RECORDS ADMINISTRATION PROGRAM

RECORDS CENTER CONSTRUCTION STUDY

Microfilming Costs

vs

Storage of Hard Copy

PREPARED BY

STAT

December 1967

7 December 1967

MEMORANDUM FOR: Chief, Support Services Staff

SUBJECT : Microfilming Costs versus Storage of Hard Copy

1. The current policy for storage of inactive records is based upon the fact that although a reel of microfilm saves space, the film processing costs far outweigh the costs to store hard copy.

2. This policy holds that it is to the Agency's advantage, both economically and efficiently, to store the hard copy of records that are to be kept less than 30 years. The exceptions to this rule are those Agency records already on microfilm or tape as a part of an existing office procedure. At present some 93,000 reels of such microfilms occupy about 1,200 cubic feet of the Records Center space. Also at the Center is another 150 cubic feet of photo miniturized products (i.e., aperture cards, minicards, microfiche, and so forth).

3. Costs for microfilming as stated in the attached price lists by GSA and our Printing Services Division (Tabs A and B) range from about $8.00 to $80.00 to microfilm two thousand images. (In papers that equals one foot or one-half safe drawer or 2,000 sheets.) The low figure relates to an automatic rotary camera handling index cards of all the same quality or tone, size, color, and thickness of paper without any staples, fasteners, or folded or torn items. The higher cost is for planetary cameras and hand processing of several sizes, typing tones, and varieties of paper in a foot of ordinary files. A commercial contractor's charges will total at least

twice these costs. Our Staff, like National Archives, and Atomic Energy, uses a microfilming cost figure of $20 per foot of files ($10 per 1,000 images) as our average for estimations.

4. The cost to build the Records Center in 1954 and the addition in 1957 totaled $662,117 including the shelving. The storage capacity at present is 106,800 cubic feet or an average cost of $6.20 per cubic foot of storage space.

5. Consequently, as a point of departure, we can calculate the cost for a given amount of records in storage or microfilm. For example, to store 1,000 cubic feet of hard copy in the Records Center at $6.20 per cubic foot costs $6,200.

6. To film 1,000 cubic feet of hard copy at the lowest rotary camera figure of $8.00 per cubic foot cost $8,000. But the space savings is tremendous. About 3,000 images fit on one 100-foot reel of 16mm film; and 100 reels will fit into a cubic foot of space. Therefore, 1,000 feet of hard copy (two million images) will fit on about 700 reels which only need seven cubic feet of storage space. If the filming cost is not charged to the storage bill, the storage is only $43.40 ($6.20 x 7).

7. Projecting these ratios to one half the files in the Records Center will show enormous savings in space through microfilming (50,000 cubic feet of hard copy can be reduced to 334 cubic feet of microfilms). If we don't include the $400,000 ($8.00 x 50,000) filming cost, this filming reduces the storage costs to a mere $2,070 ($6.20 x 334). Also if the original

documents are destroyed the space gained is a building worth $372,495 at today's construction rate of $15 per square foot. (The value of the space recovered is less at the old, original construction cost.)

8. The Records Staff has repeatedly studied and rejected the microfilming for storage concept because we consider the filming conversion costs to be disproportionately high for the space gained. STAT put the cost at $450,000 if the Agency does the project or $1,125,000 if it is contracted for. (We calculate a filming cost in excess of one million dollars, not the low $8 cost estimate which totals $400,000.) Further, we find the procedural burdens and poor record quality to be detrimental to office operations in filing, retrieving, and using the microfilm product.

9. Microfilming technology has not changed the manpower requirements for analysis and management of the material selected for microfilming, the indexing for retrieval, and the controls for related office procedures. Attached are three authoritative articles on the microfilming problems identified in the past ten years and still major problems for microfilm operations today. (Tabs C, D, and E) Every point they make should be part of this memo. Our experiences with offices handling paper records does not permit us to be optimistic. We feel the office procedures, personnel, or management will not become more proficient or concerned with filing and records just because the records media is changed to microfilm. Data processing technology changes are forcing management to give greater attention to records problems. Higher level professionals are concerned with file content, procedures, use, and disposition but the improvements will require

the next several years to be implemented, take effect, and reduce the Agency's requirement for reference to old records and a place to store them.

10. It is our recommendation that a microfilming project not be the alternative selected as the possible solution for the current records storage problem.

11. We believe and recommend that at today's Records Center construction prices of $15 per square foot an addition of 25,000 square foot for records storage floor space adjoining the present Records Center could be constructed to house 50,000 cubic feet of Agency records and the total cost would be substantially lower than related microfilming costs. 25X1

12. During the engineering planning and architectural designing careful consideration could be given to Emergency Relocation requirements for subterranean Vital Records storage and better fall-out protected operating space for the Agency Emergency Force. The Records Center personnel now maintain the 11,000 cubic feet of Vital Records on deposit. They could continue such part-time service for an adjacent emergency facility if its construction is added to the proposed Records Center addition.

13. Further, the interior design of an addition could be modernized to permit a higher density of storage. Our rate of 2 cubic feet for each square foot of floor space could be increased to a 3 to 1 or 3.5 to 1 ratio if the columns were omitted and the shelving made higher with library type catwalks instead of floors and ladders. A section with movable shelving

could be considered. Or the new "conservative" motorized retrieval of boxes from high shelves could be built in. The engineers and architects should consult with National Archives as well as the National Records Council in New York before considering a conventional structure with basic shelving.

14. Personnel considerations also require a contiguous facility rather than use of facilities located elsewhere with new manpower. Likewise, the manpower for servicing records retrieval from microfilm would be considerably higher than it is now for servicing hard copy. The research and file retrieval time may be comparable but the additional reproduction time is more for film than today's servicing operation. In addition to increased personnel costs there would have to be large institutional-size copy flow machines to handle the 100,000 service requests processed annually. The film reduction of records bulk would not reduce the personnel requirements.

15. In view of the practical operating difficulties as well as the economics involved, we are compelled to recommend against the microfilming project and continuation of the hard copy storage policy with its attendant requirement for additional construction.

STAT

CIA Records Administration
Officer

A

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GENERAL SERVICES ADMINISTRATION
WASHINGTON 25, D. C.

NAR 1844.1
March 26, 1963

GSA ORDER

SUBJECT: Accountability for Reimbursable Microfilming Services in the Federal Records Centers

1. PURPOSE. This order establishes the procedure for handling reimbursable microfilming services in Federal Records Centers and transmits schedules of fees to be charged to Federal agencies for such services.

2. AUTHORITY. General Services Administration Circular No. 295 of January 14, 1963 announces centralized microfilming services to Federal agencies on a reimbursable basis. This service can be rendered by each region within existing budgetary procedures.

3. SERVICES SUBJECT TO REIMBURSEMENT. Services to agencies for which fees shall be charged include preparing, indexing, and filming records; and inspecting the film and labeling the film containers. These services plus film and processing comprise the costs for which reimbursement will be charged.

4. FEE SCHEDULES FOR MICROFILM SERVICES. Attached are fee schedules listing the rates to be charged for various types of microfilming projects based on type of process and type and size of documents. The minimum fee for any given project is $15.00. Copies of fee schedules are being distributed to records center officials to be used as handouts for agencies interested in these services. Additional copies may be reproduced at the regional level.

5. REIMBURSEMENT. The regions shall obtain a commitment in writing for each microfilming project before any filming is actually undertaken. Such commitments should outline the scope of the work to be done, give the agency appropriation symbol to be charged, and state whether billing is to be done on a quarterly basis or when projects are completed.

Distribution: A-3a, b, 7; B-3h, 7e; F; G-3a, b, 7; H-3e, 7b

PAR 1

6. FUNDING. Allotments to finance the reimbursable work shall be obtained through normal operating budget procedures. Operating budget requests should include reimbursable funds based on an estimate of microfilming services to be performed.

Wayne C. Grover

WAYNE C. GROVER
Archivist of the United States

GSA WASH DC 63-13113

NAR 1844.1
March 26, 1963

FEE SCHEDULES FOR MICROFILMING SERVICES

Schedule A - 16mm Rotary Camera Automatic Feed

Schedule A covers only card records that are in good condition, of uniform size and thickness, and of one color, that are not stapled or fastened together.

Document Length in Inches	Cost Per 1,000 Images
2.5 thru 4.0	$2.60
4.5 thru 6.0	$2.90
6.5 thru 8.0	$3.25
8.5 thru 10.0	$3.60
10.5 thru 12.0	$3.95
12.5 thru 14.0	$4.30
14.5 thru 15.0	$4.75

Schedule B - 16mm Rotary Camera Hand Feed

Schedule B covers card records in good condition which must be hand fed into a rotary camera, because they are not uniform in size or thickness, or color:

Document Length in Inches	Cost Per 1,000 Images
2.5 thru 4.0	$4.95
4.5 thru 6.0	$5.70
6.5 thru 8.0	$6.65
8.5 thru 10.0	$7.90
10.5 thru 12.0	$9.70
12.5 thru 14.0	$13.25
14.5 thru 15.0	$23.20

Schedule C - 16mm Rotary Camera
Hand Feed

Schedule C covers subject files, correspondence files, and case files, which may contain a variety of sizes varying in color tone, in types of paper and legibility.

Document Length in Inches	Cost Per 1,000 Images
2.5 thru 15.0	$9.45

Schedule D - 35mm Planetary Camera

Schedule D covers oversize documents such as bound volumes, engineering drawings, large ledger sheets which cannot be filmed with rotary cameras.

Document Length in Inches	Cost Per 1,000 Images
14.0 thru 19.0	$31.20
19.0 thru 24.0	$35.90
24.0 thru 30.0	$42.25
30.0 thru 36.0	$50.65

The charges in Schedules A through D include the cost of filming, inspecting, developing, and materials only. Minimum charge for each project is $15.00. Additional costs, as indicated below, may apply to some projects.

The fees listed in these schedules do not include preparation time which may be required prior to filming. Such preparation may include removal of staples, unfolding documents, document repair and targeting. Where such preparation is required, a fee of $3.00 per hour should be added to the costs shown in these schedules.

The prices are based on work being performed in the Federal Records Center. If for any reason an agency must have the filming done on its

own premises, a $5.00 per hour charge will be made for transporting and installing equipment.

A slight charge may be added when the center is requested to make a special trip to pick up and return records being microfilmed.

If in the judgment of the responsible NARS official the filming is of a more difficult type than stated in the schedule, special cost estimates will be made.

Appendix A. Fee Schedules for Microfilming Services

B

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PRINTING and PHOTOGRAPHIC PRICE LIST

JANUARY 1965

OFFICE OF LOGISTICS

PRINTING SERVICES DIVISION

PRINTING SERVICES DIVISION

PRINTING PRICE LIST

(FOR ESTIMATING JOB COSTS)

These are prices to be used for estimating the cost of proposed work. Final cost will be computed from actual labor and materials used. Additional information and assistance in estimating the cost of printing jobs may be obtained by calling the Production Planning Staff, [redacted] STAT

COMPOSING

(Up to 8 x 10½ size)
(For larger sizes add 20%)

Type composition	$13.00 per page
Typing for offset reproduction (non-justified) (includes forms, etc.)	8.00 per page
Typing for offset reproduction (justified)	11.50 per page
Form composition and drafting	11.50 per page
Typing direct-image plates, mimeograph stencils, and ditto masters (straight matter)	4.60 per page

(Above prices for composing and typing include proofreading)

PRINTING

Duplicating—Mimeograph, ditto, direct image offset
(Single sheet work)

One side only:	
First 100 impressions	1.00 per page
Each additional 100 impressions from the same master or plate	.45 per page
Back-up page when two sides are printed:	
First 100 impressions	.80 per page
Each additional 100 impressions from the same master or plate	.30 per page

(Collating and stitching are not included in above prices)

Duplicating—Mimeograph, ditto, direct image offset
(Booklet work)

One side only:	
First 100 copies	1.10 per page
Each additional 100 copies	.55 per page
Back-up page when two sides are printed:	
First 100 copies	.90 per page
Each additional 100 copies	.35 per page

(Above prices include collating and stitching)

Photo Offset Printing
(Up to 8 x 10½ size)
(Single sheet work)

One side only:	
First 100 impressions	$3.85
Each additional 100 impressions	.55
Back-up page when two sides are printed:	
First 100 impressions	3.65
Each additional impressions	.35

(Above prices include camera work, layout, and platemaking)

Photo Offset Printing
(Up to 8 x 10½ size)
(Booklet work)

First 100 copies	4.05 per page
Each additional 100 copies	.65 per page

(Price includes camera work, layout, platemaking, folding, collating, and stitching. To be used in estimating booklet work.)

Letterpress Printing
(Up to 8 x 10½ size)
(Single sheet work)

One side only:	
First 100 impressions	3.45
Each additional 100 impressions	.85
Back-up page when two sides are printed:	
First 100 impressions	3.25
Each additional 100 impressions	.65

Letterpress Printing
(Up to 8 x 10½ size)
(Booklet work)

First 100 copies	16.50 per page
Each additional 100 copies	.80 per page

(Price includes type composition, proofreading, folding, collating, and stitching. To be used in estimating booklet work.)

BINDERY

Bindery operations for completed pamphlet or booklet work are included in the estimated per page cost and include folding, collating and stitching.	
Additional bindery operations and hand bookbinding or case binding will be charged at the rate of $6.75 per hour.	
Padding (100 sheets per pad)	.05 per pad
Punching (1, 2 or 3 holes) (includes makeready) per 100 sheets	1.00
Each additional 1000 sheets	.22

Note: All prices are based on straight line copy. Additional copy preparation, presswork or bindery operations will be charged at standard rates for each operation.

All estimated prices for printing include offset book, mimeograph, ditto, or 40 lb. sulphite paper. Other paper or card stock used will be charged at cost.

PRINTING SERVICES DIVISION

PHOTOGRAPHIC PRICE LIST

(FOR ESTIMATING JOB COSTS)

1. This price list has been prepared to assist the user in obtaining an *advance estimate* of the cost of specific types of photographic work. Actual charges for photographic work may vary from these estimates as they are made on the basis of fixed prices and/or charges for actual labor and materials used.
2. For information about other products and services not listed call [redacted] 25X1
3. Minimum charge on all photocopy and diazo jobs, $1.00 per requisition.
4. Minimum charge on all other photographic work, $2.00 per requisition.
5. Volume work usually decreases the price per unit for large jobs. A more accurate estimate can be obtained by calling the Printing Services Division [redacted] 25X1

I. PHOTOCOPY

Paper prints made directly from drawings, maps, documents—price includes trimming, collating, and stapling as required.

A. PHOTOSTATS

Price based on 9″ x 12″ or smaller, cost of larger prints estimated in multiples of 9″ x 12″ . . . . . $0.35 per unit

(Example: A photostat of a 16″ x 10½″ document would be figured as two 9″ x 12″ units or .70)

B. ELECTROSTATIC PRINTS

Price based on standard 8″ x 10½″ document . . .04

II. DIAZO

Paper and foil prints made directly from one-sided drawings or documents which have a translucent or transparent base. Prices are based on square footage and include trimming, collating and stapling as required.

A. PAPER PRINTS (Ozalid)

Single Wt. paper print . . . . . .02 sq. ft.

B. FOIL PRINT (Film Transparency, Ozalid)

Standard .005″ thickness film . . . . . .22 sq. ft.

III. PHOTOGRAPHY, Black & White

A. FILM NEGATIVE

Price based on individual negatives or frames

1. 35mm negative	$0.07 per neg.
* 2. 70mm negative	.10 per neg.
3. 8″ x 10″ negative	1.40 per neg.
"On Location" photography services available at additional cost of approximately	6.10 per hr.

B. PRINTS, PHOTOGRAPHIC

Price based on standard single weight prints

1. Prints up to and including 4″ x 6″	.12 per print
2. Prints larger than 4″ x 6″ up to and including	
5″ x 8″	.17 per print
8″ x 10″	.25 per print
11″ x 14″	.35 per print
20″ x 24″	1.60 per print
30″ x 40″	2.55 per print

Special printing papers and techniques are available at extra cost.

* Additional 70mm negative of same original	.06

IV. MICROPHOTOGRAPHY

A. MICROFILMING

Price includes preparatory work (unstapling etc.), shooting, processing, inspecting, cost of film, reel, carton, and reassembling of originals.

1. Flat bed camera work, for all types of originals	
a. 35mm film—each 100 frames or less	4.00 per 100 frames
b. 16mm film—each 100 frames or less	3.80 per 100 frames
2. Rotary camera work, used mainly for card files	
a. 16mm film—100 frames	.30 per 100 frames

B. MICROFILM PROCESSING (For "Customer" Film)

Price includes standard processing, inspection, reel and carton. Custom processing available at extra cost.

1. 35mm film—100 ft. roll	1.95 per roll
2. 16mm film—100 ft. roll	1.95 per roll
3. 35mm film—36 exp. cassetts	.70 per roll

C. MICROFILM DUPLICATING

From furnished film. Price includes printing, processing, film, reel, carton and inspection.

1. Diazo 35mm 100 ft. roll	4.70 per roll
2. Diazo 16mm 100 ft. roll	3.60 per roll
3. Silver 35mm 100 ft. roll	6.30 per roll
4. Silver 16mm 100 ft. roll	5.40 per roll

C. COLOR TRANSPARENCIES, ORIGINAL
From original art work

	(3 orig. or less)	(ea. add.)
1. 35mm (2″ x 2″ mount)	13.75	2.30
2. 3¼″ x 4″ (glass mount)	15.95	3.40
3. 8″ x 10″ (unmounted)	25.00	5.70

D. COLOR TRANSPARENCIES, DUPLICATE
From furnished original transparencies

	(3 orig. or less)	(ea. add.)
1. 35mm (2″ x 2″ mount)	4.60	.25
2. 3¼″ x 4″ (glass mount)	9.10	1.40
3. 8″ x 10″ (unmounted)	13.75	2.00

E. COLOR PRINTS, PRINTON
From furnished original transparencies

	(10 or less)	(ea. add.)
1. 4″ x 5″	8.00	.75
2. 5″ x 7″	9.50	.90
3. 8″ x 10″	17.15	1.45

F. COLOR PRINTS, EKTACOLOR
From negative color film

	(5 or less)	(ea. add.)
1. 4″ x 5″	7.00	1.10
2. 5″ x 7″	9.00	1.35
3. 8″ x 10″	14.00	2.10
4. 11″ x 14″	26.00	4.05
5. 20″ x 24″	55.00	8.40

G. COLOR INTERNEGATIVES
From original transparency or art work

	(8 or less)	(ea. add.)
1. 2¼″ x 3¼″	12.00	1.10
2. 4″ x 5″	16.00	1.30
3. 8″ x 10″	20.00	2.00

VI. MOTION PICTURE SERVICES

A. FILM PROCESSING (For "Customer" Film)
1. *Negative Film*

	(100 ft. or less)	(ea. add. 100 ft.)
a. 16 or 35mm	5.40	3.60

2. *Reversal Film* (Processed as Negative Only)

a. 16mm	5.40	3.60

B. FILM PRINTING—Black and White, from furnished original negative
1. *Silent Film*

	(100 ft. or less)	(ea. add. 100 ft.)
a. 35mm	11.65	4.60
b. 16mm	11.15	4.10

The Case *for* Microfilming

By MARGARET M. WEIS [1]

Western Electric Company

JERRY McDonald's article entitled "The Case Against Microfilming" [2] might better have been called "The Case Against the Misuse of Microfilming." The present article aims to show certain human failures in microfilming that can lead to hasty conclusions such as Miss McDonald's and to explain how these failures can be prevented. Some of Miss McDonald's criticisms are, of course, justified. Microfilming *has* been oversold, and the overselling *has* been harmful. Microfilming is a useful tool, but it is not the answer to every record problem.

Users of microfilm equipment should be given more information about the uses and limitations of microfilm so that they can avoid the costly errors that often result from inexperience in this relatively new field. Many problems, to be sure, will arise in filming particular types of records that the manufacturers, suppliers, salesmen, camera operators, and even microfilm "experts" can hardly be expected to anticipate. On the other hand, there are many pitfalls about which a customer can be warned in advance.

One of the most useful publications in the field of microfilming is the Department of the Army's Technical Manual no. TM-12-257, *Microfilming of Records*, available from the Superintendent of Documents, Washington, D. C., for 50 cents. Although this manual covers, for the most part, the use of specific microfilming equipment and the problems peculiar to that equipment, it includes two appendixes that are of tremendous value to users of the type of equipment discussed and that are of general interest to all users of microfilming equipment and services. Appendix 1, "Camera Operator's Guide," includes a "Trouble Chart" designed to enable the

[1] The author is Clerical Methods Planner, Western Electric Co., Inc. She has based her article on her own experience over a period of 17 years as supervisor responsible for the microfilming of approximately 200 kinds of records of the Western Electric Co. (more than 5,000,000 exposures) on 100-ft., 16-mm. microfilm. The microfilming was done in some cases to conserve storage space through destruction of originals but in most cases to provide duplicate copies for security storage at a distant location.

A joint committee of the Western Electric Co. and the Bell Telephone Laboratories is now studying the applicability of precision microfilming to the reproduction of engineering papers.

[2] *American Archivist*, 20: 345-356 (Oct. 1957).

camera operator to determine the probable cause of certain mechanical difficulties and gives detailed instructions how, in some cases, simple corrective action can be taken by the camera operator. Appendix 2, "Film Inspection Guide," describes and illustrates the defects to be looked for in the inspection of processed film, identifies their probable causes, and prescribes remedies. Also extremely valuable is the standard nomenclature, which should be used in explaining machine difficulties and film defects to suppliers' repair-service organizations.

Everybody involved in a microfilming operation would benefit from wider dissemination of information of this kind. Instruction manuals containing such information should be prepared and distributed by suppliers to all users of their equipment. Prepared by or for a particular user, such a manual is not generally available to others except as a special courtesy.

Constant electrical voltage is essential for high-quality microfilm copies — a fact that the writer learned only through experience. But the difficulties that arise from fluctuating voltage can be eliminated by setting up the microfilm equipment in a permanent location served by a separate electrical line or by installing constant-voltage transformers on camera equipment that must be moved from place to place.

The making of paper copies from microfilm in the event of a major catastrophe such as an atomic bomb attack would be, as Miss McDonald points out, a real problem, especially for companies that cannot afford to have their own reproducing equipment. In this case it is probably true that the advantages of microfilm for protection against bomb damage have been overemphasized and that this has generated too great an enthusiam for microfilm as a means of duplicating business records for protection. How paper reproductions are to be obtained quickly from microfilm if there is widespread destruction of originals has not been much discussed, probably for the reason that until very recently processes now known were not developed. In considering microfilming for security, the business or industrial client should ask: Who will make the reproductions from the microfilm, in an emergency? How long will it take to reproduce in paper form the records that our company will need? How much will it cost? What will be our position of "priority" for such reproduction?

On the other hand, it must be admitted that a microfilm copy is better than no copy at all. It is a relatively inexpensive form of insurance, the film is available for reference, and the original records can be reconstructed from the film. Such reconstruction may not be

easy; it may take a long time; it will be expensive. But the information is there and can be extracted eventually from the film.

Most of the other criticisms made by Miss McDonald in her article are unjustified. For instance, her statement on the legal status of microfilm, "If you encounter . . . [a judge] who has had a bad experience with film, he may reject it as primary evidence," is misleading. It would have been more accurate to add, "in which case, a foundation would have to be laid for introducing the film copy or a reproduction made from it as secondary evidence if the original records had been destroyed."

In most of the cases of failure of a microfilm project cited by Miss McDonald, it seems to me that the client rather than microfilm was at fault. It is not fair to build a case against microfilming by using illustrations that clearly indicate that the customer misused the microfilm process. Companies that have "stopped filming because of the loss of detail in both taking the film and reproducing it afterwards" should have made sure that they were able to get legible microfilm and legible reproductions from the microfilm before embarking on a large-scale project. Misuse of microfilming with the expectation that it is going to perform miracles and pick up details that are obscure on the original records is not a "case against microfilming," but rather a reflection on the judgment of the people who selected a medium that was not adapted to the needs of their companies or the quality of their records. Abandoning microfilming because it is not adapted to a specific group of records is like giving up all ice cream because you can't stand pistachio flavor.

The reference to microfilm copies in an engineering group raises again the question whether the records involved actually lend themselves to retention on microfilm only. Indiscriminate microfilming is always a mistake. No records should be microfilmed with the idea that microfilm copies will be used in lieu of the originals unless it has been ascertained that the film copies will be convenient for the kind of reference to which the records are normally subjected. Obviously a set of records to be used by a group of engineers who find it necessary to see and compare a dozen drawings at the same time should be retained in original paper form. This again, however, is not a case against microfilming, but a case against the *misuse* of it.

Most original drawings (tracings) are customarily filed apart from their supporting papers. But if reference copies of drawings are filed with supporting papers for convenient reference, then such drawings should not be segregated for microfilming by themselves. If reference to records filmed after such segregation is inconvenient,

this should not be counted as a disadvantage of the microfilming process. Before any records are microfilmed, the way in which the film copies are to be used must be carefully considered.

The "irate chief engineer," whose drawings included significant colors that did not show up on microfilm, should have directed his wrath not against microfilm but rather against the people responsible for setting up the microfilming program. The job should not have been started until the significance of the colors had been established and provided for. This is elementary in a microfilming project.

The company that balked at the cost of a microfilm reader was straining at a gnat after swallowing a camel. It does seem that a company that is able to spend money to have records microfilmed by an outside concern should be able to afford a reader, which costs around $500 to $750. There are, however, less expensive readers available, which are entirely adequate for normal use with records up to legal size. If a man who hires a secretary balks at buying a typewriter for her to use, is this a case against having a secretary?

Other illustrations appear to show that the customer in question mismanaged his microfilm project. The case made is against poor managers rather than against microfilming. As to the danger of putting film in the wrong box after reference, since when have engineers become file clerks? Why shouldn't the file department be responsible for finding the filmed records for users and refiling them after such use?

Adequate labeling should be provided in any case. No microfilm service organization (whether within or outside the company whose records are affected) is doing a good job if it does not take the following precautions:

1. Photograph a reel number (which will be legible without magnification) at the beginning and the end of each roll of film;
2. Scratch or mark the reel number on the spool on which the film is wound;
3. Scratch or mark the reel number on the can in which the spool is stored; and
4. Mark the reel number on the carton in which the roll or can is stored.

People who do not require their files — whether paper or microfilm — to be properly labeled are asking for trouble; and those who do not set up proper safeguards to ensure that files properly labeled are kept in good order should not be entrusted with the supervision or handling of company records in any form.

Users of microfilm should be subject to the same rules as those who use paper records, and the same kind of control should be exercised to ensure that the rules are observed. Don't blame the micro-

film because an absent-minded employee (who shouldn't be doing filing in the first place) puts it into the wrong carton. This is the same person who will put a letter into the wrong folder and put a folder into the wrong file drawer and put a binder on the wrong shelf.

The argument that records in constant use can't be released for microfilming is specious. When it is decided that microfilming is the quickest and least expensive method of duplicating records in constant use so that the microfilm copies can be stored at another location for protection, some way can always be found to release them for the relatively short time required for the microfilming operation. If microfilming is rejected, how does Miss McDonald suggest that the records are to be protected? A file of rate cards, for instance, of which only one copy exists? Is there any other duplicating method that would be easier, quicker, or less expensive? Is there any other duplicating method that would make it unnecessary for organizations using the records to release them for the time it takes to duplicate them?

Filming the reverse sides of documents is a most interesting subject, to which an entire article could be devoted. Such filming can indeed be time-consuming if the camera equipment in use is not adapted to the kind of records being filmed. This takes us back to the need for more helpful and informative sales and instruction booklets and more extensive preliminary investigation by the prospective client. The most modern, streamlined equipment, designed to photograph both sides of a document simultaneously, may prove to be less than ideal when the filming jobs to be handled are complicated — when different kinds of records are to be filmed, some large and others small, some on thick paper and others on thin, some with writing on one side only and others with writing on both sides, some with two sides designed for book-turn and others designed for tumble-turn.

The changes and adjustments that are necessary to photograph records of different reflective qualities, on different colored paper with different colored inks, and so forth, should prevent the camera operator from becoming bored, instead of inducing boredom, as Miss McDonald suggests. Not all such differences require adjustment of the camera on all kinds of microfilming work. There are many types of records microfilmed for protection that contain colors having no significance whatever or that are on colored paper for which only a single camera adjustment has to be made at the beginning of the job. Any such adjustments should add an element of interest to the work.

If, because of boredom, the operator speeds up (an unlikely result if I know my psychology) and produces poor copy, this is not a case against microfilming but a case against an incompetent, uninterested, or ill trained and inadequately supervised employee. A well trained and properly supervised microfilm operator *expects* such complications and irritations. He does not become bored by them; he considers them all part of the day's work. It takes time and thought to instill such an attitude in a microfilm operator; but of course, unless this is done, the microfilming program will not be successful. The same can be said of any other job in shop or office.

Miss McDonald's arguments with respect to the inspection of processed film are but a house of cards built on a nonexistent foundation. Let us consider them one at a time: "After being filmed, the files are generally stacked away rather haphazardly to await the return of the film." To me this suggests poor management and untidy housekeeping rather than a case against microfilming. In a well managed microfilm service organization the records that have been microfilmed are maintained in their original order and are carefully set aside for quick, convenient reference should inspection of the processed film indicate the need for retakes or other corrective action. Another remark: "When it [the film] arrives, it must be inspected by a competent official of the firm." Here we see mismanagement in another form — not a case against microfilming. Now we send the president out to buy paper clips instead of leaving the job to the employee who was hired to do it. Do "competent officials" proofread the work done by typists and stenographers? Do they refigure reports completed by calculating machine operators?

Depending on the extent of the microfilming activity, processed film should be inspected by (a) the camera operator, with occasional spot checks by his supervisor, (b) the supervisor immediately responsible for the microfilming operation, or (c) a microfilm inspector, in a large microfilming group. A fast non sequitur follows: "This close, thorough scrutiny is very important, very slow, and very boring so that eventually the inspection receives progressively less attention until it is neglected entirely or turned over to some junior clerk." A strange way for a "competent official" to handle a "very important" piece of work! Actually, the inspection of processed microfilm is too important to be entrusted to a "competent official" (whether he becomes bored by it or not) or to be turned over to "some junior clerk." Such treatment is unfair to the film, unfair to the official, unfair to the junior clerk, and most un-

fair of all to the people in the organization who are responsible for handling the details of the microfilming job.

The inspection of processed film should properly be as close as possible to the actual microfilming operation (whether the photographing is done on the company's premises or outside, by the company's personnel or by another firm under contract). Inspection is, in fact, inseparable from the filming process. Processed microfilm should be inspected by employees who are familiar with the problems involved in the handling of records and the microfilming equipment. Such employees should be trained to look for and recognize faults, to analyze them and determine their cause, to know what remedial action should be taken and by whom so that similar faults will not appear on future jobs. There are probably more than a hundred different kinds of faults, any of which might show up on a roll of processed microfilm — due to camera trouble, film defects, careless processing, reader defects, operator error, defects in the original records, or other causes.

Inspection of this sort can be very interesting and a source of continual education to the personnel in the microfilming group and can have great future value from the standpoint of improving the condition of the original records, the quality of the microfilm images, and the speed and ease of handling the entire microfilming project. We all probably, at one time or another, make the mistake of thinking that because a thing bores us it bores everybody. This is not true. Regardless of how dull an activity may appear to be from a distance, or to someone who knows little or nothing about it, it can become intensely interesting when it is explored in depth.

Miss McDonald's tale of mismanagement (which she calls "a case against microfilming") ends on a sad note: "The result is that many companies aren't in a position to state positively that they have honest, legible copies of their records." Companies that have set up microfilming programs *should* be able to state positively whether or not they have honest, legible film copies. They should also be able to state positively whether they are going to be able to get honest, legible paper facsimile reproductions from the microfilm if such copies are needed. Unless they are assured on these points, they will be simply wasting their time and money on a microfilming project.

As for the cost of retakes, Miss McDonald asks us to "consider the experience of one Los Angeles financial firm that filmed 2,300,000 documents and carefully inspected the finished product. As a result they had to find and retake 35,000 documents. The finding and retaking cost more than the original run." The same thing

happened in New York City. In such cases, blame people, not microfilm. If, from the beginning of the project, a close watch had been kept on the quality of the completed film, if each reel of completed microfilm had been carefully inspected immediately after processing, if the faults had been analyzed in detail to determine their cause, if remedial action had been taken during the course of the job — the staggering number of retakes would have been unnecessary.

Where was everybody while all these errors were being made? We can assume that the retakes involved microfilming errors rather than faulty original records because the article indicates that the records in Los Angeles had to be found and rephotographed, and the New York City job also involved finding and refilming the documents involved. It is simply not good business practice for a concern to enter into any project costing thousands (or hundreds of thousands) of dollars without setting up an effective procedure to ensure, on a day-to-day basis, the quality of the service that is being rendered.

"Some people distrust microfilm." Yes, and some people distrust central files and centralized record storage. They may or may not have good reason for their feeling, but distrust of microfilm copies does not constitute a case against microfilming. It is related instead to the fact that a service performed in a quiet, efficient manner by cheerful, properly trained, adequately supervised employees who are interested in their work will inspire confidence, whereas a poorly managed service will inspire distrust. It makes no difference whether we're talking about microfilming or haircutting. Any microfilm project is foredoomed to failure if it labors under the disadvantages of inadequate supervision, untrained personnel, users of film copies who do not know the "ground rules," and organizations made responsible for records to be microfilmed but not required to follow definite procedures in handling them.

As for microfilming costs, it is true that under certain circumstances the cost of microfilming a given set of records may equal the cost of storing them in original form for 70 years, as Miss McDonald says in relating the experiences of some companies. It is also true that under other conditions the cost of microfilming the same records or different records of the same company may be no more than the cost of storing them in original form for 10 years. So many factors enter into the computation of such costs that the mere statement of a conclusion has no meaning unless all of the conditions are known.

Many people are overwhelmed at the thought of "preparing" records for microfilming; that is, putting them in correct order;

removing clips, staples, pins, or other fasteners; and mending torn papers. Whether the cost of such operations should be charged against the cost of microfilming or whether it should be considered a natural consequence of previous filing indiscretions is something that each organization must decide for itself. *Of course* it takes time to assemble records for microfilming. In many cases the persons responsible for maintaining the records to be filmed can be instructed in advance how to prepare them so that such annoying steps as the removal of fasteners and the mending of torn sheets can be eliminated or reduced to a minimum at the time of microfilming. Small sets of papers stapled together or cards fastened with linen hinges can be microfilmed on some machines without removing the fasteners.

As to colors, only those that have special significance require color coding. Originators of records that are to be microfilmed should be advised to eliminate the use of color wherever possible and to substitute symbols, such as brackets, for red ink as a means of distinguishing negative figures.

Files should be maintained in proper order at all times whether they are to be microfilmed or not. Torn papers should be mended at the time the damage occurs, and the cost of such mending at the time of microfilming is not a proper microfilming cost. Whether the removal of fasteners, clips, and pins constitutes a legitimate expense to be charged to microfilming or whether most of the fasteners should have been removed at the time the records were originally filed is a matter that must be determined by the organization involved.

Some of the factors that affect microfilming costs are the following:

1. The kind of records involved.
2. Their purpose.
3. The kind of reference made to them.
4. The frequency of reference.
5. The persons who use them.
6. The size of the individual papers.
   Are they of uniform or variable size? Is the variation frequent or occasional?
7. The thickness of the individual cards or papers.
   Are they of uniform or variable thickness? Is the variation frequent or occasional?
8. The volume of the records.
9. The way in which the writing stands on the page.
   Is it parallel with the short dimension or the long dimension, in a uniform or variable direction, with frequent or occasional variations?

10. The number of sides to be photographed.
    Is there an intermingling of one-sided and two-sided papers? Is the change from one-side to two-side work frequent within a given lot? Is it easy to determine from the appearance of the first side or in some other manner whether the reverse side must be filmed, or must the operator look at both sides to be sure?
11. The kind of folders, binders, or fasteners used.
12. The thickness of the folders, binders, and papers.
13. The condition of the original records.
    Are they clear and legible? Are there many fasteners (staples, pins, or paper clips)? Are the sheets folded or curled at the edges? Are significant colors used or is the paper of different colors? Are flyers pasted or stapled to the papers covering significant data?
14. The kind of microfilming equipment indicated.
15. The terms on which the equipment will be procured.
    Will the equipment be purchased or rented?
16. The kind of film to be used.
17. The method of microfilming:
    Standard (one document across the width of the film).
    Duo (up one side of the film and down the other).
    Duplex (backs and fronts filmed simultaneously).
18. The reduction ratio to be used.
19. The method of feeding — automatic or by hand.
20. The grade of the product required.
    Not all records call for the same quality of product.
21. The grade, salary, and responsibilities of the camera operator.
22. The amount and nature of the supervision.
23. The kind of indexing required.
    Some records are almost self-indexing.
24. The kind of inspection to be given the processed film.
25. The manner in which corrections and other retakes are to be made.
    Comparable factors must be considered in judging the cost of storing records in their original form.

It is a good thing to find out what others have to say for or against a new process and to talk over our problems with those engaged in similar activities. But in the case of microfilming few generalizations can be made, few conclusions can be reached, on the basis of another company's experience. Each company and each organization within a company must decide for itself, first, whether records requiring extraordinary protection should be duplicated on microfilm or whether protection should be provided in some other manner; and, second, what savings, if any, can be realized by retaining long-term records on microfilm and destroying the originals and where the dividing line is in cost (for each type of record) between retention on microfilm and retention in the original form.

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The Case Against Microfilming

By JERRY McDONALD[1]

North Hollywood, California

COUNTLESS articles and speeches have been delivered to the businessman glorifying, glamorizing, and justifying the virtues and "cure-all" properties of microfilming; but never to my knowledge, based on extensive research, has anything been written about the shortcomings of microfilming.

Two years ago I attended a two-part lecture in Los Angeles. The first part covered the usual ground, extolling the finer points of microfilming. The second part, a week later, drew a very large group together with the subject described as "The Case Against Microfilming" for lack of a better name. The subject was covered competently by a prominent Los Angeles attorney though it did not express his personal feelings. Rather, it was because of his extensive experience with filming that he was called on to discuss just this one aspect of filming regardless of his own opinions. He said that, in fact, he had had to make three very comprehensive surveys to determine whether to microfilm or to store records, and that in two of the three instances he had recommended filming. His talk was based on his experience with the third survey. It may also be added that the sponsoring group, if it could be called that, had no ax to grind either. It was merely arranging the lecture in response to wishes expressed by a group of record management people in a survey. The discussion took 2 hours and merely highlighted some of the limitations of filming, with practically no references to a cost comparison of filming with storage. Despite the fact that many in the audience were either microfilm representatives or officials that had been using filming, the rather extensive question-and-answer period that followed brought out practically nothing to refute or dispute any of the attorney's statements. His presentation and facts left no room for argument, and his qualifications were readily apparent. The talk launched me into a 2-year period of research, which enlarged on and confirmed his statements.

The microfilming of records has been so oversold and sold in so many wrong places that the salesmen have often become their own

[1] The contributor of this paper is a record management consultant practicing in the West.

worst enemies. Its capabilities have been honestly and dishonestly misrepresented. Sometimes very important cost factors have been glossed over, treated as of no consequence, or ignored completely to the point where many firms, after a short and bitter experience with filming, have become thoroughly disillusioned. Filming is generally sold as an answer to the problem of space, which is often its least effective use, while its use as a tool in the accounting field, for instance, has been largely neglected. It is usually easier to sell filming for the popularly familiar need of saving space than to do the more complex job of selling it as a business technique for other purposes. I sincerely believe that the potential market for filming has not been scratched; and, if the opposition created by sales for wrong reasons continues to grow, it never will be.

One article of the type that I consider extremely misleading appeared in a business magazine of May 1954. It described how one eastern firm filmed records in a matter of weeks at a cost of approximately $1,500. It stated that the program could be continued at a cost of $250 per year. This article would have you believe that the microfilming program recovered 3,000 square feet of storage space occupied by files. A good retention program could recover 3,000 square feet certainly but not through microfilming. The amount of space recovered by $1,500 worth of microfilming would not even make a dent in 3,000 square feet of storage space. In fact, considering the cost of about $500 [2] for a reader and of some $600 for the three film cabinets illustrated in the article, you would already have spent $1,100 before you had touched a single piece of film.

What does the average businessman find wrong with filming records? To give a logical order to his objections would be almost impossible; so let's step right into the middle of the muddle, disregarding the occasions when filming is dictated by such necessities as governmental and contractual requirements.

First, take the filming of drawings of various types. One large manufacturing firm that specialized in big overhead cranes reported to me that they had stopped filming because of the loss of detail in both taking the film and reproducing it afterwards. Company after company has practically abandoned this type of filming because it simply doesn't develop a dependable finished product. The filming of drawings is a very specialized and exacting type of work that can rarely be done in your own plant. Even if satisfactory films could be obtained, the using of them presents enough difficulty to make

[2] [*Editor's note*: Most of the readers in the National Archives cost the Government about $340. A few are of a type that costs about $850.]

engineering personnel rebel against it. This may be a personnel problem, but it must be recognized because it actually exists on a large scale. If you choose to ignore it you are heading for the same trouble as at least two huge Los Angeles aircraft companies encountered. These companies have stopped filming almost completely, except where contracts have required it, and they have had no choice in the matter. A survey in one of these companies showed that $223,000 could be saved if a 12-year retention period could be placed on most of its records. Since 95% of all records have to be kept less than 10 years, this estimate is rather impressive. But I do not mean to suggest that records that are to be kept more than 12 years should be filmed; far from it.

Let us pursue this matter of filming drawings further. Have you ever seen an engineering group spread a series of past, present, and proposed drawings over a table together with accompanying pages of specifications in order to compare them? This is impossible when the drawings have been filmed, without considerable expense in finding and reproducing all the documents involved. On the film reader you can see only one picture at a time, and unless you go to the considerable expense of putting your related films on one card, you will have drawings and specifications on one subject, taken over a period of time, scattered over numerous rolls of film making the assembling of the various drawings impossible or, at least, very time consuming. How long do you think your engineers will stand for leaving their drawing boards to crowd around a viewer in an effort to decipher an obscure image, to say nothing of the time lost while they are waiting for films to be changed so that they can see other drawings that are on different reels of film? Engineers can be temperamental enough under normal conditions; but under these conditions they can become impossible. If the element of time is critical, as in some emergency, the explosion of feelings will be heard all over your plant. Without costly reproduction equipment, drawings on film cannot be taken back to the drawing board to be mulled over or be taken home to be worked on. Even with a large supply of readers, costing $500 to $750 apiece, this disadvantage can become a real problem, particularly in a large organization.

Another disadvantage is that drawings are usually filmed separately from their supporting documents. If you need the two together for an inspection, can you imagine the complications that may arise? It is not exaggerating in the least to say that 2 or 3 hours may be spent in finding the various rolls of film, threading them into a reader, finding the frames you want, and extracting the

tidbits of information you need. There are some much easier answers to all of this that will be discussed later.

Many of the situations I have described may arise where almost any type of business records is concerned. For instance, suppose you wish to make some changes or insert some additional papers in your files in relation to the material already on film. Do you put it on a fresh roll of film, cross index it and add one more item to the list of rolls to be consulted; or do you cut your film and splice your additions into the existing roll? Either method is expensive and, more important, time consuming and cumbersome. In defense industries where any one part of an assembly may be modified frequently, the problem can reach fantastic proportions, especially when you consider the ease of dropping all changes and correspondence into one file folder and having it all available in a matter of minutes to be referred to, carried to your desk, routed through interested hands, duplicated, and refiled. Incidentally, the chief engineer's "hen scratchings" are much easier to decipher in the original than they are on film.

Let us consider the physical operation for a moment. If you want a file in the original form, a record clerk walks to the file drawer, pulls the whole file, and hands it to you. A matter of minutes. If you want to see a film, you go to the index, find the number of the roll you want, go to the storage cabinet, find the film or films, and proceed to the reader with it. You open the carton, being careful not to get it mixed with other cartons all looking alike, take out the can, open the can, take out the film, thread the film on the reader and start looking. With 600 to 6,000 or more frames on a roll, all of which look alike to the naked eye, finding the proper frame, despite the best indexes yet devised, can be a time-consuming process, especially if your documents don't run in some easily followed sequence. If you have to refer to several rolls of film to get a complete picture, the time element can be very important regardless of the cost of such an operation.

When you are through with the film, it must be removed from the machine, replaced in the can, which is then replaced in its carton, which is then replaced in its proper spot. If several cartons of film are out at one time, the danger of putting the film in the wrong can or the can in the wrong carton is not to be treated lightly. Compare all of this with thumbing through a file, no matter how voluminous, to find the documents you want at a glance and then tossing it into your "out" basket to be refiled.

Some types of business raise other problems. For instance, con-

sider a legal firm whose files may include things that cannot be easily filmed, such as bound volumes (which can be filmed only with a flatbed camera equipped with a book cradle), exhibits, and sound recordings. The necessity of adding documents to a roll of film is especially recurrent in legal firms, and in some of the large firms I've seen using film this involves prohibitive cost.

Look at some other actual situations. A large aircraft parts company in Glendale bought one machine when it should have had possibly six. It was used for a month and now it gathers dust. Actually, as in many other cases, the company was generating paper faster than it could be filmed. This happens surprisingly often. An air-freight company in North Hollywood bought a filming machine and then tried to decide how it was going to be used. One problem after another arose and to date — 3 years later — not one sheet of film has been fed into it. This equipment is not cheap — $5,000 to $7,500 [3] apiece for a not too elaborate filmer. Other instances have come to light — one in which some executive became sold on filming and is keeping it going no matter what. The record people of his company film everything they can get their hands on, ignoring costs and serviceability rather than admitting to the rest of the company, though they did to me, that they had made a mistake in buying the program in the first place.

Another difficulty to be considered, which is usually not even mentioned but which is rather prevalent in some industries, is the need for a constant, even supply of current to the machine. Filming leaves very little room for error, and a weakening of the current or a surge of it during the filming can make an image useless. In some localities or in large manufacturing plants you should consider this problem seriously.

Often the records you desire to film are in such constant use that the people involved refuse to part with them long enough to get them filmed. Don't pass over this lightly. It takes time to assemble the documents, arrange them in proper order for filming, extract staples, repair tears, code colors, film the papers, and return them in usable order to their source. You are going to be intruding on someone else's sacred domain. Taking the camera to the records rather than bringing the records to the camera is often impossible.

An interesting group of cases was that of several small companies that turned to outside service companies for their filming. They did this to save the cost of buying their own equipment; or,

[3] [*Editor's note*: The price here given probably is for a 70 mm. or larger flat-bed camera. The 35 mm. flatbed cameras in the National Archives cost about $2,400.]

more commonly, they planned to do so until the thought tardily occurred to them that they would have to spend $500 to $750 for a reader.

One irate chief engineer showed me a sizable amount of film on which his drawings had been copied as part of a vital record program. Another obvious factor had been overlooked. It developed that his drawings were in many colors, each color having its separate significance. Now there is a very time-consuming process of coding the colors for filming; this is necessary since everything on film shows up in black and white or different shades of grey. In this case, no one thought of it, and the film salesman hadn't touched on it. In any event, the drawings were meaningless without the colors.

There are perhaps many other situations in which some essential details will not show on film. One good example is the case of embossed legal seals. A somewhat sloppy and rarely satisfactory method of showing such seals is to rub the broad side of a pencil back and forth across them to highlight them for filming.

The mechanical problems involved in preparing records for filming make considerable work for your already shorthanded staff. Costs have often been calculated on the basis of so many dollars per 1,000 frames. Here again, something is almost always passed over lightly as inconsequential and as something you can do in your "spare time." You first have to be sure your files are in complete and proper order. The file folders will then be taken individually, sometimes a considerable distance, to the filming location. Then someone, usually a girl, will open each folder and remove staples, clips, metal fasteners, and pins. Each piece of paper must be checked to smooth out the dog ears and folded sheets, torn places must be repaired with transparent tape, and important colors must be coded. It is generally accepted that the cost of these preliminary steps usually *at least* equals the cost of the filming and the film combined.

Some documents, such as time cards, lend themselves to filming rather easily. But generally speaking, the average file consists of an assortment of documents. Some need to be filmed on both sides. If all of them do, this is easily provided for, but if only an occasional one does, the process is very time consuming. When you have a variety of materials to photograph, including papers of different reflective qualities, different colored inks or the like, the operator must make constant simple adjustments that slow down the operation until the operator gets bored and suddenly the filming speeds up. The result is no joke.

After being filmed, the files are generally stacked away rather haphazardly to await the return of the film. When it arrives, it must be inspected by a competent official of the firm. This close, thorough scrutiny is very important, very slow, and very boring so that eventually the inspection receives progressively less attention until it is neglected entirely or turned over to some junior clerk. The result is that many companies aren't in a position to state positively that they have honest, legible copies of their records. Suppose you consider the experience of one Los Angeles financial firm that filmed 2,300,000 documents and carefully inspected the finished product. As a result they had to find and retake 35,000 documents. This finding and retaking cost more than the original run. When one considers the task of incorporating the reruns into the original film rolls, one may well become discouraged.

On the basis of the knowledge and, in some cases, just a "feeling" that some officials have, many companies refuse to discard the source documents and keep both film and paper. This situation may change when and if more persons acquire confidence in microfilming.

The legality of microfilm is pretty well established, though actually to date no major case has been tried where the authenticity of the film has been challenged. One good classic case may upset this legal acceptance completely. Some judges retain their prerogative to decide just what they will accept as evidence before their particular courts. If you encounter one who has had a bad experience with film, he may reject it as primary evidence.

Another danger, at least, can be obviated at little extra expense; that is the danger of losing the microfilm through some accident. When a consulting firm was called in to reconstruct the records of the city of Detroit after a serious fire, they were able to reconstruct all the original paper documents, but all the microfilm was destroyed completely. Copies of the film should have been stored at another and distant location.

You will be told that film is very durable and could last for 500 years. At the same time, the film producers will furnish a set of specifications for film storage that will scare you. For instance, an excess of moisture will ruin the film by sweating or mold, whereas a very cold or dry atmosphere will cause the film to become brittle. If the film is kept in a safe or vault of variable temperature, a slight distortion will occur and ruin the film completely. There are also enough instances of film being mislaid or stolen to make this a problem worthy of consideration. The answer to most of these problems is merely to have another copy of the film stored elsewhere. This

is an additional but minor expense. If you want to film for security purposes and keep the originals to work with, they should be kept at widely separated points, not in the same plant. The National Fire Protection Association has published a fairly complete and authoritative pamphlet entitled "Protection of Records" (Boston, 1947), which describes the disastrous effect of fire and heat on acetate film.

The filming equipment companies are reaping a rich harvest as a result of the possibility of atomic bombs destroying local records. They have also developed very expensive duplicating equipment to be kept at remote inland points in case of a major catastrophe. The telephone company has an excellent program along these lines; and in an operation such as theirs, which is company owned and operated, it will probably work nicely. Some facts, however, were developed on this subject in a meeting held a little while ago in San Francisco. The speaker was one of the owners of an elaborate hole in the ground for the storage of film and valuable documents. He said they were in the process of installing an $80,000 reproduction machine for the benefit of their clients. A representative of one of the country's largest insurance companies pointed out that the capability of the machine, if it worked 24 hours a day for 434 days would barely suffice to duplicate his own company's film. Where would that leave the other clients? Then too, there is the obvious possibility that in the event of a great catastrophe, the Government might commandeer the equipment.

Filming at best should be tightly controlled and strictly supervised to prevent indiscriminate reproduction. If one hasn't a firm and well developed record management program, this is rather difficult. And, frankly, in my wanderings, I find that comparatively few concerns have really complete record management programs. This is not a reflection on them because record management is still too new a field, and management has to take first things first — the production of goods and services. With the prevalent shortage of competent junior executives, the record program has often to be postponed.

Let us look at your problem as it now stands. You want record controls, vital record programs, and space and equipment recovery. You will have several requirements — low cost, flexibility, ability to find what you want and read it when you get it, ease of duplication, rapid reference service, security, privacy, and protection from fire and water damage. Let us see how you can get all of these requirements immediately, in most cases completely, and at little expense.

The Federal Government has been the real pioneer in the field of developing low cost record centers. These have resulted in fantastic savings to the taxpayers. Many large firms such as U. S. Steel, Ford, DuPont, Richfield Oil, Lockheed Aircraft, Hughes Aircraft, Pacific Telephone & Telegraph, to name a very few, have developed similar low cost centers. What is good for these firms is readily available to the smallest operator, no matter how limited his holdings, and with comparable savings.

Irving Zitmore of Washington, D. C., who is probably the leading record management consultant in the country, once ran a survey of the microfilming operation of the Federal Government and produced some drastic cutbacks in its filming programs with tremendous resultant savings. He showed quite conclusively that the Federal record centers could handle original documents, with all their advantages over microfilm, for a period up to 70 years for no more than it would cost to film them. Many record officers have shown me that they could use either commercial record center facilities or their own for at least 36 years for what filming would cost. Considering the fact that 95% of your records have a life of less than 10 years, you should investigate these commercial record centers if they are available or give thought to developing them yourself if they are not.

The policy of the Public Records Commission of the State of Vermont, as early as 1954 at least, was to microfilm only permanent records for the purpose of space saving alone. Records to be kept less than 70 years are more economically stored in low-cost record centers.

When I learned of this new policy in Vermont, I went out to investigate and found only one company in all the major cities west of the Mississippi that has developed anything worthy of the name of record centers. This was the Bekins Van and Storage Co. in Los Angeles, which has converted one entire building of 125,000 square feet into a center for over 400 local business firms including a 10,000 square foot record center for the Richfield Oil Co. I understand that the company has started two other similar depositories in Los Angeles and San Francisco and yet others in smaller cities. But so far as I know, it has the only worthwhile operation of its kind in the record management field in the West. Its staff is eager to help anyone interested in record management. It will explain to you how you can throw away files by means of proper retention schedules, or it will help you organize a record center of your own. It apparently does not believe in keeping its trade secrets.

This company has had to compete with microfilming on a cost basis many times and has had to stand some pretty close scrutiny. Actually, the low cost of storage it offers as compared with the cost of microfilming is one of the least important considerations. In addition to solving space problems, the company provides a reference service of great value. When you desire a file or information, you merely telephone the center; and the file will be pulled immediately, read to you over the phone, mailed to you, or forwarded by messenger if time is pressing; or documents will be copied and forwarded — all for less than it would cost you to do it for yourself. If you wish to work directly with the files, as when audits are necessary, you will find convenient desk space and telephone service — all at no cost.

A large aircraft company has leased 12,000 square feet of space in a Bekins record center building, and it was packed solid when I saw it. About 11 girls were working there full time, and the supervisor told me that they had never handled less than 2,500 references a month, together with a phenomenal amount of other record center work. The list of companies who have turned to Bekins for the answer to their needs reads like a Who's Who of California business.

The Bekins people also have some suggestions to offer on the matter of security copies of essential records. They cite several actual cases. In one engineering company, whenever a new drawing, specification, or other vital paper affecting its operation is developed, a copy is mailed in a numbered envelope to the record center, where it is filed in numerical order. This method of security storage has the advantage of keeping a copy of your most essential files immediately available if a disaster occurs, such as your plant burning down. Most filming operations provide only for periodic filming, which means that the protection program always lags behind the creation of important papers. The document storage method, on the other hand, fulfills every need you may have at the lowest possible cost and with the maximum of flexibility.

Another instance is that of a Railway Clerks Federal Credit Union, which instead of microfilming all its essential records, decided merely to mail a summary of its daily activities to the Bekins record center in Phoenix every night. The cost was $1 per month plus the postage, which was negligible. A monthly summary would permit the discarding of the daily reports so that they really would not have to keep more than one month's reports on hand in addition to assorted other vital documents with varying retention periods.

Consider also the case of accounts receivable, whose loss by fire is always a source of concern. How much do you suppose it would cost to mail each day one copy of your invoices to a record center to be kept for say 6 months (which is probably much longer than necessary for most businesses) and then discarded. Most companies could follow the practice of discarding after only a month because their latest invoices cover everything that has gone before, such as part payments or balances unpaid for one reason or another. I was shown the account of one very large company doing just this; its cost was $3 per month. Compare this with what you would pay for accounts receivable insurance, which has some shortcomings though it is excellent coverage.

Many business men of experience have given their opinions on the subject of microfilming. A steel company executive commented:

> It may be much cheaper and easier to store the original record. The cost of preparing, filming, inspecting, and indexing the contents of a four drawer cabinet runs to $80 or more. For $80, the company could store the contents of one cabinet in low cost storage equipment for 53 years in space renting for $1 per square foot.[4]

Another steel company executive was quoted, "It does not pay to microfilm business records when you are concerned only with saving space and equipment. It is cheaper to store the original material in a record center." And an oil company executive said:

> We have discontinued entirely the use of microfilm as a tool in our records control problem, although until a few months ago we microfilmed canceled checks. After extensive cost studies covering records of uniform size and comingled records of various sizes, we found that we could provide the space required for a longer retention period of the original document for less than the cost of microfilming. The original records are easier to locate and use in reference work than the film, which requires the use of a reader, or the expensive re-creation of the documents by use of sensitized paper. Microfilm does offer protection from fire and great savings in space; but, from a cost standpoint based on our own experience, it is not a magic solution for the record problem.

William Benedon of Lockheed Aircraft said "Record maintenance based upon the principles of record center operations provide the best method for keeping records required under a record program. . . . Using microfilm as a space saving device is no longer the cheapest method to accomplish this goal."

An article in a leading business magazine recently described how Monsanto Chemical had improved its record keeping program and,

among other things, how it had abolished a $30,000 microfilming program. And when Wayne County, Michigan, found that some of its microfilm projects were not worth their cost, it cut them back by discontinuing the filming of nine types of records at an annual saving of $2,100. It also saved $6,000 that was going to be spent on filming by merely shortening the retention period of certain records.

[*Editor's note*: A point that has not been explicitly made in this paper is that when we compare the relative economy of microfilming and storage we must not leave out of account the interest on the initial investment for microfilming. Interest is a real charge whether we pay it directly on the specific investment or not.]

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NAVY MANAGEMENT REVIEW — FEB. 1966

Making Money with Microfilm

by Mr. Frederick H. Wendte
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The Aviation Supply Office (ASO) does not propose that the Navy usurp a function of the Treasury Department as the above title implies. However, money can be made, or saved if you prefer, through the use of microfilm instead of hard-copy documents for many types of applications.

Common Uses For Microfilm

Microfilm is widely used by industry, and by federal, state, and local governmental agencies. The most frequent applications are the microfilming of records which must be retained indefinitely and which are not subject to frequent change. Some examples are: canceled checks; mortgages, deeds, and other property records; insurance policies; published books and papers; technical documents such as drawings and standard specifications; patents; and completed and compiled census records. One of the most common reasons for microfilming records is to reduce the amount of space occupied by the records. Other important reasons are savings in the handling of documents and increased capability to provide reproduced copies of documents rapidly and frequently.

ASO Experience

ASO has achieved substantial cost reductions by adopting use of microfilm. In one application drawings in microfilm aperture card form are furnished to prospective bidders with bid requests (See Navy Management Review of April-May 1964). Since December 1963, savings of over $288,000 have resulted from reproduction of drawings in aperture card form instead of on full size blueprints. Since the cost of aperture card reproduction has been reduced, additional savings are anticipated. The use of aperture cards reduced the bulk of invitations for bid sent to prospective suppliers, which saved an additional $8,500 in mailing costs. An intangible saving, but important in terms of procurement lead time, was a reduction from 30 days to 8 days in the time required to reproduce drawings.

In another application, a special microfilm technique is used to print certain ASO catalogs. This reduces the size to about one-half that of the conventionally printed catalogs. During 1964, about $40,000 in printing costs were saved when this technique was used to publish the Price and Management Data Sections of the Navy Stock List and the Master Repair List. It is anticipated that eventually most of the catalogs which ASO prints and distributes to field activities will be produced by this technique.

Criteria for Establishing Microfilm Records

With the idea in mind of making money with microfilm, ASO took a hard look at other internal operations. The result was certain procedural improvements and the determination of the feasibility of converting specific records to microfilm. Equally important, however, the research produced a greater understanding of the entire subject of microfilm and its uses. Of particular interest was the ASO development of an original set of criteria for determining the feasibility of using microfilm equipment and techniques for a given application. No record could be found of a previous attempt to develop criteria by anyone in private industry or government circles.

ASO's criteria specify that a microfilm application should have one or a combination of the following characteristics to a significant degree:

- The records must be of a relatively permanent and stable nature. A frequent and high rate of change may result in an unacceptable cost because updating the microfilm file is an expensive process.
- The number of records in the file must be large – on the order of tens of thousands. The feasibility of the application increases if the file is an expanding one.
- There is a frequent reference to the file by many users. The number of references should be on the order of 3000 to 4000 a month. This criteria

that an "out of file" situation hampers the operations of the users.

- There is a frequent need for speed in providing copies of records in the file. This should be on the order of at least 300 records reproduced per month.
- The physical size of the file is large. In conjunction with this, the space available for the file is limited and/or is needed for an office rather than file operation.
- The nature of the file is such that it would not acquire an elaborate and expensive record locator system if the file were converted to microfilm. Location systems which require only a single reference to an index, with a search lasting not more than a minute, would generally be acceptable.
- The data in the file is not at present, readily accessible from some form of mechanized data retrieval system.

Living With A Microfilm File

In determining the feasibility of a microfilm application which meets the criteria stated above, consideration must be given to the conditions which must be accepted when the file is converted to microfilm. Acceptance of these conditions frequently govern a decision to convert hard-copy records into microfilm. Some examples of these factors are:

- The file must be maintained in an inviolate condition, closely controlled to prevent loss, damage, or mishandling.
- Information included in the file must be accurate, to minimize changes or need for correction. High frequency of change to records is an obstacle to an efficient microfilm system.
- There must be a means automated if possible, for detecting errors in input.
- An accurate and variable cross-reference index system must be established for any form of roll or cartridge-type file, as well as for several of the strip, sheet, and chip file systems.
- The application must include the capability to update the file in a timely manner.
- A need and ability to provide rapid information retrieval from the file.
- The file must provide multiple accessibility and should be designed to provide service for the maximum number of users.
- The facility must exist for purging obsolete information.
- A need to expand, with available file space considered to be at a premium.

Type of Equipment and Systems

There is a wide range of microfilm equipment and systems commercially available for both simple and complex applications. The microfilm industry is highly competitive, and producers of equipment, film, and related products are constantly seeking to improve their products and services. Several of the producers offer microfilm feasibility study service without charge.

Microfilm systems are keeping pace with advancements in automatic data processing techniques. There are certain computer-related systems which produce film showing an English language translation of data contained in magnetic tapes. Other systems convert microfilm images of operational documents into electrical impulses which are recorded on magnetic tape for input to computers. These systems have been highly developed but their use requires complicated and costly equipment, specially trained personnel, and a superlative quality control program.

The Various Forms of Microfilm

Microfilm is available in various forms, each designed for specific types of applications. The optimum type of film for an application frequently dictates which type of equipment or system will be purchased. Thus, an application might be feasible if aperture cards are used, but not if roll film is used. Therefore, only aperture card systems would be considered.

- *Roll Film* which is commonly used for storage of records which must be retained indefinitely. In this application changes to the records should seldom, if ever, occur.
- *Cartridges* are basically rolls of film contained in devices which can be inserted into special viewers having powered film advance features for rapid winding of film.

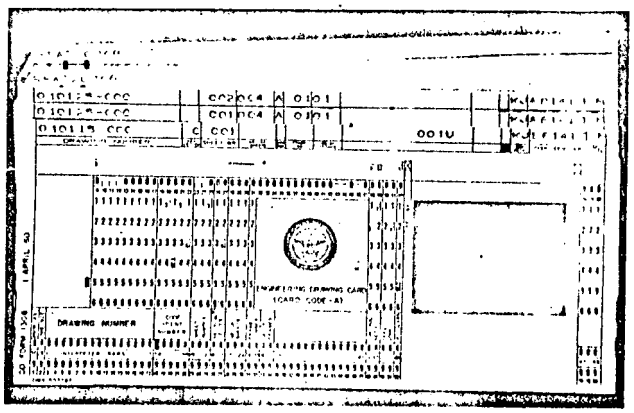

Fig I. Microfilm Aperture Card

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GOVERNMENT PRINTING OFF
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OFFICIAL BUSINESS

POSTAGE AND FEES PAID
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• *Sheets, chips, or strips* of microfilm usually require complex and costly devices for retrieval of information from the microfilm file. Tailored mechanized image systems employing these forms of microfilm are the most expensive to install, and range in cost from $40,000 to $1,500,000.

• *Card-mounted film* applications (commonly known as *aperture cards)* require the least maintenance effort. Use of aperture cards permits changes, deletions and additions to be made to the microfilm file with minimal effort. Unlike previously described forms of microfilm, elaborate indexing is not necessary since each card carries its own identification as shown in Figure I. Highly skilled operators are not required for production of duplicate cards or hardcopy.

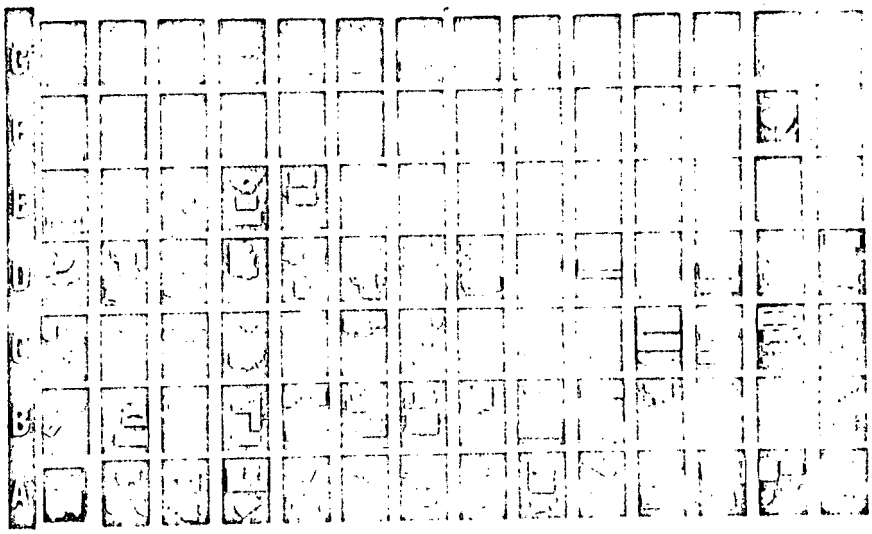

Fig II. A 4" x 6" Microfiche Card (¾ actual size)

• *Microfiche* (pronounced "microfeesh"). Microfiche cards are transparencies on which 16mm or 35mm film frames, or a combination of both, are mounted for viewing or reproduction purposes, as shown in Figure II. These cards can be almost any size, but are usually a standard 3x5, 4x6, 5x8 or FAM card size. Up to 140 micro-images can be recorded on one microfiche card. In general use, microfiche permits greater file compression than is possible with aperture cards due to the greater number of images which can be included in a single microfiche card. When the maximum number of images are contained in one microfiche card, the cost per image is substantially less than it is for an aperture card where the number of images is limited to 16. This is valid only if the total capacity of each microfiche card is used.

Cost of Microfilm Applications

There is a wide range of equipment available for microfilm applications and the variations in cost are equally wide. For complex systems which require mechanized and sophisticated equipment, the total installation cost may be over $1.5 millions. On the other hand, for a relatively simple application the cost of equipment and material may be less than $1,000. All you need is a viewer-printer, if you subscribe to one of the many microfilm services now available commercially. These commercial organizations offer a variety of services ranging from the filming of records to providing engineering and technical data in convenient microfilm forms.

You Can Lose Money Too

Obviously, care must be exercised in selecting uses for microfilm. Many systems are expensive, and sometimes potential applications simply will not provide an adequate return on the investment.

The conditions necessary for a successful application, can only be ignored at considerable risk. For example, a microfilm application which is predicated solely upon the expectation of savings on file space for *completed* or *retired* records may prove a great disappointment. The savings in space will compensate for the cost of the microfilm system only if the space cost is very high and this condition usually exists only when *active* records are maintained in highly desirable space and competition for occupancy is keen or when the size of the file is truly massive.

This caution against the possibility of unprofitable applications should not discourage careful consideration to the use of microfilm systems. Money can be made from microfilm and the initial investment doesn't necessarily have to be large.