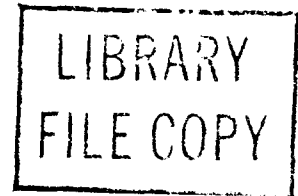


DOCUMENTS ON 16mm MICROFILM
SILVER MICROFILM PRODUCTION



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1. GENERAL

1.01 This section covers the requirements for the production of 16mm original microfilm of documents. It also covers requirements for the equipment and materials needed to produce microfilm. Depending upon the intended application, the microfilm may be retained in the form of reels, magazines, or Microstrips^{®*}.

Note: This section does not cover information on the requirements to be met by microfilm in order to be admissible as legal evidence or on the handling or microfilming of classified information.

*[®] Registered trademark of the Eastman Kodak Company.

1.02 This section is reissued to revise the information covering microfilming targets used in the production of 16mm original microfilm of documents. Detailed reasons for reissue will be found at the end of the section.

1.03 A number of methods of positioning document images when using a rotary camera are indicated below. However, only the simplex method is recommended for microfilming documents.

(a) **Simplex:** An image positioning technique in which the image occupies the full width of the film.

(b) **Duo:** An image positioning technique in which images are photographed along one-half of the film and a second series of images is photographed along the other half of the film previously left unexposed.

(c) **Duplex:** An image positioning technique in which the image on the front side of a document is photographed on one-half of the film while the image of the back side of the same document is photographed simultaneously on the other half of the film.

1.04 Briefly, the production of silver microfilm for Bell System use includes the following procedures:

(a) Documents are photographed on 16mm film with a rotary or planetary camera.

(b) Documents are photographically reduced so that several thousand page-sized documents can be placed on a 100-foot reel of microfilm.

(c) The exposed film is processed and inspected in accordance with Section 006-210-500 to ensure that requirements have been met.

(d) Following inspection, indexing information is placed on the reel container or magazine and in the document indexing catalog or file.

(e) If applicable, the microfilm is cut and loaded into Microstrip holders.

1.05 Microfilm produced by a commercial supplier should be checked periodically to ensure that requirements of Section 006-210-500 are being met.

1.06 Use care in handling microfilm to avoid scratching or otherwise damaging the microfilm, particularly the emulsion surfaces of the film.

1.07 A list of equipment and materials considered suitable for producing microfilm is covered in Section 006-220-100.

2. PRODUCTION MATERIAL AND EQUIPMENT

MICROFILM

2.01 The film used for producing original microfilm shall be 16mm nonperforated, safety-type silver film. The unexposed film shall have an average base plus gross fog density of 0.12.

EQUIPMENT

2.02 *General*

(a) All production equipment shall be capable of handling 16mm nonperforated film. The installation, operation, and maintenance instructions provided by the equipment manufacturers should be followed except as modified in this section.

(b) This equipment shall be capable of producing microfilm meeting the following resolution, density, and reduction requirements when inspected in accordance with section 006-210-500.

(1) Processed silver microfilm shall have a resolution of minimum 64.4 lines per millimeter on rotary cameras and minimum 103.5 lines per millimeter on planetary cameras.

Note: The type of camera which originated the silver film can be identified by the configuration of the test target image. A target containing five resolution test charts, as shown in Fig. 1, indicates microfilm produced on a planetary camera. A target containing three resolution test charts, as shown in Fig. 2, indicates microfilm produced on a rotary camera.

(2) The average visual diffuse transmission density of the document image background shall be minimum 0.90, maximum 1.30.

(3) Reduction shall be nominal 24X (minimum 23X, maximum 26X).

CAMERAS

2.03 A microfilm camera is a precision instrument used to photograph documents on 16mm film. It should have a means of adjusting for correct exposure and should be capable of producing microfilm meeting the requirements of this section. A microfilm camera requires care in maintenance

and should be installed in an area as free of vibration as possible. Installation and adjustment should be made by the manufacturer's representative. Two types of camera are used in 16mm microfilming: the rotary type and the planetary type. The rotary camera is the type more generally used. The planetary camera is required for special materials which cannot be photographed on a rotary camera, such as permanently bound records, books, large-size documents, corporate documents with stapled attachments, or when fine detail requires higher resolution than can be obtained on a rotary camera.

PROCESSORS

2.04 A processor is a machine used to develop, fix, wash, and dry silver film. In general, it is recommended that microfilm be processed by commercial suppliers. However, office-type processors are available for processing on premises when required.

3. MICROFILMING

GENERAL

3.01 Documents shall be photographed with a precision camera under controlled conditions in accordance with the requirements covered herein to assure microfilm acceptance for use in the Bell System.

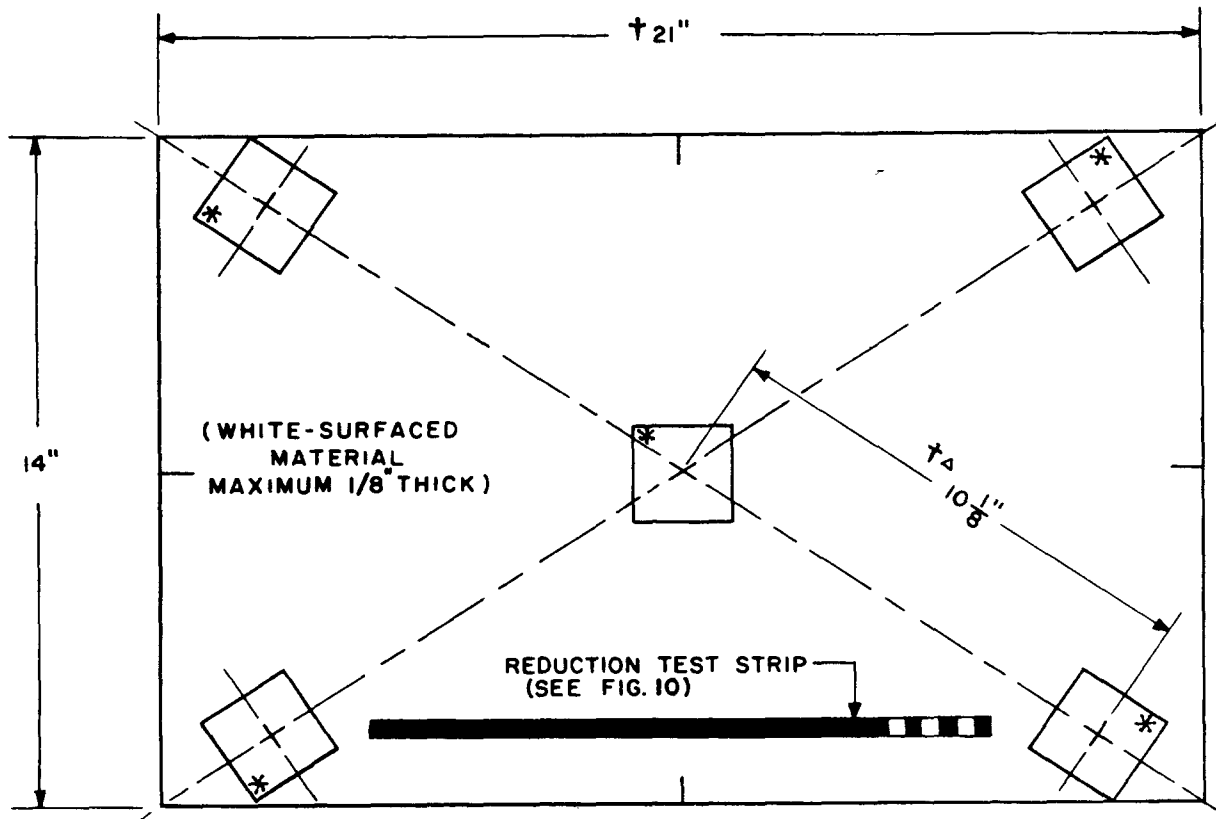
PROCEDURES

3.02 Certain procedures outlined below will be helpful in obtaining quality microfilm and in expediting the microfilm operation.

(a) *General*

(1) Documents should be sorted and prepared for microfilming. Preparation includes division of material into subject matter or size categories, removal of staples or paper clips, repair of torn or damaged pages, checking of sequence and orientation of documents, and preparation of targets required. (See 3.03.)

(2) If the documents to be microfilmed will be used in Microstrips, four blank exposures are required after a given number of images have been microfilmed to allow for cutting and loading the film into holders. Table A



- * Resolution test charts (place so that numerical information is right reading when viewed from the center of the target).
- † Distances based on a film pulldown (frame interval) of 1 inch. These distances will differ for other pulldowns.
- Δ For measuring this distance, use the period in the pattern number "10.0" as the center of the resolution test chart. (If resolution test charts issued prior to 1963 are used, the period in pattern number "4.0" should be used as the center.)

Fig. 1—Test Target for Planetary-Type Cameras

specifies the number of images for the most commonly used document sizes.

(3) For legal purposes, splices are not permitted between frames in a reel of microfilm. However, if required, strips may be appended to the beginning of the reel. ♦[See 3.03(d).]♦

(4) Cameras should be cleaned periodically in accordance with the manufacturer's instructions.

(5) Determine the correct exposure setting for a camera by performing an exposure step test to ensure that film density requirements will be met. An exposure step test is required when a camera is installed and will be advisable when major changes are introduced in the microfilm operation, such as changes in processing, brand of film, or in exposure control components. A step test consists of microfilming a set of sample documents at a range of exposure settings. The sample documents should be representative of the

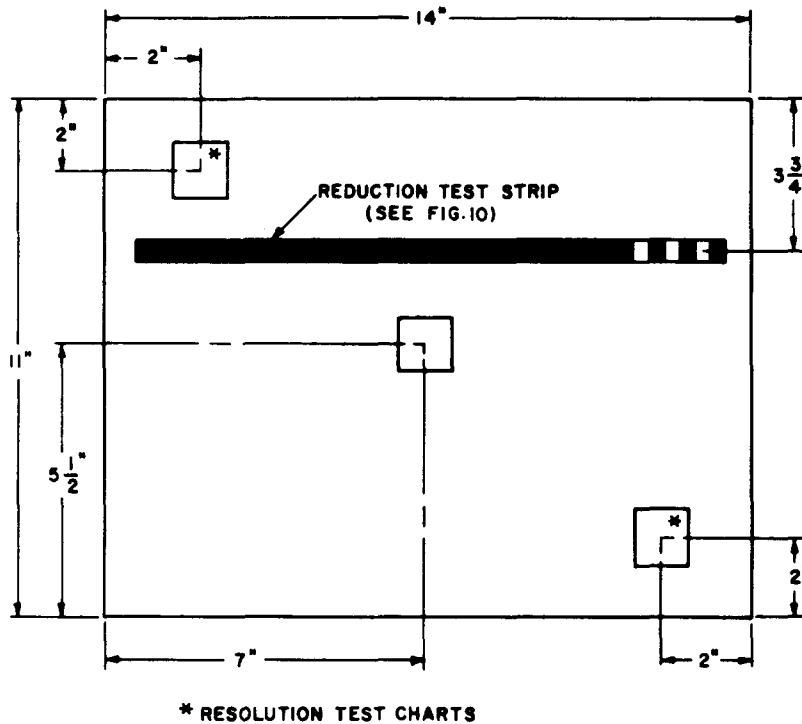


Fig. 2—Test Target for Rotary-Type Cameras

TABLE A
MICROFILMING AT 24X

DOCUMENT SIZE (W × L)	MAXIMUM NUMBER OF IMAGES PER MICROSTRIP	
	INDIVIDUAL SHEETS	CONTINUOUS FORMS
11 × 14	22	25
14 × 14	18	20
8-1/2 × 11	28	32
14 × 280	—	1

documents to be microfilmed and should be selected from existing documents in file on the basis of varying degrees of cleanliness, types of paper, and color. (Samples that are representative of only a small portion of the documents to be microfilmed should not be used.) Process the test strip with the same facilities and techniques to be used for production work. After the step test film has

been processed, the background density of each document image should be read as covered in Section 006-210-500. The proper exposure setting for the camera is that which produces a document image background density between 0.90 to 1.30 for most sample documents.

(b) *Rotary Cameras*

(1) Rotary cameras generally offer mobility as a feature. However, since relocation may disturb critical adjustments and result in degraded resolution, it is not recommended that such cameras be moved once alignment and installation are complete. When a camera must be relocated, resolution checks should be made before and after relocation and, if a loss of resolution is apparent, the manufacturer's service representative should be called to take corrective action.

(c) *Planetary Cameras*

(1) A suitable means of positioning documents on the camera copyboard should be provided,

such as light pencil corner marks or a removable guide similar to that shown in Fig. 3.

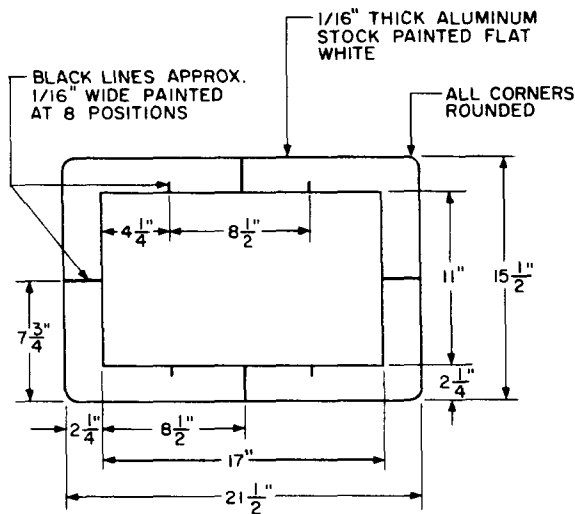


Fig. 3—Guide for Positioning 11-Inch High Documents on Planetary Camera Copyboard

- (2) Keep the camera copyboard clean to assure consistent density results.
- (3) Operate a motorized reduction unit so that the camera head always approaches the desired position from below to ensure consistent reduction.
- (4) Reflections in the camera area should be kept to a minimum. This can be accomplished with drapes or the camera room can be painted with a color and type of paint that minimizes reflection.

3.03 Microfilming targets shall be prepared and microfilmed with the documents which are being microfilmed. Targets as described below shall be 8-1/2 by 11 inch size unless otherwise specified.

Note: Targets other than the resolution and reduction test targets are not required for Microstrip applications.

(a) **Reel Identification:** This target contains the microfilm reel identification, date of microfilming, control location or originating

organization, microfilming location (if other than control location), and microfilming contractor (when microfilmed by other than the company owning or controlling the documents). ♦(See Fig. 4.)♦ This target may be combined with the "Index of Contents" and "Camera Operator's Certificate" target (Fig. 5).

BELL TELEPHONE LABORATORIES, INCORPORATED	
REEL NO.	
307-0215	
DATE MICROFILMED	JOB NUMBER <u>89B</u>
<u>7/4/72</u>	JOB REEL NO. <u>3</u>

Fig. 4—♦Reel Identification Target♦

(b) **Index of Contents:** This target contains a list of the documents microfilmed and their separation into indexing divisions as they appear in the microfilm reel. This target may be combined with the "Reel Identification" and "Camera Operator's Certificate" targets. This target will generally appear at the end of the reel. See Fig. 5.

(c) ♦**Description of Documents:** This target contains a description of the documents microfilmed on the microfilm reel, the number of the originating department, and the camera operator's name. (See Fig. 6.) This target should be used when the "Camera Operator's

BELL TELEPHONE LABORATORIES, INCORPORATED
CAMERA OPERATOR'S CERTIFICATE
 FILMED AT New York DATE 9/16/62

General Description <i>Bell System Practices</i>	Camera Operator <i>L. J. Scmithers</i>
Reel No. <i>123</i>	Department Representative <i>C. W. Wistleblock</i>

INDEXING DATA

Start B8P Q 205.001
Flash 1- Q 210.948
2- Q 226.857
3- Q 242.903
4- Q 251.112
5- Q 258.831
6- Q 274.752
End - Q 300.709

CERTIFICATE OF INTENT AND AUTHENTICITY

We certify that the microphotographs appearing on this reel were made in the normal and regular course of business and that they are true and complete reproductions of original documents described above which were created during the normal and regular course of business.

It is the expressed intent and purpose of the Bell Telephone Laboratories, Incorporated, after inspection of the microfilm to assure its completeness and quality, to destroy or otherwise dispose of the original records microphotographed herein, either immediately or when no longer required in their original form as part of the planned organizational procedure in accordance with ~~General Executive Instruction 1000~~.

Fig. 5—Combined Identification, Index of Contents, and Camera Operator's Certificate Target

Certificate" target is not required as determined by the legal department of the company [see 3.03(g)]. This target shall precede the "Reel Identification" target at the beginning of the reel.◆

(d) **Refilmed Documents:** This target contains a list of documents which appear on a microfilm strip spliced to the beginning of a reel. The images appearing on this supplemental strip are intended as substitutes for images on the main reel which were determined to be defective in one respect or another. This target should be distinguished from the correction target covered in 3.03(f).◆ This target, along with the strip of refilmed documents sometimes called a retake, should appear at the beginning of the reel.◆ See Fig. 7.◆

(e) **Omitted Documents:** This target is used when material is omitted from a reel. The

BELL TELEPHONE LABORATORIES, INCORPORATED

DESCRIPTION

Bell System Practices

6329

DEPARTMENT

L. M. Platten

CAMERA OPERATOR

Fig. 6—Description of Documents Target◆

target indicating the omission is microfilmed in place of the omitted documents. This target, in addition to explaining the absence of the document(s), may indicate where the document(s), if available, may be located. If explanatory information accounting for the omitted document appears in the original file, the microfilming of such explanatory material eliminates the need for an omitted documents target.◆ See Fig. 8.◆

(f) **Corrections:** This target is used when it becomes necessary to refilm a document. This will occur when the camera operator recognizes that an unsatisfactory image has been produced, for example, when it is recognized that a different illumination level should have been used to ensure legibility of the entire document or that a part of the document became folded over in the camera. In such cases, it is recommended that the correction target be microfilmed immediately after the doubtful image and before the corrected image. See Fig. 9. However, where automatic feed is used, it may not be practical to have the corrected image

**Bell Telephone Laboratories
Incorporated**

**START OF
RETAKE**

The micro photographs appearing between this point and the "END OF RETAKE" are true copies of original documents micro photographs of which were missing, or proved unsatisfactory on inspection of the original reel.

To preserve the integrity of the files the above mentioned documents are being rephotographed.

For description of rephotographed material see operators "RETAKE TARGET" at end of this retake section.

E-7762 (7-73)

OMISSION

The following documents,
BSP 006-215-100

have been omitted for the following reason

Filed elsewhere.

Not available at time of microfilming

These documents may be located in

File Folder: _____

Microfilm Reel 306-1572

Not available

Explanation: _____

Authorization: _____

Date 9/16/62 Signature A.M. Kosciniako

Bell Telephone Laboratories, Incorporated	General Description
RETAKE TARGET	<u>Bell System Division</u>
Filed at <u>MA</u> Date <u>7/4/72</u>	Reel Number <u>309-0215</u>
<p><u>BSP 006-110-100, Pages 2 and 4</u> <u>BSP 006-120-100, Page 16</u> <u>BSP 006-210-500 Page 9</u></p>	
<u>J.M. Robertson</u> Camera Operator	<u>J.C. Davis</u> Department Representative
END OF RETAKE	
E-7330 (7-73)	

Fig. 8—Omitted Documents Target

Fig. 7—Refilmed Documents Target

appear immediately after the doubtful image. If not discovered immediately, such documents may be microfilmed as covered in 3.03(d).

(g) **Camera Operator's Certificate:** This target, usually filled out and signed by the camera operator and sometimes signed by the person authorizing microfilming of the documents, is used to establish the validity of the microfilm records. This target, in addition to authenticating the images on microfilm to be true copies of the original records, may also indicate the intended disposition of the original records appearing in the microfilm reel. This target may be combined with the "Reel Identification" and "Index of Contents" targets. Since the acceptability of microfilm as legal evidence often depends on the preparation and execution of this target, the need, content, and method of using this target should be determined by the legal department of the company. This section does not cover the legal aspects of the certificate,

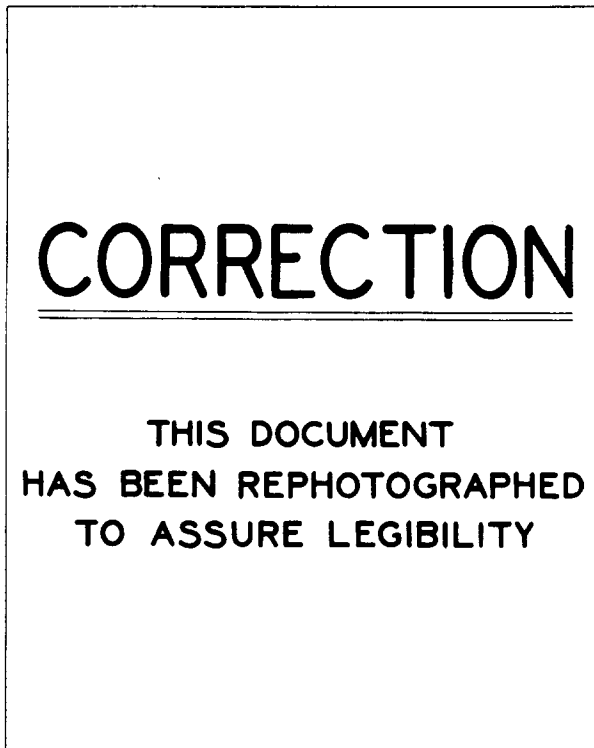


Fig. 9—Correction Target

the reel contents, or of microfilm in general. This target will generally appear at the end of a microfilm reel. An example of one type of certificate is shown in Fig. 5.

(h) **Cross-Referenced Documents:** This target contains a list of documents appearing on the microfilm reel, together with a correlation of cross references to related materials appearing

elsewhere. Cross referencing is not necessary if a cross-reference file exists or if the documents themselves include cross references. This target will generally appear at the end of the reel or at the end of the last reel concluding a general category or type of documents.

(i) **Resolution and Reduction Test:** This target is microfilmed for the purposes of checking reduction and resolution and should appear at the beginning and end of each reel.

(1) **Planetary Cameras:** The test target should contain five Microcopy Resolution Test Charts ♦No. 1010A♦ and a reduction test strip made of a dark colored steel bar and mounted as shown in Fig. 1. In microfilming, this target is centered on the camera copyboard.

(2) **Rotary Cameras:** The test target should contain three Microcopy Resolution Test Charts ♦No. 1010A♦ (available from the National Bureau of Standards) and a reduction test strip on an 11- by 14-inch sheet of glossy white photographic paper as shown in Fig. 2. The reduction test strip (see Fig. 10) may be reprinted or drawn or a thin nonrigid material may be mounted on the test target. When microfilming, the leading end of the test target should be the greater of the two dimensions that can be accommodated by the camera throat.

REQUIREMENTS

3.04 A leader and trailer, a length of film minimum 36 inches long, shall be left unexposed at the beginning and end of each reel of film for

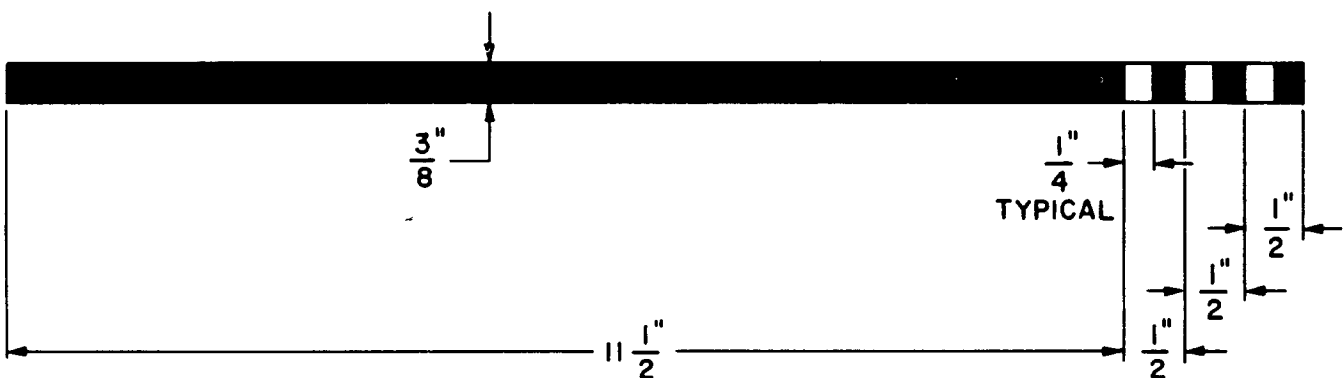


Fig. 10—Reduction Test Strip

light protection. A longer length may be provided, where required, for threading through the camera or processor.

3.05 Periodically or when significant changes are introduced in processing or the type of film used, a test strip, minimum 1-5/8 inches long for testing archival quality, shall be provided near the leader or trailer. This will consist of microfilming a blank page at least five times in succession. The background density of each page image shall be minimum 0.90, maximum 1.30. This strip will be removed from the reel and destroyed in the performance of the test and, therefore, should not appear in the main body of the microfilm reel. See Section 006-210-500.

3.06 Targets (see 3.03) shall appear in appropriate locations among the microfilmed material. Information appearing on such targets shall agree with the content and organization of images on the microfilm reel.

3.07 Document images shall contain all information appearing on the original document. Where information is lost due to overlapping, foldover, or image portions being cut off during microfilming, a second image showing the document in its entirety shall appear on the reel. See 3.03(d) and (f).

3.08 Documents containing two or more pages shall be microfilmed in consecutive frames in ascending page number sequence. All sheets of a given document shall be microfilmed together. See Fig. 11 for image orientation. Detailed information on sequence and orientation is covered by ANSI Standard PH5.3.

3.09 Document images shall be centered across the film width so that a space of minimum 0.020 inch exists between image and film edges.

3.10 Microfilm should be adequately indexed to facilitate location of information in the reel, magazine, or Microstrip. See 5. for information on indexing and cataloging.

4. PROCESSING

GENERAL

4.01 If it is planned to do on-location processing with an office-type processor, it would be advisable to have the test film for establishing camera exposure settings [see 3.02(a) (5)] processed by a local commercial supplier. Then, using these camera exposure settings, adjust the office processor to obtain the same density results. This will permit the use of commercial processing if the office processor is out of service. Exposed microfilm processed by commercial suppliers or on location must be free of scratches, foreign material, stains, or defects which make document information illegible. To assure the permanence of the microfilm image, the residual thiosulphate content of the exposed and processed silver microfilm shall not exceed 0.005 milligram per square inch of film. The processed microfilm shall be inspected in accordance with Section 006-210-500. When outside processing is used, periodic checks should be made to ensure that quality requirements are met.

SPECIAL PRECAUTIONS

4.02 A factor that affects the transmission density of processed microfilm (see Section 006-210-500)

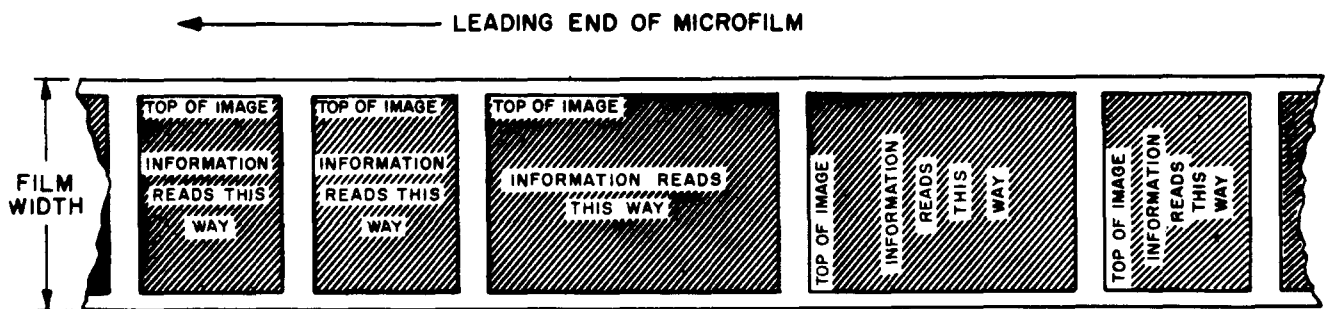


Fig. 11—Microfilm Image Orientation

is latent density loss (latent image fade). Latent images recorded on film lose density after exposure. The rate of loss is rapid at first but decreases over a period of several hours to a rate that is negligible; therefore, to obtain uniform transmission density, it is suggested that a waiting period of 3 hours be observed between the last exposure on a reel of film and processing. See 3.02 for other precautions that should be observed to assure quality microfilm.

5. INDEXING AND CATALOGING

5.01 General: Microfilmed documents should be cataloged and indexed to facilitate information retrieval. Cataloging and indexing for a microfilm file can generally follow the same arrangement already in use in filing the original documents.

5.02 Cataloging: A catalog referring to the contents of each reel or magazine should be provided to facilitate reel or magazine location. The complexity of such a catalog will generally depend on the complexity of the microfilm file. For a small file with simple categories, the catalog may take the form of label information placed on cabinet drawers or tabular entries in a notebook or chart kept in the file area. A complex file containing diverse materials and requiring extensive cross reference between documents may require a more complex catalog such as a machine-prepared list of cross references.

5.03 Indexing: An indexing system correlated with a list of contents should be used to facilitate retrieval of information retained in reel or magazine form. The present state of the art offers two main indexing systems applicable to 16mm microfilm. The flash system (see 5.04) permits simple, general-purpose indexing with minimum equipment and effort. The guideline system (see 5.05) requires special equipment but permits extensive indexing where very fine divisions are required. Both require the microfilming of indexing information, along with the documents, which can be observed on a reader. Indexing divisions may be established as indicated below. The end-tab, tell-tale indexing system (see 5.07) provides, through its fine subdivisions, rapid retrieval of information retained in Microstrip form.

(a) **Arbitrary Divisions:** Indexing divisions are established on an arbitrary basis, such as

one division every 10 feet of film or every 300 images.

(b) **Categorical Divisions:** Indexing divisions are determined by the nature of the material being microfilmed, such as divisions based on dates, originating or control locations, topical or subject matter, or serial numbers where documents are microfilmed in numerical order.

(c) **Activity:** Although documents are frequently recorded on microfilm because of their inactive or infrequent usage, some documentary materials may be of a more active nature. In such cases, a more intricate indexing system would be required to reduce retrieval time and effort. This can be accomplished by smaller divisions or by subdivisions of the major indexing divisions. As an example, consider the application of an indexing system to material microfilmed in chronological order. This material, if referred to infrequently, might normally be divided into indexing divisions, based on the months; that is, everything having a March date appears in one indexing division, April in another, etc. On the other hand, if this material is of a more active nature, the indexing divisions could be shortened to include 2-week or one-week periods or each monthly indexing division subdivided into weekly or daily categories to facilitate location.

5.04 Flash-System Indexing: In this system, each indexing division is preceded by a length of film which creates the effect of a bright "flash" on the reader screen when the film is wound rapidly. The flash can be produced by a length of completely unexposed film, the microfilming of a length of adding machine tape (minimum 45 inches), or the microfilming of a predominantly black 8-1/2 by 11 inch target at least five times in succession. After the flash has been recorded on film, a target containing the appropriate flash number or identification should be microfilmed to aid the user in identifying the flash. The flash number or identification should appear in bold characters, usually at least 3 inches high, on a white page.

5.05 Guideline System Indexing (Kodamatic Indexer®)*: This indexing system provides a group of lines photographed on the film between document images. These lines are parallel to the film edges and consist of one central reference line and one or more index lines as shown in Fig. 12. With the reference line properly centered, the

position of the index lines compared to a scale on the reader, as shown in Fig. 13, permits direct interpretation into an index division number. This translation of index line position into index division numbers can be done with the film stationary or in motion. The required division of the film can be located rapidly without the necessity of slowing or stopping film travel to read document images or indexing aids. This system requires a camera with appropriate accessories to record the indexing lines on the film between documents.

* ® Registered trademark of Eastman Kodak Company.

5.06 Index of Contents: A table of contents outlining the range of documents covered by each index division should be maintained by the camera operator during filming, and entries should be made as the indexing is changed, unless the material is organized and indexing divisions selected before microfilming. This table of contents

should be microfilmed at the end of the reel and should also appear on the reel carton as an aid to the user.

5.07 End-Tab, Tell-Tale Indexing: Up to seven alphabetic and/or numeric characters, indicating the initial entry on the first page image on a Microstrip, are recorded on the end-tab of the Microstrip holder. Up to six characters indicating the initial entry on each succeeding page on a strip are recorded on a tell-tale which is used to locate the image on a reader screen. This tell-tale is printed on the top surface of the holder, and the microfilm is housed within the holder, as shown in Fig. 14.

REASONS FOR REISSUE

1. To revise information covering test targets used in the production or 16mm original microfilm (3.03 and Fig. 4, 6, 7, and 8).

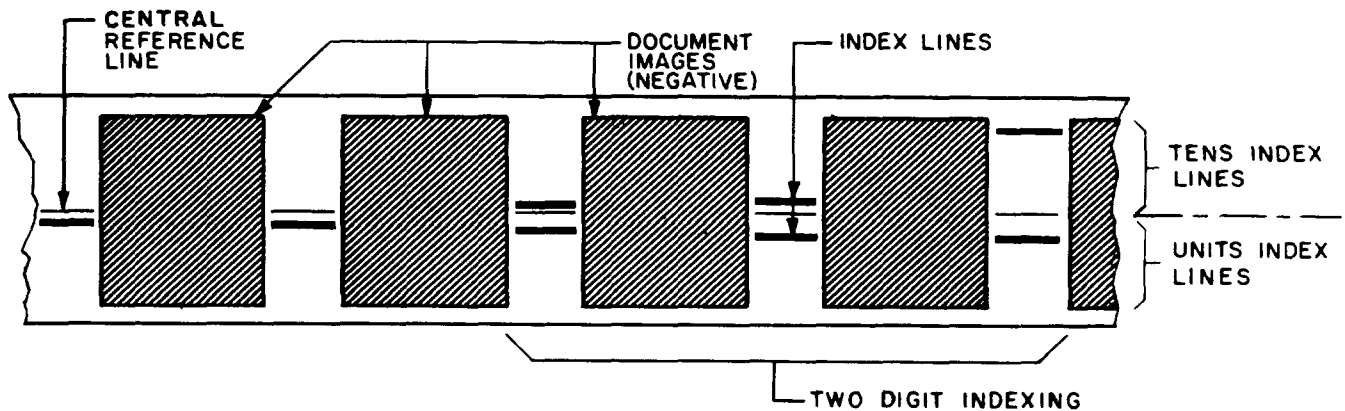


Fig. 12—Strip of 16mm Microfilm Using Guideline Indexing

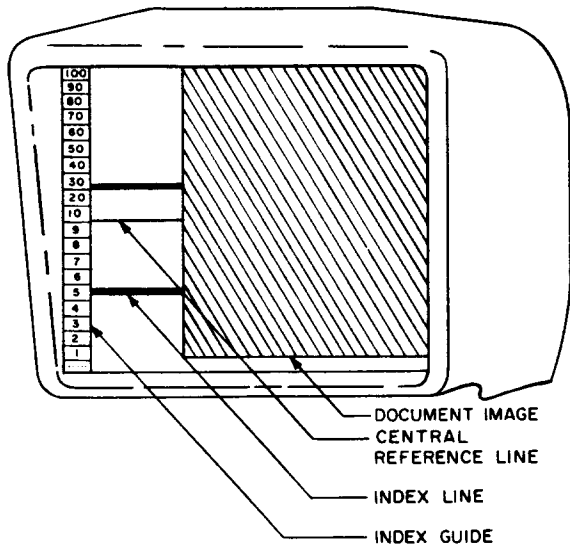


Fig. 13—Guideline Indexing as Seen on a Reader Screen (Indexing Division 35 Shown)

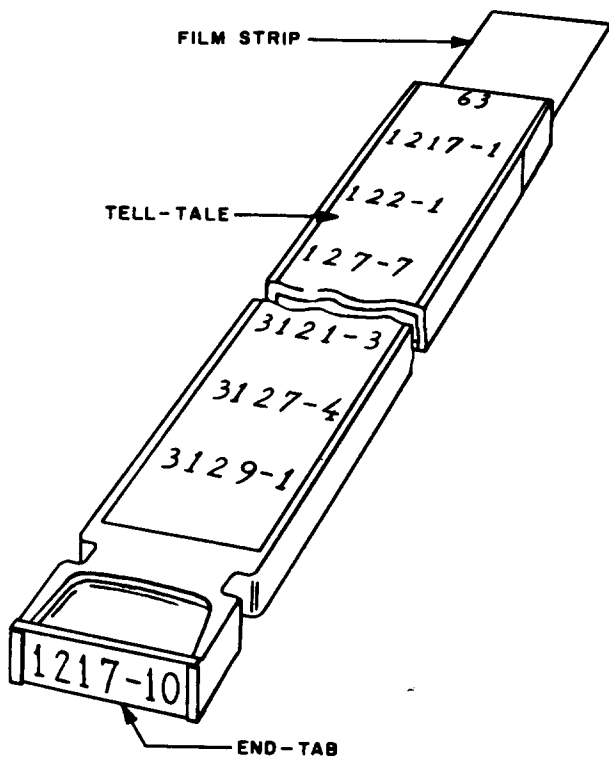


Fig. 14—End-Tab, Tell-Tale Indexing