financial risk that is wholly alien to the financial operations of a library or research institution laboratory. As of this date, only by way of rare exception have these laboratories participated in the production of micro-opaques as an end product.

The Photoduplication Service does, however, play a role in this type of documentary reproduction. It has for some years accepted orders to prepare microfilm solely intended for use in the production of both Microcards and microprint and has thus adapted its equipment and trained its personnel. In all cases the Photoduplication Service furnishes only the microfilm to the commercial processing companies, which in turn adapt it in their own plants to their own special formats. It is extremely doubtful that the production of micro-opaques will effectively penetrate the microreproduction facilities of libraries and research institutions beyond this.

Microfilm as a Means to Enlargement Prints

The earliest application of procedural microfilm in the Library of Congress was in the production of the enlargement print by the conventional photographic process of projection printing from the microfilm strip or reel to cut sheets of sensitized paper. Obvious drawbacks of lack of speed, small production and need for manpower elsewhere necessitated a complete changeover to automatic equipment in 1948, with consequent elimination of nearly all manual methods. Images on microfilm to be reproduced in the form of enlargement prints were projected by Kodagraph continuous enlargers at the rate of 40 feet per minute to sensitized paper in reels of 825 feet. These machines were quite similar to the V-mail enlargers used during World War II. One machine accommodating 16mm microfilm enlarged at 14.6 to 1 was used mainly to enlarge library catalog cards filmed at a 15 to 1 reduction ratio. Another enlarger accommodated 35mm film for reduction ratios of 7.3 to 1 and 10 to 1. The 7.3 to 1 enlarger projected the entire image of 35mm film on 9½ inch width paper. By varying the reduction ratio at the time of filming, various size originals could be made to fit on standard width papers.

Relatively high production speed, which had been initiated by use of the continuous rolls of paper in place of the cut sheets used in earlier years, was maintained to some extent in the next step—the automatic processing of the exposed paper. The Airgraph continuous processor provided developing, rinsing, fixing, washing and drying facilities on an automatic basis.

The year 1958, however, brought to an abrupt halt the use of this entire system in the Photoduplication Service. At the end of a decade of use, microreproduction laboratories were turning to electronics and the even faster dry method of facsimile reproduction. The revolutionary process called Xerography brought major changes to the operative procedures and quantity production of the laboratory of the Photoduplication Service.

Before a decision was made to change over to new equipment, careful studies were carried out in the laboratory to select the type of Xerox machine best suited to the Library's requirements. Production trials demonstrated that the greatest economies were realized by putting all material on microfilm, then running the film through the Xerox printer. In this way, all risk was eliminated that the flow of work into the machine might not keep up with the new mechanical printer. To a laboratory tooled for continuous enlargement printing, the successful introduction of the continuous electrostatic printer permitted the almost immediate displacement of a substantial quantity of facsimile reproduction equipment.

In the wake of this "revolution" in photocopying, microfilm has made substantial gains, since the use of microfilm as an intermediary permits the reproduction not only of loose sheets but also of bound material. The flexibility of the microfilm camera coupled with the flexibility of the continuous electrostatic printer (within 12 inch width paper) permits economical reproduction of the bulk of documentary material.

One exceptionally promising use for procedural microfilming, in connection with the use of the continuous electrostatic process at the Library of Congress, is the reproduction of out-of-print library catalog cards. There

has been a persistent demand over the years for inexpensive single copy reproduction of catalog cards. The National Union Catalog has, for instance, reproduced substantial holdings of regional union catalogs through the use of microfilm and continuous enlargement prints on silver paper. Although the resulting photocopy has proved adequate from the point of view of legibility, it has never been accepted wholeheartedly by librarians, principally because the cards tended to curl. This quality of the photographic paper, plus a greyish background in the finished product, militated against wholehearted acceptance.

In the hope that continuous electrostatic prints would resolve the difficulty, the Photoduplication Service has devoted a great deal of time to developing a system to microfilm standard library catalog cards for subsequent duplication on the Xerox continuous printer. When perfected, this system will produce a library card on 100 per cent rag card stock, if necessary, entirely suitable for permanent interfiling with the usual printed cards. The keystone of the system is a microfilm camera that has been adjusted to provide sufficient overlap between each exposure so that all film is exposed between the images. The camera is permanently set over a table with the reduction ratio fixed at approximately ten times. The cards are photographed over Plexiglass, with underlighting supplied to eliminate all shadow problems. As a final touch to the system, an index mark is filmed at the edge of the roll and located between the cards so that the roll of paper may be cut on an automatic cutter.

In concluding, it might be well to make some observations on the character of the requests received by the Photoduplication Service. A recent survey indicated that 60 per cent of all orders are placed by libraries (including special libraries) and that more than 50 per cent of all requests are in the areas of pure and applied science. The bulk of all requests are for the elusive, foreign language periodical, whose title is often screened behind a corporate entry unknown or unheeded by the researcher initiating the request.

Bibliographic difficulties notwithstanding, microreproduction facilitates and expands the use of research materials which might otherwise go untapped. In this respect, photoreproduction facilities are an essential ingredient of good library service. In performing this service, the staff of the Library of Congress Photoduplication Service is pleased to have the opportunity of assisting in some way toward the cultural and scientific advances which our country affords.

Medical Library Association Notes

The Medical Library Association announces eight scholarships of $150 each to students accepted for the approved courses in medical librarianship during the summer session of 1960. One scholarship each will be awarded for attendance at the summer sessions of the School of Library Service, Columbia University, July 5-August 12; Division of Librarianship of Emory University, June 14-July 22; University of Illinois Library School, June 20-July 22; and The School of Library Science, University of Southern California, June 20-July 30. Four additional scholarships will be awarded to candidates for any of these four locations. Applications for the scholarships should be made to the library school at the time of application for enrollment.

The Third Medical Library Refresher Course program will be held on Monday, May 16, preceding the Association's annual meeting in Kansas City, Missouri. Twelve courses will be offered, each three hours in length. The closing date for pre-registrations is April 1, and the registration fee is $5 for two lectures, $3 for one lecture for MLA members; $10 for two and $6 for one for non-members. For further details write Thomas E. Keys, Mayo Clinic Library, Rochester, Minnesota.

MLA is again awarding the Murray Gottlieb Prize of $100 for the best 5000-6500-word essay written by a medical librarian on some phase of the history of American medicine. The closing date for entries is March 1, 1960.

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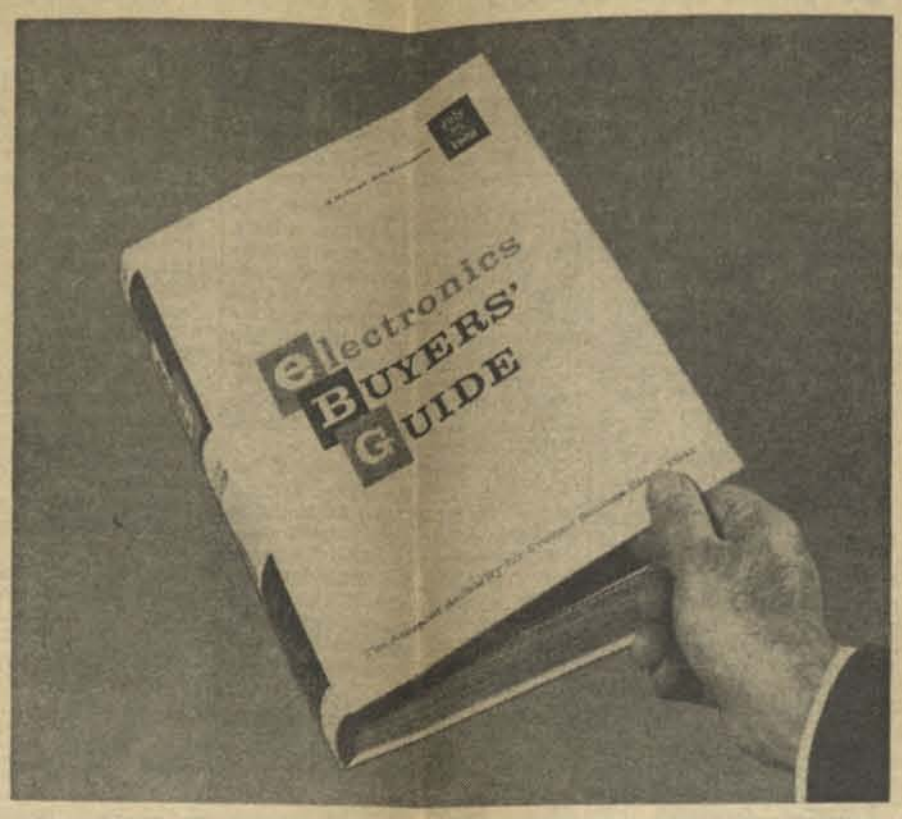


NEW

Catalog Advertising grouped in major product categories. Within each section catalog advertising is arranged alphabetically by manufacturers' names.

NEW

Lowest Rates (including 7% "Early Bird" discount if space reservation is in by February 15, 1963, and plates in by April 25, 1963.)

COMPARE:—

PER PAGE RATE	EBG	EEM	EI
1-page	$837.00	$880.	$1,122.
2-3 pages	$688.20	$690.	$1,122.
4-5 pages	$623.10	$625.	$1,122.
6-7 pages	$585.90	$585.	$1,050.
8-11 pages	$548.70	$550.	$1,050.

(See Buyers' Guide Rate Card for 12-24 page rates).

MINIMUM SPACE—Minimum space acceptable is one page. This page can be divided into fractionals, no smaller than 1/3 page (in all electronics standard shapes except island half pages). This is done to accommodate those multi-product companies who only buy 1 page and want their advertisements to appear in the proper Product Groups. It also makes possible the purchase of 1 and 1/3 pages, or more, as required. Due to cataloging, all black-and-white advertisements, no color, no inserts.

NEW

5,000 Additional Purchasing Circulation—Over 63,000 electronics Buyers' Guides covering the market in 1963. Including 58,000 regular electronics subscribers, plus 5,000 hand picked purchasing agents, and procurement officers in important electronic manufacturing firms, government and military installations, etc.

COMPARE:—These Circulation Figures.

1963 electronics Buyers' Guide—58,000* + extra 5,000 = 63,000
Electronic Engineers Master 56,205 (SRDS, Nov. 24, 1962)
Electronic Industries Directory 59,933 (SRDS, Nov. 24, 1962)
*Estimated paid circulation for electronics in July, 1963

NEW

E.B.G. REPRINT RATES (Lower than ever before), can be bound in 4-page multi-color covers at additional cost. Covers supplied by advertiser or designed and printed by publication. Paper 50 lb. white, or 70 lb. white coated stock. 8½"x11" (Folding and binding included).

	2,500 Reprints		5,000 Reprints		10,000 Reprints	
Number of Pages	50 lb. White	70 lb. Coated	50 lb. White	70 lb. Coated	50 lb. White	70 lb. Coated
1 (one side)	$20.00	—	$31.10	$ 39.75	$ 56.00	$ 72.00
1 (two sides)	$31.50	—	$44.45	$ 53.75	$ 77.95	$ 91.75
4	$55.10	—	$85.60	$110.70	$144.65	$187.45

(See Rate Card for reprint rates of 5 or more.)

E. B. G. for 21 years—most accepted directory in the industry. Contact your local electronics sales representative now for details.

electronics BUYERS' GUIDE

A McGraw-Hill Publication • 330 West 42nd Street, New York 36, N. Y.

ADVERTISING SALES REPRESENTATIVES

ATLANTA (9)
Michael H. Miller, Robert C. Johnson
1375 Peachtree St., N. E.
(404) Trinity 5-0523

BOSTON (16)
William S. Hodgkinson, Donald R. Furth
McGraw-Hill Building, Copley Square
(617) Congress 2-1160

CHICAGO (11)
Harvey W. Wernecke,
Robert M. Denmead
645 North Michigan Avenue
(312) Mohawk 4-5800

CLEVELAND (13)
Paul T. Fegley
55 Public Square
(216) Superior 1-7000

DALLAS (1)
Frank Le Beau
The Vaughn Bldg., 1712 Commerce St.
(214) Riverside 7-9721

DENVER (2)
J. W. Patten
Tower Bldg., 1700 Broadway
(303) Alpine 5-2981

HOUSTON (25)
Joseph C. Page, Jr.
Prudential Bldg., Halcombe Blvd.
(713) Riverside 8-1280

LOS ANGELES (17)
Peter S. Carberry, Ashley P. Hartman,
W. C. Gries
1125 W. 6th Street
(213) Huntley 2-5450

NEW YORK (36)
Donald H. Miller, Henry M. Shaw,
George F. Werner
500 Fifth Avenue
(212) LO 4-3000

PHILADELPHIA (3)
Warren H. Gardner, William J. Boyle
6 Penn Center Plaza
(215) LOcust 8-4330

SAN FRANCISCO (11)
R. C. Alcorn
255 California Street
(415) Douglas 2-4600

LONDON W1
Edwin S. Murphy Jr.
34 Dover St., Hyde Park 1451

FRANKFURT/Main
Matthee Herfurth
85 Westendstrasse
TEL: 772665/773059

GENEVA
Michael R. Zeynel
2 Place du Port
TEL: 244274/244275

TOKYO
George Olcott
1 Kotohiracho Shiba, Minato-ku
Tokyo, Japan
TEL: (502) 0656—(361) 2471

Costs per Distributed Image For Reflections in PCMI Microform

Fig. 5-1

No. cards distributed	No. images per card				
	50	100	300	500	1000
10	5.42 - 15.78	3.26 - 8.43	1.81 - 3.54	1.53 - 2.56	1.31 - 1.83
20	3.26 - 8.43	1.90 - 4.49	1.0 - 1.86	0.82 - 1.34	0.68 - 0.94
30	2.53 - 5.99	1.45 - 3.17	0.73 - 1.30	0.58 - 0.93	0.47 - 0.65
40	2.17 - 4.76	1.22 - 2.52	0.59 - 1.02	0.46 - 0.72	0.37 - 0.50
50	1.95 - 4.03	1.09 - 2.12	0.51 - 0.85	0.39 - 0.60	0.31 - 0.41
100	1.52 - 2.56	0.82 - 1.33	0.35 - 0.52	0.25 - 0.35	0.18 - 0.23
200	1.31 - 1.82	0.68 - 0.94	0.26 - 0.35	0.18 - 0.23	0.12 - 0.14
500	1.18 - 1.38	0.60 - 0.70	0.21 - 0.25	0.14 0.16	0.08 - 0.09

	3000	10,000
10	1.17 - 1.34	1.11 - 1.17
20	0.59 - 0.68	0.56 - 0.59
30	0.40 - 0.46	0.38 - 0.39
40	0.31 - 0.35	0.28 - 0.30
50	0.25 - 0.28	0.23 - 0.24
100	0.13 - 0.15	0.12
200	0.075 - 0.08	0.06
500	0.041 - 0.045	0.03

Microform Printing Costs

Fig.

Microcard: Cost for 40-page card = $1.95 + 7.2 cents per card printed

PCMI: Cost for 3000-page card: see tables.

Recordak: Cost for 2200 page magazine = $14.65 + 6.10/roll

Cost per image

No. Copies Distributed	Microcard cost per image	PCMI (300 pgs/card) cost per image	Recordak Cartridge	Roll microfilm	PCMI (3000 pgs/card)
1	5.0 cents		6.85	1.47	
5	1.15		1.59	.38	
10	.67	1.81 - 3.54	.93	.24	1.17 - 1.34
20	.42	1.0 - 1.86	.60	.18	0.59 - 0.68
30	.34	0.73 - 1.30	.49	.15	0.4 - 0.46
40	.30	0.59 - 1.02	.44	.15	0.31 - 0.35
50	.28	0.51 - 0.85	.41	.14	0.25 - 0.28
100	.23	0.35 - 0.52	.34	.12	0.13 - 0.15
200	.20	0.26 - 0.35	.31	.12	0.075 - 0.08
300	.19		.29	.11	
400	.19		.29	.11	
500	.19	0.21 - 0.25	.28	.11	0.04 - 0.045

Roll Microfilm (≈ 4000 pages/roll)

orig filming = $54.45 — check

contact print = $4.50/roll

cost = $54.45 + 4.50/roll

No. copies distributed	Total cost	Cost/distributed image
		1.41
1	$58.95	
5	76.95	.38
10	99.45	.24
20	144.45	.18
30	189.45	.15
40	234.45	.15
50	279.45	.14
100	504.45	.12
200	954.45	.12
300	1404.45	.11
400	1854.45	.11
500	2304.45	.11

Recordable magazine (2200 pages)

orig. filming = 2200 @ 24.75/1000 = ₹ 54.45

Kodamatic writing = 2200 @ 41/1000 = ₹ 90.20

₹ 144.65

Contact print = ₹ 4.50 for quantities up to 500 rolls
magazine + loading = 1.60 per roll

∴ Cost = 144.65 + ₹ 6.10 / roll

No. copies distributed	Total cost	Cost/distributed image
1	₹ 150.75	6.85
5	175.15	1.59
10	205.65	.93
20	266.65	.60
30	327.65	.49
40	388.65	.44
50	449.65	.41
100	754.65	.34
200	1364.65	.31
300	1974.65	.29
400	2584.65	.29
500	3194.65	.28

Microcard

1.95 + 7.2 cents / card

.050
40)2.020
200
20

100 sets = 1.95
7.20
9.15

9.15 cents / 40 pages

.23
40)9.15
80
115
120

No. copies distributed	Cost (per card w/ 40 pages)	Cost/page
1	2.02	5.0
5	2.31	1.15
10	2.67	.67
20	3.39	.42
50	5.55	.28
100	9.15	.23
200	16.35	.20
300	23.55	.19
400	30.75	.19
500	37.95	.19 -
30	4.11	.34
40	4.83	.30

1.95
7
2.02

2475 cents / 1000 cards = 2.475 cents

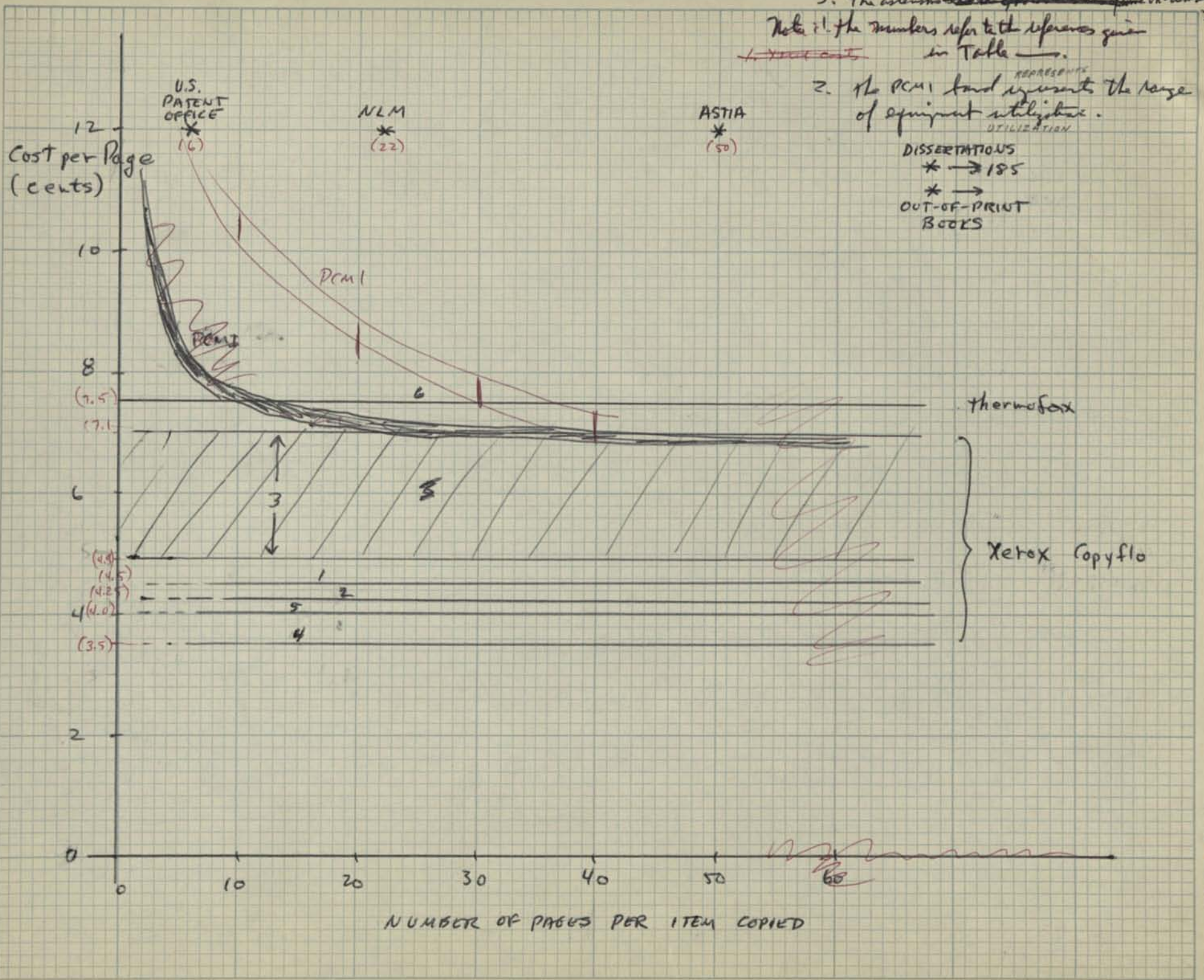
24.75
22
4950
4950
544.50

1.4
2.2
28
28
2.08

3. the asterisks represent on-demand printing tasks.

Note: 1. the numbers refer to the references given in Table —.

2. the PCM1 band represents the range of equipment utilization.



PCM1 Costs

No. pozs/letter equiv	Cost per poze (cents)
5	16.2 – 17.6
9	11.6 – 12.4
10	11 – 11.8
11	10.6 – 11.3
12	10.2 – 10.8
13	9.8 – 10.5
14	9.6 – 10.1
15	9.3 – 9.9
18	8.7 – 9.2
20	8.4 – 8.9
25	7.9 – 8.3
30	7.6 – 7.9
40	7.1 – 7.4
60	6.72 – 6.94

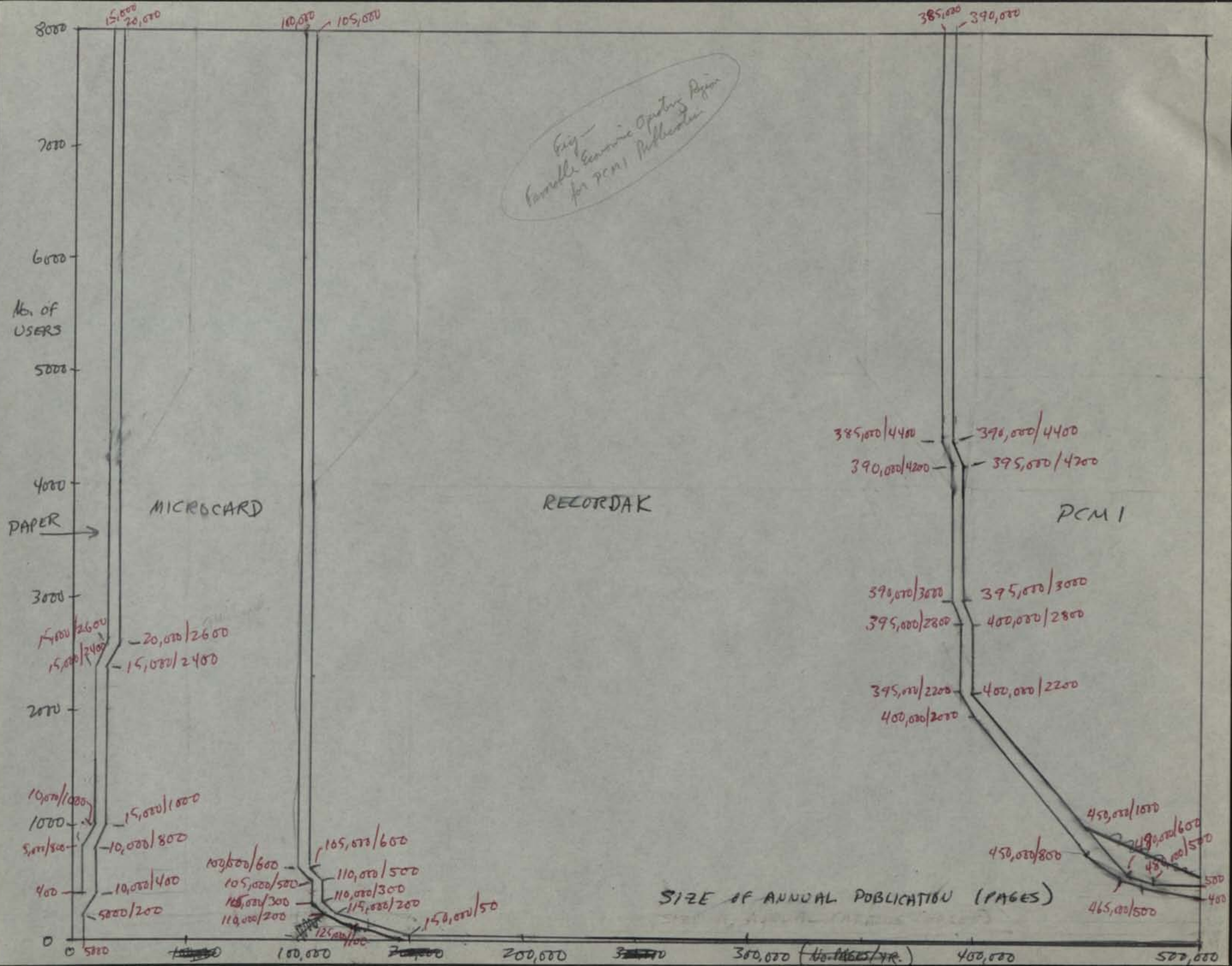

Fig—
Favorable Economic Operating Region for PCMI Publication
No. of USERS
8000
7000
6000
5000
4000
3000
2000
1000
400
0
PAPER
MICROCARD
RECORDAK
PCMI
15,000
20,000
100,000
105,000
385,000
390,000
385,000/4400
390,000/4400
390,000/4200
395,000/4200
390,000/3000
395,000/3000
395,000/2800
400,000/2800
395,000/2200
400,000/2200
400,000/2000
450,000/1000
450,000/800
490,000/600
480,000/500
465,000/500
500
400
15,000/2600
20,000/2600
15,000/2400
15,000/2400
10,000/1000
15,000/1000
5,000/800
10,000/800
10,000/400
5000/200
100,000/600
105,000/600
105,000/500
110,000/500
105,000/300
110,000/300
110,000/200
115,000/200
125,000/100
150,000/50
SIZE OF ANNUAL PUBLICATION (PAGES)
0
5000
100,000
200,000
300,000 (No. PAGES/YR.)
400,000
500,000

Fig — ECONOMICALLY FAVORABLE OPERATING REGION FOR PCMI PUBLICATION

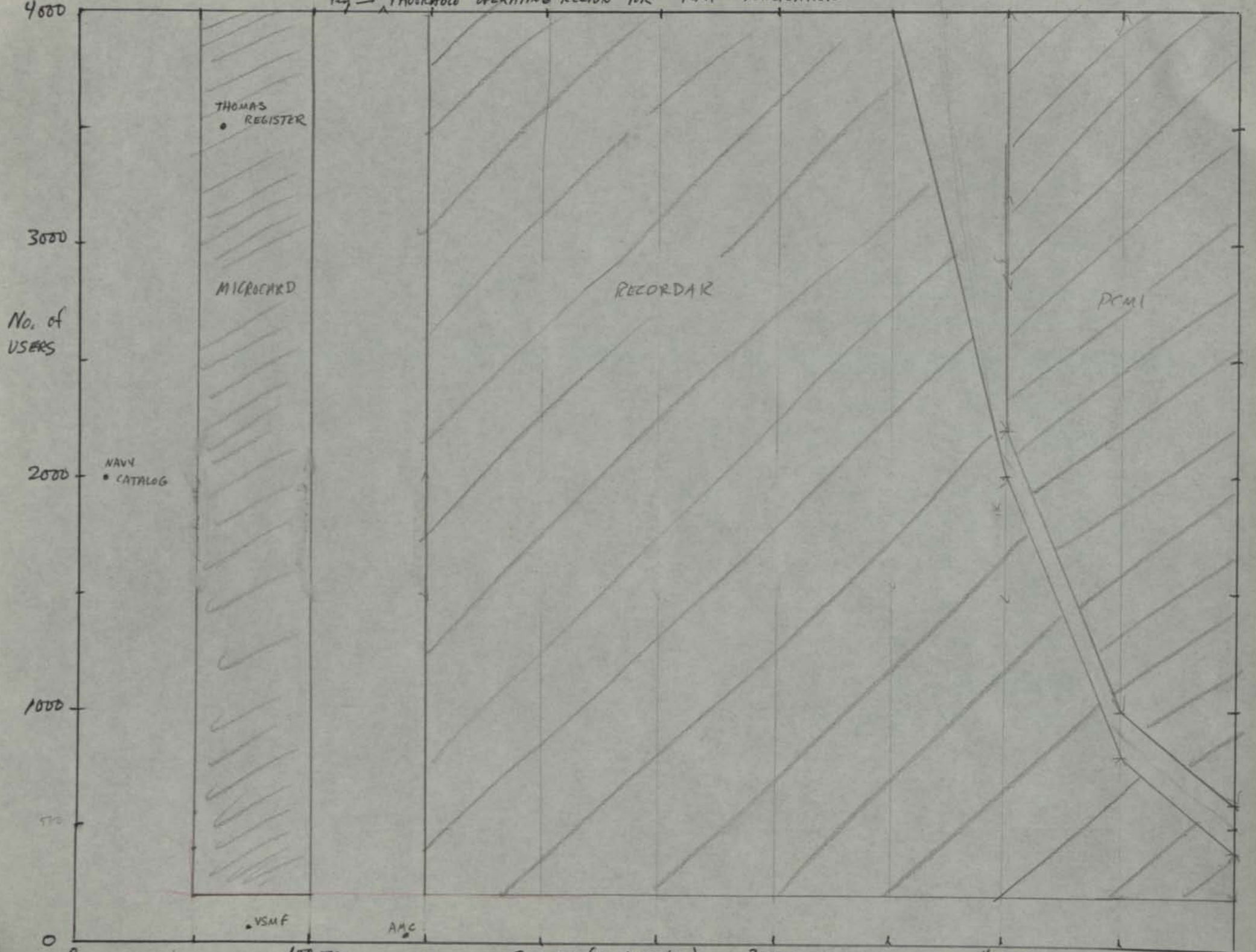
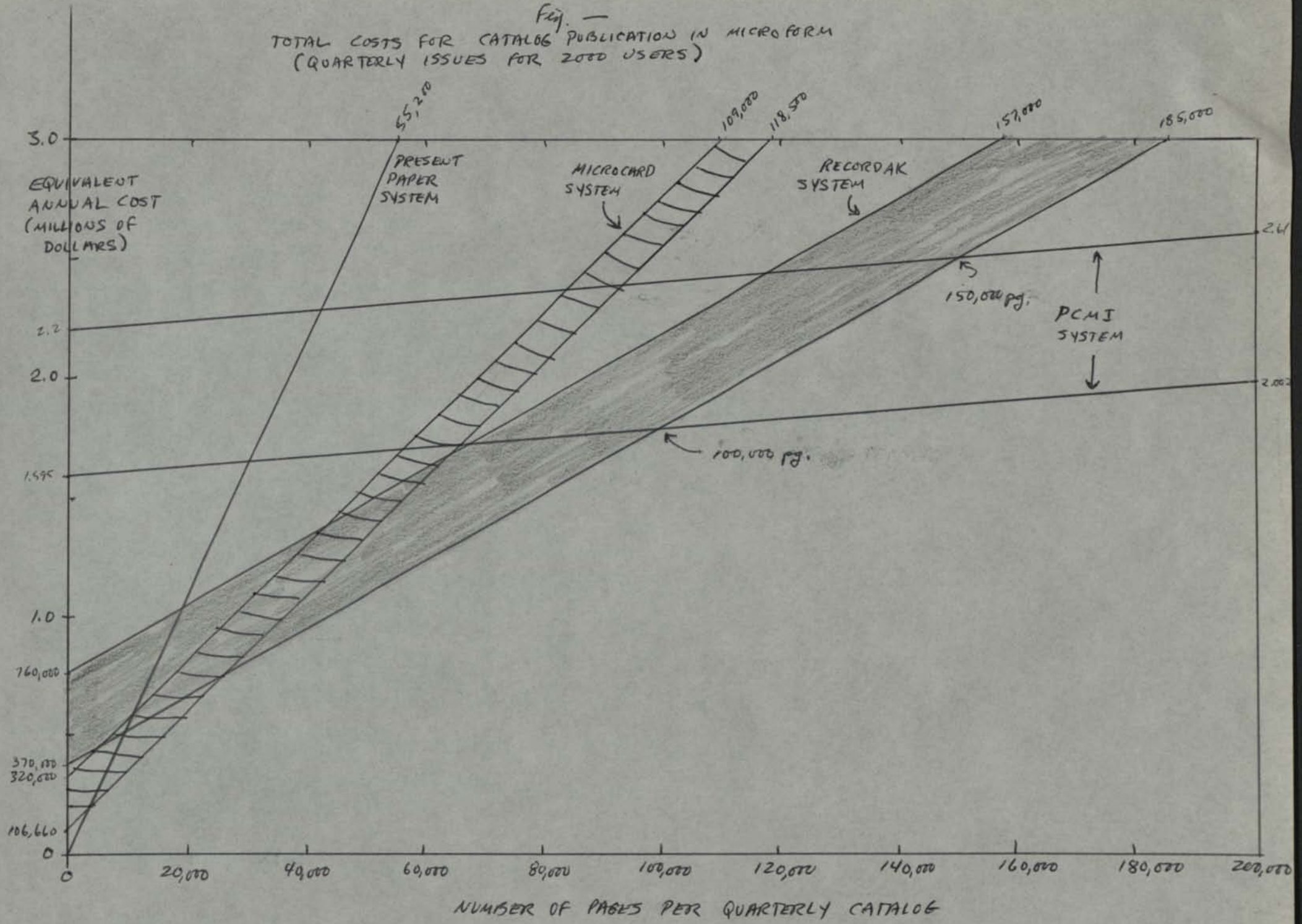
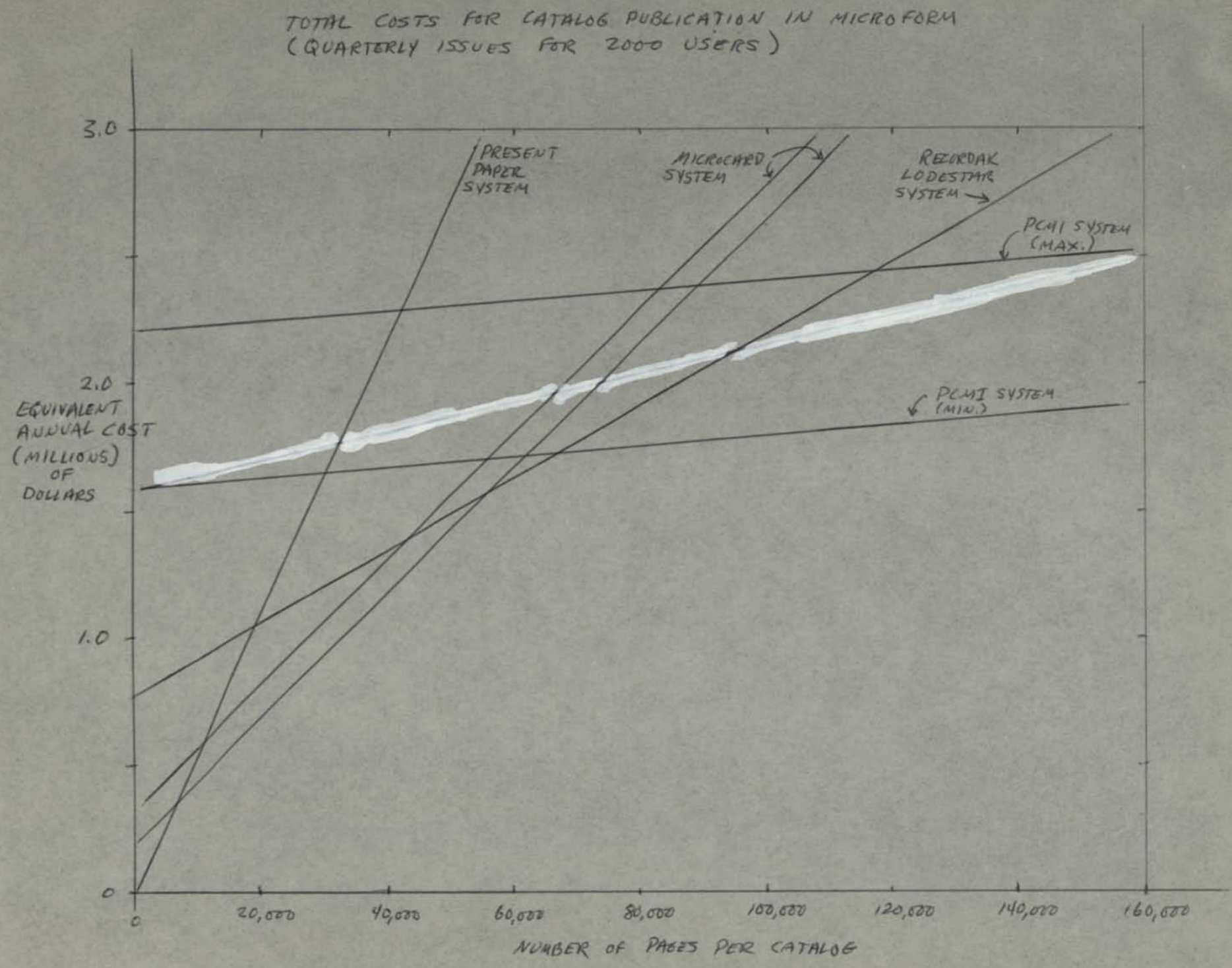


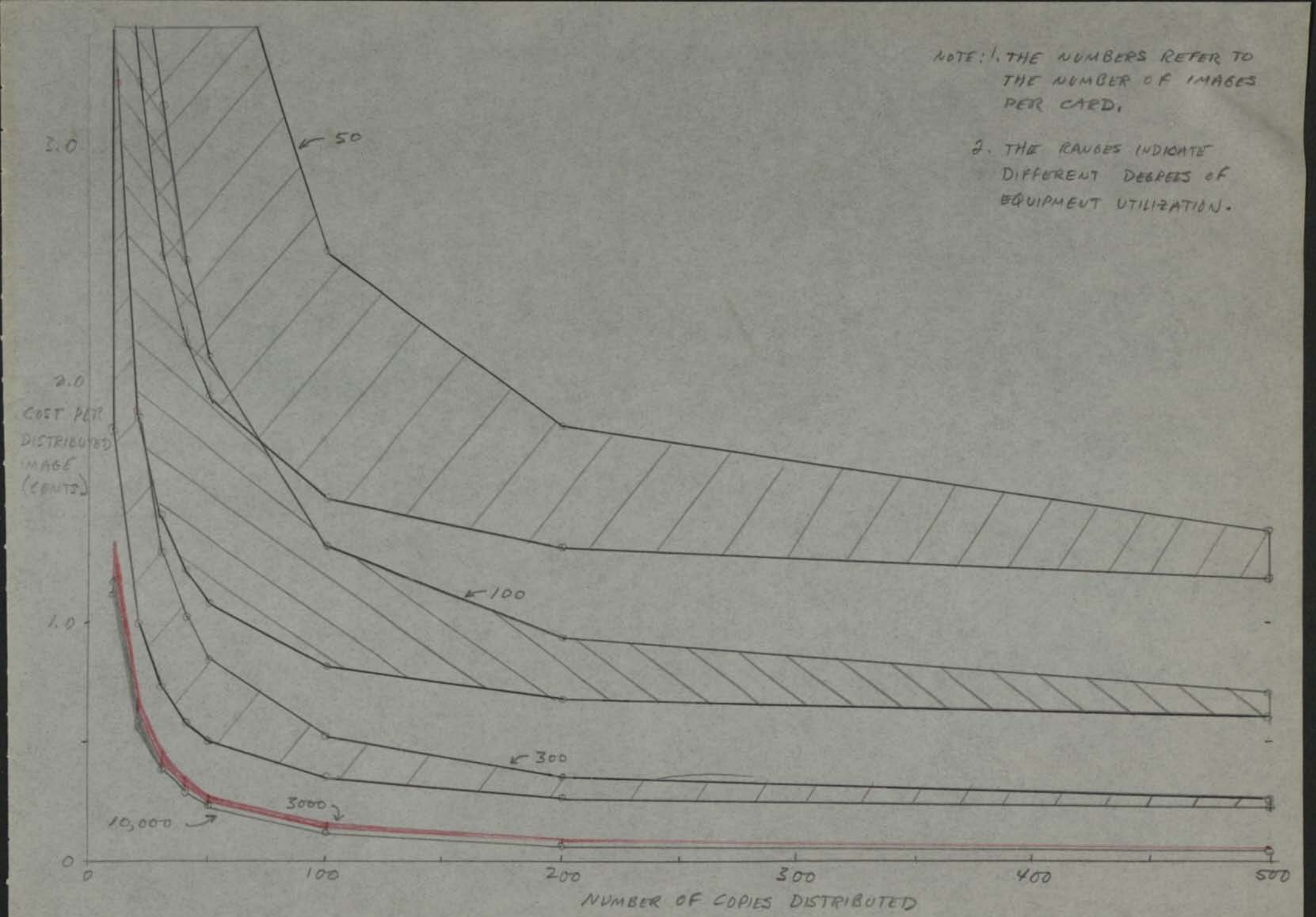
Fig. —

TOTAL COSTS FOR CATALOG PUBLICATION IN MICROFORM
(QUARTERLY ISSUES FOR 2000 USERS)




TOTAL COSTS FOR CATALOG PUBLICATION IN MICROFORM
(QUARTERLY ISSUES FOR 2000 USERS)
3.0
2.0
1.0
0
EQUIVALENT ANNUAL COST (MILLIONS) OF DOLLARS
PRESENT PAPER SYSTEM
MICROCARD SYSTEM
RECORDAK LODESTAR SYSTEM
PCMI SYSTEM (MAX.)
PCMI SYSTEM (MIN.)
0
20,000
40,000
60,000
80,000
100,000
120,000
140,000
160,000
NUMBER OF PAGES PER CATALOG

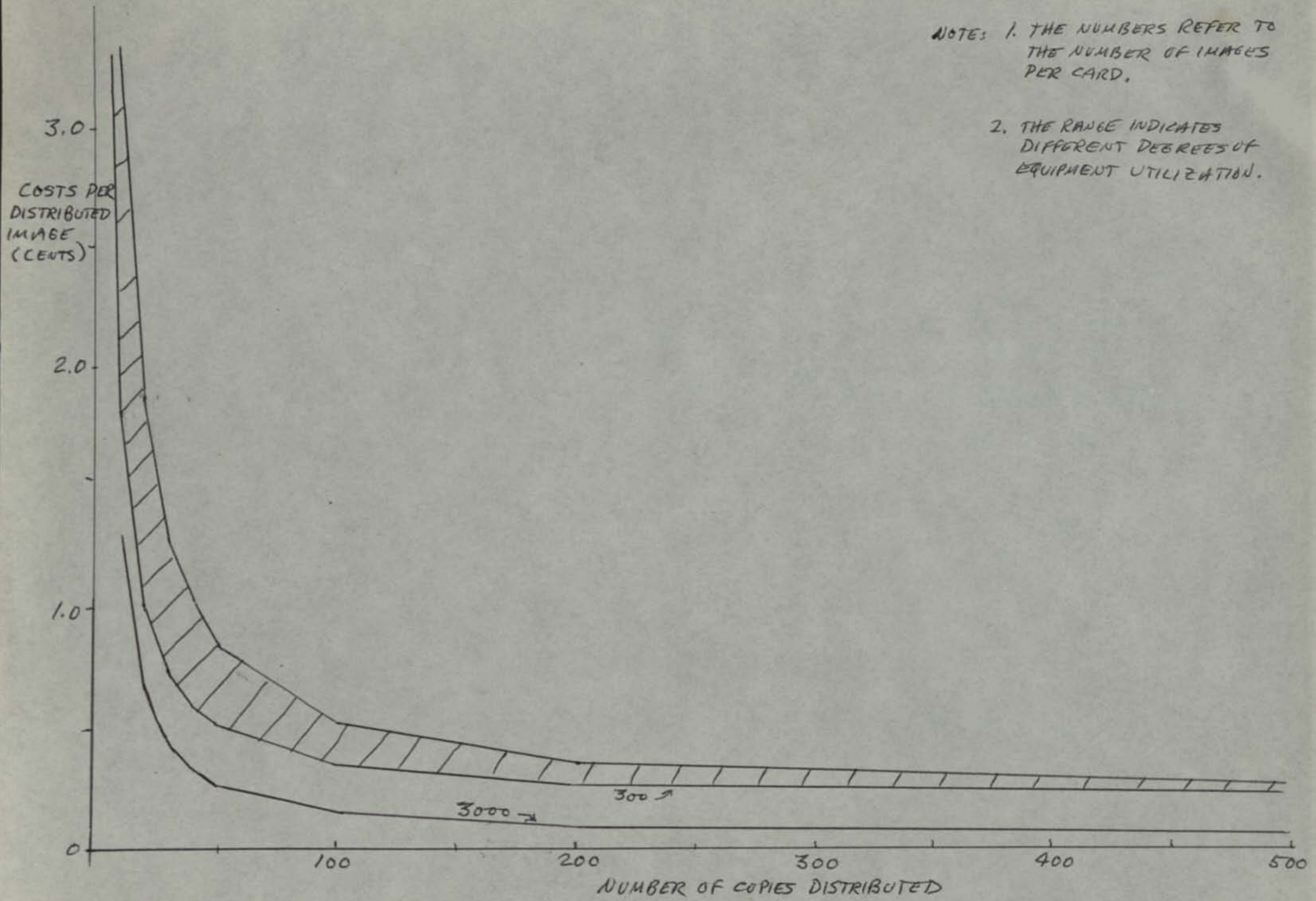
CAS
17 Jan 63



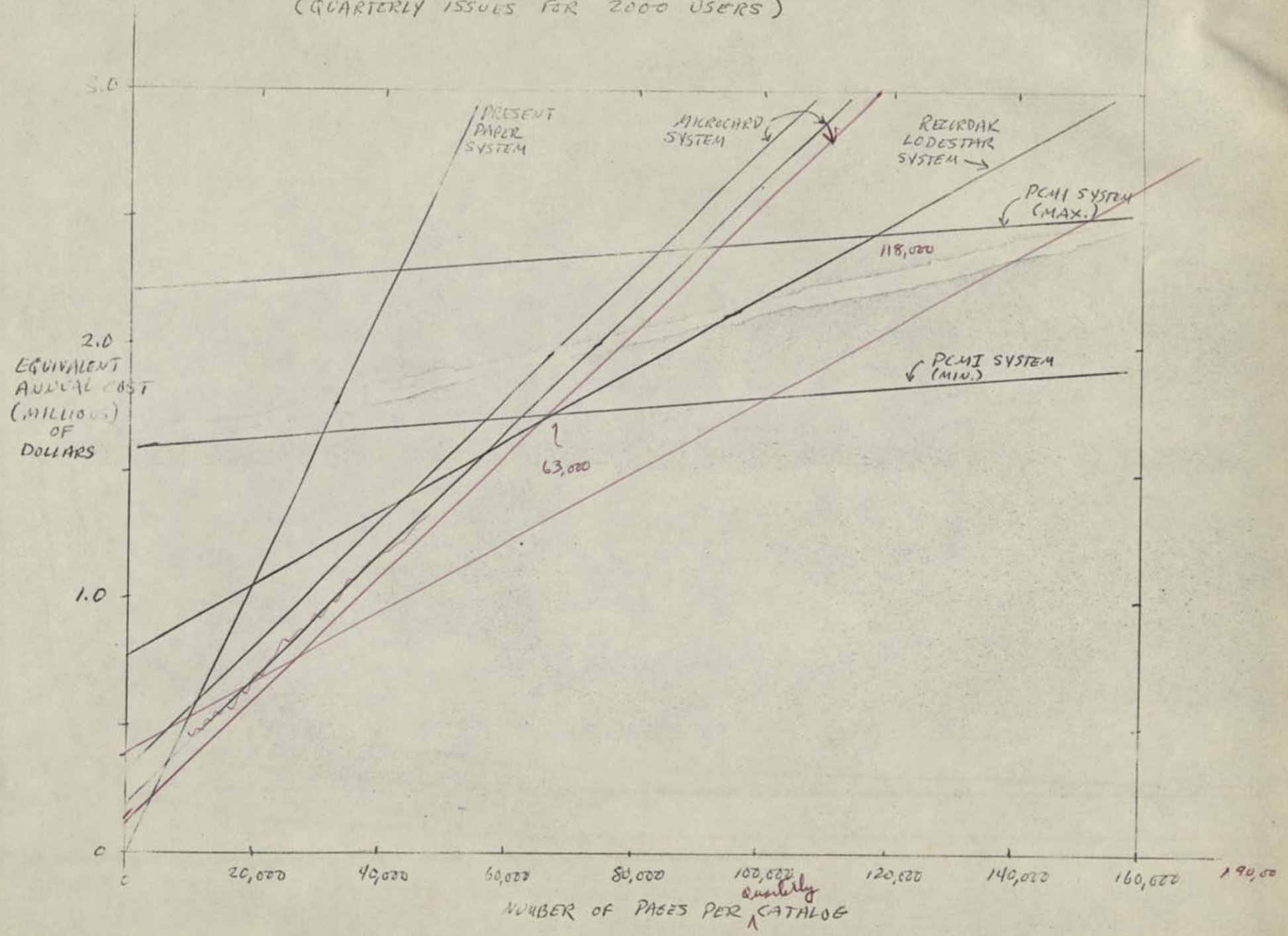
COSTS FOR PUBLICATION IN PCMI MICROFORM

NOTES: 1. THE NUMBERS REFER TO THE NUMBER OF IMAGES PER CARD.

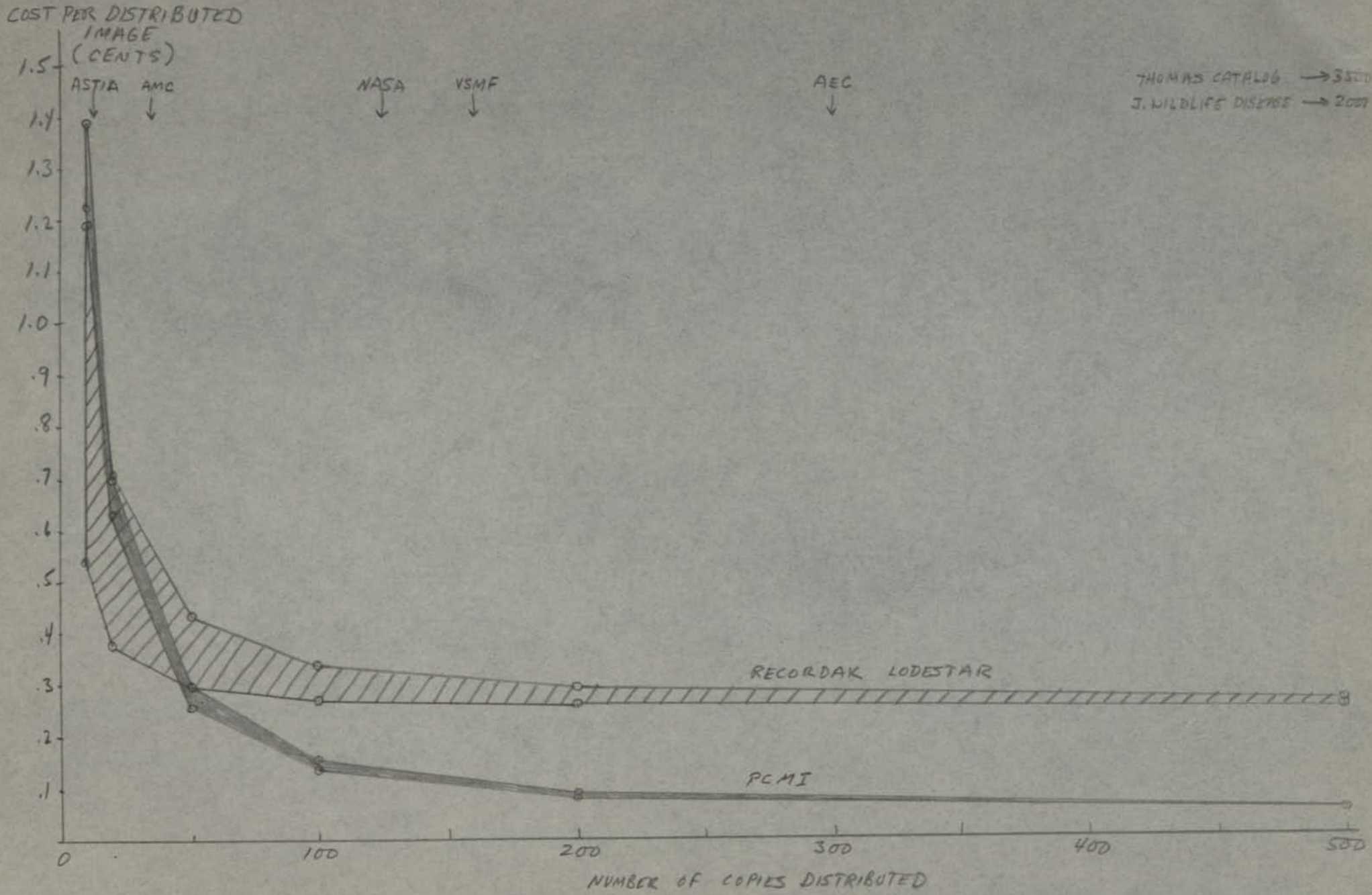
2. THE RANGE INDICATES DIFFERENT DEGREES OF EQUIPMENT UTILIZATION.



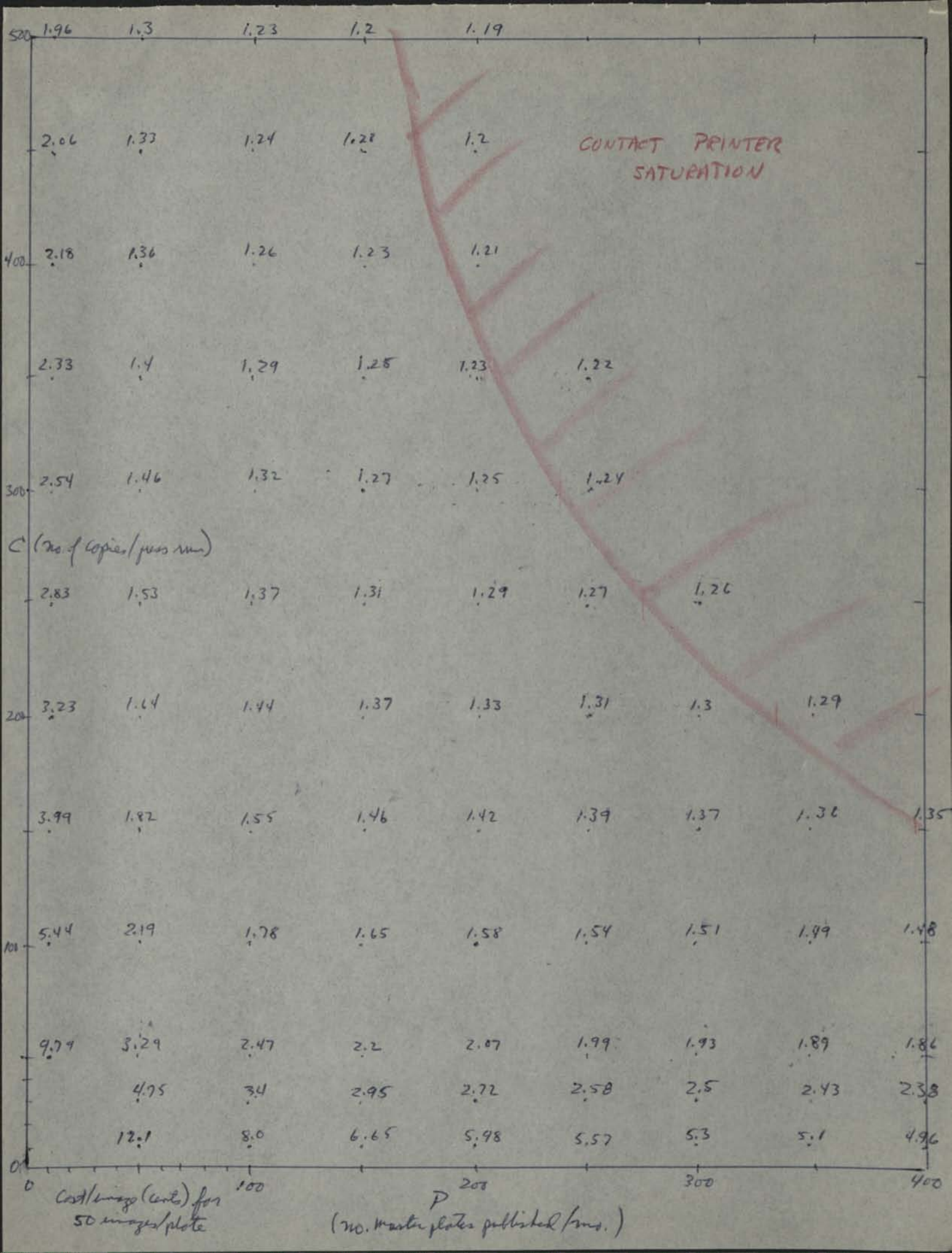
TOTAL COSTS FOR CATAL[illegible] PUBLICATION IN MICROFORM
(QUARTERLY ISSUES FOR 2000 USERS)

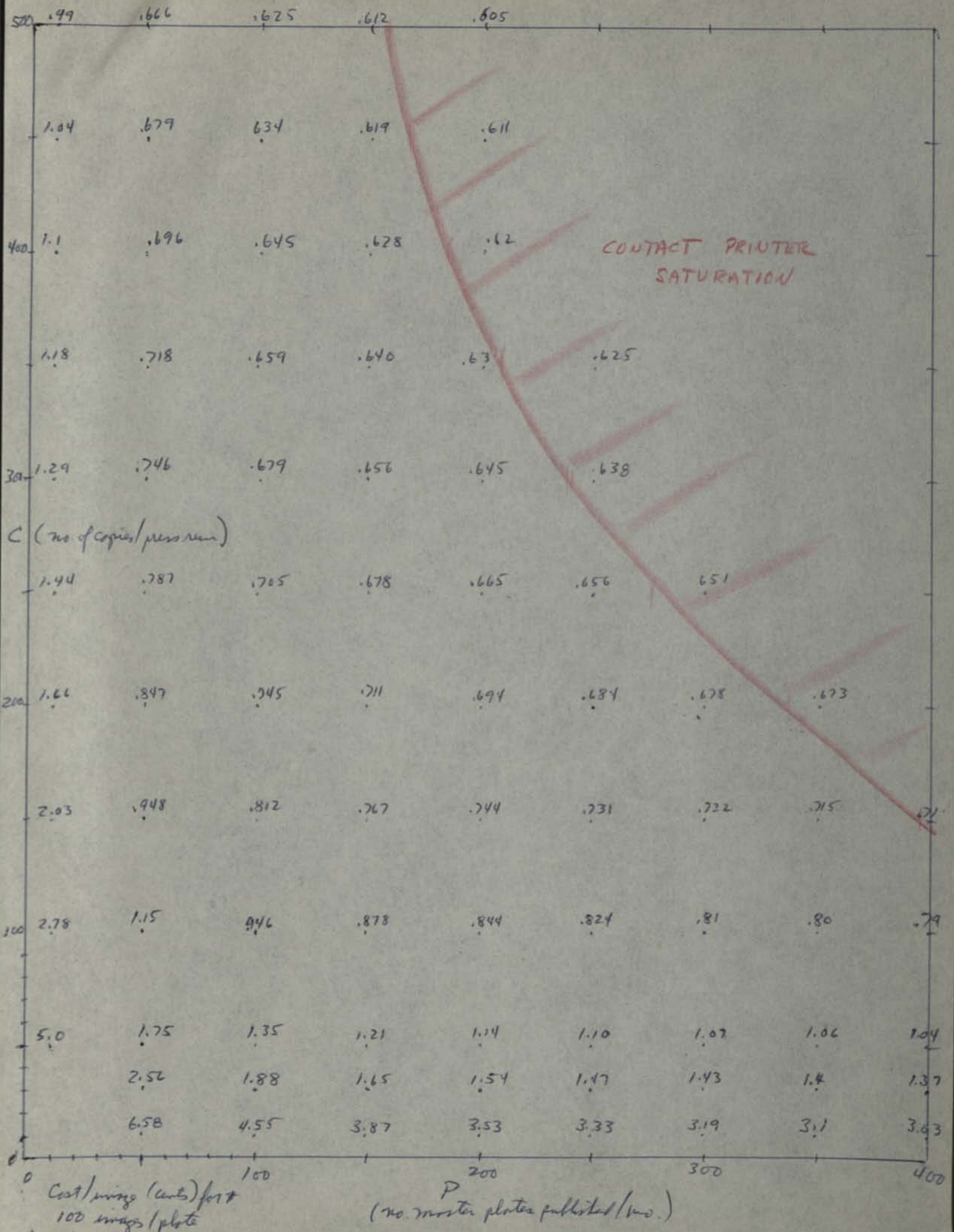


CIS
17 Jan 63



PUBLICATION COSTS FOR PCMI & RECORDAK LODESTAR MICROFORMS


500
400
300
200
100
0
C (no. of copies/press run)
1.96 1.3 1.23 1.2 1.19
2.06 1.33 1.24 1.22 1.2
CONTACT PRINTER SATURATION
2.18 1.36 1.26 1.23 1.21
2.33 1.4 1.29 1.25 1.23 1.22
2.54 1.46 1.32 1.27 1.25 1.24
2.83 1.53 1.37 1.31 1.29 1.27 1.26
3.23 1.64 1.44 1.37 1.33 1.31 1.3 1.29
3.99 1.82 1.55 1.46 1.42 1.39 1.37 1.36 1.35
5.44 2.19 1.78 1.65 1.58 1.54 1.51 1.49 1.48
9.79 3.29 2.47 2.2 2.07 1.99 1.93 1.89 1.86
4.75 3.4 2.95 2.72 2.58 2.5 2.43 2.38
12.1 8.0 6.65 5.98 5.57 5.3 5.1 4.96
0
100
200
300
400
Cost/image (cents) for 50 images/plate
P
(no. master plates published/mo.)


500
400
300
200
100
0
C (no of copies/press run)
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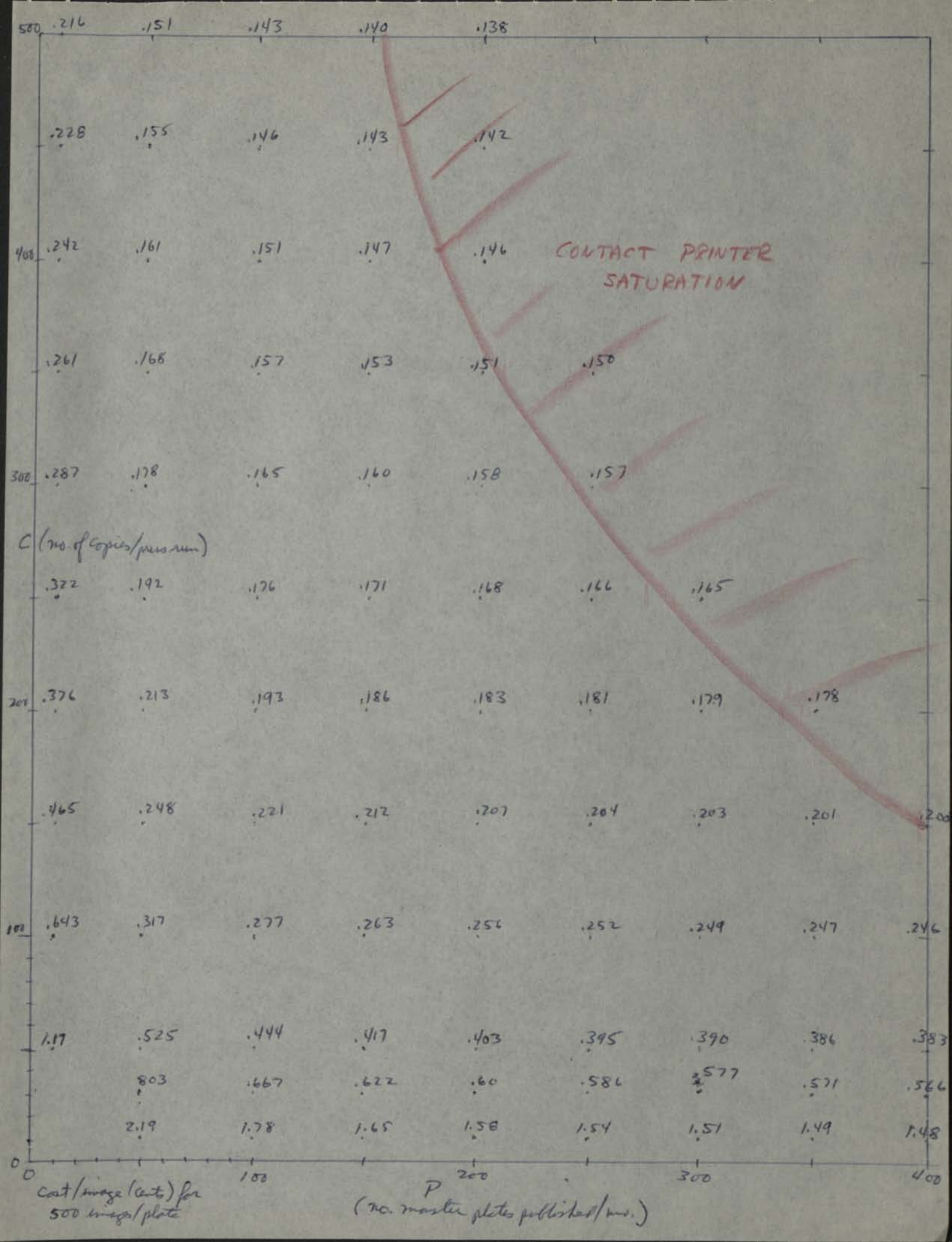
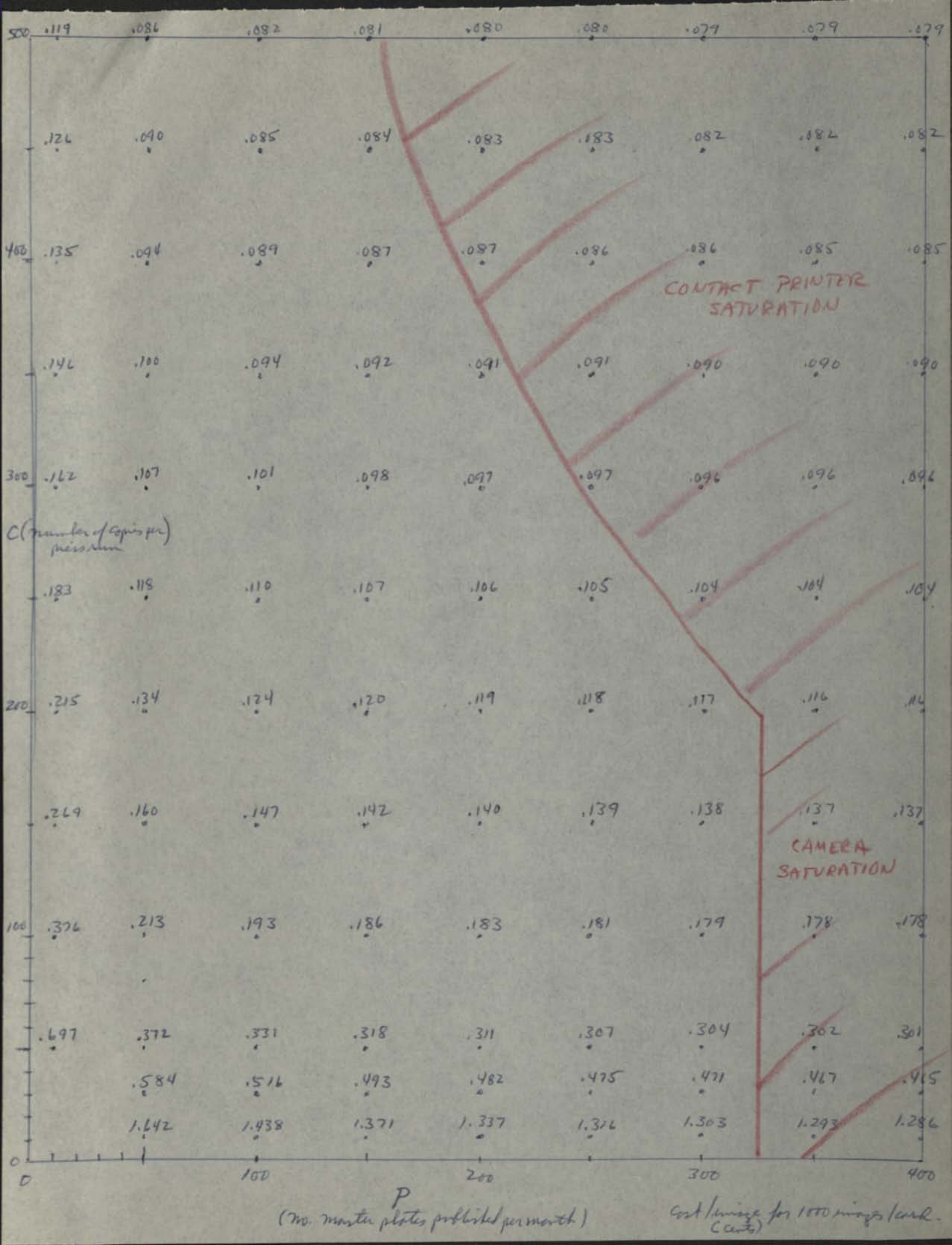
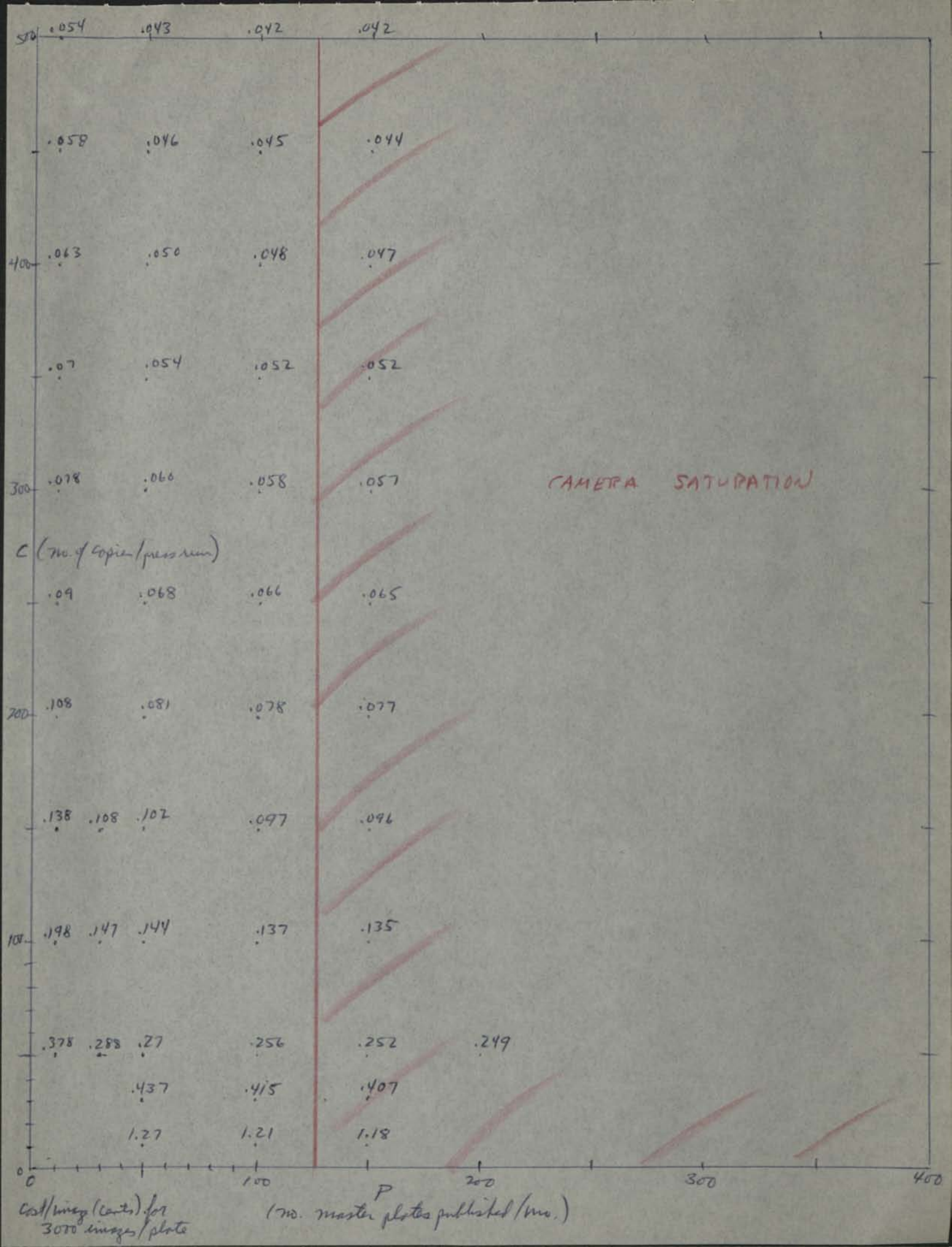
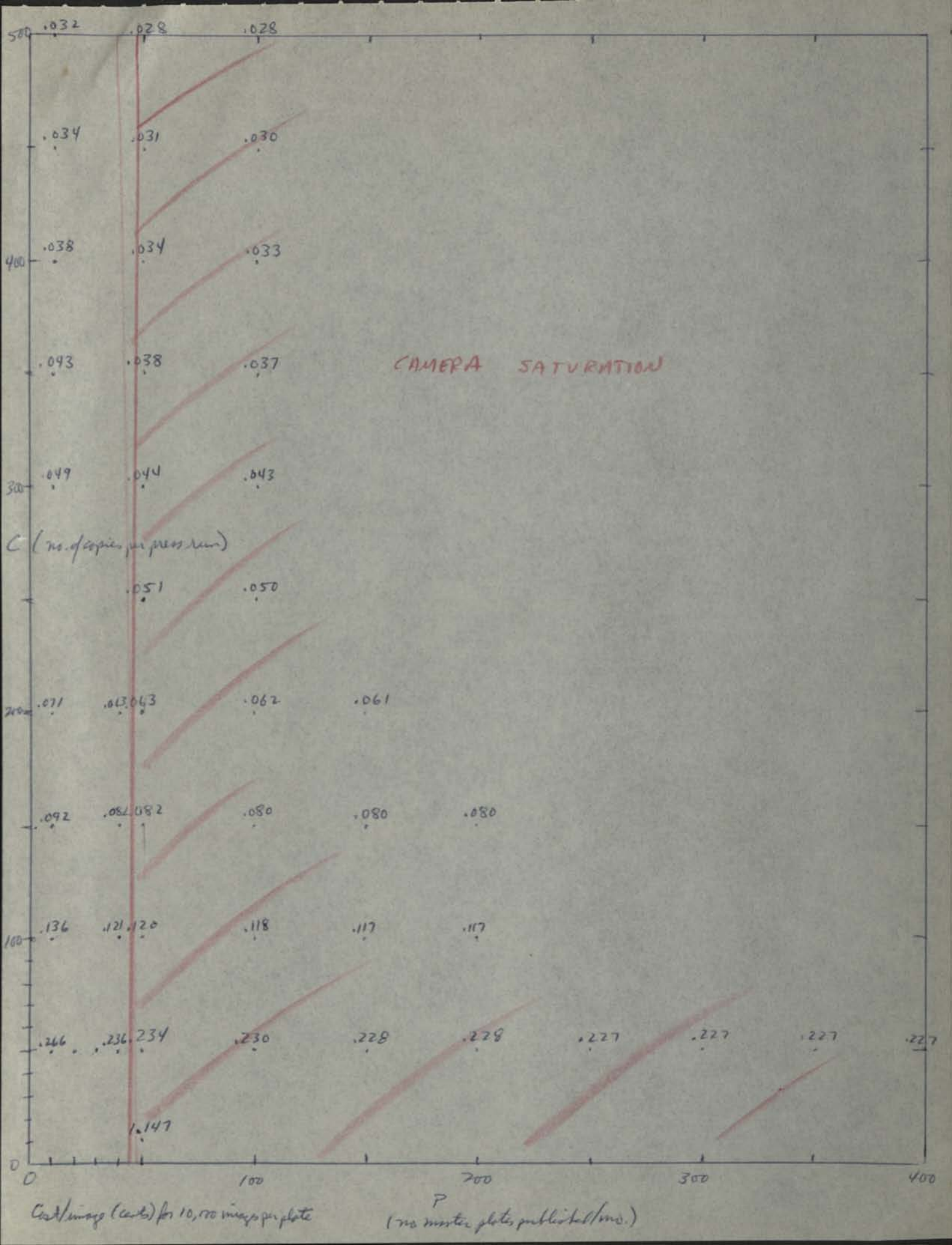
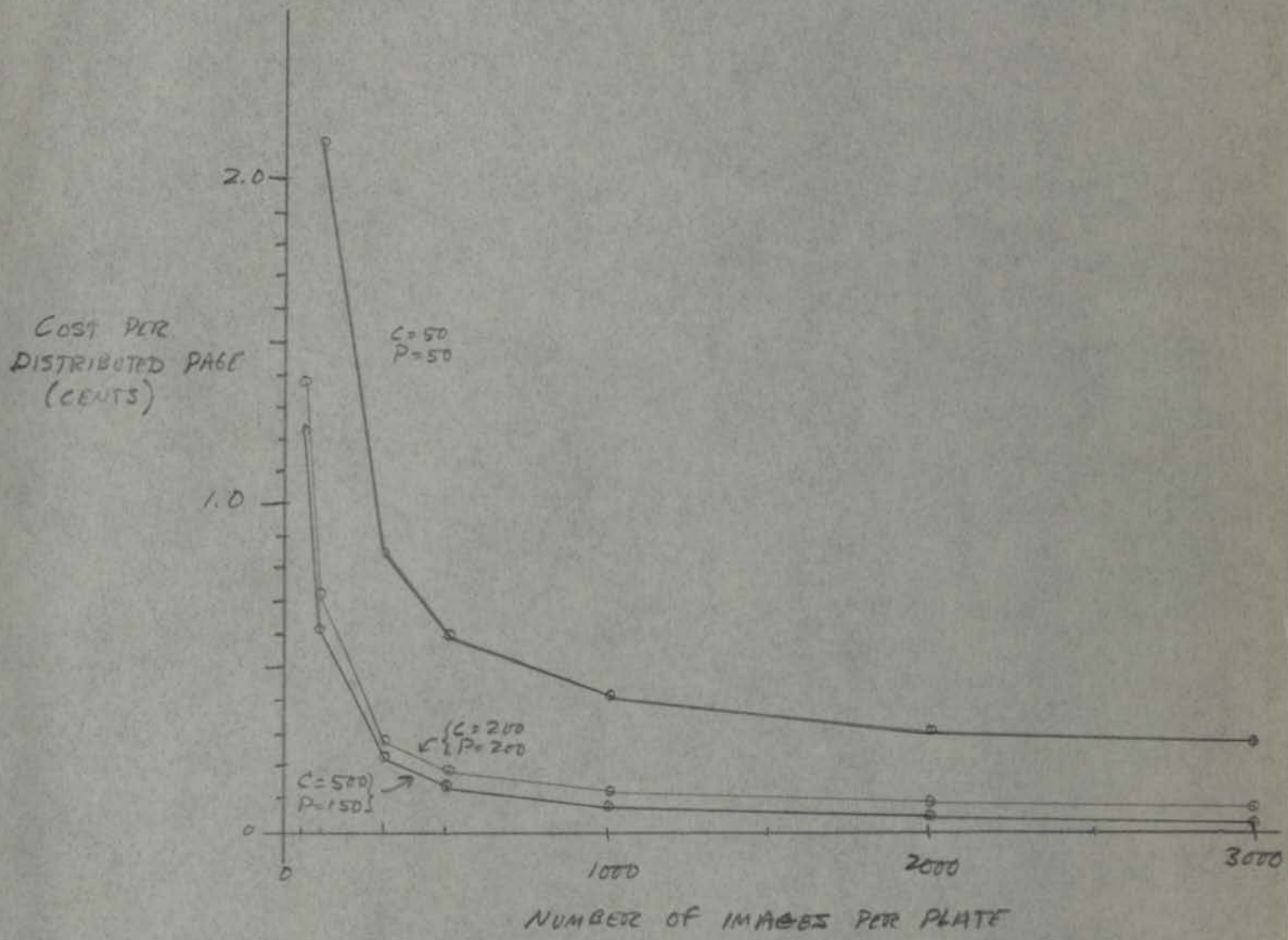
1.04 .679 634 .619 .611
1.1 .696 .645 .628 .62
1.18 .718 .659 .640 .63 .625
1.29 .746 .679 .656 .645 .638
1.44 .787 .705 .678 .665 .656 651
1.66 .847 .745 .711 .694 .684 .678 .673
2.03 .948 .812 .767 .744 .731 .722 .715 .71
2.78 1.15 .946 .878 .844 .824 .81 .80 .79
5.0 1.75 1.35 1.21 1.14 1.10 1.07 1.06 1.04
2.52 1.88 1.65 1.54 1.47 1.43 1.4 1.37
6.58 4.55 3.87 3.53 3.33 3.19 3.1 3.03
CONTACT PRINTER SATURATION
0
100
200
300
400
P
(no. master plates published/mo.)
Cost/image (cents) for 100 images/plate


500
400
300
200
100
0
C (no. of copies/press run)
.216 .151 .143 .140 .138
.228 .155 .146 .143 .142
.242 .161 .151 .147 .146
.261 .168 .157 .153 .151 .150
.287 .178 .165 .160 .158 .157
.322 .192 .176 .171 .168 .166 .165
.376 .213 .193 .186 .183 .181 .179 .178
.465 .248 .221 .212 .207 .204 .203 .201 .200
.643 .317 .277 .263 .256 .252 .249 .247 .246
1.17 .525 .444 .417 .403 .395 .390 .386 .383
.803 .667 .622 .60 .586 .577 .571 .566
2.19 1.78 1.65 1.58 1.54 1.51 1.49 1.48
CONTACT PRINTER SATURATION
0
100
200
300
400
cost/image (cents) for 500 images/plate
P
(no. master plates published/mo.)


500
400
300
200
100
0
C (number of copies per press run)
.119 .086 .082 .081 .080 .080 .079 .079 .079
.126 .090 .085 .084 .083 .083 .082 .082 .082
.135 .094 .089 .087 .087 .086 .086 .085 .085
.146 .100 .094 .092 .091 .091 .090 .090 .090
.162 .107 .101 .098 .097 .097 .096 .096 .096
.183 .118 .110 .107 .106 .105 .104 .104 .104
.215 .134 .124 .120 .119 .118 .117 .116 .116
.269 .160 .147 .142 .140 .139 .138 .137 .137
.376 .213 .193 .186 .183 .181 .179 .178 .178
.697 .372 .331 .318 .311 .307 .304 .302 .301
.584 .516 .493 .482 .475 .471 .467 .465
1.642 1.438 1.371 1.337 1.316 1.303 1.293 1.286
CONTACT PRINTER SATURATION
CAMERA SATURATION
0
100
200
300
400
P
(No. master plates published per month)
Cost/image for 1000 images/week
(Cents)


.054 .043 .042 .042
.058 .046 .045 .044
.063 .050 .048 .047
.07 .054 .052 .052
.078 .066 .058 .057
CAMERA SATURATION
C (no. of copies/press run)
.09 .068 .066 .065
.108 .081 .078 .077
.138 .108 .102 .097 .096
.198 .147 .144 .137 .135
.378 .288 .27 .256 .252 .249
.437 .415 .407
1.27 1.21 1.18
500
400
300
200
100
0
0
100
200
300
400
P
Cost/image (cents) for 3000 images/plate
(no. master plates published/mo.)


.032
.028
.028
.034
.031
.030
.038
.034
.033
.093
.038
.037
CAMERA SATURATION
.049
.044
.043
C (no. of copies per press run)
.051
.050
.071
.063
.043
.062
.061
.092
.082
.082
.080
.080
.080
.136
.121
.120
.118
.117
.117
.246
.236
.234
.230
.228
.228
.227
.227
.227
.227
.147
0
100
200
300
400
500
0
100
200
300
400
Cost/image (cents) for 10,000 images per plate
P
(no master plates published/mo.)


COST PER DISTRIBUTED PAGE (CENTS)
2.0
1.0
0
C=50
P=50
C=200
P=200
C=500
P=150
0
1000
2000
3000
NUMBER OF IMAGES PER PLATE